Remote Working and Cybersecurity in the Pandemic: Research on the Employee Perceptions of Remote Work and Cybersecurity in an International Organisation during COVID-19

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Abstract

This paper examines the employee perceptions of remote working during the COVID 19 pandemic, focusing particularly but not exclusively on the rapid developments in cybersecurity for remote organisations and workers. Data was gathered from seven interviewees and forty-seven survey respondents who worked for the International Telecommunication Union under various contracts and in various positions at the time of the study. Studying the attitudes and experiences of remote workers uncovered that flexibility and time-saving efficiencies are the most valued benefits of remote working, while the lack of social interaction is seen as the worst feature of pandemic teleworking. An observed association between younger age and a reported decrease in motivation at work calls for further academic enquiry. While studied teleworkers did not experience cyberattacks in unprecedented volume, interview enquiry confirmed that cyberattacks adapted to the vulnerabilities of teleworking and intensified during the pandemic. Swift adaptations and increased employee cyber-protection likely prevented further damage in the time of the Coronavirus cyber crisis but did not eliminate cyberattacks. The remaining cybersecurity vulnerabilities, especially in personal device usage, signal an inexpungible threat to organisational and personal safety, resilience and efficiency.

Key words: cybersecurity, remote work, telework, COVID-19

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Abbreviations

ADA	Americans with Disabilities Act
BLS	Bureau of Labor Statistics
BYOD	Bring Your Own Device
COVID-19	Coronavirus Disease 2019
DOT	Department of Transportation
EU	European Union
GGGI	Global Gender Gap Index
IBM	International Business Machines
ICT	Information Communication Technology
ILO	International Labour Organisation
IT	Information Technology
IP	Internet Protocol
ITU	International Telecommunication Union
NASA	National Aeronautics and Space Administration
NGO	Non-Governmental Organisation
NIST	National Institute of Standards and Technology
OPEC	Organisation of Petroleum Exporting Countries
OECD	Organisation for Economic Co-operation and Development
RDP	Remote Desktop Protocol
SDGs	Sustainable Development Goals
UN	United Nations
URL	Uniform Resource Locator
US	United States
UK	United Kingdom
VPN	Virtual Private Network
WEF	World Economic Forum
WFH	Work from Home
WHO	World Health Organisation
WSIS	World Summit on the Information Society

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1. Introduction

As of August 2021, the cumulative number of confirmed Coronavirus cases globally surpassed 200 million, just six months after reaching 100 million cases and 4.3 million deaths have been reported from the member states of World Health Organisation (WHO, 2021). The need to limit the contagion from the COVID-19 through social distancing measures has forced many organisations and corporations to introduce remote work options (Toniolo-Barrios & Pitt, 2020). The COVID-19 pandemic continues to severely affect public health and cause unprecedented disruptions to economies and labour markets. In line with the World Health Organisation (WHO) advice, many steps have been taken worldwide to contain the spread of the virus. Governments have implemented measures ranging from physical distancing, restrictions on the freedom of movement and the closure of non-essential companies and undertakings to the lockdown of entire cities and countries in different parts of the world. In reaction to the various restrictions, closures and measures, the sphere of work undertook a significant transformation, shifting the productive activities from office to homes. As the pandemic evolves, so have the measures governments have taken to address it. The wider effects of such drastic changes remain, however, less examined.

1.1 Reasons for Choice of Topic

During this critical time, our societies have undergone a large scale "forced experiment" where public and private sectors, organisations and workers have continued to operate while being physically separated, provided they had the necessary technological, legal and digital security conditions (OECD, 2020). Reducing face-to-face contact has been a crucial action to mitigate the impact of COVID-19. The International Labour Organisation (ILO) estimates that 7.9% of the world's workforce about 260 million workers worked from home on a permanent basis prior to the COVID-19 based on the data from 118 countries representing 86% of global employment in 2019 (ILO, 2020). Moreover, as the pandemic evolves ILO monitor noted on April 2020 that 68% of the world's total workforce live in countries where workplace closures are recommended or required. In this new environment, employers have to adapt and make contingency plans to respond to new measures as they arise. Undoubtedly, many organisations and companies are now exploring working from home (WFH) as a temporary or alternative working arrangement (ILO, 2020).

As the COVID-19 pandemic creates complex challenges worldwide, new ways of working were rapidly adopted. A rise in remote working occurred in public, private and international organisations globally. Remote working has notable benefits: organisations can save on office rent costs and outsource talented workers abroad. Employers may mitigate immigration issues and experience productivity gains while workers can enjoy flexible working hours and locations. At the same time, concerns remain on a variety of fronts, including effective communication and collaboration across different time zones, socialising and sharing knowledge virtually, preventing work isolation, protecting our data security and privacy, and slowing down workers' performance or productivity.

In the pandemic, remote working was forced upon the employees to reap the benefits of decreased social exposure through which their health could be better protected. In the post-pandemic future, employees are about to experience a shift back into offices or alternatively, they may be able to choose to remain working remotely. As millions of white-collar workers face this unique, unprecedented dilemma, understanding the impact of remote working on all areas of life, including health, well-being, and personal cybersecurity, is essential. The widespread use of digital technology in remote working has been equally enabling and potentially threatening in terms of cyber-attacks, data leakage and misuse. As an essential element of the transition into remote working, the cybersecurity challenges and approaches are deserving of special attention in this study.

1.2 Definitions of Remote Work and Cybersecurity

1.2.1 Definitions of Remote Working

Both remote work and telework refer to an arrangement where workers perform tasks and duties from an alternative location of their own choosing. "Alternative" should, in this case, be understood as an alternative to a default expectation that work is performed in a specific place. Depending on the particular job or business, the default place of work could be the premises, facilities or site of the economic unit for which the work is carried out; a client's premises, facilities or site; or public spaces (ILO, 2020). In addition, ILO (2020) asserts that remote work has the following different implications for dependent workers (employees) and independent workers (self-employed):

a) For the workers dependent on visiting specific premises of production, this implies that the work should be carried out at a worksite other than:

i. The premises, facilities or sites of the economic unit on which the worker is dependent

(such as an employer's office, a construction site, a farm or a workshop); or

ii. The client's facilities or sites of the economic unit on which the worker is dependent (such as a client's home, a shop, an office or a factory); or

iii. A public space, if the nature of the duties means that they have to be carried out in a public space (in the case of a street vendor, bus driver or patrolling police officer, for example).

b) For the workers independent of spatial restrictions, this implies that the work should be carried out at a worksite other than:

i. Premises, facilities or sites controlled by the independent worker for the purpose of carrying out the work (such as the worker's own office, a construction site, a farm or a workshop). If the independent worker mainly carries out the work in his or her own home, then the home would be considered as premises controlled by the independent worker for the purposes of performing the work.

ii. A client's facilities or sites (such as a client's home, shop, office or factory); or

iii. A public space, if the nature of the duties means that they have to be carried out in a public space (in the case of a street vendor, taxi driver or performance artist, for example).

Many definitions were used in the academic and professional literature to describe remote work, telework, work at home or work from home (WFM) or telecommuting and more. The definition of remote working in this paper is broad but draws from multiple sources. Hence, these sources and the most common definitions one may find in the literature are listed in the table below.

Table 1: Definitions of Different Terms Found in the Literatures

Term used	*Definitions*	*Source*
1. Remote work		
a)	Described as situations where the work is fully or partly carried out on an alternative worksite other than the default place of work.	*ILO (2020)*
b)	The performance of a certain employment contract of the labor function outside the location of the employer, its branch, representative office, other separate structural unit (including those located in another area), outside a stationary workplace,	*Gurova (2016)*

	territory or facility, directly or indirectly under the control of the employer, subject to use for the performance of this labor functions and for implementation of interaction between the employer and the employee on issues related to its implementation, public information and telecommunication networks, including the internet.	
c)	Work outside the place where the results of work are needed or which would be a traditional place of work in the past, using information technology.	*Hynes (2014)*
d)	A work arrangement in which the employee resides and works at a location beyond the local commuting area of the employing organisation's worksite; includes full-time telework and may result in a change in duty location to the alternative worksite.	*U.S. Office of Personnel Management (2013)*
e)	Work performed at home or in a place close to home, without commuting to a conventional office during standard working hours.	*Mannering et al. (1995)*
2. Telework	The work is fully or partly carried out at an alternative location other than the default place of work.	*Eurofound & ILO (2017)*
a)		
b)	Work that relies on technology-mediated communication and sophisticated information-processing capabilities instead of colocation for the production and delivery of work outputs.	*Fonner et al. (2010)*
c)	Replacing an employee's travel from home to office and from office to home with information processing technology (e.g. computers, telecommunications). It is related to mobility and can be used to create bonds between employees from different places around the globe and their work.	*Morganson et al. (2010)*
d)	The use of personal electronic devices such as a computer, tablet or telephone (mobile or landline) to perform the work: The use of personal electronic devices needs to be an essential part of carrying out the work.	*Greenberg (2008)*

e)	A form of work organisation in which the work is partially or completely done outside the conventional company workplace with the aid of information and telecommunication services.	*Garrett et al. (2007);*
f)	Work performed by: (a) those whose remote work is from the home or a satellite office, (b) those whose telework is primarily in the field, and (c) those whose work is "networked" in such a way that they regularly work in a combination of home, work, and field contexts.	*Konradt et al. (2000)*
3. Work at home or Work from home (WFH) **a)**	Refers to work that takes place fully or partly within the worker's own residence. The physical location where all or some of the work is carried out is thus the worker's own home. The work at home category is independent of the default place of work but might overlap where the worker's home is both the place where the work is carried out and the premises of the economic unit e.g. independent worker who has an office at home.	*ILO (2020)*
b)	An alternate way of organizing task that may be defined as the work which can be performed from home (away from the traditional workplace such as factories or offices) and enables employees to access their labour activities through the use of information technology.	*EFI (2020)*
4. Home-based work	a) Workers whose main place of work is their own home. b) Subcategory of work at home.	*ILO (2018)*
5. Remote work from home	Workers carrying out remote work from their own residence	*ILO (2020)*
6. Telecommuting **a)**	The use of information and communication technologies to replace or substitute for work environments that require individuals to commute to a traditional office.	*Bélanger (2013)*

b)	Systems that enable employees to perform regular, officially assigned duties at home or at alternative work sites geographically convenient to their residences	*Pearce (2009)*
c)	Working some portion of time away from the conventional workplace, often from home, and communicating by way of computer-based technology.	*Golden (2006)*
d)	Work conducted from home that is often supported by telecommunications technology.	*Kossek et al.(2006)*
e)	Work arrangement in which employees perform their regular work at a site other than the ordinary workplace, supported by technological connections.	*Pinsonneault (2001)*
f)	Refers to working arrangement in which the office worker is allowed or required to work at home or at a telework center on a regular basis, during regular working hours, full or part time, maintaining contact with the central office through telecommunications devices.	*Bernardino (1996)*
g)	The use of telecommunications technology to partially or completely replace the commute to and from work.	*Mokhtarian (1992)*
7. Telework from home	Workers who carry out work defined as telework in their own residence.	*ILO (2020)*
8. Home-based teleworker	Home-based workers who carry out work defined as telework.	*ILO (2018)*
9. Virtual teams	Spatially or geographically dispersed work arrangements that are generally characterized by a relatively short life span, technology-enhanced communications, and a dearth of face-to-face interaction.	*Tworoger et al. (2013)*

Based on the listed definitions of remote work, also known as telework, work at home, work from home (WFH) and telecommuting and under other terms, we can refer to our definition for remote work based on the following criteria:

1. The work location: most of the definitions include work carried out in the worker's own home or alternative premises near home. Our definition includes work carried out at home or work done in certain premises outside the office environment.

2. The nature of the technology used: some definitions include only those workers who operate computers and are connected online with their employer or client. Some definitions include the use of telecommunication technology. Our definition is any use of telecommunication technology.

3. The amount and proportion of time spent on the work premises: some definitions include full-time or part-time telework. Our definition includes both full-time and part-time, also contractor workers and even interns.

4. The contractual relationship with employer: a teleworker can be self-employed, an employee or even a volunteer. Our research is limited to employees.

5. The nature of the relationship with the employer. Some definitions include employed workers on a full-time basis or primary by a single employer or multiple employers. Our definition includes part-time workers as well as interns. Our focus is on full-time and part-time workers employed by a single employer.

The following six types of teleworkers are distinguishable: a) an employee who works at a satellite office, b) a telework centre worker, c) an electronic homeworker, d) a traditional homeworker, e) a nomadic worker, and f) a professional networker (p.19, Verbeke & Illegems, 2003). Telework can be either formal or informal. *Informal telework* can be defined as temporary telework, which is often a local arrangement between an employee and his/her supervisor. On the other hand, *formal telework* takes place regularly and is introduced as part of the organisation's human resources policy. Formal arrangements reflect the organisation's commitment to institutionalize this work option, while informal arrangements usually bear the advantage of flexibility in design (Gray et al., 1994). The total volume of telework is measured using the variables of penetration level and frequency. For example, these variables could be the percentage of workers who telework in the active workforce and the number of days per week on average that teleworkers telework.

We define the terms remote work or telework as work from home or any other workstation outside the main office for at least one day per workweek, where any sort of telecommunication technology is used by the worker. Our paper uses the above-stated names for telework interchangeably whilst referring to the same activity as defined and explained.

1.2.2 Defining Cybersecurity

In 2020, the average cost of a data breach was USD 3.86 million globally, peaking at USD 8.64 million in the United States (IBM, 2020). These expenses include discovering and responding to the breach, the cost of downtime and lost revenue, and the long-term reputational damage to a business and its brand (CISCO, n.d.; IBM,2021). Because Cybersecurity threats can impact organisations and personal lives, both firms and individuals need work together to protect the cybersecurity and data in their organisations.

The most commonly available definitions of cybersecurity stress the importance of defending computers, mobile devices and servers, but also broader electronic systems, networks and digital data from malicious attacks (Kaspersky, 2021). Cybersecurity's primary aim is to reduce the risk of cyber-attacks and protect against the unauthorised exploitation of systems, networks and technologies (itGovernance, n.d.), and through doing so, ensure integrity, confidentiality, and availability of digital information (ForcePoint, 2021). While traditional cybersecurity focuses on defending the devices, networks and technology, newer cybersecurity takes a human-centric approach. Hence, modern cybersecurity involves detecting behavioural anomalies to surface and prioritise the most severe threats, reducing investigation and threat detection times (ForcePoint, 2021). Also known as information technology security or electronic information security, cybersecurity is applicable in numerous contexts and can be further divided into several categories: network security, application security, information security, operational security, disaster recovery and operational continuity, and end-user education (Kaspersky, 2021). Recognising the broad applicability of the term, cybersecurity will be applied and depicted in most of the listed contexts and through various lenses in this paper.

1.3 Aims and Objectives

To better understand how organisations, benefit from remote work while overcoming the challenges and avoiding adverse outcomes, the following research questions were constructed. The research questions should pose as guiding pillars for the research paper and convey the thematic circles around which this paper is constructed.

Q1: What are the benefits and challenges of remote work?

Q2: What are the perceptions of employees on the various aspects of remote working during COVID-19?

Q3: What are the employees' views on their data security and privacy protection while working remotely?

Q4: How COVID-19 has affected remote working and cybersecurity in case of ITU?

Q5: How to make remote work more effective, resilient and secure in an international organisation?

As the authors of this paper have conducted internships at International Telecommunication Union (ITU) - an international organisation - this opportunity and exposure were utilized to study ITU's remote work as a case study of an international organisation. By focusing on the ITU, the authors aim to explore remote workers' experiences, investigate the short-term and long-term impact of remote work and identify areas for improvement in the post-COVID-19 era.

1.4 Interacting with Sustainable Development Goals

In order to understand remote work and cybersecurity, we identified the concerned SDGs (a total of six goals) that directly engage with the topic of this paper. However, one should note that this paper's broader, indirect implications reach beyond the below-listed Sustainable Development Goals, which are in their nature collectively synergetic.

Remote work and Cybersecurity touch on the SDGs 1, 3, 5, 8, 9 and 17. The recent pandemic proved that working remotely offers increased continuity of employment and job stability in times of crises and increased domestic demands. Hence, the adoption of teleworking can enhance the stability of economic performance (SDG 8) and growth whilst protecting human health through a decreased need for physical contact (SDG 3). Pandemic teleworking has played a crucial role in containing the spread of Coronavirus and thus played an essential role in preventing premature deaths and poverty (SDG 1). The increased need for stable and accessible internet connection for teleworkers and home-office equipment, reliable software, cybersecurity protection, and technologies continues to drive innovation and advancements in the related industries (SDG 9). The

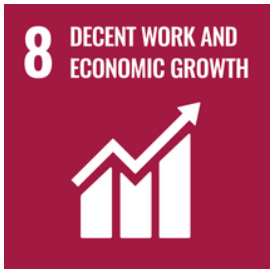
potential of teleworking to bridge the gender inequality gap (SDG 5) forms an essential part of this paper. Lastly, increased global connectivity and blurring the barriers of physical distance may forge stronger, productive partnerships for achieving the Sustainable Development Goals (SDG 17).

Ensuring cybersecurity in remote work may prevent financial risks to organisations and employees and contribute to decent, healthy working conditions. In addition, the need for promoting and ensuring cybersecurity for the remote workers will help our societies, industries, infrastructures, and markets develop as healthier, more innovative, resilient, and sustainable. As a result, multi-stakeholder and international partnerships can be utilised to work collectively to achieve all of the highlighted SDGs.

The following pages of this paper analyse the various established and potential advancements in fulfilment of the SDGs via improved gender equality, increased and improved infrastructure and connectivity, improvements in human health and security, avoiding poverty and promoting innovation. While this paper analyses remote working and cybersecurity topically rather than through the lens of the SDGs, all sections and topics addressed in this paper relate closely to the fulfilment of the SDG goals and their specific targets, as highlighted in the table below.

Table 2: The Sustainable Development Goals directly relevant to this paper, represented in logos and defined

The SDGs, represented in images	The SDGs defined	The SDG Targets
	1 End poverty in all its forms everywhere	**1.2** By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions **1.4** By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance

	3 Ensure healthy lives and promote well-being for all at all ages	**3.4** By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being **3.6** By 2030, halve the number of global deaths and injuries from road traffic accidents **3.d** Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks
	5 Achieve gender equality and empower all women and girls	**5.1** End all forms of discrimination against all women and girls everywhere **5.4** Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate **5.5** Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life **5.b** Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women **5.c** Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels
	8 Promote sustained, inclusive and sustainable economic growth, employment and decent work for all	**8.2** Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors **8.5** By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

	9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	**9.1** Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all **9.c** Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2030
	17 Revitalize the global partnership for sustainable development	**17.16** Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries

Source: The 17 Goals, Available at : https://sdgs.un.org/goals

2. Literature Review:

In this chapter, the bulk of existing literature concerning remote work and cybersecurity is reviewed, including the intersections of the two elements. The chapter bears the following structure: we begin by providing a historical overview of remote work (2.1), a section followed by listing some of the benefits of remote working (2.2), and then addressing selected challenges and concerns in remote work(2.3). Specifically, the challenges are further divided into two subsections named 'general challenges and concerns of remote work' (2.3.1) and (2.3.2) 'cybersecurity threats for the remote workers'. The intersection of remote work and gender are reviewed next (2.4), throughout the subsections labelled as 'gender implications in remote working' (2.4.1) and 'childcare, parenting and domestic work' (2.4.2). Other topics in remote working are depicted in further sections (2.5). Following these, the literature on the mental burden of pandemic remote work is discussed (2.5.1). Having brought together the most persuasive evidence on the ways to thrive in the remote working mode, the traits of successful remote workers (2.5.2) and organisations (2.5.3) are listed and depicted. Finally, turning to the cybersecurity concerns in remote working (2.6), this paper provides a review of the new and old cyber-challenges for remote workers (2.6.1) and the most common and effective cybersecurity approaches (2.6.2).

The topics mentioned above were selected for their potency to best address the research questions of this paper, as stated above. The studies and articles mentioned in the upcoming sections have significantly enriched the process of constructing this research in this paper and provide the necessary theoretical groundwork for this research.

2.1 Remote Work: Evolution and Historic Overview

While the COVID-19 pandemic triggered a global migration away from the traditional workplace, the evolution of remote work had begun long before this pandemic started. In their research on work from home, the International Labour Organisation (ILO) accurately points out that working has always been dynamic, having undertaken several transformations (EFI, 2020). However, certain moments have revolutionized the process of work and brought about tectonic shifts away from the previously commonplace ways of working. One such moment was the Industrial Revolution during the 1700s and early 1800s in Europe. Before the Industrial Revolution, peoples work, jobs or occupations were mostly family enterprises and were primarily performed at home. The examples of such types of work can be found in India's world-famous handicraft, jewellery making of stones, carving work in ivory, wood, stone and marble, work of ironsmith, or spice production, which all used to be family enterprises and were, thus, performed at home. Generalizing this observation in the article "A Brief History of the Work Home", the workhome project team emphasized that there has been integration between where people conducted their business and where their families lived and gathered for as long as humans have had homes. Examples of home-based working can be found across the globe. In pre-industrial Britain, nearly all the commoners lived and worked in open spaces known as their "work homes". Both self-employed workers and proprietors of small businesses set up their workplaces where they could make goods, either in their homes or in their associated back yards nearby, where they worked with family members and employees (Howington, 2016).

