Understanding IT-systems in Practice - Investigating the Potential of Activity Theory and Actability Theory

Hanna Broberg

School of Communication and Design, University of Kalmar, Sweden
hanna.broberg@hik.se

Abstract

To develop practice supporting IT-systems there is a need to understand the nature of IT-systems, practices and their relations. This understanding could be used in the development of an IT-system as a design theory. This paper explored the potential of Activity Theory and Actability Theory to describe and explain IT-systems, practices and their relations. Activity Theory was found to describe practices more generally but lack specific descriptions of IT-systems. Actability Theory was found to describe IT-systems and their use more specific.

Keywords: IT-system, practice, theory, Activity Theory, Actability Theory

1   Introduction

IT-systems (Information Technology based Information Systems) can, depending on from what *perspective* they are perceived, correspond to various things (Orlikowski & Iacono, 2000). They can be constituted of hardware and software, tools that are used by people, mediums of communication, as well as organisational changes. Depending on perspective, different *qualities* are associated with the IT-system (Bevan, 1999).

In a prior study of a home healthcare organisation, a lot of small problems, difficulties and inefficiencies in the work of the staffs, were identified (Broberg, et al, 2003; Broberg & Petrakou, 2004a; 2004b). When analysed, several of those problems were connected to the IT-system used, within the organisation. The IT-system, though, was found to work well technically and was regarded as rather easy to use by the staff. Hence, the problem seemed to be between the IT-system and the way the work was conducted in the organisation. The IT-system did not support the practice.

The development of *practice supporting IT-systems* has been a challenge for the Information Systems discipline for decades. Several researchers (Doherty & King, 2001; Henfridsson et al, 1997; Orlikowski & Barley, 2001; Markus, 2004) stress the importance of understanding the nature of both IT-systems and practices, as well as their relations. In order to understand IT-systems and practices, *theories* are required (Gregor, 2006). Depending on from what perspective IT-systems are perceived, they can be described and explained with different theories: mathematical, mechanical, informational, communicational, cognitive, organisational and social.

A way of using theoretical understanding in development of IT-systems is to use a *design theory* (Goldkuhl, 2004; Hooker, 2004; Walls et al, 1992; 2006). Activity Theory (Quek & Shah, 2004), Actor Network Theory (Atkinson, 2000) Socio-Technical Systems Theory (Olerup, 1989) and Soft Systems Theory (Checkland & Holwell, 1998) are some examples of theories that have been used to develop IT-systems, although not defined as design theories. Design Theory for Vigilant EIS (Walls et al, 1992), Design Theory for Decision Support Systems (Kasper, 1996) and Design Theory for IT-support of Emergent Knowledge Processes (Markus, et al, 2002) are some examples of explicit design theories. However, those tend to focus on a specific kind of IT-system. There is a need for a more general *Design Theory for*

Practice Supporting IT-systems, based on theories, which describes and explains the nature of IT-systems, practices and their relations.

There are numerous social and organisational theories that in different ways theorise about practices, IT-systems and their relations, for example General Systems Theory, Speech Act Theory, Distributed Cognition, Role Theory, Actor Network Theory, Activity Theory, Institution Theory, Structuration Theory, Socio-Technical Systems Theory, Situated Action Theory, Actability Theory, Task-Technology Fit, Symbolic Interactionism and Work Systems Theory (Agerfalk, 2003; Hasan, 1998; Schneberger & Wade eds, 2007).

Activity Theory is a theory, which describes and explains practices, what they are constituted of and how those parts are related to each other (Engestroem, 1987). Activity Theory has also been used to develop organisations and IT-systems (Engestroem, 1999; Quek & Shah, 2004). In the organisation study, Activity Theory was used to describe the practice and to explain the problem between the practice and the IT-system (Broberg, et al, 2003; Broberg & Petrakou, 2004a; 2004b). Activity Theory was found to be useful to explain the deficit of the IT-system in terms of supporting the work practice. However, Activity Theory alone did not sufficiently describe the nature of the IT-system.

Actability Theory is a design theory for the development of actable IT-systems (Agerfalk, 2003). Actability Theory in a more profound way described and explained the nature of the IT-system. However, Actability Theory describes the practice and the relation between the practice and the IT-system differently, than Activity Theory.

The *aim of this paper* was to investigate how Activity Theory and Actability Theory theorise about IT-systems, practices and their relations, to potentially contribute to a Design Theory for Practice Supporting IT-system. The selection criterions for the theories are that they do theorise about IT-systems, practices and their relations. This paper sought to study Actability Theory and Activity Theory and compare these two, without arguing any potential advantages to other theories, nor comparing them to other theories. For a comparison of Activity Theory to other theories I instead refer to Hasan (1998), Nardi (1996) and Star (1998). To my best knowledge, there is no such an equivalent comparison for Actability Theory.

2   Method for describing and comparing theories

The purpose for investigating how Activity Theory and Actability Theory theorise about IT-systems, practices and their relations is to construct a Design Theory for Practice Supporting IT-systems. The concept of *design theory* is still rather new and there is still no consensus of its definition (Friedman, 2003, Hooker, 2004; Marsch & Smith 1995; Vashnavi & Kuechler, 2004; Walls et al, 2004). Most definitions are based on definitions of the concepts of design and theory. I agree with the definition of Venable (2006) that any theory used for a design purpose is a design theory.

