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Metaphysics of Change and Identity

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ABSTRACT

Several authors have claimed the need of the IS community to theorize the IT-artifact. Additionally, phenomena of 'change' in all its facets assume a prominent role in information systems research. This paper is targeting at the intersection of research on change and the IT-artifact. The lack of longitudinal studies in the IS-literature has obscured the challenges of theorizing the IT-artifact over time. This paper raises the question under what conditions an IT-artifact persists through time as one and the same object. By exploring the metaphysical assumptions of our common understanding of the IT-artifact the inadequacy of current conceptualizations of change and IT is demonstrated. The paper shows that the commonly held identity bases on a substance philosophical viewpoint. A conceptualization of identity based on process philosophy is introduced as an alternative that avoids shortcomings of the former. Thereby, new means to study information systems and their evolution over time evolve.

Keywords

Process philosophy, substance philosophy, IT-artifact, identity, change.

INTRODUCTION

The need of the IS-community to theorize the IT-artifact as their core subject matter has been raised by several authors (Orlikowski and Iacono, 2001). The heterogeneity of research foci and the resulting conceptualizations of the IT-artifact have fueled this debate. Some scholars are more interested in the physical (hardware) aspects of technology, others study the design of software and again others are more interested in the use of technology. Another prevalent topic in IS research is 'change'. Whether or not a determinist or emergent view on technology is adopted, change in all its facets takes a prominent role in IS literature. It can be argued that both topics are close to what is generally discussed as the identity of the IS discipline (Weber, 2003). This paper does not intend to elaborate on what the boundaries of the discipline are nor what its core is. Rather it aims at the intersection of both topics: Change and the IT-artifact.

The quick developments of technology and the permeation of all aspects of society by IT lead to the impression that the degree of change and its pace are constantly increasing. However, on a closer look some of the systems date back decades and are still operational (Reimers, Johnston, and Klein, 2009). In contrast to 'change' the phenomenon of 'persistence' has been treated with seemingly less enthusiasm by IS scholars. A reason for this may be that IS literature is primarily concerned with the introduction of new technology to organizational settings. Such studies are mostly restricted to the duration of a project. Persistence is thus mainly covered as reference to legacy systems that need to be integrated to the new system. Longitudinal studies of IS are still rarely found (Reimers et al., 2009).

Different types of change can be distinguished (Lyytinen and Newman, 2008). One type of change is gradual and incremental. Just as a software update does, it slowly affects the artifact. On the opposite, revolutionary changes alter the artifact so profoundly that it becomes hard to speak of the selfsame artifact before and after the change. Scholars argue that this type of change affects the essential properties of the system. Thus, since it can be regarded as a different system - it has a different identity. The lack of the IS literature to focus on long timescales has obscured the difficulties that arise from incorporating gradual and incremental change into existing theoretical frameworks.

This paper aims at answering the question under what conditions does an IT-artifact persist through time as one and the same artifact. In other words, what constitutes a difference of identity? It will be shown that this question is not new but taunted philosophers very early on. The next section points to difficulties arising from the interconnection of identity and change. Hume very nicely phrased these difficulties of gradual change:

"But whatever precaution we may use in introducing the changes gradually, and making them proportionable to the whole, 'tis certain that where the changes are at last observ'd to become considerable, we make a scruple of ascribing identity to such different objects." (Hume, 1896, p. 190)

Next, the paper investigates this question by elaborating on the metaphysical assumptions that guide common theories and our thought. In this regard, Parmenidian substance philosophy is contrasted with a Heraclitian process philosophy. The latter is introduced as a promising way of thought that can avoid difficulties arising from the former. As both are residing on a rather high level of abstraction their implications for the conceptualization of technology are explored and theoretical examples are presented. In doing so the last section discusses a process inspired theoretical conception of the identity of IT-artifacts as new means to study change and IS in general.

