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Knowledge is the resource par excellence permeating and catalyzing social development today (e.g. Lyotard, 1984[1979], Qvortrup, 2003, and Stehr, 1994). As the general body of knowledge grows, the pressure for specialization and expertise is increased (e.g. Berger and Luckmann 1991[1966]) – something which in turn leads to the formation of ever more specialized organizations (e.g. Luhmann, 1995[1985] and Giddens, 1990). While this may increase the risk of fragmentation and isolation, it certainly enhances complexity of knowledge (Casadevall and Fang, 2014). Within already established scientific fields, such as knowledge management, numerous journals are focused on solving these challenges of complexity, theoretically as well as practically. They tend to favor strategies of conceptual simplification focusing on the application of research to contribute directly to solving practical, managerial problems, such as defining the concept of 'the knowledge worker' and understanding the role of IT in capturing, coding and sharing knowledge in organizations (Grant, 2011). Many of these journals thereby assume somewhat conventional approaches to the concept of knowledge and to the dynamics of knowledge – e.g. a sender–receiver perspective on the transfer of cognitive products from one specialized corporate unit to another. Whereas this perspective continues to be extremely valuable for practitioners, it tends to assume a blatant reduction of complexity inherent to the concept of knowledge and knowledge intensive processes. In stark opposition to this view, we believe that it is this very complexity that has made knowledge a key aspect of social development, and we therefore view it as imperative to discuss and debate as well as examine and explore the concept of knowledge in its full complexity. The *Journal of Organizational Knowledge Communication* (JOOKC) is created as a direct response to what we see as an uncritical acceptance of the ubiquitousness of the call for a reduction of complexity when dealing with – be it in theory or in practice – the concept of knowledge.

JOOKC therefore aspires to be a channel for academic discussions of the construction, representation and communication of specialized knowledge within different organizational contexts. The mission of the journal is to frame the emerging discipline of organizational knowledge communication by continually exploring and challenging the ideas of specialized knowledge (e.g., organizational, domain specific, or disciplinary knowledge), the organizational contexts in or between which it arises, evolves, flows, or is transformed, as well as the

communicative events, settings and ideologies in which these processes are embedded. And to no small degree, relations between these three pivotal concepts. The vision of the journal is to create an open and constructive academic forum for discussing, challenging, provoking, re-interpreting, and proposing. In order to accomplish this, the *Journal of Organizational Knowledge Communication* is based on one basic assumption: that the complexity of knowledge should not be reduced or avoided and that the most elegant way of approaching such complexity is from as many different disciplinary perspectives as possible. The journal will thus favor multidisciplinary, polyphonic, polyocular, and otherwise multidimensional contributions free from orthodox restraints in terms of theory or method.

This first issue is dedicated to highlighting how organizational knowledge communication can be approached from a range of different disciplines. It takes its cue from five different positions and equally different perspectives in order to show how the theme of organizational knowledge communication appears differently to each of them, while simultaneously connecting them all through its function as a boundary object (Star and Griesemer, 1989). As such, each paper can be viewed as a different point of entry in the conceptual trajectory of organizational knowledge communication as it emerges and begins to build momentum.

The common denominator for all five papers is, then, their relation to and focus on the pivotal theme of the journal. Whether this theme is even considered to be a theme or if it is considered a domain, a discipline, or a phenomenon depends on the orientation and perspective of each author demonstrating the range and variation inherent to organizational knowledge communication. Three of the five papers situate themselves in different academic disciplines in order to draw on the structure and terminology of those disciplines – from translation studies and metaphor studies to sociology and organizational communication. Each of these three papers considers organizational knowledge communication to be a phenomenon to be analyzed in a specific domain or context. Svejvig and Nielsen (2014) use metaphor analysis to discuss how organizational knowledge is structured and managed through communication in the context of large IT projects. Lueg (2014) adapts a sociological perspective to analyze how student evaluations of university-level teaching functions as a kind of performance measurement instrument of knowledge. Mousten and Locmele (2014) approach knowledge as text in order discuss how it constantly changes as a consequence of travelling through different cultural and corporate contexts. As such, the three papers position themselves within very different academic disciplines and consequently approach the boundary object of organizational knowledge communication differently. The two final papers, one by Kastberg (2014) and another by Alrøe and Noe (2014), take a somewhat different route to their discussions of this object in that they assume a meta-theoretical perspective in their analyses of interdisciplinarity, crossdisciplinarity, and multidisciplinarity in the context of organizational knowledge communication in order to critically reflect on its scientific premise.

All of the papers address the complexity of knowledge and knowledge-intensive processes in different organizational and communicative contexts either directly or indirectly. With the

objective of this first issue of the journal in mind – to highlight the multidisciplinarity inherent to approaching the concept of organizational knowledge communication – these five papers seem to be ideal examples of how different perspectives are able to contribute differently to a complex discussion and how such a discussion ultimately enriches our understanding of knowledge.

For this reason in particular, we believe this first issue to be an apt catalyst of our fundamental ambition: to publish an international, peer reviewed research journal that function as a framing of the emerging discipline of organizational knowledge communication. Such a framing not only makes room, but hopefully also enables and catalyzes new research with different disciplinary alignments and different analytical perspectives all relating to and focusing on a fuller and hopefully more complex understanding of organizational knowledge communication.

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Cross-disciplinary Science and the Structure of Scientific Perspectives

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Cross-disciplinary use of science is needed to solve complex, real-world problems, since disciplinary knowledge is insufficient. But carrying out scientific research with multiple very different disciplines is in itself a non-trivial problem because there are fundamental problems of cross-disciplinary communication, and because the present organization of science for cross-disciplinary work is inadequate. Perspectives matter. In this paper we carry out a philosophical analysis of the perspectival nature of science, focusing on the synchronic structure of scientific perspectives across disciplines and not on the diachronic, historical structure of shifting perspectives within single disciplines that has been widely discussed since Kuhn and Feyerabend. We show what kinds of cross-disciplinary disagreement to expect due to the perspectival structure of science, suggest how to handle different scientific perspectives in cross-disciplinary work through perspectives of a second order, and discuss some fundamental epistemic differences between different types of science.

Key words: Interdisciplinary science; communication; disagreement; scientific perspectives; perspectivism

1. INTRODUCTION

> *Perspective is one of the component parts of reality. Far from being a disturbance of its fabric, it is its organizing element. ... Every life is a point of view directed upon the universe. Strictly speaking, what one life sees no other can. ... Reality happens to be, like a landscape, possessed of an infinite number of perspectives, all equally veracious and authentic. The sole false perspective is that which claims to be the only one there is. (José Ortega y Gasset 1961 [1923], 90f)*

The complexity of the world is rapidly increasing, as is the complexity of science, and there is a continuing differentiation of functions and perspectives. Over time, science has differentiated from the unspecialized natural philosophy of the past into specialized fields of observation like biology, sociology and psychology (Stichweh 1992, 1996, Luhmann 1990, 446ff). The established disciplines are further differentiating into specialized sub-disciplines and new disciplines are still being formed based on functional professions in society like nursing and physiotherapy, and new technologies like information technology. Often there are also crucial differentiations within disciplines between different 'schools of thought' such as the different socioeconomic perspectives on globalization and sustainable development (Byrne and Glover 2002).

The differentiation of science is both an answer to the growing complexity of the world and in itself a source of new complexity. And the growing differentiation and complexity of science is a challenge to the use of science in society. When society is faced with a complex problem like climate change, environmental pollution, sustainable food production or life style diseases, there is a need to draw on a range of different disciplines from physics, chemistry and physiology to anthropology, sociology, economics, political science and ethics, spanning natural, social and human sciences. But these disciplines do not agree on solutions to the problem or even on what the problem is. They have no shared theoretical framework, and often they disagree on essential questions such as what is scientific and what is good science.

Therefore, there is a rising call for cross-, multi-, inter- or transdisciplinary science as a tool to address the combined problem of the differentiation of science and the increasing complexity of the systemic challenges to modern societies (e.g. Pennington 2008, Hirsch Hadorn et al. 2008, Pohl and Hirsch Hadorn 2008). The promise is that helpful solutions can be gained from the (multidisciplinary) use of several disciplines on the same problem, from the (interdisciplinary) development of a shared framework for cooperation between the disciplines, or from a (transdisciplinary) integration proper of the involved disciplinary and stakeholder perspectives. In this paper we use the term cross-disciplinary science[1] as a general term for multi-, inter- and transdisciplinary science, in order to be able to speak of the general problematics of cross-disciplinary work without being caught up in the specifics of the established categories.

[1] We use this term to designate (truly) cross-disciplinary research where different disciplines study the same research object, not including the more trivial instrumental use of other disciplines as tools within a discipline.

In the scientific literature there is a growing recognition that truly cross-disciplinary cooperation to solve complex real-world problems, which includes disciplines and schools across the traditional divisions between natural, social and human sciences, is very difficult to perform successfully. This confirms our own experiences. In spite of good wills and many ambitions to the contrary, there are fundamental problems in communicating and mediating between the different scientific perspectives, in particular where there is no common theoretical framework, and often the cooperation is constrained by the hegemony of one perspective at the cost of the others (e.g. Dewulf et al. 2007, Evely et al. 2008, Miller et al. 2008, Bracken and Oughton 2006, Harrison et al. 2008, Pennington 2008). The more ambitious the collaboration is, in terms of using and integrating very different scientific perspectives in solving real, complex problems, the more difficult the task. This raises fundamental questions on the role of scientific knowledge, communication and organization in front of complex problems. Disciplinary knowledge is insufficient, yet there is no established cross-disciplinary knowledge to fill this gap. In this situation effective cross-disciplinary communication is essential to gain the most from disciplinary knowledge, but, as stated above, there are fundamental problems of cross-disciplinary communication. Consequently, there is a need to re-evaluate the present organization of science towards complex problems.

In line with the promise of transdisciplinarity, a range of different approaches to in some way (re-)integrate very different scientific perspectives to address complex real-world problems have been suggested, such as systems theory, complex modeling and various holistic frameworks. These efforts are commendable, but we don't think any of them provide a general approach to solve the fundamental problems that arise when very different kinds of science are to be used in an integrated way in complex problem solving. The problems of disintegration are either ignored in a reductionist and hegemonic way, or a new so-called holistic perspective is introduced, which ignores the specialized perspectives and therefore in itself is a kind of reductionism. For instance, Pohl and Hirsch Hadorn (2008) consider 'systems thinking' a constituting conceptual basis of the transdisciplinary research perspective. But the choice of systems framework is not innocent – each system theory has its own perspective on complexity that observes certain types of problems, and the different system theories will leave different imprints on the answers gained.

The differentiation of science, the growing complexity of the problems science is expected to solve, and the ensuing problems in carrying out cross-disciplinary science is not only a challenge to science and the use of science in society, but also a challenge to philosophy of science. Most work within the discipline of philosophy of science has so far been concerned with single disciplines, such as physics or biology. In many cases physics is used as a model for all of science. And even when the focus is on the heterogeneity of scientific disciplines, there is rarely any focus on the interplay of different disciplines (e.g. Knorr Cetina 1999, Giere 2002, Kellert et al. 2006). However, there is an emerging awareness of the challenge of cross-disciplinary science. Recently, in a discussion of the optimality approach to modeling and its dependence on other approaches, Potochnik (2010) concluded that there is a widely felt tension in science between the explanatory independence of scientific fields, subfields, approaches and research programs, and the broad, epistemic interdependence between them because of the inherent limitations of each approach –

causal complexity makes the divide-and-conquer approach to science effective for practical reasons; yet there is a need for collaboration: "Evidential interrelationships do not respect field boundaries; they require cross-disciplinary evidence-gathering" (Potochnik 2010: 230). In this paper we take up this challenge.

We argue that the perceived problems of cross-disciplinary science are not exceptions, but symptoms of a fundamental structural problem in cross-disciplinary science, which can be analyzed philosophically by gaining a deeper understanding of the perspectival nature of science. The first step in the analysis is to investigate the cognitive aspects of science as a systemic learning process and look at the 'instruments of observation,' broadly construed. The differentiation of science is not only a differentiation of social systems, but also a cognitive and epistemic differentiation and specialization of scientific perspectives. Differentiation increases the complexity that science can handle overall, by reducing the observational complexity that each perspective must handle, through selection and delimitation. This makes differentiation a very powerful mechanism in science; and this is the reason why a genuine reintegration that 'undifferentiates' scientific perspectives, in general, is neither possible nor desirable – the strength of independent scientific perspectives is needed. There are of course many examples of theoretical syntheses in science, like the neodarwinian synthesis and relativity theory, but such local syntheses do not negate the general processes of differentiation and the overall disunity of science (Kitcher 1999). Indeed, the limited reducibility of theories leads to a pluralistic epistemology of science with complementing truths on different cognitive levels (Rorhlich 1988). The differentiation of science is the reason why truly cross-disciplinary science is a non-trivial problem. And irrespective of metaphysical beliefs, the heterogeneity of science is an empirical fact for contemporary philosophy of science to address.

In this paper we explore how philosophical analysis of the structure of scientific perspectives can help us understand the persistent problems in cross-disciplinary science. We want to expose the perspectival causes of communication failures and disagreements in cross-disciplinary science and sketch out a framework to understand and handle different scientific perspectives (see further in Alrøe and Noe 2014). We will start out by removing the road-block for cross-disciplinary work that some types of science are by necessity more scientific than others. Then we will introduce the concept of perspectives from a cognitive and semiotic understanding, because this contains strong implications for how we think about scientific knowledge and scientific disagreement. Next, we outline the connection between the perspectival structures of science and the types of scientific disagreement that they entail. Finally, we suggest how the problems that arise in cross-disciplinary science due to the perspectival nature of science can be handled through second order perspectives, and outline a perspectivist typology of science to better understand disagreements between scientific perspectives.

In doing this we hope to arouse a wider interest in the philosophy of cross-disciplinary science. Furthermore, the practical aspiration is that this pluralist and perspectivist, but not relativist, framework can serve as a helpful basis for future cross-disciplinary research and for the cross-disciplinary use of science in society.

2. PERSPECTIVES, VALUES AND 'GOOD SCIENCE'

Before we turn to the perspectival structures of science, we need to remove a potential road-block for cross-disciplinary work and for the present analysis: the idea that some types of science are *by necessity* more scientific than others, and the associated idea that the supposedly more scientific types of science are to be preferred to other types. A deeper analysis of this issue is beyond the scope of this paper, but the perspectivist understanding of science contains certain ideas about scientific quality that provide a more level playing field for different types of science, and which we will briefly outline here.

The complex cross-disciplinary research processes that aim to address complex real-world problems are interwoven with values. Some, more traditionally inclined philosophers of science might therefore maintain that the problems of performing cross-disciplinary research are examples of a science infested with normative issues, which should have been be kept outside, and refuse that this is at all a problem for philosophy of science. However, it is important to underline that this is not a question of protecting science from outside interests and 'social norms.' The scientific perspectives that are involved in complex, social problem solving stand square across the normative and the empirical, across research instruments, values and social relations (e.g. Longino 1990).

In the planning of such research, decisions must be made on what problems to investigate; what methods of observation and intervention to apply; which theoretical framework to utilize; which key concepts to use in hypothesis forming and in what sense; and what assumptions to lay down as a basis for model construction. Some and maybe most of these decisions are determined by existing research structures, traditions, policies, habits, and contingencies, but they are still research choices that jointly determine the specific perspective that is taken in the research process, and which could be different. And in a complex problem solving context, all these decisions harbour implicitly or explicitly value-laden choices.

The realization that values are deeply embedded in the practices of sciences that address complex, real world problems, has important implications for how the scientific ideal of objectivity is construed. In the research field of sustainable food production, as an example, value-laden concepts such as food quality, soil quality, sustainability, animal welfare, justice, health, and welfare enter as key elements in most research projects. At the same time, there are diverging conceptions of what soil quality, animal welfare, sustainability, etc. means, both within the scientific community and in society at large (e.g. Schjønning et al. 2004, Fraser 1995, Byrne and Glover 2002). In such truly complex research fields, which include reflexive, social and semiotic aspects as well as causal aspects, an important requirement for doing good science is to establish clarity concerning how (not whether, but how) values enter into the key value-laden concepts that are used and how this influences methodological choices. Apart from determining scientific quality, this is important for determining the relevance of the research.

That science is value-laden does not mean that it is necessarily subjective and bad science. On the contrary, the deliberate, reflexive handling of the values that are (by necessity) entailed in the research perspective is a precondition for doing good science. To be objective is not to be context-free, but to be open and clear about the context and perspective from which something is stated. In the words of Niels Bohr, objectivity simply means giving an *unambiguous description* of what has been experienced in research, and this unambiguity can only be obtained by including the context of observation (Favrholdt 1999: xlix, 88–90). Bohr thus recommended "to use the word phenomenon only to refer to observations obtained under specified circumstances" (Favrholdt 1999: 89) – phenomena are attached to perspectives. This is different from van Fraassen's definition of phenomena as 'observable entities' in contrast to appearances as the (perspectival) outcomes of given observation or measurement set-ups, and both phenomena and appearances being distinct from the theoretically postulated, underlying reality (van Fraassen 2008: 283–290). We think a more fruitful distinction between the phenomenal and the real object can be gained from semiotics – see the next section.

Being scientific in this sense can be expressed with the term 'reflexive objectivity' in line with other work towards a standpoint, perspectival, situated or naturalized account of objectivity (e.g. Kukla 2008, Barad 2007, Rouse 2002). As a criterion of good science, reflexive objectivity requires that the communication of scientific results must include a description of the cognitive context that the results spring from (Alrøe and Kristensen 2002). This is in accordance with the long tradition in scientific publication practices to require a description of the research method, and it furthermore includes other parts of the cognitive context, which are not always put forward in scientific publications, namely the intentional context (explicit values and problems) and the social context (financing and affiliations). But reflexive objectivity also points to a deeper concern for the cognitive context that is 'built-into' the scientific perspective and often not made explicit. Tacit values, knowledge, practices and instruments that, together with those that are made explicit in scientific communication, make up a scientific perspective, and they are tacit precisely because this is part of what makes a scientific perspective effective. In order to explore these tacit cognitive and perspectival structures, we need to observe scientific perspectives as perspectives and not as abstract theories or social groups of scientists.

3. A COGNITIVE AND SEMIOTIC UNDERSTANDING OF SCIENTIFIC PERSPECTIVES

There is a growing recognition that the context established by scientific disciplines, schools and methodological approaches is decisive for the focus and the kind of observations that can be made by science. This contextual and pluralist conception of science has been nurtured by the ideas about the incommensurability of successive scientific theories launched by Paul Feyerabend and Thomas Kuhn. In recent years there has been a rising interest in cognitive approaches within philosophy of science, where the focus is on scientific models and representation rather than theories and truth (e.g. Giere 1988, 1994, 2004, Cartwright 1999, van Fraassen 2008). And lately, Ronald Giere (2006a, 2006b) has developed this cognitive understanding of science into a 'scientific perspectivism' proper. Perspectivism has had a long but marginal presence in

philosophy with roots in Kant and Nietzsche (e.g. Palmquist 1993, Anderson 1998). And there have been narrower, specific perspectivist approaches within philosophy of science, such as Rueger's (2005) model–theoretical analysis of perspectives within the formalism of a theory. But Giere was the first to develop a fully perspectival philosophy of science. While Giere has mainly developed the perspectivist approach in the context of natural science, we here explore it as a general approach to science in its wider continental sense, which includes natural, social and human sciences.

The perspectivist view of science is quite radical compared a conventional realist view of science, but it can be characterized plainly in a few sentences: There is no outside perspective on the world. All knowledge comes from a certain perspective. All learning happens in concrete perspectives on the world, which are part of the world, and which can themselves be made objects of observation. This fairly banal insight contains strong implications for how we think about scientific expertise, scientific disagreement and the role of science in society, as well as for our ideas about scientific norms.

A scientific discipline is a specialized perspective for observation of a field with specific instruments, concepts, logics and examples. The perspective is reproduced and refined through internal processes. It delimits and focuses the field of observation, and makes possible the observation of certain phenomena and aspects. This view of science implies that there are many scientific truths about any complex problem, and that the question for philosophy of science is not how to select the correct one, but how to appreciate and use the nonunifiable plurality of partial knowledges (Longino 2006). All ontological claims are interwoven with the epistemological conditions for observation that apply in the perspective where it is grounded.

However, this does not imply that any truth can be as good as any other, or that there is no difference between expertise and taste. The distinct, collective character of science is manifest in the foundational methodological ideas, open inquiry, systematic observation and testable truths, which establish its excellence in the production of knowledge.

The perspectivist approach described here (which in this respect goes beyond the scientific perspectivism in Giere 2006a, 2006b) builds on a thoroughly semiotic understanding of a scientific perspective. A key element in this approach is the distinction between phenomena and noumena that Kant established in modern philosophy. Phenomena are things–for–us, things as they appear to us. Our knowledge is of phenomena and our objects reside in our phenomenal world. Noumena are the unknowable things–in–themselves. Scholars have long disagreed on this distinction between phenomena and noumena, but as Palmquist (1993, App. VIII) argues, Kant's distinction between the noumenal and the phenomenal realms is properly regarded as a *perspectival* distinction. The noumenal is not found as an object of experience, but only by its possible effect.

In Charles S. Peirce's semiotics we find the same distinction in an elaborated theory of representation and interpretation, which is readily applied in a perspectivist view of science.

