

1-1-2009

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## Recommended Citation

Stevens, Gunnar; Schwartz, Tobias; and Meurer, Johanna, "A dialectic view on Open Innovation" (2009). *AMCIS 2009 Proceedings*. Paper 668.

<http://aisel.aisnet.org/amcis2009/668>

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# A dialectic view on Open Innovation

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## ABSTRACT

The paradigm of Open-Innovation allows software companies new forms of interactive innovation and its diffusion across socio-cultural boundaries. This process constitutes and is constituted by a heterogeneous network of interacting actors. In this interaction, seeds for innovation will be created and have to be adopted by the participants of the respective network. This paper studies the concept of Open Innovation from a dialectic perspective on innovation seeds, which regards diffusion and adoption as intertwined. Traditionally, innovation research mainly focuses on transferring processes, but in order to reflect on the interactive character of Open Innovation across socio-cultural boundaries, one has to enlarge this perspective. In this paper we have developed a theoretic model which integrates also the aspect of translation and transformation. Based on this theoretical understanding we have figured out competences to adopt innovation seeds that have been developed in a cross-cultural setting. At the end of the paper we show how this model can be used to study empirically the behavior of a software company adopting externally created seeds.

## Keywords

Open Innovation, Boundary Objects, Social Constructivism, Creative Destruction, Hegelian dialectic

## INTRODUCTION

In the software branch the competence to innovate - coming up with new ideas and bringing them successfully into the market - becomes a sine qua non in general. Therefore, almost any company makes huge efforts to improve their way of commercialization of their industrial knowledge, with the aim of creating new ideas to reach sustainable growth and to stay competitive.

In current innovation management literature the conception of Open Innovation (OI) is suggested as the novel approach to develop innovations more efficient. Open Innovation follows the paradigm that “firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as firms look to advance their technology” (Chesbrough 2003, p. XXIV). This means, that new innovations are not developed exclusively within the borders of one company, but are co-created in networks (value webs) of heterogeneous stakeholders, such as (communities of) users, hobbyist developers, universities or even competitors. OI constitutes and is constituted by a platform or ‘open innovation space’ (OI space) to create, develop and discuss new customized products and services in a heterogeneous network (Piller et al. 2004). This provides the chance for a company to get in contact with new ideas, knowledge or technologies that are created by various stakeholders with heterogeneous cultural backgrounds. Initially, these new ideas often have the form of - metaphorically spoken - tiny, dirty gold nuggets that are burrowed deeply in the bulk of OI space. In the mud of the OI space there might be ‘innovation seeds’, which contain novel ‘need knowledge’ or ‘solution knowledge’ (Reichwald and Piller 2006) which have the potential to mature to innovations which can be brought into a rising market. Herzog (2008) stresses, that the introduction of an OI paradigm should come along with a change in the firm’s innovation culture, because such innovation seeds can only be adopted if a company overcomes the not-invented-here syndrome (Lichtenthaler and Ernst 2006). The organizational culture needs to produce a climate where it is not important whether an innovation seed comes from an external or internal source.

In the realm of software development, a special case of OI spaces is given by Open Source Software Development (OSSD). Thus, it makes sense to take a closer look at OSSD research. Moreover, IS research has started to explore the structure of OSS projects since OSS is becoming a well accepted business case (to emphasize this new quality, Fitzgerald (2006) also

