The CERN Computer Centre Supervision Project

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http://cern.ch/it-proj-ccs

Outline

- Motivation
- Strategy, people, history
- Objectives for 2002
- Prototype 0
  - Data gathering, internal aspects, visual aspects
  - Live demonstration
- Next steps
- Communication
- Relationship with WP4
- Conclusions

Motivation (1)

- SURE system used successfully for operators and (partly) service managers
  - But very close to its limits in terms of extending functionality, and scaling
  - No way to integrate another few hundred boxes
- PEM started with high ambitions, now defunct
  - Prototype with web page presenting services (JvE) very useful, maintained until March 2002
- EDG WP4 again very ambitious
  - Not clear that functionality required at CERN will be provided in time
    - Prototype scheduled for September 2002
- Summer 2001: Clara Gaspar starts investigating PVSS for LHCb EF control

Motivation (2)

- Something needed that offers required functionality asap
- CCS project launched late in 2001
- Mandate: develop a flexible, scalable system for supervising (i.e. monitoring and controlling) all computer centre equipment and services
- Requirements for framework functionality no different from those by detector control systems
  - Tool of choice (JCOP) for DCS systems of experiments: PVSS from Austrian company ETM
  - Try and use this to start with

Strategy

- Requirements collection by PEM and WP4 still very valid
  - No need for another time-consuming round
- New implementation taking into account functionality and constraints of PVSS
- Deliver series of prototypes with increasing functionality
  - Early user feedback facilitated

People

- Core team
  - Pete Jones (50%)
  - Jan van Eldik (50%)
  - Fabio Trevisani (50%)
  - Hugo Cacote (100%, started in 02/2002)
  - Helge Meinhard (70%)
- Advisors
  - Olof Barring (link to WP4)
  - Sylvain Chapeland
  - Rod McKenzie

History

- 2001/11/01 Informal launch of FIO group and FIO-CCS section
- 2001/11/15 Brainstorming meeting about CCS project
- 2001/11/27 One-day course “Overview of PVSS II”
- 2001/12/10 – 2001/12/14 Five-day course on PVSS II
- 2002/01 Start work on Prototype 0
- 2002/03 End work on Prototype 0

Objectives for 2002 (1)

- Prototype 0 – March 2002
  Learning experience with PVSS
  - Re-implement functionality of PEM prototype with PVSS
    - Lxbatch, lxplus, lxshare
    - No changes on node side (i.e. UDP-based PEM transport)
  - Proof-of-concept for automatically generating alerts for the operators

Objectives for 2002 (2)

- Prototype 1 – June 2002
  - Improved protocol between nodes and PVSS system
  - Improved handling of configuration info
  - Added functionality for Linux clusters
    - Including perhaps triggering automatic actions
  - Person-power permitting, add more services
- Decision on PVSS suitability

Objectives for 2002 (3)

- Prototype 2 – December 2002
  - subject to PVSS suitability
  - Add more services
  - Iterate on objectives for P0 and P1 if needed

