2006

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Recommended Citation
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http://aisel.aisnet.org/acis2006/64

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On the Adoption of Philosophical Presuppositions and their Implications for Theorising “Quality of Conceptual Models”

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Abstract

It has been claimed frequently that the importance of conceptual models for information systems development poses high demands on the quality of conceptual models. However, the notions “model” and “quality of conceptual models” remain vague. In this paper we illustrate how philosophical presuppositions affect the conceptualisation of “model” and “quality of conceptual models” respectively. Consequentially we argue that the analysis and critique of philosophical presuppositions should precede any theorising of the notions “model” and “quality of conceptual models”.

Keywords
Models, conceptual modelling, quality, philosophical presuppositions, theory development.

INTRODUCTION

It appears that conceptual models have become one of the most fundamental means for the development of information systems. Conceptual models serve multiple purposes, such as analysis, design, communication, and documentation. Due to the high consequential costs of errors introduced in early phases of information systems development (e.g., Boehm, 1981), the notion “quality of conceptual models” has gained increasing attention especially in the context of early requirements engineering. Presumably, conceptual models of a low quality will lead to a low quality of the information system developed (e.g., Poels et al., 2003).

Numerous attempts have been made to specify the notion “quality of conceptual models”. Yet the results were often only non-systematic lists of quality criteria or of generally desirable properties of conceptual models. Additionally, these criteria were frequently not rigorously formulated and exhibited substantial overlap (e.g., Lindland et al., 1994; Krogstie et al., 1995). As an alternative, framework-based conceptualisations of “quality of conceptual models” have spread (e.g., Pohl, 1994; Krogstie et al., 1995; Schütte and Roththowe, 1998; Moody et al., 2002). Nevertheless, corresponding with the differences between various lists of quality criteria, conformities between these frameworks exist only partially. Recently, an issue of the journal Data & Knowledge Engineering has been dedicated exclusively to “quality in conceptual modeling” (Nelson et al., 2005). The diverse perspectives on “quality of conceptual models” represented by the respective contributions highlight again that a universal notion of “quality of conceptual models” does not exist (Moody, 2005; Opdahl and Henderson-Sellers, 2005; Gemino and Wand, 2005; Parsons and Cole, 2005; Siu and Tan, 2005). As a consequence, any theorising of the relationships between the variable “quality of conceptual models” and other variables will be of limited generality if the meaning of “quality of conceptual models” remains rather arbitrary. Theorising of “quality of conceptual models” is further hindered by another indeterminate notion: Pretty much all theorising of “quality of conceptual models” as documented in the information systems literature suffers from an insufficient explication of the each underlying notion of “model”.

Given this unsatisfactory situation we believe it to be necessary to reconsider theorising of “quality of conceptual models” on a rather fundamental level. For obvious reasons, we also believe that in order to be able to develop a sound conceptualisation of “quality of conceptual models” it is necessary to explicate the respective notion of “model” first. Yet in this paper we are not primarily concerned with the actual explication of a notion of “model”. Instead we are concerned with a step that should precede all explications of notions of “model” – and,
thus, of notions of “quality of conceptual models” as well. The step we are concerned with is the exemplary analysis of the implications of the adoption of philosophical presuppositions for the conceptualisation of “model” and “quality of conceptual models”. Even if we review and criticise some popular sets of philosophical presuppositions (a.k.a. philosophical paradigms) and argue in favour of the adoption of a certain set of philosophical presuppositions, the aim of the paper is not to sell a certain paradigm but to illustrate the analysis of philosophical presuppositions and the implications of their adoption on theorising “quality of conceptual models”: We are primarily concerned with the structure of the argument at a meta-theoretical level and not so much with the content at the theoretical level.

The remainder of the paper is structured as follows: First, following up on our claim that particular philosophical presuppositions implicate particular notions of “model”, we exemplarily review the philosophical paradigms of positivism and radical constructivism. Subsequently, we explicate the notions of “model” implicated by these paradigms and provide a brief critique of the respective paradigms. Second, motivated by our critique of positivism and radical constructivism, we outline the philosophical paradigm of sociopragmatic constructivism and explicate the notion of “model” implicated by this paradigm. Third, by synthesising common dimensions, we review a number of framework-based conceptualisations of “quality of conceptual models”. Fourth, motivated by the outcomes of the preceding reviews and critiques, we argue in favour of sociopragmatic constructivism as the basis for a notion of “quality of conceptual models” that will eventually overcome the limitations of positivist and radical constructivist theorising of both “model” and “quality of conceptual models”. We conclude our considerations with a summary and an outlook.