There are several different suggestions to what a design theory is composed of (Goldkuhl, 2004; Gregor & Jones, 2004; Venable, 2006; Walls et al, 1992). Walls et al (1992; 2004) characterize a design theory be constituted of kernel theories, meta-requirements, meta-design, method, product hypothesis and process hypothesis, which is perhaps the most accepted and used.

Walls et al (1992) has a deductive view on the construction of design theories, as they include kernel theories that are descriptive or explanative theories from natural or social science. Design theories could also be generated inductively by refining practical design knowledge (Marsch & Smith 1995; Vashnavi & Kuechler, 2004; Venable, 2006) or from by both theory and empirical findings (Goldkuhl, 2004). The Design Theory for Practice Supporting IT-systems will, subsequently, be generated from both theory and empirical

findings. Theoretically it will be based on kernel theories that theorise about IT-systems, practices and their relations.

The aim of this paper is to investigate how Activity Theory and Actability Theory theorise about IT-systems, practices and their relations. The investigation is therefore in this paper about their nature as descriptive and explanative theories. Friedman (2003) suggests that theory in its most simplistic form is a model that describes how things work through a number of concepts that are related. Theories then describe and explain phenomena with concepts that have different relations. In this paper the different concepts that each theory use to describe the IT-system and the practice and how those elements are related to describe the relation between the practice and the IT-system will be analysed.

3 Activity Theory

Activity Theory is a Social-Psychological theory (Foot, 2001) for describing and analysing action in context, within its minimal meaningful unit of analysis - the activity (Engestroem, 1990; Kuutti, 1996).

The first activity theoretical ideas were generated by Russian psychologists, to explain the learning of children (Leontjev, 1978; Vygotsky, 1978). Since then, Activity Theory has spread over the world, and to different disciplines like Pedagogy, History, Work in Organisations, Human-Computer Interaction (HCI), Computer Supported Cooperative Work (CSCW) and Information Systems (Bertelsen & Boedker, 2000; Hasan 2001; Knutagard, 2003; Redmiles, 2002; Spasser, 1999). Engestroem (1996) describes the theory as developed in three generations.

The documentation of the theory is rather scattered and it has also been further developed within different disciplines (Knutagard, 2003). In the IT disciplines the theory has been described in five basic principles (Kaptelinin & Nardi, 2006). These principles and Engestroem's three generations is the major base of the following description.

3.1 Activity Theorising about IT-system

The fourth principle of Activity Theory is about *mediation* (Kaptelinin & Nardi, 2006) and according to Engestroem (1996) it belongs to the first generation. It was Vygotsky that noted that action can never be direct to the object, but always mediated by some *tool* or instrument (figure 1) and this contrasts humans from animals. Those instruments can be both material and immaterial and the language is one of the most important mediators.
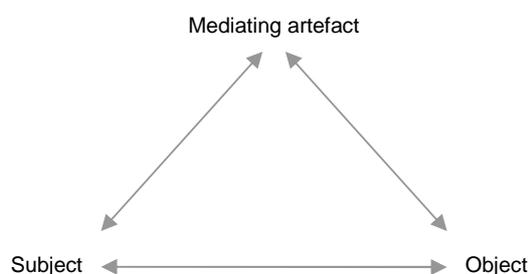
Mediating artefact

Subject ← → Object

Figure 1: Model of mediated action, Engestroem, 1996.

The mediating tools are also *artefacts*, which have been constructed by other people, perhaps, at another time and in another culture. Within them, the artefacts consequently carry the knowledge of this people and its culture, and they are the historical evidence of its development. As the artefacts are used to carry out action, they are also constraining it, and affect both the subject and the object.

There can be different kinds of artefacts (Engestroem, 1987). Vygotsky made a distinction between mental and physical tools, where psychological tools are more directed to the control of behavioural processes and some examples are language, symbolic systems, maps and schemas. Psychological tools demands a reflective mediation where the subject are conscious of its own procedures. Engestroem, on the other hand, propose different levels, where the first level is mediation with mental and physical tools that are not combined and the second level is mediation, with mental and physical tools connected. Another distinction is made by Wartofsky, in primary and secondary artefacts, where primary artefacts are those used to contribute to the survival and reproduction of the society and the secondary are those that are used to maintain and transfer the skills and practical knowledge.

Béguin & Rabardel (2000) use the ideas of mental and physical tools. They mean that the IT-system must be understood to include both aspects, in order to function as a mediator. The instrument mediates the relation between the subject and the object, but the instrument is also constituted of the subject and the artefact.