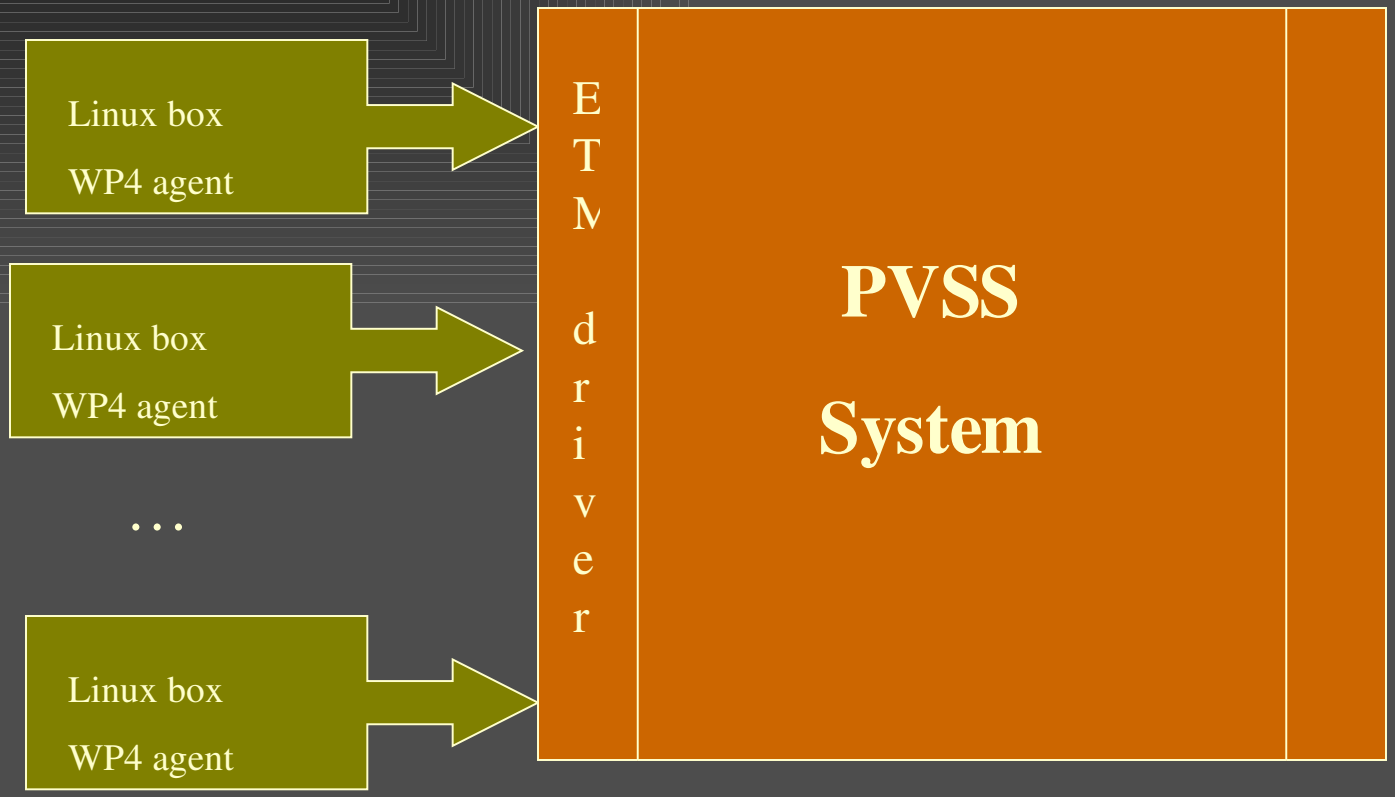
Work done: Prototype 0

- Data gathering
- Internal aspects
- Visual aspects

Data gathering (1)

- PVSS does not supply monitoring clients for computers
- Re-use of the WP4 agents (client side)
- ETM supply a driver prototype (server side)
- Linux PCs (lxbatch, lxplus, lxshare, disk server clusters, …)

Data gathering (2)



Internal aspects (1)

- Definition of the data structure
  - Basic datapoint types: FileSystem, File, Daemon, …
  - Derived datapoint types: LSF, Registration, MyPC, …
  - Instantiations of MyPC look like

