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Pragmatic Qualities of Information Systems – Actability Criteria for Design and Evaluation

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Abstract: Information systems actability theory builds on a communicative action perspective on IS. Information systems are seen as instruments for technology mediated work communication. Human actors are communicating (i.e. sending and/or receiving messages) through an information system. Information systems actability emphasises pragmatic dimensions of information systems. The paper presents 18 actability criteria divided into three groups: 1) criteria concerning user-system interaction, 2) criteria concerning user-through-system-to-user communication, and 3) criteria concerning information system's contribution to workpractice processes. These actability criteria should be possible to use in design and evaluation of information systems.
Key words: information system, communication, communicative action, design ideal, value, design, evaluation, pragmatism, actability

1 Introduction

Information systems (IS) cannot be seen just as repositories of facts of the world. An IS is a communicative instrument in organisations. Actors can perform communicative actions by support of an IS. An IS is thus a mediator of communication and action between organisational actors. An IS is also an agent with capabilities to perform predefined communicative actions. This gives IS a dual role of an instrument for users and an agent interacting with users. These roles raise demands on pragmatic qualities of information systems.

Information systems actability theory (ISAT) is a conceptualisation of information systems emphasising their pragmatic dimensions. It can be seen as a practical theory according to this notion by Cronen [8]. Practical theories have a function of *directing* actors' *attention* towards certain types of phenomena. Cronen describes practical theories in the following way: "Its use should, to offer a few examples, make one a more sensitive observer of details of action, better at asking useful questions, more capable of seeing the ways actions are patterned, and more adept at forming systemic hypotheses and entertaining alternatives" [8, p 30]. Goldkuhl [13] has elaborated the notion of practical theory and divided into several constituents: Conceptualisation, patterns, normative criteria, design principles and models.

ISAT has evolved over several years with contributions from many scholars [e.g. 2, 4, 5, 7, 14, 15, 16, 24]. Information systems actability has also been operationalised into 1) methods for specification and design of IS [e.g. 2, 4, 9, 25] and 2) methods for evaluation of IS [e.g. 3, 5, 10, 24]. ISAT and its methodological operationalisations have ambitions to cover several aspects of information systems and their designs; as relations to business process, human-computer interaction, conceptual modeling and database design. An information system is considered as a technology-based system for communication and information processing including storage and transfer. This means that within ISAT, we use the concept of IS in a restricted sense corresponding to IT-system or IT artefact.

ISAT gets its current theoretical backing from theories and knowledge traditions like pragmatic philosophy, speech act theory, classical semiotics, social action theories, affordance theory, semiotic HCI engineering, conversation analysis, discourse theory and activity theory. Confer [15] for an overview of how these different background theories have influenced ISAT. As a practical theory, ISAT comprises a conceptualisation of IS and several models [15]. ISAT also comprises normative criteria of pragmatic character (quality ideals) which can be used for design and evaluation. There have earlier been several contributions of actability criteria [e.g. 2, 3, 5, 9, 24].

The ***purpose*** of this paper is to make a further contribution of actability criteria. Eighteen actability criteria will be presented. These criteria will be structured in three different groups. The different criteria groups depend on what pragmatic scope is applied (confer figure 5 below). There are 1) criteria associated with the user interacting with the system (interaction quality). There are 2) criteria for a broader scope, the user-via-system-to-user communication (communication quality). There are 3) criteria for an even broader pragmatic scope; the use of IS as part of a business process (process quality). The eighteen different actability criteria that have been identified will be articulated and clearly related to ISAT conceptualisations and models of information systems.

The ***research approach*** is a combined theory-informed (deductive) and empirically based (inductive) endeavour; see figure 1. The conceptualisation of IS in actability theory is of course a main source of inspiration. I have also looked into earlier actability criteria; some references mentioned above. However, my partial discontent with some of these criteria has been a driving force for conducting this research, i.e. developing a new set of actability criteria. I will not go through these earlier criteria and make any critical review of them; this is beyond purpose and scope of this paper. I acknowledge also an influence from other IS theories, especially from human-computer interaction. There are many other criteria concerning IS usage and human-computer interaction (HCI); e.g. well-known usability criteria from Shneiderman [23] and Nielsen [20]. There has been an influence from such criteria to earlier ISAT criteria.

