

The proliferation of the innovation discourse

On the formation, semantics and social function
of the innovation concept

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Introduction

Innovation fatigue, innovation deficits and lack of innovation – these descriptions of the innovation capacity of the German economy have been circulating in the media for several years. From a scientific point of view, these are controversial findings: repeated statistical evidence supports the hypothesis of declining innovation (eg the KfW study on the declining innovative power of German medium sized businesses, Zimmermann 2015), but other research also suggests that Germany is a stable innovator and a pioneer in the field of Renewable Energy Technologies and Advanced Manufacturing Technologies (eg, the Focus Innovation Indicator 2015).

The contradictory statements and evaluations indicate not only the expert dilemma that the innovative power of a society cannot be measured exactly, but also that the term and concept of “innovation” as used by a diversity of stakeholders is functionalized differently. The fact that the terms innovation and innovation policy stimulate such debates and that some innovations rapidly trigger controversies also point to the discursive character and the social framing of innovations beyond their technical effectiveness. The observation that the concept itself has become an elementary component in the reflexive, self-referential discourse of modern industrialized societies (Hutter et al., 2011) is proved by fact that innovation concepts and innovation policies are increasingly observed by the media and publicly debated.

In modern societies, novelty is communicated as a value in itself. Innovation presents itself as an unquestioned principle of modern culture and has become a constitutive part of the modernist paradigm, together with the concepts of growth, progress and development. Over the last decades, the discourse on innovation has

developed and expanded into a normative discourse for all added value in economy, science, research, politics and society (technical and social innovation). But, innovations also trigger societal controversies that oppose new technologies, which grow more acute in the area of tension between euphoria and skepticism, they produce “innovation fatigue” on the one hand and a more powerful “necessity to innovate” on the other hand. The principle of innovation has thus become a constitutive, non-negotiable element of modern societies; it no longer has merely an instrumental character but turned into a fundamental value concept (Bechmann/Grunwald 1998, Godin 2015). The political communication of the principle, however, often evolves in a rhetoric, which communicates innovation as a “duty” or “compulsion”, sometimes even ideologized, and calls for a positive innovation culture. (Grunwald 2012b). Politics and the economic sector put their hope in a never-ending “innovation of innovation”. This being a culture of constant optimization and an extension of innovation to other areas of social value creation (civil society, services, political system) aimed at solving or controlling problems that have occurred in many economies since the 1980s, whether it be economic crises, lack of competitiveness, loss of production sites or ecological problems.

Innovation policy in the EU, i. e., is no longer restricted to securing only economic stability and growth, but takes on responsibility for societal and ecological problems such as climate change, demographic change, energy and resource scarcity. The dominant strategy for this is the attempt to stimulate innovation on the supply side. With growing momentum this happens through incentives for innovating research itself, for example through targeted application-oriented

research funding or by the increasing promotion of inter- and transdisciplinary projects.

Innovations also have to be accepted in society, in order to qualify as innovation. The second strategy therefore is to implement a “demand-driven technology design” and furthermore, to create the economic, cultural, social and political conditions necessary to keep the innovation process running while also creating acceptance for innovations. (Grunwald 2012, 75).

Innovation is first and foremost something that is “unlike the past”, which means there is a temporal distinction as a difference to the current state. This may be unplanned and can occur randomly (Luhmann, 1990) or instead may be the result of planned processes (Grunwald, 2012b), which developed “in the tension between planned expectations, expected developments and unexpected experiences” (Grunwald 2012, 79). Technical or scientific novelty and their distribution as innovation are therefore not pure discoveries, but results of a complex scientific and social construction processes that affect processes of social reproduction (Rammert 1993, 2000; Grunwald 2012).

Social and scientific constructions are always locally contextualized, thus producing local innovation cultures. Innovation can therefore only be socially accepted as useful if it is embedded in diachronic and synchronic semantic reference frames. How these reference frames and, thus, the conditions for successful innovations are to be determined is the subject of controversy that concern not only the local-spatial conditions, but also the temporal localization, the derivation of innovations from earlier social problems, and their orientation towards the future and sustainability. Thus, innovation policy is always additionally a dispute over sovereignty of interpretation of history and future by selectively

connecting to historic visions of the future in which some contemporary visions of the future gain discursive power.

In this paper, we do not ask the question: What is innovation and what keeps the innovation processes running? We also do not ask the question that keeps all branches of sciences busy: How do we shape innovation so that we are doing well?