```
lxplus001.System.AFSversion
lxplus001.LSF.sbatchd
lxplus001.Registration.passwd_header
```

Internal aspects (2)

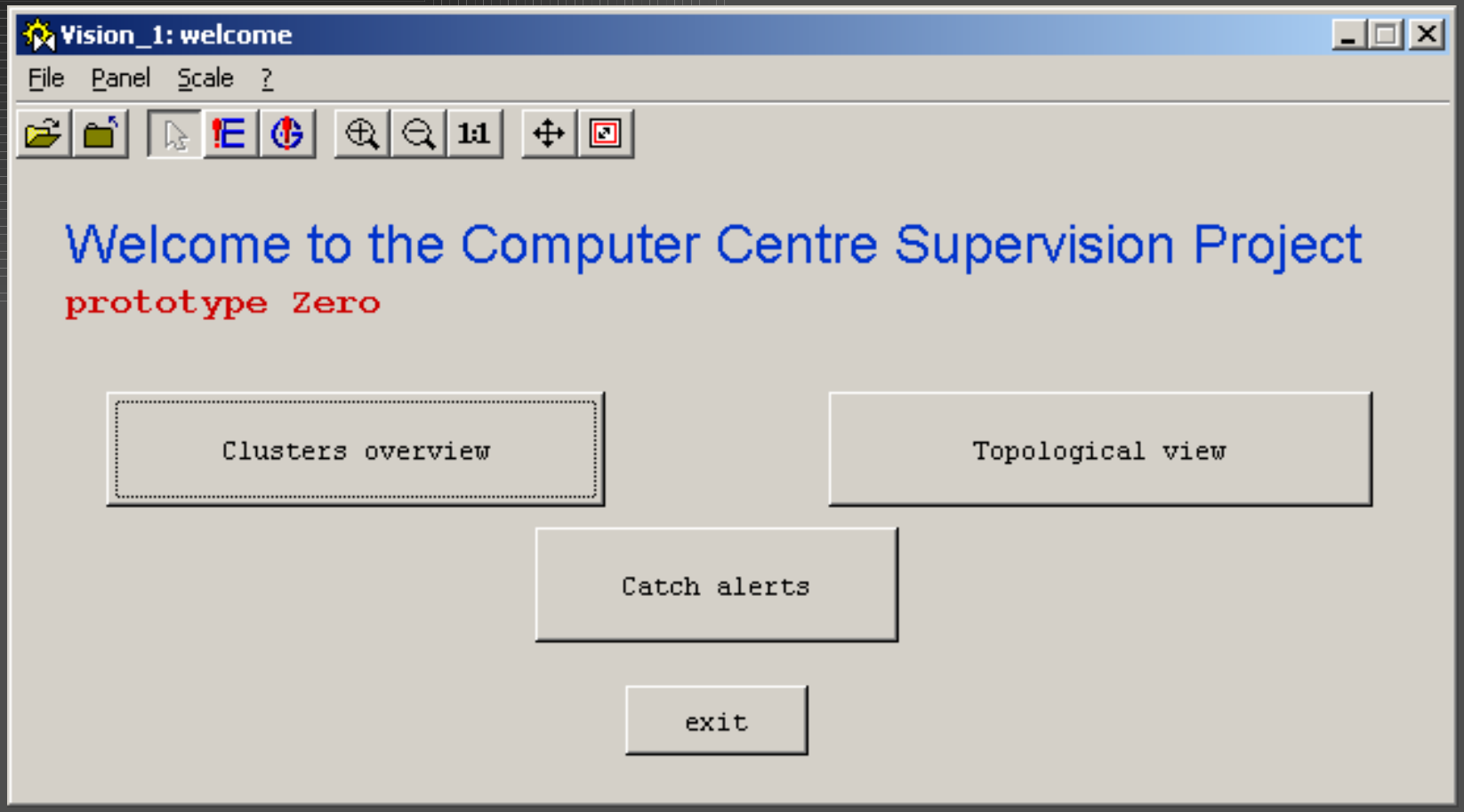
- Configuration generated by an external program
  - Machine info extracted from existing databases (CS, BIS, …)
  - Uploaded using the PVSS ASCII manager
  - 1000 machines with up to 100 metrics each
- Datapoint elements configured for.
  - Driver specifics (the source of the data)
  - Alert handling (for creating alarms – *numeric values only*)
  - Archiving (useful for trending – *does not work yet*)