I have also used learnings from several empirical studies. I have (together with colleagues and students) studied several existing information systems based on the actability perspective. When using an actability lens we have identified some feature of a system that seemed to make the system less actable. Such an empirical observation was a basis for generation of an actability criterion. The IS deficiency was turned the other way around and we stated how the system would look like if it should be actable. This gave rise to formulation of IS actability criteria as quality ideals.

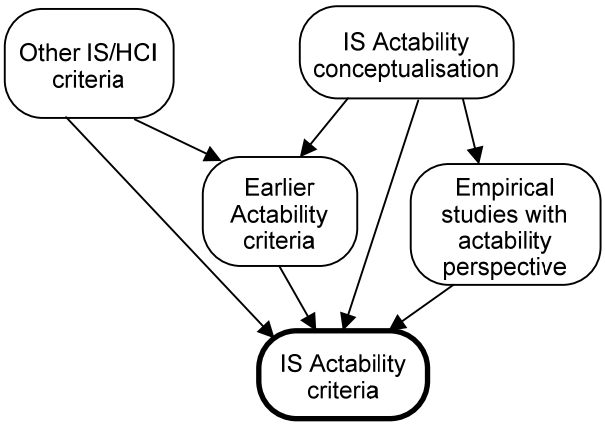

Figure 1 Combined research approach

In the next section of the paper I will go through some fundamentals of information systems actability theory. Some models will be presented as a basis for the formulation of criteria in section 3, which is the main part of the paper. The paper is ended in section 4 with conclusions.

2 Actability fundamentals

Information systems actability theory builds on a communicative action perspective on IS. Information systems are seen as instruments for technology mediated work communication. Human actors are communicating (i.e. sending and/or receiving messages) through an IS (figure 4). Sending a message through an IS means performing a communicative action. The IS affords a communicative action repertoire to its users. This repertoire enables and constrains the users in their communicating.

Such a communicative action perspective does, however, not dismiss the perspective of a human utilising and interacting with an IT artefact. ISAT comprises aspects of human-computer interaction. One important notion within ISAT is the Elementary InterAction Loop (EIAL) [2, 9, 15, 17]. This loop describes the smallest kind of interaction between a user and the IT-system (figure 2). EIAL consists of four phases. First the user interprets what can be done in this particular interaction situation. This is a phase of investigating the action repertoire and finding out what do; often called the informing phase or pre-assessment. This is followed by the intervention phase when user does something with the system; entering some kind of input to the system. The system reacts, which can mean some internal processing and some exposure of messages (feedback) to the user. The fourth and concluding phase is a "consummation" phase where the user interprets the feedback from the system. The user tries to find out (in a post-assessment phase) if the system did what was expected. EIAL builds on a fundamental action-cyclic model of pre-assessment, intervention and post-assessment [14, 19]. An EIAL can be a reading loop or a formulation loop or a navigation loop [15, 17].

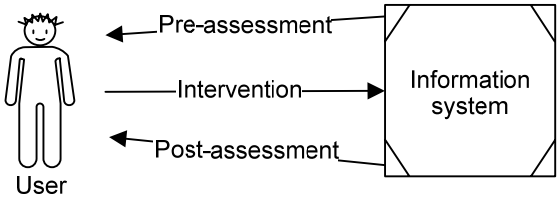

Figure 2 A user interacting with an information system: an interaction situation (an elementary interaction loop - EIAL)

The elementary interaction loop will be framed by the interaction situation, i.e. what is afforded by the current screen document. Different user actions will be possible to conduct given the repertoire afforded through the current screen document. There may be reading or formulation options. There may also be possibilities to move to other interaction situations (screen documents); i.e. navigation options. This means that information systems usually hold a repertoire of interaction situations (screen documents). One can talk about a document space and that the user will move around in this document space (figure 3).

