# DESIGN PRINCIPLES FOR COMMUNICATION QUALITY IN PUBLIC E-FORMS – A THEORETICAL SYNTHESIS

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## Abstract

*This paper adopts a communication perspective on public electronic forms (e-forms). By doing so we identify that forms are instruments for communication and, thus, also instruments through which citizens perform different communicative actions towards government agencies. As such instruments, the forms might be more or less easy to use. The purpose of this paper is to explore what features of an e-form that increase the communication quality. In the paper we conduct a theoretical synthesis of three existing approaches for analysing information systems. The result of this synthesis is a combined theory on key features of an e-form that make the establishment of communication quality more likely. The result consists of four key concepts (relationship quality, action space, action comprehension, and assistance in performing actions), each of which give rise to one set of design principles for communication from the issuer of the form to the user (citizen), and one set of design principles for communication from the user (citizen) to the recipient of the form.*

# 1    INTRODUCTION

Citizens interact with government agencies in many different matters. This interaction might be performed by face-to-face or telephone communication, but in most cases forms are filled in as part of the interaction. Until fairly recently these forms were printed on paper, citizens ordered them from the agency, filled them in and sent them back by mail. Many early e-government projects, however, aimed at making the forms available on-line in Internet-based information systems (i.e. e-services) so that the citizen could print them out. In more ambitious e-government development efforts the forms can be filled in electronically and sent to the agency via Internet. This is a key issue in many public e-services; to provide and manage electronic forms (e-forms) for communication between citizens and government agencies. The level of possible digital interaction through e-forms between the agency and the citizen is a frequent aspect when evaluating the level of 24/7 maturity in a government agency (see e.g. Layne & Lee, 2001; Hiller & Bélanger, 2001).

A traditional way of viewing forms is that they are instruments to *transfer information* from the citizen to the agency and vice versa. This is of course relevant, but in this paper we suggest a communication perspective as a complementing view. By adopting a communication perspective we identify that the forms are instruments for communication and, thus, also instruments through which citizens perform different communicative actions towards government agencies. A citizen might *ask* for a permission, *request* an allowance or a respite, *declare* income, *appeal* against a decision, etc. These are all examples of actions that the citizen performs while sending in a form to the agency.

Correspondingly, the government agency performs actions both as issuer of the form and as recipient of the form. The issuer decides what communicative actions that will be possible to perform through the form, what information content that is possible to give, in what way this is supposed to be documented etc. The issuer is often restricted by laws and regulations when designing the form. The case officer performs actions as recipient of the form on behalf of the agency, when he or she makes decisions based on the information content in the form. Common actions are for example to *approve* an application, *deny* a request, or *ask* for supplementary information (e.g. further details).

The communication perspective, thus, highlights the fact that there are several communicating actors in e-form use. Three roles are always present in e-form communication: An e-form is issued by one actor and usually filled in by another. The filled-in form is then received by a third actor (or, in some cases, the original actor). The actors filling these roles are in this paper called the issuer, user and recipient of the e-form, see figure 1 below. All of these roles may in reality be played by several people or a whole organisation, but the roles in themselves are always the same. The issuer generally issues several mostly identical copies of the e-form, each one filled in by a different user. One e-form may also have several recipients, especially if the e-form is complex and the primary recipient is a large organisation. The e-form might also be partly or entirely processed by a computer upon submission.

By naming one of these roles "user" we do not imply that the user is the only one who makes use out of the e-form. In fact, since e-forms are seen as being part of a business context there may be numerous people who directly of indirectly benefit from the e-form's existence and use. However, the user is normally the only one who directly interacts with the original e-form. In the context of public e-forms, the user is a citizen and the issuer as well as the recipient are persons at a government agency. The concept "user" is in this paper used as a synonym to "citizen".

