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The Legacy of the High Reliability Organization Project

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This article looks back over two decades of work pioneered by Todd LaPorte and colleagues, under the banner of High Reliability Theory (HRT). The article revisits the American roots of the Berkeley-based group and comments on its early and decisive fieldwork choices. It revisits some of the elements that emerged through the controversy around findings and implications of HRT. It discusses the legacy of HRT and the ethnographical impetus given to 'normal operations' studies. The use of ethnographic and sociological methodologies gave new vitality to the study of high-risks organizations.

1. Introduction

Writing a piece reflecting on Todd LaPorte's inspiration and work is a journey taking me back and forth between the United States and Europe. It is an exploration of the intellectual framing of the High Reliability Organization (HRO) group in the United States and also a reflection upon the success of HRO ideas throughout the world and especially Europe. Writing these pages made me realize that one of the main contributions of the HRO founding father, Todd LaPorte, has been to encourage numerous young researchers to engage in the complex study of large socio-technical organizations and systems. What struck me in retrospect in his work is this implicit encouragement to engage in demanding fieldwork, in order to genuinely understand the functioning of these socio-technical systems, which are key to our societies.

Ever since the launch of the *High Reliability Organizations* Project at Berkeley in the mid-1980 s, there has been an ongoing debate over the HRO category of organizations. In his handbook on Organizations, Scott (1992, p. 351) devoted a full page to this topic. The central importance of such organizations to modern society (they provide crucial services, such as electricity, transport, chemicals and health care) provokes much scrutiny, and sustains an ever-growing body of research in Management, Sociology, Political Science, Anthropology, Public Administration and Psychology.

Today, there is hardly a chapter or an article on this topic that does not give deference to the HRO model, devoting a few introductory paragraphs or a few slides to the phenomenon. It has come to replace Reason's (1990) famous 'Swiss Cheese Model', which in the past was offered as a classic starter to numerous talks and powerpoint presentations.

The success of the HRO label has not been instant but rather has gained strength each year, up to the point where some of the research now labelled 'HRO' has little relation to the original objectives of its founders. Todd LaPorte, Gene Rochlin, Paul Schulman and Karlene Roberts have presented their research findings in numerous often cited publications.[1] The intent here is not to repeat what has already been explained elsewhere. Rather, I would like to reflect upon the original objectives of the HRO project, in order to understand its reception and provide some feedback on the legacy of High Reliability Theory (HRT).

2. The original cases: A deliberate choice

The Berkeley group noticed that some high-hazard organizations were doing far better than expected. Struck by this paradox, they embarked on a new theoretical and empirical journey. They found absent from the literature any discussion on the idea that some organizations could not fail at all as an error would be so damaging that it would kill the industry altogether. They were reluctant to follow Wildavsky's (1988) analysis in *Searching for Safety*, rejecting the notion that trial and error is the best way to manage potential risks.

The group first identified three organizations that to their knowledge continuously met and often surpassed the criteria set by society for reliable performance: (i) The Air Traffic Control System (Federal Aviation Administration); (ii) Electric Operations and Power Generation Departments (Pacific Gas and Electric Company) and (iii) The peacetime flight operations of the US Navy's Carrier Group 3 and its two nuclear aircraft carriers USS *Enterprise* (CVN 65) and USS *Carl Vinson* (CVN 70). Later, the nuclear production at PGE's Diablo Canyon plant (Pacific Gas and Electric Company) was included.

The choice was deliberate and deductive: The HRO group never intended to take a large sample and verify whether this

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or that particular organization was an HRO or not. The HRO nature of an organization was decided upfront and had to match a first set of characteristics defined by the group at the beginning of the research.

The current, widely accepted definition of an HRO, namely any organization that entails some risk to the population and the environment, is a corruption of the original meaning. For example, not all organizations operating high-risk activities do so under the 'no failure' strict requirement, such as a classic HRO is bound to.[2]

Just as Normal Accident Theory (NAT) is applicable to very few accidents – Perrow (1984) himself being very restrictive – similarly, the concept of HRO does not apply to a vast category of organizations. Over the years, stimulated by the success of the label, scholars and experts seem to have forgotten that originally an HRO was primarily defined by its transactions within the institutional environment. To become or be defined as an HRO demands that society impose the norm of failure-free operations, because failure is not an option.

