The Airbus programme : powered by the European Integration process or driven by the world aerospace market?

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The Airbus Programme:

Powered by the European Integration process or

Driven by the World Aerospace Market?

(Le programme Airbus : Fruit du processus d'intégration européenne ou du marché mondial de l'aéronautique ?)

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Genève, le 13 mai 2008

Le Doyen

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Preliminary Remarks

Throughout the research, names of institutions, organizations, companies, products and services follow their official designations in English (e.g. European Commission, Directorate-General, Airbus Central Entity, Airbus A300-600, Dreamliner) at the time the source was published.

All non-English quotations are translated by the author and identified as such by the mention “Translated by author” in a footnote.

Genderization follows the available information. If the person cannot be identified the traditional form of “his” is used for practical and aesthetical reasons.

Names of countries and territories follow the habits in the mass media at the time of quotation (e.g. France instead of French Republic, West Germany instead of Federal Republic of Germany).

All weblinks were checked for their accuracy for the last time on 5th January 2008.

Abstract

The thesis examines to what extend the European integration has driven the Airbus programme. Political and industrial stakeholders have often associated both in their discourses. A combined historical and social science approach determines the actual relationships in a Strategic Trade Policies perspective as defined by Paul Krugman. Despite their references to “Europe” the national policymakers have always rejected any supranational domination of the programme. In practice they have nonetheless included static and dynamic gains such as synergies resulting from European science and technology initiatives, research programmes and Brussels-led negotiations into their decision-makings. Two factors have shaped the Airbus venture. A first was the capacity of the state and industrial actors to anticipate world aerospace market trends and moves by the competitors. Permanent technological innovation has been the second. In the foreseeable future the technological leadership of Airbus remains unquestioned. Limited resources and changing geopolitics may prove challenges in the long-term.

Keywords: Aerospace, Airbus, European integration, GATT, innovation, geopolitics, globalization, industrial policy, international negotiation, public policy, science and technology, strategic trade policies, WTO.

Executive Summary

The thesis examines whether the Airbus venture launched in 1969 is a European programme. By consensus undertakings which involve European institutions, e.g. entities legitimated by the Treaties of Rome of 1957 or one of the subsequent acts, are defined as such. Political and media discourse often associates Airbus with the European integration which has cumulated in the European Union (EU). The process was initialized after 1948 under the influence of the Marshall Plan, the pressure from the communist states and attempts to obtain economies of scale. Often the move has been explained through a common identity based on the shared history and culture. Science and Technology (S+T) policies have been one of the beneficiaries. Numerous acts by the governments and initiatives by the European institutions have shifted most of the S+T decision-making from the individual states to trans- and multinational frameworks.

S+T is vital for strategic industries. Their products are unsubstituable for other economic activities and the roles of the state, such as defence or infrastructure. One example is passenger aircraft. Governments usually assist these industries through Strategic Trade Policies (STPs). According to Paul Krugman they represent a set of coordinated measures such as national technology policies or intervention in sales campaigns. STPs only yield results if the targeted industries remain competitive. This presupposes their permanent motivation to innovate and capacity to forecast as defined by Joel Mokyr. A close relationship between the governments and the national aerospace industries can be assumed.

An essential feature of the European integration has been the transfer of national sovereignties to European institutions. It is generally agreed that the more the states overwrote national prerogatives to them the more their governments subordinated the decisions to shared goals promoted by common institutions. The research evaluates to what degree the political European integration process has shaped the Airbus programme. It assumes that the states have gradually abandoned their national visions of the strategic aerospace industries. This supposes that the attitudes of the state stakeholders towards Airbus have evolved in the same ways as their motivation to transfer national sovereignties to Europe.

The thesis follows the Idiographic-Nomothetic Approach (INA) as notably defined by Colin Elman and John Lewis Gaddis rather than the traditional model-based approach in social science. Owing to the high number of intervening variables the latter appears too limitative. The INA combines the case study of the historian with the analysis of the social scientists. Chapter One justifies the INA and presents the lecture grid which structures the analytical part in the same way a theoretical framework does. It is based on the two dimensions of innovation and STPs. Both have been influenced by the European integration in two ways. The first is the general European institutional and procedural framework which has shaped most policies of the member states. Examples are the end of intra-European customs duties or common regulations which have enabled economies of scale. The second is the direct action by the European institutions such as scientific programmes or international negotiations in the name of the member states.

Chapter Two gives background information on airframe construction and European integration. Chapter Three traces the history of the Airbus programme until 2006. Chapter Four analyses it through the lecture grid. Chapter Five applies the same principle to the recent development from summer 2006 to summer 2007. The influence of two different contexts on the decisions is compared. When the European constitution was

rejected in 2005 the integration lost its momentum. In parallel Airbus ran into the worst crisis of its history. Chapter Six broadens the discussion. Firstly, the role of the decision-makers within the Airbus programme structure is examined. Secondly, the current status of the venture is reviewed through the SWOT Analysis. The strengths, weaknesses, opportunities and threads raise questions about the future of the venture.

The origins of the Airbus programme are found in the early post-war years. In the 1940s airframe construction became a strategic industry in France, and the U.K.. Western Germany followed in the early 1960s. Owing to the favourable economies of scale and the political situation after 1945 the U.S. manufacturers occupied the market in Europe. Their large jets of the late 1950s enabled them to maximize their domination. The European manufacturers remained mostly marginalized even if their products were often superior. In the 1960s the U.S. suppliers initialized the new category of widebody aircraft[1]. Boeing launched the large B747 Jumbo. Lockheed and McDonnell-Douglas promoted each a smaller widebody with three engines. All Western European aerospace and governmental stakeholders concluded that the only way to remain in business was a parallel programme. However it would only be possible through transnational cooperation. The national STP policy makers inspired themselves from the joint issue management encouraged by the EEC. The Airbus programme initialized in 1967 was not ‘European’ since the EEC was not involved in it. In 1969 the governments of France and Western Germany launched Airbus Industrie as a binational undertaking based on national funding. Manufacturers from both countries and the U.K. participated. Specialization and final assembly in Toulouse enabled economies of scale. The governments saw this as the only way to maintain their production capacities. Although the scope remained national European resources were tapped in 1970 through the European Investment Bank (EIB).

Once the A300 became available after 1974 the U.S. launched STPs in favour of their own industry. Owing to its particular design with two engines instead of three and therefore lower fuel consumption, the high reliability and the impossibility for the U.S. competitors to launch a similar aircraft in the short term, the A300 successfully established itself on the market. Since the Airbus member states approached the programme in a national perspective they rebuked suggestions by the EEC to put it under its responsibility and transform it into a European key programme. In the later 1970s Boeing launched the B767 twinjet widebody. In collaboration with Lufthansa the Airbus programme stakeholders adapted their own similar-sized project and launched it as the A310 with superior technology in 1978.

By 1978 the U.S. put a GATT agreement on trade in aircraft on the agenda. EEC specialists took part in the negotiations together with the national governments. Later the EEC signed the 1979 Aircraft Agreement which banned export subsidies to airframes. In the same year the U.K. government became an official Airbus partner. In the meantime an independent narrowbody project was integrated into the Airbus system and launched under French pressure in 1981 as the A320. It maximized innovations enabled through technology transfers from multinational and European S+T initiatives such as the EUREKA of 1985. The U.S. manufacturers updated their designs to lower their investments and the cost of transfer for the customers.

[1] All earlier aircraft had one aisle between the passenger seats. Therefore they are known as single-aisle or narrowbody aircraft. The widebodies have two aisles per row.

The B767 and the A310 which became available after 1982 were similar in performance. Airbus updated the A300. Boeing added other versions of the B767. By 1983 they were countered by the A310-300. In 1985 U.S. pressure lowered the international operational safety standards through the Extended Twin Operations (ETOPS). They ended the restriction for transatlantic crossings to aircraft with at least three engines for reasons of redundancy. This STP targeted the B767 twinjet. Owing to the practice of non discrimination in the U.S. and within the international air safety regime the advantage had to be extended to the A310.

1986 witnessed the launch of two new Airbus widebodies compatible with the A320. The A330 was a new version of the A300, the A340 an aircraft with four engines for long-haul routes beyond the ETOPS range. Unlike the earlier aircraft they were not promoted by one of the national governments but the Airbus stakeholders. They were motivated by the need for a successor to the Lockheed and McDonnell-Douglas widebodies and the growth in air transport stimulated by the rising mobility of the factors of production often known as globalization. McDonnell-Douglas and Boeing initialized competitors. The former failed. The later launch enabled Boeing to make the B777 slightly superior to the A330/A340.

The A320 narrowbody entered into service in 1988 and became a bestseller. In 1989 the stretched A321 version was launched. Unlike the earlier aircraft it was industrialized without launch aids. It opened a second assembly site in Hamburg. The A330 and the A340 were presented in 1991 and 1992. The latter was the first aircraft ever to be certified by all members of the Joint Aviation Authorities (JAA). This federation included the national institutions from the EEC members. This was one outcome of the European integration which extended to more and more actors and domains. In parallel the transatlantic tensions had turned into an open conflict. The U.S. claimed that the launch aids to Airbus were incompatible with the GATT regime. The European side replied that the U.S. manufacturers were equally subsidized through governmental research and military programmes. The European Commission negotiated and signed the 1992 Airbus Accord to limit both ways of market distortions.

When the A330 and A340 entered into service in 1993 Airbus marketed the Airbus family concept. Pilots could be qualified for the narrowbodies and the two widebodies at the same time. Substantial economies of scale were enabled. The punctual superiority of the Boeing B777 and further U.S.-driven relaxation of the ETOPS rules gave it an advantage over the A340 since it had only two engines. The A340 with four was less economical. A shorter version of the narrowbody, the A319, enabled Airbus to consolidate its market presence. Like the A321 it did not need state launch aids. Both were assembled in Hamburg.

In 1995 Airbus Industrie launched the A330-200 extrapolated from the A330 against the B767. Again, no launch aids were requested. During the same years Boeing went through a change in its business practice. It adopted the second fundamental evolution in attitudes in addition to globalization, often known as neoliberalism. Scholars disagree on the definition but converge on the basic principles. Financial performance and no longer long-term investments became determinant for the companies. Expenses including Research and Development (R+D) were often lowered. Boeing limited itself to extrapolations of the existing models. As a result it slowly fell behind the more innovative Airbus Industrie. The latter was backed up by the governments which intended to defend their national aerospace industries through more advanced products. Owing to the seamless transnational collaboration, the operational autonomy of the technological and industrial stakeholders, the influence of European S+T programmes, the visible EEC involvement in negotiations, and the general move towards continental integration the Airbus programme was increasingly experienced as transna-

tional or European. In fact the member states kept their national control. In 1995 they approved the A380. It was the largest civilian airliner ever launched.

In 1996 Boeing took over McDonnell-Douglas and established the Airbus-Boeing duopoly. The European Commission scrutinized the merger and approved it. Only at this stage did Airbus Industrie become a European affair. Unexpectedly Boeing ran into its worst crisis of its history. Factors were the difficult integration of the competitor and the lack of pro-active investments. Airbus consolidated itself through the A330-200, which was the first aircraft in its category tailor-made for ETOPS, in 1997. Later two extrapolations of the A340, the A340-500 with a longer range than the B777 and the A340-600 with a larger capacity, were launched. In the meantime it became clear to all stakeholders that Airbus Industrie had to be restructured. The urge was amplified through the now worldwide pressure on cost owing to the globalization-induced mobility and the neoliberalism-motivated expenditure cutting. After long and tedious negotiations between France and Germany the European Aeronautic, Defence and Space Corporation (EADS) was established in 1999. It remained largely political and thus suboptimal from a purely industrial perspective. The U.K. partner took a 20 percent share of the Airbus subsidiary. The transition was approved by France and Germany since both saw it as the best way to maintain the national STPs, and the EU.

After the 11th September 2001 Boeing proceeded to layoffs as it always did in a downturn. EADS adopted a short-sighted perspective as well and halted all pro-active research. The A380 proved more resource-intensive than expected. A military transport named the A400M launched in 2001 put additional strains.

In 2003 a new Boeing management turned back to pro-active long-term investment through the B787 announced for 2008. It was a twin-engined widebody comparable to the A330 and A340 but superior to both. At first Airbus denied any need to react since its aircraft were successful. For the first time in its history the manufacturer used the same arguments as Boeing had done for years. An extrapolation of the A330 was deemed adequate. The reasons were the massive challenges with the A380 and the R+D freeze two years ago which had prevented adequate prospective studies. In late 2004 Airbus announced a derivative of the ten years old A330-200 called the A350 which would be ready by 2010. The presentation of the A380 in February 2005 stunned the world but did not dissipate the now serious doubts on the programme.

In spring 2005 Boeing presented a version of the B777 with a longer range than the A340-500. New ETOPS relaxations eliminated the business case of the four-engined Airbus since fuel prices had become exorbitant. Later Boeing announced an update of the B747 Jumbo[2]. In the meantime the difficulties extended to EADS as a whole. The main French and German stakeholders divested and BAE sold its 20 percent stake in Airbus. For contractual reasons EADS was obliged to purchase it. The result was an additional cash-drain at a critical moment. Owing to the now visible risks for the national aerospace industries France and Germany began to compete against each other within the Airbus programme. This paralyzed it even more. By coincidence the European integration stagnated after the constitution was rejected in two referendums in the same year. The Airbus announcement to open an A320 plant in China was criticised as yet another short-term move bound to increase unemployment in Europe and help a future competitor.

In 2006 the crisis deepened. New delays for the A380 were admitted. The A350 remained marginal. Finally Airbus announced the A350XWB. It was met with scepticism as well. A Russian investment in EADS was

[2] It was in fact the fourth since the entry into service in 1970.

criticised as a penetration by another potential enemy. After a further redesign the A350XWB was launched in December 2006. Its budget had tripled and market-entry was pushed back to 2013. Efficiency-based ideas by EADS were rejected by France and Germany since they would end the national influences.

Owing to the Presidential election in France and the recession in Germany both governments intensified their confrontation in 2007. After difficult negotiations the politically biased Power 8 restructuring programme submitted by EADS was accepted in both countries. Both sides enforced concessions. By summer 2007 the market finally endorsed the A350XWB. Despite the doubtful financial perspectives Airbus maximized the innovations without regard for cost. For the A380 a realistic schedule was published. The Power 8 yielded first results. Since the prospects for the national aerospace plants slowly rose the binational tensions lowered. France and Germany committed again to cooperation since both understood that only a joint programme maximized the trade-offs and thus lowered the risks for the national aerospace industries.

In a second step the research analyses the history of the Airbus programme. It adopts the perspectives of the industrial stakeholders, the national governments, and the European integration process. The industrial partners and the Airbus programme leadership have based their decisions on classical innovation strategies. The first is product differentiation, the second maximized innovation and the third appropriate demand forecasting. The A300 of 1974 was compatible with the U.S. widebodies but had a different mission profile. In 1982 the A310 responded to the anticipated market evolution and reacted to the upcoming B767 which targeted the same niche. Therefore it attempted to push innovation to a maximum. The A320 of 1988 and the A330/A340 of 1993 once more anticipated market needs. Innovations were maximized. One advantage was the operational commonality. Pilots were enabled to fly the narrowbodies and the widebodies with the same certification. The carefully planned and timed B777 proved nonetheless a hard competitor. Longer and shorter variants of the A320 enabled Airbus to cover the short-haul market. The capacity of the industrial stakeholders to finance them without subsidies illustrated the interest in the financial markets. In the widebody field the A330-200 eclipsed the B767 and the A340-500 and -600 attacked the B777. Finally the A380 aimed at the top of the market. The reorganization of Airbus into an EADS subsidiary did not change day-to-day operations. Until 2001 the Airbus products were inspired by anticipated demand. Following the paradigmatic evolution in company management towards short-term profit maximization and the complexity of the A380 calling for long-term strategies, Airbus ran into trouble after 2001. It proved unable to respond to the B787 launched in 2003. Only by 2007 the A350XWB finally convinced the markets.

As far as the attitudes of the states are concerned these remain focused on maximized trade-offs for the national strategic aerospace industries. By the mid-1960s the later Airbus governments understood that transnational cooperation in the interest of economies of scale was the only way for their airframers to penetrate the promising widebody market of the 1970s. In 1967 France, the U.K. and Western Germany initialized a trinational programme. All three countries expected to maximize the trade-offs for their national industry. France and West Germany launched the Airbus programme in 1969. During the development the governments left a considerable operational margin to the industrial experts. Once the A300 became available in 1974 both governments promoted it in a nationalist perspective. When the EEC suggested taking over the responsibility for Airbus France and Germany refused on the grounds of interference with their national sovereignty. During the same years national policies in S+T and air transport without strategic relevance were

transferred to European institutions. Following a reassessment of its national aerospace policy the U.K. joined the Airbus programme in 1979. It was mainly the additional resources that made the launch of the German-endorsed A310 possible. In the same year the governments accepted the assistance by EEC professionals during the negotiations of the Aircraft Agreement. After 1984 the A320 narrowbody was pushed by the French as a vector of their national technology policies. In 1986 the A330/A340 initialized by the Airbus stakeholders were approved by the governments. The innovative designs were again seen as the most promising strategy to maintain the national aerospace capacities. Tensions with the U.S. over subsidies were settled through the 1992 Airbus Accord. It was mostly negotiated by the EEC. The Airbus governments remained entirely committed to their national influence. Only in 1997 the European Union (EU) became formally associated when it examined the Boeing Mc-Donnell-Douglas merger. By 1998 the need for reforms became evident. After delicate negotiation the French and German governments accepted its integration into the new EADS by 1999. It was formally an independent company but political influence remained strong. For the states this reform represented the best way to ensure their national STPs in a changed context. Therefore they did not question the short-term focus adopted by Airbus after 2001. When the negative results became evident owing to the delays of the A380 and the minimalist A350 they acted. The Airbus programme did no longer deliver the expected results for the national STPs. France and Germany saw each other as a potential threat to this ambition. In both countries economic and political downturns strengthened the resolve to defend the aerospace industry against the former partner. At the same time the elites remained aware that they needed the proven static and dynamic gains. Therefore they accepted concessions for the Power 8 restructuring programme. Lower political tensions in both countries and efforts by Airbus to overcome the crisis and to react to the competition encouraged the governments to cooperate again.

The development of European integration as far as it is relevant for the Airbus programme can be condensed as follows. From the beginning the European integration the expected positive outcomes for the national policies were the motivator for the European integration. When the involved governments agreed on transnational cooperation in 1967 they had accumulated positive experiences with large-scale transnational or European programmes. A common venture for a widebody was seen as the best way to defend the national strategic interests. In 1970 Airbus Industrie obtained funding through the European Investment Bank (EIB). By 1974 the European integration process had given a distinct moral personality to the EEC and had enabled its institutions to launch coherent programmes. Any step towards integration had to be negotiated and approved by the member states. They accepted European S+T programmes but rejected a direct influence on the Airbus programme. Indirect outcomes of European S+T programmes or regulation in aerospace and direct support by the EEC in negotiations were welcome and, over the years, became a main resource. One example is the EEC participation in the 1979 Aircraft Agreement. The trade-offs of European aerospace and S+T initiatives were reoriented towards Airbus as well. The defence of the programme against the U.S. remained national in a first stage. Later the EEC took the lead in the 1992 Airbus Accord negotiation. It was an outcome of the general transfer of national sovereignties to Brussels which peaked in the Maastricht Treaty in the same year. Again the states had agreed on the externalization. By 1997 they had increased the competences of the European Union (EU) further. When the European Commission approved the Boeing-McDonnell-Douglas merger the Airbus programme became a subject of European policymaking. Two years later the EU authorized the integration of the national aircraft manufacturers into the transnational EADS. As it had been the case before the new status quo promised the highest trade-offs for the national STPs under

the new circumstances. Neither the Airbus countries nor the European institutions did intervene when EADS and Airbus adopted the short-term approach after 2001. Since things continued to go well, signs of a looming crisis were ignored. A cascade of problems became visible by 2005 and corrective action was needed. By coincidence the anomaly appeared during the year when the European constitution was rejected. Since the European integration lost its symbolic value and since the French and German governments saw their national aerospace capacities in jeopardy they abandoned not only any reference to Europe in the context of Airbus but competed against each other by 2006. By mid-2007 the joint corrective action showed first results. Airbus was again approached in the familiar multinational perspective but any reference to any whatsoever European dimension was gone.

In the light of the above the research on the influence of the European integration on the Airbus programme reveals the following. Unlike what popular and mediatic perception suggests, the European integration process has played a limited role in the history of Airbus. The programme has mostly been influenced by the world aerospace market, business opportunities and strategic errors by the U.S. competitors, as well as the ambition by the industrial actors to obtain and maintain the technological leadership. Since this has been in their very own interest the governments have maximized the opportunities for the manufacturers to achieve this. The research downplays the alleged role of the common heritage in the European integration in S+T and aerospace. It was the ever accelerating and extending integration process itself that established a framework of references and practices. The positive outcomes became the motivation for further convergence and thus the common denominator. The favourable expectations by the stakeholders reveal that the motivation behind the decision to integrate and to externalize national policies has been the promise for a more appropriate situation in the country governed by them.

A comparative approach to the attitudes of the governments towards the European integration and the Airbus programme reveals the following. The more the governments experienced positive outcomes from the European framework the more these influenced their anticipations. As a result they based their subsequent decisions – among other factors - on the current European institutional, political and procedural configuration. At given times, transfers of sovereignties to the European institutions were approved since they held the highest promises. Whenever this would not be the case, limited corrective action such as deceleration of the ongoing integration process or refusals to transfer other policies was possible. Transnational or European approaches became common in national interest promotion. This integrative strategy was plausible for the Airbus programme as well since its overall needs for resources were beyond the means of each involved state. The results of the Airbus programme lived up to the expectations and later exceeded them. Therefore the governments tolerated, in a first step, and later actively encouraged the industrial and operational autonomy of the technological stakeholders. Since aerospace was a strategic industry the states never outsourced their competence and never entrusted it to a trans- or supranational entity. Early initiatives by the EEC to assume a European leadership were rebuked since they questioned the national sovereignty. At the same time the industrial stakeholders and the governments never hesitated to include European S+T initiatives such as framework programmes or the general institutional support of the European institutions into their decisions. It was this very utilitarian and ‘opportunistic’ approach to the European integration in the context of the Airbus programme that transformed it into a European programme in the eyes of many. Airbus became

one of the symbols of the admittedly never strong ‘Euro-nationalism’. In his history of the European S+T policies Luca Guzzetti uses this term to characterize transnational programmes which would not have been possible outside the European institutional and procedural framework.

The attitudes of the national stakeholders towards the Airbus programme mirror those towards the integration process as a whole. Both are based on expected trade-offs for the territory under their control. Since the outcomes of the European integration influenced the situation of the individual countries they shaped subsequent decisions. Together with the inputs from the world aerospace market, the actions and reactions by the competitors, externalities such as the paradigmatic changes towards globalization and neoliberalism, and geopolitical factors, notably the fuel price, this European factor was one element taken into account by the national governments.

The outcomes of the Airbus programme cannot be explained by the national STPs and the trade-offs from the European integration process alone. The specialists directly responsible for the development of the Airbus aircraft have played a decisive part as well. It is quite common that experts – what the collaborators of the national manufacturers transferred to the Airbus programme were – develop a particular community spirit. This is even more the case when several governments or institutions entrust the resolution of a complex shared issue to them. Such Epistemic Communities as Peter Haas defines them usually elaborate answers based on technical and procedural aspects alone and therefore without political bias. Since they are experts with little to no direct political ties with the governments including their own their inputs are accepted by the state stakeholders. They deem them neutral and mainly issue-interested. Usually the programmes promise the best possible outcome so that all stakeholders obtain an advantage. If governmental and later European action has been essential it is probably the permanent focus of the Airbus Epistemic Community on technical and market matters that has been decisive for the success of the Airbus programme. It should be noted that the Airbus Epistemic Community operated under almost perfect conditions. Neither the industrial partners who remained competitors outside the Airbus programme nor the national governments did interfere with the day-to-day work of the experts. In the mid-1970s the Airbus Epistemic Community became pro-active. Its emancipation was based on market forecasting and anticipation of previsible moves by the competitors. Whenever one of them turned out a challenger the Airbus people was usually able to outsmart or to ‘neutralize’ it through a more elaborate product. The EADS management-imposed R+D freeze and the need felt to lower cost after 2001 ended the success story. At the proverbial last moment in 2006 the Airbus Epistemic Community convinced the EADS management and the national government that the expensive A350XWB offered the only way out of the crisis.

Whenever the Airbus stakeholders, the Airbus Epistemic Community or the national governments decided they evaluated the current situation and the available options. One tool for this is the Strengths, Weaknesses, Opportunities and Threats or SWOT Analysis. It divides the approach into two times two steps. A first lists everything from within the Airbus programme such as know-how or workforce versus everything external such as market share or STPs. Within both categories positive and negative aspects are compared.

The SWOT Analysis of the Airbus programme in the second half of 2007 reveals the following. Among the strengths of the Airbus programme are its product portfolio, its intact technological reputation and the skills of the Airbus Epistemic Community. Major weaknesses are the low capital basis, the late arrival of the A350XWB on the market and the ongoing difficulties with the A380. The external or embedding opportunities

are the market penetration, the commitment by the national governments to continue the STPs, the ongoing positive trade-offs from the European institutional and procedural framework and the general positive evolution on the world airframe market. Externalities which represent potential treats are the strong competition by Boeing, the continuing U.S. STPs and economic and political uncertainties.

The current situation allows some extrapolations. The A380 will become the reference in its category. The A350XWB is a sound programme but may suffer from the lack of resources and the earlier arrival of the B787. Airbus will continue to be handicapped by the weak Dollar. The highly successful narrowbody family will not be challenged in the foreseeable future. A new competitor in China is possible but not in the immediate future. The national governments remain committed to their strategic industries and the programme. EU support in transatlantic negotiations will continue. As it has been the case in the past the European integration will have little to no influence on Airbus. The institutional and procedural framework which structures current aerospace policies in Europe will remain important for its trade-offs and economies of scale. Other factors such as macroeconomics or geopolitics remain irrelevant as far as the focus and the time-frame of the research are concerned.

As a whole the Airbus programme can be qualified as a successful combined technological and procedural innovation and institutional optimization process. This is illustrated by the way Airbus has established itself on the market. Each new development fulfilled the promise of higher overall productivity. Like any innovation or optimization process the Airbus programme has influenced issues far beyond air transport. In detail Airbus has reoriented national STPs from individualist and competitive to consensual and cooperative, and influenced the European integration process, notably owing to the transatlantic negotiations and the transfer of sovereignty in foreign policies from the member states to Brussels. Finally the programme has made civil airframes an international trade and WTO issue. Two basics have remained unaffected. These are the place of strategic industries in the minds of the national stakeholders and the governmental sovereignty over them.

The Idiographic-Nomothetic Approach (INA) proves a practicable way to explore complex technological and political issues. Unlike the traditional theoretical framework and model-based research strategy in the social sciences, the INA does not endorse a reductionist model of analysis which only allows a limited number of variables. In addition it enables the integration of additional theoretical frameworks useful for detailed explanations of the findings. The research shows that the INA could and should be more used in the social sciences in general and European studies in particular.

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Preface

The year 1992 has become a landmark in European history. Many scholars see it as the year when twelve states ended their national economic policies. For centuries, national governments had more or less freely implemented the measures they deemed appropriate for their country (Lane and Ersson, 1997: 1-12). Now they were giving up their national focus for the Single European Market. In the same year the governments agreed to abandon their political sovereignty to a certain extend. The Maastricht Treaty initiated the transfer of a number of their traditional prerogatives to the European Union (EU) (Fontaine, 1994).

In parallel another "European" event took place. The largest aircraft ever constructed on the continent, the Airbus A340-300 and -200, were certified. This procedure had been the responsibility of the states for a variety of economic and political reasons (Perrow, 1999: 123-169). Institutional gatekeepers (Easton, 1965: 87-92) such as certification bodies ensure that new hardware complies with safety[3] standards. For the first time European states which were not all members of the EU had delegated this responsibility to a European framework known as the Joint Aviation Authorities (JAA) (JAA, 2005).

The most remarkable fact was the Airbus aircraft themselves. Their manufacturer Airbus Industrie established by aerospace companies from Germany, France, Spain and the United Kingdom (U.K.) had become the world's second civil supplier (D'Andrea-Tyson and Chin, 1992). By 1992 Airbus Industrie was considered the best possible outcome of the integration of national resources into a European programme (Kupchan, 2002: 137). Ten years earlier it had been presented as the most dynamic economic programme in Europe (Mueller, 1983: 11-17). A decade further back in time, the first Airbus aircraft was seen as an "International" venture (Muser, 1974: 76). The discursive "Europeanization" (Schwok, 2005: 16-17) underlines an increasing association of the programme with the integration process by scholars. A similar evolution has been observed in respect to their research questions (Bouma and Atkinson, 1997: 27-29). Since the 1990s Airbus Industrie had been characterized as a European venture (Courty and Devin, 2005: 108-109). In the 1980s it was seen as a venture inspired by the intraeuropean economic integration (Muller, 1989: 245-248). Earlier, Airbus Industrie was considered a transnational cooperation (Hayward, 1986: 6-7). When, how and why has this industrial programme obtained such a symbolic connotation?

It is generally agreed that state stakeholders act as the supreme authority on their territory through the monopoly of coercicion (Huggins, 1997: 265-285) and the international representation of the country (Rosamond, 1997: 443-474). Governments usually react to national and international stimuli (Putnam, 1993: 431-468). Following the accepted theories, decisions are the result of a process of selection in view of expected outcomes. They are based on the objective, resources and options, expected reactions of target publics, competitors and third parties, and windows of opportunity (Ostrom, 1999: 35-71). In given contexts common institutions like the European Union (EU) and the transfer of national prerogatives to them were seen as the best possible answer to challenges shared by the various countries (Masclet, 1993: 3-10).

[3] In air transport safety relates to technical and operational matters (Wells, 2001). Precautions against terrorism are known as security.

Leading scholars outline history as a sequence of decision-making processes with the best possible outcome in mind (Krugman, 1994: 221-244). Following this logic the Airbus programme (Hayward, 1987: 11-26) and the European integration (Schmitter, 1996: 1-14) are no exceptions.

Most scholars agree that pressure to optimize is a major driver especially in economics. Far earlier than the idea to integrate Europe the motivation to extend exchange across borders has appeared (Held, Mc Grew et al., 1999: 149-154). Like any transaction it has been inspired by comparative advantages (Lipsey, Courant et al., 1999: 763-776)[4]. Some goods are unsubstituable for other economic activities and the role of the state. Examples are military hardware and aircraft. They have been known as strategic goods (Mastanduno, 1988: 121-150). States without production facilities are confronted with external monopolies of supply (Keohane and Nye, 1989). Through Strategic Trade Policies (Krugman, 1994: 239-243) combining national and international measures many states have attempted to promote such industries (Stegemann, 1989: 73-100).

A multinational airframe venture seems a contradiction in itself. Transnational programmes enable economies of scale and allow targets beyond the potential of each participant (Mironesco, 1987: 203-214). From the beginning Airbus was promoted as a common response to the U.S. competitors (Hayward, 1987: 11-26).

A vast literature covers many aspects of the European integration. Two motivations behind the transfer of national sovereignties to supranational institutions which emancipate themselves from the contributing states have been identified. The first is the drive for economies of scale and responses to external stimuli, notably ways to optimize the implementation of the Marshall Plan after the Second World War. The second was the political integration to ensure peace and to resist the pressure from the communist countries (Courty and Devin, 2005: 8-20). Behind the economic and political motivations scholars have identified a diffuse reference to a historical heritage and identical interests (Masclet, 1993: 3). For many it is the result of a long sequence of shared experiences which have enforced similar reactions to decision-makers. Common systems and institutions were the ultimate outcome (Teyssier and Baudier, 2000: 22-40). One often quoted example is the Treaty of Westphalia in 1648 which opened the way to the contemporary nation state (Gabriel, 1994: 10-12). These territorial and institutional entities have established strategic industries, concluded alliances and treaties, and initialized and implemented the European integration – and launched the Airbus programme.

The European integration as far as it is relevant for the research is consensually traced to The Hague Congress of 1948 (Teyssier and Baudier, 2000: 22-41). A year later the argument of economies of scale was applied to Science and Technology (S+T) issues. References to values and common interests of all participating European countries and the need to ensure their future through European integration came up during the same conference (Saint-Ouen, 1989: 129-141). The Treaties of Rome of 1957 included nuclear research and therefore S+T (Guzzetti, 1995: 1-7). Even if the main arguments remained practical and functional such as economies of scale some vague “Euro-nationalism” (Guzzetti, 1995: 36) cannot be denied. Europe was approached as one entity with common issues and challenges to overcome. Strategic industries such as aerospace remained little concerned by the integration (Guzzetti, 1995: 73-75). For a long time after the launch of the Airbus programme the participating states and their industrial partners remained competitors outside the venture (Marck, 1979). When, how and why has Airbus been established? When, how and why

[4] In fact things are far more complex. Being of no relevance for the research, the theoretical, empirical and ideological implications are not discussed.

has the programme been approached as a transnational venture and when, how and why has it become a ‘European’ initiative as defined above? Has Airbus been the outcome of purely aerospace-related decisions or has it been inspired by such ‘Europeanization’s’ or Euro-nationalism? If so when, how and why?

The introduction outlines the basics of Airbus Industrie and European integration. Chapter One presents the theoretical framework based on the Idiographic-Nomothetic Approach applied to Situative Optimization through Strategic Trade Policies. Chapter Two is a backgrounder on airframes and European integration as far as it is relevant for the research. Chapter Three outlines the history of Airbus in its contexts. Chapter Four analyses it in the light of Situative Optimization. Chapter Five presents and analyses the most recent developments at Airbus under new circumstances until summer 2007. Chapter Six discusses the findings.

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Introduction - Basics Of Airbus And European Integration

Introductory Remarks

Both the Airbus programme and the European integration are outcomes of permanent optimizations.

Competition and Integration as Motivations And Contexts

The contemporary world based on competition is the outcome of innovation and optimization processes.

Technology And Innovation

Most scholars agree that the world in which we live is driven by the quest for comparative advantages (Mokyr, 1990b: 8-16) as a result of the competition among physical and moral persons for scarce resources (Samuelson and Nordhaus, 2001: 3-17). The search for optimization is permanent (Desjeux, 2002: 41-61).

Most scholars identify two ideal typic[5] drivers. They are usually defined as 'supply push' or push factors and 'demand pull' or pull factors (Geroski and Walter, 1995: 916-928). The former define new fundamental or overall knowledge or experience available to the optimizer which may be a physical or moral person. Push factors typically originate from the environment in which the optimizer operates. Examples are new technologies or economic and social developments. Pull factors refer to new perspectives for its activities. They are related to the optimizer's own activities or outcomes such as potential new markets. There is also a widespread consensus on the nature of the optimization. It may be output or delivery process-related (Damanpour, 1996: 693-716). The former refers to a produce or service, the latter to a better way for supply. Finally, the optimizer asserts the chances to implement its change against the expected resistance (Zmud, 1984: 727-738). The more the optimizer's influence enables it to shape and promote the decision-making processes and the more the advocated optimization seems urgent for those who interact with the optimizer the more the latter is motivated to give the initial impulse (Damanpour, 1991: 555-590).

At the beginning there is the idea or invention which represents a new product or the optimization of an existing one (Rouach, 1999). Optimizers or inventors have to attract decision-makers able to implement their idea (Sapiro, 1981: 701-716). Next the target public has to be convinced (Befu, 1977: 255-281). They compare the feature with those it is supposed to replace or upgrade (Loch and Hubermann, 1990: 160-177). If the promises are kept, the early adopters obtain a comparative advantage. In a third step the innovation generalizes whenever its advantages convince others (Leckenby, 1998). Some separate the adoption from the changes in attitudes (Nonaka, 1994: 14-37), usually known as the learning curve (Krueger, Jaen et al.,

[5] Throughout the research the ideal type is used as means of simplification as defined by Weber (Marshall, 1998: 292-293).

2000). It is not the physical adoption that concludes the successful diffusion but the associated practices (Haas, 1990). An innovation process is usually irreversible (Alter, 2002: 15-40).

Finally innovations have to prove their long-term value and safety. Several produces like DDT or asbestos did not. Society does not reconvert to the earlier state if the innovation fails. The phase-out represents a new innovation process, often based on a substitute (Dyson, 2000: 99-106). There have been attempts to assess innovations through ex ante and ex post technology assessments (Mironesco, 1997).

Innovation processes have shaped air transport and therefore the Airbus programme. Throughout the research the stakeholders under competitive pressure are assumed to seek optimizations.

States And Optimization

The nation state represents a second element of our civilization. Virtually all scholars agree that it consists of a set of institutions which monopolize rule making and enforcement on a delimitated territory (Huggins, 1997: 265-285)[6]. In the occidental democracies, what the Airbus countries are, the state stakeholders monitor the outcomes since successes facilitate re-election and therefore ongoing influence (Kriesi, 1995).

One major field of state involvement has been the national economy (Lane and Ersson, 2002: 206-208). Like inventions so-called public policies attempt optimizations (Sabatier, 1999: 3-17), but may not obtain the anticipated result or have unexpected side effects (Bussmann, Kloeti et al., 1997). The second prerogative of the state stakeholders has been dealing with the world outside their territory. Each state has an international moral personality (Senarclens, 1998: 101-116). Theorists conceptualize relations among states in several ways (Gabriel, 1994: 12-14)[7]. One school of thought assumes that states compete with each other (Held, Mc Grew et al., 1999: 33-34). This does not exclude punctual cooperation (Braillard and Demant, 1991).

State stakeholders operate from the intersection of the domestic and the international systems (Putnam, 1993: 431-468). Governments formulate policies in response to permanent and simultaneous national and international inputs and their situative assessment (Sciarini, Nicolet et al., 2002: 1-34). Like the above-mentioned physical or moral persons acting as optimizers they attempt to enhance their outcomes and processes through innovation (Stokes-Berry, 1994: 322-330).

The contexts which stimulate decisions by the Airbus states, the EU and other countries have evolved in permanence. Decisions on the programme have been shaped by national aerospace policies and international competition. Following the competition among the national economies and within these the strategic industries the states are supposed to compete with each other. Their stakeholders are assumed to attempt to optimize the situation on their territory and to maximize their international competitive position.

[6] There has been an endless philosophical and political debate on the way these institutions best organize and manage the territory. For an introduction see (Offe and Ronge, 1997: 60-65). Being of no relevance for the research these questions are not developed.
[7] Again things are far more complex in reality and many contradicting theories circulate among scholars. Being of no relevance for the research these are not discussed. A concise introduction to the usual conceptualizations of relations among states gives (Gabriel, 1994).

Evolution As Outcome Of Competition

In addition to innovation, learning by experience has shaped technology and states.

Innovation And Learning

Innovations are not the only source of change. Unexpected occurrences are another (Giarini and Stahel, 1990: 21-24). Accidents are one example (Lagadec, 1994: 27-37). They cause victims, destroy values (Levinson and Granot, 2002) and call for recovery operations (Jensen, 2000). Even non-lethal crises triggered by competitors (Lawrence and Thornton, 2005: 143-151) or new externalities (Krugman, 1991: 80-83) may affect companies (Thietart, 1999: 34-37) or institutions (Scholz, 1984: 145-153).

Specialists usually divide the attempt to overcome the crisis into three stages. The first is the immediate reaction to limit the damage (Regester and Larkin, 2002: 101-121). As soon as possible a plausible strategy to overcome the crisis and to neutralize its roots (Robitaille, 2004) is announced in order to restabilize. Since this intends to overcome a shortcoming the decision may be considered as an invention (Lagadec, 1994: 167-174). In a third step the corrective action is implemented. It is based on the lessons learned and attempts to prevent the occurrence to repeat itself (Lagadec, 1994: 289-293). The adoption is similar to an innovation since it leads to a comparative advantage in respect to the situation before (Perrow, 1999: 1-14).

Usually innovation-based push and pull factors and reactions to unexpected events are seen as distinct processes. The former is strategic and pro-active and the latter enforced and reactive. In fact they do have much in common since both influence outputs and practices (Hannan, 1984: 149-164). Both can be defined as procedural and institutional learning (Cohen and Levinthal, 1989: 569-596). Physical and moral personalities attempt to prevent accidents through planning and prevention (Golding, 1992: 23-52). Empirical research on the impact of air accidents on airlines confirms that innovation processes and reactions to the unexpected and unwanted alike are essential for the success in the long term (Haunschild and Sullivan, 2002: 609-643).

Innovations and reactions attempt to overcome a situation seen as less than optimal (Hannan, 1984: 149-164). Innovation through a pro-active decision and reactive influence through learning by experience have been common. For ease of reference and coherence inventions are defined as voluntary and incidents as involuntary innovations since both have a similar irreversible outcome (Kuwada, 1998: 719-736).

Throughout the research the decisions of the Airbus stakeholders are categorized in this way. An example for a voluntary innovation is the launch of a new category of aircraft in response to a new demand, one for an involuntary one the response to the superior product of a competitor.

Optimization And Integration

Throughout history the state stakeholders have been innovative and preventive as well. Many states have encouraged Science and Technology (S+T) programmes to enable their economic actors to innovate and to lead in national and international markets. This has consolidated the economy through employment and exports (Richardson and Kegley, 1980: 191-222). An additional strategy has been transnational collaboration

for economies of scale. Leading states seize the opportunity to promote standards and practices favourable for their industry. Examples were the International Telegraph Union in 1865[8] and the International Railway Congress Association in 1894 (Held, Mc Grew et al., 1999: 44-45).

The decisions and attitudes of the state policy makers targeted at Airbus Industrie are assessed first whether they are pro- or reactive and second following the expected and actual outcomes.

The International Air Transport Regime As Outcome Of Innovation Processes

The Airbus programme has evolved within global air transport. In 1903 the Wright Brothers accomplished the first officially acknowledged flight (Anderson, 2002: 2-3). In 1905 national associations of aviators established the Fédération Aéronautique Internationale (FAI)[9] as the first transnational organization to promote common interests (Morath, 2005). In 1908 the first passenger fatality in the U.S. triggered involuntary innovations (Del Gandio, 2003: 2). In 1910 the first international air transport conference was hosted by the French government (Meyer, 1944: 24). In 1913 the governments of France and Germany concluded the first bilateral treaty on air transport (Meyer, 1944: 24). In 1919 the first international organization, the International Commission for Air Navigation (ICAN)[10] (Meyer, 1944: 46-57), defined rules for air transport (CINA, 1946). Airframes turned into an economic factor in many countries (Neumann, 1928). In 1947 the International Civil Aviation Organization (ICAO) became a specialized institution within the system of the United Nations (UN, 2002: 55).

Contemporary air transport is structured around a UN-centred regime (Golich, 1989: 14-37). It includes a large number of specialized national and transnational institutions usually centred on a technical, operational or economic issue. All actors try to innovate, to learn by experience and to avoid the unexpected. The ICAO has become the supreme regulative authority (Nader and Smith, 1994: 8-21). States with an important airframe industry have been in a position to promote their manufacturers through their influence on international regulation (Perrow, 1999: 123-169). Voluntary and involuntary innovation processes have shaped the regime. The outcomes inspire new innovations or decisions such as public policies.

All Airbus-involved actors are assumed to promote and to defend the programme in the context of the international air transport regime and to take into account technological and other developments.

The European Integration As Outcome Of Optimization Processes

Switzerland and Germany originated through mergers of formerly sovereign territories into larger units (Grant, 1997: 343-367). Their stakeholders ‘outsourced’ parts of their sovereignty to a federal government (Lane and Ersson, 2000: 84-88). Motivations have been pushers such as common external challenges and pullers such as economies of scale, for instance in defence.

[8] Nowadays the International Telecommunication Union (ITU) (www.itu.int).
[9] www.fai.org.
[10] Usually known under its French designation Commission internationale de navigation aérienne (CINA).

In Europe a similar transfer of sovereignty to supranational institutions has been in progress since 1951 (Masclet, 1993: 5-8). Usually it is explained with the push factors of competitive pressure from the U.S. and the ideological influence from the Warsaw Pact (Courty and Devin, 2005: 8-19). Pull factors often mentioned are economies of scale in new and cost intensive fields of S+T (Guzzetti, 1995: 23-25) and the growing complexity of new S+T programmes (CEE/CECA/Euratom, 1960). In many cases the integration has been associated with a 'European identity' based on a common historical heritage (Saint-Ouen, 1997: 7-23) and inspiring a vague 'Euro-nationalism' (Guzzetti, 1995: 36). Although the European Union (EU) does not represent a federal state it has shaped the worldview of elites and populations almost everywhere (Teyssier and Baudier, 2000: 109-120). It has become an independent political actor (Rouban, 1998: 57-79). In many fields the member states do no longer act as individual countries but as elements of a larger entity (Elazar, 1998: 119-138). This includes economic and technology policies (Braillard and Demant, 1991: 5-15).

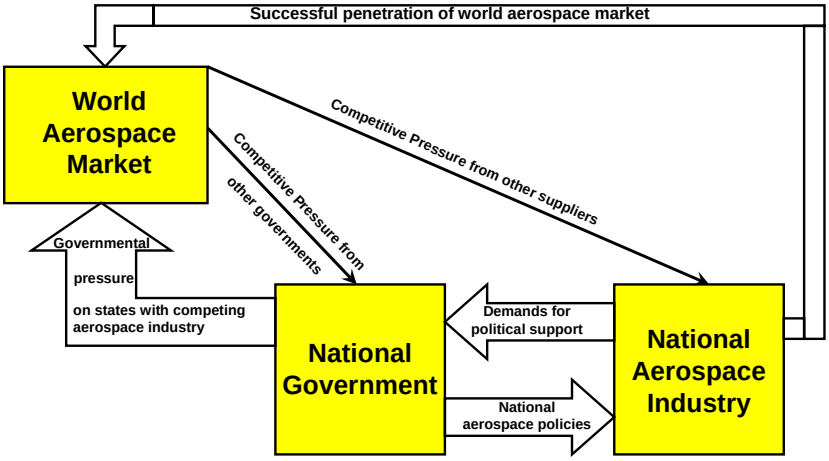
In the same way as the international air transport regime is the result of voluntary and involuntary innovations the territorial integration in Europe and the governing institutions are outcomes of permanent motivations to maximize the trade-offs for each state. Under certain circumstances and at a given time their stakeholders concluded that cooperation best served their individual interests. In the light of the positive trade-offs for all states the integration process was consolidated through the 'delegation' of national prerogatives to common external institutions. These in turn emancipated themselves from the governments and created positive policy outputs for them (Teyssier and Baudier, 2000: 5-40).

Therefore it can be assumed that European integration has influenced the national policies in respect to aerospace and the Airbus programme as well.

Focus Of The Research

Economic actors and states participate in a race for innovation and optimization under competitive pressure. Manufacturers are confronted with each other in a limited market and forced to innovate and optimize in permanence. They react to the competitive pressure through appropriate products. State stakeholders are interested in positive outputs of their aerospace industry. The more both succeed the higher the national and international trade-offs become (Revuelta, 1999: 91-98). Since the state acts as the supreme authority on its territory it supports the aerospace industry mostly upon request of the latter. Examples are subsidies or S+T programmes (Lawrence and Braddon, 2001). Since aerospace is a strategic industry for many countries other governments do the same. The government experiences pressure from outside and responds through a wide array of actions such as interventions into sales negotiations (Thornton, 1999: 63-79). The interactions are permanent and mutual (Easton, 1965). Figure One outlines the various relationships.

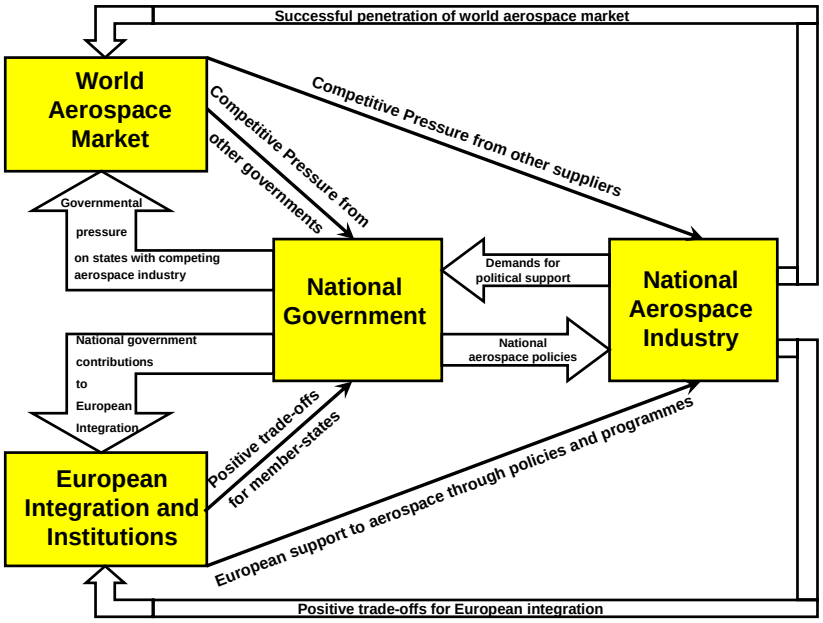
Figure 1 - State And Aerospace Industry



Source: Author based on (Easton, 1965: 103-117), (Evans, 1993: 397-430), (Hayward, 1986: 1-17), (King, Keohane et al., 1994: 49-53), (Knoepfel, Larrue et al., 2001), (Muller, 1989: 198-204).

In the case of Airbus Industrie the European integration launched by the governments as a strategy of optimization intervenes. This process shaped through state actions and their outcomes influences the interaction between the government and its aerospace industry. The government decides in favour of Europe whenever this promises the best answer to a challenge (Rosamond, 1997: 443-474). The static and dynamic gains and the European programmes may generate positive trade-offs (Courty and Devin, 2005: 38-42). Inputs through EU policies and programmes often strengthen the economic actors (Casamayou, 2007c: 4). Even sectors not directly targeted (Braillard and Demant, 1991: 15), such as strategic industries, benefit from trade-offs and may become more competitive on the world market (De Bandt and Foroy, 1991). Figure Two combines both interactions and their outcomes.

Figure 2 - Combined Influence Of International Aerospace Market And European Integration



Source: Author based on (Easton, 1965: 103-117), (Evans, 1993: 397-430), (Hayward, 1986: 1-17), (King, Keohane et al., 1994: 49-53), (Knoepfel, Larrue et al., 2001), (Muller, 1989: 198-204), (Picq, 1990), (Teyssier and Baudier, 2000: 90-94).

Based on the overall context of aerospace and European integration the research question is detailed: Has the Airbus programme been the outcome of purely economic and competitive motivations in the worldwide aerospace market or has it been inspired by the often quoted “Euro-nationalism” (Guzzetti, 1995: 36)? The study is based on the assumption that the attitudes of the state and Airbus stakeholders have evolved from purely national and competitive to European and integrative in the same way as their attitudes towards the European integration process in general. From the beginning the European integration has been justified by economies of scale and trade-offs (Steffan, 1957: v-viii) and the need to preserve the common heritage for the future (Teyssier and Baudier, 2000: 5-21). The process has extended to more and more S+T domains (Guzzetti, 1995). In the light of the above the hypothesis that the attitudes of the governments towards the Airbus programme have evolved in the same way as their motivation to transfer national sovereignties to Europe in general or in respect to S+T is approached.

Contexts And Interests Of Research

Much has been written about the history of Airbus Industrie in an industrial (Endres, 1999) or political perspective (Sparaco, 2005a). Authors have focused on technology (Mueller, 1983) and sales strategies (Mc Intyre, 1992), its impact on the airframe market (Aris, 2002) and its influence on national policymaking (Picq, 1990). Other research places the Airbus programme into the context of worldwide aerospace, either in a global (D'Andrea-Tyson and Chin, 1992) or a national perspective (Sydow, 1999: 99-102). However, only few publications attempt to adopt a transnational focus. One of the few exceptions is the French classic on the shift of aerospace policies of the Airbus countries from a national market to a world demand-driven approach (Muller, 1989). Another study traces the transatlantic competition changed by the rise of Airbus and the decline of the U.S. manufacturers (Mc Guire, 1997). It offers a wider perspective and includes the shift from national to EEC and later EU level in the negotiations within the GATT regime. The question why this transfer occurs and the European integration process in general are skipped. Research on European technology policies, again in a general historical (Braillard and Demant, 1991) or European integration perspective (Guzzetti, 1995), adopts a broad approach which barely extends to aerospace. This is even more true for theoretical (Schwok, 2005), procedural (Sidjanski, 1992) or historical (Roberts, 1996) work on European integration. The above authors neglect aerospace and even S+T as a whole. The following research attempts to bridge this gap and approaches Airbus through a focus on European perspectives. It hopefully inspires further work in aerospace, public policies and European integration.

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Chapter 1 - Approach, Theoretical Framework And Strategy

1.1. Introductory Remarks

Research in social science is usually based on a theoretical framework and a model of analysis (Quivy and Campenhoudt, 1988: 13-17). The empirical evidence validates the hypothesis or not (Morton, 1999: 3-29). If the topic includes many actors and variables changing over time, this strategy may prove too limitative (Elman and Fendius-Elman, 2001: 1-36). Another approach known as the Idiographic-Nomothetic Approach (INA) focuses rather on the understanding of complex relationships than the analysis of exact data. It has proven its value in history of technology and science (Lynn, 2001: 359-382).

1.2. Idiographic-Nomothetic Approach As Stage-Setting

Any research should respect a number of criteria (King, Keohane et al., 1994: 15). The question should be pertinent and contribute to scientific theoretical and/or empirical knowledge (King, Keohane et al., 1994: 15). The results should be verifiable and justify further work (Chalmers, 1999: 27-40).

This classical social science approach based on a formal model and its operationalization has its limits. How to include the combined influence of the end of the Cold War, the new rules for transatlantic transport and the European integration on airframe construction into a coherent research?

There is a way out of this dilemma thanks to the Idiographic-Nomothetic Approach (INA). It combines the formal analysis of the social scientist with the general understanding of the historian. The INA does not attempt an in-depth study of one delimitated subject but tries to illustrate under what circumstances it came into being and evolved (Elman and Fendius-Elman, 2001: 1-36). The work outlines the facts in their contexts and the relationship among them (Veyne, 1993: 97-118). The more empirical evidence (e.g. sources, artefacts or witnesses) (Brandt, 1998) is available, the more the research is exhaustive (Phillips, 1971). Unlike social science research which is usually deductive, historical studies tend to be inductive since they allow general conclusions through specific cases (Levy, 2001: 39-83). Like the work in social science the INA is based on a research question examined through a hypothesis. In a first step the INA attempts to “identify important questions or puzzles”. Afterwards it ‘dissects’ them through a formal analysis (Lebow, 2001: 111-135). The data for the first or ‘presenting’ part is not chosen following an a priori restrictive framework but the supposed relevance for the research question (Larson, 2001: 327-350). In a second step the historical presentation is analysed through an a posteriori ‘lecture grid’[11]. Unlike a model it remains general and enables to structure the data contained in the first part. No relevant information has to be skipped owing to a limited number of variables or cases (Gaddis, 2001: 301-326).

[11] Term coined by author based on (Lebow, 2001: 111-135).

The particularities of the INA, notably the exploration through a lecture grid without the restrictions of a preliminary model makes it attractive for looks into changing multiple relationships (Lynn, 2001: 359-382). Technology has been the classical area of application (Lynn, 2001: 359-382). Airbus which has been shaped by transatlantic competition, national policies, European integration and globalization is another candidate.

1.3. Situative Optimization As Lecture Grid

Following the known economic theories goods respond to individual and collective demand. Almost any economist identifies competition among suppliers (Lipsey, Courant et al., 1999: 3-25). As outlined earlier competition is the main motivator for innovation. International trade usually increases the overall offer (Lipsey, Courant et al., 1999: 777-798). States and their regions tend to specialize in those activities where their comparative advantages are the strongest (Samuelson and Nordhaus, 2001: 299-306).

Many economists differentiate strategic goods from other commodities (Mastanduno, 1988: 121-150). They enable other economic activities and are necessary for the work of the state (Samuelson and Nordhaus, 2001: 37-38). Examples are transportation and national defence. Their supply is know-how intensive and encourages technology transfers to other industries (Krugman, 1991: 80-83). Strategic goods are unsubstituable. States unable to supply them are vulnerable to external pressure (Keohane and Nye, 1989). Strategic industries offer opportunities for pressure in international negotiations (Baldwin, 1980: 471-506).

1.3.1. Strategic Trade Policy As Optimization Strategy

State interventions in favour of strategic industries are known as Strategic Trade Policies (STPs). Unlike protectionism, they do not attempt to save sectors in decline (Harris, 1989: 751-778) but intend to increase the future prospects of competitive sectors (Krugman, 1994: 235-243). They are best defined as an overall positive attitude towards sectors or regions (Moran, 1990: 57-99).

Economic incentives such as tax relief are common. Others are state-sponsored Research and Development (R+D) programmes (Ekholm and Torstensson, 1997: 1184-1203). Export promotion through favourable exchange rates (Schembri, 1989: 185-215), export financing (Milner and Yoffie, 1989: 239-272) or diplomatic intervention into sales campaigns (Picq, 1990: 69-71) are frequent. Espionage in favour of the assisted companies has been reported as well (Whithey and Gaisford, 1996: 627-632). Import restrictions (Dick, 1994: 83-101) through technical standards or safety regulation (Quittard, 1979) represent yet other strategies. If the state and its industries are influent they can assume leadership in the development of new international technical or other standards and increase their leverage (Hayward, 1987: 11-26).

STPs sometimes erode when the priorities of the political majority change (Gebauer and Fleisch, 2005: 18-20). Decreasing strategic industrial capacities may affect the international role of the state (Friedberg, 1989: 401-431). Warnings that the airframe industry may decline if the state lowers its commitment have been heard throughout history (Neumann, 1928). STPs only lead to visible results as long as the targeted industries maintain their efforts to remain competitive (Marshall, 1999: 179-189).

Critics have associated the concept of STP with classical economic promotion and protectionism (Stegemann, 1989: 73-100). Others relativize its relevance in view of the high complexity of international economics (Cameron, 1988: 561-603). Empirical evidence does confirm open and hidden measures in aerospace especially in the case of Airbus Industrie (Lawrence, 1999: 27-61).

1.3.2. Path Dependence As Challenge To Innovation And Evolution

The current status of a manufacturer, a sector, a site or an economy is the result of the cumulated outcomes of all past influences or its Path Dependence (Krugman, 1994: 221-244). It limits the options for decisions due to the cost of transfer which grow proportionally with the extend of a change (Cowan and Gunby, 1996: 521-542). The concept can be applied to micro- (e.g. the fleet of an airline) and macroeconomics (e.g. regions) (Krugman and Obstfeld, 1997). Innovations are usually evolutive within the general path of their context (Mokyr, 1990a: 289-297). Each subsequent decision is the result of the assessment of cost versus benefits based on the current situation and interests of the stakeholders (Frei and Ruloff, 1988: 264-347).

Sometimes, a product establishes itself as a standard. Current examples are DVDs and Microsoft Windows. More and more providers align until the sector becomes ‘locked in’ (Cowan and Gunby, 1996: 521-542). Alternatives may be denied market entry. Lock-ins are observed in macro-economics as well (Storper, 2000: 42-62), as the predominance of specific sectors in a region shows (Knorringa and Meyer-Stamer, 1998: 31-56). Classic examples are the Ruhr in Germany and the Silicon Valley in the U.S. (Dunning, 2000: 7-41).

Like most other concepts, Path Dependence has been criticised (Martin and Sunley, 1996: 259-292). Ample evidence in the airframe industry is found (Taylor, 2002: 1). History is full of manufacturers that optimized existing models in order to lower the cost of development for the supplier and to minimize cost of transfer for the airlines operating the previous versions (Lawrence, 1999: 27-61).

1.3.3. Technological Leap As Attempted Long-Term Chance

Economic actors attempt to maintain a favourable Path Dependence through pro-active innovation and appropriate reactions to externalities and challenges. Whenever possible they try to ‘bend it’ in their favour (Calatone and Benedetto, 1990: ix-x). The classical opportunity is a technological breakthrough which renders the previous lock-in obsolete (Mokyr, 1990a: 294). A disruption or technological leap takes place (Mokyr, 1990b: 105-107). Examples are plastics which replaced other materials or the mobile phone which changed attitudes. A new technology establishes the point of departure of a new Path Dependence. Subsequent pro-active innovations and reactive learning processes optimize the produce within its general path (Mokyr, 1990a: 294-295). The pioneers have the greatest initial advantage (Wise, 1985: 229-246). Like innovations technological leaps may fail (Jovanovic and Nyarko, 1996: 1299-1310). Airships (Bauer and Duggan, 1998) or the first passenger jet aircraft of 1949 are illustrations.

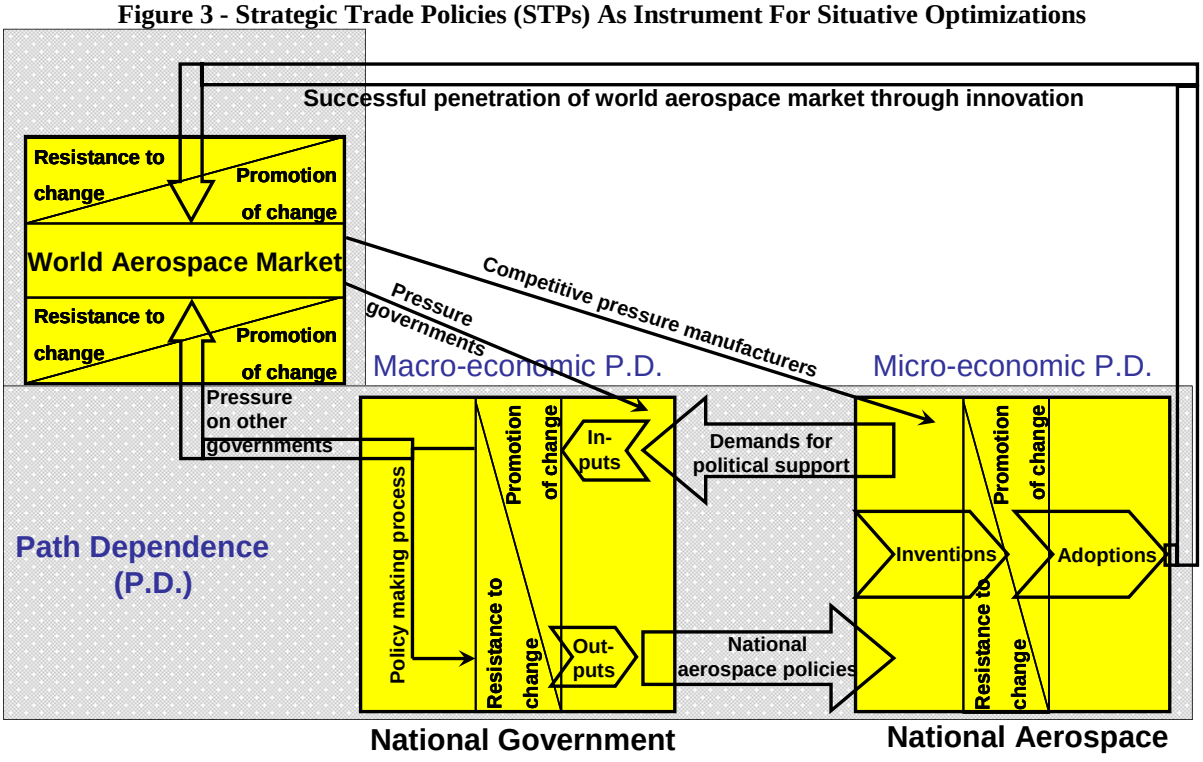
The concept of disruption or technological leap has been widely studied (Calantone and Benedetto, 1990: 158-166). The history of aviation is full of successful STP-enabled technology leaps (Gunston, 2001).

1.4. States As Site Optimizers

Since the research focuses on the attitudes of the states towards aerospace and the European integration the interactions between them can be detailed. The governments attempt to maximize their aerospace industries through STPs. The manufacturers usually formulate demands for supportive policies (Stokes-Berry, 1994: 322-330) which are accepted or rejected (Marshall, 1999: 179-189). If the state stakeholders agree to support the national aerospace industry they formulate STPs (Brainard and Martimort, 1996: 81-105). Path Dependences and lock-ins in the national economy and political configuration as well as in the international airframe market limit the available options (Ruttan, 1997: 1520-1529). Further STPs are targeted at other governments which support their aerospace industry (Lawrence and Dowdall, 1998). Again a variety of strategies reaching from better terms in export financing (Braddon, 1999: 81-88), exploitations of intra-governmental divisions (Mc Guire, 1997), hidden or open powerplays (Picq, 1990: 69-71) and intelligence action usually practiced in high-level diplomacy (Kauffer, 1999: 171-205) are applied. The government finds itself under pressure since the competitors are supported by their state stakeholders (Lawrence and Dowdall, 1998). The state stakeholders have to resist external pressure while being able to overcome the opposition from the other state.

Within the aerospace industry inventors attempt to innovate but again the Path Dependence limits their options. They have to promote the invention against intra-firm resistance to change (Zmud, 1984: 727-738). If they succeed the inventions became innovations in case the aerospace market accepts them (Butler, 1988: 15-29). Figure Three pictures the interactions which determine the outcomes of Situative Optimization.

Figure 3 - Strategic Trade Policies (STPs) As Instrument For Situative Optimizations

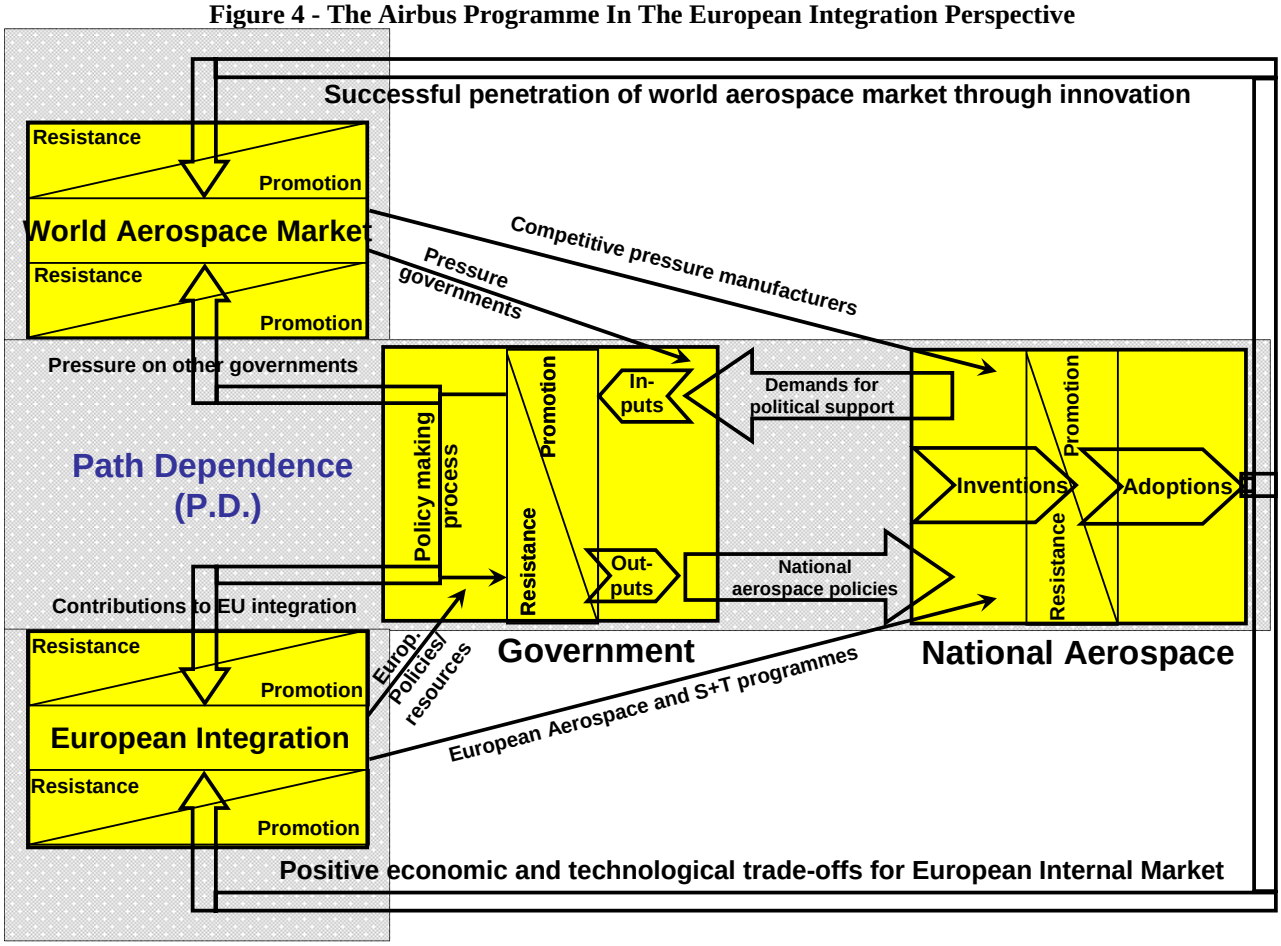


Source: Author based on (Easton, 1965: 103-117), (Evans, 1993: 397-430), (Hayward, 1986: 1-17), (King, Keohane et al., 1994: 49-53), (Knoepfel, Larrue et al., 2001), (Muller, 1989: 198-204), (Picq, 1990), (Ruttan, 1997: 1520-1529), (Teyssier and Baudier, 2000: 90-94), (Zmud, 1984: 727-738).

1.5. Research Design

As the general interactions between the states and the world aerospace market reveal the European integration affects Situative Optimization. Figure Four completes the Lecture Grid.

Figure 4 - The Airbus Programme In The European Integration Perspective



Source: Author based on (Bouma and Atkinson, 1997), (Easton, 1965: 103-117), (Evans, 1993: 397-430), (Hayward, 1986: 1-17), (King, Keohane et al., 1994: 49-53), (Knoepfel, Larrue et al., 2001), (Muller, 1989: 198-204), (Picq, 1990), (Ruttan, 1997: 1520-1529), (Teyssier and Baudier, 2000: 90-94), (Zmud, 1984: 727-738).

The continental convergence is subject to Path Dependences and only progresses if resistances and systemic inertias are overcome. In parallel with its aerospace STPs the government formulates European integration policies (Rosamond, 1997: 443-474). Like the STPs they are the outputs of a policy-making process where the supporters have to overcome hostility (Braun, 1999: 11-29). Usually in a second stage the decided policy competes against proposals from the other member states. Only policies which are approved within institutionalized frameworks may lead to a change in the consolidation and convergence process (Courty and Devin, 2005: 68-78). The common institutions which are themselves developed during the integration process launch European policies targeted at the member states. Together with the overall trade-offs of the European integration such as economies of scale (Peck, 1989: 277-299) these European policies shape again the national policymaking (Teyssier and Baudier, 2000: 90-108). The European integration also affects the economic actors, among them aerospace. Examples are economies of scale through lower prices by suppliers or common certification (Courty and Devin, 2005: 35-38), EU participation in negotiations with third

countries (Teyssier and Baudier, 2000: 109-120) and European research and S+T initiatives and programmes (Braillard and Demant, 1991). In many cases this renders the targeted industries more competitive. A larger market share generates higher trade-offs for the European economy as a whole (Courty and Devin, 2005: 104-108). New European programmes are again influenced by the outcomes of the earlier activities (Teyssier and Baudier, 2000: 94-97).

1.6. Presentation Of Results

The research follows the INA. Chapter Two places the history of Airbus in its general context. It introduces to airframe construction and European integration. Much has been written about the political (Herouville, 1958: 90-96) and economic convergence since the early days (Deniau, 1959: 5-12). The same is true for the alleged common roots (Coudenhove-Kalergi, 1957: 30-43) and the shared identity (Rougemont, 1979: 23-32). Afterwards the political integration is completed by an overview of the consolidation in S+T. Sometimes it is defined as the 'Europe of technology', a term coined in 1969 (Caty, 1969). Finally the influence of both processes on aerospace is outlined (Hayward, 1986). Chapter Three traces the history of the Airbus programme in its national, European and world market contexts. The historical outline represents a case study in its own right and serves as the data mine for the analytical part of the INA (Lebow, 2001: 111-135).

Chapter Four analyses the history of Airbus through the lecture grid based on Situative Optimization. The decisions and actions of the manufacturers are approached from the angle of voluntary and involuntary innovation. Next, the decisions and actions of the states and their outcomes are examined in a Strategic Trade Policy (STP) perspective. Finally the influence of the European integration on both is determined. Since the circumstances of the European integration changed after 2006, the most recent history of Airbus until summer 2007 is summarized and analysed separately but in the same way in Chapter Five. Although the time lag between the events and the research is very short, data and interpretations are available (Soulet, 1994). The results are compared and discussed. Based on the analysis Chapter Six details the role of the professionals within the Airbus programme and proceeds to an assessment of the future prospects of the Airbus programme. A conclusive part broadens the discussions.

1.7. Research Strategy

As it is common in historical research (Marrou, 1989: 26-46), two main inputs are used. The first is written evidence (Prior, 2003). A first category is primary sources used in decision-making processes (Brandt, 1998: 103-107). Official writings such as press releases are essential as well. Unlike the former these are explicit and general (Marrou, 1989: 64-91). Among the secondary sources, e.g. publications based on primary sources, the specialized press can be noted in a first place (Hartmann, 2003: 166-167). The general media offer another input. They represent a commercial intermediary (Jarren and Meier, 2002: 99-163)[12] between the journalist as the spectator of the event and the public (Meier and Schanne, 1996: 13-28). In some cases,

[12] This applies notably to the press in Western Europe which is studied here.

they influence the decision-making (Bonfadelli, 2000: 261-290). Background research on various theoretical and empirical topics (Rosenthal, 2004: 48-64) represents the third type of secondary sources.

As far as far as the contents analysis is concerned, the research focused on the systematic consultation (Frei and Ruloff, 1988: 120-126) of the ‘raw’ information (Holsti, 1969: 14-20). No formal methods of qualitative (Robert and Bouillaguet, 2002) or quantitative contents analysis (Weber, 1990) were applied.

The other source was semi-directed interviews (Silverman, 2001: 83-118). They intended to shed some light on special questions, complementary explanations to the documents and personal experience. This is known as oral history (Bornat, 2004: 34-47) analysed more or less in the same way as written evidence (Hepburn and Potter, 2004: 180-196). The interviewed person saw the world through his or her own pair of eyes and therefore his vision covered only a fraction of the overall event (Gaddis, 2002: 24). Since the research does not endorse it, no questionnaire-based survey (Converse and Presser, 1986) was carried out.

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Chapter 2 - Airframe Construction And European Integration

2.1. Introductory Remarks

The approach, the lecture grid and the strategy of research guide the research process. Background information on airframers and European integration clarifies the subject of the study.

2.2. Airframe Construction

Airframe history has been influenced through voluntary and involuntary innovation (Anderson, 2002).

2.2.1. Airframe Construction And Evolution Or Voluntary Innovation

The aerospace industry is high-value-adding and competitive (Hayward, 1986: 17-26). Following the usual definitions, the manufacturers are economic agents that attempt to maximize their gains. The needs for large surfaces (Fitzsimons, 2005: 20) and extensive overheads (Veronico and Hall, 1997: 10-15) raise fixed cost.

Any aircraft design represents a synthesis of anticipated demand patterns (Sturmey, 1964: 954-982). It is the result of market research and forecast (Rouach, 1999) and a race for early commitments (Eddy, Potter et al., 1976: 236). Sometimes one or several operators suggest a new design through a ‘requirement’ (Anderson, 2002: 185-201). Changing traffic patterns such as the concentration of intercontinental routes on major airports (Hanlon, 1999: 83-86) represent other motivations. If the airline is operating aircraft from the same manufacturer, economies of scale and limited cost of transfer may become arguments in favour of the new model from the same supplier. Customers and manufacturers also take into account the way competitors react to their initiatives (Condom, 2005: 15-16).

An initial stage is the project design is a response to an anticipated market need. It determines the number of passengers and engines or payload. Contacts with potential customers allow detailed plans (Jenkinson, Simpkin et al., 1999: 14). If the feedback is positive, the preliminary design phase determines the properties such as the fuselage cross section (Jenkinson, Simpkin et al., 1999: 14-15). The more the design is innovative, the more risk scenarios have to be extrapolated (Ingells, 1970: 211-214). Once the preliminary design freeze is acknowledged by prospective customers the detail design phase begins (Sweetman, 2005: 132-138). The future hardware is expected to offer a comparative advantage over the models it is scheduled to replace (O’Connor, 2001: 97). A strong emotional moment is the roll-out of the new aircraft (Mansfield, 1965). The first few machines participate in the certification programme (Jenkinson, Simpkin et al., 1999: 63-68). Some of the characteristics cannot be anticipated (Butterworth-Hayes, 2005: 152-160). Finally the aircraft is 'released for use' by the national and later European certification body (Jenkinson, Simpkin et al., 1999: 68). Their verdicts are based on ICAO-led international regulation (Golich, 1989: 24-25).

Whenever a supplier anticipates at least the return on investment, the programme is feasible (Sturmey, 1964: 954-982). The more the business case is promising the easier competitors are drawn to it. Sometimes the market sustains several suppliers (Francillon, 2000: 270-276). If this is not the case only one contender can expect to reclaim its investment. This puts it into a lucrative monopoly (Krugman, 1994: 235-239). If more than one enters the market, none is able to reach break-even. In this case, all of them try to obtain initial commitments and to convince the competitor that it has lost the race (Eddy, Potter et al., 1976: 236).

Operational life of airframes may reach 20 years or more. The depreciation depends on fuel consumption and maintenance. Product cycles may attain 30 to 40 years (Maslen, 2005: 36-49). Despite this long time frame, the 'right' timing is crucial. The window of opportunity is often very narrow. The new performer has to be available when the hardware it is scheduled to replace has to be phased out by the major airlines. Usually the first entrant sets the benchmark in its category (Hewson, 2002: 41-44). Customer expectations rise with each new model (Taneja, 2005: 77-105). Airlines assess the aircraft in the light of their strategies (O'Connor, 2001: 89-99). There always exists a risk of forecasting errors (Morrison and Winston, 1995: 91-96).

Cost of transfer such as the replacement of equipment is taken into account as well. The same applies to the training of flight, cabin and maintenance staff (Hugentobler, 1972). Some operators stage themselves as pioneers and bear the burden of initial learning (Cochennec, 2007: 10-16). Others are more cautious and wait until the 'daredevils' have shared their experience (Pilling, 2005: 4-6). Sometimes the first aircraft have minor defaults which are gradually corrected (Moores, 2007: 11). Aircraft finance operations are very complex and often involve many actors (Picq, 1990: 106-107). Over time, lessors have become intermediaries. They own the aircraft and lend them to the operators (Doganis, 2001b: 170-172).

After the entry into service, suppliers and subcontractors offer complex after sale support. An aircraft is optimized in permanence (Cochennec, 2006: 20-22). Airframes are path-dependent in respect to production sites (Sell, 2001: 12-32) and processes (Anderson, 1999: 381-392) so that possibilities for updates are limited. Existing models may allow derivates (Sturmey, 1964: 954-982). In a first step this offers an advantage. Development is less expensive since most of the facilities can be reused (Norris, 2006: 30-33). A series of aircraft developed from the same basic model is known as a family and offers economies of scale (Airbus Industrie, 2000). In case a competitor launches a 'clean sheet' design the derivative of an earlier design is usually outperformed (Cochennec, 2005: 22-27). Manufacturers try to anticipate demand through optimizations and new models. Their attitude is usually pro-active (Reysset and Widemann, 1997).

The aircraft market is very much influenced by overall changes of society and political and economic contexts. Examples are environmental or geopolitical issues (Drake and Purvis, 2001: 501-528). The latter offer chances such as new markets (Cochennec, 2005: 26-28) but present risks as well. Finally, governments may lose their interest in airframe construction as a strategic industry (Newhouse, 1982: 35).

2.2.2. Airframe Construction And Learning By Experience Or Involuntary Innovation

Any incident creates complications (ERAA, 2003: 7), affects reputation (Fink, 2000: 47-53) and destroys assets (Knight, 2005). Even rumours on defaults of an aircraft may be devastating (Kauffer, 1999: 171-205). Manufacturers and airlines try to extrapolate risks and to eliminate them through constructive and procedural

measures. States have established technical and operational safety standards over time (Levinson and Granot, 2002). They learned 'the hard way' (Perrow, 1999: 177-182) that the common good of public safety (Olson, 1971: 9-16) had to be placed over the particular interests of the airframers (Kasperson, 1992: 153-178). A residual risk always remains (Hill, 2002: 26-31). The majority of the accidents are the result of 'handling errors' (Buck, 2000). One that is relevant for the research is the lack of experience with a new aircraft especially when it represents a disruption (Sparaco, 2005a: 220).

Whenever an incident happens despite any possible precautions (Oster, Stron et al., 1992), stakeholders attempt to minimize its impact and find out the causes and intend to prevent the occurrence to repeat itself in future. First the accident site is evacuated and cleared (Jensen, 2000). Later the competent national authority bound by ICAO regulation investigates the accident (ICAO, 2001). The results of the investigation may be considered as an involuntary invention at the origin of a reactive or ex post adoption. It aims at a correction of the failure and its prevention in future (Jones, 1986). The state authorities responsible for air safety often elaborate proactive regulation which goes beyond corrective action (Haine, 2000: 15-16).

The main risk for a manufacturer is not accidents but the loss of its leading edge. A first factor is the lack of resources for investments (Lawrence and Thornton, 2005: 87-102). The failure to react to a move by a competitor either through low resources or lack of vision is another (Thomas and Forbes-Smith, 2003: 141-168). Both may be the result of a decline in governmental commitment (Newhouse, 1982: 35).

2.3. Continental Integration Towards The Europe Of Aerospace

Since the Second World War European states have converged into some sort of federation.

2.3.1. European Integration As An Inspiration And A Programme

The belief that integration eases the situation of the people of Europe has been latent for centuries (Seibt, 2002: 17-48). Many have insisted on the shared history (Teyssier and Baudier, 2000: 5-40), others on external pressure (Deniau, 1959: 13-19). The European integration is the outcome of positive expectations of the participating states which have transferred more and more national prerogatives to external institutions (Vink, 2003: 63-74) and the latter's emancipation as independent entities and actors (Sarooshi, 2005).

For most historians the European integration as far as it is relevant for the research began in 1948 when the Organization for European Economic Cooperation (OEEC)[13] was created. The Western Union Treaty (Brussels Treaty) signed by the Benelux countries, France and the U.K. established an alliance against the Warsaw Pact[14]. In May personalities launched a resolution for a united Europe at the Hague congress (Guzzetti, 1995: 2). In January 1949 several governments set up the Council of Europe[15] for political and scientific cooperation in Western Europe (Duclos, 1960: 23-26). In the same year the North Atlantic Treaty Organiza-

[13] It was renamed the Organization for Economic Cooperation and Development (OECD). For details see www.oecd.org.
[14] If not stated otherwise the chronology is based on the historical section of the official EU website http://europa.eu/abc/history/index_en.htm.
[15] www.coe.int/DefaultEN.asp

tion (NATO) was created[16]. In 1951 the Benelux countries, France, Italy and Western Germany initiated the European Coal and Steel Community (ECSC). They placed two basic albeit not really strategic sectors under a transnational authority (Guzzetti, 1995: 4).

On 25th March 1957 the Treaties of Rome established the European Economic Communities (EEC) and the European Atomic Energy Community (EURATOM). In 1959 the European Investment Bank (EIB) granted its first loans (Jouanneau, 1996: 34). In 1961 Denmark, Ireland, Norway and the U.K. applied for membership.

In January 1962 the EEC became a supranational authority through a first Regulation on agriculture (Teyssier and Baudier, 2000: 123). In May the EEC participated as an actor in its own right in the GATT Uruguay Round (Jouanneau, 1996: 37). In 1964 the Council of Ministers set up a Medium-Term Economic Policy Committee of experts from the member states and the Commission (Guzzetti, 1995: 39). The European Court of Justice held that Community Law overruled national law. 1965 witnessed a first crisis within the EEC on the issue of new prerogatives for the European Parliament and agriculture. The French President De Gaulle rejected this as a loss of national sovereignty (Sidjanski, 1992: 102). In June 1966 the Commission signed the final act of the GATT Kennedy Round (Finlayson and Zacher, 1983: 273-314).