LOGICS OF IDENTITY AND CHANGE

This paper wants to investigate under what conditions an object (e.g. IT-artifact) persists through time as one and the same artifact. Core to this question are the phenomena of change and stability (non-change). The objective of this section is to elaborate on the challenges when conceptualizing both phenomena. This ultimately requires and motivates the discussion on the notion of identity in the remainder of the paper.

As soon as an individual (observer) states that something has changed or remained the same, he compares the object at different points in time. Hence, at least one of these is in the past. The observer can thus not directly compare the objects in his visual field. If this would be possible the observer would not examine whether one object has stayed the same, but whether one object is identical to another entity. By analyzing one object at different points in time the observer needs to recall the old artifact and its properties from memory or some form of documentation. If he does not want to compare apples with oranges the observer needs to make sure that it is the selfsame object at both instances in time. Thus, he needs to establish the identity of the object across time.

Formal logic can be employed as a means to define axioms that may guide the observer to establish identity. This paragraph uses the work of Ford and Ford (1994) to show why change in formal logic is impossible:

> Axiom 1: A thing cannot be itself and something else.

This axiom builds upon the necessary separateness of the object and its environment. The observer needs to establish boundaries that specify what is part of the object and what is not. In doing so he reifies phenomena as "things" and thereby discrete unities. In other words this axiom calls for a definition.

> Axiom 2: A thing is equal to itself.

Ford and Ford (1994) refer to this axiom as the continuity or persistent element of identity. It does not mean that any change would falsify axiom 2 "but that the 'essence' or 'deep structure' of the entity remains unchanged." (ibid. p. 760). Continuity of an object is thus relying on some fixed permanent quality of the object.

> Axiom 3: A thing is one of two mutually exclusive things.

This axiom states that concerning its identity an object is itself exclusively. It cannot be anything else. Change on the contrary means that something becomes something else. At least in terms of changes of the essential features of an object change is impossible. Change in this sense is mutually exclusive to permanence.

The reference by Ford and Ford (1994) to the Aristotelian notion of essence seems to be intuitively convincing as it allows the observer to make sure that he is comparing the same object at different points in time. The identity of the object is the same (essential properties) while some things may have changed (accidental properties). In a recent paper Lyytinen and Newman (2008) distinguish two paradigms of change in the literature: continuous, incremental change (A) and revolutionary, episodic punctuations (B). The former refers to longer periods of limited adaptations necessary to respond to environmental perturbations (first-order change). The latter (second-order change) conceptualizes change as the need to reform the "deep structures" of the system. These are described as a set of fundamental choices the system has made. Such choices date back long ago. They are reinforced through positive feedback loops. Similar to the approach by Ford and Ford (1994) this model of change conceives identity of a system as rooted in its "deep structures". Change that does not affect the deep structures would consequently not constitute a new identity or a new system. Lyytinen and Newman (2008) draw on Gersicks (1991) notion of "deep structure". It is defined by Gersick (1991) as "[…] a network of fundamental, independent 'choices' of the (1) basic parts into which its units will be organized, and (2) the basic activity patterns that will maintain its existence." (ibid, p. 15)

Although essence or the deep structure seem to be handy theoretical concepts to establish identity of an object over time, their application to the empirical field is difficult. Lyytinen and Newman (2008) admit, "currently there are no clear criteria to decide what are the typical or expected features of deep structures." (ibid. p. 607) The following metaphor of the Ship of Theseus will show why Rescher (1996) comes to the conclusion that "it is somewhere between difficult and impossible to specify any such change-exempt descriptive properties or non-classificatory features that stably characterize the essence of things." (ibid. p. 35)

The problem of the identity of artifacts is well known in philosophy. The paradox of the Ship of Theseus is among the oldest and most prominent of several paradoxes.[1] Plutarch reports that the Athenians preserved the ship in which Theseus had rescued the youth of Athens from Crete for hundreds of years.[2] As soon as the old planks decayed they were replaced by new timber. The paradox consists in whether the ship is still the same although all parts of it (planks) have been replaced. Hobbes exacerbates the philosophical problem by adding another element to the story.[3] Consider the situation where the ship is in the dockyard. The Athenians require the repairmen to replace every plank by a new one. However, the old planks are not discarded. Instead, the repairmen secretly rebuild the ship in a second dockyard. Which of the ships is now the Ship of Theseus?[4]

Most theoretical solutions to this question as well as our intuition suggest that the essential properties demarcate when the identity of the ship changes. As they rely on the same metaphysical viewpoint, I will not discuss them further. Instead, I will question this commonly held metaphysical perspective and introduce process philosophy as an alternative.

