*Proceedings, Conference for the Promotion of Research in IT at New Universities and University Colleges in Sweden, Part I: Scientific Contributions*, Ronneby, Sweden, April 23–25, 2001

# Researching the Applicability of Actability

## – Towards an Improved Understanding of Information Systems as Tools for Business Action and Communication

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**Abstract.** The concept of information systems actability has been proposed as an important alternative way to understand the 'nature' of information systems as tools for business action and communication. To date, the work on actability has mainly been performed as conceptual research focusing the grounding of the concept internally and in existing external knowledge. In this paper the focus is on an ongoing research process that aims at more thorough empirical evidence of the applicability of actability. The paper can be seen as sketching the path towards an improved understanding of information systems as tools for business action and communication.

## Introduction

The concept of information systems actability has been proposed as an important alternative way to understand the 'nature' of information systems as tools for business action and communication (e.g., Ågerfalk, 1999). The concept draws on the body of knowledge developed within the fields of Human-Computer Interaction (HCI), Information Systems Development (more specifically Requirements Engineering) and Communication Modelling (including the Language Action Perspective as well as Organizational Semiotics). The aim is to reconcile these different knowledge domains to gain a better foundation for developing systems that better meet the requirements of their users. Actability can be understood as summarizing a theory of information systems as *information action systems* – an action theory of information systems (Ågerfalk, 1999; Goldkuhl and Ågerfalk, 2000).

To date, the work on actability has mainly been performed as conceptual research focusing the grounding of the concept internally (e.g., Goldkuhl and Ågerfalk, 1998) and in existing external knowledge (e.g., Cronholm *et al*., 1999). In this paper the focus is on an ongoing research process that aims at more thorough empirical evidence of the applicability of actability. More specifically, I will discuss the operationaliazation of actability into (1) method support for requirements engineering, including user interface design; (2) a framework for evaluating the actability of information systems; and (3) applications of using actability to explain information systems phenomena from an action perspective. Firstly, however, I will present the concept of actability in somewhat more detail and then discuss the research approach that has been used to ground, i.e. argue the valitity of, the concept of actability.

Please note that it is out of the scope of this paper to go into details of the concept of actability. Rather, this paper should be seen as an argument for the concept of actability and for the research process used to establish its legitimacy. As such, it can be seen as sketching the path towards an improved understanding of information systems as tools for business action and communication. More actability details can be found in other publications from the Research Group VITS (e.g., Ågerfalk, 1999; Goldkuhl and Ågerfalk, 2000; Cronholm *et al*., 1999; Ågerfalk, 2001; Ågerfalk *et al*., 2001).

## The Concept of Information Systems Actability

The point-of-departure for actability is the patterns of actions that form the business processes of an organization. The aim is to promote a design of information systems adapted to both the organization and its individual

members. Actions within a business[1] can be either communicatively or materially oriented, with the former being the most important in relation to information systems (Goldkuhl and Ågerfalk, 2000). Actability has been defined as (Goldkuhl and Ågerfalk, 2000): '*an information system's ability to perform actions, and to permit, promote and facilitate the performance of actions by users, both through the system and based on information from the system, in some business context*'. This definition highlights some central concepts for actability. The first, and most prominent, is that of *performance of action*. Information systems[2] and users can perform communicative actions, in interaction or alone. Communicative actions can be performed *through* an information system (IS). In such cases, the IS acts as an interactive tool in the performance of the action. The IS can be designed to support such interactive actions in a number of different ways. It can, for example, support in formulating the *propositional content* of the action (i.e., in constructing a valid set of references to concepts talked about and properties predicated to those concepts). It can also support in connecting the propositional content to an appropriate *action mode*. The action mode represents what performing the action does in relation to potential interpreters (commanding, promising, *et cetera*), cf. Searle (1979) on 'illocutionary point'. Distinguishing these two aspects of action (and hence of information) is one of the cornerstones of Speech Act Theory (Austin, 1962; Searle, 1969; Habermas, 1984) and is also a key-point for actability. The distinction helps to remedy what can be referred to as an *infological descriptive fallacy*; i.e. the misconception that information systems are used for descriptive purposes only, cf. Holm (1996) on '*the technological version of the descriptive fallacy*'. A notion that is evident in most current approaches to systems modelling, which assume that the IS represents a model of a piece of reality (i.e., its universe of discourse). From an actability perspective, information systems are parts of the reality themselves. Hence they can be used as automatic tools and as such are capable of doing business and performing actions 'autonomously' as agents performing automatic actions ultimately derived from predefined rules (Goldkuhl and Ågerfalk, 2000).

