Sabine Pfeiffer, University of Applied Sciences Munich, Germany (sabine.pfeiffer@hm.edu)
Stefan Sauer, Institute for Social Science Research Munich, Germany (stefan.sauer@isf-muenchen.de)
Daniela Wühr, Institute for Social Science Research Munich, Germany
(daniela.wuehr@isf-muenchen.de)

Full Paper presented on the 28th EGOS Colloquium Helsinki, Finland July 5–7, 2012.

Designing the Design Process: Exploring Organizational Paradoxes of Scrum and Stage-Gate

1. Introduction

Organizations have a long lasting tradition in designing their workflows and business processes, and the predominant organizational design approach still seems to be that of standardization. In an era of organizational standardization (Brunsson 2002a) production, and increasingly office work have been central object to standardization. Although no road to unavoidable uniformity (Brunsson 2002b), standardization is often seen as an impediment to innovation (Wright et al. 2011). Efforts to increase organizational effectiveness using standardization have been successful in repetitive production and administrative processes but less so when dealing with non-routine processes typical of professional organizations (Lillrank 2003).

R&D departments have long been spared from organizational standardization due to the assumed creativity and innovative core of their design tasks. Usually innovation is seen as a set of activities that seeks to deal with uncertainty and is, in principle, open to change. Innovation theories moved on from linear models of innovation to those relying increasingly on degrees of fuzziness, randomness, and circularity (Berker 2010). At least sustained innovation requires intertwined complexity arrangements, based on different „agentic orientations“ of the innovation actors involved, not a cut back to routinized work (Garud et al. 2011). Despite the multilevel, spontaneous and complex features of innovation, recent contributions within the system of innovation approach are marked by an instrumentalism that views innovation as a predictable and standardized process (Fløysand and Jakobsen 2011).

Along with an increasing “projectisation“ which is interpreted as a phenomenon of neo-industrial organizing, project management has become more formalized as a result of various standardizing efforts (Ekstedt et al. 1999: 7). Providing a regular flow of new product developments requires innovation routines, which impose limited bureaucratic structures,

changing innovation from an "ad hoc" to a routine mode (Benghozi 1990). As project management especially has been implemented in design departments in recent years, project driven forms of controlling and work organization undoubtedly had their effects on design work. But these effects aim not exclusively on designing the innovation process. Only recently design work itself has become a favored object of organizational design.

Two almost antagonistic approaches in designing design work could be observed. The conflicting approaches seem to raise intense demands (Smith and Lewis 2011):

- On one hand, design and innovation work has become object of thorough organizational standardization (Pfeiffer et al. 2010): in the automotive and manufacturing sector standardized innovation processes like *Stage-Gate* (Cooper 2009) try to make innovation more effective, less risky and over all predictable. As standardization and creativity usually are seen as contradictions this trend is of special interest from the perspective of organizational paradoxes.
- On the contrary, especially in the field of software design we see a trend that could be labeled as „beyond standardization": so called agile project management focuses on the autonomy of the design teams, trying to free design work as much as possible from standardized routines (Highsmith 2002). Scrum as one prominent example of agile design (Schwaber 2004) gives more room for user and customer needs and values the craftsmanship of design work (Martin 2008).

Both strategies address paradoxes of organization that dramatically culminate in the realm of design work and innovation: Design work and creativity are usually seen as unpredictable, reliant on autonomy and informal settings whereas market driven innovation tries to identify the one best way of organizational process to minimize risk and maximize predictability and efficiency. Leaning on the productive theoretical lens of organizational paradoxes, we understand the term paradox with Smith and Lewis (2011: 386-387) as distinguishable yet overlapping to tension, dilemma, and dialectic: Paradoxes are contradictory but interrelated elements, not resolved into a synthesis, but existing simultaneously and persisting over time.

According to the paradox perspective, in contrast to the contingency theory, tensions arise across phenomena and levels and persist within complex and dynamic systems (Smith and Lewis 2011: 395). The aim of this paper is not to ask which organizational tensions are dissolved by Stage-Gate and Scrum but which tensions perseverate or may emerge. Stage-Gate and Scrum provide contrary organizational frameworks and intend to coping with the paradoxes of design. Of special theoretical and empirical interest is how they succeed and/or

which new paradoxes they may create. Therefore, both approaches are of special interest from the perspective of organizational paradoxes (Clegg 2002). Due to their recent emergence in organizational design, Stage-Gate and Scrum have not been object to sound empirical research. Comparing both approaches from the theoretical perspective of organizational paradoxes reveals the most notable **research gap**.

In our paper we first provide a brief outline of the applied organizational design approaches Stage-Gate and Scrum and confront their acclaimed intentions with theoretical perspectives focusing on paradoxes of organizations (2). The **main purpose** is to draw an empirical based picture of those novel and diverging approaches of designing organizations inside their innovative core: the design departments. The following section will illustrate the consequences of these strategies for coping with organizational paradoxes. After introducing our methods and empirical field (3), our qualitative analysis of Stage-Gate and Scrum gives an insight into the emergence of well-known old and new arising paradoxes (4). In our conclusion (5) we discuss the empirical results against the theory of paradoxes of organization and propose some **theoretical implications**, focusing on the informal and experience-based competencies of employees. These often neglected labour capacities (*Arbeitsvermögen*; (Pfeiffer 2004b) are of relevance for coping with organizational paradoxes. From this perspective we will outline a possible widening of the theory of organizational paradoxes.

2. Two novel approaches of organizational design

Stage-Gate and Scrum are both novel and popular approaches, aiming to cope with organizational paradoxes, which occur in the context of innovation and design. On the first sight, both approaches seem to follow contrary roads: While Stage-Gate frames the innovation process into a standardized design, Scrum as a prominent example of agile development claims to bring utmost self-organization into the design team and process. On closer examination though, both organizational standards for innovation show striking similarities:

First, they do not deny, but claim to partially acknowledge the uncertainty that is characteristic for innovation processes and by thus, could be seen as examples of a new quality of organizational standards. Agile methods, which have evolved as a bottom-up approach, often coexist with more standardized top-down project models of project management of the Stage-Gate type; hence integrating both approaches is possible (Karlström and Runeson 2006). *Second*, Stage-Gate and Scrum both are business models: Their

protagonists – Robert G. Cooper for Stage-Gate and Ken Schwaber for Scrum – run consulting companies based on these organizational approaches, acting in all aspects as standardizers of organizational practice (see Wright et al. 2011).