METAPHYSICS OF CHANGE AND IDENTITY

The positions outlined in the previous section conceive the continuity of things as dependent on the essential properties of things. Thus, the identity of an object is inherent to the object. Ontologically things are endowed with the permanence of perduring substances over time (Rescher, 1996, p. 35). This "substance ontology" sees the world as being made up of material objects on the order of atoms or molecules (Rescher 1996). This pervasive way of Western thought originated in pre-socratic times. Accordingly, this paper refers to it as Parmenidian substance philosophy, which regards atoms as the unchanging units of existence (Rescher, 1996). The only possible change is their spatio-temporal configuration. All activity or changes that can be observed are reducible to such a reconfiguration. Zeno of Ela, a pupil of Parmenides, phrased several paradoxes in which he 'proves' that motion or change is logically impossible (Chia, 1999).[5]

Some authors (Chia, 1999; Tsoukas and Chia, 2002) argue that paradoxically change is often conceptualized in statical terms. According to them, such fixed and discontinues concepts cannot by their very nature deal with change. Analyzing movement by breaking it down into a set of rests results in a "counterfeit movement" (Chia, 1999, p. 216). "Zeno's arrow simply flies through the air and never *is* at any one point at an instant, […]" (Chia, 1999, p. 216). "A conceptual framework for making sense of change […] cannot deal with change per se, except by conceiving of it as a series of immobilities; it makes sense of change by denying change!" (Tsoukas and Chia, 2002, p. 571) In this paper I argue along with these authors that the difficulties arising in the empirical field when studying gradual change stem from the substance philosophical viewpoint that is implicit in current models of change.

Process philosophers propose their metaphysics as an alternative to substance philosophy. Essentially, it holds that "[…] processes rather than things best represent the phenomena that we encounter in the natural world about us." (Rescher, 1996, p. 2) Process philosophers hold the belief that "everything flows" (pantha rhei) and is in a constant process of becoming and perishing (Chia, 1999, p. 217). This belief was coined by Heraclitus of Ephesus (ca. 540 B.C.) who is generally regarded as the founding father of process philosophy. Plato attributes the following saying to Heraclitus:

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[1] e.g. Heraclitus' river, John Locke's socks, George Washington's axe, Tin Woodman in the Wizard of Oz

[2] See (Plutarch, n.d.).

[3] See (Hobbes & Schuhmann, 1999) II, 8-12.

[4] Four answers could be disputed: the ship the Athenians get back (1), the ship of the repairmen (2), both are Ships of Theseus (3), none is a Ship of Theseus (4). (Theis, 2001)

[5] He starts with the assumption that space and time are infinetely divisible. In the paradox of an arrow's flight he comes logically to the conclusion that a flying arrow can never reach its aim. At each moment in time the arrow occupies a space equal to its own length. At this instant in time it is at rest. A motion is entirely consisting of such instants in all of which the arrow is at rest. Thus, the arrow cannot be moving. In this sense he "proves" that change is impossible (Chia 1999, p. 216).

