

COVID-19 PANDEMIC BOOSTING DIGITAL TECHNOLOGIES

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INTRODUCTION TO THE SESSION AND 4TECH



- Key input: **4Tech project** (*Development of selected technologies during and after COVID-19 crisis*). National project financed by TA CR (CZ).
- 3 presentations from 3 countries: CZ, AT, LT followed by a discussion.
 - TC CAS: *Changing attitudes towards digital technologies: effect of the Covid 19 pandemic* (TR)
 - ITA: *Chances and limits of distance learning from a pedagogical and social perspective* (MS)
 - KEF: *Learning in post-pandemic: back to “normal” or back to better?* (AV)

4Tech project = Focus on the following 4 Technologies:

- digitalization and cloud technology,
- additive production,
- telemedicine and
- digital (distant) forms of education.



4TECH RESEARCH – OBJECTIVES

Main aim of the project ...

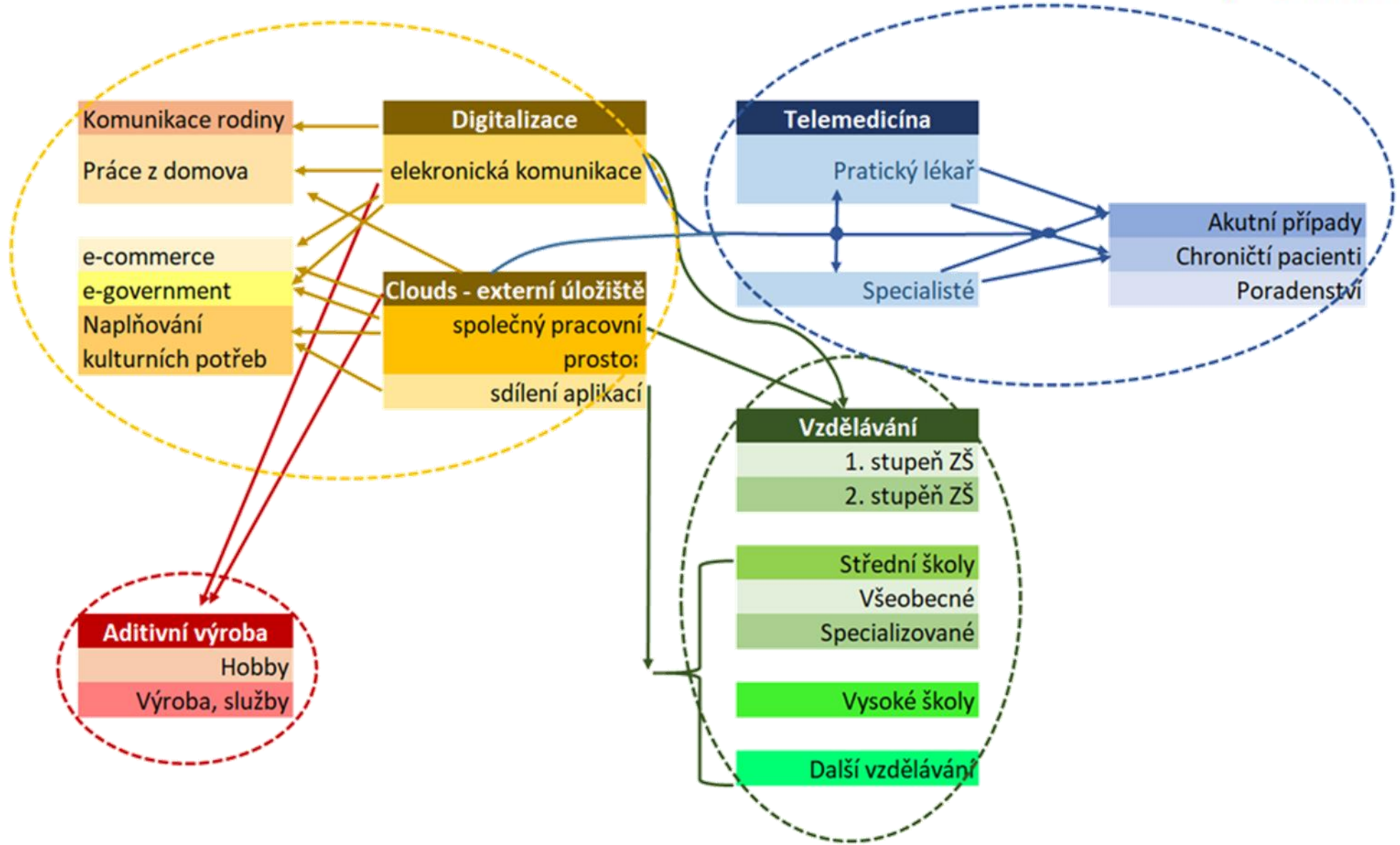
... is to capture and discuss the impulses for spread and adoption of the selected technologies and adoption induced by the COVID-19 crisis with current and future impacts mainly on the rural communities.

Specific objectives:

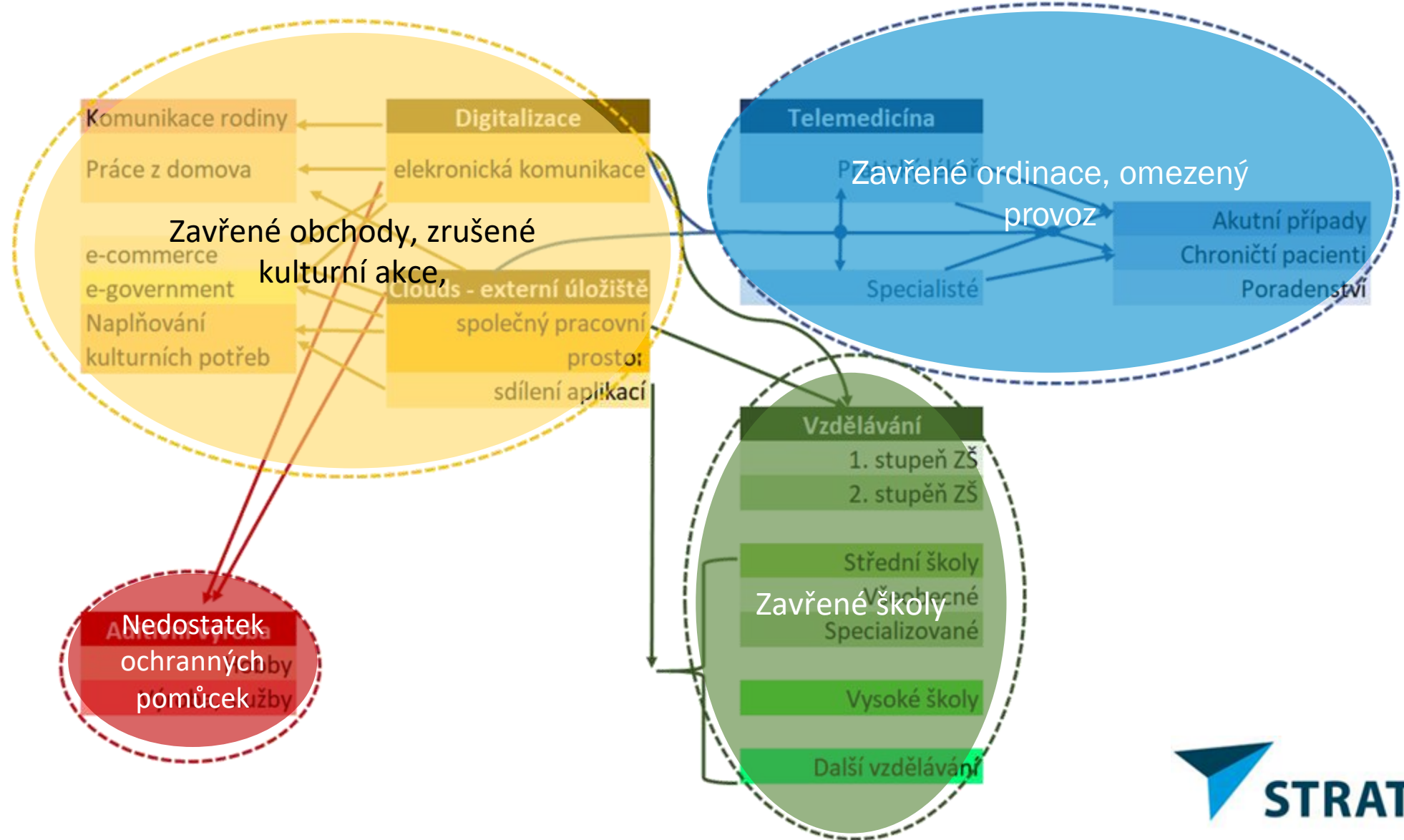
- To map extent and forms of the 4 technologies application in the COVID-19 pandemic worldwide with a particular emphasis on the Czech Republic
- To analyse fulfilment of needs in the respective technical areas and to identify impacts on multi-actors' collaboration, socio-technical system and society.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



4 TECHNOLOGIES



4 TECHNOLOGIES AND THE COVID-19 PANDEMIC



SESSION DISCUSSION

- *Collecting opinions of participants on the examples in the 3 contributions*
- *C-19 as a Window of opportunity for digitisation, particularly for e-commerce, homework; 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 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?*





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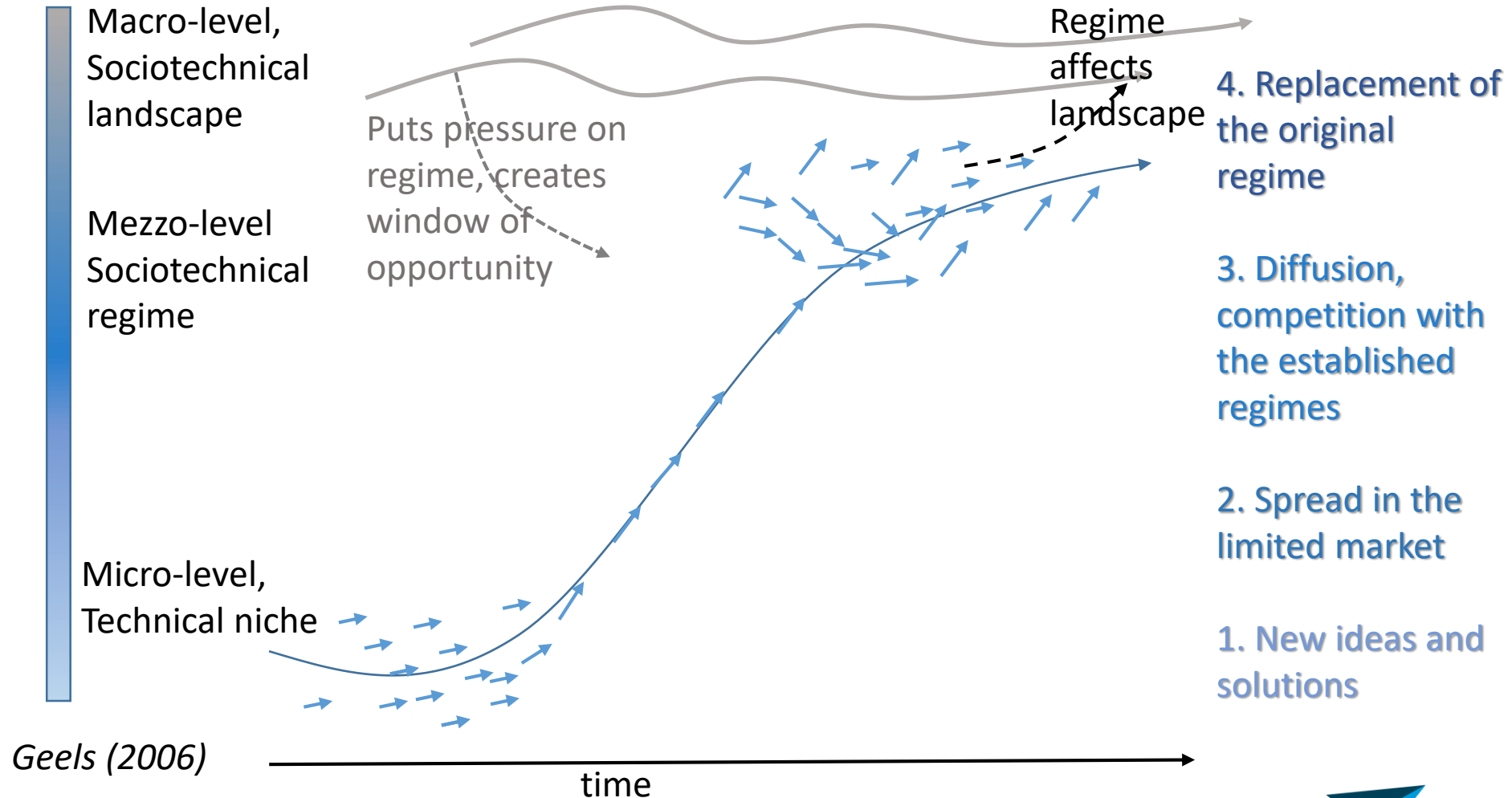