*Issuer*
Creates and
distributes
the form

*User*
Fills in the
form and
submits it
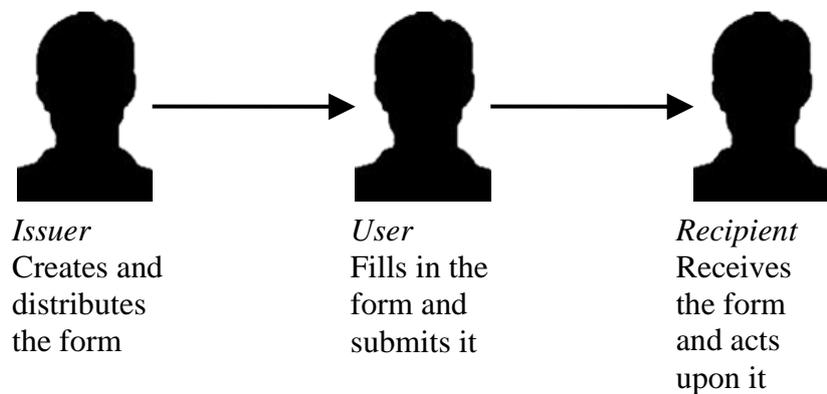
*Recipient*
Receives
the form
and acts
upon it

Figure 1: The three roles in e-form communication

The communication perspective that we adopt in this paper has its theoretical roots in the language action theory (e.g. Austin, 1962; Searle, 1969; Habermas, 1984). The key issue in language action theory is that people who communicate perform communicative actions (speech acts). Searle (1969) defines speech acts as consisting of three parts; the propositional content, the illocutionary context and the illocutionary force. The propositional content describes what the speech act is about. The illocutionary context characterizes the significant background information of the speech act and the illocutionary force specifies the intended effect of the communication.

Another important theoretical source for the communication perspective that we use is found in conversation analysis, where utterances' relations to each other are studied. While language action theory focuses on one speech act at a time, conversation analysis tries to examine how an utterance (an initiative) is followed by another utterance (a response) (Linell, 1998). This relationship is called adjacency pairs by Sacks (1992). Language action theory, as a part of a communication perspective, provides us with a deep understanding about what we do when we communicate and conversation analysis helps us to place this understanding in a wider context (a chain of speech acts). This is the reason why these two theories are suitable to merge into the communication perspective and also the reason why this perspective is feasible when studying information systems use in different contexts. This has been done by several information systems researchers (e.g. Goldkuhl & Lyytinen, 1982; Winograd & Flores, 1986; Ljungberg, 1997). In order to understand the public e-service context and the use of e-forms such a perspective, thus, provides us with important insights.

We are also inspired by the work of Cronholm and Goldkuhl (2004) where a communication analysis method is introduced. The method builds on a communication model where communicative conditions, actions, and consequences are described. This communication model emphasises the notion of 1) the sender and his or her creation of information, 2) the information content, the communicative function and the media used for the communication, and 3) the consequential actions performed by the receiver.

When viewing e-forms as instruments for communication it is obvious that the design of the e-form can result in an e-form that is more or less easy to use. We use the concept of communication quality to characterize what we mean by an e-form that is easy to use, i.e. an e-form that is fulfilling its communication purposes as satisfactory as possible. Eriksson

(2000, p. 405) defines communication quality as "*communication with qualities which contribute to actor relationships based on mutual understanding*". The purpose of this paper is to explore what features of an e-form that increase the communication quality. By conducting a theoretical synthesis of three existing approaches for analysing information systems, we develop a combined theory on key features of an e-form that make the establishment of communication quality more likely.

After this introduction, the way the analysis (i.e. the theoretical synthesis) was performed is described in the second section. The three analyzed sets of design principles are presented in section three. Then the theoretical synthesis is conducted and the result is presented in the fourth section. The issuer-user-recipient model is used to structure the results in this section. Finally, in the concluding section, four key concepts are articulated as a summary of the developed theory.

## 2 RESEARCH METHOD

This paper reports on a theoretical, conceptual work, even though the outcome of the study will apparently have practical influence. Three approaches for information systems evaluation were analyzed with the aim to combine design features from the approaches and adjust these features to the context of e-forms. The three approaches were all characterized by design guidelines; i.e. a set of principles that covers critical standpoints of each approach. The first set of principles selected as data was a set of usability principles (Keinonen, 1998). Keinonen's compilation of several previous usability models seemed to be a good starting point, since usability is the most frequently used and most well-known perspective on end-user issues. Keinonen's study represents this perspective well.

While usability is critical it does not cover communicative issues deeply enough to allow a thorough appreciation of them. Therefore two sets of principles developed from a communicative perspective on information systems were included in the analysis. The actability principles, put forth by Cronholm and Goldkuhl (2005), and the communication quality principles, put forth by Ericsson (2000), were felt to best represent this perspective, and should highlight most of the key features for this study.