speaks of OSS 2.0). In respect of our research interest, the IS research that focuses on knowledge creation and diffusion processes in OSS communities proves to be relevant work. Frequently, such research uses social network analysis as the methodological tool to study the processes concerned. For example, Long et al. (2007) adopt the network analysis methods of Wasko and Faraj (2005) to study knowledge diffusion in OSS projects. Another example is the work of Kamei et al. (2008), which shows, with the help a network analysis, that in OSS projects coordinators play an important role to mediate between the group of developers and the group of users. From a methodological point of view, there are several connections to the classical Diffusion of Innovation (DOI) theory (Rogers 2003) and its adaptation in IS (e.g. Fichman 1992). However, OSS research has shown that users are a "critical feature" (Feller and Fitzgerald 2000) in OSS projects, therefore providing an important source in OSS projects for the development of innovation (Noll 2008). Hence, one can observe in social network oriented OSS research a stronger emphasis on sharing and co-creation processes. In addition to understanding knowledge sharing and co-creation processes in OSS communities, some researchers adopt practice oriented knowledge theories and ideas of constructivist epistemology (e.g. Fischer 1999; Lee and Cole 2003; Devan and Tullio 2008; Ehn 2008). Methodologically, there are several connections to work on mutual learning in Participatory Design (Floyd 1987; Wulf and Rohde 1995) and IS research on appropriation of technology as an ongoing structuration process (Orlikowski 1992; Orlikowski 2000). However, in the case of OSS communities as heterogeneous, fluid social aggregates there is a stronger focus on cross-boundary mediation processes and the role of boundary objects (Star 1990) to enable knowledge transfer across boundaries.

Both positivistic and interpretative oriented OSS research has increased our understanding of the intertwined processes of innovation creation, diffusion and adoption in heterogeneous, fluid social aggregates. However, to our best knowledge, OSS research has missed to elaborate an integrated view on these processes. In order to overcome this situation, we borrowed from knowledge management research Carlile's 3-T framework on cross-boundary knowledge development processes. Like the practice oriented innovation research he emphasizes the relativeness of knowledge and the critical role of boundary objects to enable cross-organizational knowledge development. Moreover, one key advantage of his work is that he provides an integrative view on the different facet of knowledge evolution and diffusion.

From a theoretic point of view, Carlile's (2004) framework therefore proves appropriate to study OI spaces. Thus, in this paper we take the basic concepts of Carlile's framework and elaborate a theoretic model that allows to gain a better understanding of competences necessary to make use of innovation seeds provided in an OI space. In the second part, we illustrate our model of competencies by an ethnographical study, which we conducted in a German SME of the software branch.

## **THEORETICAL LENS ON INNOVATION DIFFUSION ACROSS BOUNDARIES**

The Diffusion of Innovation Theory (DOI) (cf. Rogers 2003) gives us a profound understanding of the innovation processes in the traditional economy, where the manufacturer produces an innovative product, which diffuses via different channels in the social system of target markets. In the traditional perspective, people in application domains are mainly perceived as passive customers, while conceptions such as Participatory Design (Mumford 1983) or Lead User Innovation (von Hippel 1986) characterize the customers not only as adopters, but also as inventors. There are several connections between both perspectives.<sup>1</sup> However in order to get aware of this, the innovation-diffusion research has to replace the traditional one-way perspective by a perspective of interactive value creation.

In the literature we find a great variety of concepts, theories and conceptual frameworks that can be adopted to study the interactive creation and diffusion of innovation across the boundaries of a social system. In order to systematize the different approaches, we consider Carlile's (2004) classification scheme of 'transfer', 'translate' and 'transform'-oriented knowledge paradigms. In the next section we want to give a brief introduction to the application of Carlile's model with reference to our research field.

### **Transferring**

The most common way to describe knowledge and innovation diffusion processes, is the way to speak of "transfer", referring implicit or explicit to Shannon and Weaver's (1949) transmission model of communication. As Reddy (1979) points out, this model is based upon a 'conduit metaphor', where a sender puts a discrete, immutable and mobile entity into a container and sends it through some sort of conduit to the receiver, who takes the same entity box out. Rogers' (2003, p. 5) characterization

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<sup>1</sup> Hippel's lead users are, for example, in some dimensions similar to Rogers' early adopter (cf. Schreier et al. 2007).

of diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" illustrates the affinity of DOI with the conduit model.

The underlying assumption of the transmission model is that knowledge is an entity that can be externalized, transferred and separately stored like physical objects. It presents a mechanistic concept that does not deal with the problem of sense-making on a theoretic level. The strength of the transmission model is that it allows to fit social systems into a graph theoretical model and to examine them mathematically. Based on the amount of empirical studies and mathematical modelling, we get a well-founded understanding of the diffusion and adoption processes in homogenous social networks, where sense-making processes can be neglected. However, besides the transfer problem, crossing cultural boundaries let also translation problems arise.