The four emerging technologies in the COVID-19 pandemic and beyond

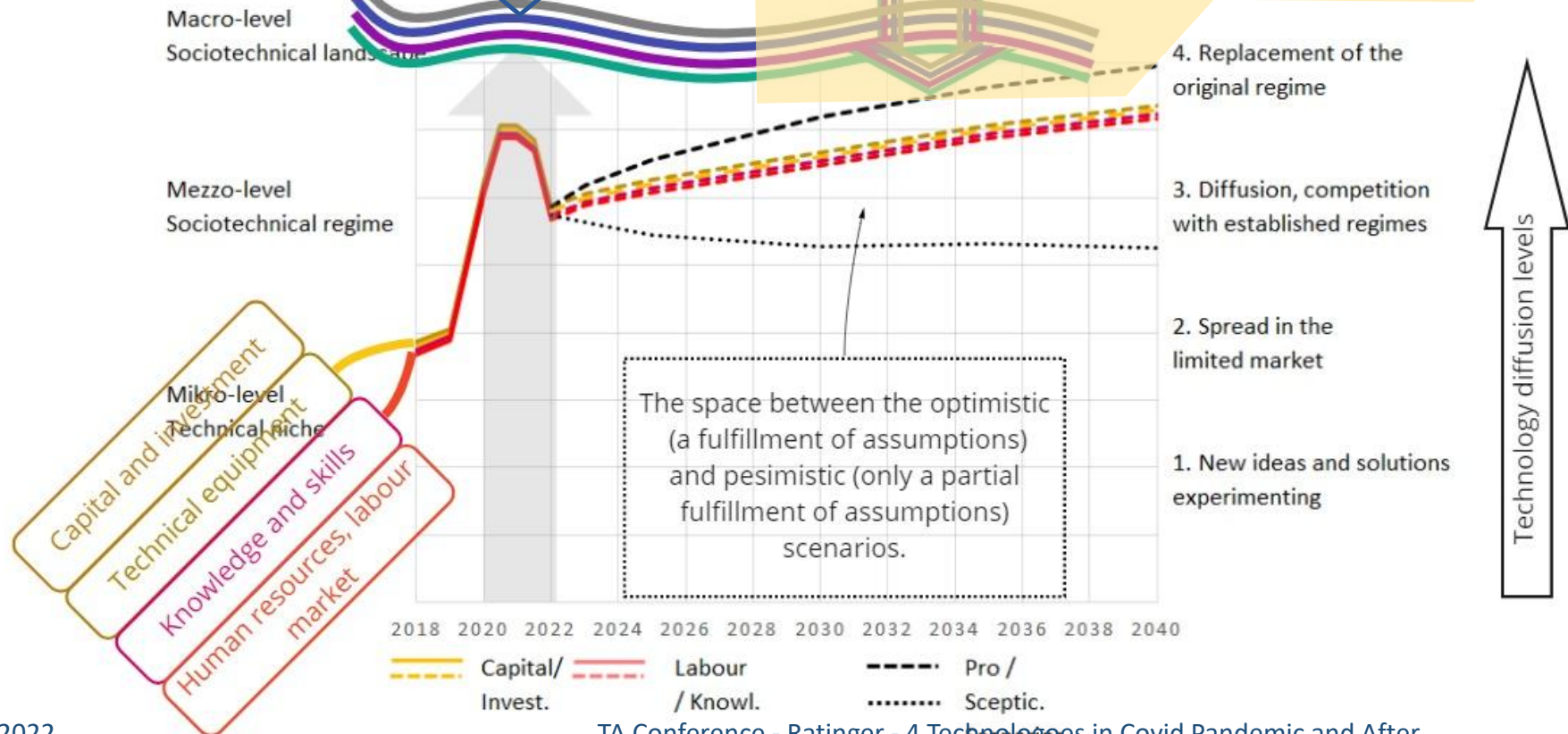
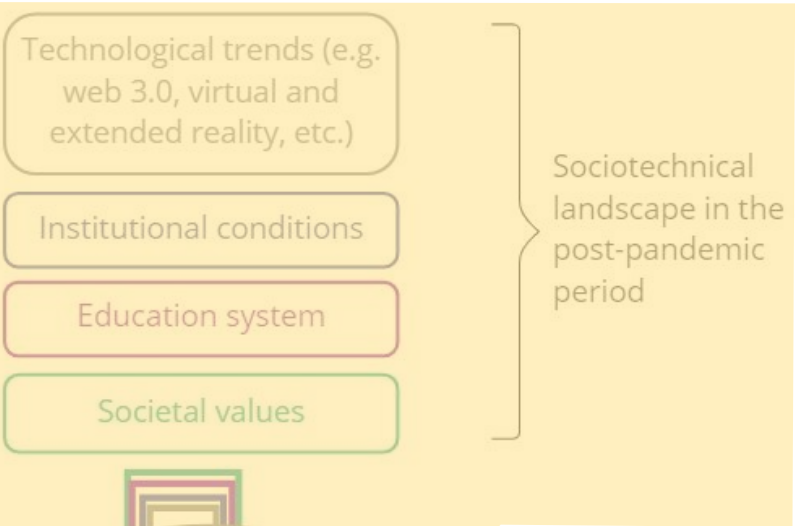
TA conference
25. July 2022



Concept: Multi-level Perspective on System Innovation



Restrictions related to Covid 19 pandemic: window of opportunity



Effects on the sociotechnical landscape

Technological trends (e.g. web 3.0, virtual and extended reality, etc.)