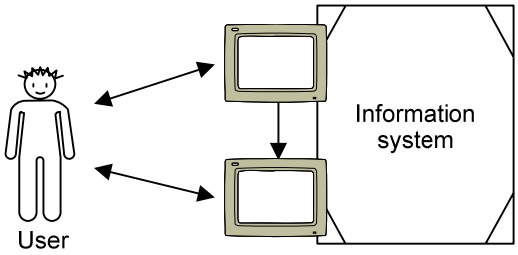

Figure 3 Navigation between different interactive situations in a system (moving in the document space)

Figures 2 and 3 have been concerned with the interaction level of information systems. I will now

turn back to the essential communication level. Information systems are used for communication between different users. This is described in figure 4 below. A focused user may read messages exposed by the system. These messages may have origin from other users (F). Messages exposed by the system to the focused user may have a direct origin from other users' formulated messages or these messages can be aggregations, combinations or other modifications (performed by the system in accordance with its programmed rules) of such original messages [24]. The database(s) of the system (called workpractice memory in the ISAT terminology) will keep input messages or modifications of such messages over time. This will enable the communication to be asynchronous.

The user can formulate and enter messages into the system. This makes the user a sender of messages. Such messages may be kept by the system (in its workpractice memory) as such or processed and transformed in some way according to the processing and storage repertoire of the system. Messages in the workpractice memory may be forwarded to other users, i.e. reading users (R). This means that the focused user can act as a communicator to other users by the support of the systems. The system functions thus as a medium for communication. Usage of an information system means a user-via-system-to-user communication. The receiving users (R) may use messages from the system as an informative basis for subsequent actions [14, 15]. This means an external use of the system (messages from the system).

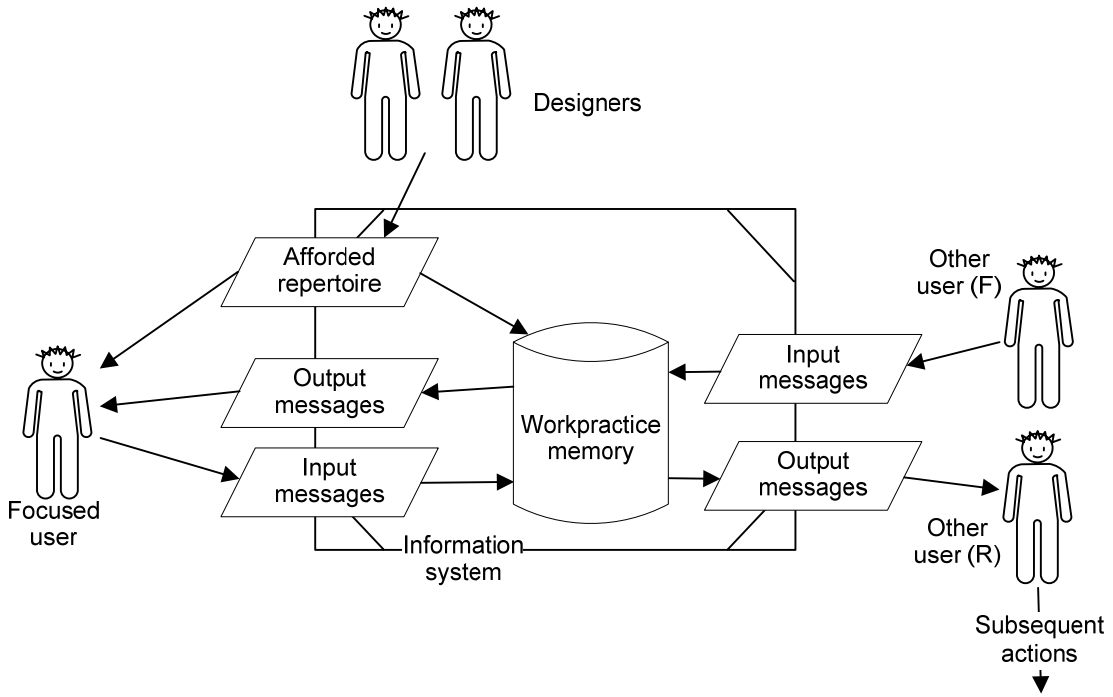

Figure 4 An information system as communication between different actors (based on [16, 17, 25])

What a user can do with a system (reading, formulation, navigation) is dependant on what the system affords to the user. The user must interpret and understand the afforded action repertoire. This afforded action repertoire should be seen as communication from those responsible for the design of the system; i.e. a designer-to-user communication [6, 11].

IS usage can thus be differentiated in several types of situations [14]:

- Reading situation
- Formulation situation
- Automatic processing situation

- Navigation situation
- Subsequent action situation

Information systems are parts of workpractices. They are communicative and information-processing instruments used for the benefits of the workpractice. The use of an IS should improve user actions within the workpractice (figure 5).

