Overview of Providers

Workshop on LHC Post Mortem

Session 4 – Data Providers, Volume, Type of Analysis

Robin Lauckner

Abstract

Post Mortem will be the key to mastering the full complexity of LHC Operation and the interaction between systems. Many systems will be involved in full optimisation and understanding of performance. Today a few systems are providing data to validate and understand hardware commissioning. This must be extended giving priority to obtaining essential information related to achieving first collisions. This talk will review systems involved, discuss the nature of the information to be provided and attempt to identify some priorities. The vacuum system will be examined to demonstrate how these demands are being met.

This Session

Key Words:

- Data Providers
- Volume of Data
- Type of Analysis

Talks:

- Overview of Providers – Robin Lauckner
- RF – Andy Butterworth
- BI – Stephane Bart Pedersen
- Kickers – Etienne Carlier
- Collimators – Michel Jonker

What Data Is Required to Understand 'Failures' During LHC Operation?

Client	Alarms	Logging	Transients
Access System			
Alice Interlocks			
Atlas Interlocks			
Beam Current Monitors			
Beam Dump			
Beam Interlocks			
Beam Feedback Systems			
Beam Loss Monitors			
Beam Position Monitors			
Beam Profile Monitors			
CMS Interlocks			
Collimators			
Cooling and Ventilation		YES	
Cryogenics, production ●		YES	
Cryostat Instrumentation ●			
Electricity Distribution		YES	

Client	Alarms	Logging	Transients
Energy Extraction ●			YES
Inflector			
LHCb Interlocks			
Power Converters ●	YES	YES	YES
Powering Interlocks ●	YES	YES	
Quench Protection ●			YES
QRL Instrumentation		YES	
Radiation Monitors			
Reference Magnets			
RF System			
Timing System			
Transverse Dampers			
Tune and Aperture kickers			
Vacuum ●		YES	
Warm Interlocks			

Check list of LHC systems that should record data for Post Mortem. Those already pushing data indicated "YES"

Priority Suppliers for Cold Powering ●

- QPS
- Energy Extraction
- Powering Interlocks
- Cryogenics
- Vacuum
- Power Converters

Many systems already publishing in the injectors

How much transient data during circuit commissioning?

Suppliers are QPS, PC and PIC

During Powering to Nominal circuits will generate PM data during tests

- Energy Extraction Discharge
- Powering Failure
- Fast Power Abort from PIC
- Heater Firing
- Artificial Quench
- Loss of sub-converter

Assume each converter generates 1.3 MB, QPS 1MB during a test. The PIC volumes are much smaller, a full powering sub-sector abort writes 6.4 kB on to logging.

Further assume that during heater firing tests 2 magnets of a 13 kA circuit are tested and each aperture of the MQM type circuits?

This gives about 4000 tests yielding some 11 GB of data on the PM server.

PIC1 and PIC2 tests expected to yield a similar amount

Circuit Commissioning Transient Data Estimate

	Tests	Cirs	PC	QPS	Sums
			MB	MB	MB
13 kA Main	17	24	1.3	1	938
IP Q&D	15	94	2.6	1	5076
600A EE	7	202	1.3	1	3252
600A no EE CR	5	136	1.3	1	1564
600A no EE	4	8	1.3	1	74
80-120 A					
60A					
Totals	48	464			**10904**

	PCS	PLI1							PLI2						PLI3				PLI4		PNO						PSQ	PAC
		1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	1	2	1	2	3	4	5	6		
13 kA Main			1	1	1	2				1	1	2	1			1	2		1			1	2					
IP Q&D				2	1	2				2		2	1				2					1	2					
IT RTQX2																												
IT RTQX1																												
IT RTQXA																												
IT RTQXM																												
IT RQX																												
600A EE			1	1	1					1	1					1						1						
600A no EE CR				1	1		1			1												1						
600A no EE				1	1		1															1						
80-120 A																												
60A																												

Priority Suppliers for Beam Run

- Beam Dump
- Powering data
- Beam Loss
- Beam Position
- RF

How much data during beam commissioning?