According to Peirce: "A sign, or representamen, is something which stands to somebody for something in some respect or capacity" (Nöth 1990: 42, CP: 2.228 [1897]). In his later works he stresses the semiotic relation between the immediate object that is represented in the sign and the reality of the object:

> *"I define a Sign as anything which on the one hand is so determined by an Object and on the other hand so determines an idea in a person's mind[2], that this latter determination, which I term the Interpretant of the Sign is thereby mediately determined by that Object. A Sign therefore has a triadic relation to its Object and to its Interpretant. But it is necessary to distinguish the Immediate Object, or the Object as the Sign represents it, from the Dynamical Object, or really efficient but not immediately present Object." (Peirce 1998: 482, CP: 8.343 [1908])*

Peirce's theory of semiotics is very rich, but here it suffices to point out that three analytically distinctive but practically connected operations are performed within a semiotic process. One is the selection of an immediate object from the redundancy of possibilities pertaining to the dynamical object; the second is the assigning of a sign to the immediate object, which represents the object in an iconic (similarity), indexical (direct connection) or symbolic (conventional) way; and the third is the linking of the quality of the immediate object (regarding its reference to the dynamical object) with its pragmatic use in the interpretation.

It is important to stress that, in Peirce's sense, there is no position from where we can observe the dynamical object as such; every perspective only adds to the number of immediate objects that refer to the dynamical object. This is of course very different from a traditional realist conception which takes the thing in itself as the immediately present object. Furthermore, there is no ontological commitment to objects in favour of relations implied in the term "object".

Figure 1 illustrates the fundamental elements of scientific observation in form of a semiotic model of the cognitive aspects of a scientific perspective , which builds on Peirce's theory of semiotics and the semiotic approach to cognition as a coupling of interaction and reference in the biosemiotic tradition (e.g. Uexküll 1982, Hoffmeyer 1997), and in this way follows Kukla's (1992) definition of a cognitive system as an interpreter; and on Niels Bohr's epistemological lesson from quantum physics, which he stated in many places, here from a letter to Pascual Jordan in 1931: "Not only, of course, have we learnt that every observation involves a disturbance of the phenomena; we have furthermore realized that the whole concept of observation requires a separation between the object and the means of observation" (Favrholdt 1999: 521), and which has later been taken up by Barad (2007: e.g. 148) and Rouse (2002: 272ff).

[2] This is a pedagogical presentation. Peirce did in fact not restrict interpretants to persons (Peirce 1998: 478).

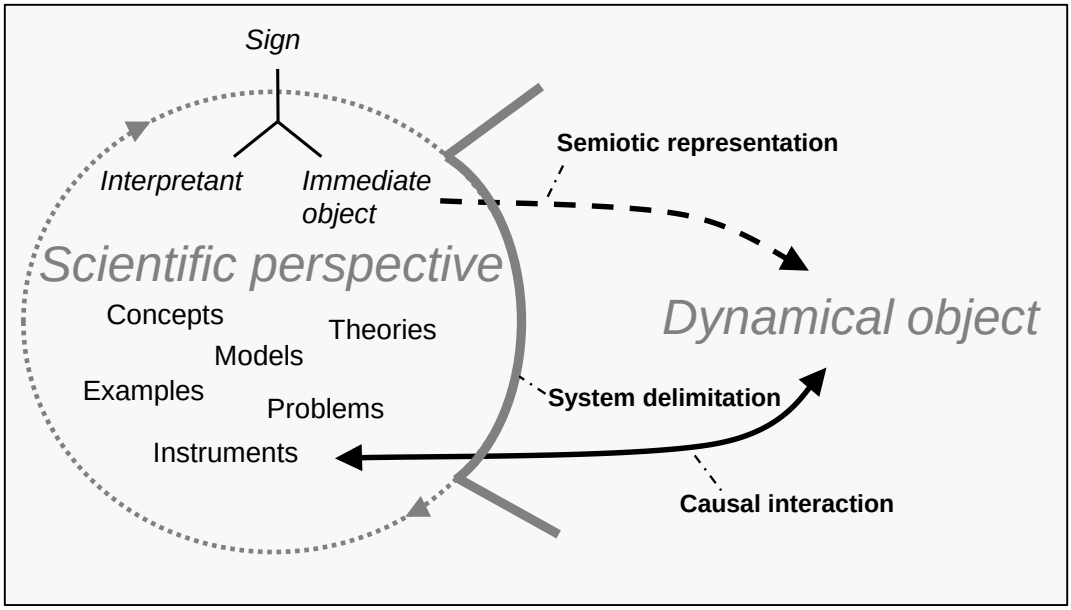

Figure 1: A semiotic model of the cognitive aspects of a scientific perspective observing a dynamical object, which is represented by an immediate object within the perspective, and the three key conditions for observation: delimitation, representation and interaction.

The model shows the three key conditions for observation. *System delimitation*: the very idea of observation requires a delimitation of the cognitive system, which separates the observer and the observed. *Semiotic representation*: the cognitive complexity of the observing system enables, and delimits, the complexity of the 'observer world.' *Causal interaction*: observation requires an interaction between the observer and the observed that can irritate the representation, and which connects the observer and the observed in a shared reference frame. A scientific observation is always done from a certain perspective with certain concepts, theories, models, examples, problems and instruments that establish the three conditions for observation. The communicative aspects of the scientific perspective are not shown explicitly in the figure but the semiotic model shows the sign as a link to the deeper cognitive basis for scientific communication – the sign is "a Medium for the communication of a Form", as Peirce puts it[3].

As a simple example of the three conditions for observation, consider a blind man with a stick. Holding the stick firmly, the man is able to observe the floor in front of him by moving the stick around, but he cannot observe the stick – the stick is part of the observing system. Holding the stick loosely, the man can observe the form of the stick in his hand, but not the floor in front of him – the stick is now part of what he observes. He can delimit his observing system to his hand or he can include the stick, but he cannot do both at the same time; he needs to make a separation between the observing and the observed to observe at all. If there is no interaction, if the stick just waves around in empty space, there can be no observation. But if the stick hits something, a dynamical object, this causal interaction is an irritation that will enable him to start making a semiotic representation of the space around him. Both the interaction and the representation are necessary for his process of observation. At first the representation may be crude and not very

[3] Undated manuscript "On Signs", http://www.commens.org/dictionary/term/sign accessed 21/11–2014.

helpful, but with continued interaction it may be refined and become more useful, so that he can use his observations to act in his environment.

The representations of science refer to or point at dynamical objects, and the representations are tested when we establish observational situations (systematic observations, interventions, experiments) where the dynamical objects may 'kick back' in the causal interactions that are an essential part of observations (cf. Figure 1), but the dynamical objects can never be fully captured in the immediate objects of science. A dynamical object has a surplus of possibilities for observation, and the representation in form of an immediate object present in any observation is, by necessity, a reduction based on a certain perspective.

When two different observations of the same dynamical object mutually exclude each other, we end up with 'complementary phenomena' in Bohr's sense (Favrholdt 1999: 88–90). Quantum physical complementarity arises where the necessary interaction with the observed object (cf. Figure 1) cannot be disregarded, because the observed objects are sufficiently small that the quantum of action becomes significant. Popularly speaking, the position of a particle cannot be observed without the radiation involved in the observation influencing the momentum or the particle, and therefore measuring the position will make the momentum indeterminate or ill defined, and vice versa. Some twenty years after Bohr first presented his complementarity view, he emphasized "the impossibility of any sharp separation between the behaviour of atomic objects and the interaction with the measuring instruments which serve to define the conditions under which the phenomena appear. …Consequently, evidence obtained under different experimental conditions cannot be comprehended within a single picture, but must be regarded as complementary in the sense that only the totality of the phenomena exhausts the possible information about the objects" (Bohr 1949). This nicely sums up the analogy between quantum physical complementarity and the potentially complementary relations between different scientific perspectives in cross-disciplinary science.

By definition, it is a condition for cross-disciplinary science proper that the different perspectives observe the same thing, so to say, and here the model in Figure 1 points to a two-layered problem of communication across scientific perspectives. There is a need to point directly at some 'real' dynamical object to be shared in cross-disciplinary work, but we can only communicate signs (names, models, etc.).[4] The specialized languages of scientific disciplines and schools are not generally shared. Some perspectives are closely connected and share methods, models, theories or worldviews, others are very different and closed to each other. The 'rock bottom' basis for cross-perspectival communication is the 'common, ordinary language' (in Bohr's sense, see

[4] According to Weisberg's (2007) argument that modeling is the analysis of real-world phenomena by way of analysing a model, these two signs, names and models, would be quite different forms of signs, a name being an abstract direct representation and a model being an indirect representation. Translating this understanding into the Peircean semiotic terminology, a model is a dynamical object that is constructed to represent another (real-world) dynamical object. Hence, whereas a model is a (quite complex) iconic sign in itself, we would more often communicate signs based on observations of that sign, or descriptions of models, in Weisberg's words.

Favrholdt 1999: xxxvii), though this is still conditioned on common daily lives and therefore prone to cultural differences.

To take a simple example, the common name 'a cow' can be generally shared but reveals fairly little of the dynamical object referred to. More specialized, perspectival names such as dairy cow (for production), year cow (for accounting), prize animal (for cattle shows), livestock unit (risk of eutrophication) and grazing pressure (for landscape conservation) point to different aspects of the dynamical object of a cow. In order to successfully communicate the immediate objects represented by these names across perspectives, a shared interpretation of the sign has to be established. Communicating across perspectives is not a trivial thing.

The second layer of the problem is that the same dynamical object can be observed and represented in different ways in different perspectives, but none of these immediate objects is the same as the dynamical object in itself, and it is not possible a priori to determine whether different scientific perspectives observe the same dynamical object in cross-disciplinary work, even though this is the presumed. In language terms, when one perspective speaks of 'sustainable development,' 'soil quality,' 'farm,' or 'cow,' it does not necessarily mean the same as when another perspective uses the same term. The communicative paradox of cross-disciplinary science is that the common language is not sufficiently precise to handle the immediate objects of specialized perspectives, but more precise and specialized communication moves us away from the common language with which we can communicate across perspectives. This is a lesson to be learned from Peirce's semiotics, and an idea that has been radicalized by Niklas Luhmann (1995, 143, emphasis in original): "The fact that understanding is an indispensable feature in how communication comes about has far-reaching significance for comprehending communication. One consequence is that communication *is possible only as a self-referential process*." Communication across perspectives depends on structural couplings being established, and the differentiation and specialization of scientific perspectives reinforces this key condition.

We may be able to interact with the dynamical object through experiments, which create particular observation conditions, and through practical experiences, and in this way we can attempt to establish whether our representations 'correspond' to reality. But built into the observation conditions provided by different scientific perspectives, there is a linkage between ways of interacting with the world and ways of representing the world that makes it difficult, and in principle impossible, to share a common reference to a dynamical object across perspectives. Obviously, this does not mean that one cannot perform cross-disciplinary work, but it does mean that cross-disciplinary work is not a trivial matter. In the following sections we will explore the perspectival structure of cross-disciplinary science and offer some perspectivist analyses and tools to facilitate cross-disciplinary communication and cooperation.

4. THE PERSPECTIVAL STRUCTURE OF CROSS-DISCIPLINARY SCIENCE

The perspectivist conception of science presents a fruitful route to a better understanding of the problems and potential of cross-disciplinary work. A key step is to give an outline of the connection between perspectival structures of science and the types of scientific disagreement that they entail. Scientific disagreement is a good thing. It is through disagreements that scientific knowledge is tested and developed. But the confusion of different kinds of scientific disagreement is not productive. By creating a better overview of what kinds of disagreement can be *expected* between different scientific perspectives, due to their perspectival differences, we can establish a better basis for assessing and handling other forms of scientific disagreement, which are due to scientific dishonesty, political spin, disciplinary hegemony, bad science, etc., and point out a route to overcome some of the pitfalls of cross-disciplinary research.

The differences between types of scientific knowledge, disagreement and learning that appear in a perspectivist understanding of science are shown in Table 1. The table shows different types of knowledge, disagreement and learning (columns) in relation to the perspectival structure of science (rows indicating 'within a perspective', 'between perspectives', etc.). The kinds of disagreement to expect within a perspective are the normal, converging disagreements (Table 1, row 1) and the diverging disagreements that transgress the perspective and which may transform or split up the perspective (Table 1, row 2), whereas forms of unconnected 'blind' disagreements and communication failures are to expected between different perspectives (Table 1: row 3). Most elements in the perspectivist understanding of science shown in Table 1 have been treated in other contexts, without a comprehensive perspectival framework, and the table shows a few well known philosophical and sociological approaches, such as the boundary-work of Thomas Gieryn, the scientific revolutions of Thomas Kuhn, and Harry Collins' interactional expertise.

<table>
<tr><th></th><th colspan="2">Type of knowledge and expertise</th><th>Type of disagreement</th><th>Type of system learning process</th></tr>
<tr><td>1. Within a perspective</td><td rowspan="2">Embodied and tacit knowledge, Paradigm, Contributory expertise</td><td>Orthodox knowledge</td><td>Converging disagreement</td><td>Socializing, Reproducing and refining, Normal science</td></tr>
<tr><td>2. Transgressing a perspective</td><td>Heterodox knowledge</td><td>Diverging disagreement</td><td>Differentiation of science, Scientific revolution</td></tr>
<tr><td>3. Between perspectives (of first order)</td><td colspan="2">Acontextual knowledge, Interactional expertise</td><td>Unconnected 'blind' disagreement, Communication failure</td><td>'Learning the language,' Hegemony, Boundary-work</td></tr>
<tr><td>4. In a second order perspective</td><td colspan="2">Contextualised knowledge, Reflexive expertise</td><td>Perspectival disagreement</td><td>Second order polyocular communication</td></tr>
</table>

Table 1. Types of knowledge, disagreement and learning in relation to the perspectival structure of science.

Gieryn (1983) investigates the actual delimitations of science from non-science that specific sciences use in the pursuit of their professional goals. As discussed in a previous section, such boundary-work can be a problem in cross-disciplinary work, because some scientific perspectives are marginalized as non-scientific by other, more esteemed and powerful perspectives. See e.g. Hinrichs (2008) for a discussion of boundary work in agrifood studies.

Kuhn's paradigms are examples of perspectives in our understanding. Kuhn (1996 [1969]), in his Postscript to The Structure of Scientific Revolutions, suggests the term 'disciplinary matrix' as a more precise term for 'paradigm,' the term used in his highly influential book from 1962. The disciplinary matrix includes symbolic generalizations (theories and laws), metaphysical paradigms (models, analogies, and metaphors), values, and exemplars (concrete problem-solutions). The elements of Kuhn's disciplinary matrix are similar to the elements of what we have termed the cognitive context of a scientific perspective. However, Kuhn and the rich tradition following Kuhn have a historical, diachronic focus, where the paradigms of normal science are interrupted by scientific revolutions or paradigm shifts within a certain scientific field, whereas we in this paper focus on the synchronic disagreements between different perspectives and the consequences of the historical differentiation of science into different fields, disciplines and schools, in line with Maruyama (1974). The Kuhnian tradition in general focuses on theories and language, though there are some who take a more cognitive approach (Chen 1997, Andersen et al. 2006). Our approach here differs from the main tradition in having an explicit cognitive focus on what can broadly be called 'the observational apparatus.' Kuhn's views on the incommensurability between consecutive paradigms correspond to the problems in integrating and communicating across perspectives in cross-disciplinary work that we have described in this paper. But where Kuhn uses a language metaphor, talking of the untranslatability between different paradigms (Chen 1997), our approach points out that is in principle impossible and in practice more or less difficult to communicate across perspectives because each observational perspective has its own phenomenal world – its own representation of the world entailed in theories, models, concepts and examples, which is tied into the specific observational apparatus and the specific forms of interaction provided by it. Despite the common features, our more general (not only diachronic, but also synchronic) and explicitly perspectivist approach leads to other questions and other answers than Kuhn's.

Collins and following him a number of other researchers have investigated what the scientific practice means for expertise, and what scientific disagreement means for the role that expertise has in society (e.g. Collins 2004, Collins and Evans 2007). However, this work concerns in particular the opportunities for individual researchers to obtain expertise in a different field than their own, and not the general perspectival structures that are in focus here. Collins distinguishes between *contributory expertise*, possessed by those who participate in everyday activities and development of the field, and *interactional expertise*, which is characteristic of those who can communicate fully with the field, but are not able to contribute. The general interactional expertise of scientists (especially within the natural sciences) helps make the, in principle impossible, cross-disciplinary cooperation merely difficult. But in general, it takes a long time to obtain interactional expertise on a new field, and due to the differentiation and specialization of science it is hardly

possible today to become a 'modern renaissance man' with interactional expertise in a range of widely different fields. Interactional expertise therefore cannot be considered a general solution to the cross-disciplinary conundrum. The 'trading zones' of Galison (1997: 803ff) refer to scientific communities and not individuals, but still, the focus is on language and not on scientific perspectives as a whole.

The perspectivist understanding provides a common framework for discussing these different approaches to handling knowledge, disagreement and learning across scientific perspectives, and this linkage may be helpful in itself. But the really novel in the perspectivist approach is that it points to structures beyond these existing approaches. It is only in a thoroughly perspectivist understanding of science that the possibility of a fourth, multi-perspectival form of knowledge, disagreement and learning shows up, building on the idea of second order cybernetics (Foerster 1984). Perspectival disagreement and reflexive expertise are based on the handling of contextual knowledge from first order perspectives in a second order learning process, which we call polyocular communication (Table 1: row 4). . This involves a second order perspective that observes the observations of first order perspectives.

In the next two sections we first describe how second order perspectives can be used concretely to handle cross-disciplinary science and then outline some general cognitive and epistemic structures of scientific perspectives that can help facilitate such processes.

5. SECOND ORDER OBSERVATION OF SCIENTIFIC PERSPECTIVES IN CROSS-DISCIPLINARY SCIENCE

Building on the ideas in the previous section, we suggest that the problems that arise in cross-disciplinary science due to the perspectival nature of science need to be handled through perspectives of a second order. Using a term first used by Magoroh Maruyama (1974, 1978, 2004) in cross-cultural and organization studies, we characterize such second order learning processes as polyocular communication based on second order observations. That is, a second order perspective does not directly observe the research object; it performs second order observations of the first order scientific perspectives observing the object, and in this sense it manifests one multi-perspectival or polyocular view of the object (see Figure 2 for an example).

The need for second order perspectives and polyocular communication is a reaction to the difficulties of communicating directly across different perspectives with, possibly, different immediate objects in form of theories, models, taxonomies and entities, different delimitations of the shared (dynamical) research object, different understandings of common concepts, different logics and rationales, different criteria of science and different societal and intentional contexts in form of values and interests. The subject matter of the polyocular communication is thus contextualised observations and representations that expose the perspectives and conditions they stem from, and contextualised notions of knowledge and expertise in general. The second order perspective that is home to polyocular communication is on the one hand a scientific perspective like any other, residing in a research group or a wider research community, but different in

operating at a meta-level compared to first order scientific perspectives on the research object. As such it is a different form of organization of the research process, a research process that includes two levels of observation to enable a new form of knowledge production based on polyocular communication.

In the (obviously simplified) example in Figure 2, agronomy is concerned with food production and observes yields on the farm, biology is concerned with nature and observes biodiversity in and off the fields, economy is concerned with markets and observes commodities from the enterprise, and sociology is concerned with culture and observes human interactions in and around the farm. In a concrete cross-disciplinary investigation of, say, nature quality in a farmed landscape, these disciplinary perspectives represent different interests in nature quality with very different ideas about what nature quality means, they have different methods for how nature quality is best investigated, different geographical and conceptual boundaries of farms and landscapes, and in the end they draw different conclusions based on different rationales. A common geographical research area therefore cannot ensure that the different perspectives observe the same dynamical object, and a common pool of data cannot ensure integration across disciplines, since data are always observations from a certain scientific perspective.

It is sometimes stated as a goal that the scientific disciplines that are applied in cross-disciplinary research should undergo a disciplinary integration proper, often using the term transdisciplinary science (e.g. Pohl and Hirsch Hadorn 2008). This may be a relevant target if the objective is, for instance, to create an integrated perspective on a technological field such as nanotechnology (Johnson 2009). If the integration succeeds, a new, separate perspective is established, where specific theories, models, values, logic and exemplars are selected and the research field determined. There are strong internal mechanisms in science that favour the formation of specialized perspectives, which offer consistent, effective and accurate knowledge in the context of their particular, delimited research world and refined tools of observation.

On the other hand, the idea of transdisciplinarity of a first order, without the selections and delimitations inherent in the formation of a single scientific perspective, is incongruous. The specialized disciplines are generally not able to both reproduce and refine their own perspective and carry out second order observations of the different perspectives (including their own) that are employed in cross-disciplinary work. It is fine to utilize and extend the interactional expertise, in Collins' sense, that each researcher bring into the work, but while such individual cross-cutting expertise is helpful, it is not enough to underpin cross-disciplinary work. There is a need for formalized procedures to observe and communicate about the scientific perspectives involved, and there is a need for separate resources to perform such second order learning processes in scientific practice, as illustrated in Figure 2. Concretely, this could for instance be organized in form of a separate work package in a cross-disciplinary research project, with its own funding and human resources, but also involving researchers from the different disciplinary perspectives, with the aim to establish a reflexive, polyocular communication based on observations of the observations of different disciplinary perspectives and their cognitive context.

