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Innovation Society Today: The Reflexive Creation of Novelty¹

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Innovation society today: The reflexive creation of novelty

While innovation has shaped modern society from its very inception, it is currently gaining new dimensions: Innovation is becoming increasingly reflexive, heterogeneously distributed, and ubiquitous. *Reflexivity* implies more than the intentional transformation of routine actions; it also refers to the transformation of social practices based on continuously (re-)produced knowledge about innovation. Thus, innovation itself becomes the aim and purpose of social activities: as the meaning and motif of (what we will refer to as the “semantics” of novelty), as a component of practical routines (the “pragmatics” of creative action), and, finally, as part of systematically (re-)produced social structures of generating novelty (the “grammar” of innovation regimes). *Heterogeneous distribution* refers to the observed shift from the individual entrepreneur to networks of innovation involving divergent actors. *Ubiquity* indicates the current expansion of innovation beyond the traditional spheres of science and economy and its generalization into an imperative for social action.

The doctoral program will address the following key questions: *How is novelty created reflexively, where can this process be observed, and which actors are driving it?* Practices, orientations, and processes of innovations will be studied in and between various areas, such as (a) science and technology, (b) the industrial and service sectors, (c) arts and culture, and (d) political governance, as well as urban and regional planning. By pursuing an extended notion of innovation, the graduate school will strive to develop a sophisticated, sociological lens which is more encompassing than conventional economic perspectives. The doctoral candidates will undertake a series of case studies in various areas, which they will also analyze in comparative terms so as to promote a more in-depth and empirically founded understanding of the meaning of innovation in contemporary society and the social processes it involves.

The graduate-level coursework will include an introduction to the theory and methods of innovation research. In addition, graduate students will be supported in developing research skills and professional competencies. Each doctoral thesis will be supervised by a team of two professors with consulting by a third external international advisor. All candidates will regularly present conceptual excerpts from their thesis in the graduate school colloquium. In addition, graduate students will be encouraged to organize workshops and summer schools on their own initiative. While the following text provides a common analytical framework for the theses, Ph.D. candidates will be expected to conduct their own high-level, independent research.

1. Graduate program profile

Society's ability to reinvent itself is currently under debate. This discussion no longer centers solely on new technologies and economic innovations, but on how novelty is currently created in all spheres of society, how it is discerned in its nascent stages, defined in different ways, and asserted in a variety of social spheres, even in the face of resistance. "Creative districts" (Florida 2002) and "creative capitalism" (Kinsley 2008); "social", "open", and "public innovation" (Howaltdt/Jacobsen 2011; Chesborough 2006) are just a few buzzwords being cast about in public debates in Europe and the USA. The graduate program "Innovation society today" places the purportedly new *reflexive quality* of actions, orientations, and institutions, *both as an overarching and cross-cutting social phenomenon*, at the center of its analysis. The studies which will take place within its framework should help gain a better understanding of the dynamics of creative processes in different fields of innovation and explain the success of specific innovations by examining social mechanisms of justification, valuation, imitation, and strategic network creation.

The graduate school's approach to analyzing the responses of different social spheres to the ubiquitous imperative of innovation differs from alternate agendas of innovation research and analyses of macro-level social change in various respects. First, unlike the predominant perspective with its underpinnings in economic theory, this approach does not limit itself to familiar fields of innovation such as the manufacturing and service sectors. Instead, we adopt and develop a more comprehensive *concept of societal innovation* rooted in the social sciences (Rammert 2010). Based on this concept, innovation is defined according to what actually counts as such in specific fields, e.g. in the arts, science, politics, or social planning. The economic concept of innovation is not abandoned in the process, but specified in terms of its main reference points, i.e. increased productivity and market presence. This positioning allows us to learn from the operational success of earlier notions of innovation while adopting a critical distance toward a purely economic assessment of innovation in other social fields.

An additional defining feature of this program lies in the cross-cutting approach of examining the reflexive creation of novelty at several levels of society (micro, meso, macro). The political and economic sciences often focus on the macro-level of society, politics and economy, or specific organizations, analyzing, for instance, issues of governance or

the management of innovation. With the approach under discussion, these levels remain analytically intact. The difference is that they are enriched by the specific *micro-level of creative and innovative action*. This allows for a productive dialog with studies that examine practices and processes of experimental inquiry, “playful” engineering, creative and improvised planning, as well as theories of subjectivity and reflexive action.

As a third notable aspect of the program, the empirical analyses of innovation will integrate *at least two out of three observational forms*. The objective is not only to capture the discourses, practices or institutions of innovation; rather, starting from the focused analysis of a case, field, or development, the candidates will be required to identify and interrelate the semantic, pragmatic, and grammatical aspects of their chosen phenomena in order to go beyond the purely discourse-based or institutional analyses commonly found in current research. This approach should enable young researchers to differentiate between merely propagandistic (pseudo innovations), unrecognized (hidden or informal innovations) or strategic versus unintentional innovations, for example.

With this systematic perspective, individual research projects conducted across individual disciplines – e.g. new developments on the Internet; social change in various fields such as urban planning, the marketing of art, simulation in the sciences; as well as innovations related to political instruments or financial products – can be situated in the context of a *systematic theory of society*, in which the contemporary signatures and regimes of an innovation society can ultimately be identified and analyzed. Further lines of inquiry in this context may include, for example, a) whether the emergence and diffusion of a new reflexive model of action can be observed across different social spheres (i.e. along the lines of Weber’s rationalization thesis), b) whether the mode of institutional differentiation is shifting towards fragmented and heterogeneously networked patterns of societal coordination and c) whether institutional innovation processes are increasingly occurring along set paths or as individualized innovation biographies.

The graduate school will therefore enrich established economical innovation research with new insights and findings, and open up previously unexamined fields to a more interdisciplinary research perspective and more specific lines of questioning. This comprehensive framework will also permit researchers to touch base with relevant fields in economic sociology, the sociology of knowledge and cultural sociology, organizational institutionalism, as well as science, technology and innovation studies and work to intensify dialog and common points of reference among these disciplines.

A broader stance towards innovation in society also implies the risk of arbitrariness in the candidates' theses. This risk is countered by a specific *requirement: all participants must orient their work on the shared analytical and conceptual framework*. Potential topics will be limited to four areas and their corresponding fields of innovation. In terms of method, individual research projects must be designed, at least implicitly, as a comparison of cases, processes, and fields of innovation. Finally, all program participants will be required to address a series of five overarching questions in their work.

Several measures make this novel research approach suitable in relation to the *professional qualification* of graduate students. First, the program was developed by a group of experienced university professors who represent central aspects of the graduate school's research perspective (STS and innovation research; network and organizational research; knowledge and communication research; cultural economics research). Other affiliated faculty members are characterized by a) their competence in the *specific fields* of science and technology, industry and services, the arts and cultural production, and social planning and political governance; b) their *disciplinary diversity* (in addition to sociology: economics, history, planning, political science, and the arts), c) their ties to other relevant institutions (WZB (Wissenschaftszentrum Berlin für Sozialforschung – Social Science Research Center Berlin), Universität der Künste (Berlin University of Arts), Fraunhofer FOKUS, IRS (Leibniz-Institut für Regionalentwicklung und Strukturplanung – Leibniz Institute for Regional Development and Structural Planning), and d) their *individual diversity* with regard to age, experience, and gender. The ability to provide gradual school participants with a strong *skill set in qualitative and quantitative social research methods* was also emphasized. The program takes advantage of existing personnel resources in the Department of Sociology for innovation research. It also integrates other disciplines engaging with the topic of innovation at the TU Berlin and bundles existing competencies in the Berlin region. In the long term, these activities should stabilize into a *cluster for innovation research*.