To understand these contrary but as it seems complementary methods of organizational design, we first give a brief outline of their intentions and characteristics as well as of their acknowledgement in the scholarly debate before we discuss both design approaches from the perspective of paradoxes theory.

Stage-Gate: Taming the innovation process

Currently, Stage-Gate is one of the most prominent approach of organizational standardization designed to speed up R&D and innovation projects while reducing time to market, i.e. the decrease of time a product takes from the first idea until it is designed, produced and available for sale (Cooper 2011). Initially published 1988 in the U.S., the German translation hit the market in 2002 and ever since Stage-Gate proves as a very successful consulting product, spreading widely especially in the German manufacturing and automotive sector. Not based on thorough empirical studies but on consultancy experience, Cooper derives the idea of Stage-Gate by exploring mostly b2c-companies all successful innovators in the 1970s and 1980s (Cooper 1976; Cooper 1979).

Stage-Gate is a organizational standard (re-)designing the innovation process by dividing it into four to six so called stages that are separated by gate meetings. In these gate meetings R&D and other company divisions decide if the innovation process at stake is to be continued to the next stage or to be aborted. Milestones describe events of great importance (beginning or end of a process such as product approval or Start of Production (SOP). Besides the standardization of the innovation process, project management is required to enable simultaneous engineering or coordinate sequential designing and structure the design process. Stage-Gate is supposed to support innovation actors in defining early phases of the innovation process that contain high risk and further to tune them with other parties in the innovation process. Stage-Gate serves as a gearing instrument and indicates when (more) supply with resources is necessary. Stage-Gate fixes schedules and determines when project teams evaluate the status, degree of performance, adherence to budgets or scheduling and finally decide about continuance or stop of the project. This decision is based on the evaluation of the innovation progress alongside pre-assigned market driven criteria. Multi-perspective based decisions and a preference for parallel instead of sequential processes are to ensure fast and market fulfilling innovations.

Although Stage-Gate seems to be a widespread though not to be quantified approach in certain industries (Heesen 2009) this organizational standard is not much empirically and/or theoretically acknowledged by organizational theory. Stage-Gate is inspired by the intentions to identify a best way for core innovation processes, to model standard procedures and to streamline comparable real activities. The object also is to create predictable, robust production and innovation processes alike. After several years of implementing this system, their effectiveness and positive consequences are becoming as evident as their downsides and blind spots. Studies indicate that firms modify their formal development regimes in need to further improve the efficiency of this process while not significantly sacrificing product novelty or quality (Ettlie and Elsenbach 2007). Stage-Gate processes have brought dramatic reductions in product development cycle times by brining structure and an overall business process to new product development, but are seen as limited and restricted in managing high-risk technology development (Ajamian and Koen 2002: 268). Other studies indicate that Stage-Gate like most product development processes see core capabilities of an organization mainly as core rigidities that have to be overcome by process redesign (Leonard−Barton 1992). Cooper, the inventor of Stage-Gate, derives the streamline for innovation processes mainly from companies manufacturing anonymous mass products for end-consumer markets. Thereby the specific qualities of innovation ecologies in different industries are often overseen in a top-down implementation of this process (Pfeiffer et al. 2010).

Scrum: setting self-organization free by agile developement

Where Stage-Gate focuses on the innovation process, Scrum as a characteristic example of agile software development refers to the design work itself (Schwaber and Beedle 2002). As agile methods continue to gain popularity, Scrum in particular is becoming a de-facto standard in the industry, leading the agile movement (Marchenko and Abrahamsson 2008). Providing a framework for designing products of high complexity, Scrum aims on cost reduction but not to the expense of product quality. Agile approaches could be seen as a response to the imperfections of plan-driven project management especially in coping with uncertainties (Dönmez and Grote 2011) and to the challenges of volatile business environments in general (Pikkarainen et al. 2008).

With Scrum, product quality and user needs are a main focus (Sfetsos and Stamelos 2010) and innovation processes are acknowledged as systematically unpredictable. Therefore, a maximum of autonomy is given to the design teams of usually 5 to 9 employees: A Scrum-team "(…) must learn to rely on itself. During a Sprint, no one external to the team tells the

team what to do.“ (Schwaber and Beedle 2002: 147). Having sole responsibility planning their design tasks, team members schedule in advance for just a short time period of usually two weeks called Sprint. Complex design processes are divided in a great many of Sprints and executed by as many Scrum teams as needed. Sprints are planned bottom-up in Sprint Planning Meetings, team members not only decide on which tasks are to be done but estimate the required time for each task. Team members communicate about their design progress every working day at the same time of day the Daily Scrum Meeting, a meeting strictly time-boxed to 15 minutes, structured by three questions. There are some more methods supporting team coordination, and unconventional modes of project controlling and monitoring. The design process itself is freed of complex project management and therefore broadly exempt from standardization demands, instead some easy to handle methods are provided for team self-management. The product quality and user centered intention is addressed by iterative and collaborative customer evaluation of sub-products. Different roles like the Scrum Master or the Product Owner hold special responsibilities for enabling and supporting the design process.

Scrum could be applied to multi-team and multi-project situations (Marchenko and Abrahamsson 2008) as well as to distributed teams (Woodward et al. 2010). Originated in software development, Scrum is not only spreading to other technology driven innovation fields but is increasingly applied in scientific research contexts (Ota 2010) and even in governmental processes of spatial development (Mierop 2008). Research shows that agile practices do improve both informal and formal communication, but also that complementary plan-driven practices remain of importance to ensure the efficiency of external communication between all actors of software development (Pikkarainen et al. 2008). In an effort to uphold the fundamental conditions of self-organization, employees in agile teams, have to balance between freedom and responsibility, between cross-functionality and specialization, and between continuous learning and iteration pressure (Hoda et al. 2011). Although this triple balancing act indicates there are persistent paradoxes of self-organization the team members have to cope with, this does not lead to stress and strain: – the contrary seems to be the case: As a longitudinal study shows, with Scrum the amount of overtime decreases, allowing the developers to work at a more sustainable pace while at the same time the qualitative results indicate that there was an increase in customer satisfaction (Mann and Maurer 2005).