The description above has focused IS interaction and IS communication. Sjöström & Goldkuhl [25] introduced the concept pragmatic duality to express and emphasise that an IS user within the same action performed a dual action of 1) interacting with an IT artefact and 2) communicating with other users. This concept of pragmatic duality has been taken one step further into the concept of pragmatic multi-functionality [15]. Besides system-interaction and communication, pragmatic multi-functionality adds work-process contribution. This implies that one particular user action at the same time means 1) that the user interacts with the system and 2) that the user communicates with other actors and 3) that the user contributes to business process performance [ibid].

The notion of pragmatic multi-functionality implies a differentiation into three layers of pragmatic qualities (figure 5). Process quality is the broadest layer. This layer comprises the layer of communication quality. To say that the process layer comprises the communication layer means that communication is instrumental in relation the process quality. What is communicated (through the IS) should be beneficial to workpractice. The communication layer comprises in turn the layer of interaction. This means that the quality of interaction should contribute to the quality of user-to-user communication and also to process quality.

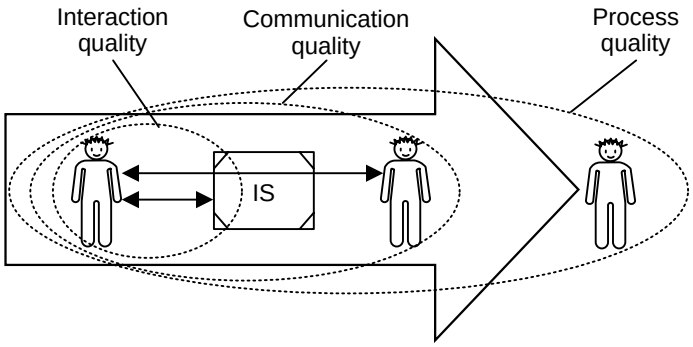

Figure 5 Three layers of actability criteria (action quality layers) (based on [15])

3 Actability criteria

Criteria for information systems are normative. They express values and quality ideals associated with IS. These criteria can be used both for design of IS and for evaluation of IS. The criteria described below are based on the four sources described in figure 1 above; i.e. IS actability theory, earlier ISAT criteria, other IS/HCI criteria and empirical studies on IS based on an actability perspective. As said above there is some influence from HCI criteria. However, the actability conceptualisation of IS are different from main-stream IS and HCI views which entails formulation of new criteria and re-formulation of old ones.

The actability criteria presented here are divided into three groups following the action quality layers in figure 5 above:

- Interaction quality criteria
- Communication quality
- Process quality

There are criteria, which can be said to relate to more than one layer. However, each criterion has been associated with only one layer (group). Nearly all criteria are associated with the two first layers. Only one criterion is associated with process quality and this will commented below (section 3.3). The group interaction quality has been sub-divided into:

- Fundamental interaction criteria
- Navigation criteria

The group communication quality has been sub-divided into:

- Reading criteria
- Formulation criteria

The pragmatic qualities of an information system are dependant on 1) the afforded action repertoire and 2) what messages have been provided by its users. It is important to recognize that the stated criteria express desirable properties of the system. These properties are seen as affordances of the system, i.e. they offer possibilities for user action of diverse actions [12, 14]. These kinds of properties are what make the system actable to its users.

3.1 Interaction criteria

These criteria are concerned with the user's interaction with the IT artefact (figure 2).

3.1.1 Fundamental interaction criteria

There are five fundamental interaction criteria which are based on figure 2 and the elementary interaction loop. Confer also the interaction quality dimension in figure 5.

I1. Clear action repertoire

This criterion is concerned with the first step in the EIAL; the informing (pre-assessment) phase where the user tries to understand what the system can do or in other terms what the user can do with the system (figure 2). The system affords a repertoire of possible actions to the user. In order to conduct any actions, the user needs to identify and understand what the action potential is. The action repertoire can be divided into 1) reading repertoire (what the user can get to know through the system), 2) formulation repertoire (what the user can say to others through the system), and 3) navigation repertoire (what kind of interaction situations/document types the system affords and how to reach these interaction situations). All these three types of action repertoires need to clear to the user.

