



Borboleta: A Mobile Telehealth System for Primary Homecare

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Slide 1

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**Borboleta
Project**



Agenda

- Introduction
- Our Context - SUS
- Motivation and Scenario
- System Design
- Implementation
- Development Characteristics
- Preliminary Results
- Ongoing and Future Goals
- References

Introduction

- Telehealth is the provision of health care using telecommunication technologies (like PDAs)
 - Extension of Telemedicine: it encompasses preventive, promotive, and curative aspects.
- Borboleta is a telehealth system for PDAs that assists healthcare professionals on their daily visits to the patients homes.



Introduction

- Miller analyzed, in 2004, the Deloitte research survey with 1200 north American physicians:
 - 96% of the physicians use some kind of computer technology on their daily work
 - 21.5% use PDAs on their routine
- Blasser, after an evaluation of hospital discharge letters, concluded:
 - 42% of discharge letters have critical or major problems; most of them related to misunderstanding or mistakes in filling the letters.
 - An IT solution helped the hospital to reduce this problem.



Our Context - SUS

- **Healthcare Center:** unit from the public health service responsible for primary health assistance.
- **Home Attendance Program:** Provision of primary health assistance to low-income patients at home.
 - The healthcare professionals visit the patient's homes providing medical attention and preventing more critical issues, which is better for the patient and less expensive for the government.
 - Help and teach families how to assist patients in the time between professionals visits.



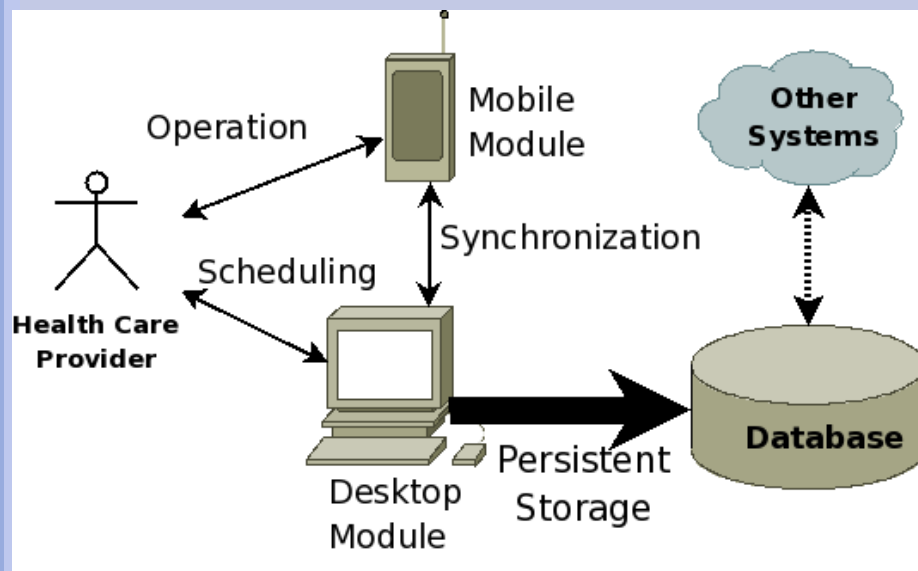
Motivation and Scenario

- Before Borboleta, homecare assistance was registered using paper forms, bringing disadvantages:
 - To fill lots of paper sheets take too much time from the homecare professional team.
 - To search for an information on paper forms demand a long time.
 - Time between the visit and the filling of the forms can lead to information loss, because it depends on human memory.
 - Difficult to raise statistics to aide the homecare assistance management.



System Design

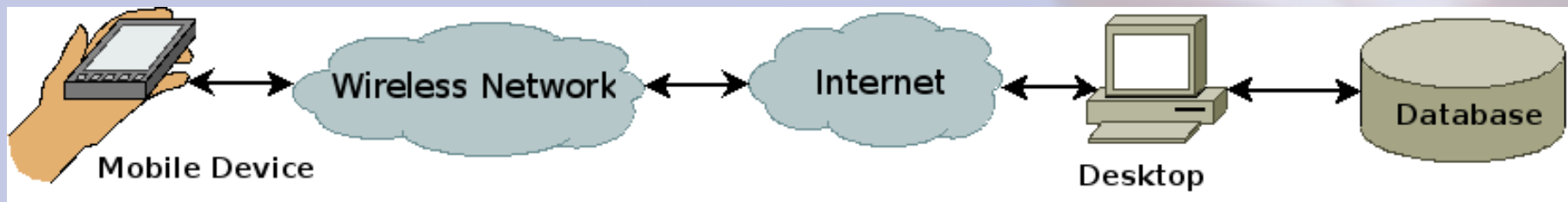
- Modules Division:
 - Mobile Module (PDAs and Smartphones)
 - Desktop Module



- Features: Mobile Module
 - Patient data
 - Patient caregiver data
 - Patient socioeconomic data
 - Schedule visits
 - Visits registration
 - Access to the visit history of a patient
 - Disease catalog (ICD-10)
 - PHC medicaments catalog

System Design

- Features: Desktop Module
 - New patient registration
 - Import supporting medical information
 - Import/export patient data
- The import and export processes are done using XML and stored by a Web server on a shared folder