Stage-Gate and Scrum from the perspective of paradoxes

Stage-Gate and Scrum, differ as they, both explicitly cope with organizational paradoxes that are characteristic for design and innovation. Due to these acclaimed intentions, both approaches suggest themselves for a discussion from the perspective of the paradoxes theory. Andriopoulos and Lewis (2009) argue that product design organizations need to address two innovation strategies: the incremental exploitation of existing products and the exploration of opportunities for radical innovations. Stage-Gate and Scrum both try to overcome these exploitation-exploration tensions and claim to provide a successful approach for managing these organizational paradoxes of design. According to Andriopoulos' and Lewis' distinction of ambidextrous and contextual strategies, Stage-Gate stands for an ambidextrous approach that differentiates exploitation and exploration and sharply separates one from another. On contrary, Scrum could be classified as contextual, trying to integrate what the authors identify as nested paradoxes of innovation. Defined as strategic intent (profit – breakthroughs), customer orientation (tight – loose coupling), and personal drivers (discipline – passion) (Andriopoulos and Lewis 2009), these design paradoxes could be easily applied to Stage-Gate and Scrum. On one hand Stage-Gate focuses on profits, shows a loose orientation to mass customers but demands thorough discipline in fulfilling its standardized Stage-Gate process and the accordingly conventional methods of project management. On the other hand, Scrum aims on generating profit by breakthroughs, deriving from a tight and vivid orientation on unique customer needs and based on a work organization that enables passionate design work. Other research shows that ambidextrous and contextual approaches are not to be differentiated that easily in organizational praxis, but that ambidexterity mediates the relationship between contextual features and performance (Gibson and Birkinshaw 2004). As a paradox is the simultaneous existence of two inconsistent states, multiple and interwoven tensions in design processes imply further opposite forces such as centralization vs. decentralization, stability vs. flexibility, and control vs. freedom (Eisenhardt 2000: 703). This defining frame seems to smoothly fit to Stage-Gate and Scrum too, as Stage-Gate tends to go for centralization, stability and control while Scrum is properly categorized by decentralization, flexibility and freedom. Classifying both approaches as such maybe consistent with their claimed intentions but would suggest that organizational paradoxes could be dissolved into one or the other opposing extremes. In contrary to dilemmas, paradoxes are not to be resolved by choice for one side as the opposing solutions are needed and interwoven (Lüscher and Lewis 2008) and therefore Stage-Gate and Scrum successfully cope with some paradoxes, fail on others and generate new ones as we now outline based on or empirical findings.

3. Methods, empirical fields and research design

Our results are based on qualitative case studies, located in two different German industries that are considered to be highly innovative: manufacturing and Information Communication Technology (ICT). These six companies were chosen within the following criteria: *First*, the companies are regarded as high tech innovators in their field and that they have successfully provided innovative products to the market. *Second*, in their variety, these companies represent a typical German firm, characterized by a SME-like and technically oriented engineering culture. Therefore, all six companies innovate and produce mostly for the world market, they are separate legal entities, not bonded to global players or listed at German or any international stock exchanges. According to Diefenbach and Sillince (2011: 1522) all six companies, though showing some elements of what the authors define as representative "democratic organization" they could be categorized as professional organizations, characterized by elaborated bureaucratic structures and processes and a comprehensive system of formal rules. All six companies show an above-average involvement in employee education, training and engage regularly in cultural initiatives (e.g. sporting and welfare-oriented character activities). Also five of the six enterprises are unionized (works council).

Five of the six are traditional manufacturing enterprises; they are still family run and have the enterprise culture typical of the traditional family-run business. In 2010 the average number of employees worldwide was 10.600, but the number varied between the smallest firm, with 350 employees, and the largest, with 39.000; the average per capita sales were 159.906 Euro, with a range of between 101.481 Euro and 270.588 Euro. Regarding their range of products, legal form, enterprise culture and per capita sales, the five firms investigated may be regarded as typical mechanical and plant engineering industry.[1] At least four of the five manufacturing firms are considered to be industry leaders and model-enterprises; therefore their chosen designing processes and innovation work is seen as a role model for future adaptation all over the industry. The number of employees in the five manufacturing companies (MAN-A – MAN-E) show a range from 350 to 39.000, who collaboratively generate a total revenue in 2010 between 40 Million Euro and 5,2 Mrd. Euro. Referring back to the number of employees these firms, they are clearly considered to be

[1] According to the VDMA (Verband Deutscher Maschinen- und Anlagenbau), the association of thousands of German manufacturing companies, the industry average value of the per capita sales is 176.000 Euro for the year 2009, and before the start of the 2008 crisis it was as much as 220.400 Euro (VDMA 2010: 7).

above average in comparison with German standards.[2] In four out of five of the manufacturing enterprises investigated, Stage-Gate is an accepted and vivid process that has joined many other long since established process standards and in all cases is linked with a highly developed conventional form of project management and control.

In 2010, the ICT-company (ICT-F) had total revenue of 39 Mio. Euro, and an employee count of 430. For Germany, where the average IT company has 84 employees[3] this ICT-F could be seen as one of the largest players in software design industry. The chosen ICT-company is regarded as a market and innovation leader in its field, offering software solutions for b2b customers. Founded in the 1980s, the company is still managed and owned by its founders. The Scrum process is still a new one, although it has been implemented some years, it is still considered to be in the validation process. *Table 1* (see below) provides an overview of all seven cases and their characteristics as companies.

Company	**n**	**Employees**	**Revenue in Mio. €**	**Revenue per capita in €**
MAN-A	19	3.800	800	210.526
MAN-B	12	350	40	114.286
MAN-C	10	8.500	2.300	270.588
MAN-D	13	39.000	5.198	133.282
MAN-E	17	1.350	137	101.481
ICT-F	19	430	39	90.698
Total	90	53.430	8.514	920.862
Mean	*15*	*8.905*	*1.419*	*153.477*

Table 1: Companies

Both qualitative studies were conducted within two different joint projects, funded by the Federal Ministry for Education and Research (BMBF) and the European Social Fund (ESF) and supervised by the German Aerospace Center (DLR). The five case studies in

[2] In the German manufacturing industry dominated by medium-size firms, the average number of employees is 176; 87 per cent of all businesses have fewer than 250 employees (Overview of the Industry, Federal Ministry of Economics and Technology http://www.bmwi.de/BMWi/Navigation/Wirtschaft/branchenfokus,did=196364.html).