These guidelines were analyzed by using a grounded theory approach (Strauss & Corbin, 1998). The set of principles were used as data and the procedures of sampling, coding, comparing and conceptualization were performed iteratively. By the third iteration the categories were beginning to feel saturated. Other sets built on similar theoretical perspectives, e.g. Sjöström's (2003) or Ågerfalk's (2003) work on actability, were almost completely covered by the other sets. The principles detailed in the first three analysed sets, while different, seemed to deal more or less with the same underlying design difficulties. Potential additional sets did not seem to enrich the developed concepts in any significant way. Thus, the analysis iteration was completed.

## 3 DESIGN PRINCIPLES FOR INFORMATION SYSTEMS

### 3.1 Usability

Usability is one of the most common perspectives used in analysing design features of information systems and has been the focus of a lot of research since the 1980s. Much of the research is grounded in cognitive psychology, and centres on how the mental faculties of humans influence how we perceive and use different artefacts. Because of this many usability theories focus on designing user interfaces that are easy to use.

Since there is no consensus on an exact meaning there are many different views on what usability really is. Keinonen (1998) condenses sets of principles from eight of the most commonly cited guidelines (Shneiderman, Apple, Norman, Polson & Lewis, Nielsen, Ravden & Johnson, ISO 9241 part 10, and Holcomb & Tharp) into a chart. This chart does not claim to be the definite word on what usability is, but gives a good summary of what the most generally agreed upon principles are. The principles in the chart are all recognised by several guidelines and many of them by almost all. In table 1 below, these eight generic principles for usability are presented.

Table 1: Eight generic principles for usability (adapted from Keinonen, 1998)

| U1 | Consistency |
|---|---|
| | Do things the same way every time so that new things have to be learned only once |
| U2 | User control |
| | Put the user in direct control of the actions performed |
| U3 | Appropriate presentation |
| | Present all information in an appropriate fashion |
| U4 | Error handling and recovery |
| | Give advance warning and allow easy detection of and recovery from errors made |
| U5 | Memory-load reduction |
| | Help the user remember important information |
| U6 | Task match |
| | Provide exactly the information that the user needs, in the right order |
| U7 | Flexibility |
| | Allow adaptation to tasks and environments beyond those first specified |
| U8 | Guidance, help |
| | Give the user relevant guidance in understanding and using the system |

## 3.2 Actability

Information System Actability Theory (ISAT) is a way of looking at information systems that highlights the actions that are performed through information system usage (Ågerfalk, 2003). This view is based on a communicative perspective on business processes. Information systems are seen as part of a business context in which actors perform communicative actions. Actability is defined as the ability of an information 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"* (Cronholm & Goldkuhl, 2005, p. 3). In table 2 below, ten generic principles for actability are presented.

Table 2: Ten generic principles for actability (Cronholm & Goldkuhl, 2005)

| A1 | Clear action repertoire |
|---|---|
| | Easily understands what he/she can do with the system |
| A2 | Satisfied communication needs |
| | Is able to "say" what he/she wants to say through the system |
| A3 | Easy to navigate |
| | Can easily move to another document |
| A4 | Action transparency |
| | Understands consequences of proposed and performed actions |
| A5 | Clear feed back |
| | Can immediately see if the intended action is executed |
| A6 | Easy access to action memory |

| A7 | Can easily access information of what has been done previously |
|---|---|
| | Personalized information |
| | Knows who has said what |
| A8 | Familiar and understandable vocabulary |
| | Understands used concepts |
| A9 | Clear intentions |
| | Understands the communicative intention of different messages |
| A10 | Support for actions |
| | Offers a good support for business actions |

## 3.3 Communication Quality

Eriksson (2000, p. 133) presents a view of communication as the performance and interpretation of communicative acts. Part of this view is that communication is used to establish a relationship between the communicating actors. Communication of high quality is defined as *"communication with qualities which contribute to actor relationships based on mutual understanding"* (Eriksson, 2000, p. 405). Eriksson also presents a set of generic principles for establishing communication quality in an information system. In table 3 below, these twelve generic principles for communication quality are presented.

