

swiss ehealth summit

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LiSA:
Live System Analysis



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

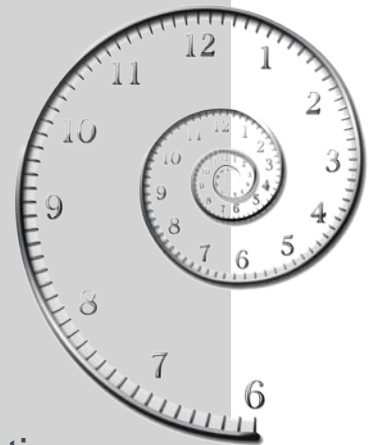
- The system must not interfere with the upstream data
 - Clinical activities are critical and cannot be interfered
- Managing heterogeneous notification from
 - People: Clinicians / Nurses / other stakeholders
 - Device: Card reader
 - Infrastructure: Availability of a lift / State (open/close) of a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

Data processing steps



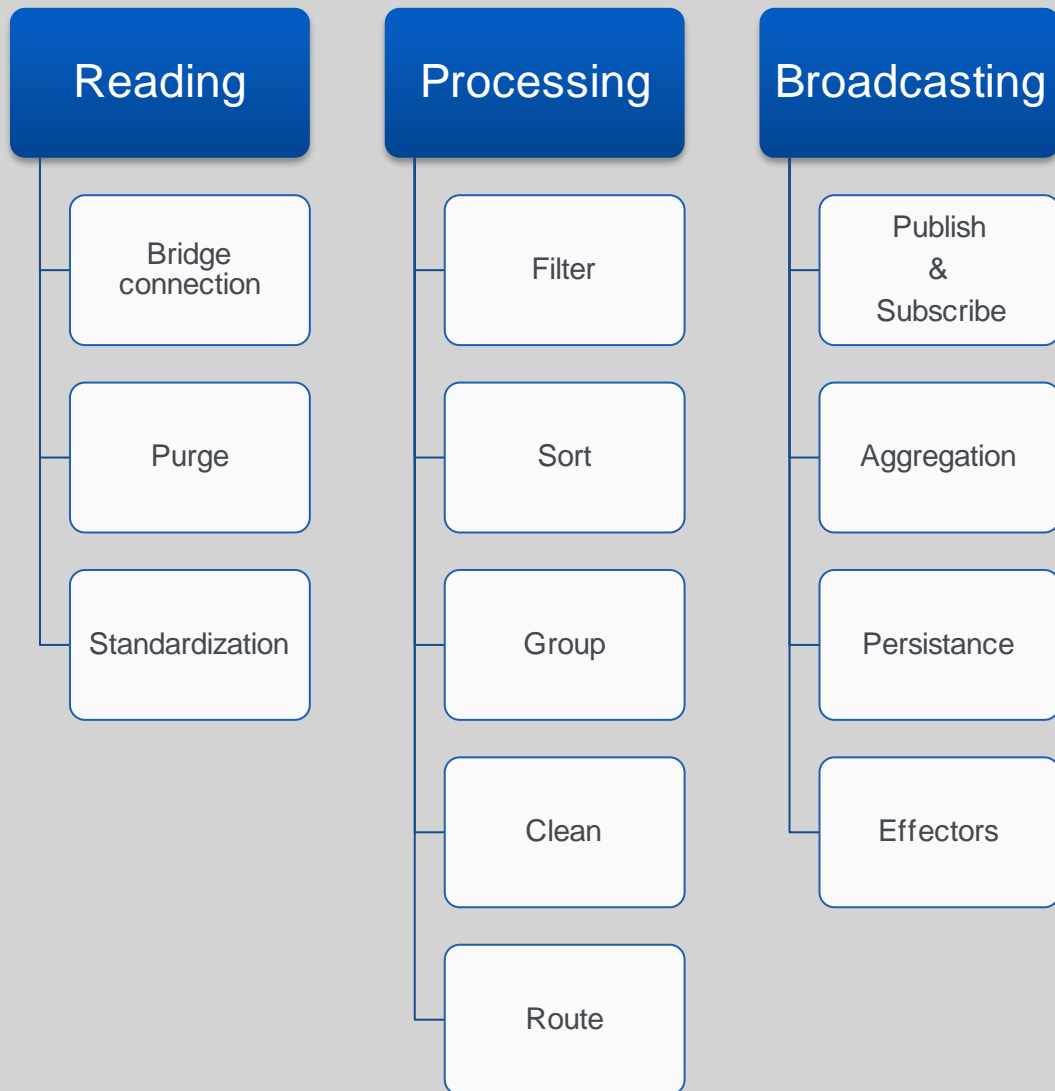
- **Reading:** Reading the data from the CIS upstream
- **Purging:** To consider only the properly constructed notifications, and not treat invalid or unintelligible notifications
- **Pump:** The system produces a stream of data and sends it to the next component
- **Routing:** The system receives the 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)W