3.2   Activity Theorising about Practice

The first principle of Activity Theory is that of *object-orientedness* (Kaptelinin & Nardi, 2006). All human activity is directed towards an object. The object is both something that exists in the external world, as a physical thing and an ideal entity, and something that exists internally in the mind of a human being. The object could be seen as an objective; it is the prospective outcome of the activity and is motivating and directing it. The object should however not be mixed up with goals. The object gives meaning to what people do. Objects can be used to separate one activity from the other. Actions can be distinguished based on whether they support the accomplishment of the object or not. The world around the human provides affordance and constraints to acting and reaching of objectives. Subjects are performers of activity towards objects; however the relation is dual in that the object also affects the subject. This principle implies that to be able to understand both individual and collective acting of humans, it is necessary to investigate and analyse objects.
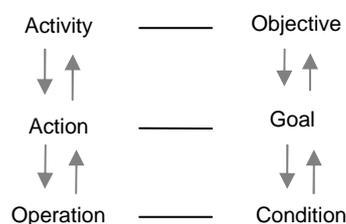

Figure 2: The hierarchical structure of activity, Kuutti, 1996.

The second principle describes the *hierarchical structure of activity* (Kaptelin & Nardi, 2006; Kuutti, 1996). The hierarchical structure (figure 2) is divided in activity, action and operation. *Activities* can be both individual and collective, when the object is shared by many people, but

actions are always individual. Activities are realised through a number of actions. *Actions* have goals, and different actions can be made to reach the same goal. The goals can be at different levels and actions have sub-actions. This hierarchy of sub-actions can go on to the passing of a level of consciousness, down to automatic processes that are operations. *Operations* are different routinized ways of conducting an action. They do not have goals but rather provides adjustments to situations or conditions. As results of changing conditions and learning, the levels can move up and down.
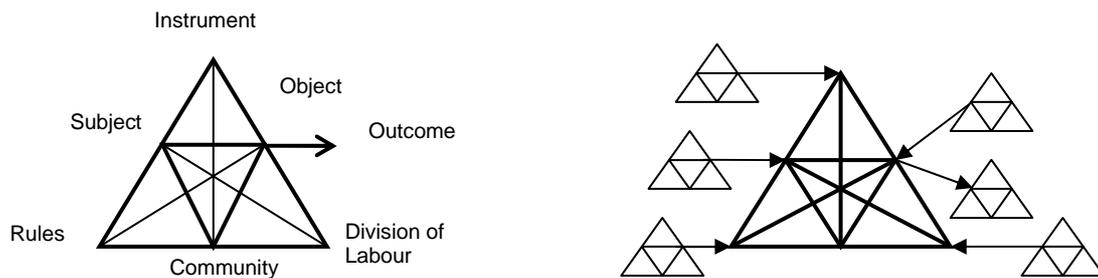

Figure 3: Graphical model of activity system (left) and activity network (right), Engestroem, 1987.

As part of the second generation, Engestroem (1987; 1996) places his graphical model of the *activity system,* see figure 3 to the left. The model adds the collective aspects of activity, the *community* that shares an object and the mediation by *rules* and *division of labour.* Korpela et al (2000) suggests a somewhat different model of an activity system than Engestroem. They explicitly includes means of coordination and communication and the work processes. The model also expresses other relations than those that are mediated and also explicitly expresses differences between the parts.

As part of a development of a third generation of Activity Theory Engestroem places the idea of *activity networks* of tool-, subject-, rule-, object and division of labour producing activities, as well as result consuming activities, see figure 3 to the right.

3.3 Activity Theorising about relations between IT-system and Practice

The third principle according to Kaptelinin & Nardi (2006) is that of *internalisation* and *externalisation.* The human mind is not separated from culture and society and the processes of internalisation and externalisation are those links. Mental processes, internal activity, is distinct from external behaviour, but must be understood in connection. Internalisation is the transformation of external activities into internal. It is also a mean for the consideration of possible interaction without actual performance. Externalisation transforms internal activities into external. This might happen to repair internalised action or when action requires collaboration between several people. Internalisation and externalisation can also be seen as processes between the individual and the collective.

The fifth principle of Kaptelinin & Nardi (2006) is the one of *development.* Activities always exist in a state of change and development. Practice is the result of certain historical developments under certain conditions.

Engestroem (1987; 1999) describes the development as the detection of small eruptions, problems, breakdowns, inefficiencies and difficulties in the practice. These could be analysed into four different kinds of *contradictions* within the activity system and activity network. A

primary contradiction exist within one of the components of the activity, a secondary contradiction exist between components of the activity, a tertiary contradiction can arise if there are a culturally more developed form of the activity and a quaternary contradiction appears between activities within an activity network.
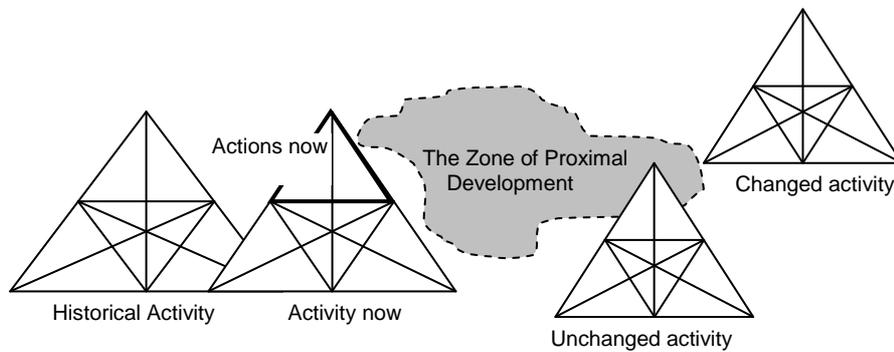

Figure 4: The zone of proximal development, Engestroem, 1999.

