

# ICT SUPPORTED COMMUNICATION IN HEALTHCARE

## *Benefits and Risks*

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Abstract: Supporting communication in healthcare by ICT enables actors (healthcare professionals and patients) to “decouple” on the place/time context of the communication process. On the one hand decoupling makes a more flexible and efficient organization of care processes possible, on the other hand it imposes preconditions to a number of features of the communication process and also to the standards being adopted.

## 1 INTRODUCTION

Communication plays a crucial role in healthcare. A health professional is communicating about 60% of his working day (Coiera, 2000), not only to share data with colleagues but also to inform the patient about his illness, ordering diagnostic tests and to coordinate different activities. In an ideal situation all caregivers would be standing around the bed of one patient at the same time with all data at hand, with no external interrupts, all contacts being face-to-face, and a patient answering all upcoming questions. Daily practice shows a complete other picture in which communication in healthcare is highly interruptive, often asynchronous, using a variety of messages, languages, media and coding systems, and has to deal with incomplete documentation distributed over different sources. And due to more co morbidity, more fragmentation of care, more part-time workers, but also patients who want to be more informed and involved, the so-called ‘communication space’ will grow even more. The examples from literature showing that communication errors are the main lead cause for unintended harm and errors within hospitals are numerous.

Because the quality of healthcare delivery is highly determined by the efficiency and effectiveness of the underlying communication process, we have to improve that communication process in order to keep the quality of healthcare at an acceptable level. In this paper, we describe how ICT can and should be used as means to improve the communication in healthcare.

## 2 ANALYSIS OF THE COMMUNICATION PROCESS

Decomposition of the communication process into its constituting components can reveal the features that characterize the communication process.

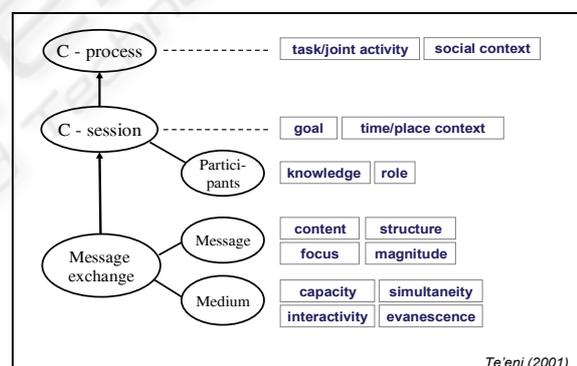


Figure 1: Decomposition of a communication process into its constituting components and their features.

According to the theoretical communication framework (Te'eni, 2001), a communication process can be decomposed into one or more sessions. Within each session one or more messages are exchanged between participants using a medium. Each of the component-levels can be characterized by a number of features (see figure 1). For example, a communication session has a specific goal and takes place within a specific time/place context, and a message can be defined by its structure, content, focus and magnitude. And because of the partitive relation between the components a message is

always exchanged within the context of a session's goal and time/place context between participants having a specific cognitive distance and (emotional) relation. This also implies that changing a feature of a component will have impact to one or more features of the underlying component(s).

Another way to show that communication always functions within a context - or in other words that communication can only be understood in relation to the context in which it is used - is by using co-tangential circles (Halliday and Martin, 1993). In this representation each circle can be seen as realisation of the outer circle(s), see figure 2.

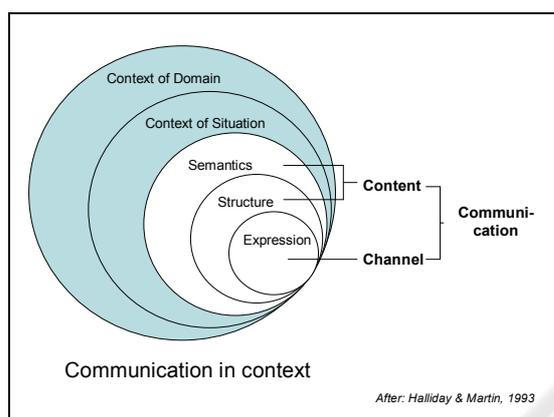


Figure 2: Communication in relation to its context.

By taking the clinical domain as an example, the context of domain includes the 'medical language', the 'clinical setting', the way of medical reasoning, etc. For the medical research domain the context of domain will include knowledge of design and analysis of e.g. Randomized Control Trials, together with the medical language and epidemiology.

Within any context of situation - comparable to the session component in the Te'eni model - one can distinguish three variables that largely determine the communication choices to be made. These variables, just like the features in the Te'eni model, refer to: the time-place context, who is taking part and in what role, and the goal of the communication.

In the next section we will introduce ICT as an intervention to the communication process and we will look for the effects of this intervention on a number of communication process features.

### 3 ICT SUPPORTED COMMUNICATION

The introduction of ICT enables participants of a communication session to 'decouple' on time/place context in a very flexible way. In other words, the

participants can choose for: same time/same place, same time/other place, other time/same place, or other time/other place. Note that decoupling can also be realised by using the traditional letter.

#### 3.1 Benefits and Risks

The main benefit of decoupling is that participants in a joint activity become less interdependent, which enables them to organize their part of the joint activity more efficiently. In literature there are several examples of reorganizations of care processes that were facilitated by a more efficient organisation of the communication process, e.g. in (Toussaint, 2004). Apart from the benefits to be gained with respect to more efficient communication, decoupling also implies losing context which can lead to misunderstanding and a possible decrease of the effectiveness of the joint activity. Because a message can only be interpreted correctly by knowing the original context, we must be aware that any loss of context has to be repaired somehow. In this reparation process, ICT can also play a crucial role, as can be illustrated by the following projects carried out by our group:

##### *SeniorGezond project*

A website has been developed for elderly to inform them about risks and prevention of fall incidences. The effectiveness of the communication is shown to improve significantly by providing extra contextual information depending on the cognitive distance (i.e. the difference in knowledge between the user and the website) (Alpay, 2007).