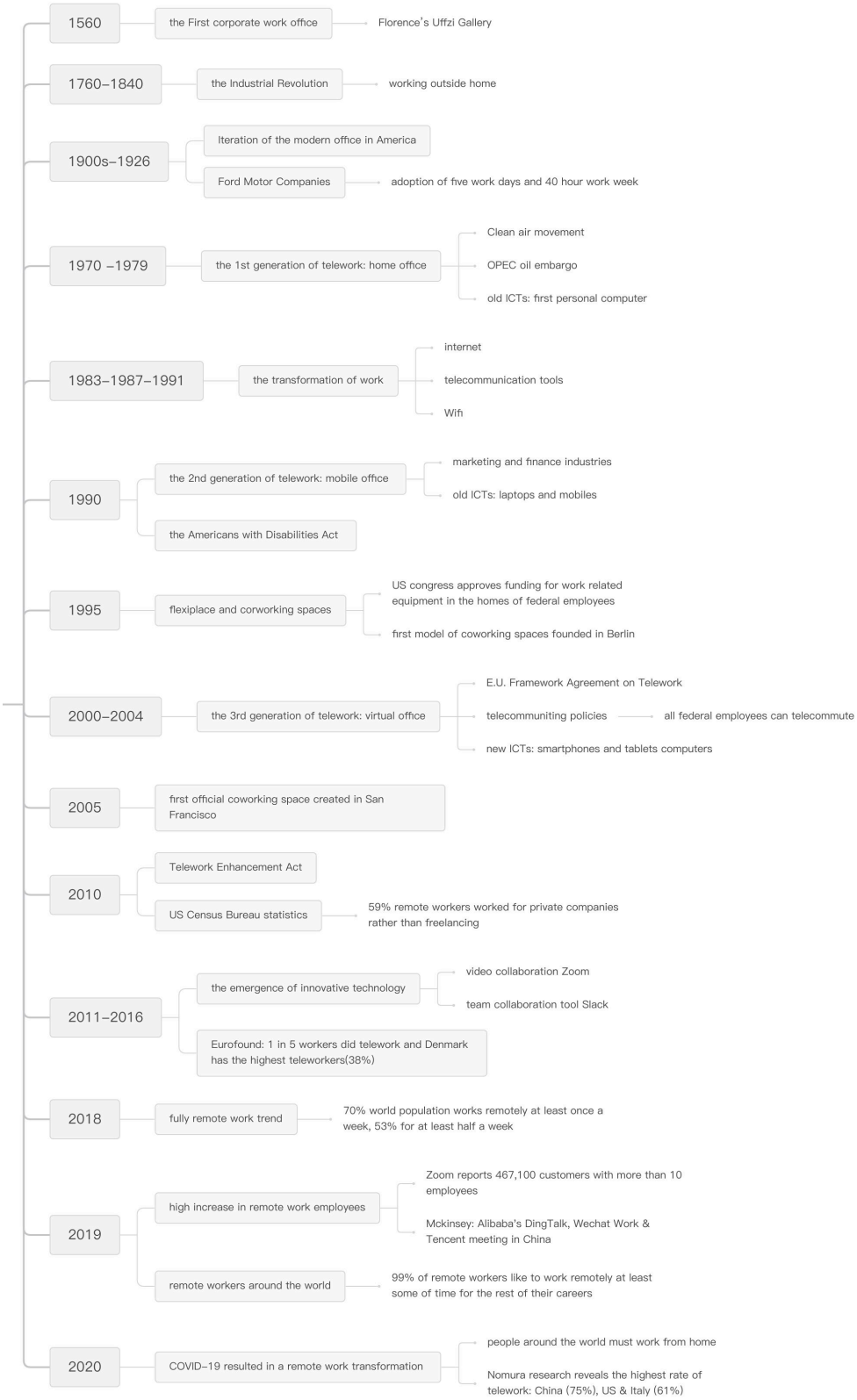
Post Industrial Revolution, the production process shifted away from households into large factories. The workers moved accordingly, away from their home-based enterprises and into the factory shop floors (ILO, 2020). More recent development in the nature of work occurred in the United States (U.S.), where a large-scale transition from traditional work to remote work began with the adoption of Work-From-Home (WFH) policies in the 1970s. The soaring gasoline prices caused by the 1973 OPEC oil embargo made commuting more expensive (Choudhury, 2020) and kickstarted the policy changes. As early as the 1980s, when home-based digital technology was limited, a researcher Olson(1983) examines some behavioral, organisational and social issues

surrounding remote work. She documented the characteristics of jobs that predisposed job holders to work remotely. The characteristics included minimal physical requirements of the job in the form of a telephone and a terminal, a high degree of individual control over work, well-defined milestones and deliverables, the need for concentration, and a low need for communication. All of these characteristics still apply to remote work and freelancing today. Remote office work or work-from-home (WFH) is considered an extension of flexible work arrangements alongside part-time work, which enabled workers, especially female workers, to balance work and childcare. With the Internet enabling connectivity since the 1990s, working remotely enabled many employers to move their labour forces offshore to lower-cost, globally-connected locations. Most commonly offshored work included office work at call centres and software engineering centres, but also freelancing in design, data entry, programming and translation (Sako, 2021).

A critical moment came upon the world of work at the introduction and widespread use of Information and Communication Technology (ICT) that allowed the reversal of the process which started during the Industrial Revolution. Connected by the technologies, people began turning towards home for work once again (ILO, 2020). With the advent of personal computers, the internet, email, broadband connectivity, laptops, cell phones, cloud computing, and videotelephony, the adoption of WFH increased in the 2000s. As the researchers, Gajendran and Harrison (2017) explain, the WFH trend was accelerated by the need to comply with government regulations, such as the Americans with Disabilities Act (ADA) of 1990. As mandated by the U.S. Equal Employment Opportunity Commission, disabled employees became legally protected if needing to work from home. All these factors, and many others, have changed how people used to work and contributed to the adoption of remote work.

Based on the works of Toptal(n.d.), Buffer (2019), Knobelsdorff (1987) and several other sources, a historical overview of remote work was constructed. Illustrated in the timeline below (see figure 1), the figure intends to highlight key developments in the evolution of remote work throughout decades and centuries, beginning from 1560 and ending in the recent year 2020. Following the timeline is an explanatory summary of the most significant of the highlighted events.

Figure 1: The History of Remote Work from 1560-2020



- In 1560, the central administrative building of the Medici mercantile empire called Florence's Uffizi Gallery is constructed. It is a predecessor to the first-ever corporate office and stands to this day in modern Florence, in Italy.

- Between 1760 and 1840, the Industrial Revolution creates strong social momentum pushing workers towards working outside of their homes.
- During the early 1900s, the first iterations of the modern office begin to appear in America, where innovations including the telephone, telegraph, typewriter and public electricity were broadly implemented.
- In 1926, Ford Motor Companies adopted a five workday week and a 40-hour workweek model that became a globally reproduced standard.
- In 1970, the clean air movement lays the groundwork for remote working by identifying one of its most compelling benefits: zero commute time. Three generations of telework arise in succession: from home office switch to mobile office and move to virtual office (Messenger et al., 2016).
- In 1973, the telecommunications-transportation tradeoff is published by physicist Jack Nilles, who worked remotely on a NASA communication system. Nilles is now regarded as the father of remote work. In the same year, (Organisation of Petroleum Exporting Countries) OPEC oil embargo come into effect in the same year. The Washington Post publishes an article titled "Working at Home can save gasoline". IBM allows five of its employees to work from home as an experiment.
- In 1975, the first personal computers are invented.
- In 1983, the internet is born.
- In 1987, the number of telecommuting Americans reaches 1.5 million (Knobelsdorff, 1987).
- In 1991, Wi-Fi is invented.
- In 1995, the U.S. Congress approves permanent funding for "flexible" work-related equipment in the homes of federal employees. At the same time, C-base, one of the first hackerspaces in the world, was founded in Berlin, Germany. Hackerspaces are some of the earliest models of coworking spaces.
- In 2000, the Department of Transportation (DOT) Appropriations Act is enacted in the US, requiring all executive agencies to establish telecommuting policies. By 2004, all federal employees can telecommute.
- In 2005, the first official coworking space is created in San Francisco, the U.S., by software engineer Brad Neuberg called the San Francisco Coworking Space.
- In 2010, 4.2 million more people worked at home than a decade before (U.S. Census Bureau, 2016). The former U.S. President Barack Obama signs the

Telework Enhancement Act, requiring all federal agencies to create policies for eligible employees to work remotely.

- In 2015, Eurofound records that one-fifth of workers did some form of telework or ICT-based mobile work occasionally or regularly, from somewhere other than the primary place of work in Europe. The percentage of employees and self-employed workers doing telework varies extensively between the European Member States. Italy recorded the lowest proportion of teleworkers (just 8%), whereas Denmark ranked at the top with 38% (Eurofound, 2020).
- The number of fully remote U.S. companies increased from 26 in 2014 to 170 in 2018. Approximately 70% of the world's population worked remotely at least once a week, and 53% for at least half of the week (Browne, 2018).
- In 2019, the working team collaboration tool Slack grows from 0 in 2013 to 10 million daily active users in 2019 (Slack, 2019). The U.S. video collaboration software Zoom reported that since 2011, they reached 467,100 customers with more than ten employees, increasing by 470% from the previous year (Zoom, 2021). According to the recent Mckinsey report, the number of people using new work tools to support their remote work also increased rapidly in China. Chinese videoconferencing and co-working tools, such as Alibaba's DingTalk, WeChat Work, and Tencent Meeting, can connect physically distanced colleagues and teams (Tonby & Woetzel, 2020). 99% of remote workers said they would like to work at least some of the time remotely for the rest of their careers (Buffer, 2019).
- In 2020, the COVID-19 pandemic transformed our world to remote work. Hundreds of millions of people around the world must work from home. The survey by Nomura Research Institute established that among the highest rate of telework is in China (75%), followed by U.S. and Italy (61%), U.K. (55%), Sweden (52%), Germany (50%), South Korea (37%) and Japan (31%) (Hosoda, 2021). Morgan Stanley predicted that office tenants across Asia would permanently give up 3% to 9% of their existing office spaces, resulting in a 10% and 15% rent decline in the next three years. Investment Bank's report estimated rental impact would be starkest in Asia, with Singapore leading the way at -10% decline, followed by Tokyo -9%, Hong Kong -7% and Sydney -5% (Kaur, 2020).

2.2 The Benefits of Remote work

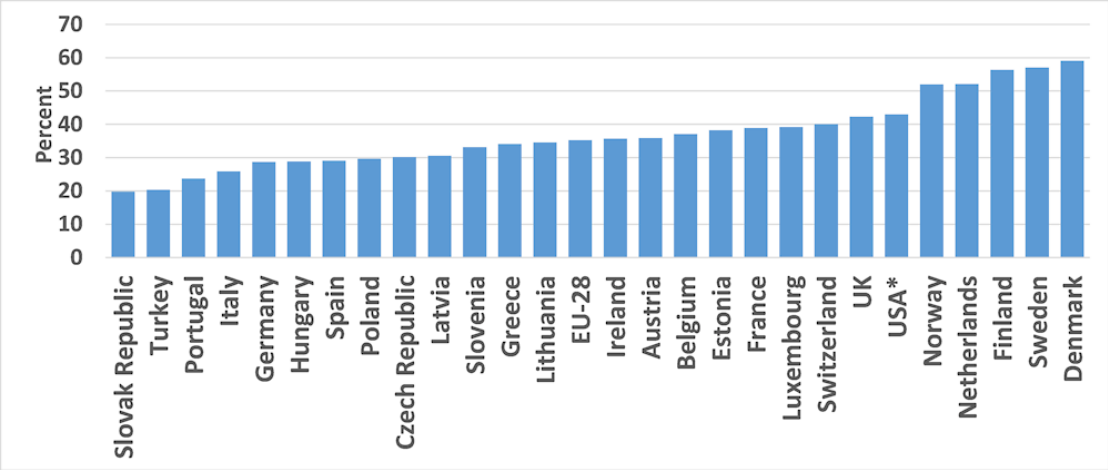
Scholars and researchers reveal numerous advantages and disadvantages for those working remotely and identify the critical issues faced by remote employees, employers

and society. A research paper done by a Stanford economist and professor Nicolas Bloom and several other authors on the benefits of working from home in 2015. The study draws attention and interest from journalists, business leaders and employees looking to avoid long commutes, skirt office politics and develop a better work-life balance (Bloom et al., 2015). This study is based on an experiment which was conducted on 1,000 employees of Ctrip, a Chinese travel company. The experiment reveals that working from home for nine months led to a (13 percent) increase in performance, almost an extra day of output per week, plus a (50 percent) drop in employee-quit or turnover rates. The experiment was so successful that Ctrip rolled out working from home in the entire firm. However, Bloom's analysis of Ctrip considers that employees are only allowed to work from home if they have a home office. The room could not be a bedroom, and nobody was allowed into the room during the workday except for the employee (Gorlick, 2020). Thus, those remote workers could find a significant challenge in balancing personal and professional lives when WFH, there is uncertainty and skepticism over the effectiveness of WFH (Bloom et al., 2015).

Furthermore, work from home (WFH) is an option for employees before COVID-19 for many countries in the past decades. WFH is an alternate way of organizing tasks, commonly understood as the work which can be performed from home (away from the traditional workplace such as factories or offices) and enables employees to access their labour activities through the use of information communication technologies (Nilles, 1997). It may be for a temporary period or for the long-term durations as an alternate to the traditional way of doing work. Once Information Communication Technology(ICT)-based mobile work emerged, as smaller and lighter wireless devices such as laptops and mobile phones enable employees to work not only from home but from practically any location where they needed to work (Messenger and Gschwind, 2016). Since 1970s, telework already existed and it was expected that everyone would work remotely by some point in the future (IL0, 2020). However, while ICT has indeed changed how we work, the use of ICT for work outside the employer's premises is still by no means a general practice for all workers. According to the research report by Eurofound and ILO (2020), the adoption of these work practices was much slower than anticipated due to various human, social and organisational factors, including the basic human factors associated with people's needs to meet other people face-to-face. In parallel with technological advances, in recent decades, more flexible working time arrangements have been adopted, driven both by the needs of organisations for more flexible production and workers' desire to better balance their work with other, personal commitments often related to family duties. This development has been influenced by the rise in dual-career families and the ongoing challenge of simultaneously dealing with work and family demands (ILO, 2020).

Before the pandemic between 2005 and 2016, the number of U.S. employees who telecommuted increased by 115% (Abrams, 2019). Recently, over 151 million Americans were employed in May 2021 and more than 25 million Americans (about 16% of the total workforce) teleworked at least part of the time or worked at home remotely because of the pandemic according to the U.S. Bureau of Labor Statistics (BLS, 2021). It is important to note that telework is widespread across many OECD countries. A substantial fraction of workers teleworked worked outside the office, from home or public spaces at least occasionally, between the years 2015 to 2016. (see figure 2).

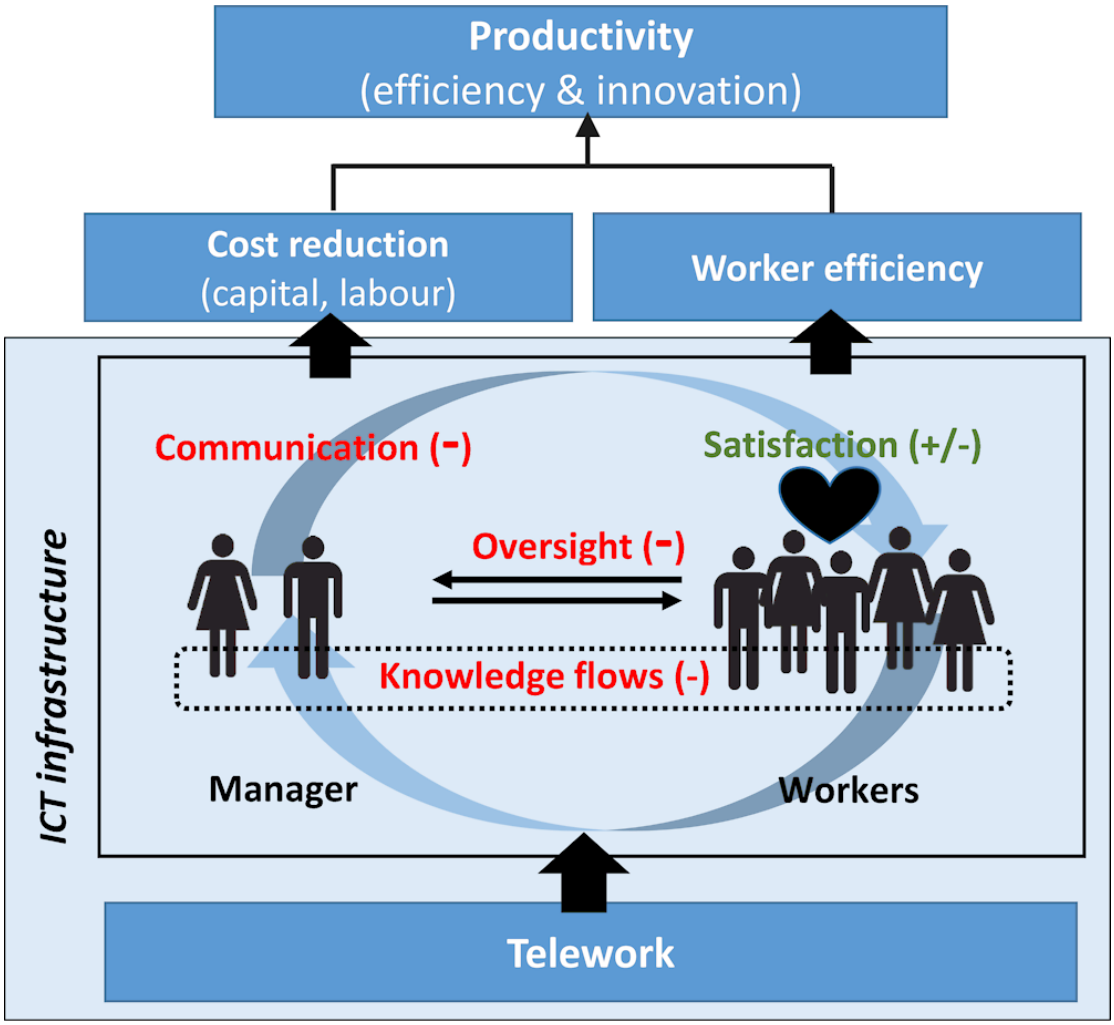
Figure 2: Share of People Using Telework in 2015/2016 (Source: OECD, 2020)



The above figure shows the use of telework for a selection of OECD countries and EU-average. Statistics for all countries except the USA indicate that the reported percentage of people (employed or self-employed) who worked from home or public spaces (such as cafés, libraries) from 2015 to 2016. For the USA, the figure shows the percentage of employees who worked remotely during 2016. This widespread teleworking figure suggests that the extent of people teleworking varied widely across countries from the lowest 20 percent in the Slovak Republic and Turkey to more than twice as many people, around 50 percent in Sweden and Denmark. According to the OECD's research study, more widespread use of telework can have a wide range of impacts on organisational performance and workers' well-being. Policies are fundamental to enable organisations and workers to benefit from the many opportunities offered by the more common use of telework. This, in turn, can have positive effects on aggregate productivity and well-being, as well as additional policy-relevant areas such as climate change or economic inequalities (OECD, 2020).

Importantly, OECD suggests that the overall effect of telework depends on two main channels. The direct channel affects organisational performance by changing the workforce's efficiency, motivation, and knowledge creation; the indirect channel is for telework to facilitate cost reductions that free up resources for productivity-enhancing innovation and reorganisation (OECD, 2020). The functioning of either channel proposes an appropriate ICT infrastructure that could enhance both.

Figure 3: Telework and Productivity (Source: OECD,2020),



The figure above illustrates how telework may increase productivity. Telework can improve productivity by raising workers' satisfaction and thus workers' efficiency, e.g. through better work-life balance, less commuting or fewer distractions leading to more focused work or less absenteeism. Nevertheless, inadequate communication, managerial oversight and the flow of knowledge may decrease the operational productivity of remote employees. Therefore, the overall impact of remote working on

productivity may depend on how significant the influence of these individual factors is. Hence, the result may vary from one working team to another.

A study by Magni et al. (2020) proved that there are family-to-work enrichment benefits for the remote workers related to reducing anxiety and better work effectiveness as outcomes when the employee has a balanced state on both family and work. Besides employee benefits, another study suggests that remote working helps the organisation increase productivity and generates ideas to welcome a new way of working, resulting in a change of mentality and effective production (Agostoni, 2020). In the study of 273 teleworkers from sales, marketing, accounting, engineering and other departments from one organisation, Gajendran and Golden (2019) found that employees whose jobs were highly complex but did not require significant collaboration or social support performed better when telecommuting than when working in the company's office. Telecommuting is perceived to have the potential to address a series of concerns of the public and private sectors, such as traffic congestion, pollution, energy consumption, labour shortage, office space and family commitments (Bernardino, 1996).

An abundance of studies and research tried to provide their readers with a better understanding of how organisations can manage remote work effectively. Research by Prasad et al., (2020) examined the psychological well-being of employees while remotely working in the information technology (IT) industry, establishing that the organisational climate, role ambiguity and job satisfaction significantly influence their psychological well-being. Health and well-being are indeed essential factors in any working mode, as the relationship between well-being and productivity at work is repeatedly established in the literature (Evers, et al., 2014; Russo et al., 2021, p.61). Notable is also research by Brynjolfsson (et al., 2020), where the impact of remote working in terms of potential employee expectations about the future was analysed. The results imply that remote working will likely continuously rise in popularity amongst employees in the future. Although the pandemic effects are still prevalent, a rise in remote workers is already evident upon comparing the numbers from the pre-COVID-19 and the post-COVID19 situations (Brynjolfsson et al., 2020).

The tabular summary below was constructed to pinpoint some of the most significant benefits of WFH from the perspectives of employers, employees, and the wider society. The summary draws from the research papers done by numerous researchers and working groups, as indicated in Table 3. These research studies show that working from home can benefit different sectors, employees, employers, and broader society. Drawing from the data of private companies and organisations in several countries, including India, Bulgaria, China, Philippines, Canada and the US, the studies of

particular significance for the summary below are conducted by the Employers Federation of India (2020), Kicheva (2021), Bloom (et al., 2015), and Golden (et al., 2008).

