5ᵗʰ European Technology Assessment Conference in Karlsruhe, Germany 7-22

Session: The COVID-19 pandemic boosting digital technologies

Session description and concept

The section largely refers to the research project 4Tech (Development of selected technologies during and after COVID-19 crisis) under the financial support of the Technology Agency of the Czech Republic, contract No. TL 040000390. The project 4Tech focusing on four technologies: digitalization and cloud technology, additive production, telemedicine and digital (distant) forms of education. It also reflects the Czech national project called STRATIN+ and it´s Module 5 conceptual and methodological framing of Technology Assessment.

The main objective of the session is to capture and discuss the impulses for spread and adoption of the selected technologies and adoption induced by the COVID-19 crisis with current and future impacts mainly on the rural communities.

The underlying research has the following specific objectives:

1) _To map extent and forms of the 4 technologies application in the COVID-19 pandemic worldwide with a particular emphasis on the Czech Republic_
2) _To analyse fulfilment of needs in the respective technical areas and to identify impacts on multi-actors´ collaboration, socio-technical system and society._
3) _To explore societal changes of values, attitudes, expectations and concerns referring to the use of the selected   technologies during the COVID-19 crisis._
4) _To conduct foresight study on technology development in the respective areas with the horizon 2040._

There will be a short introduction to the section, 3 thematic presentations and considerable space for structured discussion. Two of the presentations will refer to the mentioned Czech project. We invited colleagues from Austria (ITA) and from Lithuania (KEF).

1. Introduction to the session (<u>Lenka Hebakova</u>, Tomas Ratinger, TC)

The specific character of the session will be explained in the introduction: on one hand the session informs on the current analyses of the adoption of digital (communication) technologies under the specific pressure of the Covid 19 pandemic, on the other hand, the session should provide some input in the debate on "if the adoption has passed through a certain threshold that these technologies forever change our way of using services as education, medical service or public administration". In a structured session discussion, we will collect opinions of participants which later will be utilized in the TA part of the Czech projects.

2. Lessons learned from the pandemic period - a perspective of the service providers

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In this presentation we introduce the conceptual framework of the project 4Tech which follows the analytical concept proposed by Geels (Geels, 2002, Geels, 2004). In Geels view, innovations start in small niches which depart from the dominating socio-technical regimes, gradually attract other producers and consumers and finally develop in a new socio-technical regime. This process is embedded in broader institutional environment - socio-technical landscape. The diffusion of the novel technology is only possible if there is a "window of opportunity" i.e. favourable conditions in the corresponding regimes and socio-technical landscape.

In the next step, we present data and opinions of experts and stakeholders on the extent of the diffusion of the selected technologies as well as on barriers, which either had to be overcome, or which hindered the adoption, particularly in relation to certain groups of firms or citizens or to the geographical dimension. The results of interviews are complemented by outcomes from the review of scientific literature. The findings are structured in five groups:

i) *technical equipment and infrastructure relating to both the providers of the services as well as consumers, showing that firms and households invested a lot in the equipment and upgrade of the internet connection, particularly in the first and second wave of the Covid 19 pandemic;*

ii) *learning process and changes of attitudes towards the new technologies: in many cases the actors had to switch to digital technologies suddenly, learning by doing was the main way for improving their digital skills. Later and gradually, has started the more adequate learning process which has involved also need for reconsidering the way (principles) of providing and using service, accepting a new distribution of the roles, including new actors etc.*

iii) *overcome, supressed and persisting institutional barriers as legal requirements, technical norms, civil rights, etc.. the emergency situation allowed to supress or overlook some standards and rules in order to make the new (temporal) system functioning; however, if these issues are not solved the pre-pandemic institutional settings will push the novel technologies back.*

iv) *contribution to mitigating the disadvantages of rural areas. In particular it has become clear, that high cost and low market potential associated with low population density and large distance limit the availability of digital technology based services. Thus, digital technologies have improved substantially the integration of the intermediate rural areas, while the remote ones have benefited only moderately.*

v) *digital divide amplifying the exclusion of economically weak, old and following the previous point living in remote areas.*

Specific attention is given to the case of additive production (distributed production) which played important role in the first phase of the Covid 19 pandemic.

3. Changing attitudes towards digital technologies: effect of the Covid 19 pandemic

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This presentation follows the first one on the 4Tech project outcomes and aims at changes of behaviour and attitudes of final customers – those (households) who consume the services using the four technologies: digitation with e-commerce, e-government, e-culture and homework; telemedicine, distant (online) education; and finally, service of the additive production. The latter is however addressed rather marginally (the reason will be flow from the previous presentation).

To learn about consumers-households digital skill, perception of benefits and costs of the new technologies, and changing values we conducted a survey. The survey covered different types of areas in the urban-rural continuum, which helped us understand geographically differentiated rate of acceptance of the technologies. The questionnaire also attempted to capture changing role of consumers (households) in services – in many respect their higher share of participation and responsibility.

4. Chances and limits of distance learning from a pedagogical and social perspective

(Mahshid Satoudeh, ITA Vienna)

The dynamics and scope of digitalization and distance learning has been greatly changed by the COVID-19 pandemic. Emergency Remote Teaching (ERT) has influenced the quality of pedagogics and services (The report of the European University Association, April 2020) has noticed the need for societal impact assessment of ERT for both formal and informal education. Factors such as Infrastructure for distance learning, quality and maturity of AI supported learning and technical and non-technical skills of students and professors intertwine with development of guidelines and clear rules to protect mental health of users and achieve (new) pedagogic targets. This presentation will address digitalisation of education and distance learning from a pedagogical and social perspective and the need for TA studies for a strategic participatory planning.

5. Learning in post-pandemic: back to "normal" or back to better?

(Arminas Varanauskas, ZEF ..)

Inevitable shift to online learning in general education happened during the pandemic. That inspired various innovations and diverse solutions throughout education systems, but also that exposed the truth about the capacity to accommodate changes and preparedness for shifting educational environments online. Although we tend to think that today's young people are "digital natives", it is not always the case. Starting from the point that not everyone has necessary technology and finishing that even if technology is in place, social skills seem to decrease during the "full online regime".

Balancing flexible, on-demand reviewable education, which is enriched with different technological solutions and loss of basic social skills, sense of community, increased social anxiety and mental health issues is hard task. And schools cannot work that out alone. Governmental level recommendations on

how to minimise risk and maximise benefits is needed. And for such matter more evidence is necessary, thus here is the room for TA practitioners.

6. Facilitated discussion on the future of digital technologies in the life of ordinary citizens

(facilitated by Lenka Hebakova)

The pandemic COVID 19 extended window of opportunity for digitisation, particularly for e-commerce, homework; created window of opportunity for e-government, education and telemedicine. However, telemedicine and e-government will develop at the slow pace (due to a number of institutional barriers) but gradually. In education, we can expect regress, some features remain but the system needs to transform in a consistent hybrid of the presence and online teaching and learning. We are rather sceptical about the effect of the pandemic on additive production, although it raised attention to its capacity to act in the emergency situation.

Are there credible indications that the society (socio technological landscape) is ready for substantial larger adoption of digital technologies (change of regime)?

And with substantial positive impact on the quality of life in rural areas?