The IT artefact: An ensemble of the social and the technical? – A rejoinder

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Abstract

This paper is part of a discourse on the conceptualisation of the IT artefact. It is commentary paper based on the prior papers of Goldkuhl (2013), Silver & Markus (2013) and Purao et al (2013). It especially addresses the issues of how demarcate the IT artefact and how to conceptualise it in relation to the social and the technical. As a part of this conceptual inquiry, the paper investigates the notion of the artefact. An artefact has always functions and it has always a context where the use of the artefact and its functions is intended to contribute to some goals. As soon as we speak of an artefact, some use context is implied. Based on these premises, the paper articulates a view on the IT artefact to be a social artefact. Social does not mean that there are any humans as part of the artefact; humans appear as the users in the implied context of the artefact. Social means that the IT artefact is a semiotic artefact intended for communication between people. The IT artefact is sociotechnical artefact, which means that it is a combined technical and semiotic artefact and the use of it (by a user) implies combined technical and communicative actions. As a consequence of this view the paper also argues for co-design of IT artefact and work context. This is done in opposition to a techno-centric design of the IT artefact, which will imply a restricted design of context purely through artefact design.

1   Introduction

The seminal paper "Desperately seeking the 'IT' in IT research – a call to theorizing the IT artifact" by Orlikowski & Iacono (2001) gave rise to a very active debate on how to characterize IT artefacts and what should be the core of the information systems discipline. One response to their call is a paper by Markus & Silver (2008) on how to how to characterize IT artefacts in terms of "functional affordances" and "symbolic expressions". Another response is made by Sein et al (2011) in their development of the Action Design Research (ADR) approach. ADR aims at designing "ensemble artefacts". This is based on one of the IT artefact views, "the ensemble view", proposed by Orlikowski & Iacono (2001). I have, in Goldkuhl (2013), made an inquiry of the "conceptual travel" from "the ensemble view" to the "ensemble artefact". This paper is published in this special issue of Systems, Signs & Actions. There exist

two commentary papers to Goldkuhl (2013) in this special issue; Silver & Markus (2013) and Purao et al (2013). These two papers contain commentaries and reflections based on my paper. I will not go into their specific responses to my paper here. Silver & Markus (2013) have contributed with an important discussion, through the notion "SocioTechnical Artifact", on how to think in design about different kinds of possible use consequences. Among their messages, they warn us to make distinct separations between "the technical and social design features of a [SocioTechnical] artifact" (ibid p 87). Purao et al (2013) have further sharpened their ADR approach through explicating the differences between viewing and designing the IT artefact and the role the ensemble artefact notion plays for design. They use the term ensemble artefact in order to argue for IS scholars to take an active interest not only in the IT artefact, but also in the "work practice of organizational participants relevant to the context in which the IT artefact is realized" (ibid p 77).

As said, I will not continue the dialogue directly through responding to their specific responses to my paper (Goldkuhl, 2013). My reading of their papers has, however, triggered me to further reflect on the notion of the IT artefact. There are some formulations in both commentary papers that made me engage in further conceptual analyses and refinements. Orlikowski & Iacono (2001) have described IT artefacts as "bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software" (ibid p 121). A very important contribution of their paper is the argumentation that such technological artefacts also involve social ingredients besides technical elements. These insights are incorporated in the works of Silver & Markus (2013) and Purao et al (2013). They use alternative labels in order to emphasize the social character of IT artefacts. Silver & Markus (2013) write: "we find it more appropriate to refer to what is often called an 'IT artefact' as a 'SocioTechnical artifact'" (ibid p 83, their emphasis). Purao et al (2013) motivate their use of the term "ensemble artifact" to "re-consider the IT artifact" to be "something that carries traces of the organizational and social domain, inscribed by actors involved in its design and use" (ibid p 76-77). Both author groups emphasize obviously that the information technology artifact include certain social dimensions.

