

Interaction of humans and machine – perspectives of Technology Assessment

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5th Doctoral Conference on TA
Universidade Nova de Lisboa, Caparica,
Portugal

July, 15 - 16, 2015

Agenda

- 1 The cultural *interbeing* of humanity and technology
- 2 Humans and machines – a love story
- 3 Technology Assessment: side effects of technology as integrative problems
- 4 Topography of technology in the 21th century - challenges

1. The cultural *interbeing* of technology and humanity



- Technology is absolutely part of “*Liveworld*” (Husserl 1936); may be conceived as a universe of what is self-evident or given and a world that subjects may experience together
- Modern cultures are “*technology-based cultures*” (Hughes 2006), “culture” means here “*the whole way of life*” (Williams 1958)
- Technology today does not refer to a subsystem of society like administration or education, but it refers to a “*superstructure of society*” (Böhme 2000)

1. The cultural *interbeing* of humanity and technology

Modern culture became **technomorph**:

- all human actions,
- all human experiences and perceptions,
- the human self-conception,
- the relation to the world as well as
- the ‘*Condition Humaine*’ is technically mediated (Nordmann 2008)

“ ...*the interventions that have disrupted our lives more than all the other passions, over the last centuries, the systems of production on such a massive scale, that now weigh heavily on the whole planet*” (Latour 2013).



2. Humans and machines – a love story

Technomorphic character in the relationship man machine interaction (MMI) is also increasing:

- Since 1980s technology is not more reconsidered as a „isolated, fixed and efficient tool“ (Rammert, Schulz-Schaefer 2002:12 ff, Moniz 2012)
 - „**active technology**“ i.e. service robots are moving freely and situative in busy spaces (agent-oriented method of programming)
 - „**interactive technology**“ i.e. mobile robots doing playing football (hydraulic systems, mechanics and sensor technology) >> contingency of sequences
 - „**intelligent technology**“ i.e. brake systems in cars (braking follows own ‚calculations‘ with regard to speed, weight of the car, frictional resistance of the wheels etc)
- >> Mechanical processes (deterministic approach) are more and more oriented on „**cooperational models**“ of MMI



2. Humans and machines – a love story



Interwoven relationship between humans and machines:

- (1) **Mutual relationship between humans and machines** which constitutes the man machine interaction (cognitive and physically). Hereby, specific forms are going to be fixed (socio-technical constellation), Pickering 1993, Grunwald 2002)
- (2)**„entities do things“** (systemic: acteur-network-theory, Latour 1988, Haraway 1995)
- (3) Responsible body within these relationship is still discussed controversily (attribution of **agency, moral values, ethics**, Decker 2014, Grunwald 2014)

3. Technology Assessment: side effects of technology as integrative problems

How do we refer to technology?

How can we understand the dimension of technology for our *conditino humaine*?

What are the side-effects of (new) technologies?

Definition

- ❖ **Technology** (from Greek τέχνη, techné) is the making, modification, usage, and knowledge of **tools, machines**, techniques, crafts, **systems**, and **methods** of organization
- ❖ in order to **solve a problem**, improve a pre-existing solution to a problem, **achieve a goal**, handle an applied input/output relation or **perform a specific function**



3. Technology Assessment: side effects of technology as integrative problems

Technology and its side-effects (classical view of TA)

- Scientific-technical progress is closely connected with the cultural history of humanity (i.e. irrigation technologies, military engineering etc.),
historically the progress is based on the survival of humankind, the power and on the wealth of cultures (*technology as positive expectation of progress*)
- Industrial revolution: quality of these expectations hit his peak with the Enlightenment in Europe. From a normative perspective technology was associated with the ideals of the Enlightenment:
 - **release from the restrictions and constraints of (human) nature**
 - **enabling of human autonomy**
 - **relief of physical strain of labour**
- Normative expectation, that technical progress always implies **social, cultural and moral progress!**

2. Technology Assessment: side effects of technology as integrative problems

- In Europe and the US, since the late 20th century the scientific-technical progress has lost its innocence (Meadows et al 1972)
- Problems of undesirable side-effects of the scientific-technical progress became a relevant aspect in the discourse of the mechanisation of modern (European) societies
- The spatial and temporal range of negative (and positive) side-effects of technologies has dramatically increased, as well as the degree of technical penetration on populations, landscapes and economies