[3] The German economic sector for information and communication in 2009 had 83.600 companies and 999.500 employees (German federal Statistics https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/Dienstleistungen/Tabellen/UnternehmenTaetPersonenUmsatzBruttoanlageWZ.html?nn=50886).

manufacturing were done within the scope of the project titled: "Smart Innovation",[4] and the ICT case study within the project titled: "Balancing Work".[5]

Our strictly qualitative approach includes interviews with 71 engineers in five market-leading German machinery manufacturers and with 19 software developers in a German medium-scaled ICT company. 84 of the 90 interviewees were male and 83% received academic training. Only one person had just a vocational training without any academic education, while 23 interviewees has a combination of vocational and academic training. This level of qualification is typical for both industries in Germany, especially in manufacturing vocational training in technical occupations is wide spread and highly acknowledged, usually lasting three years of practical training inside the company and supporting theoretical education in special schools. More than 65% of our interview sample filled minor or higher management position, leading in total 1.280 persons. Quite in line with the demographics of the German workforce, the majority of our interviewees were 40 years old or older (57,6%). *Table 2* (see below) gives an overview to some relevant figures describing our interview sample. Beyond *theoretical sampling* techniques according to the Grounded Theory (Glaser 1992) and in line with our research interest, one crucial criterion for selecting adequate interview partners was their deep and ongoing involvement in innovation processes.

Company	**n**	**Gender (n=90)**		**Training (n=88)**			**Leading position (n=90)**	**Age (n=85)**			
		male	**female**	**voca-tional**	**aca-demic**	**both**		**< 30**	**30 – 39**	**40 – 49**	**50+**
MAN-A	19	17	2	11	16	8	14	0	5	9	5
MAN-B	12	11	1	10	9	8	9	1	2	6	2
MAN-C	10	10	0	3	6	0	3	0	4	3	2
MAN-D	13	13	0	7	11	5	11	0	3	8	2
MAN-E	17	17	0	6	13	2	11	1	7	8	1
ICT-F	19	16	3	1	18	0	11	5	8	3	0
Total	**90**	**84**	**6**	**38**	**73**	**23**	**59**	**7**	**29**	**37**	**12**
%		***93,3***	***6,7***	***43,2***	***83,0***	***26,1***	***65,6***	***8,2***	***34,1***	***43,5***	***14,1***

Table 2: Interviewees

The project interest of these companies was for self-exploration, which collaborated with our research interest; therefore we opted for a thorough qualitative research design.

4 Ref. no. 01FM08020; for more information see www.smarte-innovation.de.

5 Ref. no. 01FH09048; for more information see www.balancearbeit.de.

Conducting case studies in innovative companies prone to the most advanced innovation processes, the research goal was a rather open one: identifying today‘s hindrances and potentials in innovation and design work that may jeopardize or further the route to coping successfully with tomorrow‘s challenges for innovation. In general innovation is generated in every phase and on every position along the Product-Life-Cycle (PLC) and more importantly, every staff carries the capability to contribute in innovation. Therefore our main research perspective was to identify activators and hindrances for innovation along the entire PLC and to develop future innovation strategies that meet the final challenging question for these companies: how can the capability to innovate be systematically embedded as an integrated process at every work place (e.g. by linking competence, organization and personnel development)?

In our survey we took a retrospective point of view reconstructing the entire design process from the very first idea downstream to producing the final product. With our interviews we followed the innovation process step by step, starting with the R&D and design department, Production, Supply Chain Management, and After Sales Service. Product as well as process innovation takes place in complex collaboration networks and is infused with life and ideas by diverse actors. Therefore the focus of our survey was on the concrete level of every day work and in particular actors involved in the design processes. To survey we designed a special ‘Smart Innovation Process Analysis’ (*Smarte Innovationsverlaufsanalyse;* (Pfeiffer et al. 2012) which integrates the following dimensions:

- **S**ystems (e.g. networks, production or innovation-systems, organizations, etc.)
- **M**an (all potential innovation actors along the PLC)
- **A**nticipation (new products, markets or future societal challenges)
- **R**esources (conserving / saving resources in product development, production and product use and a sustainable use of human-resources)
- **T**echnology (Product and process technology, IT-Tools, new technological approaches)

This holistic research design was specifically developed for our project in the manufacturing industry and afterwards migrated to our ICT case. On the one side it is to capture the complexity of real innovation processes including the dimensions relevant to innovation mentioned above and on the other to meet the requirements of stringent time schedules in these companies. In order to guarantee a smooth integration of the interviews into the daily workflow of the interviewees, the interview time was limited to one hour.

To capture the paradoxes that employees in design departments experience in their everyday innovation work, we generated a qualitative research design mixing various methods: narrative and semi-structured interviews which were enriched by visualizing components, combined with several work site observations and 12 participative workshops according to the principles of Action Research (Fricke and Totterdill 2004). According to the principles of Action Research our research process involved innovation actors from the beginning and continuously assign them active parts. The implication of this method was followed in all participating companies: in-firm actors and researchers mutually chose the design process to be researched, specified the sample of interviewees and elected relevant topics. To ensure the participation of our interview partners throughout the research process, every Innovation Process Analysis in all six cases includes three steps: an initial workshop, the interviews conducted step by step along the innovation process, and a feedback workshop to validate our results and discussing possible consequences for organizational change with the interviewed employees.

The interview design included visualized elements as well as guideline oriented narratives (Chase 2003). For example, in one of the visualized situations our interview partners evaluated a schematic of the innovation process and its relevance to their company. Here our interview partners added, crossed out and/or changed the setting of the illustrated departments according to their experience. They also marked their own position within the process as well as their workflow with other parties. The stimulation of narratives through visualized methods was also advantageous when our interviewees indicated with different colors main activators of the selected innovation process and its corresponding departments which have more potential to engage in future innovation.

Based on our triple step holistic Innovation Process Analysis, all gathered and completely transcribed materials underwent an in-depth *qualitative content analysis* (Mayring 2000) combined with *theoretical sensitive coding* suggested by Grounded Theory, choosing emergence over forcing empirical data (see Kelle 2005). With this strictly qualitative approach we were able to reveal both dimensions of paradoxes (Smith and Lewis 2011) distinguish: not only did we find salient paradoxes in design and innovation work but also provide a comprehensive picture of deeper and more latent organizational paradoxes.

4. Empirical findings on new paradoxes of design and innovation

As our empirical study shows, that neither Stage-Gate nor Scrum overcome well known paradoxes of organizations or proof to be more apt to cope with them but rather reproduce them. In this paper we will concentrate on two new paradoxes both standards generate, highlighting them with empirical examples: The *paradox of decoupled standardization* and the *paradox of imposed self-organization*.