PHILOSOPHICAL PRESUPPOSITIONS AND THE NOTION OF “MODEL”

Before we start with the depiction of two popular sets of philosophical presuppositions for the conceptualisation of “model”, we shall introduce a distinction, which assigns all conceptualisations of “model” to one of two distinct classes, containing either “formal notions of model” or “empirical notions of model”.

The formal notion of model is used mainly in the formal sciences and is based upon the notion of “axioms”. Axioms can be considered as forms of statements (e.g., Hilbert, 1899). Characterized by their semantic indetermination (i.e., emptiness of content), it is impossible to assign axioms a value of truth. Only through interpretation, i.e., the assignment of everyday language terms to elements of the axiom, an axiom will be transformed into a meaningful proposition that can be true or false. An interpretation of an axiom leading to a true proposition is understood as a model of the axiom. Since the formal notion of “model” does not assume a relation between model and reality but between model and axiom (i.e., between propositions), the explication of philosophical presuppositions is irrelevant for the understanding of the formal notion of model. However, in the empirical sciences a relation between model and reality can be regarded as constitutive for notions of “model”. This is reflected in the widespread understanding of models as representations of reality. Only when models are assumed to have a relation to reality, meaning that they are empirical, the consideration of philosophical presuppositions becomes relevant.

Different efforts of systematising philosophical presuppositions or positions are documented in contemporary literature (e.g., Fitzgerald and Howcroft, 1998; Ridley and Keen, 1998; Guba, 1990; Morgan and Smircich, 1980; Burrell and Morgan, 1979). Frameworks are frequently used as they allow a systematic characterization of the different positions (see Table 1). For the purpose of this paper, the two rather antithetic paradigms of positivism and radical constructivism will be described with respect to ontological, epistemological, anthropological, and methodological positions. Ontological positions are conceiveable within a continuum between the extremes “realism” and “idealism”, epistemological positions between “objectivism” and “subjectivism”. From an anthropological point of view the human can be understood as a “simple response mechanism” on the one side of the continuum, and as a “conscious creator of worlds” on the other side. Methodological positions are bound to the adoption of either a nomothetic or an idiographic methodology, a distinction introduced by the German neo-Kantian philosopher Wilhelm Windelband. A nomothetic methodology implicates the search for universal laws and ultimate truth. As such it is oriented towards generalisations. In contrast, an idiographic methodology is oriented towards the specific, which frequently implicates the elicitation and documentation of subjective experience and meaning.

In Table 1 we have depicted the categories that underlie our systematisation and characterisation of philosophical paradigms. Caveat: First, our structured approach towards the characterisation of philosophical paradigms seems to suggest that it is possible to perform the respective characterisations from a neutral position. This is not the case! For example, from a radical constructivist point of view the questions regarding ontology are meaningless as we will see later on. Second, the clear distinction between the categories seems to suggest that questions regarding the respective categories can be answered independently from one another. This might actually be true for certain philosophical paradigms but not for others. For example, a realist ontology implies an objectivist epistemology (but not vice versa). Third, our subsequent characterisations of philosophical paradigms should not be accepted at face value. While we believe that our characterisations are in line with the ‘mainstream understanding’ of the respective paradigms, we have to accept that those characterisations are open to debate.
For example, positivism is usually associated with a realist ontology. However, the presuppositions underlying Hans Vaihinger’s “Philosophy of As-If” (1924) are better summarised under the label “idealist positivism”.

<table>
<thead>
<tr>
<th>Ontology</th>
<th>What is the nature of the “knowable”? What is the nature of “reality”? Is reality external to the individual and imposing itself on the individual consciousness or a product of individual cognition? What exists? What does is mean for something to exist?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epistemology</td>
<td>What is the nature of the relationship between the knower (the inquirer) and the known (the knowable)? What are the grounds of knowledge? What is truth?</td>
</tr>
<tr>
<td>Anthropology</td>
<td>What is the nature of the relationship between human beings and their environment?</td>
</tr>
<tr>
<td>Methodology</td>
<td>How should the inquirer go about finding out knowledge? Is there one best way to obtain knowledge?</td>
</tr>
</tbody>
</table>

Table 1: Conceptualisation of philosophical paradigms (e.g., Guba 1990; Morgan and Smircich 1980; Burrell and Morgan 1979).