Table 3: The Benefits of Remote Work

Benefits of Remote/Telework/WFH for Employers		***Source***
Cost, turnover rate and absenteeism	Remote work can directly lower capital costs by reducing office/parking space and equipment required by the organisation. One study suggests that offshore remote work can save money, e.g. a private financial company's Manila based remote assistant is cheaper as the firm used to spend more locally. In addition, hiring costs may decrease if higher worker satisfaction reduces employee absenteeism, voluntary quits and turnover.	Baldwin and Forslid, 2019; Bernardino,1996; Bloom et al., 2015 Choudhury et al., 2018 OECD, 2020
Productivity	Remote work can improve organisational performance and result in improved productivity than the conventional working style.	Bloom et al., 2015; Fonner & Roloff, 2010; Golden & Veiga, 2008; Kicheva, 2021, OECD, 2020
Wider talent pool	As the global labour pool grows, employees can be hired from a wider talent pool as remote work will be unrestrained from geographic conditioning. More work opportunities can be provided for women, minorities and physically challenged individuals. Hence, the skill supply increases, and the match between jobs and hires is improved.	Bernardino,1996; Clancy, 2020; Employers Federation of India, 2020
Operation continuity	In case of an undesired event, such as any natural calamities, a distributed workforce ensures continuity in operation and reduces operational risks.	Employers Federation of India, 2020
Benefits of WFH for Employees		***Source***
Commute time	Remote work reduces and saves commuting time. Commuting time reduction is especially important in the contexts such as India where people spend on average 7% of the day in commuting. A time-use survey conducted in the late 1980s showed that Americans feel more rushed than ever and that their perception of time scarcity shapes their behavior. A desire for more free time may be a strong motivator.	Abrams, 2019; Employers Federation of India, 2020; Handy and Mokhtarian, 1996; Kicheva, 2021;

		Qvortrup, 2002; Tremblay & Thomsin, 2012; GS & Sangeetha, 2020; Niles, 1997.
Travel cost	Reduced travel and other associated costs observed from studies.	Kicheva, 2021; Morgan, 2004;
Less stress and better work & life balance	Remote work is associated with lower levels of stress in employees and better work-life balance. It may also reduce stress related illnesses more directly. A study of Westinghouse employees showed that more control at work meant lower levels of stress. If telecommuting increases the control that workers have, then it may also reduce stress levels.	Abrams, 2019; Chung et al., 2020; Employers Federation of India, 2020; Fonner and Roloff, 2010; Bloom et al., 2015; GS and Sangeetha, 2020; Handy and Mokhtarian, 1996;
Autonomy for individual	Increased autonomy for individuals. Working independently can fulfill an individual's need for autonomy, control, responsibility and challenge.	Employers Federation of India, 2020 Harpaz, 2002; Johnson et al., 2007
Productivity	Expand productivity for workers (e.g. government employees in Denver and private company's employees in China).	Bloom et al., 2015 GS and Sangeetha, 2020; Handy and Mokhtarian, 1996; Niles, 1997
Family and leisure time	Increased family and leisure time for remote workers. In a survey conducted in the U.K., the data results showed flexible working can help women sustain their employment status after childbirth as they were able to control over their time.	Abrams, 2019; Ammons and Markham, 2004; Chung et al., 2020; Employers Federation of India, 2020;
Gender equality	Remote work helps and encourages female workers to attend workplace duties at their comfort. In many jurisdictions, telework is promoted as a means of giving women more flexibility to balance their paid work with their household responsibilities	GS and Sangeetha, 2020 Johnson et al., 2007
Job satisfaction	Increased job satisfaction. In the study of 128 teleworkers from IT and insurance sectors in Lithuania, the survey results suggest the possibility to work when they are	Employers Federation of India, 2020;

	unwell increases their satisfaction with telework. Another study of 375 employees, those who worked remotely demonstrated the highest level of commitments, job satisfaction and performance.	Nakrošienė, 2019 Golden and Veiga, 2008
Concentration	Less distraction from co-workers.	Employers Federation of India, 2020
Flexible location and time	Work from anywhere and anytime. One survey was conducted over 3500 remote workers around the world, the biggest benefit is the ability to have a flexible schedule (32%) and followed by flexibility to work from anywhere (26%), not having to commute (21%) and ability to spend time with family (11%).	Babulak, 2009; Buffer, 2020 Chung et al., 2020; Employers Federation of India, 2020; Gurstein, 2001; Kicheva, 2021;
Benefits of WFH for the Wider Society		***Source***
Air quality	Remote work helps in mitigating air pollution. Telecommuting has a significant effect on daily emissions, with a 50 to 60% decrease in pollutants generated by the telecommuter's vehicle use on the telecommuting days.	Bernardino,1996; Employers Federation of India, 2020; Handy and Mokhtarian, 1996; Niles, 1997
Less traffic congestion	Roads in countries such as India and Thailand are notoriously known for heavy traffic congestion. In many major cities, the average time taken to reach the workplace is among the world's highest. A significant reduction in peak hour car traffic by teleworkers is observable, alongside a falling number of trips for other purposes.	Bernardino, 1996; Employers Federation of India, 2020; Handy and Mokhtarian, 1996;
Less pressure on Migration to big cities	Migration towards big cities has resulted in overcrowding and unplanned development. WFH will help to reduce the pressure on natural resources, services and amenities from big cities due to reverse migration.	Employers Federation of India, 2020
Energy consumption	Teleworking can reduce energy use associated with travelling for work trips.	Bernardino, 1996
Better inclusive society	WFH arrangement will provide a unique opportunity for women and populations with special conditions and	Employers Federation of India, 2020; Niles, 1997

	needs. Fully integrating all groups in the workforce will make society more inclusive.	

Remote work can be a powerful tool if used to address many social, environmental and economic issues. It may help employers respond to employees' demands, reduce labour costs, access an expanded labour pool that includes disabled individuals and minorities, reduce office space expenditure, comply with increasing environmental mandates, and much more. Different researchers found that the choice of an alternative lifestyle and socio-economic or physical constraints to mobility are relevant factors in the decision to telework.

2.3 The Challenges and Concerns in Remote Work

During the pandemic, remote work has increased rapidly globally and is now seen by many as a long-term alternative to the traditional way of doing work to sustain production. The Ctrip experiment demonstrated that work from home arrangement is more productive than the traditional way of working, with employees also more satisfied and less likely to change jobs. However, the overarching effects on productivity are unclear for the short term. There can be numerous challenges and concerns associated with remote working. Drawing from the Ctrip experiment before the pandemic period, professor Bloom emphasized in an interview that “We are home working alongside our kids, in unsuitable spaces, with no choice and no in-office days. This will create a productivity disaster for firms” (Gorlick, 2020). He argues that to ensure WFH is effective and successful, certain essential prerequisites and necessary conditions need to be met.

Both employers and employees face unique challenges in the pandemic remote working (Gorlick, 2020). A survey conducted by one of Japan’s research institutes during the lockdown period confirms decreased self-reported worker productivity (Morikawa, 2020). Furthermore, a poll among US hiring managers found that managers were more likely to have experienced short-term productivity gains rather than losses due to remote work (Ozimek, 2020), suggesting that productivity losses can be ambiguous between the short and longer-term. Understanding both the short- and longer-term implications of remote working is essential. Even if longer-term productivity is established, other potential adverse effects, such as impaired communication, may result in lower rates of innovation or the fusing of work and personal, family and social lives, masking hidden overtime working (OECD, 2020).

Remote work may decrease workers' efficiency, reduce in-person interactions, and consequently impair communication, knowledge flows and managerial oversight. A wide range of evidence supports the notion that personal meetings allow for more effective communication than remote forms such as emails, chats, or phone calls. For instance, personal face-to-face communication is more convincing, attracts more attention, or allows better observation of 'social clues' (Battiston et al., 2017; Bohns, 2017; Bonet et al., 2017; Roghanizad et al.,2017). Moreover, the lack of personal interactions can also decrease knowledge flows among employees. To an extent, workers learn through interactions with colleagues, acquiring skills through learning-by-doing more slowly (Arrow, 1971; Bonet et al., 2017). In other words, innovation and long-term productivity growth may suffer from remote work. Innovation depends significantly on the sharing of knowledge. "What each individual knows is less important (…); what counts is collective knowledge" (Mokyr, 2002, p. 7).

Claudel's study (et al., 2017) found a positive link between physical proximity and collaborative research output, suggesting that 'chance encounters', which occur when people share the same physical space, are indeed essential for knowledge sharing. Without face-to-face interactions and the physical presence of employees, remote work hinders issues such as managerial oversight and the potential of shirking for employees (Bonet et al., 2017; Shapiro et al., 1984). In particular, managerial oversight may also lead to fears of surveillance, and the data collected in the process can raise concerns for privacy protection.

2.3.1 Summary of the Research on Remote Work Challenges: Tabular Overview

Companies, governments and non-governmental organisations (NGOs) are facing multiple challenges. The primary concerns and challenges regarding remote working from the perspectives of employers, employees and our society are summarized below. Constructing this tabular summary was informed by the papers of the Employers Federation of India (2020), GS and Sangeetha (2020), Wootliff (2020) that are focused on IT sectors and several other resources, as indicated in the text.

Table 4: The Challenges of Remote Work

Concerns/Challenges of WFH for Employers		***Source***
Data security & cybersecurity	Data Security, a threat to Intellectual Property Rights and issues of Cybersecurity are among the major concerns for the industries considering WFH arrangement. Company data is often stolen by employees. Control Risks interviewed 16 of its clients who currently hold positions as chief	Employers Federation of India, 2020; Hu et al., 2012; Niles, 1997;

	information officers and security leaders and are responsible for securing almost 750,000 employees in different multi-national companies, financial institutions and small fintech firms. One of the most difficult challenges for them is planning cybersecurity for the whole organization.	Wootliff, 2020
Organisational security awareness	One of the most significant challenges is raising organisational security awareness.	Hu et al., 2012
Productivity and performance measurement	Measuring productivity and performance management is going to be changed in the case of the WFH arrangement. The prevailing notion among managers is that if they cannot directly observe their subordinates while working, evaluation and giving constructive feedback will be seriously hampered. Therefore, employers need to invest in managers to equip them in measuring performance and giving feedback to their subordinates. This will be an added cost initially for the organisations, but in the long run, it will foster growth and higher productivity and engagement.	Employers Federation of India, 2020; GS and Sangeetha, 2020； Kurland & Bailey, 1999
Trust	Pioneer research by Nicholas Bloom suggests that face-to-face meetings are essential for developing new ideas and keeping staff motivated and focused.	Bloom et al., 2015
Induction	The induction programme will be a challenge for new employees.	Employers Federation of India, 2020
Cost	Some firms use the same systems and/or computers in different shifts. Sharing systems and devices may not be possible in the case of WFH. This means an increase in the costs for employers.	Employers Federation of India, 2020
Culture	It is challenging to build a culture accepting and supportive of remote work. Building and maintaining such a culture can be detrimental to retention efforts and can go as far as impact the employees' motivation and satisfaction.	Popovici and Popovici, 2020
Tracking	It is hard to track accurately who is working remotely, when and how, particularly when remote work is adopted more informally.	Popovici and Popovici, 2020
Concerns/Challenges of WFH for Employees		
Internet connection and power supply	Internet connectivity and interrupted power supply.	Employers Federation of India, 2020

Overwork	Home-based workers are generally concerned with separation of their workplace and home. Those with older children or without children working at home were more at risk of working extended hours.	Johnson et al., 2007
Taking care of family matters for female employee	Issues associated with female employees are observed in India: In-laws, sick family members, and household chores need additional attention. A study found that when women work from home, they tend to do three hours more childcare compared to women who do not. Female workers also are in charge of the mental load of worrying about their families. As a case study of workforce of one large financial sector in Canada with a sample of 18 female teleworkers, women who were parents of young children, their paid work schedules were organized to accommodate their children's needs.	Employers Federation of India, 2020 Gurstein, 2001; Chung, 2020 Johnson et al., 2007
Managing younger kids	Perhaps the most challenging aspect of working from home for parents with younger children is managing their kids. The closure of schools and transition to "distance learning" for students has forced many working parents to take on the additional job of a full-time teacher. A requirement for any business attempting to run a successful work-from-home programme is that children are in school or daycare.	Employers Federation of India, 2020 Chung, 2020
Work and life balance	WFH brings difficulty distinguishing between work and home times and balancing between the two 'worlds'. WFH increases the likelihood of work-family conflicts.	Chung et al., 2020; Employers Federation of India; 2020; GS and Sangeetha, 2020 Van et al., 2020
Health risks, loneliness, anxiety and depression	Feeling of stress, loneliness, anxiety and depression due to social isolation and intense use of information communication technologies.	Charlampous et al., 2019; Employers Federation of India; 2020; Eurofund, 2020; Employers Federation of India, 2020; GS and Sangeetha, 2020
Promotional opportunities	Employees may be reluctant to telecommute because of the perception that working remotely hinders promotional opportunities.	Chapman et al., 1995; Employers Federation of India, 2020)

Collaboration & Communication	Remote work involves minimizing live communication. Teamwork with instant messaging and video communication does not compensate for sociable people's required amount of communication. Adapting to this is not always easy for an employee. There is a lack of relationships among coworkers. Disruptive forms of communication may surge to compensate for the lack of personal communication, e.g. increased email traffic or virtual meetings . Less frequent personal communication can also have negative implications for its engagements with key stakeholders (including clients and suppliers), with adverse effects on the overall performance of businesses. According to Buffer's research over 3500 remote workers, the biggest struggle for remote workers is collaboration and communication (20%), followed by loneliness (20%) and not being able to unplug (18%).	Buffer, 2020; GS and Sangeetha, 2020; OECD, 2020
Psychological well-being	Telework affects the psychological well-being of employees. A study by Prasad implies that the remote working options need to be worked out by the employer in all the sectors to reduce the stress and enhance the psychological well-being of employees.	Prasad et al., 2020
Concerns/Challenges of WFH for Society		***Source***
Domestic violence	Although WFH provides immense opportunities for women to get integrated into the workforce, there is a surge in domestic violence cases when they work from home.	Employers Federation of India, 2020
Isolation	One of the negative consequences of working from home is that the social connection among employees is missing, and staying indoors can aggravate many mental health issues.	Charlampous et al., 2019; Employers Federation of India, 2020

2.4 Remote Work and Gender

2.4.1 Gender Implications of Remote Work

The structural, cultural, and relational mechanisms that reproduce gender inequalities in organisations comprise just a part of the globally observable gender divide. Men may have benefited from privileges, freedoms, authorities, and opportunities not equally granted and exercised by other genders throughout history. To measure progress in eliminating gender injustice, the Global Gender Gap Index (GGGI) benchmarks the progress towards gender parity in four dimensions: economic opportunities, education,

health, and political leadership. According to the GGGI (WEF, 2021, p.5), the global distance completed to gender parity is 68% in 2021, a step back compared to 2020. A timely study by ILO (ILO Monitor, 2021) linked the pandemic to the increasing gender gap via projecting the differences in the pandemic job loss in men and women. According to ILO's analysis (ibid., p.9), 5% of all employed women lost their jobs in the pandemic, comparatively more than 3.9% of employed men.

While a sudden, unexpected shift to remote working has undoubtedly affected all genders and groups, reviewing the research that examined the gender implications of remote work is nevertheless imperative for our research paper. Imperative, because significant gender differences in remote working were established by an extensive body of pre-pandemic (Sullivan et al.,2001; Chung et al., 2018) and recent pandemic-time research alike (Dunatchik et al., 2021; Anderson et al., 2020), yet again proving the complexity of the issue at hand.

Chung and Van der Horst's analysis of the large-scale 'Understanding Society' dataset that covers household panel survey data on flexible working in the UK found evidence of positive gender implications of telework. Teleworking mothers were found less likely to reduce their working hours after childbirth. Telework may, therefore, enhance the capacities of teleworking mothers to maintain working under periods of increased pressure. Twenty-eight in-depth semi-structured interviews with home-based workers and their co-residents conducted and analysed by Sullivan and Lewis (2001) confirmed that reasons for teleworking are gendered, identifying childcare as a primary motivation for women to enter telework, but not for men. Acknowledging that telework bears the potential to increase female participation at work, Sullivan and Lewis argued that women's telework continues to face marginalisation.

Drawing from a nationally representative survey of 2 200 US-based adults, the newest pandemic-era study by Dunatchik (et al., 2021, p.10) confirmed that "gender remains a powerful force in organising domestic work despite the flexibility that remote work allows." In summary, the recent studies on gender and pandemic remote working suggest that while teleworking has increased the involvement of men, specifically fathers, in domestic work and childcare (Carlson et al., 2020), the gender inequality gaps are far from closed, primarily because women also assumed further domestic responsibilities (Dunatchik et al., 2021, p.6). The following paragraphs will review the gendered implications of remote work on childcare and parenting, the impact of cultural norms and expectations on the men and women working remotely, and the implications of remote work in terms of resilience and health.

2.4.2 Childcare, Parenting and Domestic Work

Scholars have long defended flexible working arrangements, including fully remote working, to enable individuals to integrate domestic responsibilities into their working lives (Correll et al., 2014) and improve overall well-being (Kaduk et al., 2019). While men remain largely immune to the difficulty balancing work and family, Correll (et al., 2014, p.11) argued that flexible working arrangements would improve women's career advancement prospects. Survey data analysis of the US-based IT firms conducted by Kaduk (et al., 2019) confirmed that voluntary remote work is protective against stress, turnover intentions and work-to-family conflicts. However, the opposite relationship between remote work and work-family conflict was established in non-voluntary remote work, such as the remote pandemic work.

Some early pandemic evidence collected by Lyttelton and his colleagues in the early months of 2020 even suggest a potential "shrink the gender gap in childcare, particularly among couples with two full-time earners". However, the sudden pandemic school closure has put an unexpected burden on the new and experienced remote working parents alike. Nevertheless, the Office for National Statistics (ONS, 2020) data in the UK prove that British women spent more time on childcare than men during the pandemic lockdown, especially on developmental childcare, such as homeschooling.

An analysis of the data gathered from 2 200 US-based adults living and working from home during the pandemic conducted by Dunatchik and her colleagues uncovered striking differences in parenting responsibilities assumed by men and women. “Although some employees have welcomed the opportunity to work at home, few have envisioned doing so without schooling and childcare for their children,” they explain (2021, p.3). Their study concludes that despite increased housework and childcare responsibility for both mothers and fathers working from home, the gender gap neither shrank nor expanded, leaving women under greater pressure to juggle the demands from their work and families (ibid., p.7).

The differences in the reaction of mothers and fathers to pandemic school closure were also examined by Cannito and Scavarda (2020) in the case of Italian couples. While mothers more keenly accepted work and family life interference as inescapable, their husbands often claimed that childcare activities would reduce their working productivity (p.802). According to Cannito and Scavarda (ibid., p.802), the difference in attitudes lies in the prevailing gender normative roles, which reproduce and even exacerbate gender inequalities under the unprecedented extreme situation. Pre-pandemic cultural norms and expectations are likely the roots of these gender disparities.

Under the new circumstances, however, the established notion of 'second shift' for working women (Hochschild et al., 1989) that covered most of housework and childcare has expanded to include home-schooling and increased demands on health and wellbeing of children (Anderson et al., 2020, p.3). Hence, the notion of 'third shift' was coined by Chung (2020), who defined the expanded responsibilities that fall primarily on mothers. Ensuring the emotional wellbeing of children and wider family members puts more women under the "mental load of worrying about the family", she explains (ibid.), warning that the lockdowns might have further reinforced traditional gender roles.

2.4.3 Culture, Norms and Expectations

While the pandemic research highlights the adverse effects of remote working for gender equality, proponents of remote working had previously encouraged remote work as a tool for achieving improved work-life balance and wellbeing (Chung et al., 2018). While the long-term implications of the pandemic are yet to be determined, and the unique effect of closed schools yet to be measured, pre-pandemic research highlights the role of different social and cultural norms.

The national and cultural context and societal expectations influence the nature of tensions between work and family differently for men and women. Gifford (2021) explains that the gender implications of remote working are prevalent "more in some countries than others". Kurowska's (2020) research comparing Sweden and Poland demonstrated that while gender differences exist in both countries when balancing work and family, men in the more traditional society, Poland, "are able to 'escape' the trap of double burden of paid and unpaid work when working from home while women do not" (p.405). During the pandemic, gender norms continued to protect teleworking fathers, but not mothers, from extra domestic labour and the burden of their children's remote learning, even when only fathers, but not mothers, work from home Dunatchik (2021, p.8). While the 'involved father,' defined by Dermott and Miller (2015) as "emotionally and economically engaged," has become a recognizable ideal in Western societies, a gap exists between this expectation and reality (Machin, 2015). Italian fathers, for example, struggle between their willingness to adopt the new 'involved fatherhood' model and the traditional model of masculinity enacted by their fathers (Cannito et al., 2020, p.802). Under the pandemic lockdown, Italian fathers expended their time devoted to work while mothers balanced their double roles (Ibid.).

Drawing from the notion of 'intense mothering' prevalent in Canada, Margo (et al., 2008) illustrated that the time 'saved' from omitting the office commute is often

reallocated to caregiving and housework instead of personal leisure. Living within a gendered society, the women in this study "did not question whether their primary responsibility for caregiving while engaged in paid employment at home was fair" (p.454). American women are similarly stigmatized by their employers and executive teams when asking for a flexible working arrangement, including remote working. Research by Brescoll and her team proved that (et al., 2013, p.381) even when both genders requested to work flexibly to advance their careers, managers were, in their reluctancy to grant their approval to women, "not just reinforcing the gender status hierarchy wherein men have more status and power than women, but also perpetuating it."

Therefore, it is no surprise that strikingly different societal perceptions of men and women working remotely were identified by pre-pandemic research. Munsch (2016, p.1585) explains that men working flexibly to help with childcare are afforded status as members of the more privileged social group, even while women remain primary caregivers. Fathers working remotely are perceived more favourably by the societies, who reward them with a "progressive merit badge" (Kolb, 2014, as cited in Gerstel et al., 2018). People hold different expectations regarding how men and women will manage remote working. The general expectation is that fathers will maintain their work devotion while mothers use flexible working for care purposes, even when they explicitly request it for performance-enhancing purposes (Brescoll et al., 2013, as summarized by Chung and Van der Lippe (2018). Kurowska (2020) proves that such expectations are more strongly reinforced in some countries than others.

2.5 Other topics in Remote Work

2.5.1 The Mental Burden of Pandemic Remote Work

While the sudden shift towards remote working on an unprecedented scale in times of a global pandemic has undoubtedly affected the mental health of everyone (Wang et al., 2020; Rajkumar 2020), specific groups were more affected. In a survey by McKinsey, remote working mothers in developed and developing countries alike showed lower levels of wellbeing than remote working fathers (Ellingrud et al., 2020). Adding to the gender divide, Lyttelton (et al., 2020, p.2) showcased that US-based telecommuting mothers were more prone to "feelings of anxiety, loneliness and depression than telecommuting fathers." Zamarro (et al., 2021) identified homeschooling as the main culprit in early April 2021, when mothers of school-age children began showing higher levels of psychological distress than other groups.

While single parents faced a distinct set of challenges during the pandemic, including diminished access to their support networks (Dunatchik, 2021, p.9), women of colour faced disproportionately more childcare and domestic duties than white mothers (Huang et al., 2021). Vulnerable groups, such as front-line medical workers, children, older adults and the poor, were also found at increased risk of anxiety, depression, suicide, and self-harm (Wang, Y., et al. 2021, p.5). Novice remote workers amid pandemic also faced physical health issues, including weight gain, and musculoskeletal problems, as documented by Ekpanyaskul (et al., 2021).