An important concept for actability is that of *action visibility*. This means that users should feel confident that what they actually do via the IS correspond to their pragmatic intentions; that the action relationships established with possible interpreters are the intended ones and that intended perlocutionary effects (Searle, 1969) eventually arise. That is, an IS should be clear (comprehensive and intuitive) and transparent in communicating potential social consequences of actions to its users. Following this discussion, a good example of 'unactability' is the frequent use of buttons labelled 'OK' in graphical user interface applications. There is a great possibility that a user does not understand, or does not even reflect upon, what obligations are involved in pressing such a button. Even worse, as pointed out by Cooper (1995), in the case of error message dialogs, pressing OK might be the only choice available, and the user might very well feel anything but 'okay' after being accused of incompetence by a machine. An actable IS would instead make the user certain about what action that is going to be performed by pressing the button, for example by using carefully designed labels in accordance with the user's pre-understanding, and give legitimate alternatives. An actable IS would also make sure that the user understands who has decided that this button should be pressed (i.e., on whose commission it is being pressed) and towards whom the corresponding action is directed. This discussion brings on to the term 'user', which within actability is regarded as a general label applicable to any actor that uses an IS directly or indirectly. It applies to both the performers of interactive actions and to the communicators upon whose commission the performers might act, as well as to the interpreters of performed actions (or rather of results thereof). (Ågerfalk, 2001)

Finally, actability is always related to a particular *business context*. This is due to the fact that a certain speech act (communicative action) must always be understood within its context (Searle, 1969; Auramäki *et al.*, 1988; Stamper, 1994). The context for actability is a business context. This means that the actions performed can be understood as instances of generic business actions structured into business processes following generic business patterns (cf. e.g., Winograd and Flores, 1986; Dietz, 1994; Goldkuhl, 1998).

## The Operationalization and Validation of Actability

Actability can be regarded as an instance of what Goldkuhl (1999) refers to as *action knowledge*, i.e. '*theories, strategies and methods governing people's action in social practices*' (*ibid.*) – it represents knowledge about action intended for action. In fact I believe that action is where the real value of knowledge is ultimately achieved. Therefore, what Goldkuhl (*ibid.*) claims about action knowledge is really applicable to knowledge in general. Hence, the two terms 'knowledge' and 'action knowledge' will be used interchangeably in the remainder of the paper.

[1] Note that I use the term 'business' under protest, bowing only for the lack of any sufficient English counterpart to the Swedish word 'verksamhet'. To me, 'business' bears too much of commercial connotations to feel comfortable. As I see it, it is highly relevant to talk about actability in, for example, non-commercial and non-profit 'businesses' as well.

[2] Within actability, 'information system' is defined as: *a technically implemented social system consisting of an action potential (a repertoire of actions and a vocabulary), a memory of earlier actions and action prerequisites, and actions performed interactively by the user and the system and/or automatically by the system* (Goldkuhl and Ågerfalk, 2000).

## The Nature of Knowledge

Goldkuhl (*ibid*.) claims that action knowledge exists on five different levels: a *subjective* level, an *inter-subjective* level, a *linguistic* level, an *action* level and a *consequence* level. Knowledge at a subjective level is internal to a human being and is related to the notion of 'tacit knowledge' (Polanyi, 1958). Knowledge at an inter-subjective level is knowledge shared by several persons. The linguistic level refers to knowledge that is expressed in, for example, written strategies or policies. As the name suggests, action knowledge is expressed, or manifested, in action. This is the action level of knowledge. Finally, traces of the action knowledge might be found in materialized consequences of action, which constitute the consequence level.

