Resilience by Digital – How Sociotechnical Helped Maintaining Operational and Recovery

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Abstract. Global health related disasters affect humans in several areas of life. COVID-19 pandemic in 2020 had great impact on people’s everyday life, livelihood and health. It had huge impact on global economy as well as business dynamics. However, contemporary post-industrial society is more resilient due to digitalisation, turning operations spatially dispersed and even asynchronic. Thereby, most operations were maintained at least on satisfactory level. Taking the resilience to wider extension the burden on health care system was eased by quarantines and people still maintained most of their social contact by sociotechnical means. The aim of this paper is to address the topic of resilience by current global crisis, digital coping strategies and evident aftermath.

Keywords: Sociotechnical · Digital environments · Resilience

1 Introduction

Very soon after the COVID-19 outbreak in China and South East Asia local authorities took heavy measures in order to limit the extent and the speed of spreading the virus. The effect to societies was remarkable as for example mainland China was closed in February. Neighbouring nations had similar actions and by mid-March the situation was somewhat under control. As COVID-19 travelled along, other countries started to make similar actions to maintain control as well as ease the burden on health care system. In the beginning of March to mid-March there was an almost global shutdown, i.e. local curfews, traveling restrictions, social distancing executed, public venues and schools closed to mention the beginning. By the that time public discussion on the situation was about the dawn of global depression and disruption of civilisation, or at least that of the global economy. However, soon there was significant evidence of adaptation to new order as well as evidence of resilience. The aim of this paper is to discuss how resilience is built on sociotechnical modus operandi as well as on digital means on communication, interaction and working.

The history of mankind is history of disasters, epidemic, diseases, and conflicts. If natural disasters and conflicts are ruled out as local emergencies epidemic, or pandemic, has extensive effect on everyday life of people as well as economic structure and society. As long as there has been oral or written history there has been stories of how pandemic causes disruption in society. To reflect the current situation to previous outbreaks plague and in mid-17th century and Spanish influenza in early 20th century. In these two examples there was slow but wide outbreak due to lack of sufficient...
communications structure, limited mobility of people yet there was no way to bail out of physical contact. There are lot of literature on people during the plague, yet fiction but mostly historically accurate. The case of Spanish flu is different as science had taken long leaps and it was also researched widely among several disciplines. The question still remains what makes 21st century society more resilient that societies in 17th or 20th century. It was evident that 17th century as described e.g. in Decameron or Plague Year. According to the author of Plague Year Daniel Defoe [1] in mid-17th century there was no mass media, but news spread via hearsay or rumours and even administrative bodies made their decisions according to them. Also, scientific knowledge could not explain the sickness or epidemic but there were only assumptions on the mechanisms or the dynamics. As the knowledge was limited there was no true understanding how to stop the epidemic. Moreover, due to the nature of economic system people could not avoid contact if they needed to fulfil their needs for living. However, even this pandemic was slowed down by closing cities or setting people in quarantine, but it had massive effect on societies and economy.

Even in the 20th century as the Spanish influenza harvested population lack of possibilities to avoid physical contact caused large number of deaths. There are examples how it spread globally because people returning home from the World War I and other reasons for mobility. One reason for effective outbreak was established communications as virus reached even the remote parts of the globe by people working in postal and other services. Also, the extent of the outbreak hit by surprise as there was no means for quick communication as news travelled still slowly. Spanish influenza was fought same manner as the plague even recognizing the possible effect on development. As the several waves of the pandemic were over the aftermath was remarkable. Europe and other parts of the world were still recovering the great war and people had to deal with pandemic slowing it.

In January 2020 the closing societies started in China and quickly it spread through the South-East Asia and having its current peak in mid-March when most of the countries had restriction on their citizens as well as travelling restrictions. The aim was to slow the outbreak by quarantines, having the cases needing medical aid on sustainable level as well as gaining time for preparing better. In mid-March the digital communication and sociotechnical work environments started to have effect of the pandemic. Global information systems especially mass-media, social media and similar sources effectively delivered people the news on the status, information on desired behaviour, how to avoid the COVID-19, and most important it was possible to minimize social contacts in real life. This, at least to some extent, bought time and slowed the outbreak. There are several examples on how societies kept on going based on sociotechnical environments.