The graduate training concept utilizes the above-described resources through a *combination of mandatory and elective components*. The first phase of the program provides a clearly structured introduction to the theoretical fundamentals and specific methods of innovation research. Participants thus receive the necessary analytical orientation, as well as individual advising, to promptly begin working on their theses in a qualified manner. Based on experiences of other graduate schools both inside and outside the TU Berlin, a doctoral training program was developed which, after conveying theoretical and methodological fundamentals, should promote focused, independent research among participants to provide them with important additional qualifications such as self-directed inquiry, strong communicative skills, and networking for future careers in academic settings or in other professional fields. Key instruments of the program are therefore in-depth lectures, seminars, and events on individual fields of innovation and current topics in innovation research, as well as the *independent preparation of thematic workshops*. In the third and final year of the program, the participants will have their academic “premiere” as each cohort presents and discusses its research results at an *international conference*, prepared by the participants themselves, in Berlin. Mandatory participation in the graduate colloquium and regular meetings with advisers will ensure an open line of communication on the progress of students’ theses as their academic discretion grows.

Various international collaborations will ensure the long-term innovative potential, visibility, and quality of research of the graduate program. Currently, close ties exist with research partners in Stanford, New York, Paris, London, Edinburgh, and Twente, and will be drawn upon to create a program for visiting fellows and researchers. Invitations to smaller summer schools, the large final international conference, and research residencies will allow the doctoral candidates to make important contacts and gain a third international adviser for their theses.

2. Research agenda

2.1. Motivation and central focus:

Reflexive innovation as a pervasive social phenomenon

Innovation was long restricted to the labs of scientists and engineers, R&D departments in the private economy and – though seldom acknowledged – artist’s studios. Today, creative practices and innovative processes have become a ubiquitous phenomenon across all areas of society. What has changed is that the creation of novelty is no longer left to chance, ingenious inventors, and the creative habits of specialized fields. Innovations are increasingly driven with purpose, with numerous beneficiaries in mind, and in the context of broad-scale demands for strategic innovation. Innovations are managed as complex processes distributed among various entities and reflected in terms of the actions and knowledge of actors in other fields. *Reflexive innovation* refers to the interplay of these practices, orientations, and processes, while noting that the path of an individual innovation is observed, shaped, and influenced by its specific institutional setting and ties, discursive justifications, and the forms and paths of other innovations. This new form of innovation is not confined to laboratories or R&D departments – as can be seen by cross-disciplinary and regional innovation clusters – nor does it shy away from shaping new innovation regimes. Innovation society today is characterized by a wide variety of innovative processes in all fields and by the unifying social imperative to innovate reflexively. Innovation itself has become a topic of discourse driven by a “culture of innovation” (UNESCO 2005: 57ff.; Prahalad & Krishnan 2008) that pervades all social spheres reflexively.

The central research question guiding the graduate program is thus: What degree of reflexivity can be identified in contemporary innovation processes, where do these processes occur, and how are they distributed among different actors?

Hence, the main theme is the broader societal relevance of reflexive innovation. This includes practices, orientations, and processes of innovation in selected fields and how they develop and are strategically advanced within and between different areas of society. These innovative practices, orientations, and processes should not only be analyzed in the classic fields of economy (industry and services) and science (research and technology development), but also in contexts involving culture (the arts and creative cultural production) and politics (policy-making and social planning processes).

The objective is to analyze how specific innovative practices, discourses, and institutional arrangements have become increasingly reflexive in recent decades. We are additionally interested in whether new developments in other fields have promoted or impeded individual cases or paths of innovation. Empirical analyses in the individual fields and case comparisons will ultimately permit an assessment of the extent to which the principle of reflexive innovation has become not only a rhetorical, but also a practical and institutional imperative in the current social climate of innovation.

We thus employ a more encompassing concept of innovation in society than that found in economics (Rammert 2010), which also allows us to capture new developments in the arts, social planning, and design, extending beyond economic calculations and rationalizations surrounding innovation. This concept also goes further than “social innovation” (Zapf 1989) and “political innovation” (Polsby 1984) in addressing the links between and different constellations of technical, economic, and social innovation. As a key distinction already described by Ogburn (1922) and Schumpeter (1939), this extended concept differs from “normal” social change in that it refers to new developments that not only “happen” and are then recognized and promoted. Instead, what we are interested in is the intentional, systematic creation of new material and immaterial elements, technical and organizational procedures and socio-technical combinations of all of the above that are defined as “new” and legitimated as an improvement compared to what came before. In contrast to Schumpeter’s early writings, contemporary innovations are seldom brought forth by individual business entrepreneurs; instead, they are created by different types of collective entities (teams, communities, companies, networks) that – however influential or reflexive – are also only in partial command of the overall innovation process, which is distributed across numerous other entities.

“Doing innovation” has therefore become an explicit aspect of what social actors do with regards to knowledge, discourses, actions, social systems, and institutions. Continuous reflections on and about innovation are accompanied by elaborate discourses that justify the new developments based on the interests of specific actors and actor groups. These arguments can involve situational explanations, organizational and institutional rhetoric, and taken-for-granted ideologies. They can build on modern concepts of progress or subjectivity (Reckwitz 2008: 235ff.) or pragmatic regimes of justification (Thévenot 2001) and valuation (Stark 2009: 9), construct views that make innovation seem necessary – or even unavoidable –, and promote investments in innovation. These ideas slowly crystallize into indisputable and sometimes highly authoritative “facts”, or social imperatives for all actors involved.

Based on the above considerations, we can specify our research focus even further: *How reflexively do actors define and organize innovation in different fields of innovation and which justification discourses guide their practices and interpretations?*

This phrasing permits a specifically sociological approach to innovation that draws from areas such as the sociology of knowledge, organizations, economics, and STS. This approach will, however, be supplemented and supported by economic, historical, political and planning-based perspectives from other disciplines.

In contrast to the engineering sciences, the sole focus of our program is not the production of new technologies, processes, or materials. Technical innovations in this stricter sense are a relevant point of reference; nevertheless, they are investigated in terms of their relations to non-technical social innovations, as well as their reflexive ties to economic, political, cultural, or artistic innovations. In contrast to economics, the main issue is not to increase the efficiency of different factors and processes. This conceptually limited economic understanding of innovation does constitute a central reference point in terms of its practical relevance; however, it is expanded to include other areas and ultimately superseded by a more encompassing concept in which complex interrelationships count. Economic innovations can thus also increasingly draw from various other references, e.g. artistic (Hutter & Throsby 2008) or political innovations. Unique hybrid regimes of innovation can even emerge from incongruities or “dissonance” between these references (Stark 2009) through the conflicts or compromises that occur as different regimes collide.

