CERN Safety System Monitoring - SSM

Motivation: why yet another monitoring system?
Several monitoring systems exist at CERN. However, safety and access systems are very heterogeneous — none of the pre-existing systems supported all the equipment to be monitored. The focus of SSM is different from the other systems. Its goal is to provide a simple, independent verification path rather than a comprehensive status view. None of the other systems lend themselves to easy viewing with a portable device.

Design principles
- Simplicity: Web-defined interfaces with clear functional separation. Use existing systems and CERN standard services whenever possible (example: Oracle, web-services, authentication).
- Reliability: Self-diagnostic checks to tell if the displayed information trustworthy.
- Independency: Look at the system to be monitored from the outside and avoid using information produced by that system. Go to the source whenever possible (example: access PLCs directly).
- Maintainability: Scripts and database structure simple and easy to understand with up to date documentation.
- Accessibility: Works with all major web-browsers and handheld devices from anywhere.
- Conﬁdentiality: Access limited to a well-deﬁned group and login with CERN password required.

Functional separation
- Collect – the underlying monitoring engine:
  - Carries out the actual monitoring tasks (local agents, connection, item logging, events, notifications).
  - Zabbix support for Windows, SNMP, special purpose scripting, etc.
  - Linux server, Oracle database, web-based user interface.
  - "Expert information tool".
- Synthesize – the integration and synthesis layer:
  - A separate "core" Oracle database, which has access to Zabbix database tables.
  - Imports the group/machine/item/trigger structure from Zabbix.
  - All the synthesis rules defined as Oracle procedures.
- Visualize – the visualization layer:
  - Web-page: http://cern.ch/ssmo
  - Accesses the synthesis database.
  - PHP-supports light and simple.
  - Both interactive and static displays.

Access and safety systems by GS/ASE
- LACS (LHC Access Control System) – who enters LHC and when?
- LASS (LHC Access Safety System) – is it safe for beam or access?
- PACS (PS Access Control System) – idem for PS (soon).
- PADS (PS Access Safety System) – idem.
- SUS/PS – Integrated personnel safety system for SPS.
- SIS (Surveillance des Sites) – who enters CERN sites and areas other than the accelerators.
- CAMS (CERN Access Control System) – login for the fire brigade.
- SIP – Site Information Panels – displays relevant info at access points.
- Safety systems developed by us but operated by others: TDA (Atlas), furnaces (radiation monitoring).

Why Zabbix as monitoring engine?
- Support for Windows, Linux, other Unixes.
- SNMP/IPMI, database-monitoring, web-monitoring, etc.
- Extensible: server scripts, client scripts.
- Proxy servers (monitor restricted networks).
- Oracle database interface (let someone else take care of the DB).
- Web-interface out of the box (PHP – practically a drop-in).
- Can do mass updates using XML files (not quite a command line, but it’ll do).
- Robust (very few problems).
- Already known within the access team.
- Active development and user groups.
- Free.