The Berkeley group identified six areas of interest, which largely framed their intellectual choices:

1. *The evolution of HROs*: How does an HRO come into existence? How to describe the logic that leads to extraordinary operational reliability?
2. *Structural Patterns and the Management of Interdependence*: Identify the formal patterns and rules that such organizations set up to address the massive coordination issues at every level of the organization.
3. *Decision Dynamics in High Reliability Conditions*: How such organization balance between routine operations and abnormal conditions or unpredicted contingencies and how the attention to both conditions is sustained throughout the organization.
4. *The Organizational Culture of High Reliability*: Elucidate group norms that are key to the achievements required at the individual and also at the group level.
5. *Promotion of New Technologies in High-Risk Systems:* Reporting on the growing importance of information technologies (which exploded during the 1990 s) and their impact on activities. The underlying question here was: Is the adoption of new technologies always to the benefit of safety or is there any danger that their implementation might unnecessarily disturb working practices, which are at the core of sustainable reliability and safety?
6. *The Design of Consequential Organizational Systems* is the ultimate point of interest and it summarizes all the above. Would it be possible to deduce a number of principles that target not only the organizational design but also and in a bolder manner the technological design itself? Would it be possible to design better systems that could be easily audited and inspected by regulators for example? Is there a way to reduce the intricacies of the technology and help achieve what appears to have a high social, technological and human cost? This reveals one of Todd LaPorte's research obsessions, namely to engage resolutely with the question of design, refusing to be confined to 'soft' issues as social scientists often feel obliged to do.

They were not interested in giving recommendations. Rather, what they had envisioned was that their discussion of design issues could be taken up later by managers, operators and regulators if they wanted to: 'Making things work better was not the reason for our being there, nor the purpose of our work' (Rochlin, 1996, p. 56).

The HRO concept today is widely used in the industry to describe efforts towards reducing and managing risks and dangers. Hence there is some irony to report on this 'no recommendations policy'. Todd LaPorte has always said that he was open to discuss any issues that managers, employees or regulators wanted to take up, but that he believed that the role of an academic was to develop and foster knowledge on these complex socio-technical systems, not to design any specific organization or procedure. He likes adopting the 'stewardee''s point of view [see Jude Egan's (2011) contribution in this special issue].

3. Controversy (1993–2000)

Early in the development of the programme, members of the group perceived the possible misunderstandings that certain formulations or words might create. Rochlin was perhaps the most concerned about this issue. Upfront he repeatedly tried to address the potential lack of proper understanding of the exact nature of what they were describing. The label was one of his constant worries:

> In retrospect, this choice [the label High Reliability Organizations] of compact, acronymic terminology was both necessary and unfortunate. Necessary because some label is needed to identify organizations which [..] are indeed clearly distinguishable from those that have been the subject of most historical study and analysis in the organizational literature. Unfortunate because the term implies that our evaluation is based on some absolute, and static, standard of performance rather than on a relative evaluation of the dynamic management of a difficult and demanding technology in a critical and unforgiving social and political environment (Rochlin, 1993, p. 12).

He wrote repeatedly that 'reliability-seeking' organizations (from the point of view of the organizations themselves), or 'reliability-enhancing' organizations (from the point of view of the public) might have been a better choice. Furthermore, he observed that:

> Any three-letter acronym, however eloquently descriptive, is only a label. Properly used, such a label invokes a set of generally accepted, relatively invariant, static descriptors. In our case, however, the lack of any widespread consensus as to the meaning of reliable or

> effective makes it unusually dangerous to assume a commonality of meaning among our colleagues or across varying literatures (Rochlin, 1993, p. 28).

The HRO project would probably have been less visible and renowned without the publication of Scott Sagan's (1993) book, *The Limits of Safety* on nuclear weapons safety. Sagan can certainly be credited with the launch of what is now referred to as the NAT/HRO debate. It was Sagan who first suggested that the work of the HRO theorists and that of Perrow were competing and contradictory on crucial points. He coined the notion of HRO as an 'optimistic' theory, labelling Perrow's as 'pessimistic'.