In the following we exemplarily review the philosophical paradigms of positivism and radical constructivism.

**Positivism and the Notion of “Model”**

The ontological presupposition of positivism is marked by (naïve) realism. Reality consists of tangible pre-existing structures. The corresponding epistemological position is objectivism. The modeller holds a neutral (objective) position, and discovers the true existence of nature (reality) while modelling. The only possible methodology is nomothetic. The notion of knowledge is bound to the correspondence theory of truth, which is also the basis for the representational (mapping-oriented) notion of “model”. Knowledge exists if real objects with their innate properties and relations are represented (mapped) in the human mind with the same properties and relations. The human being with its consciousness is then understood as a passive medium for the representation of reality.

| Ontology | realist ontology; reality exists independent of human mind; reality driven by natural laws and mechanisms |
| Epistemology | objectivist; inquirer has direct access to nature via her/his senses; inquirer performs a non-interactive inquiry process, biasing factors are thereby excluded from influencing the findings (outcome); correspondence theory of truth |
| Anthropology | mechanistic view; human as stimulus-response mechanism; behaviorism; computational theory of mind |
| Methodology | empirical experimentalism; questions/hypotheses are stated in advance in propositional form and subjected to empirical tests (falsification) under carefully controlled conditions; nomothetic |

Table 2: Conceptualisation of the philosophical paradigm of positivism.

From the viewpoint of positivism, a model is regarded as a representation (mapping) of the ‘true’ reality. This representational notion of model presupposes a direct relation between models (the “Representations”) and model source (the “Domains”) (see Figure 1). A model is “good” or “true” if it is in correspondence with reality. The simplification (abstraction) of the representation is realized by the intentional neglect of properties of the part of reality under investigation. Applied to information systems, the positivist notion of “model” implies that what we perceive through the use of information systems is an ‘objective’ representation of reality. Consequently, using information systems to obtain information about reality supposedly does not make a difference to the direct perception of reality – if we do not take errors in the representation into consideration.

Positivism is faced with increasing criticism in the context of conceptual modelling, particularly because of its negligence of cognitive efforts by the modelling subject (e.g., Floyd et al. 1992; Falkenberg et al., 1998; Krogstie et al., 1995).
Radical Constructivism and the Notion of “Model”

Radical constructivism has gained increasing attention in recent years in information systems research (e.g., Floyd et al. 1992; Goorhuis, 1994). It holds that an objective reality – if it exists – is intellectually inaccessible to us and can thus be ignored. Instead, it is assumed that many “realities” are possible as subjective mental constructions. Thus, radical constructivism adopts the position of ontological idealism or abandons ontology entirely. From an epistemological point of view, humans do not hold an objective position. The cognitive capabilities of humans ultimately determine what and how something is perceived. Hence, knowledge is subjective and necessarily incorporates traits of the respective cognitive system (e.g., Glasersfeld, 1995).

<table>
<thead>
<tr>
<th>Ontology</th>
<th>relativist; realities exist in the form of multiple mental constructions; dependent for their form and content on the person who holds them</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epistemology</td>
<td>subjectivist; inquirer and subject inquired into are fused into a single (monistic) entity; findings are literally the creation of the process of interaction between the two; the concept of truth is substituted by the concept of viability</td>
</tr>
<tr>
<td>Anthropology</td>
<td>human as creator of realities</td>
</tr>
<tr>
<td>Methodology</td>
<td>hermeneutic; individual constructions are elicited and refined hermeneutically, with the aim of generating constructions on which there is substantial consensus; ideographic</td>
</tr>
</tbody>
</table>

Table 3: Conceptualisation of the philosophical paradigm of radical constructivism.

In contrast to positivism, radical constructivism denies the existence of an objective relation between model and reality. Models do not have an existence independent of humans. Since reality, i.e., “The world”, is subjective, models and their relation to reality are subjective too. In Figure 2 we have depicted the relations that – according to radical constructivism – hold in modelling situations.