Addressing the health impact of remote working during the pandemic and beyond is crucial for increasing the resilience and effectiveness of remote workers. The concept of resilience provides a valuable framework for assessing how well people cope with the new way of working. As Gifford explains, resilience centres around two questions: How we keep going upon facing traumatic events and how we recover from adversity. Women business leaders showed more resilience during the pandemic than men in the depressive winter months (Birkinshaw et al., 2021).

2.5.2 Traits of a Successful Remote Worker

Healthy, effective and resilient remote workers comprise organisations with equivalent characteristics. This paper refers to a successful remote worker as someone who maintains optimal mental and physical health, demonstrates resilience upon adversity and conducts their work effectively and securely. This section of the literature review strives to pinpoint the characteristics of successful remote workers to directly answer research question no.5, as set by the authors ahead of this research ("How to make remote work more effective, resilient and secure in an international organisation?"). To determine the best mechanisms behind effective, secure and resilient remote working organisations, this section spotlights their most minor units, individual workers. Successful remote workers generally demonstrate certain qualities and characteristics, as pointed out by research. Below is a summary of the most commonly pinpointed features and characteristics of an effective, healthy and resilient remote employee:

a) Research by Gigi (et al., 2020) found that *communication is the most influencing factor of creating job satisfaction among remote employees* in the IT industry. The fast-paced adoption of information technologies by non-IT working teams over the pandemic suggests that similar outcomes are likely observable in firms and organisations beyond the IT sector, namely for the ITU. Electronic communication brings efficiencies in remote work (van der Lippe et al., 2020, p.385) and, if conducted effectively, was identified as a strong predictor of leadership and

performance (Neufeld et al., 2010). A successful remote employee not only communicates regularly with their colleagues and managers but also uses in-person interactions at home as a coping mechanism whilst in lockdown isolation (Waters et al., 2021, p.5).

b) *Applying personal effectiveness strategies, such as goal setting and target orientation, increase the productivity of remote workers* (Gifford, 2021). While self-discipline may have a significant impact on the development of effectiveness strategies (Wang, B., et al., 2021), using effectiveness strategies is an acquirable skill. Channelling stress and adrenaline through light exercise in convenient home settings can also increase work and communication effectiveness (Zimmer, 2021). While effectiveness techniques may most benefit the remote workers struggling to combat procrastination, which is a common obstacle identified by Wang (B., et al., 2021), overworking also appears to be a frequent challenge for remote workers who fail to negotiate clear goals and expectations with their managers (Grant et al., 2013, p.543). Remote employees often overcompensate for their lack of visibility in the office by making themselves over-available, which adds to stress (Mulki et al., 2009, p.65). Hence, goal setting does not only improve productivity but also prevents potential burnout in remote work.

c) *Developing self-compassion is a powerful coping mechanism when facing uncertainty, such as the COVID-19 pandemic* (Waters et al., 2021, p.6). By moderating perceived stress and anxiety (Stutts et al., 2018), self-compassion improving the wellbeing, mental health and resilience of remote workers. Self-compassion involves recognising the shared nature of human experiences, which prevents feelings of separation and isolation (Neff, 2003). Studies reviewed by Waters (et al., p.6-7) provide evidence that self-compassion can be learned during the pandemic, and structured, evidenced (Neff et al., 2013) self-compassion learning programmes are available to the public (Neff et al., 2018).

d) *Empathy and gratitude make exceptionally resilient pandemic remote workers.* Leaders in remote workplaces can demonstrate empathy by "creating a sense of psychological safety for their colleagues, being inclusive in decision making, and offering perspective in challenging moments," according to the McKinsey report (Bick et al., 2020). Utilizing emotional intelligence improves well-being and resilience (Mannson, 2021) and the practical problem-solving of remote teams (Bick et al., 2020). Similarly, individuals feeling and expressing gratitude in remote work may experience lower stress levels and increased

resilience and life satisfaction (Waters et al., p.8). Gratitude also fosters the maintenance of high-quality relationships (Algoe et al., 2019), which may be uniquely important during the pandemic lockdown.

2.5.3 Traits of Successful Remote Organisations

Leaders of successful teams and organisations operating remotely generally take actions to build a working climate conducive to their organisational success and employee wellbeing, as pinpointed by research. Examination of these actions aids in forming a lens through which the ITU's remote teams will be assessed. Whilst addressing the challenges of remote working individually may also prove effective, systemic, cultural shifts may have a more lasting, cross-sectional effect. Some of these are pinpointed below:

a) Strong working relationships and trust are easier built in-person, but sharing the sense of mutuality (Gifford, 2021) and upholding transparency (Emmett et al., 2020) are standard practices shared by successful remotely working teams. Relationships and trust are essential not only for individual wellbeing but also for productivity. Research referenced by Whitmore reports that besides a lower likelihood of distress, employees who feel like they belong at work gain on average 13 extra days of productivity per year. To cultivate trusting, connected remote teams, Grant (et al., 2013, p.68/69) suggests signalling management accessibility to conduct conversations on all levels and spotlight individual and team achievements. Since employee experiences of remote work may vastly differ, leaders of successful remote teams may need to abandon the one-size-fits-all approach altogether (Emmett et al., 2020).

   Trust and connection aid in the cultivation of a 'caring culture' at work, which starts with self-care and extends to genuine caring for our employees and our teams (Mannson, 2021[1]). Demonstrating empathy and compassion in the remote working environment is an equally integral component of the 'caring culture' concept, enabling people and the business to recover from the multi-faced challenge of the COVID-19 pandemic (D'Auria et al., 2020).

   The notion of 'the healthy organisation' describes the nature of organisations better positioned to thrive in remote settings. Healthy organisations take into account the wellbeing and work-family balance of employees alongside workplace effectiveness (Lewis et al. 2011, in Chung et al., 2020). Healthy organisations institute work processes that maintain and promote physical, mental and social

[1] Ibid.

wellbeing in their employees, which produces superior work efficiency and performance (Wilson et al., 2004, in Jáimez et al., 2011, p.10). Employee participation was identified by Jáimez (et al., 2011, p.11) as an important determinant of a healthy organisation since participating employees would likely participate in the development and optimisation of strategies in all areas of work. Teams new to remote working would, therefore, particularly benefit from employee participation in developing and optimising their new strategies for remote work and collaboration.

b) Reducing work-family conflict, so commonplace in the pandemic remote work, may rest on cultural shifts in organisations. In teams upholding the 'ideal worker culture,' where the norm is to work hard and work overtime, working from home leads to intensified work-family conflict (van der Lippe et al., 2020). The 'work-family culture,' defined by Thompson (1999, p.394) as "the shared assumptions, beliefs, and values regarding the extent to which an organisation supports and values the integration of employees' work and family lives," may pose as an antidote to the ideal worker culture where the "employee's commitment, dedication and value to the organisation contingent on the number of hours they are in the office and whether they make their work responsibilities a top priority" (van der Lippe et al., p.387). Shifting towards a culture that acknowledges the co-existence of contrasting demands, especially for parents and caretakers whose responsibilities are unavoidable during the pandemic school closure, offers a space for greater wellbeing, resilience and transparency within remote working teams.

2.6 Cybersecurity Concerns in Remote Working

2.6.1 Cybersecurity Under the Pandemic Pressure

This paper's previous sections provided an essential summary of the strategies and solutions for successful remote workers and organisations. As part of the transition to the new working methods, employees and organisations need to address the underlying cybersecurity issues hindering operational security and stability. Organisations should take immediate actions to mitigate the cybersecurity risks created by a sudden shift to remote working because otherwise, the new gaps in the employee and organisational protection may be exploited. Hence, effective policies and procedures should be put into place to strengthen all three pillars of employee security and wellbeing: social life and wellbeing, mental and physical health, and cybersecurity in remote work. Upon gaining remote access to the organisation's technologies and infrastructures, employees

are at increased risk of misjudgement and human error when dealing with potential cybersecurity challenges in the isolation of their homes. Therefore, organisations should implement practical security tools, policies and protocols to mitigate the threats and protect the organisation and employee data.

As the rapid advancements in technology have transformed society, economy, and lifestyles globally, cybercrime has experienced equal advancement and growth. In this wording, cybercrime became cancer to modern societies when installing anti-virus programmes no longer offers sufficient protection (Medina-Rodriguez et al., 2020). As more people joined the digital platforms while working and studying remotely during the pandemic, the number of cyberattacks increased in many countries, including Switzerland (Nabe, 2021), where the ITU headquarters and offices are located. In addition to the increased quantity of cyberattacks, the COVID-19 pandemic also opened new playing fields for cybercriminals to target and exploit. Vulnerabilities were exposed as schools around the globe adopted e-learning platforms, with reported cases of 'Zoom' classroom hijacking to share inappropriate content with minors (Mayfield, 2020).

According to PwC (2020), the COVID-19 pandemic has presented organisations and businesses with many issues, including cybersecurity attacks, risks and threats. Priorities for businesses have shifted to maintaining business operations rather than expanding or transforming, mainly due to financial and operational challenges. According to Fleming's research (2020), it is evident that the COVID-19 pandemic has impacted cybersecurity spending by firms and organisations, which fell across (40%) of all the surveyed global organisations as a cost-saving measure. The cybersecurity spending decreased even though (46%) of organisations reported an increased amount of cybersecurity threats related to remote working, and (49%) stated that they expected an incident or data breach within a month after the report. The Barracuda networks survey (2020) of over 1,000 business decision-makers in the UK, U.S., France, and Germany found that more than half of the respondents (51%) have already reported increased email phishing attacks since shifting to a remote working model. In addition, more than a half (51%) of respondents said their workforce was not proficient or adequately trained in the cyber risks associated with remote working and half of the respondents allowed employees to use their personal email addresses and personal devices to conduct company work. Having experienced, albeit forced, remote working during the pandemic lockdowns, (56%) of respondents were planning to continue with remote work even after the COVID-19 pandemic has subsided (Fleming, 2020). These statistics prove that a concern for cybersecurity risks is in place, considering hackers are looking to target any organisations that may have weak security infrastructures

implementation during the pandemic. The unprecedented pandemic impact has revealed the weaknesses in cybersecurity mechanisms in firms and organisations alike, all while the economic situation discouraged them from investing in better cyber-protection.

Another gap in cybersecurity revealed during the COVID-19 pandemic is rooted in the way organisations acted and operated before the lockdowns. As millions of employees around the world began working from homes in lockdowns, organisations must adapt to the new remote working practices. Adaptation poses an issue, especially for those organisations who have not used remote working technology previously or did so only in a minimal capacity. Sentonas (2020) pointed out that it is important to plan in securing a remote workforce and safe access for Bring Your Own Devices (BYOD). The problem with reliance on personal devices (BYOD) is that employees now operate outside of the IT safety net without the standard cloud networks and remote-access technology. Working this way can expose private information to bad actors through common scams that are likely to increase in prevalence over the coming months (Curran, 2020).

2.6.2 'The Old' Cyberthreats Retain Efficacy

Remote work in its nature bears some unique, inherent challenges. Even without constant attacking from the cybercriminals, working remotely may lead to security risks of disclosure, modification and destruction of data via physical, administrative and personnel security vulnerabilities (Yang et al., 2013, p.11). Hence, Yang (ibid.) considers three main components of remote working security risk: the remote workers, data and information, and the software, hardware and network assets. Sharing electronic devices with other family members - a common manner in many households - may become a leakage path for sensitive information (Rikitake et al., 2001, p.40). Hence, remote employees may remain vulnerable even upon receiving cybersecurity training and complying with the cybersecurity protocols of their respective organisations. Kuhn (et al., 2002, p.10,11) warns against using a shared printer or selection of unsafe shared wireless networking technologies. While working from home, using personal devices rather than those provided by one's employer becomes a common practice for its convenience and accessibility, or simply for lack in provision from the employer. However, this also poses another potential cybersecurity threat. Such devices may use unauthorised programmes and applications, hence increasing the risk of malware attacks. The potential consequences for those attacked are also more severe, as people often store their personal and financial information on their own devices (Hutter, 2020).

The common cybersecurity threats, attacks or risks for employees within an organisation are (1) social engineering: phishing attack, (2) malicious attacks: the types of malware types are viruses, ransomware, scareware, worms, spyware, trojans, adware and fileless malware (Sundström et al., 2019).

Table 5: The Common Cybersecurity Threats, Attacks or Risks

Social Engineering	1) *Malware attacks* that focus on the weakest security link in organisations - the employees (Abraham & Chengalur-Smith, 2010). Deploying malware attacks is the easiest method for hackers to reach organisational data, as there are multiple ways of affecting, reaching and manipulating humans to do as the hackers want. Social engineers perform actions and develop malware that manipulates humans, making them perform actions that breach the organisation's security protocols without the humans knowing about it. Innocent human instincts are exploited. As social engineering does not appear as 'obviously' criminal as blatant threats or such, it is challenging to catch social engineers (Breda, Barbosa & Morais, 2017). 2) *Phishing attacks* are fraudulent communications sent to users from what they believe to be a reputable source. The fraud is often sent through email with the goal of stealing sensitive data or information. The emails are often sent to lure the receiver and fool him or her into pressing a link or answering the email with the asked information (Cisco, n.d-2).
Malicious Attacks	1) *Malware* is a term combining two words - “malicious” and “software” - to describe a software that criminals, often called hackers, use to infect and infiltrate computers, networks and data (Cisco, n.d-1). 2) *Viruses:* malicious software that are attached to files or documents, often attached in emails, supported by macros that spread the malware from host to host once the virus is opened (Cisco, n.d-1; McAfee, n.d). 3) *Ransomware* is one of the most commonly deployed malwares.

	Ransomware installs itself on a machine and encrypts the files on the machine until the owner pays to get the data back (McAfee, n.d). 4) *Scareware:* message alerts that hackers use to threaten and scare users with warnings like: "Your computer is infected with a virus, follow this link to fix the problem!" to advertise and psychologically get the user to purchase applications (McAfee, n.d; Cisco, n.d-1). 5) *Worms:* malicious software that rapidly spreads and replicates to multiple devices within a network when it is downloaded (Cisco, n.d-1). 6) *Trojans:* applications that are advertised as harmless, helpful software programs, but whilst downloaded, trojans can steal information and data, delete it, crash devices or view activities within the device (Cisco, n.d-1; McAfee, n.d). 7) *Adware:* collects data from a device and then uses the data to provide advertisements and pop-up windows on one's screen when doing an action. These types of malware are most of the time not dangerous for the computer but annoying for the user (Cisco, n.d-1; McAfee, n.d). 8) *File-less malware*: memory-resident malware that does not leave any tracks or evidence from its activity within a device. Instead, it uses programs to infect a device through a computer's memory (McAfee, n.d; Cisco, n.d-1).

2.6.3 Arising Tactics of Pandemic Cybercriminals

Multiple types of malware, a short name for 'malicious software', are used by hackers to destroy or steal data, monetary theft, hijacking computer resources, or spreading misinformation (McAfee, n.d.). Other methods include phishing, viruses, ransomware, scareware, worms, spyware, trojans, adware, and file-less malware (Sundström et al., 2021, p.11, 12). The recent pandemic has witnessed a rise in social engineering attacks, malware attacks that target employees. Social engineering is the easiest method of

reaching organisational data, as people remain vulnerable to manipulation (Krombholz et al., 2015, p.2). In the pandemic context, attackers strive to give the impression of authenticity and appear as a trustworthy source of information, such as the World Health Organisation (WHO). Personalized URLs (websites) that include the words 'covid' or 'coronavirus' are prime examples of adapting cybercrime tactics to recent events (Andrade et al., 2020, p.398). The most common types of cyberattacks that adapted their approaches to the pandemic, or were born during the pandemic, are summarized in Table 5 below (Table 5).

Besides the 'usual tactics' of cybercrime, such as phishing, hacking and ransomware, cybercriminals were detected trying to establish fake COVID-19 charities, fake personal protective equipment delivery company and other tactics of exploiting the panicking public (Cimpanu, 2020 in Turner 2020, p.24). These examples illustrate that while it is important to eliminate the potential impact of cybercrime, understanding how the attackers use human emotions, such as fear, curiosity or anxiety, is crucial (Andrade et al., 2020, p.403). Because our logical capacities are undermined under emotional pressure, people are more likely to make unsafe choices online during an anxiety-evoking time, such as the global pandemic (ibid.).

Table 6: Exemplary Types of Cyberattacks that have Arisen or Modified in Strategy Within the Context of the COVID-19 Pandemic

Attack Classification	**Attack Description (examples)**
Phishing	2020 Coronavirus Updates Coronavirus Updates 2019-nCov: New confirmed cases in your
Malware	BabyShark Mirai Rammit Matsnu
Ransomware	CovidLock Netwalker
Online meeting hijacking	'Zoom bombing'
Fake apps	Fake coronavirus maps

Source: Adopted from Andrade, Ortiz-Garcés, Cazares (2020). *Cybersecurity attacks on*

2.7 Cybersecurity Approaches in Remote Working

To ensure a high level of cybersecurity in remote-working organisations, several approaches, mechanisms and techniques should be adopted and combined. It is worth noting that due to the continuously evolving nature of cybercrime, no amount or combination of cybersecurity mechanisms can ensure lasting, impenetrable security.

Sentonas (2020) identified three key factors that would need planning for post COVID-19: a) the use of personal devices, secure access for BYOD on corporate networks, b) leveraging virtual private networks (VPNs) to protect sensitive data accessed through insecure WiFi and c) the need to keep employees informed and educated about how to secure their at home workspace. In the Crowdstrike's research, Sentonas (2020) also points out that many organisations that currently have remote working solutions in place had struggled to create and enforce policies surrounding these issues. Implementing the remote work solutions had been challenging even without the added pressure of the pandemic. Therefore, it would be expected that an organisation with no prior remote working solutions would struggle significantly to implement such security solutions at the drop of a hat in the current situation. Moreover, even if organisations and firms do have facilities for secure remote working, they may not have the solutions on the scale presently needed, and thus, they will have to further invest in new technology to support the changeover. Combined with the speed required to roll out remote working solutions, this effectively implies that both non-physical and physical security concerns are legitimate.

To mitigate the risks mentioned above and protect organisations and employees from cybercrime, Yang's team (et al., 2013, p.11) advise organisations to establish formal policies, develop employee cybersecurity training, and ensure that networks and devices are secured. The National Institute of Standards and Technology (NIST) in the US further advises requiring multi-factor authentication to access organisational data and use validated encryption technologies to protect communications and data stored on the devices (Scarfone et al., 2020). Other commonly implemented security practices include firewall, enforcing safe passwords practice, regular data back-ups, and installing anti-malware software (Sundström et al., 2021, p.16). In the pandemic context, many organisations working remotely opted to utilize VPN as they can secure the organisation's internet traffic (Zur, 2020 in Turner et al., 2020). The protection obtained by obscuring employees' location and internet protocol (IP) addresses may prove a worthwhile effort for some organisations (ibid., p.24). Whatever the approach, it is essential that the solutions do not hamper employee productivity since, as Borkovich

(et al., 2020, p.234) noted, people will find workarounds if security gets in their job performance.

Employee training is arguably the most vital component of any cybersecurity protection mechanism. According to the most recent IBM report (2020, p.30), 23% of data breaches are caused by human errors, but malicious attacks in many forms - phishing, compromised credentials or business email compromises, for example – comprise 52% of all data breaches. While many organisations, including the ITU, have implemented employee security training, these are stereotypically considered tedious and time-wasting (Adams, 2018). 'Cybersecurity fatigue', a term recently coined by Reeves and his colleagues (et al., 2021), describes a form of disengagement, weariness or aversion to cybersecurity-related working behaviors that occur resulting from overexposure to cybersecurity-related work demands or training. Hence, adding more security training and extra security protocols may not decrease employee susceptibility to cybercrime. Effective cybersecurity training and protocols should, therefore, account for the human factor.

3. Methodology

Two primary sourcing methods were utilised to derive first-hand insights from the workers, contractors, and interns at the ITU. Namely, the primary method of research interview in this paper is interviewing. A survey was also deployed to enrich our study and test the robustness of the primary impressions gained from the interviews. The gathered data was compared and critically evaluated using a mixed method of qualitative and quantitative analysis. The resources related to the data extracted from both the interviews and the survey, including transcripts and data summary, are available in the Appendix and documents complementary to this paper.

3.1 Primary Data-Extraction Method: Interviews

Seven medium-length, semi-structured interviews were conducted. The respondents were selected with consideration to achieving a diversity of gender and positions at work. Upon identifying the potential interviewees, mutual connections and acquaintances were utilised to approach them. Holding internship positions at the ITU at the time of conducting the interviews proved crucial for the authors of this paper, as deriving primary data without access to the ITU's working community and information resources would otherwise be challenging. Interviewees agreed willingly to participate in the research and were made aware of their rights to choose not to respond, pause or

stop the interview at any point. After obtaining an agreement from each interviewee, the video interviews were recorded for the academic purposes of this paper and for further transcription. The video recordings obtained from the interviews remain at the sole disposal of the authors and will be deleted once their academic purpose is lost. The semi-structured interviews took place in virtual form, using the Microsoft Teams video call function. All interviewees were familiar with the tool and had no competing obligations at the time of the interviews. The interviews were later transcribed, using randomly selected aliases instead of their actual names, to protect the interviewee identity.

The qualitative, thematic analysis was conducted on the interviews, identifying the underlying patterns, notions, themes and behaviours as explained, described and mentioned by the interviewees. The data were clustered and, if applicable, compared with the data obtained from the survey. Notably, two separate interview question sets were developed to provide the groundwork for the interviews. While five interviews focused almost exclusively on the experience of remote working, two interviews with cybersecurity professionals had a stronger informative, objective tone. The technical nature of the information about cybersecurity mechanisms in the organisation demanded gaining an objective, informative insight. Cybersecurity mechanisms used in organisations are seldom disclosed or discussed, and hence, the interviews were adjusted to extract the desired kind of knowledge. Both sets of interview questions can be found in the Appendix.

