

# Implementing the Pragmatic Web: Practical Approaches

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## 1 Introduction

Supporting human collaboration by supplying information and relaying messages is a familiar usage of ICT systems. But with the constantly increasing amount of information available in the Internet and in operational systems merely presenting information to the users has become an insufficient way of supporting humans. The burden to filter the huddle of information, judging the relevance and interpret everything w.r.t. the personal or professional activities has often become unbearable. While the Internet can be regarded as the main cause of the information overload the Semantic Web has the potential to help filtering and judging the relevance according to given concepts. But none of them thereby meets the demands that arise from the growing intensity of communication we are facing nowadays in all industrial sectors. Since neither the Internet nor the Semantic Web have any information about the users' current situation, their particular goals and needs, abilities and disabilities, the social networks that bias their opinions, cognition and working habits, these technologies are missing a targeted support for the users' actions. The supply of information and the mere transport of messages can not fulfill "the vision of the Pragmatic Web [...] to augment human collaboration effectively by appropriate technologies [...] and] by improving the quality and legitimacy of collaborative, goal-oriented discourses in communities." [SMD06]

This leads to the notion of applications being "active" partners in collaboration instead of machines for information supply and message routing. Applications thus have to be designed and built according to the needs of individuals or groups. This means (since we are not talking about physically acting socialized robots) that applications have to intervene with human communication in a meaningful and targeted way. Such interventions are not well done by only transmitting some information from one system to another. Depending on the context of the addressed and other factors such as the above noticed the same information might "act" as a warning, an invitation, a challenge, a promise or in many other ways. Applications that are built to fulfill users needs instead of just transmitting information have to be attentive to these possibilities and thus of the context of usage that determines them to a large extend. Since these applications are not physically acting their "action" depends on communication, particularly in the support of human communication.

All serious social and linguistic theories about communication prove that human communication has to do with intentions. Linguistic theories conceptualise these as ‘Illocutionary Forces’ (Austin, Searle et al.), within the sociological theories a wide field of ‘Action Theory’ (Weber, Habermas et al.) is concerned with the relation of personal intentions and social cooperation. ‘Language Action Perspective’ (Wino-grad/Flores et al.) is the promising conceptual frame to integrate many of these facets and to foster the development of applications that support communication and cooperation beyond simple information supply.

The following section presents some applications that show by example how an appropriate way of application design and implementation could look like. All of these originated from needs to coordinate complex action by means of communication. They were built according to a specific requirements evaluation methodology (cf. [He06], more general (in German) [He04]))

The starting point of this evaluation is neither an established (business) process nor its particular processing but rather individual needs within complex social groups. According to this the goals to be supported by applications are group oriented goals that have to be aligned with the personal needs. This only can be achieved by co-ordinated activities. “Pragmatic” applications support these by augmenting targeted communication within the social group.

The structure of the group and the very needs of its members is explored by means of expert and focal group interviews. Particular interest is on temporal, situational and causal dependencies of the needs uttered. Based on these interviews a phases model on different levels of (temporal and / or situational) complexity is worked out. From this model the users’ needs for information and communication within each of these phases and for important situations are determined. An example is given in figure 1 (translated from [He04]). It shows the most important functionality w.r.t. the daily routines for the rehabilitation phase of patients. Some of them will be explained more thoroughly in the following section.

Technically the applications are built upon software–platforms developed by the Fraunhofer ISST. As an example the component model for one of these, the digital companion for sport events is shown in figure 2.

## **2 Digital Companion**

Digital Companions are mobile, interactive and context–sensitive systems that provide information, support communication and accompany processes. They are built for specific purposes such as support of patients suffering from chronic diseases, individual guidance of visitors in museums or additional amusement during events, support of firemen etc. Digital Companions thus are built around needs that arise from being in complex situations. The particular offer of information, communication modes and interactive functionality depends on the general purpose, the individuality of the user and the current situation he or she is in. Such systems are not