In July 1968 the Customs Union was accomplished 17 months earlier than planned (Teyssier and Baudier, 2000: 123). In December France vetoed the accession of the U.K., Denmark, Ireland and Norway (Guzzetti, 1995: 40). In July 1969 the negotiations for membership reopened (Sidjanski, 1992: 118). In April 1970 the Treaty of Luxembourg established communitarian financial resources through levies on imports from non-members and Value Added Taxes (VATs). In January 1972 Denmark, Ireland, Norway and the U.K. were admitted (Joyaux, 1993a: 317). Norway refused in a referendum (Guzzetti, 1995: 50). In September the Ministers of Finance decided on monetary cooperation (Berthet and Bonnet, 1976: 79-80).

In 1974 the EEC obtained the permanent observer status at the UN. In December the heads of state decided to hold three annual meetings or European Councils (Sidjanski, 1992: 110). From 1977 onward the EEC participated at the G7 Summit[17]. A year later the European Monetary System (EMS) regulated the fluctuations of the currencies (Teyssier and Baudier, 2000: 103). After 1979 the European Parliament was directly elected (Masclet, 1993: 80-86). In 1981 Greece adhered (Joyaux, 1993a: 317). In 1983 the former Commissioner and Eurodeputy Altiero Spinelli submitted a Draft Treaty on the European Union. In June 1985 the Commission presented a White Paper on the Single European Market (COM(85) 310 Final, 1985). It promised static and dynamic gains (Peck, 1989: 277-299). In 1986 Spain and Portugal joined (Teyssier and Baudier, 2000: 123). The Single European Act (SEA) completed the Treaties of Rome (European Commission, 1987). It encouraged cooperation among foreign policies (Sidjanski, 1992: 180-188).

France, Germany and the Benelux countries concluded the Schengen Agreement on the abolition of border checks in 1990. On 7th February 1992 the Maastricht Treaty on the European Union was signed (EU, 1993). The Danes refused but the French approved. In 1993 the Single European Market came into force (Courty and Devin, 2005: 35). In May the Danes approved the Maastricht Treaty in a second vote. In 1994 the Euro-

[16] www.nato.int.
[17] The G Summit was launched in 1975 by France, Germany, Italy, the U.K., Japan and the U.S. as a worldwide forum of concertation. A year later joined and made it the G7 group. The admission of Russia in 1997 made it today's G8.

pean Economic Area (EEA) and the European Monetary Institute (EMI)[18] were established. Austria, Finland and Sweden joined in 1995. The Norwegians refused (Courty and Devin, 2005: 5).

On 20th October 1996 the Ministers of foreign affairs of the member states signed the Treaty of Amsterdam (EU, 1997). It introduced a European citizenship. In June 1998 the European Central Bank (ECB)[19] was established. In February 2001 the Treaty of Nice on a European constitution and institutional and procedural reforms was signed (EU, 2001). In June it was rejected by the Danes. In October 2001 a European company statute was launched (CR (EC) No 2157/2001, 2001: 1-21). Shortly after the 11th September 2001 a Common European Security and Defence Policy (ESDP) was outlined (Teyssier and Baudier, 2000: 89). On 1st January 2002 the Euro became the currency in Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. In October Denmark approved the treaty of Nice in a second referendum. In 2003 the EU and the NATO signed a security pact. During 2004 Czechia, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia joined. On 29th October the Constitution for Europe was signed (European Parliament, 2004). The French and the Dutch rejected it. In Luxembourg and Spain it was approved.

In 2007 Bulgaria and Romania joined, and Slovenia adopted the Euro. After the failure of the EU Constitution the integration process stagnated. The visible deceleration triggered warnings against the return of rivalries among the EU members (Der Spiegel, 2007f). The situation had not changed by summer 2007.

2.3.2. Towards A Europe Of Science And Technology And Aerospace

The idea of transnational collaboration in Science and Technology (S+T) can be traced back to the early industrialization (Braillard and Demant, 1991: 6). After 1945 European integration inspired S+T (Braillard and Demant, 1991: 8-10) and air transport actors (Gasser, 1957: 238-244). Two ideal typic processes, the top-down and the bottom-up strategy, can be identified. The former covers initiatives by institutions with a supranational, e.g. European, competence (Mironesco, 1987: 203-214). Bottom-up initiatives are launched by other actors such as research centres or national governments (Guzzetti, 1995: 3-6).

Discussions on common S+T programmes began in the Council of Europe after 1949 (Guzzetti, 1995: 2). In 1950 several aircraft and equipment manufacturers established the European Association of Aircraft Industries[20] as a bottom-up platform. A year later the Council of Europe recommended a coordination conference of governments and European airlines. In the same year some carriers launched the Association of European Airlines (AEA)[21] (AEA, 2005). In 1953, the European Organization for Nuclear Research (CERN) represented the first R+D bottom-up initiative by scientists and national governments (Braillard and Demant, 1991: 10). In 1955 the European Civil Aviation Conference (ECAC)[22] was launched in cooperation with the ICAO. This was deemed the best way to implement the encouraged transeuropean conference. Europe became a distinct area within the worldwide air transport regime (Antoniou, 1998: 43-54). In 1957 the Treaties of Rome included the EURATOM research programme (Guzzetti, 1995: 13-15).

[18] www.ecb.int.
[19] www.ecb.int.
[20] www.asd-europe.org.
[21] It adopted the current name in 1973.
[22] www.ecac-ceac.org.

Positive trade-offs, more complex issues and the increasing financial needs inspired the national and European stakeholders to coordinate efforts (Daumas, 1981: 122-126). Ideas for common European Science and Technology (S+T) policies emerged after 1957 (Guzzetti, 1995: 16-22) but nationalisms remained strong (Guzzetti, 1995: 28-29). In December 1960 the European Organization for the Safety of Air Navigation (Eurocontrol)[23] was founded by the national Air Traffic Control (ATC) bodies (Eurocontrol, 2000: 1). In July 1963 the EEC Commission made the first recommendation to the member states on S+T cooperation.

During the early 1960s the idea of European S+T cooperation became more familiar (CEE/CECA/Euratom, 1960). Most stakeholders acknowledged the supremacy of the U.S. (Toffler, 1972). Following the observers of the time (Kracht, 1994: 25-32) and today (Mironesco, 1997) it was mainly based on state operated but independent research institutions. Examples were the Massachusetts Institute of Technology (MIT) or the Rand Corporation (Salmon, 1972: 11-17). National and European stakeholders slowly became aware of this. In March 1965 the Medium-Term Economic Policy Committee of the Commission set up the PREST[24] group. It explored S+T policies together with non-EEC members (Guzzetti, 1995: 39). In 1967 Eurocontrol opened a common research and tracing centre (Eurocontrol, 2000: 2). EEC professionals encouraged European instead of national S+T policies but the states ignored their proposals (Guzzetti, 1995: 74). Jean-Jacques Servan-Schreiber warned against the “American Challenge”[25]. The only strategy to prevent a 'technology gap' was to imitate the U.S. practices (Servan-Schreiber, 1969: 143-154).

In 1972 the first transnational ATC centre opened in Maastricht (Eurocontrol, 2000: 2). The Commissioner Altiero Spinelli heading the Directorate General (DG) III Industry initialized the European Research and Development Committee (CERD) where experts and national officials submitted joint programmes (Guzzetti, 1995: 49). The EEC and some EFTA countries set up the Committee on Scientific and Technological Cooperation (COST)[26] (Braillard and Demant, 1991: 13). In the same year the national certification bodies founded the Joint Airworthiness Authorities[27] for common approaches, standards and implementation.

A further milestone was the first EEC top-down S+T initiative through several Council Resolutions in 1974. One of them approved an EEC contribution to the European Science Foundation (ESF)[28] inspired from the U.S. National Science Foundation (NSF) (Guzzetti, 1995: 52). In 1975 the prospective Europe+30 final report by the DG XII Research, Science and Education confirmed the need for European public policies (Guzzetti, 1995: 95). In 1978 the Forecasting and Assessment in the Field of Science and Technology (FAST) initiative was launched (Guzzetti, 1995: 99). In 1980 five European carriers created the European Regions Airlines Association (ERAA)[29] (ERAA, 2005). In December a Council Directive on cooperation in Air Accident Investigation was promulgated (80/1266/EEC, 1980: 32-33).

In 1982, the European Strategic Programme for Research and Development in Information Technology (ESPRIT) promoted the EEC-wide collaboration. European firms were mostly experienced as competitors for historical reasons (Guzzetti, 1995: 77). In 1983 the Commission initialized the Strategic Programme for the Transnational Promotion of Innovation and Technology Transfer (SPRINT) (Guzzetti, 1995: 87). A survey in

[23] www.eurocontrol.int.
[24] The French acronym means Politique de recherche scientifique et technique (Braillard and Demant, 1991: 13).
[25] Known in Europe under its French title “Le défi américain”.
[26] www.cost.esf.org.
[27] www.jaa.nl/introduction/introduction.html.
[28] www.esf.org.
[29] www.eraa.org.

1984 revealed that EEC programmes were now one of the selection criteria for production sites (Vink, 2003: 63-74). Their investments optimized the macro-economic Path Dependence of Europe (Guzzetti, 1995: 79-80). The Commission took a new top-down initiative in favour of European S+T through the first Framework Programme from 1984 to 1987 (Guzzetti, 1995: 84). Others focused on industrial technologies (Braillard and Demant, 1991: 14), among them composites[30] for airframes (Guzzetti, 1995: 87).

In April 1985 the French President François Mitterrand launched the EUREKA[31] programme for S+T cooperation among as many European countries as possible in order to catch up with the U.S. and Japan (Braillard and Demant, 1991: 115). This bottom-up venture was inspired from the American Strategic Defence Initiative (SDI)[32] (Lefebvre, Rotemberg et al., 1992: 31-33). Many saw EUREKA as the decisive shift from a national to a European perspective (Cabral, 1999: 238-253). Article 130 of the Single European Act (SEA) of 1986 illustrated this change: "The Community's aim shall be to strengthen the scientific and technological basis of European industry and to encourage it to become more competitive at international level" (European Commission, 1987). Stakeholders differentiated Europe from other regions of the world (Guzzetti, 1995: 153). From 1987 to 1991 the Second Framework Programme grouped top-down programmes (Guzzetti, 1995: 129-137). After 1987 the European Airworthiness Authorities standardized aircraft operations (JAA, 2005). In 1990 the Joint Aviation Authorities (JAA) (JAA, 2005) replaced them.

From 1990 to 1994 a Third Framework Programme followed. One of the foci was again materials for aerospace. In December 1991 a Council Regulation harmonized procedures in civil aviation based on JAA and ECAC inputs (CR 3922/91, 1991: 4-8). The Maastricht Treaty extended Article 130 of the SEA: "1. The Community and the Member States shall ensure that the conditions necessary for the competitiveness of the Community's industry exist while promoting all the research activities deemed necessary by virtue of other Chapters of this Treaty" (EU, 1993). The EU took over S+T policies from the members (Guzzetti, 1995: 155). A fourth Framework Programme ran from 1995 to 1998 (Guzzetti, 1995: 172).

Two fundamental changes after 1989 lowered the overall outcomes of these initiatives. Strategic investments such as S+T and infrastructure were no longer seen as a necessity for the company's future (Perrin, 1971: 7-11). Instead they were discarded as a nuisance since they absorbed the liquidities and the benefits of the shareholders. This focus on short-term profit (Stockhammer, 2004) is usually seen as a result of a paradigmatic change which began in the U.S. in the late 1970s. Often it has been defined as 'neoliberalism' (George, 1999)[33]. Expenditure cutting (Bank Julius Bär, 2003b: 2-8) and reorganizations (Champy and Nohria, 1996: xiii-xxx) became permanent. The second phenomenon closely linked to the first has been known as globalization (Held and Mc Grew, 2000: 1-45 1-28)[34]. A sequence of innovation processes in information technology (Cairncross, 2001), political regime changes and a declining ideological competition (Osterud, 1992: 12-23) enabled large-scale delocalizations into low-wage countries (Slaughter and Swagel, 2000: 177-180). Even strategic industries were affected (Horrocks, 2006). Countries and regions competed for investments (Schwab and Smadja, 1994: 100-110). Economic optimization became a decisive pull factor

[30] Composites are plastics used for cars, ships or aircraft. They are much lighter than metals so that fuel consumption is reduced (Morrison, 2006: 25).
[31] www.eureka.be.
[32] It was commonly known as Star Wars.
[33] The mostly polemic debate has usually been linked to issues such as welfare or working conditions in a left-right-wing perspective. Being of no relevance for the research it is not developed. A scholarly introduction to the phenomenon of neoliberalism is given by (Willke, 2003).
[34] The debate on whether this is positive (Wolf, 2004) or negative (Hirst and Thompson, 1999) has been as passionate as the discussions on neoliberalism. Being irrelevant for the research the discussions are not detailed.

for European integration (Ward and Lofdahl, 1995: 11-27). The demand for airframes was boosted by neoliberalism and globalization (Nader and Smith, 1994).

In October 1994 the Council published a resolution in favour of aviation and the aerospace industry ((94/C 309)02, 1994: 2-3). In March 1996 a White Paper on European air traffic control was adopted (COM(96) 57, 1996). Eurocontrol launched the implementation process (Eurocontrol, 2000: 5). In September the Commission concluded that the only way for the European aerospace industry to resist U.S. competition was its consolidation (COM(97) 466 Final, 1997). On 12th November it outlined the EU strategy on defence-related industries among them aerospace (COM(97) 583 Final, 1997).

In 1997 the European Association of Aerospace Industries (AECMA)[35] suggested the European Integrated Aeronautics Programme (EIAP) (Allgeier, 1998). It was justified with the U.S. STPs (Moxon, 1998). In the fifth Framework Programme from 1998 to 2002 (European Commission, 1999) aerospace remained a priority (European Commission, 1999). This mirrored the European Research Area Initiative (Lisbon Strategy)[36] (COM (2000) 6, 2000) which intended to transform Europe into the world's first S+T region. In January 2001 another group published the "Vision of 2020" on invitation by the European Commissioner for Research (European Commission, 2001). It claimed that Europe had the potential to become the world leader in aerospace provided that all actors adopt a long-term commitment. Aerospace actors also established the Advisory Council for Aeronautics Research in Europe (ACARE)[37] in 2001 (ACARE, 2005).

The sixth Framework Programme extended over the years 2002 to 2006. 50 aerospace modules were selected (European Commission, 2002). Some experts worried against a new technology gap in favour of China (NZZ, 2005). The warnings of the 1960 were against eroding production capacities, those at the turn of the century against voluntary technology transfers (Deckstein, Dettmer et al., 2006: 70-73). Many saw this as yet another outcome of the dominant short-term thinking and profit maximization (Morris, 2005: 10). In July 2002 the European Parliament and the Council established the European Aviation Safety Agency (EASA) (Regulation (EC) No 1592/2002, 2002: 1-21). In September 2003 a Commission Regulation laid down the rules for aircraft certification (CR 1702/2003, 2003: 6-79). In 2005 the Commission initialized the project for the Single European Sky based on the integration of the national airspaces (Eurocontrol, 2006).

While the Sixth Framework Programme was in progress the seventh from 2007 to 2013 was launched (Potocnik, 2006). It included again applied research in aerospace[38] but did so in a new context. The negative experience of a part of the population and even stakeholders with the transformation of long-term commitment into short-term profit had probably been one of the reasons of the failure of the European constitution. European integration was increasingly seen as an outcome of globalization and neoliberalism (Giddens and Hutton, 2000: 213-223) and no longer the decisive step towards the common interests and identity (Beck, 2000: 164-174). Therefore it was approached in a more critical way than before. One of the reasons was the fact that many citizens did not feel any professional and social progress (Kreisky, 2001: 38-50) but were affected by the negative impacts such as deteriorating working conditions or layoffs (Roesch, 2003). Despite the decline in commitment to Europe the EU remained an S+T driver and a policy area. For 60 years shared

[35] In 2004 the organization resulting from earlier mergers between the association of 1950 with several others adopted its current name Aerospace and Defence Industries Association of Europe (ASD). See www.asd-europe.org for details.
[36] http://ec.europa.eu/research/era/index_en.html.
[37] www.acare4europe.org.
[38] http://ec.europa.eu/research/fp7/.

visions and expectations have reshaped the political, economic and cultural landscapes of Europe more than it appears to the casual observer.

2.3.3. From Continental Cooperation To European Unification

The current configuration of Europe is the result of Path Dependences established through bottom-up and top-down initiatives. From a vague promise of a better future it has grown into an objective, a programme and a framework. The evolution can be considered as an innovation with roughly ten steps (Deleon, 1999: 19-32). The collective trauma and the need to rebuild after 1945 motivated the stakeholders to pacify their mutual relations (Saint-Ouen, 1989: 129-141). The Cold War represented an additional push factor (Gaddis, 2005: 20-22). The European idea had reactive and proactive motivations (Steffan, 1957: v-viii).

In a second step from 1949 and 1957 first positive experiences with international organizations (Schwok, 2005: 40-44) encouraged the governments to cooperate. They initialized programmes in fields where the trade-offs were promising but where no direct state interests were at stake (Sarooshi, 2003). This was the case for basic resources and industries without immediate strategic connotation. S+T and aerospace actors were inspired by this new system of reference and launched initiatives based on it. Outside their common denominators all actors continued to compete against each other. There was no real 'common identity'.

The third step between 1957 and 1962 transformed the cooperation into a strategic objective for coordinated governmental initiatives. The Treaties of Rome represented a pro-active attempt for political and economic innovation based on common denominators (Deniau, 1959). The new institutions were enabled to promulgate supranational legislation. The positive impact encouraged national stakeholders to launch programme coordination and resource pooling (Abbott and Snidal, 1998: 3-32). The positive impacts encouraged similar initiatives by other actors such as the cooperation in national air traffic control.

In a fourth stage from 1962 to 1968 the European framework became a parameter for national and international policy-making of the members. Like any organization the EEC institutions went through institutional learning processes and became able to develop beyond the contributing members' expectations (Sarooshi, 2003). The EEC evolved from a responsive into an autonomous entity. Although they had no true supranational prerogatives the institutions began to shape the decisions of state and other stakeholders even in cases where the latter's interests remained conflictual. The EEC launched its own pro-active programmes in a supranational perspective. Air transport actors adopted a similar geography-focused attitude. The political innovation process shaped the attitudes of stakeholders. The resulting institutional framework and system of reference was robust enough to resist hostilities from one of the members. First common initiatives in favour of a European air traffic management illustrated the choice of this new approach in other fields as well.

Between 1968 and 1974, in a fifth stage, the European institutions emancipated themselves. 'Europe' became an international subject in its own right. It influenced members and stakeholders and the rest of the world (Badie, 2004: 97-102). The EEC became aware of its capability to shape national attitudes although the impact on the member states remained limited. They did not tolerate any foreign interference with their Strategic Trade Policies (STPs). Aerospace actors agreed on common regulation.

During the sixth stage from 1974 to 1979 the relationship between the member states and the EEC became symbiotic. The members transferred more and more national prerogatives such as monetary policy to Brussels (Huggins, 1997: 265-285). The EEC began to influence national S+T policies through top-down initiatives. In parallel it evolved from a subject into an international actor. Although the members remained the main agents the EEC negotiated and signed international agreements.

Throughout the seventh from 1979 and 1986 the EEC became a major policymaker. Direct elections of the European Parliament influenced the way European issues were discussed (Mironesco, 2003: 135-160). Pressure from the U.S. and Japan motivated the members and the EEC institutions to launch the Single European Market as the most ambitious project so far. The EUREKA bottom-up initiative completed with top-down ventures extended the ambition to S+T. Most stakeholders, including those from S+T and aerospace, considered Europe and no longer their own country as their system of reference in the context of global competition. Aerospace became a target for indirect STPs through European top down initiatives.

From 1986 to 1993 this new attitude transformed Europe during an eight stage. The Single European Act differentiated the EEC from the rest of the world. The end of the Cold War in 1989 (Gaddis, 2005: 229-236) accelerated the integration process and stimulated a European identity. The Maastricht Treaty officialised the de facto supranational status of the EEC and increased its policy-making and –implementing capacity. The EU as which it was known by now developed into something between a federation and a federal state (Braillard, 1996: 21-25). Other states such as the U.S. now considered 'Europe' and no longer the individual states as the 'competent entity' in negotiations. The same was the case in aerospace programmes.

Between 1993 and 2005 the EU consolidated during a ninth stage. The Single European Market and the new information technologies virtually transformed Europe one area (Bernauer, Schneider et al., 1995: 193-197). The Treaty of Amsterdam gave it further attributes of a sovereign state. Among them were a (more or less) common foreign and security policy and a European citizenship. S+T and aerospace actors increasingly considered Europe as their ‘framework of reference’. The EU became the principal policy maker although the interests and motivations of the members often continued to diverge (Mironesco, 2003: 135-160). One of the pull factors of the Treaty of Nice was to ‘officialise’ the integration. The EU institutions consolidated their influence in air transport through the reorganization of the European airspace. The Commission proposed European STPs in favour of manufacturers. These turned towards the EU as an answer to U.S. support to their industry. By now aerospace represented a key issue in the European research area. Finally the EU took over safety regulation and the certification of aircraft.

After 2005 the European integration decelerated. The origins of the regressive tenth stage are found in the rejection of the European Constitution following a surge of mistrust as a result of the negative impacts of globalization and neoliberalism on the lives of many (Giddens and Hutton, 2000: 213-223). The lower commitment to Europe did not ‘cancel’ 50 years of history. Like any innovation and optimization process it has shaped society in multiple and irreversible ways. The stagnation of the EU did not mean a return to the situation prior to 1957 but an evolution in a new direction. Most aerospace and other economic, social and cultural actors continue to consider themselves ‘European’. This outcome of a long transformation process cannot be simply ‘erased’ from the minds and thus the practices (European Parliament, 2006).

The history of the Europe of aerospace more or less parallels the constitution of the Europe of technology. Its roots are found in the first stage of the process. Aerospace actors in various countries experienced common challenges. The states continued to consider any extraterritorial intervention into strategic industries and programmes as unacceptable. Attempts to 'Europeanize' failed since the recently established global air transport regime was deemed adequate. First initiatives of cooperation illustrated a new pragmatic approach to explore synergies where no strategic interests were at stake. During the second and third stage first pro-active steps towards air transport optimizations were attempted through S+T resource pooling. Promises of synergies encouraged the national regulation bodies to converge so that a fourth stage was initiated. During the fifth the European air transport actors experienced learning processes. In parallel with the sixth the move began to include basics of air transport such as air safety. The states agreed to transfer essential prerogatives to Europe. In the seventh stage the states adhered to top-down initiatives which had the manufacturers as targets. The Framework Programmes illustrate the transfer from national to European STPs. During the eighth stage the European integration extended more or less to the aerospace industry as a whole. States and industrial actors closely worked together within common STPs under EU leadership. The ninth witnessed the full integration of aerospace into the European S+T and general programmes. The EU became de facto the sole policymaker. The current stage has not changed this so far. Like the general European integration process or the Europe of Technology the Europe of aerospace is the outcome of pro-active and re-active decisions shaped each by push and pull factors.

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Chapter 3 - From Competition To Integration (1964 - 2006)

3.1. Introductory Remarks

The sections outline the major events and their outcomes (Bennett and George, 2001: 137-166) confirmed by the majority of the sources (Marrou, 1989: 117-139). Whenever this is not the case the choices are based on their relevance for the research question (Larson, 2001: 327-350).

3.2. From Origins To Stage Setting

In this section the history of the aircraft manufacturers on both sides of the Atlantic prior to Airbus is outlined.

3.2.1. European Fragmentation

During the Great War (1914-1918), numerous young men learned to fly. A return to a 'civil' life proved next to impossible for many of them (Lewis, 1993: 257-266). The disrupted railways in France and Belgium encouraged some to offer air transportation (Bonomo, 1926: 12-21). First airlines emerged in 1919. Most of them were backed up by the state. Many countries made aircraft construction a national priority. In Germany several carriers began operations with the world's first dedicated passenger aircraft Junkers F13 (Gunston, 2001: 171). The main objective was to overcome the country's political isolation through technological leadership (Isler and Dollfus, 1933: 28). French air transport served the national prestige and strengthened the ties with the colonies (Perrin, 2002: 158). In the U.K., the conquest of the air was popular for its technological challenge (Shute, 2000). Most governments focused on national actors and markets.

3.2.2. U.S. Integration

After 1918 the country had its share of unemployed pilots. Many of these 'barnstormers' (Collar, 1997) took up pleasure flights (Knauth, 1982: 11). Aircraft construction became the business of entrepreneurs (Ingells, 1970: 30-34). Military hardware was usually the result of tenders. In 1926 the Air Commerce Act established national standards for crews, aircraft and equipment for scheduled air transport (Knauth, 1982: 19).

In the early 1930s, Boeing proposed the B247 as the fastest machine of its time (Ingells, 1970: 51-55). The technological leap encouraged United Airlines to sign an exclusive contract. A number of airlines in the U.S. and abroad became interested but the manufacturer stood to the priority delivery of 60 units. One of the rebuked carriers was Trans Western Air (TWA)[39]. It approached the competitor of Boeing, Douglas, and requested the superior Douglas Commercial DC 1 but TWA insisted on further optimizations (Anderson, 2002:

[39] In 1945 it was renamed Trans World Airlines. It does not operate anymore.

188-189). The DC-2 outperformed the Boeing 247. Airlines from all over the world, among them the Dutch KLM and Swissair, ordered it. A decade later Boeing reclaimed the lead with the B307 Stratoliner. It was the first commercial aircraft with a pressurized cabin[40] (Caidin, 1959: 163).

3.2.3. Foundations Of U.S. Supremacy

The operations from and in the air played an essential, probably decisive role in World War Two. The U.K. focused on fighter aircraft. The U.S. specialized in long-range bombers. In 1944 the U.S. became a major promoter of an international post-war air transport regime (Zandt, 1944: 22-43) based on the 1944 Chicago Convention (Milner, 1993: 207-232). After the war, Douglas DC-3s and DC-4s were distributed in the context of the Marshall Plan. In the 1950s, the DC-6 and the Lockheed Constellation based on earlier models followed. The evolutive updates reduced cost of transfer for operators (Kracht, 1994: 21).

Even before the war ended the U.K. industry attempted to re-enter the civil market (Thetford, 1948: 27). The Tudor of 1945 was tailor-made for the needs of British South American Airways (Brookes, 1992: 36-48) and presented no interest even for other British carriers. The Bristol Brabazon of 1949 attempted a quantum leap in size and comfort but the national British Overseas Airways Corporation (BOAC) refused it owing to its low speed (Wall, 1999) and turned to U.S. supply. Things were different on European routes. The robust Vickers Viking launched in 1944 and superior to the DC-3 equipped the other national carrier British European Airways (BEA) and convinced some foreign operators (Thetford, 1948: 33).

The only way to win back market share was a comparative advantage through a jet aircraft. British research institutions, the Ministry of Supply and De Havilland presented the Comet 1 in 1949. It proved superior to any U.S. competitor (Dempster, 1960). A series of spectacular accidents ended its career in 1954. Investigations revealed fundamental design errors. In 1958 the Comet IV followed. It was based on the earlier model and outdated in respect to the U.S. jets which had dominated the skies for two years. In 1953, the Vickers Viscount propeller transport revolutionized short haul transport and was sold 445 times (Fricke, 1968: 37).

In France the manufacturers had to begin from scratch and submitted several propeller aircraft. They were inferior to the U.S. competitors so that the national Air France ordered their products. Inspired by the U.K. technological leap but drawing the lessons from the failure of the Comet the French Secretariat of Civil Aviation encouraged the Toulouse-based Sud Est Aviation (later Sud Aviation) to launch the Caravelle (Wegg, 2005: 50-55). Although the design of 1955 was largely influenced by Air France, it attracted many customers. In 1960, Sud Aviation sold 20 to United Airlines. Shortly afterwards Boeing showed an interest in transatlantic cooperation. Its competitor Douglas made a more attractive offer and a formal licence agreement was signed. Soon first documents were transferred. Too late did the French notice that Douglas was using their plans for its DC-9-15 (Kracht, 1994: 37).

The German industry was dismantled after 1945[41]. All the plans were taken over by the allies and influenced their work (Costello and Hughes, 1976: 21). The Paris Treaty of 1955 allowed again airframe construction to the Federal Republic of Germany. Unlike their colleagues in the U.K. and France, the German stakeholders

[40] Since the low atmospheric pressure does not allow breathing the cabin is pressurized (Bristow, 2003: 41).
[41] If not stated otherwise the following paragraph is based on (Kirchner, 1998: 17-80).

did not enforce national aircraft to their airlines. Contacts with Spain for a transnational collaboration led to nowhere. Rumours persist to this day that the promising project was halted by the Federal Government which did not want to upset the German-French relationship through a superior competitor to the Caravelle[42]. The absence of state involvement in any programme condemned all of them with the exception of the small HFB-320 Hansa Jet executive aircraft. In the German Democratic Republic, the facilities were dismantled as well. In the mid-1950s, Soviet Ilyushin IL-14s were manufactured under licence. The attempt to develop the Baade 152 jet was abandoned after the crash of a prototype in 1959 (Richter and Wolf, 1997: 17-19).

3.2.4. The U.S. Lead The World

In 1952, Boeing and Douglas announced each a four-engined long range aircraft. A fierce competition between the Boeing 707 (Machat, 2004: 14-27) and the DC-8 (Thomas, 2005: 12-23) began long before the maiden flights in 1958. Boeing profited from its experience with tankers[43]. After 1959, the smaller Boeing 720 joined the race (Baum, 1999: 32-47). Other manufacturers attempted to get their share. Convair, a supplier of strategic bombers, launched the four-engined CV880 for transcontinental routes in 1957. The performances were below the expectations. The CV990 Coronado became the fastest subsonic civilian aircraft ever built. It attracted some customers, among them Swissair, but only 37 were sold (Proctor, 1996).

In 1963, Boeing presented the three-engined B727 (Mansfield, 1965). Two years later, the smaller Douglas DC-9 followed (Nibloe, 1965). In 1965, the similar-sized Boeing 737 was launched (Norris, 2006: 34-35). Unlike the DC-9 which had no commonalities with the DC-8, the 'Baby Jet' included many of the components of the earlier Boeing jets. Economies of scale were considerable. Although Douglas had sold more civil aircraft than Boeing before the DC-8 and the DC-9, the investments had exhausted its reserves. In 1967 it was taken over by McDonnell specialized in military hardware. The symbiosis of military and commercial aircraft boosted the U.S. industry (Lawrence and Thornton, 2005: 3-5).

In 1964, the U.S. government issued a tender for a large military transport aircraft (Lawrence and Thornton, 2005: 49). It was won by Lockheed. Boeing decided to use the know-how. Encouraged by prospective studies (Gunn, 1964: 206-229) confirming the need for a large aircraft for the 1970s, it announced a transport for 490 passengers. This was almost three times the capacity of the existing jets. In 1966, Pan Am[44] ordered 25 of the new B747. The capital needs were such that Boeing associated major risk sharers to the programme (Gilchrist, 2000: 27). The Jumbo Jet became the first widebody and initiated several disruptions. Its roomy cabin had two aisles instead of one. Terminal and cargo facilities had to be redesigned. One of the inventions was the luggage container for the underfloor cargo hold (Horan, 1967: 15-23)[45]. The B747 was rolled out in 1968. The programme suffered a blow in 1969 when the evacuation of 490 people failed (Moser, 1986: 150) and the aircraft was certified for fewer passengers so that overall productivity was lower (Gilchrist, 2000: 56). The programme provoked a financial haemorrhage as well. In 1969 Boeing almost went bankrupt.

[42] In 1958, the German Luftwaffe had rejected the French Mirage interceptor aircraft in favour of the Lockheed Starfighter (Kirchner, 1998: 63).
[43] A tanker is an aircraft used for in-flight refuelling of other aircraft, usually fighters and bombers.
[44] This pioneering company ceased operations in 1991.
[45] The advantages are speedier planing/deplaning operations since the individual pieces of luggage are loaded inside the terminal complex, grouping of the luggage for each intermediate stop, easier transfer of containers to connecting wide body flights and the possibility to combine passenger luggage and cargo. See (Wells and Wensveen, 2004: 386-389) and (Ashford, Stanton et al., 1995: 293-297) for details.

Layoffs and salary cuts led to a recession in its hometown Seattle (Sell, 2001: 25-27)[46]. The company even considered the sale of the B737 programme to Japan (Norris, 2006: 30-33). Military contracts and the successes of the B727-200 avoided the worst (Lawrence and Thornton, 2005: 50-52).

In 1966, the technical director of American Airlines Frank Kolk suggested a smaller widebody for 250 passengers for secondary airports. It should offer the same luggage handling conveniences as the B747. Lockheed was the first to offer a very elaborate aircraft with three engines for 250 to 300 passengers named the L1011 Tristar (Berke, 2000: 58-64). Six months later, McDonnell-Douglas proposed the similar but simpler DC-10. Both manufacturers knew that the market was promising but limited. One product would pay the investment back and, since it was in a situation of monopoly of supply, become profitable. If two suppliers competed against each other, none of them would sell enough and the price had to be lowered to attract the 'marginal' customer to convince the competitor to abandon its programme (Machat, 2002: 22-41).

American Airlines found the DC-10 the best compromise for its Air Bus concept and ordered 25 in 1968 (Machat, 2002: 22-41). Other U.S. airlines ordered 114 Tristars (Ingells, 1973). Lockheed had the lead and McDonnell-Douglas was expected to abandon and reimburse the deposit paid by American Airlines. United Airlines favoured the Tristar. Since the early delivery positions were booked, the carrier ordered 30 DC-10s (Fielder and Birsch, 1992: 1-12). This decision not to support the leader illustrated the attempt to prevent a monopoly. Lockheed kept its advance but McDonnell-Douglas was now forced to continue. Penalties for cancellation would have hit the company as hard as the uncertain prospects of the programme.

Unexpectedly the Tristar ran into trouble with its engine. The leading U.S. manufacturer Pratt & Whitney[47] was under contract for the B747. From the beginning McDonnell-Douglas had monopolized the other U.S. supplier General Electric[48]. Lockheed had chosen the British Rolls-Royce[49] company. Subsidies allowed a lower price for the very promising device. At a late development stage the motor failed a crucial safety test and retrofit without compromise on the performance proved impossible. Changing the supplier was no longer an option owing to technological and contractual lock-ins (Berke, 2000: 58-64). Governmental intervention on both sides of the Atlantic avoided a meltdown (Turkel, 1981: 41-77). In the meantime the DC-10 progressed. Rumours about design flaws tolerated by the authorities as a way to maximize the market chances of the DC-10 persisted (Fielder and Birsch, 1992: 1-12). Both aircraft entered service in 1972.

3.2.5. The European Incapacities To Respond

After the Comet disaster and the rise of U.S. competition, the future of British constructors did not look too bright although it was a BOAC Comet IV that opened transatlantic services in 1958 (Walker, 2000: 71). Following a request from the Royal Air Force (RAF) Vickers suggested the VC7 jet (Das, 1955: 55). Shortly before its maiden flight in 1955 it was cancelled by the RAF and BOAC showed no interest. The almost complete prototype was scrapped. The CEO of Vickers complained: "We have handed to the Americans, without a struggle, the entire world market for big jet airliners" (Barfield, 1989: 18-32). Shortly afterwards BOAC submitted a requirement for a larger aircraft. Since none was available following the earlier decision,

[46] In 1968, Boeing had over 100,000 employees at its Seattle plants. By 1971, the number had fallen to 37,000. Unemployment rose to 17 percent.
[47] www.pratt-whitney.com.
[48] www.geae.com.

BOAC obtained the authorization to order 15 Boeing 707. In 1957 it issued a request for a new machine for its African destinations. Vickers launched the VC10. It was too small for the other routes. Only BOAC and a handful of other operators flew it after 1962. The larger Super VC10 came too late to challenge the U.S. jets (Finnimore, 1989: 13-14).

In 1956 British European Airways (BEA) issued a requirement for a short-haul jet. A demand for subsidies by De Havilland to the Ministry of Supply was rejected. In 1958 the Ministry of Transport approved BEA's order for 24 of the 120 seaters. Shortly afterwards, BEA downsized the request to 100 places (Kingsley-Jones, 1993: 16-19). In the meantime, Boeing had initialized the B727 with the capacity of the original De Havilland proposal. Like the French, the British attempted transatlantic cooperation. A Boeing delegation was granted access everywhere. In Seattle the De Havilland people were denied any information. When it carried out its maiden flight in 1962, the DH121 Trident was superior to the B727 (Kingsley-Jones, 1993: 34-36). Being too small, it attracted only BEA, two independent U.K. airlines and four from Commonwealth countries. Two larger versions were outdated at the time of market entry (Kingsley-Jones, 1993: 89-98).

France's Sud-Aviation began studies on a successor to the Caravelle in 1960 (Sparaco, 2005a: 36). Some preferred a stretched version of the existing aircraft to accelerate market entry. Others suggested a competitor to the B727. Sud-Aviation proposed the Caravelle XX to Air France. The "Grosse Julie" as it was nicknamed was powered by Rolls Royce engines. Since the parallel supersonic Concorde programme absorbed 94 percent of all resources the larger Caravelle was discussed. It was no longer competitive so that Air France ordered the B727-200. In 1966, Sud-Aviation and Dassault Aviation[50] proposed the Galion widebody for 250 persons. In parallel Breguet worked on a large four-enginer for 264 passengers (Sparaco, 2005a: 43). In 1965 both negotiated with Hawker Siddeley but without getting any results. Dassault Aviation was convinced that short-hauls were better served through higher frequencies than larger capacities. It accordingly elaborated a competitor to the DC-9 and the B737. The aircraft was larger with 140 seats and faster. Rolls Royce engines were planned but a U.S. Pratt & Whitney thruster was chosen. Under the leadership of Dassault Aviation the Mercure was launched in 1969 as a partnership of Belgian, Canadian, Italian, Spanish and Swiss companies. The prototype rolled out in 1971. A first order for ten came from the French domestic Air Inter in 1972. Once again the product was too market-specific (Kirchner, 1998: 82-83).

In West Germany the Federal Association of the Air Transport Industry (BDLI) suggested public funding in 1961[51]. After the dismissal of the idea the BDLI warned that further delays would undermine the industry as a whole. The German government concluded that the existing supply was appropriate. In 1963 Chancellor Ludwig Erhard announced interest-free loans of 60 percent of the total budget of a programme. The Ernst Heinkel Flugzeugbau announced a regional jet. Total cost was estimated at DM 60 millions. The 40 percent at the manufacturer's charge were beyond its means and the project was cancelled in 1965.

Another attempt was more successful. In 1965 the Vereinigte Flugtechnische Werke (VFW) launched the VFW-614 for 44 passengers. A potential for several hundred was identified. In 1967, the Federal Government approved funding provided that other partners joined. The VFW negotiated with the Dutch Fokker since it contributed to the F28. The VFW attempted in vain to interest the Northern Ireland based Short Brothers

[49] www.rolls-royce.com.
[50] http://www.dassault-aviation.com.
[51] If not stated otherwise the following section is based on (Kirchner, 1998: 67-106).

since they participated in the F28. Rolls Royce engines were chosen. In 1969 VFW and Fokker set up the Zweckgemeinschaft VFW-Fokker as the first transnational marketing agency in the history of aeronautics. Divergences outweighed common interests. The Dutch saw the aircraft as a competitor to their F28. Lufthansa cancelled the regional routes so that by 1970 there were only 15 options[52] from six airlines. In 1971, the prototype took off (Weder and Fricke, 1971: 15). Production began in 1974 and was ended after the delivery of 19 units.

3.2.6. Four Exceptions: BAC 1-11, F28, Transall And Concorde

One manufacturer chose a mission-profile specific approach; another increased its resources through cooperation. Two more programmes showed the potential of governmental cooperation.

In 1960, the U.K. government forced several manufacturers to merge into the British Aircraft Corporation (BAC)[53]. This reduced the number of manufacturers to two, the other being Hawker Siddeley. A research involving 89 airlines from all five continents revealed a potential for 600 small jets. In March 1961 the BAC 1-11 was launched with an order for ten from the private British United Airways. Unlike other European hardware the BAC 1-11 was not focused on one or several airlines but a generic mission profile. Soon U.S. domestic carriers committed. Douglas criticised: “We regret American Airlines has elected to buy an airplane built abroad and which we consider to be an inferior product to ours” (Skinner, 2002: 15). The U.S. Civil Aeronautics Board (CAB) claimed that jets would need subsidies[54]. When the same carriers ordered DC-9 this concern was no longer raised. Production was halted in 1984 after a total of 663 units. Although the airframe was still competitive rising fuel cost no longer allowed commercially viable operations.

The Dutch Fokker F28 Fellowship mirrored the potential of transnational bottom-up cooperation. During the interwar years the Dutch Fokker company was one of the few market-driven European constructors and had set up a subsidiary in the U.S (Klaauw, 1962: 57-60). In the 1950s it launched the Fokker F27 Friendship with British Dart engines (Hooftman, 1963: 64). From 1958 to 1986 786 of the 44-seaters were delivered. In 1962 Fokker announced a short-haul jet aircraft for 65 passengers together with Short Brothers from Northern Ireland and VFW from Germany. The Dutch government assumed 50 percent of the cost. After its entry into service in 1969 a total of 241 were built until 1986 (Kreuzer, 1991: 114-117).

There was a top-down transnational programme as well. In 1956 Germany joined the NATO and needed a transport. The Ministers of Defence of France and Germany initiated a joint programme within the framework of French-German friendship (Grosser, 2004). After a governmental treaty the French Nord-Aviation and the German Hamburger Flugzeugbau, which had already manufactured the French Noratlas under licence, the Weser Flugzeugbau (later VFW-Fokker) and others formed the joint subsidiary Transporter Allianz or Transall in 1959 (Sparaco, 2005a: 355). It coordinated the development of the new aircraft. The parent companies remained independent. A prototype flew in 1963. 180 were built in France and Germany between 1968 and 1972. 50 went to the French and 110 to the German air force. Nine were delivered to South Africa. In 1971 the Germans sold 20 to Turkey.

[52] In aircraft-related transactions an option means an announcement or promise to order at a later date.
[53] If not stated otherwise, the following section is based on (Skinner, 2002).
[54] Both later operated the BAC 1-11 nonetheless.

It is however the Concorde that illustrates best the structural weaknesses of European manufacturers and the promises of combined bottom-up and top-down transnational initiatives. The programme was a pro-active attempt for a technological leap similar to that of the Comet (Costello and Hughes, 1976: 7). In the late 1950s U.K. and U.S. research institutions launched research on commercial supersonic aircraft. Informal contacts of the U.K. manufacturer with Sud Aviation were approved by both governments. The French stakeholders were not against cooperation as long as the outcome was consistent with its strategy since cost was prohibitive (Simi and Bankir, 1968: 77). President de Gaulle had launched an ambitious scheme for the nation's future based on a nuclear arsenal, technological leadership and infrastructure. London welcomed the opportunity to revigorate the eroding industrial basis of the U.K.. A partnership with the traditional continental rival was seen as the best way towards EEC membership (Costello and Hughes, 1976: 51).

After delicate negotiations a Franco-British governmental treaty on a supersonic aircraft for some 100 passengers for medium to long routes was signed on 29th November 1962. The Concorde became the first attempt to pool strategic national resources in view of a common outcome, even if the motivations were different. The institutional frameworks and practices of both countries (Frey, 1997: 29-44) as well as the absence of earlier examples led to a complex programme structure[55]. Although the treaty proclaimed an integrated approach each side set up its own facility. The different mentalities and practices were almost impossible to conciliate (Costello and Hughes, 1976: 76-80). In 1963 President John F. Kennedy announced the participation of the government in the superior Super Sonic Transport (SST) (Dwiggins, 1968: 64-65). The Boeing 2707 for 230 passengers could optimize the geometry of its wings. Once again Europe seemed on the losing side. This seemed even more the case when the British Labour government elected in 1964 suggested the termination of the Concorde but the absence of any exit clause made this impossible. After diplomatic tensions the programme was continued (Costello and Hughes, 1976: 86-100). By July 1967 the Concorde had 74 options from 16 airlines among them Pan Am and TWA, the B2707 108 from 25 customers. Air France and BOAC had ordered both aircraft (Sparaco, 2005b: 58-100).

The Concorde was taking shape in Toulouse and Filton while the B2707 remained on the drawing board. The variable wing design which had been the main argument proved not possible. Only new funding saved the project since the manufacturer was absorbed by the B747. The programme was increasingly criticised. In the light of new knowledge[56] and experience[57], technology was no longer seen as the key to a bright future but a potential hazard (Feenberg, 1996: 45-70). First ecological movements emerged[58]. In a surprisingly short time they became able to influence the political agenda (Tarrow, 1994). The first Concorde flight was on 2nd March 1969 (Costello and Hughes, 1976: 155). When the Senate halted support for the SST in 1971 there was no outcry. Boeing which already experienced a crisis immediately sacked another 7.500 people. The "Greening of America" (Lawrence and Thornton, 2005: 58-59) was seen by those for and against the programme as the beginning of the decline of U.S. aerospace supremacy (Serling, 1978: 1-2).

In 1973 the Concorde suffered blows in turn. All North American airlines cancelled their options. The oil shock increased cost of operation (Sparaco, 2005b: 105). Like the B2707 the Concorde became a target of

[55] For instance, any British document had to be translated by an official translator before the French side was even allowed to look at it.
[56] An early example of such research is Silent Spring by Rachel Carsons published in 1962.
[57] Such as the sonic bang which was no longer lived as "freedom's protective barrier" (Morris, 2004: 28-43) but a nuisance.
[58] The best-known are Friends of the Earth and the Citizen's League Against The Sonic Boom with more than 25.000 members.

the ecological movements emerging by now in Western Europe as well (Lippe, 1979: 73-84)[59]. The aircraft was certified in 1975. Only Air France and British Airways which resulted from the merger of BOAC and BEA in 1973 took over seven respectively six of the 20 aircraft built without paying for them. History has retained the Concorde as a technological marvel, a masterpiece in policy making and a disaster in economics. Even if there had been no change of attitude after 1968 and no oil crisis it is questionable whether supersonic transport would have enabled a true innovation (Davies, 1994: 106-125).

Throughout the 1960s most European manufacturers proved incapable to resist U.S. competition although their products were often superior. A first reason was the inexistent economies of scale, the second the purely national perspective of the governments. Only transnational cooperation initiated by the manufacturers themselves or their governments increased their potential.

3.3. The Era Of The Nationalist Visionaries (1964 - 1967)

This section outlines the industrial and political origins of the Airbus programme.

3.3.1. Overcoming The Fragmentation Of European Airframe Industry

Around 1960 airlines chose European aircraft only when they were tailor-made. Most forecasters announced massive capacity increases for the next decade (Allward, 1967). In the U.K. Hawker Siddeley was studying successors to the Trident. The French Breguet hinted an aircraft with two cabin floors (Sparaco, 2005a: 43). Nord Aviation negotiated with Breguet which had the N600 on the drawing board. Sud Aviation kept the Galion under review and Dassault Aviation worked on its own 220-seater (Endres, 1999: 7). The similarities among the various projects, the needs for subsidies for all of them, the uneasiness about the future of European airframes and positive outcomes of the European integration process led to talks on cooperation among governments. The Franco-British Concorde had shown its potential (Mc Intyre, 1992: 10).

In 1964, the British and French governments launched the “Request for an Ultra-High Capacity Short Range Aircraft” (Endres, 1999: 8) for the national carriers. BAC and Sud Aviation involved in the Caravelle and the Concorde began to work on a 180- to 200-seater. Hawker Siddeley which had lost the Concorde tender and which saw its new projects rejected by the government initiated contacts with Breguet and Nord Aviation for the development of the HBN-100 widebody for 225 to 260 passengers (Kingsley-Jones, 2006: 56).

On 14th March 1965 the French Ministry of Defence invited manufacturers to submit proposals for a widebody aircraft (Marck, 1979: 184). A little later France initiated talks with German manufacturers. On an official visit in Bonn the British Transport Minister did the same. The Germans saw cooperation as an essential move for political reasons and for the future of their industry. In July a joint research group (Studiengruppe Airbus) was established by several constructors (Quittard, 1979: 73).

[59] The U.K. and Western Germany were influenced in the early 1970s. France followed after the election of President François Mitterrand in 1981. This paradigmatic change is far more complex than can be outlined here (Giugni, 2004).

In October BEA invited major European airlines, constructors and engine suppliers to a conference on air transport in the 1970s (Riche, 1965: 20). The Colloquium of London concluded that the only way to maintain a European airframe industry was an aircraft available when the window of opportunity for a widebody would be opening. The Air Bus should be more efficient than the trijets of Lockheed and McDonnell-Douglas, respond to the expectations of as many operators as possible and fit into the existing infrastructure (Lagarde and Webb, 1967: 47-54). In December the Report of Inquiry into the Aircraft Industry confirmed the feasibility of such a machine through transnational cooperation (Mc Intyre, 1992: 11).

At a first intergovernmental meeting in March 1966 the British and French Ministers of the Air suggested a two-engined design for 250 passengers, the German post holder, pushed by the Studiengruppe Airbus, a quadrijet for 300. For the U.K. the collaboration promised another convergence with the EEC. During the summer the involved manufacturers concluded that the HBN-100 was the most promising point of departure. The aircraft should be complementary to and not competitive with the other widebodies (Spaeth, 2005: 28).

During these consultations the name A300 was found. A stood for Air Bus and 300 for an even number of passengers (Aris, 2002: 9). In June the British government insisted on the selection of a Rolls Royce engine as a condition for participation. On 15th October 1966 Hawker Siddeley, Sud Aviation and Studiengruppe Airbus submitted a joint concept to the governments and requested public funding for the first time (Endres, 1999: 9). In December both sides agreed to establish a consortium (Aris, 2002: 11).

3.3.2. Promises of Cooperation

In early 1967 the governments officialised the industrial partnership (Aris, 2002: 12). In the U.K. this was Hawker Siddeley. Although it was private it was controlled by the government. The French promoted the nationalized Sud Aviation. The decision meant the end of earlier joint British and French bottom-up initiatives. Deutsche Airbus GmbH which had succeeded to the Studiengruppe Airbus was selected by the Germans (Kirchner, 1998: 140-142). The German Minister of Transport suggested that France and the U.K. invest 37.5 percent each and Western Germany 20 percent. The loan should be unsecured and be paid back only if break-even was reached (Aris, 2002: 12).

A fundamental question was the engine. Possibilities were the American Pratt & Whitney under development for the B747 and the U.K.-based Rolls Royce. Air France and Lufthansa preferred the Pratt & Whitney JT-9D since it would move the B747 both had ordered. The French and German governments favoured the Pratt & Whitney for political reasons since the French SNECMA[60] had close ties with the latter. The U.K. promoted Rolls Royce. On 9th May the general concept was approved under the designation A-300 at a trilateral ministerial meeting. The manufacturers were requested to submit a detailed study with two Rolls Royce RB-207 engines which were under development (Endres, 1999: 9).

Everywhere the project was seen as the only realistic way to remain in business. For the French government it was another ‘grand projet’ (Aris, 2002: 19) and for the British a strategy to stimulate the labour market and

[60] Société nationale d’étude et de construction de moteurs d’aviation. The nationalized company merged with SAGEM specialized in other high technology fields in 2004 to form Safran (www.safran-group.com).

to approach the EEC (Mc Intyre, 1992: 19). The Germans intended to maintain their know-how and to promote the European convergence (Kirchner, 1998: 131-146).

On 25th July 1967 the German Minister of Economy, the French Minister of Transport and the British Minister of Technology agreed to proceed (Sparaco, 2005a: 78). The name A300 became official although the aircraft had only 267 seats. Almost all French stakeholders adhered. In the U.K. scepticism prevailed and the debate turned into a confrontation among pro- and anti-Europeans (Mc Intyre, 1992: 19). Most German stakeholders, among them Konrad Adenauer, saw the A300 as a last chance for their industry (Aris, 2002: 13). The idea was not to compete against the U.S. widebodies but to "offer something better" (Sparaco, 2005a: 79). A market for 300 out of 1000 aircraft in this category over 15 years was predicted (Mc Intyre, 1992: 19).

On 26th September 1967 the three governments signed the Lancaster House Agreement (Mc Intyre, 1992: 19) to launch the preliminary design phase. A Direct Operating Cost (DOC) per seat lower by 15 percent in respect to that of the B727-200 with 148-189 passengers was benchmarked. France and the U.K. would contribute each 37.5 percent and Western Germany 20 percent. France would assume leadership in engineering and the U.K. in engine development. A prototype would only be built if the national airlines of the involved states placed orders and if at least 75 aircraft were sold until 31 July 1968 (Endres, 1999: 10). The venture would be financed through unsecured, undated and interest-free government loans refundable after break-even. In case of failure the manufacturers would assume 20 percent of all cost. Without subsidies the airframers stood no chance on the financial markets (Aris, 2002: 12). The governments justified the venture as a promising strategy towards European cooperation in the field of technology (Aris, 2002: 16).

The partners which were all of limited size agreed on an original albeit not new way of assembly[61]. Usually aircraft are manufactured at one site. In the case of the Airbus project each partner was fully responsible for some elements including all subsystems as a way to maximize economics of scale. The wings would be delivered by Hawker Siddeley and the fuselage by the Germans. The French would add the cockpit and assume final assembly. The economies of scale would increase the chance of the fragmented European manufacturers to resist U.S. competition (Endres, 1999: 10).

BEA which was looking for a larger short-haul aircraft feared that the A300 would arrive too late. Therefore it turned towards the BAC-2-11 with a capacity of 208. BAE preferred a national aircraft but the Ministry of Technology insisted on the Airbus. For most British specialists the A300 was too large. Anticipated worldwide demand for a smaller aircraft in the same category was 1500 (Endres, 1999: 9).

[61] It was practiced by Fokker in its multinational venture with VFW and Shorts Brothers.

3.4. The Era Of The Market-Inspired Engineers (1968 - 1970)

In this section the political decisions and their impact on preliminary industrial action are outlined.

3.4.1. Choosing the Right Approach

By June 1968 the main parameters of the aircraft were defined. The governmental and industrial stakeholders were forced to accept that the interest in their new aircraft remained limited. For most airlines it was too large. Lufthansa saw the need for this capacity only after 1975. On 2nd August 1968 the Ministers extended the delay for orders by four months. In October the manufacturers submitted the design (Endres, 1999: 10).

The cost of the airframe had risen in a year from GBP 130 to 220 million and that of the engine from GBP 60 to 70 million (Aris, 2002: 36). Sud Aviation warned that if the governments bailed out 30.000 jobs would be at stake. In the U.K. warnings that the A300 should be a commercial and not a political programme were heard (Aris, 2002: 37). The Rolls Royce RB211 had been selected for the Lockheed Tristar and the development of an engine for the Airbus was no longer a priority for the manufacturer (Marck, 1979: 192) and the U.K. government. BEA favoured the BAC-3-11 for 220 passengers. French officials began to focus on the smaller Dassault Mercure. There were even rumours that France might end its participation (Marck, 1979: 193). Sud Aviation began to evaluate other designs, among them a 150-seater similar to the Dassault Mercure and negotiated in secret with other manufacturers (Endres, 1999: 11).

Faced with these dilemmas, the technical leadership of the programme set up a secret engineering team with people from the three partners for the redesign of the aircraft for 250 passengers during the summer of 1968 as an attempt to increase its appeal. The new variant A250 should be as different as possible from the DC-10 and Tristar but share their operational commonalities (Sparaco, 2005a: 90). The aircraft was made compatible with the luggage containers announced for the future widebodies (Horan, 1967: 15-23). The industrial stakeholders accepted the A300B in November, as did Air France and Air Inter (Sparaco, 2005a: 92). On 11th December 1968 the A300B was presented to the Ministers. The French and German post holders accepted the fait accompli (Aris, 2002: 38). In France this illustrated the slow paradigmatic change from the nationalist Air France-focused perspective towards a transnational vision based on market outlooks. However the programme continued to be promoted as a national venture (Muller, 1989: 72-77). Many German stakeholders did not back-up the change since the smaller design was not consistent with the initial project and continued to favour Rolls Royce. Lufthansa in turn encouraged the A300B and pleaded for Pratt & Whitney engines (Kirchner, 1998: 147-151).

The British Minister of Technology rejected the “French dominated Airbus” (Sparaco, 2005a: 91) notably due to the possible selection of an U.S. engine. He argued that unanimity was needed at any stage. The U.K. criticised the expenditure of GBP 60 million so far for an aircraft that raised more or less no interest. Most saw the Airbus as a competitor to the BAC-3-11 (Norris and Wagner, 2001b: 12) to be manufactured in several countries as well. Nevertheless the government still considered Airbus as a key to EEC membership and as an essential chance for the national airframe industry (Aris, 2002: 39). The possible end of British participation was seen by the German government and Deutsche Airbus as a chance to increase their stakes (Mc Intyre, 1992: 24). In January 1969 Germany confirmed its interest in the programme and rejected the

British invitation to participate in the BAC-3-11 (Kirchner, 1998: 228-229). Hawker Siddeley remained involved. Deutsche Airbus attempted to interest Dassault to assume the role of the U.K. Company. The French and German governments feared another delay. In the end a compromise was found. The wing would be manufactured in the U.K. and completed in Bremen before going to Toulouse (Picq, 1990: 38-39).

On 10th April 1969 the British Cabinet abandoned the Airbus programme in favour of the BAC-3-11. In 1970 the latter was cancelled in turn (Endres, 1999: 11). The U.K. became the first major European airframe supplier to abandon the idea of national autonomy in large airframes[62]. Following an intervention by Franz-Josef Strauss inspired by the first European initiatives in S+T (Caty, 1969: 71-74) the German government assumed the financial part of the U.K. The French and German governments understood that the only way to ensure the future of their industry was cooperation (Sparaco, 2005a: 91-94).

3.4.2. Setting The Stage

On 29th May 1969 the German Minister of Economics and the French Transport Minister signed the launch at the Paris Le Bourget Airshow (Sparaco, 2005a: 95). Although not a single aircraft was sold both partners agreed to continue since the delay in respect to the U.S. trijets was getting longer. The loans were supposed to be paid back on a levy per aircraft sale once the break-even was reached after 350 units. The first flight was scheduled for 1972 and market entry for 1974. During the airshow the agreement with Hawker Siddeley was signed as well. Its contribution was underwritten by the German government, so that its share rose to 60 percent (Aris, 2002: 50).

The first of several fundamental questions was the organization of the programme. France favoured a large autonomy of the partners so that Sud Aviation could continue to work in its technology-driven way as before (Muller, 1989: 75-77). Sales negotiations would remain the prerogative of trade diplomats. Germany preferred an independent strong centre. This was the best way to limit French influence and to assume sales. In Germany these had always been the responsibility of the companies themselves (Kirchner, 1998: 159).

Finally the engine was chosen. A personal relationship between Roger Béteille and the CEO of General Electric[63], another U.S. motor supplier, inspired the latter to lend twelve thrusters and the necessary specialists (Muller, 1989: 62). The U.S. Company hoped to win a long-term contract. Although the engine was not European and had never been endorsed by any of the governments, the industrial stakeholders seized the opportunity (Aris, 2002: 46). Confronted with this fait accompli the governments accepted since they had one question less to sort out. This solution illustrated the technology-based approach of the Airbus people and the readiness of governments to accept compromises as long as they did not interfere with their fundamental vision (Muller, 1989: 63). Henri Ziegler even convinced McDonnell-Douglas to allow the use of the engine pods against a contribution of 40 percent to their development[64]. This surprising agreement is usually explained by the fact that the U.S. company considered Airbus as a strategic failure but a tactical opportunity to lower its financial burden (Mc Intyre, 1992: 30). On 1st July 1970 the French merged Sud Aviation, Nord Aviation and SREB into Aerospatiale. In October the governments of France, Western Germany and the

[62] The ongoing programmes such as the BAC-1-11 remained unaffected. Development of smaller aircraft continued.
[63] www.ge.com/en/product/business/aviation.htm.
[64] The shape of the engine pods and their wing mount interfaces is critical since they determine the overall inflight performance to a large extend.

U.K. authorized the industrial launch of the programme. Hawker Siddeley needed governmental backing since it was de facto a nationalized company (Endres, 1999: 11).

On 18th December 1970, the entity Airbus Industrie was established as a Groupement d'Intérêt Economique (GIE) (Mc Intyre, 1992: 26). This framework had emerged in 1967 for punctual cooperation among vineyards. All partners share one specific interest such as purchases of pesticides or maintenance of machinery but remain fully independent (Lepeltier, Buttet et al., 1984). They had no obligation to transfer assets. The new entity was only responsible for marketing and sales and customer support. Everything else such as engineering, development, procurement, etc. was the members' responsibility. On 28th December the Dutch government signed an agreement. The selected Fokker-VFW decided against a full membership in Airbus. Last attempts to reintegrate the U.K. governments failed. Therefore Aerospatiale and Deutsche Airbus took each 46.7 percent each and Fokker-VFW 4.2 percent (Endres, 1999: 12).

The internal structure of the Airbus programme was particular and the result of 18 months of negotiations (Hayward, 1986: 67). The GIE Airbus Industrie was strictly speaking not an actor in its own right but a coordinator of the resources of the parent companies allocated to the Airbus programme. Each programme and related activity (such as flight testing, model policy, etc.) was headed by a small team. In detail Airbus decision making procedures were based on two circuits of influence (Hayward, 1986: 67).

The first was the industrial-commercial structure. The partners sent representatives to the Supervisory Board to approve all strategic decisions (Aris, 2002: 55). The day-to-day follow-up was assumed by the Executive Committee staffed by the parent companies. It authorized the industrial launches of programmes. A Financial Committee responding to the Supervisory Board examined all financial questions (Hayward, 1986: 68).

The other or political decisional circuit acted as the interface with the political stakeholders (Hayward, 1986: 69). Governments were involved at two levels. The superior was the biannual meeting of the national ministers responsible for the Airbus programme. They decided on the strategic matters such as new members or the formal launch of new programmes. It represented a formal structure involved in the national policy making processes. Decisions were based on the inputs from the national industries.

The day-to-day work of the programme was supervised by three other bodies. The Intergovernmental Committee (IGC) consisted of senior officials of the responsible national ministries. Their position at the intersection of national and international influence, as well as their links with other national and international bodies responsible for air transport (Golich, 1992: 899-934) made it the major input organism for Airbus-related policies (Hayward, 1986: 69). The Airbus Executive Committee (AEC) meeting on a monthly basis monitored the organization and progress of work, the implementation of the work sharing agreements, and the impact of new programmes on these. Both therefore act as sources for the governments (Hayward, 1986: 70). The Airbus Executive Agency (AEA) based in Paris ensured the direct link between the Airbus partners and the national governments. Its main mission was to monitor the use of resources allocated to the programme and the levies on sales or returns on investment (Hayward, 1986: 70).

The financial regulation was particular as well. Once the overall budget of a programme was decided, the work share of each partner was negotiated by the Supervisory Board. Instead of setting a price for the individual components it discussed the expected overall cost of the programme. Afterwards the percentage each contribution represented was determined. Based on this each partner advanced the funds, either from own

resources or launch aids. As soon as break-even would be reached, the benefits were reallocated on a pro rata basis (Aris, 2002: 58). Break-even was based on 360 sales (Mc Intyre, 1992: 36).

Franz-Josef Strauss was elected President of the Supervisory Board. This end of French national leadership was seen as a surrender to the Germans in Toulouse (Muller, 1989: 76-77). Production was distributed among existing sites in France, the U.K. and Germany with final assembly in Toulouse where earlier programmes had established a favourable Path Dependence (Dunning, 2000: 7-41). The size of the components excluded road transportation. Cargo flights were the sole alternative but only the Super Guppy developed by Aerospacelines from California was appropriate (Aris, 2002: 61). Despite the operation of one aircraft in the U.S. it had to undergo a complete U.S. certification process. The components of the A300 prototype were transported by road. The head of logistics qualified this as sabotage (Kracht, 1994: 86).

The “Airbus méccano” (Aris, 2002: 59) managed to overcome the incompatible national engineering standards. Pilot training was assumed through the Aéroformation joint venture of Airbus and the U.S. Flight Safety Inc. (Kracht, 1994: 83-84).

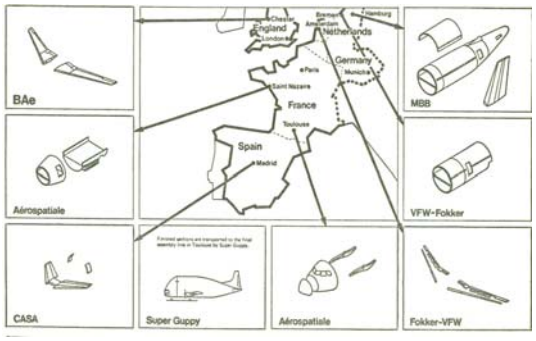
3.5. The Era Of The Daunting Entrepreneurs (1971 - 1978)

This section retraces the early years of Airbus until the launch of the second aircraft A310.

3.5.1. The European A300

During the ceremony for the arrival of the first pair of wings on 23rd November 1971 Roger Béteille confirmed: “We are not building a political aircraft” (Muller, 1989: 81). On 12th December the GIE signed a loan agreement with the European Investment Bank (EIB)[65] for the launch of industrial production (Endres, 1999: 12). On 23rd December the Spanish CASA[66] took a participation of 4.2 percent and specialized in the tailplanes (Aris, 2002: 54). Figure 1 illustrates the final Airbus system.

Figure 5 - The Airbus Méccano



Source: (Quittard, 1979: 89).

Source: (Kracht, 1994: 56).

[65] www.eib.eu.int.
[66] Construcciones Aeronauticas SA. It is now a part of the Airbus parent company EADS. For details see www.casa.eads.net.

The nationalized Air France showed the highest interest in the A300. Simulations revealed that the operational cost of the A300 was too high in comparison with the B727-200. As a way to reduce the Direct Operating Cost/DOC[67] the fuselage was stretched to add another three rows bringing capacity to 270 (Aris, 2002: 63). On 9th November 1971 Air France ordered six of the larger A300B2 and took ten options. Despite this success there were warnings against too many concessions to one customer. Airbus even announced a version A300B4 with an increased range for Iberia. The Spanish airline ordered four and took eight options. On 3rd May 1972 the Danish charter operator Sterling signed a Memorandum of Understanding (MoU)[68] for three A300B4. This was the first truly commercial sale since Denmark was not involved in the Airbus programme (Muller, 1989: 83).

During the rollout on 28th September 1972 the French Minister of Aerospace Michael Heseltine insisted: "We must move from ad hoc collaboration on specific projects towards an integrated European aircraft industry: we face too much competition from the rest of the world to risk the prospect of competing with each other" (Endres, 1999: 23). On 28th October 1972, a Franco-German crew carried out the maiden flight. It was achieved 33 days before the contract date of 30th November (Picq, 1990: 67).

3.5.2. Airbus Enters The World Aerospace Market

On 19th December 1972 Lufthansa ordered three A300B2 and took options on another three. Governmental pressure had played a part since Lufthansa preferred smaller aircraft (Muller, 1989: 83). On 31st December 38 units were sold (Marck, 1979: 283). British Airways preferred the Tristar (Endres, 1999: 53).

In spring 1974 the A300 was certified by the authorities of the member states and the U.S. (Muller, 1989: 84). In July the Thai airline Air Siam ordered two, Korean Airlines four in October. The negotiations were delicate due to the curfew and open U.S. hostility (Picq, 1990: 69-71). This success was counterbalanced by the cancellation of the Iberia order. Many airlines hesitated to commit since they doubted on the prospects of the programme. The French media were enthusiastic and considered Airbus a national asset. The Germans lived it as an international venture. In the U.K. scepticism dominated (Sparaco, 2005a: 129).

Airbus Industrie presented itself as an international company with specialized facilities throughout Europe. The main argumentation was the quality of the aircraft (Airbus Industrie, 1973a: 2). From the beginning the operators praised the performance of the A300. However it had to overcome serious challenges. The introduction of any widebody represented a disruption since new infrastructure and ground equipment was needed. This high cost of transfer lowered the hesitation to diversify the suppliers. On the other hand any new source complicated fleet management (Mc Guire, 1997: 41). Finally the U.S. put countries like Brazil under pressure to remain committed to U.S. hardware (Quittard, 1979: 153).

The difficulties encouraged a first reaction by a European representative in November 1974 (Mc Guire, 1997: 41). Commissioner Altiero Spinelli, Head of the Directorate General (DG) III Industrial policy, pointed out the declining European market share in civil aircraft. The only remedy would be a European air transport policy

[67] The Direct Operating Cost is the overall cost per flight based on fixed (such as insurance premiums or landing fees) and variable cost (such as fuel for the trip). The larger the aircraft the higher the DOC per trip becomes. The larger an aircraft and the more efficient it operates the lower the DOC per seat becomes. For an introduction see (Wells and Wensveen, 2004: 352-356).
[68] A Memorandum of Understanding (MoU) is a non-binding promise to buy. In this case the aircraft were never taken over.

preferably based on consultation and concerted action among the member states on aeronautical policy (Hayward, 1986: 32). In reply to this request the European Commission published the Action Programme for the European aeronautical sector on 1st October 1975 known as the Spinelli Report (EEC, 1975). Each partner saw Airbus Industrie as a vector to boost its national competitiveness (Mc Guire, 1997: 41)[69]. Transnational cooperation was inappropriate to bring together national policies based on competition. An integrated programme operated and financed by the European Commission was the only answer to U.S. competition (EEC, 1975: 11).

This attempt proved difficult for three reasons. A first was transatlantic ties of several competing European manufacturers with U.S. suppliers of fighter aircraft within the NATO (Hayward, 1986: 32). The European companies locked in on U.S. partners were active in the sensitive field of national security. Attempts for co-operation had to overcome the economic and political fragmentation (Mc Guire, 1997: 72). A second was the lack of a European vision of the decision-makers. Only now did stakeholders of national economies competing with each other become aware of shared interests and the need to defend them against a common rival (Jaumont, Lenegre et al., 1973: 145-150). The third problem was the dominant role of the individual states in EEC policy making (Courty and Devin, 2005: 68-69). The EEC was only at the beginning of its institutional and operational emancipation (Senarclens, 1998: 164-169). Strategic industries were outside its scope. The action programme for aeronautics was discussed within the member states but no stakeholder accepted the idea to end its control of one of its strategic assets and thus the loss of sovereignty (Mc Guire, 1997: 13).

In the U.S. aerospace was a key issue (Mc Guire, 1997: 29). The Trade Act of 1974 authorized the U.S. executive to decide any action whenever it felt that economic interests were at stake (Grzybowski, Rud et al., 1977: 283-323). Since Airbus was not affecting U.S. interests no action was taken (Mc Guire, 1997: 33). The ongoing GATT Tokyo Round[70] was based on the Multilateral Trade Negotiations (MTN) approach (Mc Dowell, 1975: 641-667). Prior to the GATT trade treaties were bilateral affairs (Milner, 1993: 207-232). Afterwards several states negotiated the same issue. The focus shifted from geographic to thematic questions such as airframes and specialists rather than diplomats became the driving force behind MTNs (Johnston, 1979: 520-522).

Three factors determined the early Airbus successes. They were the absence of visible reactions from the U.S. competitors, the evolution of the world market consistent with the previsions of the 1960s and the oil shock after 1973. Despite the monopoly established by the large B747 Boeing was unable to launch a competitor since it was still recovering from the crisis of the late 1960s (Lawrence and Thornton, 2005: 51-52). Lockheed and McDonnell-Douglas lacked the resources for twinjets (Newhouse, 1982: 127-140) although in 1971 a DC-10 (Machat, 2002: 22-41) and a Tristar with two engines were announced (Upton, 2001: 14-15). The A300 was a class of its own and was promoted as such (Airbus Industrie, 1973a: 1).

Changes in the market offered a second opportunity (Muller, 1989: 90). In Europe larger aircraft were needed on main routes. New airlines in the Far East like Singapore Airlines appeared (Newhouse, 1982: 38-39). The A300 with its capacity of 270 was tailor-made for this market. The U.S. competitors were too large. Airbus exploited the latent anti-Americanism of many decision-makers after the Vietnam War as well. An accident which took 346 lives in 1974 and which could be traced to the rumoured design errors proved fatal

[69] Article 223 of the Treaty of Rome denies the need for European programmes for industries involved in national defence (EEC, 1957).

for the DC-10 (Newhouse, 1982: 28-30). The oil shock which increased fuel cost from ten to 30 percent in the overall cost of operation of airlines was the third factor. The A300 consumed less than the U.S. trijets (Muller, 1989: 90). Airlines selecting larger aircraft began to look into the A300. In July 1975 Boeing presented a smaller version of the Jumbo, the B747SP which aimed at another market (Gilchrist, 2000: 62).

These successes were followed by a severe crisis. Between 1975 and 1976 almost no sales could be announced. 16 white tails[71] were aligned in Toulouse (Mc Intyre, 1992: 42). The French wished to maintain the current level since they saw the turndown as temporary. On German insistence the rate was reduced from two to one aircraft per month (Muller, 1989: 42). Boeing in turn sold 114 B727 alone (Mc Intyre, 1992: 42). One obstacle to sales promotion was the 1975 Export Standstill Agreement among the member states of the Organization for Economic Co-Operation and Development (OECD). It was a tacit ban on export agencies credit terms (GATT, 1981). The U.S. was promoting a plan for an international regime on export finance. Most countries operated export financing institutions such as the U.S. Ex-Im Bank, the French Compagnie française d'assurance pour le commerce extérieur (COFACE), the British Export Credit Guarantees Department (ECGD) and the German Hermes (Mc Guire, 1997: 50-61).

Before the era of the widebodies airlines had financed[72] aircraft through classical debt[73] or equity[74] financing in the same way other firms assumed investments (Wensveen, 2005: 501-532). Airbus innovated in this field. A consortium of banks from the member states forwarded a percentage or the totality of the price to Airbus. The buyer obtained a credit with interest rates below those on the markets. The difference was taken over by the export financing organizations. To all parties the agreement offered a win-win situation. Airbus could target airlines with lower credit rating. The client obtained a favourable deal. For the banks the transaction represented another business at market rates.

In 1976 the Consensus Agreement on Civil Aircraft came into force (Mc Guire, 1997: 54). It attempted to limit the actions of export financing institutions further. Like its predecessor it was not binding. The U.S. Ex-Im Bank changed its policy in respect to aircraft in the same year. Formerly only these models opposed by a foreign competitor such as the Caravelle or the A300 were entitled to special incentives. Under the new rules almost any U.S. hardware became eligible. The facility which became known as the "Airbus waiver" (Mc Guire, 1997: 57) enabled a more favourable financial package than Airbus was capable to offer.

Despite the U.S. hostility Airbus obtained crucial orders in India and South Africa. In the latter case the U.S. sales teams exploited the competition among the three manufacturers. Each of them placed their own product first and Airbus second in their comparisons. The U.S. suppliers were more afraid from each other than from Airbus (Aris, 2002: 84). In 1978 production was increased to three aircraft per month. In July the threshold of 100 sales was reached (Muller, 1989: 106). The clients could now choose between two motorizations since Pratt & Whitney had adapted the JT9D engine (Endres, 1999: 41).

[70] The GATT agreements were regularly revised at conference cycles. The Tokyo Round lasted from 1970 to 1983 (Landau, 2001: 81).
[71] A White Tail is an aircraft manufactured but not sold. For reasons of storage they are painted white.
[72] Matters are in fact far more complex but being of no relevance for the research they are not detailed.
[73] In debt financing operations the airline borrows funds from commercial banks, insurance companies and other sources to "pre-finance" the aircraft. Later the amount plus interests is paid back over time to the lenders.
[74] In equity financing the airline issues and/or sells stocks, bonds and other equities to the public and uses the new capital for the transaction. Banks are intermediaries as well. Each way has its advantages and inconveniencies. Sometimes the airline combines both ways.

On 14th March 1978 the Council of the European Communities published a Council Resolution on the development of a European airframe industry (Council of the European Communities, 1977: 6). The Airbus programme was presented as an example to follow. Again there was no reaction (Mc Guire, 1997: 72).

3.5.3. From General Confrontation To Limited Consensus

The success of the Airbus programme encouraged other bottom-up initiatives. BAC, MBB, Saab-Scania[75] and CASA considered the Europlane for 150 passengers. VFW-Fokker, Dornier and Hawker Siddeley established the Civil Aircraft Study Team (CAST). Both initiatives attempted successors to the Caravelle and the BAC-1-11 but failed (Laming and Hewson, 2000: 12). On 6th September 1974 Aerospatiale, BAC, Dornier, Hawker Siddeley, Messerschmitt-Bölkow-Blohm (MBB) and VFW-Fokker created the more formal Group of Six or European Aircraft Committee (EURAC) (Laming and Hewson, 2000: 13). The GIE Airbus sent observers but was not formally invited. In parallel BAC and Aerospatiale continued research on the competing BAC-X-11 (Skinner, 2002: 113-120) and A200.

In 1975 Dassault and Aerospatiale were looking for a U.S. partner for the A200. Unlike the Mercure the A200 raised interest in France and Germany. This happened at the time when political support from Bonn to Airbus eroded owing to the recession of 1975 (Sparaco, 2005a: 123). Governmental and industrial stakeholders from both countries as well as a faction within the growing staff of the GIE Airbus suggested the integration of a narrowbody into the Airbus programme as a way to diversify (Muller, 1989: 123). In February 1976 Aerospatiale negotiated a participation in the new Boeing B7N7 narrowbody (Birtles, 2001: 9). McDonnell-Douglas confirmed its interest in the Mercure to the French government. In June the project allocated 40 percent to Aerospatiale, 15 percent to McDonnell-Douglas despite the earlier negative experience in the Caravelle context, five to Dassault Aviation and the rest to subcontractors. Shortly afterwards McDonnell-Douglas presented the Advanced Short- and Medium-Range Aircraft (ASMR) (Marriott, 1992: 10-11). On 12th August the French government opted for the ASMR. Aerospatiale and Dassault Aviation were evaluating it when a Dassault Aviation engineer found out that McDonnell-Douglas was studying in parallel a stretched version of the DC-9 (Mueller, 1980: 24-30). The French withdrew. In October it was launched as the DC-9-80. It attempted to be the quietest and cheapest aircraft in its category although it was a derivative of the decade-old DC-9 design (Pearcy, 1999: 21-22). In early 1977 the French government selected the Aerospatiale A200 as the future national 150-seater. Shortly afterwards the new Prime Minister Raymond Barre proclaimed that any new French aircraft should be launched within the Airbus system (Aris, 2002: 122).

The EEC Action Programme for Aeronautical Research developed in response to a Council Resolution of 14th March 1977 suggested technical commonalities for future programmes (Council of the European Communities, 1977: 6). In June the Group of Six was replaced by the U.K.-based Joint Engineering Team (JET) initialized by the newly established nationalized British Aerospace (BAE)[76] formed after the merger of BAC, Hawker Siddeley and smaller manufacturers. BAE and the Airbus partners were represented each by five engineers. The JET was independent from Airbus and based on the A200 (Sparaco, 2005a: 150). French officials promoted the integration of the JET into Airbus. This in turn raised the question of the U.K.

[75] www.saabaircraft.com.
[76] www.baesystems.com.

return into the programme (Laming and Hewson, 2000: 15-18). In December 1977 JET presented two versions for 140 and 180 passengers. The members themselves suggested the adoption of the project by Airbus Industrie (Quittard, 1979: 276). No decision was taken for political reasons in respect to the future role of the U.K. in the Airbus programme and the narrowbody development (Laming and Hewson, 2000: 16).

In early 1978 Airbus Industrie tested a new input device for pilots. It was similar to the joystick of one of the new videogames (Breton, 1990) and replaced the traditional steering yoke. The long-term fundamental research illustrated the growing autonomy of the GIE Airbus in its day-to-day work (Muller, 1989: 123). In March the members of JET signed a MoU on the JET aircraft (Laming and Hewson, 2000: 16). Most people from within the GIE wished above all to avoid parallel structures which might limit the prospects of Airbus.

3.5.4. A Farsighted Decision: Diversification

Around 1975 there were signs that the reign of the A300 was coming to its close. Boeing had overcome the stagnation and pushed the B7X7 (Lawrence and Thornton, 2005: 75). The same was true for the DC-10 Twin (Endres, 1998: 58). Within the GIE derivatives of the A300 were discussed. Among these were a larger and a smaller version of the basic model, as well as a long-haul aircraft. Market research revealed that demand was the strongest for the smaller variant for 200-220 passengers (Endres, 2000: 12).

In 1976 Boeing invited Airbus Industrie to the joint BB10 programme since it deemed the market too limited for two similar aircraft and a second “DC-10/Tristar disaster” should be avoided. The negotiations focused on the possibility to combine the Airbus fuselage and the B7X7 wing. Airbus staff soon suspected that Boeing intended to delay new versions of the A300 and contacts were ended (Endres, 2000: 13).

The lack of resources and the crisis of 1975-1976 did not discourage feasibility studies for the derivative. Soon two hypotheses were discussed. The first was the B10MC (Minimum Change). The fuselage would be shortened by seven meters but the wing of the A300 maintained. This limited time and budget of development. One of the arguments in favour of early availability was a British Airways requirement for a Rolls Royce-powered aircraft for 210 passengers (Endres, 2000: 12). Since the wing was oversized in comparison to the fuselage the Direct Operating Cost (DOC) would be suboptimal. The second was the B10X with a new wing. DOC was lower but initial investments were at least four times as high. If the first solution was promising in the short term, the second was more farsighted but would be available only two years later. In both cases the General Electric engines of the A300 were maintained. The promoters knew of the intentions of Boeing and McDonnell-Douglas. Early delivery or superior performance were the options (Endres, 2000: 13). In the mid-1970s the world had increasingly become unpredictable after the recession (Richardson, 1978: 57-65) and projections became increasingly risky (Cornish, 2005: 147-168).

By March 1977 the version B10X for 220 passengers was chosen under the pressure of Lufthansa. Many within the GIE feared that once again too many concessions were being made to one single customer. On 1st September Lufthansa and Swissair issued even more strict specifications. The DOC per seat should be inferior by at least 20 percent in respect to the A300B2 (Endres, 2000: 16). Some within the GIE predicted risks of confusion of the customers if two aircraft were promoted (Aris, 2002: 91). New equipment based on the

emerging information technologies should make the A310 as the design was now called superior to the B7X7 (Endres, 2000: 42-46). The range was however inferior since the surface of the wing was smaller[77].

In early 1978 the French continued to favour the 150-seater. German stakeholders showed no interest since Lufthansa pushed the widebody. Both sides were under pressure from their national airlines and they knew that a third partner would lower their financial commitments (Muller, 1989: 113-114). The newly established BAE (Quittard, 1979: 216-218) favoured a direct participation in the Airbus programme. The U.K. which was now a member of the EEC saw Airbus as a chance (Mc Intyre, 1992: 53-54). It was clear to the GIE, the partners and the governments that the new programme needed launch aids although careful market prospecting and not governmental specifications were at its origin (Muller, 1989: 111-112).

The decision-makers within the GIE had shifted the focus from national visions to the world market. The governments did not oppose this paradigmatic change since it strengthened their manufacturers. These in turn were opposed to the growing autonomy of the GIE since they feared the transfer of their specific know-how into the GIE and from there to the others which remained competitors outside the Airbus programme. At this time McDonnell-Douglas attempted to attract Dassault into a new programme, which was the DC-X-200, a trijet similar to the first Airbus derivative but this time the French refused (Marriott, 1992: 11-12).

The U.K. finally agreed to contribute to the A310 programme but outside the GIE. Boeing invited the U.K. to participate in the B757 as the B7N7 was now called as a subcontractor (Newhouse, 1982: 25). The Treasury and the Department of Trade as well as the British ambassador in the U.S. favoured Boeing. The Foreign Office and the ambassador in Paris preferred Airbus. Many stakeholders saw Airbus as an inefficient public programme. For others it represented a promise of the Europe of Technology (Aris, 2002: 107-109).

On 6th July 1978 Lufthansa and Swissair signed a MoU for a large number of A310s (Jenkinson, Simpkin et al., 1999: 15). The programme was de facto launched with 60 commitments. Wing design and production were subcontracted to BAE. Since the aircraft was based on the fuselage of the A300 overall investments were lower than those for the B757/B767 programme (Lawrence and Thornton, 2005: 83-85). The French criticised British Airways for its lack of interest in the A310 (Endres, 2000: 16). On 14th July Boeing launched the B767 after an order from United of 30. The Italian Aeritalia contributed 20 percent to it (Birtles, 1999: 14). Other elements went to Japanese subcontractors (Lawrence and Thornton, 2005: 80).