3. Technology Assessment: side effects of technology as societal problem



- Desirable effects: science & technology as progress (innovations, visions)
 - Undesirable side effects of technology (accidents, social and environmental effects)
- Side-effects of technology are manifold and highly different; they refer both to single technical fields as well as to whole socio-technical systems
- Cognitive perception of linear and causally determined processes of technology

3. Technology Assessment: side effects of technology as integral problem

- Political institutionalisation in the US (OTA 1972-1995) was established with the goal to obtain „*competent and unbiased information*“ (US Congress 1972) of science and technology

- Institutionalisation of TA in Europe since the late 1970s (pTA // TA-institutes and interlinkages) with the goal to „*initiate a knowledge based form of advice, analysing and evaluating actual and potential societal impacts of technological innovations*“ (Bechmann, Decker, Fiedeler, Krings 2007)
 - ,*Problems*‘ refer to social and societal perception and are based on its cultural values and norms (Environment, Energy, Mobility, Sustainability, Security, Health, Labour...(definition of the problem))
 - Methodology is *interdisciplinary* or/and *transdisciplinary* (specific type of research activity)
 - ,*Precautionary principle*‘: promotion of technological innovations *and* avoidance of undesirable side effects of technologies (political advice)

3. Technology Assessment: side effects of technology as integrative problems

- While in former times philosophical perspectives made the difference between the notion **culture versus nature**, today the difference only can be drawn between the **technical versus the non-technical** (Grunwald 2008)
- Here, the **border cannot be defined**, it is blurring as well as it is open for cultural and social influences. MMI itself becomes blurring
- “Today, the mechanisation of modern societies cannot be observed as the increasing configuration of individuals with technical equipment and the increasing dependencies from technologies, **but as a shift of human action towards strong regularity of structure and routines**” (Grunwald 2008:55)
- “Essence of technical nature has changed dramatically: no longer functional tool, but technology provides:
 - imaginaries,
 - provides tool of control,
 - provides mediation between man and nature (Simondon 2012)

4. Topography of technology – new challenges

New emerging technologies (selected examples)

- Human brain interfaces
- Ambient intelligence
- Robotics

>> new challenges >> need for new concepts MMI



4. Topography of technology in the 21th century – new challenges

Historically, new phase of technological development based on the ‚classical‘ goals of technological innovations:

Knowledge of tools, machines, systems:

- ✓ in order to solve a problem
- ✓ improve a pre-existing solution to a problem
- ✓ handle an applied input/output relation or
- ✓ perform a specific function



But:

- High specification of every single technical field > **knowledge of whom?**
- Solutions seem less embedded into national/social contexts > **solutions for whom?**
- Solutions refer to specific national, cultural and social traditions > **values of whom?**
- Increase of economic entanglement on national/global level > **profit for whom?**

4. Topography of technology in the 21th century – new challenges

Hypothesis:

The conviction, that technological progress together with its unnumerable side-effects and shifts also should be considered as a social, cultural and moral progress cannot be upheld any longer **and should be taken into account** (in politics, science and society)

→(New) perspective on technical applications:

- „Innovation-centric-history of technology“ (Edgerton 2008) and its black spots
- Temporal parallelism of processes (Waczman 2010)
- Social restrictions, spaces and surprises (Turkle 2011)
- Linkage with economic interest (global/national) (Hardt, Negri 2000)
- Reference frame for ethical issues (Habermas 2001, Sandel 2010)

4. Topography of technology in the 21th century – new challenges

- ‚Good‘ (comprehensive) solutions for defined problems should be the result of societal decision making processes
- Societies // social groups have specific environments, specific needs, specific cultural traditions and therefore there is a need for specific technologies
- Function and role of technologies should be socially and cultural all taken into account: technology **is** constitutive part of modern societies

„The threat of a „colonialization of the Liveworld“ (Habermas) through emerging technologies reflects exactly this expectations. The analysis of the side-effects of technologies should reflect the social and cultural involvement as well as the function of technologies in order to open discourses of critique and reasoning power“ (Grunwald 2008)

Thank you very much for your attention!

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