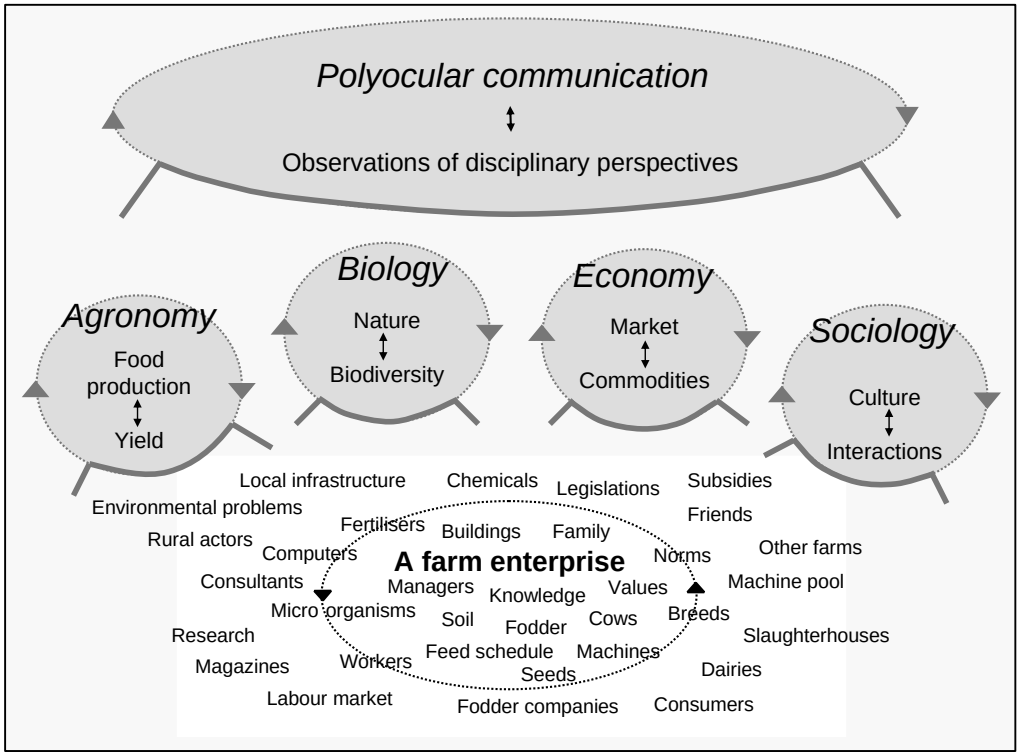

Figure 2: An example of polyocular communication based on second order observations of specialized disciplinary perspectives on a farm enterprise.

In conclusion, the polyocular approach to cross-disciplinary work that we have outlined here is neither a dis-integrated multidisciplinary approach, even though it does not seek to integrate the different disciplines involved, nor a formation of a new, integrated scientific perspective as an independent approach or discipline, even though it does bring a form of integration. This is not to say that polyocular observation and communication cannot lead to new and more integrated models of the research object, or that the involved scientific perspectives cannot learn from the process and transform their own approach accordingly. And indeed, such second order learning processes are bound to promote interactional expertise among the involved researchers. But the successful application of a polyocular approach does not depend on such changes. In fact, the approach depends on clear and distinct perspectives where the conditions for observation can be unambiguously described; and we must expect it to sometimes bring forth mutually excluding representations of the research object from different perspectives, or complementary phenomena in Bohr's sense.

Broadening the scope, we think there is a need for such second order observations, polyocular learning processes and reflexive expertise on cross-disciplinary work not only to handle the internal problems of the practice of cross-disciplinary research, but wherever different strands of science are used together to help solve complex problems and whenever different specialized scientific perspectives are brought in as expertise in democratic debates and societal decisions.

6. FUNDAMENTAL EPISTEMIC DIFFERENCES BETWEEN SCIENTIFIC PERSPECTIVES

Establishing second order perspectives on cross-disciplinary science is a necessary but not a sufficient condition for a productive understanding of perspectival disagreements. There is a need for an overview of how different scientific perspectives differ in epistemically relevant ways and what this means for their function. There are many possible ways to structure and categorize different types of science, and many have been suggested over time, but the perspectivist view of science that we apply here implies a different typology of science than the conventional.

Traditionally, science has been seen as divided into two or three main types, with the natural sciences on one side and the social and human sciences on the other, based on an ontological distinction between human and nature as that which is 'not human'. We don't think these traditional divisions, which are widely embedded in university structures and public perceptions, reflect the really fundamental differences between scientific perspectives very well. From a perspectivist viewpoint, differences that are based on the epistemological and methodological relation between the scientific perspective and its research world are more fundamental, and a better 'map' of these fundamental structures will provide a better basis for multiperspectival communication and cooperation. Below we briefly describe three basic distinctions between types of scientific perspectives (see also Alrøe and Kristensen 2002).

The first really fundamental distinction, following Habermas (1972, 302–310) is between different *cognitive interests* of science and the associated methodological differences. We do not follow Habermas' original triadic distinction, which somewhat mimics the traditional distinction between natural, human and social sciences. We distinguish between an *empirical* interest that produces descriptive and predictive knowledge referring to how the world is and probably will be and a *normative* interest that produces prescriptive knowledge on how the world should be and ideas about the good. The methodological distinctions based on cognitive interests carve the world of science differently than the traditional divisions: typical empirical sciences are physics, biology and most social sciences, typical normative sciences are logics, aesthetics and ethics. Following Peirce (1998: 51, 259), a third form of science is the hypothetical sciences, with a *hypothetical* interest in producing possible world structures. The hypothetical sciences include mathematics (the archetype of this form of science), counterfactual history, counterfactual modeling, scenario analysis, etc. Empirical, normative and hypothetical perspectives are all crucial and equally qualified ingredients in cross-disciplinary science targeted at complex real-world problems and social development.

The second fundamental methodological distinction is between *reductive science* focusing on parts and processes and *systems science* focusing on whole systems. This is the difference, in degree, between scientific perspectives with less reduced, real-world-like research worlds and perspectives with more reduced, laboratory-like research worlds (see Rouse 1987, 101). It generally distinguishes physics from ecology and social science, but the methodological distinction does not follow traditional disciplinary borders since there are more or less reductive perspectives within

physics, ecology and social science. Both reductive science and systems science relies on idealization in their theory building, but reductive science furthermore relies on the practical construction of observationally delimiting experiments (or thought experiments) and theoretical abstraction from complex system contexts.

There are great scientific advantages of working with highly reduced research worlds in terms of possibilities for experimental control and replication of results and accompanying powers of precision and generalization. This has often led to the, more or less explicit, conception that the systems sciences are necessarily less scientific than reductive sciences. But there are both benefits and costs of reduction: the powers of generalization come at the cost of impotence outside the constraining presumptions of the reduced research world. Faced with social phenomena, the laws of physics have only a limited power of explanation. One form of hegemony in cross–disciplinary science is thus the presumed superiority of reductive science over systems science, leading to the neglect of 'systems effects', 'emergent properties', 'the management factor', 'the role of motivation', etc. Conversely, there are methodological limits to systems science due to the heterogeneity of the more complex research entities, resulting in limited predictive powers. Furthermore there are ethical concerns due to the direct involvement in complex social and ecological systems, which the more reductive sciences are able to bracket out (but not avoid).

The third and last fundamental methodological distinction that we emphasize here is between *detached and involved sciences*. This is the less advertised difference between two positions of science in relation to its research world, the detached, observational and descriptive stance and the involved, experimental and intervening stance, in line with a pragmatist view of science. Some sciences, like astronomy, cosmology and the museum–based natural history of the past, are almost fully detached from their research object (this distinction does not concern the relation of science to its immediate objects, representations or models, but the relation to the dynamical research object). But most modern sciences are 'systemic sciences' that, in some way or another, influence the object that they study – if not directly through their scientific practices, then through the larger circles of research use. High energy physics constructs its elementary particles in giant colliders, chemistry invents new fancy molecules, conservation science conserves fragile ecosystems, health science cures diseases, anthropology brings new ideas into hitherto isolated cultures, and psychology changes the way people think about themselves. The mix and sequence of detached and involved stances is a key element in all scientific practice, in reductive as well as systems sciences. The detachment from the research object is a hallmark of science, as indicated by the importance of the conventional concept of objectivity, but this is only a conditional independence – conditional on the choices and actions needed to establish a detached stance.

The three fundamental distinctions can be used as dimensions to 'map' different kinds of scientific perspectives into a new typology of science. In the empirical sciences the map will include classificatory (detached, reductive), experimental (involved, reductive), historical (detached, systems), and developmental sciences (involved, systems). The classificatory and experimental approaches in the reductive sciences are closely connected, such as for instance the particle classifications and experiments of high energy physics, whereas the historical and developmental

perspectives in systems sciences are as different from each other as they are from very reductive sciences. We have experienced this marked but often unacknowledged difference between a detached, descriptive systems perspective and an involved, systems perspective that is oriented towards instigating change and transition, as a source of frustrating and unexplained disagreements in cross-disciplinary research.

A typology of science that is based on fundamental epistemic differences can facilitate the initiation and planning of cross-disciplinary research projects by offering recognition of very different types of science as equals, and by providing a place and function for different types of scientific perspectives. The specific differences can also be of help in the polyocular communication processes that we suggested above for cross-disciplinary science. For instance, logic may be recognized as a normative science that in this respect resembles aesthetics and ethics more than it does the hypothetical science of pure mathematics or the empirical science of physics; economics may be recognized as a relatively reductive science, which in this respect resembles physics more than it resembles other, less reductive social sciences; and conservation biology may be recognized as an involved science that resembles social management sciences more than the detached, descriptive science of natural history.

7. CONCLUSION

Science is differentiated and heterogeneous, and there is a need for different kinds of science to come together to help solve the complex problems of modern society. But cross-disciplinary science is not a trivial matter, and often the scientific communication across disciplines proves difficult and inadequate. This is not, in general, due to some kinds of science being more scientific than others. Empirical and normative research, reductive and systems research, involved and detached research can all be equally good science in a sufficiently general conception of science. We have argued that an increased awareness of the perspectival structure of science can facilitate scientific progress in the cross-disciplinary practice and use of science. To this end, we have pointed out the need for a new form of organizing science that includes separate, second order research processes that allow for polyocular observation and communication of specialized scientific perspectives, and sketched out how they can be realized. Making clear what perspectival disagreements to expect in cross-disciplinary science can help distinguish sound and productive scientific disagreements from disagreements due to bad science, dishonesty, spin and disciplinary hegemony, and thus help enable a new perspectivist approach to scientific knowledge. This paper is only onestep towards a philosophically and practically satisfying perspectivist framework for cross-disciplinary science, but we hope that it may lead to more philosophical, scientific and practical interest in the differences between scientific perspectives and what this means for the ability of science to investigate and help solve complex, real-world problems.

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Leading by Metaphors – A Case Study of a Mega IT Project in a Danish Bank

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Contrary to existing literature and studies of large-scale IT projects empirical data from a mega IT project in the mid-sized Danish Bank, Jyske Bank, demonstrates a successful implementation of a highly complex IT platform transition. Linguistic representations and especially extensive use of metaphors by executive management to form and shape the megaproject appeared to have significant impact on guidance of individual and collective action, and thereby presumably one of the important factors for the successful implementation. To learn from this case study, we investigate the use of metaphors in the megaproject and discuss how leading by metaphors is enacted. Our findings are that (1) storytelling with metaphors can act as backbone for communication, (2) metaphors can set direction for technical capabilities, and finally (3) metaphors can be used to emphasize emotional intelligence.

Key words: Megaproject, metaphors, successful implementation

1. INTRODUCTION

Management of mega IT projects is extremely challenging and the failure rate is high. IT systems become more and more important as a competitive element in many industries, and these technology projects are spreading over most part of organizations and posing high risk to these organizations if the mega project fails (Flyvbjerg and Budzier, 2011). McKinsey render the following number based on a database of more than 5.400 IT projects (Bloch, Blumberg, and Laartz, 2012, p. 1): "*On average, large IT projects run 45 percent over budget and 7 percent over time, while delivering 56 percent less value than predicted. Software projects run the highest risk of cost and schedule overruns*". Mega IT projects and large-scale IT projects are even that risky that it can result in bankruptcy, which happened to American LaFrance, a leading brand of custom-made firefighting and fire rescue vehicles, with a failed ERP implementation (Krigsman, 2008). The numerous large scale public IT projects that are suffering are also a clear sign of how challenging these projects are (Budzier and Flyvbjerg, 2012; Gauld, 2007; Krigsman, 2010).

Bloch et al. (2012, p. 4) present four areas that presumably cause the most IT project failures: (1) Missing focus such as unclear objectives and lack of business focus, (2) Content issues with shifting requirements and technical complexity, (3) Skill issues such as unaligned teams and lack of skills, and finally (4) Execution issues with unrealistic schedules and reactive planning. These issues are well aligned with other studies of critical success factors for projects (Cooke-Davies, 2002; Morris, 2013; Turner, Huemann, Anbari, and Bredillet, 2010) and large scale IT projects such as ERP implementations (Finney and Corbett, 2007). The study by Bloch et al (2012) furthermore indicates that the challenges are increasing for large IT projects (defined as >$15 million dollar) and they state "*large-scale IT projects are prone to take too long, are usually more expensive than expected, and, crucially, fail to deliver the expected benefits*" (Bloch, et al., 2012, p. 6).

There is no single solution or standard recipe for overcoming the challenges that mega IT projects and large scale IT projects present (and for that matter projects in general). There are many factors and several are context specific, which is the reason that universal theories hardly is the answer to the challenges – we will in the following point to two important factors. The first is people: "*the most important part of project management is the people. [and] the most important factor in selecting the top man is his qualities of leadership*" (Frame, 1988, p. 10). This might be extended to leadership competencies for the management team in and around a project. Next, the foundation for well-driven projects starts by the organization's institutional context where the organization has established appropriate governance and strategy processes, that ensures suitable front-end work with project definition and project start (Morris, 2013; Morris and Geraldi, 2011). The institutional context is built and changed over time and is as such project independent although it has a high impact on the management of projects. Many competencies and disciplines play a role in successful implementation of projects, but people and the institutional context are surely important factors.

Contrary to the existing literature and studies of large-scale IT projects empirical data from a mega IT project in the mid-sized Danish Bank, Jyske Bank, demonstrates a successful implementation

of a highly complex IT platform transition over a two-year period (2010–2012) and a well-executed launch in October 2012 with a six to 12 months stabilization period . The mega IT project is called NOVA. We designate it as megaproject and not "just" a large-scale IT project because it consists of 147 projects and 900 employees working on a tight two-year schedule, which is extremely challenging, and is mega in nature, but we acknowledge that it also could be labelled a large IT project (Flyvbjerg, 2014; Kipp, Riemer, and Wiemann, 2008). One of the authors havehas been heavily involved in the management of NOVA while the other has followed NOVA as collaborative practice researcher (Mathiassen, 2002). Gradually ee became aware of the importance of linguistic representations in NOVA during the project course, and this is especially expressed by extensive use of metaphors by executive management to form and shape the project (leadership competencies) (Müller and Turner, 2010). This appeared to have significant impact on guidance of individual and collective action, and thereby presumably one of the important factors for the successful implementation. This leads to our research question: *What can we learn from this particular case study concerning the use of metaphors to lead a project?*

We contribute to a communicative perspective by showing how organizational knowledge is manifested, managed, and utilized through communication (Canary and McPhee, 2010) with particular focus on metaphors.

The remaining part of this paper is structured as follows: The next section introduces metaphors in projects and project management to establish a conceptual foundation for this study. The research methodology is then presented with focus on project setting, data collection and data analysis. We continue with the NOVA story with emphasis on the use of metaphors. We then discuss the use of metaphors related to leadership in projects, and finally we present the concluding remarks.

2. METAPHORS IN PROJECT MANAGEMENT

"*Linguistic representations are verbal or written means used to communicate a concept to guide individual and collective action*" (Seidel and O'Mahony, 2014, p. 693), and there are many types of linguistic representations such as metaphor, poetry and storytelling (Grisham, 2006). Metaphors are pervasive in human thought (Ortony, 1993) and probably make up "*the very stuff with which human beings make sense..*". (Turbayne, 1962 cited in Grisham 2006: 488). We live by metaphors in our everyday life (Lakoff and Johnson, 1980), working life and certainly also in academia. Metaphors are used as linguistic representations to understand organization and management (Morgan, 1997), to selectively frame and guide individual interpretations of events (Goffman, 1974), for construction of theory as imaginary concepts (Weick, 1989) and much beyond. Morgan proposed eight metaphors for an organization (e.g. machine, organism and brain) and stated that metaphors imply "*a way of thinking and a way of seeing .. but also a way of not seeing*" (Morgan, 1997, pp. 4–5). We have to use several metaphors in order to study organizations as each way of seeing will provide unique insights with strengths and limitations (Morgan, 1997, p. 352). The understanding of the organization as a machine implies that employees are expected to operate as cogwheels in a machine with the managers controlling the clockwork, which make up a machine

with "*precision, clarity, regularity, reliability, and efficiency*…". (Morgan, 1997, p. 17). This basic example illustrates the supremacy of metaphors, and labelling the organization as a machine is more powerful than talking about Taylor's scientific management, Fayol's administrative theory and Weber's theory of Bureaucracy (Scott and Davis, 2007, pp. 40–53) although it covers the same thinking to some extent.

Metaphors have also been used within project studies and project management. An early use of metaphors is Angling's (1988) study of multi-project management which he characterizes as building the Great Wall of China, while Eskerod (1996) also studied multi-project management but used the Chinese dragon as metaphor. Eskerod's (1996) use of metaphor is in stark contrast to Angling's (1988) as elaborated by Skorczynska (2014) where the Chinese Wall implies order and predictability while the Chinese dragon suggest constant change and dynamism – this underlines Morgan's (1997) statement about seeing and not seeing with metaphors. A very well cited metaphor within project management is that "projects are temporary organizations" (Lundin and Söderholm, 1995; Packendorff, 1995) which originates from the Scandinavian school of project studies, which looks at how projects enfold as temporary organizations and how they are embedded in permanent organizations and wider environments (the contexts) (Sahlin-Andersson and Söderholm, 2002). Other examples include modern software projects characterized as zeppelins and jet planes (Armour, 2001), applying metaphors in product innovation (Seidel and O'Mahony, 2014), where one of the examples is a car specification using "pocket rocket" as metaphor (Seidel and O'Mahony, 2014, p. 693), and lastly a study of using building and animal metaphors in project management discourse (Skorczynska, 2014).

A rather distinct area is using multiple metaphors to classify different schools of thought within projects much in line with Morgan's (1997) use of metaphor (e.g. Svejvig and Andersen, 2014; Söderlund, 2011; Turner, et al., 2010; Winter and Szczepanek, 2009). Turner and colleagues (2010) took up this metaphorical approach and presented nine metaphors for perspectives on project. For example, they characterized the project as a machine, which embeds the view that "*the project is treated as a machine that, once defined, will be very predictable in its performance*" (Turner, et al., 2010, p. 34). This has also been referred to as the optimization school within project management (Cleland and King, 1968; Kerzner, 1998).

A common trait in the use of metaphors in project management literature is that they deal with projects in general and not a particular project. Contrary to this our study is focusing on a specific project and the specific use of metaphors within this project – that is an idiographic perspective (Neuman, 2006). However, there are other examples of specific use of metaphors in projects where animal metaphors are used to develop team relationships with desired behaviors (e.g. eagle) and undesired behaviors (e.g. rattlesnake) (Shelley, 2012). The same is the case with product innovation mentioned earlier (Seidel and O'Mahony, 2014).

This brief presentation of metaphors in organizations and projects particularly serves as the conceptual foundation for the study of metaphors in NOVA.

3. RESEARCH METHODOLOGY

These findings and discussions about metaphors reported here are part of a broader study based on a long term collaborative practice research (Mathiassen, 2002), where the focus has been twofold (Van de Ven, 2007, p. 27): (1) To co-produce knowledge with collaborators and (2) To do action / intervention research. The research was initiated during autumn 2010 where we, the two authors (practitioner and researcher), started to work together on NOVA. We have met regularly during the NOVA project execution period (2010–2012) and the following stabilization period (2012–2013). The practitioner was a part of the program management team for NOVA and has thus been heavily involved in most of the management aspects of NOVA. Our collaborative research is still ongoing and now we are focusing on writing up results from NOVA, and we continue discussing and reflecting upon the case involving management and former project participants. Gradually we became aware of the importance of linguisticrepresentations, especially metaphors, during the NOVA course, and their implications for successful implementation.

We designate it as case study research where NOVA (megaproject) is the case, as it makes empirical evidence from real people in real organizations in order to contribute with original knowledge (Myers, 2009). Case study research is effective to explore research questions about organizational contexts where the factors relevant to outcomes are not yet known (Eisenhardt, 1989), which is exactly our situation. Beforehand none of us were aware of the high importance of metaphors in project management, this emerged out of the collaborative research. We adopted a contextualized, interpretive research approach (Pettigrew, 1990; Walsham, 2006) that attempts to understand phenomena through the meanings that people assign to them (Myers and Avison, 2002). We acknowledge that access to reality is through social constructs such as language, consciousness and shared meanings (Berger and Luckmann, 1966), and such access is indeed relevant when the aim is to study linguistic representations.

3.1. Case setting

The NOVA programme is the largest change process ever undertaken by Jyske Bank and has been called one of the largest IT enabled megaprojects in Denmark. Jyske Bank is a financial institution that provides all types of financial services such as banking and financial deals primarily in Denmark. Jyske Bank employs 3,800 employees and has more than 450,000 private and business customers in Denmark. NOVA is about moving Jyske Bank's custom developed IT platform, consisting of more than 500 applications, to Bankdata's standard IT-platform. Bankdata is an IT service provider owned by 12 Danish banks who are also their customers. To undertake this large change process they involved 900 employees organized in 147 projects during a two-year period. The launch of the new IT platform was done in 33 hours (switching from old to new platform), followed by a 48 hours production test of 398 customer requirements and 1200 business processes. On Monday the 15th October 2012 the system went live for 3.800 employees and 450.000 customers. It is fairly easy to imagine the extremely high complexity of NOVA.