From our relatively broad social-science-based standpoint, our *first* concern is to develop an adequate understanding of innovation processes which are both distributed across various social fields and interconnected: How are different actors able to reflexively create and coordinate new developments based on existing patterns of action and justification? *Second*, we are concerned with understanding practices and processes: How are new developments distinguished as “new” by recognized institutions in different fields and deemed “innovations”? This includes the issue of power: Why, when, and in which constellations are specific actors and institutions able to define and successfully assert specific innovations?

Ample research is available for individual fields and forms of innovation (see Rogers 2003; Braun-Thürmann 2005; Fagerberg et al. 2005; Aderhold & John 2005; Blättel-Mink 2006; Hof & Wengenroth 2007; Rammert 2008; and Howaldt & Jakobsen 2010, among others). Innovation research, with its predominantly economic slant, has produced numerous analyses of the dynamics of technological innovations. Profit maximization, rational decision-making, and transparent price signals are built into this set of explanations. Nevertheless, these models also include insights into the boundaries of rational technology choices as well as the historic or evolutionary character of long-term technology development (see e.g. Rosenberg 1976; Nelson & Winter 1977; Elster 1983; Utterbeck 1994). With its strong focus on management, innovation research has presented in-depth studies of relevant personnel and organizational factors at the level of the firm (cf. Gerybadze 2004; Gemünden et al. 2006) and corporate networks (cf. Sydow 2001). This research emphasizes creativity and cooperation, trust and heterogeneous organization. More recently, however, scholarly interest in innovation has shifted from scientific and economic loci to other groups such as users, early adopters, and social movements (Hippel 1988; 2005; Chesbrough 2006) as new focal points.

In recent years, also due to technological and scientific competition and the necessity of drafting national innovation policies, research within this disciplinary tradition has also picked up on insights that innovation can include new forms of work (Barley 1990; Barley & Kunda 2004) and the creation of activity spaces (Massey 1992; 1995; Moores 2005) for individuals and collective actors. Innovation is now also viewed as a societal phenomenon, often with a transnational scope. This requires a broader conceptual framework and the integration of other social science disciplines. Innovations have thus been increasingly investigated in the context of organizational fields (DiMaggio & Powell 1983; Hoffman 1999), as well as national innovation systems and global innovation regimes (cf. Nelson 1993; Edquist 1997; Braczyk et al. 1998; Blättel-Mink & Ebner 2009). Innovation paths are regarded more and more as the result of cultural constructs and institutional selection, in which non-governmental organizations (NGOs) and professions play a substantial role alongside firms (Meyer et al. 1997; Meyer 2005; Fourcade 2009). Continuity and breaks among such constellations can result in different innovation biographies (Bruns et al. 2010).

The ongoing influx of new developments in cultural fields and the new creative industries has also been analyzed by scholars in order to integrate the various interrelationships of a modern society in the grips of permanent renewal in view of changing forms of media (Castells 1996; Florida 2002). Political science and sociological governance research have broadened the economic research perspective (Powell 1990; Kern 2000; Windeler 2001; Sørensen & Williams 2002; Lütz 2006; Schuppert & Zürn 2008). The history of technology, science, and economics provide the necessary historic dimension to the phenomenon of innovation and its economy (Wengenroth 2001; Bauer 2006; David 1975; Mowery & Rosenberg 1998).

A specifically sociological view of innovation has only begun to emerge, e.g. with the transfer of constructivist and evolutionary models from research on the development of new technologies (Rammert 1988; 1997; Braun-Thürmann 2005; Weyer 2008), with organizational and network research focused on innovation processes (Van de Ven et al. 1989; 1999; Powell et al. 1996; Garud & Karnoe 2001; Windeler 2003; Hirsch- Kreinsen 2005; Heidenreich 2009), and with models of creative production and cultural innovation from the sociology of knowledge and cultural sociology (Popitz 2000; Knoblauch 2010) all expanding the scope of innovation studies.

Within the Department of Sociology at the TU Berlin, the graduate program will focus on the practices and processes of the reflexive production of novelty as a shared research endeavor. Existing approaches to sociological and social-science-based innovation research will be bundled to develop a more comprehensive perspective by drawing from the various empirical studies of innovation fields in different areas of society, which will be systematically compared with regard to the rules and regimes of reflexive innovation. Through these studies we hope to gain a more thorough investigation of creative practices and innovation processes; more overarching topics such as the societal embeddedness and varying interrelationships of different regimes should also receive increased attention. With this agenda, the program can add a productive dimension to other graduate programs with a stronger economic focus. On the one hand, our approach will touch upon the concepts of innovation economics represented in the above programs and try to relate them with the views of other disciplines. On the other hand, it will consciously stray from economic-centered research to include studies on social innovation that look beyond the dynamics of companies, markets, and sectors.

Furthermore, the TU Berlin and Department of Sociology expect the graduate program to provide clear impulses for the advancement of teaching and research activities. Graduate studies with a strong research orientation will enable the Department of Sociology to broaden and intensify its signature focus on technology and innovation, the groundwork for which has been laid in the Department's BA/MA program "Sociology and Technology Studies". At the same, the graduate program will enable a more in-depth exchange among the specific fields of sociology within the Department, as well as contact with research groups at other faculties at the TU Berlin and with other research institutions in the Berlin region. These disciplines and organizations include, in particular, the economic sciences and social planning (and management), and the WZB research unit "Cultural Sources of Newness" (Social Science Research Center Berlin). Comparing processes and cultures of innovation in different societal fields should open up opportunities for new contacts and future collaborations, which can later transcend their initial geographical context. The graduate program will also provide an opportunity to intensify existing international contacts through a visiting researcher program.

2.2. Analysis: Dimensions of the research framework

Dimension I – Observation forms:

Semantics, pragmatics, and grammar

Innovations are not straightforward facts. They must first be made into such through practices of perception and legitimation. Innovations are linked to justification discourses that can contain both practical ("accounts") and theoretical ("ideologies") elements. Such ascribed concepts make innovations meaningful and understandable for direct participants in innovation processes as well as other actors. These processes traverse several stages of development: they are labeled, imbued with meaning, linked to existing knowledge, instilled with recognition and esteem, and invested with permanence through institutionalization. They can even come to develop their own paths.

The distinction between semantics, pragmatics, and grammar – though not in the more narrow sense of linguistic analysis – has already been transferred to sociological technology studies (Rammert 2002; 2006). It furnishes us with three analytical dimensions with regard to observing society: social semantics, social pragmatics, and social grammar. *Semantics* refers to the significance of what is recognized in society as innovation, i.e. to meaning, knowledge, and discourses. Innovation is not necessarily expressed explicitly in language; it can also be expressed primarily in actions, as well as in new constellations of action and technology. We use the concept of *pragmatics* to refer to this dimension. Finally, *grammar* denotes the

arrangements, regimes and rule systems that make innovation possible in the first place, as they establish a basic framework that also places limits on innovative developments.