There are some formulations in both papers that have made me wondering about the boundaries of the IT artefact. Silver & Markus (2013) write that "user training is a social feature of an ST artifact, not something that 'accompanies' it" (ibid p 83). They state that the IT artefact is seen as sociotechnical assemblage and they refer to an early textbook by Gordon Davis (1974) where information system (IS) was defined "as comprising hardware, software, data, people, and procedures. Three of the elements are technical and two (people and procedures) are social" (Silver & Markus, 2013, p 83). This artefact characterisation seems problematic. Seeing activities like user training and even people as part of the sociotechnical artefact blurs the boundaries of the artefact. I also find their distinction of the social and technical as problematic. Software and data are entirely placed in the technical sphere.

I have also detected similar problems in the text of Purao et al (2013). There is one formulation: "such ensemble artifacts can, in fact, be designed as the whole 'package' – tools, routines, procedures and even policies" (ibid p 79). This is backed by prior formulations like: "An analogy in our case may be to question whether artifacts (in our case: a hardware-software instantiation) are conceptually separate from the organizational practice in which they are intended to be embedded" (ibid p 78). Even prior to this they state: "the ensemble artifact, i.e. not only the hardware-

software instantiation but also the work practices of organizational participants relevant to the context in which the IT-artifact is realized" (ibid p 77). In both papers there seems to be conceptually sliding on how to demarcate the boundaries of the IT artefact; that is what is part of it and what is external to it. Are people and social activities parts of the information technological artefact? This is the main issue that I want to address through this commentary paper.

I state the following relating purposes of this commentary paper: I want to make further conceptual investigations of the IT artefact:

- The boundaries of the IT artefact (what is part of it, and what is external to it)

- The character of the IT artefact (how to characterize it in relation to the technical and the social)

2 What is an artefact?

The artefact notion has become very popular in the IS discourse during the last years. A simple Google Scholar search (September, 2013) gave approximately 30 500 hits. However, there seems to be different conceptions of what an artefact is. There exist many interpretations of this concept. For example, Lee et al (2013), in an attempt to replace the "IT artifact" notion with the "IS artifact" notion, have identified three types of artefacts: technical artefacts, information artefact and social artefacts. They define social artefacts in the following way: "an artifact that consists of, or incorporates, relationships or interactions between or among individuals" (ibid). They add that these interactions should be directly related to purposeful activities. This means that ongoing and emergent social practices are considered as artefacts. Any social event of purposeful, but unstable character can thus be seen as an artefact according to these authors. This based on a very broad definition of artefact by Lee et al (2013): "Anything that is made ('synthesized') by human beings is an artifact". In this definition they refer back to Simon (1996). So let us turn to this source.

Simon, in his program for the sciences of the artificial sciences, builds on several foundational assumptions. He state that "artificial things are synthesized (though not always or usually with full forethought) by human beings" (ibid 5). He also says that "artificial things can be characterized in terms of functions, goals and adaptation" (ibid). This is important for the understanding of an artefact. Simon states that an artefact always operates in an *environment*, i.e. "the surrounding in which it operates" (ibid p 6). Simon also defines an artefact to have *functions* that are important for the *goals* of the environment. He claims that "the outer environment determines the conditions for goal attainment. If the inner system is properly designed, it will be adapted to the outer environment" (ibid p 11).

Simon speaks of artificial things and his prototypical examples are physical engineered things (like e.g. a clock). It is however clear from Simon (1996) that there is no restriction to only physical things. There are some fundamentals from Simon's artefact theory that should be summarized before continuation.

An artefact is created by humans. It has some separateness; as an entity that is identifiable and has some enduring existence. An artefact operates always in some environment (context) and it has functional properties that are valuable for the goal-attainment of that environment.