In this paper digital resilience is approached by perspective of the concept of resilience as a social and individual attribute. Moreover, it is pinned to sociotechnical environments, i.e. how resilience is facilitated and enhanced by digital. As proposed above the resilience is not caused by sociotechnical, yet significantly boosted by it. Resilience is human attribute, yet it is materialised in novel ways of utilising sociotechnical environments as well as human ability to adapt to new situations and creatively use the infrastructure and tools available. As working proposals this paper addresses resilience by sociotechnical as operational resilience, i.e. ability to adapt
quickly to new outlining requirements, and organisational resilience, i.e. organisational capability to use resources and adapt and even excel in unexpected change.

2 Resilience by Digital

Different operation environments, especially ecological and economic environments of business activity are becoming more turbulent, operation modes or procedures to enable sustainability and support recovery gain importance. Especially in times of crisis organizations and individual employees need more than ever the capacities of acting on both unexpected threats and emerging opportunities on time as stated in Tsiapa et al. [2]. In these circumstances, the building of resilience into the socio-economic systems of different size is a core capacity. Organisational resilience is how those adapt to and drive emerging technologies that disrupt the status quo in areas of operating as well as they adapt.

Resilience is originally concept of ecology where it refers capability of individual, group or even the system, but its application has been expanded into social and behavioural sciences [3]. Recently, as logical extension the concept is applied in economics and organisation studies as stated in Sabahi et al. [4], Haase et al. [5] or Herbane [6]. In general, resilience denotes the capacity for continuous reconstruction [7]. Personal resilience refers to the capacity for maintaining or regaining psychological wellbeing in the face of challenge [8]. Organizational resilience is concerned with how organizations structure their activities in order to anticipate and circumvent threats and opportunities to their continued existence. As stated by Hillman [9] resilience is widely adapted, yet sometimes shallowly interpreted. Major characteristics of resilient organizations include (i) sensitivity to changes in the organization's operating environment; (ii) a flexible, adaptive decision-making process; (iii) a willingness to openly confront difficult issues such as power and control; and (iv) an organizational culture that is supportive of change [10, 11]. The organisational resilience is the capability to react, adapt and act according to internal or external signals or pressure [12].

The development of resilient organizations is not possible without reorganizing of work practices, reengineering operation modes and utilising adaptiveness or people within organisation. This might even require executing unconventional acts. This demand manifests itself in redesigning the contractual and accountability structures between individuals, organizations and diverse clusters of business actors. As stated in Burnard et al. [13] changing organisational mode enhances capability to adapt. Outsourcing, cloudsourcing, decentralization, individual contracting, job crafting, company-internal markets, and hyperspecialization are concrete examples of the ways in which companies have recently attempted to meet such requirements [14–17]. Since work task performance has increasingly become dependent on the seeking, using and sharing of information with means of information and communication technologies, a major part of employees of our time can be defined as knowledge workers and they mostly can work in sociotechnical environments. Therefore, the demands for reorganizing work practices mainly focus on the (re)organizing of knowledge related practices. Such practices, i.e. knowledge practices can be defined as a set of activities dealing with information seeking, acquisition, use and sharing, as well as
environmental scanning and personal information management [18, 19]. A major characteristic of such knowledge practices should be that they are proactive, i.e., anticipatory, self-initiated, and future-oriented, pacing emphasis on agile action that introduces constructive changes. The above demands are also reflected in the ways in which resilient organizations organize knowledge management serving to the ends internal and external intelligence. For example, weak signal analysis has become an integral part of knowledge management [20]. Such change in operation mode implicitly promotes resilience as agility increases.

