INCA Individual Nomad Clinical Assistant: supporting nurses with mobile devices

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Introduction

The introduction of Clinical Information Systems (CIS) to manage and store patient information has deeply modified the workflow of caregivers. As the information is no longer stored on a physical medium, caregivers depend on the presence of a computer to access patient data. This constraint has built up an invisible barrier between the source of information and the place of its use. The popularisation of mobile devices offers an opportunity to break this barrier by providing a ubiquitous access to information. The use of a mobile platform merges the advantages of a modern CIS and the mobility offered by paper. We have developed an application on a mobile device that nurses can carry along on all their visits. It allows the information gathered during their visits to be entered directly into the system.

Method

The tool we present aims to manage the daily interventions of nurses. The interventions concern all kinds of treatments provided by nurses to patients. In the current organisation, nurses start their day by printing out all the daily interventions and use it as a procedure to follow. Every time a nurse performs an intervention, she takes a note indicating that the task has been done properly. When they have some spare time, nurses enter all the gathered information in the CIS. Once nurses are equipped with mobile devices, paper becomes useless. Consequently, the process is simplified. Replacing the paper by a mobile device application is not straightforward. In order to access patient information, the tool must be linked to the existing CIS of the hospital without creating too strong dependencies. Moreover, the mobile interface must be adapted to the specificities of the mobile device such as a smaller display size, a reduced computational power, a tactile-based interaction and a real-time usage.

Results

In order to link the mobile application to the existing CIS, we relied on a Service Oriented Architecture (SOA). It was mandatory to think of a software architecture that would not create a dependency with any legacy system. Thus, we defined a gateway server providing centralised access for the mobile application to any required information to or from the CIS. Integrating any mobile application would only require integrating this bridge. The gateway server also clearly separates the services that are available remotely from the ones proposed as usual Web services. The developed application not only allows the validation of the interventions and the input of measures, but it also offers a simple way to define the context in which nurses are working. This context is necessary to identify the specific list of interventions for the patients under the caregiver’s responsibility.

The current CIS of the HUG includes a module that provides information concerning the interventions. Its interface is adjusted for a personal computer screen. Since caregivers are accustomed to this organisation of the information, we aimed to develop an interface on a mobile device that guarantees a certain level of homogeneity with the existing PC application. However, a mobile device’s screen is of limited size, therefore the interface has been completely rebuilt to be adapted to the new display. To deal with the limited display size, we rely on hierarchy and indexicality principles. For instance, based on the hypothesis that all tasks belonging to one category and planned at the same time can be regrouped under a single item; we regroup the interventions of similar top level in a common item. Moreover, to minimise user manipulations, relevant items are automatically moved to the top.

Conclusion

The current daily workflow of nurses cannot be managed consistently using a unique tool. The need to switch from paper to computer induces work overload and is a source of errors. Therefore, we have developed a program running on a mobile device that nurses can carry during their visits. This program allows to manage nurses’ daily interventions in real-time. The development of such a tool has required a complete reconstruction of the classical personal computer interface. This new interface takes into account a smaller display size, an innovative interaction paradigm, and real-time constraints.

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