3.2 Secondary Data-Extraction Method: Survey

Using the Google forms surveying tool, an online questionnaire was also formulated. Striving to gain a wider reach and catch a breath of opinions and experiences, ITU employees and interns were contacted with the request to complete an online questionnaire. The survey topics include (1) basic information on their background and characteristics, such as current geographical location, approximate age, and gender; (2) their opinion on remote work benefits and challenges; (3) their remote work experience (4) their cybersecurity concerns related to remote work; (5) their choice of work preference after the pandemic as well as for their future career. The online survey was circulated during the ten days between June 18 and 28th, 2021.

There were notable limitations to the reach of this survey, as it was not possible to circulate it amongst the entire body of the ITU employees and interns, but only specific groups, as permitted by the ITU. Specifically, all employees registered as potential intern supervisors, the entire intern body and the Human Resources Management team

were engaged in this survey, partly because these employees worked remotely during the pandemic. Altogether, 47 complete survey responses were recorded. The survey data, including the complete results, are included in our appendix section.

The survey data results gathered for this study constitute a unique source of information that has proven essential for understanding the underlying challenges, benefits and experiences of remote work at the ITU. Although not all employees participated, the survey sample size is substantial enough to provide valuable and insightful information that could improve the ITU's working practices and employment experiences in the future.

4. Analysis of Remote Work in the ITU & Discussion

This chapter contains the analysis of findings from both the survey questionnaire and interview. More specifically, in this chapter, the authors present the profile of the survey respondents and interviewees, the employees' remote work experiences, views and perceptions on the benefits of remote work, the challenges of remote work and future work suggestions from those employees who are working in the ITU.

At first, a thematic analysis of the interview recordings was conducted. Having transcribed the interview material, repeating themes and patterns were established by clustering. The findings section below provides an integrated summary of the interview and the survey analyses. For the purpose of protecting the interviewee privacy, names and all forms of interviewee identification were removed. Instead, randomly selected pseudonyms are used in this paper.

4.1 Outcomes of the Case Study: Findings from the ITU

4.1.1 Interpreting the Survey Data: Survey Analysis

Here are presented selected details from the survey of employee attitudes towards remote working and cybersecurity at the ITU as described previously (for complete survey details, see appendix). Altogether, a total of N=47 responses were received. For the respondents, who are full-time employees and interns at the ITU, Table 7 illustrates their age, as grouped into categories. As illustrated below, twenty-one respondents are aged between 18-24 years old, and seven respondents are aged between 25-34. Nine respondents are aged between 45-44, and both the age groups 35-44 and 55-64 received five responding representatives each. Hence, the majority of respondents are young, likely exaggerating the representation of the views and experiences of the young interns.

Table 7: Age Range of the Respondents

Age group	Number of respondents	Percentage (%)
18-24	21	44.7
25-34	7	14.9
35-44	5	10.7
45-54	9	19.1
55-64	5	10.6
Total number of respondents	47	100

Moreover, it should be noted that the majority (N=38) of respondents are female (80.9%), and the minority (N=8) of respondents are male (17%). The higher female participation in the survey reflects the bodies of employees and interns requested to participate in this survey (See figure 7). However, fewer responses from men may have limited the applicability of the results to the entire employee body at the ITU.

Furthermore, most of the respondents (N=30) live in Switzerland and the EU, with 15 respondents living in each named region. The third most represented is the Asia Pacific Region, with a total of 10 respondents, followed by the Americas with four respondents. The least represented regions are the non-EU Europe and Northern Asia (N=4) and Africa (N=1). Such a result was unsurprising considering the location of the ITU headquarters in Geneva (See Figure 8). However, the broad regional representation signifies a strongly international nature of the agency yet also exposes the remote working benefit of location flexibility and the potential for global talent outsourcing.

A significant portion of respondents (N=44) have not moved for work in the 18 months, and only a small portion (N=2) of respondents have moved (See Figure 9). Such an outcome is unsurprising considering the travel restrictions in place during the pandemic. If the remote working option is maintained in the post-pandemic future, an increasing number of employee relocations may be expectable. As more workers utilize the newly gained freedom of movement and the flexibility offered by remote work, one may witness an increased employee movement. Returning to the office model would likely not have any effect on the current state.

Since March 2020, a complete remote working mode was reported by 39 out of 47 respondents. Of the remaining eight respondents, six reported working remotely over 50% of the time and only two reported spending less than a half of their working time in remote mode. Overall, the remote working experience is considered acceptable and smooth for most of the respondents. Eleven of the respondents rated their experience as 'excellent', 20 described their experience as 'good', and 15 respondents rated it as 'fair'. Only one respondent rated their experience negatively, choosing to describe it as 'not good'.

While the initial question yielded a blanketly positive view, further enquiry uncovered that the feelings towards remote work are, in fact, more mixed. The reported individual feelings toward remote work were much less positive overall, with almost a third of respondents feeling either unsatisfied or very unsatisfied. However, the summary one may draw from the survey is mainly positive, with the majority both rating their remote working experience positively and feeling rather optimistic about it.

The reasons for the respondents' feelings of satisfaction and dissatisfaction are reflected in their choice of words that best sum up their remote work experience. In their words, some of the most significant advantages of remote work are time efficiency, flexibility, and increased peace and productivity at work. While some gained a new vision for their job or even described remote working as a 'dream come true', others were much less satisfied, describing their experiences in words such as isolation, lonely, monotonous, antisocial, lack of real/in-person interaction with colleagues or frustration. Other common descriptions included boredom and fatigue, overworking, stress and lack of motivation.

Having thematically clustered all the answers, the most commonly echoed advantages and disadvantages of remote working were identified. The most shared perks of remote working were increased time efficiency and time flexibility. The biggest challenges were isolation and lack of personal interactions. Considering the comprehensive pandemic restrictions on movement and social contact in place, the feelings of loneliness and isolation are unsurprising. Comparing the post-pandemic experiences with the results yielded from the survey would spotlight this difference in the future.

The table below provides a summary of the reported remote work experiences. One can see that the respondents have mixed feelings, which are divided into positive and negative in the table below.

Table 8: The Summary of the Remote Work Experience for ITU Employees

Common Theme	*Thematically Grouped Positive Feelings*	*Number of respondents*
Positive Feelings and Experiences		
Work Efficiency and Performance Enhancing	• Time efficient • Even more efficient • Efficiency • Autonomy, flexibility, efficiency • Perfect mix of working efficiently and balancing life • Efficiency and less stress due to the traffic issues • Productivity increase	7
Flexibility	• Flexibility • Flexible • More flexibility in terms of time management • Flexibility • Flexible	5
Shifting Perspective	• New vision of job • Interesting • A dream comes true	3
Balancing Work and Life	• Easier to manage meeting work responsibilities and parental responsibilities • A better balance between the professional and personal life • Perfect mix of working efficiently and balancing life	3
Stress and Pressure Relief	• Relief (no commuting) • Less stress due to the traffic issues • Less stressful, Autonomous, Responsible	3
Comfort and Freedom	• Comfortable and practical • Free	2
Negative Feelings and Experiences		
Lacking Interpersonal Connections	• Lack of real interaction with colleagues • Lack in-person interaction • Lack of social interaction • Lack of socialization	7

	• Lack of human connection • Less communication • I miss communicating and collaborating in person with my supervisor	
Fatigue, Overworking and Other Potential Signs of Burnout	• Tiring • Exhausted • Overworked • Complicated and overwhelming • Distracted, isolated, stressed, demotivated, tired • No motivation • Demotivated	7
Loneliness and Isolation	• Isolation and lonely • Monotonous, antisocial, lonely • Comfortable but lonely • Distracted, isolated, stressed, demotivated, tired	4
Boredom	• Flexible but not very engaging • Boring	2
Distraction, Frustration	• Frustrating • Many distractions at home	2

The survey reveals that the most substantial benefits of remote work are no commuting with 13 respondents, flexible time with 12 respondents, and saving time with seven respondents. In other words, the essential benefits associated with positive feelings are the ability to have a flexible schedule and no need to commute. The less critical yet also repeated benefits are the ability to travel, more autonomy and improved multitasking. On the other hand, the most critical challenges are isolation and loneliness. There are also other significant challenges such as frustration, distraction and lack of communication, particularly with supervisors and colleagues.

4.2 Impact of Remote Work in the ITU: Observations in Words, Graphs and Charts

4.2.1 Interview Analysis

A total of 5 interviewees were questioned about their experiences of remote working during the pandemic. With the diversity of opinions in mind, the interviewees were both male (N=2) and female (N=3) and worked in various positions at the time of the interviews. Namely, two full-time employees, one contractor and two interns were interviewed. All interviewees shared their shared affiliation with the ITU and worked remotely from home during the past several months. In addition, two full-time employees working in the cybersecurity department were interviewed with the purpose of gaining an insight into the connection between cybersecurity and pandemic remote work.

First of all, it is worth noting that a full-time employee, contractor and interns all expressed both positive and negative opinions of their remote work experience. While the interns reflected on approximately five months of remote work, the rest of the interviewees have been gathering remote working experiences since March 2020, when the ITU went remote as part of a national lockdown.

The biggest benefits of remote work, according to the five interviewees, were following:

1.	Time-efficient and time-saving due to no commuting
2.	Reach broader participants from around the world for World Summit on the Information Society Forum
3.	More efficient work online
4.	Multitasking with online meetings

For illustration of their views, the following statements were extracted from the interviews:

1. *"I think there are so many benefits or advantages when you are teleworking. You save time because you don't have to go into the office as you save time, you know, when your commute and for the WSIS forum itself, it saves because you don't have to spend money for travel because flying to Geneva is very expensive. And since the foreign is open and inclusive now with the virtual, everyone can participate all over the world*" (Contractor: Anna)

2. *"I would describe it very efficient. It's been quite a pleasant. I've been able to do more. I was able to do a lot of more focused individual works. I could be at several meetings."* (Full-time employee: John)

3. *"I think the remote work was very efficient and time saving because I didn't need to commute from my office to my home, my university and also, I can efficiently communicate with my team members because we all have meetings online. We could easily outreach for more guests because they all give business online and they can reach out to a broader audience."* (Intern: Sam)

The leading challenges of remote work as described by the five interviewees were following:

1.	Hard to manage the new interns from different locations
2.	Difficulties with attending online meetings from a variety of time zones
3.	No face-to-face socialization between different colleagues, stakeholders and partners
4.	No clear boundaries when to stop working, which might cause burnout

Again, some examples of interviewee statements:

1. *"One challenge that I follow, and I think for the virtual environment is to manage the interns because they are sitting from different locations."* (Contractor: Anna)

2. "*A challenge is the different time zones. When I had to, you know, wake up at six to meet colleagues from the east or stay up late to meet the colleagues from the west.*" (Full-time employee: John)

3. *"I cannot see my colleagues and this type of socializing would be one negative aspect of it. I'm not going to discuss conferences and meetings in physical, there's a lot of body language and energy that you can transfer in physical meetings."* (Full-time employee: John)

4. *"I have seen from other people. They don't put boundaries or limits in how much time you should work and these causes burnout, but these are also can happen on the office. if I have to summarize some of the important things or challenges that people need to keep in mind when working remotely it's setting boundaries and making the importance of pulses and relaxation."* (Intern: Kate)

5. *"Meeting people face-to-face and in-person it builds this kind of a bond that you're kind of not involved. It's very important to be able to trust your partners, your stakeholders. So, I think of course there is in the remote meetings. Also, of course you trust the partners, but I think that it's this other friendship that kind of builds when you meet people face to face, you go out for a cup of coffee and things like that. So, I think that's a missing in the remote work."* (Full-time employee: Mary)

6. *"We receive calls in the morning from countries that are working in the morning, and in the evening and night from countries who are working at night, so it's like, it kind of becomes like a full day work activity, even lunch. I mean, we really didn't have time for lunch because 12 to 2 is a very productive hour. It's like the time zone that is for everybody. So, 12 to 2, basically we've been working, you know. So, it's very intense."* (Full-time employee: Mary)

7. *"Since I was not able to work physically for ITU we sit outside. So, I felt a separation from the workplace culture which renders me like an outsider sometimes. For example, I couldn't access to the UN facilities or interact activities and the intern community."* (Intern: Sam)

Suggestions for remote work organisations:

Based on the suggestions and experiences provided by the interviewees, employers should do the following to ensure they have productive, healthy and satisfied remote workers:

- Organize online networking activities and training for employees.

- Provide comprehensive knowledge or fast IT help and support to employees

- Allow employees to express their remote work experiences, difficulties, and opinions to address their needs or conduct a survey for future improvement.

- Set remote work rules or policies that help employees to stop continuous working and prevent burnout.

- Offer remote work-related equipment and tools to employees

Selected statements illustrate the suggestions provided by the interviewees:

1. *"I think the organisation can launch some activities for a networking or just talking towards each other so that they don't feel lonely or feel depressed. So I think, it helps, if they try to do some of these activities and provide something that is useful and educated."* (Contractor: Anna)

2. *"If you are asking them to write emails and research, you have to give them a laptop or computer. If you get to talk to people, if they give them, data and phone, if you don't have that, then you know, it's very difficult to do. So provide them with basic tools and basic training."* (Full-time employee: John)

3. *"It's super important to ask the employees what they think, how the employer can help them and to do this transition."* (Intern: Kate)

4. *"You feel like you're always on calls and always on meetings. So, I think they need to be some rules with this evolving nature of work culture. So that that's a necessity, I think."* (Full-time employee: Mary)

5. *"One thing I feel that really helps us quick IT support, So that support, I think is very important."* (Full-time employee: Mary)

6. *"The organisation can provide comprehensive knowledge support for their employees."* (Intern: Sam)

From the interviews of the full-time employees, a contractor and interns, the following main benefits, challenges, and suggestions for remote work can be drawn:

Table 9: Remote Work for Employers and Employees

Benefits:	***Challenges:***	***Suggestions for employers:***
Time efficient, convenient and save travel time	Employees/online meetings are in different time zones	Offer remote work-related equipment and tools
More online opportunities	Distractions, self-discipline	Provide comprehensive knowledge or fast IT help and support
More efficient working	Lack of social contact	Organize online networking activities and data security/cybersecurity trainings; Raise cybersecurity awareness
Multitasking with online meetings	No clear boundaries or rules	Set remote work rules or policies; Allow employees to choose not to remote work; Provide a platform for employees to express or share their remote work experiences, difficulties and opinions or conduct a remote work survey for future improvement.

For all the survey respondents, the most significant benefits of remote work are no commuting, followed by a flexible time schedule. All of the benefits explained or mentioned during the interviews are listed in Table 10 below:

Table 10: The Summary of the Biggest Benefits of Remote Work are Listed Below

Biggest benefits	*Number of respondents*
No commuting	13
Flexible time	12

Save time	7
Save money	3
Less stress/no stress	2
Efficiency	2
Work-life balance	2
Freedom	2
Productivity	2
Communication by email	1
Home comfort	1
Online events	1
Multitasking	1
Ability to travel	1
More autonomy	1

4.2.2 Depicting Motivation at Work

In terms of motivation, 22 out of 47 survey respondents (46.8%) thought that their motivation levels remained unchanged in the new, remote work mode. Nineteen respondents (40.8%) expressed that they are less motivated when working remotely. Only six respondents (12.8%) indicated higher motivation compared to the office working mode (See figure 15).

In addition, almost half of the respondents (N=23=48.9%) felt online communication channels such as Teams, Zooms or Slack impacted their work positively, and a few respondents (N=8= 17%) felt that the online communication channels at their disposal negatively impacted their working experience. Intriguing was the relatively significant number of respondents (N=16=34%) aligning themselves with the statement that online communication did not change their work and motivation (See figure 16). The authors' interpretation of such results may be because online communication channels had been in operational use before the mass switch to remote working. Hence, a part of the

workforce likely developed firm reliance on online communication before the pandemic and, thus, did not experience a noticeable change.

These survey results have firmly proven that online communication channels used during remote working can positively impact employee motivation. At the same time, a few employees felt online communication could negatively impact their work. Therefore, online communication channels are essential in remote working, and they form the backbone of communication, collaboration and interaction at work. Online communication can increase employee motivation in remote work, but this result does not apply across the entire employee body.

Further analysis of the survey data uncovered that **motivation in remote work varies significantly, raising questions about the best working arrangements for the post-pandemic future.** Interviews and the survey data have proven that while some better maintain their motivation from the people and environment around them, others may possess a higher internal drive and make more motivated remote workers. A prime example of the first group is young Sam, who described his motivation as follows: *"In the onsite work, you can communicate frequently with your colleagues, and they can provide peer supervision to each other, but for the remote work you are alone in one place. So, all your motivation relies on yourself.*" An experienced interviewee reiterated having observed a similar phenomenon from the supervisor's perspective: *"if there are some younger recruits or new recruits during COVID, how do we keep their motivation?"* While the research on motivation in remote work is far from extensive, our survey uncovered that 40% of all respondents experienced a decline in motivation at work (Figure 4). A closer examination of the data, however, revealed a strong correlation between declining motivation and age. Hence, **younger remote workers face drops in motivation while their experienced colleagues reported more balanced or positive changes.** Admittedly, the surveyed sample size is not balanced and relatively small. However, intriguing observations call for further research is to test this relationship and, if validated, determine the rationale hidden behind this story of numbers.

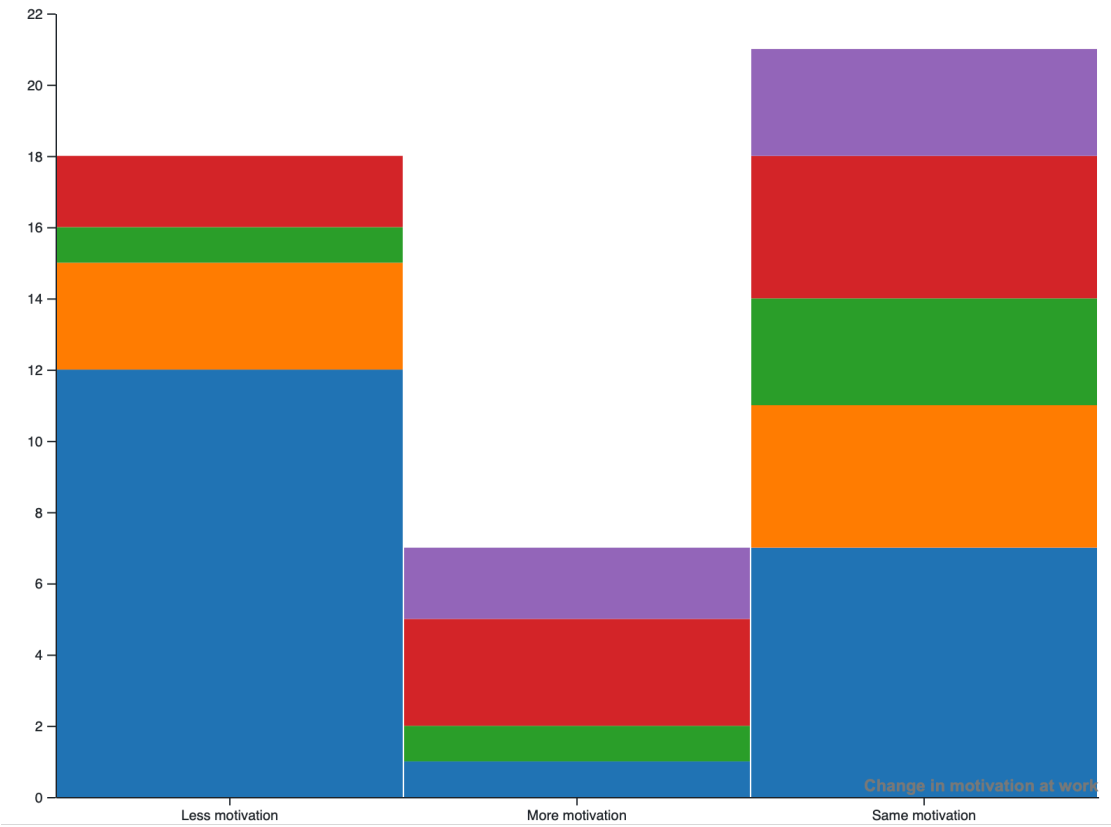


Figure 4: Number of Survey Respondents (y-axis) and Reported Change of Motivation at Work Since Adopting the Remote Working Mode, or Lack Thereof (x-axis).

4.2.3 Changes, Challenges and Shifts in Remote Work

The most challenging about working remotely for our respondents are the following: The top five are 1. Collaboration and communication (N=12=25.5%), 2. Inability to stop working (N=10=21.3%), 3. Loneliness (N=8=17%), 4. Finding reliable Wi-Fi connection (N=6=12.8%) and 5. Remote work taking up their leisure time (N=4=8.5%). Some respondents indicated other challenges such as 6. Distractions at home (N=2=4.3%), 7. The sense of belonging to the organisation and a mix of elements including staying motivated in different time zones (N=2=4.3%).

Upon asking about the top two aspects of the respondents' lives that changed the most since working remotely, more than half of respondents (N=26=55.3%) choose

collaboration and communication. Less than a half (N=19=40.4%) of respondents choose a working location and set up, followed by a third (N=16=34%) choosing changed working hours. About a quarter of respondents selected (N=12=25.5%) productivity/performance, and their mental health (N=10=21.3%). Only a few respondents choose cyber/data security and privacy (N=2=4.3%) and childcare (N=1=2.1%).

The changed hours reflect the increased flexibility in remote work, as reiterated by those surveyed and interviewed alike. Perhaps worrying is that one-fifth of responders chose their mental health as one of the most significant areas of change in their lives. While there is an existing possibility of mental health improvements rather than declines, this serious issue should be investigated further to eliminate the potential negative outcome.

After the pandemic, more than half (N=24=51.1%) of respondents want to continue working remotely for two to three days per week. About a quarter of respondents (N=11=23.3%) prefer continuing in a remote setting for one day per week. In addition, most of the respondents (N=41=87.3%) answered they would like to work fully or partially remotely for the rest of their career, whereas only (N=6=12.7%) do not want to work remotely. The overwhelming majority of respondents willing to work remotely signifies major shifts in attitudes and perspectives towards remote working. While the pre-pandemic attitudes were not measured, it is presumable that the pandemic forced remote working had an eye-opening effect on the surveyed workforce. The newfound preference for remote working will, therefore, likely have lasting implications in the post-pandemic future.