The change process can be expanding from primary contradictions, which resolving cause secondary contradictions and so on, until the whole activity has transformed. This occurs in a continuing and evolving development processes. Contradictions are either resolved by them selves or need active change efforts. Engestroem (1999) also uses the concept of the *zone of proximal* development (figure 4) which describes the area in which it is possible for an activity to change.
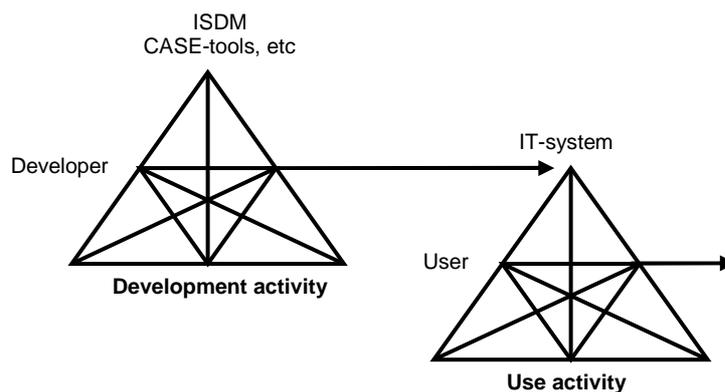

Figure 5: Development of IT-systems as a development activity and a use activity, Bertelsen & Boedker, 2000.

The activity system describes the IT-system as a part of the practice with relations to other parts of the practice that are people, groups, objectives, rules and division of labour. The development and use of IT-systems has been described (figure 5) as the connection between a tool producing and a tool using activity (Bertelsen & Boedker, 2000; Boedker & Groenbaeck, 1998).

4 Actability Theory

Actability Theory has been developed to describe the use of IT-systems in practice and is to be used as a quality concept and measure and as a design theory to guide the development of IT-systems.

The theory has been developed by a research group belonging mainly to the University of Linkoeping in Sweden. It is described in its entirety mostly in the doctoral thesis of Agerfalk (2003) but in parts in several research papers, for example in Cronholm & Goldkuhl (2005) and Goldkuhl & Agerfalk (2000; 2005).

Actability Theory is based on ideas from several theories of action, communication and information. Some concepts from those theories have been used the way they are and some concepts have been further developed. Different writings describe different aspects, as well as different versions in the development process of the theory.

4.1 Actability Theorising about IT-system

Being actable is a property an IT-system can have, but only in relation to a business context. An actable IT-system is defined as: *"The ability of an IT-system to perform actions and to permit, promote and facilitate users to perform their actions both through the system and based on messages from the system, in a work practice context"* (Goldkuhl & Agerfalk, 2000, p 2).

The IT-system is then, in Actability Theory, seen as a *tool* for action and a *medium* of communication. As an instrumental pragmatism (Goldkuhl & Agerfalk, 2000) and a part of Actability Theory, different kinds of *artefacts* are classified as static tools, mechanic tools and automatic machines. Artefacts that on their own can perform actions are automatic machines. However, this action is always based on rules set by humans and they act as agents for the human actors. Artefacts that can perform actions when manoeuvred by humans are mechanical tools. Static tools are used to support humans when acting.

In Actability Theory IT-systems are defined to consist of the following parts or properties (Cronholm & Goldkuhl, 2002):

- An *action potential* – that is a predefined set of actions that are possible to perform.
- *Actions* – that are performed interactively by the user and the IT-system and/or automatically by the IT-system.
- An *action memory* – containing information on previously performed actions and conditions and prerequisites for coming actions.
- *Documents* – that presents prerequisites for action, mediates action or presents results of action.
- A structured *practice language* – that sets the frames for actions, action memory and documents.

4.2 Actability Theorising about Practice

Actability Theory is based on a generic model of *social action*, see figure 6 (Goldkuhl & Agerfalk, 2000). Theoretically, the action model collects different aspects of acting from several action theories, like Situated Action, Activity Theory, Speech Act Theory, Structuration Theory and Institution Theory. Later, these ideas have been structured and presented as Socio-Instrumental Pragmatism (Goldkuhl, 2005a).
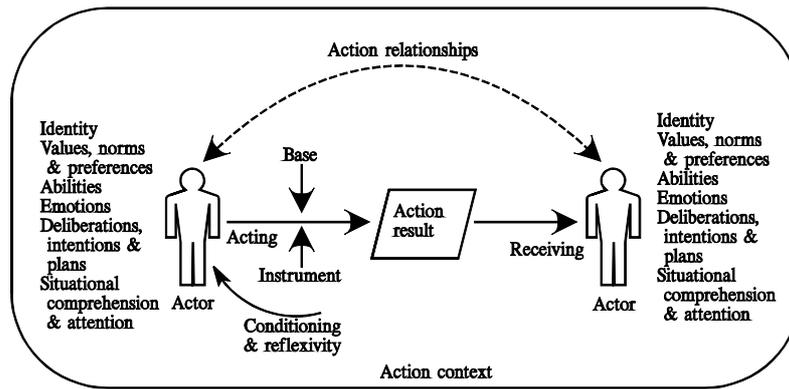
Figure 6: Generic model of social action, Goldkuhl & Agerfalk, 2000.