Table 3: Twelve generic principles for communication quality (adapted from Eriksson, 2000)

| C1 | Communication acts with a relevant and comprehensible information content |
|---|---|
| | The propositional components of communicated messages are relevant and understandable |
| C2 | Communication acts with a relevant and understandable action aspect |
| | The illocutional components of communicated messages are relevant and understandable |
| C3 | Comprehensible communication |
| | The communicating actors are able to understand each other |
| C4 | Trustworthy communication |
| | The communicating actors are able to trust the communicated messages |
| C5 | Communication acts which can be controlled and criticised by the interpreter and defended by the sender |
| | The messages are to be clear enough that the user can evaluate their validity |
| C6 | Trustworthiness/Security |
| | The communicating actors are trustworthy and have a good reputation |
| C7 | Empathy |
| | The communicating actors are considerate, respectful and cooperative towards each other |
| C8 | Reliability |
| | The communicating actors honour their commitments |
| C9 | Messages with a good presentation |
| | Presentation of messages is visually clear and aesthetical, supporting human cognition |
| C10 | Suitable media for the communication |
| | The medium is a viable way of conducting the communication |
| C11 | Good recollection of the communication and commitments made |
| | The actors are able to recall previous communication |
| C12 | Good access to information and communication |
| | The actors have access to the information they need |

# 4 FEATURES THAT AFFECT COMMUNICATION QUALITY IN E-FORMS

In this section the categories developed through comparing the coded data to each other will be presented. For each category the underlying concepts found during the analysis of the category and the data will also be briefly described. The data in this study were the principles from the three approaches summarized in table 1-3. After analysing the data, six categories of principles were created, see table 4 below.

The principles in the first category dealt with the way the relationship between the communicating actors was established and maintained. The concept of relationship quality was identified as an important aspect of communication in e-forms. Principles in this category were A7, C6, and C7.

The second category contained principles that covered the width of the range of actions available to the user. This is known as the concept of action space. There were six principles in this category: U6, U7, A2, C2, C10, and C12.

The next category contained principles that dealt with the users' understanding of what the actions performed within the e-form meant. This evolved into the concept of action comprehension. In this category were principles U1, A4, A8, A9, C1, C2, C3, C4, and C5.

After this came a category that contained principles covering how to make it possible for the user to select and perform the right actions. The core property of all these principles was that they all dealt with assistance in performing actions. The principles behind this concept were U2, U4, U5, U8, A1, A5, A6, A10, and C11.

The fifth category contained principles that were in fact not about communication but about interaction between the user and the system. Without a well-designed system interface it is often hard to do anything valuable with an information system. The design of the system interface (relevant to interaction quality) is however not within the scope of this paper and this concept will thus not be further analysed. There were three principles in this category: U3, A3, and C9.

The last category contained one single principle, C8. This principle was not about the design of the e-form at all but about the business process supported through the e-form. This is of course important but is an external consequence (perlocutionary effect) and not in the scope of this paper (as it refers to process quality rather than communication quality).

The first four concepts seem to be of importance to e-form communication. In the following sections we will therefore analyze these concepts to discover what they might imply for the communication quality of e-forms.

Table 4: The concepts identified by conceptualisation and the principles in each category

|  |  |
|---|---|
|  | **Relationship quality** |
| A7 | Personalized information |
| C6 | Trustworthiness/Security |
| C7 | Empathy |
|  | **Action space** |
| U6 | Task match |
| U7 | Flexibility |
| A2 | Satisfied communication needs |
| C2 | Communication acts with a relevant (and understandable) action aspect |
| C10 | Suitable media for the communication |

| | |
|---|---|
| C12 | Good access to information and communication |
| | **Action comprehension** |
| U1 | Consistency |
| A4 | Action transparency |
| A8 | Familiar and understandable vocabulary |
| A9 | Clear intensions |
| C1 | Communication acts with a relevant and comprehensible information content |
| C2 | Communication acts with a (relevant and) understandable action aspect |
| C3 | Comprehensible communication |
| C4 | Trustworthy communication |
| C5 | Communication acts which can be controlled and criticised by the interpreter and defended by the sender |
| | **Assistance in performing actions** |
| U2 | User control |
| U4 | Error handling and recovery |
| U5 | Memory-load reduction |
| U8 | Guidance, help |
| A1 | Clear action repertoire |
| A5 | Clear feed back |
| A6 | Easy access to action memory |
| A10 | Support for actions |
| C11 | Good recollection of the communication and commitments made |
| | **System interface** |
| U3 | Appropriate presentation |
| A3 | Easy to navigate |
| C9 | Messages with a good presentation |
| | **Perlocutionary effect** |
| C8 | Reliability |

## 4.1    Communication from Issuer to User

The issuer-user-recipient model (figure 1) means that there are two general instances of communication involved in e-forms – communication between the issuer and the user and communication between the user and the recipient. In this section the principles in all four categories will be analysed to determine what they might mean for the communication between the issuer and the user of the e-form.