On 18th August 1978 the Airbus partners and BAE agreed on the full reintegration of BAE into the programme. British Airways was allowed to buy 19 B757 with Rolls Royce engines (Birtles, 2001: 48). An order of ten A300 by the pioneering no-frills carrier Laker Airways[78] (Calder, 2003: 56-78) at the Farnborough Airshow 1978 was seen as a compensation (Endres, 1999: 85). In October the A310 was formally launched when the new partner gave its approval. The decentralized production was maintained (Hayward, 1987: 11-26). On 29th November the governmental treaty for the reintegration of the U.K. was signed. BAE got a 20 percent share against USD 50 millions and became a full member as per 1st January 1979 (Endres, 1999: 17). As a further concession to the French the right of vote was limited until 150 aircraft were sold or until 1st August 1981 unless the state-owned British Airways ordered Airbuses. BAE was even selected as the future competence centre for the wings of any future derivative (Muller, 1989: 117-119). The Belairbus consortium

[77] Most of the aircraft fuel is stored in the wings (Anderson, 2002: 344-353).
[78] It went bankrupt in 1982.

made up of three Belgian companies participated in the A310 (Ansbach, 1997: 30). Soon afterwards the research on the JET was integrated into Airbus. The narrowbodies for 125 to 180 passengers became known as the SA1[79], SA2 and SA3 (Laming and Hewson, 2000: 16).

3.5.5. The Strategic Breakthrough

In May 1977 the U.S. domestic carrier Eastern Airlines[80] accepted a free trial of four A300 for six months[81]. The government applied an importation tax of five percent on any Airbus (Aris, 2002: 102). The financial transactions were assumed by a consortium led by the Bank of America. The ability to negotiate this operation in a hostile territory proved the credibility of the programme. Airbus even escaped the obligation to 'buy back' Tristars for compensation[82] (Mc Intyre, 1992: 46).

Massive and immediate U.S. reactions were justified with the argument of "predatory financing" (Mc Guire, 1997: 53) as Boeing called it. For most observers this harsh reaction revealed the fear of a strategic industry decline (Baldwin, 1980: 471-506) in a context of growing competition (Held, Mc Grew et al., 1999: 168-171). The U.S. was confronted with exporters whose political influence was lower (Mastanduno, 1988: 121-150) but whose export financing was more elaborate (Zysman, 1977: 839-877). To make things worse for the U.S. the defeat had occurred at home. Section 201 of the Trade Act of 1974 allowed action whenever a national industry felt discriminated (Pindyck and J., 1987: 101-122). Although the GATT regime attempted to ban such distortions (Landau, 2001: 80-81) they were continued.

In March 1978 Eastern Airlines ordered 23 aircraft. During the six month trial the Airbus had performed better than expected by three percent. There remained one challenge. The A300 was deemed too heavy by the New York Port Authority and operations from New York La Guardia were denied. The heavier DC-10 and Lockheed Tristars were certified. Airbus proposed undercarriage modifications which were rejected. Only a payment of USD 800.000 for work on the runway lifted the ban (Aris, 2002: 101). Another challenge was the direct New York-Puerto Rico flights. The route exceeded the maximum distance an aircraft with two engines was allowed from airports suitable for emergency landings (Moser, 1986: 109-111). After claims by Eastern and General Electric the Federal Aviation Authority (FAA)[83] granted an exception (Aris, 2002: 101). In every respect the year 1978 can be considered as the decisive year. Airbus had survived a crisis and won against the U.S. competitors which were backed-up by their government (Marck, 1979: 283).

In 1978 the OECD Consensus Agreement became the Commonline Agreement. Although the EEC negotiated and signed the member states ratified it (Mc Guire, 1997: 54). It was an element of the general regime of tacit restrictions on export financing (Moravcsik, 1989: 173-205). Practices remained unaffected. In July the U.S. President Jimmy Carter proposed a regulatory framework for aircraft trade at the G7 meeting in Bonn (Mc Guire, 1997: 76). An agreement within the GATT seemed most appropriate (Jackson, Louis et al., 1982: 267-397). The British and French governments saw this as an opportunity to promote their viewpoints (Finlayson and Zacher, 1981: 561-602). The EEC participated in its own right (Mc Guire, 1997: 77).

[79] SA stood for Single Aisle.
[80] It was one of the most popular carriers at the time but it went bankrupt in 1991.
[81] Eastern Airlines only took over the cabin furbishing (Enders, 1999: 56).
[82] A manufacturer sometimes "buys back" other aircraft as a part of the overall deal. These are stored or sold to another operator or leasing company.
[83] www.faa.gov.

3.6. The Era Of The Offensive Strategists (1979 - 1987)

This section spans the time-frame from the launch of the A310 to the double A330/A340 programme.

3.6.1. The Beginning Of Transatlantic Confrontation

On 31 March 1979 Lufthansa and Swissair approved the updated version of the A310 (Sparaco, 2005a: 156). The new programme pushed break-even from 350 to 800 (Klee, Bucher et al., 1983: 436). Airbus Industrie maximized innovations. Unlike earlier models in this category the A310 needed only two pilots instead of three (Endres, 2000: 42). For the first time cockpit instrumentation was partially substituted with cathode ray tube screens (CRTs). The avionics[84] incorporated the latest technologies. Composites were widely used. The customer could choose among the Franco-American CF6-80C2, the Pratt & Whitney 4152 and the General Electric JT9D engines (Endres, 2000: 32). The B767 was more conventional although it relied on a two-man crew as well. Boeing highlighted the smaller fuselage cross section and therefore the lower consumption (Jenkinson, Simpkin et al., 1999: 84). Airbus Industrie promoted the higher capacity, the superior technology and the compatibility with standard containers (Sparaco, 2005a: 155).

In parallel to the A310 and the B767 development the U.S. proposal of 1978 for a GATT agreement on aircraft trade was negotiated. The participants soon understood that the U.S. was defensive since their suppliers were under pressure from Airbus Industrie. The alleged liberalization of the aircraft market was seen by the Europeans as an attempt to protect their manufacturers from present and future competition (Mc Guire, 1997: 78). Officially the European states were represented by the EEC. The members continued to refuse any supranational control of their airframe industry. Information was exchanged only with the national ministries but not the European institutions. In France and the U.K. the industrial stakeholders delegated the negotiations to the government which negotiated in their own rights (Mc Guire, 1997: 70-71). The GATT attempted to eliminate as many Non-Tariff Barriers (NTBs) as possible (Finlayson and Zacher, 1981: 561-602). The common denominator was trade in airframes, so that an MTN was initiated. It focused on all aircraft trade-related issues, such as subsidies, export financing and NTBs. A consensus had to be reached (Hoekman, 1989: 693-714). U.K. stakeholders tended either towards Boeing or Airbus, therefore the influence of the country was limited. The French defended direct subsidies. Both countries fought U.S. tariffs but intended to preserve launch aids. The Germans kept a low profile (Mc Guire, 1997: 72-83).

On 12th April 1979 the Agreement on Trade in Civil Aircraft (Aircraft agreement) was finalized (GATT, 1979a). Tariffs and NTBs such as certification and safety issues were to be eliminated in tin civil aircraft, parts and simulators[85]. The end of taxes was a European victory since the U.S. was obliged to cancel the five percent Airbus importation duty. Export subsidies were regulated (Mc Guire, 1997: 80). Article Six outlined the particular nature of aircraft trade. The countries were allowed: “to take into account the special factors which apply in the aircraft sector, in particular the widespread governmental support in this area, the international economic interests, and the desire of producers of all Signatories to participate in the expansion of the world civil aircraft market” (GATT, 1979a: 3-4). It more or less neutralized the Agreement since any

[84] The avionics include all electronics systems aboard an aircraft. The main categories are navigation and communication equipment.
[85] A simulator or flight simulator is a device used for pilot training.

side could interpret it in the way it wanted (Mc Guire, 1997: 82-84). All sides were satisfied with the outcome. The U.S. could maintain indirect subsidies through research and military programmes, the Europeans continue launch aids to Airbus aircraft. The U.S. industry had made the European export subsidies experienced during the Eastern deal of 1978 a main argument. Launch aids as practiced by the Europeans had never been applied in the U.S.; therefore their manufacturers had no experience with these. During the meetings the U.S. had rather been at a disadvantage following the dominant position of their industry. The claims that the U.S. were discriminated were rejected by countries with smaller airframe industries (Mc Guire, 1997: 87-90).

In 1979 the U.S. 'Airline Deregulation Act' (Congress, 1978) entered into force. It liberalized air transport within the U.S.. Most airlines rearranged their networks and streamlined the connections (Brenner, Leet et al., 1985: xi-xii). Many flights arrived and departed at the same time at selected airports. This "hub-and-spoke" system (Hanlon, 1999: 83-86) allowed more destinations than the local market sustained since connecting passengers increased overall demand. Lower cost of production allowed for lower fares.

On 16th December 1980 Airbus launched the updated A300 named the A300-600 as a successor to the initial aircraft after an order for eleven from Saudi Arabian Airlines. It included the cockpit and the systems of the A310 (Endres, 1999: 58). The B767 carried out its maiden flight in September 1981 (Birtles, 1999: 16). On 3rd April 1982 the A310 followed (Endres, 2000: 27). From the beginning competition was severe and included propaganda battles on the respective advantages of both aircraft. Specialists concluded that their overall performance was similar. Fuelburn of the A310 per seat was even slightly lower. In June 1983 Airbus launched the A310-300 with an increased range (Endres, 2000: 42). On 9th July 1983 the A300-600 took off for the first time (Endres, 1999: 127).

Boeing reacted with the B767ER with an increased range and, in September 1983, the stretched B767-300 (Birtles, 1999: 28). In the same year, a larger version of the Jumbo, the B747-300 for some 380 passengers appeared (Gilchrist, 2000: 63-64). On 13th September 1984 Pan Am was the first U.S. airline to order the A310-300. On 8th July 1985 it carried out its maiden flight. The customer had the choice among CF6-80C2 or Pratt & Whitney 4142 engines (Endres, 2000: 127).

In 1985 Trans World Airlines (TWA) launched transatlantic B767-flights from hubs at secondary airports in the U.S.. Safety regulation had banned twinjets from routes where flying time with only one engine to the next certified airport exceeded 60 minutes. After technical adaptations the U.S. regulation body FAA allowed TWA 90 minutes instead of 60. Non-stop flights to Europe became possible through the new Extended Twins Operations (ETOPS) (Moser, 1986: 109-126). These 'niche routes'[86] attracted those who were willing to pay more for the convenience of an eliminated aircraft change at one of the major U.S. gateways. Pan Am which was introducing the A310 felt discriminated. Since it was a U.S. carrier and since the engines were U.S. made, the FAA certified the A310 for ETOPS as well. Many air safety professionals were sceptical (Cubbin, 2000) but the passengers discarded the risk. In 1986 the FAA extended the ETOPS rule from 90 to 120 minutes so that direct transatlantic flights became possible (Kinnison, 2002: 40-43). The ETOPS had not been forecasted (Muller, 1989: 112) and favoured the B767 with its longer range.

[86] Term coined by author to illustrate their place in the overall service product of the airline. Barriers to market entry of competitors are very high as well so that the provider stands a good chance of having a monopoly on the route and therefore an excellent chance to differentiate its overall product (Lancaster, 2006). Boeing refers to these routes as long thin routes (Norris and Wagner, 1999: 116).

Overall demand for air transport was stimulated by a wave of delocalizations from the U.S. and the U.K. into regions with lower cost of production (Schwab and Smadja, 1994: 100-110). The communication technologies (Cairncross, 2001: 1-19) facilitated this move (Malone and Laubacher, 2000: 289-299). Being under competitive pressure themselves airlines began to watch expenditures as well. Their efforts focused on salaries (Ditze, 1989: 151-154), maintenance (Ditze, 1989: 36-38) and inflight service (Dodson, 1989: 151-170). Although higher workload respectively lower salaries increased the risk of operational (Nader and Smith, 1994: 266-277), economies in maintenance the probability of technical failures (Beveren, 1997: 28-32), the number of occurrences did not significantly increase (Oster, Stron et al., 1992: 19-40).

3.6.2. The A320 Narrowbody

In October 1979 the DC-9-80 based on the DC-9 flew for the first time (Pearcy, 1999: 22). In November the Airbus member Fokker announced a successor to its F28 for 132 passengers (Muller, 1989: 126). Despite this defection the Airbus stakeholders initiated the detail design phase of the SA1 and SA2 (Laming and Hewson, 2000: 16) in 1980. At the same time sketches of two widebodies called the TA9[87] and the TA11 appeared. The TA9 was a larger twin-engined aircraft and market research predicted 450 sales (Sparaco, 2005a: 182), the TA11 a four-enginer for long-haul routes (Norris and Wagner, 2001b: 23).

France favoured the narrowbody, Germany the widebodies, especially the TA11 (Aris, 2002: 119-120). The personal-intensive development of the A310 was winding down. Research on the narrowbody and the widebodies was possible with the available resources (Jenkinson, Simpkin et al., 1999: 15). Both initiatives illustrated the increasing capability of the GIE to identify market needs and its growing autonomy from the partners and the national stakeholders. In January 1981 an updated version of the DC-9-80 called the MD-82 had its maiden flight (Pearcy, 1999: 38). In March, which was before the first flight of the A310, the narrowbody was initialized as the A320 (Muller, 1989: 128). It was developed in a perspective of being the first of a product family. The customers benefit from economies of scale in spares, maintenance and support. Providers suffer less if one model experiences a downturn in demand (Germain, 2000: 6). The fuselage allowed longer and shorter derivatives (Norris and Wagner, 2001b: 18). A new version of the CFM-56 and the V2500 supplied by the International Aero Engine Consortium (IAE)[88] established by Pratt & Whitney, Rolls Royce as well as German, Italian and Japanese partners were proposed (Pearcy, 1999: 32-33). The 150-seater was promoted as the successor to the DC-9 and B737 which were reaching the end of their life cycles. Since both continued to be in demand and many customers were interested in keeping cost of upgrading low, Boeing announced the slightly larger B737-300 for 128-149 passengers in March 1981. Boeing extrapolated an existing design and kept investments down (Shaw, 1999: 7). The competing MD-80 was known for its low price and its financial arrangements (Pearcy, 1999: 45).

Bonn had pushed the A310 and convinced Paris to accept it. Now France attempted to win Germany for the narrowbody (Muller, 1989: 127). François Mitterrand who was elected President in May 1981 made it a national priority. A DOC per seat lower by 25 percent in respect to the similar sized B727-200 was targeted. At the Paris Le Bourget Airshow of 1981 the launch of the programme together with a commitment of Air France

[87] TA was the acronym for Twin Aisle.
[88] www.i-a-e.com.

over 25 units was announced (Muller, 1989: 128). The production was again decentralized with final assembly in Toulouse (Sparaco, 2005a: 186-187). In summer 1981 the U.S. carrier Delta issued a request for a 150-seater with 30 percent less fuelburn than the B727-200 and announced an order for up to 70. Airbus Industrie was ready for design compromises. Warnings against a too tailor-made aircraft were issued once again (Muller, 1989: 129). The low DOC possible through the minimal capital cost of the MD-80 made the aircraft very attractive so that Delta preferred the latter (Pearcy, 1999: 54).

The complex design of the A320 and the negotiations led to a delay of two years. The competitors exploited this window of opportunity. Boeing announced the B7J7 with the promising but unproven propfan[89] engines. McDonnell-Douglas adopted them as a retrofit for the MD-80 (Pearcy, 1999: 35-37). The European challenger was confronted with the risk of becoming outdated when it entered the market (Laming and Hewson, 2000: 18). Any propfan-equipped aircraft would burn less even with a fuselage of less elaborated aerodynamics. After 1986 the fuel price fell and the propfan lost its edge. The A320 turned out to be the only entirely new aircraft although its engines were conventional. The Airbus partners eased the fears of the governments by leaving the option to retrofit the A320 with propfans (Mc Guire, 1997: 99).

In the opinion of the governments of the Airbus countries the narrowbody was essential for the programme (Mc Guire, 1997: 98). In their view the launch aids were allowed under Article six of the GATT Agreement. For the U.S. representative at the GATT Aircraft Committee this was not true and he attempted to bring up the matter of subsidies but without success (Mc Guire, 1997: 100). Despite the divergent priorities the Airbus partners understood that none of them could bail out since this would mean the end of the programme. The only way to enhance their perspectives was a more market-driven product range.

Unlike some U.S. GATT policymakers Boeing and McDonnell-Douglas did not encourage political action against Airbus Industrie at this time. Both were convinced that their cheaper and proven aircraft would remain in higher demand (Mc Guire, 1997: 101). The engine manufacturers and the subcontractors were not interested in disturbances since Airbus Industrie was a major client. Therefore they did not try to win the government in favour of action against the competitor (Lamarque, 1994). Washington had no motivations to react to the A320. Lacking political support the U.S. GATT negotiators were unable to resist European pressure. Stakeholders on both sides of the Atlantic understood that the U.S. industry would not adopt a common position (Mc Guire, 1997: 103).

The budget of the A320 was estimated at USD 1.7 billion (Mc Guire, 1997: 107). More than ever the A320 remained the priority for France. In Germany it continued to be discarded as a commercial risk by the Airbus minister (Mc Guire, 1997: 98). Franz-Josef Strauss warned that without the new programme unemployment would rise. For Margaret Thatcher Airbus Industrie was a costly Labour heritage. Franz-Josef Strauss warned that if the U.K. did not commit to the A320 the U.K. participation in Airbus would be ended (Aris, 2002: 126). The private British Caledonian committed to ten after a commercial evaluation against the B737-300 (Muller, 1989: 131). This encouraged the British government to grant GBP 250 million. 50 millions were to be repaid in any case and the rest through a levy on each aircraft (Mc Guire, 1997: 98). The Germans agreed on 90 percent of Deutsche Airbus in return of a royalty of DEM 2.5 million per aircraft after the 600th

[89] A propfan or unducted fan engine combines the advantages of the propeller and the jet engine and eliminates most of their respective shortcomings. When development started in the 1980s a reduction of fuel consumption by 30 percent in respect to conventional jet engines was promised. See http://home.swipnet.se/~w-65189/turbine_engines/types_of_turbine_engines.htm for an introduction to the various engine types.

sale. France participated with FF 380 million or 75 percent of the budget of Aerospatiale. On 12th March 1984 the governmental agreement for the A320 with 51 firm orders was signed in Bonn (Muller, 1989: 131).

Innovations were maximized (Laming and Hewson, 2000: 38-43). Airbus Industrie intended to offer a product as superior as possible in respect to the established competitors (Mc Guire, 1997: 99). The fuselage cross section exceeded those of the B737 and the MD-80. Passenger comfort was higher (Francillon, 2000: 270-276). For the first time computer technology was an integral part of the design. CRT screens replaced many instruments on the flight deck. The Fly-by-Wire technology transmitted inputs from the pilot through electronic commands (Picq, 1990: 173-174). The traditional steering yoke was replaced with a lateral steering stift under development since 1978 (Henley, 1998: 30-35). Fuel consumption with the planned conventional engines was inferior by 20 to 25 percent to the B737-200 and 40 percent to the B727-200. The updated B737-300 had its first flight in February 1984 (Shaw, 1999: 7). It was superior to the basic model but lagged behind the A320. At the same time, a stretched version of the B737 was announced. Its capacity of 170 passengers would fill the gap between the B737-300 and the larger B757 (Shaw, 1999: 13). The decision to stretch an existing design for the second time was taken after the cancellation of the B7J7 with propfan engines after the falling oil price had eliminated any interest in the high investment (Sparaco, 2005a: 217). In February 1985 the charismatic Jean Pierson, 44, became the new head of the GIE (Aris, 2002: 137).

3.6.3. The Symbiotic A330/A340 Widebodies

After the launch of the A320 the efforts focused on the widebodies TA9 and TA11. Both were based on the fuselage of the A300. The former was a twinjet for 350 passengers. The latter designated a four-engined aircraft for intercontinental routes (Norris and Wagner, 2001b: 24-25). Since these included operations over the seas more than two engines were needed for safety reasons at the time (Kinnison, 2002: 40-43). From the beginning the double programme promised economies of scale for the manufacturer and the operators. Both aircraft had much in common with the A320 (Aris, 2002: 142). The overall budget was estimated at USD 3.3 billion. This represented a break-even after 750 units in a market estimated at 800 to 1000 (Sparaco, 2005a: 204). Launch aids were unavoidable. From the beginning the marketing team analysed the preferences of as many airlines as possible. A DOC per seat of the TA11 identical or even lower than that of the B747-300 was attempted although the aircraft was smaller by 33 percent (Germain, 2000: 12).

At the Paris Le Bourget Airshow in 1985 McDonnell-Douglas which had solidified itself through the MD-80 announced the MD-11 as a successor to the DC-10. The available funds were limited to USD one billion. McDonnell-Douglas attempted to minimize the cost of transfer for current DC-10 operators. The successor would be available earlier than the TA11 (Marriott, 1992: 20). The success of this programme was crucial for the future of McDonnell-Douglas. Therefore it launched an intensive lobbying campaign in Washington against the latter (Mc Guire, 1997: 117). U.S. Policymakers understood that the 1979 GATT Agreement had not stopped the European competition (Lawrence, 1999: 27-61). In their opinion Airbus Industrie was a main factor behind the rising budget and trade deficit (Mc Guire, 1997: 120).

On 23rd September 1985 the U.S. President Ronald Reagan warned that the EEC might be targeted for unfair practice (Mc Guire, 1997: 120). The Economic Policy Committee of the U.S. Cabinet adopted two strategies. The first was a complaint for violation of the GATT Agreement within its follow-up Aircraft Committee.

The second was to intimidate the Airbus countries. Looming GATT sanctions were to be used as a lever. In both strategies the U.S. presented themselves as the defenders of free trade and entrepreneurship (Aris, 2002: 157). These events coincided with the Boeing announcement of a further version of the B747 (Gilchrist, 1998: 21). Boeing welcomed government involvement. McDonnell-Douglas in turn replied with an updated MD-80 as a way to fight off the Airbus narrowbody (Mc Guire, 1997: 30).

In early 1986 the French government which was speaking on behalf of all Airbus governments offered to negotiate as a way to pre-empt U.S. moves. Subsidies for the widebodies were already on the agenda. After the launch of the A320 liquidities were low, although orders were promising. The reserves of Aerospatiale allowed only the initialization of the new programme. BAE admitted that without government subsidies it would have to withdraw. Deutsche Airbus as well lacked any reserves (Mc Guire, 1997: 121-122). The U.S. competition encouraged Airbus Industrie to update the long-ranger (Muller, 1989: 134-135).

At a first transatlantic meeting in February 1986 the U.S. delegation complained about export financing, government subsidies to Airbus Industrie, government-enforced purchases of Airbus aircraft by Air France, Lufthansa and Iberia, and government-directed procurement of European-made aircraft parts. The U.S. side justified its actions through Article Six of the GATT Agreement. European stakeholders rejected the accusation since the 1979 Agreement allowed these interventions if the targeted company could consolidate its position on the market (Mc Guire, 1997: 122-124).

On 27th January 1986 the Airbus Industrie Supervisory Board approved the widebodies and christened the twinjet the A330 and the quadrijet the A340. Both stood good chances in the post-deregulation market. The A330 offered a capacity increase on trunk routes, the A340 three different profiles. These were the replacement of ageing trijets, the opening of niche routes where ETOPS were impossible and the densification of schedules through the replacement of few B747 flights with more operated with smaller aircraft (Germain, 2000: 6). The overall budget was estimated at USD 2.5 billion (Sparaco, 2005a: 204).

In early 1986 McDonnell-Douglas suggested another transatlantic cooperation to the three Airbus countries (Norris and Wagner, 2001b: 28). Since the widebody programme was expensive the idea to find a risk-sharer seemed plausible. Airbus Industrie was authorized by the governments to evaluate this possibility. A hybrid project called the AM300 with three engines based on an MD-11 fuselage and an A330 wing for a total cost of USD two billion was discussed (Sparaco, 2005a: 207). The GIE wanted to limit the share of McDonnell-Douglas to 35 percent but the latter insisted on 50. Once again the talks stalled. For many this represented another attempt to destabilize Airbus Industrie (Aris, 2002: 143-144).

In parallel to the transatlantic negotiations Airbus Industrie announced that the A330/A340 would go on as planned whatever the actions taken by the U.S.. In March 1986 the GATT negotiations opened. The U.S. intended to consider civil aircraft as manufactured products without rights for subsidies. The official U.S. estimation of the European direct subsidies was USD 2.75 billion. The U.S. also noted a declining number of U.S. subcontractors. The decline was seen as a result of the European efforts to restrict procurement to European companies (Mc Guire, 1997: 123). The Europeans did not dispute the basic claims. In their opinion this was the result of the ongoing concentration and internationalization of the aerospace industry (Hayward, 1999: 3-14). The high demand for the A320 and the A330/A340 illustrated the market-driven approach. The launch aids which had been at 100 percent for the first two aircraft and 90 percent for the A320 would cover

65 percent of the A330/A340 budget. This showed the increasing commercial success of the Airbus programme (Aris, 2002: 145-146). The A330 would be available in 1991, the A340 a year later (Sparaco, 2005a: 204). In October 1986 an order for 100 A320 from the U.S. Northwest stunned the world. It was not criticised since the U.S. competitors were successful as well (Laming and Hewson, 2000: 19).

The Europeans intended to extend the negotiations to the aerospace industry as a whole. In their opinion the U.S. manufacturers profited from military programmes, NASA research and other government financing. For the first time the European criticised the indirect subsidies in the U.S.. Soon after the first GATT negotiations Jean Pierson outlined that for the sole year 1984 U.S. Federal expenditure for aerospace had exceeded USD four billion. NASA had subsidized the propfan. Another indirect subsidy was tax reliefs. By mid-1986 it was clear to all participants that an agreement would be next to impossible (Mc Guire, 1997: 122-124).

In December 1986 McDonnell-Douglas launched the MD-11 with 100 orders (Marriott, 1992: 20-22). Among the clients were Alitalia, Singapore Airlines and Swissair. All of them were operating Airbus aircraft but two had DC-10s in their fleet. Cost of transfer was minimized. Market entry was announced for 1991, which was a year before the A340. The Italian consortium Aeritalia which participated in the B767 was allocated 13 percent of the MD-11 programme (Marriott, 1992: 22).

On 23rd December 1986 an agreement with IAE for the revolutionary superfan[90] engine for the A340 was signed. Lufthansa ordered 15 A340 with this technology on 15th January 1987. This unproven feature represented a challenge for Airbus and IAE but promised a fuelburn lower by 30 percent over the MD-11 (Norris and Wagner, 2001b: 40). Air France relied on the updated CFM (Muller, 1989: 137).

3.6.4. The Beginning Of The Airbus Success Story

In 1987 the U.S. increased their pressure. In February a high-ranking delegation toured the Airbus capitals. It claimed that the market for smaller long-range aircraft was too limited for two competitors. Unlike the high amounts of the European programme the budget of the MD-11 would be recoverable. Therefore only the U.S. programme respected the 1979 GATT Agreement (Mc Guire, 1997: 122-124). To the general surprise in the U.S. the U.K. Department of Trade and Industry rejected the claims with the argument that 10.000 jobs were at stake. The French Delegation for Civil Aviation and the Ministry of Foreign Affairs followed. In Germany the Economics Ministry and the State Secretary of Economics confirmed their commitment. In their opinion the subsidies were legal (Aris, 2002: 158-159).

While the negotiations were in progress the A320 was presented on 14th February 1987. The French Prime Minister Jacques Chirac warned: “The Airbus consortium will not be daunted by the Americans who killed off the Concorde. The A320 has already been a spectacular success. We will fight any trade war flow-for-flow, as the future of the aeronautical industry and the employment it brings are at stake” (Aris, 2002: 150). The maiden flight took place on 22nd February 1987 (Laming and Hewson, 2000: 20).

[90] A superfan (not be confused with a propfan) is a jet engine with a front fan blade far larger than the diameter of the combustion chamber. It is enclosed in a second conduct and therefore delivers thrust as well. The “envelope” of the simultaneously thrusted cold air around the hot exhaust gas reduces fuel consumption and noise. The more compact engine body lowers weight as well (Bristow, 2003: 127-130).

On 7th April 1987 IAE warned that the superfan engine could not be delivered in time (Norris and Wagner, 2001b: 40). For some clients such as Lufthansa this was a blow (Norris and Wagner, 2001b: 41). The time-frame excluded any alternatives. On 8th April 1987 Airbus and CFM signed an exclusive agreement for an updated CFM-56 engine for the A340. All clients approved the solution (Germain, 2000: 17-21). Unlike the failure of Rolls Royce in the Tristar programme the superfan episode was mainly a setback for PR. In the end the overall cost of operation of the conventional thruster was higher by one percent since the superfan would have been far more maintenance intensive than predicted (Norris and Wagner, 2001b: 33).

As it was the case in the earlier programmes the launch subsidies to the A330/A340 were allocated to the national partners. Despite its liberal worldview the Thatcher government approved a loan of GBP 450 million to BAE in May 1987. It covered 60 percent of its work share (Aris, 2002: 146). France backed Aerospatiale with FF 4.86 billion repayable through levies on sales. The French partner in the CFM engine consortium, Snecma, got another FF 906 million. Deutsche Airbus received loan guarantees of DM three billion. Earlier the German government had opened an overall credit of DM 3.1 billion but 2.9 billion were used up (Mc Intyre, 1992: 113). A four percent share in the programme was negotiated with the Italian FIAT and Australian companies but both did not materialize (Norris and Wagner, 2001b: 32).

The A330 and A340 were assembled in Toulouse. Hamburg which was evaluated as well obtained all future derivates of the A320 in compensation (Aris, 2002: 146). The growing business case for a smaller long-ranger led to a change so that the A340 now had the priority (Germain, 2000: 22). On 5th June 1987 the programme was officially launched at the Paris Le Bourget Airshow. It included the A330, the A340-200 for 262 passengers for ultra long-haul niche routes and the A340-300 for 292. Commitments for 130 aircraft of all variants from ten customers including Air France and Lufthansa were announced. Another buyer was the U.S.-based International Lease Finance Corporation (ILFC) (Norris and Wagner, 2001b: 32).

As outlined earlier the expensive widebodies had reshaped financial operations. Aircraft leases through intermediaries became an option. The providers bought the aircraft and leased them to the airlines. The main advantage for the client was the lower capital cost. In case of a downturn the airline could downsize the fleet relatively easily[91]. Once the contract was terminated the airline exchanged the aircraft against more recent models or bought them for the residual value. The leasing companies placed the older machines with another operator at a lower fee or sold them on the second hand market (Hastings, 2006).

Since the U.S. failed to stop the subsidies of the new Airbus programme, McDonnell-Douglas began to lobby in favour of a Section 301 Action by the Department of Commerce possible under the 1974 Trade Act. It allowed governmental retaliation such as taxes or sanctions whenever it agreed that a national industry was affected by unfair trade (Heilman-Grier, 2005). The U.S. State Department was concerned about the growing impact of the European planemaker but it considered the traditional ties with the European NATO-member states as more important than the dispute over a specific economic activity (Mc Guire, 1997: 129).

The flat refusal by all Airbus countries of any claim on the incompatibility of the launch aids with the 1979 GATT Agreement stunned the U.S. stakeholders. To the general surprise it was McDonnell-Douglas which halted the intended Section 301 Action. It feared that this move might prompt retaliation from the EEC and/or

[91] Leasing operations have been very complex. From a theoretical point of view the aircraft available for lease represent a secondary market which allows a better response to the need of the final customers through an intermediary (Gavazza, 2006). For an introduction to the leasing company perspective see (Mehta, 2006: 1-4), for the airline perspective (Wells and Wensveen, 2004: 441-443).

the national governments. Boeing felt the same. In the end only the U.S. GATT Trade Representative maintained the Airbus case on the agenda (Mc Guire, 1997: 131). In this context the Airbus countries issued a joint statement: “Airbus Industrie has been created in order to provide Europe with a strong, competitive and independent civil aerospace industry able to maintain and ensure competition against the U.S. manufacturers which were tending towards a monopoly position” (Mc Guire, 1997: 127).

In October 1987 the Airbus programme grew into a political issue when the Economic Commission of the European Parliament rejected the U.S. claim that the launch aids to Airbus Industrie violated the GATT Agreement (European Parliament, 2000). In November the Airbus Intergovernmental Committee launched an audit. It acknowledged the technological and commercial skills of Airbus Industrie and their contribution to the European airframe industry. The capacity to react to sudden external changes was limited. Finally the organization as a GIE was no longer appropriate. However, an independent Public Limited Company (PLC) was deemed impossible in the near future (Mc Intyre, 1992: 210). The recommendations focused on the short term. A Chief Financial Officer (CFO) with statutory power should be added to the upper management. The GIE should be responsible for the programmes as a whole and become more independent from the partners. The Supervisory Board should be reduced in size. The report issued the warning that if the recommendations were not followed Airbus might never become a global player. Some of the recommendations were implemented by late 1988 (Aris, 2002: 162-164).

During 1987/88 the Europeans were essentially defensive. In the words of an EC official the aim of European policy was to buy time while the launch aids for the A330/A340 programme were under way. EEC policymakers began to see Airbus Industrie as a European issue (Courty and Devin, 2005: 109).

By 1987 the financial situation of the parent company of Deutsche Airbus, Messerschmitt-Bölkow-Blohm (MBB), had become catastrophic (Mc Guire, 1997: 141). The interest in aerospace by the German Daimler-Benz company relieved the Federal government. The socialists and the ecologists feared a near-monopoly (Mc Intyre, 1992: 257). The German cartel office approved since the consolidation promised economies of scale. The acquisition strengthened the German position within Airbus. MBB was renamed Deutsche Aerospace (DASA). Since Daimler-Benz had no intention to take over the costly and risky Airbus programme the government funded Daimler-Benz’s obligation to Airbus with USD 2.7 billion (Aris, 2002: 172-173).

3.7. The Era Of The Audacious Innovators (1988 - 1992)

This section outlines the time between the entry into service of the A320 and the ‘Airbus Accord’ of 1992.

3.7.1. Setting The Stage For The Coming Competitions

In January 1988 Boeing presented the B737-400 for 146-170 passengers together with the B747-400 (Shaw, 1999: 13). The latter continued the lucrative monopoly at the upper end of the range. On 26th February the A320 was jointly certified by the national authorities of France (DGAC), Germany (LBA), the Netherlands (RLD) and the United Kingdom (CAA) (Sparaco, 2005a: 218). In April the plans for a stretched version were unveiled by the GIE, as well as its intention to associate Italy (Laming and Hewson, 2000: 23).

In the years after 1988 Boeing practiced another change. Frank Shrontz, the new Chairman of the Board since January (Bauer, 1991: 330), made expenditure cutting his priority (Lawrence and Thornton, 2005: 92-94). The management agreed since sales were excellent (Bauer, 1991: 331-333). Under these circumstances it seemed more appropriate to extrapolate the existing range than take the risk of new models. The sole exception was the B777 project competing against the MD-11 and the A340 (Upton, 1998: 10). Boeing became an early adopter (Romelaer, 2002: 66-104) of the short-term shareholder-value thinking (George, 1999). Strategic investments in research lowering the cash flow[92] limited the dividend and were cut. Analysts warned that Boeing might lose its leading edge (Lawrence and Thornton, 2005: 92-95). More or less in parallel the Airbus ministers discussed for the first time a possible transformation of Airbus Industrie into a subsidiary of the four partners in the interest of financial transparency (Sparaco, 2005a: 228).

Once A320 operations began, specialists worried about the capacity of the inexperienced pilots to cope with the technological disruptions (Beveren, 1997: 95-98). On 26th June 1988 an Air France A320 crashed at an airshow. The investigation concluded that the pilots had overridden the safety parameters in order to fly lower than allowed (Richter and Wolf, 1997: 359-361). Some other incidents led to a discussion of possible hazards and ways to overcome them (Beveren, 1997: 102-119). All accidents were the result of the lack of experience with the unfamiliar man-machine interface (Buck, 2000: 184-203). Crews had to 'learn on the job' (Vries, 2005: 62-64). The lessons from the A320 could however be integrated into the similarly disruptive A330/A340 (Beveren, 1997: 125-131). The technological revolution was criticised by some as being too extreme, especially for older pilots who had evolved in non-electronic environments. Younger colleagues familiar with computer displays could better adapt to the A320 (Sparaco, 2005a: 224).

Prior to the formal launch of the B777 Boeing had looked into the MD-11 and the A340 and was able to outpace them. Mike Bair, chief project engineer of the new B777, boasted at a media briefing: "The competition had gone beyond the point of no return. So it was pretty obvious for us to pick design features like the fuselage cross-section, which would be better than theirs" (Norris and Wagner, 2001a: 15). The A340 nonetheless represented a serious threat to the B747-400 due to its lower capacity and higher flexibility (Norris and Wagner, 1999: 85). Therefore Boeing lobbied in favour of a GATT Aircraft Agreement complaint (Mc Guire, 1997: 140) and the government stepped in(Lawrence and Dowdall, 1998: 15).

Under the menace of confrontation justified through the trade regimes the Airbus member states investigated the U.S. practices (Mc Intyre, 1992: 117-118). A report by the French Senate revealed that U.S. aids through defence and NASA budgets were higher than the European launch aids and that the relationship between the bureaucracies and the manufacturers was almost symbiotic (Fortier, Blin et al., 1988: 5). Both sides had always openly admitted this (Mironesco, 1997: 17-19). It was therefore the U.S. and not the Europeans who applied unfair practices. The report concluded that a confrontation with the U.S. should however be avoided (Fortier, Blin et al., 1988: 63). Faced with these accusations the U.S. adopted offensive and defensive strategies. The first included renewed claims on the distortions caused by European subsidies and the menace to bring the case to the GATT (Lawrence and Dowdall, 1998: 15). In parallel the U.S. began to admit indirect subsidies (Mc Guire, 1997: 147). This new attitude was seemed linked to the large commercial successes of the U.S. manufacturers in 1988.

[92] The cash flow is the benefit of a company before depreciations and investments are accounted for.

On 20th May 1989 the Airbus Supervisory Board announced the stretched A320 for 180 to 200 passengers. The ILFC leasing company placed the first firm order. This was particularly encouraging since it had to anticipate future demand even better than an airline (Laming and Hewson, 2000: 23). Unlike the A310 the A321 did not need a new wing design. A tailor-made update would have had a minimal impact on performance but a huge effect on cost. Unlike the A310, the aircraft promised excellent values with the existing wing. Another reason was the lack of engineering resources since the A330/A340 programme absorbed them. The cockpit and systems were identical to the A320. Following the earlier commitment made at the launch of the A330/A340 the A321 was assembled in Hamburg-Finkenwerder. For the first time since 1945 Germany delivered a large aircraft (Sparaco, 2005a: 228). Elements were subcontracted to the Italian Alenia and Japanese companies. The budget of USD 500 million was limited (Laming and Hewson, 2000: 25). No state aids were requested (Sparaco, 2005a: 228). In June 1989 the smaller B737-500 took off for its maiden flight. It claimed a 25 percent lower fuelburn than the basic model (Shaw, 1999: 14). In November the A321 was launched with 183 commitments from ten customers (Laming and Hewson, 2000: 124).

In 1989 the sale of Deutsche Airbus and its parent company DASA was completed (Mc Guire, 1997: 140). Since aerospace transactions were based on the U.S. Dollar DASA's earnings were in this currency but expenditures in Deutschmarks. Any depreciation of the Dollar in respect to the German money had a negative effect on the balance sheet. Outsourcings to U.S. subcontractors were a defensive strategy chosen by DASA and BAE. Aerospatiale turned towards Bombardier[93] of Canada (Mc Guire, 1997: 143). The German government intended to compensate the new Deutsche Aerospace (DASA) for the fluctuations of the Dollar. Soon the U.S. made a formal complained at the GATT (GATT, 1990). The German scheme drew the whole consortium into an unwelcome dispute (Mc Guire, 1997: 143). BAE was privatized in late 1989 (Wegscheider, Sever et al., 2003).

3.7.2. Prelude To The Next Transatlantic Round

The U.S. maintained that the launch aids to the Airbus programme violated the GATT agreement but they understood that it was impossible to have them cancelled. Therefore they 'scaled down' the ambition to 'limiting' them (Mc Guire, 1997: 146). Following the EEC the U.S. industry benefited from governmental programmes (Mc Intyre, 1992: 259). Launch aids were the only way to step into markets monopolized by the subsidized competition (Krugman, 1994: 234-241). Assistance did therefore not violate the GATT Agreement. In the opinion of the U.S. the obligation to repay only in case of success demotivated Airbus Industrie from attempting to reach profitability. Washington continued to claim that their manufacturers were market-driven (Sparaco, 2005a: 217). The Europeans maintained that they received indirect support through military and scientific programmes completed by economic incentives such as tax exemptions (Lawrence and Dowdall, 1998: 15). The Airbus stakeholders accepted concessions or lower subsidies but insisted on reductions on the U.S. side (Mc Guire, 1997: 160).

[93] www.aerospace.bombardier.com.

On 10th January 1990 the MD-11 made its maiden flight (Marriott, 1992: 44). Fuelburn was much higher than promised so that the aircraft was less competitive (Norris and Wagner, 2001b: 59). In March the A300-600 was certified for an ETOPS margin of 120 minutes (Norris and Wagner, 2001a: 18).

In September 1990 a report commissioned by the U.S. Department of Commerce at Gellman Research Associates[94] on Airbus Industrie funding was released (Lawrence and Dowdall, 1998: 16). It concluded: "AI [Airbus Industrie] programs, taken individually or as a group, have not been and will not become commercially viable in the foreseeable future (…) A privately financed firm would not have invested in any of the AI programs because non of these programs would show sufficient profits" (Golaszewski, Berardino et al., 1990: ES-1). Over the past 19 years, France, Germany and the U.K. had committed USD 13.5 billion to the various programmes up to the A330/340. If the cost of government borrowing were included the sum would rise to 19 billion and in case market rates were applied to USD 26 billions. This represented 75 percent of all investments (Golaszewski, Berardino et al., 1990: 2-1-2-13). The Airbus partners had only repaid some USD 500 million or four percent by 1989 (Golaszewski, Berardino et al., 1990: 2-3). Cash flow of all programmes had been negative and only the A330/A340 was likely to yield positive results (Golaszewski, Berardino et al., 1990: 4-5). The 'Gellman report' concluded that Airbus Industrie was a danger for the U.S. industry since its market penetration limited the financial resources available for future investments (Golaszewski, Berardino et al., 1990: 5-5). Since the market was oligopolistic Airbus Industrie would nonetheless remain in business (Golaszewski, Berardino et al., 1990: 5-1). The conclusions were soon disproved by reality. The A300 and the 310 were losses as the Europeans admitted (Lawrence and Dowdall, 1998: 15). The A320 had sold almost twice as much as anticipated and generated revenues. The A330/340 exceeded the expectations as well (Aris, 2002: 168).

The Europeans announced limits to their aids in case the U.S. were ready to negotiate their indirect subsidies. McDonnell-Douglas and Boeing suggested to the government that a concession to the European side in indirect subsidies might eliminate risks of retaliation (Mc Guire, 1997: 148). The European Commissioner for Trade Willy de Clerq justified the move: "Not only is Airbus a success story for European technology but, more importantly, it is an example of industrial cooperation within the European Community (…) and we must defend the idea and the concept with all the means at our disposal" (Aris, 2002: 158).

At this moment several manufacturers discussed smaller jets. Aerospatiale and Aeritalia, which were partners in the AIR Consortium manufacturing the turboprops ATR42 and ATR72 in Toulouse, intended to add a regional jet and invited CASA. The Germans in turn talked with the Chinese about a similar concept (Sparaco, 2005a: 230). Each manufacturer attempted to maximize its individual gain.

By 1990 the U.S. carrier United looking for a successor to the DC-10 soon eliminated the MD-11. Jean Pierson was contacted by the President of United since he wanted to renegotiate the price of the A330/A340 but Jean Pierson was on holidays and invited him to wait. United became the launch customer for the B777 twinjet in October 1990 (Upton, 1998: 11). From the beginning Boeing made it clear that it counted on concessions in respect to ETOPS regulation (Sparaco, 2005a: 230). After the launch of the B777, the manufacturer intensified its campaign in favour of a GATT complaint on illegal subsidies to Airbus Industrie. At this time Airbus Industrie paid back USD 900 million of state aids (Mc Guire, 1997: 139) after having an-

[94] www.gra-inc.com.

nounced a profit for the first time (Sparaco, 2005a: 235). The amount was not disclosed but at a meeting of the European aerospace ministers a figure of USD 105 million was hinted (Mc Intyre, 1992: 267).

In early 1991 American criticised the MD-11 and kept the DC-10 in service until the problems were solved (Marriott, 1992: 47). The crisis widened when Singapore Airlines cancelled its order for 20 in August (Norris and Wagner, 2001b: 59). The airline committed to up to 20 A340. This proved a deadly blow to the MD-11 and neither the aircraft nor the manufacturer ever recovered (Norris and Wagner, 2001b: 59).

In June 1991 Airbus Industrie launched the A321. The partners issued a Lira 150 billion bond (USD 120 million) (Laming and Hewson, 2000: 25). On 7th October the A340-300 prototype was presented (Sparaco, 2005a: 236). For the first time the ceremony included European symbols. The Orchestre du Capitole of Toulouse[95] performed the "Song of Joy", which had been the anthem of the EU since 1972 (Diem, 2005). Soon a military version as a replacement for the Transall after 2000 was rumoured. The suggestion came from a working group within the Western European Union (WEU). Soon it became clear that a tailor-made military aircraft would suit better. Aerospatiale, Alenia, BAE and CASA centralized their research into the Euroflag group (Knappe, Palomino et al., 2006: 225).

Doubts on the commitment of the U.K. re-emerged since British Airways did not even invite Airbus Industrie to submit an offer for its A330/A340 when it evaluated the B777. Airbus complained at the European Commission for distorted competition but later withdrew the claim. The choice of General Electric instead of Rolls-Royce engines created a shock in the U.K. itself (Sparaco, 2005a: 238).

In November 1991 a research ordered by Airbus Industrie at the Washington-based attorney office Arnold & Porter[96] as a response to the Gellman report disproved the U.S. claims that McDonnell-Douglas and Boeing were commercial enterprises (Arnold & Porter, 1991: 1). Three sources of government subsidies were identified. A first was the U.S. Department of Defence (DoD). Military research allowed intrafirm technology transfers to civil programmes (Arnold & Porter, 1991: 4-8). Boeing had never denied the "quantum leaps" (Arnold & Porter, 1991: 1) of its civil programmes enabled through military technology (Caidin, 1959: 144-146). Between 1976 and 1990 the DoD had spent USD 50 billion on aeronautical R+D. At least USD 6.34 billion had been allocated to McDonnell-Douglas and Boeing. If the spill-overs to civilian programmes were included the leverage effect of the subsidies added up to some 9.7 billion (Arnold & Porter, 1991: 2). NASA R+D provided another income. One of its goals was to ensure U.S. military and civil supremacy in aerospace (Arnold & Porter, 1991: 2). The report estimated the overall expenditure during the last 14 years by NASA at USD 8.9 billion. The benefit of NASA R+D reached through the leverage effect to commercial programmes between 1976 and 1990 added up to USD 16.96 billion (Arnold & Porter, 1991: 2). Tax and other incentives represented the third source. From 1976 to 1990 they provided benefits of some USD 1.4 billion to McDonnell-Douglas and 1.7 billion to Boeing. The cumulated profit from the three sources to the civil programmes added up to some USD 33.48 to 41.49 billion (Arnold & Porter, 1991: 3). For short, U.S. Strategic Trade Policies included all known ingredients (Stegemann, 1989: 73-100).

In Europe the support to airframers remained lower. In early 1991 Aerospatiale announced its intention to take over De Havilland Aircraft in Canada (Sparaco, 2005a: 236). The Canadian government supported the

[95] www.onct.mairie-toulouse.fr.
[96] www.arnoldporter.com.

move for employment policy reasons (Trebilcock and Austin, 1998: 1-59). On 13th May 1991 the ATR parent companies Aerospatiale and Alenia notified the Directorate General (DG) for Competition. The investigation by the European competition authorities revealed that the ATR market share in the 20 to 70 seat category would rise from 20 to 50 percent worldwide and from 49 to 65 percent within the EU. On 2nd October 1991 the European Commission rejected the merger on the grounds of a dominant position in the European market although it would have strengthened a European company (Case No. Iv/M053, 1991).

In parallel to the "battle of the reports" (Lawrence and Dowdall, 1998: 16) discussions on a shortened version of the A320 for 124 passengers began (Laming and Hewson, 2000: 26). It would complete the narrowbody family at the lower end. Most GIE decision-makers supported the idea (Sparaco, 2005a: 234). DASA had continued its MPC75 programme with the Chinese. In parallel negotiations between DASA, Aerospatiale and Alenia for a small regional jet family for 80 to 130 passengers available after 1997 began in March 1991. It should be independent from Airbus (Mc Intyre, 1992: 267). BAE defended its existing smaller BAE 146. The recession triggered by the Gulf War changed the picture (Sparaco, 2005a: 235). DASA insisted on the transfer of the whole narrowbody programme to Hamburg (Laming and Hewson, 2000: 26).

Aerospatiale did not believe in the new Airbus initiative. The smaller a derivative the lower its margin becomes. Even major sales would not generate substantial profits. Only a smaller clean sheet design promised a business case. Therefore Aerospatiale promoted an X92 and X122 (Sparaco, 2005a: 236). In the view of many a 90- to 120-seater outside the Airbus programme would establish an intra-European competition and weaken both programmes. A second argument shared by BAE, DASA and Jean Pierson was the fact that Boeing had a whole family of B737 derivatives. A smaller version would make the narrowbody family as a whole more attractive. The budget was as low as USD 250 million. This could be entirely assumed by the partners. Finally the new Airbus could be marketed as a VIP and corporate jetliner (Sparaco, 2005a: 236). On 22nd May 1992 the A319 was announced (Laming and Hewson, 2000: 27). The first order for six came from the leasing company ILFC.

3.7.3. The 1992 'Airbus Accord'

In the meantime the U.S. and the European governments as well as the EEC had become interested in an agreement. It allowed them to monitor the other side. For the Europeans it was obvious that the U.S. only agreed on concessions since they believed that there was no way to track indirect subsidies (Mc Guire, 1997: 151). The German exchange rate scheme remained unsolved. The EEC feared that the U.S. would bring it to the GATT. These fears were confirmed in March 1991 (GATT, 1992: 1). GATT officials were afraid that a U.S.-EEC battle might disrupt the Uruguay Round. They attempted to convince the U.S. not to bring up the DASA scheme or the Airbus subsidies (Mc Guire, 1997: 152).

Through informal channels the Europeans learned that indirect subsidies limited to four or five percent did not pose a threat to the U.S. manufacturers. Their size exceeded that of any European company. As an additional incentive for the U.S. the Europeans offered to lower the ceiling on direct subsidies from 45 percent to 30 to 40 percent of the overall cost of programmes. The U.S. interpreted this as a concession and signalled the withdrawal of the GATT subsidies issue. Now they were under pressure to offer something in re-

turn. The EEC proposed a scheme to cap subsidies to five percent of the total turnover of a signatory's industry. To the general surprise the U.S. agreed on the principle (Mc Guire, 1997: 153).

In respect to the German exchange rate scheme the EEC maintained that it was an EEC internal trade affair outside the scope of the GATT. For the U.S. it represented an export subsidy to Airbus (Mc Guire, 1997: 153). On 4 March 1992 the final report of the GATT Committee on Subsidies and Countervailing Measures declared the German scheme incompatible with the provisions of Article 9 'Export subsidies on products other than certain primary products' of the GATT Subsidies/Countervailing Measures Agreement (GATT, 1979b: 20). The EEC disputed this. The Germans announced to end the scheme (Mc Guire, 1997: 155). The U.S. Department of Commerce announced to turn the matter to the GATT for a judgement or to initiate a 301 Action under the 1974 Trade Law if no agreement was reached by 31st March (Mc Guire, 1997: 155).

On 1st April 1992 the A340-200 prototype took off (Norris and Wagner, 2001b: 68). In the meantime the A330 progressed. The A330 became the first Airbus with a choice of engines from General Electric, Pratt & Whitney and Rolls Royce from the beginning (Norris and Wagner, 2001b: 44).

On 2nd April 1992 the U.S., the EEC and its members announced the U.S.-European Agreement on Airframe Aerospace Subsidies, immediately usually known as the "Airbus Accord" (Mc Guire, 1997: 155). Unlike the vague 1979 Aircraft Agreement it established an institutional framework. Formally it was based on Article 4 'Government-Directed Procurement, Mandatory Sub-Contracts and Inducements' of the 1979 GATT Agreement (GATT, 1979a: 3). The Airbus Accord was signed by the EEC on 13 July 1992 (92/496/EEC, 1992: 31). The European side agreed to limit reimbursable public advances to 33 percent of the overall amount of a programme. This meant an average reduction of 17 to 27 percent. For the first 25 percent of the total sum the official interest rates were applied. The rate of the remaining 75 percent would be raised by one percent. All subsidies had to be reimbursed by the benefiting entity in 17 years maximum. The U.S. side limited indirect support through military and scientific programmes to three percent of the overall turnover of the benefiting company (European Commission, 2005). Both sides agreed on the exchange of balance sheets through the competent authorities. For the Airbus countries and the EEC this was Washington, for the U.S. competitors the governments of the Airbus partners (Mc Guire, 1997: 155). A clause of exception allowed interventions in case a manufacturer was near to going bankrupt. Financial incentives for new programmes in turn were forbidden (Mc Guire, 1997: 155). For all aerospace stakeholders it was obvious that the failing McDonnell-Douglas was targeted (Mc Guire, 1997: 156).

In practice the Airbus Accord enabled both sides to continue their schemes. In the opinion of many the Europeans had made too many concessions for too little in return. The Airbus member countries were obliged to reschedule their R+D. On the other hand the Europeans had obtained a strategic victory since they had forced the U.S. to acknowledge its subsidies. This discredited their claims to be the defenders of free trade and entrepreneurship. Far more than the Aircraft Agreement the Airbus Accord illustrated the growing capacity of the Europeans to defend common issues. This strengthened their position in future negotiations (Mc Guire, 1997: 155-156).

At the Farnborough Airshow in 1992 Boeing revealed that some airlines were interested in a very large aircraft. The next day Airbus revealed the Ultra High Capacity Aircraft (UHCA) which had been studied for some time by Aerospatiale and DASA (Spaeth, 2005: 40-41). Ten airlines had given inputs (Sparaco, 2005:

107-119). On 14th October 1992 the A330 prototype was rolled out (Norris and Wagner, 2001b: 78-79). On 22nd December the A340-300 and -200 were certified by the 18 members of the European Joint Aviation Authorities (JAA). Two variants of a new model were approved at the same time. This was another first (Norris and Wagner, 2001b: 71). Airbus was now able to market its Airbus Family concept (Airbus S.A.S., 2002: 34-39). Any A320 pilot could easily convert to the larger aircraft (Buergi, 1999: 8-9). The Cross Crew Qualification allowed considerable economies of scale (Airbus S.A.S., 2005a).

By mid-1992 Boeing studied two larger aircraft. These were a stretched B747 (Norris and Wagner, 1999: 89) and a double-decker for 600 people (Heppenheimer, 1995: 180). Boeing confirmed secret talks with DASA on the latter. At a Supervisory Board meeting on 15th December DASA insisted that the programme would be outside Airbus. Jean Pierson, the head of the GIE Airbus was against (Aris, 2002: 172). Airbus Industrie was paralyzed (Norris and Wagner, 1999: 89).

3.8. The Era Of The Skilful Leaders (1993 - 1997)

This section outlines the time between the 'Airbus Agreement' and the last full year of the GIE.

3.8.1. New And Intensified Competition

On 5th January 1993 the Wall Street Journal reported an agreement between Boeing, Daimler Benz, the parent company of DASA, and BAE to pursue the development of a 600-seater. Airbus Industrie confirmed that Aerospatiale and CASA participated in the talks. In the opinion of many Boeing intended to saw disorder in the Airbus system (Aris, 2002: 174). For Airbus Industrie stakeholders the offer was at least partially sincere (Spaeth, 2005: 47). On 27th January 1993 Boeing and the Airbus partners announced a joint committee for the Very Large Capacity Transport (VLCT) (Norris and Wagner, 1999: 89). In parallel Boeing continued its research on a larger B747 and a new model (Norris and Wagner, 1999: 89). The Airbus partners did not end their own work. From the beginning they based it on the 80 meters by 80 meters box[97] (Spaeth, 2005: 41) certified by the ICAO and recommended by the Airports Council International (ACI)[98] (Airbus Industrie, 1999: 11). The GIE Airbus remained absent (Spaeth, 2005: 47). Jean Pierson complained that the longer the discussions lasted the more Boeing would enjoy its monopoly (Spaeth, 2005: 47). Each B747 generated a net profit of USD 30 million (Aris, 2002: 176). Finally the joint working group was disbanded in April 1995. Boeing cancelled its related programme (Norris and Wagner, 1999: 89).

A330 flight tests were going so well that 1000 hours of checks were slashed (Norris and Wagner, 2001b: 79). The commonality with the A340 and the learning curve of the manufacturer (Womer, 1979: 312-319) made this possible (Norris and Wagner, 2001b: 79). On 11th March 1993, the Airbus A321 had its first flight (Knappe, Palomino et al., 2006: 236). Unlike earlier models it was a superior head-on challenger of the established B757 (Laming and Hewson, 2000: 25). In June 1993 the smaller A319 was launched with a first

[97] Tarmacs, runways and terminal positions are certified for a maximum aircraft 'footprint'. When the B747 was introduced an 80 meters by 80 meters square was certified as the largest category. The new aircraft would be geometrically compatible with all ground spaces certified for the B747. This reduced potential investments for airports and airlines and a long definition and certification process (FAA, 1998: 9).
[98] www.airports.org.

order of six from the lessor ILFC (Laming and Hewson, 2000: 27). Like the A321 it was assembled at Hamburg-Finkenwerder. The programme was financed without launch aids (Laming and Hewson, 2000: 28).

In October 1993 the Airbus A3XX Integration Team centralized the large aircraft projects of the partners (Spaeth, 2005: 51). In June 1994 the B777 had its maiden flight (Norris and Wagner, 2001a: 64). The later market entry was not seen as negative since "Boeing let Airbus freeze its metal beyond change and then made it better" (Hough, 1996: 3-9). Despite the economies of scale through the Cross Crew Qualification the B777 proved a serious competitor especially in Asia where it replaced A300s (Sabbagh, 1995).

By July 1994 the design of the A3XX was defined (Sparaco, 2005: 107-119). The market potential was estimated at 1000 over 20 years. The estimated budget of USD eight to ten billion made launch aids unavoidable (Marc, 2005: 26). At the low end of the market the Airbus AE31X aircraft family for 95 to 125 passengers was rumoured. Soon China was said to be interested (Sparaco, 2005a: 253).

In 1994 Airbus outsold Boeing for the first time with 125 aircraft against 111 (Lynn, 1997: 222) although Airbus Industrie had lost a 100 aircraft order from Saudi Arabian Airlines (Lynn, 1997: 1-9). During the competition the U.S. National Security Agency (NSA)[99] intercepted the communications between the delegation and the headquarters[100] and submitted them to Boeing. When this came out the matter was raised by the European Parliament (Akdeniz and Gladman, 2000)[101]. Since the end of the Cold War, such findings had put strain on transatlantic relations (Latsch, 2005: 48-49).

In the meantime airlines suggested a smaller A330 variant for 253 passengers whose range and payload would be superior to those of the B767-300 (Norris and Wagner, 2001b: 91). The GIE initiated the new programme in April 1995. The potential was estimated at 800 until 2015 (Norris and Wagner, 2001b: 92). During the Paris Le Bourget Air Show, the four Airbus partners officially agreed to negotiate reforms of the Airbus structure (Sparaco, 2005a: 329). The German Chancellor Helmut Kohl affirmed that an independent Airbus Industrie would be more reactive to challenges from the competitors. France intended to establish competence clusters so that each countries would remain competitive on its own (Sparaco, 2005a: 329). Boeing announced the stretched B777-300 for up to 451 passengers (Norris and Wagner, 1999: 151).

On 25th August 1995 the A319 had its maiden flight (Laming and Hewson, 2000: 28). The German Airbus partner launched a new programme outside Airbus with China and South Korea (Sparaco, 2005a: 252). Aerospatiale invited again BAE and Alenia to complete the ATR turboprop series with a jet family. Many decision-makers within the GIE saw this as a danger to the Airbus programme. The Chinese brought the issue into the GIE since they intended to negotiate with Airbus Industrie only (Sparaco, 2005a: 252). McDonnell-Douglas in turn had launched the MD-95 for 100 passengers in August 1994. It was based on the ageing DC-9 but its systems and engines were state of the art (Pearcy, 1999: 58).

On 24th November 1995 the Airbus Supervisory Board approved the A300-200 based on a budget of USD 450 million (Norris and Wagner, 1999: 117). No launch aids were requested. The initial A330 was renamed the A330-300. Boeing prospected an update of the B767-300 (Birtles, 1999: 38-41).

[99] www.nsa.gov
[100] In 2000 the NSA in turn stated that it had uncovered an Airbus plot including bribery to high-ranking Saudi state officials (Asser, 2000).
[101] Before these facts became known, it was assumed that the order was a sign of Saudi gratitude towards the United State for their involvement in the Gulf War of 1990/91 (Akdeniz and Gladman, 2000).

In the same year Airbus Industrie began to promote the A3XX for 555 to 655 persons (Cochennec, 2005: 18-26). Travel habits of the lower and middle management of most companies have been influenced by the rigorous cost-efficiency programmes triggered by the now worldwide competition for production sites. Those passengers who accounted for most business travels now chose the lowest fare even if this meant changes of aircraft en route. The lower revenues or yields per trip had to be compensated through lower cost of production enabled by larger aircraft (Doganis, 2001b: 9-10). Long-haul traffic focused on major airports or hubs where the passengers connected to other flights (Hanlon, 1999: 133-138). More customers per flight were the only way to lower cost (Airbus Industrie, 1999: 3). The two possible engine suppliers for the A3XX were the U.S. based Engine Alliance, an ad hoc partnership between Pratt & Whitney and General Electric, and Rolls Royce which announced the Trent 900[102]. BAE saw the A3XX as a major risk. The government supported the programme. All French stakeholders were enthusiastic. Relations between both countries deteriorated. In Germany neither DASA nor the government did give too much credit to the programme (Laming and Hewson, 2000: 28). Boeing knew about the risk to lose its monopoly in the large aircraft market. Following its strategy to reduce cost of development it promoted two stretched versions of the B747-400 and abandoned the new design (Norris and Wagner, 1999: 90-91). Airbus insiders later admitted that a go-ahead of Boeing would have been fatal for the A3XX (Spaeth, 2005: 53). Boeing began to promote its smaller aircraft. More than ever airlines differentiated their services through increased frequencies and niche routes. For both smaller aircraft were appropriate. Budget restrictions forced the important stakeholders to limit unproductive travelling time. The expected benefit of their trip for the company outweighed the fare in any case. Such passengers generated higher yields for the airlines (Hanlon, 1999: 189-195). For the price-sensitive travellers the B747-400 was large enough (Boeing, 2005c: 12-13).

A first hint that the A3XX may became a success came from a meeting on 14th May 1996 with airlines (Marc, 2005: 29). Most of them appreciated the end of the Boeing monopoly (Sparaco, 2005a: 254). During the Farnborough Airshow 1996 Boeing disqualified the A3XX as an “industrial suicide” (Spaeth, 2005: 54). Airbus Industrie continued to penetrate the U.S. market. In summer 1996, the fifth largest US-airline, USAir[103], placed an order for 124 Airbus A319 and A320 completed by 276 options (Flugrevue Online, 1997a). In November Boeing won an equally important order over 103 narrowbodies from American (Newhouse, 2007).

In May 1996 several airlines encouraged a larger A340 for ultra long niche routes with a range superior to that of the B777 (Norris and Wagner, 2001b: 108). By summer two variants were presented. The A340-500 could carry 313 passengers over 15.000 km and the larger A340-600 378 over a distance similar to that of the B747-400 (Norris and Wagner, 2001b: 111). Both models claimed lower cost of operation than the B777. The four engines allowed operations without ETOPS restrictions (Norris and Wagner, 2001b: 111).

In 1996 both manufacturers entered the VIP market. In July Boeing unveiled the Boeing Business Jet (BBJ) based on another derivative of the B737, the 700 series, under development (Norris and Wagner, 1999: 63-64). Airbus launched the Airbus Corporate Jetliner (ACJ) inspired from the A319 (Laming and Hewson, 2000: 28). The first B737-700 for 149 passengers left the factory in December 1996 (Shaw, 1999: 14).

[102] In 2001 Brussels approved a British governmental loan to Rolls Royce of GP 250 million (C(2001)3266 Final, 2001).
[103] Renamed USAirways in 1997.

On 28th July the four partners officially confirmed the need to transform Airbus Industrie into a private company by 1999 (Sparaco, 2005a: 329). In November 1996, a research by the Lehman Brothers Bank[104] corrected the image of Airbus as an inefficient state undertaking (Campbell, 1996: 14-17). Its product line was coherent but needed to be completed with the A3XX offering even the chance for a monopoly. R+D activities were long-term oriented. New partners from anywhere could be easily integrated. However things were far from perfect. The domination by the partners slowed down decisions. Strikes and unrest in France and the U.K. were another risk. Finally A3XX sales could be below the expectations. The main error would be to underestimate Boeing. A privatized Airbus could be an attractive portfolio for investors (Campbell, 1996: 14-17).

3.8.2. The End Of A World

On 6th December 1996 Boeing announced the takeover of McDonnell-Douglas. Since 1994 talks had been held in secret (Harrison, 2003). In 15 years two U.S. manufacturers were gone. Boeing became a civil and military giant with a turnover of USD 56.2 billion. This was more than the cumulated revenues of the whole European aerospace industry (Aris, 2002: 189). On both sides of the Atlantic the announcement set the competition authorities in motion. In the U.S. the Federal Trade Commission (FTC)[105] was charged with the case. The European Commission examined mergers by any company exporting for more than EUR 250 million within the EU as a whole (OJ L 395, 1989).

Under the pressure of the merger the Airbus partners reaffirmed the commitment to a new structure on 13th January 1997. Each of them would retain its share. Everywhere this victory of common sense was welcomed (Sparaco, 2005a: 330). In France the recent stake of Aerospatiale in Dassault Aviation was seen as a promising first step towards a privatized and ultimately self-governed independent Airbus (Sparaco, 2005a: 330). Some weeks later the partners cancelled the planned overwriting of their design offices and production facilities to the new company. It proved impossible to evaluate the assets (Sparaco, 2005a: 330).

On 20th January 1997 Boeing abandoned the stretched B747. Soon it denied any market for the A3XX (Sparaco, 2005a: 300). The new Boeing obtained a worldwide share of more than 60 percent (Harrison, 2003). DASA insisted that Airbus Industrie be assisted by the national and European policy stakeholders. The EEC elaborated a European aerospace policy[106]. BAE suggested a private company capable to resist the U.S. competition and attractive for the capital markets[107]. In France the determination was particularly strong. Aerospatiale and the Government called for retaliation by the EU and a clear signal to the U.S. that Europe was ready to defend its aerospace industry[108]. A competitor to the A320 was the B737-800 which took off for the first time in July 1997 (Shaw, 1999: 14) strengthened the resolve. Since it was based on the existing B737 cost of development was lower than that of the A320. In would prove a stiff competitor, partially owing to the ongoing active U.S. governmental involvement in favour of Boeing. In the same month Boeing announced the B767-400 as a response to the A330-200. The U.S. carrier Delta became the launch

[104] http://www.lehman.com
[105] The Federal Trade Commission (FTC) established in 1914 protects the U.S. consumer rights. See www.ftc.gov for details.
[106] Quoted by (Martel, 2000: 53) from Air & Cosmos, No. 1594, 3rd January 1997.
[107] Quoted by (Martel, 2000: 54) from Air & Cosmos, No. 1620, 4th July 1997.
[108] Quoted by (Martel, 2000: 53) from Air & Cosmos, No. 1592, 20th December 1996.

customer when it placed an overall order of 106 aircraft of various types with Boeing (Norris and Wagner, 1999: 117). This order and others from American and Continental over 35 in June 1997 were exclusive contracts until 2017. They were seen as an open declaration of war to Airbus and free trade. Therefore the Europeans evaluated them as well (Harrison, 2003). The U.S. FTC defined them as a possible threat since pressure to innovate was reduced. Boeing insisted on the synergies which was in the very national interest of the U.S. so that the FTC gave its approval on 1st July 1997 (Sparaco, 2005a: 255).

The Airbus countries turned towards the EU (Aktas, Bodt et al., 2001: 447-480) since it was the sole body responsible for the assessment of mergers outside Europe (Harrison, 2003). Following the growing number of transnational mergers both the U.S. and the EU had established policies for the investigation of mergers outside their jurisdiction but with an impact on their economy. Extensions to the Articles 81 (competition as governing market principle) and 82 (abuse of dominant position by companies) of the Treaty of Rome (EEC, 1957: 34-36) had been validated by the European Court of Justice[109]. In 1991 the U.S. and the EU had signed an agreement in this respect (OJ L 95, 1995: 47-52).

The evaluation by the European Commission was based on consultations with the member states, the FTC and Boeing (Commission of the European Communities, 1998: 15-16). Airbus Industrie was involved in the whole process (ICPAC, 2000: 56). Boeing contested the association of the exclusive contracts with the merger issue. The U.S. announced retaliations in case the EU opposed to the merger (Harrison, 2003). In fact the EU could not prevent the merger but only apply sanctions within the European Single Market (Aktas, Bodt et al., 2001: 447-480). The strong involvement of the EU surprised the U.S. (Sparaco, 2005a: 255). On 16th July 1997 the limits of political influence on the Airbus programme became visible when the four responsible Airbus ministers acknowledged the difficulties of reforms (Sparaco, 2005a: 330).

On 30th July 1997, the European Commission approved the merger under certain conditions (97/816/EC, 1997: 16-47). For ten years Boeing had to maintain McDonnell-Douglas as a separate entity and to submit an annual report. Boeing should also maintain the same level of customer support as McDonnell-Douglas. The new entity was obliged to licence McDonnell-Douglas technologies whenever these came from governmental programmes. Finally Boeing was obliged to cancel the exclusive deals and was not allowed to conclude others until 1st August 2007 (97/816/EC, 1997: 16-47).

Airbus Industrie had insisted on the end of the exclusive contracts. Soon rumours circulated[110] that these were concluded for tactical reasons. They violated the principles of free trade to such extend that the Europeans would focus their attention on them instead of the attempted dominant position of Boeing. The concessions seemed limited. For instance the new company was free to end any McDonnell-Douglas programme. The affair represents a turning point of European integration. For the first time the EU had assumed leadership in a transatlantic aerospace issue (Burgner, 1997).

The merger illustrated the drive for economies of scale and lower cost in any industry following the worldwide competition (Held and Mc Grew, 2000: 1-45). Even the U.S. understood that concentration was the price to pay for the future of strategic industries (Cosentino, 1999: 15-25). This argument outweighed the traditional

[109] http://curia.europa.eu.
[110] Information based on discussions with aerospace professionals who wish to remain anonymous.

antitrust attitude in the interest of fairness in the domestic market (Harrison, 2003). Throughout Europe the merger launched a debate on the fragmentation of the European aerospace sector (Sparaco, 2005a: 256).

3.8.3. A New Beginning Under The Airbus-Boeing Duopoly

Two suppliers which share a market create a duopoly which is a special case of the oligopoly of supply. It impedes competition (Samuelson and Nordhaus, 2001: 183-196). The attitudes of suppliers and buyers are opposed. Both sellers intend to consolidate their position and to squeeze the other out of the market. In case one of them succeeds it establishes a monopoly (Lipsey, Courant et al., 1999: 232-249). The airlines try to prevent this. Therefore they tend to prefer the weaker of the two contenders, as new Airbus customers admitted (Siegmund, 1997: 24-25). Airbus Industrie consolidated further and set up a mixed company with Alenia and Chinese partners for the AE31X programme in 1997. Two aircraft compatible with the Airbus family were planned. From the beginning the programme emphasized the need for a superior response to the 100 seating McDonnell-Douglas MD-95 and Boeing 737-600. At the same time there was the question of a possible conflict with the slightly larger A319 (Sparaco, 2005a: 256). Notably for this reasons research on a further shrink of the A319 for 100 passengers was carried out in parallel (Hewson, 2002: 41-44). On 13th August 1997 the A330-200 had its maiden flight (Norris and Wagner, 2001b: 95).

Everybody expected Boeing to become the dominant player. Instead it ran into its worst crisis. First it had to absorb its rival. After a new order record intake Boeing was forced to increase its workforce. The constant hiring and firing of the blue-collar workforce never enabled a true company culture (Handy, 1999: 72-75) or an adequate level of experience (Michel, Salle et al., 2000: 162). A second factor was the extreme individualization of each aircraft. For instance, customers could choose among 109 shades of white paint. The error rate was high (Aris, 2002: 193). Finally, the production lines had never changed since the 1940s. Bottlenecks amplified the problems. Until the early 1990 there had been no computerized inventory. The transition implied another learning process in parallel with the integration of the former competitor and the training of the new workforce. In June 1997 the disorganization had reached such proportions that the production of the B747 and the B737 was halted for 20 days (Lawrence and Thornton, 2005: 132-137). The Asian crisis (Krugman, 1998: 27-31) gave an additional blow (Norris and Wagner, 2001b: 98).

As a first step towards rational operations Boeing would terminate the McDonnell-Douglas MD-80 and MD-90 series which competed with its B737 after the remaining 104 orders were executed. The MD-11 of which 19 remained to be delivered was maintained since its potential as a freighter was promising (1997b). The 100-seater MD-95 competed against the totally different B737-600 (Shaw, 1999: 8). When Airbus announced the AE31X and later the A319 shrink, Boeing decided to maintain it as the B717 although it remained outside the own family concept (Norris and Wagner, 1999: 26).

Airbus Industrie was challenged by the weak Dollar. The 1997 Dolores[111] programme included a streamlined organization and some layoffs (Aris, 2002: 180). Stakeholders from within the GIE began to suggest an in-depth reorganization. One idea was to transform the GIE Airbus into a Limited Company (Bruce, 1999: 123-132). Its integration into a European civil and military conglomerate was another (Bieler, 1999: 113-122).

[111] The name stood for Dollar Rescue. It is also the Spanish words for pain.

BAE, CASA and DASA insisted on a private company. Aerospatiale preferred a nationalized consortium. One of the arguments was a possible end of the transatlantic tensions since the figures would be checkable. In any case launch aids compatible with the 1992 Airbus Accord would remain a key element. All Airbus partners now openly suggested a European aerospace policy to their governments and the Commission (Prem, 1999: 133-142). The French-German summit in September 1997 fixed the deadline of the transformation of the GIE Airbus into a public company on 1st January 1999. The EU was invited to accelerate the pending European company statute (Sparaco, 2005a: 331).

On 24th September 1997 the European Commission published a report on the challenges the European airframe industry was likely to meet. It made it clear that "The (…) industry will only allow for a small number of world-class prime contractors to sustain competitiveness and commercial success through the integration of capabilities in a broad range of inter-related aerospace disciplines" (COM(97) 466 Final, 1997). Airbus Industrie had risen to 30 percent market share but had stagnated at this level since 1989. Boeing held 64 percent prior to the merger. The greatest asset of the U.S. was the commitment by all stakeholders to remain the world leader in aerospace (Thornton, 1999: 63-79). Only in regional aircraft the situation was more favourable. In 1994 European manufacturers kept 70 percent. The collapse of Fokker and the sale of Dornier to Fairchild as well as offensives from Canada and Brazil had led to a decline. Japan focused on highly specialized subcontracting. In China the civil aircraft industry was at its beginning but ambitions were visible.

If Europe should resist U.S. supremacy the national governments had to abandon once for all their nationalist perspective for military reasons in favour of a common policy (COM(97) 466 Final, 1997: 14-17). In 1996 aerospace counted for three percent of total EU exports. Formally the member states continued to be the sole competent decision-makers in regard to the national aerospace industries and the hesitation to change this remained considerable. The extension of the EU research programmes to aerospace and to optimize the overall conditions were appropriate strategies (COM(97) 466 Final, 1997: 11). However, only integrated companies with civil, military and space branches in several countries would allow significant synergies. Even if all European aerospace companies were merged together the resulting conglomerate would still be smaller than the post-merger Boeing (COM(97) 466 Final, 1997: 14).

In October 1997 the B777-300 had its first flight (Norris and Wagner, 2001a: 59). In December Airbus Industrie formally launched the competing A340-500 and -600. Commitments amounted for some 80 of both versions. The budget was estimated at USD 2.9 billion. This made launch aids necessary (Norris and Wagner, 2001b: 112). BAE requested USD 200 million. BAE later admitted that it could have funded the entire share itself on only slightly worse terms. It saw the application as a test for the national commitment to the U.K. industry in the ongoing discussions on the Airbus reorganization (Norris and Wagner, 2001b: 112). On 9th December 1997 the heads of state of the Airbus countries officially endorsed the restructuring of the European civil and military airframe industry. The partners were invited to present their plans until 31st March 1998 (Sparaco, 2005a: 331).

3.9. The Era Of The Ambitious Managers (1998 - 2003)

This section outlines the privatization of Airbus Industrie and the launch of the A380.

3.9.1. Closing The Gaps

In January 1998 Boeing's new small B737-600 had its maiden flight (Shaw, 1999: 20). In the same month Noel Forgeard followed Jean Pierson at the helm of the GIE. He was a strong personality and had his origins in the French elite university system. His first success was the sale of 59 narrowbodies to British Airways (Sparaco, 2005a: 259). For the first time the airline ordered Airbuses (Aris, 2002: 197).

In February 1998 the U.K. liberated its launch aids to the A340-600/400 programme. France and Germany soon followed. In May Singapore Airlines selected the A340-500 over the B777. Another key order for 18 A340-600 came from Emirates, the upstart from the United Arab Emirates (Norris and Wagner, 2001b: 113).

In spring the launch of the A3XX was put on the agenda. From the beginning Airbus Industrie announced a whole family including a freighter (Spaeth, 2005: 127-128). The date of market entry initially scheduled for 2003 was postponed. None of the 20 airlines participating in the definition process opposed. The fuselage cross section excluded air transport of the elements. Combined marine/road transfer was selected. As a site for final assembly Hamburg did not stand much chance despite the easy access to marine transport since the A321 and A319 were manufactured there. Rostock was supported by all political parties, from the extreme left to the extreme right. The argument in favour of Seville was the low cost of production. France advanced Nantes, Saint Nazaire and Toulouse and insisted on the local know-how (Spaeth, 2005: 58).

On 27th March 1998 the partners admitted their incapacity to agree on the details of a reorganization of Airbus Industrie. They even questioned the deadline of 1st January 1999. BAE and DASA criticized the status of Aerospatiale as a nationalized company (Aris, 2002: 198). Despite its own crisis Boeing continued to launch competitive products. The Boeing 757-300 with 243 seats was rolled out in May 1998 (Birtles, 2001: 29-31). Even Airbus insiders admitted that it was very competitive (Spaeth, 1999: 22-23). This did not save it from a commercial failure. On 31st May 1998 the A330-200 was certified by the European Joint Aviation Authorities (JAA), the U.S. FAA and Transport Canada for ETOPS 120[112] (Norris and Wagner, 2001b: 99).

The AE31X project was cancelled in summer 1998 (Sparaco, 2005a: 257). Airbus Industrie focused on a smaller A319. From the beginning the design suffered from shortcomings. One of them was the suboptimal ratio fuselage cross section/wingspan (Anderson, 1999: 105-122). On 8th September 1998 Airbus presented the A318 at the Farnborough Airshow and estimated its market potential at 2000. The investment of USD 300 million was brought up entirely by the Airbus partners (Sparaco, 2005a: 258). For Airbus Industrie the wider cabin and the commonality with the other aircraft outweighed the slightly less than optimal performance (Figgen, 1999: 24-26). The competing B717 made its first flight in September 1998 (Norris and Wagner, 1999: 36). Its marketing campaign did not attack the European aircraft but highlighted the transatlantic cooperation. For the first time, Boeing had outsourced components to Austria, France, Germany, Israel, Japan, South Korea and Taiwan (Boeing, 2005b).

[112] This meant the aircraft is allowed routes from where it can reach an airport of diversion with one engine out of two in two hours at maximum.

1998 was the best year so far for Airbus Industrie. It had sold 556 aircraft for USD 13.3 billion and had a backlog of USD 42 billion. Boeing still led with 656 sales (Sparaco, 2005a: 258-259). During the same year discussions on the vague military transport began in earnest. A research group was created within the GIE to assess the Future Large Aircraft (FLA) (Sparaco, 2005a: 263). By 1999 national rivalries were partially overcome. National defence still was the prerogative of the sovereign state (Sparaco, 2005a: 355). Belgium, Germany, France, Italy, Spain, Turkey and the U.K. had established common specifications. The GIE Airbus and the partners in France and Germany felt capable to take the challenge (Sparaco, 2005a: 356).

In February 1999, the market entry of the A3XX was rescheduled for 2005 (Airbus Industrie, 1999). The capacity of Airbus Industrie to launch this programme was questioned (Spaeth, 2005: 56). In April the A318 was formally launched with 80 orders, 30 of them from the leasing company ILFC (Sparaco, 2005a: 258).

3.9.2. Towards The Reorganization

Although talks on a new structure of Airbus Industrie had been going on for a year, the partners had not been able to decide on the transition. During the discussions the British and German sides had insisted on the privatization of Aerospatiale (Aris, 2002: 200-201). In July 1998 the sale of Aerospatiale to the Largadère group active in the media[113] was discussed. In France the operation mirrored a paradigmatic change by the Jospin government. Largadère was aware that Aerospatiale and the government feared the erosion of national expertise. Therefore it merged Aerospatiale and Matra[114], a supplier of military hardware. The French precipitation was motivated by rumours on a merger of BAE and DASA (Aris, 2002: 201).

In summer 1998 BAE and DASA started their negotiations. News leaked out just before the French summer holidays. The French Minister of Transport warned that any Anglo-German convergence would mean the end of the French support to the Airbus single entity. The French requested a 50 percent share to counterbalance the Anglo-German entity. Aerospatiale refused to exchange validation data with the other partners (Aris, 2002: 203). DASA accused the French to consider the Airbus programme as a national affair.

On 7th September 1998 the four 'Airbus ministers' confirmed that they backed up any reorganization of Airbus Industrie. France insisted again on its leading position. The U.K. and Germany praised the promises of increased efficiency (Sparaco, 2005a: 332). On 12th October 1998 the negotiations became official. The merger was announced for early 1999. The French were invited to join. In fact BAE began to doubt on the intentions of DaimlerChrysler[115], the new parent company of DASA. Airbus was one activity among several (Aris, 2002: 204). In January 1999 BAE seized the opportunity to take over the legendary Marconi company specialized in military electronics with the resources readied for the merger (Aris, 2002: 205-206). The rebuked Germans turned towards the French (Sparaco, 2005a: 332). They did not know that in January Aerospatiale had launched 'Opération Pégase' together with BAE to create an Anglo-French Airbus company and to buy DASA out. It failed as well (Aris, 2002: 206).

[113] www.lagardere.com.
[114] Mécanique Avion Traction (MATRA) was a well-known French conglomerate active in mechanics, aeronautics and armament. In 2000 it was merged with the space divisions of the other Airbus partners into a new entity called EADS Astrium (www.space.eads.net).
[115] www.daimlerchrysler.com.

Despite these manoeuvres the four partners established Airbus Military in February 1999 as a subsidiary to the GIE. By December the projected A400M military transport was selected by Belgium, France, Germany, Italy, Spain, Turkey and the U.K. (Knappe, Palomino et al., 2006: 250). Airbus Industrie was now seen as a full aerospace conglomerate (Moxon, 1998).