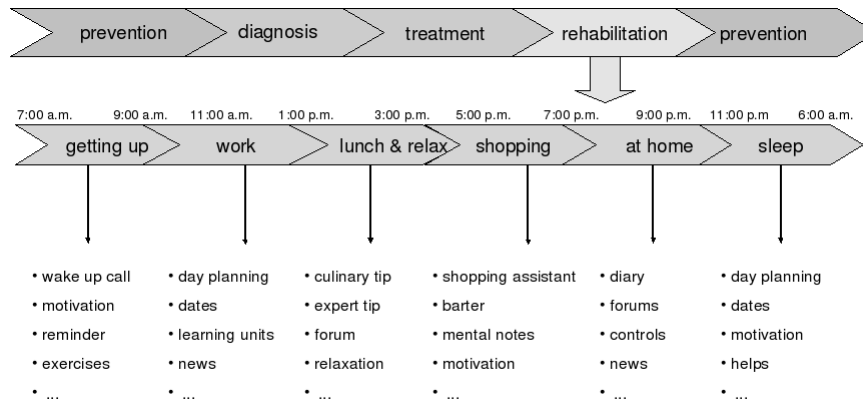


Figure 1: Result from the requirements analysis of patient's needs

bound to a single physical hardware but have to be regarded as systems that show up in different coverings and that can make use of arbitrary supporting systems such as sensors and actors as well as different user interfaces such as web-applications, PDAs or smart-phones.

One of the most demanding application domain for digital companions is the support of psychosomatic therapy. A prototype for adipositas permagna patients as shown in figure 3 has been built upon the mentioned technical platform. As the screenshots show functions for communication with the health care professionals (physicians, dieticians and psychotherapists) about physical and mental states are as well provided as “logging” facilities, helpful information and stimuli. Together these functions form a specialized and individualized attendance that supports the communication between the patient and the psychosomatic therapist team. Especially in psychosomatic healing processes communication among all involved persons is crucial not only for collaboration but as part of the therapeutic process itself.

As depicted in figures 3 and 4 a wide range of different types of communication is needed in the therapies. These types can roughly be grouped according to the patients' needs they can be traced back to. The groups chosen according to the results of interviews with experts are (from left to right) “Therapy”, “Nutrition”, “Exercises” and “News”.

Some of the communicative and coordinative functions mentioned in figure 1 can be seen in detail in figure 3, e.g. a diary (fig. 3a) that supports the necessary control by partly replacing the analogical conversation between physician and patient while training the self-controlling habits of the patient that are needed for the secondary prevention. Fig. 3b) shows nutrition tips that prolong the supporting advice of dieticians and, similar to fig. 3c) with reference to physical exercises supports learning of

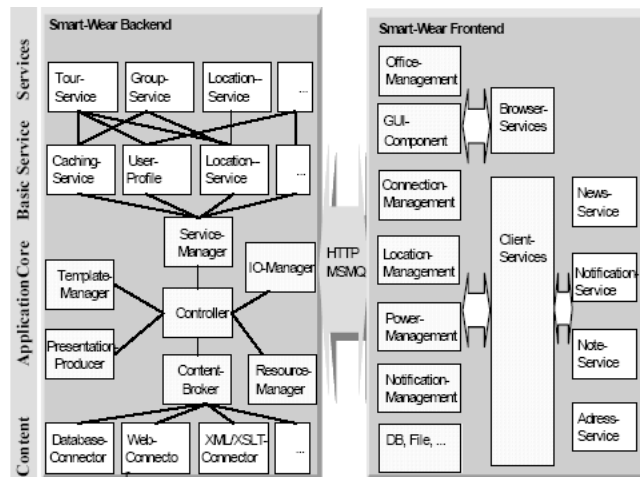


Figure 2: Component model of the companion for sporting events

healthy habits by reminding, motivating and giving expert advice.

From the professional point of view the same functions are needed for the support of infant patients. But since the needs of the infant patients and their communication habits differ largely from that of adults the prototype had not only to get a different surface but also provide different ways of communication, information and stimuli. The screenshots in figure 4 show the contrast. It's worth mentioning, that some features originally developed for the infant's version have been proven valuable for the adult's version such as continuous change in the offer of services.

Again some of the communicative functions that mirror the needs of the patients shall be emphasised. Especially for children reminder are of fundamental importance but tend to become annoying very fast. Figure 4a) shows one way of motivation for exercises that integrate into the everyday activities ("Use everyday occasions for more motion") while figure 4b) shows the barometer of success. The latter is not only a way to gain recognition in the rehabilitation phase that thus substitutes the commendation of the physiotherapists. The data also gets transmitted to the therapeutic team thereby supporting the medical attendance in the non-stationary phase. The screenshot shown in figure 4c) reflects the fact that social communication is one of the crucial factors for the psychosomatic therapy of children. Therefore an easy to use general purpose communication application that allows for synchronous as well as asynchronous communication had to be integrated into the DigiDou.