The purpose of an e-form is allowing the user to perform certain communicative actions. The communication from the issuer to the user functions mainly as a guide to steer the user to the correct way of doing this. The most important part of the issuer's communication is the series of cues that encourage the user to perform certain communicative actions – to supply information, to confirm some state of affairs, to assert their identity, etc. Apart from these cues an e-form regularly contains additional information aimed at helping the user perform the right communicative actions. It is the communication through these cues and additional information that is the focus of this section. The concepts developed in the previous section – relationship quality, action space, action comprehension and assistance in performing actions will be analysed one by one.

**Relationship quality**

What might the concept of relationship quality imply for the communication quality of e-forms? The first principle in this category deals with personalizing information (A7). There

should never be any doubt as to who is behind a certain message. For e-forms this means that it should always be evident who the issuer is. Even though the issuer may actually be a group of people in a government agency, somebody should always be responsible for issuing the e-form. There should always be an actual person that the user can contact about the e-form.

Another prerequisite for establishing good relationships is the trustworthiness of the issuer (C6). This will in part be a reflection of the general reputation and demeanour of the issuer. But it will also matter whether the e-form is successful in assuring the user that the communication from the issuer is appropriate and enough, and that using the e-form will be secure and meaningful.

Lastly the issuer's empathy for the user's situation is a key (C7) to sending the appropriate message. The issuer should have a respectful and cooperative attitude towards the user. Showing that the individual social relationship with the user is important is crucial for high quality business processes (Eriksson, 2000, p. 54).

### Action space

The action space is the space bounded by the possibilities and restrictions for actions that an information system has (Eliason, 2003, p. 22). The action space in this particular case is the range of communicative actions by the issuer that are or can be presented to the user. What should this range include? Or, in other words, how much should the issuer say? How verbose should the cues be, and how much additional information is needed?

The first thing that the principles in this category tell us is to be relevant (U6, C1, C2, C10). This may be seen as an upper boundary for the communication from issuer to user. Communication that is not relevant should not be performed, presumably because this is confusing, disturbing and perhaps even irritating for the user.

While it is important not to be irrelevant it also seems important to be comprehensive (A2, C12). This can be construed as the lower boundary for the communication from issuer to user. Providing too little information might render the e-form unusable.

Keinonen (1998, p. 27) expresses both sentiments by stating that *"According to the principle of task match, designers should provide exactly the information that the user needs, no more – no less."* Though this may seem obvious, it is of course very hard to anticipate exactly what the needs of the user are. What seems relevant to one user might be irrelevant to another. One user might need the communication from the issuer to be very verbose, while a briefer message might suffice for another.

The last principle in this category seems to provide a way of handling this question. Applying the principle of flexibility (U7) would mean that the e-form should be flexible enough to handle the communication needs of different users. Preferably the user should be able to control how extensive the communication with the issuer should be.

### Action comprehension

The principles in this category all deal with understanding the actions performed with the information system (i.e. e-forms in the e-service). This seems to be an essential prerequisite of communication quality within e-forms.

Several principles refer to the vocabulary used in the e-form (U1, A8, C1, and C3). The language and other symbols used must be familiar to the user. Concepts and expressions should be used in a manner that is consistent, not only through-out the e-form, but consistent with the way it is used in other information systems, since most users will spend more time using other information systems than the particular e-form in question.

Recognizing the language used is of course just the first step to understanding the underlying meaning and significance of the messages in the e-form (A4, C2). The e-form cues in

particular, can be viewed as a request to perform a specific communicative action. The user must therefore be able to understand exactly which response is being requested.

Beyond understanding the actions of the issuer, the user should also be able to evaluate and criticize them (C5). The actions should be clear enough that the user could evaluate the validity of the messages sent from the issuer to the user. The user should also be able to understand why the issuer performed a particular communication action (A9, C4). Knowing the intentions behind the action makes it easier to select an appropriate response, and allows the user to determine whether the issuer has valid reasons for requesting a certain response.