Institutional conditions

Education system

Societal values

Sociotechnical landscape in the post-pandemic period

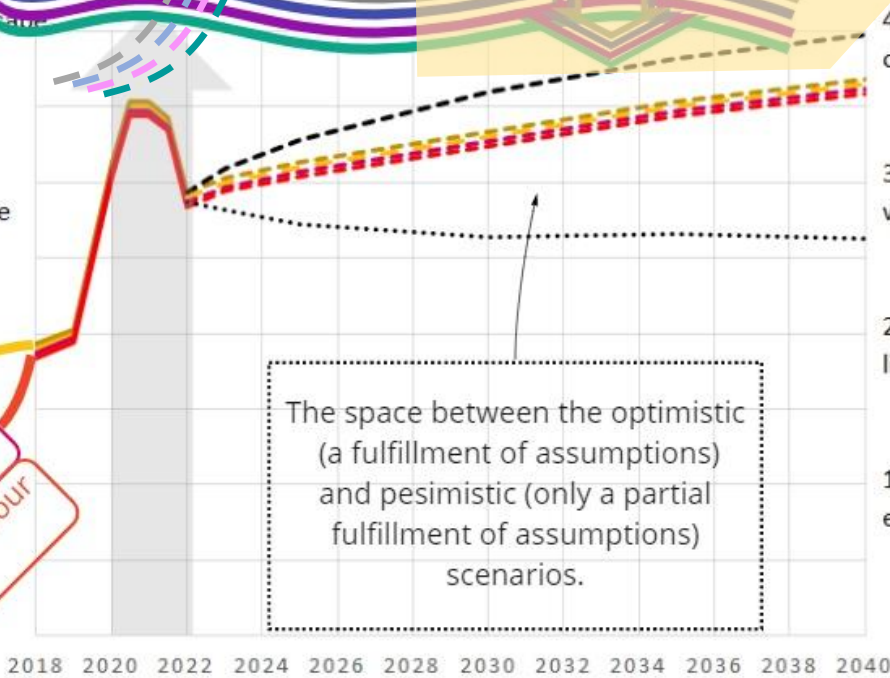


Macro-level Sociotechnical landscape

Mezzo-level Sociotechnical regime

Mikro-level Technical niche

- Capital and investment
- Technical equipment
- Knowledge and skills
- Human resources, labour market



1. New ideas and solutions experimenting
2. Spread in the limited market
3. Diffusion, competition with established regimes
4. Replacement of the original regime

Technology diffusion levels

Conclusions of the analysis of “lockdown” boosts



- ICT equipment + infrastructure
- Learning and changing attitudes
- Institutional conditions / changes
- Digital divide effects
- A special lesson of the additive production

ICT equipment + infrastructure



- Seemingly sufficient capacity and access to data networks (internet) before the pandemic
- Covid protective measures increased the use of ICT
 - Replacement of personal contacts by virtual (in businesses as well as households)
 - Parallel use of ICT by household members (virtual school, home office, etc.)
 - Differences in technical conditions important only in spring 2020; then massive investment in the equipment and connections.
- Mobilisation of 3D printers (and their users)
 - For the production of protective means in the I. wave of the covid 19 pandemic, spring 2020
 - Later, to address shortage of some spare parts/ components due to the global market disruptions

Learning and changing attitudes



- Sudden jump in the virtual space →
 - Intensive learning of the new „digital“ skills
 - Need for understanding the functioning of the digital(ised) society
- „Learning by doing“ –
 - Ad hock solutions in the spring 2020, gradually improving
 - Eventually, acquirement of permanent knowledge, reflection in the life style and societal values
- Positive effect of the length of the restrictive measures / lockdown
- Importance of the earlier „digital“ experience (particularly in education)
- The role of leaders (principals in the schools)
- Changing attitude: reservation → massive adoption → counter reaction [→ gradual adoption]
- Public administration – lessons with delayed effects in the progress of e-government.

Institutional conditions / changes



- In many cases the expansion of the technology in the „emergency regime“ without legal backup (rules, norms).
 - Fast adoption of some legal norms (e.g. on digitization of the health care)
 - Debate on the others has been opened: online education, the right for quality (fast internet connection)
- Redistribution of responsibilities and new forms of collaboration
 - Online education: new distribution of roles between the school/teachers and parents (student)
- e-government:
 - The acceptance of bank identity for the communication with public administration (not really associated with Covid 19) → fast development of applications (for citizens)
 - Internal barriers: the need for hard-copy
 - How to secure ICT experts for the public sector?

Digital divide



- Lack of technical equipment or incapacity to acquire sufficient digital skills → exclusion.
 - Technical digital divide, mainly in spring 2020, later moderated by
 - i) The public support,
 - ii) Civil society solidarity (donations)
 - Socially conditioned digital divide (e.g. in online education, parents are incapable to adapt to their new role)
 - Geographical – remote rural areas lack quality internet connection, absence or expensive complementary logistic services
- Remote countryside and some social groups – the problem of digital divide might amplify.