Stage-Gate and the paradox of decoupled standardization

The *paradox of standardization* fosters tensions between real innovation needs and the demands of the standard procedure. On one hand, the applied standard claims to support the innovation process but rather neglect its needs. On the other hand, due to the hegemonic discourse the standard implements, evaluating real innovation needs can only be addressed by the terminology and according to the framework the standard instructs. The standard is increasingly perceived as an illusory world, innovators feel like actors performing a play about innovation not as engineers operating in a real innovation process. The intentions of the standardization ideal more and more erode; efficiency and risk reduction are eaten up by facade-like gate-meetings and time-consuming aftermath justifications.

Interviewees describe these phenomena vividly, repeatedly referring to themselves as „actors“ giving a „play“, the notion of „stage“ ironically assigning to a different meaning. The standard intended to determine the innovation process becomes a decoupled organizational layer, not supporting but undermining real needs of innovation work. This process could be illustrated best describing how engineers negotiate whether to enter the gate to the SOP in the respective gate meeting:

- As described, the Stage-Gate approach suggests collective decisions on perpetuating or terminating a given innovation process. This mutual consent is to be based on rational criteria and generated by several in-house stakeholders participating as equals in the gate meetings. In reality, the scheduled gate decisions are treated as immovable milestones; an open and controversial discussion about product deficiencies does not take place. Interviewees describe numerous situations where all participants vote for a „go“ despite of severe technical problems instead of an appropriate hold. According to the Stage-Gate process the decision about SOP is pending in a usual interdepartmental meeting. Consequently we observed the following drama: even if involved and experienced innovation actors know, in contrast to the (usually top-down) planning, that the real production status of the machine is definitely not ready for SOP,

straightforward votes have to be very well considered. It takes courage and, it is usually up to the downstream departments such as production, which have no other choice, since they will carry the responsibility now or later to provide serial ready products. This official meeting is a setting where a rejection of the Gate can have serious consequences for reclining people. Personal justification or sanction from upper management is to mention some after effects.

- Cooper, the inventor of Stage-Gate, derives the streamline for innovation processes mainly from companies manufacturing anonymous mass products for end-consumer markets. One central – and in the automotive industry well established – milestone there is the start of production (SOP). This clear cut between the innovation process and the serial production as well as the according gate-meeting initializing the start of production are seen as crucial. In the b2b-oriented manufacturing industry though, we see substantially smaller lots and mostly unique engineering solutions for one sole customer. Therefore transitions between innovation and production are fluid and a gate meeting assigned to mark an unambiguous start of production does not reflect the specific needs of the field. Although Cooper argues the advantages of parallel proceedings over the much slower sequential approach, this milestone in all observed Stage-Gate applications always clearly ends regular design activities and assigns the responsibility for providing products ready for serial production over to the department of production. The decision for SOP in the context of Stage-Gate is a very critical, problematic step in the machinery manufacturing industry. It is at this point that procedural flaws of Stage-Gate implications arise. Following the standard procedure, the gate meeting to decide the SOP is held and taken seriously nonetheless, further aggravating to the described irrational effects of facade-like interactions in the gate meeting.

Stage-Gate is an organizational standard that aims on the formalization of the innovation process. On one hand, the risky side of innovation is delegated to the upstream processes of ‘creative chaos’ and invention, allowing and even fostering informality. On the other hand, as soon as invention is entering into the mere innovation process, this is supposed to be tamed, formalization and standardized routines take over. But as our interview analysis reveals, the paradoxes between the formal and the informal cannot, however, be resolved by separation between creative invention and incremental innovation. This separation is an artificial one, and employees experience on a daily basis the inevitably heightened tension between the formal process and the real demands. Our empirical insights into Stage-Gate implementations

in manufacturing companies make two things clear: (1) the organizational standardization of the innovation process heightens the paradoxes that it set out to resolve. (2) The accompanying and often dysfunctional tensions are resolved, and must be resolved, at the level of concrete innovation work. This applies for one thing to the difficulty of synchronizing the real innovation process with the phases laid down by Stage-Gate and it applies also to the accompanying replacement of the Stage-Gate process by the objectively necessary steps of concrete innovation work. Employees must not only tolerate this paradox, they must also 'operate' the standardization process even though it is perceived as superseded.

Here it is important to stress the fact that organizational requirements are decoupled from real processes – this well documented fact, has long been recognized by organizational sociology, especially by neo-institutionalism. Our concern is to emphasize, that the employees are not only well aware of this decoupling, but that they are the ones to do the work to overcome, deal with and compensate for the accompanying tensions, contradictions and irrationalities. After all, what is explicitly perceived as a make-believe world has real consequences. These can even go as far as knowingly allowing technically misleading approaches to be further developed – in order to satisfy the formal process.

Scrum and the paradox of imposed self-organization

Empirical findings on Scrum give insights to the *paradox of imposed self-organization*. Again, the needs of the design process itself have to be addressed and supported. On one side, self-organization of the design teams is the core ingredient, on the other side the modes and manners of this self-organization are imposed in details. Scrum as a standard procedure demands self-organization of teams but meticulously describes how, when and even in which kind of posture self-organization should be brought to life. These contradictions induced by the organizational standard are further amplified by implementing self-organization into an otherwise hierarchical organization not prepared to giving up conventional top-down project management. Two empirical examples illustrates how Scrum summons self-organization while at the same time forces it into extremely narrow pathways:

- One unique and central method of Scrum is the daily scrum meeting. All team members are expected to take part on a daily routine and to stand upright in front of a board visualizing the work progress of the actual sprint instead of sitting around a meeting table. The duration is strictly limited to 15 minutes. As this setting usually is experienced as an agile and productive way to communicate and coordinate the daily work requirements, it turns out to be less eligible if the design team faces more severe

problems that demand intensified exchange. In this case, if the team sits down and expands the meeting time in favor to solve the design problem at stake, the team-members act according to the innovation needs, the product quality paradigm and the imperative of self-organization. At the same time they knowingly fail Scrum requirements, which leads to feelings of remorse and strategies of hiding their lapse to other Scrum teams. The reason for these observed strong emotions are easy to identify: Scrum as an organizational standard explicitly demands to follow the methods to the core, any changes and one is not allowed calling the process Scrum anymore. In the IT sector agile methods are not only an organizational standard but a marketing instrument as well: following agile principles is aggressively communicated to customers. Acknowledging that fact, Scrum teams capable to design their own routines for good act increasingly secretive, while those that stick to the Scrum standard no matter what show no intention to reflect upon their flaws in self-organizing or approval of quality needs.