4.2.4 Further Observations in Remote Working – Results of the Thematic Analyses

a. Pandemic remote working has delivered positive effects for the organisation. The increased working efficiency was repeatedly reported both by the interviewees and the survey respondents, both in terms of time-saving and removing the spatial barriers one encounters in the office. *"You save time because you don't have to go into the office,"* says Anna, explaining the obvious efficiency. However, efficiencies were gained in terms of reported work productivity, too. *"In terms of productivity, I think it's been more productive,"* reports Mary. The working efficiencies gained were reportedly rooted in improved communication (*"I can efficiently communicate with my team members because we all have meetings online,"* says Sam), and the ability to sit in two meetings simultaneously (*"I could be at several meetings… at the same time"* explains John).

b. COVID-19 transformed the way of holding conferences, including ITU's WSIS Forum. As the countries around the globe seized travelling for undefined periods of time, large-scale events including forums, conferences, concerts and sports matches undertook a rapid transformation to adopt new, virtual formats. ITU's biggest annual conference, the WSIS Forum, was no exception. Through virtualising the conference, an upscaling potential was uncovered. In the words of one of the forum organisers, *"we were able to include more stakeholders…we had more than 50 000 participants, which is unbelievable in our process. Otherwise they are like around the maximum 2000 people physically here in Geneva. [Virtual conference model] opened a whole new way of working and participation."* Turning virtual has helped in terms of accessibility, too. *"The forum is open and inclusive now with the virtual [model]. Everyone can participate all over the world because of course the forum is free."* Increasing accessibility furthers several SDGs along the way, including access to education (Goal 4) and other goals specific to the topics addressed at the forum.

c. Benefits gained through increased flexibility of remote work come at a cost. Working from their homes, ITU's remote workforce gained a degree of freedom over when and how they work and better integrate domestic responsibilities into their daily schedules. Young intern Sam considers changing focus during the day beneficial. "I can do something at home and do something related to work and return to my other things. So, like [working in] shifts," he explains. However, Sam's internship does not involve cross fast-paced continental stakeholder communication. *"They are coming from all over the world,"* explains Anna, "*it's difficult to adjust the time zone."* John shares the experience, saying, "I had to wake up at six to meet colleagues from the east or stay up late to meet the colleagues from the west." Showcasing availability by agreeing to extended meeting hours may result in overworking, unpredictable work schedules, and potential disruption of sleeping patterns. The survey results prove the extension in working hours, too, with 81.7% of respondents claiming to work longer hours and 34% working many extra hours per week (Figure 5). One reason for this increase may be the perception of availability inherent in online communication, where one does not need to knock on an office door to see if they can spur a discussion. *"We don't have that clear boundaries because when you go to the office, everyone knows that the 12 or one you'll be away for lunch,"* tells Anna. Therefore, protecting employees from the negative well-being implications of overworking and irregular working schedules should be prioritized.

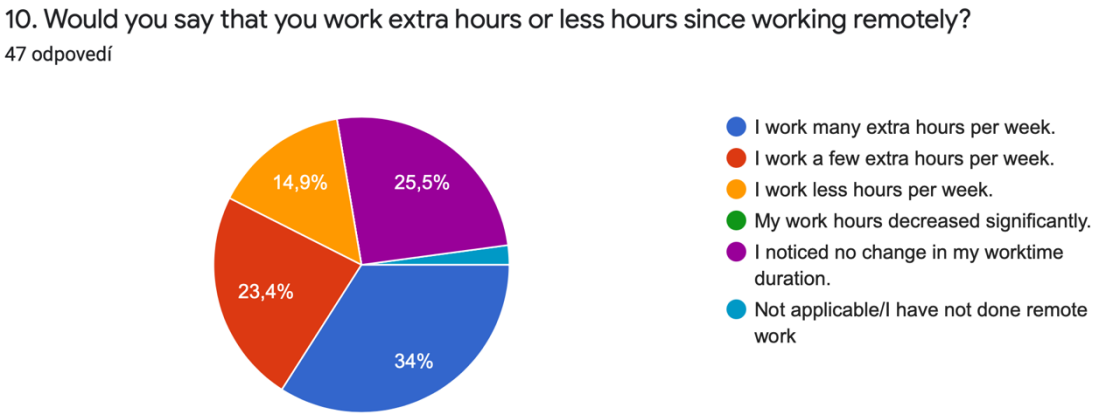


Figure 5: Assessment of change in working hours as a result of remote working

d. Unintentionally, interviewees illustrated reinforcement of traditional gender norms. A working mother, Mary, sees remote work as means of incorporating childcare into her working life, which is a common practice among mothers, as described in the previous section on gender. *"You can pick up your child and bring them home and make them comfortable, and… continue with your work,"* she explains. Mary continues to describe how remote work shields her from the potential judgement of her colleagues. *"in office, you know, it's like, people notice that you're leaving and coming. And so, I think for mothers, it was really useful in that sense, because it doesn't impact your work at all."* Contrasting to her experience, but in line with the reviewed literature, was John's summary of remote working as *"an amazing opportunity for work and life balance where not a single moment of the day, of the week, could, you know, take me away from my work."* Comparing these two statements, one gains a textbook example of the phenomenon described in the previously discussed Italian study by Cannito and Scavarda (2020, p.804), with *"women juggling to balance their double role as mothers and workers, and fathers expanding the time devoted to paid work."* Our study further proves the prevalence of a remaining gender divide in remote work, echoing research works by Cannito and Scavarda (2020), Chung and Van der Lippe (2018) and others.

e. Adjusting to remote work may be followed by adjusting back out of it. Working longer hours and scattered work schedules may be natural side-effects of a drastic double transition from the office into homes, and from holding a popular in-person forum to organizing a virtual event incomparable in capacity and scope. Kate, who is used to switching between remote and office-based working, explains that every change is initially *"a challenge because when you're used to do something… you have to rethink your routine."* Hurried switch back into the office may, therefore, bring

similar adjustment challenges. Hence, switching back gradually may improve health risk management in terms of both the COVID-19 and employee wellbeing. Gradual changes are in line with the survey results, indicating that the majority (51.1%) of surveyed employees would prefer to continue working remotely at least on a part-time basis of 2-3 days per week (See Figure 23 in Appendix).

f. Repeatedly praised was the **high performance of the IT support team, who helped resolve technological difficulties of remote work.** Mary elaborates: *"If I'm facing a problem and I know nothing about technology or equipment… the response is quick and timely, it's ideal… Otherwise you can feel lost, you know, like, oh, my laptop is just not starting. What happened, you know?... So that support, I think, is very important when you're working alone, otherwise, you can just feel isolated."* Mary's sentiment was echoed throughout the conducted interviews, presumably because receiving IT support provided not only technical support to the employees but also a sense of collective problem-solving during the isolating pandemic times. Lack of experience with various virtual platforms and tools was also addressed by providing numerous employee training sessions. *"There were lots of trainings, technical trainings on how to use a particular platform,"* describes James. Training sessions, technical and IT support were the primary means of support interviewees perceived to be benefiting from, especially in the early months of remote working. Hence, establishing a strong support system and building technological confidence may have underpinned the increased efficiency of the bulk of ITU's remote workforce.

g. Drawing explicit boundaries systemically may remove ambiguity in remote work and protect employee wellbeing. While entering several meetings simultaneously, as described by John, may increase working efficiency, the newfound ability to join more meetings than would be physically possible in the office-based mode can prove exhausting. Anna explains that having *"meetings around the clock"* can leave her feeling exhausted. The feeling described here recently gained salience under the name *"zoom fatigue"* when established news platforms popularized the term in April 2020[2]. Several survey respondents echoed similar feelings, having summarized their remote work experience as *"tiring", "too much meetings", "overwhelming,"* and *"exhausted"*. Hence, this research provides further evidence that extensive hours of online communication can be more mentally taxing and stressful and decrease

[2] BBC, for example, by Jiong at: https://www.bbc.com/worklife/article/20200421-why-zoom-video-chats-are-so-exhausting, accessed: 6.7.2021; or National Geographic by Sklar at: https://www.nationalgeographic.com/science/article/coronavirus-zoom-fatigue-is-taxing-the-brain-here-is-why-that-happens, accessed: 6.7.2021

employee health and wellbeing, as previously established in research by Wiederhold (2020). While popular articles offer prevention strategies for individuals, such as to reduce the size of video chat windows or avoid using the full-screen mode (Basby, 2021), two interviewees emphasized their perceived *"need to set different rules and boundaries"* collectively within their working teams. An example was given by Mary, who described another working team whose members *"don't do [virtual] meetings on Friday, so they take time to do other work."* Seemingly, some teams prioritize 'zoom fatigue' prevention while others do not. Likely, the reason behind this variation stems from work culture differences among the different teams. While limiting virtual meetings may aid in the prevention of 'zoom fatigue' symptoms and improve the wellbeing of those affected, those willing to showcase availability at work may perceive such measures as limiting. Prioritizing worker wellbeing would thus represent a shift away from 'ideal worker culture', as described by van der Lippe (et al., 2020), towards a 'caring culture' introduced earlier by Mannson (2021[3]).

h. Many remote workers feel lonely, especially younger women. Survey analysis shows that feelings of loneliness, isolation and lack of communication and social interactions were frequent among the remote workers, interns and contractors at the ITU. Interestingly, respondents who summarized their remote work experience as 'lonely', 'isolating' or non-interactive (including variations and synonyms of the listed adjectives) were almost exclusively female. Two thirds also under 35 years old. Hence, more than any other group, younger women struggled with isolation during the pandemic remote working. Interviewee Anna was one of them, explaining how remote work *"affects our mental state". "We are very isolated just at home,"* she adds. As social distancing rules phase-out, the post-pandemic remote work may not be comparably isolating. However, the impact of months-long isolation on the mental wellbeing of remote workers may have lasting effects on the health and productivity of the most impacted.

4.3 Cybersecurity in Remote Working – Results

4.3.1 Summary of the Interview Observations

In terms of cybersecurity, most respondents (N=38=80.9%) have never experienced any cybersecurity risks (See figure 17). The remaining 20 percent of respondents

[3] This is a citation from the "Future of Work" workshop organized by the authors of this paper and Ms. Ovalles. Link to the complete video-recording and transcript to this workshop is in the reference list

experienced some threats less than five times (N=3=6.4%), or 5-10 times (N=4=8.5%), and only two reported combatting cybersecurity threats more than ten times(N=2=4.3%). Considering the immense volume of cybersecurity breaches and threats reported by other companies and organisations, as discussed in the literature review, it is probable that the low levels of experienced cybersecurity threats are the result of an effective cybersecurity protection system in place. The interviewee cybersecurity experts confirmed this hypothesis by reporting facing a significant increase in cyber threats. Therefore, an effective cybersecurity system is likely in place at the ITU, enabling the workforce to focus on their primary job tasks rather than dealing with the influx of cyber threats. Difficulty recalling the non-effective cybersecurity threats may also play a role in the low levels of reported cyber attacks. The cybersecurity risks that the employees remembered encountering during their remote work were exclusively invariable - phishing emails.

The surveyed workforce widely recognises the efficiency of the ITU cybersecurity team. Most of respondents think ITU is somewhat sufficient (N=5=10.6%), sufficient (N=18=38.3%), very sufficient (N=12=25.5%) and excellent (N=10=21.3%) in ensuring their data security. Only a single respondent choose to describe ITU's cyber protection as not sufficient at all (See figure 19).

Despite the low levels of reported cyber risk encounters, the ITU's employees worry about the security of their private and work-related data while working remotely. More than 20 respondents (44.7%) worry about this matter occasionally. Six respondents (12.8%) worry a lot about their working data and private data security, but a significant number of respondents (20 respondents = 42.6%)report never worrying (See figure 18). The significant variance in attitudes towards cybersecurity threats may reflect upon the omnipresent nature of cyberthreats that leaves some feeling anxious while others grow apathetic towards it. A similar range of attitudes may be observable around the issue of climate change, which, just like cybersecurity, is currently unresolvable by a single action or an actor and continues to pose a threat for the decades to come.

Further interviews were conducted with two ICT specialists currently working in the Information Security department, which provides cybersecurity services to all the ITU staff, including interns and contractors.

According to James, who works in the Information Security department, suggesting a few challenges related to data security in the following areas:

1. *"The biggest challenges which we have today is called data classification as to know which data needs to be kept for how long, because not all data needs to be kept".* (James, full-time employee)

2. *"Data loss is primarily a problem which basically really comes at the level of the end user because if someone deletes something, it is their responsibility of what they have deleted or not deleted. It cannot keep every iteration, every file you have made, because any document, as you know, good for at least about five or six different iterations before it is accepted, put away, or something. Somebody reviews it and give a few corrections and then you go through. So we cannot keep everything the most important challenge which we always have is to find the last approved version of the document. That's the most important part for us is what was the last published document in that whole series of work in progress. And that's one of the challenges which we need to worry about*." (James, full-time employee)

3. *"BYOD, or bring your own device type of questions. And then bring your own device type of questions has been a double-edged sword to start with. We basically do a lot of something called trust. So we trust you saying that you will not abuse the data you have in your hands. And even after you leave the organisation, you have a contractual, basically saying that any data which you have collected from us will not be reused for anything bad, but that's roughly the type of information you should have. But a BYOD question is a real challenging issue, which we need to answer."* (James, full-time employee)

The following recommendations for cybersecurity were given by the interviewee Tom:

1. *"Cybersecurity is not only the way to protect the tools and protect the organisations it's three main pillars. The first one is of the products, whether it's a firewall, detection systems, or any other technology or security technology, but it's also the processes, because if you don't implement correct processes, that would mean you are not doing the protection very well. And the third important pillar is our staff. And for this specifically, we have a concept in ITU here, we call it the human firewall."* (Tom, full-time employee)

2. *"We have implemented the concepts that we called the "follow me security", which means whatever you are or whatever tools you are using. There should be a security mechanism that are following you. And in that aspect, we have implemented, we have installed some security controls in the desktop, in the laptops to make sure that they can protect our staffs when they are remotely working."* (Tom, full-time employee)

In summary, the following cybersecurity and data security challenges related to remote work were identified throughout the interviews:

1.	Employee data and non-employee data
2.	Data classification, data loss and access
3.	Flaws in one of the 3 pillars protection: products, processes, staff (human firewall)
4.	Raising employee awareness and skill to identify cyberthreats
5.	BYOD (bring your own device)-related issues

The following solutions to cybersecurity attacks were proposed by the interviewees:

1.	Security controls in desktop and laptops
2.	Cybersecurity awareness trainings for employees and onboarding trainings for interns
3.	Customizations of security tools that best fit a particular organisation

4.3.2 Cybersecurity in the Pandemic: ITU's Experience

Interviews with data- and cybersecurity experts were enabling in comprising a comparison between the used mechanisms of data protection as described in the reviewed literature and the mechanisms utilized by the ITU. This section will review, compare and contrast these mechanisms, relying substantially on the knowledge extracted from the two interviewees, James and Tom[4], with additional insight provided by the survey respondents.

[4] James and Tom are not the interviewees real names, but randomly selected aliases used to protect the identity of the interviewees'

Remote work has undoubtedly brought around its unique challenges for cybersecurity. Cyberattacks also increased quantitatively, with increased cyber threats reported by organisations in Switzerland (Nabe, 2021). Inside of the ITU, cyber experts also confirmed that *"they have increased"* in quantity. While many organisations did not provide adequate protection for their remote workers (Furnell et al., 2020), the ITU was undoubtedly better prepared for the pandemic.

"We have been providing remote connectivity for staff for the last 20 years", explains James, *"so people were able to work from home."* Since the ITU interacts with a global clientele across many time zones, it has been customary that meetings may sometimes be held virtually and in early or late hours. With employees and stakeholders communicating virtually, connecting from their homes, remote work was not an entirely new concept for many. *"People were able to deal [with] VPN. People were able to do a remote desktop for years, so that has not changed,"* says James. This initial advantage meant that the remote communication channels, remote conferencing and working were in place before the pandemic, although utilized to a much lesser extent. Having established remote communication, cybersecurity for remote workers was also a familiar concept for the ITU, albeit gaining the spotlight only under the pandemic lockdown.

However, having remote working cybersecurity tools in place did not refrain the ITU from a spike in attacks, especially during the initial months into the pandemic. In Tom's words, the flow of attacks was quite intense: *"I remember in the beginning of the COVID, we detected huge phishing campaigns against our staffs but also against our remote connection tools. So, for instance, the VPN or the RDP, because… the hackers knew that a lot of people are working remotely and, therefore, they were targeting this remote connection to attack the organisation."* Tom's and James' summaries align with the reviewed literature, confirming that the increase in cyberattacks was substantial amid the COVID-19 pandemic. The nature of these attacks against the ITU varied and ultimately resulted in increased vigilance from the cybersecurity team and spurred the implementation of new cyber-protection concepts and mechanisms.

At the ITU, numerous data- and cyber-protection mechanisms are simultaneously in place. ITU's cybersecurity team strives to *"protect the organisation, the network – whether it is in Geneva, the headquarters, or in the regional offices of ITU"* – as well as ensuring that ITU's conferences and meetings are secure, trusted and protected, said Tom. Data storage, one of the vital mechanisms in place, involves gathering and backing up the data, as well as ensuring data availability for the *"least privileged access positions, which is not always the case"*, stated James. He explained that having access

to relevant data sets enables employees to work effectively and increase their working efficiency. Data classification is a challenging part of this process, as the data experts need to identify *"which data should be kept, and for how long",* James says. Leaks in ITU's data storage mechanisms occur primarily when the end-user, the employee, deletes data that should be stored for future reference.

ITU's cyber-protection mechanisms operate in a system of three pillars: the first pillar is composed of protective products, *"whether it's it's a firewall it's intrusion detection systems, or any other technology or security technology",* explains Tom. Implementing correct processes and the ITU staff awareness and skillset pose as second and third pillars. The emphasis on the third pillar is unsurprising, considering the reviewed literature. Tom's team of cybersecurity experts prioritizes the role of staff because the cyberattacks target them so often. *"For this specifically, we have a concept in ITU here, we call it the 'human firewall' ",* he says, adding that no technology can fully substitute the central role of staff awareness and education on cybersecurity. To decrease employee vulnerability to cybercrime, mandatory staff training was implemented at the ITU, describes Tom. Educating and examining the employees in five thematic modules, this training is externally outsourced but customized to fit within ITU's context. Having implemented thorough cybersecurity training before the pandemic, much did not need to change for the employees working from home. The learning curve for the employees at ITU was *"extremely low",* explained James, *"because they already knew how to use it."* Based on their personal experiences or lack thereof, 85% of surveyed respondents considered their data security at work 'sufficient' to 'excellent' (Figure 19).

While cybercrime is a serious problem for organisations, data loss does not occur exclusively through criminal or even intentional activity. Over the 150 years of ITU's existence, data storage has undertaken a significant transformation. At first, all documents were stored in paper format. *"We have paper archives in our systems",* explained James. While adopting digital data storage mechanisms increased the protection of documents against the natural effects of ageing on paper, building a technologically dependent data storage has its own inherent challenges. When a website's URL address changes over time, its data may get lost. This aspect of data loss has nothing to do with human error or cybercrime but is instead based on how *"we have technologically constructed our systems",* states James.

4.3.3 'New' Cybersecurity: Response Mechanisms and Adaptation Strategies

As a direct response to the pandemic shift to fully remote working mode, the ITU's cybersecurity team has implemented a new concept called 'follow me security' which

means that *"whatever you are or whatever tools you are using, there should be security mechanisms that are following you,"* as Tom describes this. The new concept represents a shift in the way cybersecurity teams regard their targets. Since working has changed, cybersecurity measures and mechanisms now need to follow the employees to their homes around the globe. The on-site protection of ITU's headquarters, previously of primary importance, became less significant as the bulk of the employees no longer visit the premises on a regular basis. In Tom's words, "*the whole concept has changed, and, therefore, we shifted our thinking from an on-prem protection to a mobility protection"*. Specifically, this means higher security control in the desktops and laptops and cybersecurity trainings tailored to account for the new and increased risks brought by the remote working mode.

The 'Bring your own device' policy, better known as BYOD, has been challenging even previously to the pandemic, posing as a *"double-edged sword"* (James). Admitting that ITU is still in the process of resolving the dilemma surrounding the BYOD policy, James explains that the *"BYOD question is a real, challenging issue, which we need to answer."* The problem exists on two fronts. While the issue of decreased cybersecurity inherent to the usage of personal devices (as explored by Hutter, 2020) was discussed briefly in the Literature Review section of this paper, another challenge was brought up by an interviewee. It is the potential abuse of data by former employees, who may retain copies of documents they once had access to. Deleting all work-related data from personal devices has its limitations, and thus the organisation has to *"trust you saying that you will not abuse the data you have in your hands,"* as James puts it. The employee yet again proves to be the weakest link for the organisational data security, as *"technologically, there are tons of ways and intelligent person will be able to get hold of the data and keep it with them for long",* explains James.

Apart from the BYOD policy and the employee behaviour related vulnerabilities, the remaining most common cybersecurity challenge is *"use of legacy applications"*, an issue highlighted by Tom. Legacy applications contain numerous vulnerabilities, so the *"hackers would scan the network to detect those vulnerabilities and use it as an attack vector to compromise our network",* explains Tom. Phasing out of these applications is a gradual process, smoother on an organisational level but perhaps more difficult to enforce for those working from their personal devices.

5. Conclusion and Limitations

5.1 Thesis Summary

As remote work - telework, WFH, or telecommuting has been a necessary work practice and arrangement for many global organisations and workers during the lockdown period of the COVID-19 outbreak. This research is mainly about the understanding of remote work during the COVID-19 Pandemic. The primary focus of this paper centers around the following five research questions:

Q1: What are the benefits and challenges of remote work?

Q2: How COVID-19 has affected remote working and cybersecurity in case of ITU?

Q3: What are the employees' views on their data security and privacy protection while working remotely?

Q4: What are the perceptions of employees on the various aspects of remote working during COVID-19?

Q5: How to make remote work more effective, resilient and secure in an international organisation?

In this internship thesis report, the most recent literature on remote working and cybersecurity topics was reviewed and analysed. Remote work bears both advantages and challenges for the employer, employees and broader society. While forced remote working, initiated by the pandemic measures, differs from voluntary remote work in many aspects, the relevant literature, as reviewed in this paper, provided an insightful lens through which the various implications and aspects of remote work may be assessed. Building upon a firm groundwork of academic research, this paper uses both quantitative and qualitative methods to conduct state-of-the-art research into remote working and cybersecurity at the International Telecommunication Union. In the true remote working spirit, an online survey and virtual interviews with the ITU's workforce were conducted to gather data on their attitudes, knowledge and experiences. Data extraction has proven vital for our understanding of the specific challenges they have faced during the pandemic. Information on how the remote workforce benefited from the change of work settings was collected and depicted, and their changed attitudes

were analysed. A special focus of this report is on the cybersecurity changes and challenges in remote working for an international organisation. Significant developments in this area occurred due to the global spike in cyberthreats, hence why this paper includes the assessment of ITU's cybersecurity performance and depicts employee awareness and attitudes towards the pervasive cyberattacks. By depicting some of the most significant shifts, changes, and challenges in remote work, with perhaps the greatest cybersecurity challenge, this paper aims to inform and enable further changes and developments that would enable improved working lives and performance of remote workforces globally.