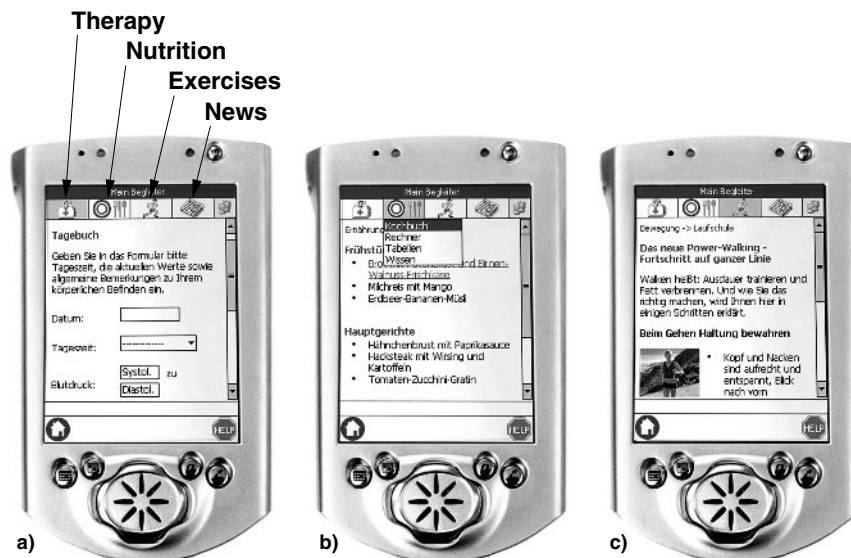


Figure 3: Screenshots of the digital companion for “Adipositas permagna” patients

### 3 Perspective

It's not by accident that the chosen example is situated in the healthcare domain. Several factors feature it to be one of the outstanding domains for applications that support cooperation by providing qualified assistance with communication: necessity and intensity of cooperation, high fraction of communication in the daily work (both with professionals and with patients), great dependency on information supply with an appropriate offer available online and last but not least growing economical pressure.

Since the development of methods for an appropriate requirements engineering as well as the development of adequate technological platforms went along with the design of the “Digital Companion” (as well as similar applications), the current practical approaches to the concept of a “Pragmatic Web” have to be considered tentative tries rather than matured systems. We have to admit that we are way from having an integrated methodology that covers all necessary steps from requirements engineering to technical and social implementation of “pragmatic systems”. But we can refer to LAP as a sound theoretical grounding and to many promising prototypes like the one shown here.

Keeping the considerable efforts in mind that went into the buildup of the prototypes it is evident that the coevolution of analytical methods and technical platforms as

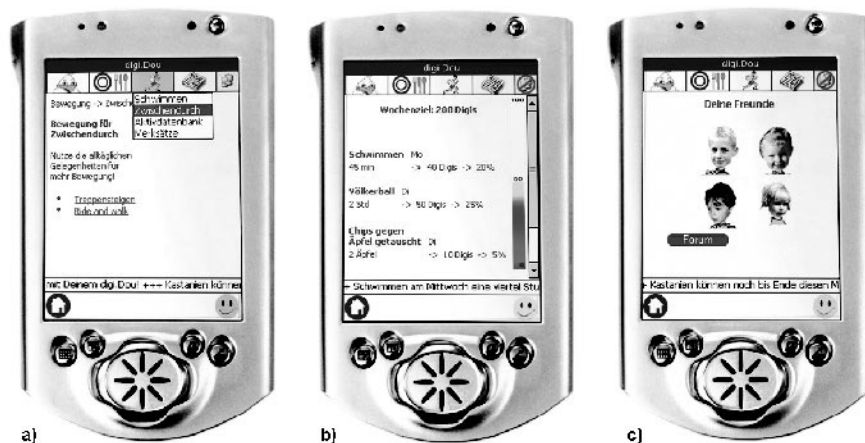


Figure 4: The “DigiDou” companion for infant “Adipositas permagna” patients

demanded in [MA06] is one of the most pressing needs for the near future.

## References

- [He04] Kerstin Heuwinkel. *Zwischen Heinzelmann und Frankenstein. Ansatz zur Etablierung Digitaler Begleiter als moderne Vertraute des Menschen*. PhD thesis, Universität Düsseldorf, 2004. Available online <http://www.ub.uni-duesseldorf.de/home/etexte/diss/file?dissid=880>.
- [He06] Kerstin Heuwinkel. Nursing ICT. Methodological Approach to Analyse Patients’ Needs and Expectations. In *Proceedings of the 1st European Conference on eHealth ECEH06*, Fribourg, October 2006. In print.
- [MA06] Aldo de Moor, Mark Aakhus. Argumentation Support: From Technologies to Tools. *Communications of the ACM*, 49 (3): 93–98, March 2006.
- [SMD06] Mareike Schoop, Aldo de Moor, Jan L. G. Dietz. The Pragmatic Web: A Manifesto. *Communications of the ACM*, 49 (5), May 2006.