3.2. Data collection

The data collection has been ongoing since September 2010 and is still taking place in the form of additional interviews, reflections with stakeholders and informal talks. Below is Table 1 sketching the major data collection activities:

Phase	Time period	Data collection activities
Project execution	September 2010 – October 2012	Regular meetings, typically monthly, between practitioner and researcher, where specific interventions such as project charter structure, planning issues and basis for decision-making were discussed. Parts of the meetings were also used for more reflective discussions about how NOVA was unfolding and the reasoning behind it Collecting published and unpublished documents: plans, reports, minutes and presentations; press releases; Jyske Bank and Bankdata home page information (www.jyskebank.dk; www.bankdata.dk); news articles; magazine reports, videos etc.
Stabilization after launch	October 2012 – March 2013	Interviews with executive management, bank staff and project manager for change process (three interviews) Continued collection of documents
Writing up and continued discussion and reflection	March 2013 – September 2014	Interviews with executive management, bank staff and project manager for change process (three interviews) We started to write up and analyze the case from March 2013, which then have led to additional informal talks, emails and meetings, which make up the collected data Continued collection of documents

Table 1: Overview of data collection methods

As shown in Table 1 above, the data collection started from the very beginning of NOVA that was during September 2010. We decided to work together on this megaproject, and we were quite sure beforehand, that this would be an interesting case to study – as this was really a high risk megaproject (Flyvbjerg and Budzier, 2011). We held regular meetings, typically monthly, and at specific events even more often e.g. when preparing a basis for the decision-making early in the megaproject (October – November 2010). Although the focus of the meetings was to discuss specific project management issues such as planning many other topics emerged out of the discussion, for instance the importance of linguistic representations and communication style. The meetings are documented in hand-written field notes. However, we did also collect documents, which we found relevant, but this has been a less conscious process as we have a good working relationship with Jyske Bank and Bankdata, where we can get relevant information upon request. In fact both organizations have been very cooperative and open to our research, which has been a driving force for this study. We focused on doing interviews during the next phases, the stabilization period and writing period, where we have had six interviews with stakeholders (executive management, bank staff and project manager for change process). The interviews have had multiple purposes ranging from the strategic intent and results discussed with executive management to understanding the daily work situation for the bank staff after the launch of the

new IT platform. Internal newsletters, presentations and videos have very often complemented the findings from interviews - Jyske Bank has its own TV channel, where they broadcast and record various topics, which emphasize the focus on communication styles. The interviews lasted from one to two hours each and we have written-up the major issues, but not prepared detailed transcriptions.

Data collection and data analysis are not distinct processes in qualitative research, but overlapping and carried out iteratively, and this is specifically the situation in this study where it has been natural to start analyzing the situation and then afterwards to collect more data. Nevertheless, they are discussed separately and presented in a linear fashion starting with first data collection and then data analysis, as this is a useful and logical way of understanding the two activities (Myers, 2009, p. 165).

3.3. Data analysis

We have lived by the metaphors and linguistic representations in NOVA, and this has been a part of our ongoing interpretation and understanding of the megaproject for a long time. We made use of the data sources presented in Table 1 above to obtain an overall understanding of NOVA and to present the story line in this paper. However, the richest source of empirical data for this metaphorical analysis stems from selected PowerPoint presentations as these were used by executive management to explain and convince NOVA project members about vision, objectives and project approach.

The metaphorical analysis follows the subsequent steps (inspired by Schmitt, 2005): (1) Select documents, (2) Map out the metaphorical use in documents, and finally (3) Analyze the metaphorical use. *The first step* was to identify potential documents, primarily PowerPoint presentations and written up story lines from interviews. In the *second step* we then mapped the metaphors used in the document, and this resulted in 45 distinct metaphors. The metaphors are taken from many sources where several are inspired by the Apollo moon mission back in 1960's such as "*Failure is not an option*" ((Kranz, 2001) and "*NOVA let's make history*" (shown on a slide with a background where Neil Armstrong steps down as the first man on the moon). Others are metaphors used in daily life like "*to stretch shoes from size 42 to size 44*" (about the changes to the standard IT platform from Bankdata). The *third step* was to analyze how the particular metaphor was used to enable and support NOVA leadership as enacted by management.

4. THE NOVA JOURNEY

The timeline below in Figure 1 shows major phases in the project, which are used to explain the NOVA journey:

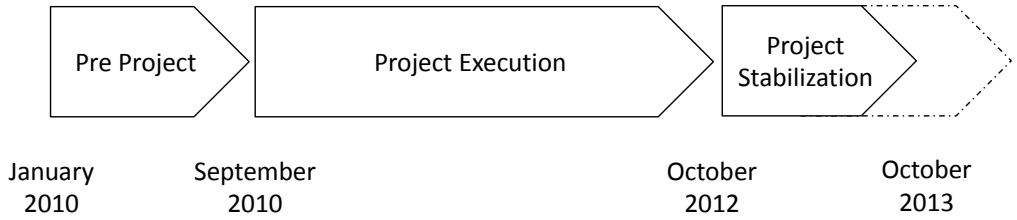

Figure 1: Timeline of NOVA megaproject

Pre-project: The situation for Jyske Bank back in 2009 was that the three largest banks in Denmark had their own IT development while all other banks were organized around three local IT service providers where Bankdata was one of them. Jyske Bank has a yearly strategy process where outsourcing of IT development is always being discussed, and in 2009 it was reaffirmed that IT development should be done internally as a sourcing principle because it was seen as a necessary strategic resource for Jyske Bank.

However, the financial sector in Denmark was forced into considering new business models with strategic alliances, and to potentially engage in mergers and acquisitions because of the global financial crisis (see also Andersen and Overgaard, 2011). This has certainly impacted Jyske Bank's strategy discussion in the beginning of 2010 where a decision was taken to look for a new sourcing strategy concerning IT development. Several arguments were brought up that "*Jyske Bank needs a bigger IT muscle*" and "*increased internal IT resources were seen as a vicious spiral*" of adding more and more IT resources. Nevertheless, there was a need for more IT resources if Jyske Bank was going to sustain their competitive advantage, and Jyske Bank conceded that they did not want to invest more in IT capabilities, making the obvious choice to look for a strategic IT partner, because IT is a strategic resource to a bank.

Executive management searched for sourcing solutions and a meeting between the managing director for Jyske Bank and the chairman of the board for Bankdata in April 2010 was the starting point for the strategic alliance between the two organizations as it was seen as being beneficial to both parties. It was expressed as follows: "*this is about finding playmates who want the same as you*". Jyske Bank decided to rely on the standard IT platform supplied by Bankdata with a very brief initial technical discussion, and much lesser than typically anticipated in the literature (Henderson and Venkatraman, 1999 (1993); Ross, Weill, and Robertson, 2006). The focus was on the strategic partnership and not on the technical capabilities of Bankdata's IT platform – it was verbalized as follows: "*it was not about who has the smartest and most beautiful IT platform*", and "*Jyske Bank have to live with duct tape*" indicating that some functionality will be missing in the standard platform from Bankdata (referring to using duct tape in Apollo 13 to repair lithium hydroxide canisters to remove the C02 (Atkinson, 2010)).

The many meetings and workshops between Jyske Bank and Bankdata resulted in a strategic partnership, which was proclaimed in a stock exchange announcement on the 1st September 2010. Jyske Bank became member (owner) of Bankdata together with 11 others banks, and moved its IT development to Bankdata, which implied that about 370 employees were changing their employer from Jyske Bank to Bankdata.

Project execution: The real project work starts immediately after the stock exchange announcement where the two organizations, Jyske Bank and Bankdata, should get together. NOVA has an immediate effect on more than 500 employees in the two organizations, which are affected by the strategic outsourcing decision. NOVA presents unimaginable many open areas and issues such as: (1) The scope of NOVA, (2) people management of employees in this outsourcing situation, (3) the structure for cooperation including organization, roles, responsibilities and governance, and (4) major technical decisions– to mention few important areas.

A very important decision had already been taken in the pre-project phase regarding which IT platform that should survive after NOVA and this is expressed in the following: "*It is Bankdata's IT platform that remains! This means that Jyske Bank has to 'move in' with Bankdata and that Jyske Bank's IT platform has to die*". This was a very tough decision for Jyske Bank's employees as they felt strongly about their "own" IT platform. This was verbalized as "*when we sum it up, the decision is not that difficult in our mind, but it is in our heart*".

The pre-project has only scratched the technical surface of the new IT platform from Bankdata and a comprehensive business analysis was initiated during September 2010 to compare the old and new IT platform and identify major and minor gaps. The business analysis was divided into eight tracks staffed by 140 employees from Jyske Bank and 60 employees from Sydbank and Bankdata. Sydbank is also a member of Bankdata and is already using Bankdata's IT platform; Sydbank is the fifth largest bank while Jyske Bank is the third largest bank (Wikipedia, 2014). Bankdata contributes with technical knowledge while Sydbank has extensive knowledge about setting up the IT platform and using it in their daily work with private and business customers. There is a strong culture in Jyske Bank, and you are part of "*the green family*" (green is the logo color), and several among Jyske Bank's management and employees felt that they were delivering Jyske Bank's "*DNA*" to Sydbank. Others realized that it was necessary knowledge sharing between the two competitors, and that Jyske Bank and Sydbank have to share their DNA. The business analysis resulted in a list of major and minor gaps, which were used in NOVA onwards. Another outcome of this analysis was to soften up the decision about the IT platform, which meant that some Jyske Bank IT applications would survive after NOVA.

The challenge regarding the new IT platform to solve Jyske Bank's business requirements was expressed as "*to stretch shoes from size 42 to size 44*", which means adding a new functionality, and to use "*duct tape*" to repair issues where the new functionality was not feasible due to schedule and/or cost reason.

A very tough schedule was defined where the launch of the new IT platform would have to take place on the 15th October 2012 (two years ahead from decision about launch milestone) and the stabilization period should finish no later than 1st March 2013. This meant ramping up resources with a peak of 900 employees working on NOVA and establishing 147 projects in the NOVA programme (or megaproject).

The project execution phase consists of six areas where the 147 projects are assigned and these areas are as follows: (1) Data migration, (2) Technical infrastructure, (3) Bankdata IT development, (4) Jyske Bank IT development, (5) Product and processes, and (6) Organizational implementation. It is a highly demanding process to coordinate, control and ensure communication among 147 individual projects spread across the six areas.

An important way for management to cultivate and motivate the 900 employees was to use the Apollo programme as an overall metaphor for the NOVA journey. An extract from a PowerPoint presentation with 25 slides is reproduced here (Spring 2011):

> *The front page has only the word "NOVA", but the background photo is stars in the sky showing the boundless space (Slide #1)*
> *"Strongly manned" and "Joint analysis and check procedures" with NASA's Mission Control Center in Houston as background (Slide #3 and #5)*
> *"Countdown to launch – 72 weeks out of 111 weeks left to launch" with a photo showing the launch of a rocket with fire spreading from engines (Slide #16)*
> *"Safe landing of projects" with a photo of a Lunar landing module landed on the moon (Slide #16)*
> *"Launch day is 15th October 2014 – Failure is not an option" with a photo of three parachutes moving to the earth (Slide #23)*

This communication was done by executive management to tell the story that the people on the project was doing a very difficult task comparable to the Apollo programme. "Failure is not an option" (Kranz, 2001) is a strong message and everyone understands that space missions are life critical and that failure is not an option, and this analogy is drawn to NOVA. The communication style, e.g. by PowerPoint presentations, always included extensive use of metaphors and photos to back up the message put forward.

Success was the option and opposite to failure, as the new IT platform was launched on the scheduled day October 15th2014, and all the effort of the project execution phase seemed to have borne fruit. A video was produced for the NOVA celebration party emphasizing that "NOVA is a success", and as a tribute to all the people involved in NOVA, and once again it shows the superior way that Jyske Bank communicates.

Stabilization period: Launching a new IT platform is to some extent finalizing the technical work although error correction and support are ongoing, but it is also a starting point for the business line staff serving private and business customers as well as the many back office functions in a bank. This is a critical period for any organization because it is here that the system should show

that it is viable, and there were many struggles such as performance drop by employees due to learning curves and other issues (Elrod and Tippett Donald, 2002; Markus, Axline, Petrie, and Tanis, 2000; Robey, Ross Jeanne, and Boudreau, 2002). The "performance drop", "the dive" and "death valley of change" is some of the labels by which the time after launching a new system is characterized. This is very frustrating to the bank staff at all levels, and creates many discussions. However, this is also tackled by the Jyske Bank management and the CEO of the bank says (December 2012):

> *"We know there are many problems out there right now, things take extra time and productivity is lower. It will take a while yet [before we are back to normal]. But we had counted on [the situation]. It must be weighed against that we would otherwise have spent 3-4 years (instead of two) on conversion."*

Again, the right communication at the right time, and the CEO message was clear, that executive management was expecting problems and lower productivity (the drop) and that it would take some time before normal operation was achieved. This was a reassuring message to all the hard working bank staff trying to survive in a tough situation and a pat on the shoulder to all staff involved in supporting daily business by organizational implementation activities. Slowly but surely Jyske Bank went back to normal operation during 2013.

We are going to round of this section by expressing some of the reasons why NOVA can be regarded as successful: (1) NOVA was delivered according to schedule and with the agreed functionality overall, but the cost has increased considerably (which to some extent was expected by top management); (2) The stabilization period was very frustrating and problematic, but Jyske Bank became more and more acquainted with the new system over a period of 6 to 12 months; and finally (3) Jyske Bank survived the stabilization period and the new IT platform is still used by all the employees in 2014. It is time for Jyske Bank to harvest the benefits from this mega change process.

5. LEADING BY METAPHORS

The story line presented in previous section shows some of the metaphorical representations used in NOVA and it is immediately clear that such expressions are efficient tools for forming and shaping a project as well as motivating and influencing others, which are important leadership competencies (Morris, 2013). With this in mind, we will return to our research question: *What can we learn from this particular case study concerning use of metaphors to lead a project?* Below, we discuss and reflect upon the key insights from use of metaphors in NOVA.

Create a storytelling with metaphors as backbone for communication: The overall story line with the Apollo program was a very appropriate way to communicate the vision and strategy for NOVA. The statement that NOVA is a (close to life) critical mission for Jyske Bank and failure is not an option really are strong messages to the project personnel and other stakeholders. Developing an effective vision implies that the vision is imaginable, desirable, feasible, focused, flexible and communicable according to Kotter (1996, p. 72), and most of these characteristics are followed by

the NOVA vision. Kotter talks about "an imaginable picture of the future" (Kotter, 1996, pp.: 72–75), and this was met by NOVA in an exemplary manner by using the Apollo program and associated metaphors. The choice of the Apollo program appeared to be very viable for NOVA and was used repeatedly. There were so many ramifications from this overall metaphor such as (1) "*strongly manned*" and "*joint analysis and check procedures*" with NASA's mission control center in Houston as background (slide #3 and slide #16), (2) "*safe landing of projects*" (slide #16), and (3) "*Countdown to launch*..". (slide 13). There was an overall purpose of the Apollo journey and then many possibilities for more detailed and specific messages.

Use metaphors to set directions for technical capabilities: While it might be rather obvious to use rhetorical instruments as storytelling and metaphors to develop vision and strategy, it is less intuitive to use the same thinking for technical capabilities. However, the NOVA case shows that technical issues can also be articulated by metaphors, and it might be a convincing way to align between business functions (less technical savvy) and technical functions – as well as setting directions in a clear formulated way. One of the challenges for Jyske Bank was to convince its employees that the Bankdata IT platform was the right choice although it was a compromise functionality wise. This is voiced in the following metaphors: (1) "*It was not about who has the smartest and most beautiful IT platform*" – this is not a beauty contest; (2) "*Jyske Bank have to live with duct tape*" – we can repair the solution); (3) "*To stretch shoes from size 42 to size 44*" – we stretch shoes when we buy shoes, which are too small, they seemed to fit when we bought them, but then we realize that they are too small after wearing them for some time; and finally (4) "*It is Bankdata's IT platform that remains! This means that Jyske Bank has to 'move in' with Bankdata and that Jyske Bank's IT platform has to die*" – die is a strong word, so the project personnel do not have to argue that they want to keep their "Jyske Bank baby", the decision has been taken! We do not argue that the metaphors replace requirements specifications, gap analysis etc., but it is a convincing rhetoric grip that helps persuade the audience. In their paper about managing the repertoire in product innovation Seidel and O'Mahone (2014, pp. 693, 699) present similar examples such as a flextruck (truck with flexible cargo area) that was labelled a "*Swiss army knife*" and the earlier example of "*pocket rocket*" for a car specification. They also argued that the stories and metaphors cannot stand alone but need to be complemented by specification and prototypes in order to have a repertoire of representations in product innovation.

Use metaphors to emphasize emotional intelligence: Emotional intelligence is a central leadership competence (Müller and Turner, 2010) and in rhetoric there are three modes of persuasion: pathos, logos and ethos, where pathos appeals to the audience's emotions (Toye, 2013, p. 14). The NOVA change process was highly emotional for the many employees who were transferred from Jyske Bank to Bankdata and it make sense to verbalize the socio-cultural issues arising from this drastic decision. Metaphors like (1) "*When we sum it up, the decision is not that difficult in our mind, but it is in our heart*", (2) "*The green family*", and (3) *"[Jyske Bank's] DNA*" address interpersonal sensitivity where executive management (and other management personnel) takes account of the employees' needs and perceptions (Müller and Turner, 2010), and shows empathetic understanding (Turner and Müller, 2005).

As a final comment, leadership is that highly linked to communication and communication style that any leader needs to know the repertoire of stories, metaphors, poetry, myths (Grisham, 2006; Turbayne, 1962) and other rhetorical means and how to use them efficiently in projects. This is not a trivial consideration and is certainly an underdeveloped discipline within classical project management – soft skills like communication are the hardest (adapted from Morris, 2013, p. 198).

6. CONCLUDING REMARKS

The purpose of this study was to investigate what we could learn from this particular case concerning the use of metaphors to lead a project. To address this topic we told and analyzed the story about the NOVA journey and how metaphors were used along the journey, starting in the pre-project phase and continued through the project execution phase and beyond. The linguistic representations and especially the extensive use of metaphors by executive management formed and shaped the megaproject, and appeared to have significant impact on guidance of individual and collective action – and was thereby presumably one of the important factors for the successful implementation. Our findings are that (1) storytelling with metaphors can act as backbone for communication, (2) metaphors can set direction for technical capabilities, and finally (3) metaphors can be used to emphasize emotional intelligence.

We have conducted a single case study from an idiographic perspective and we should thus be cautious about generalizations. The megaproject and following change process at Jyske Bank is an unusual case at least in a Danish context, but might be "translated" to other large scale projects and megaprojects or other settings in general (Seddon and Scheepers, 2006) We argue that the use of metaphors as communication style used by managers is a more generic competence, which is applicable in many situations in projects and beyond. It is important that managers (leaders) have their own context in mind, since the outcome may differ across contexts. Aspects, which have proved to be important in this study, may have less importance in another context. Other insights could appear if a similar topic were to be investigated in another company; we thus encourage other researchers to study use of metaphors in projects.

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Performance Measurement at Universities: studying Function and Effect of Student Evaluations of Teaching

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This paper proposes empirical approaches to testing the reliability, validity, and organizational effectiveness of student evaluations of teaching (SET) as a performance measurement instrument in knowledge management at the institutional level of universities. Departing from Weber's concept of bureaucracy and critical responses to this concept, we discuss how contemporary SET are used as an instrument of organizational control at Danish universities. A discussion of the current state of performance measurement within the frame of new public management (NPM) and its impact on knowledge creation and legitimation forms the basis for proposing four steps of investigation. The suggested mixed-methods approach comprises the following: first, thematic analysis can serve as a tool to evaluate the legitimacy discourse as initiated by official SET affirmative documents by government, university, and students. Second, constructs for the SET questionnaire can be developed and compared to existing SET questionnaires in terms of reliability and validity. Third, data from SET can be used to corroborate the relationship between the qualitative (comments) and quantitative (scaled questionnaire) sections. Fourth, it can be investigated if SET actually contribute to teaching improvement by examining how the instrument is integrated into systematic ex-ante and ex-post organizational management. It is expected to find discrepancy between the proponents' intent to evaluate teaching and the way the performance measurement instrument is implemented.

Key words: student evaluations of teaching; performance measurement; performance management systems; higher education; knowledge management; knowledge economy

1. INTRODUCTION

> *"Often, we get so wrapped up in the measuring of performance that we forget to examine the purposes for which we measure." (Bromberg, 2009: 214)*

During the last decade, at the latest, many European universities had to undergo rapid changes from their traditional administrative forms to new public management. Politicians and other advocates proffered efficiency improvements and accountability of a hitherto seemingly intransparent organization. Even though one common and consistent definition of new public management (NPM) is missing and it can merely be considered an "umbrella term" (Van de Walle & Hammerschmid, 2011: 191), the notion usually implies the transfer of free market economy practices to public organizations, such as universities. The doctrinal compounds of NPM have first been summarized by Hood (1991) and consist of, shortened, a "hands-on professional management", performance standards and measurements, output control, the disaggregation of units, competition, private sector management style, and cost-efficient resource use (Hood, 1991: 5). This reinvention of the university organization widely across Europe (Schubert, 2009; Van de Walle & Hammerschmid, 2011) has in parts been presented as a logical solution to university administration (Choong, 2013), but has also — to a larger extent — led to strong criticism (Andersen, 2002; Clark, 1998; Evans, 2004; Kallio & Kallio, 2012; Moed, Burger, Frankfort, & van Raan, 1985; Stölting & Schimank, 2001; Temple, 2014; Ward, 2011). These new rules that were enforced on universities and researchers have changed the power balance in the organization, the position of the organization in society, and the essential understanding of "knowledge". Struggles relate to the question of the legitimacy of knowledge (Lyotard, 1984: 6, s. also Temple 2014): Who, within an economized system, decides what knowledge is and who knows what needs to be decided?" (Lyotard, 1984: 9). In the focus of criticism were also the doctrine of performance measurement systems and instruments (PMI) that were applied to researcher and teacher performance (Kallio & Kallio, 2012). In Denmark, this change has been implemented in 2003 as "the new 2003 University Act" (Kristensen, Nørreklit, & Raffnsøe-Møller, 2011; Wright & Williams Ørberg, 2008) and this implementation almost reinvented the university as a research and teaching organization. In their extended review of the changes, Kristensen et al. (Kristensen et al., 2011, s. also Andersen 2002) list a shift in the management structure to mostly external agents and the connection of resource allocation to measurements of research output, but, interestingly enough, not to university administration (Kristensen et al., 2011: 14).