Visual aspects

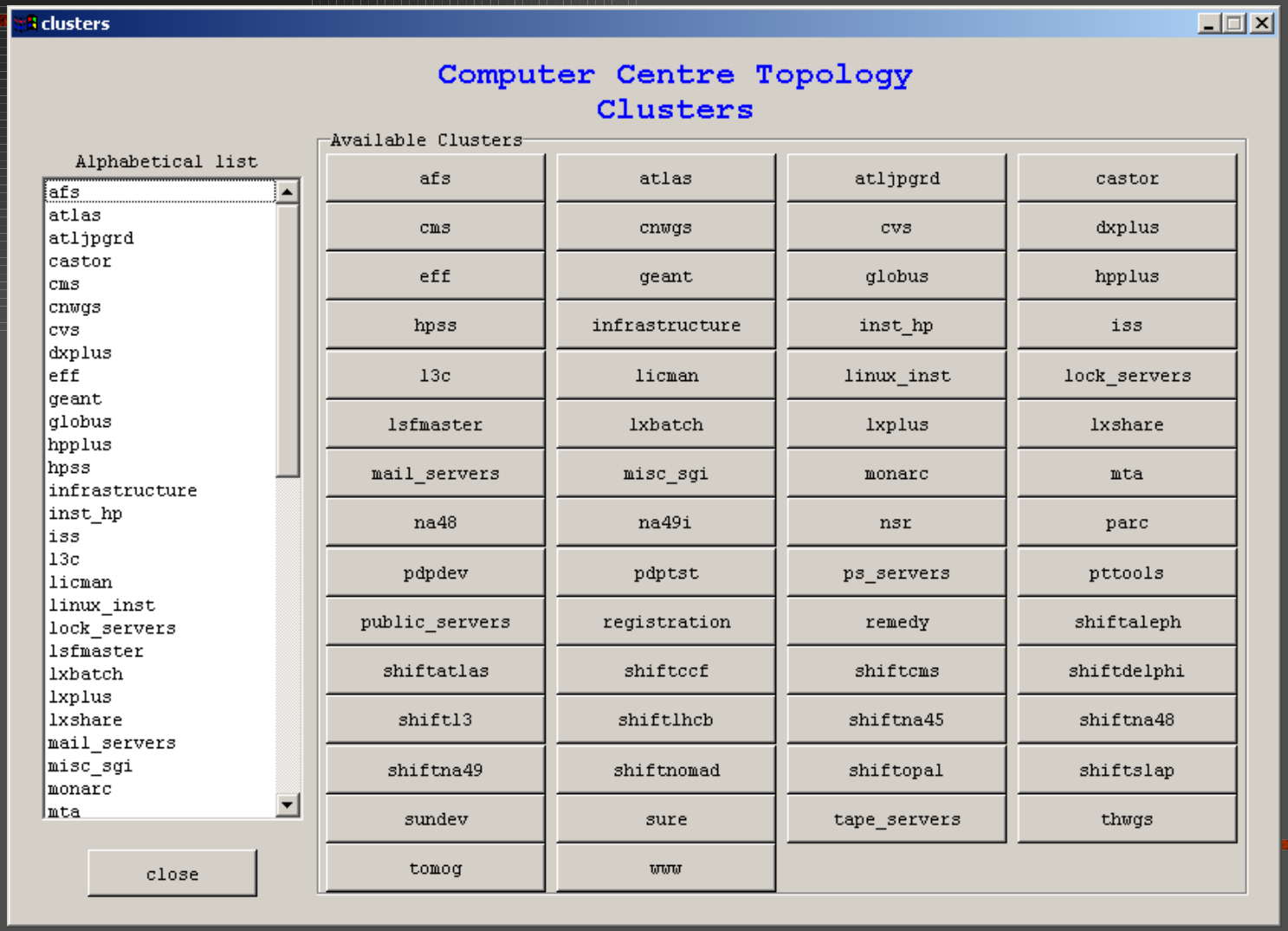
- PVSS uses panels to interact with users
- PVSS provides a toolkit to build them
  - Graphical objects (windows, buttons, circles, …)
  - C-like scripting language
- Three views were implemented:
  - Clusters a la PEM
  - Topological
  - Alert catching
- Static “PEM” Web page now generated from PVSS data (http://cern.ch/it-proj-ccs2/PrototypeZero/ClusterStatus)