"[…]everything moves on and nothing is at rest; […]comparing existing things to the flow of a river[…]you could not step into the same river twice."(Cohen, 2002)

At first glance Plato's interpretation of Heraclitus seems to consider identity of the river as depending on the identity of its component parts (waters). This however, does not resemble anything different compared to substance philosophy. Cohen suggests that what Heraclitus had in mind is better understood in the following translation: "Upon those who step into the same rivers, different and again different waters flow." (frag. 61 transl. by (Cohen, 2002)) Thus, difference and sameness are coinstantiated in the same object. Cohen calls this pattern of Heraclitean reasoning the "unity of the opposites". The identity of Heraclitus' river does not rest on the identity of its component parts or essential properties but on what it does. It needs to be conceived not as a static object but as an everchanging flow. We could say that the essence of the river is its everchanging flow. Or as Rescher states: "For Heraclitus, reality, is at bottom not a constellation of things at all but one of processes." (1996, p. 10). By giving primacy to process rather than to substance, process metaphysics simply avoids the difficulties of how to make sense of change from a substance philosophical point of view.

For the substance ontologists the physical world is a collection of things. Its properties determine what a substance is. However, only the interaction of substance with others is observable to us. This behavior of things is conceived as rooted in the stable properties of things. In process metaphysics, this ontological dualism of thing and activity is replaced with an internally monism of activities of varying, potentially compounded sorts (Rescher, 2000). This means, processes are not activities of stable things. Instead, things are the stability patterns of variable processes. That does not mean that process metaphysics intirely dispenses the concept of 'thing'. But it holds that things are best understood as certain sorts of processes. In Rescher's terms process philosophy emphasizes activity over substance, process over product, change over persistence and novelty over continuity (Rescher 1996, p. 31). Rescher states we have no experiential contact with substances as such but only with their effects: "Substances are something we know not what; it is only their causal impetus that we can ever come to experiential grips with." (1996, p. 53)

The aim of this paper is not to give a full account of process philosophy but to demonstrate it as an alternative point of view to conceptualize identity of the IT-artifact throughout time. It has been stated before that process philosophy does not deny things but makes sense of them from a processual perspective. In this regard, an object is identifiable not by a continuity of material components or its physical form but by processual and functional unity (Rescher 1996). In this sense, Rescher argues that "we indeed do not step twice into the same waters but we can certainly step twice into the same river." (1996, p. 52). The unity of a thing that defines what something is, consists in what it does. For Rescher identity rests on identifiability. The identification of things is interactional and thus inherently processual. Thus, things have an identity and therefore individuality through their processual interactions with others. Their unity as an entity is lying not so much in the mind as in the experience of their 'beholders' (Rescher 1996, p. 59). In contrast to the conceptualization of identity in formal logic the identity of things in processual terms is continuous. The identity of a thing is thus conceptually closer to the identity of persons. It is not the person who 'has' a career but it is the career that individuates the person.

PANTHA RHEI – PROCESS PHILOSOPHY AND THE IDENTITY OF THINGS

The previous section introduced process philosophy as a promising metaphysical alternative to prevalent substance metaphysics. It started out with the observation that the Aristotelian distinction of essential and accidental properties of things is difficult if not impossible to handle in empirical settings. To determine what the essence or deep structure of a thing is, remains always at least a debatable and artificial decision. This is true for simple objects like rivers or ships but even more for IT-artifacts.

This section is devoted to show we make sense of technology or, more specifically, how we can conceive the IT-artifact from a processual perspective. From this point of view 'to be identical' is not to be confused with 'to retain identity'. Where the former is concerned with a specific set of properties, the latter refers to the observable effects of things – to what things do. Based on a brief literature review this section derives four basic requirements that a process metaphysical conception of identity should meet.

From a constructivistic viewpoint continuity is not an inherent property of things but it is the subject that is attributing continuity and permanence to his constructs. Reschers argumentation that things are what they do requires the experiencing or observing subject. „[…] it takes a mental process (of separation) to extract „things" from the blooming buzzing confusion of the world's physical processes." (Rescher 2000, p. 7). Grint and Woolgar (1997) propose the notion of technologies-as-texts that demand interpretation by their readers or users. The meaning of a text or technology consequently emerges as the subject starts reading. The technology receives identity only in interaction or experience. Thus, the identity of things is not to be found in the thing itself but in interaction, in the process of identification.