This new approach to university management conceptualized universities as private, competitive and output-oriented businesses and brought substantial change to how the university structure was managed, how resources were allocated and to how performance was managed (Kristensen et al., 2011). Despite pointing out that the university is "probably the most 'performance-measuring' institution there is" (Raffnsøe-Møller, 2011: 49), criticism amongst Danish scholars was huge. Researchers argue that despite the official Danish government agenda to liberate the universities from state influence, the universities are still under pressure from the state – namely to live up to economized standards (Wright & Williams Ørberg, 2008).

This paper focusses on the concept of student teacher evaluations (SET) as performance measurement instrument. Departing from Max Weber's and Robert K. Merton's concepts of bureaucracy and the perspective of new institutionalism (DiMaggio & Powell, 1983) it deals with how such a PMI can be investigated from a sociological perspective. The research site of this study are the Danish universities, amongst them Aarhus university (AU). The topic of university performance measurement is highly relevant for European governments who are accountable to their citizens for the quality of public universities; to students who aim at obtaining a high quality education; for teachers (researchers) in HE whose careers depend on SET and for both agent groups whose working milieu will be affected by SET (Kallio & Kallio, 2012). For these very reasons, *if* SET have to be installed at universities, their flawless, and thus fair, functioning is a necessity. To approach this issue empirically, I propose a four part study, that tests the reliability, validity, and organizational effectiveness of student teaching evaluations (SET) as a performance measurement instrument in universities. Further, I aim to provide theory-guided constructs for future SET development. The novelty of this project lies in its character as a theory-driven mixed-methods empirical test of a selected, highly relevant PMI which will contribute to the improvement of university performance measurement systems. This paper is thus to be understood as an outline of a larger future research project and a discussion of the status quo of SET. The remaining part of this paper proceeds as follows: Section 1 is concerned with background information on performance measurement and SET as customer-client relation. The second section introduces the theoretical perspective on the study. Section 3 derives a couple of research questions, followed by an outline of a possible methodology to pursue each of these questions (section 4). Finally, I discuss this project's implications, its limitations and provide a brief recapitulatory conclusion in section 5.

2. PERFORMANCE MEASUREMENT AND STUDENT TEACHER EVALUATION AS CUSTOMER-CLIENT COMMUNICATION

The term performance measurement originates from the field of management accounting and comprises a merely quantitative approach as well as a broader approach to measurement. Neely et al.'s definition exemplifies the quantitative approach by defining performance measurement as "the process of quantifying the efficiency and effectiveness of past actions." (Neely, Adams, & Kennerley, 2002: xiii). A broader approach, which includes qualitative measures, and the one that this study will base its design on, is the one provided by Moullin: performance measurement means "evaluating how well organisations are managed and the value they deliver for customers and other stakeholders" (Moullin, 2007: 188). Since new public management seems to construct performance measurement systems as measuring university "excellence", I adopt Moullin's suggestion to link the definitions of excellence and performance measurement. "Organisational excellence is outstanding practice in managing organisations and delivering value for customers and other stakeholders" (Moullin, 2007: 182). I am aware that these definitions can be problematized since they seem to capture the features of a leadership tool rather than provide

definitions from a critical meta-perspective and thus subordinate to organizational hegemony: the character of 'how well' processes work, 'efficiency', 'excellence' or basically 'performance' itself (s. also Otley, 1999: 364) seems to comply with the leadership perspective. Yet, more critical perspectives from sociological or educational studies have not provided competing definitions. Agents that are given the opportunity to use performance measurements instruments as the evaluators of another agents' performance will find themselves in a position of control. In this case, this control is given to university students from their first semester on. Course evaluations at AU usually offer evaluation with a mix of Likert-style scales and other rating scales and inquire about the students' satisfaction with the class framework – e.g. the physical settings – but also about knowledge-related aspects. Knowledge related aspects are e.g. "I find the objectives of the course appropriate" or "The ability of the teacher to put the topic and the solutions to the assignment into perspective" or "The contribution of the lectures/classes to your knowledge and comprehension" (AU, 2013). In Denmark, course evaluations are usually planned to be summative and completely anonymous. They are usually distributed to the students in the form of a standardized questionnaire, with some room for additional comments.

This strengthening of the role of the student as a stakeholder or even as a customer (Kristensen et al., 2007), has additionally heated the debate about new public management and the ethics behind performance measurement. While proponents argue that SET lead to increased teaching and learning quality, critics suspect negative impacts on staff motivation and compliant behavior as a self-protective measure (Crumbley & Reichelt, 2009; Simpson & Siguaw, 2000), misinterpretation, abuse, even cruelty by students (Chan, Luk, & Zeng, 2014; Clayson, 2005; Hajdin & Pažur, 2012; Lindahl & Unger, 2010) or simply a lack of validity in indicating student achievements (Galbraith, Merrill, & Kline, 2012). For the aspect of quality knowledge mediation the aspect of self-protection by the teacher (researcher) and compliant behavior is crucial: if the SET are used as criteria for tenure or promotions, teachers (researchers) behave rationally by decreasing the course level to the lowest common denominator in order to receive favorable SET. Thus, content and quality of knowledge mediation, even the basic understanding of what knowledge is, are affected by SET. Not the initial expert in a field of knowledge – the class instructor – has interpretation authority, but the request to let students assess aspects such as "The ability of the teacher to put the topic […] into perspective" strongly suggests a very high insight and previous knowledge by the students. Some SET, though not at AU, go so far as to ask "Is your teacher knowledgeable?" (Platt, 1993). Knowledge is constructed as a product that the customer has the right to assess; the researcher is despite the strengthened demand for research-based teaching not created as the producer, but reduced to the role of a shop assistant. It can be argued that this idea of a teaching researcher has a corrupting effect on the students' attitudes toward higher education and their understanding of their own role (Platt, 1993). An informed customer, so suggests the standardized questionnaire, may equally judge the shop, the shop assistant and the product. Rational, self-protective behavior will lead class instructors to adjust their class and what they present as intended learning outcomes respectively knowledge in a way that also the poorer, unprepared students can follow. If this behavior is seemingly justified by evaluations, the course will most likely be repeated with the same intended learning outcomes, and thus, a new knowledge standard is legitimized. These outlined negative consequences are appropriate arguments to make a case against SET in its very

essence. Proposing an alternative approach, this project aims to ask whether SET have a (positive) impact at all or if they are an empty end–in–itself control instrument. In short, do SET really function as an instrument of accountability? Thus, this paper does not condone downright criticism towards university performance measurement and SET and the demand to abolish them. Essentially though, I argue that proponents do not sufficiently consider the reliability and validity of their measures and the function and effect of the instrument in general. The question whether universities have developed SET with "meaningful measures that drive performance improvement" (Moullin, 2007: 181) is highly relevant.

Isolated instruments like SET can only be considered reliable and valid when embedded in a comprehensive performance measurement system which motivates agents and defines what performance is and to whom it has to be delivered. Failing to account for the special conditions and agent motivation in knowledge management may result in a decrease in teaching quality, functional fixation on single measures, and alienation from knowledge mediation. Dysfunctional consequences instead of performance improvement or control are possible. Thus, to be functional, SET have to be embedded in a mature management context: close communication with the lecturers on meaning, measurement and operation of the SET and the execution of effective organizational consequences and practices depending on the results – thus the meaning of control – are just two examples of such embedment. These ex–ante and ex–post steps are taken to foreclose that an illusion of control is created, where really no control is present (Rosanas & Velilla, 2005). Meaning and purpose, in particular, have to be defined, made transparent and adapted to organizational changes: "Any controlled system requires objectives and goals against which its performance can be assessed" (Otley, 1999: 367). On a more operational level, the student questionnaires must be designed to prevent bias. Misconstruction of any part of a performance measurement system may otherwise lead to a negative work environment and to "incorrect inferences in decision–making" (Choong, 2013: 102). Bromberg (2009: 214) points out that the lack of " sophisticated measures" is the highest threat to the purpose "of improved productivity". This study will enable identification of how the SET instrument should function departing from our chosen theoretical approaches, how it is meant to function by its initiators and to test if the chosen operationalization and contextualization fulfill these intentions. Eventually, results may enable researchers and university management to propose or define avenues for organizational improvement.

3. THEORETICAL PERSPECTIVES

From a theoretical standpoint, this project aims at making three theoretical propositions meet. The perspective combines the Weberian sketch of the ideal bureaucracy (Weber, 1905, 1968) with Robert K. Merton's critical approach towards bureaucracy's dysfunctions (Merton, 1940), and the perspectives of organization–related critical management studies (Kanter, 1977; Parker, 2002) as well as neo–institutionalism and isomorphism (DiMaggio & Powell, 1983). Max Weber's concept of the shell as hard as steel serves as an overarching theoretical construct. Ward's recent work on the "global restructuring of knowledge and education" (Ward, 2011) has been proven helpful in applying such concepts to concrete HE practices of control and government. Further, I will find addenda to Weber's approach on bureaucracy and to the perspective of critical management to

authority and power in Pierre Bourdieu's concept of symbolic power (Bourdieu, 1979, 1991). I alert that the sociological framework will provide a critical perspective, whilst, for the purpose of the empirical test, I will take on the stance and the notions of accounting tradition, thus in principle affirming organizational control.

3.1. Bureaucracy – Max Weber

The core of this project will be approached from the perspective of Max Weber's theory of bureaucracy. This choice of Weber's critical, yet in some principles condoning theoretical approach towards administration is a deliberate one: Like Weber, this project assumes that bureaucracy is (can be) the most efficient way to organize human work and outcome, but I point to the danger of its paralyzing effect when not being thoroughly designed. This paralyzing effect is what leads Weber to his notion of the "shell as hard as steel"("stahlhartes Gehäuse", Weber, 1905) mostly known as "iron cage" as translated by Talcott Parsons (for a discussion of notion and translation s. Baehr, 2001). A powerful bureaucracy controls society's individuals – but who controls the bureaucracy? An uncontrolled bureaucracy threatens to limit individual freedom and human life can be trapped in a shell of rule–based control. Despite this criticism, Weber defined rules about an ideally working bureaucracy: it is characterized by a hierarchical organization, exact assignments of competences, selection of staff and promotion based on competence as well as seniority (judged by the organization, not individuals), documentation and legitimation of all processes in writing (transparency), application of consistent rules and regulations, expert training for bureaucratic officials, and the fact that rules are implemented by neutral officials (separation of ownership and control) (Allan, 2009; Hartfiel, 1976). Bureaucracy, in short, should ideally protect individuals against meaningless orders and conducts as well as abusive domination.

3.2. Dysfunctions of bureaucracy – Robert K. Merton

Robert K. Merton's reflections on the negative sides and the dangers of bureaucracy can, to a certain extent, be understood as an answer to Weber's overarching theory: e.g. whilst Weber still defines bureaucracy as "fundamentally domination through knowledge" (Weber, 1968: 225), Merton casts doubt on the "knowledge" determinant by emphasizing the agency of bureaucrats and flaws due to inflexibility and lack of adapting skills and procedures to varying circumstances (Merton, 1957). Merton's outlook on overly conform behavior and the categorical use of rules stresses the risk of a bureaucracy becoming a system that controls for controlling purposes, and for this very reason, may remain ineffective. In the worst case, the bureaucracy's and bureaucrats' "conformity to the rules interferes with the achievement of the purposes of the organization, in which case we have the familiar phenomenon of the technicism or red tape of the official. An extreme product of this process of displacement of goals is the bureaucratic virtuoso, who never forgets a single rule binding his action and hence is unable to assist many of his clients." (Merton, 1940: 563).

3.3. Neo-Institutionalism/Isomorphism

This perspective, though Merton is not amongst the most commonly used theorists for Critical Management Studies (CMS), is mirrored in modern and critical management studies: focused on the meso-level of business organizations, modern and CMS provide possible connections to these thoughts: unnecessary or unsuitable bureaucracy must be eliminated in order for an organization to work efficiently (Wren & Bedeian, 2009). Critical management studies emphasize the reproduction of power structures, social injustice power rituals by administration and management in organizations. CMS often overlap with the approach of neo-institutionalism which attempts to understand how organizational developments affect the behavior of agents. The most relevant trend within neo-institutionalism for this study is research on coercive isomorphism: organizations, though they might be different in their core, appear to be managed and structured in a similar way due to political influences and legitimacy struggles. This also enables bad practices to diffuse (Strang & Macy, 2001). Neo-institutionalism acknowledges the pressure on organizations to strive for legitimacy in the broader environment of institutions. Public institutions are also being rationalized, mimicking the processes of private business (DiMaggio & Powell, 1983) – whilst ignoring their very different roots and different identity concepts. Partly supporting Merton's criticism – though Merton focuses more on the actor – DiMaggio and Powell claim that the similarization of bureaucracies across organizations does not necessarily make them "more efficient" (DiMaggio & Powell, 1983: 147). Since DiMaggio and Powell, many researchers have critically remarked that the homogenization of organizations and their bureaucratic structures has reached the university sector. Using the example of SET this project sets out to examine whether this is to the university's benefit, detriment or if it has any effect at all.

4. FUTURE RESEARCH: QUESTIONS TO CONSIDER

This paper essentially departs form the assumptions that a) effective measurement of teacher performance is possible and that b) the current measurements are insufficient and erroneous. To control these assumptions, I propose that future research considers five interrelated research questions. I describe and motivate these research questions in the following.

It can be assumed that politicians, university administration and leadership tie goals to SET that go beyond plain performance measurement as an end in itself, but aim at performance improvement or ensuring good quality. Knowing the stated purpose of the SET and what is defined as good or desirable performance will build the foundation for the following research questions. Thus, it has to be asked

1. What are the intended purposes of SET?

The underlying broad definition of performance measurement systems (s. earlier) allows for a variety of measuring methods, including qualitative approaches. For this reason and to make it possible to develop a coherent basis for possible recommendations on improving SET later on, it has to be asked

2. Is the instrument appropriate? [Are there alternative possible measurement instruments to serve these purposes?]

Once the intended purposes and the appropriateness of the choice of SET as a measuring instrument are known a shift to the operational level is meaningful. Departing from the findings of what SET are supposed to measure a comprehensive set of questionnaire constructs can be developed (Hair, Black, Babin, & Anderson, 2006). Actual SET from Danish universities should be used and their shortcomings can be investigated compared to the theory-driven development of SET constructs. On this basis, it has to be asked

3. Is the questionnaire valid? [Do the questions load positive on the underlying constructs and do they measure what they are intended to measure?]

Knowing the purposes of the PMI creators and proponents, it is now possible to focus on the actors assessing the lecturers' performance: in order for the questionnaire design to be a meaningful instrument, the students' perception of its purposes has to be similar to the intended ones. A standardized questionnaire can only be *relevant* if all possible categories of student perceptions are considered and taken into account. Ignorant questionnaire design will lead to biased answering behavior, which is time-consuming to detect and significantly decreases the value of the instrument (Choi & Pak, 2005). Surveyed individuals might tend to indicate their discontent on a Likert scale even if the question does not relate to the cause of their unhappiness (extreme responding, negativity bias). Considering that a student body can be highly diverse (age, gender, study level, learning motivation, programs, cultural expectations etc.) it can be doubted that these students can be surveyed using the same questionnaire. Thus, it has to be asked:

4. Is the questionnaire relevant? [Does the instrument sufficiently consider different student types and groups and their expectations towards teaching?]

Effective PMIs require systematic performance management of processes that will support reaching the intended purposes. This could for instance include follow-up communication with the teaching staff, incentives and offers for teaching improvement where needed, or rewards for high quality teaching (s. earlier). It is thus crucial to ask:

5. Is the instrument effective? [What organizational and managerial steps, involving the teaching staff, are taken after the questionnaires are statistically processed?]

5. OUTLINE OF A POSSIBLE METHODOLOGY

The outlined research questions can be handled by employing a mixed-methods approach for the four steps of investigation.

First, thematic discourse analysis (Fereday & Muir-Cochrane, 2006; Guest, MacQueen, & Namey, 2012) can be used to evaluate documents focusing on the support of SET. These documents could originate from the three agencies government, university and student representatives. This qualitative approach to content analysis is chosen to ensure that all categories, including non-political ones, are made visible by a first analysis. Thereby, the reasoning of these three players for supporting SET and – since SET are already an established instrument at all Danish universities – the legitimacy discourse around measuring and assessing knowledge built by the three agencies can be described. In addition, this will enable the researcher to trace if the discourse is referential, that is, to what extent and with what weighting these three agencies have cross reference to each other. The result of this investigation will be an overview of the purpose that SET should ideally serve and of what they are intended to measure. This will answer the research questions 1. *What are the intended purposes of SET?* and 2. *Is the instrument appropriate?*

As a *second,* consecutive step, guiding constructs for the SET questionnaire design are to be remodeled and re-derived. With the help of these constructs questionnaires to contrast with the existing SET questionnaires can be developed (Dillman, 2007; Hair et al., 2006; Luft & Shields, 2003). This will enable the researcher to test the questionnaires for their reliability and validity in cases where in-classroom surveying is being hindered by the already existing SET, the confusion this might cause amongst students and the unfavorable dependence on real-time class semester schedules. Equally, in this step erroneous or misleading questionnaire design can be identified (such as using a Likert-similar scale both for attitudes and keywords or sentence fragments, (AU, 2013)). Overlaps as well as shortcomings of the supporters' intent to evaluate teaching and the way the PMI is applied can be identified. Thus, research question 3. *Is the questionnaire valid?* can be answered.

Thirdly, the relationship between qualitative (comment section) and quantitative (scaled questionnaire) information can be tested. Since practice shows that usually only the quantitative measures are taken into account, identify student clusters based on the qualitative section (e.g., overburdened vs. under-challenged; content-focused vs. holistic) should be identified as a first step. This information can then be corroborated with the scaled constructs. It is expected that strongly diverging interpretations of the same grade given in an evaluation can be found. Consequently, research question *4. Is the questionnaire relevant?* can be answered.

The fourth step investigates the actual consequences of the PMI compared to its proposed effect (s. thematic analysis) of teaching improvement. This ex-post observation focuses on administrative and management measurements taken after the assessment of the evaluation data. It should be traced what happens after the SET are statistically processed. This means that official policies on the follow-up-process from communicating the results to the teachers to reactions towards the quality of teaching (e.g., rewards and incentives, improvement initiatives, monitoring

of change) should be identified. The concrete method of investigation depends on the tacitness of information: Preferably, written documents should be analyzed, but where departmental and university policy on SET follow up initiatives is not textually documented, (qualitative) interviews with the decision-makers in question should be considered. Additionally, a teacher-typology based on a survey across two departments will demonstrate the effect of SET on a personal level. This will allow for answering question *5. Is the instrument effective?*

6. DISCUSSION

This paper introduced an outline of possible empirical approaches to measuring the effectiveness and function of student evaluations of teaching. It has taken a critical stance on SET as functioning performance measurement instrument, pronouncing its negative impact on the perception and legitimation of knowledge, whilst generally condoning performance measurement of higher education staff. The outlined and interrelated subprojects built a bottom-up approach that fosters an understanding of the intended purposes of SET and then, adjusting to this perspective, reconstructs whether these purposes can be served. Future results will have to be interpreted within the frame of the Danish context, since other countries might have different SET traditions and a different understanding of the student-teacher relationship.

The findings might support governments and universities in successfully introducing SET while ensuring an organization-specific approach and reliability and validity of the instrument. An appropriate PMI will do justice to a diverse student body by de facto including their patterns of thought. Further, insights will hopefully inspire successful, bottom-up inspired *management* of staff performance, thereby ensuring the effectiveness of SET and at the same time allowing for an affirmative and motivating performance measurement system. This extension of a hitherto single performance measurement *instrument* to a management system will allow for addressing the problem of legitimizing complied knowledge and lowered course content standard: teachers whose performance is embedded in a sensitive and appropriate set of communication and incentives will behave rational when improving their course content instead of lowering their expectations.

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Knowledge Representation in Travelling Texts: from Mirroring to Missing the Point!

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Today, information travels fast. Texts travel, too. In a corporate context, the question is how to manage which knowledge elements should travel to a new language area or market and in which form? The decision to let knowledge elements travel or not travel highly depends on the limitation and the purpose of the text in a new context as well as on predefined parameters for text travel. For texts used in marketing and in technology, the question is whether culture–bound knowledge representation should be domesticated or kept as foreign elements, or should be mirrored or moulded—or should not travel at all! When should semantic and pragmatic elements in a text be replaced and by which other elements? The empirical basis of our work is marketing and technical texts in English, which travel into the Latvian and Danish markets, respectively.

Key words: knowledge representation; text travel; foreignization; domestication; mirroring; moulding; semantics; pragmatics; communicative event; marketing-cultural; technico-cultural; functionalism; semiotics; strategy; removal; adaptation; replacement; creation

1. INTRODUCTION

"Can you think what the Mirror of Erised shows us all?" (Rowling 1999: cpt. 12). The Harry Potter series is already a classic novel series, which will probably stay alive generations after it was first published. In Harry Potter and the Sorcerer's Stone, we come across the discussion of the Mirror of Erised. With our point of departure in the mirror image, we—two university teachers in Denmark and Latvia, respectively, who have taught and researched text production and translation for more than two decades, and who have a common interest in web content and text travel—set out to investigate how knowledge representation in English, Latvian and Danish materialized in marketing-cultural and technico-cultural text travel.