##### *SuperAssist project:*

Electronic personal assistants supporting distributed supervision of complex task environments are being developed. With respect to the support of communication personal assistants are able to filter, provide and enrich information, and can even express emphatic behaviour (Blanson Henkemans, 2008).

##### *RAP project:*

The effectiveness of the interdisciplinary team conferences at the Rheumatologic Rehabilitation Clinic in LUMC improved significantly by introducing ICT for decoupling on time/place context for the information session. For optimisation reasons both message structure and content (registration of more structured information items) had to be adjusted (Verhoef, 2007).

In the next two sections we will elaborate on two scenarios by describing both the benefits and the

risks of applying decoupling by ICT. For both scenarios a suggestion is made how to repair possible negative effects on other communication features.

**3.2 Scenario 1: e-Consult**

The electronic consult or e-Consult can be regarded as an additional way of communicating between a patient and his physician alongside the regular face-to-face consultation. By decoupling on time/place context the patient can ask questions that were not addressed during the normal consultation or ask for extra explanation or details for treatment, while the general practitioner can reply to patient questions outside the hectic office-hours.

Despite of these advantages, the e-Consult is still offered by a minority of primary care doctors. Literature (van Gemert, 2006) shows that for most general practitioners the disadvantages of introducing the e-Consult clearly outweigh the advantages (see table 1).

General practitioners mainly regard the e-Consult as a replacement for the consult by telephone and not as a contribution to a better quality of healthcare. This will probably be the reason that one of the main negative effects of decoupling on time/place context - i.e. the lack of personal contact - is mentioned only after arguments regarding higher workload and incompatibility with the information system. A closer look at the effects of decoupling gives support to the opinion that an e-Consult is a replacement for a consult by telephone rather than a substitute for a regular face-to-face consult.

Table 1: Advantages and disadvantages of using the e-Consult (questionnaire filled in by 654 Dutch general practitioners).

<i>Advantages</i>	<i>Disadvantages</i>
Meeting the patients wishes	Higher workload
Outside office hours	No reduction of regular consultations
Reduction of number of consults by telephone	No financial compensation
	Incompatibility with the Information system
	Lack of personal contact

Decoupling on time-place context directly has effect on other features of the communication process and in particular the message exchange component. Compared to the face-to-face consult, the interactivity will decrease, the structure of the content will increase, the capacity of the medium (i.e. the number of supported modalities) will

decrease and the evanescence will become low. Because modifications of features such as interactivity and capacity - that are essential for a regular consult - cannot be repaired, an e-Consult will never be a good replacement for a regular consult. A related consequence is that the use of e-Consults is only limited to non-urgent communication and between actors already having an established patient-doctor relation.

**3.3 Scenario 2: Clinical Research based on Clinical Patient Data**

In scenario 1, decoupling on time/place context only effects a number of features of the message exchange component, but the context of domain (i.e. the clinical care setting) remains the same. In this scenario 2, we will look at decoupling on time/place context accompanied by a changing context of domain (i.e. from clinical care to clinical research). The clinical researcher wants to reuse the clinical patient data that were captured by the clinician within the context of patient care. Reuse of data that were registered for another purpose is only feasible when a number of preconditions are met. Let us first assume that the cognitive distance between the researcher and the clinician will be limited when they are working within the same field. But their needs with respect to the granularity of the data and the number of parameters will diverge. The most important precondition however is that sufficient context information is available to the researcher to determine whether the data meets the requirements for research. As a first step towards semantic interoperability the clinician should use controlled terminologies during the registration of his findings. But apart from using non-ambiguous codes for findings or diagnoses the correct interpretation is always dependent on (part of) the original context that usually gets lost by the decoupling process (e.g. reasons for visit, medication history, co morbidity). Therefore a prerequisite to make reuse of clinical data possible is an electronic patient record system facilitating capturing and communicating both the data and their context.

**4 DISCUSSION**

Transformation of a communication scenario as described in the introduction to a communication scenario supported by ICT may imply that both the clinical data and their original context are available to all authorized users any time and any place. It may also imply that additional measures must be

taken to repair what gets lost by decoupling on time and place. In daily practice no clinician can be convinced why he should record the complete context of each patient encounter because of possible future reuse of the data in another domain. Even within the same domain it will always be a trade-off between costs related to the time-consuming recording process and the new opportunities that become feasible by reusing data. Within the clinical care domain, the continuity of care should always be the leading factor. And of course only a small part of the complete patient record is suited for being shared.

A practical consequence of decoupling on time/place that was not mentioned before can be loosing information that always 'automatically' came to the healthcare professional as part of his routine (participation in a working meeting, picking up the lab results when walking along the lab, etc.). For each of these situations the lost information should be provided in another way.

In order to achieve real semantic interoperability we have to standardize both the content and the way of communication. For standardizing the communication many standards are already available. The content can be standardized by describing the structure (using a reference information model) and the semantics (using a terminology system). Next to a reference information model and a terminology system a third component is needed to act as mediator between data and terminology and to define the clinically relevant domain content together with its context. The Archetype concept from the (ISO/CEN) EN13606 standard on communication of EHR information seems to be a promising candidate for this third component.

## 5 CONCLUSIONS

Supporting communication in healthcare by ICT can give rise to more flexibility and efficiency of care processes. However, in most cases these benefits can only be realized if the original context of the information to be communicated is registered explicitly and if negative effects of decoupling on time/place context on other features of the communication process can be repaired. As future work, we plan to explore how the archetype approach can be used to tackle these interoperability problems.

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