Already in the group's papers, we find discussion of Perrow's arguments and a determination to build a different framework away from his theory. Team members were interested in organizations that have fewer 'normal accidents' than predicted by Perrow's (1984) theory. In Roberts' review of Perrow's main contentions (complexity and tight-coupling), she concluded rather provokingly that Perrow had an engineering (rather than a sociological) point of view on these organizations (Roberts, 1988, p. 10).

There is no doubt that Perrow's specific arguments directed the discussion towards design issues, which is unusual for a social scientist. However, one could also praise the fact that for the first time such a discussion could be led (and legitimized) by a sociologist. From then on, the design of high-risk technology also became an issue for social scientists.

The HRO project contributed greatly to this shift in interest, asking tough questions such as: how should a high-hazard organization be designed if one would want to enhance its ability to be easily regulated by safety authorities? LaPorte especially has been an advocate of pursuing this far-reaching question. Other researchers like Heimann (1997) or more recently Etienne (2007) have followed up on this agenda, albeit from a different theoretical perspective.

My own work based on ethnographic studies conducted at four civil nuclear power plants, including Diablo Canyon from the HRO sample (Bourrier, 1999a, 1999b) led to a reconsideration of the conditions under which adjustments and informalities – that sociologists tend to see everywhere – were induced by the organizational design itself. At some plants, informal adjustments were frequent, at others they were kept minimal. Some organizational designs are more transgression prone than others.

Early debates found their way into the *Journal of Contingencies and Crisis Management*, which over the years has become the natural habitat for HRT discussions. The special issue in 1994 fuelled many articles, aimed at either reinforcing or diminishing the usefulness of the controversy, supporting one theory against the other, or trying to reunite the rivals. The long list of articles shows that the controversy is still alive, providing a firing angle for scholars wishing to take aim at safety and reliability issues. Reference to the controversy has become a *passage obligé*. However, LaPorte (1994, p. 209) dismissed the idea that the work of HRO theorists might be competing with Perrow's own attempt. He also insisted that the HRO research agenda should be regarded as a follow-up to Perrow's work. Perrow (1994, p. 212) disagreed that the HRO theory could be an offspring of his own theory.

One of the main contentious issues is the suspected 'going native' tendency of HRO scholars. Perrow questioned the ability of HRO researchers to have maintained the objectivity in their fieldwork, accusing them of excessive proximity, which might have altered their judgment on the organizations they researched.

Attention to methodology has been one of the great by-products of this polarization of theories. Perrow and Sagan have used secondary documents, 'after the event' type of memos, from which they have derived a theory of accident causation. The HRO group also used documents. However, much of their work is ethnographic in nature (a combination of face-to-face and group interviews with field observations). Unintentionally probably, this controversy has enabled the development of ethnographic approaches to the study of high-risk organizations [see Rochlin's (2011) contribution in this special issue].

A great number of studies have now adopted the 'Normal Operations Studies' approach. If a zero-incident workday does not exist, this calls for methodologies that can precisely describe how actors manage to adjust constantly to changing situations for the sake of safety (Bourrier, 2002; Woods & Hollnagel, 2006; Pettersen, 2008). As Vaughan (1996), Perin (2005), Walker (2010) showed in their own ways, countercultures of safety are developing to compensate for unpractical and unworkable bureaucratic rules. The question remains, how to stay knowledgeable of adjustments made in the field, at all levels of the organization? How is it possible to discriminate between 'good' adjustments (good for safety) and 'bad' ones'?

4. The Project's legacy

Both HRT and NAT have prompted an interest in system design, organizational features, organizational culture and a reflection on the impact of the environment (political, regulatory, social) on safety performances.

The influence of the institutional environment on accident prevention is analysed differently in both theories. Following the two NASA losses (*Challenger* in 1986 and *Columbia* in 2003), a very dynamic literature studied the harmful effects of constant budget constraints affecting the shuttle programme and its security division (Heimann, 1997, 2005; Vaughan, 1996; Starbuck & Farjoun, 2005). As Vaughan explained, this pressure (along with other factors) produced a culture within the organization that permitted a 'normalization of deviance'. It is now accepted that safety performances have to be understood in a wider context, including the impact of regulation, the pressure of public opinion and political interference.

Both HRO and NAT gave legitimacy and weight to an alternative perspective on high-risk systems, one that differs from the previously dominant engineering perspective (Perrow, 1994, p. 220). Dependability, availability or maintainability is not all that counts when one seeks to describe high-risk systems. Other factors coming from organization science have to be taken into account.