On 22nd February 1999 the French approached the German partner and kept BAE in the dark. Talks involved the owners of the Airbus parent companies and not the latter. Only a small group inside Largadère and DaimlerChrysler was informed (Aris, 2002: 207). By July an agreement on a European Aeronautic Defence and Space Company (EADS) was reached. It was presented as the European answer to Boeing (Aris, 2002: 207). Only days before the announcement Largadère informed BAE. The surprised U.K. partner had only one day to decide. The French urged it to join to counterbalance the Germans. BAE refused since it had no intention to become a junior partner in a company it had not been invited to create (Aris, 2002: 207).

On 14th October 1999 the French government, Aerospatiale and DaimlerChrysler Aerospace SA officialised the merger (Knappe, Palomino et al., 2006: 252). Largadère and DaimlerChrisler each held 30 percent of the binational European Aerospace and Defence Company (EADS)[116]. In France the state held 50 percent, Largadère 37 and the rest was floated (Sparaco, 2005a: 332). With a turnover of 22.5 billion Euros and a workforce of 88.900 EADS became Europe's largest aerospace company and the worlds' second after Boeing. Airbus counted for some 60 percent of its activities (Aris, 2002: 207). The complex structure of EADS mirrored the ongoing political involvement. For fiscal reasons the headquarters were installed in the Netherlands. Two operational offices were established in Paris and Munich. Both were a national CEO. Since there was no place for the Spanish CASA in the new structure it was only a question of time until it would be taken over. Spain's centre-right Aznar government saw this as an opportunity to raise cash and sold it to DASA. The future role of the far larger U.K. partner remained open (Aris, 2002: 207).

In 2000 the Airbus military programme was officialised and other partners were invited to join. In May 2001 the Organisation conjointe de cooperation en matière d'armement (OCCAR)[117] established in 1996 as the office for joint armament procurement by France, Germany, Italy and the U.K. was selected as the customer interface (Knappe, Palomino et al., 2006: 277).

3.9.3. The Giant Ramps Up

In December 1999 the Airbus Supervisory Board authorized to offer the A3XX (Marc, 2005: 36). All U.S. airlines denied any interest. Qantas and Singapore Airlines requested major optimizations. Some engineers attempted to convince the management that 85 percent of the initial requirements would do as well. By early 2000 the technical targets had been met by 98.8 percent (Aris, 2002: 210).

On 14th March 2000 the U.K. government announced a launch aid of GBP 530 million. The Minister of Industry claimed that the new programme would create up to 22.000 jobs in the U.K.. It underlined its strategic interest but made clear that the subsidies would be granted only if the wing was allocated to the U.K. (Aris, 2002: 210). All governments had already committed to USD 2.5 billion out of the 10.7 billion of estimated

[116] www.eads.com.
[117] www.occar-ea.org.

total cost. France announced subsidies of FF 9.2 billion in 2001 and another eight billion until 2005. Boeing and the U.S. government protested that the European side violated the 1992 Airbus accord (Aris, 2002: 211). Under the influence of Boeing the U.S. warned they might take the case to the WTO. The Europeans announced a close scrutiny of the U.S. practices (Aris, 2002: 211).

After the establishment of the EADS the partnership with BAE had to be defined. The latter agreed on a stake of 20 percent in the Airbus Integrated Company where EADS held 80 percent. At anytime after 2003 BAE had the right to sell its stake to EADS which would be obliged to take it over (Aris, 2002: 212). On Friday, 23rd June 2000 the new Airbus Integrated Company Airbus Société d'actions simplifiée (S.A.S.) was presented (Aris, 2002: 212). On 18th September the European Commission approved the reorganization (Knappe, Palomino et al., 2006: 256). In the view of many one clumsy system was replaced by another barely more efficient. Others feared that Airbus might, like Boeing, become a victim of short-term thinking. Economies of scale and accelerated decision-making dissipated some of the fears (Aris, 2002: 212). The Airbus headquarters remained in Toulouse. Since there was still no European company statute, Airbus S.A.S. was based on French legislation. The production sites were governed through national subsidiaries (Sparaco, 2005a: 333).

Fundamental choices remained political. The main assembly of the A3XX was allocated to France owing to the available workforce (Storper, 2000: 42-62). The interiors would be added in Hamburg. Major investments on the German site were necessary. Since a biotope was scheduled for elimination, a struggle for influence among ecologists and EADS took place. After long negotiations the costly works could proceed. The transport was to be done with special barges and over prepared roads to the facility in Toulouse (Spaeth, 2005: 58-59). In late April 2000 came the breakthrough when Dubai-based Emirates ordered ten A3XX. Soon Air France and the lessor ILFC followed. By the end of the year Airbus had won orders from Singapore Airlines, the independent U.K. based Virgin Atlantic and the Australian Qantas. In 2000 Airbus christened the new flagship the A380 (Spaeth, 2005: 59). There was now a widespread consensus – skilfully orchestrated by the Airbus marketing – that it had taken the technological lead (Lawrence and Thornton, 2005: 70-73).

On 23rd April 2001 the A340-600, the longest civil aircraft ever constructed, had its maiden flight. It was very elaborate but heavier than expected. Since it was more efficient than predicted the contractual performance was met (Norris and Lewis, 2001). Exactly one week later Boeing cancelled any plans for a very large aircraft since it had found no clients (Aris, 2002: 218). It launched a new project named Sonic Cruiser. It was a family of aircraft for 175 to 300 passengers operating at slightly less than the speed of sound (Cochennec, Angrand et al., 2001: 10-13). Overall cost was estimated at USD eight to ten billion and the first flight was announced for 2006. All of a sudden the A380 seemed outdated. Many considered the Sonic Cruiser as a strategy to divert attention from the A380 (Thomas and Forbes-Smith, 2003: 215). According to others both concepts were extrapolating two views of society. Airbus was democratising air travel through lower cost. Boeing focused on the 'happy few' who could afford high fares. In the same way Boeing had denied any real interest in the A380 Airbus bashed the Sonic Cruiser (Cochennec, 2001: 18-24). A new transatlantic clash was beginning when the 11th September 2001 stunned everybody (Friedman, 2004: 2-4).

Attitudes of the target public of the Sonic Cruiser changed almost immediately. For those who continued to travel the fare regularly outweighed comfort whenever they chose an airline or flight path. In Europe they began to chose no frills carriers (Calder, 2003). Within days Boeing lowered its delivery estimates for 2002

by 30 percent and sacked 30.000 workers. The impact on Airbus was less dramatic. Through cutting overtime and an early retirement scheme Airbus reduced its workforce slightly by 1000 to 44.500 (Aris, 2002: 219). Another initiative to reduce cost was an R+D freeze with the exception of the A380 and the A400M. This paradigmatic change was widely noted (Casamayou, 2002: 11). Boeing abandoned the Sonic Cruiser although it communicated this only in 2003 (Lewis, 2003). On 18th December 2001 the A400M programme was officialised by the countries which had shown their interest. The investment was estimated at EUR 18 billion. The Airbus Military Company (AMC) was set up as a subsidiary of Airbus S.A.S. (Bombeau and Gaudin, 2001: 50-53).

On 15th January 2002 the A318 for 100 passengers carried out its maiden flight (Hewson, 2002: 41-44). Sales were below those of the other narrowbodies. On 11th February the A340-500 with the longest range ever for a civil aircraft for up to 16.700 km followed (Knappe, Palomino et al., 2006: 266).

3.9.4. Boeing: The Rebirth?

In spring 2003 Boeing announced a new conventional aircraft named B7E7 to replace the B767 and A330/A340s after 2008 (Thomas and Forbes-Smith, 2003: 216-218). For the first time the entire fuselage of an airliner would be made of composites (Cochennec, 2003: 22-23). Production would be decentralized and assumed by risk sharers, and the elements transported to the final assembly site with transformed B747 (Norris, 2004: 9). 35 percent of the overall manufacturing was subcontracted to Japan and Italy. For the first time the two competing engine suppliers, General Electric and Rolls Royce agreed on a common wing mount interface. Further innovations included a wide fuselage cross section. Airbus considered the new aircraft as a response to the A330 and denied any need to react. At this time Airbus had outsold and outdelivered Boeing (Cochennec, 2004: 18-23).

The B767 was repositioned as a tanker. The U.S. Air Force negotiated more than 100 sales. In late November 2003 an ethics scandal shocked Washington. The incident opened a chance to EADS to bid for 100 tankers contract together with the U.S. Lockheed Martin (Sparaco, 2005a: 271). Airbus was becoming a military supplier. On 27th May 2003 the A400M programme was officially launched with 180 orders. The first flight was announced for 2006 and entry into service in 2008 (Sparaco, 2005a: 354).

3.10. The Era Of The Short-Term Thinkers (2004 - 2006)

This section covers the delayed and inappropriate Airbus response to the B7E7.

3.10.1. The Tide Turns

On 26th January 2004 the U.K. Ministry of Defence preferred the new tanker based on the A330 over the B767 (Bombeau, 2004: 24-26). This was another strategic success and raised the credibility of EADS in the ongoing negotiations for the delivery of 100 tankers to the U.S..

By spring 2004 it became apparent that for the first time Airbus hesitated to take a challenge since it did not announce a response to the B7E7. Insiders soon identified three factions[118]. For a first there was no need to react. A second suggested an updated A330 (Condom, 2004: 17-20). It would enter the market together with the challenger but its cost of development would be far lower. A third suggested a new family of aircraft. This was the most expensive and most delayed but the most promising solution, as the A310 had shown. On 30th April 2004 Boeing formally launched the B7E7. Only in September there were first hints on a reaction by Airbus. Unlike the A310 and later models it was announced as an evolution instead of a revolution. Boeing warned that it would not tolerate any launch aids (Cochennec, 2004: 10-12). On 10th December Airbus presented two versions of the A350 based on the A330-200. The fuselage cross section was identical to that of the earlier widebodies and therefore inferior to that of the challenger (Kingsley-Jones, 2005). Entry in the market was announced for 2010. This was two years behind the B7E7.

On 12th January 2005 the U.S. Government and the EU agreed to stop subsidies to Boeing and Airbus for the next three months. The U.S. once again insisted on the illegal subsidies to Airbus worth USD 15 billion, whereas the EU countered with claims for up to USD 23 billion in indirect support to Boeing. Both sides agreed to reduce tensions notably following the difficulties in Iraq in where the U.S. and several European EU member states were involved (Pope, 2005).

In January 2005 the B7E7 was christened B787 Dreamliner (Cochennec, 2005: 20-24). The next offensive of Boeing came on 15th February when the twinjet B777-200LR Worldliner with a range of 17'400 kilometres and a capacity similar to that of the A340-500 was rolled out (Thomas and Forbes-Smith, 2005: 9-19). The twinjet had lower cost of operation than the A340-500 with four engines. A further relaxation of the ETOPS-rules to 207 minutes by the U.S. increased its comparative advantage (Norris, 2005).

On 18th February the heads of the Airbus states boasted during the reveal of the A380: "The birth of the big Airbus jet (…) marked a milestone in Europe's ability to work as one, beating the rest of the world in terms of industrial capacity and technological innovation" (Ballantyne, 2005: 5). Rumours about weight problems persisted (Thomas and Forbes-Smith, 2005: 10-21). U.S. academics and analysts predicted that the whole programme would create an overall loss of USD eight billion throughout its duration (O'Connell, 2005). In March an new version of the B747 for 450 passengers was discussed (Cochennec, 2005: 28-31). In April Boeing confirmed that the 1992 Airbus Accord was outlived. Airbus and the European Commission replied that the B787 was more subsidized than any Airbus aircraft (Mandelson, 2005). The maiden flight of the A380 on 27th April was followed throughout the world (Butterworth-Hayes, 2005: 23-26). In May a major update of the A350 was revealed (Cochennec, 2005b: 14-16).

On 30th May the U.S. announced the request of a WTO Dispute Settlement Panel to resolve the pending questions on aircraft subsidies. The U.S. claimed that the EU had not followed the three month freeze agreed upon in January (Shark, 2005). On 7th June both sides issued a joint statement that "this dispute shall not affect our cooperation on wider bilateral and multilateral trade issues. We heave worked together well so far, and intend to continue to do so" (Portman and Mandelson, 2005).

[118] If not stated otherwise this and the final section is based on the inputs by several mid- and high-ranking aerospace professionals and journalists the author contacted in his work as an aerospace journalist. Some of them wish to remain anonymous.

During the Paris Le Bourget Airshow in June both manufacturers claimed that they were the only one which respected the 1992 agreement (Sweetman, 2005: 6). An order for 60 A350 by Qatar Airways created a major sensation (Martin, 2005: 1). In July, Thomas Enders, the former CEO of the defence systems division and Noel Forgeard became the new Co-presidents of EADS (Beauclair, 2005: 10-11).

On 6th October 2005 the A350, now presented as a 90 percent new aircraft, was launched with 140 orders (Cochennec, 2005: 16-18). Final assembly was planned in Toulouse (EADS, 2005). Airbus denied to need any launch aids (Cochennec, 2005: 16-18). The progress of the A350 in respect to its predecessors A330-200 and 300 was compared to the evolution from the basic A340 to the A340-600/500. In the opinion of many, Airbus missed the opportunity to "leapfrog" its competitor. Boeing had successfully done so with the B777 in regards to the MD-11 and the A340 (Hamilton, 2006). Boeing reiterated its support for the U.S. government to end launch aids through a settlement or a WTO litigation (Boeing, 2005a). Even without a formal request France agreed to assume a share in the A350. Launch aids of EUR 1.3 billion for an overall budget of around 4.3 billion were rumoured. Break even was settled at 600 units. The U.S. side threatened to revoke the 1992 agreement. The greatest trade war in history was announced (Airwise News, 2005b).

In the meantime the A380 faced the unexpected issue of wake turbulences[119]. Following U.S. experts the separation between aircraft had to be increased (Denuit, 2005). The A380 would therefore lose a major USP which was higher capacity without additional flights. Airbus rejected the conclusions. The ICAO classified the wake turbulences of the A380 as stronger and more problematic than those of the smaller B747-400 (Pasztor and Michaels, 2005: 1). Airport compatibility in turn was confirmed (Cochennec, 2005: 28-29).

Another surprise was the formal launch of a derivative of the B747, the B747-8 for 450 passengers or cargo (Doyle, 2005: 26-27). The latter got orders from two leading freight carriers (Cochennec, 2005a: 14-16). Emirates deferred the delivery of the 18 A340-600. It insisted on an increased performance of the aircraft. When the carrier had ordered it in 1997 the model had no competitor (Norris and Wagner, 2001b: 113). In December China committed to 150 Airbus narrowbodies and announced an assembly line (Casamayou and Cochennec, 2005: 10-12). In parallel the country talked about an 150-seater (Ionides, 2006: 15). Since the investment made considerable technology transfer necessary warnings were raised (Deckstein, Dettmer et al., 2006: 70-73). Most agreed that Boeing held again the upper hand (Greising and Oneal, 2005).

In 2005 the A400M programme was finalized after long delays. The aircraft would be manufactured like the civilian Airbuses. France and Germany were responsible for the fuselage, the U.K. for the wing. Other elements were allocated to Belgium, Spain and Turkey. Final assembly was to take place in Seville[120]. The maiden flight was now announced for 2008 (Sparaco, 2005a).

Towards the year's end it seemed as if Boeing would win the order battle with 1002 net orders (Cochennec, 2006: 10-11). Claims over a jeopardized position due to the subsidies of Airbus seemed less credible than ever (Sachdev, 2006). Airbus announced 1055 net sales. In terms of value Boeing reclaimed the lead since it had placed more widebodies (Kingsley-Jones, 2006: 14). There were rumours that Airbus might offer compensation for the higher fuel burn of the A340-500/600 than that of the B777 (Kingsley-Jones, 2006: 9).

[119] An aircraft travelling through the air disturbs it as a boat does in water. The larger the aircraft the stronger the wake turbulences and the longer it takes until they dissipate. A plane following in flight may be shaken. Therefore minimal distances are introduced. These disturbances may prove fatal for smaller aircraft. Since increased separation between aircraft reduces the number of flights admitted at the airport, its overall capacity decreases (Bristow, 2003: 429-434).
[120] www.airbusmilitary.com.

Airbus underlined its ambitions to keep its leadership (Casamayou, 2006: 15) and further increased the performances of the A350 (Deseilligny, 2006: 24-26). Boeing announced larger variants of the Dreamliner. Airbus finally conceded it might tap on the governmental aids (Turner, 2006).

On 10th March 2006 the best result ever (Rising, 2006) for the Airbus parent company EADS was announced (Beauclair, 2006: 10-11). On 26th March the A380 passed the crucial cabin evacuation test and was certified by the European EASA and the U.S. FAA for 853 passengers (Condom, 2006: 18-19).

This success was followed by the first of a series of blows against Airbus. On the annual meeting of the International Society of Aircraft Traders (ISTAT)[121] on 26-28 March, Steven-Udver-Hazy, the charismatic founder of ILFC, criticised the A350 as being inferior to the B787 (Gates, 2006d). Airbus played down the warning once more. Qatar Airways announced that it might cancel its order for 60 (Shannon, 2006).

On 4th April Airbus suffered the next shock. The shareholders Largadère and DaimlerChrysler announced each the sale of 7.5 percent (EADS, 2006b). Three days later BAE confirmed its intention to dispose of its 20 percent stake in Airbus (EADS, 2006c). The 2001 agreement obliged EADS to take it over. For some this was a short-sighted move by BAE tempted to buy into U.S. companies. Others claimed it was a deliberate manoeuvre to destabilize Airbus plagued by difficulties with the A380 and the A350 (Clark, 2006).

In April a total redesign of the A350 was announced (Norris, 2006). It would however cost at least Euro eight to ten billions and be available by 2012 only (Norris, 2006: 6). For some the redesign and the later arrival on the market offered an opportunity to outsmart the competitor (Aboulafia, 2006b) through a superior product based on the lessons learned from the B787 in the same way Boeing had managed with the B777 against the A340 (Lawrence and Thornton, 2005: 145-150). The B787 was too advanced to be reshaped anymore (Reed, 2006a). Like Boeing Airbus had relied on an outdated design once too often (Norris, 2006: 5). The selection of Tianjin as the site of the Chinese assembly line was seen as the short-minded help to a future competitor (Leithen and Sobie, 2006: 8). At the same time rumours about problems with the B787 appeared (Homes, 2006).

On 13th June Airbus suffered the deadliest blow so far. A delay of a further six months of the A380 due to wiring problems was announced. EADS warned that the shortfall in earnings might reach Euro 500 millions until 2010 (Airwise News, 2006u). Singapore Airlines and Emirates publicly insisted on compensations (Airwise News, 2006s). The EADS shares fell by 32 percent (Airwise News, 2006a). Following Airbus the military A400M programme was not affected (Airwise News, 2006r). Airbus played down another order lost to the B787 by the blue chip carrier Singapore Airlines (Kingsley-Jones, 2006: 4).

On the 16th March EADS announced an investigation (Airwise News, 2006n). Noel Forgeard admitted he had heard about the bottlenecks in April only. On the same day it became known that he and other executives had sold stock options. The German minister of Economy urged EADS to solve its problems. For many the credibility of Airbus was affected but, like Boeing, it would overcome the crisis (Condom, 2006: 4). In Germany the resignation of Noel Forgeard was requested when he claimed that the Hamburg site was responsible for the A380 delay (Airwise News, 2006o). On 21st June the French Minister of Finance suggested the merger of EADS and Airbus (Airwise News, 2006m). More and more experts saw the A380 as a failure (Aboulafia, 2006a). The most important customer, Emirates, defended it (Airwise News, 2006l).

On 21st June the French Prime Minister insisted on urgent action since vital interests were at stake. The Germans warned that they would not tolerate any tilt within EADS towards the French. Both outlined the chance the takeover of the 20 percent share from BAE offered for a reorganization (Airwise News, 2006k). The crisis extended to the U.S. where a Republican lawmaker suggested that the foreign carriers should pay for the airport adaptations for the A380 unless an U.S. carrier placed orders (Airwise News, 2006j).

On 29th June the turmoil reached a new climax. Internal EADS documents suggested tensions at the highest level. They confirmed that more than a month before the public announcement of delays to deliveries of the A380, Noel Forgeard must have known about the difficulties (Airwise News, 2006i). The delay strained the Franco-German relations. On 1st June, Noel Forgeard and Gustav Humbert were replaced by the former director of the French Railways Louis Gallois, 61. He was appreciated for his negotiation skills with the trade unions. Tom Enders became his German partner. Gustav Humbert at Airbus S.A.S. was replaced by Christian Streiff, another Frenchman. The Franco-German equilibrium remained (Airwise News, 2006h).

On 2nd July 2006 a financial arbitration revealed that the sale of its 20 percent Airbus stake would generate half of the profit BAE it had anticipated. BAE nonetheless liquidated it (EADS, 2006a).

3.11. The Comeback Of The Pioneers? (Since 2006)

This section traces with the attempts of Airbus to overcome the double crises of the A380 and the A350.

3.11.1. Airbus Overtaken By Its Rival

Even at this stage EADS remained successful. On the day both CEOs resigned, the U.S. Army signed a firm order for 352 helicopters (Morrison, 2006). Shortly afterwards, Airbus presented updates on the A320 in order to increase fuel efficiency (Cochennec, 2006: 20-22). With more than 400 orders before the maiden flight the B787 was the most successful Boeing model ever at that stage (Reed, 2006b).

3.11.2, A New Airbus S.A.S.

On Monday, 17th July 2006, the first day of the Farnborough show, Airbus announced the revamped A350 as the A350 Xtra Wide Body (XWB). It was a family of four passenger versions and a freighter for 270 to 350 passengers. The fuselage was slightly wider than that of the B787. Market entry was announced for 2012 (Airbus S.A.S., 2006). The new series was tacitly promoted as a successor to the A340 (Croft and Hughes, 2006). Airbus Sales Manager John Leahy challenged: “We have leapfrogged our competitor. What you get by being a little bit later is that you get to study your competitor and see how, step by step, you can do better” (Martin, 2006: 1). Unlike the B787 the A350XWB did again not have a fuselage made of composites. The aircraft clearly outperformed the B777 (Polek, 2006b). Boeing doubted on the capacity of Airbus to implement this competitor for both the B787 and the B777 (Airwise News, 2006c).

[121] http://www.istat.org

At the last day of the show Airbus created the first positive surprise since the beginning of the crisis through a spectacular order from Singapore Airlines. The blue chip customer transformed nine options on the A380 into orders and committed to 20 A350XWB (Kaminski-Morrow, 2006a). This move was considered as the beginning of the turnaround of Airbus. During Farnborough, Airbus outsold Boeing with 182 orders and commitments for USD 21.5 billion versus 79 aircraft worth about 10.2 billion (Jameson, 2006).

The Airbus crisis was far from over, as Christian Streiff outlined during the A350XWB press briefing: “I want this company to get back to its basics: Airbus’ success has been based on the enormous courage it took to introduce the latest technologies, and on strong customer orientation with a spirit of always delivery more than expected (…) Based on previous lessons learnt, the A350XWB brings Airbus fully back into the game and will be a success” (Airbus S.A.S., 2006).

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Chapter 4 - Airbus In The European Context

4.1. Introductory Remarks

As the Idiographic-Nomothetic Approach (INA) combines data mining and analysis the Airbus story outlined in Chapter Three provides the 'raw data' for the second part of the research divided into three steps. First, the lecture grid based on situative optimization is applied to the historical narrative. The technical decisions for the Airbus programme usually made by the manufacturers and later the Airbus entity are approached with the question of innovation in mind. Afterwards the governmental STPs are examined. Over time changes in the wider context such as new technologies, economic paradigms and geopolitical reconfigurations have influenced decision-making. One such parameter is European integration. Since the research is dedicated to it a second step correlates the chronologies of the technological and political sequences with the European integration as far as it is relevant for the research question. In a third the findings are approached through the research question so that the hypothesis can be verified.

4.2. Situative Optimization

This section determines the motivations of the industrial and state actors throughout the Airbus history.

4.2.1. Introductory Remarks

Manufacturers attempt to dominate the market through technological leaps. STPs support them in their ambitions. Aerospace and state actors are confronted with Path Dependences and lock-ins.

4.2.2. The Actors And Their Strategies

This section outlines the voluntary and involuntary innovations of the manufacturer and the STPs of the states at the various stages of the Airbus programme.

4.2.2.1. The Manufacturers And The Airbus Entity

The invention of the aeroplane in the early 20th century launched innovation processes (Kennett, 1991: 1-23). After 1918 passenger aircraft became a strategic good (Morrow, 1993: 349-378). In France air transport became essential for the ties with the colonies and national prestige. Most manufacturers were under state influence. In the U.K. the suppliers acted as technology drivers. Formally they remained independent but mostly acted within state programmes (Groves, 1929: 289-317). In Germany the works were private enterprises mostly under governmental contract (Morrow, 1977: 36-51). In the U.S. aircraft evolved through the

competition among manufacturers (Anderson, 2002: 187-188). During the Second World War the absence of direct hostile influence on the territory and the strategic needs encouraged the U.S. manufacturers to concentrate on long-range aircraft. After the war the partially U.S. shaped international air transport regime (Milner, 1993: 207-232) encouraged large civil aircraft (Zandt, 1944). An additional incentive was the Marshall Plan. Aircraft supply to war-torn Europe promised to lock out the local competition for the foreseeable future (Kracht, 1994: 21). The available know-how offered major pulls.

During the Second World War the European industry had suffered major drawbacks. The facilities in France and Germany were destroyed, those in the U.K. locked in on outdated military hardware. In addition the French and U.K. industries lacked the experience in large aircraft (Kracht, 1994: 22). After 1945 the U.K. resumed the pre-war habit of tailor-made designs for specific airlines[122] (Brookes, 1992: 36-48). The De Havilland Company launched the first passenger jet. Every imaginable contingency was accounted for (Hill, 2002: 26-31). When the Comet 1 rolled out in 1949 it was superior to any U.S. aircraft. A series of accidents terminated its promising career in 1954. The investigation revealed physical properties of airframes unknown at the time of the development stage of the Comet (Edwards, 1993).

In France the various manufacturers remained nationalized after 1945. Several of them presented propeller aircraft inferior to the U.S. hardware. When the French state stakeholders announced a national jet programme the Toulouse-based Sud Est Aviation, later to become Sud Aviation after a merger, won with the Caravelle in 1955. Even an U.S. carrier ordered it (Wegg, 2005: 50-55). Boeing and Douglas approached Sud Aviation for licence agreements. The offer from Douglas was more attractive. Know-how transfers were agreed. It was not a Caravelle that rolled out of the factory in 1965 but the superior DC-9. The U.S. competitor had ‘leapfrogged’ the former through theft of intellectual property (Martel, 2007: 7-8).

In Western Germany the Allies had dismantled the industry after 1945 (Costello and Hughes, 1976: 21). The Paris Treaty of 1955 allowed again airframe construction. Ambitions to re-enter the civil market reappeared. The government rejected the necessary initial contributions for political reasons. It did not want to upset the delicate relationship with France and other countries through superior products (Kirchner, 1998: 63). In 1959 the lack of suitable equipment a treaty between France and Germany for the military Transall freighter led to a binational treaty. The technologies of transporters were more or less in the public domain so that France did not risk losing its military know-how. Germany in turn could gain experience (Kirchner, 1998).

The U.S. manufacturers Boeing and Douglas each announced a large quadrijet in 1952 (Caidin, 1959: 124-146). They intended to lower cost of production for the airlines. This in turn would encourage further orders. After the maiden flights in 1958 the Boeing 707 and the Douglas DC-8 dominated the market. Boeing consolidated its position through the smaller three-engined B727 in 1963 (Mansfield, 1965). Douglas brought out the DC-9 (Nibloe, 1965). Boeing responded with the similar-sized B737. It shared essential features with the earlier aircraft. Economies of scale through the ‘family concept’ were considerable. Boeing ”locked in” the jet aircraft Path Dependence in its favour through pro-active innovation and skilful responses to the competitors (Norris, 2006: 34-35). Douglas did not capitalize on commonalities so that it fell back in sales. In 1967 it was taken over by McDonnell specialized in military hardware (Lawrence and Thornton, 2005: 3-5).

[122] Several airlines specialized in geographic zones such as the South Atlantic or Europe coexisted until 1949.

By 1958 the U.K. De Havilland redesigned the Comet but it was outdated when it entered the market (Walker, 2000: 70). The competing Vickers took the chance of a military request and proposed the Vickers VC7 jet (Das, 1955: 55). The nationalized BOAC was not interested so that the prototype launched in parallel with a military tender was scrapped in 1955. Soon afterwards the airline made a similar requirement but the machine was gone. Therefore it ordered the B707. In 1957 BOAC issued another requirement but the resulting VC10 was too tailor-made (Finnimore, 1989: 13-14). A short-sighted management and the incapacity of the stakeholders to cooperate hat eliminated a promising challenge to the U.S. superiority. A similar incapability to look beyond the national market was observed in the short-haul sector. The national airline for the European routes, BEA, issued a request for a 120-seater. While the aircraft was under development by De Havilland BEA downsized its request to 100 seats (Kingsley-Jones, 1993: 16-19). In the meantime Boeing had initialized the B727 for 120 passengers. When the DH 121 Trident was presented in 1962 it outperformed the B727 but was too small to compete against it. Larger versions came too late to challenge the U.S. machine (Kingsley-Jones, 1993: 34-36). Again the lack of strategic vision and coordination among the various air transport and state actors had excluded the success. In 1960 the government had merged several manufacturers into Hawker Siddeley involved in the DH 121 Trident and BAC. The latter launched a small passenger jet (Skinner, 2002: 15). Instead of waiting for a request by an airline it focused on the ideal typic profile of short-haul jet traffic. Operators from all over the world including the U.S. appreciated the BAC 1-11 (Skinner, 2002). The Dutch Fokker company proposed the competing F-28 in the mid-1960s (Kreuzer, 1991: 114-117). Since the manufacturer was smaller than BAC it innovated through transnational cooperation including VFW in Germany and Shorts Brothers in Belfast. Economies of scale were enabled.

In France things evolved in a different direction. Sud Aviation evaluated a successor to the Caravelle in 1960 (Sparaco, 2005a: 36). A first school of thought focused on a major update of the existing aircraft. This would enable an early market entry at lower cost more or less in parallel with the B727. Another faction suggested a competitor to the B727 and the DC-9. Development would take more time and cost higher but the aircraft would outperform the U.S. products. Sud Aviation suggested yet another approach through a larger design with engines supplied by the U.K. Rolls Royce company. Despite the promises of a new design the government chose the Caravelle update. Since it was no longer competitive, Air France preferred the B727 (Sparaco, 2005a: 36). Dassault Aviation specialized in military supply prepared a superior competitor to the U.S. models. The Mercure was launched in 1969 as a multinational venture under French leadership. Unlike the BAC 1-11 and the Fokker-28 it was too market specific (Kirchner, 1998: 82-83).

In Germany the various manufacturers had re-entered the market through smaller aircraft and suggested a national aerospace policy. The Federal government rejected the idea. The Air Transport Industry Association (BDLI) warned that Germany might lose the strategic sector altogether (Kirchner, 1998: 67-90). In 1967 the Federal government granted funding to VFW provided that other industrial stakeholders stepped in. After long negotiations Fokker became a partner but divergences outweighed common interests (Kreuzer, 1991: 161-164). The German manufacturers were as innovative as the French and U.K. competitors but unable to enter the market. For political reasons the government did not support them (Kirchner, 1998).

In the late 1950s French and U.K. manufacturers attempted another technological leap over the U.S. competition through supersonic transport (Costello and Hughes, 1976: 67-68). Soon all stakeholders experienced that this programme was beyond the individual means of any of them (Simi and Bankir, 1968: 77). In

November 1962 France and the U.K. signed a state treaty (Costello and Hughes, 1976: 76-78). Boeing and Douglas were absorbed by their programmes and unable to react. Therefore the U.S. government launched the Supersonic Transport (SST) programme (Dwiggins, 1968: 64-65). Again the Europeans seemed on the losing side. The B2707 initialized later than the Concorde was more elaborate. For physical reasons the design failed. The Concorde had its maiden flight in 1969 (Costello and Hughes, 1976: 155). Government funding for the B2707 was halted in 1971. When the Concorde entered into service in 1975 it was no longer seen as a pioneering venture but an ecological irresponsibility and an economic nightmare (Davies, 1994: 106-125). The failure of the B2707 revealed that the U.S. industry was not immune against setbacks.

In the mid-1960s the symbiosis of civil and military airframe construction paid off again for Boeing. Following the loss of a military tender Boeing launched a new technological disruption through the of the widebody aircraft. It anticipated that Lockheed which had won the contract and McDonnell-Douglas would be unable to launch competitors. For Boeing the programme proved extremely difficult. In the end the B747 Jumbo Jet was certified for fewer passengers than expected since it failed the evacuation test (Moser, 1986: 150). The resource drain threatened Boeing's very survival (Lawrence and Thornton, 2005: 50-52). After 1970 it established a monopoly in the upper end of the market for over 30 years (Gilchrist, 2000: 56). The strategy of 'betting the company' had paid off (Sutter and Spenser, 2006: 211-224).

Encouraged by a request for a smaller aircraft with the same advantages and handling characteristics as the B747 by American Airlines (Berke, 2000: 58-64), Lockheed launched a smaller widebody. Since the market was very promising, McDonnell-Douglas replied with a similar design (Machat, 2002: 22-41). The competition would prove ruinous for both manufacturers. Both the Lockheed Tristar and the DC-10 entered the market in 1972. A new category of aircraft with common characteristics (Mokyr, 1990a) had emerged.

From 1964 to 1967 the Airbus programme was initialized. Around 1960 European operators mostly relied on U.S. hardware. Most forecasters predicted a capacity rise for the next decade (Allward, 1967). In France Breguet (Sparaco, 2005a: 43), Nord Aviation, Sud Aviation and Dassault (Endres, 1999: 9) had aircraft for some 200 passengers on the drawing board. In the U.K., Hawker Siddeley pursued similar research. The manufacturers experienced that they lacked the resources to step into the promising market. The Concorde illustrated the promises and challenges of transnational cooperation. Representatives from the manufacturers and the governments from both countries began to explore further possibilities. The pull factor of the Concorde and the pusher of insufficient resources encouraged a first change in attitudes in respect to other national aircraft programmes (Mc Intyre, 1992: 10). In 1964 the French and the U.K. governments issued a joint requirement for a widebody for short-haul operations (Endres, 1999: 7). This was a new approach since Air France and BEA had different route profiles. Sud Aviation and BAC began to work on a 200-seater. Hawker Siddeley which had lost the Concorde tender, Breguet and Nord Aviation promoted the HBN-100 twinjet widebody for 260 passengers (Sparaco, 2005a: 43). The governmental top-down and industrial bottom-up initiatives were pro-active attempts to anticipate demand. French and U.K. stakeholders opened discussions with German stakeholders. Since the German government continued to ignore requests for STPs the manufacturers joined forces in the Studiengruppe Airbus (Quittard, 1979: 73).

At the Colloquium of London in 1965 representatives from European airlines, manufacturers and suppliers concluded that the future belonged to the widebody. A twinjet similar to the upcoming U.S. widebodies might offer the chance to insert itself into the same market (Riche, 1965: 20). If the Air Bus was launched by several manufacturers as a way to maximize economies of scale it might be ready at the same time as the U.S. competitors and benefit from the window of opportunity (Mc Intyre, 1992: 11). The bottom-up initiative was more or less the response to the earlier governmental involvement (Spaeth, 2005: 28). From the beginning the industrial stakeholders knew that they had no chance in a head-on competition against the U.S.. At the same time they were aware of the opportunity to benefit from the ground facility adaptations.

In any case a disruption was scheduled to take place and the cost of adoption of an additional widebody model was lowered (Lagarde and Webb, 1967: 47-54). If the European aircraft focused on a different market than the U.S. widebodies it would be complementary to them (Spaeth, 2005: 28). The U.K. government insisted on a Rolls Royce engine for the machine now known as the A300. In October 1966 the constructors submitted a concept and requested governmental funding for the first time (Endres, 1999: 9).

In early 1967 the governments officialised the industrial cooperation. France promoted the national champion Sud Aviation. The U.K. chose Hawker Siddeley. In Germany the interested manufacturers had established the Deutsche Airbus (Kirchner, 1998: 140-142). The governments agreed on funding (Aris, 2002: 12). The question of the engine remained open. Air France and Lufthansa opted for the same U.S. thrusters as those planned for their B747. The governments preferred a solution which involved the French SNECMA. The U.K. continued to promote Rolls Royce. In May 1967 the manufacturers obtained the governmental go-ahead (Sparaco, 2005a: 79). In September 1967 the preliminary design phase was launched (Jenkinson, Simpkin et al., 1999). France obtained the management and the final assembly. The economies of scale enabled the industrial partners to overcome the handicap of their limited sized (Endres, 1999: 10).

From 1968 to 1970 the Airbus programme went through the most existential crisis. Despite its careful elaboration the A300 faced difficulties. For most prospective customers, among them BEA, the A300 was too large (Endres, 1999: 10). The technological programme leadership took evasive action to prevent a major disaster (Wildavsky, 2000: 22-45). It set up a clandestine team from the three industrial partners to redesign the aircraft for 250 passengers in summer 1968. The new variant was made entirely compatible with the now known U.S. widebodies. Luggage container interlining[123] between these aircraft became possible. Airlines had the possibility to split up the widebody fleet between U.S. aircraft for long-haul operations and Airbuses for shorter routes instead of using the U.S. competitors for long and middle-range routes (Airbus Industrie, 1973a). More widebody patterns became available and thus incentives to operate the A300.

The surprised industrial stakeholders approved the redesign (Sparaco, 2005a: 92). It was after all based on market inputs (Sparaco, 2005a: 91). Unlike the government Hawker Siddeley confirmed its interest in the venture (Picq, 1990: 38-39). In May 1969 the Airbus programme was launched. Entry into service was scheduled for 1974 (Aris, 2002: 50), two years behind the U.S. widebodies.

[123] Interlining means moving luggage and cargo from one aircraft to another. If containers are used the belongings of many transfer passengers can be handled at the same time which reduces risk of loss of luggage and speeds up the process. For details, see (Ashford, Stanton et al., 1995).

The fear to miss the window of opportunity encouraged an unconventional answer to the engine dilemma. A personal relationship between the industrial coordinator of the Airbus programme and the CEO of the U.S. General Electric encouraged the latter to step in. The engine developed for the DC-10 had never been endorsed (Muller, 1989: 62). McDonnell-Douglas allowed Airbus to use its engine pods against a financial participation in their development. The competitor probably saw Airbus as hopeless. At the same time it obtained the tactical opportunity to lower its cost of development through a participation (Mc Intyre, 1992: 30). The industrial partners seized both opportunities. The governments accepted the technological choice since one crucial question was answered. In October 1969 France and Germany gave the formal go-ahead but the government of the U.K. officially left the programme (Endres, 1999: 11).

In December 1970 Airbus Industrie was established as a Groupement d'intérêt économique (GIE). The industrial partners remained independent and coordinated the punctual Airbus programme through this interface. The entity was only responsible for sales and customer support so that the partners did not have to transfer assets or know-how (Lepeltier, Buttet et al., 1984). Industrial decisions were governed by the Supervisory Board of representatives (Aris, 2002: 55). The day-to-day activities were controlled by the Executive Committee. Both were staffed by the parent companies. A Financial Committee responded to the Supervisory Board (Hayward, 1986: 68). This structure was embedded into a political framework. The capacity to redesign the aircraft in secret, to select a never endorsed engine and to obtain concessions from a competitor illustrated the ability of the industrial stakeholders to react to external stimuli and to launch proactive initiatives despite the rigid system. In the same year VFW-Fokker was associated (Endres, 1999: 12).

Air transport was chosen for the transfer of the elements to the final assembly site (Aris, 2002: 61). If the Concorde programme had been difficult for the coexistence of two different industrial cultures, the Airbus venture seemed almost impossible. Three industrial practices and three attitudes had to be merged (Aris, 2002: 59). Pilot training was taken over by Aéroformation, a joint venture of Airbus and the U.S. Flight Safety Inc. (Kracht, 1994: 83-84). For some U.S. companies Airbus was a looming opportunity.

From 1971 to 1978 Airbus entered the market. In December 1971 the GIE carried out its first act on behalf of the states and the member companies when it negotiated a loan from the European Investment Bank (EIB) (Endres, 1999: 12). In December the Spanish CASA joined (Aris, 2002: 54). The first airline interested in the A300 was Air France but it insisted on further optimizations. After long negotiations the industrial partners approved a further update. In November 1971 the state-owned airline placed the first Airbus order ever (Muller, 1989: 83). In October 1972 the maiden flight was carried out (Picq, 1990: 67).

Unlike Lufthansa which yielded to governmental pressure (Muller, 1989: 83) British Airways preferred the Rolls-Royce powered Lockheed Tristar (Endres, 1999: 53). The A300 was after all an aircraft with a specific profile (Sparaco, 1997: 10-18). The early adopters appreciated it. The promising comparative advantages were partially nullified through the cost of adoption. Airlines operating widebodies for long and short-haul routes were obliged to split the fleet among two manufacturers (Mc Guire, 1997: 41). Many airlines doubted on the long-term prospects of the A300 and hesitated to commit.

The U.S. competitors were unable to react through twin-engined derivatives of their trijets owing to the lack of resources and the B747 served another market (Newhouse, 1982: 127-140). An additional pull factor was

the need for an aircraft like the A300 by operators from the Far East (Newhouse, 1982: 38-39). After 1973 the high fuel price offered a major push factor. The A300 shared the operational advantages of the U.S. trijets (Quittard, 1979: 153) but consumed less (Muller, 1989: 90). During 1975/76 a recession overshadowed the initial successes. Under this pressure manufacturers, governments and banks innovated in sales incentives (Wensveen, 2005: 501-532). Airbus Industrie obtained the decisive victory through a disruptive new way of doing business in May 1977. The U.S. domestic carrier Eastern Airlines agreed to try four A300 free of charge for six months (Endres, 1999: 56). During the trial the A300 performed three percent better than promised. In 1978 Eastern Airlines placed a large order (Aris, 2002: 101). This success became a first the trademark for the negotiation skills of the Airbus people.

By 1975 the U.S. competitors announced responses to the A300. Boeing had overcome the crisis and promoted the B7X7 widebody (Lawrence and Thornton, 2005: 75). The same was true for the DC-10 Twin (Endres, 1998: 98). Despite the very limited resources and autonomy stakeholders from within the GIE thought about strategies to forestall these responses. Discussions included a larger and a smaller derivative as well as a long-range aircraft. The smaller variant for 200 to 220 passengers raised the highest interest (Endres, 2000: 12). Two options were evaluated. One had the same wing as the A300. Investments would be limited and the new model would be available soon. Both arguments were stimulated by a request from British Airways for a smaller widebody (Endres, 2000: 12). Overall performance would remain slightly suboptimal. The other variant had a tailor-made wing. Initial investments would be four times as high and the optimization process would take two years. In the light of the looming U.S. competition this was seen as more appropriate. The Airbus stakeholders knew by now the projects from Boeing and McDonnell-Douglas so that they could adapt their responses. Early market entry or increased performance were the alternatives (Endres, 2000: 13).

It was the prestigious Lufthansa and Swissair that enforced the more elaborate but resource-consuming B10X for 220 passengers by March 1977. In September the two prospective customers raised the stakes even more (Endres, 2000: 16). The A310 as the new derivative was called should be as disruptive as possible thanks to the emerging computer technology (Endres, 2000: 42-46). The A310 illustrated that the decision-makers within the GIE no longer had national airlines but the world market in mind. They were left to do so by the governments since this proved the best way to strengthen the national strategic industries. The main decision remained political. France continued to push a narrowbody (Muller, 1989: 113-114).

In 1976 Boeing invited Airbus Industrie to collaborate on the A310-sized joint venture. The contacts never became official since the industrial decision-makers concluded that the alleged cooperation was an attempt to destabilize Airbus (Endres, 2000: 13). Later Boeing invited the U.K. partner to cooperate on the B757 narrowbody as the B7N7 was now called (Newhouse, 1982: 25).

The Airbus system encouraged other European manufacturers to transnational cooperation for a narrowbody. Several bottom-up initiatives promoted successors to the DC-9 and B737. The GIE Airbus sent observers to the most promising of them which was the Group of Six (Laming and Hewson, 2000: 13). In parallel BAC and the Airbus partner Aerospatiale continued their own research. In 1975 Dassault and Aerospatiale began looking for German and U.S. partners for their joint A200 project (Sparaco, 2005a: 123). Stakeholders from the Airbus partners and from within the growing GIE staff encouraged the integration of the narrowbody proposals into the Airbus programme to diversify the offer (Muller, 1989: 129).

Boeing negotiated with Aerospatiale on a share in the B7N7 narrowbody programme (Birtles, 2001: 9). McDonnell-Douglas confirmed its interest in transatlantic cooperation for its Advanced Short- and Medium Range Aircraft (ASMR) partially based on French inputs (Marriott, 1992: 10-11). In August 1976 Aerospatiale, Dassault and McDonnell-Douglas opened negotiations. A Dassault engineer found out that McDonnell-Douglas secretly worked on a stretched DC-9. The French withdrew (Muller, 1989: 117). The DC-9-80 was promoted as the cheapest aircraft in its category (Pearcy, 1999: 21-22). In summer 1977 British Aerospace (BAE) which was the result of a merger of several aerospace companies, among them the Airbus partner, initiated the Joint Engineering Team (JET). It was based on the narrowbody studied by the Group of Six. The French A200 was chosen as a point of departure for this structure outside the Airbus programme (Sparaco, 2005a: 150). Unlike the DC-9-80 it was a clean sheet design (Quittard, 1979: 276).

In the meantime the GIE Airbus was becoming increasingly independent. In early 1978 an engineering group from within the GIE tested a new input device for pilots inspired from the upcoming videogames (Breton, 1990). The Airbus Industrie central entity had become de facto independent from the manufacturers and the governments in prospective research (Muller, 1989: 123). A growing 'Airbus identity' became visible as well since more and more GIE-based decision-makers suggested the integration of the JET into the Airbus programme. Their pull argument was to offer the existing know-how and the now proven technological framework to the new aircraft whereas the main pusher was to prevent a parallel transnational programme which might divert resources from them (Laming and Hewson, 2000: 16). The industrial partners did not appreciate the emancipation of the GIE since they feared the diffusion of company-specific know how.

In July 1978 Lufthansa and Swissair signed for the A310. Although the aircraft maximized new technologies the overall investment for the A310 was lower than that for the B757 and B767 as the B7X7 was now called. The main reason was the same fuselage for both Airbus aircraft which allowed Path Dependence-based economies of scale (Lawrence and Thornton, 2005: 83-85). In October 1978 the A310 was launched (Hayward, 1987: 11-26). British Airways rejected it (Birtles, 2001: 48) although BAE rejoined the Airbus programme per 1st January 1979 (Endres, 2000: 17). Soon afterwards the research on the JET narrowbodies was integrated into Airbus (Laming and Hewson, 2000: 16).

Between 1979 and 1987 Airbus Industrie established itself as a technology leader. In March 1979 Lufthansa and Swissair approved the final design of the A310 (Sparaco, 2005a: 156). The new programme raised the final break-even from 350 to 800 aircraft for both models (Klee, Bucher et al., 1983: 436). The A310 maximized the technological leaps (Endres, 2000: 42). Boeing responded with the B767. Airbus promoted the superior technology and the compatibility with the standard widebody containers (Sparaco, 2005a: 155). In December 1980 Airbus updated the basic model into the A300-600 (Endres, 1999: 58).

The B767 carried out its maiden flight in September 1981 (Birtles, 1999: 16). In April 1982 the A310 followed (Endres, 2000: 27). Specialists concluded that their overall performance was similar. The B767 had the advantage of the longer range so that the A310-300 was initialized (Endres, 2000: 42). Boeing replied with the stretched B767-300 in September 1983 (Birtles, 1999: 28). A year later the U.S. carrier Pan Am preferred the A310 over the B767. In July 1985 the A310-300 had its maiden flight. Customers could choose among two engines. The competition lowered the overall price (Endres, 2000: 127).

In 1985 the U.S. certification body FAA allowed the traditional competitor of Pan Am, TWA, transatlantic operations with the B767 under the new Extended Twins Operations (ETOPS) rules. Only aircraft with at least three engines had been certified for such flights so far (Moser, 1986: 109-126). Later the U.S. Federal Aviation Authority (FAA) eased the regulation even more (Kinnison, 2002: 40-43). Demand for secondary European destinations was stimulated by the increased mobility of decision-makers following delocalizations and access to new markets (Schwab and Smadja, 1994: 100-110). Since Pan Am operated the A310 the FAA was reluctantly obliged to grant the same prerogatives to the latter. The U.S. STP in favour of the B767 created a disruption but the U.S. was unable to transform it into a durable advantage. This development had not been forecast neither by Airbus (Muller, 1989: 112) nor by futurists in general (Richardson, 1978: 57-65).

In the narrowbody market things evolved as well. In October 1979 the DC-9-80 based on the ageing DC-9 (Pearcy, 1999: 22) and in 1981 the MD-82 which was a derivative of the former were presented (Pearcy, 1999: 38). In March which was before the first flight of the A310 Airbus Industrie initialized the narrowbody (Muller, 1989: 128). From the beginning the fuselage allowed larger and shorter derivatives. This pro-active 'built in' product family represented a first. Again customers could chose among two motorizations (Laming and Hewson, 2000: 18).

The A320 as the narrowbody was now called was promoted as a successor to the DC-9 and the B737 which were reaching the end of their life cycles. Both airliners continued to be in demand so that their suppliers were encouraged to minimize investments, Boeing announced the slightly larger B737-300 in March 1981 (Shaw, 1999: 7). In the same way Airbus was doing with the A300 Boeing extrapolated the B737. It was however not some years but over a decade old. The same was true for the MD-80/82 (Pearcy, 1999: 45). In this context the clean sheet Airbus narrowbody became a promising business case. Its envelope was pushed to the maximum of the technologically feasible. The idea was to benefit from the upcoming window of opportunity of fleet replacements and to 'leapfrog' the U.S. derivatives which promised lower initial investments and cost of transfer following the fleet Path Dependences (Kreuzer, 1991: 221-223).

Boeing responded with the disruptive B7J7 with the unproven propfan. McDonnell-Douglas adapted the thruster to the MD-80 (Pearcy, 1999: 35-37). The A320 with conventional engines looked outdated (Laming and Hewson, 2000: 18). Any propfan-powered airframe was more fuel efficient even with less elaborate aerodynamics. After 1986 the oil price fell so that the main push factor of high fuel cost which had been at the origin of the propfan dissipated. The stakeholders lost the motivation to pursue the innovation. The A320 turned out to be the only clean sheet design although its engines were conventional. In order to dissipate eventual governmental fears the designers left open the propfan option (Mc Guire, 1997: 99).

In March 1984 the A320 was launched with 51 firm orders (Muller, 1989: 131). Both the B737-300 (Shaw, 1999: 7) and the MD-80/82 (Pearcy, 1999: 45) were outperformed. The customers could chose among new versions of existing aircraft and minimize the immediate cost of purchase and fleet integration but for the price of less advanced technologies or maximize the disruption but for the price of higher cost of adoption and integration. Like the Airbus widebodies the A320 was based on decentralized production with final assembly in Toulouse. The prototype was presented in February 1987 (Aris, 2002: 150).

In parallel to the A310 and the A320 the prospective research carried out within the GIE focused on two widebodies based on the A300/A310 fuselage. One was a stretched version of the A300 (Sparaco, 2005a:

182), the other a long-haul aircraft with four engines (Norris and Wagner, 2001b: 23). The personal-intensive development of the A310 was coming to a close. Therefore fundamental research on both designs was possible (Jenkinson, Simpkin et al., 1999: 15). Both initiatives outlined the emancipation of the GIE. At this time the ETOPS which favoured twinjets for lower cost of operation still lay in the future (Kinnison, 2002: 40-43). From the beginning the two widebodies were almost symbiotic. This promised economies of scale for the manufacturer and the customers. In addition the airframes were made as compatible with the A320 as possible (Aris, 2002: 142) so that the incentive to operate Airbus aircraft for short- and long-haul routes was maximized (Sparaco, 2005a: 204). For the quadrijet a DOC per seat identical or lower than that of the B747 was attempted although the capacity and productivity was lower by 33 percent (Germain, 2000: 12). In 1985 McDonnell-Douglas announced the MD-11 as a successor to the DC-10. Due to limited funds the company focused on low cost of transition for current DC-10 operators. The MD-11 would be available before the more elaborate Airbus quadrijet (Marriott, 1992: 20). In January 1986 the Airbus twinjet A330 and the quadrijet A340 were launched. The A330 offered a capacity increase on trunk routes, the A340 three profiles. These were the replacement of trijets, long-distance routes with lower overall demand beyond the distances practicable for ETOPS and the densification of schedules through the replacement of few flights with B747 with a larger number operated by A340 aircraft (Germain, 2000: 6).

In early 1986 McDonnell-Douglas and Airbus discussed a joint venture (Sparaco, 2005a: 207). In the opinion of many this represented another attempt to destabilize Airbus and the negotiations again led to nowhere (Aris, 2002: 143-144). In December McDonnell-Douglas launched the MD-11 (Marriott, 1992: 20-22). There were several blue chip carriers among the customers notably owing to the promised low cost of transfer (Marriott, 1992: 22). Airbus Industrie signed an agreement for the superfan engine which was more or less at the invention stage for the A340 in late December. The risk of failure was high but the possible trade-offs of this disruption were considerable (Norris and Wagner, 2001b: 40). In April 1987 the engine supplier warned that the superfan would not be ready in time (Norris and Wagner, 2001b: 40). The tight timeframe excluded any alternatives (Norris and Wagner, 2001b: 41). For compensation Airbus Industrie signed an exclusive agreement with CFM which was one of the suppliers of the engine for the A320. All clients approved this solution although it established a monopoly for one engine supplier (Germain, 2000: 17-21).

In June 1987 the double programme was officially launched. Owing to the established Path Dependence the final assembly was maintained in Toulouse (Aris, 2002: 246). The anticipated demand for the A340 was higher so that the quadrijet was privileged (Germain, 2000: 22). It was offered in two versions, the A340-200 for ultra long-haul routes with 262 passengers, and the A340-300 for usual distances with 292. Commitments accounted for 130 aircraft of all variants from ten customers. Among these were Air France and Lufthansa. Another buyer was the U.S. leasing company International Lease Finance Corporation (ILFC). This was particularly important since lessors relied on trend-scouting even more than airlines (Gavazza, 2006).

Between 1988 and 1992 Airbus Industrie introduced its major USP which was the commonality of its two aircraft series. In February the A320 was certified (Sparaco, 2005a: 218). Specialists worried about the disruption created by the computerized systems (Beveren, 1997: 95-98). After the entry into service several incidents occurred (Richter and Wolf, 1997: 359-361). All of them could be traced to the unfamiliar man-machine interface and Airbus Industrie proceeded to updates (Beveren, 1997: 202-111). In-depth analysis

revealed that the incidents were unrelated to the technology of the aircraft but the result of the lack of experience of the pilots (Buck, 2000: 184-203). Some interpreted it as a 'generation problem'. Pilots who had evolved in a world without electronics had difficulties to convert. For their younger colleagues the disruption was limited (Sparaco, 2005a: 224). The lessons (Vries, 2005: 62-64) of the A320 were integrated into the similarly disruptive A330/A340 programme (Beveren, 1997: 125-131).

In May 1989 Airbus Industrie announced a stretch of the narrowbody. Unlike the A310 the A321 did not need a new wing. An additional reason for this choice was the lack of resources since they were all allocated to the A330/A340 programme. For final assembly a new site in Hamburg was opened (Sparaco, 2005a: 228). Elements were subcontracted to the Italian Alenia and Japanese companies (Laming and Hewson, 2000: 25). In June 1989 the smaller B737-500 took off for the first time (Shaw, 1999: 14). In November the A321 was initialized with 183 commitments from ten customers. Among these was the U.S. leasing company ILFC. This illustrated again the positive anticipation in regards of the aircraft (Laming and Hewson, 2000: 23).

At this time the GIE evaluated a shorter version of the A320 (Sparaco, 2005a: 234). In parallel the German Airbus partner DASA initialized discussions with the Chinese. In March 1991 it opened negotiations with Aerospatiale and Alenia for a family of regional jets outside the Airbus system (Mc Intyre, 1992: 267). Aerospatiale deemed the shorter version of the A320 too small to be profitable (Sparaco, 2005a: 236). BAE promoted its BAE 146 jet family (Kreuzer, 1991: 189-193).

The spectre of intra-European competition re-emerged. The U.K. and German partners as well as the GIE stakeholders favoured the 'Airbus in-house' solution. Since Boeing offered a family of B737 variants. A smaller but superior aircraft would make the Airbus portfolio more attractive. Updates of the production line and cost of integration for operators of the other Airbus narrowbodies were again minimal (Sparaco, 2005a: 236). In May 1992 the A319 was announced. A first order over six came from the U.S. leasing company ILFC. Once again this proved to be a good omen (Laming and Hewson, 2000: 27).

While Airbus Industrie was launching new clean sheet designs for the narrowbody and the widebody market Boeing adopted the ambient new economic paradigm (Stockhammer, 2004). Focus shifted from long-term strategic investment to short-term expenditure cutting (Lawrence and Thornton, 2005: 92-94). Since sales were boosted by the continuous growth of air transport this change was not opposed (Bauer, 1991: 331-333). Boeing decided to extrapolate the established products. Investments for the supplier were limited and ease of transfer for the customer maximized owing to the Path Dependences. This lowered the risk of forecasting errors as well (Graf, 2002: 1-24). The sole exception was a new large twinjet widebody labelled the B777 being launched as a successor to the A300. It was updated to compete against the MD-11 and the A340 (Upton, 1998: 10). Boeing analysed both competitors under construction and was able to offer a punctually superior product (Norris and Wagner, 2001a: 15).

In early 1990 the MD-11 had its maiden flight (Marriott, 1992: 44). The aircraft was less competitive than expected (Norris and Wagner, 2001b: 59). The blue-chip customer Singapore Airlines cancelled its order in favour of the A340 (Norris and Wagner, 2001b: 59). In March the A300-600 was certified for ETOPS 120 minutes (Norris and Wagner, 2001b: 18). By 1990 the U.S. carrier United evaluated a successor to the DC-10. Although the cost of transfer would have been limited the MD-11 was the first to be eliminated. In October United became the launch customer for the B777 (Upton, 1998: 11). From the beginning Boeing pushed

further ETOPS concessions (Sparaco, 2005a: 230). The main motivation was the roll-out of the A340-300 prototype in October 1991 (Sparaco, 2005a: 236). In April 1992 the A340-200 followed (Norris and Wagner, 2001b: 68). The A330 was presented in October (Norris and Wagner, 2001b: 44). In December the A340-200 and -300 were both certified together. The first joint approval of two models highlighted their similarities (Norris and Wagner, 2001b: 71). Airbus became able to market the Airbus Family Concept (Airbus S.A.S., 2002: 34-39). Any pilot certified for the Airbus narrowbodies could easily convert to the A330 and A340 (Buergi, 1999: 8-9). The Cross Crew Qualification enabled economies of scale.

In 1992 Boeing revealed the interest of some airlines in a very large aircraft. Airbus Industrie confirmed that Aerospatiale and DASA had been studying a Ultra High Capacity Aircraft (UHCA) (Spaeth, 2005: 40-41). Ten airlines had given inputs (Spaeth, 2005: 107-119). Boeing focused on a stretched B747 and a 600-seater (Norris and Wagner, 1999: 89). The U.S. manufacturer confirmed talks with the German Airbus partner DASA on the latter. DASA informed the other partners that the undertaking would be outside Airbus Industrie. This time the programme seemed impeded (Norris and Wagner, 1999: 89).

From 1993 to 1997 Airbus Industrie became the Number Two worldwide. In January 1993 an agreement between Boeing, Daimler-Benz, the parent company of the German Airbus partner DASA, and BAE to work on a 600-seater was announced. Airbus Industrie confirmed the participation of Aerospatiale and CASA. In the opinion of observers Boeing intended again to saw disorder into the Airbus programme (Aris, 2002: 174). Many Airbus people identified a genuine interest (Spaeth, 2005: 47). In parallel all partners continued their own research (Norris and Wagner, 1999: 89). From the beginning the Airbus partners based theirs on the certified 80 x 80 meters parking space. Cost of integration was lower since all the certifications were available (Spaeth, 2005: 41). As it had been the case for the A320 the basic design should allow longer and shorter derivatives (Endres, 2005: 268-272).

In 1995 Airbus Industrie launched the promotion of the A3XX for 555 to 655 persons (Cochennec, 2005: 18-26). The aircraft was justified with the growth and the restructuring of air traffic. Instead of travelling directly passengers changed into a larger aircraft for the route among two major airports and then back into a smaller one for the final leg since this was usually cheaper. Following the now generalized expenditure cutting even business travellers who generated most airline revenues chose the lowest fare. In most cases this implied the above hub-and-spoke transfers (Hanlon, 1999: 136-137). For the airlines the only way to compensate for the decline of the average yield was to use larger and more productive aircraft for the routes among the hubs (Doganis, 2001a: 9-10). The A3XX was promoted as an answer to the growth and the new structure of air transport. Two competing engine suppliers were contracted (Airbus Industrie, 1999: 3).

Boeing was aware of the risk to lose its monopoly at the upper end of the capacity range. Following the strategy of extrapolation it proposed two larger versions of the B747 (Norris and Wagner, 1999: 90-91). Most Airbus Industrie stakeholders admitted that their launch would have terminated the A3XX (Spaeth, 2005: 53). Boeing refocused its attention on the existing smaller aircraft. In its opinion decision-makers intended to minimize travel time. This was only possible through direct flights between as many city pairs as possible operated on a dense schedule (Hanlon, 1999: 189-195). For the price-sensitive markets the B747-400 was

large enough (Boeing, 2005c: 12-13). In May 1996 potential customers appreciated the possible end of the Boeing monopoly. Boeing itself abandoned the stretched version of the B747s (Sparaco, 2005a: 300).

The A330/A340 widebodies were slightly less successful than predicted. In June 1994 the B777 had its maiden flight (Norris and Wagner, 2001a: 64). Following its punctual superiority over the Airbus products and the impossibility to retrofit them the B777 soon proved a serious competitor despite the Cross Crew Qualification. After receiving several requests the GIE stakeholders reacted through a smaller variant of the A330 for 253 passengers superior to the B767-300 in April 1995. It was the first aircraft tailor-made for ETOPS (Norris and Wagner, 2001b: 91-92). Boeing consolidated the B777 basic model through the larger B777-300 (Norris and Wagner, 2001a: 151).

After the A330-200 was launched in November 1995, Boeing announced a B767-300 upgrade (Birtles, 1999: 38-41). In May 1996 several airlines requested a larger A340 capable to fly farther than the B777 (Norris and Wagner, 2001b: 108). The GIE elaborated the A340-500 for 313 passengers and the larger A340-600 for 378. Both claimed lower cost of operation than the B777 since they were not subject to the ETOPS restrictions on transpacific routes (Norris and Wagner, 2001b: 111). In 1997 Boeing reacted to the A330-200 through the B767-400 (Norris and Wagner, 1999: 117). In December 1996 the A340-500 and -600 were launched with 80 orders (Norris and Wagner, 2001b: 112).

After March 1993 the A321 extended the Airbus Industrie narrowbody range (Knappe, Palomino et al., 2006: 236). In June the smaller A319 was launched with an order of six from ILFC. It was assembled in Hamburg together with the A321 (Laming and Hewson, 2000: 27-28). Its first flight followed in August 1995 (Laming and Hewson, 2000: 28). McDonnell-Douglas brought out the similar-sized MD-95 based on the DC-9 (Pearcy, 1999: 58). In July 1997 Boeing initialized the B737-800. It was a direct competitor to the A320 offered at a competitive price (Shaw, 1999: 14) but the A320 was more advanced.

By 1994 the Airbus AE31X aircraft family for 95 to 125 passengers was rumoured. China was said to be interested (Sparaco, 2005a: 253). In 1995 the German Airbus partner prepared a programme outside Airbus Industrie with China and South Korea. Aerospatiale invited BAE and the Italian Alenia to complete the ATR turboprop series with a jet family (Sparaco, 2005a: 252). Many within Airbus Industrie saw this as a risk for their programme (Sparaco, 2005a: 252). In 1997 Airbus Industrie set up a subsidiary for the AE31X (Sparaco, 2005a: 256). In parallel the GIE pursued its research on a smaller A319 (Hewson, 2002: 41-44).

In December 1996 Boeing took over McDonnell-Douglas (Harrison, 2003). The new conglomerate cumulated 60 percent of the market. More or less in parallel Boeing announced several exclusive contracts (Harrison, 2003). DASA requested national and European STP support to Airbus. This conflicted with the traditional economic policy in Germany. BAE in turn suggested a private Airbus company attractive for investors. Aerospatiale called for European retaliation (Martel, 2000: 53-54). In July 1997 the European Commission approved the Boeing-McDonnell-Douglas merger but requested the abrogation of the exclusive contracts (97/816/EC, 1997: 16-47). The Airbus-Boeing duopoly shifted the market from an imperfect competition into a bipolar equilibrium (Siegmund, 1997: 24-25).

After the merger Boeing was expected to remain the Number One. Instead it ran into the worst crisis of its history. Primary factors were the absorption of McDonnell-Douglas with its different company culture and the low level of experience of the own blue-collar workforce as a result of the traditional hire and fire policy as

the classical way to keep labour cost down (Michel, Salle et al., 2000: 162). In order to rationalize Boeing maintained only the MD-95 regional airliner and remarketed it as the B717 (Norris and Wagner, 1999: 26).

While being confronted with the complexity of the Airbus programme and the U.S. STPs the industrial partners confirmed the need to reform the programme by 1999 in 1996 (Sparaco, 2005a: 329). A U.S. bank concluded that the Airbus programme would be attractive for investors (Campbell, 1996: 14-17). Under the pressure of the takeover of McDonnell-Douglas by Boeing the partners reaffirmed their commitment to reforms in January 1997 (Sparaco, 2005a: 330). This time the transformation of the GIE Airbus into a limited company (Bruce, 1999: 123-132) and its integration into a European civil and military aerospace corporation were assessed (Bieler, 1999: 113-122). Despite new successes the global market share of Airbus Industrie stagnated at 30 percent (COM(97) 466 Final, 1997). In December the heads of state requested the industrial partners to submit their proposals by March 1998 (Sparaco, 2005a: 331).

The major events between 1998 and 2003 were the formal privatization of the Airbus programme, the launch of the A3XX and the diversification into military aviation. At the beginning the industrial partners admitted not to be able to agree on the details. The privatization of Aerospatiale through its sale to Largadère eliminated a major obstacle to reforms (Aris, 2002: 201). In October negotiations between the U.K. and the German Airbus partners failed (Aris, 2002: 205-206). The latter turned towards the French (Sparaco, 2005a: 332). Shortly before the final agreement Largadère invited BAE to participate but it refused (Aris, 2002: 207).

In October 1999 the merger became effective. The new European Aeronautic, Defence and Space Company (EADS) was mostly held by Largadère and DaimlerChrysler, the parent of DASA. It comprised two equivalent operational units in France and Germany (Aris, 2002: 207). When the EADS was established in 2000 BAE took a stake of 20 percent in the new Airbus Integrated Company (Airbus S.A.S.) while EADS underwrote the remaining 80 percent. BAE had the right to sell its stake after 2003 (Aris, 2002: 212). Day-to-day operations of the Airbus plants did not change much although decision-making accelerated (Aris, 2002: 207).

The most publicised event after 1998 was the launch of the A3XX. From the beginning Airbus Industrie announced a whole family including a freighter (Spaeth, 2005: 128). Many analysts doubted on the capacity of Airbus Industrie to implement the programme (Spaeth, 2005: 56). In December 1999 the A3XX was launched (Marc, 2005: 36) with a market entry scheduled for 2005 (Airbus Industrie, 1999).

Even after the reorganization of Airbus Industrie into a subsidiary of EADS the political influence remained high. Mostly for these reasons the main assembly of the A3XX was allocated to Toulouse (Storper, 2000: 42-62). Logistics were more complex than those for the other aircraft. The interiors were added in Hamburg (Spaeth, 2005: 58-59). Industrialists warned against the split. The breakthrough for the new aircraft marketed as the A380 came in 2000 with orders from blue chip customers (Spaeth, 2005: 59).

Boeing replied with a family for 175 to 300 passengers operating at just below the speed of sound (Cochennec, Angrand et al., 2001: 10-13). Suddenly the A380 seemed outdated. For many the Sonic Cruiser was nothing but a new attempt to destabilize Airbus under the disguise of a disruptive programme. In the same way Boeing had denied any potential to the A380 Airbus bashed the Sonic Cruiser (Cochennec, 2001: 18-24). A slump in aircraft sales after the 11th September 2001 meant the end of the exchange.

In May 1998 the ETOPS-120 minutes certification of the A330-200 opened a new era for the Airbus Industrie widebodies (Norris and Wagner, 2001b: 99). In April 2001 the A340-600 had its maiden flight. It was the first Airbus aircraft with a slightly lower overall performance than expected. Demand remained sustained since it had no competitor at the time (Norris and Wagner, 2001b: 133). In February 2002 the A340-500 with the highest range ever in the history of commercial aviation followed (Knappe, Palomino et al., 2006: 266).

The competition in the narrowbody market was opened by Boeing's smaller B737-600 in January 1998 (Shaw, 1999: 20). In the summer Airbus Industrie cancelled the AE31X project and substituted a shrink of the A319 for it (Sparaco, 2005a: 257). Physical constraints such as the ratio fuselage cross section/wingspan made it slightly suboptimal from the beginning. In the opinion of Airbus Industrie the roomy cabin and the commonality with the other narrowbodies were more than adequate compensations (Figgen, 1999: 24-26). In September the competing B717 entered the market (Norris and Wagner, 1999: 36). Unlike the new A318 it was a clean sheet design. For airlines which operated other Airbuses the A318 offered advantages. In case the carrier was specialized in short-haul routes the B717 was more appropriate (Figgen, 1999: 24-26). In April 1999 the A318 was launched with 80 orders. 30 of them came from ILFC (Sparaco, 2005a: 258). The maiden flight took place in January 2002 (Hewson, 2002: 41-44). Sales remained low.

In 1998 Airbus Industrie diversified into military aviation. In response to requests from the armed forces of the Airbus countries, a working group was set up within the GIE (Sparaco, 2005a: 363). Despite the upcoming reorganization of Airbus Industrie the partners established Airbus Military in February 1999 as a subsidiary to the GIE. By December the project A400M was selected by several NATO countries (Knappe, Palomino et al., 2006). In 2000 the Airbus Military Programme became official. In December 2001 the A400M was initialized through the Airbus Military Company (Bombeau and Gaudin, 2001: 50-53). In May 2003 the A400M was launched with 180 orders (Sparaco, 2005a: 354). In 2003 an unexpected window of opportunity enabled EADS to enter the tanker market. After a scandal the U.S. Air Force was forced to reopen a bid for 100 units. EADS and the U.S. Lockheed Martin brought the A330-200 into the game (Sparaco, 2005a: 271).

After the 11th September 2001 Boeing proceeded to layoffs (Aris, 2002: 219). Airbus and EADS reacted through a prospective R+D freeze. Like Boeing had done a decade earlier the new Airbus Company jeopardized its own future prospects through the end of pro-active investments (Casamayou, 2002: 11).

In lieu of the Sonic Cruiser (Lewis, 2003) Boeing announced an ultra-efficient aircraft as a successor to the B767 and a superior competitor of the A330 and A340 in spring 2003 (Thomas and Forbes-Smith, 2003: 216-218). It was scheduled for 2008 and promised fundamental disruptions. For instance the fuselage was entirely made of composites (Cochennec, 2003: 22-23). Airbus stakeholders concluded that the new B7E7 was a response to its established A330 family and denied any need to react. At this time Airbus had outsold and outdelivered Boeing (Cochennec, 2004: 18-23).

Between 2004 and 2006 Airbus experienced the first fundamental crisis in its history. By spring 2004 three attitudes towards the B7E7 were noted. For a first faction no reaction was necessary since the existing portfolio was attractive enough. A second suggested an updated A330 (Condom, 2004: 17-20). It would enter the market at the same time as the B7E7 but its cost of development would be far lower. A third encouraged a new widebody family. Boeing launched the B7E7 in April 2004. In December Airbus presented the A350

based on the A330-200. Unlike the earlier models the new aircraft was promoted as an evolution instead of a revolution (Cochennec, 2004: 10-12). Airbus adopted Boeing's arguments in favour of the extrapolation of a proven design in the interest of lower cost (Norris, 2006: 5). Market entry was announced two years behind the B7E7 (Kingsley-Jones, 2005). In January 2005 the B7E7 was christened B787 (Cochennec, 2005: 20-24). Boeing administered the next blow in February when the B777-200 LR Worldliner with a range superior to that of the A340-500 was rolled out. After the rise of the fuel price its cost of operation was lower since it had only two engines. A further relaxation of ETOPS to 207 minutes after an STP increased its comparative advantage over the Airbuses (Thomas and Forbes-Smith, 2005: 9-19).

In May 2005 a major update of the A350 was revealed (Cochennec, 2005b: 14-16). During the Paris Le Bourget Airshow in June a commitment over 60 by Qatar Airways created a sensation (Martin, 2005: 1). In October 2005 the A350, now promoted as a 90 percent new aircraft, was launched with 140 orders (Cochennec, 2005: 16-18). In the opinion of many Airbus missed an opportunity to leapfrog its competitor as Boeing had done successfully with the B777 over the A340 (Hamilton, 2006).

Following more devastating critics by long-term customers Airbus announced a redesign of the A350 in April 2006 (Norris, 2006). The budget would double and market entry slip to four years behind the competitor (Norris, 2006: 6). Analysts concluded that the later launch offered the opportunity (Aboulafia, 2006b) to leap-frog the B787. The challenger could no longer be retrofitted (Reed, 2006a).

The other source of increasing worries was the A380. Long before its roll-out in February 2005 (Ballantyne, 2005: 5) rumours about delays persisted (Thomas and Forbes-Smith, 2005: 10-21). After its maiden flight in May the aircraft was confronted with major challenges (Pasztor and Michaels, 2005: 1). Boeing created a new disturbance through the B747-8 for 450 passengers or cargo launched in late 2005 (Doyle, 2005: 26-27). As a freighter it soon outsold the A380 (Cochennec, 2005a: 14-16). In March 2006 the A380 was jointly certified for 873 passengers by the JAA and the U.S. FAA (Condom, 2006: 18-19). In June 2006 another delay of at least six months of the A380 following problems of coordination among the Toulouse and the Hamburg site was announced (Airwise News, 2006a).

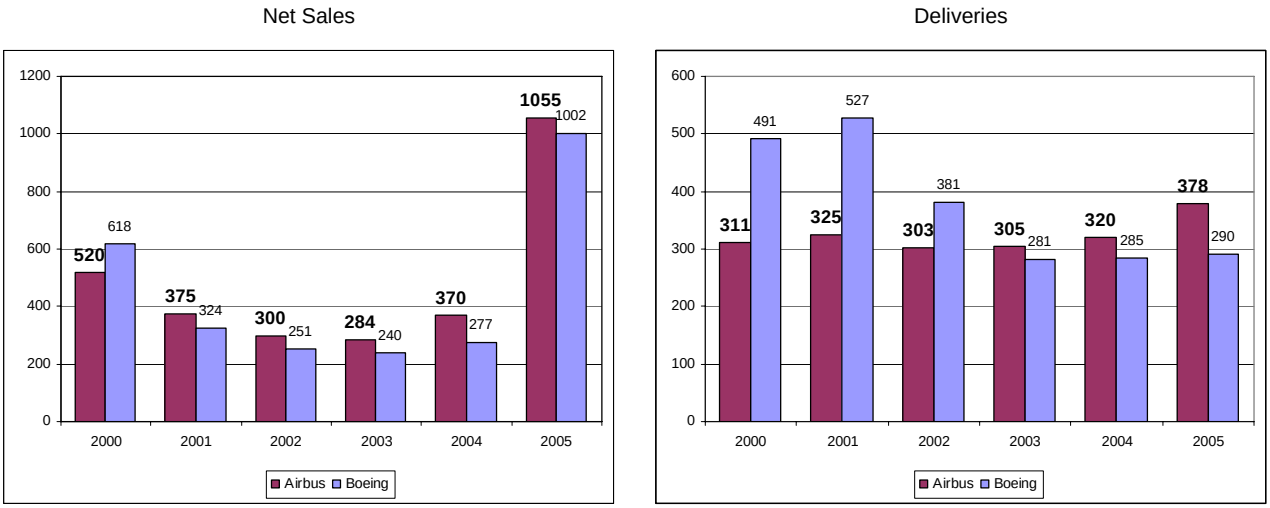
In the sector of military aircraft Airbus consolidated its position. In January 2004 the U.K. preferred the new tanker based on the A330 over the Boeing competitor (Bombeau, 2004: 24-26). In 2005 the military A400M project was finalized. Like the civil aircraft the A400M relied on a decentralized production with final assembly in Seville. The maiden flight was announced for 2008 (Knappe, Palomino et al., 2006).

Experts traced the crisis of EADS to the political influence, the budget overflow of the A380 and the R+D freeze in 2001 (Aboulafia, 2006: A20). EADS nominated former programme stakeholders as its new CEOs (Beauclair, 2005: 10-11). More or less at the same time as the B747-8 was launched the key customer Emirates cancelled the delivery of 18 A340-600. Back in 1997 there was no equivalent B777 version and the fuel price was lower (Norris and Wagner, 2001b: 113).

In December 2005 China committed to 150 narrowbodies and announced an assembly line in cooperation with Airbus (Casamayou and Cochennec, 2005: 10-12). Technology transfers were inevitable and warnings were heard (Deckstein, Dettmer et al., 2006: 70-73). Despite its massive difficulties Airbus outsold and outdelivered Boeing in 2005. Figure Six illustrates the trend of the past five years. The evolution of orders outlines the low ebb between two major replacement cycles. Deliveries illustrates the capacity of Airbus to

consolidate output whereas Boeing remained committed to the hire and fire principle. Whenever production was raised the new staff had to go through a learning process again (Cochennec, 2006: 10-13).

Figure 6 - Airbus and Boeing Net Sales And Deliveries (2000-2005)



Source: (Cochennec, 2006: 10-13).

Most observers agreed that Boeing had come out stronger than ever of its crisis. Now it was the turn of Airbus to experience the results of overconfidence, short-term savings leading to long-term expenses, and a lack of vision (Greising and Oneal, 2005). There were rumours that Airbus might offer compensation for the higher fuel burn of the A340-500/-600 in comparison with the B777 (Kingsley-Jones, 2006: 9).

By now EADS as a whole had run into difficulties. Unexpected sales of a part of the stakes held by the EADS main investors (EADS, 2006b) and the elimination of the 20 percent BAE stake in Airbus destabilized the company at this crucial stage. Some financial analysts interpreted the move by BAE as a short-term profit maximization, others as a carefully orchestrated new blow against Airbus since EADS was obliged to buy it back (Clark, 2006). In the opinion of most the worst was the damaged reputation of Airbus as a pro-active innovator and organizer (Condom, 2006: 4). On 1st June the two EADS CEOs were replaced. The nomination of their successors respected the fragile Franco-German equilibrium (Airwise News, 2006h).

At the Farnborough Air Show 2006 Airbus announced the revamped A350 as the A350Xtra Wide Body (XWB). Like the A380 it was a family of four passenger versions and a freighter for 270 to 350 passengers. The fuselage cross section was slightly larger than that of the B787, making the A350XWB more roomy. Market entry was scheduled for 2012 (Airbus S.A.S., 2006). It was promoted as the superior reply to the B787 (Martin, 2006: 1) and the successor to the B777 (Polek, 2006b). An order by Singapore Airlines for 20 (Kaminski-Morrow, 2006a) was widely interpreted as an attempt to prevent a Boeing monopoly.

4.2.2.2. The States

The national Strategic Trade Policies (STPs) have two origins, which are the technological evolution of airframes and the domestic and international economic and political motivations and practices of the country. In

France, the U.K. and Germany the innovation of the aeroplane encouraged reactions. After 1918 technology and economy policies extended to national aircraft supply (Bonomo, 1926). If the basic incentive was identical everywhere, each of the later Airbus countries developed its particular strategies.

In France airframes became an element of the state-led pro-active policy of technological autonomy and leadership (Perrin, 2002: 158). After the Second World War the government launched a reconstruction programme. In the meantime the needs of Air France had evolved so that national designs were less appropriate than those from the U.S.. Encouraged by the failure of the first jet passenger transport in the U.K. the government initialized the state of the art Caravelle (Wegg, 2005: 50-55). Supersonic transport seemed the next logical step. After 1958 President De Gaulle relaunched the national ambition for technological leadership. Since there were many challenges French policymakers began to explore new ways of funding. Existing industrial contacts encouraged cooperation with the U.K. (Simi and Bankir, 1968: 77). After 1962 both governments pooled their efforts. There was no integral programme but two parallel efforts. The French STPs in respect to civil airframes were based on state leadership and maximized technological leaps. They succeeded with the Caravelle since the national resources allowed the pro-active programme. Once a certain level of complexity and cost was reached the country lacked resources despite its technological superiority. In both cases France managed to initiate technological leaps and thus establish a favourable national Path Dependence (Costello and Hughes, 1976: 7).

The economic history of the U.K. has mostly been shaped by other than state actors. However the country has never been driven only by entrepreneurs as a popular idea suggests. The crown and the government have supported many ventures. Formally they have often been independent or ‘private’ so that industrial actors have competed with each other for state programmes (Groves, 1929: 289-317). After 1945 the suppliers absorbed by military hardware attempted to re-enter the civil market (Thetford, 1948: 30-33). The government encouraged the launch of the disruptive first passenger jet Comet 1 superior to any U.S. competitor but failed (Dempster, 1960). Later the absence of a coherent vision by the state, manufacturers and potential customers led to wasted chances despite promising technological leaps (Barfield, 1989: 18-32). Since the jet aircraft were resource-intensive the government enforced mergers among the manufacturers. One of the two remaining conglomerates launched the successful BAC 1-11. When supersonic air transport appeared on the agenda the government encouraged the manufacturers to take up the challenge despite their limited resources. The overall economic strategy was to revigorate the economy through the Common Market. The Concorde was seen as a promising approach (Costello and Hughes, 1976: 51). U.K. STPs were based on a vague vision of technology as a way to decelerate the decline of the national economy. The responsibility was left to the individual manufacturers.

Until 1939 Germany focused on exports enabled through superior technology. The main actors were private enterprises (Neumann, 1928). After the lost war any expansionist idea was stigmatized (Kappler, 1997: 125-138). The reconstruction absorbed all state resources (Kirchner, 1998). A new generation of economic and political stakeholders based their attitudes no longer on nationalism but the cooperation with the former enemies. At the same time the economic liberalization had convinced the elites that the forces of the market were the best grants for technological and economic development (Ortlieb, 1974: 60-76). Even after the end of the restrictions in airframe construction in 1955 the government never put programmes which might jeopardize competing aircraft on the agenda. It also rejected claims by the manufacturers for a more active state

involvement. There were never any STPs in favour of airframes (Kirchner, 1998: 70-80). In 1959 a state treaty for the joint Transall military transport was concluded with France. For the Germans it offered the chance to participate in a larger albeit not disruptive venture, for the French the possibility to 'control' a potential competitor and to obtain economies of scale.

Although the popular vision of the U.S. is that of a liberal country many sectors are regulated and state-governed although their day-to-day business is their responsibility (Ingells, 1970: 30-34). This has been the case for strategic industries. In case they failed to deliver the expected results the state usually dropped them (Caidin, 1959: 59). During the Second World War the U.S. suppliers remained independent. Unlike the U.K. the U.S. were never exposed to any direct threat so that their manufacturers were able to adopt a long-term vision. Minor updates after the war made the hardware ready for commercial use. The huge surpluses and the now underused production capacities encouraged aircraft supply within the Marshall Plan. For many this represented a pro-active attempt to saturate Western Europe so that competitors would be confronted with lock-ins (Kracht, 1994: 20-21). The U.S. STPs were based on a pro-active national vision of optimized macro-economic policies and direct intervention through military programme. The cumulated outcomes of the STPs and the optimized Path Dependence gave them a clear advantage over Europe.