For technico-cultural web content travel, which culture-bound knowledge elements should then be transferred or altered (domestication) or left as foreign elements (foreignization)? And in the case of marketing-cultural content travel, which elements would then be moulded—and according to which criteria—and which elements would be mirrored? In our work, English, used in native contexts and as a lingua franca, has been our common denominator, and a second, local language has been the distinguishing factor. We have come across examples where knowledge representation in English has travelled through translation, adaptation and replacement into corresponding or new knowledge elements in our local areas. De Mooij argues that both knowledge representation and language are important: "What you see are the words, but there is a lot behind the words that must be understood to transfer advertising from one culture to another" (de Mooij 2004: 179). She is backed up by Bhagat et al. who claim that "understanding knowledge management processes in global and multinational organizations requires developing crucial insights into the complexities of acquiring, transferring, and integrating knowledge" (Bhagat et al. 2002: 204).

For text travel on the web, the challenge for content managers and text producers is to spot knowledge elements connected to real-world systems or processes and to manage the text travel process. The decision whether knowledge elements should travel highly depends on the understanding and the purpose of the text in a new context. For an understanding of English cultural concepts in another language, de Mooij claims that English language understanding is overestimated (de Mooij 2004: 184) and backs it up with Eurobarometer research from 2001 (Eurobarometer Standard # 55). Recent research among high-school students in Denmark by Mousten (2014/2015) on the inclusion of loan words in unsolicited supermarket advertising shows the same results. English loan words were not understood on their own, only in context, and they were often misinterpreted if the context did not explain the term.

1.1. Research question

Our material includes knowledge representation for content, which sometimes focused on domestication or moulding in the local language as the dominant function, and sometimes English, representing the foreignizing or mirroring element, was the dominant function in text travel. The textual elements, which seemed problematic, were typically linked to systems or processes at the

place of text origin, or were determined by predefined parameters. Against this backdrop, we formed our research questions:

1. When someone creates a text which is meant to travel, how is knowledge representation identified and handled for elements that would either lead to foreignization/mirroring or would lead to domestication/moulding?

   And:
2. How can the fruitful or failed reception of a text by its audience be explained by the writer's lack of proper awareness of knowledge representation and its realization in text travel?

   And in turn:
3. How, reiteratively, can focus on text travel contribute to an in-depth understanding of knowledge representation in different contexts?

Different texts have been included in our work; in the English–Danish case primarily technico-cultural texts on web pages, and in the English–Latvian case primarily marketing-cultural texts. Knowledge representation and our contact with English as an L2 source have been our stimulus to tap into the communicators' creative potential to manage text travel and in turn the success of domestication or the doom of failure when doing so.

2. KEY CONCEPTS AND LITERATURE

To work on our research questions, we need to explore some key concepts. First of all, we would like to elaborate on different aspects of text travel, namely management and corporate communication strategies, dynamics and development, and in this context the link between text and knowledge and corporate communication; secondly we explain foreignization-or-domestication; and thirdly the key concepts of mirroring-or-moulding.

2.1. Management and corporate communication strategies in text travel

Our first key concept is text travel and how text travel is linked to corporate knowledge communication and knowledge representation methods. Text travel is a well-known concept from localization, which links up with the organizational decisions to let texts travel or not. Pym refers to text travel as distribution (Pym 2004). The development and management processes at different levels in an organization call for conscious strategies of knowledge representation. Strategic choices are relevant for our studies of knowledge representation and knowledge management and especially useful when the speeds of information exchange and knowledge transfer increase the speed of text travel across languages and borders. Choo looks at three areas where information is used strategically; firstly to make sense of change, secondly to create new knowledge for innovation purposes, and thirdly to determine which actions to take (Choo 1996; Choo 2006: 86–93). The problem of codifying knowledge is elaborated on by Davenport and

Prusak who advocate that when communities of knowers share knowledge and collaborate, their ongoing conversation will generate new corporate knowledge (Davenport and Prusak 1998: 66). All three strategic instruments as well as the knowledge gained and shared are relevant for our studies of knowledge representation in text travel.

2.2. Dynamics and development of text travel

Text travel is used as a metaphor for texts moving from one place to another and maybe even back again or in a third direction. We therefore see texts as dynamic entities. Sometimes they change, because they have to; and sometimes they stay in their original form, because that is a precondition for travel. In a modern, organizational context, text travel draws on cross-cultural communication, knowledge management, technical writing and translation, and in this context, Choo's change strategies mentioned above link up with the contrastive pairs of foreignization-or-domestication as well as mirroring-or-moulding. Over the past half century, focus has largely shifted from foreignization as the ideal towards domestication. In the discussions that have meandered between these two contrasts, it is no surprise that action, processes, decisions, etc. have become very visible.

2.3. The link between text and knowledge and corporate communication

Text travel can also be related to the stability and instability of knowledge elements in different socio-cultural contexts. Gioia et al. have investigated adaptive instability in organizations in relation to identity and image and see instability in this context as the driver of change. Moreover, they conclude that the fluidity of identity helps organizations adapt to changes (Gioia 2000). We argue that the very same ideas can be used in ascertaining or changing corporate identity and image in relation to cultures and customers. In the process of fluidity that we call text travel, companies can for instance remove, change, replace and add texts to other semiotic instruments, or other semiotic instruments to text. Instability in relation to text travel is linked to the propensity to change in the text to cater to another culture's audience whereas stability means that text travel can take place almost seamlessly.

2.4. Foreignization-or-domestication

The concepts of foreignization and domestication are not, as here, typically associated with what can be regarded as appropriate knowledge, which we normally term epistemology (Bryman 2012:19), but this happens in the work fields of translation, adaptation and localization. Whereas foreignization has the overall purpose of communicating the semantics and pragmatics of the original text, possibly explained, domestication has the overall purpose of communicating the sender's message through the semantic and pragmatic knowledge representation in the receiving locale, as deemed appropriate. Expressed differently, the idea of foreignization is maximal transfer of meaning of the original text, including its foreign elements, whereas domestication is a minimalist idea where the audience does not have to struggle with problems of understanding out-of-own-culture elements, but are instead presented to well-known knowledge elements.

2.4.1. Foreignization and domestication illustrated

An illustration of how foreignization and domestication go hand in hand is evident in Jameson Whiskey's "Beyond the Obvious" campaign from 2007. In this campaign, the idea of stability and instability link up with the idea of text travel.

In the ad called "the Harpist," the Swedish guitarist Conny Bloom plays the harp. But for those who did not know the harpist, he was just a mixed-race man with dreadlocks dressed in leather trousers playing the T-Rex's song '20th Century Boy' on the green and gold harp. Kuhling and Keohane describe this image as one that "disrupts taken-for-granted binary opposition between tradition/modernity, insider/outsider, Irish/non-Irish, white/non-white, and opens up our minds to an idea of Irishness that is much more fluid, hybrid and produced in dialogue." (Kuhling and Keohane 2007: 12).

Figure 1: The Irish and Latvian adverts for Jameson Whiskey

Drawing on Bahtin's notions of dialogisation and polyphony (Bahtin 1986: 263), Kuhling and Keohane argue that the ad opens up the concept of Irishness to the dialogue where a young coloured man can engage in the dialogue with the Irish traditional music and culture (symbolised by the harp) where both of them are transformed yet not assimilated by the other (Kuhling and Keohane 2007: 12). This is an example of foreignization and domesticating working together, thus creating change while at the same time ensuring stability through explicitness during text travel. The instability of knowledge elements was accepted in the advertisement, which was controversial even for the Irish audience.

The original English version of the magazine advertisement contained no text, just a picture of the harpist, the bottle of Jameson Whiskey and the slogan "Beyond the Obvious". In the text travel through a Latvian socio-cultural context, the instability was mitigated for the Latvian audience:

the text was created in the magazine ads that explicitated the dialogue and linked the image to the established knowledge elements about Irishness: "Maybe you would like to see a real, handsome Irishman here, with flaming hair, dressed in green, playing the harp in the clover meadow. But we think – it would have been too obvious. Beyond the obvious."[5] The explicitation of the wording mediated the foreign element into a domesticated knowledge element which added stability to the new ideas and knowledge about Irishness, implying that the traditional romantic Irishness of red-haired folks dressed in green in green meadows does exist, also in a non-Irish, localized version.

2.4.2. Foreignization and domestication summed up

Although the trend towards domestication has increased since the 1970s, the match between foreignization and domestication has no winner. Venuti started problematizing over-minimalization and advocated the necessity of showing the differences of a text, i.e. keeping foreignization in texts, because domestication advocates "an ethnocentric reduction of the foreign text to target-language cultural values" whereas foreignization is "an ethnodeviant pressure on those (cultural) values to register the linguistic and cultural difference of the foreign text, sending the reader abroad" (Venuti 1995: 20). Later, however, he concedes that "Translations […] inevitably perform a work of domestication" (Venuti 2000: 82). Domestication is a matter of choice and evaluation of the cultural codes in the source text. If these codes are too many or too difficult, such "alien cultural images and linguistic features may cause the information overload to the reader." (Yang 2010: 79)

The question asked and the answer missing from the discussion of domestication-or-foreignization is the inevitable incomprehension of knowledge elements, which in turn may reject the understanding of whole texts, thus calling for other texts in their place. This lack of discussion of adaptation and replacement was noted by Gengshen. In his words, "there is not yet any systematic study of adaptation and selection and their interrelationship" (Gengshen 2003: 283).

2.5. Mirroring-or-moulding

The choice between mirroring and moulding may be ascribed to the superiority of cultural ideas to be mirrored, be they personal, corporate or political—compared to local, moulded ideas. Mirroring is contrasted with moulding, whereby a new picture is created, different from the original picture, but with the same basic idea. Mirroring is the idea, that although slightly distorted as mirrors tend to do, the same picture is there in the new language, maybe with small blemishes from the mirror.

We have used the quote in the beginning of the text from Harry Potter; the Mirror of Esired. This idea is not clearly comprehensible at first sight; one indeed needs a mirror to turn it into the Mirror of Desire. The mirror is the language lens, which turns the image into something comprehensible in another language, but the picture is the same. As an alternative to the language mirror, the job

[5] In Latvian, as shown on the picture: Tu varbūt vēlētos šeit ieraudzīt īstu īru skaistuli ugunīgi liesmojošiem matiem zaļā tērpā spēlējam arfu āboliņa pļavā. Bet mums šķiet, ka tas būtu pārāk... acīm redzami. Aiz acīmredzamā

may be to mystify and provoke the audience, to pass on the image or idea directly to trigger an effect within the reader.

The mirroring-or-moulding theory is used to either reflect beliefs, values, stereotypes, or alternatively it will form them. The decision to mirror or mould in our cases has been made after a thorough analysis, and then the choice has been made of the strategy that expresses the core advertisement idea's text travel in the simplest way possible (Ločmele 2013).

2.5.1. Mirroring-or-moulding illustrated

Although from the realm of fairy tales, the translation of Hans Christian Andersen into English for a British audience, is sometimes a tale of decruelization. In "Little Ida's Flowers", for instance, the references to death are either rewritten or left out (Hansen 2005: 168). This cannot be explained in terms of domestication, but rather the editor's or translator's choice(s), maybe based on avoiding what might be seen as reprehensible. Such a strategic choice is hard to explain in terms of domestication, but is probably rather a case of personal preferences or marketing considerations. Hans Christian Andersen's fairy tales are found in so many moulded versions that in the UK he is considered a writer for children whereas in his native country of Denmark, he is considered a very profound writer of fairy tales at many levels for all ages (Pedersen 2004: 15–17).

In a more modern-day corporate example, Crispin Thurlow and Adam Jaworski's study of frequent-flyer programmes concludes that their promotional discursive strategies create "symbolic capital" for a new elite of frequent flyers (Thurlow and Jaworski 2006: 130), thus their research adheres to the moulding argument. Both mirroring and moulding can be extended to other communicative codes and are relevant terms in connection with both translation and adaptation and replacement, in particular of dynamic texts such as advertisement texts.

2.5.2. Distinction between foreignization-or-domestication and mirroring-or-moulding

When we introduce mirroring-or-moulding theory alongside foreignization-or-domestication, the reason is that mirroring and moulding are not the same as foreignization and domestication. To stay with a translation example of Hans Christian Andersen's writing, the first translation into Chinese was The Emperor's Clothes. This was a 1914 translation, which fitted very well into the revolutionary mood at the time when power was shifting (Syddansk Universitet 2014), so in this connection the moulding took a political turn where the term domestication would give the wrong idea.

The idea of text travel does not favour foreignization over domestication, or vice versa. Nor does it favour mirroring over moulding. Hence the neutral term text travel. Text travel does not respect genres, forms or content, but on the other hand, text travel may exactly follow a source text rigorously and not allow anything to go astray. Incidentally, this year (2014), the University of Oslo has defined a thematic research area called *Traveling texts: Translation and Transnational Translation*, explaining the focus as follows: "This interdisciplinary thematic area studies how

ideas, values, genres, literary and rhetoric forms travel over cultural and linguistic borders in translation" (UiO 2014).

3. METHODOLOGY

Before venturing into an analysis of foreignization–or–domestication and mirror–or–moulding as strategic work processes in connection with text travel, we shall look at the underlying drivers and decisions.

Figure 2 contains a model of how travelling texts undergo different organizational processes before landing in a work process category. The starting point of the model is the *original content* and the final result is the *new content.* As a consequence of the overall corporate strategy in the form of foreignization–or–domestication or mirroring–or–moulding, respectively; any text or text element undergoes one of several modes of text travel. The choice of travel or non–travel is explicitly or implicitly made by the communicators or forced upon them by corporate guidelines.

The model in Figure 2 is loosely based on the text travel, as devised by IBM and Microsoft and other software suppliers in the 1990's, which had to address the global market fast and effectively. Other companies have taken up the idea and developed organizational tools to let texts travel or not, for instance VELUX, the world–renowned supplier of rooftop windows (Mousten 2008). According to a study of VELUX's Danish and English websites from 2008, it turned out that all text travel categories were present, and that the different categories could be referred to different organizational choices.

In the model, we presume that there is a conscious knowledge of the strategic choices (foreignization–or–domestication or mirroring–or–moulding), according to which the semantic/pragmatic choices and textual/semiotic choices are made at different places in the work process, which in turn decide the travel route of the texts in question.

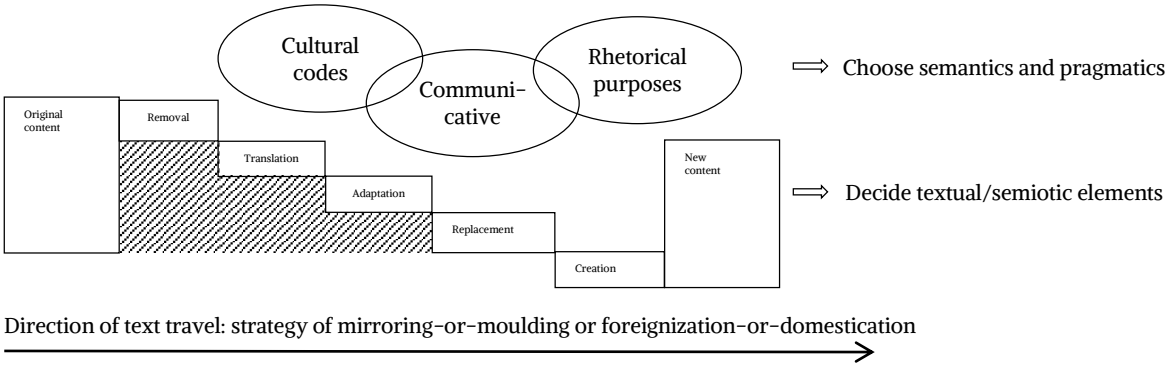

Figure 2: Model of text travel and knowledge representation

The key to deciding on the knowledge elements to be chosen, the semantics and pragmatics have to be determined for the situation. We have here leaned on Hatim who states that three criteria are decisive. One is the cultural codes which reflect the institutions and social processes, the

second is the communicative events of the community, and the third is the variety of rhetorical purposes at play (Hatim 1998: 93–94).

Then the textual and/or semiotic elements are selected for the text. This is the stage when content is rejected or accepted. As the texts travel, the box in the model called *new content* is the result of one of five processes, where the original content is the starting point, be it a full–fledged text or a loose draft. From this starting point, travel or non–travel is determined.

The process of non–travel is depicted as *removal,* covering texts with knowledge elements which do not travel. There is no overall idea in letting the text travel, neither cultural codes, communicative event nor any rhetorical purpose. In other words, the semantics and pragmatics of the text do not work.

The travelling texts then appear in one of three modes. Firstly *translation,* which is here used in a narrow sense where loyalty with the source text and equivalence override other considerations. This is the most direct route of travel, because the cultural codes, communicative event and rhetorical purpose are kept, so the semantics and pragmatics of knowledge representation through language are also kept.

Secondly, *adaptation* represents travelling text which is to some extent domesticated or moulded because of a change in cultural code, communicative event or rhetorical purpose. Adaptation therefore gives some leeway to semantic and pragmatic choices.

Thirdly, *replacement* is ideational content travel, which means travel only of knowledge elements, not necessarily expressed in the same semantic or pragmatic knowledge elements at text level. However, there must be some remaining cultural codes, communicative event or rhetorical purpose, but others may be realized differently.

Finally, there is *creation* of content, which does not travel. The knowledge elements and the texts elements are both new. Creation must fill in the void needed to effectively communicate with a certain culture. Created texts emerge in the culture and language where they are used and express new semantic and pragmatic content.

The result of the text travel is then the box called *new content*. Following the line showing the *direction of text travel*, we experience an increasing complexity and change. Although the line only goes in one direction, it is important to stress that the direction may sometimes be reversed and go a bit backwards before advancing forward. We thereby also challenge the notion that text production and translation are always going from a point (source text) to a point (target text). Chesterman points this out when he argues that translation is not a movement from A to B, as the source text normally continues to exist. He views translation as an evolution of the source text (Chesterman 1997: 7–9). Where this needs to be pointed out for the work process of translation, it is evident for the other work processes. Another prerequisite for successful text travel is negotiation as a means to make an organization reach different markets. Vermeer has explained

the process in this way, "The aim of any translational action, and the mode in which it is to be realized, are negotiated with the client who commissions the action" (Vermeer 1989/2004: 227). The issue of negotiation, although essential, is not dealt with here.

To sum up our work so far, we have three main steps lined up for our work. One is the strategic choice of foreignization–or–domestication or mirror–or–moulding, respectively. Based on the strategy, the semantic and pragmatic choices are made with a view to cultural codes, the communicative event and the rhetorical purpose. And finally, the textual and semiotic elements can be adopted from the text travel or created to fulfil the requirements of the new content.

4. ANALYSIS OF TEXTS

Based on the model of text travel and knowledge representation through removal, translation, adaptation, replacement and creation of content, we want to analyze the text content and evaluate the travel process between English and Latvian and English and Danish, respectively. In this process, we look at mirroring–or–moulding and foreignization–or–domestication strategies applied on marketing–cultural and technico–cultural texts.

4.1. English–Latvian marketing–cultural text travel

We analysed posters in the streets of Riga, the capital of Latvia. We looked into their connection with the whole marketing campaign, in which a complete set of knowledge elements was necessary for realizing the text travel and revealing the encoded meaning.

Figure 3: Visvaldi—a Latvian Audi A6 poster

Our first example is a moulded marketing-cultural text in Latvian with a pinch of English added. This text turned out to travel well. In the spring of 2014, Audi A6 posters appeared as shown in figure 3. The headline of the poster reads: *Visvaldis.* Subhead: *Vienmēr valdīt par situāciju ir patīkama sajūta – Moller Auto.* [Visvaldis. To be always in control over the situation is a nice feeling – Moller Auto]. Several contexts contribute to understanding the message.

First, *Visvaldis* is an old Latvian name. Its origin is traced to Vissewalde rex de Gerzika, Duke of Jersika from 1230 to 1239. Some sources indicate that the duke was Russian and had a name Wiscewolodus (i.e. Vsevolod or Vyšeslav?) (Korpela 2001: 163). Second, this knowledge adds another, socio-political context to the message in Latvia, which has a large Russian-speaking population and complicated relations with one of its neighbours—Russia. The name has the meaning: one who reigns over everything/everywhere in both Latvian and Russian. Thus the name of the car was appealing to both the Latvian and the Russian-speaking audience. The metaphor in the name is expanded in the subhead.

Third, modern knowledge transfer was coupled with the knowledge of the nation's history, where Latvia has strong links with Germany, thus rooting the advertised German car in the Latvian culture. But what makes the car truly Latvian is its fourth social context, by which the same idea of superiority is transferred as the knowledge code, but is represented with the cultural code congruent with the Latvian tradition to celebrate name days (the name day of Visvaldis is celebrated in spring—at the time of the campaign). This knowledge representation helped make the advertisement even more appealing. The text travelled by intricately interweaving the contexts, traditions and creating a new value for the advertised car in Latvia.