Much still remains to be done. There is a wide gap between the level of knowledge published and debated in the academic circles on these issues and the level of knowledge transfer that has actually occurred from these circles to the industry or regulatory circles. Hopkins (2001, p. 72) is right when he observes that 'this is not just a theoretical debate. There are practical consequences for the way we go about accident prevention'.

Designing or reinforcing organizational dynamics that favour social exchanges on unexpected events and surprises, and implementing voluntary error reporting systems are now considered key risk mitigation strategies throughout the industry. Some of these initiatives owe their inspiration, if only indirectly, to HRT.

The HRO literature has continued to grow, evolving from a research topic to a powerful marketing label: organizations concerned with their level of safety and/or with their public image want to become HROs and maybe more importantly they want to be described as HROs. The HRO term has somehow become a label of excellence, even appearing in Wikipedia. How can we account for this 'success'?

The restrictive list of characteristics given by HRO authors, rather than providing a starting point leaving researchers and experts free to enrich the categorization, evolved over the years to become a set of minimal conditions to describe a successful high-risk organization. It has been presented as 'a four-step process model of quality management' (Gaba, 2000, p. 86). This was never the intention of the Berkeley researchers.

An example of how far the HRO label has traveled can be found in studies of the healthcare system, the newest member of the HRO club. The link between the medical field and the HRO agenda is undoubtedly a direct consequence of the alarm sparked by the report *To Err is Human: Building a Safer Health System*, published by the American Institute of Medicine (1999) (cf. Shapiro & Jay, 2003; Wilson et al., 2005; Roberts Madsen Desai, & Van Stralen, 2005; Carroll & Rudolph, 2006; Pronovost et al., 2006; Dixon & Shofer, 2006). It concludes that death at the hospital from preventable errors is the fifth cause of mortality throughout the western world. The main argument is that some of the deaths occurring in hospital are totally preventable. Bad communication, bad preparation, lack of feedback, great discrepancies among services, wards and experts are error inducing. These errors are embedded in the way the system is organized.

Following this brutal awakening, the health system is now engaged in a systematic comparison of its operations with other high-risk industries (such as aviation and the nuclear industry). Health organizations now have a great interest to reduce their level of error and are showing a keen interest in various approaches, such as voluntary error reporting systems (translated into 'sentinel events' reporting in the medical setting).

The HRO literature substantiated the idea that safety and reliability are not only the result of great technology in combination with a great culture. They are also the result of organizational design: choices and allocations are made, which greatly influence the potential to be safe and reliable. These decisions have to be questioned and reflected upon constantly.

Variance across organizations does exist. Industry and regulatory circles have always preferred to talk about 'culture' when confronted with organizational variance, to the detriment of drawing on well-equipped organizational analysis. However, this work would allow social scientists, and notably organization theorists, to expose the strengths and weaknesses of various organizational regimes and actually contribute decisively to the safety debate, regarding the consequences of certain organizational choices.

The HRO literature gave a boost to comparative research on high-risk organizations, across a number of countries, across industries, public and private, and this impetus needs to be further nurtured. Indeed, such 'Normal Operations Studies' still need much encouragement, as the conditions under which researchers can independently embark on these topics remain tenuous (Bourrier, 2010).

HRO research has revealed the potential of studying daily operations as opposed to *a posteriori* analyses of major accidents. Resorting to ethnographic and sociological methodologies gave new vitality to the study of such complex organizations. This must be considered a great tribute to the early developers of High Reliability.

Approaching the final point, *en hommage à Todd LaPorte*, there is something more to all of the above. One of the great points that I learned from him, is this idea that we know so little about the functioning of complex organizations. We are only looking at the tip of the iceberg. Deep below, complex work is done, people are toiling, and complex decisions are made everyday, with few paying attention to them. We depend on these invisible webs of teams, decisions, technology, infrastructures, and yet we know almost nothing about their daily operations. The investigation must go on.

Notes

1. See, for example, LaPorte and Consolini (1991), Roberts (1993), Rochlin (1996, 2001) and LaPorte (2001).
2. For example, they never considered NASA as an HRO. See Boin and Schulman (2008) on the status of NASA as an HRO.

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