



Pervasive Intelligent Decision Support in Health Care Environment

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KEYWORDS

Health Care, ICU, INTCare, Pervasive, Real Time, Critical Environment.

ABSTRACT

This research topic arises as a consequence of the work that already being done in the project INTCare. The results obtained show that decision support exploration, not just in an intelligent way, but also in the universal and ubiquitous perspective, is a major challenge for the future use of these systems in critical environments.

This work aims to investigate the possibility of using the data collected online and in real time from not only bedside monitors, but also from other data sources to predict the future state of patients. In order to prove this idea is needed develop a prototype that will support the decision on the most appropriate treatment for the effective recovery of the patient and promote an actuating in real time. This work will involve the Intensive Care Unit (ICU) of the Hospital of Porto (CHP), EPE. The proposed research is mainly based on a literature review conducted taking into account the environments in which it inserts (Information Systems (IS) and critical care medicine). After the literature review was proved the lack of solutions in this area, despite the changes that have occurred either in IS or in Medicine. Based on these faults was defined a research question that came induce an entire project (goals, motivation, contributions, methodologies and research techniques, project planning, expected results). The project will be sustained by the investigation in a number of subjects on the several areas.

INTRODUCTION

This document falls in the information systems and health area. It present one project that have the objective to find what were the necessities and requirements to turn better the decisions in critical environments like ICU. This decisions need to be mad in real time and in online mode, every time, everywhere doing that one ubiquitous and pervasive environment. One of the foundations for the creation of this proposal was the work and results achieved by INTCare (Portela, Vilas-Boas, Santos, & Fernando, 2010; Manuel Filipe Santos, 2010; M. F. Santos, Cortez, Gago, Silva, & Rua, 2006; M.F. Santos et al., 2009; M. F. Santos et al., 2009;

Manuel Filipe Santos, Vilas-Boas, Portela, Silva, & Rua, 2010; Silva, Cortez, Santos, Gomes, & Neves, 2008). Based on the already presented (INTCare) were performed some tasks framed with this PhD project that aimed at continuing the work already done from one perspective of universality and ubiquity.

BACKGROUND

The Critical Care Medicine allows for the recovery of patients in the terminally ill or in a state of organ failure. This recovery depends largely on decisions taken in the ICU, as these may influence the outcome of a more patient than any innovative intervention that can be performed. The process of decision making in ICUs is complex, involves many actors and delicate situations.

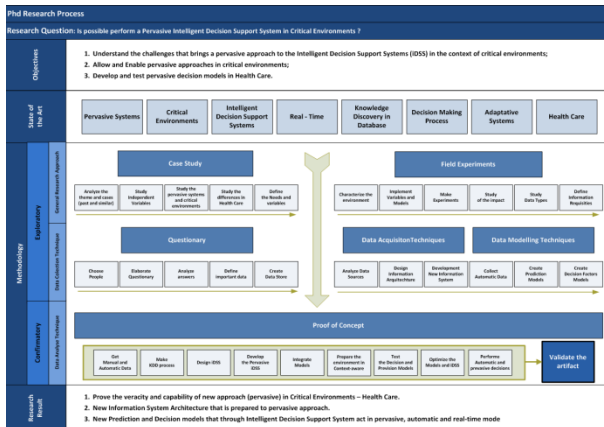
Information Systems can be defined by (Turban, 2001), systems that collect, process, store, analyze and disseminate information for a particular purpose. These are planned, developed thinking about the objectives of the organization and implemented with the aim of supporting the business, regardless of the environment in which they operate. Since 1980 many businesses have wagered on expert systems provide support for solving complex problems. Decision makers now need proactive Decision Support Systems and intelligent that use contextual data (Kwon, Yoo, & Suh, 2005).

RESEARCH PROCESS

The research process involved in this project will have a more quantitative approach. In order to achieve the objectives underlying this paper proposes to use two types of research methodologies: exploratory and confirmatory.

The exploratory level will be a general approach that will primarily aim to understand the problem, the data acquisition and development of models through the Case Studies and Field Experiences. After the exploratory phase, where the goal is to find the best way to prepare this pervasive, there is the confirmatory phase, whose main objective is proof of concept.

In both phases is an review of literature is necessary because that allows for us to perceive what exists and helps the definition and implementation of new ideas. The figures 1 show what is the research question, the objectives, the research areas, methodologies and techniques that will be needed to use to achieve expected results.



Figures 1: Research Process

RESEARCH RESULTS

After some researches we can understand some problems and define some requirements that were important to create a pervasive environment. To that we design an architecture (Portela et al., 2010) that helps the data acquisition and provide it in real time and online mode and develop one application that allows recording and validating data in electronic format. This application is an Electronic Nursing Records (ENR) (M. Santos et al., 2009) that enable have all information in electronic format that will be necessary to create prevision and decision models. Thus, over the last period it was possible to perform the following tasks:

INTCare

- Study of new needs and system changes
- Betting on the system interoperability
- Recast of the data collection system
- Design new information system architecture

Electronic Nursing Record (ENR)

- Insertion of the new features
- Improving the application
- Star of the testing phase in the ICU

Previsions and Decision

- Study of decision variables
- Inserting the new variables for the prediction
- Preparation of statistical models
- Testing of new models and results

Environment

- Studies on the critical environments
- Definition of the environment of the ICU

The architecture developed for the system of data collection (Portela, Santos, et al., 2010; M.F. Santos, et al., 2009) was designed so that it should be independent and act in real time. To this was necessary to implement some intelligent agents able to act without human presence, ensuring reliability and consistency of the whole system. The work that has been developed has been accompanied by all the elements involved in this PhD project and will be documented at the time of preparing the thesis.

CONCLUSIONS

After having done some modifications in architecture and to have developed a new application, we had access to new data, that before was difficult to have and with it we can produce new prevision models.

The methodologies and techniques that were referenced before is helping to do this project. The research process presented is the base of this work.

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