Figure 4: Visvaldi—a Latvian Audi A6 web advertisement supporting the poster ad

Compared to our model of knowledge transfer, we here see an example of replacement. The Latvian text has travelled from a global English culture (Le Book 2009) where an advertisement featuring the same car was used for the Audi A6 2009 campaign with a different text: *Flawless design is the language everyone understands: the Audi A6 – the most successful business car in the world.*

The ideational transfer of knowledge is realized in different pragmatic text examples. The poster would not have been sufficiently effective without other elements of the campaign which were needed to completely understand the meaning and establish a full string of associations. The repetition of audio (radio ads) and visual (posters) information for the drivers in the streets of Riga added to the pragmatic effect. Several web advertisements with the headline *Esmu Visvaldis* [I am Visvaldis], as shown in figure 4, implying the meaning—one who reigns over everything, and the subhead, imperative sentence, played on the components of the proper name, explicitating their meaning *Visvaldis: Valdi visur* [rule everywhere]. Thus a framework was added to a completely rewritten text.

The text without its graphic, semiotic references as a radio advert would create a rather silly statement of one's power and strength. Only coupled with the picture of the car and the textual elements did the campaign reveal the intended message, so the simultaneous travel of audio and visual genres contributed to the success of especially the audio text. The posters had the additional function of adding more detailed information about the technical specifications of the car, as shown in figure 5.

Figure 5 Visvaldis – webpage featuring detailed information about the Audi A6

The text travel for the Audi A6 did not end here. The travel was elaborated on at Audi Latvian's company website as well as on the website of Møller Auto Rīga, the official dealer of Audi, where more information could be found online. Figure 5 above shows the cultural contexts necessary to understand the Latvian meaning of Visvaldis as well as how information, or knowledge elements, is contingent on its socio–cultural context. A fluid mix of values, contexts and technical specifications created the exact amount of knowledge needed for the campaign.

To sum up, the Visvaldis campaign followed a moulding strategy. A lot of the text and the knowledge representation travelled, but replacement and creation were important knowledge representations for the right image, and both global and local identities amalgamated.

The second example of a marketing–cultural text from the Latvian perspective is an advertisement slogan from the Latvian national airline AirBaltic, which is more problematic, exactly because of the connotations and denotations picked up by text travel. *Live Fast, Fly Young*[6] was an advertisement slogan by AirBaltic used on posters in English in public places, mainly universities, where the audience is local and international students specialise in different subjects, including languages. Addressed to young people who presumably know English, the slogan was used to promote discount prices in winter 2014. The close rhythmical connection to *Live Fast, Die Young* immediately overtook the mimicked wording of the phrase, and along this line, the text travel followed several routes.

The first text travel route was from the world scene to Latvia in that the line is very popular all over the world, being used by about 100 artists in their lyrics. The second travel route was across genres. The text appears as lyrics in different albums, in addition to being found in several genres in writing. A third route of travel was across industries, because it is also used by the Nike Air Jordan brand on their T–shirts. Thus the phrase may be considered as belonging to the omniculture of young people, including young people in Latvia. The fourth route of text travel is through history. In different variations, it can be traced back to Anglo–American culture through the 1900s, and it is known to university students, particularly those who study American literature and culture. For this reason, some of the variations are very well–known, too, for instance the fifth travel route when it expresses a generation gap through the disillusioned James Dean, who died in a car accident when he was 24. His biography was titled *Live Fast, Die Young.* In turn, with this as a background, the text travelled even further in the phrase coined by the Chicago writer Willard Motley in his debut novel called *Live Fast, Die Young, Leave a Good–Looking Corpse.* This additional slogan phrase probably lingered in the minds of some people, for others it might just be an unfortunate coincidence, when the original, short version of the slogan for the airline was published in March and April 2014. This was the time of the events around the missing Malaysian Airlines Flight 370, and air safety was the focus of everybody's attention.

[6] The example was originally mentioned in Ločmele, G. (2014),but the analysis is new with many comments added.

The strategy was a mirroring of the rhythm, but moulding of the language and the context. Several cultural codes were embedded in the associations for the text. The situation at hand foregrounded the associations linked with the deeply embedded historical and cultural text travel routes, and the diversity of cultural codes endangered the rhetorical purpose. The AirBaltic poster was quickly taken out of circulation, because the copywriters had not fully analysed associations, and thus the cultural and historical connotations of the phrase. The text was not meant to travel at all, but in its stead the semantic references travelled into many directions.

Moreover, and maybe just as important, the copywriters had not taken into account the sensitivity of the airline advert in relation to the safety of flights, so the communicative event and cultural codes went against the rhetorical purpose of the text.

The example may be viewed as lack of management of knowledge, partly caused by a rather short period of existence of companies and advertising in post-communist countries. The continuity of advertising knowledge was interrupted by the Soviet rule in Latvia, as the way firms generate and pass on knowledge is a prerequisite of the continuity of their success (Davenport and Prusak, 2000: xxii).

With these two examples of text travel and knowledge representation in different media and genres, as well as marketing and cultural messages, we hope that we have illustrated the complexity as well as the importance of understanding and using the mirror-or-moulding theory.

4.2. English-Danish Technico-Cultural Text Travel

It is a general assumption that technical texts can travel freely and without any changes, because of the standardised content and nature. Some even label technical and technically related texts *nomothetic,* because they are an offspring of nomothetic sciences, and as such are not expected to change in semantic contents (Breivega 2003: 32-35)[7]. In the applied contexts of the nomothetic sciences, however, they all become full of references to culture, knowledge and processes, because when a text or a message is linked to a certain culture, or is derived from a certain culture, it almost always carries technico-cultural elements. Even the commonly used example of the neutrality (nomothetics) of technical texts—based on the story that Newton formulated the theory of gravity by seeing an apple falling (Dolan 2011)—is not neutral and without any cultural references. Although apple trees are fairly ubiquitous, the story does not have the same relevance and culture-bound references in Iceland and Greenland as on the continents of the Americas, Europe and Asia. To include a generally known field, which is also often claimed to be semantically neutral, we can point to computer texts. The first example shows that such texts are indeed not culture-neutral. It is a text for translation into Danish from English about computer assembly, which is supposed to be the same all over the place. It should also be mentioned that the commissioner of this text asked for it to be written for travelling into other languages. However, this text turned out to be problematic, because some elements were system-bound, for instance this introduction:

[7] She discusses Christer Laurén's nomothetical versus idiographical approach.

"Computer World was one of the first repair shops in Fargo, ND that.. "(TAPP project: 2012)[8]. What would the purpose be of this information in a given translation—in this case the Danish text? If we look at the strategy in this case, the domestication strategy would be the only one possible. The semantics and pragmatics would seem out of place in a text for the Danish audience, and in terms of text travel the solution would be to put this information in the removal category, see figure 2. This phrase cannot be domesticated, because then this activity would have to find a parallel in a Danish context, which in turn would mean that the text might either—as here— just as well take its starting point in Denmark.

Technical texts are full of technico-cultural references like that. And for good reason: the writer wants to make the text interesting to the audience, and one of the means is to link it to the everyday activities, including geographical representations. This was exactly what Newton did, although his example was more generally applicable. Anyway, in our text, after the short introduction to computer assembly, we continue looking at the instructions. One of the next points is: "Tools needed: A set of small Philips screw drivers (highly recommended that you magnetize them)" (TAPP project: 2012). References in instructions are so closely linked with the processes and habits of the source culture that the writer of the text would not necessarily be aware that the process described is not known or used elsewhere. In the Danish culture where the text had to be used, the process of magnetizing screw drivers is not a generally known process, nor one that amateurs know how to perform. So in this case the strategic choice of domestication would dictate that either screwdrivers come magnetized or not. The semantics and pragmatics would have to change accordingly, and the text travel category would dictate replacement of the information.

The problem for writers of instructions and manuals is that unknowingly they insert tricky expressions as well as system-bound and culture-bound expressions. English may be a global language—the contents described are not. This problem is expressed by the question from Ditlevsen et al.: "But how can one translate professional texts functionally adequately? This at first sight naïve question is not that easy to answer, because it always depends on the translation situation at hand."[9] (Ditlevsen et al. 2003: 179). So in our example, we have a theme where the main part of the contents can travel within the translation category, but we still have elements of knowledge representation, which semantically and pragmatically either have to be sorted away (removal) or replaced with some other ideational element which semantically and pragmatically fits into the new content (replacement).

In the next example, the TAPP writer chose to take the job into his/her own hands by pre-domesticating the text. In this way, the text could be prepared for translation, adaptation or replacement already at the point of writing (the USA), which is a great advantage if a text has to

[8] Used with permission. The TAPP project is a collaboration between universities in Europe, the USA and Asia who co-write, translate and make usability testing as a university learning project, including primarily master students from the humanities as well as the natural sciences. The process copies industry-like processes closely, so the same problems that appear in trade and industry surface in these projects.

[9] My translation from: Men hvordan oversætter man så fagtekster funktionsadækvat? Dette umiddelbart lidt naive spørgsmål er ikke så nemt endda at svare på, for det afhænger altid af den enkelte oversættelsessituation.

travel into several markets. The example is from the forensic world, where—with minor variations—most of the methods are supposed to be the same all over the world. The title of the text is "Forensic photography" and it begins with a small history section: "Forensic photography can be traced back in the USA to the early 1800s when inmates were documented through pictures" (TAPP project: 2012).

The writer of the text wanted to be rational and prepared this text for translation: "Forensic photography can be traced back in Denmark to the early 1800s when inmates were documented through pictures" (TAPP project: 2012). This pre-domestication in English seems to be a good idea at first sight. Then the text can just be translated, maybe even run through a machine translation process with post-editing before use.

With the text originating in the USA, however, the writer took it for granted that the semantic references would be the same in the USA and Denmark, which means that it could be placed in a translation category. But—when did forensic photography start in Denmark? And where? Here a review according to the model in figure 2 would also dictate the domestication strategy. As regards semantics and pragmatics, it is dangerous to take for granted that the knowledge representation would be the same. So what could be done instead would be a mark-up for domestication, for instance: "Forensic photography can be traced back in [place] to the [period] when [event..]." (TAPP project: 2012). In this way, most of the knowledge representation would be found and solved. Even with this preparation for domestication, it is necessary to be strongly critical of the knowledge representation in the contents before translating, adapting or replacing the semantic and pragmatic references of the text. So even if pre-domestication has been made, the decision of the text travel process still has to be made and has to be checked with regard to cultural codes, the communicative event and the rhetorical purpose, and after that the textual and semantic elements can be decided.

The third and last technico-cultural example is from a text on road construction. The idea behind it is that a constructor has developed a device that would prevent debris from getting into sewer systems and pipelines. The text was called "erosion control maintenance" (TAPP project: 2012). Already here we face problems. For those who do not know about the product beforehand, it is hard to decipher the noun phrase erosion control maintenance. What is the knowledge representation of the phrase? 1) Control of the maintenance of erosion? 2) Maintaining control of the erosion? 3) Controlling the erosion by maintenance? 4) Maintenance of the control of erosion? Or something else? Anyway, we move on into the text and come across the purpose of the device: "In order to protect the existing rainwater sewer system, the protection, commonly known as a catch basin, must be placed at the inlet to the pipe line." (TAPP project: 2012). For this text, the choice between foreignization and domestication is not so easy. Although domestication is generally favoured for technico-cultural texts, some foreignization elements need to be transferred. And the purpose of the text, although known in another language, has to be introduced to this new audience. However, according to our model, the positioning of knowledge representation has to be altered, too, because the idea is new. The Danish translation could read like this: *Hvis man vil beskytte det eksisterende kloaksystem til afledning af regnvand, skal man*

placere en beskyttende, <u>såkaldt</u> "<u>vandafløbspose</u>", ved åbningen til vandafløbsrøret. The back translation would read like this. *In order to protect the existing rainwater sewer system, the protection, a <u>so-called "water-drainage bag"</u>, must be placed at the inlet to the pipe line.* The underlined parts have shifted the focus from something generally known to something new, emphasized by *so-called* and with the term for *water-drainage bag* in quotes to introduce the term in the target culture. Note also, that in the back translation, the changed semantic description of the product is much more detailed in its knowledge reference. The shift from *catch basin* to *water-drainage bag* is a shift from one knowledge representation to another, although with the same semantic effect. The shift from *basin* to *bag* is also a shift made possible by having access to the picture of the product, and the design is more in focus in the Danish language than in the English expression. The language in general is made to travel by rephrasing the knowledge representation from *given knowledge* to *new knowledge*, but apart from the product term, most of the semantic and pragmatic references can be kept. Semiotically, we face a different story. Figure 6 shows the device.

Figure 6: Catch basin for erosion control maintenance

As regards a text travel decision in relation to a Danish culture and context, this text would have to go into the removal category. Although it could work linguistically, the text has to be discarded until extensive product adaptation has been made. Reason: Danish water drainage systems do not go under the pavements, but from the asphalt directly underground. This is a proof that technico-cultural texts link up with cultural codes in many ways. The pragmatics of the situation killed the idea in the end, so even though the text could be made to travel in a direct translation situation, the real-world situation would discard the text. This paradox between possible text travel and impossible product travel has cost lots of corporate money worldwide.

From the above examples, we have seen that both marketing-cultural and technico-cultural texts strongly depend on their audiences and the target culture. In addition, the semiotic references are also necessary to make the semantic and pragmatic choices needed in a given situation. The rhetorical purpose and the communicative event will determine the strategy for handling the text, and these considerations will determine the text travel category.

5. CONCLUSION

We started out with three research questions: the first asking how knowledge representation was identified and handled for elements that would either lead to a foreignization–or–domestication decision or a mirroring–or–moulding strategy. We chose to apply the foreignization–or–domestication theory mainly to the technico–cultural texts and the mirroring–or–moulding strategy mainly to the marketing–cultural texts. In our examples, we saw both fruitful and failed text travel across languages and cultural borders. Successful text travel was mainly seen when the texts had been thoroughly analysed, both as regards textual and semiotic references whereas lack of respect for the linguistic, historical as well as pragmatic knowledge representation of words and pictures risked going wrong.

This leads us to the derived research question whether a fruitful or failed reception of a text by its audience can be explained by lack of proper awareness of knowledge representation and whether knowledge representation can travel. We saw that when texts travelled seamlessly, they had been subjected to a thorough and full semiotic analysis of their old and new references, and how such references would be perceived by a new audience, and vice versa: failed travel could be analysed as lack of work on the target locale's needs and preferences.
This leads to the third question by which we asked how, reiteratively, focus on text travel can lead to an in–depth understanding of knowledge representation. During our work with the mirror–or–moulding or the foreignization–or–domestication approach for knowledge representation in our text travel model, we realized that the contrasts are interdependent and enable us to identify the knowledge fields that we have to evaluate whether we should change. Should it travel with its foreign–looking element and get a teaching function, or should it be moulded into a more domestic variant of something we know better? The examples in our article present different levels of fidelity to the original content, functionality in relation to the receiving culture and focus on the situation and content of the knowledge to be mirrored. "Thus, it seems that the focus of mirror–gazing as inner work would need to be on the projected images—what they are, how they look, and how they look back at us." (Donohue 2011: 97)

It seemed proper to let the words of interpretation of the Mirror of Erised be the closing of our article. Open–ended, with the reminder that knowledge representation is in the eyes of the beholder, and we should constantly strive to focus on the combination of knowledge representation, text travel and the semantic and pragmatic expressions, all combined with the overall strategy of foreignization–or–domestication or mirror–or–moulding.

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Organizational Knowledge Communication – a Nascent 3rd Order Disciplinarity

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There is an emerging tendency that the organizational communication functions of larger companies enter into a symbiotic relationship with the companies' Knowledge Management function. A tendency this journal has labelled Organizational Knowledge Communication. This should come as no surprise to neither the researcher nor the practitioner; after all who can say where a corporation's knowledge work ends and where its organizational communication begins – and vice versa? In this paper I will present a theoretical account of the three disciplinary trajectories that, in my view, have given rise to Organizational Knowledge Communication, i.e., organization studies, communication theory and Knowledge Management, respectively. In their synthesis the three trajectories form a disciplinary triple helix, a triple helix which, in turn, gives rise to Organizational Knowledge Communication as a novel, 3rd order disciplinarity. Whereas each discipline is a strand in its own right in the helix, these strands, nevertheless, also allow for disciplinary integration, albeit punctually and dynamically. And it is exactly in such trilateral punctual and dynamic integrations that Organizational Knowledge Communication becomes visible, becomes a disciplinarity. I theoretically present an example of such a punctual integration and point to some of the immediate research promises that it holds. This theoretical account ends by describing Organizational Knowledge Communication as a nascent 3rd order disciplinarity.

Key words: Organization, communication, knowledge, triple helix of disciplinary trajectories, trilateral punctual integration, 3rd order disciplinarity

1. INTRODUCTION

Although the term Organizational Knowledge Communication is novel (and so far exclusive to this journal), the practice of 'doing' Organizational Knowledge Communication is ubiquitous. This claim, I hold, has a firm basis in theory as well as practice. From the point of view of organizational theory it is a truism that "[e]very form of society requires organization". (Littlejohn and Foss, 2010: 293). At the most fundamental level, and therefore also at the most influential level, all corporations are in fact (also always) the result of endeavors of organization, the primary goal of which is to accomplish the corporation's mission, its raison d'être, as well as its vision – regardless of what they may be in particular (Cheney et al., 2010). In terms of the field of knowledge studies, Lyotard (1984), Stehr (1994 et passim), and most recently Leydesdorff (2006), to name but a few, hold that we are currently living in a what is known as a knowledge era, in the era of the "knowing organization" (Choo, 1998), or of the "knowledge intensive company" (Alvesson, 2004). A core feature of which is the commonly accepted fact that it is the production, customization, proliferation and utilization of knowledge that constitute the driving force behind organizational (as well as societal) growth (e.g., Qvortrup, 2003, and Kastberg, 2007). And last, but certainly not least, due to a veritable paradigm shift in the appreciation of what communication is, current communication theory now views communication as a cooperative, a participatory, an inherent social endeavor (e.g., Tomasello 2008)[10], whereby – among other things – communication has become inseparable from the very fabric of organizing.

Leaving the theoretical disciplines and turning to real-life organizational practice, there is no doubt that the three disciplines in question make up a rudimentary infrastructure of mutual dependencies of organizing, knowing and communicating in the day-to-day lives of knowledge intensive companies. As would be obvious to most scholars, such a real-life synthesis of disciplines does not, however, translate well to the rather rigid separation of university disciplines. Well, then, one might ask, where does this leave Organizational Knowledge Communication? Have I merely stated that what has analytically and academically been divided into separate disciplines does in fact empirically form a coherent corporate synthesis; a synthesis that we would otherwise call the day-to-day practices of the knowledge intensive company? I have, but I have also done more than that. My point of for this claim can be found in Wartofsky's credo that:

> *"Though it may appear that we have arranged our learned disciplines to reflect the way the world is, it is rather the case historically that we have construed the world in the image of our disciplines." (Wartofsky, 1997)*

Whereas the above (and other) traditional university disciplines have unquestionably given us immense insights, they have also given us tunnel vision, i.e., as disciplinary specialization progresses our insight grows deeper and deeper, yet in many cases also less and less relevant to fewer and fewer people – a development, which Scharmer calls a pathology (2009). Secondly,

[10] This is, then, in stark opposition to viewing communication as (merely) the neutral vehicle of message delivery (e.g., Shannon and Weaver, 1949).

consciously turning away from a more traditional university view (which would spur me to look at organization studies, and Knowledge Management and communication theory separately) would allow me to favor a synthetic look at Organizational Knowledge Communication. Such a synthetic view would imply two things. It implies that I allow myself to leave behind the comfortable and reassuring institutionalized mono-disciplinarity. It also implies that I leave behind the constraining confinement of the mono-discipline(s) in question. At a somewhat more abstract level this is in many ways congenial to Law, when he holds that:

> *"If the world is complex and messy, then at least some of the time we are going to give up on simplicities. But one thing is sure: if we want to think about the messes of reality at all then we are going to have to teach ourselves to think, to practice, to relate, and to know in a new way." (Law, 2004:2)*

Derived from the above I hold that, in order to study Organizational Knowledge Communication – in itself a novel perspective, deeply immersed in the "messes of reality", as we saw in section 1 – I need to suspend disciplinary simplicities. Suspending disciplinary simplicities, however, does not mean giving up on disciplines altogether. Organizational Knowledge Communication does in fact pay homage to its parent disciplines much in the same way as Bernard of Chartres would pay homage to the "ancients":

> *"We are like dwarves perched on the shoulders of giants [in casu: the disciplines], and thus we are able to see more and farther than the latter. And this is not at all because of the acuteness of our sight or the stature of our body, but because we are carried aloft and elevated by the magnitude of the giants." (Bernard of Chartres, app. 1134)*

In this sense Organizational Knowledge Communication resembles a sort of prism[11] through which several disciplines each cast their particular light on the same entity, each beam of light being a beam in its own right yet in their integration the beams contribute to establishing a synthetic impression hitherto unseen (cf. sections 5 and 5.1)[12]. The view, which I advocate at this point, is, then, in tune with Horgan, when he states that:

> *"The basic idea of the edge of chaos is that nothing novel can emerge from systems with high degrees of order and stability, such as crystals; on the other hand, complete chaotic […] systems such as turbulent fluids or heated gases, are too formless. Truly complex things – amoebas, bond traders, and the like – happen at the border between rigid order and randomness." (Horgan, 1996:196-197)*

Organizational Knowledge Communication does acknowledge its parent disciplines, i.e., the "systems with high degrees of order and stability". Yet at the same it challenges the restrictions imposed by said parent disciplines' "order and stability". On the one hand this entails that Organizational Knowledge Communication is neither out to debunk disciplinarity in general nor out to deconstruct the three particular university disciplines in question. On the other hand it

[11] I am thankful to my colleagues Thomasen and Abell for introducing me to the idea of the prism in this sense.

[12] This is what I coin a "trilateral punctual integration" later on in this paper.

entails that Organizational Knowledge Communication is consciously looking for what happens "at the border between rigid order and randomness", i.e., when the prism casts new light on the meeting places in–between disciplines.