Real Time Architecture

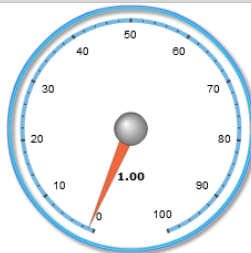
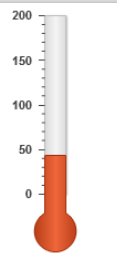


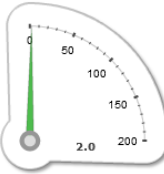
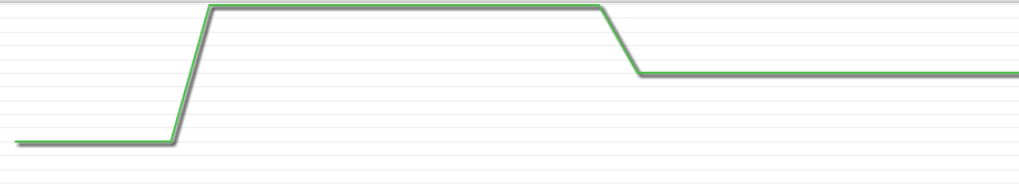
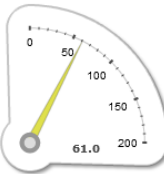

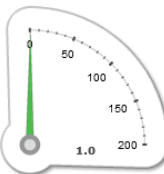



- A robust architecture is necessary to build a nearly real-time system
 - the system should be able to receive a significant amount of data from several sources
- Publish/Subscribe Design Pattern
 - add an intermediate layer between the components.
 - Loose coupling
 - Decrease the direct dependency
 - 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



Whiteboard

Groups	original.lab.result	original.echeancier.task.refr...	hi7.criticaldata.v2
<p>appointment.sms.patient (1) hi7.criticaldata (1) hi7.criticaldata.v2 (8) hi7.lab.result.v2 (1) hi7.patient (1) lab.result.sang.artériel.gazometrie.c_base_b (1) lab.result.sang.artériel.gazometrie.f02i (1) lab.result.sang.artériel.gazometrie.pco2.mesure (1) lab.result.sang.hematocrite (1) lab.result.sang.hemoglobine (2) lab.result.sang.p.asat (1) lab.result.sang.p.bilirubine.totale (1) lab.result.sang.p.creatinine (1) lab.result.sang.p.egfr (1) lab.result.sang.p.gamma.glutamyltranspept (1) lab.result.sang.p.idh (1) lab.result.sang.p.phosphatase.alc. (1) lab.result.sang.p.potassium (1) lab.result.sang.plaquettes (1) lab.result.sang.ppt (1) lab.result.sang.temps.de.quick (1) lab.result.sang.viremie.vih (1) original.agi.timbre (8) original.application.services.xml.refresh (1) original.application.system.referential.refresh (1) original.dani.patient.status.change (1) original.echeancier.task.refresh (43) original.hi7.patient (3) original.hospital.map.property.update (5) original.lab.result (1) original.lab.result.request.id (1) original.patient.codage.save (3) original.patient.document.publication (8) original.patient.facts.dataset.create (3) original.patient.facts.dataset.delete (1) original.patient.facts.dataset.print (1) original.patient.facts.dataset.read (2) original.patient.facts.dataset.save (2) original.patient.facts.dataset.sign (4) original.patient.facts.event.create (1) original.patient.order.create (9) original.patient.radio.order.sign (1) original.pharmacy.batch.create (1)</p>			
<p>All notifications</p> 	<p>prescorule.patient.movement</p>  	<p>original.user.patient.navigate</p>  	<p>patient.criticaldata.update</p>  
<p> <input checked="" type="radio"/> S <input type="radio"/> M <input type="radio"/> H <input type="radio"/> D <input checked="" type="radio"/> Raw <input type="radio"/> Average <input type="radio"/> Sum <input type="radio"/> Max <input type="radio"/> Min <input type="button" value="Start"/> <input type="button" value="Pause"/> <input type="button" value="Stop"/> Night mode Off </p>			