Instead, we look at the innovation discourse as a strategic discourse of modern societies, which have fallen into a crisis. This discourse has already succeeded in implementing the scientific, technical and social innovation as an “improvement” and as a “solution” to social problems as a principle and consensus. Innovations are communicated mostly as conditions for the solution of societal problems and therefore represent the vehicle of social self-preservation. This principle is losing credibility the more innovations, particularly technological innovation, is considered a cause rather than a solution to economic and social instability. Within the context of growing post-materialist settings, the increasing criticism of growth, market, progress and other paradigms of the organization of modern societies including increasing uncertainty in the face of technological complexity and higher risk awareness, discursive dominance can only remain when:

- ◆ Stakeholders broaden the concept of innovation semantically
- ◆ Criticism is integrated
- ◆ Participation in the innovation process is allowed
- ◆ And the “futurability” of innovation is communicated.

Both, supporters and opponents of the modernist innovation principle follow a strategy:

Inclusion – to be found in processes of semantic extension of the concept with the integration of criticism, the enabling of participation in the innovation process and the communication of the sustainability of innovations.

Therefore, we ask: How is innovation discussed, and what are its semantic structures and which functions are fulfilled by the innovation discourse in modern society? What is the role of discursive strategies, such as the extension of the term innovation to cultural and social contexts, like “innovation culture” or “social innovation”? Which elements of technology discourses, for example discourses on technology futures or imaginations of the future influence both innovation discourses and innovation strategies? How are they referenced strategically?

Below, we attempt an analytical review of the innovation concept and focus on three recognizable processes of the expansion of the concept for producing and maintaining social consensus on “Innovation as a solution to social problems”:

- ◆ The integration of post-materialist criticism of the modernist paradigm leads to the semantic reinterpretation of the concept of innovation as “sustainable innovation”.
- ◆ The integration of users by granting participatory rights implies the extension of the term innovation to “social innovation”.
- ◆ The integration of concepts of a technomoralist, desired future leads to a temporal extension and reevaluation of “forced innovation” to a positive connotation of innovation as transformation, thus, a re-evaluation and transformation of “Innovation as coercion” into a social consensus that innovation, change and transformation are inevitable and necessary.

I Integrating criticism:

Semantic re-interpretation and incorporation of divergent concepts. From innovation ban to sustainable innovation

Social interpretations and cultural appropriation of the innovation principle

“Innovation is the key to prosperity, growth and jobs” (BMBF, Federal Report on Research and Innovation 2014). Slogans such as these tend to exist in almost any national strategic paper. Knowledge, creativity, entrepreneurship and value creation are regarded as elementary contextual conditions for innovation. They stand for the ability of a society to compete in the increasingly rapid diffusion chains of the innovation spiral and thereby, to be able to produce and attract economic, social and cultural capital. The current innovation discourse legitimizes the “coercion to innovate” as inevitable for the welfare of companies: for maintaining a competitive edge, to ensure growth and progress, to make use of social, scientific and technical inputs and, thus, for the efficiency of the production of scientific and technical knowledge. How did this happen?

A comprehensive discourse analysis of the concept, especially its formation since the 17th century is already available (Godin 2015), a discourse analytical study of its semantics and use in the present and especially the development in the 20th and 21st century, are, however, scarce (example for extensive analysis see Hutter et al. 2011). The emergence of the innovation discourse is an essential aspect of the cultural process of the formation of modernity. It begins with a change of attitude on the “New” as something positive. If innovation was a pejorative term until the late 17th century, and equated with heresy (Godin 2008), then the semantics of the term has fundamentally changed with modernity. The affirmation of the New (neophilia) is itself a product of the modern age, accompanied by an altered understanding of the relationship between humans and nature and with a decoupling of the religious world view from the scientific: humans as creators, as agents, who not only dominate nature, but can create

and alter the perfection of divine creation in an epigenesis. Innovation today marks not only the difference between the new and the old (Bechmann / Grunwald 1998), but also the new as the “Desired” and “Better”, which materializes also according to the social ideas of the better way or good life. (Godin 2014, Grunwald 2012, 2012b).

In the current German discourse, innovation refers mostly to technical innovations, new products and inventions and their successful value creation. Ideas and inventions classify as an innovation if they can be measured by its social impact, i.e. in the form of their realization as new products, services, processes, organizations and processes that disseminate in the market (diffusion). Thus, the concept of innovation, at least in the German discourse, always refers to a means-end relation, a utilitarian calculation and a value orientation, which refers to all sections of the society.