- Agile methods value the potential of self-organization, acknowledging the unrivaled experience of the design team members. This autonomy though is kind of imprisoned in the black box of the single design team. In our case study the organization of the ICT-company though lacking a tight hierarchical structure and culture, is technologically driven and hence dominated by a conventional project management with rigid forms of accounting. Both, project management and internal control by management ratio are IT based, demanding constant feedback and data managements of the employees. These have to act agile, team and task driven inside their Scrum team, while fulfilling all and often contradictory activities to the outside, hence the surrounding organization as well as upstream and downstream processes. The same is true for customer expectancies. The Scrum process, obliged to customer and user needs, recommends to cut the design process into short time periods of mostly two or four week lasting Sprints. The underlying idea is to constantly provide users and/or customers with results of even smaller subtasks in order to ensure an ongoing feedback and optimization of the software in the making. In reality most customers inside and outside the organization apparently feel no urge or have no time for repeated testing of software, which is still in alpha stadium or of mock-up quality. They often prefer to postpone this effort until the next essential milestone of the project. Members of Scrum teams have to cope with these double-layered inside-outside contradictions: inside their team rules autonomous self-organization along the

needs of concrete work tasks. On the outside a management ratio controls with rigid top-down project management; Scrum members are on the one side expected to produce design results for direct user feedback in an agile hence short-cycled pace and on the other to perfectly satisfy customers‘ vague expectancies after several month at a single blow. As there is no real segregation between inside and outside, employers do not live in two different worlds, which they could switch as they wish, acting in that mode here and in the other one there. Rather they experience both twofold logics morphed into one, inseparably intertwined. They have to cope with these vivid paradoxes everyday.

5. New forms of organizational design – new design paradoxes?!

The theory on paradoxes of organizations provides a sound background for capturing the complexity and range of paradoxes and tensions organizations produce and have to cope with at the same time. According to a dialectical view of management (Cunha et al. 2002: 33), our goal in this paper was not to redefine or renew these fruitful theoretical concepts. By recognizing the ongoing persistence of underlying tensions, paradox theory points to the need for dynamic, adaptive organizations, and flexible, improvising routines (Clegg et al. 2002). Stage-Gate and Scrum are two new organizational approaches standing for this demand. Looking into these organizational standards for design work, we found insights that endorse existing findings of paradox theory. Just to name a few:

- According to Diefenbach and Sillince (2011) Scrum and Stage-Gate cannot be interpreted as examples for informal *or* formal organizations but instead show complex tensions of both. The seemingly more informal approach of Scrum fosters unintended formal phenomena while the acclaimed formal standard of Stage-Gate generates its informal counterpart.
- Diefenbach and Sillince (2011) also address the paradox that despite all organizational change towards flatter and postmodern organizations, hierarchical order is quite persistent and is much more widespread than thought, even in postmodern, representative democratic and network organizations. This we found is especially true for agile forms of design work like Scrum.
- A well-proven theoretical framework describing paradoxes in organizational change differentiates between performing, belonging, organizing (Lüscher and Lewis 2008) and learning (Smith and Lewis 2011: 382-384). All the corresponding tensions and contradictions are to be found in our empirical material. Following the categorization

of Smith and Lewis, Stage-Gate and Scrum especially claim to address the organizational paradox of learning/organizing: ensuring stability and efficiency by organizational routines while enabling dynamic, flexible and said agile outcomes. Our studies showed that both approaches designing design work are not apt to dissolve this paradox. The same is evident for the paradox of performing/organizing: innovation workers in both contexts are constantly torn over the conflicting demands of means vs. ends, team/design work demands vs. customer demands, and high commitment vs. high performance.

- Smith and Lewis (2011) emphasize the difference between latent tensions that persist because of organizational complexity and adaptation, and salient tensions experienced by organizational actors. Based on our holistic and explorative research design described above we identified both. While salient tensions are more easily verbalized in the interview situation, by combining interview results with reflective workshops and work site observations, latent tensions more and more came into view. In our study interviewees mostly explain salient tensions by flaws of the implementation process, for example: Scrum rules that are not followed consequently by all team members or the idea of Stage-Gate meetings that is not sufficiently communicated throughout the organization. Latent tensions however, are uncovered more hesitantly but nonetheless can be interpreted as a constitutive leitmotif to be found throughout our empirical basis. In short this comes down to the fruitless endeavour of organizations to resolve contradictions between quality and profit, between creativity and efficiency, between risky innovation and all-out control.

The theory of paradoxes provides us with an amazing variety of convincing explanations about how paradoxes occur in organizations and as to which tensions seem to be unavoidable. Organizations are not inevitably doomed to dysfunction, especially given the uncertainty of its characteristic for innovation and design work? What exactly make them carry on being innovative? As our empirical insights show, the answer to these questions is not to be found inside the organizational structure but on the level of those working inside this structure, building and maintaining it, and compensating its fails and downsides in their everyday working life.

Our survey design as well as our innovation and design processes, center around innovation actors as the main enablers of innovation. Our subject oriented qualitative approach to design work and its paradoxes fostered by new organizational designs like Stage-Gate and Scrum reveal specific competencies. The competencies needed for the work-

embedded coping with the paradoxes of organizational design are mostly hidden capabilities that predominantly resist formalization and objectification but are experience-based and show an embodied quality. We conceptualize these capabilities as labor capacity (*Arbeitsvermögen*, (Pfeiffer 2004a) and would suggest to broaden the theory of paradoxes by this complemental perspective on the dialectical counterpart to commodified labor power. This core competence enables innovation actors to design the working processes actively and situation adequate. Labor capacities even in supposed abstract or virtual settings - are linked to material factors and concrete physics. For instance in Information and Communication Technologies (ICT) real objects or even subjects are far from being absorbed by the virtual world. What rather can be observed is a re-concretion of the abstract. So, workers in ICT materialize in their imagination e.g. very concrete representations of customers and their information needs. Labor capacity has three levels of phenomena; all three dimensions form a dialectical triad and emphasize qualitative aspects and the sensuality of subjects:

- *First* the specific objects and means of work, are them materials, abstract „things“ or customer needs; the object of labor that can be identified with the question: what is the object and intention of the working process? Following the implication of the concept, the actual object of labor that workers relate their actions to, can be very different from the object given by the exchange value. The instruments of labor in other words are the means and materials that are being used directly by the workers to achieve the work object.
- *Second* the work organization – i.e. the in each case relevant (socially and physically) experienceable part of the world. That encloses e.g. the team ecology, the modes of work coordination, the organization narratives or the enterprise culture, but also the hierarchical structure, the specificity of industrial relations, the implemented organizational standards and so on – every dimension of organization that is to be experienced as well as coped with by the employees.
- *Third* a *subjectifying* work action (Böhle 1994) e.g. a corporeal coping with objects of work as if they were subjects, experientially exploring them, getting emotionally involved. This side of labor actions contains experience-based forms of knowledge, often called tacit and informal and is combined with sensual and body embedded forms of action.

