

**Dare to do the immeasurable! A closer look on the immeasurable bias of  
technological developments**

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This short article gives an overview about some recent research and reflection on technological developments. I already came in my master thesis – that is to be published in some aspects shortly – to the conclusion that emerging technologies provide a new paradigm in innovation culture and in technological development. These findings are presented in relation to the phenomenon that we are widely conscious about the massive impact of modern lifestyle on the concept of freedom or on what we refer to as „economy“ or „society“. While we observe immense technological and environmental disasters, married to institutional fainting and failure, we see ourselves often incapable of implementing solutions in our day to day life, in our research and in our social engagements as well as in our economical conduct. This thought is even more stinging if we keep in mind that some stabilizing technological solutions have already been developed on a theoretical level for solving the climate problem within the next decades. (Socolow & Pacala, 2004) Therefore some basic aspects of our partly inconsistent way of cracking daily problems with a larger image in mind should be reflected. Philosophy has in this context the duty to provide a translation between different disciplines and philosophers should also carry out their duty to fundamental research by illuminating the blind spots of political, scientific and industrial action. The usage and creation technology can be described, based on some basic assumptions on technical knowledge, instrumental knowledge and rational reflection. First of all they are rooted in as well as closely related to implicit knowledge. The evolutionary conditions of human thinking could be better described based on natural and cognitive sciences than on some absolutely abstract concept of rationality. (B. Irrgang, 2001) It's almost needless to say that modern high-tech apparatus are only possible by the means of scientific breakthroughs during the past centuries and by „standing on the shoulders of giants.“ But technological development should not only be conceived as a mere realization of applied scientific research. (Bunge, 1966) Instead, technology forms the mesocosmos and the evolutionary niche in which innovations tend to happen due to various cultural and social interactions, which have – amongst others – their manifestation in practical research. (Baudrillard, 1991; W.E. Bijker & Pinch, 1984; Borgmann, 1984) These phenomena strongly depend on implicit conditions of our social behavior e.g. on physical and behavioral entities that rather emerge as macro structures or systems with own functionalities than as a sum of all their subsets. Actually, what we call society is not only formed by laws or immaterial processes but also by tangible (and economically intangible) behavioral structures. (Smith, 1999) Especially the construction of large technological systems has to be conceived on such a level and it also has to be reflected in regard to social implementation and consequences. (Hughes, 1989) Empirical research can provide valuable insights into the acceptance of certain social groups towards technological innovations. (Benighaus & Renn, 2016; Schweizer Ries, 2008) For instance, the disaster in Fukushima unleashed a political decision making process that aimed to change the German energy production towards renewable energies. In consequence, the evaluation of scenarios for the construction of energy systems raised questions on how these scenarios are related to the public acceptance of certain forms of energy and of construction measures. (Schubert,

2016) Innovation itself is also a specific kind of social process. Social innovation as such is even a sort of emerging paradigm, closely related to moral assumptions about how the future should be, about the problems that should be solved and about different perspectives that should be included into operations that possibly lead to perceived solutions.(Fontrodona, 2013; Osburg & Schmidpeter, 2013)

Decisions as a part of inventions and innovations have to be made on a new, non-utilitaristic level. This assumption seems valid to me, even having in mind that some effective decision support systems have been developed to engage decision making in a non-linear way and to solve systematic deficits in current decision making processes. Stakeholder-engagement in general has even become vital for success, because traditional decision making and planning doesn't deliver appropriate results for current, global challenges in complex systems. (Courtney, Richardson, & Paradice, 2004; Vester, 1999)

One reason for this is that the capitalistic lifestyle of industrialized regions, eventhough it is irrational in many aspects, is expanding in an imperialistic manner all over the globe. It is treated as not negotiable or even as a desirable way of life.(Brand & Wissen, 2012) Another reason for this might be seen in the fact, that innovation has a historical and cultural dimension, which can be described in terms of technological pathways that are either stabilized or disrupted by Lock-Ins or by various mechanisms of institutional change.(Brian Arthur, 1990; Mahoney, 2000; Werle, 2007) Problems like the exceeding of our planetary and social boundaries, as described by Raworth and Rockström, though observed, simply don't get solved and often can't be solved in a centralized manner, which makes a new approach to knowledge production a necessary asset for development. (UNESCO, 2013) Traditional ethics are therefore challenged, especially in their political, cultural and scientific dimension and especially regarding the risks of Innovations and the context for the implementation of resilient technologies.(Bernhard Irrgang, 2016) A perspective is therefore needed, which steps beyond „simply producing knowledge for instrumental purposes, whether to inform and solve puzzles for academic audiences, or to solve problems for policymakers, practitioners or groups of activists.“(UNESCO, 2013) This makes it clear that we need a perspective that helps to understand some scientific and technological boundaries, which have emerged in the course of the industrialization of the western world, the electrification of the household and the digitization of our lifeworld(Capurro, 1995).

Complexity is at some level neither fully reconstructable nor predictable on a logical level. Especially if some preconditions that form such complex systems and global interactions, like the so called human consciousness, are not rational at all and only perceivable from an individual perspective. Thinking and reflecting in an active manner is – as well as constructing experiments or drafting theories – not the same cognitive process as memorizing books. Even if a CT or another imaging tool makes it obvious for some people that comparable brain regions are interacting in the process: The process of inventing a thought is bound to a subjective perspective and experience. We also see that our technological power has created challenges for the structure of social interactions as well as for their boundaries. These boundaries of knowledge creation are not only found in academic research but in non-academic inventions as well as in the daily life of every individual. A daily life with its own struggle to make sense of a technologically induced social surrounding or an experimental understanding of natural phenomena.

This practical dimension even might be key for understanding the emerging culture of technological developments in relation to implicit conditions like cross-regional, cross-sectoral, cross-social or cross-generational knowledge transfer by the means of technology. Such a historical and scientific dimension makes clear that a new perspective for moral philosophy is needed in order to catch a glimpse at phenomena like the digitization which manifests as a paradigm or a trend in social networks, in the development of social bots, in the cross-product-automation in industry 4.0 or in new forms of political activism.

This means that innovations or technological developments are in some sense based on economical feasibility but they are not strapped to economical rationality – no matter in which context this rationality found firm ground. If we conceive moral assumptions and technological developments in

relation to biology and ecology, it is clear that they should not behold only to an economical context. The reason is that it's simply too risky to discard the power of disruptive and collective moral action while failing to face global challenges and disasters which – in many cases – only exist as a consequence of collective behaviors.(Intergovernmental Panel on Climate Change-IPCC, 2014)

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