As discussed above, resilience is a multilevel construct that has been investigated since the 1970s in diverse fields such as ecology and psychology [21]. Resilience at work is a positive developmental trajectory characterized by demonstrated competence in the face of, and professional growth after, experiences of adversity in the workplace [22]. Researchers have addressed a variety of issues related to organizational resilience [11] personal resilience and social resilience [23]. In this context, there is discussion about multitasking, availability management, awareness deficit, and temporal fragmentation of work task performance as stated e.g. [24]. In addition, the studies of job design have addressed issues of process reengineering [25]. The requirements for developing resilient organizations have also been reflected in the concurrent renaissance in studies of strategic planning, within the special context of strategic flexibility, agility emphasis and environmental scanning as an integral part of knowledge management [20, 26]. Especially in production engineering and industrial engineering are the domain on resilience, but resilience by digital is only marginal issue. For example, the studies of personal information management have largely neglected the issues of organizing knowledge practices for resilience [18, 27].

Digitalization of work enables better use of knowledge due to enhanced access, management and dissemination [28, 29]. It is expected to result in enhanced productivity [20, 30–34]. Sociotechnical work environments provide sufficient infrastructure for continuing operations and also provide suitable means for internal and external collaboration [35]. Digitalisation affects as well on efficiency. The great expectations are not easily fulfilled regarding digitalization on the employee’s viewpoint. In fact, the effects of digitalization seem to be twofold: By bringing about ever more information systems, applications, user interfaces and operating systems to enhance productivity and efficiency of work, digitalization has led to increasing information load, hectic pace of work, multitasking, and interruptions [36]. Studies confirm that users can experience ICT as demanding and stressful [37–39]. Another rather negative result of digitalization is potential weakening of social ties and reducing social inclusion: by increased use of ICT people tend to have less face-to-face contacts [39]. In work context this may lead to weakening sense of community, and consequently issues with trust and motivation and during the crisis this might be non-optimal. There might also occur consequences of inadequate information systems, such as decreased job satisfaction and engagement with the organization [40]. Technical issues are evident hindrance of working, yet those can also lead to negative attitudes of working and therefore build communities of non-practice as negation of well-functioning hybrid organisation. Those can negatively affect work quality and productivity as stated in Franssila et al. [36]. However, the perverse use of ICT, I self-inflicted interruptions, excess communication and always on are side-effects of digitalisation and resilient individual can cope and by that even
leverage organisational resilience especially when global crisis requires quick and extensive action.

3 Impact of COVID-19 and Digital Resilience

Globally the educational system in spring 2020 was in crisis as schools were closed and teachers had to change their modus operandi almost for one night. For example, in Finland grades from the 4th were totally closed and most preschool and on the grades 1st to 3rd stayed also home if possible. In Finland the situation was somewhat easy as there is high device penetration, people are digitally literate, and schools have suitable digital infrastructure and in general people were willing to adapt to the new situation. Tuition was provided on mixed platforms and it was managed mostly by the teachers. Agile action was proof of concept for resilience in semi-closed society. This kind of operational resilience occurred globally since need to keep children in school called for novel applications of technology and ways to work.

Operational ability of working organisation also relied extensively on utilising sociotechnical environments. As soon as pandemic was spreading all organisations that could closed their offices and staff took their laptops and smart phones and stayed home. The initial idea is to maintain operations by having people healthy, but as soon as officials pointed out the need social distancing the measures by organisations had dual impact. The need to maintain operations that are not production related yielded to novel ways of organising activities. In most countries forced or voluntary social distancing caused novel ways of working and utilisation of spatial dispersion. The effect will be permanent, and digitalisation of work takes the giant leap forward. There will be collateral effect too as COVID-19 will change work related traveling habits and time-space management. This is an example of organisational resilience, but not attribute of organisation per se yet sum of adaptiveness of personnel and sufficient infrastructure.

The mental confidence frame also explains why certain people in leadership positions are not acting as leaders. Creating strategies for an uncertain future requires a playful mind able to entertain multiple scenarios and hypotheses, and then ground those hypotheses through facts and organizational culture into strategies and action plans [41, 42]. This, however, carries the risk of individual hubris or groupthink: if the works are not grounded in the facts, the manager will enter the realm of magical thinking where his decisions “will work, because they are his decisions”, and the organization is forced to carry out the ideas, either due to trust in the manager’s skill, fear of being fired, or a combination thereof [43].