Performers of action are *actors*, who can be separated in performing and receiving actors and in the roles of communicator, translator and conductor. The actors possess identity, values, norms, preferences, emotions, abilities, deliberations, intentions, plans, situational comprehension and attention. Actors have intentions and perform actions to make a difference; acting is then meaningful and purposeful.

Actions bring *results* that can have *effects* for receiving actors and in the action context. The producing of the result is a process of transformation. The results and effects can be of different kinds and actions can be separated into material, social, communicational, etcetera. The *materials*, *prerequisites* and the results of the action are called action objects. Actions and actors are connected to each other in interaction flows by the exchange of action objects. The action takes place within an *action context*.

Actability Theory, based on the ideas of Speech Act Theory, makes no clear distinction between acting and communicating and stresses the idea that communication is action (Agerfalk, 2003; Sjoestroem & Goldkuhl, 2002). When the actors communicate, they, at the same time, want to achieve something.
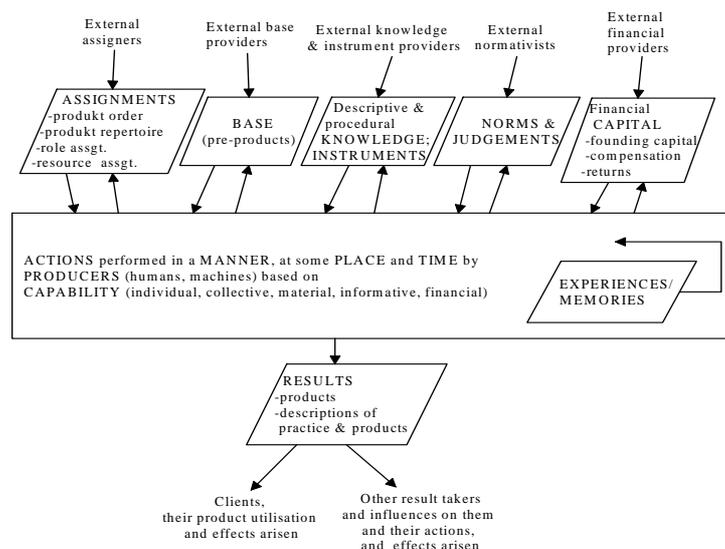

Figure 7: Generic model of work practice, Goldkuhl, 2005b.

Actions are performed within practices. A *practice* is defined as 'someone that does something for someone else' (Goldkuhl, 2005b). Actors that perform actions within an organisation does it both for his or hers own purposes and as agents for the organisation. Organisations do not act on their own, but through their staff. The action flow of an organisation is often repetitative and forms an action pattern of institutionalised acting.

The practice has been described in a *generic practice model*, see figure 7 (Goldkuhl, 2005b). It defines the parts of a practice to be: *actions* performed in a *manner*, at some *place* and *time* by *producers*, based on *capability* and with *assignments*, *base*, *knowledge* and *instruments*, *norm* and *judgements* and *capital* that have *results* for *clients* and other *resultants*.

4.3   Actability Theorising about relations between IT-system and Practice

Agerfalk (2003) has changed the model of a *use situation* of Shackel (1984). The use situation is constituted of a user, a task and a tool, in a context. Shackel defines them in binary relations, where Agerfalk defines them in a trinary relation (figure 8, to the left). The new relation is said to change humans from passive users of information to active performers of actions in businesses.

There could, according to Actability Theory, be three different kinds of use situations. In an automatic usage situation the action is performed by the IT-system based on instructions from human actors, where the IT-system is used as an automatic machine. An interactive use situation occurs when an IT-system is used to permit, promote and facilitate users' performance of actions through the system. In these situations the IT-system is used as a mechanical tool. In a consequential use situation the IT-system is used to permit, promote and facilitate users' performance of actions, based on information from the system. In these situations the IT-system is used as a mechanical tool.
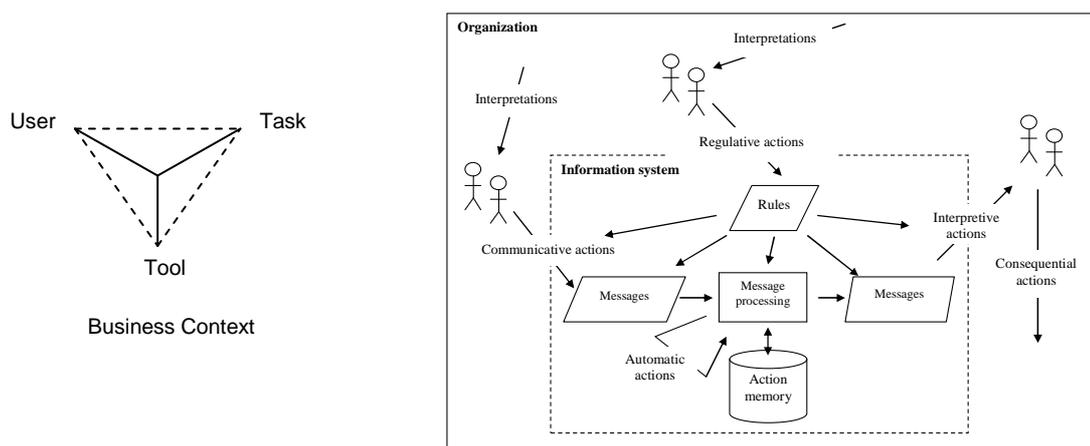
Figure 8: The A[3] model of a use situation (left) and IT-systems as action systems (right), Agerfalk, 2003.