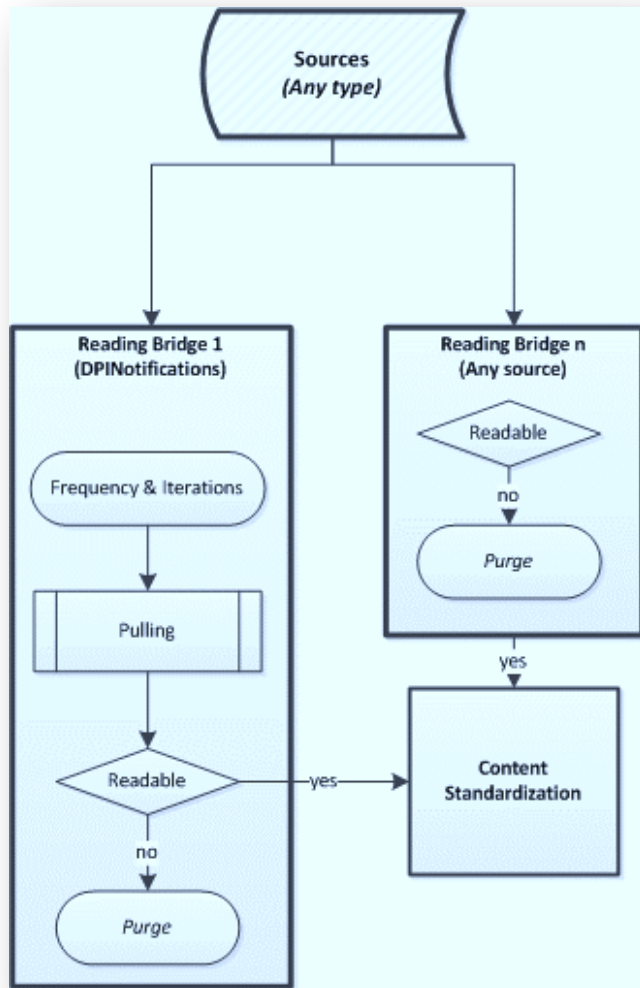
Results and discussion

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

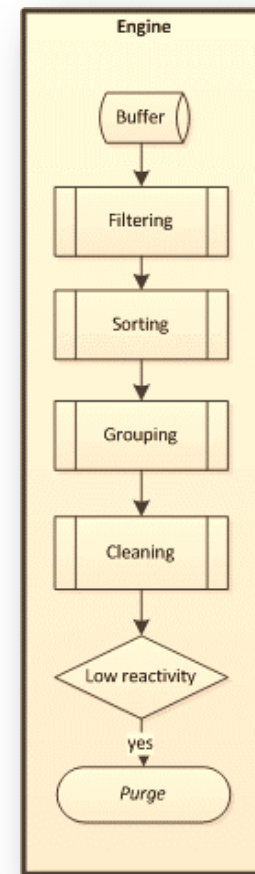




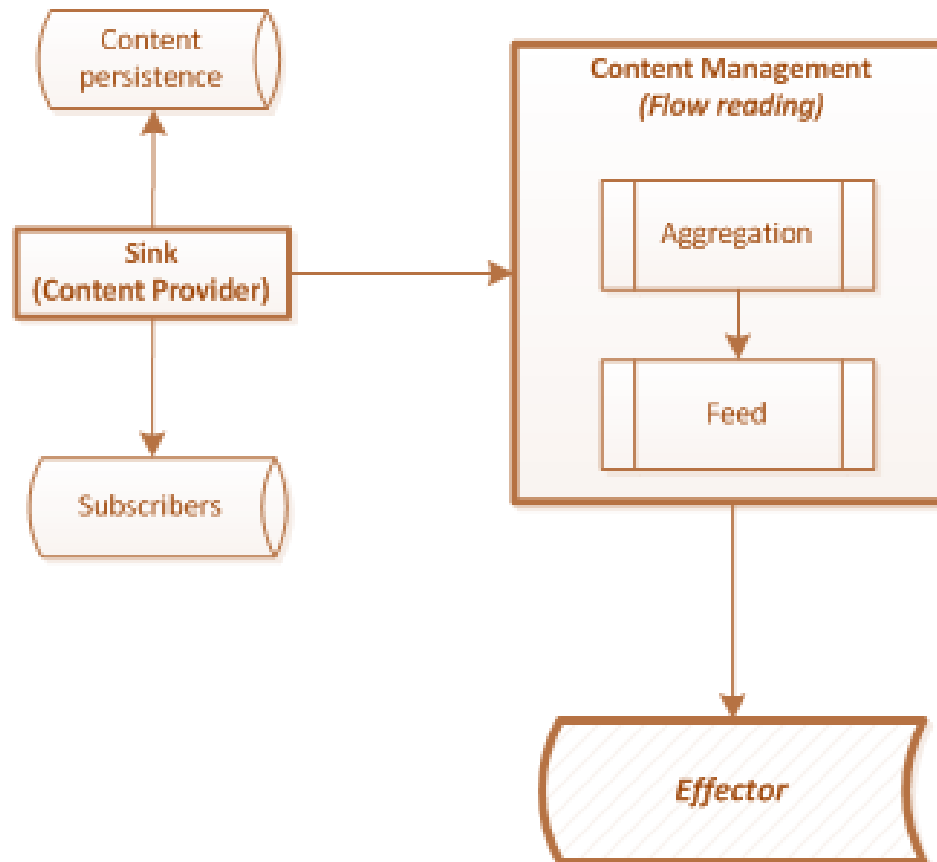
Reader



Processor



Real-time architecture



Overview

