



CMS DCS

towards the final system and beyond

DCS workshop

3rd, April 2006

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Introduction



CMS is going to have a combined detector test commonly referred to as MTCC (magnet test cosmic challenge) in summer 2006. Detectors are supposed to provide a down scaled version of their final systems for this test.

At the same time people will start to put electronics in the underground counting rooms and commission a.m.a.p.

In the 2nd half of 2006 the detector will be lowered and connected to electronics and services. The final commissioning will start.



The MTCC installations will evolve to the final systems.

Therefore the final installation of the CMS DCS system has already started and will continue at least a few years.

This presentation will sketch the steps towards completion of the final installation and concentrate on the problems we already saw and the ones we're able to predict.



Basic services



- **Power:**
 - Canalis system is being installed.
 - Many problems with PLC software discovered
 - Dead lock situation between DSS and TWIDO SW discovered and fixed.
- **Cooling:**
 - Being commissioned.
 - Not really used yet.
- **GAS:**
 - Only temporary systems in use
 - Final system incl. HW foreseen beginning of '07.

Interlocks will be based on those systems. It must be possible to relate failures of those systems to the dependant problems.



- Networking:
 - Intermediate solution in place.
 - Waiting for IT to install the final system to be able to set up our final private network.
- PCs:
 - Most PCs for the final DCS system have been ordered and will come soon.
 - *Waiting for SYSTEC USB->CAN hub*
 - First 16 PCs have been installed using CMF



- Eases the installation and maintenance of PC farms a lot.
- *Missing:*
 - *Map some central repository to a network drive*
 - *Install the PVSS user with corresponding rights*
 - *Configure firewall or switch it off*
 - *Install ORACLE instant client*
 - *Install DIM DNS*



- Allows for installing PVSS
- *Missing:*
 - *Install PVSS as a service*
 - *Handle different versions of PVSS concurrently for upgrade (set PATH)*
 - *Apply PVSS patches*
 - *Configure the main project*
 - *Install additional components needed (different OPC server, etc.)*



Configuring PVSS



- *Project creation should be centralized using some lookup of machine name versus PVSS system name and number*
- *Installation tool should offer centralized management of:*
 - *Central repository for FW installation*
 - *Components to be installed on a system*
 - *FW version to be used per system (for upgrade)*
 - *Concurrent upgrade of components in all projects concerned*



- *PVSS process management should be centralized providing information about the overall system status, patch level of individual systems, etc.*

Up to now everything described should be automatic. It is true that some of the steps will be done rarely in the final, running system. During commissioning, however, re installation of at least a project will happen often.



Redundancy



- We will run at least the central DCS supervisor as a redundant system. Seeing the amount of data, this system has to deal with, redundancy might be a challenge. To be tested.



Accessing and configuring the systems



- Access control must prohibit unauthorized access and define the scope of control per user
 - *Authentication must be based on a central mechanism (NICE, AFS, etc.)*
 - *User roles must be defined in a DB and an administration tool for roles is needed.*
- The configuration has to be loaded from the DB and applied.
 - *Loading and application of configuration must be controlled by the FSM. It's being worked on, but we saw that it is much more complicated than we thought and no solution really fits well into our architecture.*



Monitoring PVSS



- *Centralized pmon, mentioned already*
- *It should be possible to view the PVSS log files centrally (easily).*
- *PVSS system status should be available in a more verbose way. E.g. graphical visualization of PVSS processes, their performance (status of internal queues, etc.) and intercommunication.*
- *Alarms should not partially use RAIMA for storing the configuration. An alarm must be fully defined by the information written to ORACLE.*



- *A tool external to PVSS must be available for visualizing PVSS data and to compare with data of non PVSS systems like DAQ, RCMS, DQM, etc.*



- The currently promoted mechanism for remote control (terminal server) is at maximum a solution for experts amongst others due to the very limited number of possible concurrent connections. In addition this is only a solution for Windows based PVSS systems.

We need a web access to PVSS.



- Backup strategies have not been tested yet
 - Do we need backup at all? If the whole system can be re-installed automatically it might not be needed.
 - What to back up (project or ASCII export)
 - When to back up (in safe system state only?)
 - Where to back up (central IT service, local disk)
 - How to restore?



- For upgrading several versions (patch level) of PVSS and projects must be available. *It must be possible to configure centrally, which version of which project uses which version of PVSS.*
- *It must be possible to know centrally the patch status of each PVSS system and to apply patches centralized.*



Expert system



- Complex error situations can eventually not be coded in the FSM nor represented in a PVSS alarm.
- *We need an expert system like system to analyze complex error scenarios and either inform about or act on it.* Sub groups in CMS ask for it or start to write their own tools to preserve the knowledge gained during commissioning. If we don't provide such a tool soon, inhomogeneous solutions will proliferate.



Summary



- A lot of effort went into the development of the FW and much of the needed functionality is in.
- Large scale deployment reveals missing features needed for controlling such a system.
- Reality will teach us now, what we couldn't imagine before.