The three perspectives of semantics, pragmatics, and grammar allow differences in the relative importance and primacy of these elements in the creation of novelty to be captured empirically and juxtaposed for analysis and comparison. These perspectives may also diverge, e.g. when doing innovation (pragmatics) takes on a life of its own and divorces itself from that which is declared as “new” (semantics). These aspects can override each other and assume a leading role in innovation processes in different ways. One of the research questions in the graduate program will thus be to observe whether one or more of these three perspectives is absolutely critical, or perhaps even negligible, in the innovation fields analyzed as well as the significance assigned to this state in individual cases. Further, more specific lines of questioning include:

- Are there fields of innovation in which specific discourses (semantics) are strong drivers of innovation, as it appears to be the case in politics and planning activities oriented on sustainability, and for artistic innovations?
- Are there fields in which systems of rules (grammar) from different areas of society either promote innovation or restrict new developments? Patent regimes could be postulated as an example of the former; the adoption of collaborative R&D forms from other countries in the USA until the mid-1980s as an example for the latter.
- Are there also fields in which innovations quietly prevail as implicit dimensions of practices, or concealed in material products (pragmatics) despite cumbersome rule systems and without explicit announcements? Social and cultural innovations occurring below the public radar could serve as examples.

In addition, as regards the interplay of different aspects of innovation processes, we are particularly interested in whether these take on a mutually reinforcing character and how this interplay might influence subsequent developments. This also lets us capture more complex social phenomena, such as those which can emerge through unintended consequences of social action and through the overlapping of other social fields.

Dimension II – Aggregation levels of innovation:

Action, organizations, and society

From a sociological perspective, we can observe innovations at different levels, regardless of whether we are dealing with cases of “knowledge”, “fiction”, or “institutionalization”. We can distinguish between three levels of innovation: action, organizations, and society (see also Luhmann 1975; Röpke 1977). This distinction serves as a heuristic device to pinpoint the subjects of investigation and therefore also to coordinate project research. The graduate research projects will thus be required to address the interplay of at least two of these three levels (see below for further details).

At the level of conceptualizations, plans, and projections, we can regard *innovation as a phenomenon rooted in action*. As important as the social observation, negotiation, legitimation, and embeddedness of the innovation may be, it is usually based in action. Moreover, even though an innovative action can only be viewed as innovative (or not) in relation to other actions, our objective is to systematically account for the activity of knowledgeable subjects as the source of innovations and also to observe the creation of novelty as a micro-structural phenomenon in various research fields. One suitable point of departure for this endeavor is doubtlessly sociological theories of action, which also broach the issue of plans, imagination, and creativity (Joas 2002; Popitz 2000). Links between current forms of flexible production, the development of creative industries, and the subjectification of work (Bolte & Treutner 1983; Voß & Pongratz 1998; Moldaschl & Voß 2002) emphasizes the ongoing significance of subjectivity.

If interactions are already relevant at the micro-structural level, they play an even more important role at the *organizational level*. The internal organization of innovations, social forms of the production of novelty, and innovation networks are situated at the analytical crux of this level. Research can analyze, for example, the interactive organization of scientific work, operational production processes, and management practices geared towards innovation in firms. Further focal points can include practices and processes at the firm level, in inter-organizational networks, and in organizational fields. A central assumption is that not only the diverse relationships between different organizations – lab and patent offices, studios and museums, and architecture firms and city planning departments –, but that also the ways in which these organizations coordinate their interactions and relationships hold a relevance for the creation of novelty. The arrangements and rule systems constituted by these areas form the key elements of specific innovation regimes. These areas are simultaneously the contexts in which innovations emerge in practical terms and are semantically justified.

Society is the third relevant level of observation, which increasingly calls for an analysis at the global level, i.e. as a “world society” traversing the boundaries of individual nation states. Our initial focus in this regard will lie on the distinct macro-structural features of those areas of society most likely to be gripped by the imperative of innovation, e.g. science and economy. To do justice to our concept of a more comprehensive approach, we will also endeavor to analyze fields of innovation which are most prominently situated in other areas of society (culture and politics, for example). Within these areas, we will concentrate on specific segments for which we can provide special research expertise. These include design, production and marketing in the arts, and the implementation of new political instruments, for example with issues of sustainability and gender arrangements, or the planning of residential dwellings, urban neighborhoods, and infrastructure (architecture, urban planning, and landscape architecture). We will focus, on the one hand, on sets of semantics, practices, and grammar systems with an overarching social relevance; on the other, we will observe the formation of transnational sets and the adoption of mechanisms and actor constellations that either drive these developments or stand in their way.

Dimension III – Social spheres and fields of innovation:

Technology/science, industry/service, and fields of comparison

Because the graduate program is based at the Technische Universität Berlin with inner-university links to disciplines such as computer science, architecture, and planning (urban, regional and environmental), technical innovations will constitute an important focus. Novel technologies are organized primarily in the highly differentiated spheres of science and economy, as well as in the increasingly dense networks between the two (cf. Bommers & Tacke 2011). Central fields of innovation in these key areas include *technological disciplines* in which the lines between “pure” technology and “pure” science are blurred (cf. “technoscience” from Latour 1987). *Industrial production and the service sector* are further spheres in which economic competition drives actors to demand, develop, and market “innovative” technologies and procedures.

The production of art as well as *political and planning processes* will be included in the research spectrum as additional comparative fields. Since the Italian Renaissance, originality has been a driving ideal in the arts, along with ongoing technical and institutional innovations. References to the “creativity” in the arts have made their way into the semantics of innovation in other spheres of society: artistic performance techniques are increasingly employed in the business world, for example (Boltanski & Chiapello 2003), and their implicit organizational structures are also transferred to processes of scientific discovery processes. Our objective in analyzing the arts is not to limit ourselves to organized arts and their institutional forms in a narrow sense, but to observe the broader context of artistic creation processes (Dewey 1988) which actors themselves describe as “creative” (Bröckling 2007). This can include, for instance, the design of human-machine interfaces, music making with software samplers, etc.

Starting in the mid-1970s, the field of *political and social planning* experienced a massive upheaval in the face of disillusionment and nation state politics challenged by globalization. Meanwhile, the arenas of negotiation have shifted and undergone restructuring. New, and in part, “high-tech” decision-making aids and policy instruments have been devised and established. The driving actors have reassured themselves and the addressees of their actions that these changes are not only new, but better – in short “innovative” – for confronting potential problems (Djelic & Sahlin-Andersson 2006). These developments are closely aligned with innovations in other fields, particularly spatial planning. Innovations in governance are thus included as a separate research field in the graduate program (Voß & Bauknecht 2007). Numerous social planning and policy measures are based on survey data collected along national or federal state boundaries. Innovation processes – e.g. in innovation clusters – do not develop in line with these geographical boundaries. New foundations and, in some cases, new instruments are therefore required for political and social planning measures in an era of reflexive innovation. This will allow them to account for heterogeneous innovation processes transecting multiple organizations by incorporating relational data.

Innovations involving technical artifacts are general regarded as distinct from new policy instruments or innovations in other fields (Zapf 1989; Gillwald 2000; Rammert 2010). We will analyze commonalities, interrelationships, and differences with regard to innovations in individual and different fields. Possible topics may include the recombination of technical artifacts, problem-solving practices, or improved institutional processes.