The “Domains” (i.e., the source) are part of “The world” just like the “Representations” (i.e., the model) and the modelling subjects (see Figure 2). An objective relation between the domain (of discourse) and representation does not exist, since “The world” and everything that is part of it are constructions of the subject. Thus, we have to understand the “Domains”, the “Representations”, and the relations between them as projections of the modelling subject.
Sociopragmatic Constructivism and the Notion of “Model”

Our perspective is beyond positivism and radical constructivism. We will justify our position in the following criticism. (Recall, the depiction and criticism of philosophical paradigms in this paper is a matter of illustration only. Both, depiction and critique, are meant to be examples for the analysis of philosophical presuppositions and their implications for the theorising of the notions ‘model’ and ‘quality of conceptual models’. For genuine philosophical insights we have to refer the curious reader to the respective philosophical literature.)

Positivism claims (1) that all experiences are based on the sensual experiences, i.e. the given (positive), and (2) that the inexperienceable is not real or at least not recognizable. Its advocates try to establish final, general laws (nomothetic methodology). The problem is that the decision regarding the meaning of the given must be made in advance. However, the meaning of experience is not given by experience itself, but is grounded in preconditions of all cognitions. Questioning the a priori conditions of the possibility of cognitions and of the given are rejected by positivism as metaphysical – or as “Pseudo-problems in philosophy” (Carnap, 1967).

Radical constructivism (e.g., Glasersfeld, 1995) claims that all knowledge is created (constructed) by the cognitive capabilities of a sole individual. Thus, knowledge cannot be a (true) representation of reality. Rather it is a creation (construction) that helps the subject to survive in its environment. With other words: Knowledge does not need to be true; it needs to be viable. The fundamental problem with this approach rests with its inability to account for sociality and its consequences for the constitution of knowledge within society.

Summing up, both positivism and radical constructivism have limitations regarding their ability to explain phenomena that we regard as being rather significant in the context of conceptual modelling. To overcome these limitations, we propose an alternative philosophical paradigm which we call “sociopragmatic constructivism”.

Our sociopragmatic thesis is that common action is realised on the basis of symbolically constituted “worlds of meaning” (Sinnwelten). A completely isolated human action – even thinking, knowing, believing – is, from a genealogical point of view, impossible: This claim explains why sociopragmatic constructivism implicates the grounding of the notion of “quality of conceptual models” in pre-existent common practices of symbolisation and communication.

One point of difference between sociopragmatic constructivism and radical constructivism is that the former does not look for specific human capacities at the level of single individuals, but seeks to explain human actions and their consequences (e.g., institutions, models, knowledge) by accounting for the underlying forms of practice. Human action is distinguished by its specific form of co-operative organisation that manifests itself in the form of practices such as communication, which is not the achievement of a sole individual. Exchange by means of symbols modifies the horizons of meaning (Sinnhorizonte) of the participating individuals (e.g., Gadamer, 1999). This process, however, can be regarded as the “construction of worlds of meaning”. It is an active and creative process, because language, pictures, and models cannot literally transport meaning. Thus, the concept of “construction” refers to a socially, “life-worldly” (lebensweltlich), and pragmatically-oriented description of inter-subjective processes (practices) in and through which humans always ‘acquire’, reassure, control, and ‘transfer’ knowledge by means of their communicative and interpretational capacities. Accepting this point of view also helps to understand Berger and Luckmann’s (1966) thesis that social reality can be grasped only in a “double mode”, both as an objective fact (i.e., the symbols) and subjective meaning (i.e., the meaning of the symbols).

Positivist and radical constructivist modes of description are reductive. In these modes, the affairs under investigation are described from a certain point of view without asking if such a single-perspective description can be adequate at all. In contrast, the sociopragmatic constructivist mode of description takes the interconnection between common action and the creation of meaning into consideration, and thus implicates both a holistic and a reflective methodology. Nevertheless, sociopragmatic constructivism acknowledges that its methodology implicates circularity: Analyses, descriptions, and subsequent interpretations of these descriptions require humans to engage in a hermeneutic circle, since the creation of meaning simultaneously requires and alters horizons of meaning (e.g., Gadamer, 1999; Heidegger, 1962).