If use, purpose and value assignment represent the status of an innovation, then the innovation capacity of societies is not only determined by the generation of innovation on the supply side (*technology push*), but decisive are also the social contexts that frame demand, acceptance, positive review, actual exploitation of novelty (*social-pull*). In the end, it is the public communication (not only acceptance) that turns a perceived, mostly positively evaluated improvement in a specific identity setting and social contexts into an actual innovation. Other improvements remain hidden at first, because they are mostly pejoratively rated and socially rejected, stigmatized and prohibited. Therefore, they do not have the status of an innovation, but maintain the potential of becoming one.

Improvement is also recognized as an innovation if it can act as capital in social relations. It surpasses the threshold of acceptance in the social system in a ritualized way, by being pushed into the focus of social and scientific attention by events such as celebrations and presenta-

tion events or studies on their long-term effects. On top of its practical added value, by capitalization the innovation evolves into a carrier for distinction or improving status and becomes the marker for avant-garde-like identity positions. It generates multipliers and imitations, but also counter-movements, for example rejection or even sabotage.

In this process, supporters of innovations change communication strategies and bring along the development of a language for providing and generating acceptance of technology and technical maturity. This is especially significant for innovations that lead to changes of perceptions and social conditions such as the perception of new speeds with the introduction of innovative mobility systems in the 19th and 20th centuries, the change of sociality and of the production process through the introduction of innovative lighting systems or the change of communication behaviour and of spatial perception by introducing modern communication systems.

Innovation as Risk

Since the beginning of modernity and especially in the present era of innovation rhetoric, the concept of innovation contained an implicit valuation as the better, good and desirable (Nowotny 1997). A new awareness for problems and a differentiated view of the concept evolved in a context of increasing awareness and communication of risks. Unexpected, negative consequences of the introduction of innovations show that innovations are ambivalent and that they bring forth winners as well as losers at the stakeholder level. They are afflicted with risk and thus produce uncertainty (Grunwald 2012 76; Grunwald 2012b). Critique of the innovation concept relates primarily to those processes, products and technologies that have been previously discussed in society as an innovation. So, even a critique of innovation serves as a marker that indicates a new feature, even if this

means putting the exclusively positive semantics into perspective by referencing uncertainties, doubts, risks and polyvalent affects on different interests-groups.

The process of the diversification of debates on social consensus about what can be considered an innovation and how innovations trigger social change, marks an era in which in addition to a more democratic access to knowledge, the possibilities of equivalence of value judgments and social influence and options for the management of social space increase. (Stehr 2000) On the other hand, the pluralization of relevant value judgments and options leads to an increase of complexity in social relations. With a more profound knowledge and acknowledging the equivalence of knowledge also contingency experiences increase: the former sense of control of processes dissolves, resulting in uncertainty and actual or perceived loss of control, which in turn can be potentiated by ever more complex technologies and technological convergence. The dilemma of the knowledge society and innovation society is that the expansion of options also brings about uncertainty regarding the adequacy and accuracy of judgments and actions. This concerns not only single innovations, but the total number of paths of future social developments through possible and likely impacts in the complex social and ecological system. A society that increasingly reproduces in the medium of technology (Grunwald 2012), leads to increasing technological complexity possibly being reflected in society by: a duplication of debates regarding the risk potential of new technologies, controversies about risk management and polarizing strategies of dealing with innovations and new features in general.

But it is questionable whether the innovation discourse can retain its role as a catalyst of growth ideology under conditions of uncertainty. Skeptical voices raise doubts about whether innovation continues to be a self-evident value, in situations where on the one hand we can

estimate the consequences of the introduction of new technologies, but on the other hand cannot even imagine certain consequences because future contexts are radically unknown to us. Besides the establishment of innovation as a self-evident value of modern societies and an innovation euphoria that sees innovation as the (technical and scientific) key to solving social and economic problems, there is also a range of skeptical voices. Peter Sloterdijk pushes this attitude polemically in front of an audience from the financial sector that sees circulation of financial capital and speculative areas in danger due to lack of innovation (see KfW study): "The contemporary world is a largely unmoderated outdoor experiment on the simultaneous introduction of a non-counted number of innovations to civilization. Everything that does not lead to a catastrophe in short or medium term must be regarded as success. Modern nations are thus always also test systems for implementing innovations." (Sloterdijk 2011)