5.2 Findings

Our seven interviews and forty-seven survey respondents provided solid knowledge and information bases for the following conclusions: Firstly, our analysis revealed the employees' perceptions of the benefits and challenges in remote working during the period of pandemic restrictions. Some of the most valued aspects of remote working are related to efficiency gains and increased time flexibility. The leading burdens of remote working are, according to our analysis, lack of interpersonal connections and potential burnout. To eliminate the possibility of burnout, this paper aligns with the reviewed literature and interviewee suggestions in recommending regular breaks and schedules, effective time-management techniques and outsourcing personal interactions in forms permitted by the local health authorities.

This paper established that the future of office work is remote, or at least partially remote if employees' preferences were prioritised. More than 50% of survey respondents wished to work remotely for about half of the workweek. Most of the respondents, 87.3%, would welcome remote working on a partial basis.

The interviews were particularly contributive in providing insider perspectives on remote working and cybersecurity and elaborating some suggestions for further improvements in this sphere. To make organisations more effective, resilient and secure, the leadership should consider offering remote work-related equipment, tools and training. Organisations should also provide basic knowledge of the potential cybersecurity challenges and solutions and working knowledge of the technologies used in remote working. Fast IT help and support are crucial for effective remote work and cybersecurity in a remote working setting. To prevent workforces from developing the signs of loneliness and boredom that impair their work and wellbeing, organisations should set up online networking activities to implement remote socialisation.

Overworking and burnout can be further eliminated by setting clear policies and rules for remote working and intentional development of caring working culture instead of the ideal worker culture. Lastly, continuously raising cybersecurity awareness may help organisations in the prevention of numerous cyberattacks.

5.3 Reflections

In the sudden, mass, global transition of office employees towards virtual workplaces, one is drawn instinctively towards comparing the current working practices from those of the past. Just like the internet and cell phones have distinctly changed human societies. Their adaptation has recently enabled millions of workers to protect themselves from the deadly coronavirus while maintaining their jobs and careers. The future is undoubtedly full of further drastic changes based on the backbone of the internet and telecommunications technologies.

The said technologies allow us to move from physically oriented to non-physically oriented communication structures, in which spatial and temporal boundaries are significantly reduced (Agres et al., 1998). Most industrialized countries are gradually evolving from cultures based on physical contact to forming virtual societies where goods and services are accessible without interpersonal interactions. Remote working forms a vital part of this evolution toward a virtual workplace.

As humanity moves toward virtual societies and virtual workplaces, these should not be accepted as societal guidelines that all must follow or require enforcement. Instead, the virtualization of the human experiences is a natural result of the evolution we are collectively experiencing.

In the meantime, one should keep in mind the short-term and lasting challenges and concerns of remote working. The OECD recently raised the following question for our global societies: How can we minimise the risks of widespread teleworking, its harming long-term effects, including the decreasing worker well-being? Firstly, policy-makers should assure their constituents that teleworking remains a choice, and a viable alternative in office working remains tangible. Co-operation among social agents may be essential to address some of the teleworking concerns, such as the 'hidden overtime', as this paper depicts. To increase the gains from widespread teleworking for productivity and innovation, policy-makers can promote the adoption of managerial best practices, self-management and ICT skills, investments in home offices, and fast and reliable broadband internet across entire countries.

Public policies and dialogues among an inclusive range of social actors can play a crucial role in facilitating this transition and contributing to spreading teleworking practices that enhance productivity and worker well-being. They can enable an organisation to carry out the necessary adjustments while counteracting potential risks and allow more workers to benefit from welfare-improving telework opportunities (OECD, 2020). While telework does undoubtedly affect worker productivity and well-being, policymaking that helps to maximise the benefits of telework is desirable.

The practical recommendations based upon the knowledge gained throughout forming this paper are summarised in the following five points: 1) Public and organisation-level policies should ensure that telework remains a choice for employees, who should retain their right to discontinue teleworking upon the approval from their public health authorities. 2) Policies should encourage arrangements that provide workers with an appropriate working environment. Examples of such arrangements are promoting co-working spaces across different countries, offering allowances for home offices, supportive infrastructure and childcare closed to home, investments in required skills through online learning, and raising employee awareness and onboarding training. 3) Policies should facilitate the diffusion of best practices developed in the pandemic era. The need to enforce security controls in cell phones, laptops and computers, also to manage data classifications effectively. 4) Policies should facilitate remote work by offering bilateral tax agreements and increasing digital capacities of the public sectors to showcase the benefits of telework. Lastly, 5) policies should support and provide access to a fast, reliable and secure ICT infrastructure for organisations and workers, hence why it is essential to stimulate investments in ICT infrastructure and upgrades (adopted from OECD, 2020).

5.4 Suggestions for Further Research

On the brink of an unprecedented event, the pandemic implications are uncertain for the employees, employers and society. The impact of the economic stagnation kickstarted by the pandemic may further enforce remote working, which poses as a cost-saving measure for organisations and firms. The OECD (2020) calls for public policies and cooperation among social partners to ensure that effective, efficient, and welfare-improving working methods emerge during the pandemic and are maintained and further developed once physical distancing is over. Further research is needed to determine the most effective pathways to achieve the vision proposed by the OECD. Studies in management and leadership are necessary to determine the optimal approaches to maintaining motivation, collaboration and innovation in remote working

teams. Further research in economics is necessary to determine the implications of changes in the power and efficiency of labour forces, office space rental markets, widespread offshoring of talent and further digitalisation of consumption.

From the perspective of public policymaking, governments should encourage investments in remote workers' managerial and physical capacities to maximise the productivity and welfare gains inherent to the widespread adoption of telework. Equally, potential concerns over the workforces' wellbeing and constraints in innovation that may stem from excessive downscaling of physical workplaces should be addressed on the levels of public policymaking.

Hence, future research should focus on determining the exact implications of the remote pandemic work, including but not limited to health and wellbeing, productivity, efficiency, and job satisfaction. Having identified the most valuable and burdensome factors to the remote employees, further studies may focus on testing ways of leveraging the most health- and performance-enhancing components of remote working lifestyles while effectively eliminating the burdens.

Building on the groundwork of this research paper, the relations between remote work and gender should be further examined to eliminate the gender divide, as established in the academic literature and reinforced by the findings of this paper. This research paper observes that men and women may not comprehend the meaning of work-life balance in the same fashion. This perception gap, best observable in parenting, is rooted in the inherent, persisting gender divide and gender bias. Having reinforced the findings of Cannito and Scavarda (2020), this paper aligns with their conclusions. Namely, remote work does not equalise the work-life balance for men and women. Even an unprecedented extreme situation does not modify gender normative roles, putting higher pressure and workload on women, especially mothers.

Furthermore, the survey results prove increased mental health risks prevalent in pandemic remote workers. Recognising the recent findings by Wang (Y. et al. 2021), who has proven that vulnerable groups are at increased risk of mental health decline over the pandemic lockdown, the authors of this paper propose an expansion of the definition of vulnerable to include persons of young age who, as this paper proves, share significantly lower levels of motivation compared to more experienced workers.

5.5 Limitations

Several limitations deflate the broader implications of this study. The most significant ones will now be briefly explored. First of all, this paper was constructed under considerable time constraints, and hence, due to the limited time allowance, the authors reviewed a reduced volume of academic and non-academic literature. Due to the time and capacity constraints, data extraction methods yielded seven interviews and less than fifty survey responses. Relying solely on a fraction of the employee, contractor and intern bodies at the ITU may provide a representative sample to the extent that one cannot define with certainty. While a mixed-method approach was effectively employed in this research, ultimately, its scope was limited to the listed potential supervisors, the Human Resources Management Department and the intern body at the ITU. Larger sample pools for both means of the primary data extraction would enrich our study and ensure broader applicability to the entire organisation. Wider implications may also fall under scrutiny since the ITU may differ significantly in numerous aspects from other international organisations and agencies.

Sample selection bias is also possibly present in the study, further constraining its broader implications. Interviewees had been previously acquainted with the authors of this paper and may have altered their responses due to the prior connection. The lack of previous studies focusing on international organisations also posed a constraint, as this area remains relatively unexplored in academia. No relevant studies cantered around the ITU had previously been made publicly available, and hence, this paper had only a minimal groundwork specific to the case study of the ITU. Ultimately, making generalised statements about remote working, cybersecurity or other topics based on the results presented in this paper is discouraged until further studies affirm the conclusions reached here in a robust manner.

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7. Appendix

The appendix contains the exact copy of the survey questionnaire used to gather data

about attitudes about remote working and cybersecurity at the ITU. Following the questionnaire are the survey responses in form of raw data and basic graphs. Finally, the basic question sets used in the two kinds of semi-structured interviews are included below. The interview transcripts are available upon request.

1. Survey Questionnaire

Title: COVID-19, Remote work and Cybersecurity: Analyzing employee experience of remote working and cybersecurity at the ITU

Introduction: COVID-19 impacted the world of remote work, many organisations moved to remote working. Information communication technologies (ICTs) played a central role, with internet connection at home making the transition to remote work more smoothly and unproblematic for most of employers and employees. However, major challenges in terms of remote working and data security remain prevalent for employees around the world. To better understand the experiences of ITU employees who are currently working remotely or did so in the past during the pandemic lockdown, we are conducting a survey. We strive to gain a comprehensive, yet detailed knowledge of your experiences, and your time and opinions are valuable to us. Thank you very much for taking the time to deepen our understanding of these issues.

This survey will take around 8-10 mins to complete. Your answers will be kept strictly confidential. The anonymously gathered data will be used for academic purposes and will be shared with our working supervisors at the ITU and our academic committee.

Thank you for your time and contribution.

About us: We are a team of ITU interns and graduate students at the University of Geneva. We are currently finishing our Master's in Innovation, Human Development, and Sustainability, which puts a strong emphasis on the United Nations' Sustainable Development Goals (SDGs). If you have any questions or would like to provide us with more information, please email us at: jing.yang@itu.int & laura.linkeschova@itu.int.

Basic Information

1. Age*

☐ 18-24
☐ 25-34
☐ 25-34
☐ 35-44
☐ 45-54
☐ 55-64
☐ 65+

2.What is your gender? *

☐ Female
☐ Male
☐ I refuse to answer this question

3.Where do you live? *

☐ I currently live in Switzerland.
☐ I currently live in an EU country.
☐ I live in the Asia Pacific region.
☐ I live in the Americas region.
☐ I live in non-EU Europe or Northern Asia.
☐ I live in Africa.

4.Have you moved for work in the past 18 months? *

☐ Yes
☐ No

5.If you answered 'Yes', please tell us where you moved, and if your decision had anything to do with remote working, or cybersecurity:

Remote Work

6.What percentage of your working time do you spend working remotely? *

☐ 100%
☐ more than 50%
☐ about 50%
☐ between 20-50%
☐ less than 20%
☐ none

7.How would you rate your remote working experience so far? *

☐ Excellent
☐ Good
☐ Fair
☐ Not good
☐ Bad

8. What words would best sum up your remote working experience? *

9. On a scale of 1-6 how have you been feeling about working from home? *

☐ 1 = Miserable
☐ 2 = Very unsatisfied
☐ 3 = Unsatisfied
☐ 4 = Satisfied
☐ 5 = Very Satisfied
☐ 6 = Extremely satisfied

10. Would you say that you work extra hours or less hours since working remotely? *

- ☐ I work many extra hours per week
- ☐ I work a few extra hours per week.
- ☐ I work less hours per week.
- ☐ My work hours decreased significantly.
- ☐ I noticed no change in my worktime duration.
- ☐ Not applicable/I have not done remote work

11. What were some or the biggest benefits of remote work for you? *

_____

12. Please rate the importance of the following benefits of remote work based on which one you value the most: 1 = This benefit is the least important to me 6 = This benefit is the most important to me

	1	2	3	4	5	6
1.Ability to have a flexible schedule	☐	☐	☐	☐	☐	☐
2.Ability to spend time with family	☐	☐	☐	☐	☐	☐
3.Flexibility to work from anywhere	☐	☐	☐	☐	☐	☐
4.Improved multitasking	☐	☐	☐	☐	☐	☐
5.No need to commute	☐	☐	☐	☐	☐	☐
6.Other:	☐	☐	☐	☐	☐	☐

13. If you choose other in above question, please specify:

_____

14. Does your motivation, or drive at work, change when working remotely? *

- ☐ Yes, I am more motivated when working remotely.
- ☐ Yes, I am less motivated when working remotely.
- ☐ No, my motivation is just the same, regardless of where I work.

15. Have the indirect communication channels (e.g., via Teams, Zoom and Emails) impacted your work? *

- ☐ Yes, negatively. Online communication with my working team, and/or my supervisor don't support my work well enough.
- ☐ Yes, negatively. Online communication with my working team, and/or my supervisor don't support my work well enough.
- ☐ No, the online communication has not changed my work and motivation.

16. Have you ever encountered cyber security risks while working remotely? (e.g., phishing emails, suspicious phone calls, personal data breach, etc.) *

- ☐ Yes, I experienced this more than 10 times
- ☐ Yes, I experienced this less than 5 times
- ☐ Yes, I experienced this 5-10 times
- ☐ No, I have never experienced this

17. If yes, please describe your experience(s):

_____

18. When working remotely, do you worry about the security of your working data and private data? *

- ☐ Yes, I worry about this a lot.
- ☐ Yes, I worry occasionally.
- ☐ No, I never worry about this.

19. How would you grade the performance of the ITU in terms of ensuring your data security? *

- ☐ 1=Not sufficient at all
- ☐ 2=Insufficient
- ☐ 3=Somewhat sufficient
- ☐ 4=Sufficient
- ☐ 5=Very sufficient
- ☐ 6=Excellent

20. For you, what is most challenging about working remotely? *

- ☐ Collaboration and communication
- ☐ Loneliness
- ☐ Inability to stop working
- ☐ Remote work takes up your leisure time
- ☐ Facing distractions at home
- ☐ Time constraints caused by being in a different time zones
- ☐ Staying motivated
- ☐ Finding reliable Wi-Fi connection
- ☐ Other

21. If you choose other in above question, please specify:

22. What top 2 aspects of your life changed the most when working remotely? *

- ☐ Collaboration and communication at work
- ☐ Working location and set-up
- ☐ Working hours
- ☐ Mental health
- ☐ Productivity/Performance
- ☐ Childcare
- ☐ Cyber/Data security
- ☐ Privacy
- ☐ Other

23. If you choose other in above question, please specify:

24. How important are the following statements for you while working remotely? *

	Very important	Important	Not important	Not very important	No opinion
Collaborating with colleagues	☐	☐	☐	☐	☐
Communicating with colleagues	☐	☐	☐	☐	☐
Flexible working time	☐	☐	☐	☐	☐
Privacy	☐	☐	☐	☐	☐
Cyber and data security	☐	☐	☐	☐	☐
Health protection	☐	☐	☐	☐	☐
Productivity/Performance	☐	☐	☐	☐	☐
Efficiency	☐	☐	☐	☐	☐
Mental health	☐	☐	☐	☐	☐
Interaction and socialising with friends and family	☐	☐	☐	☐	☐
Save money	☐	☐	☐	☐	☐

25. When the pandemic is fully over, would you still like to work remotely? If yes, how much? *

- ☐ I would not want to work remotely
- ☐ 1 day per week
- ☐ Fully remotely
- ☐ 1-3 days per month
- ☐ 2-3 days per week
- ☐ No opinion

26. Would you like to work remotely, or at least partly remotely, for the rest of your career? *

☐ Yes

☐ No

2. Survey Results

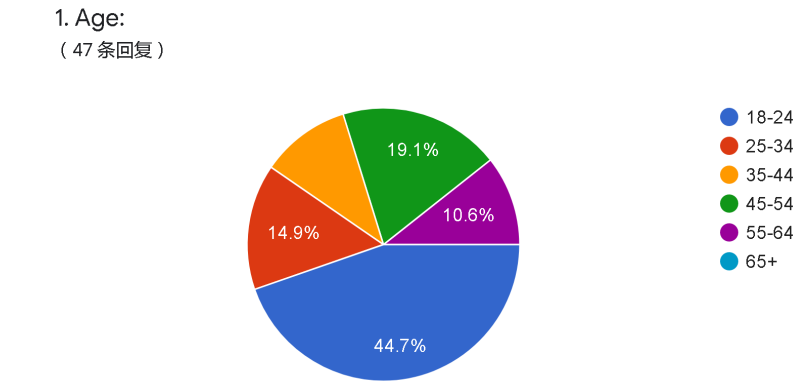

Figure 6: Respondents by Age

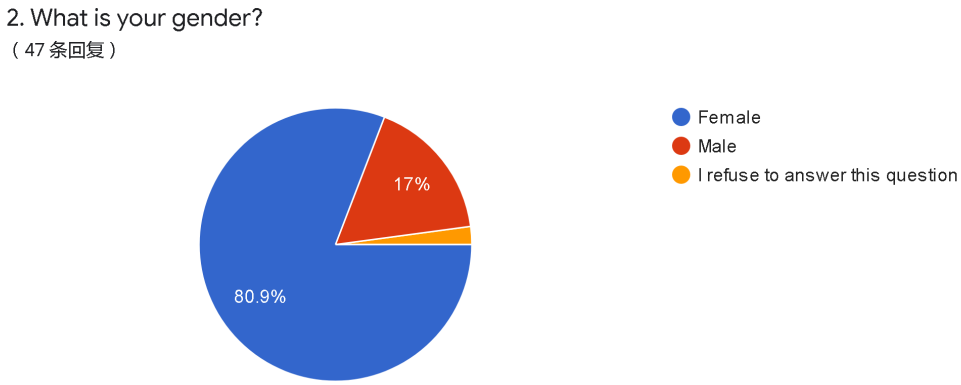

Figure 7: Respondents by Gender

3. Where do you live?
（47 条回复）

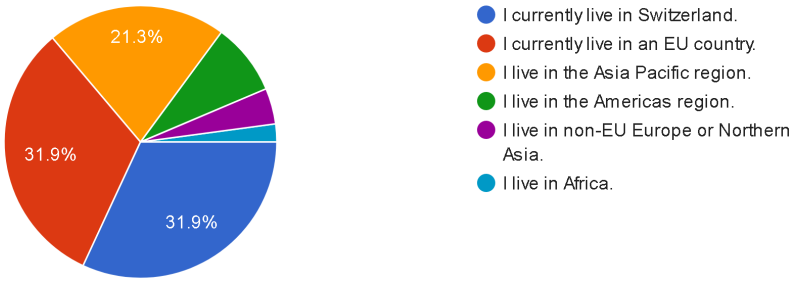

Figure 8: Respondents by Regions

4. Have you moved for work in the past 18 months?
（47 条回复）

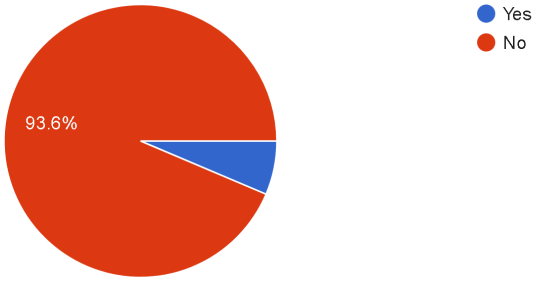

Figure 9: Respondents Moved for Work in the Past 18 months

5. If you answered 'Yes', please tell us where you moved, and if your decision had anything to do with remote working, or cybersecurity:

- I left my apartment in Belgium to go back to Switzerland.
- Did some remote working from another country during periods of quarantine linked to travel

6. What percentage of your working time do you spend working remotely?
（47 条回复）

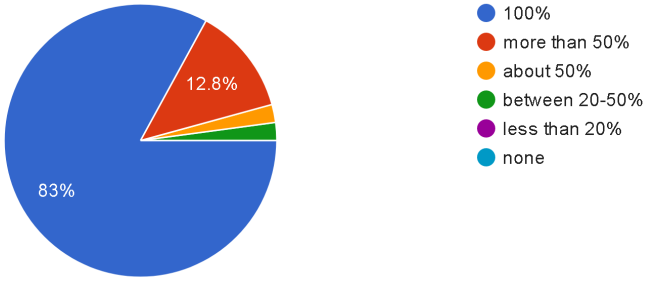

Figure 10: The Percentage of Time Spent Working Remotely

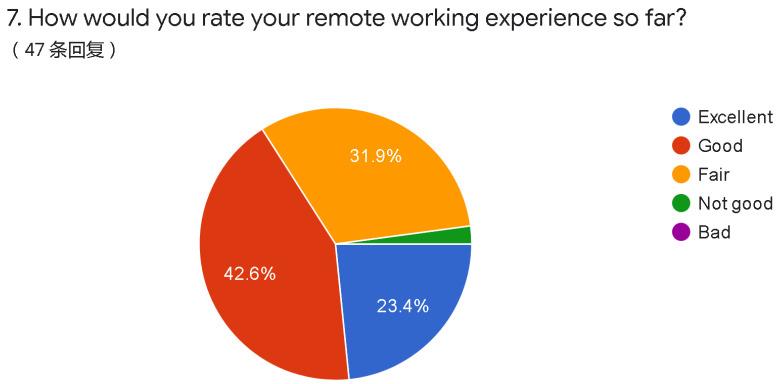

Figure 11: The Rating of Remote Working Experience

8. What words would best sum up your remote working experience?

- Time efficient
- isolation and lonely
- Flexibility
- The lack of real interaction with my colleagues
- Complicated, overwhelming, lack of human connection
- Tiring
- Sufficient
- Lacks in-person interaction
- Lack of socialization
- Lack of socialization
- monotonous, antisocial, lonely
- Even more efficient
- New vision of job
- A dream come true
- efficiency and less stress due to the traffic issues
- Productivity increase
- Autonomy, flexibility, efficiency.
- Efficient
- Flexible
- interesting
- overworked
- I love it. I have been so much more productive not having to commute, go out to get lunch, run between physical meetings. Sometimes, I have even been able to do two meetings at once - something that is impossible when working in

person. While it can be harder to draw a line between work and home, it has been easier to “have it all” in terms of meeting work responsibilities and parental responsibilities.

