

## Session D1

### **Industry 4.0 in the light of demographic change. Less work – less workers? Older adults operating more machines? Cover a growing care need by machines or by former factory workers?**

*Chairs: Ulrike Bechtold (Institute of Technology Assessment)*

Industry 4.0 and demographic change are developments which affect European societies now and in future: The EC aims to tackle (an ageing population) and foster them (growing economies via re-industrializing Europe) within the Grand challenges. Their consequences are expected to be manifold. Yet, it may be worthwhile investigating them by taking a closer look at how they affect each other, how they interact or even reinforce each other's implications and consequences as opposed to implications expected when regarding these developments separately.

Demographic change describes a change in societies' age structure – there will be less young people as birth rates decline and more individuals who pertain to older age groups.

Industry 4.0 embraces digitally connection of all components along the value chain: machines, components, raw material, workers, products and consumers. This effects on work environments and a broad spectrum of positive and negative implications are discussed. Yet, for workers a few aspects remain to be considered (vgl. Aichholzer et al. 2015):

- Will there be sufficient work?
- What kind of work?
- Whom will rationalization (not) affect – what is the role of education?
- What does flexibility mean – e.g. 24/7 available for employer etc.

This session aims to ask how these two developments interact on two levels: Firstly on the level of realities in terms of work and life structures (1) and secondly in terms of epistemic value. What may be the impacts of their interrelation and the respective narratives in terms of value-shifts, paradigmatic constellations and world making (2).

(1) This could embrace questions as how are older adults affected by changes in actual working conditions as triggered by I4.0 (e.g. more machines to do the job, quicker change rates in machinery or software to handle etc.) in social, psychological and physical ways?

Another issue may be addressed in the light of industry 4.0 from the perspective of older adults: who will be supporting and caring for those who will need assistance and/or help. Will it be those who are rationalized away from the smart factories? Or will their education to do so be too costly? Will they be willing and or suitable to change into social service?

(2) I 4.0 and digitalization and "life 4.0" developments are permeating our everyday life (e.g. self-banking, self-scanning health parameter, self-scanning goods at supermarket, and the respective data connected ...). What are the consequences for our world making in these terms for the health and care sector from an epistemic point of view?

Although the health and medical service sector may not be directly affected, it may be subject to an unquestioned paradigm of letting machines do whatever they can do. In other words, may I4.0 and its narratives, which permeate society at large, may affect the relation of AAL (ambient assisted living) applications and technologies and their role in the minds of their users. Not only smart products will be produced in smart factories but smart older adults will be the result of smart homes.

## **Different perspectives on an ageing society: demographic versus economic dependency in the light of industry 4.0. Innovation and Grand Challenges**

*Authors: Ulrike Bechtold (Institute of Technology Assessment), Martin Fieder and Harald Wilfing (Vienna University)*

The phenomenon of an ageing population is global (WHO, 2015; UN, 2017). In Europe the respective main focus of policy as well as research and development activities mainly concern how to react in terms of securing the pension system (e.g. Eggleston and Mukherjee 2019) and securing high quality in care (e.g. WHO, 2017, Murphy et al., 2018; Hahnenkamp et al, 2018). The public discourse however, is frequently coined by a rhetoric of “problems that wait to be solved” (WHO 2015, ISSA, 2015). The underlying problem is discussed in the following framing: there will be less young people to firstly pay for the older ones and secondly provide for qualified staff in the area of supporting and caring for older adults. However, this somewhat unilinear (and clearly reductionist) relation lacks considering the developments of “smart factories” which - depending on the source you rely on – heaps of human recourses will become available in the next few years. We aim to compare statistical data in terms of demographic and economic dependency and consequently put these in the context of (first) estimations and experiences with smart factories, industrial developments in times of real time economy and internet of things.

Merely comparing numbers will of course not suffice a highly complex issue. Hence we are trying to identify other areas which will need to be considered in this context, such as qualifications and interests of the affected person groups or social prestige of working areas. Lastly we will identify the relevance of these numbers, considerations and thoughts for the development of innovations in the sector of AAL (Active assisted living).

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## **Demographic change and Industrial Societies 4.0**

*Author: Claus Seibt (Transformations and Futures Research)*

Demographic change and industry 4.0 are developments which will strongly affect European societies. The European Union aims to re-industrialize Europe taking at the same time its rapid ageing societies into account. Demographic change describes a change in society's age structure.

However, the re-industrialization of Europe is shaped by another mode of production and value creation than the fordist mass production mode of the past. Boltanski and Esquerre accurately picture today's European industrial economies not as industrial societies of mass production, but of new forms of luxury goods manufacturing and cultural production, including tourism.