Demonstration of Prototype 0

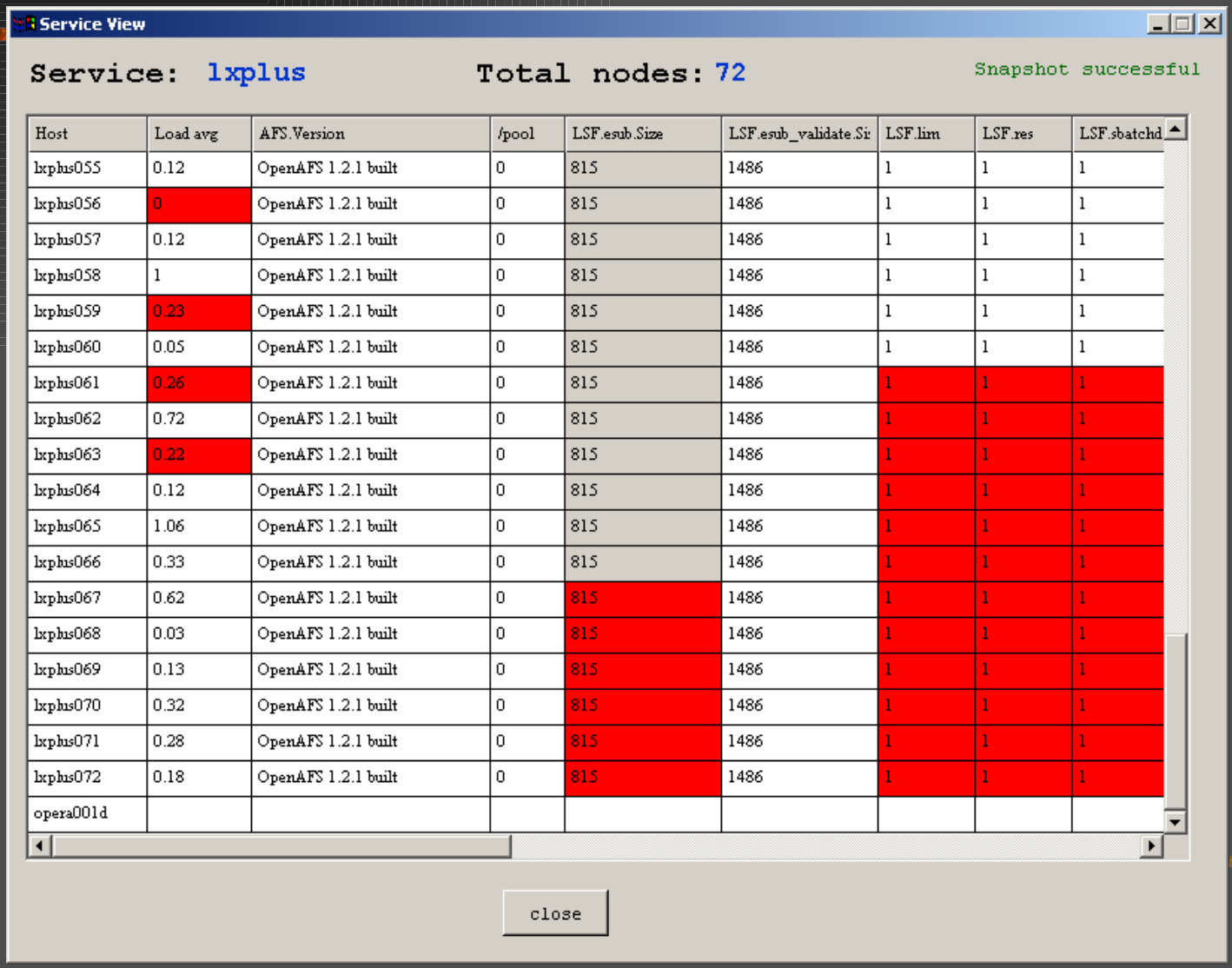
Welcome panel



Clusters overview

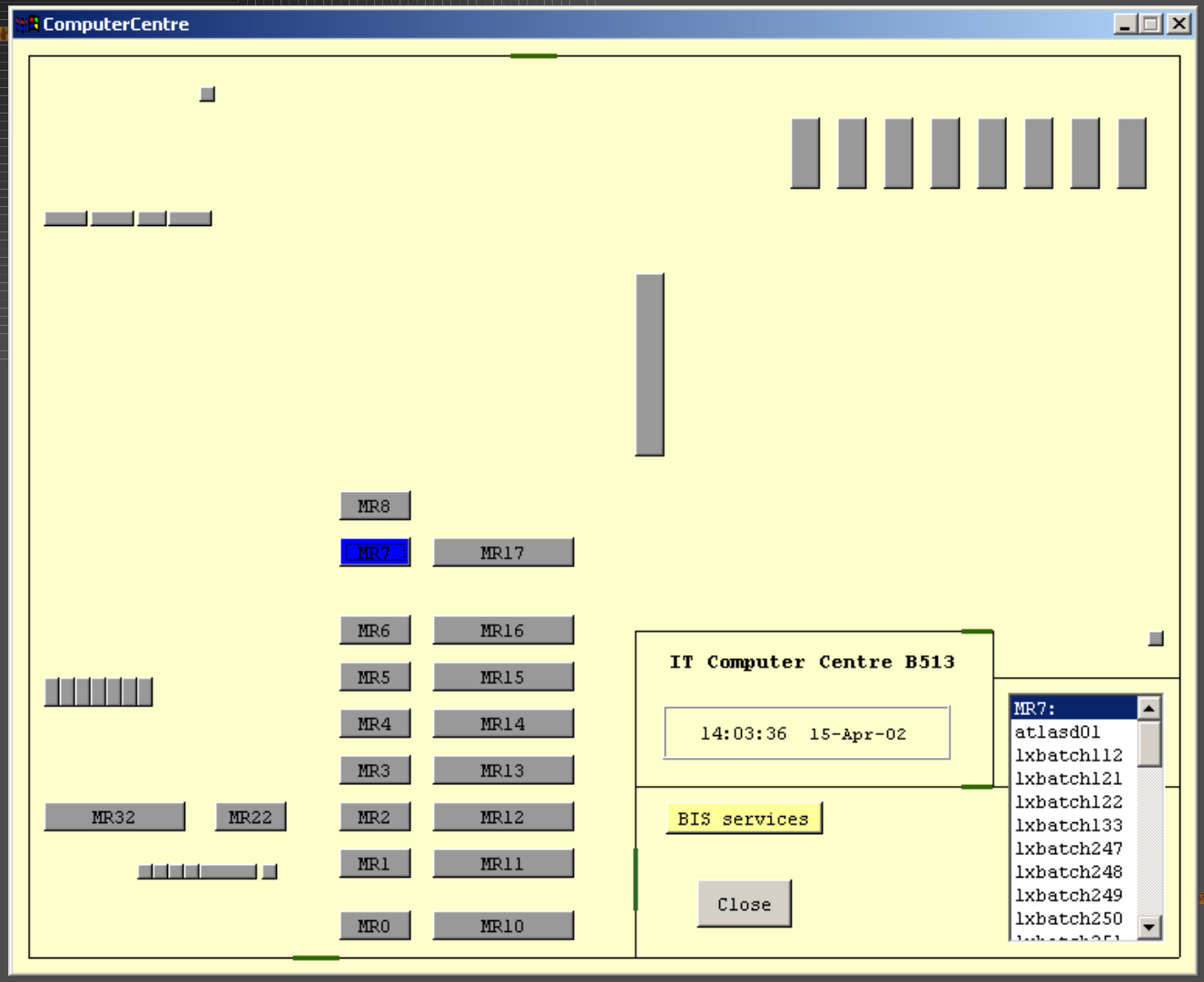


Lxplus detailed view

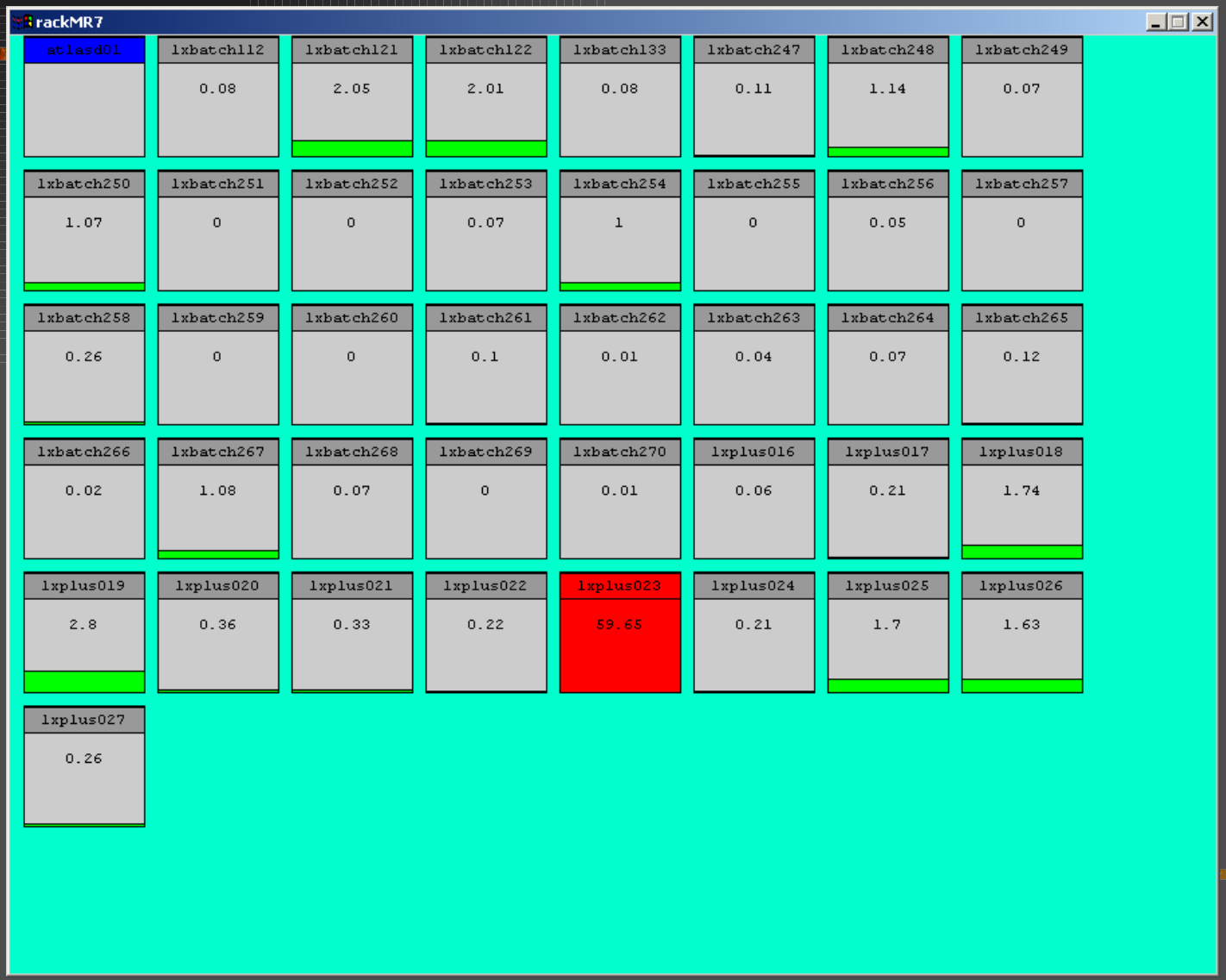


Host	Load avg	AFS.Version	/pool	LSF.esub.Size	LSF.esub_validate.Si	LSF.lim	LSF.res	LSF.sbatchd
lxplus055	0.12	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus056	0	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus057	0.12	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus058	1	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus059	0.23	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus060	0.05	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus061	0.26	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus062	0.72	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus063	0.22	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus064	0.12	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus065	1.06	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus066	0.33	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus067	0.62	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus068	0.03	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus069	0.13	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus070	0.32	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus071	0.28	OpenAFS 1.2.1 built	0	815	1486	1	1	1
lxplus072	0.18	OpenAFS 1.2.1 built	0	815	1486	1	1	1
opera001d								