As a medium of communication the IT-system receives messages from actors that in this role are *communicators*. The model to the right in figure 8, describes the relation between the use situations and the parts of the IT-system in the business (Agerfalk, 2003). The *messages* are stored in the action memory and are presented to receiving actors in the role of *translators*. These actors can then act based on the interpreted message and is then in the role of

conductors. Based on the Language Action Perspective, the messages include both a textual content and some reference to an action. Actability stresses the importance of being specific about the action referring, so that correct actions can be performed.

Figure 9: Model of the elementary interaction loop, Agerfalk et al, 1999.

The acting connected to the IT-system is described in an *elementary interaction loop* (figure 9), the EIAL (Agerfalk, et al 1999). A user performs an interaction each time something is done in a user interface of an IT-system. Each interaction follows a schema of three phases in a loop. The use action is when the user manipulates something in the user interface. The IT-system action is the response to the user action. It can be several different operations and often results in some kind of feedback to the user. While this is done the user waits. The interpretation is the user trying to understand the feedback from the IT-system. An interpretation action can yield another user action, which makes the loop start all over again.

5   Discussion

Activity Theory and Actability Theory is in this paper investigated as contributors to a Design Theory for Practice Supporting IT-systems. The reason is that Activity Theory theorise about practice and its relation to IT-systems, while Actability Theory theorise about the IT-system. The hypothesis is that the two theories could be complementary in theorising about IT-systems, practices and their relations. Theories were found to be constituted of concepts and their relations. In the following section a comparison is made of the concepts included in Actability Theory and Activity Theory that describe and explain IT-systems, practices and their relations.

At first it could be discussed if Activity Theory and Actability Theory are at all comparable and whether there could be obstacles in, subsequently, combining them into a design theory. A first opposition that could be made is that they are different types of theories. That Activity Theory is a descriptive and explanative theory, whereas Actability Theory is a design theory. Actability Theory is based on several action and communication theories as kernel theories. These kernel theories can also be used to describe and explain use of IT-systems for action and communication. Activity Theory was originally a theory to describe and explain the learning processes of children. It has later been used to describe and explain IT-systems in practices and the relation between IT-systems development and use. Activity Theory has also been used to design IT-systems and is then, according to Venable (2006), a design theory. A conclusion of this is that Actability Theory and Activity Theory could both be treated as descriptive and explanative theories, as well as design theories. In this comparison, it is only the descriptive and explanative properties that are of interest.

The second opposition concerns the levels of the theories. Actability Theory is a more specific theory, whereas Activity Theory is a more general theory. Actability Theory is focused on acting in relation to IT-systems, whereas Activity Theory includes all acting.

Activity Theory also takes the minimal meaningful unit of analysis to be the activity whereas Actability Theory has its focus on the action level. However, this may rather mean that the two theories complement each other well.

The third opposition is that Actability Theory is already a theoretical combination, of which Activity Theory is a part. Since Activity Theory and Actability Theory are found to deal with different levels, the overlapping of the theories ought to be mostly at this level. Overlapping is not an obstacle for combining the theories, rather an advantage. However, there must be some interesting parts that are specific for each theory, to make it meaningful to combine them. The result of the following comparison will show how much and in what way the theories are overlapping and what concepts that may be unique for each theory.

5.1 Comparison of Theorising about IT-system

In some versions of Actability Theory the concept of *IT-system* is used and in some the concept of Information System is used instead. An Information System can be both manual and digital. A problem with the definition of Information System is that sometimes it includes also the people using it. A computer based Information System is sometimes referred to as an IT-system, where IT is the abbreviation of Information Technology.

Activity Theory was constructed before any IT-systems existed. It has the more general concept of *tool* or *instrument*, which refers to all different kinds of tools. When Activity Theory has been used to theorise about IT-systems they are seen as the tool. In Activity Theory only the general concept of tool or instrument is to be compared with the more specific concept of IT-system in Actability Theory, see table 1.

Table 1: Comparison of IT-system concepts in Activity Theory and Actability Theory.

Activity Theory		Actability Theory	
Tool/Instrument	Mental part	Action potential	IT-system /Information System
		Practice language	
		Actions	
	Physical part	Action memory	
		Documents	

In the introduction of this paper it was mentioned that IT-systems could be seen differently upon, depending on what perspective that is used. In Actability Theory the IT-system is seen both as a tool and as a medium of communication. In Activity Theory the IT-system is seen as a mediating tool. The tool view of both theories is not restricted to the interaction of a user and a tool only, rather both theories emphasises the tool as used in a context.

Both in Activity Theory and Actability Theory the IT-system is also seen as an artefact. That implies that the IT-system is considered to be something that is constructed by people and includes traces of the culture of this people. In Actability Theory this has also been explicated in the concept of action potential, which is a part of the IT-system. The action potential of Actability Theory could also be compared to the mediating characteristic of the tool in Activity Theory. The mediation implies that the action is both afforded and constrained by the tool.