The last issue should be emphasized. We cannot, in any meaningful way, study artefacts without taking into account a context and use situation. There might of

course be studies of their inner construction, but if such studies are done with no reference to functions and external goals, then these constructions are seen as purposeless. They are studies of seemingly "natural objects", and not of artificial objects, because there are always functions, contexts and goals associated with artefacts.

This is also apparent when turning to artefact theory as it appears in different disciplines, as archaeology (e.g. Binford, 1962), philosophy of technology (e.g. Vermaas & Houkes, 2006), engineering design (e.g. Chandrasekaran & Josephson, 2000; Maier & Fadel, 2009) and general design studies (e.g. Crilly, 2010). Artefacts are considered as separate entities with functions that are valuable for users of artefacts. Artefacts are elements within some context and are used by users as part of striving for goal satisfaction.

Even if artefacts in these theories are considered as physical entities, it is important to note that their functions are not restricted to material influence. Other functions as social and aesthetic functions are also acknowledged (e.g. Binford, 1962; Crilly, 2010). Other types of artefacts are also acknowledged, as sign artefacts and thought artefacts (Bernard, 2009). Even if an artefact does not need to have a physical existence, it needs to have some separate and enduring existence and it should be brought into existence as a result of some intentional making of humans. This means that I do not consider an emergent social practice to be an artefact. Such practices will of course be populated by several kinds of artefacts.

3 In what way is an IT artefact social?

An IT artefact is a physical artefact based on technology. Every running IT artefact relies on some hardware. The software and hardware can be seen as an integrated whole. Without the software, the hardware is just an empty shell. Without hardware, the software is just symbolic expressions. But together they are machines with the power to execute intentionally designed information-processing tasks.

There is a 'T' in IT artefact, i.e. it is a technical artefact as described above. But there is also an 'I' in IT artefact, i.e. it is an *informational artefact*. This is actually the most important trait and what distinguishes it from many other types of technical artefacts. Many technical artefacts work according the principle matter/energy influences matter/energy. E.g. an oven heats what is put in the oven; a washing machine works on clothes to make them clean etc. An IT artefact, like e.g. the social welfare application as described in Goldkuhl (2013), does not work on matter as the intentional influence. It has of course a matter/energy base, but its purpose is informative, which means that people can be informed and can inform others through these artefacts. This is the fundamental idea of an IT artefact. Its basic functions are to provide information to users and provide communication possibilities to users. An IT artefact lets users say something to be kept in the artefact and/or directed to other persons. An IT artefact lets also users get know something, usually with an origin from other persons. Information and communication is the core of IT artefacts.

It is primarily the 'I' of IT artefacts that make them social. They are means of making humans' knowledge common. My claim is also that it is the 'I' that is the most important trait when looking at IT artefact. When looking at ovens, it is their capacity to produce heat that is the essential function. When looking at IT artefacts, the most important trait is their capacity to mediate communication between people. In this argumentation it is time to re-use an old slogan from Goldkuhl & Lyytinen

(1982)[1]. We argued in this paper to recast the traditional view on information systems as "technical systems with social implications" to "social systems only technically implemented". This was a way to foreground communication and the use of language, which of course are seen as fundamentally social in nature.