Even though Goldkuhl's (*ibid*.) characterization of action knowledge seems valid, I do find it difficult to think of these five aspects of knowledge as five distinct levels. As pointed out by Goldkuhl (1999), what we refer to as one piece of knowledge might exist on several different levels (linguistic, action, *et cetera*). Therefore I choose to use the term *aspect* when referring to the different 'levels' of action knowledge. Furthermore, I propose to view the first two (subjective/inter-subjective) as one dimension that cuts across the other three aspects, which altogether constitute a two-dimensional scheme of action knowledge aspects. Additionally, action prerequisites, serving as a base for action (cf. Goldkuhl and Ågerfalk, 2000), do not necessarily have to be explicitly stated linguistically. Rather, they can be highly *tacit*. It is important to realize that tacit (non-explicable) as well as linguistic (explicable) action knowledge can serve as a base for action, alone or in combination. One can argue that there is always an element of tacit subjective knowledge involved in human action since explicitly stated (linguistic) action prescriptions are always interpreted and merged with the practical non-externalized consciousness of the actor. The four latter aspects (tacit/linguistic, action and consequence) can be seen as temporally ordered as *action prerequisites*, *action* and *action results*. Furthermore, tacit as well as non-explicated linguistic knowledge are *unobservable* while explicitly stated linguistic knowledge as well as actions and consequences are *observable*. Table 1 summarizes this discussion in a visual representation of the two-dimensional scheme.

| | *Unobservable* | | *Observable* | |
|---|---|---|---|---|
| | **Tacit** | **Linguistic** | **Action** | **Consequence** |
| **Subjective** | Inexplicable personal knowledge. | Explicable personal knowledge. | A person performing an action, meaningful and understandable to that person. | Result of a single person's action, meaningful and understandable to that person. |
| **Inter-subjective** | Shared inexplicable knowledge. | Shared explicable knowledge. | Several people performing a co-operative action, meaningful and understandable to the persons involved. | Result of several people's co-operative action, meaningful and understandable to the persons involved. |
| | ***Action Prerequisites*** | | ***Action*** | ***Action Results*** |

**Table 1:** A two-dimensional scheme of action knowledge aspects.

It is important to realize that knowledge that is primarily regarded as a consequence aspect in one context might be considdered as tacit, linguistic or action in another. That is, a piece of knowledge must always be understood in relation to other pieces of knowledge and from the point-of-view that it is observed. I will return to this recursive nature of action knowledge below when discussin the grounding of such knowledge. The empirical work on actability is mainly concerned with inter-subjective observable knowledge, such as method prescriptions with method-following actions and consequences. Nonetheless, for the concept of actability, unobservable knowledge is important since action is always influenced by unarticulated prerequisites, which of course complicates the design of information systems.

## Principles for the Grounding of Action Knowledge

Goldkuhl (1999) states that the notion of practical rationality (Weber, 1978) is necessary in order to ground action knowledge since prescribed means must be possible to relate not only to empirically observable consequences but also to intended ends and values. According to Weber (*ibid*.), rationality consists of three sub-rationalities: *instrumental rationality* (means in relation to ends), *rationality of choice* (ends in relation to values) and *normative rationality* (ethical principles in relation to action). The first two of these are related to purposive-rational action, and the third to value-rational action. Furthermore, the concept of grounding of action knowledge assumes that rationality is argumentative and discursive, which means that it is possible to argue the validity of the knowledge in inter-subjective dialogues (Goldkuhl, 1994). This view, with its roots in Habermas' (1984) social-critical concept of rationality, is the key to an important distinction between true and valid – something is 'true' for somebody if that somebody accept it as valid and useful. '*Claiming the validity of knowledge is pre-*

*senting good reasons as arguments for the knowledge.*' (Goldkuhl, 1999) Hence, grounding of action knowledge is to present such good reasons for it that other people accept it as valid. This is supposed to be done by argumentatively relating the focused knowledge to three different knowledge sources acting as warrants for the knowledge under scrutiny. These three knowledge sources give rise to three different grounding processes. Understanding these three grounding processes (summarized in Figure 1) is important in order to understand how the validity of actability can be claimed.