This criterion states that the system should expose its action repertoire in a clear way to the user. A clear action repertoire enables the user to be well-informed what do with the system and that he can perform subsequent actions with confidence. An actable system should have a clear action repertoire.

I2. Intelligible vocabulary

This criterion is in one sense more general than the earlier one. It is concerned with exposed action repertoire, but not only this. It is concerned with the language used in the whole user interface of the system. For the user to understand what to do and also to accomplish different tasks, it is necessary to understand the language used. The vocabulary of the system needs to be harmonious with the workpractice language of its users. As much as possible the same terminology and concepts should be used in the system as in the surrounding workpractice. The system should also provide explanations for the different used concepts, so the user can check the meanings.

The criterion states that the used vocabulary should be intelligible and correspond with the users' workpractice language. This enables the user to act with confidence in many interactive situations and to interpret information from the system accurately. An actable system should have an intelligible

vocabulary.

I3. Action transparency

This criterion is concerned with the afforded actions of the system. The system affords actions (e.g. formulation actions) to the user. For the user it is important to understand what the consequences of a conducted action will be. What will happen after the user has pressed a certain button on the user interface? What does the system execute after the user has entered a certain message? In order to act with confidence (i.e. to be sure what will happen subsequently in and through the system) the user needs to have a clear picture of subsequent actions after the interaction has been performed.

The criterion states that the user should understand in advance what will happen when he performs different IT-mediated tasks. This enables the user to act in confidence when interacting with the system. The user becomes well-informed about the action repertoire and can anticipate the consequences of different actions. An actable system should be action transparent.

I4. Clear feedback

This criterion is concerned with the post-assessment phase of the EIAL (figure 2). The user obtains a clear feedback of what has been performed through an interaction. The user will not be in doubt of what has happened after his intervention. Depending on what type of interaction (reading, formulation or navigation loop) there will be different kinds of feedback [17]. A formulation action needs explicit feedback, so the user can be ensured that his formulated message has been registered. A reading interaction will give messages to read as an apparent feedback. A navigation demand should bring the user to the requested screen document. This criterion on feedback coincides with what has been stated in many HCI publications, e.g. [23]. It has here been clearly related to the phase conceptualisation in ISAT (the fourth phase in the EIAL loop).

The criterion states that the user should receive a clear response (a feedback) to his intervention to the system. This feedback enables the user to post-asses his intervention properly and thus to be sure about the results of his earlier action. An actable system should produce clear feedback to the user.

I5. Amendability

This criterion is concerned with possibilities to correct earlier actions made to the system. Errors are made during IS usage. This is the case even if there is an information system with high actability. How does the system permit the user to undo what has been done earlier? There will of course sometimes be actions which are not possible to reverse due to workpractice reasons. However, a good feature of an IS is that it capable of being corrected. The user should be able to make amendments to the system. In order to do this the user should have access to what earlier actions have been performed (confer criterion C1 below) and how to undo this action. This means that amendability is a special kind of action repertoire of the system; that it comprises both the doing and undoing of a certain type of action. This criterion is also well-acknowledged in the HCI literature [20, 23].

The criterion states that the user should be able to correct an earlier erroneous action. This enables the system to be more accurate and permit the user to make certain errors without severe consequences (a “forgiving” system). An actable system should have amendability; i.e. to be possible to recover from identified erroneous actions.

3.1.2 Navigation criteria

Besides these fundamental interaction criteria there four criteria especially concerned with navigation. This means movement from one interaction situation to another (figure 3).

I6. Easy navigation

This criterion is concerned with the ease of moving from one interaction situation to another. This criterion is related to the action repertoire (navigation repertoire) of the system (cf criterion I1). It should be clear for the user what interaction situations there are in the system and how to reach such a situation; i.e. a screen document where some desired action can be conducted. It should be easy to move around in the document space of the system. There are different navigation principles in information systems as hierarchical, sequential and direct navigation. Adequate, intelligible and accessible navigation principles should be used. In order not to get lost in the document space of a system, it should offer some navigation transparency and traceability to the user.

The criterion states that the user can move around in the system in a controlled manner. This enables the user to get to the desired spot in a system easily. An actable system should be easy to navigate.