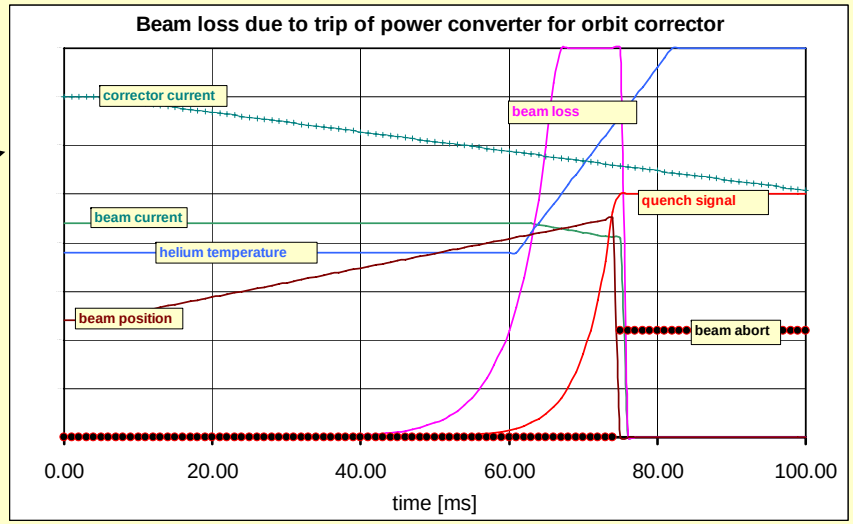
A full LHC Post Mortem will give several GBs data (PC = 2, BL = 2, RF = 2)

Expect (hopefully?) 100 GB / week early on – more tricky!