On both sides of the Atlantic the motivations behind STPs from 1964 to 1967 remained purely national. What slightly evolved were the strategies. France experienced that it could increase its outputs through cooperation with the U.K.. The country even subordinated the U.K. and Germany to its ambitions (Costello and Hughes, 1976). Cooperation yielded better results than the earlier national STPs. The promises of the Concorde encouraged the governments to initialize another programme with the U.K. for an aircraft appropriate for French and U.K. carriers in 1964 (Endres, 1999: 8). France invited Germany as well (Quittard, 1979: 73). The country continued its STPs in a way to preserve and to consolidate its technological Path Dependence. The adoption of the widebody aircraft which promised a technological leap either alone or in cooperation with other countries illustrated the French ambitions to remain a leader in aerospace.

In the U.K. the transnational cooperation did not initialize major changes as well. The additional resources offered better prospects. In the interest of even more resources the stakeholders agreed to extend the possible cooperation to West Germany (Quittard, 1979: 73). The Minister of the Air concluded that only transnational cooperation would enable future programmes (Mc Intyre, 1992: 11). The STPs of the U.K. remained vague and relied much on the ambitions and the capacities of the manufacturers themselves.

Germany did not abandon its low-profile attitude in respect to strategic industries in general and airframes in particular. The cooperation with the former enemies remained its priority. New national projects were ignored. Although there were practically no German STPs the Path Dependence of its industry became more positive since it specialized in smaller aircraft (Kirchner, 1998: 67-80).

In the U.S. governmental military inputs which enabled technology transfers to civil aircraft allowed Boeing to consolidate its leading position (Caidin, 1959). The government intensified its STPs through a tender for a large military transport and a state-authored supersonic research programme. The latter was justified with the need to maintain the technological superiority of the U.S. (Dwiggins, 1968: 64-65).

In 1965 the joint French-U.K. programme got inputs from the prospective customers. Leading European airlines concluded that transnational cooperation was the only way to deliver a next-generation aircraft (Riche, 1965: 20). France and the U.K. became interested in a German contribution through additional resources. France chose Sud Aviation which successfully participated in the Concorde. The U.K. selected Hawker Siddeley not involved in this programme so that transnational synergies would consolidate the industrial basis as a whole. In Germany the government left once again most of the initiatives to the manufacturers. The interested companies established the Studiengruppe Airbus (Quittard, 1979: 72-73), soon transformed into the Deutsche Airbus (Endres, 1999: 8-9).

In March 1966 the governments agreed on the proposal for a twinjet submitted by the French and U.K. manufacturers based on the ideas of the European airlines submitted a year before (Spaeth, 2005: 28). Almost from the beginning the political stakeholders left the technological implementation of the programme to the industrial partners since these were closer to the market. In December the governments and the manufacturers agreed on a transnational consortium (Endres, 1999: 8-9).

In May 1967 the governments approved the programme. There remained fundamental questions. One concerned the engine. France and Germany promoted a U.S. product endorsed by their airlines. The U.K. insisted on a solution provided by its 'national champion' Rolls Royce (Turkel, 1981: 41-77). After an evaluation the three governments requested a proposal based on U.K. Rolls Royce engines from the manufacturers. In July the three competent ministers confirmed the programme now known as the A300 (Endres, 1999: 5). France took over the engineering and the final assembly. The U.K. focused on the engines and the wings. Germany assumed smaller elements (Endres, 1999: 18).

Each partner promoted and justified the Airbus programme in a national perspective. For the French it was another pro-active initiative to affirm leadership in the mass short-haul market. Their colleagues from the U.K. expected to revigorate the national industry (Endres, 1999: 10). Closer ties with EEC members during the negotiations for membership vetoed by France (Sidjanski, 1992: 69) were also expected. For both countries Airbus offered a promising strategy to retain favourable Path Dependences. German decision-makers identified two perspectives. The aerospace industry was highly value-adding and contributed to the economy as a whole (Kirchner, 1998). The second was to become a mayor player in a promising transnational scientific and technological programme which would enable capacity building without putting the proven political and S+T attitudes in jeopardy (Kracht, 1994).

All three countries were mainly motivated by a looming window of opportunity for their strategic industries. The A300 promised the pro-active penetration into a new market and a technological leap (Sparaco, 2005a: 79). Since this lowered the financial and technological risk the governments mostly endorsed the proposals from the industrial actors which got the inputs from the market. The national policy-makers decided following their needs and priorities in given national and international political, economic and technological circumstances (Moravcsik, 1993: 3-42). All three governments were aware that transnational cooperation was the only way to implement the programme. Each of them attempted to force the other partners to remain committed. A prototype would only be funded if the national airlines of the involved countries ordered the aircraft and if a certain number would be sold until July 1968 (Endres, 1999: 5). This limitative clause illustrated that all three governments remained sceptical. During the same years the U.S. initiated the widebody era through a military tender. An even more ambitious supersonic programme followed.

From 1968 to 1970 the industrial and political stakeholders overcame the most critical stage of the programme (Ormerod, 2006: 120-134). By 1968 the A300 had not met the expected success on the market and even the carriers from the member states remained critical. The governments were aware of the risk to miss the window of opportunity. Cost had risen by some 85 percent for the airframe and twelve percent for the engine (Aris, 2002: 36). In all three countries the commitment was in decline. The governments weighted the cost of the termination of the programme against the potential trade-offs for their national strategic champions and were reluctant to end the undertaking (Marck, 1979: 192-193).

The manufacturers knew they would lose in case the promising programme was halted. Therefore they submitted an updated design in December 1968 (Sparaco, 2005a: 90). The French stakeholders adopted it since the engineering had been done in France (Aris, 2002: 38). The U.K. Minister of Technology rejected the 'French dominated Airbus' on the grounds of the possible selection of a U.S. engine. Officially the government remained loyal to the programme (Sparaco, 2005a: 91). BAC which was encouraged by the Concorde initialized a smaller widebody with Rolls Royce engines. In the opinion of the government this national programme stood better chances than the transnational Airbus. As a way to increase the economies of scale the U.K. project intended to involve several countries, among them Germany. Therefore the government withdrew from Airbus in April 1969. The industrial partner Hawker Siddeley remained a subcontractor (Endres, 1999: 11).

Most of the German decision-makers confirmed their interest in the Airbus programme and rejected the U.K. invitation for the competitor (Kirchner, 1998: 98). Three motivations behind the German loyalty can be identified. A first was the boost the programme offered to the national economy. A second was the French-German friendship. German decision-makers did not dare to bail out since they feared French retaliation. They knew that their neighbour needed additional resources to assume its part in the programme and that the French stakeholders were aware of this. Germany could save the programme. Both rather reactive motivations can be explained by the political configuration. The pressure from the industrial stakeholders encouraged Germany to assume the part allocated to the U.K.. A third incentive was strategic and pro-active. For the first time France was obliged to treat Germany as an equal partner. France retained the technological and political leadership. French stakeholders had no other choice than to accept the new role of their neighbour if they wanted the Airbus programme to continue (Sparaco, 2005a: 91-96).

In May 1969 the French Minister of Transport and the German Minister of Economy signed the launch of the aircraft (Sparaco, 2005a: 95). Germany assumed 60 percent of the cost since it underwrote the U.K. part. France favoured a geographical organization so that the state would remain an essential actor. Germany preferred a strong central entity. The Airbus stakeholders would be responsible for customer contacts in the same way as any industrial company. An independent Airbus Industrie would limit the French influence as well (Kirchner, 1998: 159). As far as the engine was concerned it was the industrial partners that found an unconventional solution with a never endorsed U.S. thruster. The governments accepted since they had one question less to negotiate (Muller, 1989: 63). No action was taken by any of them when the U.S. delayed the delivery of the first transport aircraft for the transfer of the elements to the final assembly site following alleged certification issues. Many within the Airbus programme interpreted this as a first attempt to harm the potential competitor to the U.S. suppliers (Kracht, 1994: 87).

In July 1970 France increased the economies of scale through a merger of Sud Aviation with two other manufacturers into Aerospatiale. Although not a single sale had been concluded the governments of France, Germany and the U.K. gave the industrial go ahead. The U.K. was no longer an official partner but remained involved through its de facto nationalized company (Endres, 1999: 11). In December 1970 Airbus Industrie was established as a Groupement d'intérêt économique (GIE). This French legal structure gave much autonomy to the programme and maintained the independence of the industrial partners (Mc Intyre, 1992: 26). France and Germany also signed an agreement with the Dutch government. The industrial partner preferred the status of a subcontractor (Endres, 1999: 12). The structure of Airbus Industrie mirrored the double political and industrial cooperation. The governments were involved through the national ministers responsible for aerospace. They took the strategic decisions such as the nomination of future partners. The way the industrial stakeholders implemented the decisions was supervised by senior officials from the responsible ministries through the Airbus Intergovernmental Committee. The Airbus Executive Committee verified that the outputs and outcomes were consistent with the STPs. The communication between the governments and the industrial partners was assumed by the Airbus Executive Agency.

The three parallel structures ensured the permanent flow of information between the Airbus stakeholders, the national industrial entities and the governments. The industrial partners coordinated their work through the Supervisory Board (Hayward, 1986: 67-70). The visions of policymakers remained national. France and Germany saw the programme as a way to optimize their Path Dependences. France obtained programme leadership and Germany the opportunity to develop its aerospace industry (Dunning, 2000: 7-41).

From 1971 to 1978 Airbus established itself on the market. In December the GIE obtained funding from the European Investment Bank for the industrial ramp up (Endres, 1999: 12). The countries admitted Spain as an additional partner through CASA (Aris, 2002: 54). Air France was ready to order the A300 if it was optimized (Aris, 2002: 63). The Germans accepted since France was the leader (Muller, 1989: 83). During the roll-out in 1972 the French Minister of Aerospace outlined the need to integrate the national industries into a European conglomerate. This was the only way to resist U.S. competition (Endres, 1999: 23). Lufthansa committed only to a symbolic number although the government put it under pressure. Each country certified the A300 according to its own regulation. The programme had not changed practices (Muller, 1989: 84).

After the A300 entered into service the national STPs or the vision of the programme did not evolve. French stakeholders remained enthusiastic and continued to consider the programme as a national venture. German post holders promoted it as a transnational cooperation. In the U.K. scepticism about a product inconsistent with the market remained the word of the day.

U.S. STPs were extended to political action. For the first time this was the case during the sales campaign in South Korea won by Airbus in the end (Picq, 1990: 69-71). Countries like Brazil were put under pressure to remain committed to U.S. hardware (Quittard, 1979: 153). These interventions did not influence the STPs of the Airbus states. This was the case in the U.K. and the Netherlands where the STPs included transatlantic cooperation within the NATO (Hayward, 1986: 32). A recommendation by the European Commission for an industrial integration and not only a cooperation was ignored by the Airbus states (Mc Guire, 1997: 41).

A subtle change nonetheless took place. The challenge to convince customers as well as externalities such as the oil crisis and the recession led to discussions on the future of the programme. France intended to maintain the current rate of production. In the view of its stakeholders Airbus represented a national strategic programme where financial aspects were secondary. Germany with its economic vision advocated a lower rate to save resources. France agreed after long negotiations. For the first time the French abandoned their strictly nationalist view in favour of a transnational perspective (Muller, 1989: 42).

Many saw the Export Standstill Agreement concluded within the Organization for Economic Cooperation and Development (OECD) in 1975 as a factor of the crisis. It regulated export financing practiced by most states (Mc Guire, 1997: 50-61). A year later the participating states, among them the Airbus countries, signed the Consensus Agreement on Civil Airframes. While the negotiations were in progress the traditional bilateral approach was increasingly abandoned in favour of the Multilateral Trade Negotiations (MTNs) led by experts. The contacts were ensured by experts familiar with the technical aspects of the issue and representing the governments. The governments were aware that the only way to influence the evolution and outcome of the talks in a way consistent with their interests was an institutional innovation which simplified or solidified the governance and the handling of the issue (Johnston, 1979: 520-522). States apparently adopted a neutral or issue-specific approach. In fact it enabled them to consolidate their position within the framework (Hoekman, 1989: 693-714)[124]. The ongoing negotiations concerned international trade in a field where the impacts of transactions on states and industrial actors went far beyond the usual industrial, financial and technological aspects (Krasner, 1995: 19-36). Indeed, trade in airframe always had the particular connotation of a strategic good for both the seller and the buyer since both were confronted with the chances and risks of a monopoly of supply (Lawrence and Dowdall, 1998).

This pro-active move by France and Germany as well as the U.K. was countered by the U.S.. Whenever a U.S. manufacturer entered a sales campaign it became entitled to a more advantageous package known as the Airbus Waiver (Mc Guire, 1997: 57). This new STP strategy did not prevent strategic successes of the A300 in India and South Africa (Aris, 2002: 84). It may be the reason why the Airbus states continued to ignore recommendations by the EEC institutions in favour of common STPs. For each government the Airbus programme remained a national strategic initiative (Mc Guire, 1997: 72).

A visible change was nonetheless observed. The multinational Airbus had encouraged several initiatives for a new narrowbody based on transnational cooperation. The Airbus partners were involved in several of them (Laming and Hewson, 2000: 13). In 1975 Aerospatiale and Dassault were looking for a U.S. partner. McDonnell-Douglas confirmed its interest in a narrowbody programme to the French government. The latter approved since this would involve an experienced partner and lower the financial contribution. After the failure (Mueller, 1980: 24-30) French political stakeholders suggested the integration of the narrowbody into the Airbus programme (Aris, 2002: 122). Lufthansa preferred U.S. aircraft. Some industrial stakeholders joined their French colleagues and favoured an extended Airbus programme (Quittard, 1979: 79).

[124] Again, things are far more complex in reality but, being of no further relevance for the research, cannot be developed. Illustrations are international treaties and organizations focusing on technological issues, such as transportation, telecom or logistics. The more a state is powerful owing to its industry in the field the more it can promote its technological standards for example. In many cases the issue takes the form of a regime, as air safety (Golich, 1989) illustrates. This issue is often criticised as being de facto controlled by the U.S. Federal Aviation Authority (FAA) which in turn defends the interests of the U.S. manufacturers through STPs (Nader and Smith, 1994: 1-15).

Another element in national STPs emerged after 1976. More or less in parallel to the promotion of the French narrowbody, professionals within the GIE Airbus prospected ways to make the Airbus offer more attractive through a smaller version of the widebody (Endres, 2000: 12). German political stakeholders backed up the new model (Endres, 2000: 16). France continued to promote the narrowbody (Muller, 1989: 113-114). Appeals from the EEC to integrate the national aerospace policies remained ignored (Council of the European Communities, 1977: 6).

While the missing consensus among the partners undermined the Airbus programme events took an unexpected turn in 1978. The U.K. industrial partner reaffirmed its interest in future derivatives of the Airbus range and the government became interested again in an official partnership. There were various reasons for the strategic reorientation in the U.K.. The political decision-makers intended to consolidate their role within the EEC (Mc Intyre, 1992: 53-54). The aerospace stakeholders had experienced the failure of most national programmes. Only the A300 had kept the involved company alive. STPs therefore had to focus on the successful programme. A formal participation allowed a more active role of the country in future programmes. France and Germany welcomed the partner as an additional source of funding. The new A310 needed considerable launch aids. In the U.K. there remained an influent faction who preferred transatlantic to continental cooperation. The Treasury and the Department of Trade favoured Boeing, the Foreign Office and the influent ambassador in Paris Airbus. Both sides argued with better trade-offs. Since there was no full consensus the U.K. government attempted to obtain a compromise. The country was ready to fund the A310 but the newly established British Aerospace (BAE) which had taken over the Airbus industrial partner would remain outside the GIE (Aris, 2002: 107-109).

In July 1978 commitments from Lufthansa and Swissair highlighted the favourable market response to the A310. France and Germany, and BAE agreed on the full reintegration of the U.K. (Birtles, 2001: 48). France enforced symbolic concessions on the U.K. (Muller, 1989: 117-119). Soon afterwards the three governments agreed to integrate the preliminary work on the narrowbody by the Airbus partners into the programme. This promised the best way towards the new aircraft (Laming and Hewson, 2000: 16).

More or less in parallel with its consolidation Airbus obtained a decisive victory with the U.S. Eastern Airlines. The financial transactions were coordinated by the Bank of America. The U.S. government immediately applied a special import tax on Airbuses. Alleged ‘predatory financing’ was criticised (Aris, 2002: 102). Most observers of the time saw this as a reaction to a strategic defeat. The U.S. became aware that they had to live with foreign competition. Despite the open governmental pressure Eastern ordered 23 A300 which was a spectacular number for the time. The U.S. administration reacted through alleged safety concerns. The Airbus stakeholders and the new operator overcame them as well (Marck, 1979: 283).

While the reintegration of the U.K. and the success in the U.S. was under way the Commonline Agreement was negotiated. For the first time experts from the EEC participated as observers. The member states had increasingly transformed the EEC into an international subject (Courty and Devin, 2005: 12-13) so that the latter signed the Agreement in 1978. It was however the Airbus states that led the negotiations and ratified the document (Mc Guire, 1997: 54). In the same year the U.S. President encouraged a new agreement (Mc Guire, 1997: 76).

From 1979 to 1987 the STP practice evolved further. The first visible example was the negotiation on the GATT Agreement suggested in 1978 by the U.S. President on airframe market distortion (Mc Guire, 1997: 76). Most European states concluded that Washington attempted to maintain its dominant position. France defended the launch aids as a pillar of its aerospace policy. Despite their different preferences in cooperation with European or U.S. partners the U.K. stakeholders backed up France. Germany kept a low profile (Mc Guire, 1997: 78). For the first time EEC officials played an active part in the meetings. European stakeholders concluded that the U.S. manufacturers obtained indirect subsidies through military and scientific programmes (Mc Guire, 1997: 72-83).

In April 1979 the Agreement on Trade in Civil Aircraft (Aircraft Agreement) was finalized. It regulated tariffs and export financing. A major victory for the European side was the end of the U.S. Airbus importation tax. Although the Agreement did not hurt the dominant U.S. position Washington experienced that its leadership was challenged (Mc Guire, 1997: 87-90). All sides were satisfied since the agreement did not affect the current practices. A special clause allowed the signatory states to intervene whenever national policies deemed it necessary. In practice all governments were free to continue their STPs (Mc Guire, 1997: 82-84).

In April 1980 all Airbus countries approved the A300-600 proposed by the industrial stakeholders (Endres, 1999: 58). In 1981 the competitor to the A310, the B767, appeared. Since the latter had a longer range than the Airbus the updated A310-300 was announced in June 1983 (Endres, 2000: 42). Partially as a reaction to the A310 the U.S. initiated a new STP to encourage the B767 in 1985. It was the Extended Twins Operations (ETOPS) that enabled transatlantic operations for twinjets. As the U.S. carrier Pan Am operated the A310 the U.S. certification body FAA had to extend it to the European model as well (Moser, 1986: 109-126).

The launch of the A310 did not overcome the latent tensions between France and Germany. The former continued to promote the narrowbody, Germany two further widebodies suggested by the GIE stakeholders. After 1981 the new French President François Mitterrand made the narrowbody now called the A320 a national priority. France felt encouraged to promote ‘its programme' after Germany had successfully enforced the A310 (Muller, 1989: 128-129). Slowly the German political stakeholders became aware of the business case of the narrowbody since older U.S. aircraft needed to be replaced (Mc Guire, 1997: 98).

The U.S. manufacturers were convinced that their proven aircraft would remain in high demand so that they did not push political or economic action against Airbus in Washington (Mc Guire, 1997: 101). They noted that the consensus in Europe in favour of the narrowbody was limited. Margaret Thatcher was against financial participation of the U.K. government (Aris, 2002: 126). In Germany the opinion became more favourable since all industrial stakeholders saw the potential of the programme. After an order from a private U.K. airline the Thatcher government became the first to commit to launch aids in form of loans to be paid back by BAE through levies on sales. France and Germany agreed on similar arrangements (Mc Guire, 1997: 98). In March 1984 the governments enabled the A320. The launch aids based on repayments illustrated the belief of all three governments into the long-term perspectives (Mc Guire, 1997: 98). The U.K. claim for programme leadership was opposed by France so that final assembly was allocated to Toulouse. Each partner had attempted to obtain the maximum for its own industrial partners (Sparaco, 2005a: 186-187).

Soon afterwards the two suggested widebodies were put on the agenda. The national airlines of France and Germany had slightly different needs in this category so that both proposals were studied (Aris, 2002: 142).

At this time McDonnell-Douglas had the MD-11 under development. From the beginning the company attempted to mobilize the U.S. government against Airbus (Lawrence, 1999: 27-61). The incapability to prevent the rise of Airbus despite the Aircraft Agreement and the stagnating industrial basis of the U.S. (Tolchin and Tolchin, 1988) were additional incentives for the government to get involved. A first U.S. strategy was the claim of a GATT Agreement violation by the Airbus countries, a second the intimidation of the individual countries, again through the spectre of GATT sanctions. In both cases the U.S. presented themselves as the leader of free entrepreneurship and the Airbus countries as interventionist. Since Boeing was launching new programmes as well it joined the claim for U.S. STPs (Aris, 2002: 157).

In the name of all Airbus countries France offered negotiations in 1986. Financial resources of the manufacturers were low after the launch of the A320 and the new widebodies were impossible without launch aids (Mc Guire, 1997: 121-122). The Airbus countries attempted to 'buy time' to finalize the launch aids for the new programme. In February 1987 the U.S. submitted the announced claim. All Airbus countries defended the launch aids through Article Six as well (Mc Guire, 1997: 122-124). In the meantime the new widebodies became known as the A330 twinjet and the A340 quadrijet (Germain, 2000). During the initialization of the programme in 1986 McDonnell-Douglas suggested another transatlantic cooperation to the governments. These allowed the GIE to explore this possibility but the industrial stakeholders rejected the idea so that the states abandoned it (Sparaco, 2005a: 207).

In March 1986 the U.S. requested new GATT negotiations against civil aircraft market distortions. They also outlined the declining share of U.S. parts in Airbus aircraft (Mc Guire, 1997: 123). In the opinion of the Airbus countries the U.S. decline was a result of the more and more transnational structures of the industry, which was beyond their control (Hayward, 1999: 3-14). During the confrontations they reaffirmed the business cases of the A330/A340 and announced that the launch aids would account for 65 percent of the estimated cost. For the A300 and the A310 they had reached 100 percent and 90 percent for the A320 (Aris, 2002: 145-146). The Airbus countries agreed to renegotiate the aerospace issue but insisted on the coverage of the indirect subsides through military and scientific programmes in the U.S. to the civil manufacturers (Mc Guire, 1997: 122-124).

In early 1987 the U.S. pursued their manoeuvres of intimidation. They claimed that the world market would endorse only one mid-sized aircraft in this category. The McDonnell-Douglas MD-11 was less expensive and available earlier (Mc Guire, 1997: 122-124). To the general surprise the U.K. was the first country to refute the claims on the argument of jobs. France defended its technology policy and Germany the overall importance of the programme. At the roll-out of the A320 in February French political stakeholders warned that the Airbus stakeholders would counter any U.S. attempt to interfere (Aris, 2002: 150). All countries justified the launch aids through Article Six of the 1979 agreement. In May 1987 the Airbus member states approved the A330/A340 support. The schemes were again based on repayments through levies on sales (Mc Intyre, 1992: 113). Again the underwriting countries were confident about the prospects to reclaim their investments. The industrial organization proved difficult. France suggested Toulouse for final assembly, Germany Hamburg. After more than a decade of participation the government deemed the local work force experienced enough to take responsibilities. Most decision-makers experienced that the positive results of the policies of good neighbourhood slowly overshadowed the negative image of the country as a heritage from both World Wars (Grosser, 2004). France won with the argument of the Path Dependence (Storper, 2000: 42-62).

Germany obtained a strategic victory since all derivatives of the A320 would be assembled there. This outcome illustrated again the belief in the future of the programme (Aris, 2002: 146).

Since the U.S. had failed to prevent the launch aids for the new widebodies McDonnell-Douglas hoped to obtain sanctions based on the 1974 U.S. Trade Act. It enabled punitive measures by the government whenever a national industry would be discriminated. The U.S. State Department was concerned about the growing market penetration of Airbus but the transatlantic ties within the NATO were deemed too important to be jeopardized for a trade issue. Therefore the claim was not pursued (Mc Guire, 1997: 129).

In October 1987 the EEC became a visible actor in the transatlantic dispute when the European Parliament rejected all U.S. pledges. The European institutions played an increasingly active part and attempted to coordinate the national policies (European Parliament, 2000).

Although the member states began to approach Airbus as a transnational issue their STPs continued to be practiced in a domestic perspective. For the first time the German government intervened in favour of its industry. The parent company of Deutsche Airbus was broke by 1987. The German Daimler-Benz was interested to take over the aerospace activities with the exception of Airbus. After the government underwrote to the obligations the new parent company assumed the programme (Aris, 2002: 172-173).

From 1988 to 1992 the Airbus programme and the attitudes of the member states evolved further away from nationalist visions. In February 1988 the Airbus countries and the Netherlands jointly certified the A320. Regulation policies converged as well (Sparaco, 2005a: 218). Soon afterwards the Airbus ministers suggested to render Airbus Industrie more efficient through reorganizing it. Both the state stakeholders and the industrial partners were opposed to any restriction in their autonomy. Outside the programme the states and companies remained competitors (Sparaco, 2005a: 228).

On the other side of the Atlantic Boeing was changing its strategic vision from long-term commitment to short-term profit maximization (Lawrence and Thornton, 2005: 92-95). This meant the end of pro-active investments with the exception of the B777 large twinjet. Since the A340 quadrijet challenged this new programme, Boeing drew the government into another GATT Aircraft Agreement complaint (Mc Guire, 1997: 140). France replied to the pressure through an investigation of its own. In 1988 the Senate concluded that the subsidies through defence and NASA research programmes exceeded by far the launch aids to Airbus (Fortier, Blin et al., 1988: 5). The U.S. reacted through a renewed claim on market distortion banned under the GATT Aircraft Agreement (Lawrence and Dowdall, 1998: 15). In parallel Washington admitted for the first time the practice since it could no longer hide it. This concession did not hurt the U.S. since their superior position was not affected. It was above all a moral victory of the Airbus countries over the common competitor (Mc Guire, 1997: 147).

The Airbus stakeholders initialized a stretched version of the A320, the A321, in May 1989 without state aids. All relevant political stakeholders had concluded that the market-driven approach of the industrial partners granted the best perspectives for their national facilities. Following the earlier commitment final assembly was allocated to Germany. For the first time since 1945 a large aircraft was delivered from there. This was an important step in the Franco-German relations (Sparaco, 2005a: 228).

At this time Germany launched the first own STP. After the sale of Deutsche Airbus the government compensated for losses resulting from the low U.S. Dollar through subsidies (Mc Guire, 1997: 143). For the first time the other Airbus countries criticised an STP for its strictly national perspective. For many Airbus decision-makers the exchange rate scheme was an open provocation to the U.S.. Indeed the U.S. launched a GATT claim (GATT, 1990). In late 1989 the U.K. also operated a change in its STPs when it privatized BAE. The move was justified with the worldwide liberalization (Wegscheider, Sever et al., 2003). Since the move had no direct effect on Airbus there were no reactions. During this dispute the EEC appeared as an actor and gradually assumed the lead over the Airbus states (Mc Guire, 1997: 146). After they had admitted the indirect subsidies the U.S. lowered their ambitions. Airbus was a reality and Washington-led STPs which included the GATT Agreement had failed to eliminate the competitor. The U.S. shifted to a strategy of containment (Mc Guire, 1997: 146). In parallel with the U.S. attitude the European argumentation evolved. Launch aids were seen as crucial since the U.S. subsidized its industry (Krugman, 1994: 234-241). The U.S. maintained that their suppliers were private enterprises whereas Airbus was a nationalized programme. One of the arguments was the fact that the manufacturer would have to repay only once profitability was reached (Sparaco, 2005a: 217). While these exchanges were in progress the Airbus industrial partners signalled that they could do with lower launch aids if the U.S. limited their subsidies (Mc Guire, 1997: 160).

In September 1990 the Gellmann Report commissioned by the U.S. Department of Commerce concluded that all Airbus programmes would have been impossible without funding. The Airbus countries had committed between USD 13.5 billion and 26 billion since 1971. USD 500 million or four percent had been repaid. The oligopolistic nature of the market and the Path Dependence of the growing Airbus fleet would enable the supplier to remain on the market (Golaszewski, Berardino et al., 1990: 5-5).

Like the previous U.S. attacks these new claims did not intimidate the Airbus countries. They admitted the losses of the A300 and A310 (Lawrence and Dowdall, 1998: 15). In close cooperation with each other and the EEC the governments prepared the next moves. Taking into account the conclusions of the industrial partners on launch aids they offered a limitation of their support if Washington accepted a cap on indirect subsidies. The European Commissioner of Trade defended Airbus as a key actor in the EEC economy (Aris, 2002: 158). When the U.S. side understood that all European political stakeholders stood behind Airbus, Boeing and McDonnell-Douglas encouraged the government to concessions in indirect subsidies. Their leadership would remain unquestioned (Mc Guire, 1997: 148). One of the reasons behind this assessment was the minimal coordination of national STPs of the Airbus countries outside the programme. Smaller jets which might be complementary to Airbus were discussed by the French and German partners outside the structure. The Germans even intended to collaborate with China (Sparaco, 2005a: 230).

In October 1991 the A340 was rolled out. For the first time the European symbols were displayed (Sparaco, 2005a: 237). At this time a working group within the Western European Union (WEU) suggested a new military aircraft. The Airbus partners of France, the U.K. and Spain, as well as the Italian Alenia established a research group outside Airbus. As far as military technology was concerned the states remained cautious when they selected partners (Sparaco, 2005a: 238). EEC policymakers still did not approach aerospace in a ‘Euro-nationalist’ (Guzzetti, 1995: 36) perspective. When Aerospatiale attempted to take over a Canadian competitor together with the Italian Alenia (Sparaco, 2005a: 236) the operation was refused by the European Commission on the grounds of negative impact on competition (Case No. Iv/M053, 1991).

In November 1991 a research mandated by Airbus Industrie in the U.S. concluded that Boeing and McDonnell-Douglas benefited from massive STPs through programmes by the U.S. Department of Defence and the NASA. In addition the government granted tax incentives. Following the way of analysis the overall contributions from 1976 to 1990 ranged from USD 18.34 billion to 29.76 billion (Arnold & Porter, 1991). Table One summarizes the claims of both reports[125].

Table 1 - The Battle Of The Reports

Gellman Report		Porter Report	
Type of Subsidy	**Amount (in Billion USD)**	**Type of Subsidy**	**Amount (in Billion USD)**
Governmental subsidies of France, the U.K. and Germany between 1971 and 1990	13.50	U.S. Department of Defence (DoD) through military programmes between 1976 and 1990 to Boeing and McDonnell-Douglas	6.34
Above governmental subsidies including interest rates for lending states	19.00	Above subsidies and induced spillover effects for civilian programmes of both manufacturers	9.70
Above governmental subsidies including interest rates for lending states at capital market interest rates	26.00	NASA through scientific programmes between 1976 and 1990 to Boeing and McDonnell-Douglas	8.90
Average: 75 percent of total cost of each programme	Airbus partners have repaid USD 500 million or four percent	Above subsidies and induced spillover effects for civilian programmes of both manufacturers	16.96
		Cumulated tax incentives between 1976 and 1990 to Boeing and McDonnell-Douglas	3.10
		Total indirect subsidies and incentives	18.34
		Total indirect subsidies and induced spillover effects and incentives	29.76

Source: Compiled by Author from (Arnold & Porter, 1991), (Golaszewski, Berardino et al., 1990).

Even if the figures have to be biased in both reports there is no doubt that the overall financial commitments of Washington provided essential incomes for the manufacturers. One detail merits closer attention. If the U.S. examined the history of the Airbus programme from the moment the prototype was constructed, the Europeans focused on the evolution after 1976 only. There was no fundamental disruption in U.S. practices between 1971 and 1976 (Newhouse, 1982: 29) so that the figures may be extrapolated to 1971. Although the projection may not be absolutely accurate owing to the lack of empirical data, it gives a basic idea of the U.S. amounts for the whole duration of the Airbus programme. On the other hand the adaptation of the European amounts over the period examined in the U.S. would not make sense. The U.S. subsidies were generic research programmes (Braun, 1997) with mostly annual budgets. The European launch aids in turn aided ramp-ups of specific aircraft. Table Two gives the extrapolated U.S. support.

[125] Both reports base their figures on 1990 U.S. Dollar values.

Table 2 - Extrapolated U.S. Indirect Subsidies 1971-1990

Gellman Report		Porter Report	
Type of Subsidy	**Amount (in Billion USD)**	**Type of Subsidy**	**Amount (in Billion USD)**
Total subsidies to Airbus	13.50	U.S. DoD military programmes	8.60
Total subsidies to Airbus including interest rates for lending states	19.00	U.S. DoD military programmes and spillover effects	13.16
Total subsidies including interest rates at capital market rates	26.00	NASA research programmes	12.08
		NASA research programmes and spillover effects	23.02
		Cumulated tax incentives	4.21
		Total governmental aid	24.89
		Total governmental aid and spillover effects	40.39

Source: Author based on (Arnold & Porter, 1991), (Golaszewski, Berardino et al., 1990).

Whatever the exact amounts, the estimations disprove the claims that Boeing and McDonnell-Douglas were truly private companies. While the 'battle of the reports' was in progress, Airbus initialized the A321 without launch aids as announced (Laming and Hewson, 2000: 27). This illustrated the growing technological and economic maturity and the ambition of the industrial partners to become market-driven.

In this context of mutual distrust all protagonists on both sides of the Atlantic became convinced that a formal agreement promised the best possible outcome. The U.S. attempted to maximize their benefits. The EEC announced its support. Soon it assumed the leadership in the negotiations on the European side. The industrial stakeholders interacted with their governments which in turn cooperated with the EEC. All European negotiators were convinced that the only motivation for the U.S. to bring up the indirect subsidies was their belief that nobody could monitor them (Mc Guire, 1997: 151). Once again the Europeans were in an inferior position. Since their industry as a whole was smaller than its U.S. counterpart, the power of the Airbus countries and the EEC over the U.S. remained lower. They hoped to minimize losses. The European side still lacked a common front. This was illustrated by the German exchange scheme. In March 1992 Washington brought the case to the GATT (Mc Guire, 1997: 152).

Terms were not very favourable for the Europeans when they obtained an unexpected chance. Through informal channels they learned that the U.S. manufacturers could do with lower indirect subsidies. This insider knowledge enabled the EEC, after extensive consultation with the Airbus governments, to submit an incentive. In fact it was a carefully laid trap. The proposal suggested aids of 30 to 40 percent of the overall programme cost instead of the current 45 (Mc Guire, 1997: 153). For the U.S. this represented a major concession which is usually interpreted as a typical gesture of surrender in negotiations (Hoekman, 1989: 693-714). Whatever the U.S. offered in return it would be less limitative for them. In addition their superiority would be codified in the expected agreement. For the yielding party any concession from the other side represented an acceptable result so that it would prefer securing the gain instead of pushing negotiations further (Hegvedt and Killian, 1999: 269-302). Therefore Washington signalled to drop the GATT claim against Ger-

many. Instead of pushing towards the conclusion of an agreement based on these outcomes the EEC brought up the matter of indirect subsidies and suggested a cap of five percent. To the surprise of the European stakeholders the U.S. agreed on the principle. Washington knew of the position of the U.S. manufacturers on a possible limit. This additional concession seemed acceptable since the U.S. would retain their leading position (Mc Guire, 1997: 153).

After this victory the EEC changed its tactics again. The Europeans raised the stakes and rejected the U.S. criticism on the German exchange scheme. The U.S. maintained their claim. Finally the German government announced the termination of the scheme. As a response to the unyielding European attitude the U.S. Department of Commerce raised the stakes. Washington warned to turn over the Airbus subsidies to the GATT or to launch action enabled under the 1974 Trade Act if no agreement was reached. It could no longer come back on the earlier concessions (Mc Guire, 1997: 155). In April 1992 the U.S. government, the EEC and the Airbus countries announced the U.S.-European Agreement on Airframe Aerospace Subsidies, usually known as the Airbus Accord. Unlike the earlier OECD and GATT Agreements it established an institutional and procedural framework (Mc Guire, 1997: 155). The European side accepted limitations to their launch aids, the U.S. general caps on the indirect subsidies. Table Three outlines the details.

Table 3 - 1992 Airbus Accord

Clause	EEC and Airbus states	U.S. Government
Limitations in public interventions	Restrictions of launch aids to 33 percent of overall budget of a new programme 25 percent of the sum granted at official interest rates 75 percent granted at official interest rates raised by one percent Integral repayment in 17 years maximum by benefiting entity	Indirect subsidies through military and scientific programmes limited to three percent of turnover of the civil aircraft industry or four percent of the overall value of an individual company's civil sales
Validation by other signatory party	Annual balance sheet by governments of Airbus countries to the U.S. government and regular meetings to monitor compliance	Annual balance sheet to the governments of Airbus countries and regular meetings to monitor compliance

Source: Compiled by author from (92/496/EEC, 1992: 31), (Mc Guire, 1997: 155-156).

In practice the Airbus accord did not put an end to the current STPs of both sides. As it was the case in the 1979 Aircraft Agreement there was a clause of exception which allowed interventions in case a manufacturer was at the verge of bankruptcy. Aids to new programmes remained illegal. All stakeholders knew that this targeted the ailing McDonnell-Douglas. From the beginning there was the question of interpretation. The Europeans were free to practice indirect subsidies on their own, for instance through the EU Framework Programmes. In the U.S. the caps were not seen as absolute but as upper thresholds from where new negotiations would begin. However the Agreement was more formal than the previous initiatives. It included monitoring facilities and established binding mechanism (Mc Guire, 1997: 156).

Many European observers of the time concluded that their side had made too many concessions for too little in return. The Airbus countries had to readjust their policies. The lower amounts obliged the industrial partners to review the financial options and the way they implemented the programme. The U.S. in turn could maintain their practices for the price of minor concessions. Unlike the Airbus countries they could also hide their involvements far easier. From a tactical viewpoint the U.S. had once again successfully exploited its superior position (Mc Guire, 1997: 156).

In a strategic perspective things looked different. For the first time the EEC had been the main negotiator and defender of the strategic interests of all Airbus countries. For the U.S. this was an unpreceded experience. The EEC had turned into a fully emancipated international actor independent from the member states but closely cooperating with these. The U.S. had been confronted for the first time with a common defence line. The EEC negotiators in turn exploited the weaknesses of their opponents even if their overall position remained inferior. They forced the U.S. to admit that their manufacturers were at least as subsidized as the Airbus programme. This was a major psychological victory which promised to undermine the U.S. position in future negotiations (Mc Guire, 1997: 155). Finally the Airbus states and the EEC had become experienced in the defence of common interests. Both the EEC professionals and the national negotiators became aware that they were able to resist U.S. pressure.

In December 1992 the two variants of the A340 were certified by the 18 member states of the Joint Aviation Authorities (FAA). The simultaneous approval of two versions of a design by a supranational body was another first and showed the increasing involvement of the European countries to outsource national prerogatives (Norris and Wagner, 2001b: 71).

From 1993 to 1997 the externalities of the Airbus programme changed. By 1993 the industrial partners no longer were entitled to choose the industrial options; they became the de facto sole decision-makers. A first example was the discussion with Boeing on a large aircraft in 1993 (Aris, 2002: 174). In June they initialized the A319 as the shorter variant of the A320 was called. Again no launch aids were requested and the states limited their intervention to a minimum (Laming and Hewson, 2000: 28).

By 1994 the industrial stakeholders had the intention to launch the very large aircraft code-named the A3XX. It implied massive launch aids (Marc, 2005: 26). In parallel a machine smaller than the A319 was examined in collaboration with China (Sparaco, 2005a: 253). While Airbus Industrie ramped up two new widebodies the U.S. continued their STPs. One of the intelligence agencies intercepted the communications of the Airbus delegation so that a huge order from Saudi Arabia went to Boeing (Lynn, 1997: 1-9). When this came out the European Parliament discussed the matter but it was too late (Akdeniz and Gladman, 2000: 200).

In spring 1995 the four industrial partners exchanged about possible optimizations of the Airbus programme. Since the manufacturers were the strategic industries of their countries the governments became involved. France endorsed a reorganization based on the national competences so that the states would remain the key actors. Germany advocated a transnational reorganization based on the industrial processes. Once again both countries diverged in their nationalist versus economic approach. The U.K. did not join the debate since BAE was already a private company (Sparaco, 2005a: 329).

Discussions led by the French and German industrial partners on new regional aircraft revealed that the Airbus programme remained one agreement among several in their opinion. Aerospatiale invited BAE and the Italian Alenia, Deutsche Airbus Chinese and South Korean companies to participate in two competing projects outside Airbus (Sparaco, 2005a: 252). In November the manufacturers refocused on Airbus through the A330-200 widebody without launch aids. From the beginning the political stakeholders had supported the promising programme (Norris and Wagner, 2001b: 117).

The A3XX got a mixed welcome. France was enthusiastic and saw it as a chance to outgrow the U.S. competition. The U.K. government qualified it as a risk and the industrial partner was lukewarm. The Germans were sceptical as well (Spaeth, 2005). In May 1996 the governments approved two new extrapolations of the A340 based on airline requirements (Norris and Wagner, 2001b: 108-111).

In November 1996 a report from an U.S. investment bank concluded that Airbus would be attractive for investors (Campbell, 1996: 14-17). More or less in parallel Boeing won huge orders from U.S. carriers. They were presented as exclusive deals up to 2017 which monopolized the supply (Norris and Wagner, 1999: 117). Before the situation could be assessed Airbus and the states suffered another shock. In December 1996 Boeing took over McDonnell-Douglas. Its turnover exceeded the cumulated revenues of the aerospace industry in Europe as a whole (Aris, 2002: 189). The merger was justified with the need to consolidate the strategic industrial basis in the U.S. and the opportunity to preserve the know-how of McDonnell-Douglas. The U.S. Federal Trade Commission (FTC) examined the move. Since the U.S. domestic market was not truly affected the argument of the strengthened national strategic capacities followed. In the end the FTC gave its approval to the exclusive contracts and the merger in July 1997 (Sparaco, 2005a: 255).

The European Commission was obliged to examine mergers anywhere in the world whenever the exports of the entity exceeded EUR 250 million. Its power to implement defensive action was limited to the territory under its jurisdiction but the concerned company might be hurt nonetheless (Harrison, 2003).

The industrial partners relaunched the discussion on reforms. Even state-centred France welcomed the initiative. Only weeks later they were unable to agree on how to evaluate their assets involved in the programme (Sparaco, 2005a: 330). They admitted their failure and turned towards the states (Aktas, Bodt et al., 2001: 447-480). In France Aerospatiale and the government insisted that the EU should retaliate since it was the only body entitled and capable to do so. BAE and to some extend the U.K. government encouraged the privatization of the national Airbus partners and their merger as the best way to adapt to the new situation. In Germany the reactions were unexpected. DASA requested national and European intervention in its favour. A strong faction within the government supported this claim. The contribution of Airbus to the German economy was considerable (Sparaco, 1997: 10-18).

While the national discussions were in progress the governments of the Airbus countries turned towards the EU. In 1991 it had signed an agreement on transnational mergers[126] with the U.S. (OJ L 95, 1995: 47-52). When the European Commission investigated the case Boeing contested the association of the exclusive contracts with the merger issue. Airbus Industrie in turn insisted on their examination (Aktas, Bodt et al., 2001: 447-480). At first sight the consolidation mirrored a position of strength. Airbus Industrie remained handicapped. Both the industrial and the national stakeholders remained unable to adopt a truly common

[126] At the time of signature it was the EEC.

position over their individual interests (Sparaco, 2005a: 330). At the same time the merger could not hide the decline of McDonnell-Douglas following its incapacity to resist the competition from Airbus.

In July 1997 the European Commission approved the merger but enforced concessions. Boeing was forced to cancel the exclusive deals (97/816/EC, 1997: 16-47). It was a symbolic victory since the companies had opted for Boeing anyway. Soon rumours circulated that the contracts had been a disinformation campaign. They represented such a flagrant violation of all practices that the European attention focused on them instead of the merger as such. Boeing obtained the expected dominant position (Martel, 2000: 63).

The McDonnell-Douglas-Boeing merger represents a turning point in the history of Airbus, transatlantic relations and the EU. First it confirmed the relative decline of the U.S. aerospace industry in respect to Airbus. Even aggressive STPs had not halted the visible deterioration of the U.S. Path Dependence. For the first time the European institutions had assumed the leadership over the Airbus states (Harrison, 2003). The examination of the merger had no longer been a multinational affair among Washington, Berlin, London and Paris but a bilateral issue between the U.S. and Brussels. Washington had learned from its relative defeat in the negotiations of the 1992 Airbus Agreement. Therefore the government did anything to 'outsmart' the European side in close cooperation with Boeing. In Europe the Boeing-McDonnell-Douglas merger stunned the industrial and political stakeholders. All of them agreed that the Airbus programme needed to be reorganized to become more efficient.

Most specialists expected Boeing to remain the number one but it ran into its worst crisis instead (Aris, 2002: 193). One of the internal factors was the absence of a long-term vision. Among the external influences the Asian crisis of 1997 were noted. Despite the downturn Boeing retained its strength. One of the reasons was the fact that it operated from within the U.S. Dollar area whereas Airbus Industrie suffered from the variations of the different European currencies among themselves and in respect to the Dollar. The industrial partners initiated the Dolores programme (Aris, 2002: 180). While it was in progress the stakeholders within the GIE suggested once again reforms (Sparaco, 2005a: 331).

In September 1997 the Franco-German Summit put the reorganization by 1999 on the agenda. The participants invited the EU to move on with the European company statute (Sparaco, 2005a: 331). Later that year the European Commission suggested a transnational European aerospace policy (COM(97) 466 Final, 1997). The member states preferred little interference with the core strategic industries from abroad.

However things began to move under pressure from the industrial stakeholders and the governments. Both of them felt that the U.S. supremacy needed an adequate response (Sparaco, 2005a: 331). The successes of the B777 had limited the sales of the A340. Following several requests two new versions with increased capacity and an ultra-long range were initialized prepared by the GIE Airbus Industrie and the industrial partners (Norris and Wagner, 2001b: 112). This time, launch aids were unavoidable. The governments relied on the market-based decisions of their partners and granted them accordingly. The STPs of the states remained in a national perspective but the political stakeholders were aware that the only way to maintain the Path Dependences favourable was to allow a greater margin of independence to the industrial partners. This would make them more flexible and market-responsive.

Between 1998 and 2003 the Airbus programme went itself through a disruption. In February 1998 the countries liberated the launch aids for the two new versions of the A340 (Norris and Wagner, 2001b: 113). In

spring the industrial partners put the A3XX on the agenda. Although scepticism prevailed the competition for the final assembly site was fierce. France insisted on its know-how. Germany promoted the existing Hamburg site since maritime access facilitated logistics (Spaeth, 2005: 128).

The industrial partners in turn felt that the time to consolidate had come. Each of them intended to maximize its position. In the opinion of BAE and DASA the state ownership of Aerospatiale made the necessary reforms impossible (Aris, 2002: 198). In May the JAA and the U.S. FAA jointly certified the A330-200. This transatlantic cooperation was another first (Norris and Wagner, 2001b: 99). In summer 1998 the industrial partners cancelled the Euro-Chinese project in favour of the A318. Again they did not request launch aids (Sparaco, 2005a: 257). At the same time the Airbus programme was selected as the possible framework for the still vague transeuropean military transport.

Although reorganisations had been discussed for a year the partners had been unable to reach a consensus. In the meantime the states changed their attitude. In 1998 rumours on a merger among BAE and DASA reached French state stakeholders. Even these had launched reforms in the public sector, so that the French Largadère Group was allowed to buy into the former state asset Aerospatiale. Both state and economic decision-makers were aware of the crucial role of the company for the country. Therefore they merged Aerospatiale with a supplier of military hardware to increase economies of scale (Aris, 2002: 200-203).

In summer 1998 the plans for a merger among the U.K. and the German Airbus partners became official. The French Minister of Transport felt rebuked and warned that France would end any contribution to the reorganization of Airbus if the two entities converged. Later the French government only insisted on a 50 percent stake in the future entity. The U.K. and German governments remained in the background (Aris, 2002: 203). Behind the stage the need to find a compromise raised the tensions. France intended to maintain its dominant role, the U.K. hoped to make the structure more flexible. The German government kept a low profile in the issue but DASA criticised the French to approach Airbus in a purely nationalist perspective (Sparaco, 2005a: 205). Soon afterwards the Anglo-German attempt failed. In parallel Aerospatiale had examined a merger with BAE in July 1999 (Aris, 2002: 203-206). Although the struggle for influence continued, the four partners established the common subsidiary Airbus Military. The military aircraft was the result of a bottom-up technological and strategic initiative of several states and not a NATO, WEU or EU top-down programme (Moxon, 1998). By 1999 national defence procurement began to be approached in a perspective of efficiency and economies of scale (Sparaco, 2005a: 356).

In February 1999 the French responded to the German advances (Aris, 2002: 203-206). The government played a major role whereas on the German side the main interlocutor was the new DASA parent company DaimlerChrysler. Soon the civil and military European Aeronautic Defence and Space Company (EADS) based on a full merger of Aerospatiale and DASA was discussed. Throughout the process EADS was presented as the European and not the Franco-German answer to Boeing (Aris, 2002: 207).

In October of the same year the French government, Aerospatiale and DaimlerChrysler Aerospace, which was the new name of DASA, officialised their merger into the EADS (Knappe, Palomino et al., 2006: 252). Its structure mirrored the political consensus. The main stakeholders were the French Largadère and the multinational DaimlerChrysler Company. The head offices in France and Germany were each led by a national CEO. This created a delicate balance of power. Although it was formally independent EADS remained highly

political. From the beginning the complex structure was criticised by industrial and state stakeholders. Most of the critics outlined the wasted chance to transform the largest aerospace company in Europe into an efficient and truly market-driven conglomerate (Aris, 2002: 207).

While the negotiations were in progress the Airbus Military Programme was launched in 2000 (Bombeau and Gaudin, 2001: 50-53). Still under the old Airbus system the A3XX was initialized (Spaeth, 2005: 58-59). In March the states decided launch aids over USD 2.5 billion for a budget estimated at USD 10.7 billion. This was 25 percent below the allowed 3.3 billion. Nonetheless Boeing and the U.S. government claimed that they violated the Airbus Accord. The mutual claims on illegal support resumed (Aris, 2002: 211).

In June 2000 the Airbus Integrated Company (Airbus S.A.S.) was set up. 80 percent were held by EADS and 20 by BAE. EADS was obliged to buy back the U.K. share at any time after 2003 (Aris, 2002: 212). In September the European Commission approved the new structure (Knappe, Palomino et al., 2006: 256). After years of negotiations, while the U.S. steadily increased their pressure (Harvey, 2005), the four Airbus countries had agreed on the transfer of strategic industries to a transnational entity. If the states continued national STPs, the way the selected industries operated had changed. The national STPs targeted the local plants of a transnational or European company. The competition became visible during the selection of the final assembly site for the A3XX now known as the A380 (Spaeth, 2005: 58-59).

The 11th September 2001 had a fatal effect on Boeing but a limited impact on Airbus. The formal independence of EADS enabled it to choose its ways to react. One of them was a widely noted freeze of pro-active R+D (Aris, 2002: 219). Neither the aerospace ministries nor the governments of the Airbus countries did criticise EADS for this. In December 2001 the A400M military transport was formally launched by the Airbus Military Company (AMC) set up as a subsidiary of Airbus S.A.S. (Bombeau and Gaudin, 2001: 50-53).

In spring 2003 Boeing announced a new mid-sized widebody. Airbus, EADS and the governments on both sides of the Atlantic felt no urge to act (Cochennec, 2003: 22-23). When a window of opportunity for a tanker in the U.S. opened, EADS and an U.S. partner announced their interest (Sparaco, 2005a: 271).

Between 2004 and 2006 Airbus imitated its competitor as far as the short-term profit thinking was concerned. In January 2004 the U.K. Ministry of Defence selected the A330-200-based tanker over the Boeing competitor. This decision based on another performance-driven assessment further strengthened the reputation of Airbus (Bombeau, 2004: 24-26).

As far as the response to the new mid-sized Boeing challenger B7E7 was concerned things were different. After long hesitations Airbus extrapolated the A350 from the A330-200 in 2004. Unlike all previous models it was not a pro-active initiative but a minimalist reactive move (Cochennec, 2004: 14-16). It was evident to most specialists that the challenges and budget overflows of the A380 and maybe the limited launch aids had made a more elaborate reaction impossible (Kingsley-Jones, 2005). In their opinion Airbus paid the price for the short-sighted focus on expenditure cutting as Boeing had done (Kingsley-Jones, 2005: 14). The obvious difficulties of Airbus did not prevent a resurgence of the transatlantic tensions on alleged violations of the 1992 agreement. In January 2005 Washington renewed a claim for illegal subsidies of over USD 15 billion to Airbus. In its counter-claim the EU pointed towards the higher indirect subsidies of up to USD 23 billion.

Neither the U.S. nor the EU was interested in a clash. Both sides were involved in Iraq and therefore intended not to stir an additional conflict. A subsidies freeze for three months was agreed (Pope, 2005).

The de-escalation was only apparent since the U.S. launched a new technical STP campaign. In a move coordinated with the formal launch of the Boeing challenger now marketed as the B787 and the presentation of a new ultra-long haul version of the B777 twinjet the ETOPS rules were further relaxed. The U.S. aircraft could now operate direct transpacific routes which had been the domain of the A340-500 with four engines. The Airbus lost its comparative advantage (Thomas and Forbes-Smith, 2005: 9-19).

During the roll-out of the A380 in February 2005 another evolution took place. The heads of state of the former four Airbus countries hailed the event as a milestone in the history of European integration and not transnational cooperation (Ballantyne, 2005: 5). In April Boeing warned that the Airbus Agreement was outlived. The EU replied that the B787 was the most subsidized aircraft in history (Mandelson, 2005).

In May the U.S. announced to bring the launch aids issue to the WTO. In June both sides agreed to halt the dispute (Portman and Mandelson, 2005). After a spectacular order of 60 the A350 was launched. Final assembly was allocated to Toulouse since the aircraft was based on the earlier widebodies (Martin, 2005: 1). Airbus and EADS announced not to request launch aids (Cochennec, 2005: 16-18). Boeing in turn confirmed its support to Washington in the U.S. attempt to ban launch aids through a WTO settlement (Airwise News, 2005c). France announced to be ready to step in even without a request by Airbus or EADS. The U.S. renewed the threat to end the 1992 Airbus Agreement. In the view of many the replacement of both EADS CEOs at this critical stage hinted a major crisis (Beauclair, 2005: 10-11).

While Airbus was confronted with technical issues of the A380 and a limited interest for the A350 (Pasztor and Michaels, 2005: 1), Boeing launched a new update of the B747 Jumbo towards the end of 2005 (Doyle, 2005: 26-27). Airbus signed an agreement for a production line in China. France was the most visible negotiator (Casamayou and Cochennec, 2005: 10-12).

In Spring 2006 Airbus conceded that it might request launch aids for the A350 (Turner, 2006). Shortly after the announcement of the best results ever for EADS (Rising, 2006) a series of blows affected Airbus. A first shock was the decision by the main shareholders Largadère and DaimlerChrysler to reduce their participations in EADS (EADS, 2006b). Next followed the announcement of BAE to get rid of its 20 percent stake in Airbus S.A.S. (EADS, 2006c). Since EADS was obliged to take it over it suffered an additional cash drain. After criticisms by leading air transport stakeholders Airbus hinted a revamp of the A350 (Norris, 2006: 6). In June 2006 a first of several delays of the A380 were announced (Airwise News, 2006u).

The German Minister of Economy urged EADS to overcome the challenges. Like most German political and aerospace stakeholders he rejected the claims that the delays were caused at the Hamburg site and requested the resignation of the French EADS CEO nominated in 2005 (Airwise News, 2006o). German political stakeholders warned against any tilt in favour of France within EADS. French ministers insisted that national interests were at stake (Airwise News, 2006k). A more or less open confrontation of the two main Airbus partners was something unheard of before. In a context of economic stagnation in Germany the aerospace sector was seen as crucial (Der Spiegel, 2007b). In parallel the German society went through a paradigmatic transition. A new generation of stakeholders born of parents who had themselves not participated in the Second World War was rising within the hierarchies. This upcoming elite did no longer feel per-

sonally responsible for the contemporary German history (Broder, 1998: 28-34). As a result they found it legitimate to defend the interests of their country in the same way stakeholders in others did. France outlined once again its commitment to assume leadership within the programme. Each government saw the fundamental national interests at stake. At the same time both governments understood that they needed each other to overcome the Airbus crisis. In the end the EADS CEOs were replaced. The new nominations mirrored again the binational equilibrium. Another Frenchman took over Airbus S.A.S. (Airwise News, 2006h).

In July 2006 Airbus presented the revamped A350XWB at the Farnborough Air Show (Airbus S.A.S., 2006). The aircraft was far superior to the earlier version but its budget had at least doubled. It seemed obvious to everybody that the greatest challenges to Airbus still lay ahead (Airwise News, 2006c).

4.2.3. The Airbus Programme And European Integration

As the two preceding sections outline the industrial and political stakeholders approached the Airbus programme as the best way to defend their national interests. Both have practiced the strategy of obtaining comparative advantages through innovation and optimization (Zmud, 1984: 727-738). In the following section the industrial and political decision-making is placed in the context of the European integration. Parallelisms can be identified and studied.

Almost from the beginning airframe construction and international air transport influenced national policies and international relations (Freer, 1986: 44-46). Military aviation played a vital part during the Second World War. The U.K. resisted the German advance notably thanks to its capability to leapfrog the German technologies (Macmillan, 1960: 149-160) whereas the U.S. tipped the balance in favour of the Allies through mass production (Ingells, 1970). After 1945 all European countries affected by the war were forced to launch reconstruction programmes[127]. In a first step they were reactive and focused on immediate needs such as housing. Later the governments redefined their STPs. One of their ambitions was new passenger aircraft in France and the U.K.. First attempts failed since their manufacturers were unable to fight against the omnipresent U.S. competition. The shared needs to overcome the consequences of the war encouraged transnational cooperation in Western Europe. Under U.S. leadership the Organization for European Economic Cooperation (OEEC) was established as a coordinator and facilitator for the Marshall Plan (Guzzetti, 1995: 2).

The positive outcomes of the coordinated efforts for reconstruction was interpreted by many as a new chapter in the shared European history (Steffan, 1957: v-viii). This pull factor encouraged further transnational cooperation. A major push factor, which was the Cold War, amplified the feeling to be confronted with the same risks (Gaddis, 2001: 301-326). As a response France, the U.K. and the Benelux states signed the Western European Union (WEU). The traumatic war experience and the transborder cooperation inspired intellectuals as well. At the Hague Congress in May 1948 they suggested common policies. A year later several countries established the Council of Europe for cultural and scientific cooperation. Some of the decision-makers hoped that Europe might become independent from both superpowers (Guzzetti, 1995: 2). Strategic industries remained outside the discussions. The fundamental suggestive power of the integration process at continental scale motivated other stakeholders. Several suppliers of airframes and equipment established

[127] If not stated otherwise, the information on the EEC and later EU development is based on http://europa.eu/abc/history/index_en.htm.

the European Association of Aircraft Industries in 1950[128]. All three initiatives were unrelated. A closer look reveals that they shared the same geographical context of Western Europe and motivation of pooling resources. The geographical area developed into a common denominator for state and other stakeholders (Saint-Ouen, 1989: 129-141).

In 1951 France, the Benelux countries, Italy and Western Germany initiated the European Coal and Steel Community (ECSC) (Guzzetti, 1995: 4). It established a regional international organization for the joint management of the basic source of energy and raw materials of the time. It had rational and economic motivations, such as economies of scale. France also intended to integrate the industrial potentials of the former enemies into its sphere of interest as a way to 'control' them (Stein, 1982: 299-324). Italy and Western Germany lived this as their international rehabilitation (Deniau, 1959). In the same year the Council of Europe promoted the continental coordination of air transport (ECAC, 2005). The airlines established the Association of European Airlines (AEA) through a bottom-up initiative (AEA, 2005). The governments decided not to dissociate air transport in Europe from the international air transport regime but to optimize it within the existing framework in close cooperation with the International Civil Aviation Organization (ICAO) (Antoniou, 1998: 43-54). As far as airframes were concerned each country maintained its strictly national policy. The U.K. and its industry competed against the U.S. but the other European countries as well. The failure of the Comet encouraged the French Caravelle (Wegg, 2005: 50-55). While both countries continued to compete in aerospace they joined forces in the CERN. It focused on fundamental research where economies of scale were in the interest of all states (Braillard and Demant, 1991: 10).

During the second half of the 1950s the continental convergence gained momentum. Positive experiences and learning processes, more complex issues and increasing risks were the pull and push factors (Daumas, 1981). In 1957 the Treaties of Rome established the EEC. It included policies, economics and S+T through EURATOM (Guzzetti, 1995: 13-15). The EEC was a political programme and an international framework with own institutions independent from the member states (Teyssier and Baudier, 2000: 122). Its very existence influenced the attitudes of political and economic stakeholders. Again the positive impacts encouraged similar initiatives in other sectors (Sarooshi, 2003). In 1959 France and Germany launched the bilateral Transall military transport since the economies of scale promised advantages for both sides. In 1960 the European national air traffic control bodies established Eurocontrol for transnational coordination. This initiative was outside the EEC but offered another example of the coordination within Western Europe (Eurocontrol, 2000). Airframe construction remained unaffected (Golich, 1992: 899-934). As early as 1961 other countries, among them the U.K. intended to join the 'Common Market'. Again the decision had no influence on the orientation of French and U.K. STPs but there was a change in procedures. By 1962 French and U.K. industrial and political stakeholders had understood that cooperation was the only way towards the technological leap of supersonic transport. For France this was another national ambition, for the U.K. the ideal strategy to prove its potential as an EEC member (Costello and Hughes, 1976: 76-78).

In the same year the EEC opened new perspectives to the members once they enabled it to negotiate on their behalf in the GATT Kennedy Round. This strengthened the position of the individual governments (Jouanneau, 1996: 37). The EEC began to promote economies of scale through supranational regulation as well (Teyssier and Baudier, 2000: 123). In 1963 the Commission issued a first recommendation on S+T

[128] www.asd-europe.org

cooperation to the member states. The idea was to consolidate Europe as a whole. In 1964 the Council of Ministers established the Medium-Term Economic Policy Committee (Guzzetti, 1995: 39). Supranational decisions became a common experience for policymakers in the member states when the European Court of Justice decided that European law overruled national law.

The origins of the Airbus programme can be traced to the years 1964 to 1967. National policies had undergone first shifts away from the traditional nationalist focus owing to the European integration. The anticipated mass transport (Allward, 1967) inspired manufacturers in France and the U.K.. Most of them were aware that their resources were too limited to launch any proposal (Mc Intyre, 1992: 10). The Concorde programme and the European integration showed the promises of synergies through cooperation.

In 1964 the French and U.K. government issued a joint requirement for a large aircraft (Endres, 1999: 7). The manufacturers from both countries looked into their earlier joint projects. Governments and manufacturers were inspired by the window of opportunity for the widebodies for the 1970s. Soon German suppliers and state stakeholders were associated (Quittard, 1979: 73). During the first half of the 1960s it became obvious to many European observers that the U.S. superiority was mainly the result of the country's economies of scale and ways to organize its S+T policies around state-sponsored research institutions (Mironesco, 1997). Other factors were the focus of most economic actors on market needs (Toffler, 1972) and the permanent STPs (Kracht, 1994: 17).

Decision-makers from various institutions saw resource pooling as a possible way to resist U.S. pressure. In 1965 the Medium-Term Economic Policy Committee of the European Commission set up the PREST group to explore joint S+T policies together with non members (Guzzetti, 1995: 39). In the same year European airlines issued a request for a large aircraft practicable only through transnational cooperation (Mc Intyre, 1992: 11). Governments and industrial stakeholders concluded that the future aircraft should extend the widebody offer as a whole and not compete against the U.S. models (Spaeth, 2005: 28). Outside the suggested punctual cooperation in aerospace the states remained competitors. Even the European integration process was affected. In 1965 France boycotted the EEC on the grounds of agricultural disputes. In the end President de Gaulle concluded that the advantages of the European integration outweighed the compromises on national sovereignty (Sidjanski, 1992: 102).

In late 1966 the manufacturers submitted the A300 concept (Endres, 1999: 9). Industrial and political partners agreed to establish a transnational consortium (Aris, 2002: 11). In the same year the EEC obtained an international personality when the European Commission signed the GATT Kennedy Round. No direct or causal relationship between the A300 ramp-up and the beginning of the era of the sovereign EEC can be determined. Nonetheless the fundamental change in attitudes towards transnational programmes in Europe is at the origin of both. States and other stakeholders were attracted by the idea of coordination among national S+T policies through transnational or supranational structures. Institutional innovations are at the origin of this (Stokes-Berry and Berry, 1999: 169-200). Governments and other institutional actors concerned by an issue adopted the strategy which had enabled another country or institution to overcome the challenge (Stokes-Berry, 1994: 322-330). Policy outputs were aligned on the successful model even if the way to implement them remained unchanged (Knoepfel, Larrue et al., 2001: 37-45). Coordination and integration

within Western Europe increasingly turned out to be the best solution. For this reason ‘Europe’ became the reference for a growing number of sectors (Courty and Devin, 2005: 38-42).

In strategic industries coordination remained punctual and based on the smallest common denominator. In 1967 the governments selected the industrial partners in a national perspective. In France this was the national champion Sud Aviation, in the U.K. Hawker Siddeley as a way to involve the aerospace industry as a whole in transnational projects, and in Germany a group of companies acting through Deutsche Airbus (Kirchner, 1998: 140-142). The governments agreed on funding as well. Following the pressure from London a U.K. engine was chosen although the airlines from France and Germany endorsed another solution (Sparaco, 2005a: 79). In late 1967 the new venture was initialized (Aris, 2002: 12). Each partner approached it in a national context. France promoted the Airbus as another opportunity for technological leadership and the U.K. as a new chance to underline the commitment to EEC membership and to maintain its industrial capacities (Endres, 1999: 10). For German stakeholders it enabled capacity building without upsetting the relationship with other European countries (Kirchner, 1998).

During 1967 the air transport system of the EEC members and other states which contributed to Eurocontrol moved from parallel national Air Traffic Control centres (ATCs) to a coordinated system (Eurocontrol, 2000). Motivations for economies of scale encouraged EEC experts to suggest European instead of national S+T policies. Since this affected strategic industries the national governments ignored the idea (Guzzetti, 1995: 74). At the same time strategies for technological parity with the U.S. were discussed. The French intellectual Jean-Jacques Servan-Schreiber encouraged European companies to reorganize themselves in the same way as the leading U.S. actors (Servan-Schreiber, 1969: 143-144). The stakeholders of the Airbus programme may have followed the discussion. Indeed the specialization of each national partner within a transnational structure enabled substantial economies of scale. This functionalist integration of European facilities was an elaborate answer to the American Challenge.

Between 1968 and 1970 the Airbus programme went through the most critical stage. In parallel the European institutions obtained their own resources. In both cases the consensus to consolidate what had been achieved so far drove both the aerospace and the political integration programme beyond the point of no return. In the case of the Airbus programme the common denominator was strong enough to encourage the political and industrial stakeholders to remain committed despite the rising cost and the uncertain outcomes. The decision-makers were aware of the risk to miss the window of opportunity and felt the need for evasive or corrective action (Wildavsky, 2000: 22-45). Since the failure of the Airbus programme would be a disaster for the national strategic industries, the governments approved the redesigned aircraft (Sparaco, 2005a: 90). They were aware that the termination of the programme would damage their reputation as well (Aris, 2002: 37). The joint programme of several European states was beginning to reshape the political landscape and was now taking a life of its own.

In July 1968 the EEC Customs Union was accomplished 17 months earlier than planned. This illustrated the capability of the member countries to define and implement common answers to shared challenges (Teyssier and Baudier, 2000: 123). Fundamental political, economic and strategic questions remained the jealously guarded domain of the national governments. France vetoed the accession of new EEC candidates, among

them the U.K., despite the cooperation in aerospace (Guzzetti, 1995: 40). Since the other members favoured the extension of the EEC it was forced to accept negotiations in 1969 (Sidjanski, 1992: 118).

In strategic issues the states remained the exclusive decision-makers. The Airbus programme illustrated that the way to assume them was evolving. The A300 could keep its promises only if it was realized as a multinational venture (Sparaco, 2005a: 91-96). When the U.K. withdrew and attempted to integrate Germany into its competing programme, the latter's governmental and industrial stakeholders refused. Germany transformed the looming crisis into a pro-active strategic move. Its stakeholders knew that France was unable to continue the programme with its own resources. Germany offered to take over the U.K. part. This enabled it to become the equivalent partner of France (Kirchner, 1998: 98). Its elites were forced to accept the German offer and to treat the former enemy as its equal. Both launched the A300 in 1969. Owing to the structure of its national aerospace industry even the U.K. government remained strongly involved (Endres, 1999: 11).

In 1970 the Treaty of Luxembourg opened direct funding of the European institutions through import levies and the VAT. The Customs Union and the own resources enabled the EEC institutions to emancipate themselves from the member states. In December the Airbus programme obtained the moral personality of a Groupement d'intérêt économique (GIE) (Lepeltier, Buttet et al., 1984). It could decide in its own right and was independent from the industrial partners (Hayward, 1987: 11-26). In late 1970 the Dutch Fokker company became associated (Endres, 1999: 12). By coincidence the European integration process and the transnational aerospace programme obtained institutional personalities and dedicated resources. They became able to act on their own within the national and international institutional and procedural system.

Between 1971 and 1978 the A300 transformed the world aerospace market. In parallel the European integration went through the decisive steps from a multilateral programme into a supranational system. The first act of the GIE Airbus in 1971 was the signature of a loan from the European Investment Bank (EIB) (Endres, 1999: 12). A European institution became involved from the beginning. Spain joined the team (Aris, 2002: 54). The first order came from Air France after another optimization of the aircraft (Muller, 1989: 83). Germany agreed since the update was consistent with the market (Aris, 2002: 63). At the roll-out ceremony in 1972 the French Minister of Aerospace confirmed the need for the European manufacturers to act as one. This was their only chance to resist U.S. competition (Endres, 1999: 23). He had probably followed the discussion on the American Challenge. Top stakeholders promoted transnational cooperation as the only long-term perspective for the national strategic industries (Muller, 1989: 84).

1972 was a key year for the European integration. The U.K. became a member of the EEC (Joyaux, 1993a: 317). The Ministers of Finance of the member states decided on monetary cooperation (Berthet and Bonnet, 1976: 79-80). The EEC began to shape the national economic policies (Rosamond, 1997: 443-474). The air transport system of Europe shifted from the national airspace-based approach towards economies of scale through a first transnational control centre (Eurocontrol, 2000: 2). The state bodies responsible for the certification of aircraft established the Joint Airworthiness Authorities (JAA) (JAA, 2005: 1). The approval of the A300 remained a national responsibility of the member countries since it had been initialized earlier (Muller, 1989: 84). In the same year the European Commissioner Altiero Spinelli launched the European Research and development Committee (CERD) (Guzzetti, 1995: 49). The EEC and some EFTA countries

set up the Committee on Scientific and Technological Cooperation (COST) (Braillard and Demant, 1991: 13). By now the European integration influenced the individual aerospace and S+T policies.

In 1974 several Council Resolutions launched further strategic initiatives. They included the top-down establishment of the European Science Foundation (ESF) through the EEC (Guzzetti, 1995: 52). The EEC also obtained the permanent observer status at the UN and became a distinct international entity. Through the rising influence in national policy-making the EEC grew into a framework and a supranational entity. The Airbus programme inspired the EEC stakeholders. In November 1974 Altiero Spinelli warned against the declining global market share of European manufacturers. Only a top-down European air transport policy would enable a turnaround (Hayward, 1986: 32). The appeal fell on deaf ears since each country remained committed to its purely national approach to aerospace (Sparaco, 2005a).

In 1975 the Europe+Thirty report confirmed the need for European public policies (Guzzetti, 1995: 95). The Commission exemplified it through the Action Programme for the European aeronautical sector. It suggested the management of Airbus Industrie through a Commission-led top-down policy (EEC, 1975: 11). Supranational interferences with defence-related industries were not endorsed by the Treaties of Rome. Several military aerospace cooperation agreements with U.S. companies created additional complications. The members maintained the national approach to strategic industries (Mc Guire, 1997: 13).

The recession of 1975/76 changed the attitudes. Germany convinced France that a lowered aircraft output rate would enable considerable savings in the interest of both countries (Muller, 1989: 42). If the strategic objective remained national the way to reach it now took external inputs into consideration. In the opinion of many the Export Standstill Agreement concluded by the Organization of Economic Cooperation and Development (OECD) in 1976 represented a major factor of the crisis (Mc Guire, 1997: 50-61). Airbus and the member states innovated in financial arrangements (Wells and Wensveen, 2004: 501-532). The U.S. government responded through the Airbus Waiver which was a STP in favour of its manufacturers (Mc Guire, 1997: 57). It did not prevent new successes of Airbus (Aris, 2002: 84). The governments did not react to the U.S. countermeasures (Marshall, 1999: 179-189) and failed to adopt the first EEC recommendations of 1977 (Council of the European Communities, 1977: 6) to coordinate their national STPs.

The rise of Airbus and the evolution of the European integration into a symbiotic relationship member states - EEC reshaped the worldview of European aerospace stakeholders. Transnational industrial cooperation became an option as the various approaches to a new narrowbody illustrated (Laming and Hewson, 2000: 13). By 1976 Aerospatiale and Dassault looked for a U.S. partner. The government approved since an additional risk sharer in a strategic industry successfully transformed through transnational cooperation while remaining under national control seemed practicable. France which had been promoting the narrowbody became also the first to suggest its integration into the Airbus programme (Aris, 2002: 122). The discussed parallel Joint European Transport (JET) consortium was eyed with suspicion by the GIE staff members who advocated its integration into the Airbus programme (Quittard, 1979: 79).

Pro-active market research by the GIE stakeholders showed that a shorter version of the A300 promised the highest commercial trade-offs and the lowest industrial cost of transfer owing to the Path Dependence. Following the pressure from Lufthansa the German side favoured an aircraft as advanced as possible even if this quadrupled the investment for the new A310, extended the time frame and amplified the risk of fore-

casting errors (Graf, 2002: 21-27). France continued to promote the narrowbody under the pressure from Air France (Muller, 1989: 113-114).

While the national governments were trying to find a consensus on the future programmes, the EEC began to acknowledge the importance of the venture for Europe. This became visible in the negotiations for a new framework for trade in airframes. While these were under way Airbus Industrie obtained a decisive victory in the U.S. in 1977 (Endres, 1999: 56). The government imposed an Airbus importation tax (Aris, 2002: 102). For many observers the U.S. admitted their incapacity to react to innovative moves (Marck, 1979). It was this strategic breakthrough that put Airbus on the world map (Marck, 1979: 283). For the economy of the EEC this was positive since many of the airframes were exported outside Europe.

In 1978 the European Monetary System (EMS) inaugurated transnational currency management (Teyssier and Baudier, 2000: 103). When the OECD Consensus Agreement was renegotiated the EEC participated in its own right for the first time and signed the Commonline Agreement. It was ratified by the member states (Mc Guire, 1997: 54). The ongoing shift of sovereignties from the national to the European level now extended to essential national policies and international negotiation.

By 1979 the U.K. became interested in a formal Airbus membership (Mc Intyre, 1992: 53-54). The other governments agreed since this lowered their contributions (Aris, 2002: 107-109). The request also proved that the Airbus programme was now seen as a favourable option by other aerospace powers. Since Boeing was competing for a U.K. partnership doubts about the U.K.'s loyalty remained. Owing to the promised synergies the JET project was integrated into the Airbus programme (Laming and Hewson, 2000: 16).

Between 1979 and 1987 Airbus Industrie and the European institutions became independent from the contributing governments. In 1979 the European integration accomplished another major step through the first direct election of the European Parliament (Masclet, 1993: 80-86). In the same year the EEC participated in the same way as any other state in the negotiations for the GATT Agreement on Trade in Civil Aircraft (Aircraft Agreement) (GATT, 1979a). Most European negotiators suspected that the U.S. expected to officialise the status quo of its aerospace policy. Instead, Washington was forced to withdraw the Airbus importation tax (Mc Guire, 1997: 78). France and the U.K. defended the launch aids as the only way to maintain their aerospace capacities. The industrial partners interacted with their national governments since they mistrusted the EEC institutions (Mc Guire, 1997: 72-83). In practice the Aircraft Agreement signed in 1979 had no effect since it included a clause of exception (Mc Guire, 1997: 82-84).

In 1980 five European carriers established the European Regions Airlines Association (ERAA) (ERAA, 2005). A Council Directive on cooperation in Air Accident Investigation was promulgated in the same year (80/1266/EEC, 1980: 32-33). Both events represent new bottom-up and top-down attempts for common responses to challenges in European air transport. Again the dates are more or less a coincidence but not the trend towards common solutions at European level.

After 1981 the French President François Mitterrand made the narrowbody now known as the A320 a centrepiece of national industrial policy. He felt entitled to promote 'his' programme after Germany had 'obtained' the A310 (Muller, 1989: 128-129). Since the need to replace the ageing U.S. narrowbodies promised a huge market the German political stakeholders approved the new programme extension (Mc Guire, 1997: 98).

In 1982 the European Strategic Programme for Research and Development in Information Technology (ESPRIT) and the Strategic Programme for the Transnational Promotion of Innovation and Technology Transfer (SPRINT) promoted EEC-wide cooperation among firms (Guzzetti, 1995: 77-87). A survey revealed that economic stakeholders began to see Europe and no longer just their own country as their production site (Vink, 2003: 63-74). The investments were positive for the European economy as a whole (Guzzetti, 1995: 79-80). The technology-intensive and market-driven A310 (Endres, 2000: 42) as well as the update of the A300, the A300-600, were almost symbolic examples for this upswing (Endres, 1999). In the same year the Commissioner Altiero Spinelli circulated a draft European constitution. Although the parallel events were not related they illustrated the growing influence of the European integration on worldviews.

In 1984 the Commission launched a new pro-active top-down initiative in favour of European S+T through the first scientific Framework Programme from 1984 to 1987 (Guzzetti, 1995: 84). Others focused on industrial technologies (Braillard and Demant, 1991: 14), among them composites for airframes (Guzzetti, 1995: 84). In the same year the disruptive A320 was launched (Sparaco, 1997: 10-18 286). The French government convinced the partners that their contributions to the narrowbody were in their own interest (Picq, 1990: 288-290). Everybody understood by now that the only way to implement national STPs was a transnational consensus (Picq, 1990: 291-295). Owing to the established Path Dependences the U.S. manufacturers updated their current narrowbodies (Shaw, 1999: 7). The A320 became the only new airframe with a higher overall efficiency (Mc Guire, 1997: 99).

1985 represents a crucial year for the European integration, the S+T policies and aerospace. In April the French President launched EUREKA for S+T cooperation (Braillard and Demant, 1991: 115). In the eyes of many the bottom-up EUREKA represented the decisive shift from a national to a European perspective in S+T (Cabral, 1999: 238-253). The Commission launched a top-down disruption of similar importance through the programme of the Single European Market (COM(85) 310 Final, 1985). It intended the more or less integral merger of the national economies (Peck, 1989: 277-299). EUREKA was a result of the push factors of U.S. and Japanese superiority in strategic technology (Braillard and Demant, 1991: 115), the Single European Market was driven by the promise to achieve economies of scale for the economic actors. Air transport and future aircraft design went through a major disruption in the same year. The competitor of the A310 was granted the Extended Twin Operation (ETOPS) privilege (Moser, 1986: 109-126). Since Pan Am relied on the A310 powered with U.S. engines the U.S. authorities had to extend the derogative to it as well.

1986 was another decisive year for the European integration and the Airbus Programme. The EEC admitted the Iberian peninsula (Teyssier and Baudier, 2000). The Single European Act (SEA) encouraged European STPs. Europe defined a geographical identity and differentiated itself from the rest of the world (Guzzetti, 1995: 153). In the same year Airbus Industrie put two widebodies on the agenda. The slightly different requirements from Air France and Lufthansa encouraged the GIE to study both of them (Aris, 2002: 142). The U.S. understood that the Aircraft Agreement had not prevented the rise of Airbus (Aris, 2002: 157). McDonnell-Douglas which had the MD-11 under development (Lawrence, 1999: 27-61) mobilized the U.S. government into a GATT Aircraft Agreement violation claims against all Airbus countries (Aris, 2002: 159). Again the two events are not directly related but illustrate the general trend towards the management of issues in the interest of many governments or actors by specialized institutions. Funding for the two upcoming widebodies was essential so that the European countries tried to finalize them before a possible confronta-

tion (Mc Guire, 1997: 121-123). Germany lost the competition for the final assembly site owing to the Path Dependence to Toulouse but obtained the final assembly of future narrowbodies (Aris, 2002: 146).

In early 1987 the U.S claimed that only the MD-11 was justified (Mc Guire, 1997: 122-124). Nonetheless McDonnell-Douglas failed to mobilize STPs. Although the U.S. State Department was concerned about the rising market share of Airbus it understood that retorsions might affect its other strategic interests. Washington was reluctant to risk an eventual destabilization of the NATO framework (Mc Guire, 1997: 129). The European Parliament rejected all U.S. claims. This was a strong endorsement of aerospace by the European institutions (European Parliament, 2000). Again the states ignored the idea of top-down coordination of STPs. There were even new tensions since the German government intervened for the first time in favour of its national partner (Aris, 2002: 172-173). The French and U.K. partner feared U.S. counter measures which might draw the whole programme into unwelcome transatlantic disputes.

In the same year the Second Framework Programme until 1991 grouped top-down initiatives (Guzzetti, 1995: 129-137). The European Airworthiness Authorities elaborated common standards for aircraft operations in all signatory states (JAA, 2005). Both represented new milestones in top-down and bottom-up initiatives towards the consolidation in a growing number of S+T and STP issues, such as aerospace.

Between 1988 and 1992 Airbus became the technological leader. The European integration transformed the common institutions into the main decision and policy-makers on an extended territory. The A320 was jointly certified by the Airbus countries and the Netherlands. Despite the European Airworthiness Authorities each country proceeded on its own but followed the same criteria (Sparaco, 2005a: 218).

Soon after the A320 entered into services the Airbus industrial partners discussed a reorganization of the programme to increase its efficiency. EUREKA (Braillard and Demant, 1991: 115) and the upcoming Single European Market had shifted the visions of many decision-makers away from a nationalist to a transnational or European approach as the best way towards positive S+T trade-offs (Rainelli, 2002: 40-41). Only core strategic industries remained the exclusive domain of the government since their outcomes and not necessarily their efficiency were determinant. Governmental attitudes remained mostly competitive instead of cooperative (Sparaco, 2005a: 228). The limited cohesion among the states was partially neutralized by a paradigmatic change in the U.S. which undermined the industrial long-term prospects. Boeing shifted its attitudes from long-term commitment to short-term profit maximization (Lawrence and Thornton, 2005: 92-95). In order to lower cost the existing designs were updated and no longer replaced. The only exception was the B777. Boeing suggested a new GATT Aircraft Agreement complaint to the government (Mc Guire, 1997: 140). In 1988 the French Senate claimed that the U.S. subsidized their industry through defence and NASA programmes (Fortier, Blin et al., 1988). Washington admitted the practice (Mc Guire, 1997: 147).

In May 1989 Airbus Industrie announced the A321 without launch aids. The governments participated only in the fundamental negotiations such as the new plant in Germany. Most stakeholders appreciated this extension as a token of trust from the former enemy (Sparaco, 2005a: 228). The country launched a first STP in favour of its industrial partner through compensations for the low Dollar (Mc Guire, 1997: 143). France and the U.K. condemned the direct intervention by a partner on the grounds that it might draw all of them into a dispute. This was another first (Mc Guire, 1997: 143).

The U.S. announced a GATT complaint (GATT, 1990). Three U.S. motivations can be found. A first was the lower performance of the MD-11 than expected. As a result it did not stand up to the A340 (Norris and Wagner, 2001b: 59). The second was the growing frustration over the rising Airbus Industrie market share; the impossibility to lower the political support for the programme in Europe a third (Sparaco, 2005a: 217). The political and economic integration of Europe had given formal roles to the common institutions, therefore the EEC assumed the lead from the beginning (Mc Guire, 1997: 146). From the beginning of the new dispute the European Commissioner of Trade defended Airbus (Aris, 2002: 158). The mostly favourable experiences with the integration encouraged the Airbus countries to adopt a common strategy. After consultations with the EEC the industrial partners announced that they could accept lower aids in case the U.S. capped their subsidies (Mc Guire, 1997: 160). In September 1990 the U.S. Gellman Report concluded that none of the Airbus programmes would have been possible without funding (Golaszewski, Berardino et al., 1990: 5-5).