Sociopragmatic constructivism implies a new orientation in conceptual modelling: We argue for an anthropocentrism that does not focus on the single individual and her/his epistemic capabilities, since it is only possible to speak of an individual if a pre-existent social frame is presupposed. This social frame provides the means that come into play when humans engage in symbolisation and communication. Thus, following Heidegger (1962), humans have access to “The world” only as far as they engage in these practices.

Describing human practices is different from describing objects or states of affairs. Describing human practices includes looking for prerequisites, self-descriptions and for variable historical and cultural contexts. Truth and reality must therefore be interpreted in the same relative manner as their models. However, that what we seek to describe is always in a more progressive state than that what we define as “knowledge” or “model”. Even in the case of well-established forms of practice which claim to provide universally valid knowledge and methods such as logic or mathematics, this universal validity is guaranteed solely by the ‘universal’ acceptance and continuous...
re-enactment of these practices, but not because mathematics and logic are ‘hard-wired’ in the brain or contained in ‘our genes’.

Practices that support the ‘acquisition’, i.e., the creation and re-creation of knowledge, such as conceptual modelling, are modified by each new participant (e.g., by means of the creative use of language), since the permanent social interaction by means of symbolic processes sustains a permanent social change. It urges us to understand “models”, “model representation”, and “modelling” in a non-reifying manner as processual forms of practice and not as “objects” or “states of affairs” (e.g., Whitehead, 1929).

Taking the above into consideration, the following consequences for the notion of “model” result: We must distinguish between “model”, “model representation”, and “modelling”, since focusing on the representation will neglect the interactive constitution and ‘exchange’ of knowledge. Reductive approaches, i.e., approaches that are based on philosophical presuppositions of, e.g., positivism or radical constructivism, fail to acknowledge the very nature of modelling processes, namely that they are socially constituted processes of ‘acquisition’ and mediation of knowledge.

Stachowiak (1972, p. 150) characterises models by highlighting three main properties common to all models:

“(A) Characteristic of mapping. Models are always models of something, namely representations of certain ‘originals’ (or ‘prototypes’), natural or artificial, which themselves can be models again.

(B) Characteristic of shortening (reducing, abbreviation). Models do not generally map all the attributes of the original represented by them, but only those that are relevant for the modeller or model-user. […]

(C) Characteristic of pragmatical model function. Models are not in themselves coordinated to their originals. They always fulfil their functions of substitution only for subjects with goal-dependent mental or factual operations within certain lapses of time.”

In combination, these traits of models and the philosophical presupposition that determine the interpretation of those traits have implications for the practice of modelling. From a sociopragmatic constructivist perspective, the implications are as follows:

Due to the fact that models are models of something, that is representations, the question of what a community regards as worthy of representation and that what is actually represented has to be raised. This means that one has to provide analytical results that clarify what is ‘really’ represented, or one has to enter an interactive process and find common models via participation a common modelling practice.

Models do not map all properties of the originals they represent, but only those properties that seem to be relevant for the designers or the users of a particular model. This means that one has to surface the horizons of meaning of the people involved in the modelling effort via common practices, such as explicatory interaction. Surfacing the horizons of meaning is necessary for the explication of pragmatic motivations that ultimately determine the attribution of significances to certain features of the original (domain) and its properties. Thus, a model representation can actually depict different models – if different motivations have led to the same representation, i.e., identical mappings of properties of the original.

Models do not stand in a one-to-one relation to their respective domains. They have, for certain individuals, a substitution function that is bound to certain situations in a given temporal space and with regard to given actions. Thus, models do not have an independent existence, rather they have to be created and re-created by participation in common practices: creating models and using models. If these practices cease, the models vanish.