First, the knowledge can be related to its own background knowledge and hence knowledge partly holds its own justification. This *internal grounding* means to reconstruct and articulate knowledge that might be taken for granted. All explicated knowledge can be understood in terms of the concepts used to articulate the knowledge. To analyse how these concepts relate, and to define the concepts as such, is to perform a conceptual grounding of the knowledge. Another important aspect of the articulation of the background knowledge is to relate it to its values and goals. Furthermore, the concepts used and their anchoring in values need to be consistent and free from ambiguities and internal contradictions. This can be achieved through an explicit evaluation of the cohesiveness of the knowledge. Second, the knowledge can be related to other existing knowledge of theoretical character. This *external theoretical grounding* means to perform conceptual grounding and value grounding where relations between the focused knowledge and other external knowledge are in focus. It might also mean the grounding of the knowledge in existing explanatory theories. Third, the knowledge can be related to empirical observations. This *empirical grounding* means to ground the knowledge through applications and observations.

- Internal grounding
  - Knowledge reconstruction
  - Conceptual grounding
  - Value Grounding
  - Evaluation of Knowledge Cohesion
- External theoretical grounding
  - Conceptual grounding
  - Value grounding
  - Explanatory grounding
- Empirical grounding
  - Application and observation grounding

**Figure 1:** A summary of the different action knowledge grounding processes (Goldkuhl, 1999).

## Concepts, Operationalizations, Actions and Consequences

In addition to the above mentioned aspects of knowledge existence, action knowledge might exist in different forms of abstraction – from 'pure' abstract theoretical knowledge to knowledge directly applicable in everyday situations. In the case of actability there has been a need to operationalize it into more applicable and empirically testable forms. The idea of operationalization assumes two basic categories. I refer to these as *concept* and *operationalization*. The concept is always more abstract than its operationalization and both need to be an explicitly stated linguistic aspect of the action knowledge under scrutiny. This is necessary in order to observe and communicate the analysis between researchers and reporting the results of the research. Of course, they need not be explicated initially, even though I believe that they should since the externalization of knowledge into a written formulation requires precision and hence the very externalization process becomes an important part of internal grounding of both the concept and its operationalization. Thus, the formulation and externalization of a concept and its operationalization implies an internal and external theoretical grounding. The operationalized concept can then be applied in practice whereupon consequences arise. I refer to these two instances of the action knowledge as *application* and *consequence*, respectively. The first represents an action aspect of the knowledge and the second represents a consequence aspect. Both instances are possible to relate to empirical observations and empirical data and thus together constitute the empirical grounding of the action knowledge. To summarize, I conclude that one piece of knowledge can be instantiated and studied in (at least) four different shapes: as a concept, as an operationalization of the concept, as an application of the operationalization, and as a consequence of the application. Table 2 concludes this discussion with actability as the main concept for this work with three different operationalizations.

| ***Inter-subjective linguistic aspect*** | | ***Inter-subjective action aspect*** | ***Inter-subjective consequence aspect*** |
|---|---|---|---|
| **Concept** | **Operationalization** | **Application** | **Consequence** |
| Actability | VIBA/SIMM | Specifications of requirements | Requirements specifications |
| Actability | Actability Evaluation Model | Evaluation of existing and re-designed systems | Evaluation reports and re-design suggestions |
| Actability | Analytical Frame of Reference | ▪ Analysis of the IBSA<br>▪ Analysis of the LIM | ▪ Description of the IBSA<br>▪ Description of the LIM |
| ***Internal grounding and External theoretical grounding*** | | ***Empirical grounding*** | |

**Table 2:** Operationalizations of actability with their applications and consequences.

Note that the consequence instance of the action knowledge, as well as an operationalization, can be considered as a concept in its own right. That is, we can choose to focus, for example, the consequence as 'the piece of knowledge' and operationalize it, *et cetera*, to eventually arrive at even more specific applications and consequences. As suggested above, I believe that this recursive character is inherent in the nature of action knowledge. In the practical research work, this recursiveness has been used as a means to go further into specific applications (see below). It has also been used for the purpose of grounding of actability *per se* as described below.