By now the European integration affected everyday life. In 1990 the governments externalized another major prerogative, which was access to their territory to the EEC through the signature of the Schengen Agreement. The European Airworthiness Authorities were replaced with the Joint Aviation Authorities (JAA, 2005). Materials for aerospace played an important role in the Third Framework Programme running from 1990 to 1994 (Guzzetti, 1995: 139). It meant a new step towards convergence in general and in aerospace.

Outside the Airbus programme each country and industrial partner continued on its own. They studied smaller regional jets without much concertation among the various programmes (Sparaco, 1997: 10-18 230). The GIE stakeholders focused on the shorter smaller narrowbody (Sparaco, 2005a: 234). The U.S. airframers interpreted the lack of cohesion as a sign of weakness. Therefore they accepted concessions on indirect subsidies. In their opinion their superiority would remain unchallenged (Mc Guire, 1997: 148). In the midst of this dispute the roll-out of the A340-300 in 1991 was staged as a European event (Sparaco, 1997: 10-18 237). This could not hide the fact that Airbus Industrie still regularly failed to raise ‘Euro-nationalist’ attitudes (Guzzetti, 1995: 36). A working group within the Western European Union (WEU) suggested a new military transport outside the Airbus programme (Sparaco, 1997: 10-18). Even the European institutions did not launch STPs in favour of aerospace. When Aerospatiale and Alenia attempted to take over a Canadian competitor the Commission refused on the grounds of the dominant position (Case No. Iv/M053, 1991). Despite the absence of any institutional European commitment to Airbus Industrie, its stakeholders felt strong enough to challenge the U.S. claims that its manufacturers were free enterprises through the Arnold & Porter Report (Arnold & Porter, 1991).

While the ‘battle of the reports’ was in progress the protagonists concluded that an agreement might arrange both sides (Mc Guire, 1997: 151). During the negotiations the industrial stakeholders exchanged with their governments which in turn kept the EEC informed. The manufacturers remained sceptical about ‘Brussels’ (Mc Guire, 1997: 151). The German STP undermined the European position. During the same time a Council Regulation harmonized requirements and procedures in aviation (CR 3922/91, 1991: 4-8).

In February 1992 the Maastricht Treaty on the European Union officialised the de facto supranational status of the EU (EU, 1993). The EU became something between a federation and a federal state (Braillard, 1996: 21-25). Third countries and organizations began to experience it as an international actor in its own right (Rosamond, 2005: 463-478). Although the Maastricht Treaty and the ongoing negotiations were unrelated the institutional change inspired the national STP stakeholders. The industrial partners of Airbus Industrie

and through them the programme were now under the influence of the S+T bottom-up and top-down programmes targeted at them (Mc Guire, 1997: 152). Their attitude shifted from a multinational to a European venture focused on the world-market (Hansson, 1999: 191-198).

The Airbus Accord of 1992 limited the European launch aids and the indirect subsidies in the U.S. (Mc Guire, 1997: 155-156). It illustrated the European integration, consolidation and emancipation process (Mc Guire, 1997: 156). Since all actors in Europe experienced positive trade-offs, European integration in aerospace became 'promotable' in STP formulation. The EEC had established itself as an international actor able to respond to external challenges. Finally the Europeans had proven that they were able to enforce concessions from the U.S.. This strengthened their overall position (Mc Guire, 1997: 156).

While the national and international outcomes of the European integration became visible to all involved actors the two versions of the A340 were certified by all members of the Joint Aviation Authorities (JAA) (Norris and Wagner, 2001b: 71). This first approval through a European structure was not directly influenced by the Maastricht Treaty but nonetheless illustrated the permanent consolidation process (Sparaco, 2005a). The industrial actors continued to neglect the European perspective when they saw this as a more promising strategy. In 1992 the German partner discussed a joint very large aircraft with Boeing outside the Airbus programme (Norris and Wagner, 1999: 89).

Between 1993 and 1997 the civil airframe market shifted towards a duopoly. The European integration established some sort of transatlantic axis between Washington and Brussels. Airbus Industrie seemed again paralyzed when its partners discussed with Boeing on a large aircraft (Aris, 2002: 174). In June the smaller A319 narrowbody was initialized in Hamburg (Laming and Hewson, 2000: 28). In 1993 the European integration reached a new stage through the Single European Market (Courty and Devin, 2005: 35).

In 1994 the European Economic Area (EEA) and the European Monetary Institute reshaped the economy of the EU and other European countries. In 1994 the Airbus industrial partners agreed on the very large A3XX (Spaeth, 2005: 41). At the lower end of the capacity range the AE31X family was announced (Sparaco, 2005a: 253). No direct relationship between the events can be identified but Airbus could not have expanded without the inputs of the European S+T initiatives targeted at the national partners (Musquere, 2004). In the same year the European Parliament discussed the assistance of a U.S. intelligence agency to Boeing (Akdeniz and Gladman, 2000: 200). The Council issued a resolution in favour of the aerospace industry ((94/C 309)02, 1994: 2-3) but the governments continued to reject interference with their STPs from outside.

In 1995 new members consolidated the EU (Courty and Devin, 2005: 5). A Fourth Framework Programme ran from 1995 to 1998 (Guzzetti, 1995: 172). The A319 completed the portfolio but the B777 partially nullified the USPs of the A330/A340 (Norris and Wagner, 2001b: 64). The GIE stakeholders chose an indirect strategy and countered the B767 with the superior A330-200 without launch aids in April (Norris and Wagner, 2001b: 91-92). The B777-300 was attacked with the A340-600 and -500 (Norris and Wagner, 2001b: 111). In parallel the stakeholders discussed the possible new structure of Airbus Industrie (Sparaco, 2005a: 329).

In 1996 the EU took further steps towards a 'Europe of aerospace' (Horrocks, 2006). In March it adopted a White Paper on the reorganization of European air traffic control (COM(96) 57, 1996). Eurocontrol launched the implementation (Eurocontrol, 2006). In September the Commission concluded that a consolidation of the

European aerospace was the only way to resist the U.S. competition (COM(97) 466 Final, 1997). In November it suggested European STPs for defence-related industries (COM(97) 583 Final, 1997). The S+T initiatives were partially neutralized through the now widespread change in attitude from long-term commitment (Perrin, 1971: 7-11) to short-term profit maximization of many of the actors targeted by these programmes (Bank Julius Bär, 2003a: 2-8) following the paradigmatic change often defined as neoliberalism (Harvey, 2005: 31-32). In October 1996 the Treaty of Amsterdam accelerated the integration through a European citizenship.

During the same year Boeing concluded exclusive deals in the U.S. (Norris and Wagner, 1999: 127). In December it took over McDonnell-Douglas (Aris, 2002: 189). The U.S. Federal Trade Commission (FTC) approved both in summer 2007 (Sparaco, 2005a: 255). Many observers interpreted the move as reactive and defensive rather than offensive. Airbus Industrie had weakened both U.S. competitors so that the stronger absorbed the weaker to remain in business (Sparaco, 2005a: 330).

The industrial partners relaunched the discussion on reforms (Sparaco, 2005a: 330). Aerospatiale and the French government requested retaliation by the EU since in their opinion it was the only entity able to do so. BAE and the U.K. government promoted large-scale privatizations. To the general surprise the German DASA encouraged national and European responses. This decision was widely seen as the result of the relative weakness of the German partner compared to the others (Sparaco, 1997: 10-18).

The European Commission examined the merger (Harrison, 2003). Based on the Agreement on Transnational Mergers signed by Brussels and Washington in 1991 (OJ L 95, 1995: 47-52) it approved it in July 1997 but obliged Boeing to cancel the exclusive deals (97/816/EC, 1997: 16-47). While the investigation was under way Airbus Industrie set up a mixed company for the AE31X in 1997 together with Chinese partners (Sparaco, 2005a: 256). In parallel it studied its own shrink of the A319 (Hewson, 2002: 41-44).

The Boeing-McDonnell-Douglas merger represented a turning point for global aerospace (Bieler, 1999: 113-122), Airbus Industrie, transatlantic relations and the European integration. The move which established a duopoly in the aircraft market over 100 seats was examined in a bilateral perspective by Washington and Brussels. The EU spoke in the name of all countries (Aris, 2002: 193). In the eyes of the European Commission Airbus Industrie had become a common or ‘European’ issue. Therefore it was defended against extra-European pressure (Putnam, 1993: 431-468). Everybody agreed that reforms were necessary. Bottom-up initiatives outside the Airbus programme such as the European Integrated Aeronautic Programme (EIAP) by the European Association of Aerospace Industries (AECMA) (Allgeier, 1998) encouraged a more active involvement of the EU.

After the merger Boeing ran into the worst crisis of its history. One reason was the neglected strategic vision for almost a decade (Aris, 2002: 193). Boeing was unable to exploit its strong position. Most Airbus-involved decision-makers were aware by now that reforms were urgent (Sparaco, 2005a: 331). In September 1997 the Franco-German Summit put the reorganization on the agenda. The EU was invited to accelerate the pending European company statute (Sparaco, 2005a: 331). The Commission suggested again a European aerospace policy based on transnational integration (COM(97) 466 Final, 1997). In November a European strategy on defence-related industries, among them aerospace, followed (COM(97) 583 Final, 1997).

Between 1998 and 2003 Airbus Industrie was reorganized. During the same year all S+T policies became more or less a European affair. The major Airbus Industrie events were the privatization, the launch of the A3XX and the diversification into military aviation. In Europe new transfers of sovereignty from the states to the common institutions in economic and foreign policy transformed most state polices.

In May 1998 the JAA and the U.S. FAA jointly certified the A330-200. This transatlantic cooperation was another first and illustrated the integration of air transport (Norris and Wagner, 2001b: 99) and globalization (Held and Mc Grew, 2000: 1-45). The European integration went through new steps with the European Central Bank (ECB) in June and the Fifth Framework Progamme until 2002 (European Commission, 1999). Aerospace remained a priority (European Commission, 1999).

In summer 1998 the industrial partners and the GIE stakeholders cancelled the Euro-Chinese AE31X in favour of the A318 based on the A319 (Sparaco, 2005a: 257). The manufacturers exchanged on reforms but could not agree on the details (Aris, 2002: 201). Following the worldwide trend towards privatizations (Clarke and Pitelis, 1994) Aerospatiale was sold to the French Largadère Group in 1998 (Aris, 2002: 200). French stakeholders warned against any agreement between BAE and DASA without their consent. In September 1998 the Airbus ministers reconfirmed the need for reforms (Aris, 2002: 203). France intended to maintain its dominant role; the U.K. promoted a more flexible structure. The German authorities remained in the background. DASA criticised the French to approach Airbus in a purely nationalist perspective (Sparaco, 2005a: 205). While they were preparing the reorganization the reorganization the four partners established Airbus Military as a subsidiary to the GIE in February 1999 (Knappe, Palomino et al., 2006: 250).

In the same month Franco-German talks on a merger Aerospatiale-DASA opened (Aris, 2002: 203-206). In France the government was the driving force, in Germany the new DASA parent DaimlerChrysler. In April 1999 the A318 was launched (Sparaco, 2005a: 258). By October the civil and military European Aeronautic Defence and Space Company (EADS) based on the merger of Aerospatiale and DASA was constituted (Knappe, Palomino et al., 2006: 252). EADS was promoted as the European and not the Franco-German answer to Boeing (Aris, 2002: 207). By now the visible trade-offs of the European integration had influenced the attitudes of the decision-makers. Among the beneficiaries of the bottom-up and top-down S+T initiatives were the national partners of the Airbus programme. Airbus Industrie had been assisted through the EU notably during the transatlantic negotiations. As a whole the Airbus programme was no longer seen as a multinational but a European programme. BAE was formally invited to join at this stage only and refused. The main stakeholders were Largadère and DaimlerChrysler. The structure was based on two equivalent units in France and Germany (Aris, 2002: 207). Although it was formally independent EADS remained mostly a political affair and the complex structure was widely criticised. National ambitions remained the main driver.

EADS took 80 percent of the new Airbus Integrated Company and BAE 20 percent. EADS was obliged to take over the stake at any time after 2003 in case BAE wanted to sell it (Aris, 2002: 212). The merger was encouraged by push and pull factors. The former were the ongoing U.S. STPs and the pressure on cost (Harvey, 2005). The latter were drawn from the now proven idea of transborder cooperation within Europe (Schwarz, 2005: 17) and the static and dynamic gains (Sparaco, 2005a: 206). The reorganization was the outcome of a bottom-up initiative of national industrial and political stakeholders.

Still under the old Airbus system the A3XX was launched in December 1999 (Spaeth, 2005: 58-59). In March 2000 the states allocated launch aids below the allowed overall amount to the A3XX. Boeing and the U.S. government claimed a violation of the Airbus Accord (Aris, 2002: 211). In September 2000 the Commission approved the restructuring programme into EADS (Knappe, Palomino et al., 2006: 256). Political influence in EADS remained strong. As a result the integration of the A3XX now marketed as the A380 was split between Toulouse and Hamburg (Spaeth, 2005: 58-59).

In January 2001 aerospace actors invited by the European Commissioner for Research published the "Vision of 2020" (European Commission, 2001). It claimed that Europe had the potential to become the world leader in aerospace if all actors maintained a long-term vision (Stockhammer, 2004). A parallel bottom-up initiative was the Advisory Council for Aeronautics Research in Europe (ACARE)[129] established by aerospace actors in 2001 (ACARE, 2005). In February the European integration continued with the Treaty of Nice on a European constitution (EU, 2001). The new A340-600 in April 2001 consolidated Airbus and thus the Europe of aerospace (Norris and Wagner, 2001b: 133). In October a European company statute became available (CR (EC) No 2157/2001, 2001: 1-21). All three events were not directly related but their coincidence illustrated that most sectors were by now concerned by the integration (AECMA, 2002b).

The 11th September 2001 had a fatal effect on Boeing but a limited impact on Airbus. EADS and its subsidiary interrupted pro-active R+D as a way to save cost (Aris, 2002: 219). Neither the governments of the Airbus countries nor the European institutions did criticise EADS for this. In the same way the old Boeing had done the new Airbus jeopardized its future (Casamayou, 2002: 11). After Nine Eleven a Common European Security and Defence Policy (ESDP) was brought up (Teyssier and Baudier, 2000: 89). This reaction affected strategic industries and the Airbus Military Programme. In December the A400M was launched (Bombeau and Gaudin, 2001: 50-53).

In January 2002 the Euro opened a new stage in the continental integration (Deutsche Bundesbank, 2006). The maiden flight of the A318 took place in the same month (Hewson, 2002: 41-44). Soon the A340-500 followed (Knappe, Palomino et al., 2006: 266). The sixth Framework Programme from 2002 to 2006 covered aerospace (European Commission, 2002). Some experts worried against a new technology gap in favour of China (NZZ, 2005). The warnings in the 1960 had been against eroding production capacities since they lacked the economies of scale, those at the turn of the century against short-sighted technology transfers to a future rival (Deckstein, Dettmer et al., 2006: 70-73). The long-term loss of competitive resources was mostly interpreted as another outcome of short-term attitudes (Morris, 2005: 10). In July 2002 the European Parliament and the Council established the European Aviation Safety Agency (EASA) (Regulation (EC) No 1592/2002, 2002: 1-21). It Europeanized air safety (EASA, 2004). In 2003 the EU and the NATO signed a security pact. Foreign policy and defence, which represented two core attributes of the sovereign state, were partially transferred to the EU. This new move transformed it into a partially supranational entity.

In spring 2003 Boeing announced the disruptive B7E7 (Thomas and Forbes-Smith, 2003: 216-218). Airbus denied any risk for its portfolio (Cochennec, 2004: 18-23). When a new window of opportunity for a tanker in the U.S. opened, EADS and a U.S. partner announced their interest (Sparaco, 2005a: 271). In September a

[129] www.acare4europe.org.

Commission Regulation laid down the rules for aircraft certification (CR 1702/2003, 2003: 6-79). Aerospace and air transport went through a further integration.

After a promising start in 2004 Airbus went through the worst crisis of its history until 2006. In parallel the European integration peaked and began to show signs of stagnation. In 2004 ten new members joined the EU. In October the Constitution for Europe was signed (European Parliament, 2004). A new Airbus success was the selection of its tanker by the U.K. (Bombeau, 2004: 24-26).

In the same year Airbus created the first negative surprise in its history when it hesitated to respond to the B7E7. By December it initialized the A330-200-based A350. For the first time Airbus did not chose the maximal disruption but a minimal evolution (Cochennec, 2004: 14-16). In the eyes of most specialists the lethargy was the result of the technological complexities and budget overflows of the A380 and the R+D freeze (Kingsley-Jones, 2005). The U.S. renewed the claim to the WTO for an Airbus Accord violation through illegal launch aids in January 2005. In its counter-claim the EU pointed towards the indirect subsidies. From the beginning the EU defended Airbus. Both sides hesitated to draw each other into an open dispute. Both were involved in Iraq and hoped to keep tensions to a minimum (Pope, 2005). Washington and Boeing orchestrated a counter-offensive based on a new version of the B777 for extended ETOPS (Thomas and Forbes-Smith, 2005: 9-19) and the launch of the B7E7 as the B787 (Cochennec, 2005: 20-24).

The roll-out of the A380 in February 2005 showcased another change in attitudes. The heads of state of the Airbus countries hailed the event as a milestone for European integration and not the result of a transnational cooperation (Ballantyne, 2005: 5). Airbus was now approached as a shared governmental bottom-up initiative and no longer a series of national units operating in parallel (Rein and Schoen, 1998: 145-166). The main push factors behind this change were the resource intensive A380 programme and the U.S. STPs. Among the pull factors the positive trade-offs of the many consolidating European bottom-up and top-down initiatives and their favourable impacts on aerospace can be quoted.

Technological and financial problems overshadowed the event and affected the reputation of Airbus (Thomas and Forbes-Smith, 2005: 10-21). In April 2005 Boeing warned that the Airbus Agreement might be outlived. The EU replied that the B787 was the most subsidized aircraft in history (Warwick and Turner, 2007: 98-99). In this delicate situation the U.S. warned to bring the launch aids to the WTO in May 2005. In June both sides agreed to halt the dispute (Portman and Mandelson, 2005). Soon afterwards both EADS CEOs were replaced. For many this hinted new problems to come (Beauclair, 2005: 10-11).

Despite several updates (Cochennec, 2005: 16-18) the A350 failed to win substantial orders with the exception of a large but vague commitment at the Paris Air Show of 2005 (Martin, 2005: 1). In October the aircraft was launched with final assembly in Toulouse (EADS, 2005). Airbus and EADS declined any need for state aids (Cochennec, 2005: 16-18). France announced to assume a part of the budget in any case. The U.S. renewed the threat to withdraw from the 1992 Airbus Agreement (Airwise News, 2005c).

At this moment the European integration experienced a disruption. France and the Netherlands rejected the European Constitution in referendums. Again there was no direct relationship between the stagnation of Airbus and the political setback. Both have nonetheless the same origins or roots (Robitaille, 2004). There were the negative impacts of short-term thinking, notably perceived as an uncertain personal future, on large

parts of the population (Stockhammer, 2004). By now the EU was often associated with globalization which was widely seen as the motivator of short-term thinking (Heisenberg, 2004). Parts of the elites more or less openly adhered to this changed worldview (Harvey, 2005). The Constitution had been promoted as the decisive step towards European integration and the referendum was seen as a chance to reverse the fatal trend (Evans, 2004: 47-50). As far as Airbus was concerned observers concluded that it had been the victim of its short-sighted expenditure cutting in a critical phase.

In December 2005 Airbus signed an agreement for a production line in China (Casamayou and Cochennec, 2005: 10-12). Most experts did not interpret this as a strategic diversification but a short-sighted technology transfer to a competitor (Dahlkamp, Rosenbach et al., 2007: 19-34). In parallel the Commission initialized the project for the Single European Sky based on the merger of national airspaces (Eurocontrol, 2006). European air transport was now reorganized in a perspective of continental cooperation and no longer national coexistence. The sovereignty over the airspace was actually handed over to Europe.

While new problems with the A380 became public and sales of the A350 remained limited Boeing countered with the B747-8 in late 2005. The cargo version soon set the standard in its category (Doyle, 2005: 26-27). Soon after the announcement of the best results ever for EADS (Rising, 2006) a series of blows destabilized Airbus and its parent company. A first shock was the divestment of the main shareholders Largadère and DaimlerChrysler (EADS, 2006b). Next followed the announcement of BAE to sell its Airbus stake (EADS, 2006c). In June 2006 new delays for the A380 were announced (Airwise News, 2006u).

French and German ministers urged EADS to solve the problems. Each government claimed that the sites in the other country were responsible for the delays which jeopardized the own production facilities (Airwise News, 2006o). Both warned against tilts in favour of the other within EADS. France and Germany claimed that national interests were at stake (Airwise News, 2006k). Although the neighbour formally remained a partner it was by now seen as a potential hazard for the strategic industries in both countries. The commitment to Europe declined. The most ambitious step had after all failed to convince the population in two countries (Miquet-Marty, 2006). The EADS crisis had structural and immediate factors. Among the former were the political compromises during the reorganization into the new company, the R+D freeze after 2001 and the unexpected complexity of the A380. Among the latter the divestments in EADS and Airbus interpreted by many as other typical short-term foci can be enumerated. Both EADS CEOs were replaced in 2006. The nomination of their successors respected the delicate equilibrium (Airwise News, 2006h).

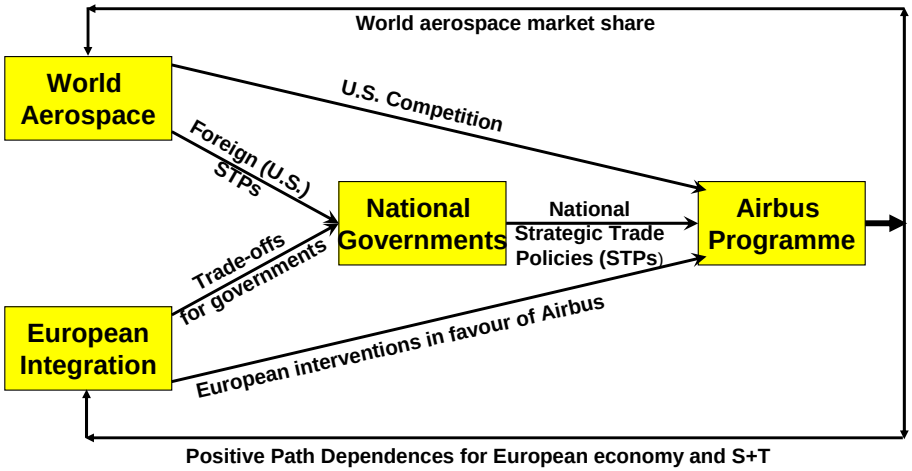
In July 2006 Airbus presented the revamped A350XWB at the Farnborough Air Show (Airbus S.A.S., 2006). The aircraft was superior to the earlier version but its budget was twice as high. Airbus promoted the A350XWB as an elaborate reply to the B787 and the successor to the B777. There was no doubt that the greatest challenges for Airbus still lay ahead (Airwise News, 2006c). The European integration process stagnated since the stakeholders were discouraged from new moves after the failure of the European constitution. Existing initiatives were continued since their positive outcomes were not questioned.

4.3. The Influence Of European Integration On Airbus Programme

The above analysis outlines the technological and political approaches to the Airbus programme and correlates them with the European integration. The following section focuses on the relationship between the Airbus programme and the European integration and evaluates the motivations of the stakeholders. Have they been driven by the world aerospace market or the process of the European integration?

As outlined in the Lecture Grid Airbus is the outcome of governmental and industrial decisions motivated by Situative Optimization. They have been shaped by the national strategic visions and the world aerospace market. In parallel the states have enabled and consolidated the European integration (Zahariadis, 1999: 73-93). The outcomes of both processes have influenced the governments, the world aerospace market and the European integration (Easton, 1965: 103-117). Figure Seven recalls the interaction in a simplified form.

Figure 7 - Situative Optimization Simplified Lecture Grid



Source: Author based on (King, Keohane et al., 1994, 49-53), (Easton, 1965: 103-117), (Zahariadis, 1999: 73-93).

The Airbus programme and the European integration have gone through various stages. Each of them is the outcome of national STPs and European initiatives. Comparisons of parallel evolutions are only possible if they share at least one element (Przeworski and Teune, 1970: 43-46). Usually this is the chronology since sequences take place within given time frames (Bartolini, 1993: 131-167). Both also share the same background or 'structure'. It determines the individual decisions which shape the events or 'processes' (Gaddis, 2002: 35-52). The background consists of the omnipresent and permanent drive for innovation and optimization as a result of the competition for scarce resources. The processes are the direct contexts in which the state and aerospace actors decide. A first is airframe construction which depends on the world aerospace market (Golich, 1992: 899-934), itself influenced by the international air transport regime (Golich, 1989) and further factors such as the world economy or geopolitics (Hobsbawn, 2002: 9-22). The usual decisional pattern for the aerospace actors is voluntary and involuntary innovation, for the states pro- or reactive STPs.

A second is the political environment in which the states and aerospace actors operate and try to optimize the overall situation. European integration has been chosen as the most promising strategy of optimization in a given context. Later it was consolidated since first outcomes were positive (Easton, 1965: 113-117). The transformations within Europe have affected the world aerospace market (Hansson, 1999: 191-198) and air

transport as well. The cumulated outcomes of the actions taken by the airframers, the state actors and the European institutions have shaped the minds of the stakeholders. Accordingly they have changed their opinions (Inglehart, 1993) so that, over time, their attitudes have evolved (Peffley and Hurwitz, 1993: 61-90).

This shift can again be summarized through a theory. The relationship context – attitudes is known as 'framing' (Snow, 2004: 380-412). Since outcomes of the European integration have often exceeded the expectations of the actors, they have extended this practice of convergence to a growing number of domains (Nelson and Oxley, 1999: 1040-1067). This 'Europeanization' (Vink, 2003: 63-74) can be understood as an optimization process. Over time the practice generalized (Nelson, Oxley et al., 1997: 221-246). The bottom-up and top-down initiatives focused first on domains with limited strategic implications for the governments but considerable economies of scale such as fundamental research (Guzzetti, 1995: 8-10). Later initiatives in more sensitive sectors such as air traffic control and IT followed. The mostly positive outcomes of the European integration and the competitive pressure on manufacturers (Muller, 1989: 245-248) made the integration of the airframe industry within the European framework the best possible option. Over time the European institutions became able to promote top-down industrial and aerospace policies since the member states adhered to their proposals owing to their above-mentioned positive experiences. When the EEC or later EU stakeholders experienced that the outcomes were mostly positive they framed their own attitudes accordingly and promoted European technology, air transport or aerospace (Smith, 1995: 103-124)[130].

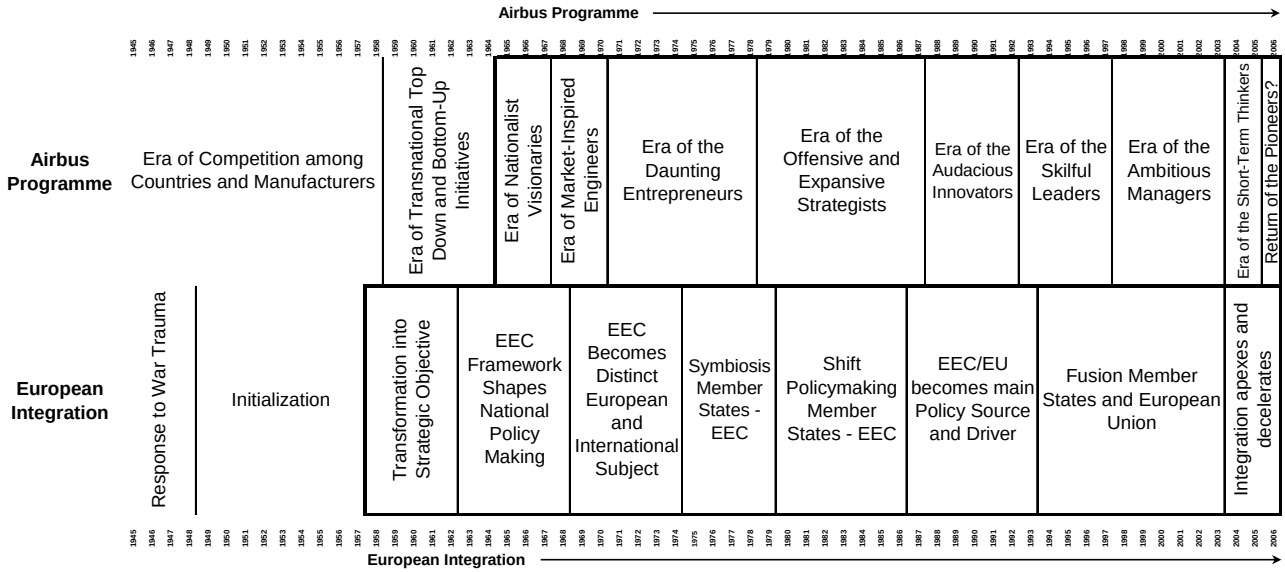
As outlined in the section on the European integration the process has roughly gone through ten stages. Each of them can be interpreted as a reframing by the decision-makers and other concerned actors which in turn influenced public opinion (Gabel, 1998: 333-354). They are the response to the war trauma until 1949, the initialization by 1957, the consolidation of punctual cooperation into an integral strategic objective until 1962, the development of the EEC framework into a parameter for governmental policy-making by 1968, the emancipation of the European institutions as a subject in international relations until 1974, the symbiosis member states - EEC by 1979, the shift of policy making capacity from the members to the EEC by 1986, the emergence of 'Europe' as the main policy driver by 1993 and the de facto fusion of the member states into a single policy and economic area until 2005. After the rejection of the European constitution the commitment to the European integration stagnated by 2006.

The history of Airbus can be divided into eleven stages. A first was the 'prehistory' without cooperation until 1958 (Kracht, 1994: 7). First transnational initiatives set the stage until 1963. They encouraged the nationalist visionaries until 1967. The market-inspired engineers transformed their ideas into a practicable programme by 1970. The daunting entrepreneurs reshaped the world market until 1978. Afterwards the offen-

[130] The concept of framing originated in the research on bottom-up mobilization through social movements defending a cause. Whenever they succeed their causes become a part of the general worldview and attitudes. Classical examples are ecological issues, gender equality or affirmative action (Snow and Benford, 1988: 197-217). The concept has been explicitly and implicitly used in research on the European integration. An explicit example is the mobilization in favour of the integration by political parties and movements (Pridham and Pridham, 1981), an implicit the discourse on the common identity (Le Goff, 1994) as a driver for the integration. Public policies which originate as top-down initiatives whatever their authoring geographical entity, stimulate a similar consensus first among the policymakers themselves (Muller and Surel, 1998) and later - provided that their outcomes are consistent with the expectations - of the target and the general public (Turner, 1997: 409-439). Famous examples are the welfare state, unemployment policies and infrastructure. This shared vision has been defined as the 'référentiel' ('policy perspective') (Muller, 1989: 10-12). The theoretical backgrounds of framing processes and policy perspectives are very different from each other but their impact on promoters, target publics and the public opinion are very close to each other. Since the INA endorses the combination or the parallel use of different models (Bennett and George, 2001: 137-166) and since framing processes and policy perspectives are very close to each others as far as the results needed for the analysis are concerned only the term of framing will be used in the research.

sive and expansive strategists enabled Airbus Industrie to diversify by 1987. The Airbus aircraft family which resulted from their endeavour was elaborated by the audacious innovators until 1992. By 1997 the skilful leaders maximized the technological leadership of Airbus Industrie. The ambitious managers resisted the pressure from the sole remaining competitor and reorganized the programme until 2003. Once it was privatized the new Airbus was not immune against the change from sustainable long-term benefit to short-term profit thinking. Since the outcomes were negative owing to the technological challenges of the two main programmes and the situation on the world market new leaders were appointed in 2006. They initiated a turnaround during the year. Figure Eight correlates the two processes within their timeframes.

Figure 8 - Chronologies Of European Integration And Airbus Programme



Source: Author based on (Bartolini, 1993: 131-167), (Przeworski and Teune, 1970: 43-46).

Prior to 1939 airframe construction was a purely national affair although the air transport regime which governed demand became transnational (Dollfus, 1938). There were ideas on European integration to prevent a new war (Saint-Ouen, 1997: 25-30). No connection between airframes and European integration can be noted although there were some attempts for technical coordination (L'Escaille, 1925: 225-233).

After the Second World War life had to go on. As it is common in disaster relief, first measures were reactive and targeted basic needs such as housing (Jensen, 2000: 14-15). Soon pro-active programmes became possible again (Fink, 2000). Relaunches of the airframe industry were one of them. Mostly under U.S. influence the affected countries began to bundle their forces in 1948 and initialized the second step. It was the idea to collaborate across the borders. Rather soon they experienced that transnational cooperation was promising. Intellectuals associated the positive outcomes with the latent European identity based on the common history of the continent (Saint-Ouen, 1989: 129-141). Visible economies of scale accelerated the institutional innovation process and inspired other stakeholders. Several punctual and unrelated initiatives were initialized. The most important was the European Coal and Steel Community (ECSC) of 1951. It established the idea of continental economies of scale in two leading albeit not strategic industries. The latter remained under national control. In aerospace, the governmental and industrial stakeholders had mostly the

home market in mind (Wall, 1999: 32-44). Owing to the lack of economies of scale in Europe and U.S. STPs the manufacturers from overseas occupied the market. In air transport technical and operational challenges were identical worldwide. Mostly for this reason a suggested specific European air transport regime was rejected in 1955 in favour of adaptations within the existing international framework to the situation in Europe. All processes enabled capacity building of the involved institutions and established the experience of transnational cooperation. The ideological pressure during the Cold War motivated the political cooperation in Western Europe as well (Osterud, 1992: 12-23).

In 1957 the European Economic Communities (EEC) inaugurated the third stage of the continental reconfiguration. European integration became a strategic objective for the states. The new institutions were designed to assume coordination and their architecture made future adaptations easy (Deniau, 1959: 91-100). A procedural framework within a specific geographical area was established. National stakeholders were encouraged into common programmes (Abbott and Snidal, 1998: 3-32). This and earlier successful bottom-up initiatives such as the CERN established transeuropean large-scale project management in the minds of policymakers. Owing to their special relationship after the war France and Germany (Rovan, 1989: 92-104) emerged as the main driving forces behind the new institutions (Courty and Devin, 2005: 20-22). A bilateral treaty for the resource-intensive Transall military transport in 1959 offered advantages to both sides (Kirchner, 1998: 18-19). The looming technological leap of supersonic travel needing far higher investments encouraged the cooperation of France and the U.K.. The motivations of both governments were different but both shared the same strategic objective and signed a state treaty in 1962 (Costello and Hughes, 1976). This was one example of the growing practice of large-scale programmes within Western Europe (Guzzetti, 1995: 22-23). The mostly positive outcomes of the various initiatives encouraged more and more actors to optimize issue handling through cooperation at a continental scale. One example was the national air traffic control bodies of the EEC and other European countries in 1962.

After 1962 the European framework became one of the parameters in national and international policymaking. During this fourth stage the EEC grew into an international organization with supranational prerogatives (Sarooshi, 2003). Its stakeholders learned to elaborate and target their proposals for top-down S+T initiatives. The European institutions became independent from the states. The Concorde and parallel top-down and bottom-up initiatives influenced the attitudes of air transport and aerospace actors. During these years first rumours on a new category of aircraft called widebodies circulated (Lagarde and Webb, 1967: 47-54). The larger market share of the U.S. competitors, the threat to the European suppliers of being marginalized and the promising business case of a widebody encouraged discussions on pro-active strategies.

In 1964 the French and U.K. government issued a joint requirement for a widebody aircraft for their national airlines. This first stage of the attempt which would later become the Airbus programme was intended by the nationalist visionaries. In 1965 European airlines confirmed the need for a widebody. This bottom-up initiative consolidated the top-down strategy of the states. In 1966 the governments of France, the U.K. and Germany decided to launch a joint widebody in response to the request. Each country approached it within its national aerospace policies. The new aircraft was a common denominator which promised the highest trade-off. Issue-centred approaches of this kind began to be practiced in bottom-up and to-down initiatives (Meynaud and Sidjanski, 1971). Outside these punctual collaborations the states and other actors remained

competitors. France even interrupted its work within the supposedly consensual EEC and provoked a crisis in 1966. The European framework proved robust enough to resist.

By coincidence the year 1966 witnessed the signature of the GATT Kennedy Round final act in the name of its members as well. The European institutions emancipated themselves from the member states. By the mid-1960s the integration reshaped the political and intellectual landscape of Western Europe. Whenever the economies of scale seemed to justify this, governments or other institutions would attempt transnational coordination within the EEC or Western Europe as a whole. The worldviews of the individuals mostly did not change but the way they defended their interests based thereon. Cooperation within the existing European institutional and procedural framework and no longer individual attempts became the norm.

In the competitive airframe market a joint venture was seen as the only way to remain in business owing to the present and looming future U.S. competition. The European integration offered a political, economic and intellectual framework to the stakeholders (Kracht, 1994). In addition the majority of the elites in their home states had adopted the idea of continental convergence for economic reasons. It offered them possibilities to influence the process in their favour (Denis and Kanapa, 1969: 45-64).

In this context the formal launch in 1967 of a trinational large-scale venture based on a consensus and encouraged by earlier experiences seemed an obvious choice. In the opinion of many the very idea behind the programme would not have been imaginable a few years earlier. The stakeholders could simply not have imagined such a decision (Kracht, 1994). Each government saw the economies of scale as the best possible way to promote its own interests in aerospace. In a similar way the idea of transnational cooperation in aviation encouraged the joint management of the national airspaces within the existing Eurocontrol structure (Eurocontrol, 2000). The Airbus industrial partners appointed by the governments delegated the programme leadership to a steering group and executed the parts allocated to them by the governments. Their day-to-day operations remained unchanged (Ansbach, 1997). Other working groups within the ministries had to coordinate the three national approaches to aerospace STPs (Hayward, 1987: 11-26).

In 1968 a move never heard of before in a multinational state-led programme inaugurated the era of the market-inspired engineers. As a way to make the aircraft more market consistent and to make it compatible with the U.S. widebodies a group recruited from the industrial partners without the latter's knowledge by the programme directors redesigned the A300. Almost from the beginning the leadership emancipated itself from both the industrial partners and the governments. The surprised manufacturers and the French and German governments accepted the update. The U.K. rejected the proposal since it was seen as a competitor to an own national programme. The industrial partner remained committed.

By coincidence the European integration process entered its own fifth stage in 1968. The EEC became an international actor in its own right. The customs union with considerable impacts on the economic life in the member states was accomplished 17 months earlier than planned. This confirmed the capacity of their governments to find consensus-based responses to common challenges (Badie, 2004: 97-102). This was the only way to resist the competitive pressure from the U.S.. In his provocative 'American Challenge' Jean-Jacques Servan-Schreiber encouraged the European S+T-intensive industries and institutions to overcome national fragmentation in favour of economies of scale (Servan-Schreiber, 1969).

After its formal launch in 1969 by France and Germany the Airbus programme mirrored this approach. Since the U.K. had bailed out, Germany assumed its financial commitments and saved the initiative. This illustrated the motivation of the Germans to continue in the interest of their industry and their loyalty to France. Behind these admitted goals there was the ambition to consolidate the own position against France (Kirchner, 1998: 63). In 1970 the continental integration took a new step through dedicated funding for the European institutions. There is no relationship between the Airbus programme and this reorganization endorsed by the EEC members. Both events nonetheless mirrored the trend towards external institutions acting in the common interest. Everywhere the European integration justified by economies of scale was now seen as essential for the common future (Jaumont, Lenegre et al., 1973: 145-150). Since the initiatives were taking place in Western Europe, they were 'European' (Masclet, 1993: 7-8). More and more actors changed their attitudes. In other words, it was mostly the ongoing convergence which inspired the sometimes quoted Euro-nationalism (Guzzetti, 1995: 36). The Airbus programme was also organized around a central structure to which the contributors overwrote punctual responsibilities. Its architecture as a Groupement d'intérêt économique (GIE) enabled the integration of other partners (Lepeltier, Buttet et al., 1984). The overall programme management was very complex. A consensus had to be reached despite the often divergent industrial and political interests (Hayward, 1987: 11-26). The specialized central institution on the other hand assumed day-to-day routines and simplified the management process of the programme.

In the case of the EEC and the Airbus programme the operation (but not the strategic planning which remained under the auspices of the individual governments) was entrusted to common entities able to act on their own. The only way to obtain the expected results was to enable them to optimize the outputs (Haas, 1992: 1-35). The stakeholders from within were interested in positive outcomes for all participating states since this strengthened their own role (Adler and Haas, 1992: 367-390). This applied to the EEC in general and the Airbus programme in particular.

When the daunting entrepreneurs opened the third stage of the Airbus programme in 1971 their cooperation with the European institutions was almost immediate. Airbus Industrie secured a loan from the European Investment Bank (EIB). From the beginning the stakeholders based their strategic planning on the European institutions. During the roll-out ceremony in 1972 the French Minister of Aerospace outlined the need for a European approach to airframes. By coincidence the same year witnessed a major stage for the integration process. The EEC was enlarged and the Ministers of Finance agreed on a common scheme for their currencies. Air traffic control moved from coordination to integration through a common centre. A first step towards integration in airframe construction was observed when the EEC and other signatory states federated their national aircraft certification bodies under the Joint Airworthiness Authorities (JAA). It had no influence on the A300 approval carried out by each country on its own. Finally the EEC alone and the EEC together with other countries established structures for the coordination of S+T activities (Braillard and Demant, 1991: 13).

Another landmark year for the Airbus programme and the European integration was 1974. The A300 entered service. Through its observer status at the UN the EEC obtained a distinct international personality. This symbolic accomplishment opened the sixth stage of the European integration process. The member states

and the EEC more or less merged into a coupled system (Zahariadis, 2003: 285-310)[131]. At the beginning there were several far-reaching S+T top-down initiatives (Guzzetti, 1995: 52). An eminent Commissioner warned against the stagnation of the European airframe industry despite the Airbus programme. In his opinion a top-down European policy would allow to reverse the trend (Hayward, 1986: 32). Since the Airbus programme and aerospace in general remained a national strategic industry, the suggestion was ignored.

It was no longer the same for inputs from the partner country. During the recession of 1975/76 Germany convinced France to lower the production rate (Muller, 1989: 42). In the meantime the EEC continued to promote a common approach (EEC, 1975). The Commission should manage Airbus Industrie as a top-down programme. Again the proposal remained theoretical. Further changes away from the purely national approach to STPs were noted nonetheless. France now considered the Airbus programme as the most appropriate framework for its overall aerospace policy (Laming and Hewson, 2000: 15-18). Other European manufacturers were inspired to follow the Airbus model after just a few years. Several suppliers, among them the French and U.K. partners attempted to establish transnational consortia for narrowbodies.

Many saw the OECD Exports Standstill Agreement of 1976 as a major factor behind the ongoing difficulties to enter the world market (Mc Guire, 1997: 50-51). Therefore the Airbus stakeholders elaborated favourable financial packages (Wells and Chadbourne, 2000). These were most probably at the origin of the decisive break into the U.S. market in 1977. The U.S. reacted through import taxes on Airbus aircraft and public attacks. The Airbus countries did not adopt a common position. Neither did they follow another EEC recommendation to coordinate the national aerospace policies (Council of the European Communities, 1977: 6). Again they rejected any external interference with the national strategic industries. In many other fields they agreed on cooperation whenever this served the national interests. In 1976 the governments decided a common approach to their currencies (Teyssier and Baudier, 2000: 103). This meant another decisive step towards the integration of national policies. In 1978 EEC officials participated in the negotiations of the OECD Commonline Agreement. Later the EEC signed this attempt to structure trade in airframes although the individual states ratified it. Both moves confirmed the convergence EEC - members.

During the same years the Airbus venture underwent a fundamental change. The GIE-established market research proposed a second aircraft. As it was the case in many programmes shared by several governments or actors and managed by a specialized institution the decision-makers from within shifted from management to active prospecting since this raised the prospects of the programme (Adler and Haas, 1992: 367-390). Since this transition was in the interest of the governments they agreed and retained their roles of supervision and strategic leadership. The German side endorsed the new A310. The growing strength of the Airbus structure and the promising prospects encouraged the U.K. to reapply for a full integration into the programme. London saw this as a new way to extend its influence within the EEC. Since the A310 needed considerable investments the other partners agreed. Later integrations of new members into transnational or European programmes were now quite common (Guzzetti, 1995: 54-57).

1979 was another landmark year for the Airbus programme and the European integration process. For the former it opened the era of the offensive and expansive strategists. The symbiosis member states – EEC

[131] Systems coupling defines the way (usually two) systems interact with each other. A classical example is air traffic control and capacity of airways.

was consolidated by the de facto shift of policy making from the national governments to Brussels during the seventh stage of the integration process. Decisive institutional and procedural reforms were undertaken during the same period. A first step was the direct election of the European Parliament after 1979. European issues were brought into the national political agendas (Rougemont, 1979: 34-44). Another was the official participation of the EEC in the 1979 GATT Aircraft Agreement negotiations (GATT, 1979a). It was a new attempt to regulate the trade in airframes. The national industrial partners remained critical towards the representatives from Brussels and exchanged only with their national governments. These interacted with the EEC stakeholders (Mc Guire, 1997: 70-71).

In 1980 the new regional airlines from EEC and other European countries founded their association (ERAA, 2005). They followed other air transport stakeholders which had established a common platform for the promotion of their common interests, notably in the policy process of the EEC (Lamarque, 1994: 28). By now such associations and interest groups were active in almost any sector. Europe had become the common framework for them and was being shaped by their actions. Obtaining positive trade-offs for their members was the main motivation for these interest groups. The alleged historical and cultural European identity was hardly ever mentioned in their programmes. Since most of these actors operated within Western Europe and shaped policymaking through their inputs they obtained a European identity (Kirchner and Schwaiger, 1981: 161-165). The members and stakeholders differentiated themselves from the competition from outside the continent through the active involvement in European policy making (Courty and Devin, 2005: 8).

In the same year a Council Directive targeted another sensitive domain of the member states. It was air accident investigation. The EEC members accepted to coordinate the specialized institutions (80/1266/EEC, 1980: 32-33). The dates were again a coincidence but the underlying trend they mirrored was not. The need to collaborate in S+T, economic and political domains was now generally admitted. In a more complex and more competitive world economies of scale were getting crucial. In addition these stakeholders who adopted a European perspective obtained formal and informal possibilities to influence European policy-making processes. The outcomes of these commitments shaped the minds of the stakeholders and they began to differentiate Europe from the rest of the world accordingly (Masclet, 1993: 124-127).

During these years a series of innovation processes in information technology, materials and manufacturing triggered what some called a new industrial revolution. Gains of productivity were unexpectedly high (Laurent, 1983: 1-34). As a result of the high priority given to S+T Japan became the leader in these technologies (Feigenbaum and Mc Corduck, 1984: 107-118). Many scholars trace these innovations to a new paradigm which had gained ground during the 1970s. It was based on an absolute belief in the regulative forces of the markets. An early example was the deregulation of the air transport in the U.S. in 1979 (Brenner, Leet et al., 1985). Competition intensified and so did the need for expenditure control. Delocalizations into low-wage countries became a response (Schwab and Smadja, 1994: 100-110). Under the new U.S. President Ronald Reagan and the U.K. Prime Minister Margret Thatcher the new worldview changed the attitude of the state actors (Harvey, 2005: 1-4)[132].

[132] Again things are far more complex in reality and the debate has been largely ideological. Most scholars do agree on the relationship new technologies, industrial revolution and paradigmatic change (Manu, 2007: 2-30). As a technology-intensive platform Airbus Industrie has obviously been affected by these changes. Throughout the research they are dealt with as an externality which is only detailed as far as it is directly relevant for the research question.

In this context the A310 was presented as the most elaborate aircraft in its category in 1982. Superior technology was the only way for Airbus Industrie to counter the higher cost of production. The programme was widely seen as a way to overcome the economic and technological stagnation of Europe, often known as the Euroclerosis (Lutz, 1986: 89-90). The continent was losing competitive ground to the U.S. and Japan where the elites encouraged the diffusion of the new technologies (Haefner, 1986: 92-105).

The European institutions reacted to the new challenges. New top-down S+T initiatives encouraged the EEC-wide intrafirm cooperation in 1982. The psychological barriers were high since the targeted companies saw each other as potential competitors and not partners for historical reasons (Guzzetti, 1995: 87). The cumulated positive outcomes of the various S+T initiatives had changed the attitudes of many economic actors. They approached the continent as a whole and no longer only their own country as their production site. This commitments to Europe was again mostly based on economic and not historical or philosophical inputs (Guzzetti, 1995: 70-87). The symbolic force of the European integration remained strong as a first draft for a European constitution illustrated. Other top-down S+T initiatives promoted large-scale economic and technological cooperation (Braillard and Demant, 1991: 14).

The launch of the disruptive A320 narrowbody within the Airbus system in 1984 confirmed the position of the programme as the most appropriate framework for national aircraft programmes. Although it had been a long-standing French initiative the other partners approved it. From the beginning the aircraft was planned to be superior to the U.S. competitors. It should also benefit as much as possible from the upcoming bottom-up and top-down S+T initiatives (Picq, 1990: 157-159). The former was the French EUREKA of 1985 (Braillard and Demant, 1991: 13). Many observers concluded that it created the incentive to shift the focus of S+T decision-makers from national to European (Cabral, 1999: 238-253). A more or less parallel top-down initiative was the Single European Market planned for 1993. Both programmes attempted to restore the competitiveness of the European economy against the U.S. and Japan (COM(85) 310 Final, 1985).

1986 was another landmark year for both the European integration and the Airbus programme. The Single European Act (SEA) officially defined a geographical and institutional identity for Europe and initiated the shift of most formal policy-making from the member states to the EEC during an eighth stage of the European integration. Two widebodies based on different requirements inaugurated a new era of the Airbus programme. The A310 had been enabled by the pro-active technological stakeholders within the Airbus programme and the support by the German stakeholders. The A320 was the outcome of a French STP implemented through the Airbus programme. The new widebodies A330 and A340 were promoted by the stakeholders within the GIE. Although it officially had no power the central entity had taken the lead in the Airbus programme over the manufacturers and the states. Both accepted this since it was after all the GIE experts who knew the programme best (Aris, 2002: 142). Again there was no direct relationship between the transformation of the EEC into the main policy driver and the changing attitudes towards the intra-Airbus stakeholders. Both trends were nonetheless driven by the same trend towards specialization and focus on output. Two more changes facilitated this transition within the Airbus programme. The first was the open transatlantic dispute with the U.S. which stirred the governments into action. The states elaborated common responses and rejected the claims on alleged Aircraft Agreement violations. The U.S. were forced to accept the rise of European aerospace (Aris, 2002: 159).

At the A320 roll-out ceremony in early 1987 the representatives of the European governments confirmed the crucial importance of the programme. It was clear to them that Airbus should be more efficient. Although the stakes were high and the U.S. pressure was discussed by the European Parliament the individual governments could not agree on a common strategy. The dissent among the partners even grew when Germany launched first own STPs in favour of the manufacturer. Officially the partners feared an additional pretext for U.S. retaliation. In fact they were afraid of a stronger national competitor (Aris, 2002: 172-173).

In 1988 the A320 was jointly certified in the Airbus countries. After the JAA had been established the practices had become identical in the member countries. Some accidents raised fears that the technological leap was excessive and had failed. Reality proved otherwise and the Airbus programme entered the era of the audacious innovators. The A320 was unanimously seen as the most advanced narrowbody and one of the most disruptive aircraft ever (Picq, 1990: 173-174). It was generally associated with French technological superiority, German engineering quality and the successful integration of country-specific skills into one programme for the benefit of Europe as a whole (Rainelli, 2002). In this positive context the industrial partners of Airbus Industrie discussed ways to render the way the programme was managed more efficient.

The ongoing political, economic and S+T integration had increased the potential of Europe as a production site. If economic and other actors wanted to maintain the positive Path Dependence they had to remain committed to the integration process. By now this motivation mostly influenced their attitudes towards ‘Europe’. In their majority the approaches were in an economic perspective. Since this promised the highest trade-offs the Airbus partners based their reforms on the existing European framework. European S+T initiatives opened many possibilities to the national partners even if strategic industries such as defence and aerospace mostly remained outside the integration process (Sparaco, 2005a: 228). Partially owing to these outcomes but mostly the pro-active initiatives by the manufacturers and the governments the Airbus programme consolidated. The A321 narrowbody was even possible without state aids. This confirmed the know how of the industrial partners so that the governments left most of the technological choices to them (Sparaco, 2005a: 249). The political stakeholders focused on the general orientation such as the decision to establish a second final assembly plant in Hamburg for the A321. Most stakeholders in Germany welcomed this as a token of confidence from France, which was their former enemy and competitor (Grosser, 2004).

In 1989 the U.S. suggested an update of the 1979 Aircraft Agreement. The European Commissioner of Trade defended Airbus Industrie as a key asset for Europe (Aris, 2002: 158). France outlined the high indirect subsidies in the U.S.. From the beginning the EEC negotiated in the name of all Airbus countries. For the first time the latter acted together. The European integration had reshaped the attitudes of their stakeholders. The U.S. pressure strengthened the resolve. The European side knew that it found itself in a weaker position and that the U.S. side was well aware of this. The European stakeholders could only hope to minimize their losses (Saner, 2005: 115-116). Therefore they proposed to lower the launch aids if the U.S. limited their indirect subsidies (Mc Guire, 1997: 160).

The negotiations illustrated the consolidated role of the EEC as the main policy-maker and –driver. The end of the Cold War strengthened its role since it symbolized more than ever the unification of the continent (Everts, 1992: 55-81). The new elites and the population in the former communist countries hoped to join the

EEC. The arguments were mostly economic but included the hope to consolidate the democratization processes and to rejoin the common cultural space after 40 years of separation (Joyaux, 1993b: 304-306).

During these years the transfer of national competences to the EEC had influenced the attitudes in favour of the integration even more. A major example was the Schengen Agreement in 1990. Large parts of Western Europe would be experienced as one area of unrestricted mobility by the citizens. The formal Joint Aviation Authorities (JAA) replaced the loose cooperation among the certification bodies. While the integration process was changing the configuration of the international air transport regime in Europe it did not have a similar effect on the national manufacturers. Each of them intended to launch a smaller aircraft. They were less resource-intensive so that each supplier approached them on its own. In the ongoing transatlantic negotiations the U.S. side interpreted this lack of cohesion as a sign of weakness. Therefore they accepted a concession on the indirect subsidies. They expected to retain their leadership (Mc Guire, 1997: 160).

While many doubted on the true commitment of the Airbus partners to the programme and others feared a transatlantic confrontation the A340 prototype was staged as a European achievement in 1991 (Sparaco, 2005a: 237). This vision was largely supported and promoted by the media (Martel, 2000: 41). Indeed, the aircraft was the result of a common programme based on the decade-long inputs from four countries and their leading manufacturers and influenced by the European policy and programme framework. Airbus Industrie was not a political European achievement but the outcome of different initiatives. Even at this stage there was no absolute or ‘automatic’ commitment to a truly transnational or European aerospace industry. A military transport was studied outside the Airbus programme (Knappe, Palomino et al., 2006: 225). Even the European institutions failed to approach aerospace in a European perspective. The Commission refused the takeover of a Canadian competitor by one of the Airbus partners on the grounds of negative impacts on competition (Case No. Iv/M053, 1991). EEC stakeholders did not differentiate the strategies of aerospace from traditional sectors. The involved states remained hesitant to share information with the EEC. They feared that competitors might benefit from it. The involved countries approached the attempt in a national STP perspective and did not really involve the EEC (Aktas, Bodt et al., 2001: 447-480).

Almost everywhere else the attitudes were now focused on collaboration and integration (Zahariadis, 2003: 285-310). In 1992 the JAA and no longer a set of parallel national bodies certified the A340. After long and difficult negotiations the EEC signed the Airbus Agreement which was supposed to end the transatlantic disputes in 1992 as well. Concessions were enforced upon the European side but it did not suffer a defeat. Both the EEC and the Airbus partners had learned to cooperate in the mutual interest even if the motivations of the latter remained national. The Airbus Accord illustrated the transformation of the EEC institutions into negotiators. The EEC and the members alike had gone through an essential institutional and procedural transformation and proved the capacity to resist external pressure.

Shortly after the Airbus Accord the Maastricht Treaty endorsed the fusion EEC – member states. It prepared the terrain for further integration. While Europe consolidated, the Airbus programme witnessed another dissent among its industrial stakeholders. Boeing and the individual partners discussed a joint very large aircraft. One of the arguments for the involved stakeholders was the need to join forces since the attempted technological leap was said to be as important as that of the first widebodies in the 1960s.

After 1993 the Airbus programme moved on under the skilful leaders. In the same year the Single European Market opened the ninth stage of the European integration. The member states and the EEC or the European Union (EU) as it was now called merged into one economic and political area. The states transferred new core competences to the EU through the European Monetary Institute. The European Economic Area (EEA) extended the integration to countries outside the EU. By 1994 the Airbus partners were again fully behind the programme and launched the large A3XX and the small AE31X to complete the product range at both ends (Sparaco, 2005a: 253). Again no direct relationship between the European and the aerospace events can be identified but the industrial partners could never have imagined the A3XX if they had not grown stronger through the inputs from the numerous bottom-up and top-down initiatives over a decade. Additional factors were the optimized conditions of operation following the European integration such as the elimination of intra-European customs duties (Knappe, Palomino et al., 2006: 334-337).

By now the Airbus programme directly involved the European institutions. One example was the assistance given by one of the U.S. intelligence agencies to Boeing discussed by the European Parliament. The member states continued to act as the sole competent authorities in respect to aerospace since the French and U.K. partners supplied military hardware. Another Council Recommendation on the formal integration of the national aerospace industries in 1994 was ignored by them ((94/C 309)02, 1994: 2-3).

In 1995 the EU grew by ten new members. Airbus Industrie launched the A319 without state aids. The A3XX in turn needed massive assistance. Notably for this reasons all stakeholders discussed again ways to make the programme more efficient. The manufacturers hoped for lower cost of production and higher margins. Since the competition was worldwide by now the obligation to rationalize was everywhere. The governments were so satisfied with the results of the multinational programme that they were ready for compromises on the structure (Sparaco, 1997: 10-18). Finally the pressure from the U.S. remained high.

In the meantime the state elites had widely adopted the paradigm of expenditure cutting and profit maximization (George, 1999). Privatizations of former state enterprises to raise cash and to make them more market-responsive had become common. Many large-scale transnational companies had gone one step further. Their focus was no longer expenditure cutting but maximized benefit margins or ‘shareholder value’. The pressure to lower cost increased (Stockhammer, 2004). At this stage the phenomenon became often known as ‘neoliberalism’ (Roesch, 2003). Its focus on efficiency inspired new top-down initiatives in 1996. A White Paper on air traffic control (COM(96) 57, 1996) was adopted by Eurocontrol (Eurocontrol, 2006). European air transport obtained a distinct identity within the international air transport regime. The Commission endorsed once again transnational mergers among the aerospace suppliers (COM(97) 466 Final, 1997). European STPs for defence-related industries were suggested (COM(97) 583 Final, 1997). The EU stakeholders considered themselves the best-placed authority to defend the strategic industries.

In the same year the political European integration took a new step with the Treaty of Amsterdam. It established new formal ties EU – member states. However the new economic paradigm lowered the commitment to Europe as a production site since alternatives offering lower cost of production were available (Heisenberg, 2004). Many companies delocalized. More or less in parallel the European integration found itself under critical review since many intellectuals qualified it as the transfer of neoliberal interests into politics (Cassen, 2004: 6-7). In this changing context the Airbus partners discussed reforms. Boeing announced exclusive deals with major U.S. carriers.

The 1996 Boeing-McDonnell-Douglas merger stunned everybody. All observers concluded that the lack of pro-active responses to the Airbus challenges had undermined both manufacturers (Lawrence and Thornton, 2005: 88-89). The upcoming duopoly did not favour Airbus Industrie. The French and German industrial and governmental actors requested an intervention by the EU. The U.K. stakeholders who had adopted the new economic paradigm long ago advocated the privatization of the Airbus actors. Once again the different mentalities became visible. If the French request for EU involvement followed the state-centred interventionist tradition, the German move was more surprising. Owing to the far higher cost of the reunification than expected (Betz, 2000) the export-oriented aerospace sector was crucial for the German economy. The stakeholders hoped for a maximum support. In the opinion of all three countries the EU was the only competent and influent authority to intervene. The legal framework was an agreement on mergers signed in 1991 by the EU and Washington (OJ L 95, 1995: 47-52). This illustrated once again the leading role of the EEC and later the EU in fundamental political matters. The examination was a bilateral issue between Washington and Brussels which negotiated in the name of all Airbus countries. This evaluation made Airbus Industrie a European affair. In parallel it continued its pro-active moves and established a mixed company for the small AE31X family with Chinese partners (Sparaco, 2005a: 256).

In this new context the European Association of Aerospace Industries (AECMA) (Allgeier, 1998) endorsed a stronger involvement of the EU. All stakeholders were aware that Airbus Industrie needed reforms to remain competitive. Once again France and Germany took over the leadership. At their traditional summit in 1997 they appealed to the EEC to accelerate its pending European company statute. The European framework was now an integral part of their worldview. The EU endorsed the reorganization of the European aerospace industry through transnational integration (COM(97) 466 Final, 1997). It recommended the same move for the fragmented defence contractors. The EU intended to take over the STP lead from the member states in their common interest (COM(97) 583 Final, 1997).

After 1998 the skilful managers led Airbus to new successes even under the new circumstances. Their era began with the first joint European and U.S. certification ever of an aircraft. The EU and other European countries now acted as one in the crucial field of airframe approval. Boeing ran into a self-inflicted crisis which prevented it from exploiting the favourable situation (Aris, 2002: 193).

Airbus Industrie dropped the AE31X in favour of an own smaller narrowbody (Sparaco, 2005a: 256-258). The governments acknowledged the need for reforms. Following the worldwide trend towards state divestments (Feigenbaum and Henig, 1994: 185-208) Aerospatiale was privatized in 1998 (Aris, 2002: 200). In parallel the European Central Bank inaugurated a new era of the European integration. In the new context the governments felt the need to back up their manufacturers more than ever. One way was to add the discussed military transport to the Airbus programme. The transatlantic partnership had deteriorated after the end of the Cold War so that a European source of supply was seen as an advantage. While the reforms were discussed the Airbus Military subsidiary for the A400M military transport was set up (Knappe, Palomino et al., 2006: 250).

Each partner knew that it needed at least one ally to obtain a dominant position in a restructured programme. At the same time each company saw the others as competitors. First the U.K. and German suppliers BAE and DASA intended to join forces. After the U.K. partner got the chance to buy up another competitor the

merger failed. Later France and the U.K. decided to outsmart the Germans. In the end the traditional Franco-German couple led and implemented the transition. Their attempt failed as well (Aris, 2002: 202).

During the exchanges the day-to-day work at Airbus Industrie continued. The A318 was launched in 1998 without state aids (Hewson, 2002: 41-44). In October 1999 Aerospatiale and DASA announced their merger into the European Aeronautic Defence and Space Company (EADS). Since the U.K. partner BAE had not been invited to the elaboration process it refused to enter the EADS and contented itself with a 20 percent stake in the subsidiary Airbus Integrated Company. The parent company was obliged to take it over at any time after 2003 in case BAE wished to sell it. From the beginning EADS was promoted by all stakeholders as the European response to Boeing (Sparaco, 2005a: 332-333). One of the reasons was the now generally endorsed supranational role of the EU in economic, S+T policy and regulation (Courty and Devin, 2005: 108), another the differentiation of Europe from the rest of the world (Schwok, 2005: 141). EADS was a multinational company. For many experts and the public it became the 'European' answer to Boeing (Knappe, Palomino et al., 2006: 8-9). Behind the stage things remained different. During the reorganization of Airbus France and Germany attempted to maximize their influence. Even afterwards political interference remained strong and led to two equivalent headquarters. The operational results were excellent so that the new organization was barely criticised.

Still under the old system the A3XX was initialized in 1999. As a result of the political involvement assembly was divided between Toulouse and Hamburg. Specialists warned against this avoidable inefficiency in what was already a highly complex programme where simplification and streamlining should have been maximized. In the view of some this was more or less an organizational accident waiting to happen (Petroski, 1992: 85-97). Although the launch aids respected the Airbus Accord the U.S. announced a new WTO claim. In September 2000 the Commission approved the EADS despite its dominant position in Europe (Knappe, Palomino et al., 2006: 256). The European institutions now approached aerospace in a continental strategic perspective. The Airbus governments had put strong pressure on the EU. The worldwide concentration in technology-intensive industries which had been observed for some years now made large-scale units the logical choice (Cosentino, 1999: 15-25). The attitudes of the national aerospace stakeholders had shifted from a national to a transnational perspective within the European framework (Sparaco, 2005a: 332-333).

In January 2001 aerospace actors invited by the Commission concluded that Europe had the potential to become the world leader in aerospace provided that all actors remained committed to manufacturing in Europe (European Commission, 2001). The parallel bottom-up Advisory Council for Aeronautics Research in Europe (ACARE) came to the same conclusion (ACARE, 2002). Both initiatives illustrated the shift in attitudes from coordinated parallel to an integral aerospace policy. In February the Treaty of Nice formalized the now advanced stage of fusion of the member states and the EU. In the same year a European company statute became available (CR (EC) No 2157/2001, 2001: 1-21). The two events were not directly related but illustrated, each in its way, the merger of the EU into one area and the changes in attitudes.

The 11th September 2001 surprised Boeing and EADS. The latter interrupted its prospective R+D work to lower investments. This was a typical short-term approach. The European institutions and the Airbus countries did not intervene. In their opinion EADS was free to decide how it wanted. Nine Eleven also had an impact on the European institutions. Discussions on a Common European Security and Defence Policy (ESDP) were launched (Teyssier and Baudier, 2000: 89). It is probable that the attempts of a European

security policy accelerated the A400M military aircraft. The integration became a day-to-day experience through the Euro in large parts of the EU in 2002 (Deutsche Bundesbank, 2006).

Many stakeholders now had a 'European' and no longer national vision. As a result they warned against the systematic technology transfers to China (Dahlkamp, Rosenbach et al., 2007: 19-34). In their opinion they opened the way to a future competitor. The arguments mirrored those of the late 1960s against the U.S.. The 'American Challenge' had encouraged the European economic actors to adopt the strategies of the superior U.S. competition. The current warnings were against short-term profit-motivated technology transfers which would enable a future competitor to take the lead over Europe. There was still time to prevent this.

In 2002 the European integration in aerospace took another decisive step through the European Aviation Safety Agency (EASA). It assumed the formerly national prerogative of air safety in the name of the EU and other signatory states (EASA, 2004). The extension of the European integration to core domains of the member states continued in 2003 when the EU – after extensive consultations with the member states – and the NATO signed a security pact. National defence and foreign policy came under EU jurisdiction. By now the EU was a de facto supranational set of institutions (Courty and Devin, 2005: 112-113). A Commission Regulation extended its competences to aircraft certification (CR 1702/2003, 2003: 6-79).

Owing to its superior products, the strategic errors of Boeing, notably the neglected new developments, Airbus became the number one in orders. It looked more solid than ever and was focused on the resource-intensive A380. When Boeing launched a new twinjet in 2003 Airbus denied any need to react.

In 2004 the European transformation reached its apex in a tenth stage but not for long. Ten new members joined. The same year witnessed the signature of the Constitution for Europe. Airbus also obtained a maximum success when the U.K. selected its tanker. Soon afterwards things changed. For the first time Airbus did not announce an adequate answer to the disruptive Boeing twinjet later known as the B787. The limited resources did not allow any strategic answer although the Airbus management never admitted this. From the beginning Airbus seemed not really committed to the minimalist and purely reactive A350 programme. In the same way its competitor had done for years it insisted on the opportunity to respond to demand through updates of a well-introduced design. At the same time the A380 ran into trouble. Specialists traced both problems to the end of pro-active R+D after 2001, the underestimated complexity of the A380 and the unexpected turnaround of Boeing. The visible difficulties of Airbus did not stop the U.S. in early 2005 to renew the claim that the Airbus launch aids violated the 1992 Airbus Agreement. For the first time since the beginning of the crisis of the European integration the EU took position in favour of the programme. It qualified EADS and Airbus as essential assets for the European economy as a whole. At the same time it renewed the attacks on the U.S. indirect launch aids. Neither Washington nor Brussels were interested in a confrontation. The U.S. and several EU countries were involved in Iraq.

During the roll-out in February 2005 the heads of state of the Airbus countries presented the A380 as a European and not a common national achievement (Ballantyne, 2005: 5). EADS positioned itself as a leading European company (Knappe, Palomino et al., 2006: 8-9). Indeed it operated from European territory. The national governments closely interacted with the common institutions. By now the policies elaborated by the latter affected more or less any domain. In the U.S. EADS was perceived as a EU-influenced and not a mul-

tinational company (CSP, 2007). Airbus and EADS yielded excellent results which responded to the ongoing national STP ambitions of France and Germany. In summer 2005 major difficulties with the A380 became known. Boeing and the U.S. government renewed their attacks on Airbus. The EU replied that the B787 was the most subsidized aircraft in history (Klapper, 2007a). EADS and Airbus decided against launch aids for the A350 (Airwise News, 2005a). France announced to step in any case (Airwise News, 2005b). Everywhere Airbus was now seen as a victim of the short-term thinking. In the opinion of many the Airbus and EADS decision-makers had proven their incompetence.

By coincidence the French and the Dutch rejected the European constitution at this critical time for Airbus. The referendum campaigns attacked the project as being antisocial (Salesse, 2004) since it served mostly those who benefited from short-term thinking based profit maximization (Cassen, 2004: 6-7). No direct relationship between the Airbus crisis and the double failure of the European constitution can be constructed. Nonetheless both are outcomes of the mostly negative impacts of short-term profit thinking on large parts of the population (Fougier, 2005: 31-47). Examples were unemployment, less favourable conditions of work or the decline of traditional companies since they had neglected the necessary investments (Stockhammer, 2004). In the opinion of many citizens European policy-making increasingly seemed dictated by stakeholders in favour of profit maximization. The European integration was increasingly seen and experienced as something negative (Cassen, 2004: 6-7). Therefore the constitution was rejected since it symbolized the codification of this new ‘neoliberal’ Europe. In case of doubts a political proposal is usually refused as a way to forestall unexpected outcomes. The vote can be interpreted as a corrective action (Evans, 2004: 59-62).

In the opinion of many, Airbus remained trapped in its short-term approach when it announced a plant in China. Indeed China had never hidden its ambition to enter the world aerospace market through imported technology (Kingsbury, 2007: 45-47). On the other hand the Single European Sky which ambitioned to merge the European airspace into one area as a way to make air transport in the continent as a whole more efficient (Chambost, 2007: 116-117) outlined that even after the failure of the European constitution virtually all aerospace and air transport stakeholders remained committed to the European institutional and procedural framework. It was too established to be really questioned since it had shaped the economic, the political and the social life everywhere on the continent (Herrera, 2006: 27-34).

The rejection of the European constitution and the sudden stagnation of the idea of a fully integrated Europe (Salesse, 2004) influenced the attitudes of the elites in France and Germany. They focused back on a purely nationalist perspective. In their opinion the crisis emanated from the sites in the other country. Both governments and many economic stakeholders defended the own facilities. Since the national economies of France and Germany stagnated aerospace was seen as essential for more than the usual strategic reasons. As a result both governments refocused their STPs from the transnational European to a strictly national perspective. Any reference to Europe had vanished from their discourses. Even within the Airbus programme France and Germany adopted a more or less national perspective and competed against each other. The visions had turned back from a long-term commitment to the future of the European aerospace industry to a short-term focus of the immediate national stakes. This new attitude was the result of the difficulties experienced by EADS and Airbus and the visible stagnation of the European integration after the failure of the Constitution.

At the same time both governments knew that needed each other to save the Airbus programme. More than ever the venture represented the only way to maintain the national aerospace industries. Therefore they agreed to replace the EADS CEOs. A new leadership promoted the former pro-active approach which had enabled the success of Airbus for more than two decades. The industrial stakeholders decided on a major update of the A350. Owing to the many difficulties there remained doubts on the ability to implement this vision. On the other hand everybody knew that the world aerospace market would never tolerate any monopoly of supply by Boeing (Norris, 2006: 5).

4.4. Association Airbus Programme and European Integration

The parallel presentation of the Airbus programme and the European integration process reveals that the aerospace venture has mainly been driven by the world aerospace market and the reactions by the U.S. competitors in a national STP perspective. The European integration process was secondary until 1992. The next Section examines to what extend they interact with each other.

In the 1960s the new aircraft was outlined as a market-consistent approach through a multinational programme. During the roll-out in 1972 the A300 was announced as a first step towards integrated airframe construction in Europe. By the time the European institutional and procedural framework had consolidated and extended to more and more policy domains. Through the discursive association with the continental integration the Airbus programme obtained a label or evocative image (Bradley, 1981: 33-39)[133]. The reference was coherent with the stakeholder's general idea. As such it was used for a political marketing campaign. Such undertakings firstly mobilize those are in favour of the idea. Secondly, they intend to put those who are against in doubt. Finally they intend to convince the undecided (Bongrand, 1993: 47). Occasions were the roll-outs of the A320, the A340 and the A380. This symbolic association of the Airbus programme with the ongoing development in Western Europe was one of many examples of attitudes framed in favour of the continental convergence (Nelson, Oxley et al., 1997: 221-246).

The states kept their control over the programme. Not until 1992 when the transatlantic confrontation led to the Airbus Accord did the governments involve the EEC. When Boeing absorbed McDonnell-Douglas in 1997 most stakeholders requested an intervention by the EU. This transfer of sovereignty made it a European affair (Aktas, Bodt et al., 2001: 447-480). Two years later the EADS defined itself as a European company. It expected to be associated with the positive image of the integration in Europe and beyond (Nelson and Oxley, 1999: 1040-1067). France and Germany maintained their control over the programme. The states never formally transferred the responsibility for their strategic industries to an external entity. As they had done several times they adapted ways to implement their STPs after the externalities changed.

A top-down examination confirms the above. When the Airbus programme was discussed in the mid-1960s the European institutions were beginning to act as independent entities. By 1975 they were consolidated and able to suggest their own programmes. The states accepted to examine them on a case by case basis (Nau, 1975: 617-653). Since aerospace was deemed essential for Europe as a whole EEC stakeholders suggested

[133] The terms of label and evocative image refers to the general theory of symbols. From an industrial marketing perspective the association of the Airbus programme with the ongoing European integration was the association of a new programme or product (the A300) with a positive idea which had proven its value to decision-makers (Kroeber-Riel and Weinberg, 2003: 229-235).

assuming the responsibility for Airbus. The governments maintained their nationalist approach and ignored this and following initiatives.

The governments and other actors experienced that most top-down initiatives had positive outcomes (Guzzetti, 1995: 76-79). Sometimes they created leverage effects for Airbus even if they did not directly target it. An example was research on materials for aerospace. This “indirect action” (Guzzetti, 1995: 60) was practiced by the European institutions in those fields were their decision-makers saw an obvious interest but where the member states rejected external control (Guzzetti, 1995: 59-60). After 1978 the EEC assisted the Airbus states in transatlantic negotiations. By the time the 1992 Airbus Accord was worked out the EEC had taken the lead in most issues involving member and third countries. The former had learned that this served best their strategic interests. Most air transport and aerospace actors had optimized their operations within the European framework since this proved the best alternative (ECAC, 2005). Several treaties in the 1980s and 1990 made the European institutions the sole authority to examine the Boeing-McDonnell-Douglas merger in 1997. The Airbus states were encouraged to entrust foreign policy-related STPs to them.

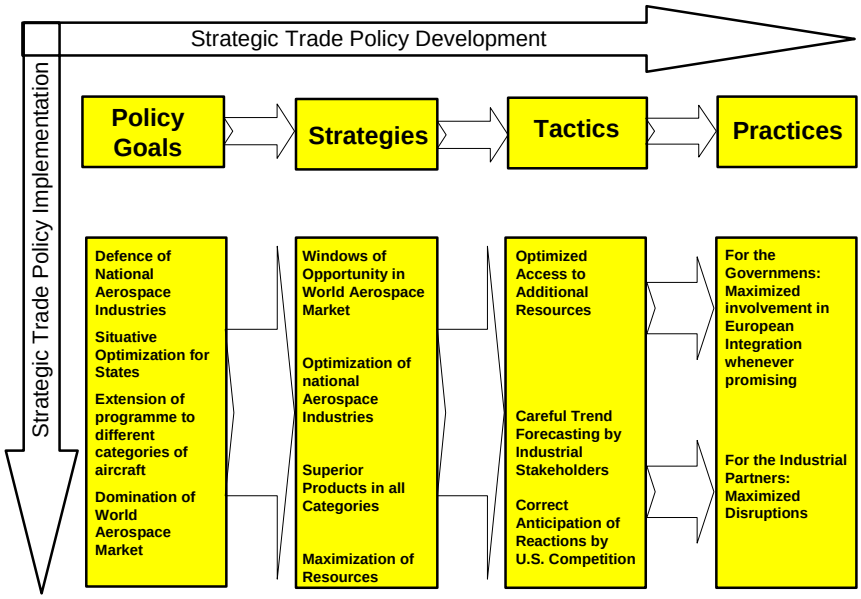
Both the bottom-up and top-down perspective illustrate that the influence of the European integration on the Airbus programme grew with the transfer of national competences to the common institutions and the continental convergence. The higher the trade-offs from the direct and indirect action for the states and the industrial actors became, the more the governments integrated top-down programmes into the Airbus-related policy planning and implementing. Throughout the time they remained the ultimate decision-makers. This confirms that the programme was less inspired by the idea of European integration but the attempt to optimize the outcomes of the national STPs. Although common experiences and values facilitated the association with the European dimension and the decisions based thereon (Schokking and Andersen, 1960: 385-410) the references to the European integration were rather political marketing campaigns in the context of a series of economic, political and social changes (Avenarius, 2000: 160-177) than commitments to the transfer of the national sovereignty over the strategic aerospace programme to external institutions. If the motivations of the Airbus political stakeholders were not European, so what were they?

It follows from the above that the Airbus programme represented a possibility to optimize the strategic aerospace industry in response to challenges from abroad and within the own territory felt by all national stakeholders (Knoepfel, Larrue et al., 2001: 25-31). Four ideal typic strategic orientations or policy goals (Reysset and Widemann, 1997: 4-5) were endorsed by the industrial and political partners. A first was to defend the national aerospace industries against the U.S. competition. Situative optimizations for the states were another. Thirdly, the STP policymakers hoped to extend the positive outcomes of the A300 to other aircraft categories. Finally, the Airbus states attempted to dominate the world aerospace market.

In order to achieve these policy goals the governments developed four ideal typic strategies (Reysset and Widemann, 1997: 5). A first was the exploitation of windows of opportunity within the world aerospace market. Economies of scale for the national facilities based on the complementarities of the centres and the learning curves of the stakeholders maximized the prospects (Ghertman, 1999: 66-73). Superior products were a third. Finally as many resources as possible were channelled towards Airbus (Ansbach, 1997).

Based on the strategies shaped by the competitive world aerospace market and the particular nature of airframe construction the Airbus stakeholders relied on three ideal typic 'tactics' or methods to implement them (Reysset and Widemann, 1997: 6). Two of them were mainly practiced by the manufacturers. The first was the correct forecasting of trends (Cornish, 2005), a second scenarios for the possible options for the U.S. competitors (Rouach, 1999: 10-28). The third was to minimize the cost of acquisition and to maximize the leverage effect of the additional resources. This was best enabled through the static and dynamic gains of European integration (Revuelta, 1999: 91-98). The governments influenced and shaped the European integration process in such a way that it served best their national interests. The manufacturers based their decisions on positive outcomes from European programmes and trade-offs and maximized technology leaps. Figure Nine outlines the implementation of the Airbus programme. The various steps operationalize the Situative Optimization based on industrial Technology Leaps and national STPs outlined in the lecture grid.

Figure 9 - Situative Optimization As The Driver Of The Airbus Programme



Source: Author based on (Knoepfel, Larrue et al., 2001: 25-31), (Reysset and Widemann, 1997: 4-6).

As outlined earlier, the Airbus programme and the European integration can be divided into various stages. Until the late 1950s airframe construction was a strategic industry approached in a national perspective. Each country had the resources to compete against the European neighbours but not the U.S. (Golich, 1992: 899-934). After 1959 the idea of transnational cooperation in order to increase the national capacities through economies of scale within the established Franco-German couple gained ground. In 1962 the Concorde treaty was signed. It offered the best possible way to implement different STPs. The same year opened the fourth step of the European integration where the EEC shaped the national policy making. The prospects to join were one of the motivations of the U.K. (Costello and Hughes, 1976: 53-58). In 1965 the manufacturers, the STP policy makers and the airlines understood that new ways to defend the national aerospace industries had to be defined. Encouraged by mostly positive experiences with the European integration the manufacturers, the governments and the operators explored the possibility of transnational cooperation. Maximized resources were the only way to respond to this unique chance.

By 1968 the market-inspired engineers elaborated a project unimaginable earlier owing to the lack of resources and inspiration. In the same year the European customs union differentiated Europe from the rest of the world. The idea to overcome challenges in common inspired stakeholders in many domains. After the first sale in 1971 the Airbus programme entered the era of the daunting entrepreneurs. Through a loan by the European Investment Bank (EIB) the European framework offered additional resources. After 1974 the EEC institutions became independent and able to launch S+T programmes. During these years the first successes of Airbus Industrie showed that the transnational programme served best the national interests. The commercial consolidation, the limited reactions from the U.S. competitors and the accumulated experience made the state-of-the-art A310 possible. The capacity of the EEC to participate in transatlantic negotiations enabled it to assist the Airbus programme in a way which did not interfere with the national STPs after 1979.

When the offensive and expansive strategists took over the Airbus programme after 1979 they relied on the European institutional and procedural framework. Examples were the bottom-up and top-down initiatives in favour of air transport. An attempt by the U.S. to outsmart the A310 through ETOPS as a reaction to the penetration of Airbus into the U.S. market failed. The EUREKA bottom-up initiative and the Single European Market top-down programme accelerated the merger of most policies of the member states within the general programme of the EEC institutions. Inputs from EUREKA encouraged the disruptions of the A320 narrowbody. It was the same for the A330/A340 widebodies after 1986. Both programmes illustrated the ambition to become a global player through technological leadership.

The Single European Act in 1986 inaugurated the transfer of policy making from the members to the EEC. The national governments had again concluded that this was the best possible outcome for them. The negotiations of the 1992 Airbus Accord under EEC leadership highlighted the trade-offs of the European integration even further. The governments relied on the European institutions for their national policy making. After 1993 the EU and the member states grew more or less into one institutional area. Most strategic industries remained unconcerned. In practice the governments could no longer achieve their goals without the leverage effects from indirect action. The skilful leaders transformed the Airbus programme into the leading technology driver on the market. In 1997 Boeing and McDonnell-Douglas created the surprise through a merger which jeopardized the future of Airbus. This new situation encouraged the member states and manufacturers to entrust the management of their aerospace industry partially to the EU. Two years later other changes in the attitudes of economic stakeholders inspired the states to transform Airbus Industrie into a subsidiary of EADS. Both decisions again served best the national interests. The formally independent and Europe-committed EADS (Knappe, Palomino et al., 2006: 334-337) promised higher STP trade-offs.