One option to take this aspect into account without leaving the conduit paradigm is to model the translation as an additional cost, which is "required to transfer a unit from one place to another, in a form that can be accessed by the recipient" (von Hippel 1994, p. 430). In addition, one can neglect this issue on the theoretical level but solve it practically. Here, Roger gives the practical advice that technicians should reflect upon adoption depending on specific local norms in the target systems: "Understanding such [local] perceptions can provide useful lessons to technological experts. After all, it is individuals' perceptions of an innovation that count" (Rogers 2003, p. 109).<sup>2</sup>

### Translating

With the help of a social constructivist model of innovation diffusion we can deal with the phenomena articulated by Rogers not only on a practical, but also on theoretical level. A social constructivist model is mainly based on two theoretic assumptions: (1) that people act toward things on the basis of the meanings that the things have for them (Blumer 1966) and (2) that meaning is relationally defined by the particular "thought world" (Dougherty 1992).

The first premise says that innovations are inherently meaning-impregnated. Together with the second premise, we have to realize that innovations only exist relatively to a particular reference system of a social world. Transferring (seeds of) innovation from one social system to another is therefore confronted with the translation between reference systems.

Taking the premises of the social constructivist model serious, the theoretic problem arises, how translation from one reference system into another one is possible in general. Star (1990) has figured out, that this translation problem is akin to the framing problem, which arises if an object must be identified as the same, however from different independent viewpoints in an open, evolving system. From this perspective, she introduces the concept of the boundary object to address the translation problem on a theoretical level. A boundary object can serve as a common object in both reference systems because it is plastic enough to adapt to local needs, yet robust enough to maintain a common identity across the sites.

Based on the idea of End User Development (EUD), Fischer (1999) has worked out a conceptual framework for interactive value creation which is called Meta-design. As a part of this work, Fischer has studied the role of artifacts serving as boundary objects between the designer and the user to foster social creativity. Because users and designers belong to different social worlds, Fischer emphasizes that the different cultural backgrounds of the participants are a source of creative invention, but he is also aware of the danger of misunderstanding. Therefore, to cooperate, the language of users and developers has to be translated. In his work, Fischer demonstrates that in this context the artifact can play the role of Star's (1990) boundary object, because it is a shared object that has a meaning in both reference systems.

In summary, the difference between the 'conduit and the boundary object metaphor is that in the first paradigm the artifact is the message that is transferred from A to B, while in the second paradigm the artifact is the medium in the cooperation of A and B that enables the translation from one reference system to the other.

### Transforming

Translation-oriented conceptions have a strong affinity to an interpretative paradigm by emphasizing the process of creating a „shared meaning“ (Dougherty 1992), or mechanisms "to reconcile discrepancies in meaning" (Nonaka and Takeuchi 1995, p. 67). However, an underlying assumption of the translate paradigm is that reference systems might be different, so that an object of one system must be translated into an object of the other system to be understandable for the latter. This relies on the assumption that the reference systems are isomorphic to each other (which presumes the existence of a general underlying

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<sup>2</sup> In addition, Rogers (2003) describes the phenomenon of re-inventions made by the people in the field. However, the aspects of sense-making and in-situ innovation are not reflected in the theoretical model of the DOI.

structure). However, in the development and diffusion of innovations ideas frequently get into conflict, and become inconsumable objects in the different reference systems.

On the practical level there are several strategies to manage conflicts with regard to the introduction of new technology. However, Carlile's (2004) consideration on the third paradigm makes us aware that in research is rooted in a monotone logic of knowledge development that focuses on the creation of something new, but neglects the devaluation of the existing resources.

On the theoretical level, there is a need for a dialectical logic that can deal with conflicts and inconsumable items in an appropriate manner. Carlile mentions the Pragmatist school as an appropriate philosophical background, but interestingly he has overlooked the Hegelian heritage of the Pragmatist thinking. As a consequence, he did not explicate the underlying connection between conflicting struggle and evolution in his model of transformation and he did not make use of a dynamic logic neither of the Hegelian one nor the one elaborated by the Pragmatists Peirce and Mead. In both schools of thinking, conflicting experiences, which cannot be translated into the own reference system, are seeds for innovation. Synthesizing from actual conflicts (Hegel), respectively conceptualization from emergent events (Mead) present a transformation of the reference system as a totality, where the creation of new habits and norms present at the same time destruction of old habits and norms.