The major difference between the sociopragmatic and the radical constructivist notion of “model” consists in the introduction of a “Social Context” representing “The world” by the first (see Figure 3). Both the positivist assumption and the radical constructivist projection of an “external world” are rejected, because “The world” neither has an objective existence nor is it a construction of a sole individual. Rather the individual is embedded in a social context with social practices that determine eventually the individual actions; acts of cognition included. Thus, experiencing “The world” is a subjective and social process, but not an objective and individual (anthropological or biological) one.
NOTIONS OF “QUALITY OF CONCEPTUAL MODELS”

“Quality – you know what it is, yet you don’t know what it is. But that’s self-contradictory. But some things are better than others, that is, they have more quality. But when you try to say what the quality is, apart from the things that have it, it all goes poof! There’s nothing to talk about. But if you can’t say what Quality is, how do you know what it is, or how do you know that it even exists? If no one knows what it is, then for all practical purposes it doesn’t exist at all. What else are the grades based on? Why else would people pay fortunes for some things and throw others in the trash pile? Obviously some things are better than others – but what’s the ‘betterness’? – So round and round you go, spinning mental wheels and nowhere finding anyplace to get traction. What the hell is Quality? What is it?” (Pirsig, 1974, p. 184).

The analysis of various lists and frameworks reveals that there is only a small conformity between the dimensions used for the description of quality. The semiotic dimensions – syntactic, semantic and pragmatic quality – have met the broadest acceptance. A more detailed consideration of the ingenuities of the different authors concerning the dimensions allows a conclusion which may be valid for other notions relevant to conceptual modelling in general: The notions vary from author to author.

**Syntactic Quality**
- degree of correspondence between a conceptual model and its representation (Liddle et al., 1997);
- degree of correspondence between model and language (Lindland et al., 1994);
- degree of correspondence between the specification and the language (Krogstie et al., 1995);
- degree of consistency between model and its meta model (Schütte and Rotthowe, 1998).

**Semantic Quality**
- degree of correspondence between a conceptual model and the real world (Liddle et al., 1997);
- degree of correspondence between model and domain (Lindland et al., 1994);
- degree of completeness (constructs are sufficient to capture essential aspects of the real world) (Schütte and Rotthowe, 1998; Teuw and Van den Berg, 1997);
- degree of ontological correspondence between language and domain (language suitability) (Schütte and Rotthowe, 1998);
- inherence or propriety (constructs do not model derived features, only essential features) (Teuw and Van den Berg, 1997).

**Pragmatic Quality**
- degree of correspondence between a conceptual model and its interpretation (degree to which model is understood) (Liddle et al., 1997);
- degree of correspondence between model and audience interpretation (Lindland et al., 1994).

Further dimensions – which may also be seen as supplementing single semiotic dimensions – are:

**Social Quality**
- degree of agreement in model interpretation (Krogstie et al., 1995);
• degree of consensus between model designer and model user on topics like problem to be represented and type of construction (Schütte and Rotthowe, 1998);
• degree of requirements understanding at a given time (Pohl, 1994);
• degree of agreement on a specification (Pohl, 1994).

Cognitive Quality
• cognitive adequacy (Ramesh et al., 1999);
• clarity of representation (Schütte and Rotthowe, 1998; Teuw and Van den Berg, 1997).

Additional quality features that have frequently been proposed in the literature are: consistency (constructs do not conflict, are not ambiguous, and are parsimonious), orthogonality or modularity (the independence/dependence of model constructs is the same as the independence/dependence of corresponding real-world aspects), and generality (model constructs are independent from applications and application domains) (Teuw and Van den Berg, 1997), as well as economic efficiency, comparability, and systematic design (Schütte and Rotthowe, 1998).

Critique
In our opinion, the core problem with the lists and frameworks analysed has to be seen in the operationalisation of the dimensions of quality. Operationalisation, meaning the assignment of empirical indicators to the construct representing a certain quality dimension, is necessary for any practical use of the notion “quality”. If particular notions of “model” and “quality of conceptual models” are implicated in particular philosophical presuppositions, so are necessarily possible operationalisations of – or, the assignment of empirical indicators to – dimensions of “quality”.

Looking at the operationalisation of quality dimensions within the analysed frameworks, it becomes obvious that these operationalisations partly rest on contradictory philosophical presuppositions. For example, on the one hand, we find that operationalisations of the syntactic and semantic dimensions appear to rest on positivist assumptions, since they require a correspondence either between model and reality, or, between language and reality. On the other hand, we find that operationalisations of the pragmatic and social dimensions appear to rest on anti-positivist (social-) constructivist presuppositions, since they take the social aspects of knowledge, modelling, and models into consideration. In short, the operationalisations are partly based on incompatible ontological and epistemological presuppositions.