I7. Action stage overview

This criterion is concerned with the movement from one situation to another in a defined sequence of action stages in a work process. To facilitate such a movement, the system should present an action stage overview of the process and it should also inform where the user is in the process at the moment. This contextual information makes a work process more transparent. This may contribute to process quality. Since this system feature is concerned with movement from one interaction situation to another, it has been grouped as an interaction and navigation criterion.

The criterion states that the user should get an overview of the IT-mediated work process and where he is in this process at the moment. This makes the user aware of the subsequent stages of a work process and thus what is expected from him. An actable system should give action stage overviews (when relevant).

I8. Conceptual consistency

This criterion is concerned with relations between different interaction situations. The different situations should offer similar structure and use of concepts. The meaning of terms should be similar through the system in order to avoid confusing the user. Different symbols in the system should be used in a consistent way. This criterion can be found (with other formulations) in the HCI literature; e.g [20, 23].

The criterion states that the user should meet a consistent terminology and other symbology in the system. This prevents to user to be confused when using the system. The user can act with more ease and comfort. An actable system should be conceptually consistent.

I9. Action accessibility

This criterion is concerned with the allocation of action possibilities in different interaction situations. It is a challenging IS design task to make meaningful groupings of different tasks into one interaction situation (one screen document). Each interaction situation should contain appropriate action affordances. It is desirable that certain action alternatives are accessible within one interaction situation. If it appears a certain need for action in a particular situation, then it should be easy for the user to access this action affordance. It is not actable if the user needs to move around in the system in order to search for and find the requested affordance and then has problems to return back to the original place. This is not only the case of easy navigation (I6), but to put action affordances in proper places (interaction situations).

The criterion states that the user should have easy access to action affordances when needed. This enables the user to perform his tasks fluently and avoid unnecessary movements within a system. An actable system should have proper action accessibility.

3.2 Communication criteria

These criteria are concerned with user-to-user communication mediated through the IT-system. Confer figure 4 and the communication quality dimension in figure 5. Communication criteria are divided into reading criteria (i.e. the user interpreting messages that have origin from other users) and formulation criteria (i.e. the user is communicating messages through the systems intended for other users). There may of course be different kinds of processing and aggregation of messages before they reach the reading user [24]. The user will may not see the messages with original content, but rather something refined (i.e. processed by the IT system). Communication in both directions is mainly considered as a formalised communication according to a predefined message types (in a formalised workpractice language).

3.2.1 Reading criteria

This group of criteria is concerned with the user getting informed through the IT-system. What the user can get to know through reading messages that are presented by the system to him. This should not be seen as the user being passive receiving what ever messages are exposed to him. In most cases, reading is the result of an active retrieval made by a user with information needs.

C1. Clear and accessible workpractice memory

This criterion is concerned with the possibility for users to reach information stored in the system. In ISAT such storage in databases etc is called a workpractice memory. Messages are stored over time because there are requirements that different actions and observations need to be remembered. A workpractice memory is seen as an external and collective memory for actors within a workpractice; confer the notion organisational memory [1, 21]. A workpractice memory will therefore be a source for users to obtain information which might be relevant for conducting actions in the workpractice. To use workpractice memories of an IT-system is a way the get informed by others. It is also a way to be reminded by the system about earlier actions performed by the user himself.

A clear and accessible memory is thus a primary means for users to get informed by other users through the system. The reading user needs to get a good view of the reading repertoire of the system/workpractice memory (cf. criterion I1 above) and obtain possibilities to access the desired information. What is presented to the user needs to be intelligible to him (cf. criterion I2 above).

The criterion states that the user should have easy access to the workpractice memory of the system (i.e. messages from other users and also earlier messages from the actual user himself). This enables the user to get informed about different relevant issues in the workpractice. An actable system should have a clear and accessible workpractice memory.

C2. Actor clarity

This criterion is concerned with the possibilities to “see” the sender behind messages. What is said is always said by someone. IT-systems have often, unfortunately, a tendency to “objectify” messages and strip away the senders from the messages. What is kept in databases (workpractice memories) is often only the message content and not information about message origin (i.e. the sender). To know about the senders (i.e. the originators) of different messages is a way for reading users to be better informed about what is conveyed. There may arise needs for more information which leads to a need for the user to get into contact with the sender; either through the system or besides the system. To have visible senders means more transparent systems. This criterion is a call against anonymity in information systems. It is a call for actor clarity. Actor clarity can either mean clarity about organisational actors, roles or distinct persons. Actor clarity is about identification of senders.