The work objects, the means for labor as well as the work organization together form the habitat of the labor capacity experience. They are, on the one hand, its (also physically represented) condition and, on the other hand, its avenue and via the objective, the social and

the structural enter the subject. By means of the categorical dimensions of the means of work, the work objects and work organization, the link between the subject and structural levels of action has been integrally established: As a complex and contradictory environment that is physically experienced and in which the labor capacity both expends itself and is developed and from which it obtains its specific characteristics. Labor capacity is cultivated in its application – i.e. in action. While labor power as a commodity is a measurable quantity, labor capacity in whole is a value of quality eluding attempts to formalization. It is that somewhat fuzzy condition which provides this bundle of capabilities with the potential for coping with uncertainties and imponderability. Labor capacities are attained within concrete work experiences and are crucial core-competences to handle complexity and uncertainty (Böhle 2011). Especially in circumstances that are typical for innovation they come to their bests, when formalized and standardized processes reach their limits and a modus operandi according to most given standards would be misleading. In the end these ‘other‘ forms of knowledge and action form part of what makes innovation and design possible and enable employees coping with organizational paradoxes.

Based on thorough qualitative material and according analysis we spotlighted two additional paradoxes that seem characteristic for novel organizational design approaches aiming on processes of innovation and of product design: The *paradox of decoupled standardization* and the *paradox of imposed self-organization.* Managing these paradoxes of innovation and design is not any more the sole responsibility of the top management, but occurs on all organizational levels (Andriopoulos and Lewis 2009). Coping with paradoxes is a challenge for everyday work: Employees permanently compensate, integrate and alleviate organizational tensions as they become dysfunctional.

Literature

Ajamian, Greg M. and Peter A. Koen. 2002. "Technology Stage-Gate (TM): A Structured Process for Managing High-Risk New Technology Projects." PDMA Toolbook 1 for New Product Development:267-298.

Andriopoulos, Constantine and Marianne W. Lewis. 2009. "Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation." *Organization Science.* 20 (4):685-695.

Benghozi, Pierre-Jean. 1990. "Managing Innovation: From *ad hoc* to Routine in French Telecom." *Organization Studies.* 11 (4):531-554.

Berker, Thomas. 2010. "Dealing with uncertainty in sustainable innovation: mainstreaming and substitution." *International Journal Innovation and Sustainable Development.* 5 (1):65-79.

Böhle, Fritz. 1994. "Relevance of Experience-based Work in Modern Processes." *AJ&Society (The Journal of Human Centered Systems and Machine Intelligence).* 8 (3):207-215.

------. 2011. "Management of Uncertainty - A Blind Spot in the Promotion of Innovations." Pp. 17-30 in *Enabling Innovation. Innovative Capability - German and International Views*, edited by Sabina Jeschke, Ingrid Isenhardt, Frank Hees, and Sven Tantrow. Berlin, Heidelberg: Springer.

Brunsson, Nils. 2002a. "Organization, Markets, and Standardization." Pp. 21-39 in *A World of Standards*, edited by Nils Brunsson and Bengt Jacobsson. Oxford: Oxford University Press.

------. 2002b. "Standardization and Uniformity." Pp. 138-150 in *A World of Standards*, edited by Nils Brunsson and Bengt Jacobsson. Oxford: Oxford University Press.

Chase, Susan E. 2003. "Taking narrative seriously: Consequences for method and theory in interview studies." Pp. 273-296 in *Turning points in qualitative research: Tying knots in a handkerchief*, edited by Yvonna S. Denzin Lincoln, Norman K. Walnut Creek, CA: Rowman & Littlefield.

Clegg, Stewart R., ed. 2002. *Management and Organization Paradoxes*. Amsterdam, Philadelphia: John Benjamins.

Clegg, Stewart R., João Vieira da Cunha, and Miguel Pina e Cunha. 2002. "Management Paradoxes: A Relational View." *Human Relations.* 55 (5):483-503.

Cooper, Robert G. 1976. "Introducing successful new products." *European Journal of Marketing.* 10/1976:.

------. 1979. “The dimensions of industrial new product success and failure.” *Journal of Marketing.* 43:.

------. 2009. “Effective Gating. Make product innovation more productive by using gates with teeth.” *Marketing Management Magazine.* 03/04:12-17.

------. 2011. Winning at New Products: Accelerating the Process from Idea to Launch. New York: Basic Books.

Cunha, João Vieira da, Stewart R. Clegg, and Miguel Pina e Cunha. 2002. “Management, paradox, and permanent dialectics.” Pp. 11-40 in *Management and Organization Paradoxes*, edited by Stewart R. Clegg. Amsterdam, Philadelphia: John Benjamins.

Diefenbach, Thomas and John A. A. Sillince. 2011. “Formal and Informal Hierarchy in Different Types of Organization.” *Organization Studies.* 32 (11):1515-1538.

Dönmez, Denniz and Gudela Grote. 2011. “Managing Uncertainty in Software Development Projects: An Assessment of the Agile Development Method Scrum.” Pp. 326-328 in *Agile Processes in Software Engineering and Extreme Programming: Lecture Notes in Business Information Processing*, edited by Alberto Sillitti, Orit Hazzan, Emily Bache, and Xavier Albaladejo. Heidelberg, Dordrecht, London, New York: Springer.

Eisenhardt, Kathleen M. 2000. “Paradox, spirals ambivalence: The new language of change and pluralism.” *The Academy of Management Review.* 25:703-705.

Ekstedt, Eskil, Rolf A. Lundin, Anders Soderholm, and Hans Wirdenius. 1999. Neo-industrial Organising: Renewal by Action and Knowledge in a Project-intensive Economy. London: Routledge.