Fields of innovation themselves – including those investigated in greater detail in the doctoral program – are subject to change as the medium and result of reflexive innovation on a societal level. One basic change concerns the boundaries of the fields of innovation. We believe that the permeability of these boundaries is increasing. The research projects should thus be situated in both classic fields of innovation within defined areas of society and in new fields of innovation that cut across different boundaries: the former permits an analysis of the extent to which reflexive innovation leads to a proliferation or perhaps even a comingling of references in relation to its justification and valuation, e.g. innovations in companies that increasingly employ political and ethical references in addition to economic ones (Kock, Gemünden, Salomo & Schulz 2010), or scientific innovations that are subject to the dual pressures of remoralization and economic rationalization (Weingart, Carrier & Krohn 2007; Schimank 2006). In examining heterogeneous fields, we will also bring up issues of co-production, co-existence, stabilization and path creation for hybrid innovation regimes. A systematic question that links both classic and heterogeneous fields, and one that is at the heart of our research agenda, involves the comparative assessment of innovation dynamics from the 1960s to the 1980s, e.g. have fundamental changes occurred in relation to innovation paths and discourses?

Examples of dissolution, transfer, and heterogeneity in innovation fields that we propose to investigate include:

- Innovations at the boundaries between science and industry (transfers, spin-offs, international networks/alliances)
- Innovations situated between science and politics (consulting, governance; urban, regional, and environmental planning)
- Innovations that cross the lines between industry and politics (regional clusters, competence networks, trend-setting technologies)
- Innovations situated between the arts and economy (design, architecture, marketing, fashion)

Cross-cutting research questions for all fields include, e.g.:

- The pragmatics and semantics of creativity in science, technology, economy, and the arts
- Comparative forms of innovative processes in organizations
- Paths of innovation, as well as discontinuities or fractures, evaluation processes, new relationships and heterogeneous actor constellations.

Ph.D. theses

The above description permits a broad range of research projects. These will be narrowed down to *individual studies* to be carried out by the Ph.D. candidates with the steps described below. Dissertation proposals should meet the following criteria:

First, the studies should be situated in individual fields of innovation. Nonetheless, participants will be expected to compare their cases to other fields based on secondary literature and the topics discussed in the program.

Second, the studies should be designed to include different levels of analysis. Although individual approaches may be situated primarily at the micro or macro level, at least one additional level should be included in the analysis, as well as one other social sphere.

Third, the individual studies should – to the greatest possible extent – integrate the following five research questions in their analytical approach to enable a systematic subsequent comparison of practices and processes in different fields of innovation. All participants, especially post-graduate candidates, will be expected to engage in this comparison, as well as in the ongoing development of a comparative framework that specifies both homogeneous and heterogeneous elements of a contemporary innovation society.

Possible dissertation topics in and between innovation fields

Social spheres	Science	Economy	Culture	Politics
Fields of innovation	Technology and science	Industry and service	Arts	Political & social planning
Levels of innovation				
Action				
Organization				
Society				
Primary faculty advisers				

	E.g. constellations of creative practices in science and the economy	E.g. artists and industrial innovation	E.g. first-stage gentrifiers and the creative appropriation of urban spaces	E.g. innovative action analyzing the example of "open spaces" in planning
	E.g. comparative analysis of the concept of innovation in German technology disciplines in the 60s and since the 90s	E.g. innovations in consumer product markets and the interplay between producers, retailers, and consumers	E.g. changing discourses and artistic innovation	E.g. the birth and diffusion of "pedestrian zones" in German federal city planning
	E.g. transatlantic comparison of the innovation biographies of renewable energies			E.g. the role of standardization in the development of nanotechnology
				E.g. new governance forms and control instruments of science and innovation policy
	<i>C. Funken</i> <i>H. Knoblauch</i> <i>W. König</i> <i>J. Köppel</i> <i>W. Rammert</i> <i>A. Windeler</i>	<i>N. Baur</i> <i>K. Blind</i> <i>H.-G Gemünden</i> <i>M. Hutter</i> <i>A. Windeler</i>	<i>M. Hutter</i> <i>G. Joost</i> <i>H. Knoblauch</i> <i>F. Liebl</i> <i>W. Rammert</i>	<i>H. Bodenschatz</i> <i>K. Blind</i> <i>G. Christmann</i> <i>J. Köppel</i> <i>J.-P. Voß</i> <i>U.-J. Walther</i>

Central research questions for the doctoral theses are as follows:

1. *Which practices of “doing innovation” (pragmatics) can be identified in the respective field?*

This question focuses on identifying and describing creative activities and innovative actions in the field in detail, both in terms of their processes as well as the primary rules and resources that govern them. How can the aspects of discovery, reconfiguration and experimentation, as well as trial and error, be reconstructed as a relevant deviation in drafts, experiments, simulations, compositions, or design and planning variations?

2. *What concepts and justifications of innovation (semantics) dominate the field?*

This question centers on the processes of signification, definition, and evaluation of developments as “new”, “improved”, and “valuable”. Which rules and values guide debates and which “inner logic” is used to construct discourses in the different fields? What role do different media play in helping specific discourses to gain ground? Have new or modified regimes of justification emerged?

3. *Which reflexive references to relevant actors, technologies, and processes of innovation can be observed in other fields?*

With this question, we are interested in the increasing involvement of heterogeneous actors and institutions, and the reflexive creation of novelty through the transfer of ideas and resources from other fields. To what extent do innovation processes actively integrate aspects of discovery, technical construction, patenting, financing, marketing, political support, widespread use, and public opinion? And what are the main forms of establishing and organizing (when relevant) these reflexive references?

4. *Which constellations of different actors from the areas of society in question can be observed in the specific field of innovation? How are distributed innovation processes coordinated and which kind of regime emerges (grammar), that defines something as “new” and becomes critical for the successful diffusion and implementation?*

On the one hand, this aspect touches on the forms of reflexive references and the coordination of innovative activities among different actors. On the other, it addresses the reconstruction of the rules and mechanisms of an innovation regime in the field in question. Who is involved in defining novelty with what type or level of authority? Which networks do actors use in innovation processes and how do they coordinate their activities?

How are competencies and authoritative resources distributed? Who determines the value of an innovation on what grounds? How do specific authorities that define innovation retain their independence and recognition, and when do they forfeit their autonomy to external parties?

5. *Compared to earlier phases, can certain changes be identified in discourses, practices, or institutional regimes?*

This question is central to the research approach, since it addresses the transformation of classic modern innovative society to the current societal state of ubiquitous innovation. It adopts a comparative historical perspective to determine whether significant differences can be identified between innovations in the 1950s and 1960s, and those occurring in the 1990s and 2000s. Public and scholarly semantics; technological, corporate, and political practices; and institutional rules pertaining to innovation will be analyzed and compared in the respective fields in both these time periods.