**Assistance in performing actions**

Supporting the performance of actions for the issuer-user communication is mainly about making it as easy as possible for the user to receive and understand the appropriate communication from the issuer. The system (i.e. the e-service) will be designed to support a certain action space. This is not the most important action space though, as it is the perceived action space of the user that determines what action the user might try to take. At any point it should be obvious to the user what messages are available from the issuer (A1), but the user should always be in charge of what messages the user will receive (U2).

Several principles also deal with memory-load reduction (C11, A6, and U5). This is the dichotomy that Norman (1990) calls "knowledge in the head" versus "knowledge in the world". The less information that the user is forced to remember, the more the user can focus on the task at hand and on analysing further actions. The system should therefore offer a good recollection of previous communication and commitments made.

## 4.2      Communication from User to Recipient

No e-form design will guarantee high communication quality from the user to the recipient, since the actual communication will be determined by the user. On the other hand, by carefully considering design decisions the likelihood that the user is successful in performing the intended communicative actions can be increased.

For the user, using an e-form is performing certain communicative actions. The actions are performed through a series of cue-response pairs (compare to the discussion about initiative and response in utterances by Linell, 1998). Each cue is accompanied by a means of responding – an option to check, a field to write in, a value to select, etc. To respond to these cues is to fill in the e-form. After the user has performed all communicative actions the e-form is said to be submitted. E-forms are often, but not always, constructed in such a way that no individual responses are submitted to the recipient until all required responses are filled in and the user has expressively submitted the whole e-form. Different kinds of quality controls of the information are possible to conduct before submission. Apart from responding to the cues a user might want to provide certain information not asked for or ask the recipient a question.

It is the design of interfaces that facilitate this communication which is the focus of this section. The four concepts in our theory – relationship quality, action space, action comprehension and assistance in performing actions will be analysed one by one.

**Relationship quality**

Key to high quality relationships is to personalize the communication (A7). Since the recipient of a public e-form may often be someone in a large government agency it may be impossible for the user to know exactly who will interpret his or her communicative actions (and this might actually not be decided until after the form has been submitted). It is still important that the user is able to picture who the recipient will be, since the user's view of the

recipient will influence the communication. If the user can identify with the recipient's situation there is a better chance that the appropriate action will be taken (C7). There should always be a clear way of contacting either the recipient or the issuer.

The user must also be assured of the competence of the recipient to handle the submitted e-form in the proper way, i.e. comprehend the user's communication and act on the commitments made through receiving the e-form. The user should also be able to trust that his or her integrity is respected and that the submitted information is not misused in any way (C6).

As computers are getting more advanced and more ubiquitous, more and more functions in our society are getting automated. It is possible to create e-forms that are both filled in and interpreted automatically, by computers. Interacting with a computer and with another human being is very different however, and for this reason it is always important to indicate whether the user's actions will be interpreted by a human being or by a computer (A7).

Designers of e-forms must be aware that having an automated recipient may in many cases negatively influence the communication quality. For one, the user might find it harder to trust in the competence of a computer to interpret the user's actions in the right way, which may limit the messages the user feels comfortable sending (C6). The interaction with the computer may also not be accompanied by the same feeling of mutual commitments as human communication which might lessen the user's empathy for the situation (C7). This is in line with the results of Graafland-Essers and Ettedgui (2003) who have shown that a majority of citizens still wants to interact with government agencies in the traditional ways (e.g. face-to-face). For e-government to succeed the quality of communication is crucial. Citizens who are left alone with a computer interface for permit application and a legal setting not transparent enough will not use that e-service (ibid.).

Deciding on an automated recipient is therefore not only a question of efficiency but also of quality. If some of the submitted forms are handled automatically, the user should always have the option of requesting that the form should be handled manually. In the case of public e-forms this would probably mean that the citizen uses another communication medium, since using an e-form cannot be the only way to perform a certain action towards the government agency as long as not all citizens have access to Internet.

**Action space**

The action space in user-recipient communication is the range of communicative actions that the user can perform. Just as for issuer-user communication it would seem important to find a balance between action relevance (U6, C2 and C10) and comprehensiveness (A2, C12).

For many e-forms identifying the actions that are relevant for the user would be hard, if not impossible. E-forms are designed with the purpose of facilitating one or more type of actions. E-forms vary greatly however in how free communication can be. Sometimes the possible actions are very strictly defined (e.g. answering a yes/no question), other times they are more free (e.g. an open field where the user can send an e-mail to the recipient).