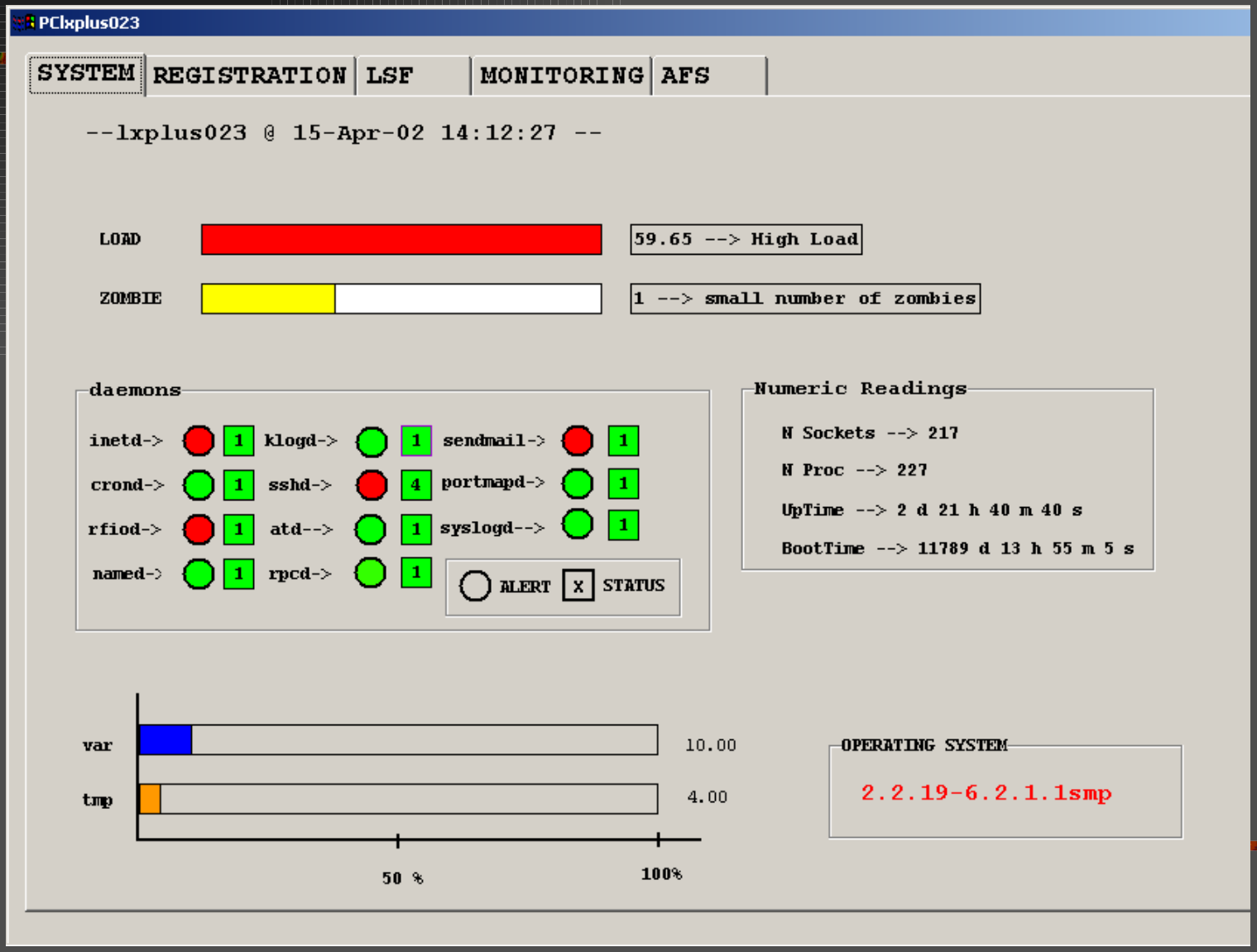
Topological view



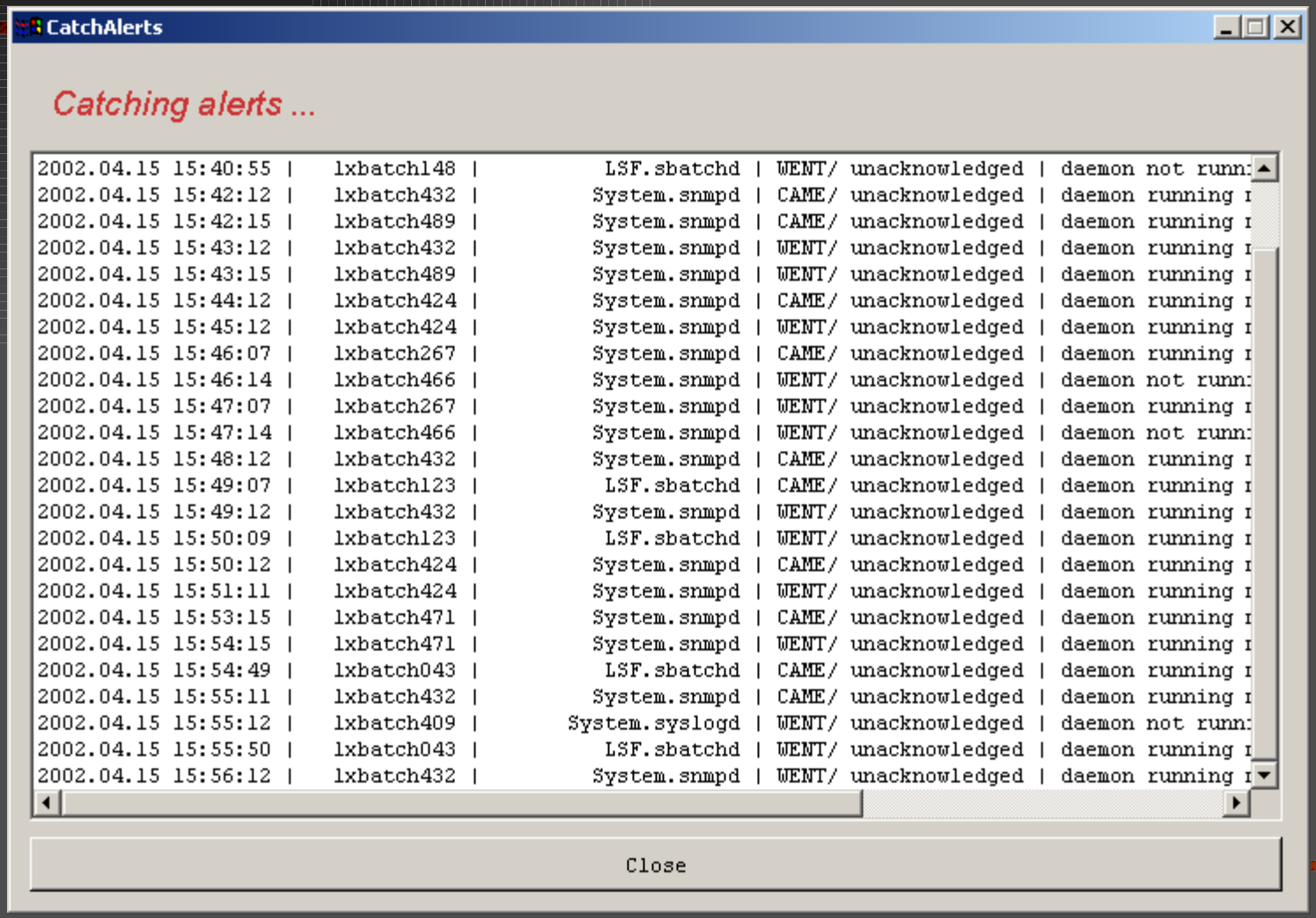
One rack


rackMR7
atlasd01
lxbatch112 0.08
lxbatch121 2.05
lxbatch122 2.01
lxbatch133 0.08
lxbatch247 0.11
lxbatch248 1.14
lxbatch249 0.07
lxbatch250 1.07
lxbatch251 0
lxbatch252 0
lxbatch253 0.07
lxbatch254 1
lxbatch255 0
lxbatch256 0.05
lxbatch257 0
lxbatch258 0.26
lxbatch259 0
lxbatch260 0
lxbatch261 0.1
lxbatch262 0.01
lxbatch263 0.04
lxbatch264 0.07
lxbatch265 0.12
lxbatch266 0.02
lxbatch267 1.08
lxbatch268 0.07
lxbatch269 0
lxbatch270 0.01
lxplus016 0.06
lxplus017 0.21
lxplus018 1.74
lxplus019 2.8
lxplus020 0.36
lxplus021 0.33
lxplus022 0.22
lxplus023 59.65
lxplus024 0.21
lxplus025 1.7
lxplus026 1.63
lxplus027 0.26

One machine


PClxplus023
SYSTEM
REGISTRATION
LSF
MONITORING
AFS
--lxplus023 @ 15-Apr-02 14:12:27 --
LOAD
59.65 --> High Load
ZOMBIE
1 --> small number of zombies
daemons
inetd-> 1
klogd-> 1
sendmail-> 1
crond-> 1
sshd-> 4
portmapd-> 1
rfiod-> 1
atd--> 1
syslogd--> 1
named-> 1
rpcd-> 1
ALERT
X
STATUS
Numeric Readings
N Sockets --> 217
N Proc --> 227
UpTime --> 2 d 21 h 40 m 40 s
BootTime --> 11789 d 13 h 55 m 5 s
var
10.00
tmp
4.00
50 %
100%
OPERATING SYSTEM
2.2.19-6.2.1.1smp

Alert catcher



Next steps (1)

- Prototype 1, due June 2002
  - Deployed by
    - Operators (partly phase out Sure)
    - Service managers concerned
  - Additional objectives:
    - Scalability tests (criteria to be discussed and defined)
    - Re-design of data points
    - Web interface

Next steps (2)

- Decision about suitability of PVSS