Constructionism would argue that the social community is playing a pivotal role in how its members interact with things. Or as Wenger (2005) phrased it ",[…] what it is to be a medical claim [artifact] is always defined with respect to specific forms of participation [in a community] that contextualize meaning. It cannot be assumed to be intrinsic or universal." (ibid, p. 63)

In his book 'What things do' Verbeek argues for a post-phenomenological view on artifacts. Artifacts cannot be separated from their use contexts (Verbeek, 2005, p. 117). "A technology can receive an identity only within a concrete context of use, and this identity is determined not only by the technology in question but also by the way it becomes interpreted […]" (ibid. p. 117). Ihde (1986) calls such context dependence 'multistability', which means that one and the same artifact can have different identities in different use contexts.

Gibson coined the term 'affordance' to refer to the multiple uses for which artifacts may be employed. Affordance is neither an objective nor a subjective property. "It cuts across the dichotomy of subjective-objective" (Gibson, 1979, p. 129). Gibson stresses that what we perceive when looking at objects are not the qualities of objects but their affordances. "The fact that a stone is a missile does not imply that it cannot be other things like a brick." (Gibson, 1979, p.134). Artifacts amplify and reduce aspects of perception; they invite and inhibit actions of their users.

In the IS literature Orlikowski's notion of 'technology-in-practice' stresses again that technology cannot be thought of in isolation. Instead, it is the practice of doing something in which the meaning of technology emerges. Structuration theory used by Orlikowski as her theoretical framework grants humans with the option always to do otherwise. Therefore, technologies are never fully stabilized. For "analytical and practical convenience" she admits, we may "choose to treat them as fixed […] for a period of time" (Orlikowski, 2000, p. 411). Orlikowski explicitly brackets the dynamics of technology and assigns a "stabilized-for-now" status to the technological artifacts under scrutiny. This analytical and practical convenience is unproblematic for short time periods and as long as we do not want to discriminate among different technologies. As soon as we are concerned with the use of technology that extends over decades it becomes questionable whether a "stabilized-for-now" status can still be assumed.

From this argumentation four requirements for conceptualizing identity can be inferred. First, it is not the artifact that has an identity but it is the interactional process in which an identity emerges. Secondly, the perception or experiencing of the interacting subject co-shapes the identity of an (IT-) artifact. This requirement is of special significance because it implies that artifacts may have multiple co-existing identities at the same time. Resulting from the second requirement it can be inferred that artifactual identity arises always in a concrete context of use.[6] The fourth requirement has been presented as the most critical throughout this paper. It requires that an identity concept is able to discriminate between artifacts throughout time. The above-mentioned theoretical conceptions from the literature satisfy the first three requirements but fall short on the fourth. It is exactly this problem that lies at the heart of the quotation by Hume mentioned in the introduction of this paper.

It is fairly easy to argue that different meanings exist in different social settings. But, an identity concept that stops at that stage falls short in addressing the challenges that motivated this paper in terms of discriminating between artifacts throughout time. The mentioned theoretical concepts like Orlikowski's 'technology-in-practice' do account for such different meanings but leave out the temporal dimension.

In process metaphysics the identity of something resides in what something does. This is not to be confused with a notion of technological determinism nor with a denial of things. It holds that identity rests on identifiability, which involves a perceiving observer.[7] It is in this interactional process where the identity of the artifact emerges. The literature does not fall short of concepts of interaction with technology (see above).

For instance the Gibsonian concept of affordances has been introduced above. On first glance, affordances seem to be built into artifacts, which looks like substance philosophy is sneaking in through the back door. The identity of an artifact throughout time would then rely on its discriminating affordances. Such atomistic and hence substance philosophical viewpoint is opposed by Gibson (1979). The co-existence of different identities is due to different processes of interaction that are carried out in different social communities. As artifacts receive their identity in these interactions they are differently identified. The stability of these identities is dependent not on artifact-inherent objective affordances or features. But in the Gibsonian sense different communities perceive a different set of affordances. Thus, to study the identity of artifacts requires a closer look at what influences perception. It is the viewpoint of the perceiving individual, hence the observer's identity. The way we see is what we see. For instance, the telephone was marketed as a concert listening device. Broadcasting agencies

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[6] "always" refers to (a) actual use and (b) perceived use which includes observers of actual use.

