swiss ehealth summit

3 september 2013

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Introduction

- Improving management and governance
  - Extract indicators from increasing volume of data
  - Harvest multiple sources of data (clinical, logistic, financial, …)
    - Emergency and disaster plans
    - HR
    - Bed management
    - Clinical alerts
  - …

- Existing tools
  - Aggregate and consolidate storage
  - Separate analytical and transactional databases
  - No support for real-time outside transactional CPR
What is missing

- Lack of responsiveness (J-1 versus now)
- Need of real-time analytical tools

What need to be done

- Develop conceptual and technical basis for building real-time monitors objects useful in critical situations
Foundation

- Existing Clinical information system
  - Message-oriented middleware
  - Component based architecture
  - Two communication technique: services and messages
    - **Services**: can be called by another component that needs to perform a function
    - **Messages**: Possibility to be informed of the action without having to call the initial component
Requirement

- The system must not interfere with the upstream data
  - Clinical activities are critical and cannot be interfered
- Managing heterogeneous notification from
  - People: Clinicians / Nurses / other stakeholders
  - Device: Card reader
  - Infrastructure: Availability of a lift / State (open/close) of a door
- Necessity to unify and centralize the management of these data
Data processing steps

- **Reading**: Reading the data from the CIS upstream
- **Purging**: To consider only the properly constructed notifications, and not treat invalid or unintelligible notifications
- **Pump**: The system produces a stream of data and sends it to the next component
- **Routing**: The system receives the pumped notifications and offers referral opportunities to route them by category, arrival date, size of the message or others detailed properties
- **Cleaning**: The system changes the notifications to keep only information relevant for a human
- **Grouping**: The system has the ability to create clusters of notifications based on selected criteria (date, keywords in posts, or properties, type (default) or category, key/value)
Real Time Architecture

- A robust architecture is necessary to build a nearly real-time system
  - the system should be able to receive a significant amount of data from several sources

- Publish/Subscribe Design Pattern
  - add an intermediate layer between the components.
  - Loose coupling
  - Decrease the direct dependency
  - Share responsibilities.
  - The component goes through the intermediary layer to subscribe to a producer of interest. This additional step is responsible for informing the subscribed components of any change on any data stream.
Robust architecture

- Reading
  - Bridge connection
  - Purge
  - Standardization

- Processing
  - Filter
  - Sort
  - Group
  - Clean
  - Route

- Broadcasting
  - Publish & Subscribe
  - Aggregation
  - Persistance
  - Effectors
Results and discussion

- Expected benefits
  - Enhance decision support and responsiveness
  - Improved management of clinical and non-clinical critical situations
  - Better and clearer governance management
Real-time architecture
Overview