Integration of criticism

To successfully use the innovation discourse as a catalyst for solving social problems, the consensus on its associated paradigms "growth" and "progress" must be preserved. There may be considerations such as: "Not every innovation can generate growth." But few would question the statement "No growth without innovation". Proponents of the modernist innovation paradigm take the spreading criticism of the ideology of growth not only serious, but also integrate criticism in the new governance of innovation. Science funding, for example, sees the risk potential of innovations. But instead of limiting funding, the uncertainties and risks are made the main topics of new research questions and funding programs that provide even more budget for research on risk assessment, risk elimination and procurement of acceptance.

How does this work for criticizing particularly technical innovations as potentially risky pro-

ducts? It happens precisely through an integration of criticism in the favorable speaking about this innovation. Even the topos of sustainability may ultimately aim at achieving a positive turn of criticism of the innovation and growth ideology of modern societies. By discursively referring to sustainability, potential hazards of technical innovations are indeed generally admitted but risk accusations of a specific innovation that is already classified as "sustainable" or "sustainability contributing" are being countered. Colonized and domesticated by the innovation discourse, "sustainability" turns into a positive attribute of innovations in production processes, services and technologies. Growth turns into "sustainable growth" and innovation into "sustainable innovation".

Innovative is what potentially can ensure the survival of a society, the "responsible innovation" in the sense of a technology governance that is directed towards responsible technology and innovation (Nordmann 2014, Grunwald 2012a), oriented at utopian thinking and at socially negotiated, needs-based normativity. In times of risk society with commitments to sustainability this would include also technologies and processes, which "save", "secure", "preserve" not the social and political state of the art, but the diversity of natural and cultural resources. This shows the possibility of further semantic reinterpretation: What was once referred to polemically as innovation fatigue, or even disapprovingly as a fear of technology, namely a cautious attitude towards technological innovations and an assessment of their risk potential, can be hailed as the new way of technological progress today. A way that restricts the feasibility and market principles by norms of social responsibility and by fulfilling the complementary imperative of risk society, namely the sustainability of social, economic and political action. Awareness of modern societies of their own fragility (Stehr 2000) has led to perceiving the positive as what minimizes risk, integrates criticism, accepts

diversity, solves problems and resolves conflicts. The umbrella term for this is “Sustainable Innovation” (Fichter et al. 2006).

Whether the innovation discourse can maintain its role as a catalyst of the ideology of progress under these conditions is questionable. By including criticism of innovation and expansion of the semantic field the term innovation is no longer indispensably linked to its traditional semantic field, marked by growth principles and optimism about progress. Even the representatives of a post-growth society with their definitions of sustainability through abstinence and de-growth represent themselves as actors in the innovation discourse. The concept of innovation appears thus largely decoupled from the growth paradigm and now describes future orientations that can be applied on new products or social trends in a flexible way. Even more apparent is the decoupling of the traditional innovation discourse from modernist innovation ideology and the reorganization of the innovation paradigm in the theories of modern ecomodernism (Spahl 2015; Breakthrough Institute 2015). The Ecomodernists regard crisis, destruction, depression, systemic contradictions and dialectical dysfunctions of the current regulatory regime, that lead to a semantic conversions (for example, of the concepts of resources and nature protection) as a functional prerequisite for innovation at all, and understand innovation not only as a solution to social crisis, but the crisis as a requirement for innovation.

II Integration by granting participatory rights:

The appropriation of social issues. From the culture of innovation to social innovation

Since the 1980s, the cultural foundations of innovation processes have been increasingly examined. On the one hand, researchers try to explain the national- and regional-cultural contexts of the emergence of innovations from a macro perspective. (Rogers 1995; Blättel-Mink 2005; Jones 2000; Barben 2007; Gieseke 2000) On the other hand, sociological and economic studies examine the role of knowledge and rationalities in processes of emerging innovation and creation of corporate culture with a meso and micro perspective approach. (Dierkes 1997; Knorr-Cetina 1999; Abbott 2004) Research on innovation did examine the creation, implementation and diffusion of innovations, but hardly noticed the innovation discourse itself and its semantic field as a decisive factor. There have been some attempts at trying to consider specific innovation policies and innovation discourses in their cultural contexts. The department of "Cultural Sources of Newness" at the Science Center Berlin for Social Research, founded in 2007, was devoted to several projects regarding the question of social and cultural contexts of innovations. (Hutter et al. 2010) Furthermore, Godin (2015) examined how the concept of innovation in the Middle Ages and well into the early modern period was connoted purely pejorative and has developed into a positively politicized term only since modernity. What is missing are attempts to examine the social function and instrumentalization of the term by using methods of a critical discourse analysis. The focus of interest would then shift to:

- ◆ the paradigmatic and social-epistemological context, such as the views on modernity, progress, development (traditionalism, modernism, escapism);
- ◆ identity positions regarding the capacity of technologies, the evaluation of their impact on social developments and principles of dealing with technical possibilities (proactive

vs. precautionary principle);

- ◆ emotions that are projected on new technologies (e. g. technology-euphoria, -nostalgia, -anxiety, hostility to technology).

Principles and propaganda

It is controversially discussed how to best regulate innovation through politics or how to design participation of civil society and thus increase acceptance of technology. Debates on regulatory principles in innovation policy are particularly enlightening because they use the climate of uncertainty to shift formerly politically constituted controversy on the scene of innovation policy and thus construct national and regional cultures of dealing with new technologies, with reference to past innovation eras. The different ways of introducing governance structures, as well as research funding, technological development plans and regulations for use of resources, waste and emissions are subject of debate not only in politics but also in civil society and academia. The direction in which way to go from here, divides the world "beyond left and right" in ideological camps, which differ by the principles of their handling of risks, technological innovations, their visions of the future and openness to social change.

For instance, the proactive imperative differs from the precautionary principle (Fuller 2014) in that the proactive principle trustfully approaches technological developments and technical innovation and is characterized by a positive and optimistic attitude towards technological change. According to Fuller, these identity orientations (*proactionary* vs. *precautionary*) replace even the old political axis of the left and right. In a society that constitutes itself through the medium of technology and in which attitudes towards technological progress are important, in this society the new trenches extend not along political attitudes, but at the boundary between people who believe in the potential of technological innovation and even believe in the pos-

sibility of technological solutions for the inherent negative consequences (*up-wingers*) and those who argue for a limitation of the modern lifestyle and thus a limitation of the human technological intervention in an assumed natural order (*down-wingers*). (Fuller 2014) On the same level, in the climate debate, the opposition of emission reduction (*mitigation*) versus climate change adaptation (*adaptation*) is a politically solidified controversy, that critics assess as a hindrance because they should rather be thought of as complementary strategies. (The Hartwell Paper 2010) In the debate about the different principles of dealing with innovations and new technologies, the US and the EU are presented as representatives of opposing strategies and antagonistic regulatory regimes: on the one hand, the US with its proactive approach, on the other hand the EU acting on the basis of the precautionary principle. Since the 1980s, the technological deficit of Europe is repeatedly pointed out and scary images of the industrial downfall, especially in Germany, are conjured. The accusations, primarily from the pro-innovation-lobby affiliated with the industry, claim that Europe will sleep in on the second industrial revolution in information technology und microelectronics because it lacks a consistent industrial strategy and because of a control-addiction, protectionism and over-regulation. (Seitz 1990; Jarvis 2014) "Ritualised opposition" against innovation are supposed to be mostly found in the energy and biotechnology sector. Critics warn, that biotechnology could become the "vehicle of applied cosmo-politics" and that nations, especially Germany, should not lose the connection to the development of innovation in this field of technology. (Benedikter, Giordano, DIE WELT, 29.1.2012)

A similar line of argument is brought forward by the authors of the debate journal "the European" in August 2014 (Scherzer and Ebert in The European 2014) while scientist and social philosophers favor a more moderate approach, requesting a better understanding of techno-

logical developments and responsibility as well as maturity concerning new technologies (Heuer, The European 2014). They also advocate a culture of skepticism toward technological developments, especially in regard to the involvement with the strategies of big business. (Mishima, The European 2014)

Differentiating technology acceptance

This "culture of scepticism" (positive) or the "culture of fear" (negative) requires a differentiated perspective as it does not affect all aspects of technology in the same way. Innovations are increasingly developing even outside of high-tech research labs because of the changing concepts of work and production, leading to a closer connection of innovations to the life worlds of users, who introduce innovations to the market via start-ups. On the other hand, the resulting democratization of innovation strengthens the voice of non-expert discourses and valorizes their risk perception and critical assessment. The awareness of the ambivalence of technology is increasing in broader strata of society (Acatec 2011).