Since Activity Theory does not have the concept of IT-system it could not define its parts as is done in Actability Theory. Actability Theory defines the IT-system to be constituted of an *action potential, practice language, actions, action memory* and *documents*. In Activity Theory IT-systems as tools have been described to have a mental and a physical part, where the *mental part* then may be compared to action potential, action language and actions and the *physical part* with action memory and documents, see table 1.

In Actability Theory the IT-system can be seen as different kinds of tools: automatic machines, mechanic tools and static tools. In Activity Theory only subjects perform actions and subjects are people, groups or roles. In Actability Theory IT-systems are also seen to be able to act, although not acting on their own, but as agents acting on behalf of and based on rules set by humans. The IT-system is then seen as an automatic machine.

5.2   Comparison of Theorising about Practice

Activity Theory uses the concept of *activity*. An activity can be used to describe an organisation, a part of an organisation or something that spans totally different borders. Activity Theory was originally constructed in Russia, based on German action philosophy, where the word 'Tätigkeit' is used (Knutagard, 2003). In English there is no good counterpart to this word, therefore the word activity has been used instead. The concept of activity could then have a different meaning outside of Activity Theory.

In different versions of Actability Theory the terms organisation, business, business context and practice, are used. As I see it the term organisation points to structured units, with somewhat clear boundaries in which work is conducted and a business is when this organisation is about making a profit. Organisations or parts of organisations could be work practices, but practices could also span across organisational boundaries. The *practice* concept related to Actability Theory has been developed simultaneously into a Theory of Practice (Goldkuhl, 2005b). The generic practice model is based on several different theories of which Activity Theory is one. The practice concept of Actability Theory should therefore be compared with the activity concept of Activity Theory, see table 2

Table 2: Comparison of practice concepts in Activity Theory and Actability Theory.

Activity Theory		Actability Theory	
Activity	Subject	Capability	Practice
		Producers	
	Community		
	Object	Assignments	
		Base	
	Tool	Knowledge	
		Instrument	
		Experiences and memories	
	Division of labour	Manner	
	Rules	Norms and judgements	
	Outcome	Results	
	-	Capital	
	-	Actions	
	-	Time and place	
Activity network	Tool producing activity	External knowledge and instrument providers	
	Subject producing activity		
	Rule producing activity	External normativists	
	Object producing activity	External assigners	
		External base providers	
	Result consuming activity	Clients	
		Result takers	
	-	External financial providers	

Engestroem defines the parts of the activity to be: *subject, tool, object, outcome, rules, community* and *division of labour*. The parts of the generic practice model are: *actions, manner, place, time, producers, capability, assignments, base, knowledge, instruments, norms and judgements, capital, experience and memories, results, clients and other result takers*. The practice model also includes *external assigners, base providers, knowledge and instrument providers, normativists, financial providers, clients and other result takers*. In

Activity Theory this is instead defined as an *activity network,* of *subject-, tool-, object-, rule-,* and *division of labour producing activities*, as well as *object consuming activities*.

The practice model is more complex than the activity model. Some parts of the activity and activity network are directly comparable to parts of the practice, see table 3, but some parts differ. The concept of community in the activity has no real counterpart in the practice. Activity Theory is not a situated action theory and does not include concepts of time and place. In Activity Theory the activity is defined to be constituted of actions in the hierarchic model but it is not explicated in the activity model, like in the practice model. Activity Theory is not an economic theory and does not include capital, as opposed to Actability Theory.

Table 3: Comparison of practice concepts in Activity Theory and Actability Theory.

Activity Theory		Actability Theory	
Action	Subject	Actor	Social action
		Identity, values and norms, preferences, emotions, abilities, deliberations and intentions, plans, situational comprehension, attention	
	Object	Base	
		Action result	
	Tool	Instrument	
	-	Conditioning and reflexivity	
	-	Acting	
	-	Receiving	
	-	Action context	
Operation		-	

The *action* in Activity Theory is defined only to be constituted of a *subject*, an *object* and a *tool*. Since the *social action* concept in Actability Theory is based on several action theories it includes more aspects in the action model than Activity Theory, such as *values, norms, identity, abilities, emotions, situational comprehension, result, receiving actor, action relationship, base, result* and *conditioning and reflexivity*. In Activity Theory values and norms, for example, are not in the action model but in the activity system model. Activity Theory also includes the concept of *operation*, which is not included in Actability.

It could be questioned if the social action of Actability Theory has more resemblance with the activity system of Activity Theory. On the other hand Actability Theory also includes the practice model that was compared to the activity in Activity Theory. The most important principle of practice in Activity Theory is that of object-orientedness. What confirms the difference between the social action and the activity is that the activity is defined to be collective, which is an aspect that is not clearly explicated in the social action model. Activity Theory also separates activity and action with the difference between objects and goals. The action of Actability Theory is said to be meaningful and purposeful. In Activity Theory this is explained to be because the action is directed by an objective of an activity. There is neither a goal nor an object in the model of social action in Actability Theory.