Pluralistic view of theory and research methods

The graduate school opens up a broad theoretical framework for analyzing the reflexive creation of novelty. A wide variety of theories can be applied in the individual theses. These approaches provide both competing and complementary perspectives for an examination of innovation in contemporary society. The program's focus on reflexive innovation and the interplay of semantics, pragmatics, and grammar provides a general theoretical orientation for the different research cases. Its focus is also primarily at the societal level. Given these elements, reflexive innovation can be analyzed as a central aspect of societal development using a variety of different theoretical propositions and disciplinary methods. Comparing the resulting variety of theoretical and disciplinary approaches will be an important task of the doctoral program as a whole. This undertaking will be pursued from the very start, by presenting initial empirical findings and inviting representatives of various research institutions to regularly held workshops. Orchestrated discussions among Ph.D. candidates, affiliated scholars, and external experts should enable a gradual understanding of the contours and significance of contemporary innovation society, one that is well-founded on both a theoretical and empirical level. This dialog should also reveal the different mechanisms and actor constellations that contribute to these processes.

The broad research concept corresponds with a pluralistic approach to methods. The doctoral candidates will be encouraged to acquire and practice both qualitative and quantitative research methods. General mixed methods courses will be provided for all participants at the outset of the program. In-depth courses for specific methods will then be offered at a later point in time. This pluralism should not be equated with arbitrariness. The systematic reference point of “reflexive innovation” will require a clear formulation of initial hypotheses and a reflection on proposed methods. Certain methods are also closely associated with individual analytical perspectives. An analysis of pragmatics requires direct access to actions and objects in the field, e.g. through participant observation, video analyses, technographic studies, or reconstructive interviews. Semantic analyses, on the other hand, require a stronger content-based perspective, one that employs methods such as ethnosemantics, genre or discourse analysis. A grammatical perspective can be complemented by methods such as innovation biographies, path or network analyses. In-depth support and advising will ensure that the Ph.D. candidates are able to select and acquaint themselves with appropriate methods in the first year of the program.

2.3. References

- Aderhold, J. und R. John (Hg.) (2005): *Innovation. Sozialwissenschaftliche Perspektiven*. Konstanz: UVK.
- Barley, S. R. (1990): The alignment of technology and structure through roles and networks. In: *Administrative Science Quarterly*, Vol. 35, No. 1, S. 61-103.
- Barley, S. R. und G. Kunda (2004): *Gurus, hired guns, and warm bodies. Itinerant experts in a knowledge economy*. Princeton, NJ: Princeton University Press.
- Bauer, R. (2006): *Gescheiterte Innovationen. Fehlschläge und technologischer Wandel*. Frankfurt/M.: Campus.
- Blättel-Mink, B. (2006): *Kompodium der Innovationsforschung*. Wiesbaden: VS Verlag.
- Blättel-Mink, B. und A. Ebner (Hg.) (2009): *Innovationssysteme. Technologie, Institutionen und die Dynamik der Wettbewerbsfähigkeit*. Wiesbaden: VS Verlag.
- Boltanski, L. und E. Chiapello (2003): *Der neue Geist des Kapitalismus*. Konstanz: UVK.
- Bolte, K.-M. und E. Treutner (Hg.) (1983): *Subjektorientierte Arbeits- und Berufssoziologie*. Frankfurt/Main und New York: Campus.
- Bommes, M. und V. Tacke (Hg.) (2011): *Netzwerke in der funktional differenzierten Gesellschaft*. Wiesbaden: VS Verlag.
- Braczyk, H.-J., P. Cooke und M. Heidenreich (Hg.) (1998): *Regional innovation systems*. London: UCL Press.
- Braun-Thürmann, H. (2005): *Innovation*. Bielefeld: transcript.
- Bröckling, U. (2007): *Das unternehmerische Selbst*. Frankfurt/M: Suhrkamp.
- Bruns, E., D. Ohlhorst, B. Wenzel und J. Köppel (2011): *Renewable energies in Germany's electricity market. A biography of the innovation process*. Dordrecht: Springer.
- Castells, M. (1996): *The rise of network society. Volume 1, The information age: Economy, Society and Culture*. Oxford: Blackwell.
- Chesborough, H. (2006): *Open innovation. The new imperative for creating and profiting from technology*. Boston: Harvard Business School Press.
- David, P.A. (1975): *Technical choice, innovation, and economic growth*. New York: Cambridge University Press.
- Dewey, J. (1988): *Kunst als Erfahrung*. Frankfurt/M: Suhrkamp (New York 1958).
- DiMaggio, P. J. und W. W. Powell (1983): The iron cage revisited. Institutional isomorphism and collective rationality in organizational fields. In: *American Sociological Review*, Vol. 48, No. 2, S. 147-160.
- Djelic, M.-L. und K. Sahlin-Andersson (Hg.) (2006): *Transnational governance. Institutional dynamics of regulation*. Cambridge: Cambridge University Press.
- Edquist, C. (Hg.) (1997): *Systems of innovation. Technologies, institutions, and organizations*. London: Routledge.
- Elster, J. (1983): *Explaining technical change. A case study in the philosophy of science*. Cambridge: Cambridge University Press.
- Fagerberg, J., D. C. Mowery und R. R. Nelson (Hg.) (2005): *Oxford handbook of innovation*. Oxford: Oxford University Press.
- Fourcade, M. (2009): *Economists and societies. Discipline and profession in the United States, Britain, and France, 1890s to 1990s*. Princeton: Princeton University Press.
- Florida, R. (2002): *The rise of the creative class*. New York: Basic Books.

- Garud, R., P. Karnoe (Hg.) (2001): *Path dependance and creation*. Mahwah, N.J.: Erlbaum.
- Gemünden, H.-G., K. Hölzle und C. Lettl (2006): Formale und informale Determinanten des Innovationserfolges. Eine kritische Analyse des Zusammenspiels der Kräfte am Beispiel der Innovatorenrollen. In: *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung*, Vol. 58, Sonderheft 54/06, S. 110-132.
- Gerybadze, A. (2004): *Technologie und Innovationsmanagement*. München: Vahlen.
- Gillwald, K. (2000): *Konzepte sozialer Innovation*. Berlin: Wissenschaftszentrum Berlin für Sozialforschung, P00-519.
- Heidenreich, M. (2009): Innovation in Europe in low- and medium-technology industries. In: *Research Policy*, Vol. 38, No. 3, S. 483-494.
- Hippel, E. V. (1998): *The sources of innovation*. New York: Oxford University Press.
- Hippel, E. V. (2005): *Democratizing innovation*. New York: Oxford University Press.
- Hirsch-Kreinsen, H. (2005): *Wirtschafts- und Industriesoziologie: Grundlagen, Fragestellungen, Themenbereiche*. München: Juventa.
- Hof, H. und U. Wengenroth (Hg.) (2007): *Innovationsforschung. Ansätze, Methoden, Grenzen und Perspektiven*. Münster: LIT Verlag.
- Hoffman, A. J. (1999): Institutional evolution and change. Environmentalism and the U.S. chemical industry. In: *Academy of Management Journal*, Vol. 42, No. 4, S. 351-371.
- Howaldt, J. und H. Jakobsen (Hg.) (2010): *Soziale Innovation. Auf dem Weg zu einem postindustriellen Innovationsparadigma*. Wiesbaden: VS Verlag.
- Hutter, M. und D. Throsby (Hg.) (2008): *Beyond price. Value in culture, economics and the arts*. New York: Cambridge University Press.
- Joas, H. (2002): *Die Kreativität des Handelns*. Frankfurt/Main: Suhrkamp.
- Kern, K. (2000): *Die Diffusion von Politikinnovationen. Umweltpolitische Innovationen im Mehrebenensystem der USA*. Opladen: Leske + Budrich.
- Kinsley, M. (ed.) (2008): *Creative Capitalism: A Conversation with Bill Gates, Warren Buffett, and Other Economic Leaders*. New York: Simon & Schuster.
- Knoblauch, H. (2010): Alfred Schütz, die Phantasie und das Neue. Überlegungen zu einer Theorie des kreativen Handelns. In: *Die Entdeckung des Neuen*, hg. von N. Schroer u.a. Wiesbaden: VS Verlag.
- Kock, A., H.G. Gemünden, S. Salomo und C. Schultz (2010): The Mixed Blessings of Technological Innovativeness for the Commercial Success of New Products. In: *Journal of Product Innovation Management*, Vol. 27, im Erscheinen.
- Latour, B. (1987) *Science in action. How to follow scientists and engineers through society*. Cambridge, Massachusetts: Harvard University Press.
- Lütz, S. (Hg.) (2006): *Governance in der politischen Ökonomie. Struktur und Wandel des modernen Kapitalismus*. Wiesbaden: VS Verlag.
- Luhmann, N. (1975): Interaktion, Organisation, Gesellschaft. In: ders.: *Soziologische Aufklärung*. Opladen: Westdeutscher Verlag, 2. Aufl., S. 9-20.
- Massey, D. (1992): Politics and space/time. In: *New Left Review*, No. I/196 (November-December), S. 65-84.
- Massey, D. (1995): The conceptualization of place. In: *A place in the world? Places, cultures and globalization*, hg. von D. Massey und P. Jess. Oxford: Oxford University Press, S. 45-77.