This commentary paper is written in the tradition of making the social visible in IT artefacts. There are many other papers in this tradition; some are mentioned above in the backdrop (Orlikowski & Iacono, 2001; Markus & Silver, 2008; Sein et al, 2011). This includes also the two commentary papers, which triggered the writing of this commentary (Silver & Markus, 2013; Purao et al, 2013). I see the commendable purpose of emphasizing the social character of the IT artefact and making people visible in IS theorizing. However, *we do not need to put humans inside the boundary of the IT artefact in order to make these artefacts social*. The concept of the (IT) artefact (following the characterization from section 2 above), implies always artefacts with social functions and in social contexts. An IT artefact is always part of some social context, a business process or workpractice or how we conceive this context. The use of the IT artefact is genuinely social as it implies the conduct of communication. I have, based on the artefact conceptualization from section 2, made a visualization in figure 1.
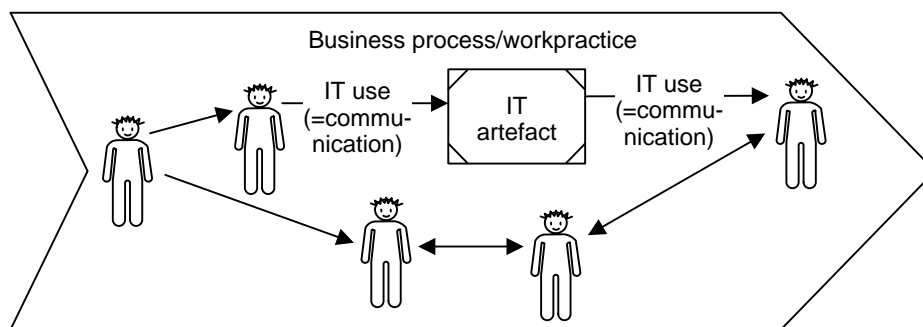

Figure 1: An IT artefact as part of a work context;
use of the IT artefact implies communication.

It is important to see that social structure (to use this term from Orlikowski & Iacono, 2001) is inscribed into the IT artefact. Different norms and linguistic elements are inscribed into the software of the IT artefact through design. The IT artefact will also evolve as a social-semiotic object since new information will be added to its workpractice memory through communicative acts performed by its users. There are more arguments in this direction in Goldkuhl (2013).

4   In what way is an IT artefact sociotechnical?

The main argumentation in section 3 above was to emphasize the social character of IT artefacts in spite of their technical basis. In this section I will focus on their combined technical and social character, i.e. seeing them as *sociotechnical artefacts*.

In order to read information from the IT artefact, e.g. a social welfare officer studying the economic situation of clients on a screen (from the case in Goldkuhl,

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[1] This was originally formulated in a paper in Swedish (Goldkuhl, 1981).

2013), the user needs to handle different elements of the user interface as the keyboard and the pointer device. There is a need to technically handle the IT artefact. But such technical operations are intrinsic parts of the communicative and interpretive acts conducted by the users. It is not the case that the users perform social acts that are purely social and not technical. Such acts are social and technical at the same time. Sjöström & Goldkuhl (2004) has labelled this pragmatic duality; see also Goldkuhl (2013). When communicating with other persons through the IT artefact, the user must also as part of such communication handle the artefact technically.

Being an 'I' + 'T' artefact means that it is both a technical artefact and a sign artefact. This is actually what makes IT artefacts so powerful instruments. Such an artefact has a powerful technological base (hardware and basic software as operating system). The capability of an IT artefact is also dependant on the ingenuity of those participating in the design. The design of communication and information processing is of course fundamental for how useful the artefact will be. This dual nature of IT artefacts makes it challenging to conduct designs with good quality. Both Silver & Markus, (2013) and Purao et al (2013) observe the risks of a too narrow and techno-centric design, where the IT artefact is not well adapted to the social context and unforeseen consequences may arise. This discussion is to be continued in the next section.

5   Design of an IT artefact – and context

Research in IS is about design. It is both about past design when studying existing IT artefact and about prospective design in design research studies. This is one reason why the sharp division between "behavioural science" and "design science" (introduced in March & Smith, 1995 and Hevner et al, 2004) is an unhappy one. I fully acknowledge the differing epistemological orientations in these different research approaches (see Goldkuhl, 2012). But I claim that it absolutely necessary to acknowledge the design character of existing IT artefacts (they being shaped by initial design efforts and continuously appropriated and redesigned during their life-time).

The articulated artefact conceptualisation, described above in this commentary, can help us to sharpen the discussion on the design of artefacts – and its context. This view makes completely clear that a design of an IT artefact also implies design of its context. A designed IT artefact brings usually new (communicative) functions to its users, which mean new ways to partake in communicative practices. Of course there are situations where users and workpractices are recalcitrant to new IT designs.