A special lesson of the additive production



- Important role in spring 2020
 - i. 3D models of protection components were distributed under very convenient conditions (free of charge, or under low cost licence agreements)
 - ii. Experiences and recommendations shared within communities of 3D print providers.
 - iii. Lower quality of 3D print products was accepted – the Covid 19 protection means found suitable particularly in the time of shortage.
- Then a retreat, additive production replaced by the common injection mold technology
- However, increased awareness about the capacity of the additive production.
- New interest in additive production with global market problems

Foresight outcomes

Need for adequate technical equipment for more intensive use of digital based services	Need for a bigger capacity of data network connections
Need for legal and other institutional changes (particularly in the education and health sectors)	New distributions of responsibilities and forms of collaboration
Accelerated learning process - gaining knowledge and skills	Shift in societal values / preferences



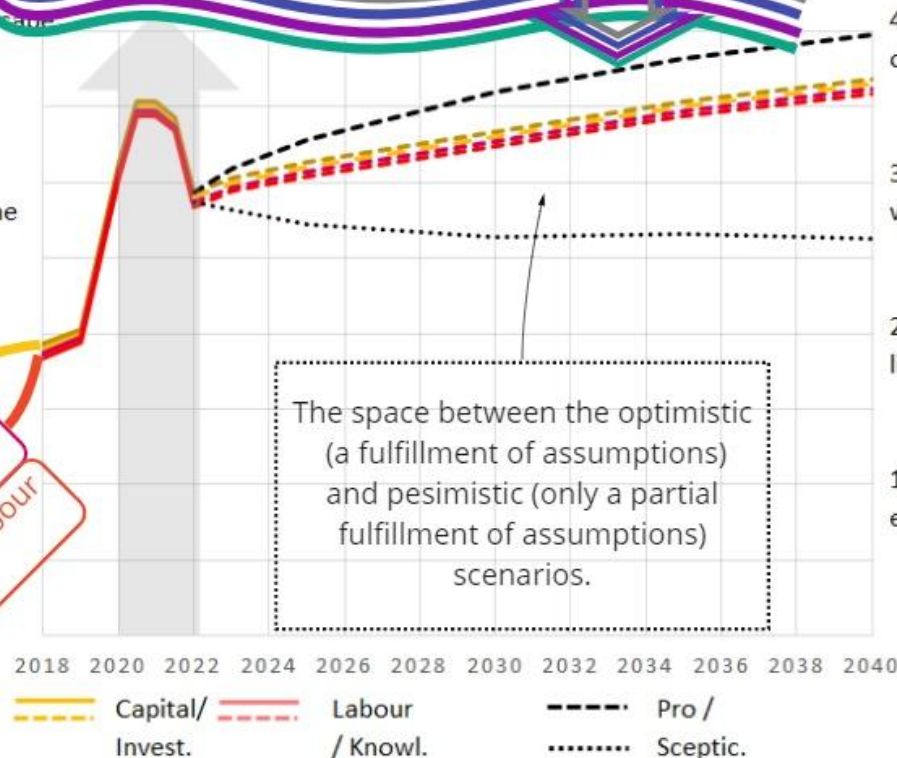
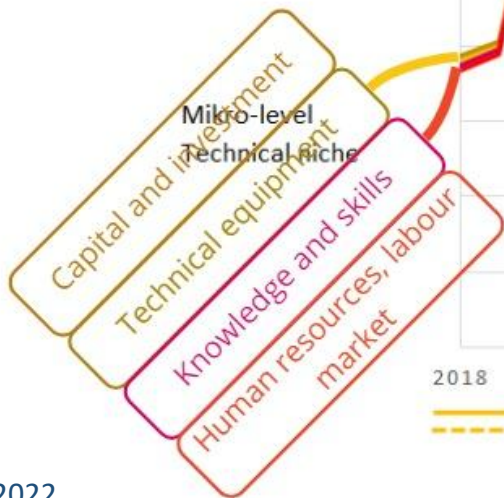
Sociotechnical landscape in the post-pandemic period



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Mikro-level Technical niche



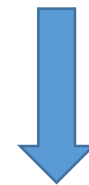
4. Replacement of the original regime
3. Diffusion, competition with established regimes
2. Spread in the limited market
1. New ideas and solutions experimenting



Foresight approach



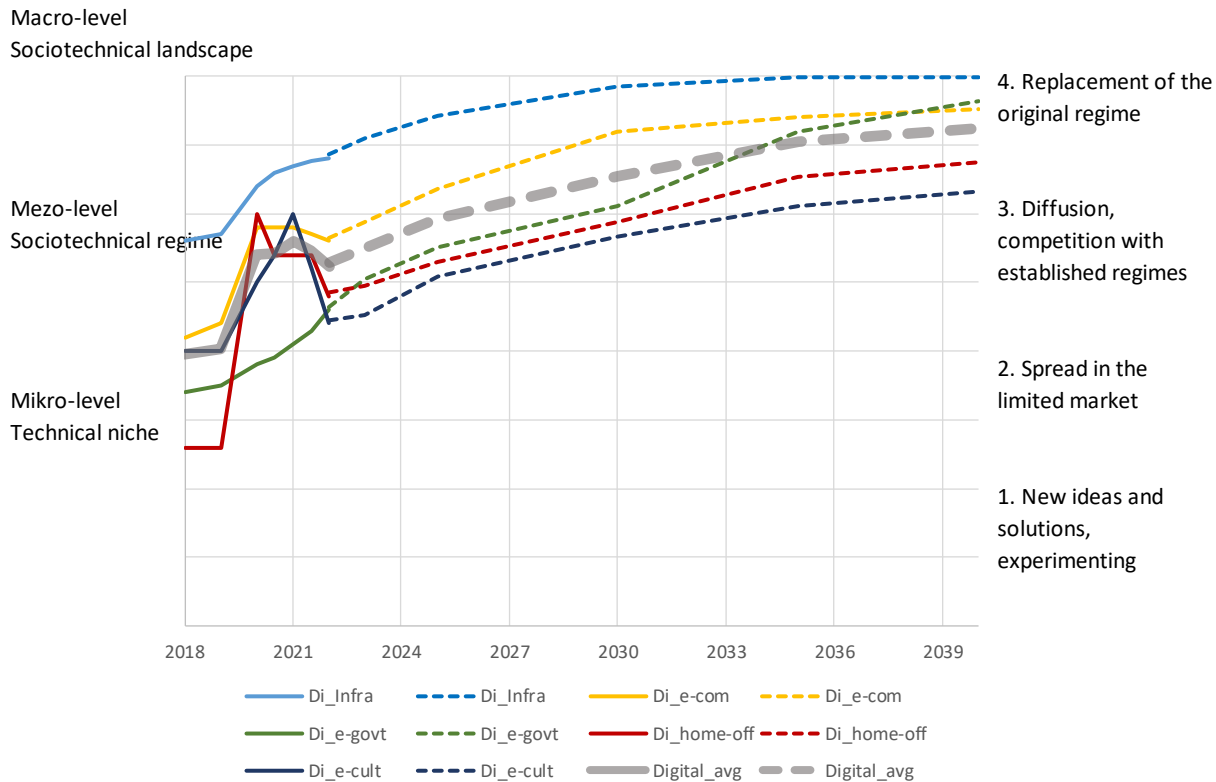
- If the “pandemic impulse” contribute to the diffusion of the selected technologies and their dominance by 2040 ?
 - Becoming “sociotechnical regimes”
- Two scenarios Pro (positive) and Sceptical.
- Expert panel for each technology
 - What does it mean becoming a regime?.
 - SWOT analysis →
 - Key internal factors (including “pandemic” lessons)
 - Key external factors: trends and long term policies
 - Stakeholders
 - Effects: What will change most in the life of citizens and firms, geographical and social implications.