- Meyer, J.W. (2005): *Weltkultur. Wie die westlichen Prinzipien die Welt durchdringen*. Frankfurt/Main: Suhrkamp.
- Meyer, J.W., J. Boli, G.M. Thomas und F.O. Ramirez (1997): World society and the nation state. In: *American Journal of Sociology*, Vol. 103, No 1, S. 144-181.
- Moldaschl, M. und G. G. Voß (Hg.) (2002): *Subjektivierung von Arbeit*. München: Hampp.
- Moore, S. (2005): *Media/theory. Thinking about media and communications*. New York: Routledge.
- Mowery, D.C. und N. Rosenberg (1998): *Paths of innovation. technological change in 20th century America*. Cambridge: Cambridge University Press.
- Nelson, R. (Hg.) (1993): *National innovation systems. A comparative analysis*. Oxford: Oxford University Press.
- Nelson, R. und S. Winter (1977): In search of a useful theory of innovation. In: *Research Policy*, Vol. 6, S. 36-76.
- Ogburn, W. F. (1922): *Social change*. New York: H. W. Huebsch.
- Polsby, N. W. (1984): *Political innovation in America. The politics of policy initiation*. New Haven: Yale University Press.
- Popitz, H. (2000): *Wege der Kreativität*. 2. erw. Aufl. Tübingen: Mohr.
- Powell, W. W. (1990): Neither market nor hierarchy. Network forms of organization. In: *Research on Organizational Behavior*, Vol. 12, S. 295-336.
- Powell, W. W., K. W. Koput und L. Smith-Doerr (1996): Interorganizational collaboration and the locus of innovation. Networks of learning in biotechnology. In: *Administrative Science Quarterly*, Vol. 41, No. 1, S. 116-145.
- Prahalad, K. and M.S. Krishnan (2008): *The new age of innovation*. New York: McGraw Hill.
- Rammert, W. (1988): *Das Innovationsdilemma*. Opladen: Westdeutscher Verlag.
- Rammert, W. (1997): Auf dem Weg zu einer post-schumpeterianischen Innovationsweise. In: *Technikentwicklung und Industriearbeit*, hg. von D. Bieber, Frankfurt/M: Campus, S. 45-71.
- Rammert, W. (2002): The cultural shaping of technologies and the politics of technodiversity; In: *Shaping technology, guiding policy*, hg. von K. Sörensen und R. Williams, Cheltenham: Edward Elger, 173-194.
- Rammert, W. (2006): Die technische Konstruktion als Teil der gesellschaftlichen Konstruktion der Wirklichkeit. In: *Zur Kritik der Wissensgesellschaft*, hg. von D. Tänzler, H. Knoblauch und H.-G. Soeffner. Konstanz: UVK Verlag, S. 83-100.
- Rammert, W. (2008): Technik und Innovation. In: *Handbuch der Wirtschaftssoziologie*, hg. von Andrea Maurer. Wiesbaden: VS Verlag, S. 291-319.
- Rammert, W. (2010): Die Innovationen der Gesellschaft. In: *Soziale Innovation. Auf dem Weg zu einem postindustriellen Innovationsparadigma*, hg. von J. Howaldt und H. Jakobsen. Wiesbaden: VS-Verlag, S. 21-51.
- Reckwitz, A. (2008): Die Erfindung des Kreativsubjekts. Zur kulturellen Konstruktion von Kreativität. In ders.: *Unschärfe Grenzen. Perspektiven der Kultursoziologie*. Bielefeld: Transcript, S. 235-257.
- Rogers, E. M. (2003): *Diffusion of innovations*. Fifth Edition. New York: Free Press.
- Röpke, J. (1977): *Die Strategie der Innovation. Eine systemtheoretische Untersuchung von Individuum, Organisation und Markt im Neuerungsprozess*. Tübingen: Mohr.
- Rosenberg, N. (1976): *Perspectives on technology*. New York: Cambridge University Press.