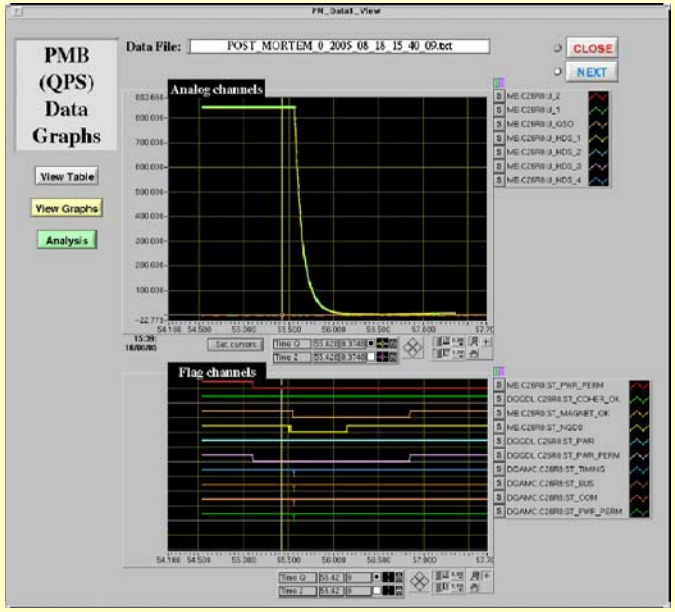
Types of Analysis

- Generic Analysis
- External Analysis
- Specific Analysis

Rüdiger plot - Different systems and sources

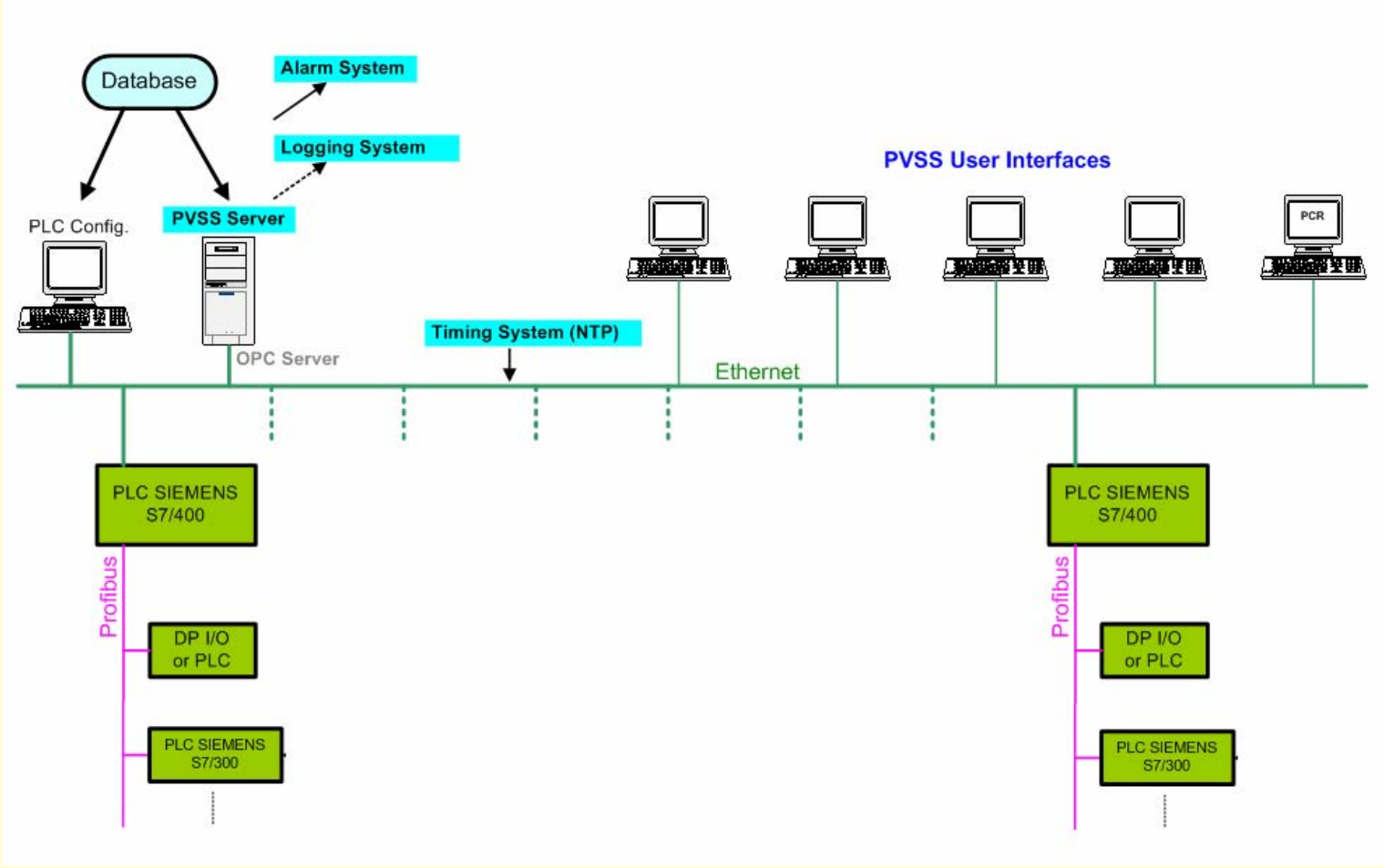


Developed for LHC h/w



Existing investment of AP s/w

Hardware configuration for the Vacuum system



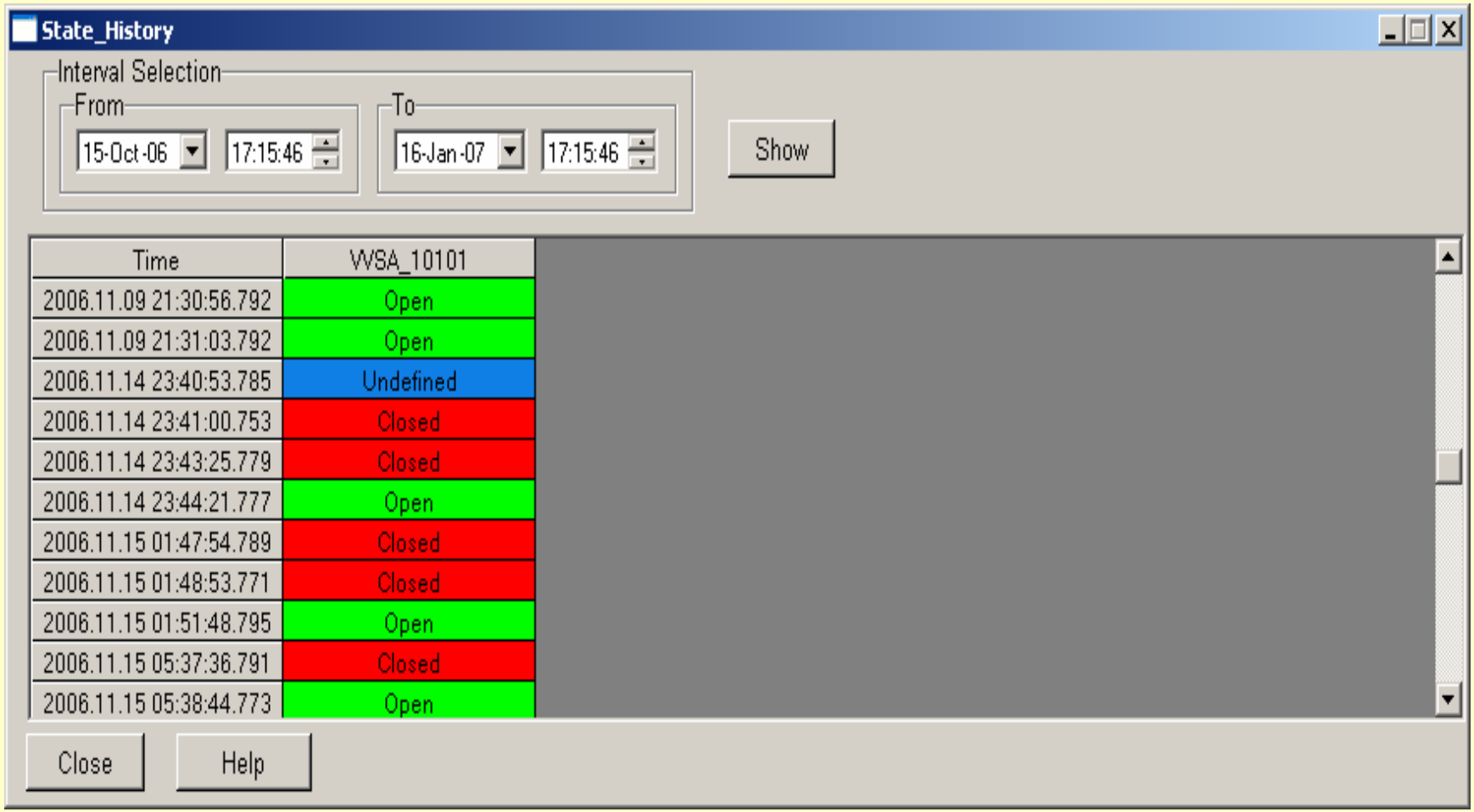
Slide from Isabelle Laugier

Logging of Vacuum Data

- Logging into PVSS
  - Change of state of Sector valves, with UTC time from PLC
  - Value of the pressure for Gauges and Pumps with UTC time from PLC.
- Logging into LHC logging DB from PVSS(not active for the moment but ready)
  - Value of the pressure for gauges and pumps with UTC time from PLC.
- To be added today:
  - Logging of change of state of sector valves,

Slide from Isabelle Laugier

Sector valve change of status in PVSS for SPS



Slide from Isabelle Laugier

Vacuum – an example

- Isabelle has promised details of what is logged, time stamping, naming and some questions she would like put to the WS