## Generation and Validation of Knowledge

Within the concept of grounding of knowledge we must conceptually distinguish between the *generation* and the *validation* of knowledge. Even though the two are usually quite intertwined it is possible to talk of a 'context of discovery' and a 'context of justification' (Goldkuhl, 1999). Traditionally, knowledge is generated and validated either inductively or deductively. In the case of induction the knowledge source for generation is purely empirical observation. Advocates of strict Grounded Theory (e.g., Strauss and Corbin, 1998) even claim that knowledge must be generated from empirical data and not from preconceptions and pre-formulated hypotheses. With a deductive approach knowledge is generated from external knowledge of theoretical character or simply through 'internal' construction of hypotheses. The knowledge is then validated through, for example, empirical observations. An alternative approach to strict induction or deduction is what is usually referred to as an abductive approach (Alvesson and Skjöldberg, 1994; Pierce 1931-35). The idea here is to continuously develop theory based on external theories and on empirical observations and to let the evolving theory play an active part in collecting and interpreting data in a recursive manner (cf. Walsham, 1995). An abductive approach helps to remedy some of the problems with a strict inductive approach, such that it helps directing attention to relevant phenomena. It also helps to create knowledge that is known to be practical right from the outset. An abductive approach that acknowledges all three sources of knowledge (internal, external and empirical) as important for both generation and validation has been used in the research on actability. With that approach, we can use different external theories as a source for generating knowledge. This knowledge can then be applied in practice and empirical data collected, which typically will have repercussion on the knowledge under development. The knowledge can also be related to other external theories (and/or the ones used for its generation) to achieve external theoretical validation. This way generation and validation go hand in hand during an accumulative grounded knowledge development.

## The Grounding of Actability

The process of grounding of actability follows what has been discussed above, i.e., internal grounding, external theoretical grounding and empirical grounding. Note that by grounding I refer to both generation and validation as two important aspects of grounding. The main sources for external theoretical grounding has been various contemporary IS knowledge domains, primarily HCI (e.g., Preece *et al*., 1994; Norman, 1988), information systems development and requirements engineering (e.g., Iivari and Lyytinen, 1998; Jacobson *et al*., 1992), and communication modelling, including the language action perspective (e.g., Dignum *et al*., 1996) and organizational semiotics (e.g., Stamper, 1997). The different external sources of knowledge has been reconciled and reinterpreted from an action perspective to form the concept of actability; the internal grounding process (Ågerfalk, 1999; Goldkuhl and Ågerfalk, 2000). As mentioned above, actability has been operationalized in three different ways for the purpose of its empirical grounding (see Table 3).

| **Concept** | **Internal Grounding** | **External Theoretical Grounding** | **Empirical Grounding** |
|---|---|---|---|
| Actability | Purely internal | ▪ HCI<br>▪ ISD (RE)<br>▪ CM (LAP + OS) | ▪ Actability Design (the ISD method VIBA/SIMM)<br>▪ Actability Explanation (an analytical frame of reference)<br>▪ Actability Evaluation (an evaluation model) |
| Actability Design | Internal plus actability | ▪ RUP/UML<br>▪ Human Centred Design<br>▪ Rapid Application Development | ▪ Development projects<br>▪ Classroom experiences |
| Actability Explanation | Internal plus actability | ▪ Grounded Theory<br>▪ Abduction | ▪ Analysis and description of the IBSA |
| Actability Evaluation | Internal plus actability | ▪ Usability evaluation methods<br>▪ General evaluation methods | ▪ Evaluation, re-design and follow-up cycles |

**Table 3:** Grounding of the different concepts.

The first operationalization, Actability Design, is in the form of a requirements engineering method referred to as VIBA/SIMM[3]. The second operationalization, Actability Explanation, is in the form of an analytical frame of reference intended for analysing and understanding information systems phenomena. The third operationalization, Actability Evaluation, is in the form of a model for evaluation of actability. Since action knowledge is recursive by nature, so is the process of grounding it. Therefore, a particular concept (see above) can be grounded both internally, externally and empirically. The result of (or rather the operationalization used for) empirical grounding can then be focused as a concept in its own rights to which the three grounding processes apply as well. Table 3 shows the three groundings of actability *per se* and of its three operationalizations. The adopted principle is that the grounding of an operationalization, for example the Actability Evaluation Model, internally, externally and empirically yields an empirical grounding of actability, which is the main concept under scrutiny. As shown in Table 3, the internal grounding of an operationalization includes the grounding of it in its actability 'legacy' as well. Above I mentioned that actability has been externally grounded mainly with respect to HCI, information systems development (ISD) and requirements engineering (RE), and communication modelling (CM). Each operationalization has then been externally grounded in more specific approaches within these larger areas, as shown in Table 3. In the next section I will present the grounding of these operationalizations. But first some words about why these three operationalizations were chosen for the empirical grounding of actability.