Addresses are a good example of varying freedom in communication. One of the most used interfaces in the world has very lax restrictions on its action space; postcards. Addresses on postcards can be written in a number of different ways using a varying number of lines. Still, postcards tend to get delivered to the right address. The same interface on a computer is often not as tolerant. A flight booking system might have very strictly defined fields for name, address, postal code etc. If the user does not know the exact address or postal code the system will often not let the user book the flight.

The task of finding a balance between relevance and comprehensiveness highlights the importance of defining one's view of the user. This paper views users as being cooperative

communicators, see e.g. Grice's cooperation maxims (Grice, 1975). In designing e-forms therefore, one should trust the user in determining what to communicate, as the user would generally not willingly violate any of Grice's cooperation maxims. As long as there is sufficient assistance in performing actions there is no reason to mistrust the communicative intentions of the user. There might often be a good reason to give some extra information or to ask a clarifying question. Therefore the user should generally be as free as possible in choosing what to communicate through the interface (U7). Of course this principle must be used in a conscious way when designing public e-forms, since authority decisions are to be made from the information in the e-forms. Citizens' justice must not be violated as well as laws and regulations must be followed.

## Action comprehension

In order to be able to select appropriate responses the user needs to understand the possible actions that are available. First of all, the user must understand the language used in the e-form. The available actions should be described in a familiar and consistent way (U1, A8, C1, and C3).

von Wright (1971) describes three parts of an action: doing (performance), result and consequences. The user must fully understand each of these three parts to comprehend the actions available (A4). Doing is the act of performing an action. The user should be able to fully understand how the action is performed before doing it. The result of an action is the thing that gets done by performing the action. For example, the result of submitting the form is that the form gets submitted. The result is controlled by the actor. Before undertaking an action the user should be able to understand what the result is. The consequences of an action are all the things brought about by the action. These can happen as an effect of the action, but are not controlled by the actor. For an e-form, these are for example what happens after the e-form has been submitted. The user should be able to understand what the consequences of an action are supposed to be before carrying it out. There should also be a clear timeline for when different consequences take place, for example when an application will be issued if the user submits the e-form today.

## Assistance in performing actions

Understanding the actions available is not enough to be in control of the situation. The user might also need support in choosing and performing the appropriate action. The principles in this category all deal with giving the user control of the situation.

It should always be obvious to the user what the possible actions are at any single point (A1). In addition to having a clear perception of the current action space the user should always have a clear overview of the entire use situation for the e-form (U8, A10). Where does the process of using the e-form start and where does it end? What are the necessary steps that lead up to submission of the form?

After the user has selected the action the information system (i.e. the e-service) should offer the appropriate support for performing it. Keinonen (1998, p. 26) claims that *"interaction is more rewarding if the users feel they can themselves directly influence the objects, instead of merely giving the system instructions to act"*. The ideal is that the user should be in direct control of the actions performed (U2). This requires clear feedback (A5) on all actions. The information system should warn before doing any potentially hazardous actions, especially ones that cannot be cancelled. As stated above, the user should generally be able to consciously decide to do them anyway, as a cooperative and rational communicator is assumed.

After performing an action the user should be able to undo erroneous actions or edit the communicated message without doing the whole thing again (U4). This means that how to withdraw a submitted form should be clear.

# 5 CONCLUSIONS

By conducting a grounded theory analysis, the design principles of three existing approaches have been categorized and some key concepts have been identified. These have thereafter been analysed for two types of communication: communication from the issuer to the citizen and communication from the citizen to the recipient. By doing this we have arrived at a new combined theory of how communication quality in e-forms can be established, consisting of four key principles.

*Relationship quality* – The identity of the issuer should be plainly visible in the e-form and there should be an easy way of contacting either the issuer or the recipient. The issued message should be empathic to the citizen's situation and instil trust in the governmental process at hand. It should be clear who the recipient of the e-form is. The citizen should be able to trust that the recipient will understand the submitted message and honour commitments made. The citizen should be assured that submitted information is handled with integrity.

*Action space* – The communication from issuer to citizen should be comprehensive but relevant. The e-form should be flexible enough to handle citizens with varying needs. The citizen should be able to communicate everything that he or she determines to be relevant. The e-form should preferably not disallow messages not following the desired syntax.