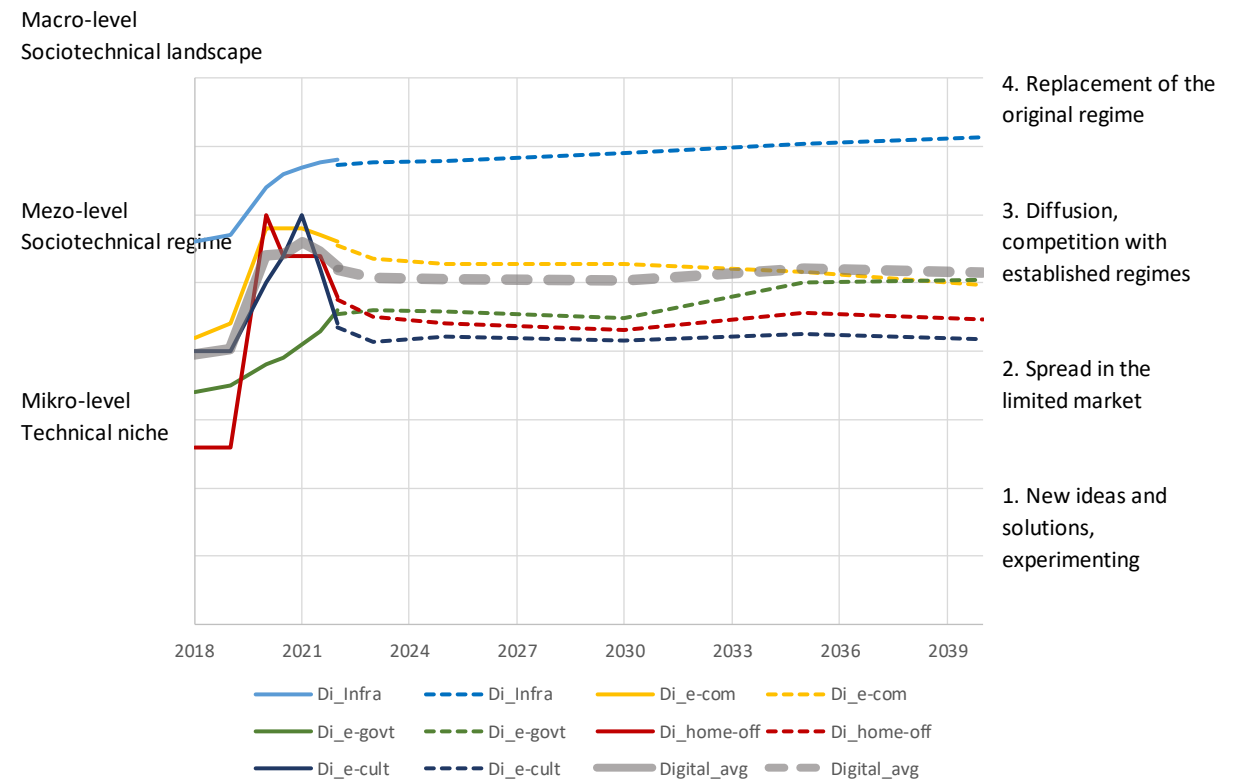
Digitalisation



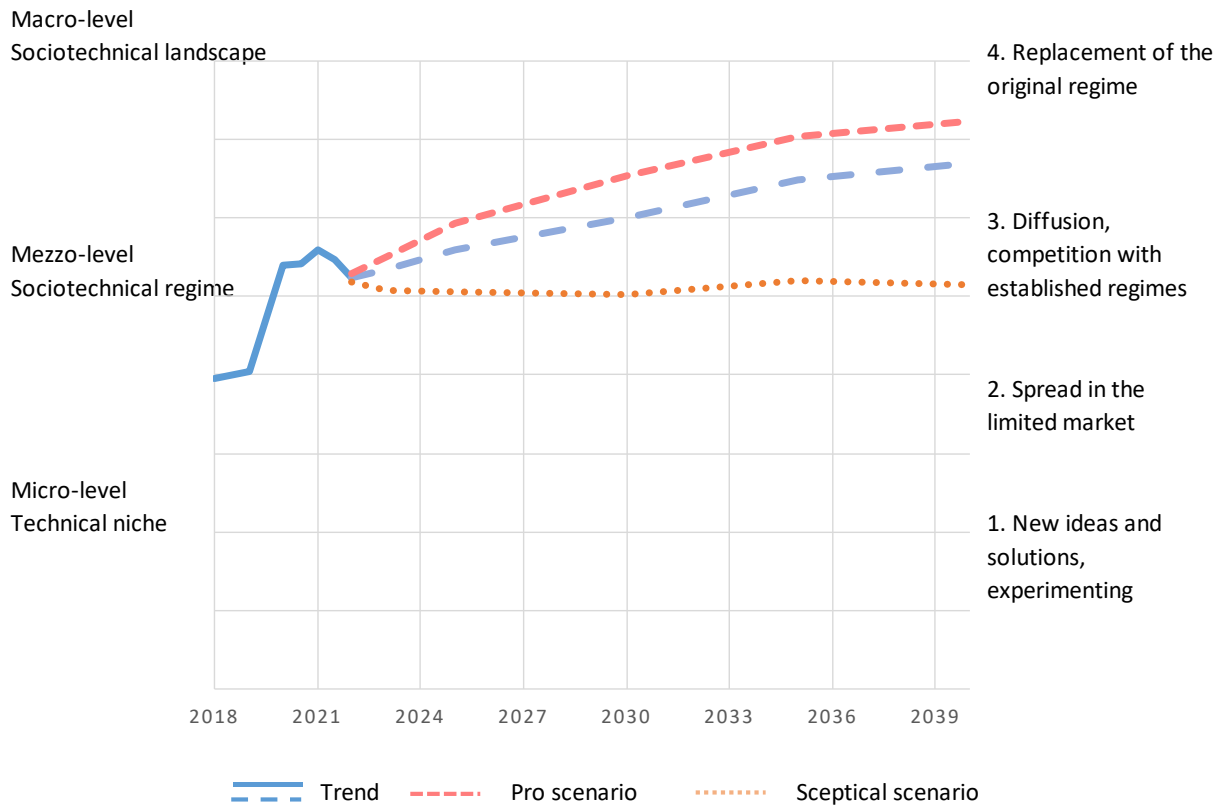
Pro scenario



Sceptical scenario

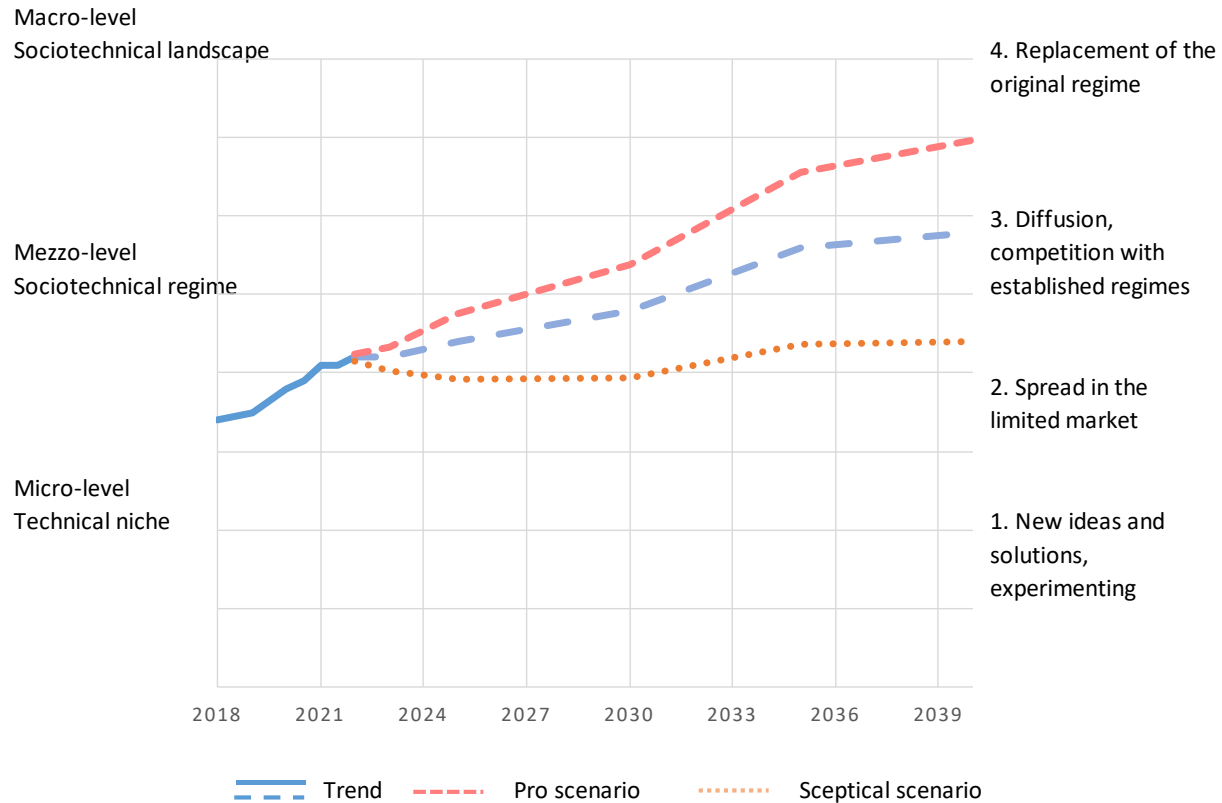


Digitalisation in general



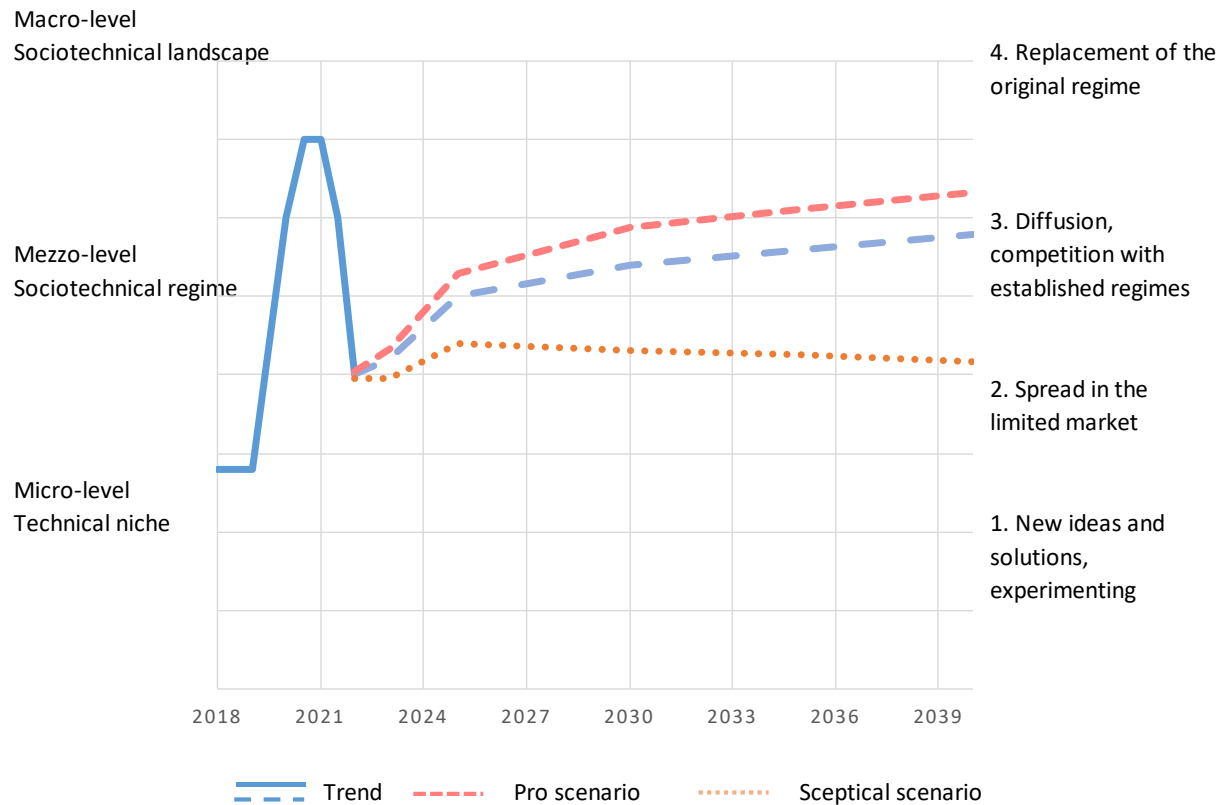
Factors

- Improving the coverage of the high speed internet
- Effective cyber security
- Qualified IT people in public administration
- Legislation favouring digitalization (at least not hindering)
- Coming ICT literal generations