[7] Although the notion of a "perceiving observer" is tautological it is used here to emphasize the importance of perception through the observer's senses.

provided subscribers the option to listen remotely to various kinds of performances. The technological artifact afforded broadcasting. It affords a two-way communication between remote partners as well. With the advent of the Internet people used telephones to establish modem connections because it also affords the transmission of bits and bytes. While being originally conceived as a line-switched it becomes today packet-switched. Telephone technology today does not rest on a specific telephone infrastructure (landlines) but makes use of other mediums as well (e.g. cable-based, mobile phone).

Based on this example we could say that the identity of the telephone has shifted. The identity of an artifact from a process metaphysician's perspective rests on identifiability. It involves the perspective of the identifying observer and the historical background. The concept of affordance is useful to describe what the artifact does. It however may not be confused with an all-encompassing list of properties able to grasp what the artifact is. Instead, the set of affordance arises in a history of interaction in context. It is shaped and it shapes the perspective of the individual. The identity of an artifact is thus emerging from the perspective of a community and the individual. Thus, whether the change from line-switched to packet-switched in the example of the telephone constitutes a new identity is dependent on the process of identification an individual performs. For a technician it is an entirely new technology, while a typical user would not even witness such change.

Kanellis, Lycett and Paul (2000) propose to use the notion of "identity" and loss of identity to make sense of failure of systems. Information systems survive as long as their identity is maintained. In this sense the authors are not working out the concept of identity of the IT-artifact but attempt to show its applicability. However, Kanellis et al. (2000) concede that „identity [...] is very important, as it is the way that the stakeholder „sees" the system" (ibid., p. 207)

The identity of an IT-artifact is composed of a manifold of different identities arising in the interactional relations. If we focus on the interactions with a person (observer), we can (1) sketch the identiy of an IT-artifact for a person, (2) this person is in fact capable of describing different technological identities.

CONCLUSION

This paper has been framed by two seemingly recurring topics in IS research. Both, phenomena of change and the discussion on the IT-artifact assume a prominent role in the IS discipline. In the previous sections I argued that the need to theorize the IT-artifact becomes evident at its intersection with phenomena of change over long periods of time. The 'identity of an artifact' has been proposed in this paper to systematically engage with a theorization of the IT-artifact. It has been argued that such a theoretical conceptualization needs to account for how an artifact can persist as one and the same artifact in spite of gradual change.

Existing theoretical conceptualizations in the IS-literature and philosophy have been examined. The underlying substance metaphysic has been identified as an explanation of the difficulties of such approaches to provide a sound conceptualization of the identity of IT-artifacts. This paper proposes process philosophy as a foundation that avoids such difficulties on the metaphysical level. The concept of 'affordances' seems to be well compatible with process philosophy. It conceives the identity of an artifact as arising from a history of interaction and perception situated in a social environment. Not object-inherent characteristics are individuating the artifact but its relational affordances. To specify affordances of an artifact involves simultaneously the individual in relation to which these affordances exist and are perceivable. Therefore, the identity of an (IT-)artifact is specifiable only 'in relation to' an individual.

The notion of identity represents a new approach to theorizing the IT-artifact. While this paper cannot provide a fully developed research framework it offers a perspective different to commonly used philosophical underpinnings. The identity of IT-artifacts and the theoretical concept of affordances may serve well as a new vehicle to study information systems in general but it is particularly aiming at studies of change of IS with long timescales.

Einstein stated, "It is the theory that decides what we can observe" (Einstein[8]). This paper showed that 'identity' in itself is a theoretical construct that depends on the metaphysical positioning of the researcher. It is thus inherently perspectival. The theories with which we make sense of the world are then like a pair of glasses that determines whether we establish a continuing existence of an artifact or if we conceive it as something new.

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[8] Quoted in (Heisenberg, 1971, p. 77).

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