  - Develop list of criteria – user involvement
    - Functionality
    - Performance
    - Ease-of-use for users and developers
    - Cost
  - Experience with PVSS from Prototype 0:
    - Very useful to use control framework functionality provided
    - Complex toolkit - need expert advice from ETM

Next steps (3)

- Prototype 2, due December 2002
  - subject to positive result of suitability decision
  - Deployed by
    - IT managers
    - End users
    - Service managers of additional services
  - Additional objectives:
    - Correlation engine on PVSS system
    - Local correlation engine (?)

Communication

- Moving from learning experience into an effort eventually leading to deployment
- Wider communication required
  - Receive requirements/use cases from users (IT service providers and end users alike)
  - Discuss acceptance criteria
  - Present regularly what we have done
- Monthly open project meeting planned with users at CERN

Relationship with EDG WP4

- Short-term: Plan to use their configuration database services
- Long-term: Make sure the two projects converge
  - Different approaches towards same goal
- Use same solutions wherever possible
  - Factorise and modularise as much as possible to support different solutions where necessary
- Regular contacts with WP4 through WP4 manager

Conclusion

- Good start
  - But P0 still has a lot of rough edges…
- Core team very motivated and committed
  - Potential for further successful work
- Will need help from users
  - Make their needs known
  - Help implement their service
  - Use the system
- A very long way ahead…