However, this awareness and the influence of civil society on the governance of technological developments cannot be traced back to a general "Technology Angst" or "innovation allergy" because it differs in regard to the type and field of application of the technology. The Acatech report (2011) observes a high level of acceptance in the field of product technology and everyday technology as well as in the field of workplace technology. In contrast, the image of the so-called external technology is more differentiated in the fields of energy (nuclear power plants), mobility (transport infrastructure), waste (waste incinerating plants) and genetic engineering. In these fields we notice a discomfort created by technologies and infrastructure where the concrete added value for the individual is not directly visible. Instead, these technologies are attributed with a "personal feeling of risk or

a reference to the change of natural livelihood". (Acatech, 12) A skeptical attitude towards new technologies is mainly to be found where the development of these technologies leaves little room for participation and therefore the lack of knowledge and the feeling of not-being-integrated is perceived as a loss of control. While new technologies become more and more complex and potentially less comprehensible, the communication offices of businesses and academic institutions have successfully developed ways to convey the facts in a generally intelligible way. The participation of citizens in the introduction of new technologies is now considered essential for subsequent acceptance. The previous marketing strategies of companies that attempted to convince potential users of the application value of their products is now complemented by strategically building trust and by integrating users in production processes as producing consumers (prosumer). This includes communication on the fact that potential risks are evaluated and handled carefully in favor of the consumer. On the one hand, this early communication with involvement of multiple stakeholders fulfills a legitimizing function regarding already voiced or anticipated criticism. On the other hand, it produces a greater public awareness of latent and possible consequences. The Acatech report shows how more knowledge does not automatically lead to higher acceptance. There are indications that a higher understanding of complexity is detrimental to agreeing to technological developments.

Acatech studies indicate that the reputation of German technophobia is not correct, one could rather speak of a skeptical view of technology or culturalist middle class attitudes that replace the conventional modernist progress assumptions of the post-war-decades. (Acatech 2011) This could be explained by a tradition specific to the German culture of innovation, which excludes technology and science from the classical educational canon and understands technology merely

as a product to consume. This view developed in a specific cultural background and in the context of an understanding of nature as authentic and inherently good as well as in the German tradition in the 20th century of perceiving technology as potentially externally determined, end in itself, hostile to nature and as an "industrially manifested power". (Acatech 2011, 15)

Participation: domesticating and governing emotions through inclusion

As more of the understanding of technological processes and their impacts on society dissolves in increasing complexity, the influence of emotions on technology assessments and attitudes on technology becomes stronger. The attitudes towards new developments are also affected by values, identity positions and lifestyles: "technocratic-liberal progress-oriented people" differ from "culture pessimistic alternatives".

Discussions on the impact of technologies introduce the terms of "objectivity" and "rationality" as combat terms and vary between accusations of lack of objectivity on the one hand and technocratic strategies of habitual objectification on the other to legitimize their own "objective" position. (Grunwald 2014) While the charges of emotionality become a killer argument in scientific debates of technical experts, emotions do exist in public controversies and are staged in the media. They must be taken seriously and receive their voice. Media also reinforces certain fears such as risks associated with food, climate, diseases and epidemics. Some technologies can include various potentials depending on the purposes for which they were developed and used. Likewise, the tactile and sensory experience of new technologies plays a role in the assessment.

For example, technologies that cannot be perceived by the senses produce more fear because they cannot be localized or experienced and therefore seem to be not controllable. (Renn 2009). Such seemingly abstract technologies (i. e. nanotechnology) make it impossible to

make a conscious decision for or against them and thus lead in some way to an incapacitation of the individual. Also, the functionality of the new technology is becoming less apparent. This increases the focus of attention on their risk potential even more so. Consumer organizations founded in the postwar period and consumer advice centers, which became stronger in recent decades as well as independent product testing institutes appear on the scene as counterweights to the innovation optimism of the industry. Since fear and skepticism regarding technological innovation exist, they must be part of a policy of public dialogue in order to reach consumers. Fach (2000) speaks of a congruence of loud public controversy and private mechanisms taking place quietly to reach habituation to new technologies in social systems like family, education and health. In the latter, in particular teachers, parents and physicians act as technology intermediary "brokers" in everyday life. (Fach 2000). Technology dialogue, as argued from this point of view, finally solves the former power struggle between progress optimists and progress pessimists, generating new concepts of political and theoretical reflection: "rationality replaces legitimacy, insight displaces power and instead of domination there is only acceptance." (Fach 2000)