Ettlie, John E. and Jorg M. Elsenbach. 2007. “Modified Stage-Gate® Regimes in New Product Development.” *Source Journal of Product Innovation Management.* 24 (1):20-33.

Fløysand, Arnt and Stig-Erik Jakobsen. 2011. “The complexity of innovation: A relational turn.” *Progress in Human Geography.* 35 (3):328-344.

Fricke, Werner and Peter Totterdill, ed. 2004. Action Research in Workplace Innovation and Regional Development. Amsterdam: John Benjamins.

Garud, Raghu, Joel Gehman, and Arun Kumaraswamy. 2011. “Complexity Arrangements for Sustained Innovation: Lessons from 3M Corporation.” *Organization Studies.* 32 (6):737-767.

Gibson, Christina B. and Julian Birkinshaw. 2004. “The Antecedents, Consequences and Mediating Role of Organizational Ambidexterity.” *Academy of Management Journal.* 47 (2):209-226.

Glaser, Barney G. 1992. Basics of grounded theory analysis: emergence vs forcing. Mill Valey: Sociology Press.

Heesen, Marcel. 2009. Innovationsportfoliomanagement: Bewertung von Innovationsprojekten in kleinen und mittelgroßen Unternehmen der Automobilzulieferindustrie. Wiesbaden: Gabler.

Highsmith, James A. 2002. Agile Software Development Ecosystems. Indianapolis, Boston: Pearson.

Hoda, Rashida, James Noble, and Stuart Marshall. 2011. "Developing a grounded theory to explain the practices of self-organizing Agile teams." *Empirical Software Engineering.* Online First 14th April 2011:online published.

Karlström, Daniel and Per Runeson. 2006. "Integrating agile software development into stage-gate managed product development." *Empirical Software Engineering.* 11 (2):203-225.

Kelle, Udo. 2005. ""Emergence" vs. „Forcing" of Empirical Data? A Crucial Problem of „Grounded Theory" Reconsidered." *Forum: Qualitative Social Research.* 6 (2):Art. 27.

Leonard−Barton, D. 1992. "Core capabilities and core rigidities: A paradox in managing new product development." *Strategic management journal.* 13 (S1):111-125.

Lillrank, Paul. 2003. "The Quality of Standard, Routine and Nonroutine Processes." *Organization Studies.* 24 (2):215–233.

Lüscher, Lotte S. and Marianne W. Lewis. 2008. "Organizational Change and Managerial Sensemaking: Working Through Paradox." *Academy of Management Journal.* 51 (2):221-240.

Mann, Chris and Frank Maurer. 2005. A case study on the impact of scrum on overtime and customer satisfaction. Presentation. Agile Conference, 2005. Proceedings. IEEE.

Marchenko, Artem and Pekka Abrahamsson. 2008. *Scrum in a multiproject environment: An ethnographically-inspired case study on the adoption challenges.* Presentation. Agile, 2008. AGILE'08. Conference. IEEE.

Martin, Robert C. 2008. Clean Code: A Handbook of Agile Software Craftsmanship. Upper Saddle River: Prentice Hall.

Mayring, Philipp. 2000. "Qualitative Content Analysis." *Forum: Qualitative Social Research.* 1 (2):Art. 20.

Mierop, Roy G. 2008. "The Agile State, an Organizational View on Spatial Development in The Netherlands." Pp. 63-85 in *The Challenge of Social Innovation in Urban*

Revitalization, edited by Paul Drewe, Juan-Luis Klein, and Edward Hulsbergen. Amsterdam: Techne.

Ota, Martin. 2010. "Scrum in Research." *Lecture Notes in Computer Science.* 6240:109-116.

Pfeiffer, Sabine. 2004a. Arbeitsvermögen. Ein Schlüssel zur Analyse (reflexiver) Informatisierung. Wiesbaden: VS Verlag für Sozialwissenschaften.

------. 2004b. "Arbeitsvermögen und Domänen der Informatisierung - Konsequenzen für die Gestaltung von Arbeitssystemen." Pp. 19-30 in Domänenspezifische Kompetenzentwicklung zur Beherrschung und Gestaltung informatisierter Arbeitssysteme. edited by Peter Röben and Felix Rauner. Bielefeld: Bertelsmann.

Pfeiffer, Sabine, Petra Schütt, and Daniela Wühr. 2012. "Smarte Innovation erfassen: Innovationsverlaufsanalyse und Visualisierung – Vorgehen und Samplebeschreibung." Pp. 49-74 in *Smarte Innovation. Ergebnisse und neue Ansätze im Maschinen- und Anlagenbau*, edited by Sabine Pfeiffer, Petra Schütt, and Daniela Wühr. Wiesbaden: VS Verlag für Sozialwissenschaften.

------. 2010. "Standardization of Production and Development Processes – Blessing or Curse?" Pp. 411-422 in *Sixteenth International Working Seminar on Production Economics*, edited by Robert W. Grubbström and Hans H. Hinterhuber. Innsbruck.

Pikkarainen, M., J. Haikara, O. Salo, P. Abrahamsson, and J. Still. 2008. "The impact of agile practices on communication in software development." *Empirical Software Engineering.* 13 (3):303-337.

Schwaber, Ken. 2004. Agile Project Management with Scrum. Redmond: Microsoft Press.

Schwaber, Ken and Mike Beedle. 2002. *Agile Software Development with Scrum*. Upper Saddle River: Prentice Hall.

Sfetsos, Panagiotis and Ioannis Stamelos. 2010. *Empirical Studies on Quality in Agile Practices: A Systematic Literature Review.* Presentation. Quality of Information and Communications Technology (QUATIC). Seventh International Conference on the IEEE.

Smith, Wendy K. and Marianne W. Lewis. 2011. "Toward a Theory of Paradox: A Dynamic Equilibrium Model of Organizing." *Academy of Management Review.* 36 (2):381-403.

VDMA. 2010. Maschinenbau in Zahl und Bild 2010. Frankfurt/M.: VDMA.

Woodward, Elizabeth, Steffan Surdek, and Matthew Ganis. 2010. *A Practical Guide to Distributed Scrum*. Boston: IBM Press.

Wright, Christopher, Aandrew Sturdy, and Nick Wylie. 2011. "Management innovation through standardization: Consultants as standardizers of organizational practice." *Research Policy.* 41 (3):652-662.