In the conceptualisation of quality, it is the realist ontological and objectivist epistemological notion of “correspondence” that can be considered to be the most debated (e.g., Krogstie et al., 1995). According to the correspondence theory of truth, correspondence exists only if there is an objective conformity between a representation and what is represented. Yet as we have argued in both our critique of positivist presuppositions and our outline of sociopragmatic constructivism, a ‘correspondence’ can only be established temporarily via engagement in common practices. And such a ‘correspondence’ can only mean that interpretations and horizons of meaning have been aligned. Such an alignment has to take place both when creating and when re-creating (i.e., using) models.

As already stated at the beginning of this section, we do not regard empirical indicators of quality dimensions to be features of an ‘objective’ reality in the sense of (naïve) realism. Like the models themselves, empirical indicators have to be understood as results of common social practices as well.

Sociopragmatic-Constructivist Perspective on “Quality of Conceptual Models”
Sociopragmatic constructivism postulates that quality is a concept derived from and shaped by particular, commonly grounded purposes. These purposes may root in completely disparate spheres of life, e.g., building a house, comprehending complicated issue, explaining technical procedures. During abstraction, processes in the lifeworld (i.e., social context, “The world”) are consciously neglected (abstraction as “desisting from something”) while special problem solutions are focused (abstraction with respect to something). Both aspects of abstractions are equally important and are taking place simultaneously.

During abstraction, a concept emerges, a kind of model. This concept is not independent from already given social practices. Instead, this concept can only be understood within a commonly grounded understanding of the abstraction practice. With other words, the practice of abstraction and the results of this practice can only be meaningful if they can build on a pre-existing understanding within the relevant social community, e.g., a group of modellers and model users. “Naturally” presupposing this understanding is suggested by our practical experience within our social environment: A specifically human “world of experience” is first hypothetically expected from all other beings of the same species, and later confirmed by interaction.
The quality of models and modelling processes will always be bound to human competencies. Thus, the quality of conceptual models can only be as good as the practices of modellers and model users. The appropriateness of models can therefore neither be found with the model nor with the modeller nor with the model user. According to sociopragmatic constructivism, the quality of conceptual models is an outcome of purpose-driven modelling practices (i.e., model creation and model re-creation/use) within a social context. “Quality of conceptual models” is thus a relational measure, i.e., a matter of the always local and temporary mutual acknowledgement of practices within an always already given social community. This relational notion of “quality of conceptual models” is supported by Stachowiak’s relational notion of “model”.

CONCLUSION

Every effort upon improving the quality of conceptual models needs to be grounded in well-defined notions of “model” and “quality of conceptual models”. Since particular philosophical presuppositions implicate particular notions of “model” and “quality of conceptual models”, the analysis of presuppositions must precede any theorising of the respective notions.

Positivist notions of “model” and “quality of conceptual models” presuppose a relation between some supposedly objective reality and the model of this reality. This presupposition precludes the consideration of the role of modellers and model users in the processes of modelling and model use. Radical constructivist notions of “model” and “quality of conceptual models” confine models and their quality to the realm of purely subjective imagination. Even if such an understanding emphasises the active role of modellers and model users in the processes of modelling and model use, it cannot account for the role of social grounding and social interaction. Sociopragmatic constructivism aims at overcoming the limitations of reductive philosophical paradigms. The presuppositions of sociopragmatic constructivism allow a rich conceptualisation of the human condition in terms of common practices. These practices are enabled by shared horizons of meaning and, at the same time, create shared horizons of meaning. Thus, knowledge and common practices are interwoven and cannot be separated.

An understanding of conceptual modelling on the basis of sociopragmatic constructivism leads to the recognition that the quality of conceptual models is not a property of some artefacts. Rather, conceptual models and quality of conceptual models are bound to common practices of model creation and model use as well as to shared horizons of meaning. Consequently, every effort at improving the quality of conceptual models needs to take common practices, shared horizons of meaning, and the constitutive interactions between them into considerations.

Our exemplary analysis of philosophical presuppositions and their implications for the conceptualisation of “model” and “quality of conceptual models” not only highlights the need for such an analysis to precede all theorising of the respective notions, but also shows that the emergence of universal notions of “model” and “quality of conceptual models” should not be expected. To the contrary, competing notions of “model” and “quality of conceptual models” will flourish on the basis of competing philosophical presuppositions.

REFERENCES


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