From an innovation research perspective, the underlying connection becomes obvious, if we recall that Schumpeter's dialectic concept of innovation (cf. Prendergast 2006) and Mead's pragmatist concept of emergence (cf. Aboulafia 1991) rely on a Hegel's 'emanatist conception' (Prendergast 2006) of evolution. Schumpeter apply a Hegelian view to analyze the evolutionary process of economic change based on a macro-economical level, thereby figuring out a need to interrupt the regular circuit flow by development processes of creative destruction.

Mead adopts a Hegelian view to characterize emergent events, which mediate between existing knowledge and a surprising experience and at the same time sublimate both, leading to a transformation in the actual reality construction. We can use the idea of emergent events and the idea of the boundary object to characterize the parallels, but also the differences between the second and third. Both the boundary object and emergent events mediate between different reference systems. However, boundary objects mediate only between existing, commensurable systems. In opposite, emergent events also mediate between conflicting ones, thereby leading to further development of a system as a whole.

From this perspective, the third paradigm can be characterized as a dialectic one which introduces a dynamic, conflict oriented perspective that emphasis the transformational potential of innovation as 'creative destruction'. The dialectic moment of the third paradigm emphasis that research should reflect on both elements of innovation:

- Without reflecting on the destructive potential of innovation, one will interpret a not-invented-here behavior (Lichtenthaler and Ernst 2006) only as a particularistic attitude and cannot determinate the underlying rationality.
- Without reflecting on the utopian synthesis potential of innovation, one will interpret a conflicting behavior only from the status-quo, neglecting the principle chance of development, where a innovative world view will sublimate actually incommensurable perspectives.

### **Outline of a classification of competencies that support the adoption innovation seeds**

In the previous section, we have demonstrated that Carlile's (2004) progressive model of transferring, translating and transforming can be adapted for the topic of the interactive creation and diffusion innovation. Showing the connection between the transform-paradigm of Carlile and the Schumpeter-Hegelian innovation concept has demonstrated the specifically dialectical character of the transformation. From this perspective, we deduce a progressive model of competences to make use of the innovation seeds which are provided by the OI space.

#### **1. Transfer**

The transfer aspect focuses on the collection of innovation seeds that are available in an OI space. Therefore, the challenge is to create the capacity to process innovation seeds by increasing the search space (e.g. by enlarging the OI space or create more and increase the quality of the channels into the OI space) or searching in the space more efficiently (e.g. by creating heuristics to filter out noise information of the space). As long as the world view is shared and all participants speak the same language, there is no extra need for translation and transformation competencies.

#### **2. Translation**

The translation aspect does not only focus on the collection, but additionally translates innovation seeds that came from different social words into the own reference systems. On this level, the additional competence has to be built to take-over the

perspective of the other. The competence to speak the other's language can be increased by the creation of a shared practice or organizing a legitimate peripheral participation in the practices of the other. In addition, boundary objects are helpful to provide common landmarks that can be used to synchronize different reference systems. As long as all participants share the same world view, conflicts refer mainly to misunderstandings and can be solved on the level of translation.

### 3. Transformation

The transformation aspect focuses on the evolution of ideas that are provoked by experiences that stands in conflict to the own reference system and existing beliefs. In such cases one needs an understanding of the foreign perspective, but, additionally, one also has to deal with contradictions between own and foreign perspective and has to understand the different perspective as a thesis-antithesis step of a Hegelian dialectic.

Therefore, one of competences is to be trained in dialectic thinking to see the chance of a creative destruction given by an innovative synthesis. Because contradiction can also suspend existing routines, dialectic thinking should also cover the competency of self-reflection, self-criticism and self-confidence. The competency allows to experiment with new perspectives without looking ahead of the full consequences.

Using this model as a sensitizing theory to study the behavior of companies acting in OI spaces, in the next section we present an empirical study that was part of a participatory action research project we conducted in cooperation with a German SME in the software branch. The analysis of the empirical data mainly focuses on the constitution of the OI space and the perception and adoption of innovation seeds.