After 2004 both Airbus and the European integration experienced apparently unexpected disruptions. In fact they were, in both cases, the logical outcome of earlier developments. After the privatization the industrial stakeholders of Airbus accumulated several errors. They overestimated their own capacities after repeated successes (Reason, 1997: 6-7). The decision to cut pro-active investments in a critical moment crippled their capacity to anticipate the next move by the remaining competitor and to elaborate the appropriate response. All these errors were outcomes of the worldwide fundamental change towards short-term instead of long-term thinking. Many political stakeholders who favoured a further European consolidation adhered to the new paradigm often called neoliberalism (Cassen, 2004: 6-7). The negative impacts of the deteriorated conditions of work and even existence influenced the feelings towards the European integration from rather positive into

indifferent or even negative. When the constitution was rejected in 2005 the image of the EU suffered even more. Considerable parts of the population and the elites became critical towards the European integration. Again, the problems had been latent and cumulative but those in favour of the Constitution had not anticipated them (Fougier, 2005: 31-47). The positive trade-offs for numerous political, economic and social actors as well as the multiple institutional and procedural lock-ins made it virtually impossible to renationalize issue handling. The doubts cast on further transfers of sovereignty and the visible hesitation to end programmes under EU leadership illustrated that the European integration had rather been a strategy in favour of the situative optimization than a goal in itself (Seifert, 2007: B5).

4.5. Airbus – An Integration Driven By The World Aerospace Market

Based on the results of the parallel analysis of the motivations behind the Airbus programme and the European integration the initial question can be approached: Have the attitudes of the national stakeholders towards the Airbus programme evolved in the same way as the attitudes towards the European integration?

It follows from the above that Airbus has mostly been driven by other than European motivations. Most of the influence can be attributed to the world aerospace market. The direct and indirect association of European institutions to the venture has proven the most efficient way to implement the Airbus programme. Reference to Europe has mainly been in a political marketing campaign perspective. The European integration has been the cumulated outcome of two processes. A first is bottom-up strategies in favour of a joint management of common economic and S+T issues through transnational cooperation or external institutions. After initial positive trade-offs stakeholders within the governments extended this scheme to a growing number of policy fields. Other institutions and economic actors were encouraged to establish their own common institutions to defend and promote policies in their global interest (Stokes-Berry and Berry, 1999: 169-200). The second process was the emancipation of the common institutions from the members, either states or other actors, and their capacity to promote programmes on their own. Since the top-down initiatives usually promised positive outcomes the governments began to adopt and integrate them into their national policy-making. In either case the national governments agreed on the externalization in the first place.

Both processes have influenced the national policy-making even in those domains not targeted by bottom-up or top-down initiatives. The European procedural and conceptual framework inspired and later more or less forced other economic and S+T actors, among them those in air transport, to align their optimizations on the EEC structures and processes (Hettne, 2000: 156-166). Such adaptations were the only way to remain competitive and credible. Therefore the framing of their decision-makers became ‘European’ (Muller, 1990: 44-49). The same was true for the national governments. Contributions to the EEC turned out to be the most promising way to promote national interests. Over time the governments outsourced more and more responsibilities to the central institutions (Hirst and Thompson, 1999: 228-255). At any step the national governments decided whether to change the status quo or not. Essential domains remained under their control. In others the EEC and later the EU became the competent entity (Hen and Leonard, 1992: 22-30). In this case its top-down programmes often strengthened the strategic industries through their indirect influence. Examples are S+T initiatives or later negotiations in the name of the governments of the member states.

In detail the attitudes of the policymakers towards airframe construction and later Airbus Industrie mirror the expected trade-offs of the European integration process for the national strategic aerospace industries. Until the Second World War the states had limited incentives for the economic integration of Europe (Steffan, 1957: v-viii) and none for cooperation in airframe construction (Kracht, 1994: 2-5). The resources of each country were largely sufficient. After 1945 the joint management of the reconstruction became the best possible option. The world airframe market was dominated by the U.S.. National attempts by the U.K. and France to resist through technological leaps failed. In the early 1950s basic sectors where promises for the economies of scale were high were externalized to common institutions. Each member obtained higher positive trade-offs than expected (Herouville, 1958: 109-113). Strategic industries remained unaffected since outcomes and not necessarily the way to deliver them were crucial. The signatory states did not include them into the Treaties of Rome. Within the binational Franco-German framework France became able to externalize parts of the cost of a future military transport thanks to the cooperation with Germany. Behind the Concorde Treaty of 1962 were similar utilitarian motivations in France and the U.K.. London openly promoted its intention to join the 'Common Market'. Cooperation in strategic industries became an option.

New opportunities in the world aerospace market appeared. Both state and industrial actors in France, the U.K. and Germany understood that the only way to realize them was transborder cooperation. The above transnational programmes, the U.S. competition and the positive experiences with transnational cooperation within the EEC encouraged the governments to join forces. As it was the case in other programmes the state stakeholders were receptive for proposals from the directly responsible specialists (Adler and Haas, 1992: 367-390). The decisional power remained within the governments since they could adopt or reject the proposals. During the same years they began to integrate inputs from the EEC institutions into their policy-making. In the 1970s the national governments delegated competences to the EEC and enabled its stakeholders to implement the visions through top-down initiatives. Indirect action by the EEC turned into an essential resource for the Airbus countries. Once the Airbus programme was launched the day-to-day work was assumed by the GIE. It evolved into a prospective research unit. After the mid-1970s the Airbus central entity took the lead and suggested extensions of the programme through new aircraft. Since they convinced the national governments they were implemented.

During the 1980s the members endorsed the independence of the European institutions. Issues became so complex that the governments consensually agreed on new prerogatives for the EEC. The erosion of national policy-making was counterbalanced by static and dynamic gains. The policy-making process within the EEC offered them ample opportunities to promote and consolidate their national interests (Hen and Leonard, 1992: 27-30). A similar transfer of decisional power was observed within the Airbus programme. If the A310 initialized by the GIE and the A320 taken up by the GIE after the merger of several projects were more or less endorsed by one of the governments, the A330/A340 were driven by the world market and initialized by the specialists. A world-market consistent portfolio was the best answer to the needs of the national aerospace industries. Therefore the governments encouraged the evolution.

From the mid-1980s to the early 1990s the governments agreed on transfers of further prerogatives to the EEC, among them parts of their foreign policies, and based the national policies on top-down initiatives. Actors from air transport and aerospace actors aligned on the EEC and extended the European framework to air transport. Indirect action involved the EEC more and more into the Airbus programme, notably during the

first transatlantic exchanges. The Airbus Accord of 1992 encouraged the states to associate the EEC as an external negotiator in the name of Airbus to the programme. For the first time the programme became a European issue since the EEC institutions were officially involved. During the same year the states delegated essential state policies to the EU in the Maastricht Treaty. At first sight both events represent reframings of attitudes of state stakeholders in favour of a supranational federation. In fact the partial externalization of the Airbus programme and the political convergence which cumulated in the EU were national strategies to maintain the positive outcomes of the European integration under changed circumstances.

When the Boeing-McDonnell-Douglas merger put the Airbus programme at risk the states officially entrusted the EU with its defence against competitors. It role and influence made it the only possible policy partner. In 1999 when the EADS was established it was again not the accelerating European integration but the world aerospace market that drove the decision. The formal and functional integration of the former national partners located in Europe was the most promising strategy to remain competitive. Another factor was the growing pressure on margins and towards economies of scale owing to the globalization process, itself largely shaped by a widespread paradigmatic change from long-term to short-term thinking often known as neoliberalism. Even if it was formally a company EADS was a complex consensus-based binational framework which served the national interests of France and Germany. Since the EU framework proved the most efficient way to evolve within the reshaped environment, the attitudes of the Airbus-involved stakeholders remained committed to Europe as a production site. When the EADS changed its focus from strategic anticipation to immediate expenditure cutting or shareholder value thinking after the 2001 downturn the states and the EU did not intervene. Large parts of their elites had adhered to this worldview.

Owing to their short-term vision the decision-makers from the national governments and the European institutions did not care to react when parts of the population lost their confidence in the European integration. For these citizens the continental transformation became a symbol for the negative experiences with globalization and neoliberalism such as deteriorated conditions of living (Cassen, 2004: 6-7). When the European constitution was rejected in 2005 the European integration lost its suggestive association with a more promising future. In the meantime the Airbus programme had run into its worst crisis since its managers adopted this very short-term perspective. As a result of both more or less unanticipated developments France and Germany reframed their attitudes from consensual integration back to the competitive nationalism of the 1960s. At this time the promising outcomes of the early European integration had just framed the stakeholders' minds from parallel operation to punctual cooperation (Haas, 1961: 366-392).

As a whole the attitudes of the national governments towards the Airbus programme have mirrored a continuously result-oriented attempt for Situative Optimizations in a national perspective. This is an example of how the state stakeholders have approached and interpreted the political and economic European integration as a whole. Both have been motivated and determined by the classical ambition of the decision-makers to maintain and increase the chances to maintain a dominant or leading position of their country (Senarclens, 2004: 91-96) in a world which, in the opinion of most scholars, has been and continues to be based on the competition for scarce resources (Cohen, 1992: 72-92). One promising strategy has been the autonomy of supply in strategic goods combined with the promise of a monopoly of supply towards other countries (Keohane and Nye, 1989). The Airbus programme has been shaped by the world aerospace market (Golich,

1992: 899-934) and enabled by the resources generated by the European institutional and procedural framework (AECMA, 2002a) which completed the national inputs (Bieler, 1999: 113-122). The stakeholders have experienced it as the only practicable strategy from the beginning to maintain, promote and expand the national airframe industries.

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Chapter 5 - The Known Or A New Airbus (2006 - 2007)?

5.1. Introductory Remarks

Although the A350XWB looked promising the crisis of Airbus was far from over. Until the Paris Aérosalon in June 2007 Airbus remained in a state of stagnation. Historical research endorses a certain timelag between the events and research on them. The latter is not supposed to enumerate the facts but to place them and interpretations – if possible from various epochs – into their wider contexts (Asa-Berger, 2000: 23-25). The events until summer 2007 have been deemed crucial for the future of Airbus by all stakeholders and observers. The chronology and its interpretation complete Chapters Three and Four.

5.2. Continuation Or Disruption?

This section covers the attempted responses to the crisis between the Farnborough 2006 Airshow where the A350XWB was presented and the Aérosalon de Paris in June 2007 when the market endorsed it.

5.2.1. Setting The Stage For The Next Competitions

After 4th September 2006 the A380 underwent its passenger flight testing without incident. All participants praised the aircraft. On 11th September 2006 EADS announced a 5.02 percent stake by the Russian Vneshtorgbank state bank for USD 1.3 billion. EADS was posed to become a partner of the state-controlled aircraft holding Russian United Aircraft Corporation (Airwise News, 2006v). On 21st September EADS announced further delays for the A380. On 3rd October they were said to be ten months. Only one A380 would be delivered to Singapore Airlines in October 2007. This was almost two years behind schedule (Wee and Gunsalus, 2006). All customers were obliged to review their strategies and requested compensations. This new delay loped another USD 3.6 billion from projected EADS profits until 2010 (Gates, 2006a).

On 6th October the Airbus CEO Christian Streiff hinted a major restructuring (Frost, 2006b). The German Minister of Economy warned against major transfers from Germany to France (Karp, 2006a). On 9th October Christian Streiff resigned from his post since he could not implement his radical reforms. He repeated that Hamburg was the weakest link in the chain. His successor Louis Gallois, 61, assumed both responsibilities of Co-CEO of EADS and Managing Director of Airbus S.A.S.. After his studies at French elite universities he had worked for Aerospatiale and the French national railways SNCF. At both places he was appreciated for his workforce-oriented vision and his fairness in negotiations (Airwise News, 2006w). On 10th October Louis Gallois announced a simplified EADS structure (Airwise News, 2006d).

On 18th October Louis Gallois presented the Power 8 restructuring plan. It included the accelerated development of new aircraft, cost savings by 30 percent until 2010 and gains in productivity. The efforts should be shared by the partner countries (Daly, 2006). The urge became clear when Airbus admitted that it would

have to sell 420 A380 instead of 270 to reach break even notably due to compensations. The U.S. warned not to tolerate any subsidies (BBC News, 2006). In the meantime speculations that even the A350XWB did not stand against the B787 circulated (Thomas, 2006). On 27th October weight problems of the A380 were confirmed but said to be under control. All specialists were aware by now that the B787 was too heavy as well (Wallace, 2006). On 3rd November another A350XWB revamp was hinted. In the meantime the A380 problems were traced to incompatible software versions in Toulouse and Hamburg (Rothman, 2006).

On 7th November Airbus suffered a new shock when FedEx switched its much heralded 2002 order for ten A380 freighters to 15 B777. The customer justified this with lost confidence. Unlike the B777 and the B787 the A380 was now seen as a risk by many. In contrast to the passenger version which was mostly compatible with the existing infrastructure the freighter needed massive investments in logistics and facilities (Schlangenstein, 2006). At this critical moment the U.S. renewed the WTO case on 15th November. In their view European contributions were illegal since there had been risk free grants of some USD 23 billion over 40 years. Both the U.S. government and the EU signalled their commitment to negotiations but these were not initialized (Gates, 2006b). On 20th November the Chinese partners of Airbus agreed to launch the plant in Tinjian (Airwise News, 2006x). In the midst of this turmoil Airbus announced an increase in production of the A320 from 30 to 36 per month by 2008 (Airwise News, 2006y). In January 2007 Airbus launched a freighter based on the A330-200. The A330-200F carried 64 tonnes over 7400 km (Sarazin, 2007: 26-29). The aircraft offered 21 percent more capacity and flew 20 percent farther at a cost per tonne 13 percent below that of the nearest competitor (O'Keeffe, 2007: 26-29).

5.2.2. Coming… Coming… Come

On 10th December Airbus officially launched the A350XWB family. Its three members ranged from 250 to 375 passengers and challenged the B787 and the B777. Their cabins were slightly larger than those of the B787. Like the Dreamliner the Airbuses had fuselages of composites but their structural engineering was different. Risk sharing partners were invited. Rolls Royce committed to the engines. Airbus made it clear from the beginning that it needed a second supplier to be able to offer a choice to the customer. Entry into service was scheduled for 2013, which was five years behind the B787. Airbus admitted to lose a first wave of some 600 sales but announced to be ready for a major replacement cycle of early A340 and B777 expected to peak around 2015. A budget of USD 15 billion was advanced which was three times the amount for the initial version. The Power 8 programme was seen as crucial for the new venture. No formal orders were announced, which was unusual for a launch. Boeing played down the impact of the future competitor. Insiders admitted that it would be obliged to revamp the B777-300 and forced to launch earlier than planned the larger B787-10. The main design freeze of the A350XWB was scheduled for mid-2008. This would enable the integration of lessons learned during the B787 flight test programme (Wall, 2006).

On 12th December 2006 Lufthansa became the launch customer of the passenger version of the B747-8 und did not buy additional A380 as expected (Kingsley-Jones, 2006: 10-11). A day later the EASA and the FAA jointly certified the A380 (Karp, 2006c). In January 2007 Boeing announced more gross orders than Airbus for the first time in five years. The figures were 1058 against 824. In February most candidates for the French

presidency made the recovery of EADS one of their themes. The German side reaffirmed to defend its interests (Barotte, 2007: 5). On 19th February the Federal Chancellor Angela Merkel and President Jacques Chirac agreed that both sides should contribute to the A350XWB (Der Spiegel, 2007b).

The French state still owned 15 percent of EADS. On the German side the share sold by DaimlerChrysler was taken over by a group of 15 banks, including eight public-sector institutions (Der Spiegel, 2007g). This new attitude of German policymakers was another first since they had traditionally focused on macroeconomic optimizations and not intervened in favour of individual companies. The German Minister of Economics hinted that EADS might lose defence contracts if it cut too many jobs in Germany. Later he reduced his threat to the plea to distribute layoffs equally among France and Germany (Der Spiegel, 2007e). German aerospace stakeholders called for a more aggressive German industrial policy inspired from French interventionism (Friedmann, 2007). On 20th February EADS confessed the impossibility to launch the Power 8 programme since the French and German stakeholders could not agree on the A350XWB final assembly site (Frost, 2007b). A week later the European Economic Advisory Group (EEAG)[134] made up of professors in economics warned against a return to economic nationalism within the EU. This would undermine the competitively of the European economy (Seith, 2007a).

5.2.3. At Last The Turnaround?

On 28th February 2007 the Power 8 Programme became official. One plant in France, Germany and the U.K. would be divested. Another factory in France and two in Germany were to be sold or closed down. A total of 4.300 jobs in France, 3.700 in Germany, 1.600 in the U.K. and 400 in Spain would be cut, whenever possible without layoffs. Half of the cuts were planned within the 56.000 Airbus employees and the rest within subcontractors. The final assembly of the A350 XWB would be centred in France instead of being split between France and Germany. In return, an additional A320 line would be opened in Hamburg. The successor to the A320 would be assembled there as well (Frost, 2007c). New financial sources should be tapped at the capital markets and through launch aids by the Airbus countries (Seith, 2007a).

On 3rd March Airbus halted the work on the A380 freighter after the sole remaining customer UPS had postponed delivery (Rising, 2007). On 6th March most workers in Toulouse and Hamburg went on strike. In the meantime Airbus had become one of the main themes of both finalists for the French presidency. The right wing candidate Nicolas Sarkozy suggested a state representation in EADS notably in case of a capital increase. The socialist Ségolène Royal supported a bid by several French regions to buy a stake in EADS to compensate for the similar move in Germany. In Germany leaders suggested that the role of government in Airbus should focus on research funding as it had traditionally been the case (Sommazi, 2007b).

On the 9th EADS acknowledged a fourth quarter loss of USD 2.26 billion against a benefit of 593 billion a year before. Louis Gallois confirmed: "It was the worst year for Airbus in its life (…) We have to build a new Airbus (…) It is our priority in 2007 to implement Power 8". He announced further losses although Airbus deliveries would reach 450 aircraft (Moore, 2007). On the same day Finnair, one of the original A350 customers, became the first airline to endorse the A350XWB (Kaminski-Morrow, 2006b). During the ISTAT

[134] www.cesifo-group.de/portal/page/portal/ifoHome

2007 Forum, Steven Udvar-Hazy from ILFC confirmed his preference for two capable competitors after he had criticised the initial A350 at the 2006 event. The founder of ILFC warned that the successors to the A320 and the B737 series might meet competition from China, Japan and Russia by 2015 (Gates, 2007d).

On 19th March the WTO litigation between Washington and Brussels heated up again. According to the U.S. the supports had never forced Airbus to adopt a market and risk-driven approach (Gates, 2007b). The U.S. manufacturers had always assumed the full commercial risk. The EU accused the U.S. of illegal subsidies to the B787 and other aircraft through research (Klapper, 2007c). The U.S. Federal government and two states had allegedly supported Boeing with USD 23.7 billion through tax breaks, development funding and grants (Klapper, 2007d). On 21st March 2007 the U.S. replied that Airbus had received over USD 100 billion in aids. For Boeing the greatest concern was the funding of the A350XWB (Klapper, 2007a).

On 22nd March Airbus announced to allocate five percent of the A350XWB airframe to Russia after signing a letter of intent with Aeroflot for 22 aircraft. After giving the preference to the B787 following its earlier availability the air transport stakeholders favoured Airbus after the U.S. President had criticised the political situation in their country. EADS and Russia also talked about further cooperation (Frost, 2007a).

From the beginning the new French President Nicolas Sarkozy granted his support to the Power 8 programme. French and European aerospace stakeholders and policymakers were relieved that he had been elected (Massy-Beresford, 2007). On 30th May Airbus obtained a major boost when Qatar Airways increased its 2006 commitment to the A350 from 60 to 80 A350XWB of all versions (Kaminski-Morrow, 2007b). Airbus announced a monthly output of 16 A350XWB by 2016 (Kingsley-Jones, 2007). At the same day EADS gave details on the reorganization of Airbus in the context of Power 8. The national centres would no longer be organized around geographical divisions but their function in the production process as it was the case in most transnational corporations (Airbus S.A.S., 2007b). At the G8 summit in early June the French and German heads of state announced a binational summit on Airbus (Bousquet, 2007b).

Although Boeing announced a tremendous celebration for the B787 rollout for the 8th July (Gates, 2007a), rumours on delays and design flaws became more and more insistent (Gates, 2007c). Some project managers at major subcontractors were replaced (Kirby, 2007). Despite this new development, neither Airbus nor EADS was relieved. New details on alleged insider dealing by the former directors as well as a ‘golden parachute’ for the former EADS CEO created a Europe-wide scandal (Bousquet, 2007a).

When the Paris Aérosalon in June was only days away, the A350XWB programme manager boasted: “The competitive challenge is defined. The 787’s risk is the A350XWBs advantage (…) We intend to employ all the tactics that Boeing has used successfully with the 777 against the A330/340 to take the advantage with the A350 to ensure that it is superior to the competition in every measure" (Kingsley-Jones, 2007: 76-84). Experts concluded that the A350XWB might indeed be slightly superior to the B787 but the its arrival half a decade behind the challenger remained a serious handicap (Alcock, 2007: 1-4).

Discussions on Airbus dominated the Paris event. The European manufacturer made announcements for 425 firm orders and 303 commitments of all models including the A380, the A350XWB and the new A330-200 freighter (Martin, 2007: 1). Boeing had 125 sales (Kaminski-Morrow, 2007: 8). Louis Gallois claimed that “Airbus is fully back” (Martin, 2007: 18). Many agreed that Airbus was moving towards a turnaround (Doyle, 2007b: 11). Major questions remained. There was still no second engine supplier that had committed and

ILFC had failed to reconfirm the conversion of the small initial order to the new version. Nonetheless the Airbus had returned to its former well-known pro-active attitude. The commitment to maximize innovations through technological leaps or disruptions without regard for initial cost was promoted again. A brochure brought it to the point: “A350XWB: A step ahead of the B787, a generation beyond the B777” (Airbus S.A.S., 2007a: 27-31).

5.3. The Basics Remained

This section takes a look at the events outlined in Section One in the same way as Chapter Four does at Chapter Three and compares the findings.

5.3.1. Actors And Strategies

In the following the preceding chronology is analysed. Are examined the EADS and Airbus, the states and the European integration process in the same way as in Chapter Four.

5.3.1.1. The Manufacturer (EADS and Airbus)

The presentation of the A350XWB at the Farnborough Airshow did not dissipate the doubts. In September a Russian state bank purchased five percent of EADS. It became a partner for the national aerospace industry (Airwise News, 2006v). In October the EADS CEO hinted a reorganization (Frost, 2006b). Soon afterwards he resigned since he could not implement it. He maintained that the plant in Hamburg was at the origin of the difficulties (Airwise News, 2006w). His successor who assumed leadership of both EADS and Airbus reconfirmed the need to overcome the political heritage of EADS (Airwise News, 2006d).

In mid-October the Power 8 reorganization was presented. It targeted a simplified production and accelerated product development cycles. Initial funding should be assumed by the Airbus countries (Daly, 2006). The A380 delays increased the financial drain (BBC News, 2006). The Chinese partners of Airbus announced to launch the new plant (Airwise News, 2006x). For the first time in five years Airbus lost the order race with 824 against 1058 gross orders of Boeing. (Barotte, 2007: 5).

In February 2007 EADS admitted the impossibility to implement the Power 8 since the question of the A350XWB assembly site remained open (Frost, 2007b). The programme was based on the sale of one plant in France, the U.K. and Germany. Another in France and two in Germany should be outsourced or closed down. 10.000 jobs would be slashed. The A350XWB would be assembled in Toulouse, the probable successor to the A320 in Hamburg (Frost, 2007c). Launch aids and the capital markets should provide the financial resources (Seith, 2007a). In March most workers in Toulouse and Hamburg went on strike (Sommazi, 2007a). In May EADS launched Power 8. Any geographical organization was to be eliminated in favour of an output-oriented structure as it existed in most multinational companies (Airbus S.A.S., 2007b). Attacks on EADS continued. In July alleged insider deals by the former CEOs created a scandal (Bousquet, 2007a).

Large orders at the Paris Aérosalon in summer 2007 for all models did not dissipate doubts on Airbus (Casamayou, 2007a: 4).

The A380 delays were the main worries for EADS and Airbus. In September and October 2006 EADS pushed delivery further back (Wee and Gunsalus, 2006) and announced cumulative losses until 2010 (Gates, 2006a). In October the technical problems were reported to be under control (Wallace, 2006). In November they were traced to different software versions in Toulouse and Hamburg (Rothman, 2006). In December the A380 suffered another defeat when Lufthansa chose the B747-8 passenger version over additional A380 (Kingsley-Jones, 2006: 10-11). On 13th December 2006 the A380 was jointly certified by the European EASA and the U.S. FAA (Karp, 2006c). If the passenger version seemed to get slowly on track it was a different story for the freighter. In November FedEx switched its highly symbolic 2002 A380 order to B777 (Schlangenstein, 2006). In March 2007 the development of the A380 freighter was halted after the sole remaining customer had postponed delivery (Rising, 2007).

The other challenge to EADS remained the A350XWB. According to rumours even the new version was no match for the B787 (Thomas, 2006). In the meantime difficulties of Boeing with the B787 became known (Anselmo and Mecham, 2006). After another update (Rothman, 2006) the A350XWB was launched as a family of three aircraft which challenged the B787 and the B777 in December. Its cabin was slightly larger than that of the B787. Airbus admitted to lose a first wave owing to the delay but would be ready when the early A340 and B777 would became obsolete around 2015. Like the B787 the A350XWB was mostly made of composites. Much of the work would be outsourced. The budget was three times as high as in the beginning. No formal orders were announced. This was unusual for a launch. The main design freeze was scheduled for 2008. From the beginning Airbus announced to optimize the product over the B787 as much as possible. Immediate successes of a freighter based on the A330-200 gave additional hope to win back market share (Sarazin, 2007: 26-29).

Only in March 2007 a first formal A350XWB order was signed (Kaminski-Morrow, 2007a). Following a Russian investment Airbus subcontracted parts of the A350XWB to Russia. Shortly before the Paris Aérosalon in June 2007 the spectacular commitment from the Mideast announced in 2005 was transformed into a firm order and increased to 80 aircraft (Kaminski-Morrow, 2007b). The more the Paris Aérosalon approached the more Airbus announced its ambition to leapfrog the B787 and to make the B777 obsolete with the A350XWB (Kingsley-Jones, 2007: 76-84). During the event in June Airbus refocused the discourse on the need to maximize disruptions and ended any reference to cost saving (Martin, 2007: 18). Boeing admitted a delay for the first flight of the B787 (Gates, 2007a). Since the A350XWB lay years in the future Airbus had no chance to put the difficulties of its competitor to its own advantage but it repositioned itself as the technological leader.

5.3.1.2. The States

Between 2006 and 2007 EADS, Airbus and the French and German governments went through major evolutions. In September 2006 Russia invested in EADS. The country ambitioned to become a superpower again and maximized know-how import. Warnings against technology transfers were immediate (Airwise News, 2006b). When the CEO of EADS hinted the need to restructure the German Minister of Economy warned that he would defend employment (Karp, 2006b). In October the Airbus CEO resigned since his reforms

stood no chance for political reasons. His French successor reconfirmed the need for structural changes (Airwise News, 2006d). In October he hinted the Power 8 programme (Daly, 2006). In November the U.S. relaunched the claim that Airbus had obtained USD 23 billion over 40 years at the WTO (Gates, 2006c). Washington and Brussels announced negotiations but none were held (Gates, 2006b).

In December 2006 the A350XWB was formally launched. Its budget of USD 15 billion was based on anticipated cumulative cost savings enabled by the Power 8 programme and launch aids. Major doubts remained (Wall, 2006). All candidates for the French presidency made the turnaround of EADS one of their priorities (Barotte, 2007: 5). They approached the question in a national perspective. The French state continued to hold 15 percent in EADS. The same domestic policy focus was observed in Germany. Through public sector institutions and merchant banks the German government took over the part in EADS sold by DaimlerChrysler. This contrasted with the German economic policies focused on macroeconomics (Der Spiegel, 2007g). The Minister of Economy appealed to EADS not to eliminate too many jobs in Germany (Der Spiegel, 2007e). German stakeholders requested a national aerospace policy based on the French model. In February the heads of state of France and Germany confirmed that the A350XWB was crucial for both countries but could not decide on the assembly site (Der Spiegel, 2007c). In the opinion of many an open confrontation between both countries was now possible (Seith, 2007a).

Some days later their governments approved the Power 8 reorganization programme. The main cuts were targeted at the overheads. For compensation France obtained the final assembly of the A350XWB. Hamburg would assume parts of the A320 production and later the probable successor (Frost, 2007a). Strikes struck all French and German sites in March. In France both finalists for the Presidency favoured active state intervention (Barotte, 2007: 5). In Germany policy-makers insisted that the government should remain committed to the proven macroeconomic optimization and R+D funding (Sommazi, 2007a). In this critical moment the U.S. announced a new WTO litigation (Gates, 2007b). The EU replied that the B787 which had enabled the turnaround of Boeing was the most subsidized aircraft in history (Klapper, 2007e). The U.S. countered that Airbus had received aids of USD 100 billion throughout its history (Klapper, 2007a).

Based on the Power 8 Programme Airbus outsourced five percent of the A350XWB to Russia (Frost, 2007a). The new French President endorsed Power 8. At the G8 Summit the French and German heads of state announced a summit on Airbus for June (Bousquet, 2007b). They adopted a pro-active long-term perspective and ignored earlier EADS financial scandals (Bousquet, 2007a). In their opinion this was the only way to transform the massive order inflow during the Paris Aérosalon into a benefit (Doyle, 2007b: 11).

5.3.2. EADS, Airbus And European Integration

In the same way as in Chapter Four the relationship between Airbus and the European integration remains to be examined. In a first step the evolutions are parallelized. Next the motivations of the stakeholders can be identified. As outlined earlier the research examines the question whether the state stakeholders behind the Airbus programme have been driven by the European integration or the world aerospace market.

The years 2006 and 2007 witnessed the last steps so far of the European integration[135] and the Airbus programme. The European integration process had peaked in 2004 and stagnated in 2005 after the failure of the constitution. In its ongoing tenth stage the numerous Path Dependences and lock-ins created by the European integration did not erode. What has changed is the perception of the process. After this reframing Europe and the EU have been seen as negative and no longer worth any promotion during 2007 (Nelson and Oxley, 1999: 1040-1067).

It was the opposite for Airbus. After its stagnation the programme underwent a turnaround in summer 2006 and entered an eleventh stage. New industrial stakeholders and decision-makers within the French and German government decided on an appropriate response to the B787. In the eyes of many the A350XWB confirmed the return of the pioneers who felt capable to overcome the crisis after several years of short-term thinking. No reference to Europe was made during the redesign process. Boeing had returned to its former long-term commitment and made the best-selling A330 series more or less obsolete (Croft and Hughes, 2006). The European integration had lost its symbolic value after the failure of the Constitution in 2005. As a result France and Germany promoted each the shared Airbus programme in a nationalist perspective as they had done in the 1960s. Everybody was aware that the problems with the A380 and the challenges of the A350XWB programme could only be overcome through cooperation. In this context a Russian investment into EADS in September 2006 was seen as a sign of trust by many political stakeholders. Others warned against the risk of technology transfers to a competitor of Europe (Airwise News, 2006b).

As it had been the practice for decades the Airbus stakeholders assumed the day-to-day work (Haas, 1992: 1-35). Suggestions to overcome the crisis by EADS insiders were rejected by France and Germany (Der Spiegel, 2007a). Each government feared to be enforced to concessions in favour of the other (Der Spiegel, 2007c). Later the politically biased Power 8 programme followed.

The EU remained outside the Airbus programme until November 2006 when the U.S. relaunched their claim against the launch aids (Gates, 2006c). As it had been the case earlier the EU announced to negotiate in the name of the Airbus countries (Gates, 2006b). Another example for the continuity of the European framework was the certification of the A380 by the EU-initiated EASA (Karp, 2006c). A Seventh Framework Programme from 2007 to 2013 illustrated the ongoing top-down initiatives (Potocnik, 2006). It included applied research in aerospace.[136] December 2006 also witnessed the formal launch of the A350XWB. Again there was no reference to Europe (Wall, 2006).

In 2007 Bulgaria and Romania joined the EU. For both it remained the most attractive option despite the stagnation of the EU. Some warned against the now general indifference towards the European integration. It meant that all countries would lose if the European cohesion eroded (Seith, 2007a). In France the turnaround of EADS became a priority for both presidential candidates. In Germany public institutions participated in a takeover of the former DaimlerChrysler share. The government had never before intervened in this direct way in the Airbus programme. Aerospace was now seen as the way to overcome the economic stagnation (Seith, 2007b). In both countries the STPs were fully national and competitive. Nonetheless their decision-makers remained aware that cooperation remained the only realistic option. After a bilateral bargai-

[135] If not stated otherwise the following Section is based on http://europa.eu/abc/history/2000_today/2006/index_en.htm.
[136] http://ec.europa.eu/research/fp7/.

ning process based on foreign and domestic policy inputs (Evans, 1993: 397-430) without any EU participation they adhered to the Power 8 programme.

The EU re-entered the scene when the U.S. relaunched the WTO claim in March 2007. As usual Brussels took the defence of Airbus and rejected the U.S. claim. In the meantime EADS slowly overcame the problems with the A380 (Sparaco, 2007: 20-26). The pro-active A350XWB reaffirmed the manufacturer's ambition for technological superiority (Cochennec, 2007: 20-26). First significant orders validated the updated design. Since a successful Airbus remained the only practicable way for France and Germany to continue the STPs the governments refocused on cooperation. In both countries the political situation returned to normal. In France the presidential elections were over and Germany had enforced major concessions on France (Beste, Hammerstein et al., 2007). An additional incentive for a return to the former transnational attitude towards Airbus was the U.S. pressure. An agreement on subcontracting work on the A350XWB to Russia helped to restabilize Airbus (Frost, 2007a). The orders at the Paris Aérosalon in June 2007 confirmed the renewed confidence by the world aerospace market. Airbus obtained a new chance to challenge Boeing by the French and German stakeholders and the potential customers.

5.3.3. Association EADS/Airbus And European Integration

As outlined earlier the Airbus programme has served as an optimizer of the strategic aerospace industry through a set of public policies (Knoepfel, Larrue et al., 2001: 25-31) based on the policy goal (Reysset and Widemann, 1997: 4-6) of efficient national aerospace industries (Braddon, 1999: 81-88). Products in demand on the world aerospace market and high priority resource allocation to the national manufacturers (Cosentino, 1999: 15-25) were the strategies to reach the objective. According to the experiences of the political stakeholders from the beginning of the Airbus programme the best way to ensure this Situative Optimization was to obtain maximized inputs from the EEC and later the EU such as framework programmes or participation in transatlantic negotiations (Ansbach, 1997: 3-5). The industrial partners tried to be as pro-active as possible so that they could avoid surprises (Rouach, 1999: 10-28).

Throughout its history the Airbus programme had been governed in a nationalist STP perspective. It was the same with the European integration. Over the years the national governments had transferred national competences to the European institutions. Later the latter had launched top-down initiatives. Whenever one or the other was consistent with the national priorities the governments approved and implemented them. Even in those cases where the states remained the formal decision-makers they often 'tapped' the synergies and resources generated through the European framework (AECMA, 2004). Behind the cooperation among the states did not stand the idea to transform Airbus into a trans- or supranational programme but the strategy seen as the most promising way to optimize the national aerospace industries.

After the blow to European integration in 2005 which was more or less parallel with the failure of Airbus to deliver an appropriate answer to the pro-active B787, France and Germany feared that the results of years of proven STPs might be lost (Airwise News, 2006e). Since the threat to the national aerospace industries seemed serious and imminent (Airwise News, 2006f) the governments adopted a strictly national approach in order to save as much as possible (Airwise News, 2006g). Any reference to Europe or transnational cooperation was now seen as inappropriate. In practice the Airbus programme remained embedded in the

European framework after 2005 and continued to benefit from its trade-offs. In parallel with the attempt to relaunch Airbus through the A350XWB in summer 2006 both countries experienced each a major national turmoil. Their situation further encouraged national approaches to STPs (Evans, 1993: 397-430). In France this was the presidential election, in Germany the recession. Nonetheless, all stakeholders from both countries were aware that the only way to save Airbus was to remain committed to the transnational cooperation. Since both governments knew this each of them maximized the pressure on the other and bargained in order to obtain as many concessions as possible (Saner, 2005: 183-185). At the same time they remained committed to the current European institutional and procedural framework. In this context the Power 8 programme was finally enabled. When the U.S. attacked the Airbus programme in autumn 2006 the EU stepped in. Despite their open competition against each other within the programme neither France nor Germany changed their attitude towards the EU as a negotiator in their name against a common enemy. The Seventh Framework Programme illustrated that both governments continued to build their policies on EU support as they had done before the crisis.

By spring 2007 the Power 8 programme was approved. At the same time the national political situation returned more or less to normal. In France the new President backed up Airbus in a national strategic perspective, in Germany the pending question of the former DaimlerChrysler stake was settled. An additional incentive was the foreseeable end of the A380 problems and the endorsement of the A350XWB by the market. Owing to the lower immediate pressure for reactions (Fink, 2000) and the more promising perspectives the governments became again open to compromises. The reactive crisis management gave again way to elaborate far-sighted strategies (Regester and Larkin, 2002). The Paris Aérosalon in June 2007 showed the promises of a successful turnaround of Airbus for the national strategic industries. The renewed Franco-German cooperation was promoted as the only realistic answer to the challenges and chances in the world aerospace market (Martin, 2007: 60). No reference to the European integration was made. Unlike the Airbus programme the European integration stagnated and no change was in sight. The evocative value of Europe for political marketing campaigns remained low but its indirect action was as welcome as ever.

5.3.4. World Market Remains Main Driver Of EADS/Airbus

The above conclusions allow again the approach to the research question: Have the attitudes of the national stakeholders towards the Airbus programme evolved in the same way as their attitudes towards the European integration? As the history of Airbus until 2006 reveals the world aerospace market-encouraged motivations and not the perspective to contribute to the European integration through the Airbus programme have shaped the decisions. The association of European institutions and especially their programmes has proved the most efficient way towards the expected trade-offs for their national Situative Optimizations. The European framework has been welcomed as a provider of resources for Airbus and less as a goal in itself. The bottom-up transfers of sovereignty to the European institutions and top-down programmes operated by them have yielded numerous trade-offs for Airbus. At every stage the individual governments retained the ultimate control on the national prerogatives to be externalized or the top-down initiatives to be implemented (Senarclens, 2001: 60-70).

The difficulties of Airbus with the A380 and its latest model after 2004 convinced a faction within Airbus and EADS that only a major redesign of the A350 would enable them to remain in business (Croft and Hughes, 2006). Since the European integration had lost its symbolic power after 2005 and the national aerospace industries were at risk the French and German governments refocused on national positions. Particular political events in both countries encouraged their governments to raise the stakes. In France this was the presidential election, in Germany the takeover of the DaimlerChrysler participation in EADS. In the meantime the stakeholders from within Airbus and EADS attempted to overcome the difficulties. Proposals based on industrial efficiency were rejected by both governments since they would have meant a lower national influence. However both governments were aware that a consensus had to be reached. When the U.S. relaunched their claims France and Germany took the EU intervention in their name more or less for granted. It was the same for the indirect action of the Seventh Framework Programme (Potocnik, 2006). The outcome-oriented attitude in a national perspective towards the European integration did not change.

The negotiations of the Power 8 programme were in a competitive spirit without any reference to Europe. Formal commitment to Europe was no longer seen as important despite the numerous trade-offs. Both governments concluded that the only way to ensure a positive outcome for the own national strategic industries was a maximized position within the new Power 8 structure (Martin, 2007: 60). When the difficulties with the A380 were coming under control and the new A350XWB was finally endorsed by the market, the French and German governments became again more inclined towards cooperation. The pressure for immediate and visible reactions lowered. More elaborate but time-consuming pro-active strategies became the most favourable option for the stakeholders again (Fink, 2000). Any reference to the European integration remained absent since this did no longer promise advantages in political marketing campaigns. This illustrated again the ongoing mostly national trade-off oriented approach to the European integration.

Following the above conclusions the period from summer 2006 to summer 2007 confirms the overall parallel, result-oriented attitude of the national policy-makers towards the Airbus programme and European integration. The discourse and the attitudes changed due to the changed framing of the allusions. There were periods where a strong involvement of the European framework served best the national interests; in others the opposite was true. Illustrative examples were the years 2006 and 2007.

5.3.5. Whatever The European Constellation - Always The National Interests First

History divides the attitudes of the governments towards the European integration and the Airbus programme into two parts. The first covers the period from 1964 to 2005 where the venture has emerged, reshaped world aerospace and become a market leader.

During these years the framework established through the European integration consolidated and influenced the policy-making of the Airbus states. For these reason they have relied more and more on ‘Europe’. Over time this continental context or ‘European dimension’ has become more or less omnipresent and an integral part of any decision by the participating states. Worldwide changes as the outcome of a paradigmatic change from long-term commitment to short-term profit maximization modified the attitudes within Airbus. Its approach shifted from pro-active to reactive. Since parts of the elites had adopted this worldview as well they did not intervene when first signs of negative influence on Airbus appeared. The paradigmatic change in-

spired a more critical attitude towards the European integration process by considerable parts of the population. Therefore the symbolic constitution was rejected in 2005. Under these circumstances France and Germany were preoccupied about their national strategic industries. In addition Boeing turned into a strong competitor again.

As it is usually the case when decision-makers feel an immediate risk they focus on what they deem the most immediately needed and feasible corrective action (Wildavsky, 2000: 22-45). In this case this was the direct intervention in favour of the national aerospace industries even if this raised tensions with the partner within the Airbus programme. The European dimension became irrelevant.

A faction within Airbus returned to a pro-active attitude in summer 2006. Since the European integration continued to stagnate from 2006 to 2007 the attitudes of the state actors can be studied under changed circumstances and compared (King, Keohane et al., 1994: 76-77). The analysis reveals that the attitudes in respect to Airbus and European integration remained basically unchanged. State stakeholders continued to privilege their national interests. The strategies evolved fundamentally. Consensual cooperation at a European scale was no longer seen as the most promising approach. Maximized competition with immediate and visible national trade-offs seemed more appropriate. As it had been the case prior to 2005 the integrated Europe represented a source for resources but it had lost its symbolic value for political marketing campaigns. The nationalistic attitude towards the Airbus programme and the European integration remained unaffected by the new context. The results confirm that the apparent but not the real relationship of the states with the European integration process had changed. Airbus and the European integration have been driven by expected trade-offs for the participating governments. This supports the hypothesis that both the Airbus programme and the European integration are outcomes of the same state-centred attitudes.

Chapter 6 - Further Discussion

6.1. Introductory Remarks

The relationship Airbus programme – European integration examined in Chapters Four and Five reveals the attitudes of the national governments in both cases. The final Chapter outlines the overall contribution of the decision-makers directly involved in the development and the promotion of the Airbus aircraft and attempts to look into the future of the venture.

6.2 The People Behind Airbus

6.2.1. Introductory Remarks

This Section outlines the strategies adopted by the industrial managers of Airbus.

6.2.2. The Airbus Programme As An Epistemic Community

After 1945 each supplier fulfilled the role as a strategic industry in the eyes of its government. Since needs for economies of scale grew and the European integration influenced national policy making, the governments experienced cooperation to achieve static and dynamic gains (Guzzetti, 1995: 16-22). In 1959 France and Germany launched the binational Transall programme (Kracht, 1994). Like the Concorde Treaty of 1962 between France and the U.K. it was a punctual agreement (Costello and Hughes, 1976: 67-68).

When first concepts for widebodies appeared in the early 1960s French and U.K. manufacturers discussed a possible cooperation (Mc Intyre, 1992: 10). The governments gained experience in transnational cooperation within the EEC (CEE/CECA/Euratom, 1960). In 1964 France and the U.K. agreed on this approach for a large aircraft (Sparaco, 2005a: 43). Later they invited the Germans. As it is often the case in such programmes the stakeholders delegated the day-to-day work to specialists (Adler and Haas, 1992: 367-390). In 1965 manufacturers and operators concluded that there was a chance to enter the widebody market if the states could agree on a joint programme (Riche, 1965: 20). The suggested twinjet should be available at the same time as the U.S. widebodies. Since investments in ground infrastructure were needed anyway, cost of adoption could be lowered since more aircraft would use the facilities (Spaeth, 2005: 28).

In 1966 the governments endorsed a proposal from the three appointed manufacturers (Endres, 1999: 10). In 1967 the states allowed the manufacturers to initialize the Airbus programme (Sparaco, 2005a: 79). The benchmarks were ambitious but did not target technological disruptions to avoid unexpected outcomes (Aris, 2002: 12). Engineering and final assembly were allocated to Toulouse (Endres, 1999: 10). While the A300 was under development details of the competitors became known. The programme leaders felt the need for a major update which was still possible (Endres, 1999: 10).

At this stage the Airbus programme leadership had already developed into what scholars call an Epistemic Community (Haas, 1992: 1-35). It consists of a group of usually government-appointed specialists responsible for an issue which preoccupies many governments. Since the experts are respected in their field and independent from all states, the governmental officials and other stakeholders trust their proposals and programmes more than if they originate from the competent governmental agencies (Haas, 1992: 1-35)[137]. For the members of the Epistemic Community the programme becomes their 'raison d'être'. Therefore they attempt to maximize the outcomes for the sponsoring governments so that these would remain committed to the programme (Howe, 1997). For this very reason the programme Airbus leadership had the A300 secretly redesigned in 1968. The surprised manufacturers accepted the update since it came from their trusted own specialists (Sparaco, 2005a: 91). After the clearance of contractual lock-ins the governments did the same (Muller, 1989: 62). The pro-active approach by the leaders did in no way question the governmental sovereignty over the national strategic industries but promised to consolidate them. The Epistemic Community approach also solved the potentially fatal dilemma of the engine choice (Mc Intyre, 1992: 30).

In October 1969 France and Germany formally launched the Airbus programme. The U.K. government withdrew after the STP priorities changed but the industrial partner continued as a subcontractor (Endres, 1999: 11). In 1970 the French and German governments gave the moral personality of a Groupement d'intérêt économique (GIE) to the programme. Officially the body was responsible for sales and customer support (Aris, 2002: 55). The formal political and industrial decisional structure was very complex and decision-making promised to be extremely difficult (Hayward, 1987: 11-26). The central entity can be seen as the next step of the Epistemic Community structured around the A300. There have been many cases where the governments or other actors have enabled an Epistemic Community to transform itself into a formal organization (Adler and Haas, 1992: 367-390). Air France, being the most interested, enforced another minor update before signing the first contract ever (Muller, 1989: 83). This 'fine-tuning' illustrated the ongoing attempt to focus on real demand (Michel, Salle et al., 2000: 233-237).

When it entered the market in 1974 the A300 was state of the art in technology (Picq, 1990: 67). It came four years behind the B747 Jumbo and two later than the DC-10 and the Lockheed Tristar. Their earlier availability which had established fleet Path Dependences was one of the reasons why it proved more difficult to convince the airlines of the qualities of the A300 and its complementarities to the other widebodies than expected. The airlines hesitated to commit to two suppliers for long and short/middle-haul services (Mc Guire, 1997: 41). Many operators had doubts on the long-term prospects of the programme. Finally the recession after the oil crisis in 1973 made investments impossible for many of them (Hagrup, 1975). On the other hand the rising fuel cost strengthened the business case of the new aircraft. Since the A300 was tailor-made for shorter routes the emerging carriers in the Far East suddenly had an incentive to split the widebody fleet according to the missions (Newhouse, 1982: 127-140). Table Four compares the A300 with its competitors. The three-engined U.S. aircraft were larger and had been designed for longer routes. This made them less

[137] The concept of Epistemic Community emerged in the context of international expert groups set up to handle an issue in the interest of all interested governments. Examples are environment protection, healthcare or specialized applicable research. In air transport efforts to facilitate transoceanic navigation in the 1950s (Knauss and Bruetting, 1962: 68) or fights against terrorist attacks in the 1970s (Ashwood, 1987) can be quoted. If the existence of Epistemic Communities is widely accepted there are divergences on their definition and notably their analysis in a public policy or S+T perspective (Sebenius, 1992: 323-365). Being of no relevance for the research the discussion is not developed.

appropriate for shorter flights (Muser, 1974: 5-8). The B747 covered another market. All widebodies had created a new Path Dependence through a common disruption (Mokyr, 1990b: 105-107).

Table 4 - The Airbus A300 In The Widebody Market

Entry Into Service	Model	Typical Passenger Capacity[138]	Typical Range in kilometres	Observations
1970	Boeing B747-100 Jumbo	366	9'800	Long-range aircraft with four engines, performance below expectations
1971	Boeing B747-200 Jumbo	366	12'200	Updated long-range aircraft with four engines to meet specifications
1972	McDonnell-Douglas DC-10-10	280	6'112	Middle-range version with three engines
1972	McDonnell-Douglas DC-10-30	280	10'100	Long-range version with three engines
1972	Lockheed Tristar	253	7'419	Promoted as middle- to long-range aircraft with three engines
1974	Airbus A300	263	3'890	Two engines

Source: (Muser, 1974: 60), (Sparaco, 2005a: 352), (Weder and Fricke, 1971: 9-11).

Since Lockheed and McDonnell-Douglas were absorbed by their programmes finalized when the A300 emerged (Berke, 2000: 58-64) they were unable to react (Machat, 2002: 22-41). Boeing was in the process of recovering the investments for the B747 (Lawrence and Thornton, 2005: 75-80). The spectre of a challenger to the A300 put the marketing staff within the GIE under pressure. Discussions with airlines and internal assessments revealed that a shorter variant of the A300 based on the same fuselage had the highest potential (Endres, 2000: 12). In 1976 Boeing invited Airbus Industrie to collaborate on its widebody. Most members of the Airbus Epistemic Community saw this as an attempt to disturb the programme (Endres, 2000: 13). Lufthansa endorsed the new A310 by 1977 but required a better performance (Endres, 2000: 16). Therefore the systems were based on the emerging microelectronics (Endres, 2000: 42-46). Again, the industrial partners approved the proposal since it came from their trusted experts. Later the government followed. The A310 did again not question their national sovereignty at all. The pro-active move based on maximized technology leaps consolidated the national aerospace industries. The same was true for the independent fundamental research carried out by the GIE staff such as a new input device for the pilots (Muller, 1989: 123). Despite the efforts the outcomes of the STP 'Airbus Industrie' remained below the expectations. The governments innovated through financial arrangements (Wensveen, 2005) so that the decisive U.S. market could be penetrated nonetheless in 1978 (Petzinger, 1996: 186-188).

The GIE staff increasingly approached airframe construction in Europe as a whole from its perspective. Many criticised the idea of a parallel consortium in which several of the industrial Airbus partners would launch a narrowbody promoted by the French (Laming and Hewson, 2000: 13). The French Airbus partner even

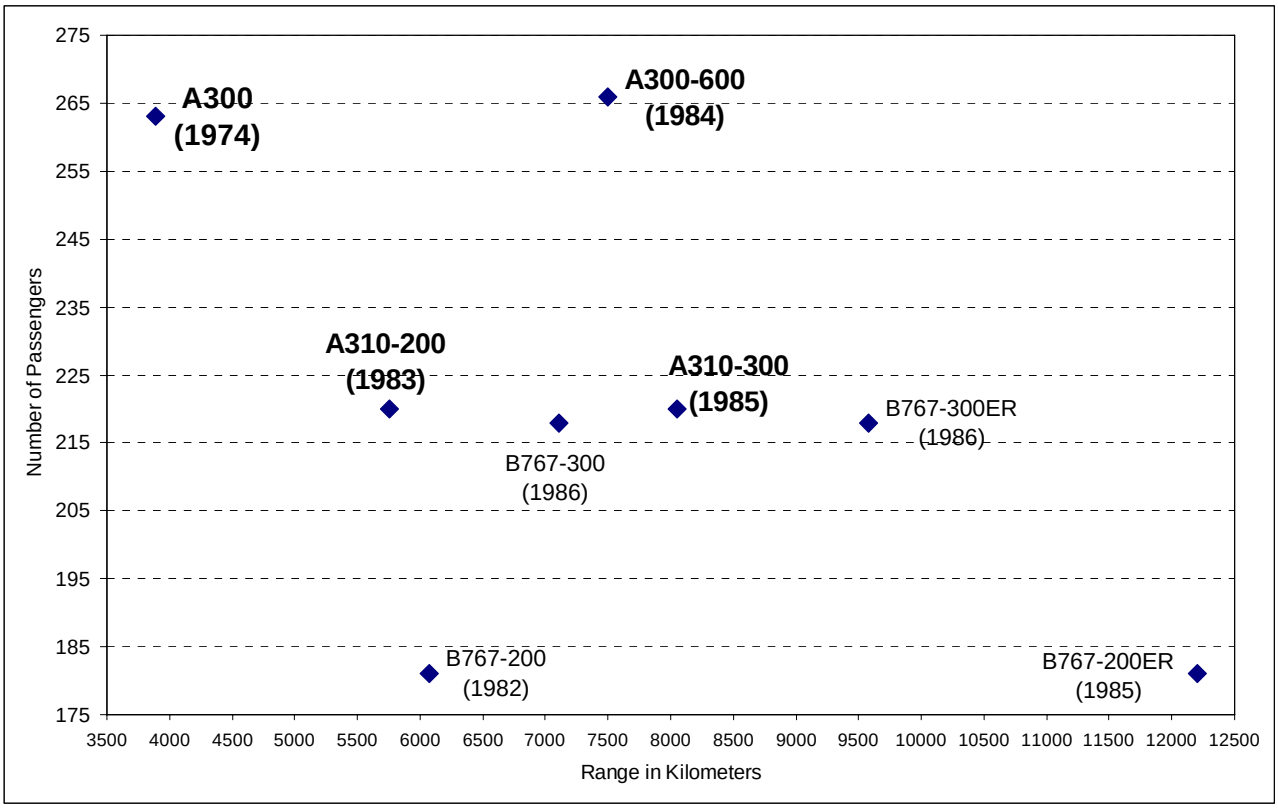
[138] Following the usual two-class configuration of the 1970s.

negotiated with McDonnell-Douglas in 1976 (Marriott, 1992: 10-11). After the failure of the talks the U.K. manufacturer initialized the JET consortium for the narrowbody (Sparaco, 2005a: 15). Unlike the announced updates of the DC-9 and the B737 of the 1960s its proposals were clean sheet designs (Quittard, 1979: 276). The Airbus Epistemic Community saw it as a competitor which might divert resources from them. The same series within their structure would consolidate the Airbus programme and therefore their own position within. The industrial partners soon became convinced. Once they had admitted the U.K. as a full member in the Airbus programme in 1979 the governments accepted the transfer as well (Laming and Hewson, 2000: 16). After the A310 the Epistemic Community led the way towards a consolidated programme for the second time (Adler and Haas, 1992: 367-390).

The A310 was formally launched in 1979. Although the design maximized the technological innovations it required a relatively low overall investment. As it was based on the A300 fuselage the infrastructure could be reused (Sparaco, 2005a: 156). Airbus Industrie competed against the B767 which was a clean sheet design but needed considerable resources. Boeing optimized the aircraft as a whole and did not give the same priority to technological maximization (Lawrence and Thornton, 2005: 80-84). The B767 had a longer range but from a technological point of view the A310 was more advanced. Unlike the U.S. competitor it was fully compatible with the earlier widebodies (Sparaco, 2005a: 155). The shorter range of the A310 was a result of the integral and optimized design and could not be corrected (Endres, 2000: 42). As a way to consolidate its advantage Boeing launched the stretched B767-300 and later extrapolated it into an Extended Range (ER) version (Birtles, 1999: 28). Airbus replied through the major update of the basic model into the A300-600 (Endres, 1999: 58). In 1985 a leading U.S. carrier and the U.S. government intended to consolidate the advantage of the B767 through the Extended Twin Operations (ETOPS) (Moser, 1986: 109-126). The increased mobility stimulated demand for direct flights to secondary destinations (Mittelman, 2000). In response Airbus launched the more elaborate A310-300 (Endres, 2000: 42). The U.S. operator Pan Am preferred it over the B767. Following the principle of non-discrimination the ETOPS were extended to the A310. As a result the STP in favour of the B767 did not translate into a decisive advantage of Boeing over Airbus. Nonetheless the ETOPS introduced an unexpected externality which had not been forecast by anybody (Muller, 1989: 122).

Figure Ten illustrates the attempts to consolidate the own position and to outsmart the competitor. The graph associates typical range and passenger capacity. In the beginning the A300 was the only twinjet widebody. In the mid-1970s the A310 was launched as a derivative. In parallel Boeing initialized the B767. Since it was a clear sheet design the supplier could optimize it for a longer range. Airbus Industrie replied with the A300-600 which continued the market presence of the A300. It also attempted to extend the range of the A310 through the A310-300 to neutralize the B767. Boeing more or less forestalled the reaction and updated the B767, now called the -200, into the Extended Range (ER) version. It was followed by the stretched B767-300 and B767-300ER. The A300-600 remained more or less unaffected by the interaction between the A310 and the B767. Its full compatibility with the existing widebodies and its superior technology enabled the A310 to resist the competitive pressure. As a whole the first two Airbus aircraft can be qualified as successful Situative Optimizations despite the competitive pressure and the changed externalities.

Figure 10 - Competition Among Early Twinjet Widebodies



Source: Author based on (Airbus S.A.S., 2005a: 10-13), (Kreuzer, 1990: 194-202), (Sparaco, 2005a: 352).

In 1981 Airbus initialized the narrowbody as the A320. From the beginning longer and shorter versions were planned (Laming and Hewson, 2000: 18). A superior clean sheet design was the only way to compete against the cheaper U.S. updates of the well-introduced competitors (Kreuzer, 1991: 221-223). In 1981 the MD-81 based on the outdated DC-9 appeared. Slightly optimized versions followed in 1982 and 1983 (Pearcy, 1999: 38-40). Boeing updated the B737 into the B737-300 by 1984 (Kreuzer, 1991: 211-215). After the A320 was initialized Boeing and McDonnell-Douglas looked into the fuel-saving propfan engine (Pearcy, 1999: 35-37). Although Airbus pushed the disruptions to a maximum the A320 looked outdated. Lower fuel prices eliminated the threat. Since the U.S. manufacturers had focused on existing airframes and the disruptive engine failed the A320 was the only new narrowbody (Mc Guire, 1997: 99).

In 1985 McDonnell-Douglas announced the MD-11 as a successor to the DC-10. Owing to the competition by the Lockheed Tristar the DC-10 had never been profitable (Machat, 2002: 22-41). Therefore the manufacturer proposed an update which offered a minimal cost of transfer to the existing customers and which would be available before the Airbus competitor (Marriott, 1992: 20). With the A310 in operation and the A320 narrowbody under development the GIE stakeholders initialized two further extrapolations of the A300 by 1986 without any input from the governments or the manufacturers. One was a larger variant of the twinjet, the other a quadrijet for long-haul routes (Norris and Wagner, 2001b: 23). Among the push factors was the anticipated demand for a successor to the A300 and a long-ranger which would replace the ageing U.S. trijets and allow more flexible schedules than the larger B747. Major pull factors were the available human resources since the personnel-intensive A310 development stage was coming to an end (Jenkinson, Simpkin et al., 1999: 15). From the beginning the two widebodies were almost symbiotic and largely compati-

ble with the A320 (Aris, 2002: 142). The motivation to equip the fleet with the A320 with a higher cost of adoption could be increased through the A330/A340 sharing the same basic characteristics and targeting the larger aircraft reaching the end of their lifespan (Sparaco, 2005a: 204). Therefore the governments endorsed the proposal.

Soon after the formal launch of the A330/A340 McDonnell-Douglas and Airbus Industrie discussed a joint venture based on the integration of the three designs into one (Sparaco, 2005a: 207). Again most within the Airbus programme rejected the idea. At first the governments were open to talks (Aris, 2002: 143-144). In December 1986 McDonnell-Douglas formally launched the MD-11 (Marriott, 1992: 20-22). Airbus Industrie intended to increase the performance of the A340 and adopted the disruptive superfan engine which failed. Unlike the U.S. narrowbodies which were outdated and where the superfan represented the only real update the A340 was a clean sheet design with a superior global performance than the MD-11 based on the DC-10. Therefore the overall impact on the programme was marginal (Norris and Wagner, 2001b: 40). Final assembly of the double Airbus programme was again allocated to Toulouse (Aris, 2002: 246).

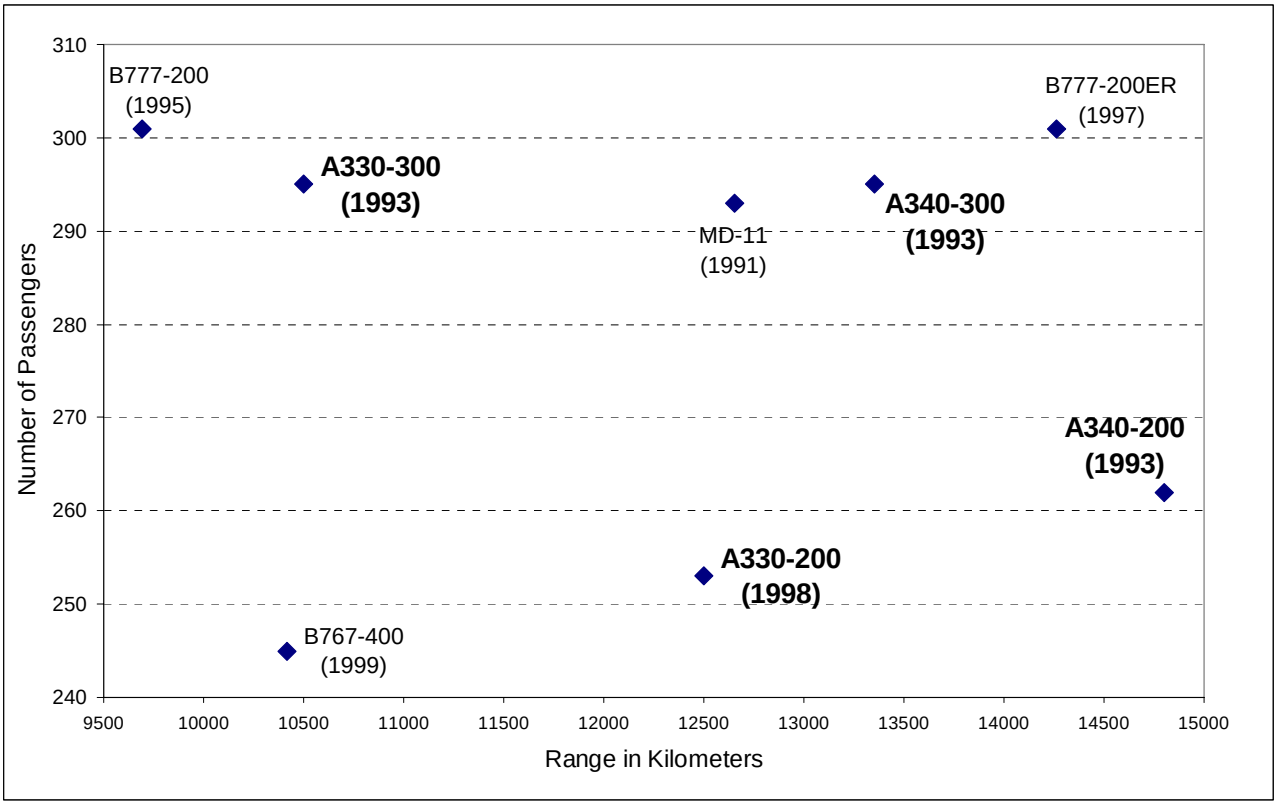
Unlike Airbus Industrie Boeing benefited from Path Dependences which enabled updates of the existing aircraft as a way to minimize the cost of adoption for the customers and to lower initial investments (Lawrence and Thornton, 2005: 93-95). This was one of the pull factors behind the change from a long-term product maximization to a short-term cost saving attitude (Bauer, 1991: 331-333). The B777 which was at an advanced development stage was continued. Since the A330/A340 were defined, Boeing was in a position to make the B777 slightly superior (Norris and Wagner, 2001a: 15). In addition the ETOPS rules were extended so that the twin-engined aircraft outperformed the A340 with four thrusters (Sparaco, 2005a: 230). The MD-11 did not meet the expectations (Norris and Wagner, 2001a: 59). After 1993 the two versions of the A340 and the A330 (Norris and Wagner, 2001b: 44) enabled Airbus to market its family or commonality concept. The parallel certification of the pilots for both the narrowbody and the widebody aircraft allowed considerable economies of scale (Buergi, 1999: 8-9).

In 1993 Boeing negotiated with some of the Airbus partners but not the Airbus programme leadership on a very large aircraft (Norris and Wagner, 1999: 89). Again many saw the initiative as an attempt to divide the partners (Aris, 2002: 174). In parallel the Airbus Epistemic Community centralized several vague national programmes into the new A3XX. From the beginning a maximum terminal compatibility was envisaged (Sparaco, 2005: 107-119). Airbus Industrie acted once again in a pro-active way. The ongoing pressure on travel budgets called for high capacity links between major hubs (Hanlon, 1999: 136-137). Following its strategy to extrapolate existing designs Boeing proposed two larger versions of the B747 (Norris and Wagner, 1999: 90-91). Many Airbus insiders admitted that their go-ahead at the time would have terminated the A3XX (Spaeth, 2005: 53). After the failure to launch an alternative Boeing changed its marketing strategy. It insisted that the travellers would continue to prefer direct flights with smaller aircraft (Hanlon, 1999: 189-195). Many potential customers endorsed the A3XX (Marc, 2005: 29). If the prospects of the A3XX were promising, sales of the A330 and especially the A340 were lower than expected. After 1994 the B777 proved a tough competitor despite the Airbus family concept (Norris and Wagner, 2001a: 64). As a response Airbus Industrie targeted the successful B767 with the A330-200. It became the first smaller widebody twinjet tailormade for ETOPS (Norris and Wagner, 2001b: 151). After 1998 it developed into another bestseller (Norris

and Wagner, 2001b: 95). This time Boeing lacked the resources for an appropriate response. Therefore it reacted through the B767-400 which proved a commercial failure (Norris and Wagner, 1999: 117).

Figure Eleven outlines the competition of the Second Generation widebodies. McDonnell-Douglas was the first entrant in 1991 but failed. The disruptive A330/A340 programme set the benchmark in the second generation widebody cluster in 1993 in middle and long-haul. It also established the Airbus family concept. The B777 came two years later. An ER-update after 1997 outperformed both versions of the A340. The USP of the operational compatibility with the narrowbodies and the overall high qualities of the aircraft nonetheless established them firmly on the market. Airbus Industrie could not counter the B777 directly. Therefore it chose an indirect strategy. Through a derivative of the A330 twinjet, the A330-200 tailor-made for ETOPS, it attacked the best-selling B767 series. This time it was Boeing which was unable to launch a pro-active reply so that it updated the B767-300 into the B767-400 by 1999. As a whole the Airbus widebodies consolidated the Situative Optimization for the contributing national industries.

Figure 11 - Competition Among Second Generation Widebodies

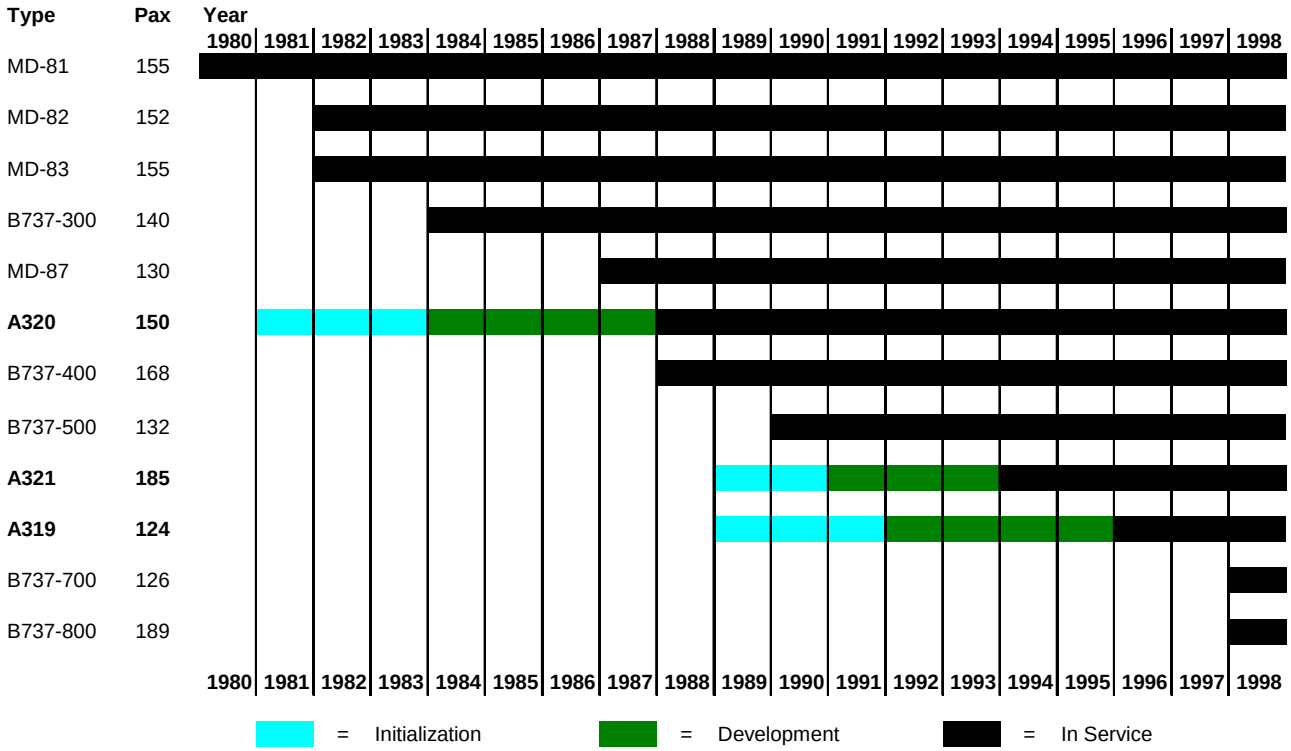


Source: Author based on (Airbus S.A.S., 2005a: 17-21), (Norris, 2006: 32-35), (Sparaco, 2005a: 352).

A similar interaction is observed in respect to the narrowbodies. In 1987 McDonnell-Douglas presented the MD-87 for 130 passengers (Pearcy, 1999: 38). In 1988 Boeing followed with a stretch of the B737-300 into the B737-400 for 168 (Shaw, 1999: 13). In the same year the A320 for 150 people began its career (Sparaco, 2005a: 218). In 1989 the Airbus Epistemic Community announced the stretched version of the A320 as the A321. The airframe was relatively cheap and the industrial partners did not need launch aids (Sparaco, 2005a: 228). In the same year the smaller B737-500 for 132 people appeared (Shaw, 1999: 14).

As a response Airbus Industrie evaluated the shorter A319 for 124 passengers in 1989 (Sparaco, 2005a: 234). Since smaller aircraft need lower investments some of the partners attempted their own programmes (Mc Intyre, 1992: 267). Again the Airbus stakeholders convinced the industrial partners that the 'in-house' solution was in their interest. In 1992 the A319 was launched. Like the A321 it was assembled in Hamburg (Laming and Hewson, 2000: 27-28). In 1997 Boeing presented the B737-800 with 189 seats as an alternative to the A320 and the B737-700 with 126 as the answer to the A319 (Shaw, 1999: 14). Figure Twelve sums up the second generation narrowbody market.

Figure 12 - Competition Among First Wave Second Generation Narrowbodies



Source: Author based on (Airbus S.A.S., 2007a: 8-13), (Muser, 1982: 84), (Norris, 2006: 32-35), (Pearcy, 1999: 19-22), (Shaw, 1999: 20), (Sparaco, 2005a: 352).

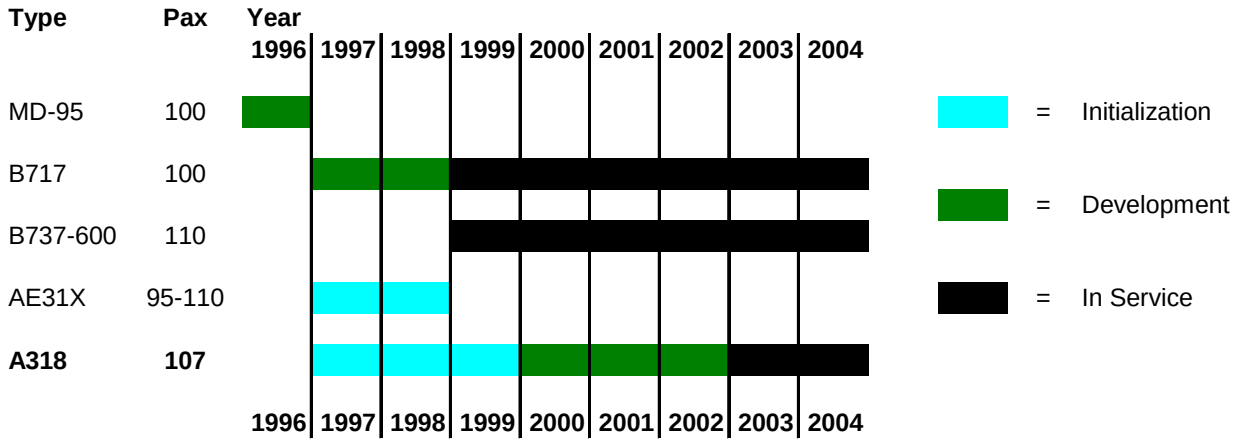
Ranges are less important for this category of hardware than for widebodies. Therefore the average passenger capacity is correlated with the year of entry into service. Boeing and McDonnell-Douglas based all the extrapolations on the ageing DC-9 and B737. McDonnell-Douglas opened the competition with three closely related stretches of the MD-80 series by 1982. Boeing followed with its first update B737-300 by 1984. McDonnell-Douglas reacted to Boeing through the MD-87 in 1987. Airbus Industrie made the A320 as disruptive as possible. Boeing forestalled the new competitor and added the B737-400 and -500. In parallel Airbus Industrie elaborated the A321 and the A319. The former which appeared in 1994 was countered with the B737-800 in 1998. The A319 of 1996 was attacked with the B737-700 after 1998. Owing to their technological superiority the Airbus narrowbodies turned into an optimal STP outcome for the national strategic industries. Since the A321 and A319 were assembled in Hamburg the Situative Optimization strengthened Germany as well as France.

The underfunding of McDonnell-Douglas and Boeing's 'flight from innovation' (Lawrence and Thornton, 2005: 87) had weakened both of them. In late 1996 Boeing took over McDonnell-Douglas (Harrison, 2003). Following its strategic errors Boeing ran into the worst crisis of its history after the merger (Burgner, 1997). Airbus Industrie launched the A340-500 and the A340-600 in 1997 to outsmart the B777 through higher capacity and longer range (Norris and Wagner, 2001b: 112). It was however obvious to all political and industrial stakeholders that Airbus Industrie needed a more responsive structure. In 1999 the European Aeronautic, Defence and Space Company (EADS) was established with the former Airbus organization as a subsidiary (Aris, 2002: 207). It remained under close governmental control. In the same year the A380 for 555 passengers was initialized (Spaeth, 2005: 128). Boeing hinted an aircraft family travelling just below the speed of sound (Cochennec, Angrand et al., 2001: 10-13). Suddenly the A380 seemed outdated. In the opinion of many the Sonic Cruiser was a new attempt to destabilize Airbus through an apparent programme.

After 2002 the A340-600 became the first Airbus aircraft to be slightly below the expectations. Since it occupied a specific niche and fit into the Airbus family concept it remained in demand. A year later the A340-500 renewed with the Airbus tradition to deliver better performance than promised (Knappe, Palomino et al., 2006: 266). During the same years the competition continued within a second wave of smaller narrowbodies. Since 1997 (Sparaco, 2005a: 257) the Airbus Epistemic Community had been thinking about the smaller AE31X in cooperation with Chinese partners (Sparaco, 2005a: 253). It was the reaction to the announced MD-95 for 100 passengers (Pearcy, 1999: 58-59) and the smallest variant of the B737, the B737-600, for 110 (Hewson, 2002: 41-44). Both were scheduled for 1998. After the takeover of its manufacturer by Boeing the MD-95 was upgraded into the B717 and marketed in parallel with the B737-600. Both became eventually available in 1999 (Norris and Wagner, 1999: 36). In 1998 the AE31X venture was abandoned. The Airbus Epistemic Community launched a further shrink of the A319 called the A318 (Sparaco, 2005a: 257). It entered into service in 2003 (Sparaco, 2005a: 268). Sales of the smallest possible Airbus narrowbody derivative remained below the expectations (Hewson, 2002: 41-44).

Figure Thirteen outlines the interaction among the competitors at the low end of the market. McDonnell-Douglas opened it with the MD-95. The machine was under development when the manufacturer was absorbed by Boeing. The latter was working on the B737-600. In the beginning the MD-95 and the B737-600 competed against each other. Airbus Industrie in turn announced a clean sheet design tailor-made for regional routes in collaboration with the Chinese. In parallel the Airbus Epistemic Community evaluated a further shrink of the A319. After the AE31X failed in 1998 the research continued. Notably for this reason Boeing maintained the MD-95 and transformed it into the B717 in 1998. When the A318 appeared in 2003 Airbus had a competitor to both. It was full member of the Airbus family and thus another element of the integral Situative Optimization.

Figure 13 - Competition Among Second Wave Narrowbodies



Source: Author based on (Airbus S.A.S., 2007a: 6-7), (Norris, 2006: 32-35), (Norris and Wagner, 1999: 29-31), (Shaw, 1999: 20), (Sparaco, 2005a: 352).

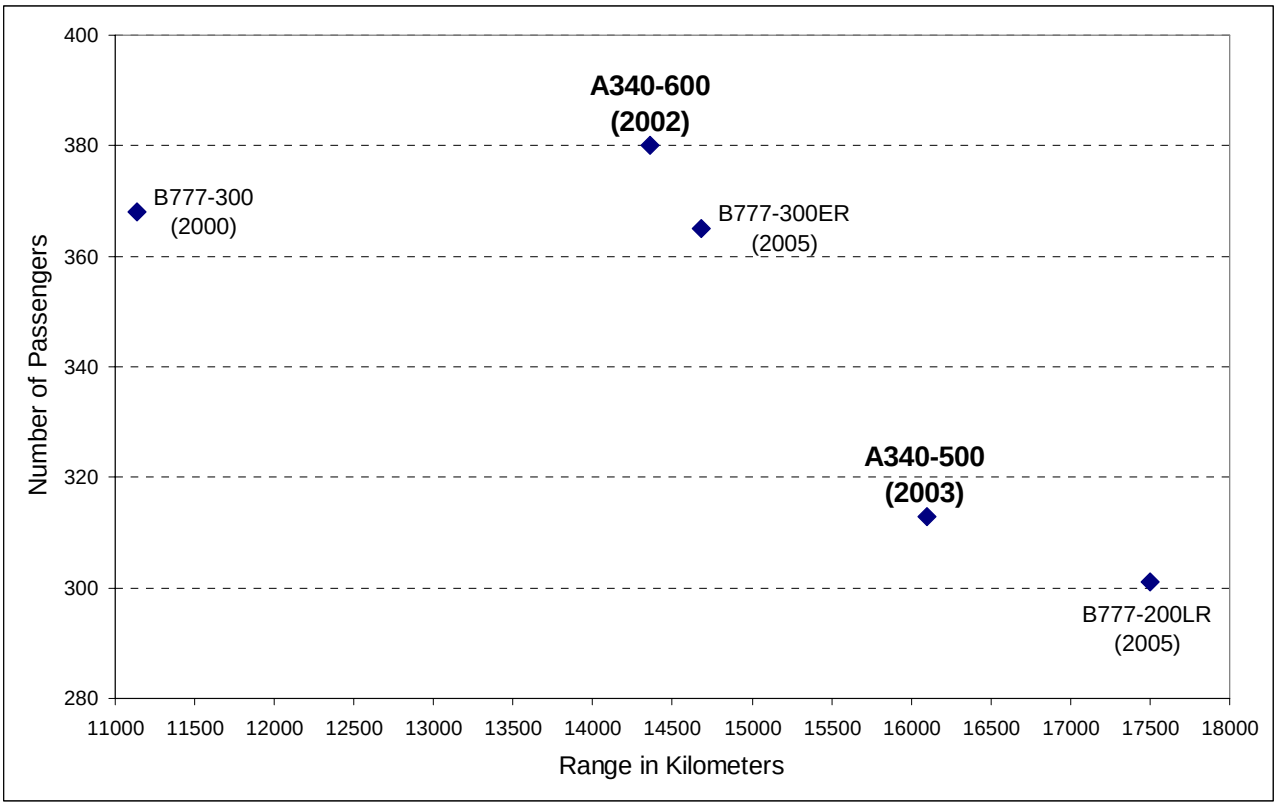
Boeing and Airbus were hurt by the recession after 11th September 2001 (Aris, 2002: 219). Airbus and EADS ended all prospective R+D research with the exception of the A380 (Casamayou, 2002: 11) and the A400M military aircraft launched in the same year (Bombeau and Gaudin, 2001: 50-53). Like Boeing Airbus counted on its established Path Dependences to minimize expenditure (Lawrence and Thornton, 2005: 96-99). By now the Boeing products were mostly outdated (Pritchard, 2005). At the proverbial last moment a new engineering team elaborated a new twinjet widebody targeted at the A330/A340 follow-up market (Masters, 2007: 49-52). As Airbus had done with the A320 Boeing maximized the disruptions with the B787 (Condom, 2004: 17-20). Everybody knew that this was the last chance for a turnaround (Cochennec, 2003: 22-23). From the beginning there were warnings that the attempted technological leap may exceed the feasible (Lawrence and Thornton, 2005: 143-145).

Eminent members of the Airbus Epistemic Community suggested a new widebody family based on a larger and more comfortable fuselage. The interrupted prospective research after 2001 and the resource drain for the very complex A380 made this impossible (Cochennec, 2004: 10-12). Airbus paid the prize for its short-term focus far sooner than had done its competitor. In 2004 Airbus proposed the A350 based on the A330-200 (Cochennec, 2004: 18-23). By the time the A380 rolled out in February 2005 both programmes were known to be very problematic (Thomas and Forbes-Smith, 2005: 10-21).

In the same month Boeing administered the next blow. Again, Airbus had not been able to react as a result of the lack of prospective research and resources. The B777-200 Long Range (LR) had a longer range than the A340-500. New U.S.-enforced ETOPS regulation opened most destinations and the A340-500 with four engines lost its business case (Thomas and Forbes-Smith, 2005: 9-19). By this time everybody was aware that Airbus was confronted with problems (Greising and Oneal, 2005). Many saw the A380 as a failure (Aboulafia, 2006: A20). Airlines defended it (Airwise News, 2006l). A new update of the B747 in late 2005, the B747-8, increased pressure (Doyle, 2005: 26-27). Industrial and governmental stakeholders identified the underestimated complexity of the A380, the R+D freeze in 2001 (Polek, 2006a) and the arrogance of a company which had not experienced any setback for years (Reason, 1997: 6-7) as the roots of the crisis.

As Figure Fourteen reveals Boeing countered the A340 derivatives in a smart way. When Airbus Industrie had launched the A340-500 and -600 in 1997 no competitor was in sight. The stretched B777-300 had a far lower range. A B777-300ER update outperformed the A340-600. The greater shock was the B777-200LR which literally terminated the A340-500 in the same year. Together with the overall crisis the careful blows visibly lowered the future prospects of the Situative Optimization in the Airbus countries.

Figure 14 - Competition Among Current Large Widebodies



Source: Author based on (Airbus S.A.S., 2007a: 22-25), (Hales-Dutton, 2006: 18-19), (Sparaco, 2005a: 352).