To develop methods to support the development of information systems of high actability is arguably one of the most important ways to operationalize the concept into directly applicable knowledge. In fact, this is where the actability saga once began. When the work on actability was initiated, it served as an articulation and refinement of the theoretical backbone of the already existing RE method VIBA/SIMM, originally published by Goldkuhl (1993). While redesigning the method to take advantage of recent knowledge developments, the idea of actability grew and became an important concept beyond merely a foundation for requirements engineering. During the work on VIBA/SIMM it became clear, however, that there was a need to also assess existing systems as well as making formative evaluations. This was when the need for a thorough actability evaluation model became obvious. Both VIBA/SIMM and the actability evaluation model represent normative prescriptive action knowledge in the form of method support. This is one important form of action knowledge but not the only one (Goldkuhl, 1999). Creating and applying an analytical frame of reference to guide the analysis of different information systems phenomena is a way of exploring the explanatory power of actability – another important form of theoretical knowledge. So far the analytical frame of reference has been used to characterize the Internet-based software artefact (IBSA), which is a particular form of IS constructed using Internet-technology (Ågerfalk *et al*., 2001).

## Research on Actability

The research on actability has been going on since early autumn 1997 when the redesign of VIBA/SIMM was initiated. The research process, as described above, implies that the internal grounding and external theoretical grounding of actability has been highly intertwined with its empirical grounding and hence with its different operationalizations. I refer to these two generic foci as conceptualization (internal grounding and external theoretical grounding) and application (empirical grounding). These two foci constitute a hermeneutic spiral-like structure connected by the operationalization (see Figure 2). The empirical research within this overall framework has been (and still is) carried out differently within different empirical contexts. The all-pervading approach, however, is the abductive approach mentioned above (see Figure 3). Within this framework, an operationalization of actability is applied in practice and data continuously collected, typically through interviews, observations and field notes based on experi-

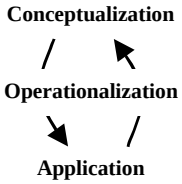


**Figure 2:** A hermeneutic spiral-like structure.

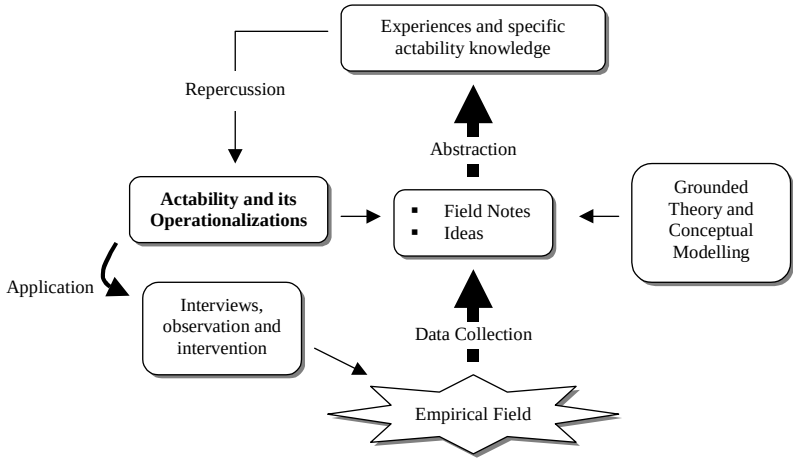


**Figure 3:** The Empirical Research Arena

[3] Versatile Information and Business Analysis according to the Situation adaptable work and Information Modelling Method.

ences from interventions (i.e., action research). Collected data are then analysed and suggestions for modification of the operationalization identified. As a means for structuring the analysis, the data is categorized and interrelated in a structured way similar to that of Grounded Theory (Straus and Corbin, 1998). To this end, conceptual modelling is also used as a way to picture and describe the generated categories. During analysis, actability and the focused operationalization is used as a tool that directs attention to phenomena relevant for the situation at hand. During this iterative process of operationalization, application and conceptualization, repercussion on the concept of actability itself occurs as a natural consequence. This way actability is continuously developed conceptually while it is being empirically validated.