The increasing interdependency of technology and way of life and the constitution of society in the medium of technology (Grunwald 2012) opens the semantic field of innovation not only towards the inclusion of risk and criticism ("sustainable innovation"). More importantly, the concepts of "open innovation" and "social innovation" also bring the implicit consequences for society (Zapf 1989, Gillwald 2000) and the appropriation of the social as aspect of innovation into focus. Innovation turns into a principle that affects all areas of society. In a society in which on the one hand technology is socially constructed and on the other hand society is reproduced in the medium of technology –

technology and society are inextricably linked – thus, the innovation discourse can only continue to exist, if the users are involved, their negative emotions are being taken seriously and when they are even regarded as potential innovators.

Social Innovation

In recent years, the concept of social innovation has become more and more present, both in political discourses and discourses in civil society. The term "social innovation" cannot hide the fact that they often have their attributed cause in technological innovations. This occurs in the sense of "cultural lag" between technological and social innovations and because social change would never develop congruent with actual technological developments. (Ogburn 1957) Technological innovations as new technical artifacts induce change in communication and social processes between people and also characterize the conceptualization of what is new and futuristic. Therefore, when they reach the consumer and are embedded in their life worlds, technical innovations lead to social change, which in turn then bring forth new processes, institutions and forms of organization that are called social innovation.

While Ogburn put forward his theory of cultural lag between technical and social innovation and thus attributed a minor role to social change, Whyte (1982) worked on the question of how social innovations can be viewed as solutions for problems of society, produced by technological innovation. He does not constitute the social innovation as a simple consequence or reaction, but as an active approach to change in culture and therefore also in technology. Social innovations are therefore self-productive and socially active and not catch-up adjustments to technological change. From this perspective, the linear causality from technological to social innovation dissolves, social innovations are defined as "new ways to achieve goals" that change the direction of social change. (Zapf 1989,

Howaldt & Schwarz 2010).

They can be prerequisites, concomitants or consequences of technological innovations and affect not only the level of the individual but also the level of organizations, which go through social change first and need to ditch the old paradigms of the innovation culture as well as the insistence on pseudo innovations, to ready themselves for basic innovations and new developmental paths (ibid.).

The term social innovation extends the technologically pre-occupied innovation concept to other areas of society, especially to new user cultures, lifestyles, backgrounds and their models of action and forms of organization. Characteristics of the new social movements involved in designing social innovation, are their organization in networks and their confident proactive, inclusive-participative role in innovation processes as pioneers of change, transformation stakeholders, social entrepreneurs or advocates of "open innovation". Society itself becomes the place of innovation. (Howaldt/Kopp/Schwarz 2008) Social innovation replaces social change.

In their self-description, civil society actors of emerging social innovation rarely refer to the politicized concept of innovation. They refer to themselves as "pioneers of change" or "protagonists of transformation". This way they perform a discursive inclusion that clearly distinguishes from anti-systemic and escapist tendencies of systemic criticism. (Ufer 2015) If the original motivation of these groups lies in the negative evaluation of the technical-modernistic pressure to innovate, then an innovation discourse that integrates the guiding principles of sustainability and participation and opens up towards societal aspects (social innovation, open innovation) can integrate groups that formerly emerged at the margins of the discursive field.

This paradigmatic shift takes place in politics and industry. Both recognize potentials of added value in public and private sectors brought by these communities and want to include them

through promotion of social entrepreneurship. Since 2011 the European Union has been requesting an "innovation union" of technological and social innovation and directs (with the initiative "Social Innovation Europe") the attention to the social and cultural contexts as well as the societal impact of social innovation and social entrepreneurship.

This is not the place to discuss whether the governance of the emergence of social innovation leads to a socio-political program similar to the regulation of technological innovation. In such a scenario, questions regarding the feedback from social innovations to society and their governance and regulation become important: Does a variety of new social innovations, that exist competitively and target different identity groups, lead to an increase in societal complexity, a production of insecurity and disorientation among users? Can social innovations involve risks to the same extent as technological innovations? Will there be impact assessments for social innovation?