#### OBSERVING THE ADOPTION OF INNOVATION SEEDS IN PRACTICE

The empirical case study was conducted in a wider project context of End User Development (EUD). In this project, we cooperate with different software companies to integrate EUD concepts into their products. We assumed that organizing customer knowledge as innovation seeds might support SME's intention to develop user centered, tailorable software systems. Hence, we especially study, how small companies interact with and learn from users and how they integrate the gained knowledge about user demands, user habits and user competences into the software development.

To analyze and support these learning processes, we conducted a *Business Ethnography* (BE) in one of the companies (cf. Meurer 2008; Nett et al. 2008). The BE represents a participative action-research model (Nett and Stevens 2008) which should support reflection processes in integrated organisations and technology development (Wulf and Rohde 1995). It uses common ethnographic methods like site visits, participatory observation, etc., However in opposite other ethnographic approaches these studies are shaped by the action research character and embedded in an on going, self-reflective learning process. The BE has therefore two key elements. The first key issue are the empirical study, carrying out expert interviews with project partners about their cooperation practices and using the collected data as a starting point to develop a grounded theory. The second key issue, grounded in action research character of BE, is to confront the project partners with the analyses of the interviews, and ask them to give comments. This kind of reflection is typically organized in the form of reflection workshops and the aim of these workshops is two-folded. First, it is a common method in action research to communicative validation of the analyses, which is adopted in BE. Second, such a reflection from an external perspective supports a critical self-reflection supporting self-organized learning processes (A more detailed description of the methodological background is given in Nett and Stevens (2008) . A first analysis of observed learning processes is presented in Meurer (2008)).

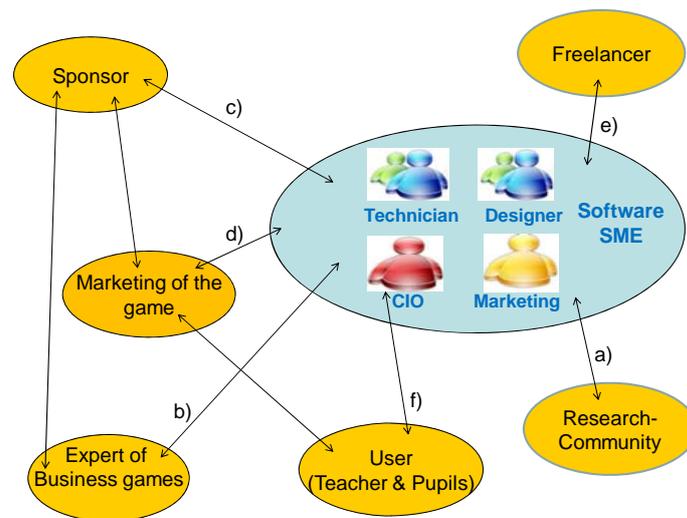
In this case, we conducted ten interviews of one hour duration each and held two reflection workshops in the period of September 2007 to May 2008. In the study it was possible to interview all employees with a fixed contract: the CEO of the enterprise, the CIO, one apprentice of IT-technology, two marketing employees, one additional technician and one designer. Additional interviews were conducted with one former marketing employee, as well as with one designer and one development freelancer, both of them with a long record of contracts with the company.

All interviews were based on semi-structured guidelines, which contained questions on the role, tasks and responsibilities of the interviewees in the enterprise. Further, questions were asked about processes and communication media in the context of possible knowledge about or contact to the clients. Interviews were recorded and transcribed. We interpreted the empirical material in two steps. Based on long informal cooperation with the company and our theoretic lens we firstly paraphrased the material and identified this way sequences which are secondly analyzed in detail. Here, we use the sequence analysis, a hermeneutic *Kunstlehre* suggested by Ulrich Oevermann (cf. Titscher et al. 2000). The aim of the sequence analysis is to reconstruct the immanent logic of observed practices. In order to reduce the danger to subsume the case under foreign categories, one has to explicate the analysis in great detail. In this paper, the empirical study mainly has an illustrative character, therefore the extensive deduction of the interpretation is dropped (cf. Meurer 2008 for a detailed analysis).

