Providing Decision Support
Anytime and Anywhere:
*MET* System Experience

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Outline

- Decision support *anytime and anywhere*
- Computer in a pocket
- Classical DSS design
- New architecture for *anytime and anywhere* DSS
- Mobile Emergency Triage
- Discussion
Providing Decision Support
*Anytime and Anywhere*

- Decision support is needed when a decision problem arises
  - This calls for use of computing devices that are more handy than desktop computers and that can work offline

- Decision support is required for complex problems with sophisticated solution strategies (e.g. triage support and clinical caremap)
  - This calls for system’s design that allows for versatility and easy adjustment to problem on hand

- Support *anytime and anywhere* – available on demand for a class of decision issues of diversified complexity
Computer in a Pocket

Mobile devices with “lean” computing capabilities (notebooks, tablets, handhelds, cell phones)

- **Issues**
  - Diversity of platforms
  - Diversity of decision making settings (the same system may be used in doctor’s office and an ambulance)

- **Solution**
  - Versatile decision support system that can be accessed on different mobile platforms and can support a range of decision issues
Classical DSS Design

- Sprague (1980)
System’s Architecture for Classical DSS

☐ Stand-alone
  ■ Functionality confined to a single system

☐ Client-server
  ■ Functionality distributed between powerful server and "thin"client(s)
    □ Client acts as a terminal hosting interface subsystem
    □ Server manages dialog with a user and hosts database and model subsystems
  ■ Typical example: web-based DSS
Issues with Classical DSS Architecture

- Requires fairly “strong” computing platform
  - But stand alone system is not feasible for many decision situations

- Requires strong and stable connection
  - But "thin" client – server system is not feasible for many decision environments

- Requires uniform platform specifications for an interface
  - But hard-coding interface into a DSS is not feasible for many cross-platform implementations
Postulates

- If computing platform is not powerful enough, a DSS should be “decomposed” into appropriate executable components.

- If a connection is not stable or constant, a "thin" client still should be able to operate and provide support.

- If computing platforms are heterogeneous, an interface should be adaptable to changing requirements.
Our Solution

- New architecture: extended client-server paradigm
  - Client performs some tasks of a server while there is no connectivity

- Model-based interface design
New Architecture – Server

- Interface model
- Decision model
- Solver model

**Problem subsystem**

**Solver subsystem**

**Database subsystem**

Synchronized with a client database

**Builder**

**Integrator**

From a client

To a client

**Platform subsystem**

**Interface subsystem**
New Architecture – Client

- Problem subsystem Jr.
- Solver subsystem Jr.
- Interface subsystem Jr.
- Database subsystem Jr.

From a server

Executor

To a server

Synchronized with a server database
**MET – Mobile Emergency Triage**

- Clinical support system to be used by the Emergency Department medical personnel for triage of patients with acute pain condition

- Developed as a flexible DSS that can be accessed anywhere and anytime and used to support medical decision making with regards to a heterogeneous set of clinical decision problems (abdominal pain, scrotal pain, hip pain, etc)

- Designed according to an extended client – server architecture. Client component can run on a desktop computer, a tablet computer, a handheld, and a mobile phone
MET Server

**Problem subsystem**
- Abdominal pain
- Scrotal pain
- Hip pain

**Solver subsystem**
- Heuristic classifier

**Platform subsystem**
- Cell phone
- Handheld
- Desktop

**Builder**

**Integrator**

**Interface subsystem**
- Pictogram editor
- List editor
- Numeric editor

**Patients’ database**
Synchronized with a client database
MET Client – Cell Phone

- Clinical decision rules
- Heuristic classifier
- Pictogram editor...

Executor (Symbian OS)
**MET Client – Handheld**

- Clinical decision rules
- Heuristic classifier
- Pictogram editor...

**Executor (PalmOS)**

- Problem subsystem Jr.
- Solver subsystem Jr.
- Interface subsystem Jr.
- Database subsystem Jr.
MET Client – Desktop

- Clinical decision rules
- Heuristic classifier
- Pictogram editor...

Problem subsystem Jr.
Solver subsystem Jr.
Interface subsystem Jr.
Database subsystem Jr.

Executor (Mac OS X)
Discussion

- Possibility to develop a versatile DSS (clinical system for complete patient management from triage to discharge)

- Flexibility in receiving decision support (irrespective of a decision situation and a decision environment)

- Ability to develop new theoretical model of the DSS design (to support wide range of clinical problems of varying complexity)

- Ability to deliver cross-platform DSS implementation (system "learns" about a platform and performs self-adjustment to its specifications)
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