III The integration of the future:

Innovation as a „realization“ of past techno-visions and construction of new futures

From the perspective of social innovation, the perceptions, evaluations and emotionalizing of innovations, especially technological and social innovation, represent not only an ex post assessment of innovations (e. g. in form of high demand, trend setting, prohibition or denial of use). They rather form mainly ex ante the social contexts in which innovation develop (e. g. by bringing discourse stakeholders to debate: What do we want vs. what do we not want? How do we want to use the technical opportunities in the future?).

Technology discourses in society are not only discourses on existing technology and human-technology relationship, but also on latent and manifest visions of technology, imagined and voiced visions, as well as futures of modern societies negotiated in debates and controversies. It is because of the fact that they contain hopes, fears, and express needs and desires that technology discourses represent at the same time regulative ideas about the present and thus influence today's visions of the future. According to Nordmann (2014) the anticipation of a world that is radically different from ours, is not possible because our knowledge and judgments are shaped by experience and history.

As society is becoming aware of increasing complexity in technical and social innovations, the realm of possibilities of the future gets too indefinite to make reliable, indicative statements about the future. This leads to the recognition of the fact that the future is in principle always open. This has to be handled in a constructive way, because the demand of politics and society for orientation and knowledge increases with the uncertainties created by technological and social developments. This regards especially uncertainty regarding future developments as well as the awareness of the risks afflicted with these developments. Despite our lack of knowledge on the future, there are social and individual imaginations of possible futures that

are technically coded and which are negotiated in current debates and controversies. Discourses on possible futures influence imaginations of the new, the governance of innovation as the intersubjective and communicative construction of the new (Knoblauch 2014) and, thus, mark the paths from the imagination to the actual materialization of the future. Although it can be assumed that these fantasies, utopias and visions of the future have an impact on actual technological developments and innovations of the future, it is by no means certain that there is a direct causality between imagination and realized innovations. It is also unclear which paths these developments take in complex social systems with diverse social actors.

Therefore, all talk of the future is of a speculative nature. This becomes even more problematic when forecasts of a likely future or scenarios of multiple possible futures claim to produce knowledge for orientation and guiding action. This became obvious in the very diverse debates on climate engineering, synthetic biology or human enhancement (Grunwald 2013). But, subjecting the contemporary debates and discourses on possible futures to a hermeneutic analysis may provide insight into "imaginings of specific cultural, economic and social contexts in which new developments should become innovations" and on actual occurring processes of communicative and discursive production of technology futures. (Grunwald 2012, 84)

This means: The analysis of possible technology futures and innovation paths is always also an analysis of the present, which can provide insight on which stocks of knowledge, diagnoses and values primarily influence current visions of the future and why debates on possible futures are becoming more heterogeneous and controversial, why projections of the future are getting increasingly random and why orientation is thus a process of mediation between particular positions.

The proliferation of the innovation discourse as outlined above and the integration of criticism (sustainable innovation) and of social aspects (social innovation, open innovation) are particularly true examples of how futures of technology and innovation are imagined and negotiated in contemporary societies. Technology futures are in any case afflicted with risk, which means that innovations have to be responsible (for future generations and nature) and sustainable. Sustainability itself is a concept that gives insight on the future viability of innovation and in this respect integrates the future.

Technology futures furthermore depend on acceptance and are designed inclusively through introducing the concept of participation and the extension of the technological innovation concept onto the social. If technology is combined with social aspects and if the technological innovation is supplemented by social innovations then technological change is at the same time social change. The concept of social transformation is mainly transported by stakeholders of social innovation and shows that the future is a highly competitive terrain, where many stakeholders clash, but where one thing is consensus: innovations are future – we only reach the future through innovations.

This understanding of innovation as a cultural process, with its long cycles that precede actual technical innovations and even survive them, its embeddedness in the knowledge organization of society as well as its latency in economy and politics of a society are essential for approaching a more complex understanding of the imagination of social transformation.

Innovation discourses assume not only the discursive production of the new with references to social imaginations of futures, they also constitute an accompanying governance of innovation processes by circulating intentions, directions and purposes communicatively, by making these processes and the market emergence of new products, services and institutions a subject of

discussion, by offering evaluations as well as by representing emotions and identifications.

The semantic and discursive opening of the innovation concept towards “sustainable”, “social” and “open” innovation suggests that the “new” and curiosity, as well as the principle of scientific, technical and social innovation are fully implemented as consensus. In contexts of growing post-materialist settings and increasing growth criticism the modernist concept of innovation finds its rescue precisely in its broadening and semantic expansion.

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