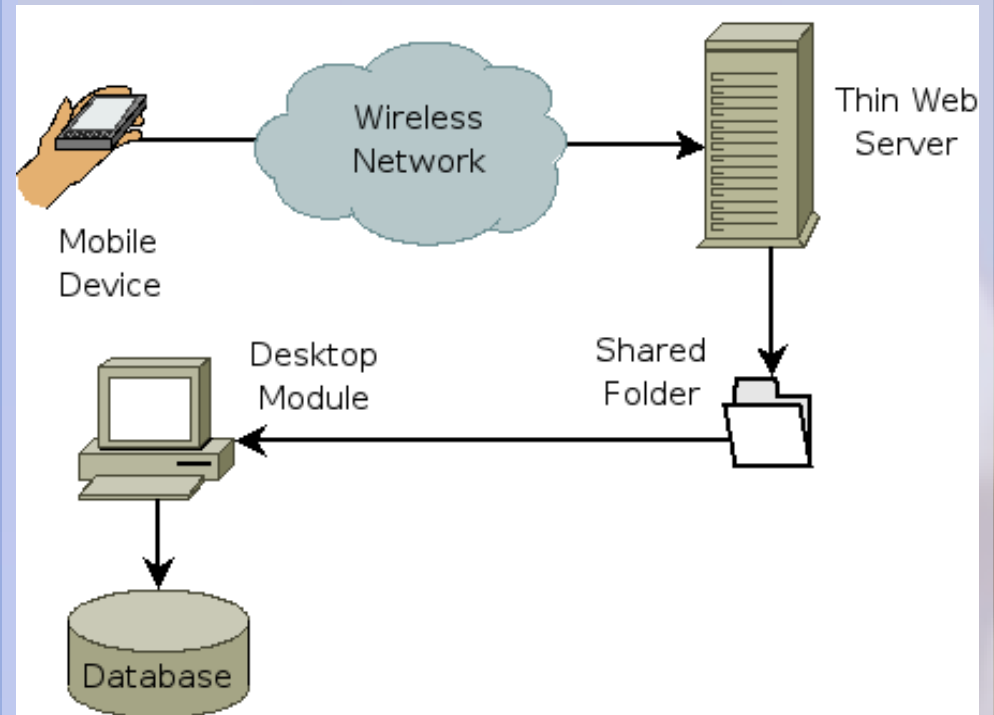
Implementation

- Mobile Module (PDA and Smartphones)
 - Focus on HCI trying to maximize the usability and getting information as clear as possible.
 - Usage of *dropdown lists* and *radio button components*.
 - Optimization of the data information on different screens according to the user needs is a way to keep the information clear.
- Difficulties with the Mobile module implementation
 - Resource Limitation: Memory, Java ME Library
 - Difference between Java ME simulator and real PDA environment

Implementation

- Desktop Module and Synchronization

- Synchronization done over HTTP using XML and also file sharing
 - ☺ Deploy the system as soon as possible
 - ☺ Easy to implement
 - ☹ Lack of security
 - ☹ Too much user interaction during the process



Development

- *eXtreme Programing Methodology*
 - Unit Tests
 - Short Releases
 - Strong and frequent relationship with the users
 - nurses, physicians, PHC director
- Java and Java ME
 - Portability
 - In spite of the limitations, Java ME has a useful range of features
 - Easy way to use the HTTP protocol
 - XML parsing and building



Preliminary Results

- Before deploying Borboleta, the time between the visit and the form filling was about 3 days, and sometimes could reach up to a week.
- With Borboleta, the form is filled on site during the visit, taking much less time.

- We measured the time spent filling the paper forms and disposed on the table bellow.
- Reduction of time spent filling the forms to about 5 minutes.

Visit Type	Time Spent
New Patient	30-40min
Treatments	15-20min
Occasional assistance and Dressing	10-15min

Time spent filling the paper forms



Preliminary Results

- Immediate access to the patient visits history, without the need for *a priori* preparation to gather the information.
- The PDA gives more mobility during a visit than the paper forms
- Filling the visit data on the site
 - Before the Borboleta system, the paper forms data were typed into the old Healthcenter system.
- Creates the opportunity for integration with other systems
 - for example, for data mining.



Ongoing and Future Work

- **Ongoing:**

- Keep developing the Mobile module (PDA and smartphones) to better fit the needs of the healthcare professionals
- Develop a Web system to replace the Desktop Module
- Simplify the synchronization process
- Raise the security level
- Integration with international standards (e.g., HL7, OpenEHR).

- **For the future:**

- Extension of Borboleta to support other kinds of health services.
- Data mining
- Artificial Intelligence

References

- Robert H. Miller, *Physician's use of IT: Results from the Deloitte Research Survey*, Journal of Healthcare Information Management 18 (2004), no. 1.
- R. Blasser, *Potential prevention of medical errors in casualty surgery by using information technology*, In ACM Symposium on Applied Computing, pages 285–290, 2004.
- World Health Organization, *International statistical classification of diseases and health related problems (The) ICD-10 second edition*, World Health Organization, 2004.



Borboleta

Mobile Telemedicine Services for All



<http://borboleta.incubadora.fapesp.br>

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