In the remainder of this section I will discuss the three operationalizations of actability and argue their validity by presenting in more detail how each of them has evolved. It is important to realize that even though the three operationalizations are treated as three distinct phenomena, they are somewhat overlapping and intertwined. For example, some elements of the RE approach to Actability Design (VIBA/SIMM) will be used in the model for Actability Evaluation as well. Furthermore, knowledge developed during the work on one operationalization has substantial impact on the others since they all derive ultimately from the concept of actability.

## Actability Design

The aim of the work on Actability Design is to operationalize actability into an ISD method, VIBA/SIMM, with special focus on RE. An ISD method represents normative and prescriptive knowledge intended to help system developers direct attention to certain important aspects during systems development. The result of the use of the method is a detailed requirements specification including functional and non-functional requirements, requirements on information content and user interface design requirements. The method adopts an iterative approach that promotes a combination of analytical modelling and prototyping. As shown in Table 5, VIBA/SIMM is influenced by current developments within RE, such as the RUP (e.g., Kruchten, 1999) and the UML (e.g., Booch *et al.*, 1999), User-Centred Design (e.g., Preece *et al.*, 1994) and Rapid Application Development (e.g., Martin, 1991; Graham, 1998)). Since based on actability, process orientation and a communicative view on information systems are also important influences. Details of the method has been described by Ågerfalk (1999), Ågerfalk *et al.* (2000) and Ågerfalk and Goldkuhl (2001).

| | |
|---|---|
| **Internal Grounding** | ▪ Internal plus actability |
| **External Theoretical Grounding** | ▪ RUP/UML<br>▪ User Centred Design<br>▪ Rapid Application Development |
| **Empirical Grounding** | ▪ Development projects<br>▪ Classroom experiences |

**Table 4:** Grounding of VIBA/SIMM.

As mentioned above, Goldkuhl (1993) published the first official version of VIBA/SIMM and during the autumn 1997 a major redesign of the method was initiated. The work on VIBA/SIMM has followed the abductive approach described above (Figure 3). Basically, different versions of the method has been proposed and used in different development contexts (see Figure 4). During the empirical work, changes have been made effective in the method both instantly during development projects based on 'modification ideas' and through explicit redesigns based on qualitative analyses of collected empirical data. The empirical work has also included educational settings where students have been observed using the method.

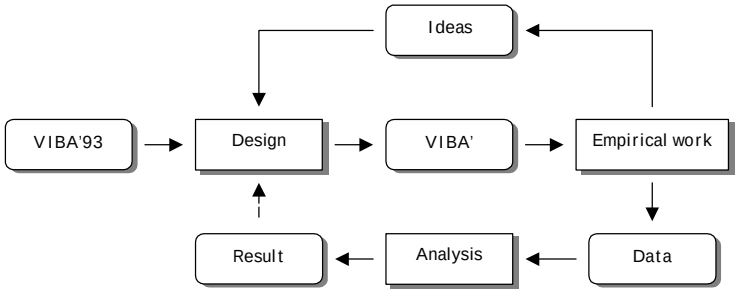


**Figure 4:** The work on VIBA/SIMM.

## Actability Explanation

The aim of the work on Actability Explanation is to operationalize actability into an analytical frame of reference that can be used to understand and describe different information systems phenomena. The framework is in the form of a set of different interrelated categories that can be used to direct attention during qualitative analysis. The way the frame of reference is supposed to be used follows the general approach for this work as described in Figure 3 and is hence based on an abductive variant of Grounded Theory analysis (see also Table 5).

| | |
|---|---|
| **Internal Grounding** | ▪ Internal plus actability |
| **External Theoretical Grounding** | ▪ Grounded Theory<br>▪ Abduction |
| **Empirical Grounding** | ▪ Analysis and description of the IBSA |

**Table 5:** Grounding of the actability analytical frame of reference.

The creation of the framework has been performed as an iterative process during which the frame of reference was used to characterize the Internet-based software artefact (IBSA), see Ågerfalk *et al.* (2001). So far the work on actability explanation has been performed in a joint project with an industrial partner (anonymously referred to as 'the IT Company'). During this study, data was collected from studies of the RUP with related sources and professional IBSA developing practices at the IT Company. The collected data was then analysed by use of the actability analytical frame of reference to generate a description of the IBSA and empirically verify the possible use of actability as an explanatory tool. The description of the IBSA will be used in our further research on method configuration, but that is another story (cf. Karlsson, 2001).