The criterion states that the user should as far as possible be aware of who has said what through the system. This may enable the user to reach contact with originators of messages. An actable system

should have actor clarity (i.e. visible senders of messages).

C3. Intention clarity

This criterion is concerned with the precision and clarity of messages. It states that messages should not only contain a propositional content, but also a clear intention; or stated in terms of speech act theory [22] a clear illocutionary force. IT-systems have often, unfortunately, a tendency to "objectify" messages and strip away the intention from the messages. What is kept in databases (workpractice memories) is often only the propositional content and not information about message intention. To be sure about the meaning of a message there is a definitive need to understand the message intent; i.e. the kinds of relations that are established between senders and receivers.

This criterion is classified as a reading criterion; the reader must understand the intention of messages presented to him. There is of course also a need for senders to be aware of the presumed intention in the communication repertoire of the system.

The criterion states that the user should be aware of intentions of the conveyed messages. This enables the user to properly understand the full meanings of read messages. An actable system should have intention clarity.

3.2.2 Formulation criteria

This group of criteria is concerned with the user communicating through the IT-system. What the user can say to others through the system. This is concerned with role of the user as a formulator and sender of messages through the system.

C4. Satisficing communication needs

This criterion is concerned with the possibility to serve the communication needs of the user. Are there possibilities (within the communication repertoire of the system) for the user to formulate desired messages? The criterion is concerned with the semantic expression capability of the system. Can the user say what he desires through the system or must he use other communication channels? Is it possible, not only to express routinized messages, but also to express the exceptional and unexpected?

The criterion states that the user should be able to realize communication needs through formulating messages into the system. This facilitates communication in the workpractice and puts it into organised and recognised patterns. The users will know where and how to communicate which contributes to both communication efficiency and communication comfort. An actable system should satisfy the users' communication needs.

C5. Relevant communication demands

This criterion is concerned with the demands on the user when entering messages into the system for communication purposes. Communication through the system is not only concerned with user needs but also with demands on him. When communicating something through the system, there should not be put too much demands on entering information to the system that are already there. Necessary identification of information objects needs to be done, but this identification process needs to be done with as much ease (guidance) to the user as possible. The user should not be demanded to re-register (repeat) information that is already kept in the system.

The criterion states that the user should not be demanded to re-register information into the system that is already kept by the system itself. This will not put unnecessary burden on the user. It will instead facilitate the task of entering information into the system. An actable system puts relevant communication demands on the user.

C6. Workpractice memory addition

This criterion is concerned with adding messages into the workpractice memory of the system (see C1 above). The formulation of messages (as described in C4 above) should lead to a deliberate use of these messages in the system (processing, transfer, storage). This criterion is concerned with aspects that are directly subsequent to the formulation of messages (C4). The entered messages may need to be processed in proper ways and stored in the workpractice memory for later use. The addition of messages to the workpractice memory establishes proper communication conditions of the IT-system. These communication conditions need to be managed dynamically by the system through its continual addition of messages into the system. The workpractice memory needs to be accurate and up-to-date. Workpractice memory addition enables the system to be used for retrieval and reading (C1) and directing messages to targeted addressees (se C7 and C8 below).

The criterion states that the system should process and store input messages in proper ways in order to establish good communication conditions through the workpractice memory of the system. This enables later retrieval and reading of messages and intended distribution of messages to targeted addressees. An actable system should have an updated workpractice memory, through addition (processing and storing) of input messages which functions as communication conditions of the system. An actable system should have a well functioning workpractice memory addition.

C7. Addressee relevant communication

This criterion is concerned with distribution of messages to users, i.e. to actors that are seen as intended addressees of the messages. Formulation of messages into the system (C4 above) shall in some defined situations be followed by the exposure of these messages or some related messages (that has been processed) to appointed receivers. The system should be able to distribute messages to such intended addressees and that these messages are considered relevant for these addressees. We are here concerned with intended communication effects of formulating messages; that messages will reach the addressees as presumed by the communicator.

This criterion is also related to I3 above about action transparency. The distribution of messages to addressees must be transparent to the sender. When formulating messages he must understand and foresee the distribution of messages to targeted receivers.