- Education strengthening digital and financial literacy
- Accompanying services (e.g. logistic)



Factors

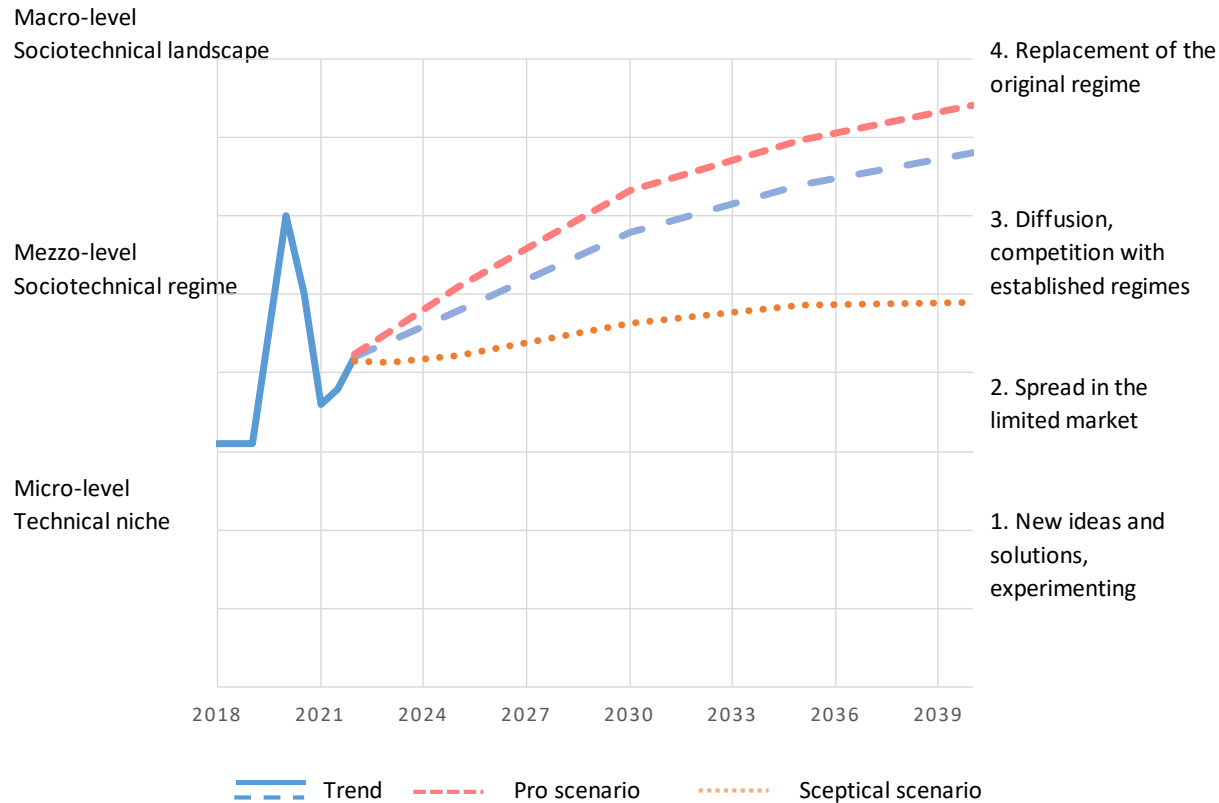
- Internet access and improving ICT literacy
- Increasing availability of telemedicine devices
 - Willingness to use them
 - Price
- Institutional aspect
 - Legal base,
 - (Care) Standards
 - Distribution of responsibilities



Factors

- Improving ICT skills of teachers + standards
- Enhanced organizational and technical capacity of schools
- New pedagogical and didactical methods
- Improving computer literacy among the population
- General acceptance of
 - online education (legal, symbolic)
 - new roles and responsibilities of parents and students

Additive production



Factors

- Gradual standardisation of products and production (norms)
- Increasing share of certified materials
- Preference for local production in reaction to the disruption of global markets
- AddP gradually in curricula of professional high schools and technical universities