Activity Theory states that the minimal meaningful unit of analysis for understanding human behaviour is the activity. Actability Theory has an action perspective, even though, it is stated that the acting takes place within a business context and is a social action. Activity Theory and Actability Theory can therefore be seen to be on different levels of theorising. Although, following the activity hierarchy of activity theory, it is two strongly related and complementary levels. The practice concepts can be seen as related either statically or dynamically. In both Activity Theory and Actability Theory the practice is described both statically and dynamically.

5.3 Comparison of Theorising about relations between IT-system and Practice

Actability Theory is more specific on IT-systems. The theory defines the relation between the IT-system and practice in *use situations* and *interaction loops*, see table 4. The use situation, as constituted of user, task and tool has very much in common with the *action* model of Activity Theory. Activity Theory might then be on a more general level than Actability Theory.

The definition of the *operation* in Activity Theory is that it is not as conscious as the action; it is something performed more as routines and as reactions to circumstances in the environment. Operations can also be seen like the method of performing the action. There can also be a shifting between the levels due to learning or introduction of new things.

Table 4: Comparison of concepts in the relation between the IT-system and the practice Activity Theory and Actability Theory.

Activity Theory	Actability Theory
Action	Use situation
Operation	Interaction loop
Contradiction	
Zone of proximal development	

In Actability Theory an action can be constituted of one or several iterations in an interaction loop. This implies one part of the same relation as in Activity Theory between the action and operation. However I do not think that an interaction phase could change into an action and vice versa. The breakdown of an operation into an action in Activity Theory, when introducing something new in it could be used to explain the effects of bringing a new IT-system into a practice. Also concerning the interaction loop Actability Theory is clearly more specific on the IT-system. Operations in Activity Theory can be of any kind, not only IT-system use.

Activity Theory expresses the principle of development – that the activity undergoes a constant development process that is inevitable. The change is also a response to small problems that are the symptoms of four different kinds of *contradictions*. Activity Theory also has the concept of the *zone of proximal development*, which is the span in which an activity could change. Actability Theory does not seem to deal with change and development and has no comparable concepts, see table 4.

Since Activity Theory does not define parts of the IT-system, it also does not express those parts in relation to the practice. Actability Theory, on the other hand expresses the relations between the parts of the IT-system and the practice, in the model that describes the IT-system as an action system. Activity Theory shows the IT-system as a tool in the activity system and therefore as a tool in context. In Actability Theory I interpret the IT-system to be an instrument in the generic practice model. In the activity system model of Engestroem the relations in the model are of the mediated kind only. This is criticised by Korpela et al who suggest another model. However, in the activity system model the relation of the IT-system to other parts of the system is clearly expressed. I do not find it as clearly in the generic practice model.

I also find that Actability Theory focus more on the IT-system as support for the action. Kuutti (1996) has some examples of IT-support at the different levels of the activity hierarchy. IT-systems can then also be seen in their relation to the practice as activity supporting.

6   Conclusion

Activity Theory describes practices with the concepts of activities, activity networks, actions and operations. The theory describes IT-systems as instruments or tools that are artefacts with mental and physical properties. The relation between the IT-system and the practice is described as mediation and as a part of the activity system. The theory explains the implementation of IT-systems and its effects in the principle of development.

   Actability Theory describes practices as social action and generic practices. The theory describes IT-systems as tools and mediums that are constituted of action potential, actions, action memory, documents and work practice language. The relations between the IT-system and the practice are described in use situations and interaction loops and as an instrument in the generic practice model.
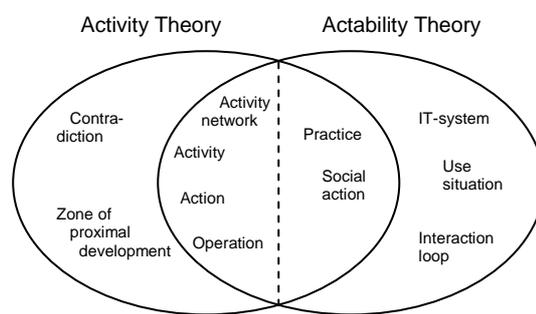

Figure 10: Partly common and unique concepts in Activity Theory and Actability Theory.

The comparison shows that Activity Theory and Actability Theory do have a common base and that some concepts within the theories are rather similar, see figure 10. However there are also differences, such as unique concepts within each theory. Activity Theory can be considered as a general theory that describes and explains all collective human acting, whereas Actability Theory is more specific and focuses on human acting with IT-systems. What is more, Activity Theory focuses on the activity level, while Actability Theory focuses more on the action level. Actability Theory also more specifically describes the nature of the IT-system.

   Actability Theory was hypothesised not to theorise so much about the practice and its relation to the IT-system. This assumption was partly made because the action and practice concept used in Actability Theory was not constructed solidly for IT-systems, but to stand alone. There may be a need in Actability Theory to connect these concepts further to the IT-system and its use. Activity Theory on the other hand, includes specific aspects in the relation between the IT-system and the practice, the change and development principle and the concepts of contradiction and zone of proximal development.

   The next step in constructing the Design Theory for Practice Supporting IT-systems is to clarify what common parts in the two theories should be used. Moreover, an even more thorough review of other relevant theories that potentially could contribute to the design theory is possible.

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