- productive, quiet, relief (at no commuting)
- Isolating, frustrating
- More flexibility in terms of time management; less social interactions with colleagues
- challenging, tiring, innovative, perspective changing
- No social interaction, no good tools, too much meetings
- Not motivating
- Less stressful, Autonomous, Responsible
- Comfortable but lonely
- Flexible but not very engaging.
- Overwhelming, systematized, routine
- flexibility (F)
- For someone who has difficulty with social skills and oral communication, this is an excellent way to work.
- It's not bad. Although, I miss communicating and collaborating in person with my supervisor and there are many distractions at home. Moreover, some times you may feel lonely and hence less productive but you can face these problems working from different places, not only your home. Definitely, I see the remote work as a temporally solution with some advantages but after this health situation improve, I would love to go back to the office.
- mostly for classes so far
- Less communication
- Perfect mix of working efficiently and balancing life
- I like the work I do, but I do not like working remotely. Remote work - distracted, isolated, stressed, demotivated, tired
- Comfortable. Practical.
- It really helps having a better balance between the professional and personal life. However, we loose to many contacts and social life by working 100% remotely.
- convenient flat
- free
- exhausted
- no comment
- a little bit boring
- good

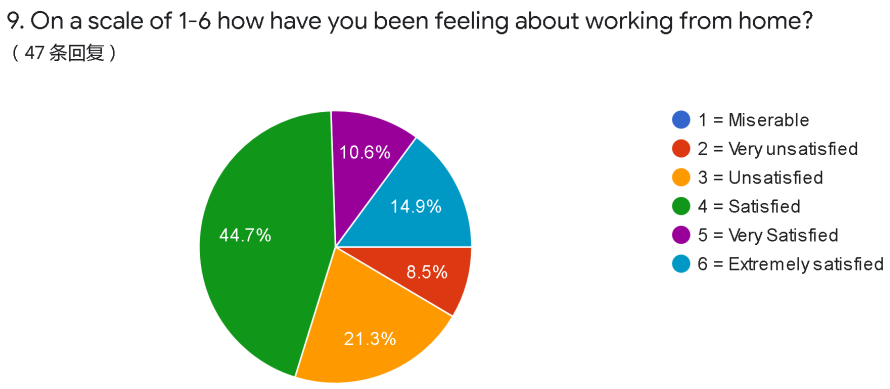

Figure 12: The feeling of Working from Home

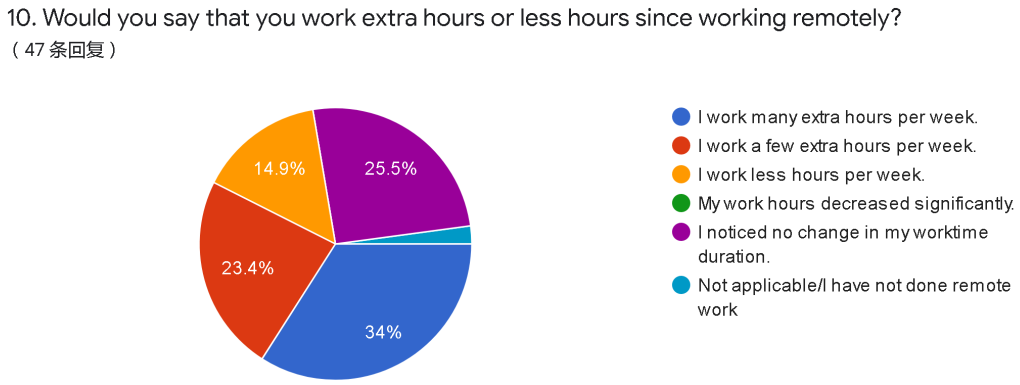

Figure 13: Work Extra Hours or Less Hours Since Working Remotely

11. What were some or the biggest benefits of remote work for you?

- Less money spent on car fuel and less travel time spent in General
- flexible
- flexible time more freedom when and where to work
- No wasting time on commuting
- Multitasking and ability to travel
- Comfort of my home, more flexibility
- The emissions we can avoid by not using transportation
- The flexibility of my work schedule
- saving time
- Opportunity to organize many online events which would not be possible if the work was on-site
- not have to commute, wake up later in the morning, no need to get dressed formally all days, more flexibility in work hours throughout the week.
- No commuting / car traffic

- Life stressless
- Time saving in all aspects of my daily life (commute, house chores, shopping, family).
- Balance between work and private life / less stress due to the traffic / efficiency of meetings which are more productive
- Flexibility
- The freedom. Time to exercise. Time for webinars and continuous learning initiatives.
- Work & Life Balance
- Not having to commute.
- Possibility to streamline precedent activities not essential
- Manage kids when they were in lockdown or when they get sick.
- More autonomy making it easier to meet work and parental responsibilities. Loved being able to see more of my children. Loved being able to use the time usually spent commuting and traveling between meetings to get more work done. Loved being able to even do two meetings at once sometimes. I have been way more productive and actually fear that returning to the office will reduce my productivity.
- no commuting (personal and environmental benefits); flexibility
- not having to commute
- Time savings (not having to travel to the office)
- More time with family, less commuting time, saving money through eating at home
- No driving, no connection problems (no traffic jam)
- I have more time for myself
- Less pressure, more flexible schedule, ability to assist to different meetings at any time
- Less money expenses
- Flexibility and the financial benefits of not living in Geneva while not being paid.
- Better use of spare time and increased productivity at non-work related tasks due to lack of commute; flexibility
- ability to do all activities (study, classes, work, etc.)
- Communication by email
- The biggest benefits are: The possibility to spend more time with my family and friends, more flexible schedule (although it could evolve in working extra hours), it's easier to face meetings in different time zones.
- no commute, home comfort

- Efficiency

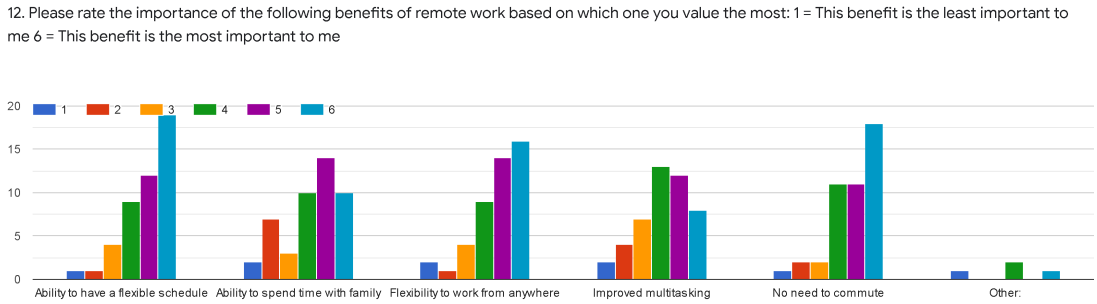

Figure 14: The Importance of the Benefits of Remote Work

13. If you choose other in above question, please specify:

- save money
- not having to dress nicely all the time

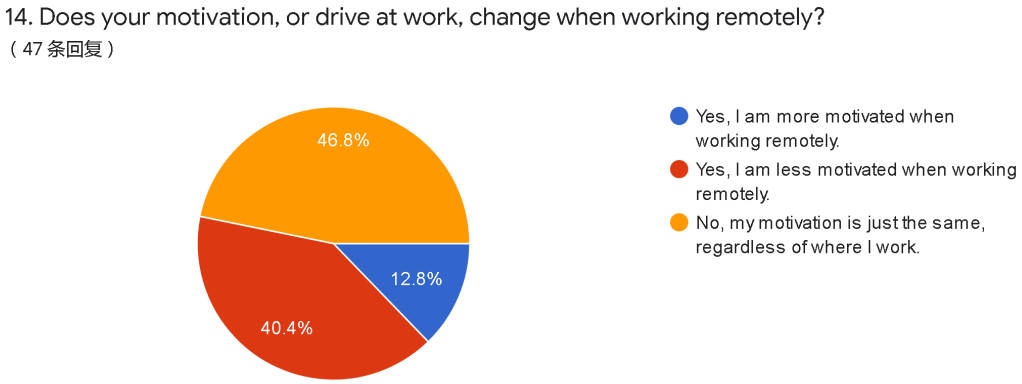

Figure 15: Motivation or Drive at Work Change when Working Remotely

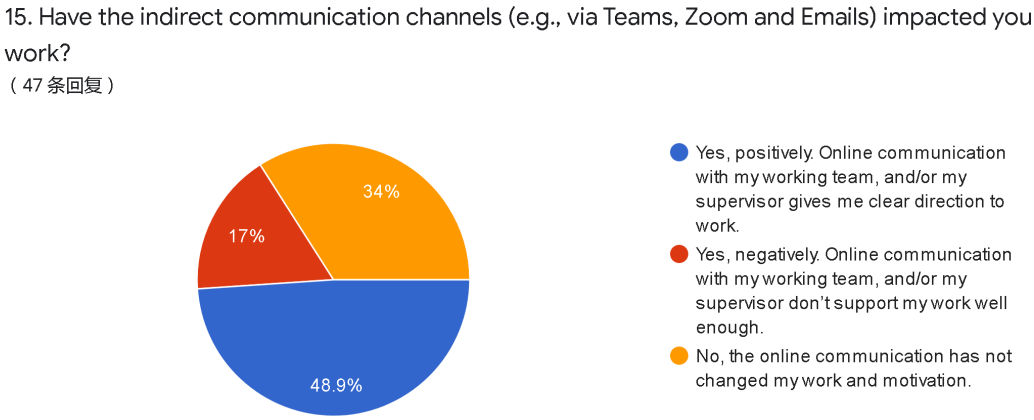

Figure 16: The impact of Indirect Communication Channels

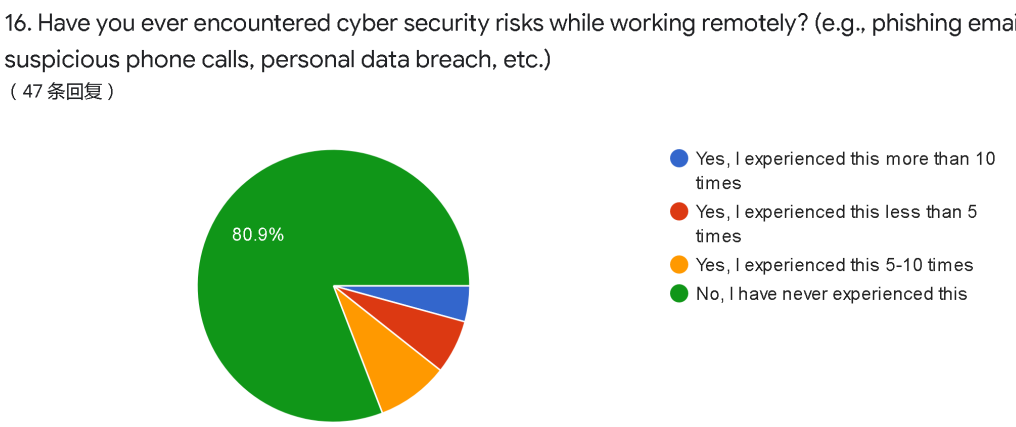

Figure 17: The Times of Cybersecurity Risks while Working Remotely

17. If yes, please describe your experience(s):

- phishing emails
- Phishing e-mails asking me to enter my passwords
- I have experienced two scam emails so far.
- Perhaps slightly more than pre-Covid there are phishing emails purporting to be from legitimate businesses.
- spam and phishing emails
- Mostly phising emails
- somebody unknown sent me email

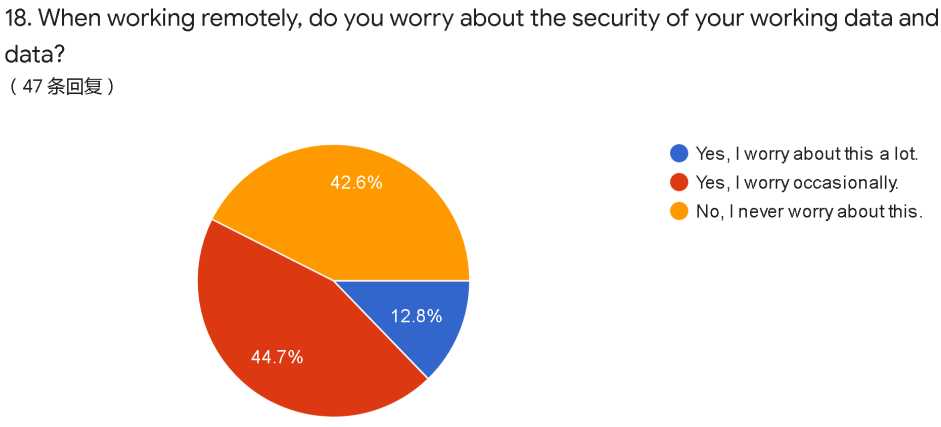

Figure 18: The Security of Working and Private Data

19. How would you grade the performance of the ITU in terms of ensuring your data security?
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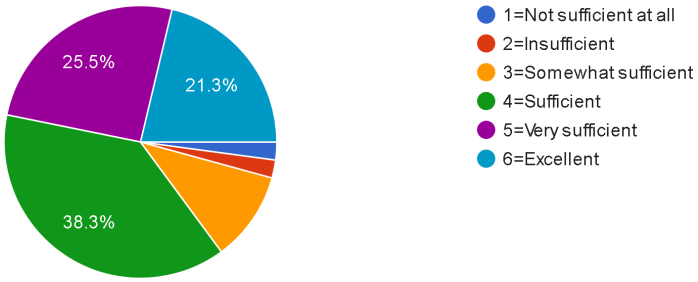

Figure 19: The Performance of ITU in terms of Ensuring Data Security

20. For you, what is most challenging about working remotely?
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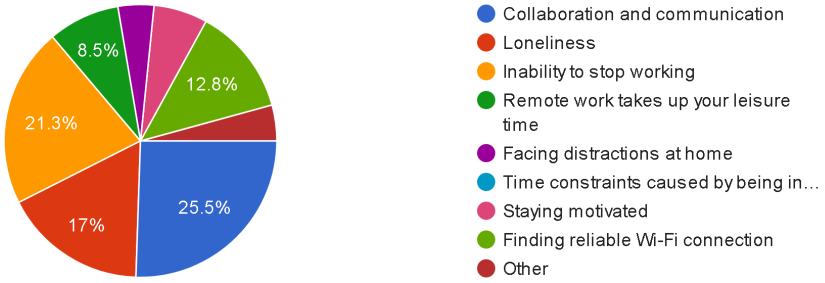

Figure 20: The Most Challenging About Remote Work

21. If you choose other in above question, please specify:

- The sense of belonging to the company/organisation
- a mix of elements: staying motivated, loneliness, collaboration & communication, different time zones.

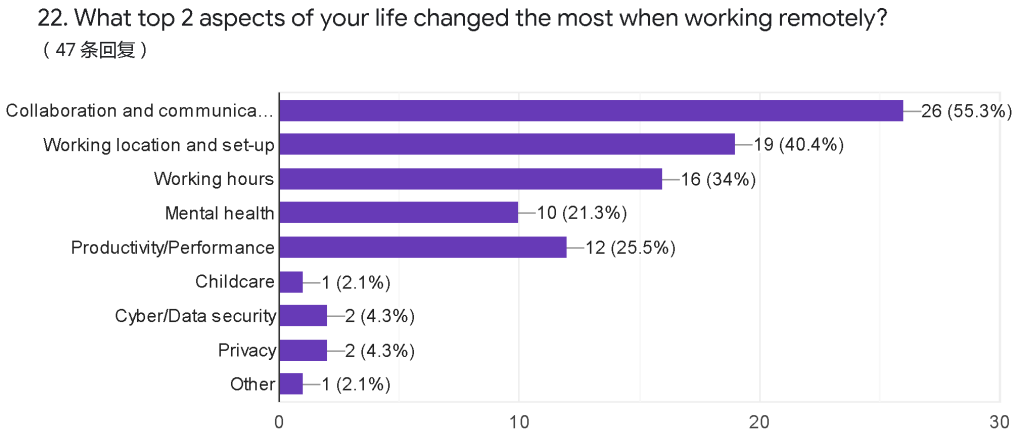

Figure 21: The Top 2 Aspects of Life Changed the Most When Working Remotely

23. If you choose other in above question, please specify:

- less health problems such a backpain

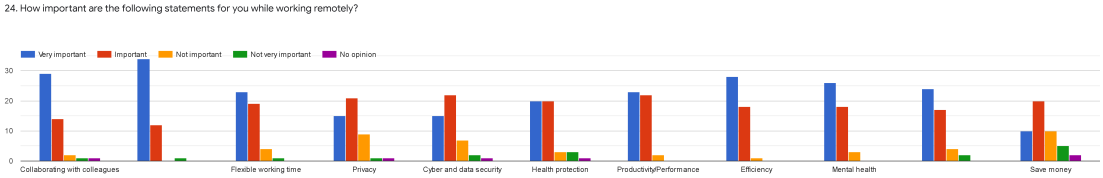

Figure 22: The Importance of the Statements

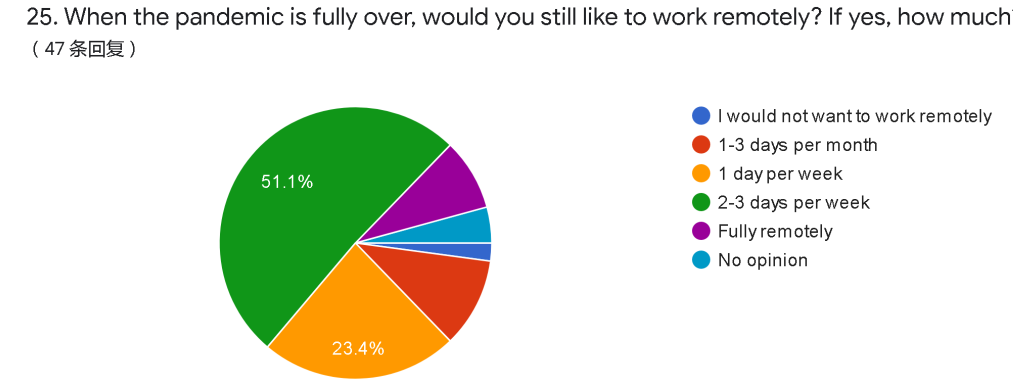

Figure 23: Work Preference After the Pandemic

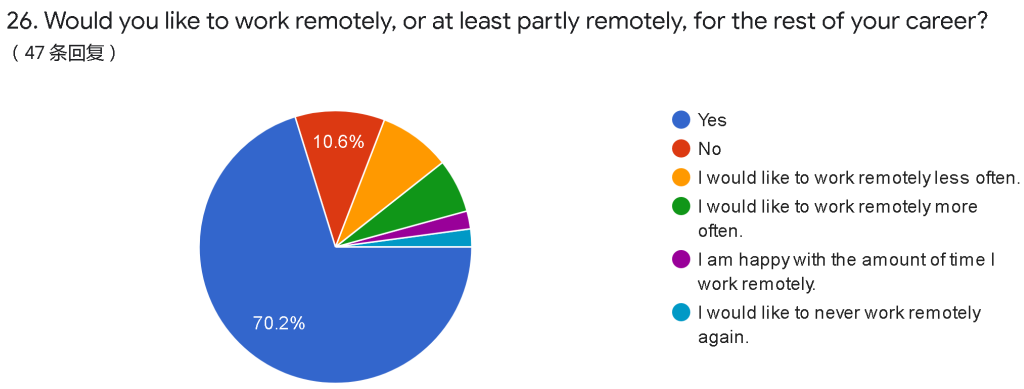

Figure 24: Work Preference for the Rest of Career

3. Semi-Structured Interview Question Sets:

a) Interview Questions for Employees, Contractors and Interns: Remote Work and Cybersecurity Experiences:

1. Hi, can you please tell us a bit about yourself, and your position at the ITU?
2. Can you please share with us if you have ever worked remotely, for the ITU, and if so, for how long?
3. Has your work has been fully remote, or did you ever partially return to the office?

a. Do you work from home or another place?

b. How far away you are located from your work?

c. Are there aspects of your work you had to give up since going remote, things you can't do remotely?

4. How was your remote experience so far? How would you sum it up?
5. What kind of support (material and financial) have your employer provided?
6. Do you think that was enough of support, or do you wish you were more supported in your remote work? If so, in what aspects or areas?
7. Have your working hours changed since working remotely? Would you say you work extra hours, or less hours since working remotely?
8. Has your motivation to work changed at all since working remotely?
9. What areas of your life, besides the work itself were impacted by your remote working?
10. In your opinion, have you benefited from remote work? If so, in what ways?
11. What were the biggest challenges around remote work for you, if there were any?
12. Have you encountered any cybersecurity risks while working remotely? If yes, could you tell us your experience?
13. Do you feel like your work and private data are secured while working remotely,

when you use your private laptop and phone to do work?

14. Do you worry about the online surveillance from your employer while you work remotely?
15. When the pandemic is over, would you still like to work remotely?
16. What organisations should do to make remote work more effective, resilient and secure for its employees?

b) Question Set for the Cybersecurity Department Experts at the ITU:

1. Can you please describe to us your department or your working team to us? What do you mainly work on, how do you work and how big is your team?
2. How does the ITU ensure the security of it's employees, and its data?
3. What are the most common cybersecurity challenges and threats you come across at the ITU?
4. Have you noticed any change in the cyber threats since the ITU went remote?
5. Could you share with us how you handled them, or managed to solve them?
6. Since COVID-19, if you could share with us have the cyberattacks increased or decreased? why remote security risks increased or decreased?
7. Could you please share with us what kind of cybersecurity awareness training provided for all the employees in the ITU?
8. What would you say are the biggest vulnerabilities of the ITU's cyber-protection mechanisms that are in place?
9. What would be your recommendation for a successful cybersecurity strategy for organisations which have remote employees? any suggestions on remote cybersecurity strategy?
10. What would you recommend to the employees of the ITU and other organisations to ensure their cybersecurity when working remotely?
11. How the dynamics of cybersecurity have been changed since the pandemic in the ITU?
12. What the organisation or employers need to do during covid-19 when employees are working remotely? How they can better protect their employees?
13. How employer and employee need to rethink about cybersecurity and improve cybersecurity of remote work?