This points to the fact that the digital resilience of an organization, and on a wider scale, that of a society, is reliant on three factors: 1) a technological readiness, which has at least been experimented with, if not taken into everyday practice before a crisis takes place, 2) employers’ trust of their work force and middle managers, and 3) top management’s understanding and acceptance of the actual facts of the situation, and their willingness to let that acceptance trickle down in the organization as support for resilient, digital practices, and as a clear statement of trust towards the employees’ competence and diligence. Moreover, resilience requires taking the critical steps without hesitation. Future textbooks will be full of examples from spring 2020 about
how societies, organisations, and even individuals dismantled their operating models in order to maintain their functions, business or livelihood. Of course, the past months are example of the opposite, negations of resilience and how non-resilient have suffered greatly due to lack capability to adapt.

4 Concluding Remarks

The aim of this paper is to address the topic of resilience by current global crisis, digital coping strategies and evident aftermath. Interesting topic in the current context. The paper presents as introduction to the problem identified in summer 2020. In this paper digital resilience is a concept of resilient behaviour as a social and individual attribute. Social refers group action to maintain operational during the crisis. It could be seen as an implicit contract of joint endeavour to stay alive. As individual attribute it mostly refers to flexibility and grit. Flexibility is about adjusting to new ways of operating, adapting and accepting new tools, but it is also curious mind of discovering new. Grit is state of mind not to be afraid of changes and accepting unexpectable. Digital resilience is pinned to sociotechnical environments, i.e. how resilience is facilitated and enhanced by platforms, tools, media, social media, digital convention, and digital practices. As proposed above the resilience is not caused by sociotechnical, yet it is significantly boosted by it. Resilience is human attribute, yet it is materialised in novel ways of utilising sociotechnical environments as well as human ability to adapt to new situations and creatively use the infrastructure and tools available. Put into action the resilience by sociotechnical is operational resilience as human ability to adapt quickly to new outlining requirements, and organisational resilience as organisational capability to use resources and adapt and even excel in unexpected change.

The last six months has been dramatic for all knowledge work, as all operations that could have been spatially dispersed have been spatially dispersed. Requirement for social distancing has challenged activities. Evidently routine work and most urgent issues have been saved, but peripheral activities and risky endeavour have been suffering. Social contacts with peers and clientele are minimised and only on need to basis. Social distancing blocks serendipity and kills creativity. People play it safe and new ideas are not nurtures during the quest for survival, but prolonged pandemic also calls for new vistas. Building capacity for renewal, creativity and innovation would be token of even higher order of resilience.

Ability to shift working paradigm will be the cornerstone of resilience in work organisations. It is dependent on cultural and organisational determinants. Resilience for example in Nordic countries was supported by low organisations and lesser hierarchy. Trust on personnel and minimal amount of micromanagement forecast success on paradigm shift. Cultural aspects are hard to scrutinize, but some initial evidence on work ethos a key factor is already discussed yet it needs more work.

This paper has discussed the resilience as concept in context of maintaining operational ability and staying in business. Resilience has more connotations, yet those need to be elaborated further as time goes by. This paper presents the notions of resilience during the first months of pandemic and further work is needed to see the different perspectives of resilience as organisational or individual attribute as well as
capability promoted by sociotechnical. This is a study with a introduction and a identification of the problem. The state of the art regarding the concept of resilience and its definitions and particularities is evolving and by end of year 2020 or 2021 the whole concept of resilience is redefined because the people are resilient.

Acknowledgements. This paper has received funding from the European Union’s Horizon 2020 programme H2020-WIDESPREAD-2018–2020 CSA Scaling Up Educational Innovations in Schools — SEIS under grant agreement No 856954. Dr. Heljä Franssila and Professor Reijo Savolainen are acknowledged for their elaboration on the concept of resilience.

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