Boltanski and Esquerre distinguish in their study of today's and tomorrow's European societies among four groups or classes of households or individuals as economic entities. At first the number of rich and economically independent pensioners, second the group of the creatives and cultural elites with high-income and capital, third the huge number of domestic and servants. And fourth at the growing number of entities „suspended“ from economic and societal participation.

In our paper we discuss demographic change and industry 4.0 arranged in front of Boltanski and Esquerre's accurate social analysis regarding the re-industrialization of Europe (Industrial Society 4.0). Digitization and „life 4.0“ developments are spreading into everyday life. High-rent pensioners are major consumers regarding these trends. This social class can well afford with their pensions and capital rents a good life i.e. as frequent tourists and consumers of luxury goods and services. As creatives and elites they engage in online participation, blogging and other cultural actions.

In the class of domestic workers and servants many of the older aged have to keep on working to gain additional income to supplement insufficient pensions. Such workers serve, for example, as taxi or mini bus drivers and for multiple other services including guards in museum and exhibition halls. How may digitization shape their vocational needs? How can digitization empower them?

The last group „the old, poor and deprived“ in Europe's Enrichment Societies“ may in future become one of the major European humanitarian problem. Thus, the paper will end with the discussion on general social transformations in times of unequal enrichment in the digital era.

## **AAL and Industry 4.0 Policies in Austria**

*Authors: Ingo Hegny and Kerstin Zimmermann (Austrian Federal Ministry of Transport, Innovation and Technology)*

Digitalization and ageing population will change our society. They are also the driving forces in technological and social aspects. To shape the future accordingly the Austrian government has set up the National Strategy 2020 for Research, Development and Innovation (RDI) entitled 'Becoming an Innovation Leader' which combines a wide mix of initiatives.

In the above mentioned areas two R&D programs called 'ICT of the Future' and 'Production to the Future' are in place since 2012. They are funding mainly co-operative projects between science and industry. During the last years we see a trend to larger projects in order to reach critical mass and public awareness. So Ambient Assisted Living (AAL) test-regions and pilot fabs are also part of the Federal Open Innovation Strategy and their success stories are published on [open4innovation1](http://open4innovation1).

In order to support the national stakeholder two platforms were funded: Industrie4.02 and AAL Austria3. They are community driven and enhanced the experts' dialogue. Working groups like 'The Human in a Digital Factory/Plant' and 'Ethics for a better AAL' deepen the understanding and provide guidelines. Case studies, regional support and a common vision will also cover upcoming technology like artificial intelligence (AI) and interdisciplinary topics bringing together productivity and AAL in order to support workers acting as well as carers. The talk will give an overview of the ongoing activities in the area and present new ideas in the regulatory framework between technology push, demand pull and responsible data access.

## **Technology for lifelong learning**

*Authors: Marianne Barland (Norwegian Board of Technology)*

Artificial intelligence, automation and digitalization are changing the face of jobs as we know them, triggering new skills requirements. An important point on the political agenda is how we can develop our skills throughout our lifetime in order to adapt to the changing job market.

This presentation argues that the same technology that is changing our jobs also creates new opportunities for lifelong learning.

Technological development has led to many predictions about learning revolutions over the years. Innovations such as film, radio, video and CD-ROM have acted as supplements to established teaching practices but has not realized the optimistic visions associated with them. The internet and widespread digitalization seen right now spurs a new wave of optimism – and have already led to an upsurge of new, digital forms of learning.

The presentation will outline how new technology can help strengthen the potential for lifelong learning in three fundamental ways:

- **Remote:** The Internet and spread of PCs and smartphones have led to new digital forms of learning. Learning activities can happen whenever and wherever, at a pace that suits the individual. MOOC are a familiar example of this and make it possible to move away from the traditional classroom environment.
- **Personalised:** In digital learning situations, large volumes of data can be collected on an ongoing basis and analysed. This can contribute to understanding and improving the learning process, and learning systems can adapt teaching in real-time to each individual participants level and needs, and provide immediate feedback. Data analysis can also help create the best possible base for learning, adapted to participants' work and home environment and schedule.
- **Simulated:** Digital simulations make it possible to design work-like and customized learning modules connected closely to real work tasks and situations. This can encompass everything from 2D and 3D models on a PC or smartphone to simulations that involve the use of virtual, augmented or mixed realities. The use of gamification can increase the motivation to learn.

Although technology can create many opportunities, policy makers must act to facilitate a system for lifelong learning. This should include policies that strengthens the supply side, making universities and private providers able to offer education and learning that meets society's demands. Likewise, citizens, organizations and employers need policy instruments which makes them able to re- and upskill throughout working life.