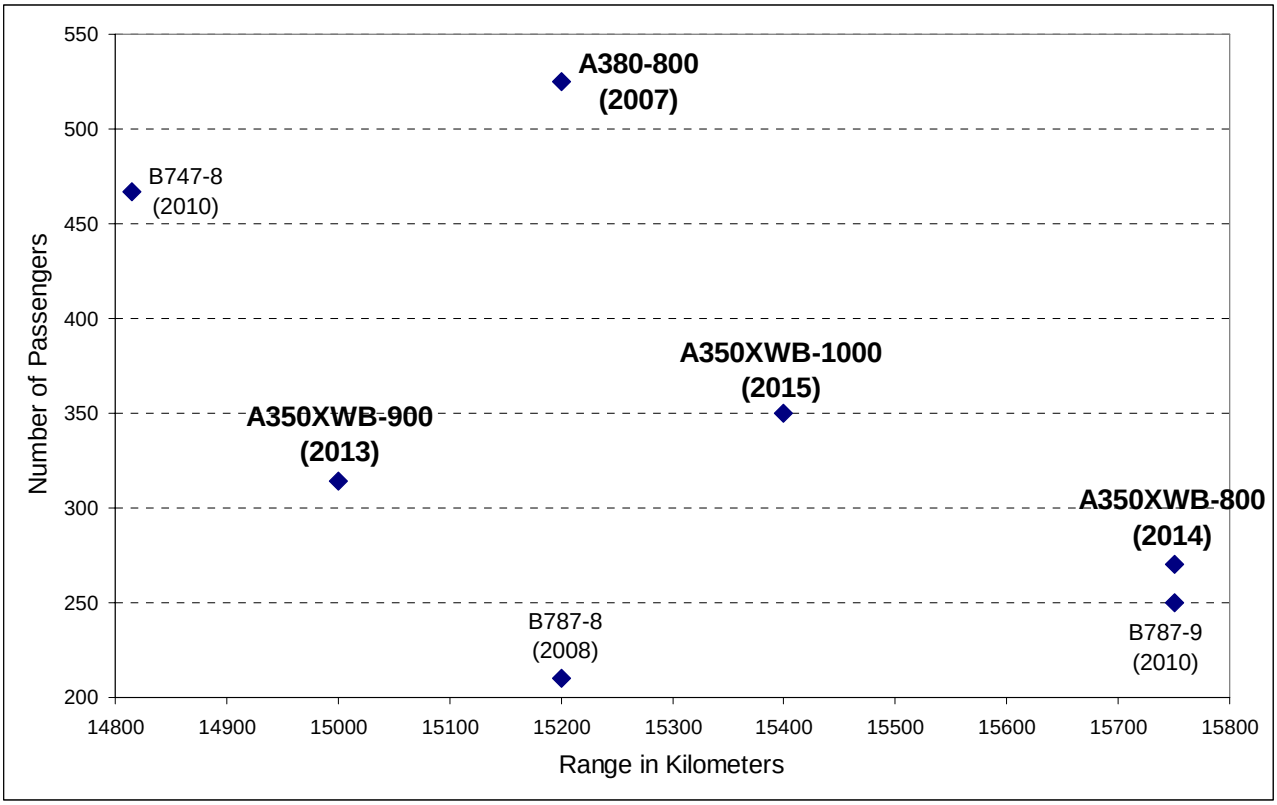
From the beginning the Airbus Epistemic Community had been aware that only an adequate response to the B787 would prevent Airbus from slipping out of the mid-sized market altogether (Norris, 2006: 6). At this time the governments were worried about their national strategic industries. Therefore they accepted the update even if its budget promised a massive resource drain for years to come (Norris, 2006: 5). The launch of the A350XWB in 2006 did not dissipate doubts (Croft and Hughes, 2006). It was punctually superior to the B787 in the same way the B777 was to the A340. Market entry would be five years behind the B787 (Wall, 2006).

In late 2006 Airbus and EADS stakeholders worked out efficiency-based reforms (Frost, 2006a). The French and German governments rejected them since they affected their national sovereignty over Airbus (Airwise News, 2006p). By spring 2007 the Power 8 programme biased in favour of governmental influence was launched (Bousquet, 2007b). By early summer 2007 first signs of a turnaround were noted. The A350XWB attracted substantial orders (Kaminski-Morrow, 2007b). Some even concluded that it might pose the same problems to the B787 the B777 did to the A340 (Gates, 2007e). The delays with the A380 were being over-

come (Sparaco, 2007: 20-26). Massive orders at the Paris Aérosalon in summer 2007 underlined the renewed confidence in the future capabilities of Airbus (Martin, 2007: 1).

Figure Fifteen sums up the current prospects. Delivery of the first A380 was guaranteed for October 2007. Airbus now occupies the upper end of the market. The derivative B747-8 lies three years in the future and will find itself in a category below it. The long-haul versions of the B787 seem more or less on track although Boeing has repeatedly admitted industrial difficulties. They benefit from the earlier market entry but cannot be retrofitted anymore. The new A350XWB may – and probably will – be further upgraded. Although the crisis is far from over and its financial impacts risk to affect EADS for years to come the new product family does again promise a substantial Situative Optimization to the French and German governments.

Figure 15 - Competition Among New Widebodies



Source: Author based on (Airbus S.A.S., 2007a: 32-33), (Hales-Dutton, 2006: 18-19), (Kingsley-Jones, 2007: 76-84).

A research on the attitudes of the state stakeholders towards the Airbus venture would be incomplete without a look into the way the stakeholders within the programme implemented the decisions. In the light of the findings in Chapters Four and Five the decisions by the governmental and industrial stakeholders have been guided mostly by the anticipated impacts of the Airbus programme on the world aerospace market. One of the main driving forces behind the successful Situative Optimizations has been the emancipation of the directly involved stakeholders into a world aerospace market-focused Epistemic Community and their capacity to cope up with technological and economic change. With the exception of the A350 the aircraft have always been pro-active. Whenever a competitor appeared it was not countered by a reaction but outsmarted by an elaborate countermove. Once the top management of EADS and Airbus adopted the same short-term per-

spective after 2001 as Boeing had done this capability was lost. At this time Boeing which had preferred short-term profit thinking over long-term commitment for a decade had been in decline for years. It was not a coincidence that the B787 which offered the last chance for a turnaround was launched in 2003 when Airbus suffered from problems and was unable to react (Cochennec, 2003: 22-23). Since Airbus found itself in a far worse situation than Boeing in less time after this fundamental error the technology and not management inspired Airbus Epistemic Community made its own emergency call in summer 2006. The A350XWB may once again outsmart its competitor. Even other perspectives are getting more promising. For the time being it is Airbus which by now offers the largest and most complex civil airliner ever brought off the ground.

6.3. The Airbus Programme: From Past Results To Future Prospects

6.3.1. Introductory Remarks

This final Section endeavours a history-inspired look into the future of the Airbus programme.

6.3.2. The Airbus Programme in a SWOT-Perspective

So far the research has looked into the past. Historians understand today's past as yesterday's present and the day before yesterday's future (Gaddis, 2002: 111-128). The decisions by industrial and state actors in a Situative Optimization perspective have always been motivated by higher overall trade-offs than potential risks (Morris, 2000: 1-21). A classical example for the former has been the promise for increased sales through a new aircraft, for the latter the adoption of unproven technologies. Such evaluations have always been behind the decisions. Chapters Four and Five illustrate that external factors such as the attitudes of the decision-makers have played a part as well (Ghertman, 1999: 40-73). For instance the move by Boeing in the 1980s to focus on extrapolated versions of the existing models was influenced by the paradigmatic change from long-term commitment to short-term profit. The actual decision was based on the Path Dependences of the customer's fleets which would encourage them to remain loyal to Boeing owing to the lower cost of adoption (Bauer, 1991: 330-333). One and a half decades later the pull factor of the own decline and the push of a disoriented Airbus (Masters, 2007: 49-52) made the B787 the only practicable way to reverse the trend in 2003 (Lawrence and Thornton, 2005: 144-146). Airbus had adopted a short-term vision after 2001 as well (Casamayou, 2002: 11) and suffered from the negative impacts earlier and more than Boeing. The Airbus Epistemic Community understood that the only way to save the Airbus programme and thus their own existence was the equally disruptive A350XWB (Hamilton, 2006).

After the Paris Aérosalon in summer 2007 which concludes the historical review Airbus presents a contrasted picture. The market accepts A350XWB as an alternative to the B787 and a successor to the B777. The industrial difficulties with the A380 are in the process of being overcome (Done, 2007). On the other hand the Power 8 programme still has to show major results and the financial situation of EADS remains tense (Hollinger and Wiesmann, 2007). Any future decision by any of the involved actors will rely on a

situative assessment in the same way as all earlier ones have done (Cowan and Gunby, 1996: 521-542). It covers the available resources (Knoepfel, Larrue et al., 2001: 70-95), the existing know-how to involve them to reach the target (Michel, Salle et al., 2000: 4-14), the situation on the world aerospace market (Rouach, 1999: 11-16), externalities such as geopolitics or technology (Guellec, 1999: 3-7) and a risk assessment (Peretti-Watel, 2001: 9-12). The results are condensed into a 'photograph' of the positive and negative aspects (Farjoun, 2002: 561-594). In a second step the available options are evaluated (O'Brien and Meadiws, 2000: 36-44).

There are several basic methods for this instant picture depending on the attempted outlook. One of them focuses on how the Airbus programme appears able to fulfil its expected mission of Situative Optimization. It covers its Strengths, Weaknesses, Opportunities and Threats. Usually they are abridged into SWOT (Berry, 2007: 1). The analysis is based on a two times two matrix (Berry, 2007: 2). A first pair of foci is differentiated into internal versus external. The former relates to anything relevant for the analysis that mirrors the current status of the entity such as the Airbus programme. Examples are the capacity to innovate, the staff loyalty or the infrastructure. Everything outside the examined entity is external. These are the externalities which can and have been influenced, such as the market, and those which cannot. Examples are macro-economic, technological or social parameters. The second dimension differentiates the helpful from the harmful (Berry, 2007: 3). Again both exist within the entity and its environment. Helpful factors within the entity are the know-how or financial strength. External positive contributions are the Path Dependence on the market, weak competition or political support. Anything negative either within the entity or outside is harmful. Within the entity this may be weak management or outdated tools. Outside strong competition or declining political support may be quoted. Table Five outlines the idea behind the SWOT Analysis.

Table 5 - SWOT Analysis

	Helpful	Harmful
Internal	**S = Strengths** Attributes of the examined entity which are positive for the current situation and helpful to achieving the objective.	**W = Weaknesses** Attributes of the examined entity which are negative for the current situation and harmful to achieving the objective.
External	**O = Opportunities** External conditions which are positive for the current situation and helpful to achieving the objective.	**T = Threats** External conditions which are negative for the current situation and harmful to achieving the objective.

Source: (Berry, 2007: 1-3), (Dugger and Balamuralikrishna, 2007: 5-6).

After the Paris Aérosalon the Airbus programme inspires the SWOT Analysis given in Table Six.

Table 6 - SWOTs Of The Airbus Programme In Summer 2007

	Helpful	Harmful
Internal	**S = Strengths** ✈ Ongoing strong brand despite recent crisis (Nelms, 2007: 35-39); ✈ Substantial aerospace know-how (Sparaco, 2007: 12-18); ✈ USP of Airbus Family Concept (Cross Crew Qualification) (Airbus S.A.S., 2007a); ✈ Coherent product range in process of being extrapolated and updated (Sarazin, 2007: 26-29); ✈ Coherent transition towards future products (disruptive A350XWB maintains Airbus family concept) (Alcock, 2007: 1-4); ✈ Strong motivation to overcome the crisis within Airbus Epistemic Community (Martin, 2007: 60); ✈ Possibility to learn from B787 design for A350XWB (leapfrogging competing product) (Kingsley-Jones, 2007: 76-84); ✈ Possibility to learn from B787 programme errors (outperform competitor's organization and programme management) (Beauclair, 2007: 16-21); ✈ Excellent sales team (Newhouse, 2007: 92-93).	**W = Weaknesses** ✈ Organization weakened by recent crisis (Massy-Beresford, 2007: 7); ✈ Low capital basis for current and future investments (Massy-Beresford, 2007: 6); ✈ Tensions within blue collar workforce owing to Power 8 programme (Casamayou, 2007b: 4); ✈ Demotivated subcontractors owing to Power 8 driven redefinition of contracts (Apter, 2007: 38); ✈ Uncertain overall outcome of Power 8 Programme (Alcock, 2007: 1-4); ✈ Difficulties and delays with A380 not yet overcome (Alcock, 2007: 36); ✈ Open questions with A350XWB (only one engine supplier, risk sharers) (Sparaco, 2007: 12-19); ✈ EADS top management has not only Airbus to control but other subsidiaries as well (Holyle, 2007: 7).
External	**O = Opportunities** ✈ Strong national STP commitments in France (Condom, 2007: 5) and Germany (Bollinger, 2007: 70-73); ✈ Strong customer basis ensures Path Dependence (Goold, 2007: 10-12); ✈ Possibility of unexpected technical (Benichou, 2007: 32-39) and logistical problems with B787 (Trimble, 2007: 10); ✈ Ongoing interest for third party investors (Gates, 2006e) and subcontractors (Martin, 2007: 15); ✈ Market chances increased owing to low fuel consumption (Calvo, 2007: 68-70); ✈ No paradigmatic change towards lower worldwide mobility in view (Jackman, 2007: 24); ✈ Air transport continues to grow in new markets such as India and China (Ionides, 2007: 46-47); ✈ Strong demand for all types of aircraft (Morris, 2007: 44) stimulated by national STPs in new markets and the Gulf (Flottau, 2007: 52-54); ✈ Ongoing direct support by the EU in transatlantic negotiations with the U.S. (Warwick and Turner, 2007: 98-99); ✈ Ongoing positive outcomes of indirect action by the EU (framework programmes, synergies) (Learmount, 2007: 10); ✈ High competitivity of European aerospace industry as a whole (Massy-Beresford, 2007: 100-102).	**T = Threats** ✈ Market lock-out of A350XWB owing to earlier arrival of B787 (Cochennec, 2007: 20-26) and its emerging Path Dependence (Martin, 2007: 20); ✈ Competitor with a similarly motivated Epistemic Community (Goold, 2007: 1-12); ✈ Competitor experienced in sales campaigns (Doyle, 2007a: 11); ✈ Competitor with superior funds and thus able to dictate the pace through replacements of the B777 (Kingsley-Jones, 2007: 25) and eventually the B737 (O'Keeffe, 2007: 28-31); ✈ Competitor backed up by U.S. STPs (Casamayou, 2007c: 4); ✈ Risk of new hostile action by the U.S. against launch aids (Warwick, 2007: 5); ✈ Possible rise of new competitors (notably China) (Kingsbury, 2007: 45-47) benefiting form short-term minded technology transfers (Dahlkamp, Rosenbach et al., 2007: 19-34); ✈ Risk of enforced changes due to environmental awareness (O'Keeffe, 2007: 10-13); ✈ Risk of political destabilization in key markets (notably Gulf region) (Kingsley-Jones, 2007b: 5); ✈ Risk of changing geopolitics [war (Trimble, 2007: 5), terrorism (Naudin, 2007: 66-69), fuel prize (Linn, 2006) or raw materials supply (Beauclair, 2007: 18-21)].

Source: (Berry, 2007: 1-3), (Dugger and Balamuralikrishna, 2007: 5-6), (Powell, 1992: 551-558).

6.3.3. An Airbus Programme For Tomorrow

The SWOT Analysis offers a point of departure for an evaluation of the available options. Actual decisions are based on the visible alternatives to project the present ambitions into the future (Frei and Ruloff, 1988: 324-327). Strategies for such 'looks into the future' are extrapolated current trends, notably in technology

(Halal, Kull et al., 2000: 355-368), analogies with past situations under similar circumstances (Frei and Ruloff, 1988: 173-177) or scenario building (Graf, 2002: 13-34). Since this is outside its scope the research limits itself to some general thoughts. At first sight the Airbus programme seems indeed "fully back" as the EADS CEO claimed at the Paris Aérosalon in 2007 (Cochennec, 2007: 12-14). The Airbus Epistemic Community and the managerial stakeholders within EADS successfully convinced the divided state stakeholders back into cooperation. Both were determined to outsmart the competition through the pro-active inventions on the A350XWB (Kingsley-Jones, 2007a: 5).

Even during the crisis the Airbus programme remained a Situative Optimizer for the national aerospace industries (Doyle, 2007b: 11). When Airbus ended its prospective research in 2001 almost anybody was aware of possible problems (Casamayou, 2002: 11). Warnings not to underestimate Boeing had been issued eleven years ago (Campbell, 1996: 14-17). Many saw the crisis as the opportunity (Kingsley-Jones, 2005) to implement the necessary industrial reorganization through the Power 8 reform programme. When EADS had been established the production processes had not been redesigned (Casamayou, 2004: 4). Updates only were possible for the A380 (Lancesseur and Lecompte-Boynet, 2007: 20-26). The A350XWB enabled a new overall approach inspired from the difficulties with the A380 (Petroski, 2006: 97-115). Final assembly was centralized in Toulouse. This was the result of binational negotiations among two competing sovereign states (Der Spiegel, 2007c). Their governments understood that a return to the former consensus was the only way to save the Airbus programme (Massy-Beresford, 2007: 7). The Airbus Epistemic Community backed up by a new EADS management successfully convinced them (Sparaco, 2007: 12-19).

Despite its back-up by the states the Airbus programme remains fragile. Its qualified workforce (Sparaco, 2005a: 337-342) is discouraged. Everybody saw the divestments and layoffs as (yet another) proof of incompetence of well-paid managers (Der Spiegel, 2007d). As a whole the Airbus Epistemic Community, the established brand and the ability by all actors to overcome nationalistic frictions are promising for the common future. On the product side the Airbus Family Concept and a market-consistent portfolio remain the main USPs (Buergi, 1999: 8-9). The new A330-200 freighter is again a class of its own (O'Keeffe, 2007: 26-29). There had been warnings that the Airbus family concept may lead to a fatal lock-in once the technology is outdated. In fact cockpits have evolved in time while remaining fully backwards compatible. This is even the case for the disruptive A350XWB (Bregier, 2007).

Airbus has delivered the A380 almost two years later than planned (Cochennec, 2007: 10-16). Since the difficulties were process- and not aircraft-related (Champion, 2005) Airbus used the time for an intense flight test programme (Kingsley-Jones, 2007: 28-32). In October 2007 the launch customer put the A380 into service (Cochennec, 2007: 42-45). Overall A380 numbers will remain limited since the aircraft is only suitable for traffic between major hubs (Leahy, 2007). On the other hand two airlines are already requesting the stretched version. Airbus will not be able to launch it well into the next decade owing to budget constraints (Moores, 2007). The financial impacts of the crisis as a result of the penalties and lost balance payments will drain Airbus well into the next decade (Airwise News, 2006q).

The second critical programme is the A350XWB. For the time being it seems on track but will trail the B787 by five years. Airbus centres its marketing campaign on the "worth waiting for" argument (Leahy, 2007). The B787 cannot be retrofitted anymore so that the A350XWB designers systematically adopt superior alternatives. For instance the cabin is wider or six large screens are installed in the cockpit instead of five as there

are on the B787 (Cochennec, 2007: 46-47). It was however Boeing that had initiated the technological leap towards this new kind of visualization (Dupont, 2005: 26-27). The B787 is the first large aircraft made of composites and Boeing does most of the pioneering work (Beauclair, 2006: 28-29). Airbus can build upon this pre-existing experience from the beginning (Beauclair, 2007: 16-21). The massive investments needed for the A350XWB and its arrival by 2013 remain problematic (Croft and Hughes, 2006). Even after the difficulties became known the B787 continues to attract customers. By now the race stands at 817 against 292 firm orders (Cochennec, 2008: 22). According to some the A350XWB has missed the window of opportunity so that Boeing will dominate the mid-sized market. On the other hand delivery positions far beyond 2013 are booked (Martel, 2007: 5). Nonetheless it has to be acknowledged that lessors have ordered more B787 than A350XWB (Goold, 2007: 12B). It is highly improbable that their customers will operate the A350XWB in parallel. Most specialists conclude that overall demand over the next decades is large enough to sustain both competitors (Beauclair and Cochennec, 2007: 32-39). Finally the airlines fear monopolies of supply. Whatever the further progression of the new mid-sized widebody, the A350XWB has already revigorated the Airbus programme and given back the operational independence to the technology- and world market-driven Airbus Epistemic Community from management and governments. Situative Optimization will consolidate.

Boeing has one main advantage over Airbus since it operates from within the Dollar area. Airbus and EADS are penalized by the exchange rate Dollar – Euro (Apter, 2007: 22). For historical reasons airframes are billed in Dollars. For Airbus the strong Euro is problematic and may enforce updates (Morrison, 2007: 11).

Another question is the future of the narrowbodies. When the A320 entered the market it leapfrogged the MD-80 and the B737 series. Boeing has continued to update the B737. The A320 has become the best- and longseller. Margins on narrowbodies are lower than those for widebodies but the huge number of sales compensates for this (Aboulafia, 2005). For some time Boeing has hinted a similarly disruptive new aircraft as the B787 for the narrowbody market (O'Keeffe, 2007: 28-31). Since the U.S. aircraft are rather inferior to the A320 family a revigorated Boeing fighting a destabilized Airbus may be tempted to launch another programme. There are arguments against. Owing to the urge to replace the aircraft of the 1980s and the long delays for delivery airlines are ordering the current models in large numbers with deliveries stretching well beyond 2010 (Airwise News, 2006y). Airframes based on extrapolated current designs and new versions of the engines would lower the cost of operation by a few percent (Kingsley-Jones, 2007: 11). Only disruptive engines promise gains which justify the investments. Options are being explored (Warwick, 2007: 28-35). Additional disruptions such as new body shapes are being examined within the Seventh Framework Programme (Bollinger, 2007: 70-73) and U.S. initiatives (Warwick, 2008: 20). For the time being there is no incentive to launch a new race for innovation. Experts conclude that the decisions to initialize successors lie at least five years in the future (O'Keeffe, 2007: 28-31). The current Airbus narrowbody family represents a more than adequate contribution to Situative Optimization in the Airbus countries and the European economy as a whole.

For some years Airbus and Boeing have been warned against new competitors. In their markets the Russians (Casamayou, 2007: 10-12) and Chinese (Leithen, 2007: 38-41) are possible candidates. Others include Brazil (Kingsley-Jones, Croft et al., 2007: 37-45) and Japan (Jackson, 2007: 32). China has never hidden its ambitions in aerospace. The first airframe is a regional jet of the size of the B717 or the A318 (Julian, 2008: 32-33). Its potential outside the STP-enforced sales to national carriers is uncertain. Russia,

China and Japan are currently partners of Boeing and Airbus (Lawrence and Thornton, 2005: 100-102). Warnings against technology thefts are frequent (Dahlkamp, Rosenbach et al., 2007: 19-34). Airbus is advised to remain vigilant. Its Asian partner may turn into a competitor. Some experts claim that design and sales remain crucial and not manufacturing. As long as the Airbus Epistemic Community retains its capacity to be a step ahead of the competition and reverse engineering additional pressure may stimulate innovation (Gates, 2007d). For the time being no challenger to Boeing and Airbus is in sight but this may change.

Aerospace will remain a strategic industry. France and Germany can be assumed to continue and even intensify their STPs. The Airbus crisis has made them clear that only cooperation ensures Situative Optimizations to them. Even the cumulated resources of both countries remain limited. Therefore they continue to integrate the additional trade-offs from the European integration. Framework and other programmes (Learmount, 2007: 14) and the participation of the EU in negotiations continue to act as the main drivers. In the U.S. aerospace remains a priority (Warwick, 2007: 9). U.S. leadership in the civil market has been challenged by Airbus. By now it attacks its competitor in the military tanker business. Boeing has lost contracts in the U.K., Australia and Saudi Arabia (Hoyle, 2007). The latter has been a traditional ally of the U.S.. A next round of negotiations on the launch aids to Airbus is scheduled for February 2008. As it has become the custom the EU reacts through a counter-claim on indirect subsidies to Boeing and the B787 programme (Frances, 2007). Transatlantic tensions are not likely to drop (Heymann, 2007).

As far as the European integration as such is concerned it remains of limited relevance for Airbus. Two events in December 2007 have relaunched the discussions. The Treaty of Lisbon based on the idea of a Constitution for the EU was signed[139]. To what extend it influences future events remains open. The other was the extension of the Schengen Agreement to former communist countries (Schelter, 2007). Reactions to both events were mostly sceptical[140]. The European integration is expected to continue. The European policy-making framework has evolved as well. By now the EU promotes emission standards for aircraft (Cochennec, 2007: 18-20) and policies to implement them within the international air transport regime (Daoust, 2007: 32-33). It also pushes fundamental research in aerospace (Coppinger, 2007: 30). The aerospace actors continue to see Europe as a policy framework and not their 'supreme fatherland' (Coudenhove-Kalergi, 1953: 60) which triggers 'Euro-nationalist' feelings (Guzzetti, 1995: 36). Their minds remain framed on globalization and competition. The institutional and procedural framework remains above all an additional resource provider for the Airbus stakeholders.

Growth will continue to drive the world aerospace market. Demand will remain high for large and smaller long-haul aircraft (Leahy, 2007). The massive order intake will slow down since the aircraft have to be absorbed by the market. Demand has always been cyclical. Both airframers have massive backlogs which ensure several years of production (Cochennec, 2008: 22).

Forecasting remains uncertain. Some general trends which may influence the Airbus programme are nonetheless identifiable. In the last years there has been a growing awareness for CO^2 emissions and their alleged role in the climatic change (Laharrere, 2007: 64-69). Manufacturers and operators are by now motivated to lower fuel consumption (Turner, 2007: 23). Other factors with a possible impact on the future of

[139] http://eur-lex.europa.eu/JOHtml.do?uri=OJ:C:2007:306:SOM:EN:HTML.
[140] See http://news.bbc.co.uk/2/hi/in_depth/europe/2003/inside_europe/default.stm for a general discussion and http://news.bbc.co.uk/2/hi/europe/7139265.stm for the Lisbon Treaty.

Airbus may be terrorism which is hardly predictable (Naudin, 2007: 251-254) or geopolitical disruptions such as a crisis in the Gulf (Hourcade, 2007: 62-67). More vague questions include the oil peak (Deffeyes, 2005: 179-188), rarefaction of raw materials for airframe construction (Beauclair, 2007: 18-21) and alternative fuels (Airwise News, 2006t). Airbus has been doing research in hydrogen powered aircraft for years within EU research programmes (Sparaco, 2005a: 349). All three are irrelevant for the topic of the research.

Airbus will remain a promising STP for the involved governments and one of the benefiting entities from the European policymaking framework. In order to maintain the national sovereignty European bidders for the plants for sale were selected (EADS, 2007). It is less new competitors or macroeconomic disruptions that will jeopardize the Airbus programme but the low financial resources for years to come. Further pro-active moves will be more difficult. Of course there remains the risk that something unexpected happens. The Airbus political and industrial stakeholders can only attempt to anticipate as much as possible. This had been their strategy for decades and seems to be their approach for the years to come.

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Conclusions

Introductory Remarks

The Airbus programme has been shaped by continuous innovations and optimizations. Both were driven by the ambition to outperform the competition in future.

The Airbus Programme As An Innovation and Optimization Process

For years, the Airbus programme has been a part of the day-to-day life of aerospace stakeholders and decision-makers in a variety of national, European and international institutions. The cumulated outcomes led to substantial changes in different fields (Herrera, 2006: 30-34). Critics argue that more than 'just' this multinational programme has been necessary to reshape the world. This is certainly true but history is always the final outcome of many interactions and influences (Gaddis, 2002: 5-16). One example is the role of the Airbus programme as a technology driver. Microelectronics and communication technologies have accelerated decision-making and increased mobility (Cairncross, 2001: 6-19). Demand for air transport has grown. The second Airbus model tailor-made for this new demand opened the era of microelectronics in airframe construction. Some of the impacts of the Airbus programme are directly visible. When it was launched the U.S. competitors Boeing and McDonnell-Douglas were slow to react (Machat, 2002: 22-41). Changes in the world aerospace market were not the only factor behind the decline. Another was the shift towards short-term thinking (Lawrence and Thornton, 2005: 61-74). In the opinion of many this has been a major reason for the discussions on the alleged 'deindustrialization' in the U.S. (Hayes and Wheelwright, 1984: 1-8).

A closer look at Airbus reveals similarities among the two remaining competitors. Both have continued to offer the adequate responses to demand. They do less easily admit state assistance. The various Airbus programmes have been enabled through launch aids (Lawrence and Dowdall, 1998). Boeing has benefited from permanent military and indirect scientific subsidies (Braddon, 1999: 81-88).

The main driver of the Airbus successes has been the permanent commitment by the involved stakeholders. Once the programme was launched they intended to transform it into a technological and institutional innovation. Firstly, they submitted a design which was different from those of the U.S. widebodies but nonetheless shared their functional characteristics (Airbus Industrie, 1973b). Towards the end of the decade the next aircraft maximized the use of new technologies. The A300 established a bridgehead in a new market, the A310 outpaced the competition. The A320 and A330/A340 set disruptive overall standards. Gains of productivity were even higher after the Airbus family concept became effective. Airbus extended its market coverage when it extrapolated the initial models. Finally the A380 established a new monopoly of supply. These repeated and interrelated successes would not have been possible without the European integration. From the beginning the central institutions felt responsible for the programme. Although the national mentalities did

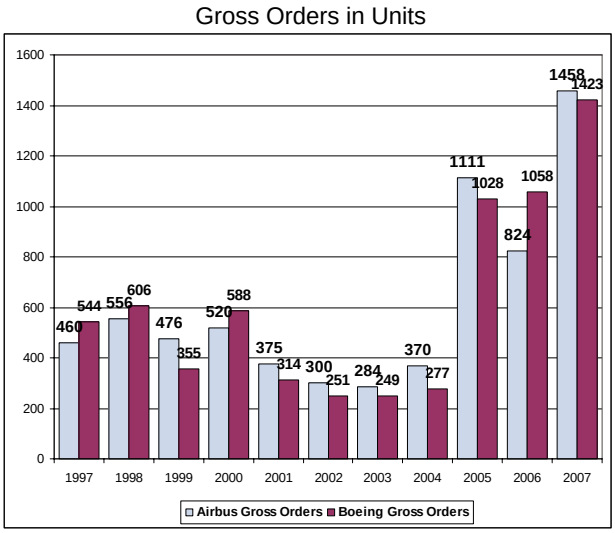
not yet endorse a truly European venture both industrial and political stakeholders soon relied on outcomes in form of trade-offs of the European integration for the strategic planning. As this proved the most efficient way to assist the state-dominated strategic industries the European stakeholders made aerospace one of the focal points in their top-down initiatives. Over time Airbus established its Path Dependences within the fleets of a growing number of customers. Later this microeconomic change reached a macroeconomic relevance when the configuration of the national aerospace industries evolved. As a result the economy of Europe as a whole was transformed (Hansson, 1999: 191-198).

It has been generally agreed that the success of the Airbus programme is the combined outcome of the programme launch at a time when details about the U.S. designs were known and would be taken into account (Ingells, 1973: 169-179), the chosen type of aircraft, the motivation to do it better than the competition (Siegmund, 1997: 24-25) and the trade-offs of the European integration (Mc Guire, 1997: 40-42). From the beginning Washington has done everything to defend the national aerospace industry (Horrocks, 2006). The massive STPs did not prevent the natural outcome of a competitive shift in a limited market: The U.S. manufacturers lost ground. Even the ultimate U.S. STP which was the merger of McDonnell-Douglas and Boeing in 1997 did not reverse the trend. Only the Airbus crisis caused by the arrogance of leaders who have known the success for years and the negligence of the future gave a new chance to Boeing.

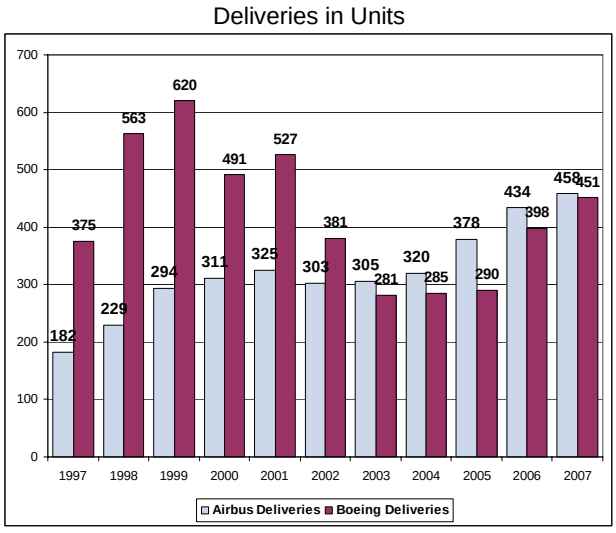
Figure Sixteen shows the evolution of the Airbus share after the duopoly came into being. The merger was a defensive measure to strengthen the U.S. industrial platform (Aktas, Bodt et al., 2001: 447-480). Following the recession after the 11th September 2001 and a general saturation in the airframe market (Casamayou, 2002: 11) sales dropped. Boeing ran into a crisis and Airbus was able to overtake it. As negotiations are usually long and complex the number of successful conclusions was not affected by the Airbus slowdown. By 2006 the European supplier suffered from the management and the engineering crisis. Boeing benefited from the strong interest in the B787. In 2007 Airbus booked again more gross commitments although the net orders (gross orders minus cancellations) stood at 1338 for Airbus and 1413 for Boeing (Cochennec, 2008: 20-28). As far as sales skills are concerned gross orders are more illustrative than net orders (Newhouse, 2007: 100-107)[141]. Aircraft represent means of production (Wensveen, 2005) where cancellations are usually involuntary and made only to avoid the worst (O'Toole, 2003). Boeing deliveries fell after the orders from before the crisis were executed. Airbus systematically increased its output capacities.

[141] The difference is mostly due to the transfers of the commitments for the initial A350 to the A350XWB. Earlier orders were cancelled as they were replaced by the converted new orders. These had to be renegotiated under particularly difficult condition s owing to the delay (Cochennec, 2008: 22).

Figure 16 - Airbus And Boeing Gross Orders And Deliveries



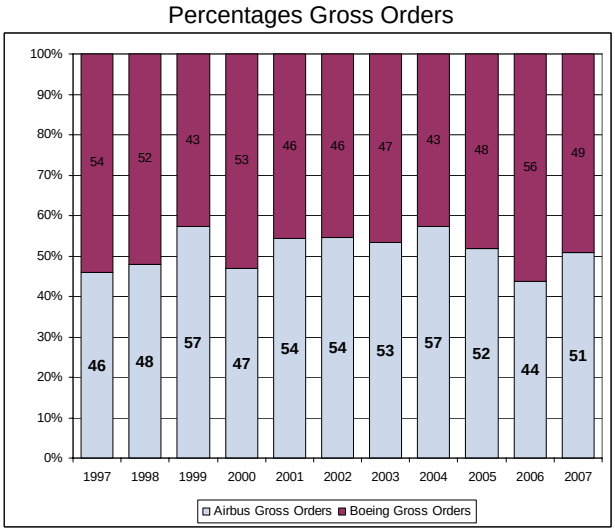
Source: (Heymann, 2007), (Kingsley-Jones, 2008: 10).



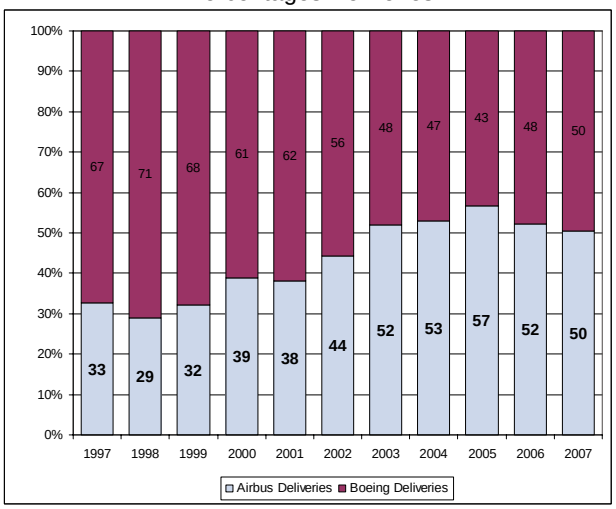
Source: (Heymann, 2007), (Kingsley-Jones, 2008: 10).

The percentages in Figure Seventeen give an even more evocative illustration of the rise of Airbus.

Figure 17 - Airbus And Boeing Market Shares In Percent



Source: Author extrapolated from (Heymann, 2007), (Kingsley-Jones, 2008: 10).



Source: Author extrapolated from (Heymann, 2007), (Kingsley-Jones, 2008: 10).

The above data confirms that the Airbus programme has enabled a Situative Optimization. The venture thus represents a successful innovation (Marshall, 1999: 179-189). It has influenced national (Nelms, 2007: 35-39), European (European Commission, 2007) and international politics (Klapper, 2007b).

A first point is the very way it succeeded. At the beginning there was the need felt to increase the prospects of the European aerospace industry. The inventors were inspired by the potential of a new category of wide-bodies. The stakeholders able to decide on the launch were convinced (Alter, 2002: 15-40), as were the early adopting national airlines. Changing externalities such as higher fuel prices and the absence of competitors enabled further gains of productivity. When the competition reacted Airbus was able to present the superior A310. Most of its early adopters were airlines which operated the A300 (Endres, 2000: 55-56). The

greater mobility of the factors of production raised overall demand for air transport. A further change in the narrowbody market enabled Airbus to maximize the promises again. When a similar window of opportunity opened for the widebodies Airbus innovated through the A330/A340. The Airbus Family Concept increased the overall productivity. The transition was facilitated by new externalities such as the pressure on cost of production. Extrapolations of the new models enabled Airbus to cover the whole air transport market. Finally it launched the largest aircraft ever attempted. Despite the Airbus crisis this new machine is promising. The perspectives of the A350XWB, the latest addition to the portfolio, remain open for the moment.

The innovation and optimization process launched through Airbus has shaped the world in several ways. First of all the programme has acted as a permanent technology driver. Its strategy has been based on the adoption and extrapolation of existing technology and new inventions and responses to new externalities (Schmitt, 1999: 213-227). Through its superior products Airbus has influenced the world aerospace market.

Next the Airbus programme has changed the way STPs are operated. In the beginning these were purely national. All other countries were seen as potential competitors. Again the context encouraged the innovation. First experiences with transnational programmes within the European integration inspired the STP policymakers to attempt the continental pooling of resources. Since outcomes were favourable and the pressure to succeed high they remained committed to this strategy. The national governments maintained their sovereignty but maximized synergies. Again externalities provided the decisive push factor. As it has been the case in other European programmes the states changed the attitudes towards Airbus from working in parallel to consensual and later from cooperative to integrative. Only when the Airbus crisis lowered the positive trade-offs both governments cut back their commitment from integration back to simple cooperation.

The Airbus programme has also influenced the European integration process once the ‘overall context’ made this possible. In the late 1960s the national integrative moves towards the EEC began to extend to S+T. In parallel the emerging institutional and procedural framework encouraged other stakeholders to launch their own transeuropean organization. The overall air transport organization in Europe became more efficient. First top-down initiatives in favour of a European aerospace policy came at an early stage and did not influence the state actors. The European stakeholders moved to indirect action (Guzzetti, 1995: 60). The growing competences of the EEC extended its scope to transnational negotiations on aerospace. Finally the EU and the national governments defended Airbus together. This was notably the case during and after the Boeing-McDonnell-Douglas merger in 1997. Since then the defence of the venture against the U.S. claims for allegedly illegal launch aids has been an exclusive EU affair.

One of the outcomes of the European consolidation was the competences of Brussels in foreign policies (Courty and Devin, 2005: 15). In this context the Airbus programme has contributed to redefine the relationship between the EEC and later the EU and other political entities. The EEC was neither involved in the 1975 Export Standstill Agreement nor the Consensus Agreement on Civil Aircraft of 1976 (Mc Guire, 1997: 54). In 1978 the document was updated into the Commonline Agreement. This time EEC officials participated in the negotiations but the member states ratified it (Mc Guire, 1997: 54). A new GATT round which led to the 1979 Agreement on Trade in Civil Aircraft (Aircraft agreement) witnessed the participation of the EEC as an actor in its own right (Mc Guire, 1997: 80). During the subsequent transatlantic exchanges on the launch aids to

Airbus and the indirect subsidies to the U.S. suppliers the Airbus countries and the EEC acted more or less in parallel. The Airbus Accord of 1992 was mostly elaborated and negotiated by the EEC (Mc Guire, 1997: 155). The examination of the Boeing-McDonnell-Douglas merger was the exclusive responsibility of the EU (Harrison, 2003). Beyond any doubt its nature as a strategic industry has encouraged these political reorientations which, in their time, promised the highest trade-offs. It can be assumed that the Airbus programme has played a considerable part in the transition from national activism to a European foreign policy (Mc Guire, 1997: 159-168).

Finally the Airbus programme has reshaped the international system. Firstly, it has transformed airframes into an issue within international trade. The 1975 Export Standstill Agreement among the OECD members focused on export financing of a large array of manufactured goods (Mc Guire, 1997: 51). In 1976 the Consensus Agreement on Civil Aircraft concentrated on commercial airframes (Mc Guire, 1997: 54). During the ramp-up of the Commonline Agreement signed in 1978 the recent Multilateral Trade Negotiations (MTNs) approach was extended to airframes (Mc Guire, 1997: 54). Technical experts from all interested countries focused on one particular issue and no longer delegations handling integral or global packages (Johnston, 1979: 520-522). In the same year, the U.S. brought aerospace STPs into the international system when they initiated the 1979 Agreement on Trade in Civil Aircraft (Aircraft agreement) (Mc Guire, 1997: 80). As it established a framework the U.S. based their subsequent claims on the Airbus launch aids thereon. During the Airbus Accord negotiation the contacts shifted towards bilateral exchange between Washington and Brussels (Mc Guire, 1997: 155). In this way the international system absorbed the influence of the EEC and later the EU in the context of Airbus. Based on the agreed framework the U.S. repeatedly claimed at the GATT (GATT, 1990) and later the WTO (Gates, 2006b). Again the various negotiations on airframes have neither been the only driving force between the shift from general to punctual agreements nor the main factor behind the growing influence of the EEC and EU as an international negotiator. However the role of aerospace in this international systemic transformation process cannot be denied (Mc Guire, 1997: 156-158). These examples show the far-reaching consequences of the Airbus programme.

There are two fundamental things that have not been affected by the Airbus venture. The first is the national attitude of the countries in respect to the programme. Throughout its duration it has been promoted in a national competitive interest. Until today the Airbus countries have never transferred the ultimate sovereignty to an external body. In a first stage the states acted through their national industrial partners. Later the EADS mirrored the national competition for maximized trade-offs. The second is the basic motivation behind the national STPs. In France this has remained the ambition of technological leadership and autonomy of supply orchestrated by the state (Perrin, 2002: 158). In the U.K. the individual industrial actors have retained a considerable autonomy but were led by the government (Groves, 1929: 289-317). Since the beginning of the European political and economic integration there have been questions about the loyalty of the U.K. (Coudenhove-Kalergi, 1923: 35-39). Would it favour its former colony in the New World (Kupchan, 2002: 139) or the Continent (Aris, 2002: 107-109)? U.K. attempts to collaborate with Boeing instead of Airbus have been notorious (Newhouse, 1982: 25). In Germany the individual companies were responsible for the Airbus programme. The government remained in the background for most of the time (Kirchner, 1998: 70-80). Only when the situation deteriorated the government took direct action. Common positions based on different or

even contradictory motivations, contexts or circumstances has been observed many times during the European integration process (Mironesco, 2003: 135-160).

Airbus has been powered by national ambitions, fuelled by the European integration, driven by the international political evolution and maintained aloft by the world aerospace market. The alleged common history (Le Goff, 1994) of the nations of Europe has barely been a motivation for the political and industrial stakeholders. Nonetheless the outcome has strengthened the European economy as a whole (Schwarz, 2005: 17). Although it remains outside the 'Institutional Triangle' made up by the Commission, the Council and the European Parliament (Courty and Devin, 2005: 43-44), the Airbus programme might prove decisive for the future of the Old World. There is a school of thought which claims the slow end of the American era. One of the arguments is the erosion of the technological know-how for a variety of reasons such as the isolationist attitude after 2001 (Dworschak, Evers et al., 2007: 152-164). Others point towards the international balance of power. The 'Rise of Europe' (Kupchan, 2002: 119) is the outcome of the omnipresent continental integration. Both extrapolations may be confirmed by the renewed vigour of Airbus owing to its technological superiority and the trade-offs from direct and indirect action by the European institutional and procedural framework. Numerous authors agree on the importance of innovative technology for the economic (Speser, 2006) and political future of a country (Herrera, 2006: 27-34). One indicator for this alleged loss of technological superiority in the U.S. may be the difficulties with the B787 programme. Boeing has outsourced know-how sensitive development to Japan although many members of the engineering-led Boeing Epistemic Community have warned against (Lawrence and Thornton, 2005: 149). For the time being Airbus externalizes production to China. The governments and EADS have selected bidders from Europe for the plants to be sold under the Power 8 Programme (Beauclair, 2008: 10-11). This mirrors once again the attempted national Situative Optimization but may be interpreted as some form of Euro-nationalism as well.

The Idiographic-Nomothetic Approach As An Invitation

The Airbus programme has involved more actors than it seems at first sight. For instance it has been a matter of national economies, public policies, European programmes, and transfers of sovereignty or international negotiations. Any theory-based model would have been too reductionist, notably owing to the need to define variables. The Idiographic-Nomothetic Approach (INA) largely liberates the researcher from these limitations in his work and opens it to additional inputs whenever he deems them necessary.

The historical part in Chapter Three mirrors how the stakeholders have taken their decisions and implemented their actions. Both was relayed by the media (Pfetsch and Wehmeier, 2002: 39-97) and earlier authors (Atkinson and Coffey, 1997: 45-62). Event interpretation of their time and in hindsight can be combined (Asa-Berger, 2000). As it is always the case the look back broadens the view (Gaddis, 2002: 9-11).

Chapter Four highlighted first the industrial side of the programme. There the attempts to innovate and to created favourable disruptions originated. Afterwards the governments and their actions were examined. They have shared the drive to optimize the operational conditions for the Airbus programme and thus for their strategic industries. The section on the European integration correlates both chronologies with the integration process in general and in respect to S+T of which aerospace is a part (Bieler, 1999: 113-122). The

former is sometimes known as the Europe of technology (Braillard and Demant, 1991). Based on this background information the research question on the attitudes of the stakeholders towards the Airbus programme was examined. The approach by the relevant national decision-makers was apparently European but nationalist in fact. Since the failure of the European constitution in 2005 and the Airbus crisis created a double negative disruption the comparative and interpretative exercise was repeated for this distinct period in Chapter Five. Tactics changed but the underlying strategies remained unchanged.

This research would have been more difficult without another major advantage of the INA over the model-based approach. The INA allows references to other theoretical frameworks (Levy, 2001: 39-83) in addition to the Lecture Grid without losing coherence (Jervis, 2001: 385-402). These were framing to reconstruct the changes in attitudes of different actors in an evolving context (Snow, 2004: 380-412), the policy goal as a fundamental driver behind the STPs (Reysset and Widemann, 1997: 4-6) and the Epistemic Community to trace the technological experts within the national manufacturers and later EADS (Haas, 1992: 1-35).

The advantages of the INA for social science seem evident. It remains surprisingly little used in this discipline (Levy, 2001: 39-83). To some extend the same goes for questions related to S+T and aerospace in a European context. Most research on the way the EU came into being and how it influenced the national governments skips these questions (Courty and Devin, 2005). The INA might become an alternative way to examine less known but nonetheless crucial questions raised by the European integration.

Final Remarks

Since their respective beginnings the Airbus programme and the European integration have inspired academics, specialized authors and journalists. The above scholarly research concludes that the Airbus programme was not ‘European’ which means an initiative associated in a way or another with the EEC or the EU (Courty and Devin, 2005). It was not even truly Euro-nationalist (Guzzetti, 1995: 36). Nonetheless authors with a background in aerospace (Endres, 2000) identify a consensus within the national industrial partners to consolidate the programme although the other manufacturers remained competitors outside Airbus (Quittard, 1979: 275-283). The press people have reported the European vision of the Airbus and later EADS (Matlack, 2007) almost from the beginning. Does this visible ‘Europeanization’ (Schwok, 2005: 16-17) not challenge the formal conclusion of the research?

A first supportive argument for this ‘Europeanization’ is the attitudes of the Airbus Epistemic Community. From the beginning the directly involved professionals have approached Airbus in a European perspective. In its first sales documentation Airbus Industrie made references to ‘specialized facilities throughout Europe’ (Airbus Industrie, 1973a: 2). The venture has been animated by a ‘Euro-nationalism’ or even ‘Euro-patriotism' throughout its history. When the first German engineers settled in Toulouse many locals rejected them. The Second World War was a mere 20 years away. Most of their future French colleagues from Aerospatiale helped them feel at home (Quittard, 1979: 228-233). Once the programme was aloft the Airbus Epistemic Community regularly referred to the ‘European’ answer to the American Challenge (Kracht, 1994: 7-9). As far as the European stakeholders were concerned they were never really enabled to assume the leadership over the programme by the national governments. As early as 1975 the Commissioner Altiero Spinelli

(Guzzetti, 1995: 49) signalled the strategic interest of the programme for Europe as a whole (EEC, 1975). This was just at the beginning of the top-down initiatives which would establish the European S+T policies.

These two events lead us to one of the better explored aspects of the European integration. It is the common identity traced to the common cultural and historical heritage (Aucourt, 1993), challenges and hopes (Le Goff, 1994). Let us quote some events although they have nothing in common with Airbus, aerospace or S+T. In the mid-1970 while the Europe of technology was taking shape political parties in several countries discussed cross border collaboration in all EEC member states (Seiler, 1978: 115-124). Later, when the integration process was well advanced and when the EU assumed the main role in the transatlantic interactions on the Airbus launch aids versus the indirect subsidies scholars looked into the question of a common European political area (Telo, 1995: 1-70). It was certainly not a coincidence that during the same years ways to integrate the national domestic and foreign policies were discussed (Bernauer, Schneider et al., 1995: 193-197). While economists had approached the EU as one economic policy area for years (Ward and Lofdahl, 1995: 11-27), political scientists began to understand it as one institutional area (Lane and Ersson, 1996). It is therefore no surprise that the late 1990s also witnessed public requests by Airbus and other aerospace stakeholders in favour of a more active European involvement (Sydow, 1999: 99-102). Finally national policy-makers in third countries such as Switzerland have become aware of the influence of the 'European dimension' on their day-to-day life by now (Sciarini, Nicolet et al., 2002: 1-34).

It cannot be denied that the European integration and the common identity which have served as the research question are realities. It is also true that their influence has extended to more and more domains through increasingly complex and extensive institutional and procedural frameworks. Maybe the most eminent symbol of the suggestive force of the European integration has been the fact that scholars outside Europe have felt at an early stage that the process would not only transform Europe but influence the rest of the world as well (Haas, 1961: 366-392) and give this new Europe a distinct economic, political and cultural identity (Artaud, 1989: 64-78). Political marketing campaigns and public opinion have transformed the Airbus programme into one of its symbols. Throughout its history Airbus has not only been driven by the world aerospace market but powered by the European integration process as well.

Annexes

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Annex 1 - Airbus Market Penetration

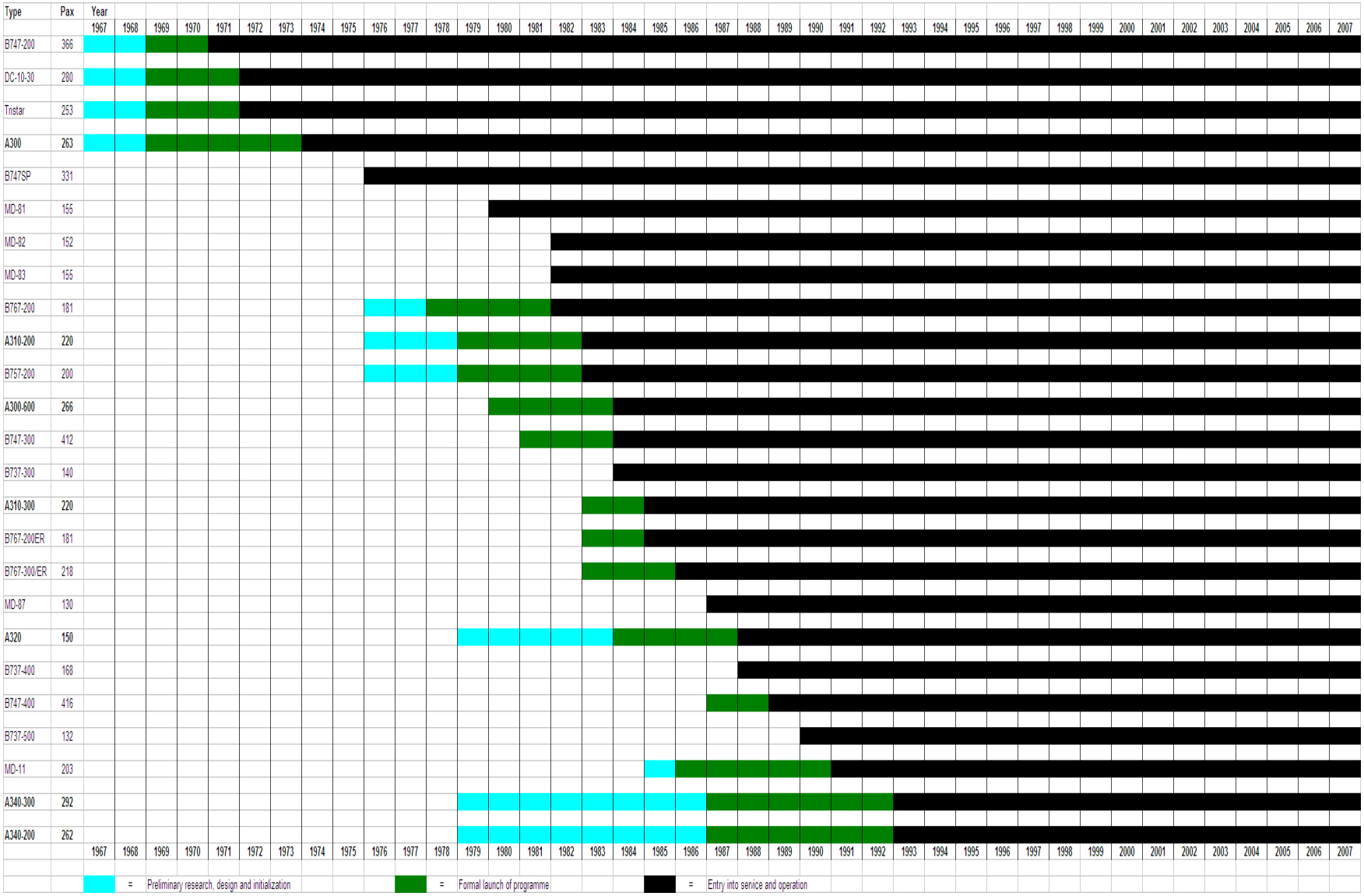
Any new aircraft is the result of a long and complex elaboration, industrialization and certification process. In a first step market and technological research is carried out by the manufacturer or suggested by one or several airlines which submit a requirement (Anderson, 2002: 186-190). If in-depth market prospecting and technological specifications confirm the business case of the project (Jenkinson, Simpkin et al., 1999: 12-15) respectively the economic and technological feasibility of the requirement (Anderson, 2002: 191-194) the proposal is submitted for approval. The more the decision-makers within the manufacturer adopt a pro-active strategy, the higher the know-how of the workforce and the more financial resources are available the easier such preliminary research or initialization work essential for its future position on the market becomes (Warwick, 2007: 9). As the new aircraft is supposed to outperform the existing hardware it can be seen as an invention at the origin of an attempted innovation process (Speser, 2006: 15-22).

If the industrial (and often governmental) stakeholders are convinced they give the go ahead (Sabbagh, 1995: 46-47). After the launch the new aircraft is designed and prototypes are manufactured. These undergo a series of tests in view of the certification by the competent national or, since 2002, European institutions (Jenkinson, Simpkin et al., 1999: 55).

Once it is released for operation the aircraft enters commercial service and is mass produced.

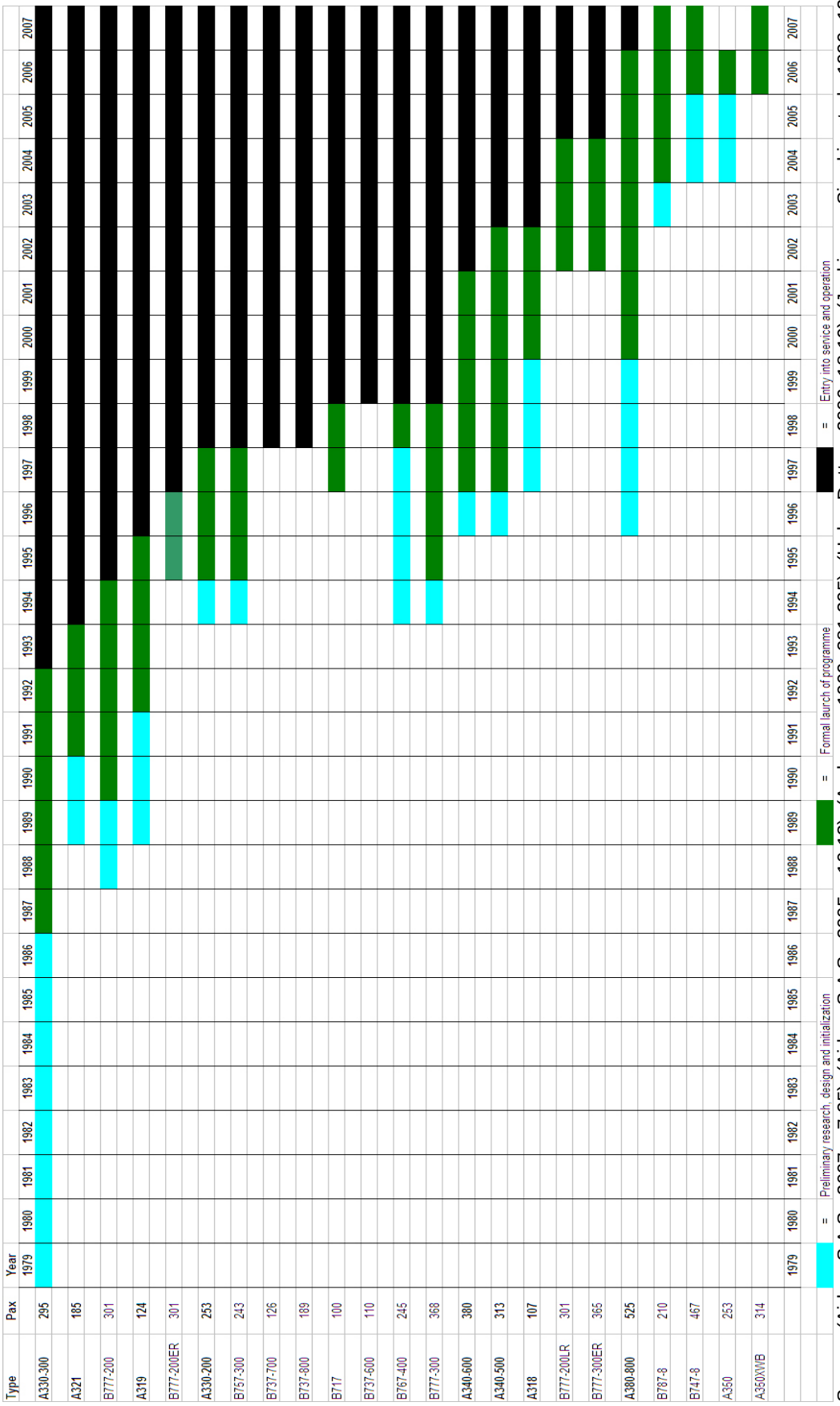
Whenever two or more manufacturers anticipate the return on investment (Machat, 2002: 22-41) similar aircraft are launched more or less in parallel. Examples are the three-engined Lockheed Tristar and the McDonnell-Douglas DC-10 of the late 1960s. If a competitor joins the race later it has the opportunity to “leapfrog” or outsmart the challenger (Hough, 1996: 3-9). In this case it makes its own design as superior as possible after a careful analysis of the former. The later the competitor elaborates its products the less the challenged manufacturer is able to react since the conceptual and technological characteristics such as the diameter of the fuselage or the number of engines are ‘locked in’ or ‘frozen’ and can no longer be updated. Boeing has successfully done so with the B777 over the A340 (Upton, 1998). Since the European aircraft arrived earlier on the market and since it had other USPs such as the Airbus family concept the Boeing strategy did never pose a real threat to Airbus. For the time being it is impossible to forecast to what extend the A350XWB which systematically outsmarts the B787 (Kingsley-Jones, 2007: 76-84) can really overtake the challenger. It comes a full five years later and will be confronted with established fleet Path Dependences. In addition the overall technological level of both designs is similar so that the A350XWB does not promise a further technological leap (Abramovitz, 1986: 385-406). On the other hand all early Boeing delivery positions are booked so that the earlier availability of the B787 is no longer a competitive argument (Martel, 2007: 5).

Figure A1/1 – Chronology Of Airbus Aircraft



Source: (Airbus S.A.S., 2007a: 7-25), (Airbus S.A.S., 2005a: 10-13), (Anderson, 1999: 381-395), (Hales-Dutton, 2006: 18-19), (Jenkinson, Simpkin et al., 1999: 12-19), (Kreuzer, 1991: 194-202), (Muser, 1982: 60-84), (Norris, 2006: 32-35), (Norris, 2006: 32-35), (Norris and Wagner, 1999: 29-31), (Pearcy, 1999: 19-22), (Shaw, 1999: 20), (Sparaco, 2005a: 352), (Weder and Fricke, 1971: 9-11).

Figure A1/2 – Chronology of Airbus Aircraft



Source: (Airbus S.A.S., 2007a: 7-25), (Airbus S.A.S., 2005a: 10-13), (Anderson, 1999: 381-395), (Hales-Dutton, 2006: 18-19), (Jenkinson, Simpkin et al., 1999: 12-19), (Kreuzer, 1991: 194-202), (Muser, 1982: 60-84), (Norris, 2006: 32-35), (Norris, 2006: 32-35), (Norris and Wagner, 1999: 29-31), (Pearcy, 1999: 19-22), (Shaw, 1999: 20), (Sparaco, 2005a: 352), (Weder and Fricke, 1971: 9-11).

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Annex 2 – Chronology Of Airbus And Boeing Sales

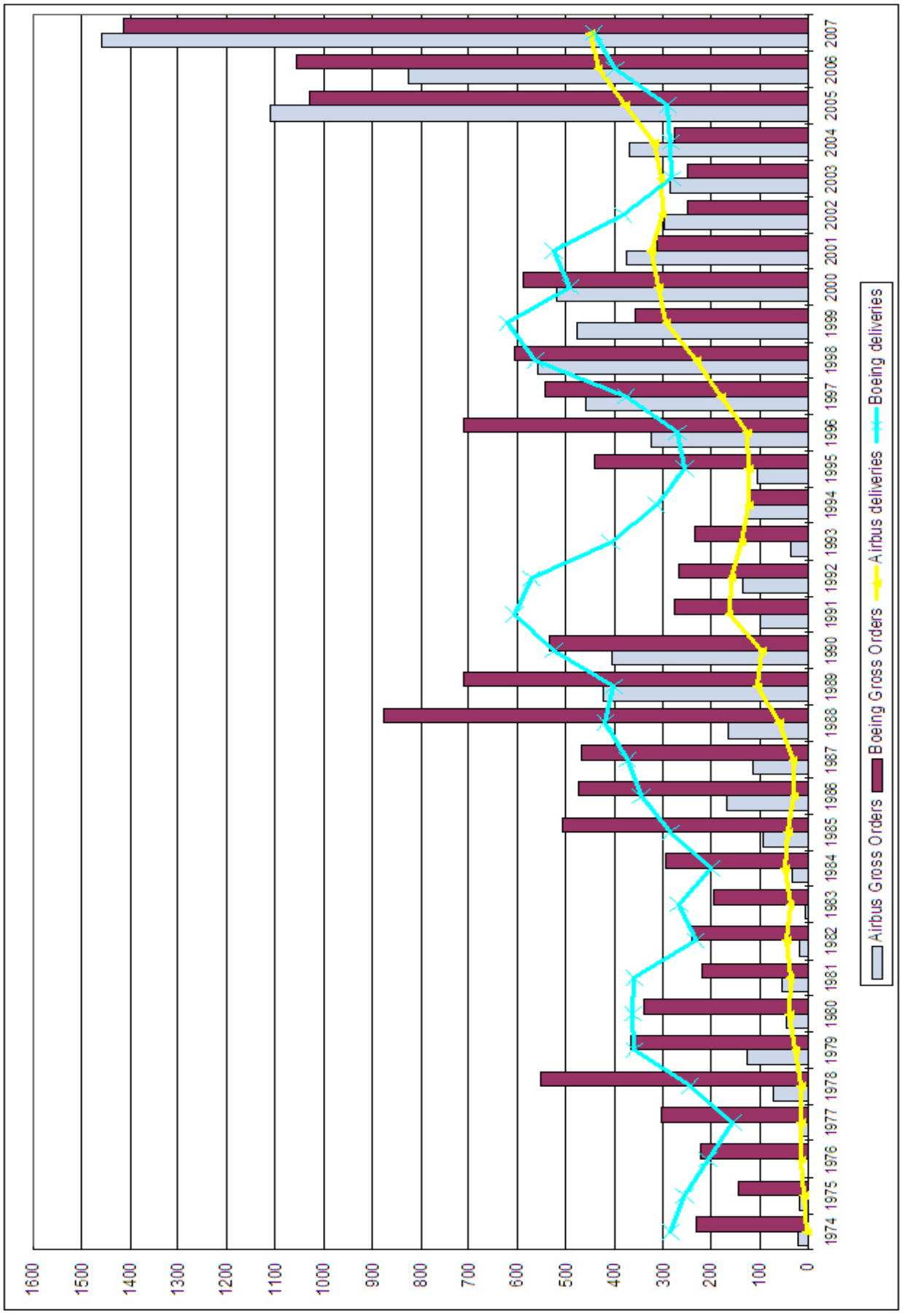
The summary takes into account gross orders and commitments of Airbus and Boeing. The gross orders illustrate the positive outcomes of sales negotiations. As it is the case for means of production (Michel, Salle et al., 2000: 72-81) what aircraft are (Wensveen, 2005), the customer only orders if it anticipates a return of investment within its current present and future business. Whenever it is forced to cancel the client usually loses down payments and the appropriate delivery positions. Tensions with the manufacturer often complicate future negotiations. Finally, cancellations send negative signals to the market since they mirror a failure in strategic and operational planning and are interpreted as a sign of weakness (Boer, 1999: 148-168). Relations, notably with the financial markets, other suppliers and contractors may be affected.

Table A1 - Airbus Widebodies And Selected Competitors

Year	Airbus Gross Orders	Boeing Gross Orders	Airbus Deliveries	Boeing deliveries
1974	20	234	4	284
1975	16	144	8	255
1976	1	221	13	207
1977	16	305	15	156
1978	73	552	15	243
1979	127	368	26	360
1980	47	340	39	363
1981	54	219	38	359
1982	17	240	46	232
1983	7	195	36	266
1984	35	294	48	200
1985	92	508	42	285
1986	170	474	29	344
1987	114	467	32	374
1988	167	877	61	420
1989	421	713	105	402
1990	404	533	95	527
1991	101	275	163	606
1992	136	267	157	572
1993	38	236	138	409
1994	125	125	123	312
1995	106	441	124	256
1996	326	712	126	271
1997	460	544	182	375
1998	556	606	229	563
1999	476	355	294	620
2000	520	588	311	491
2001	375	314	325	527
2002	300	251	303	381
2003	284	249	305	281
2004	370	277	320	285
2005	1111	1028	378	290
2006	824	1058	434	398
2007	1458	1423	453	441

Source: Author extrapolated from (Heymann, 2007), (Kingsley-Jones, 2008: 10).

Figure A2 – Chronology Of Airbus And Boeing Gross Orders And Deliveries

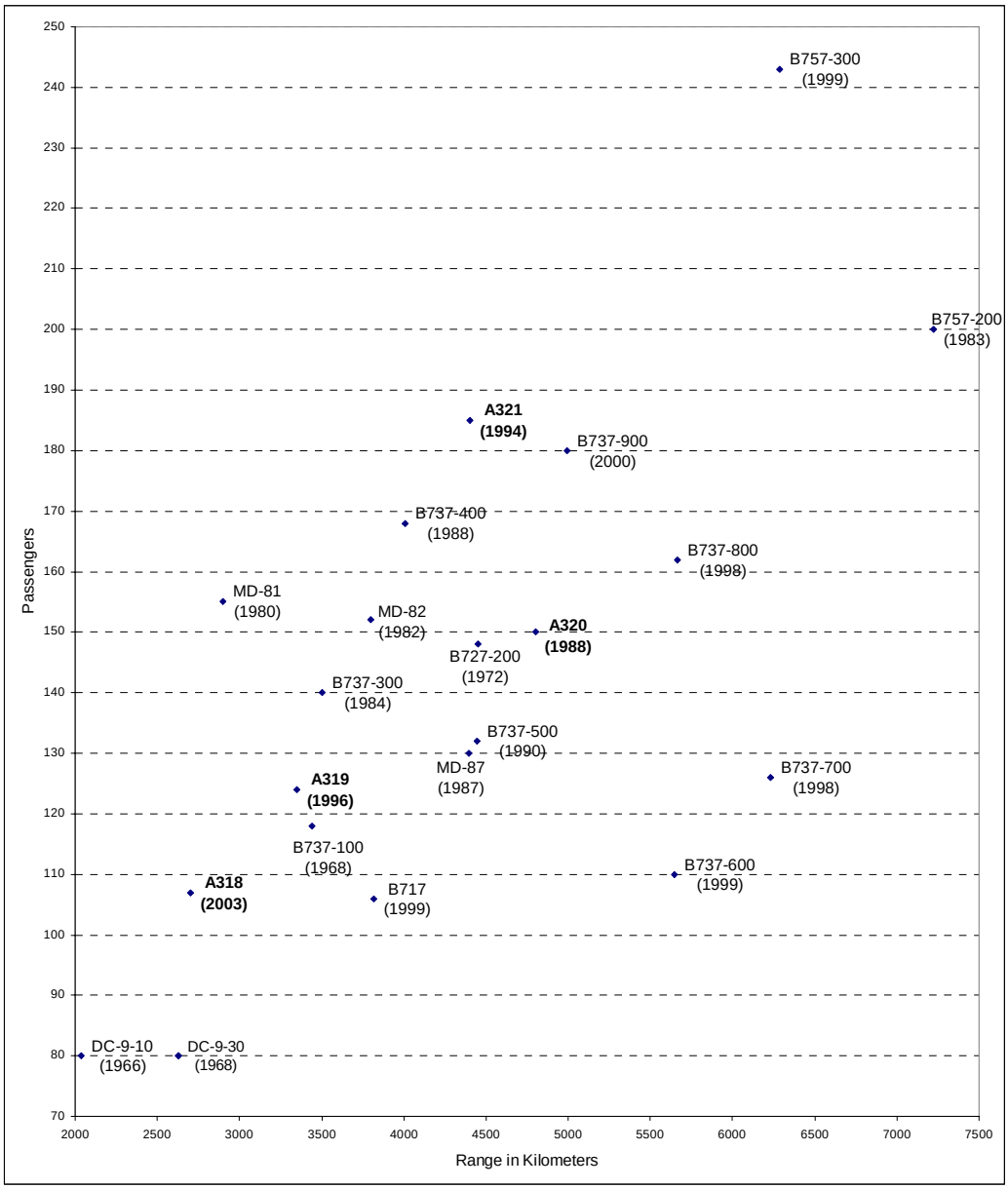


Annex 3 - Airbus Aircraft And Competitors

The Airbus aircraft have been launched in response to anticipated market demand and the current and future competition. Usually a new design outperforms the predecessors. The following comparisons are based on correlations of the average passenger capacities and ranges with maximum payload (Jenkinson, Simpkin et al., 1999: 244-245). Both are essential but do not represent the only parameters the customer takes into account. Other criteria are the expected performance within the planned mission profiles such as payload correlated with demand on the route (Taneja, 2005), the own and the competitor's existing fleets (Shaw, 2004), the overall package offered by the manufacturers such as spares and crew training and the strategies of key actors in the financial markets (Wensveen, 2005).

Narrowbodies usually operate on short- and medium-haul routes. The essential parameters are quick turn-around times on ground, numbers of cycles or trips between maintenance intervals, crew and maintenance cost and expenditure per seat and trip (Mehta, 2006: 1-4). Airbus favoured above all minimized fuel consumption, cutting-edge technology and low cost of operation. The additional fuel represents dead weight which lowers productivity (Jenkinson, Simpkin et al., 1999: 244-245). The graph reveals two market trends over time. The first is age and capacity versus range. In a first time new aircraft were larger than their predecessors and their ranges were increasing since the engines were more efficient. About a decade ago smaller aircraft for regional services entered the market (Hewson, 2002: 41-44).

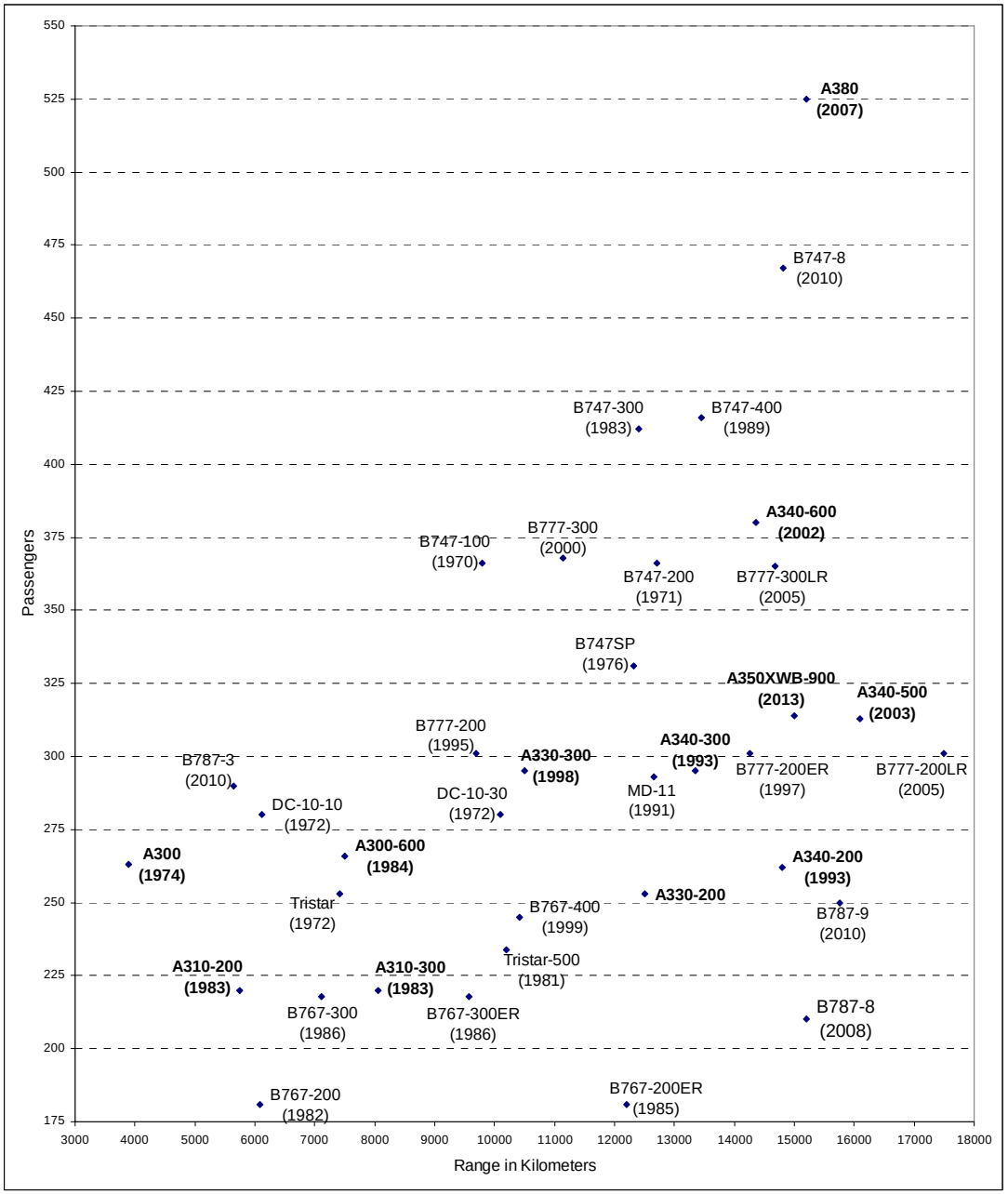
Figure A3/1 - Airbus Narrowbodies And Selected Competitors



Source: (Airbus S.A.S., 2007a: 7-13), (Muser, 1982: 84), (Norris, 2006: 32-35), (Norris and Wagner, 1999: 29-31), (Pearcy, 1999: 19-22), (Shaw, 1999: 20), (Sparaco, 2005a: 352).

For widebodies, usually used for middle- and long-haul operations, the range is essential. The manufacturers have attempted to outreach each other from the beginning (Kreuzer, 1991: 31-50). As it has been the case in the short-haul market, more efficient engines and elaborate aerodynamics have enabled longer ranges. The graph shows that the later the aircraft entered the market the longer its flight duration became. Older aircraft are less efficient. The two schools of thought in favour of large and smaller aircraft for intercontinental operations can be identified (Nana, 2005: 30-37). There are some exceptions to the long-range rule. The B787-3 for instance is tailor-made for shorter routes (Beauclair and Cochennec, 2007: 32-39).

Figure A3/2 - Airbus Widebodies And Selected Competitors



Source: (Airbus S.A.S., 2007a: 17-25), (Airbus S.A.S., 2005a: 10-13), (Hales-Dutton, 2006: 18-19), (Kreuzer, 1991: 194-202), (Muser, 1974: 60), (Norris, 2006: 32-35), (Sparaco, 2005a: 352), (Weder and Fricke, 1971: 9-11).

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Annex 4 - Specifications Of Airbus Aircraft

The aircraft are listed in chronological order. Following international standards in aircraft comparisons the data is average and reflects typical ranges with typical passenger load for passenger aircraft (Jenkinson, Simpkin et al., 1999: 244-245). For freighter aircraft payload and range refer to maximum structural payload. All geo- and volumetric data is metric since the research targets social science and not aerospace.

Table A4 - Technical And Operational Specifications Of Airbus Aircraft

A300B4		
Entry into Service (EIS)	**Parameters**	
1974	Overall length:	53.62 m
	Wing span:	44.84 m
	Height:	16.53 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	3890 km
	Range with max. fuel:	5190 km
	Typical passenger configuration:	263

Source: (Airbus Industrie, 1973a), (Picq, 1990: 297) (Sparaco, 2005a: 352), Photo copyright: Collection Daniel Martel.

A310-200		
Entry into Service (EIS)	**Parameters**	
1983	Overall length:	46.66 m
	Wing span:	43.90 m
	Height:	15.80 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	5750 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	220

Source: (Quittard, 1979: 290), (Picq, 1990: 297), (Sparaco, 2005a: 352), Photo copyright: Collection Daniel Martel.

A300-600		
Entry into Service (EIS)	**Parameters**	
1984	Overall length:	54.10 m
	Wing span:	44.84 m
	Height:	16.54 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	7500 km
	Range with max. fuel:	7700 km
	Typical passenger configuration:	266

Source: (Airbus S.A.S., 2005a: 12-13), (Sparaco, 2005a: 352), Photo copyright: Airbus S.A.S..

A310-300		
Entry into Service (EIS)	**Parameters**	
1985	Overall length:	46.66 m
	Wing span:	43.90 m
	Height:	15.80 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	8050 km
	Range with max. fuel:	9600 km
	Typical passenger configuration:	220

Source: (Airbus S.A.S., 2005a: 10-11), (Sparaco, 2005a: 352), Photo copyright: Airbus S.A.S..

A320		
Entry into Service (EIS)	**Parameters**	
1988	Overall length:	37.57 m
	Wing span:	34.10 m
	Height:	11.76 m
	Fuselage diameter:	3.95 m
	Range with max. payload:	4800 km
	Range with max. fuel:	5600 km
	Typical passenger configuration:	150

Source: (Airbus S.A.S., 2007a: 10-11), (Sparaco, 2005a: 352), Photo copyright Airbus S.A.S..

A340-300		
Entry into Service (EIS)	**Parameters**	
1993	Overall length:	63.60 m
	Wing span:	60.30 m
	Height:	16.85 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	13350 km
	Range with max. fuel:	13700 km
	Typical passenger configuration:	295

Source: (Airbus S.A.S., 2007a: 20-21), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A330-300		
Entry into Service (EIS)	**Parameters**	
1993	Overall length:	63.60 m
	Wing span:	60.30 m
	Height:	16.85 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	10500 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	295

Source: (Airbus S.A.S., 2007a: 18-19), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A340-200		
Entry into Service (EIS)	**Parameters**	
1993	Overall length:	59.40 m
	Wing span:	60.30 m
	Height:	16.85 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	14800 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	262

Source: (Sparaco, 2005a: 252), Photo copyright: Airbus S.A.S..

A321		
Entry into Service (EIS)	**Parameters**	
1994	Overall length:	44.51 m
	Wing span:	34.10 m
	Height:	11.76 m
	Fuselage diameter:	3.95 m
	Range with max. payload:	4400 km
	Range with max. fuel:	5600 km
	Typical passenger configuration:	185

Source: (Airbus S.A.S., 2007a: 12-13), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A300-600 F		
Entry into Service (EIS)	**Parameters**	
1994	Overall length:	54.10 m
	Wing span:	44.84 m
	Height:	16.54 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	3650 km
	Range with max. fuel:	4850 km
	Typical passenger configuration:	3650 km with 54.6 tonnes 4850 km with 48.1 tonnes

Source: (Airbus S.A.S., 2005a: 14-15), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A319		
Entry into Service (EIS)	**Parameters**	
1996	Overall length:	33.84 m
	Wing span:	34.10 m
	Height:	11.76 m
	Fuselage diameter:	3.95 m
	Range with max. payload:	3350 km
	Range with max. fuel:	6800 km
	Typical passenger configuration:	124

Source: (Airbus S.A.S., 2007a: 8-9), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A330-200		
Entry into Service (EIS)	**Parameters**	
1998	Overall length:	58.80 m
	Wing span:	60.30 m
	Height:	17.40 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	12500 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	253

Source: (Airbus S.A.S., 2007a: 14-15), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A340-600		
Entry into Service (EIS)	**Parameters**	
2002	Overall length:	75.3 m
	Wing span:	63.45 m
	Height:	17.3 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	14360 km
	Range with max. fuel:	14600 km
	Typical passenger configuration:	380

Source: (Airbus S.A.S., 2007a: 24-25), (Sparaco, 2005a: 252), Photo copyright Editions Skyward.

A340-500		
Entry into Service (EIS)	**Parameters**	
2003	Overall length:	67.50 m
	Wing span:	63.45 m
	Height:	17.10 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	16100 km
	Range with max. fuel:	16700 km
	Typical passenger configuration:	313

Source: (Airbus S.A.S., 2007a: 22-23), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A318		
Entry into Service (EIS)	**Parameters**	
2003	Overall length:	31.45 m
	Wing span:	34.10 m
	Height:	12.51 m
	Fuselage diameter:	3.95 m
	Range with max. payload:	2700 km
	Range with max. fuel:	5950 km
	Typical passenger configuration:	107

Source: (Airbus S.A.S., 2007a: 6-7), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A380		
Entry into Service (EIS)	**Parameters**	
2007	Overall length:	72.8 m
	Wing span:	79.8 m
	Height:	24.10 n
	Fuselage diameter:	7.14 m
	Range with max. payload:	15200 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	525

Source: (Airbus S.A.S., 2007a: 32-33), (Sparaco, 2005a: 252), Photo copyright Airbus S.A.S..

A330-200 Freighter		
Entry into Service (EIS)	**Parameters**	
2009	Overall length:	58.8 m
	Wing span:	60.30 m
	Height:	17.4 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	5925 km
	Range with max. fuel:	7400 km
	Typical passenger configuration:	69 tonnes over 5925 km 64 tonnes over 7400 km

Source: (Airbus S.A.S., 2007a: 16-17), (Sarazin, 2007: 26-29), Photo copyright Airbus S.A.S..

A350 **(Initial version)**		
Entry into Service (EIS)	**Parameters**	
Projected for 2010	Overall length:	58.80 m
	Wing span:	61.1 m
	Height:	17.4 m
	Fuselage diameter:	5.64 m
	Range with max. payload:	16300 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	253

Source: (Airbus S.A.S., 2005b), Photo copyright: Airbus S.A.S..

A350XWB **(Version 900)**		
Entry into Service (EIS)	**Parameters**	
Projected 2013	Overall length:	66.90 m
	Wing span:	64.00 m
	Height:	16.90 m
	Fuselage diameter:	5.96 m
	Range with max. payload:	15000 km
	Range with max. fuel:	n/a
	Typical passenger configuration:	314

Source: (Airbus S.A.S., 2007a: 28-29), (Bregier, 2007: 2), Photo copyright Airbus S.A.S..

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