The intention is to elaborate further on the analytical frame of reference and use it to describe other types of IS phenomena as well. Actually, Ågerfalk *et al.* (2000) used an unarticulated embryo of the framework to discuss actability and the concept of trust in relation to local Internet-based marketplaces. Our intention is to carry on with that work.

### Actability Evaluation

The aim of the work on Actability Evaluation is to operationalize actability into a model that can be used for evaluating the actability of information systems. The work is meant to complement contemporary models for usability evaluation in order to take full account of the action character of information systems and the relation between the IS, its users, their actions and the business context.

| | |
|---|---|
| **Internal Grounding** | ▪ Internal plus actability |
| **External Theoretical Grounding** | ▪ Usability evaluation methods<br>▪ General evaluation methods |
| **Empirical Grounding** | ▪ Evaluation, re-design and follow-up cycles |

**Table 6:** Grounding of the actability evaluation model.

At the time of writing we are working on the articulation of the model and investigating pros and cons with other evaluation models, both general evaluation models (e.g., Patton, 1990) and usability evaluation models specifically (e.g., Preece *et al.*, 1994), see Table 6. Additionally, Hedström and Cronholm (2001) have performed some preliminary work on actability evaluation, which will serve as input to this work.

The work has been principally divided into five steps, where we at the time of writing find ourselves engaged in step one. The steps are (1) introductory theorization and preparation of empirical work, (2) evaluation of chosen IT systems' actability, (3) redesign of systems, (4) follow-up of modified systems and their actability, and (5) theoretical refinement and conclusions. In this work we want to study different types of information systems (internet-based, standardized business systems, *et cetera*) within different types of organizations.

## Conclusion

In this paper I have presented the concept of information systems actability and the ongoing process of grounding it (generating and validating) – a process towards an improved understanding of information systems as tools for business action and communication by means of researching the applicability of actability. I have discussed three generic grounding processes with corresponding knowledge sources: internal grounding, external theoretical grounding and empirical grounding; and specifically how these has been used (and still are being used) to ground the concept of actability. The research process has been described as an abductive approach where actability has been generated and validated by means of three, partly overlapping, operationalizations: Actability Design, Actability Explanation, and Actability Evaluation. The first focused on actability as a foundation for information systems development, the second on evaluation of actability in existing systems, and the third on using actability as a means to understand information systems phenomena. Now it is time to conclude. Is the concept of actability valid, and if so, in what sense and to what extent? Since this is an ongoing research process, actability currently conducts a journey towards validation, and hence it cannot already be valid, or can it? Actually, the very concept of validity, as discussed above, implies two contradictory conditions: (1) all knowledge is valid and (2) no knowledge is valid. In this paper I have argued the validity of actability by presenting the different grounding processes and activities performed to that end. Now it is up to you as a reader of the paper to pass the sentence. If you believe that what I have proposed means that actability is valid (or at least is soon to be), then so it is.

## Acknowledgements

I am indebted to the many people in the Research Group VITS who have contributed to the presented research on actability. First and foremost I would like to mention Göran Goldkuhl and Stefan Cronholm who have contributed strongly to the conceptualization of actability and to the work on actability design (VIBA/SIMM). I

would also like to mention Anders Hjalmarsson and Fredrik Karlsson with who I work closely on the analytical actability frame of reference. Finally, I would like to mention Emma Eliason who has put a lot of effort into the actability evaluation model together with myself, Göran and Stefan.

This work has been financially supported by The Knowledge Foundation (KK-stiftelsen), The Swedish National Board for Industrial and Technical Development (NUTEK), and The Swedish Council for Work Life Research (RALF).

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