The *design of context through artefact design* can be done in different ways. It can be done in *techno-centric* way with a narrow focus on the IT artefact and perhaps mainly on its technical character (figure 2). I such a case, it is likely that unforeseen social consequences will arise. This is what Markus & Silver (2008) and Silver & Markus (2013) so eloquently urge us to be more aware of. When designing IT artefacts we should be more sensitive to possible future consequences for users and other actors.

Techno-centric
design
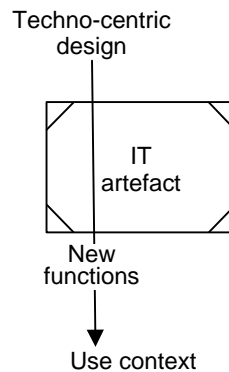
IT
artefact

New
functions

Use context

Figure 2: Techno-centric design of IT artefact
(design of work context purely through artefact design)

There exist of course alternatives to techno-centric design. The IT artefact and its use context (business process/workpractice) can be designed *in concert*. I call this kind of approach *co-design*, i.e. co-design of artefact and work context; cf. also Alter (2006). Such a design implies usually the generation of models (e.g. business process models) describing the intended design and alignment of IT and workpractice. The designers address the whole of the IT artefact, IT artefact functions, IT artefact uses, users and their competencies and motivation, workpractice goals and other parts of the context as activities and semiotic and/or material artefacts/objects. The influence on the use context will not be limited to some residue of the artefact design. The influence will be the result of a conscious holistic design process. It is not only through artefact design and new IT functions. There will be a direct link from the co-design to the work context. This path will go through activities of (re-)learning and also practice re-arranging (figure 3).

Co-design
(Workpractice & IT alignment)

IT
artefact

New
functions

Practice
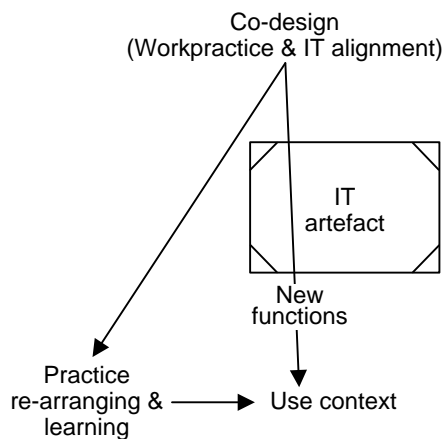re-arranging & ⟶ Use context
learning

Figure 3: Co-design of an IT artefact and work context

This is also how I interpret the ADR approach and the intentions behind it. Purao et al (2013) ask IS design researchers to pay more attention to "the work practices of organizational participants relevant to the context in which the IT-artifact is realized" (ibid p 77). Design research should be expanded "towards a more situation, organiza-

tion and user aware approach" (ibid p 78). This means to more fully take into account the work context of the IT artefact. If we fail to do so, we just produce a senseless technical object and not an artefact that is meant to be workable in its intended context.

6   Concluding remarks

In these concluding remarks I let myself be more personal. I found it very interesting and stimulating to dig more into the conceptualisation of the IT artefact and especially into the ensemble view and its "conceptual child" the ensemble artefact as was done in Goldkuhl (2013). I am happy and grateful that my earlier paper inspired the generation of the thoughtful commentaries made by Mark Silver and Lynne Markus (2013) and Sandeep Purao, Ola Henfridsson, Matti Rossi and Maung Sein (2013). It was really rewarding to read their papers. I am also happy that their commentary papers triggered me to take one step further in conceptualising the IT artefact and its context as has been made in this commentary. It is my hope that this ensemble of four papers will further stimulate the discourse on the IT artefact. Much has been said here, but more is to be said in the future on IT artefacts and their contexts. I welcome further reactions to our papers!

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