*Action comprehension* – The issuer should use a familiar and consistent language. The citizen should be able to understand which response is being requested and the reason why. The messages should be clear enough that the citizen can evaluate their validity. The possible actions for the citizen should be described in a familiar and consistent way. Before undertaking an action the citizen should be able to understand the performance, result and consequences of it.

*Assistance in performing actions* – The citizen should be able to recognize what messages there are from the issuer, and choose among them. The e-form (and the e-service) should strive to reduce the memory-load of the citizen and offer a good recollection of previous actions. To be able to select the appropriate actions, the citizen should have a clear overview of the entire governmental process, and what actions are possible at every single point. When needed, the citizen should get guidance on how to perform the selected action. The citizen should be able to control the selected actions directly, with immediate feedback and the ability to undo or edit previous actions.

These four key concepts and their underlying design features are derived from a conceptual, theoretical analysis. This approach has resulted in design principles for communication quality in e-forms that are well grounded in theory. This has been a proper way to start this research, but the final result of the research efforts must of course also be of practical relevance. The next research phase is, thus, to apply these features in practical e-form design and evaluation settings. When doing these empirical tests of the theory, the issuer-user-recipient model will be suitable to apply.

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## References

Austin, J. L. (1962). How to Do Things with Words. Oxford University Press.

Cronholm, S. and Goldkuhl, G. (2004). Communication analysis as perspective and method for requirements engineering. In Maté, J.S. and Silva, A. (Eds. 2004). Requirements Engineering for Sociotechnical Systems. Idea Group, Hershey.

Cronholm S. and Goldkuhl G. (2005). Actability at a glance. Department of Computer and Information Science, Linköping University.

Eliason, E. (2003). Effektanalys av IT-systems handlingsutrymme. Licentiate Thesis, Department of Computer and Information Science, Linköping University. [in Swedish]

Eriksson, O. (2000). Kommunikationskvalitet hos informationssystem och affärsprocesser. Doctoral Dissertation, Department of Computer and Information Science, Linköping University. [in Swedish]

Goldkuhl, G, and Lyytinen, K. (1982). A language action view of information systems. In Ginzberg and Ross (Eds. 1982). Proceedings of third International Conference on Information Systems. Ann Arbor.

Graafland-Essers, I. and Ettedgui, E. (2003). Benchmarking e-Government in Europe and the US. RAND, Santa Monica.

Grice, H.P. (1975). Logic and Conversation. Syntax and Semantics, vol. 3, pp. 41–58.

Habermas, J. (1984). The theory of communicative action 1. Reason and the rationalization of society. Polity Press, Cambridge.

Hiller. J. and Bélanger, F. (2001). Privacy strategies for electronic government, E-government series. Endowment for the business of Government, Pricewaterhouse Coopers, Arlington, VA.

Keinonen, T. (1998). One-dimensional usability – Influence of usability on consumers' product preference. Doctoral dissertation, Department of Product and Strategic Design, University of Art and Design Helsinki, Helsinki, Finland.

Layne, K. and Lee, J. (2001). Developing Fully Functional E-government: A four-stage model. Government Information Quarterly, 18(2), pp. 122-136.

Linell, P. (1998). Approaching dialogue. Talk, interaction and contexts in dialogical perspectives. John Benjamins Publications, Amsterdam.

Ljungberg, J. (1997). From Workflow to Conversation. PhD dissertation, Department of Informatics, Göteborg university.

Norman, D.A. (1990). The psychology of everyday things. New York: Basic Books.

Sacks, H. (1992). Lectures on conversation. Blackwell.

Searle, J. R. (1969). Speech Acts: An Essay in the Philosophy of Language. Cambridge University Press, London.

Sjöström, J. (2003). Socio-pragmatical analysis of IS actability evaluation heuristics. In Proceedings of Action in Language, Organisations and Information Systems (ALOIS 2003), Linköping, Sweden, March 12–13 2003.

Strauss, A. and Corbin, J. (1998). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Sage Publications, 2nd edition, Thousand Oaks, California.

von Wright, G.H. (1971). Explanation and understanding. Routledge & Kegan Paul, London.

Winograd, T. and Flores, F. (1986). Understanding computers and cognition: A new foundation for design. Ablex, Norwood.

Ågerfalk, P. (2003). Information Systems Actability – Understanding Information Technology as a Tool for Business Action and Communication. Doctoral Dissertation, Department of Computer and Information Science, Linköping University, Linköping, Sweden.