In the next chapter we give a brief introduction into relevant characteristics of the SME and the constitution of the OI space in which the software SME participates. Afterwards we focus on the adoption of the innovation seeds in this very OI space.

### The OI space given by the mutual constituted production and consumption sphere

The software enterprise works in the field of educational products and is one main manufacturer of an online business simulation game. The business game is a web based product implemented in Flash, and is publicly available for the teachers (also called tutors) and the pupils. While the teachers introduce the game in their classes, it is played by their pupils in school or at home. The company develops and administrates the simulation game and also holds the intellectual property. However, in the production and the diffusion of the game, the SME cooperates with several other actors. This is not unusual, but rather often necessary for software SMEs, especially in the area of new media and creative industries. In the following we give a brief outline of the relevant network of the OI space, illustrated in figure 1.



**Figure 1:** Schematic view of the relevant social network producing and consuming the business simulation game.

The first relationship in the network is given by the cooperation of the company with the users of the game (f). For them, the game is free of charge, because the development and administration is paid out of the education sponsoring budget of commercial enterprise. The development activities have to be negotiated with the sponsor (c). In the development of the core game logic, the company cooperated with a professional expert on business simulation games (b), additionally it cooperates with a network of free employees in question of interaction design (e). In addition, merchandise of the game is done by a third organization (d), which was created as a public-private partnership to foster the use of computers in schools. The company was interesting for our EUD research because they want to redesign their business game in a way that allows its users (the pupils) a more flexible use context with regard to adapt complexity on different didactical learning matters. In designing an EUD-version of the game, the SME is cooperating with regional universities (a). In particular, production and consumption of the business simulation game are not completely separated spheres of existence but rather mutually constitutive, shaping the OI space of the product. In such OI spaces the different groups can create new innovation seeds whenever interaction and communication takes place and a new challenge for innovation research is to understand how innovations seeds will emerge and evolve in such setting.

### Transferring, translating and transforming innovation seeds in practice

In this section we present some examples where the employees of the SME speak about their customer's relationships. The given examples are assorted relating to the three levels of adopting innovation seeds which are outlined above. To illustrate our model, we present a few examples of adopting innovation seeds with regard to its challenges and problems.

#### Transferring and Translating

On the first level, we observe the users of the business game to communicate with the software SME through a communication channel, which was originally developed as an electronic registration form. Initially, this registration

technology was created by the company to handle administrative affairs such as announcements or notices of removal. However, the users 'mis-'use this channel also as a feedback channel to communicate with the software SME. For example, the users address problems applying to the product, but also made suggestions and proposals, such as to make the business game adaptable, to be able to create individual company names with the own likeable color. Another customer's idea was to play the game as a peer-to-peer version with fragmented company roles.

By mis-using the registration form the users enlarged the OI space by creating a new communication channel. A technician illustrates the use of this channel as follow: *"Thus, we always get such requests: 'I want to have this and that, this I would like to do, but I cannot. Can you help me to get this feature?' At one time the point came, where we said, so let's put these requests together and make a list, such a top five list. Somehow, the mails are saved now"*.

The technician describes a situation here, where the company considered about what to do with the mass of unexpected customer feedback. On the one hand, this sequence shows that the SME receive feedback through the channel and take the information 'out of the box' without any problems. On the other hand, the technician describes here a crisis situation, in which the company must decide on how to cope with this flood of user feedback. The chosen solution of the company to overcome the crisis was to range the feedback after its frequencies and save the mails in an archive. This strategy addresses the administrative issues to manage the various customer feedbacks, but in opposite to concepts like Lead User Innovation (von Hippel, 1986), the chosen solution do not mention a strategy to identify innovation seeds in the flood of user feedback.

This example also affects the second level of translation. The SME does not only adopt information that was transferred by the creative 'mis-'using of the registration form of the users, but also developed an extra field for contact. The reaction illustrates that the SME was able to translate the need with was articulated by user's creative 'mis-'use into their own reference system. Recognizing the need of the costumers to give feedback enabled the company to develop a more proper channel that makes it easier to collect external knowledge and to integrate it in the knowledge management of the company. In other words we can say that the SME demonstrates in this case their competence to speak in the language of the users.