1.1. Research agenda and organization of the paper

With a point of departure in the framing presented in the introduction, I will theoretically establish, investigate and account for three things in this paper. Firstly, I will establish disciplinary trajectories of current dominant ideas of the three parent disciplines (sections 2, 3 and 4). Secondly, I will establish a synthesis of these trajectories, i.e., the triple helix of Organizational Knowledge Communication (section 5). Thirdly, I will enter into the triple helix and identify and investigate one salient and theoretically promising meeting place between these parent disciplines, a trilateral punctual integration in my terminology. In the process I will account for some of the core research promises that such trilateral punctual integrations harbor. I will subsequently utilize the insights thus gained as a stepping stone to reinterpret the notion of disciplines and point to Organizational Knowledge Communication as being a nascent 3rd order disciplinarity (section 5.1). The paper ends with a vision of a two pronged research strategy for Organizational Knowledge Communication (section 6).

Needless to say, a caveat must be issued here. Due to the fact that organization studies, communication theory and Knowledge Management are not merely complex concepts but indeed also (immense) fields of study each in their own right, I approach them from a certain perspective (cf. y Gasset, 1923, on perspectivism in this sense). For the sake of the argumentation in this article, the perspective chosen is that of trajectories of current, dominant ideas. As mentioned above, a synthesis of these three trajectories – a triple helix of trajectories – is presented and one exemplary and salient meeting place between the disciplinary strands is identified and discussed. For when selecting specific dimensions of vast disciplinary fields, focusing on a limited number of concepts within these dimensions, and viewing these concepts from a certain perspective, I am knowingly blurring or even blotting out other dimensions, other concepts, other perspectives. I explicitly do so, however, in strict adherence to the notion that conscious "perspective taking" is a prerequisite for any systematic analysis (Perner et al., 2003:358).

2. AN ORGANIZATIONAL TRAJECTORY

Though man has probably organized himself (and others) since time immemorial, modern organizational theory typically traces its academic roots back to the seminal works of German sociologist Max Weber[13]. Since then a number of scholars from within organizational studies have given their view on the evolution of modern day organizations and – sometimes more to the point – how we may look at the nature of organizations. Scott (1998), for instance, applies three perspectives unto his understanding of organization theory. 1) Organization theory seen from a "rational" perspective, with a focus on production processes and structure; implying that the organization is seen as a "machine". 2) Organization theory seen from a "natural" perspective, with

[13] For an English introduction to Weber's main ideas and concepts see Collins, 1986.

a focus on behavioral processes and motivation; implying that the organization is seen as an "organism". 3) Organization theory seen from an "open" perspective, with a focus on the organization's relationships to its surroundings; implying that the organization is seen as an open and loosely-coupled network. Stemming from Scott's reading of seminal theoretical works on organizational theory, he is able to depict a sort of history of ideas of organizational theory. Prototypically, organization theory up until the 1930'ies would be seen as predominantly "rational", equally prototypically organization theory in the time span from the 1930'ies to the 1960'ies would be seen as predominantly "natural" and last but not least from 1960'ies onwards organization theory is seen as predominantly "open". The underlying idea of an evolution in organization theory along the lines stipulated by Scott seems to be generally accepted. We see a similar idea of evolution in the work of Likert (1967). Here organization theory is seen to be progressing through perspectives labeled authoritative, consultative and participatory, respectively. Glasl and Lievegoed (1997) sum it up rather nicely when they see the evolution of organization theory as a progression from classical techno-structural theories (e.g., Taylor, Weber, Fayol) via psycho-socially theories (e.g., Mayo, Lewin, Herzberg) to systems theories (e.g., Burns & Stalker, Lievegoed, Mintzberg). What these theories have in common – and I am explicitly looking away from what may separate them – is a sort of shared history of ideas, a shared trajectory, as it were. There is a tendency to acknowledge a development over time; a development of going from a perception of the organization (as well as its practices and processes) as being structurally relative simple, relatively mechanistic and relatively closed to an understanding of the organization as a highly complex, a highly dynamic and an open entity. That is from rigid bureaucracies (in the Weberian sense) to open and loosely-coupled network organizations (cf. e.g., Rogers and Kincaid, 1980) and self-organizing, autopoietic systems (Luhmann, 1984, et passim). This trajectory forms the first strand in the triple helix.

3. A COMMUNICATION TRAJECTORY

As is well-known to the community of communication practitioners and researchers, communication theory, too, has undergone a considerable development. Beebe et al. sum it up in this way:

> *"Our understanding of communication has changed over the past century. Communication was initially viewed as a transfer or exchange of information, but it evolved to include a more interactive give-and-take approach. It then progressed even further to today´s view that communication is a process in which meaning is created simultaneously among people." (Beebe et al., 2004:11)*

The shift in focus in these phases is quite revealing: From communication as a matter of "the sender" sending (communication seen as transmission or signaling) via communication being a matter of "the sender" adjusting to feedback from the "receiver" and / or the environment (communication seen as interaction, typically from a cybernetics point of view) to the idea that communication is basically a cooperative enterprise (Tomasello, 2008) calling for the equal involvement of both "sender" and "receiver" – explicitly perceived as communication partners (Rogers and Kincaid, 1981) – in a joint meaning making process (communication as transaction,

typically based on a systems theory approach)[14]. In lieu of this new theoretical appreciation of communication, communication has also been elevated to being seen as epistemic (e.g., Scott, 1967) or constitutive (e.g., Putnam and Nicoreta, 2008), i.e., when we communicate we do more than merely send our messages We do in fact communicatively construct ourselves, others as well as the world in which we live. Reflections of such an evolution within general communication theory are also to be found at the level of organizational communication. In her book on organizational communication, Miller (2003) offers a condensed version of a history of dominant ideas, a history where management philosophies (or approaches) are paired with the communicative aspects of content, direction, channel and style.

Characteristics of Prototypical Approaches to Organizational Communication : from classical to current			
	Classical approach	Human relations approach	Human resources approach
Communication content	Task	Task and social communication	Task, social, innovation
Communication direction	Vertical (top–down)	Vertical as well as horizontal	All directions, typically team–based
Communication channel	Usually written	Often face–to–face	All channels
Communication style	Usually formal	Usually informal	Formal as well as informal, but typically informal

Table 1: Characteristics of Prototypical Approaches to Organizational Communication : from classical to current (based on Miller, 2003:57)

Even if this table is a crude generalization of trends, it nevertheless becomes clear that – over time – organizational communication has evolved as a field in as much as it has gone through a number of phases, which have transformed it – essentially following the evolutionary phases of general communication theory. For organizational communication the transformation may be subsumed under such headings as: from univocality to a plurivocality, from a unilaterality to a plurilaterality, from mono–modal to multimodal, and from centralized to decentralized. This trajectory forms the second strand of the triple helix.

4. A KNOWLEDGE MANAGEMENT TRAJECTORY

Even if the academic study of knowledge may trace its intellectual roots back to Plato´s Theaetetus, the study of Knowledge Management (henceforth KM) – as well as the coining of the phrase itself – is a much more recent phenomenon. According to Wiig (1997) KM emerges as a discipline in its own right as late as in the 1980'ies, but although it is not much more than three decades old, KM

[14] Further elaborations on this understanding of communication theory history are to be found in e.g., Windahl et al., 2008, as well as Littlejohn and Foss, 2010.

has nevertheless matured remarkably fast as a discipline. Guretzky establishes, in a recent article, the following trends in the history of dominant ideas of KM:

Trends in the History of Ideas of Knowledge Management	
KM generations	Focal points
KM 1.0	Making implicit knowledge explicit
KM 2.0	Let's communicate!
KM 3.0	Deregulate, integrate and empower the employee to adapt to complex situations

Table 2: Trends in the History of Ideas of Knowledge Management (translated from von Guretzky, 2010

KM 1.0 is crowned by the seminal works of Nonaka and Takeuchi (1995) as well as Choo (1998). Here the bulk of the effort going into investigating organizational knowledge focuses on making tacit knowledge explicit. The strong focus on the process of "translating" tacit knowledge into explicit knowledge stems from two interconnected ideas. 1) Knowledge is a valuable organizational resource, which (therefore) needs to be managed, and 2) only explicit knowledge can be managed. Well-known representatives of KM 2.0 would be Davenport and Prusak (1998), who – with a firm basis in a Communities of Practice approach – would emphasize communication as essential to knowledge work in organizations. KM 3.0 is still an emergent field (for a discussion of core aspects of this generation of KM see Kastberg, 2007 and 2010a). We may, however, say that it draws on the previous KM generations but adds to them the idea of emancipating the knowledge worker; i.e., of self-governance in the knowledge work.

This table, however crude the generalization may be, does nevertheless depict a clear disciplinary development. In terms of evolutionary development the legacy of the early cognitivist idea, i.e., that knowledge is an entity which we can make explicit, easily isolate, somehow package and then send to whomever is in need of that particular parcel of knowledge, seems to be vanishing. And, at least ideologically, KM seems today to adhere to some form of constructivism (be it social, e.g., Berger & Luckmann, 1966, or radical, e.g., von Glasersfeld and Smock, 1974) or – more recently – constructionism (Gergen, 1985). This trajectory forms the third and last strand of the triple helix, which will be introduced and elaborated on in the next section.

5. A TRIPLE HELIX OF DISCIPLINARY TRAJECTORIES

In the above sections 2, 3 and 4 I have sketched out the three trajectories; and although each trajectory is a school of thought in its own right, the trajectories are not altogether unrelated as I stated in section 1. But not only are they not unrelated in the day-to-day operations of real-life knowledge intensive companies, theoretically speaking I do in fact see the trajectories forming a triple helix. That is: A triple-stranded, interdependent, spiraling structure in which the strands converge on one another, but never quite merge, in a strict disciplinary sense. This idea of the triple helix of communication, organization and KM is, of course, a metaphor borrowed from the double helix of the DNA strands (Watson 1968). Dwelling for a moment on DNA research, it is well-known that certain nucleotides in the strands punctually bind together across the double

helix, a binding that is referred to as a base pair. In much the same way, the trajectories of our three parent disciplines are also linked punctually; what DNA research calls base pairing, however, is – in the case of Organizational Knowledge Communication – rather a punctual linking by means of what we may refer to as boundary objects (Star and Griesemer, 1989) of a conceptual nature. Let us take a closer look at the theoretical possibility for establishing such boundary objects in the triple helix in question. Conceptually speaking a boundary object binding organizational studies to communication theory is established by a statement by Kleinbaum, Stuart and Tushman. In a relatively recent paper they are able to present an empirical study substantiating one of the credos that the field of professional communication otherwise (truism–like) tend to take for granted, i.e., that "[c]ommunication is heavily constrained by formal organizational structure" (2008). The conceptual boundary object which binds communication theory to knowledge studies is established by the explicit mentioning of innovation in table 1 (i.e., communicating knowledge for purposes of innovation) as well as – at a more general level – the transactional view on communication itself, stressing the co–operative meaning making or knowledge creating, epistemic nature of communication (cf. section 3). Whereas such bilateral punctual integrations are interesting in and of themselves they are probably not all that uncommon (I have coined them 2nd order disciplines in section 6 below). What <u>is</u> unique to Organizational Knowledge Communication, however, is that it gives rise not to bilateral but to trilateral punctual integrations. In fact, Organizational Knowledge Communication only becomes visible as a disciplinarity in the trilateral punctual integrations it is able to establish. In the next section I will present one such trilateral punctual integration binding KM to both communication theory and organization studies.

6. FROM TRILATERAL, PUNCTUAL INTEGRATION TO NASCENT 3RD ORDER DISCIPLINARITY – AND BACK TO TRILATERAL PUNCTUAL INTEGRATION

In order to illustrate the idea of the trilateral punctual integration, I will now take a closer look at one such meeting place. For this illustration I have chosen to look at the KM phenomenon of „ba"[15], i.e., "a shared place for emerging relationships" as well as for "knowledge creation" (Nonaka and Konno, 1998:40). "Ba" comes into existence <u>as</u> a trilateral punctual integration thanks to the fact that the KM trajectory has currently arrived at a dominant idea where knowledge creation is explicitly linked to, in fact made dependent on, the forming of a knowledge enabling organizational design, particularly of fostering micro–communities in which communication is cooperative and transactional (von Krogh et al., 2000). All of which are properties otherwise traditionally found within the realms of current organization studies and communication theory, respectively (cf. the three trajectories above). That it: What makes „ba" a trilateral conceptual boundary object binding the disciplinary trajectories in question is the fact that, strictly theoretically speaking, „ba" can only come about at a point in time where – in the course of the trajectory of dominant ideas of all the disciplines – the scholars involved would have:

[15] "Ba" is Japanese for place or location.

1. A systems theory understanding of organizations (cf. section 2)
2. A transactional understanding of communication (cf. section 3)
3. A constructivist/constructionist understanding of knowledge (cf. section 4).

And it is exactly thanks to trilateral punctual integrations such as this one that Organizational Knowledge Communication sets itself apart not only from mono–disciplines but equally from the myriad of inter– and transdisciplines. Organizational Knowledge Communication, quite simply, exists in an altogether different disciplinary ecology. In order to substantiate such an, admittedly, rather bold claim a presentation and discussion of the disciplinary identity of Organizational Knowledge Communication is called for at this point. I can probably best describe the disciplinary identity of Organizational Knowledge Communication by contrasting it to other types of disciplines. The disciplinary types with which I contrast Organizational Knowledge Communication I have coined 1st and 2nd order[16] disciplines.

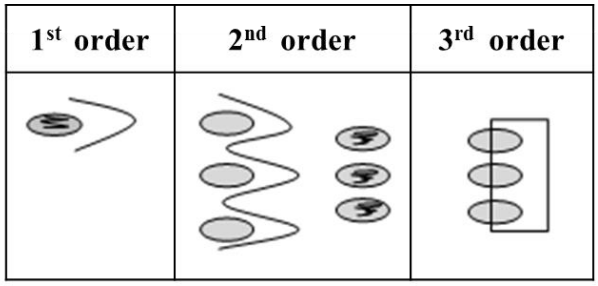

Figure 1: An ordering of disciplinarities (adapted from Kastberg, 2007)

1st order disciplines are the product of what in a European university environment would be a prototypical "Humboldt" division of university disciplines. It is depicted in the firgure to the far left. A first order university discipline comes into existence when a particular object of study is exclusively being examined by a fixed conglomerate of theories and methods, which, in turn, has been sanctioned and codified over time from research carried out into that very object. (It is questionable if many pure 1st order disciplines exist today.) The two middle images depict 2nd order disciplines – typically referred to as inter– or transdisciplines. The first of the two middle images show the kind of 2nd order discipline which comes into existence when different objects of study are examined by means of one overarching theory. It could be the application of, say, critical theory unto objects of study from different fields as such as social science, pedagogy, and history. The latter of the two shows the kind of 2nd order discipline which comes into existence when different objects of study are examined by means of one all–pervading method. It could be the application of, say, statistical method unto such fields as population studies, corpus linguistics, and economics. What formally establishes these as 2nd order disciplines is the fact that they imbed the possibility for 1st order disciplines. The image to the far right depicts what I have labelled a 3rd order disciplinarity (Kastberg, 2007). A 3rd order disciplinarity comes into existence when not one overarching theory and not one pervading method is the common denominator. The common denominator is the object of study itself and unto that object (in principle) any theory and any

[16] The idea of "ordering" in this sense goes back to Bateson, 1972.

method may be applied. That is, first of all, a third order disciplinarity is independent from the restraints of any one theory, any one method. Its only obligation, its telos, being to match the complexity of the object of study with modes of examinations befitting said complexity. What formally establishes this as a 3rd order disciplinarity is the fact that it imbeds the possibility for 2nd order disciplines.

Let us now look at Organizational Knowledge Communication through the optics thus provided. Acknowledging its three parent disciplines with their different theories, methods, and objects of study, Organizational Knowledge Communication, quite simply, cannot be a 1st order discipline. Neither is Organizational Knowledge Communication a 2nd order discipline. There is, quite simply, no one overarching theory, no one overarching method through which to investigate an object of study. And, in the terminology introduced in section 5, the bilateral, punctual integration of 2nd order disciplines does not suffice if one wants to adequately encompass the triple helix of Organizational Knowledge Communication. What, then, characterizes Organizational Knowledge Communication as a 3rd order disciplinarity? Well, first of all, I am, and quite deliberately so, referring to Organizational Knowledge Communication not as a discipline but as a disciplinarity. I do so, because Organizational Knowledge Communication is quite simply not an institutionalized university discipline, if we compare it to this definition:

> *"[…] the primary unit of internal differentiation of science […]. There exists a long semantic prehistory of disciplina as a term for the ordering of knowledge for the purposes of instruction in schools and universities. But only the nineteenth century established real disciplinary communication systems. Since then the discipline has functioned as a unit of structure formation in the social system of science, in systems of higher education, as a subject domain for teaching and learning in schools, and finally as the designation of occupational and professional roles." (Stichweh 2001:13727).*

Secondly, I refer to it as a 3rd order disciplinarity because it eludes standard definitions of disciplines (of both the 1st and the 2nd order kind). As a 3rd order disciplinarity, i.e., as something apart from standard disciplines, Organizational Knowledge Communication pays equal homage to three parent disciplines, none of which holds an a priori privileged position (as would be the case in any 2nd order discipline). As we saw in the example above, "ba" is looked at through a prism of three equal lenses. Last but certainly not least, Organizational Knowledge Communication is inherently dynamic and uniquely so. It is inherently dynamic because it can only be observed, it can only find its expression in the trilateral punctual integrations. And it is that very characteristic that makes Organizational Knowledge Communication unique. It is only the flux of the three trajectories that Organizational Knowledge Communication emerges; it does so when a "perturbation" is generated (von Glasersfeld, 1989:11) in this flux. At this point it is paramount that I add that to me perturbations are in fact meeting places. Metaphorically speaking they constitute meeting places much akin to the ancient Greek "agora", if you will, or town square. In the "agora" people from all walks of life, all strata of society, from the "polis" proper and beyond would meet in order to buy, sell, negotiate and gossip. But the "agora" was not only a common ground; it was also a neutral ground. As a common, neutral ground the trilateral punctual integration holds the potential of being (or of becoming) such a productive meeting place for the exchange of ideas,

practices and policies across traditional disciplinary borders. A trilateral punctual integration, then, binding the three trajectories at a certain point is a perturbation in this sense. It is a perturbation in the flux of mono-disciplinary trajectories because, otherwise, these disciplines would (merely) progress in accordance with their own 1st (or 2nd) order disciplinary logics, respectively. And it is exactly because of the constitutive force of these unique, trilateral punctual integrations that Organizational Knowledge Communication is not yet another inter- or transdiscipline, that it is in fact a nascent disciplinarity of a novel kind.

Returning yet again to the trilateral punctual integration of "ba", which was used above as an exemplary illustration, we saw that this particular prism of Organizational Knowledge Communication consists of:

1. A systems theory understanding of organizations (cf. section 2)
2. A transactional understanding of communication (cf. section 3)
3. A constructivist/constructionist understanding of knowledge (cf. section 4).

Something which, at a more concrete level, could theoretically integrate organizational design theory (e.g., Jones 2012), 2nd order cybernetic communication theory (e.g., von Förster, 2003 et passim), and knowledge flow theory (e.g., Nonaka et al., 2008). This particular trilateral punctual integration, then, would be able to address and consistently integrate particular research questions such as these:

1. What would characterize organizational practices favoring knowledge enabling communication?
2. What would characterize KM practices favoring knowledge communication across organizational boundaries?
3. What would characterize communication practices favoring the co-construction of knowledge as well as the organizational practices necessary to do so?

In the "ba" example the trilateral punctual integration is (Chimera-like) part organizational design theory, part 2nd order cybernetic communication theory, and part knowledge flow theory, each of which is an approach in its own right, and yet their integration holds a promise that we may hope to understand, to appreciate to investigate "ba" at a deeper and more fulfilling level.

7. ORGANIZATIONAL KNOWLEDGE COMMUNICATION – ENVISIONING A TWO-PRONGED, EXPLORATIVE RESEARCH STRATEGY

As may be inferred from the above, it is my belief that these strands, again theoretically speaking, are converging ever closer – typically by means of such trilateral punctual integrations as "ba". This does not mean, however, that I am advocating the coming of a new, all-encompassing paradigm in the Kuhnian sense (1970), a new transdiscipline or the like. Neither am I advocating a

sort of Heraclitian notion that "everything flows" – disciplines and concepts alike – since this could very well lead to the rampant relativism otherwise known as postmodern paralysis. As Knodt laconically states: "[t]he end of metanarratives does not mean the end of theory, but a challenge to theory" (1995:xi). Rather than being destructive (to the disciplines) I see the challenges posed to the disciplines by the punctual integrations as being productive; as being impetus for new insights. I see trilateral punctual integrations as being such border phenomena between schools of thought "with high degrees of order and stability" (cf. the Horgan quote above).

What I am envisioning, research-wise, based on the above theoretical framing of Organizational Knowledge Communication as a 3rd order disciplinarity is a two-pronged, explorative research strategy. First of all, that research into Organizational Knowledge Communication at the level of trilateral punctual integrations be carried out in such a way as to give rise to a wealth of novel ways of diagnosing and solving some of the highly complex theoretical problems evolving around the infrastructure of mutual dependencies of organizing, knowing and communicating in the day-to-day lives of knowledge intensive companies (e.g., how to define success, how to 'do' innovation, how to raise entrepreneurial awareness etc.). Secondly, and this more as a sort of spin-off, that research into Organizational Knowledge Communication at the level of 3rd order disciplinarity be carried out in such a way as to shed new light on 'old' questions or problems (in a Popperian sense) of each or the three disciplines involved in forming the triple helix of Organizational Knowledge Communication.

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