- Schimank, U., (2006): Ökonomisierung der Hochschulen - eine Makro-Meso-Mikro-Perspektive. In: *Die Natur der Gesellschaft. Verhandlungen des 33. Kongresses der Deutschen Gesellschaft für Soziologie in Kassel, 2006*, hg. von K.-S. Rehberg. Frankfurt/M.: Campus, S. 622-635.
- Schuppert, G.F. und M. Zürn (Hg.) (2008): *Governance in einer sich wandelnden Welt* (Politische Vierteljahresschrift. Sonderheft 41/2008). Wiesbaden: VS-Verlag.
- Schumpeter, J. A. (1939): *Business cycles. A theoretical, historical, and statistical analysis of the capitalist process*. 2 Vols. New York: McGraw-Hill.
- Sörensen, K. und R. Williams (Hg.) (2002): *Shaping technology, guiding policy. Concepts, spaces and tools*. Cheltenham: Edward Elgar.
- Stark (2009): *The sense of dissonance*. Princeton: Princeton University Press. Sydow, J. (2001): *Management von Netzwerkorganisationen*. Wiesbaden: Gabler. Thévenot, L. (2001): Pragmatic regimes governing the engagement with the world. In: *The Practice Turn in Contemporary Theory*, hg. von T. R. Schatzki, K. Knorr Cetina und E.v. Savigny. London: Routledge, S. 56-73.
- Utterbeck, J. M. (1994): *Mastering the dynamics of innovation*. Boston: Harvard Business School Press.
- UNESCO World Report (2005): *Towards knowledge societies*. Paris: UNESCO Publishing.
- Uzzi, B. (1996): The sources and consequences of embeddedness for the economic performance of organizations. The network effect. In: *American Sociological Review*, Vol. 61, No. 4, S. 674-698.
- Van de Ven, A.H., H.L. Angle und M. S. Poole (1989): *Research on the management of innovation. The Minnesota Studies*. New York: Ballinger, Harper & Row.
- Van de Ven, A.H., D.E. Polleye, R. Garud und S. Venkaraman (1999): *The innovation journey*. New York: Oxford University Press.
- Voß, G.G. und H.J. Pongratz (1998): Der Arbeitskraftunternehmer. Eine neue Grundform der Ware Arbeitskraft? In: *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, Jg. 50, Nr. 1, S. 131-158.
- Voß, J.-P. und D. Bauknecht (2007): Netzregulierung in Infrastrukturen. Der Einfluss von Technik auf den Verlauf von Governance-Innovationen. In: *Gesellschaft und die Macht der Technik*, hg. von U. Dolata und R. Werle. Frankfurt/Main & New York: Campus.
- Weingart, P., M. Carrier und W. Krohn (2007): *Nachrichten aus der Wissensgesellschaft. Analysen zur Veränderung der Wissenschaft*. Weilerswist: Velbrück.
- Wengenroth, U. (2001): Vom Innovationssystem zur Innovationskultur. Perspektivwechsel in der Innovationsforschung. In: *Innovationskulturen und Fortschrittserwartungen im geteilten Deutschland*, hg. von J. Abele, G. Barkleit und T. Hänseroth. Köln: Böhlau, S. 21-32.
- Weyer, J. (2008): *Techniksoziologie. Genese, Gestaltung und Steuerung sozio-technischer Systeme*. München: Juventa.
- Windeler, A. (2001): *Unternehmensnetzwerke. Konstitution und Strukturierung*. Wiesbaden: Westdeutscher Verlag.
- Windeler, A. (2003): Kreation technologischer Pfade: Ein strukturierungstheoretischer Ansatz. In: *Managementforschung*, Vol. 13, S. 295-328.
- Zapf, W. (1989): Über soziale Innovationen. In: *Soziale Welt*, 40. Jg., H. 1-2, S. 170-183.

Appendix 1: Graduate school setting

In keeping with its image as a strong research university, *innovation is a central thematic focus at the TU Berlin*. The university has defined eight cutting-edge fields as part of its strategic approach to the imperative of innovation in contemporary society and it bundles various competencies in interdisciplinary innovation centers. New forms of cooperation with external research institutions and the private economy have been established in a number of “innovation laboratories”. The university is thus not only a paradigm of ubiquitous, reflexive innovation, but has also defined the production of innovation as a research topic in economics, social planning, humanities, and social sciences. The doctoral program will endeavor to expand existing loose ties – particularly between sociology and the economic sciences – by merging the expertise and networks of different departments with the objective of collaborative research and the promotion of young scholars. This should result in systematic insights into epistemic aspects of innovation that cannot be captured by the sciences or engineering, but which are significant for an understanding of “doing innovation” and novelty as a social imperative.

The program will draw on long-term *national and international contacts* to institutions, working groups, and research projects with a similar subject matter. Especially the Center for Technology and Society (Zentrum Technik und Gesellschaft), as well as the Center for Entrepreneurship (Zentrum für Entrepreneurship) at the TU Berlin, the GRF-funded doctoral program “Research on Organizational Paths” at the FU Berlin, the research area “Society and Economic Dynamics” at the Social Science Research Center (WZB), the Graduate School for the Arts and Sciences at the Berlin University of the Arts, the Fraunhofer Institute for Open Communication Systems FOKUS, and the Leibniz Institute for Regional Development and Structural Planning (IRS) in Erkner. Internationally, solid contacts are also in place with the Centre for Work, Interaction and Technology at King’s College London, the Department for Science, Technology and Policy Studies at the University of Twente, the Center for Work, Technology, and Organization at Stanford University, the Centre for Cultural Studies at Goldsmith College at the University of London, the Institute for the Study of Science, Technology and Innovation at the University of Edinburgh, the Scandinavian Consortium for Organizational Research at Stanford University, and the Graduate School of Economics at Hitotsubashi University in Tokyo. As part of the ERASMUS program, collaborative contacts have also been established with the Norwegian University of Technology in Trondheim, the University of Strasbourg, University of Twente, and the Complutense University in Madrid. We will draw on these contacts for both the visiting researcher program and for potential international stays for Ph.D. candidates.

Alongside access to national and international research networks, the TU Berlin offers an excellent infrastructure and a dynamic setting for teaching and research. The University will provide a series of *classrooms and offices with a total area of at least 200 m²* near the Department of Sociology. This spatial proximity should promote communication within the program and help maintain close ties to the Department.

The Main Institute for Scholarly Training and Cooperation (ZEWK) will not only support the doctoral program with tailor-made seminars on “soft skills”, but also give interested Ph.D. candidates the opportunity to take part in advanced courses on topics such as research and project management free of charge. Participants can also take advantage of inexpensive courses at the Center for Modern Languages (ZEMS) and the University Sports Center (ZEH). The *TU-DOC office* provides guidance to young scholars, from the start of their university careers until the post-doctoral phase, in order to navigate this broad spectrum of opportunities. The office also provides information in the areas of service and continuing education, financial aid, promoting women in academia, and international topics. In addition, the office for young scholars will support the doctoral program by supporting networking with existing doctoral programs at the TU so that both sides might profit from synergies and bundle their interests and achievements through joint external presentations.

With its three labs, the video lab, technography lab, and network lab, the *Department of Sociology* not only provides modern technology for the collection and evaluation of empirical data, but also physical spaces for these activities. The *three labs* are thus the hub for combining advanced research and the training of students and doctoral candidates: the network lab has eleven computer workstations for the analysis and visualization of social interrelationships, which are especially suitable for projects that examine the structures and coordination of innovation systems and regimes. As a mobile unit, the technography lab enables the recording, visualization, and simulation of the (inter)actions of people, machines, media, and programs, thus offering key insights into the performativity of innovative action. And, our most long-standing resource, the video analysis lab for the qualitative analysis of interactions and performativity, is particularly suited for the evaluation of collaborative video analysis with its specially equipped meeting area. Ph.D. candidates are also welcome to visit the *three established research colloquia* at the Department of Sociology, in the areas of general sociology, the sociology of organizations, and technology and innovation research. Participants for subsequent cohorts will receive their academic training at the Department within the scope of the *MA program for “Sociology and Technology studies”*, which commenced in late 2010.

Appendix 2: Graduate program timeline

Program timeline					
1 st semester	2 nd semester	3 rd semester	4 th semester	5 th semester	6 th semester
Theory & methods Research topic and design		Independent empirical research Discussion of results		Continued research Publication of results	
Fundamentals Perspectives on innovation society	In-depth study E.g. — Science/economy — Politics/art				
	Applied activities Analysis/literature/writing Individualized advising/discussion in team with external experts				
Colloquium					
Progress meetings with advisers each semester					
Internal workshop	Summer School I		Summer School II		Final conference

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