#### *Transformation*

On the third level we want to illustrate an example which is stated by several interviewees. Several members of the SME describe their impression of a user workshop which was initiated by sponsor of the business game. The workshop took place with the teachers as users of the business game and some developers of the SME. In the perception of the SME the workshop had "failed". One interviewee describes the workshop as follows: *„Only one (teacher) was able to play through the game. This one gave us good feedback, too. When the teachers played [the business game] with their pupils this was a whole catastrophe. The teachers endeavored but it was a real big chaos"*. More pregnant another interviewee pointed: *"It [the business game] can really destine the complete lessons for half a year, as it has been designed that extensively. The game has really nothing to do with art and music classes (.) It is perceived wrong by the teachers, even though it is communicated properly by us"*

In the phrase *"it [the business game] can really design the complete lessons for a half year"*, the interviewee pointed out the benefit of the business game that it is able to design the whole school lessons. However, an interesting aspect of this phrase is that the game is put in the active role of designing the school lessons, while the teachers obtain a passive role. The protocol also demonstrates in respect of the designed artifact that the technical and the didactical level are integrated, which makes it difficult to deal with both interwoven issues as separate ones. Nevertheless, if software developers want to respect the domain expertise of its users than the analytical separation of technical and domain issues becomes necessary, illustrating that Max Weber's (cf. 1998 a for a detailed analysis) postulate of 'value-freedom' of social science becomes also relevant for technical disciplines like software development. The phrase *"it is perceived wrong by the teachers even through it is communicated properly by us"* illustrate such need. It present amalgamation of a describe judgment made from a technical point of view and a normative judgments made from the own value system about right and wrong (use) practices.

In particular, the transcript demonstrates that, unlike the previously communicated aim of the company, namely to design the game flexibly and usably for various user contexts, the company communicates their own role in communicating the 'right' usage. Here, the SME interprets the observed discrepancy between intended and observed use only as a failure of translation, but not as a seed of transformation, searching for a synthesis of the thesis (designer's use intention) and the anti-thesis (teacher's use intention). This means the companies do not adopt the utopian potential of contradiction, but interpret the conflicting behavior only from a status-quo. In other words, in the case the company follows the second and not the third knowledge paradigm.

Asking for the reason of the failure of the adoption on the third level of transformation, we should reflect that on this level in general dialectic thinking is helpful to experiment with contradicted realities in an innovative way. A presumption of this is to

accept that realities exist in plural, where the own reality is not only one. In particular, the dialectic thinking would benefit from a self-critical and self-reflective self-confidence, which makes differences between own conception and foreign conception explicit in order to innovate both. From (semi-) professionalized disciplines such as social work or psychotherapy, the formation of such self-critical self-reflection is part of education. In opposite to this, engineers are not trained in this level of self-reflection, but interpret the world as one consistent reality. While this appropriate attitude for finding a synthesizing perspective, the case indicates the technical identity of the company to impede them to perceive the contradicted realities as such and not only as a problem of communication.

## CONCLUSION

In this paper we have demonstrated that the research on interactive creation, diffusion and adoption of innovation across socio-cultural boundaries can benefit from the adoption of Carlile 3-T framework as a theoretic lens. The adoption of this model creates an appropriated vantage point to figure out competencies that supports an evolutionary adoption of innovation seeds existing in open innovation spaces. Characterizing the identified competencies, we can summarize the different levels as follows:

1. Transfer: the technical competence to transfer innovation seeds into the own system,
2. Transform: the empathic competence to translate them
3. Translate: the dialectic competence to transform them in the Hegelian sense of sublation.

The presentation of the shaping of OI space in a business game and the adoption of innovation seeds has given a first impression of how our theoretical lens can be used in empirical research.

In addition, the empirical study indicates that the technical identity formed by the engineering education is useful in the case of problem solving, but may be problematic in the case of problem reflection. In further research, we want to study this phenomenon in detail in order to work out a didactical conception to transmit competencies that are helpful to adopt the innovation seeds that grow out of the Open Innovation paradigm.

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