The criterion states that relevant messages should be presented to intended users (addressees). This creates a full communication process from sender to receiver. The intentions of the sender to communicate something to targeted receivers will be fulfilled. Receivers will obtain relevant information. An actable system should have addressee relevant communication.

C8. Addressee adapted communication

This criterion is also concerned with distribution of messages to users, i.e. to actors that are seen as intended addressees of the messages. This criterion focuses not what is said (as in C7 above) but how messages are distributed to receivers. It may not be sufficient that a certain message is distributed to an addressee. The way an addressee receives the information may be crucial for an efficient communication process. It can concern when (i.e. appropriate time) or where (i.e. appropriate distribution place) something is presented to the receiver. It can also concern the distribution media or the form of the message. The distribution way should be adapted to the addressee and his possibilities to receive and make use of the intended message.

The criterion states that messages should be presented to intended users (addressees) in appropriate ways. This enables the addressee to be reached by the message and use it accordingly. An actable system should have addressee adapted communication.

3.3 Process criteria

This criteria group is concerned with the effects of the IS usage to the workpractice processes. Confer the process quality dimension in figure 5. In this group there is only one general criterion stated. Process quality is concerned with particular characteristics of each specific workpractice process. Goals and values concerning the specific IS and its workpractice context need to be stated in order to create workable process criteria for design and evaluation. This means that this general actability criterion (P1) needs to be supplemented by domain-specific criteria [10].

P1. Subsequent action support

This criterion is concerned with the use of information mediated through the IT-system. What is presented to the user may be used to enable or improve actions in the workpractice. The user should be supported by the system in the course of his actions. These actions can be performed outside the system or they can be performed subsequently through the system. The key issue is that the user obtains an action support relevant for tasks in the workpractice. The action support can consist of explicitly recommended actions, i.e. the information contains a very clear and action-directing support. The information can also be more indirectly action-supportive. There can be information forming the basis for decisions or giving suggestions for aspects to observe or to be attentive about. Historical information can be action-supportive in the sense that it informs the actor/user what to take into account when acting. There may also be regulative information guiding the user of what rules to follow when conducting some action; e.g. stating what kinds of action that should not be conducted.

The criterion states that information from the system should be useful to its users. Presented information should give users action support in order to improve the workpractice. Information from the system should thus contribute to process quality of the workpractice through enabling or improving actions that are seemed pivotal. An actable system should give appropriate action support to its users.

4 Conclusions

The presented actability criteria are based on:

- The actability conceptualisation of information systems
- Actability models of IS (figures 2-5)
- Other IS/HCI criteria
- Earlier actability criteria
- Empirical studies on IS based on the actability perspective

Eighteen criteria have been presented and described in similar ways. These criteria have been divided in three main criteria groups: 1) interaction criteria, 2) communication criteria and 3) process criteria. These criteria can be seen as a further development of the practical theory of information systems actability. A practical theory and its normative criteria should guide people to perceive and consider the values of studied phenomena [8, 13].

These criteria should be possible to use in the design of information systems. The functions of the criteria are here to express possible quality ideals to strive for. It is of course the responsibility of designers and other stakeholders participating in the IS development process to judge and evaluate which of these criteria should be taken into account. The criteria can be used as inspiration when designing the system together with domain-specific goals. They can also be used in formative evaluation of design proposals during the IS development.

These criteria should also be possible to use in post-evaluations of information systems. There may be many reasons for evaluations of IS in use. There are also different strategies and approaches for IS evaluation [8, 18]. In any evaluation there are needs for explicit criteria to be used as a yardstick when investigating the IS. Criteria can be captured and generated from workpractice itself. External criteria of

general character can also be used [8]. These presented actability criteria can be used as such general criteria in post-evaluations of IS. As said above (section 3.3), it is important to supplement the actability criteria with domain-specific process criteria.

The use of the actability criteria in design and evaluation may be a source for further research. It is important to inquire the practical uses of these criteria. This may lead to validation or re-formulation of criteria. Theoretical development of ISAT and empirical studies on IS and their development and use may also contribute with new or re-formulated criteria.

This paper is written as a contribution to the practical theory of information systems actability. What has been said should however not be interpreted as something restricted to this specific theory. The paper gives ultimately a contribution to our understanding of pragmatic qualities of information systems.

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