

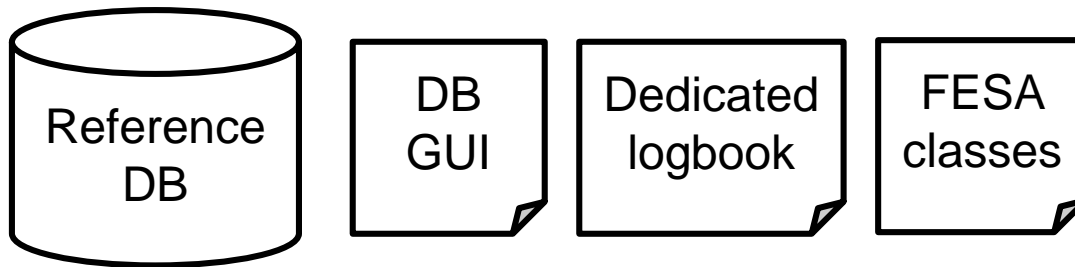
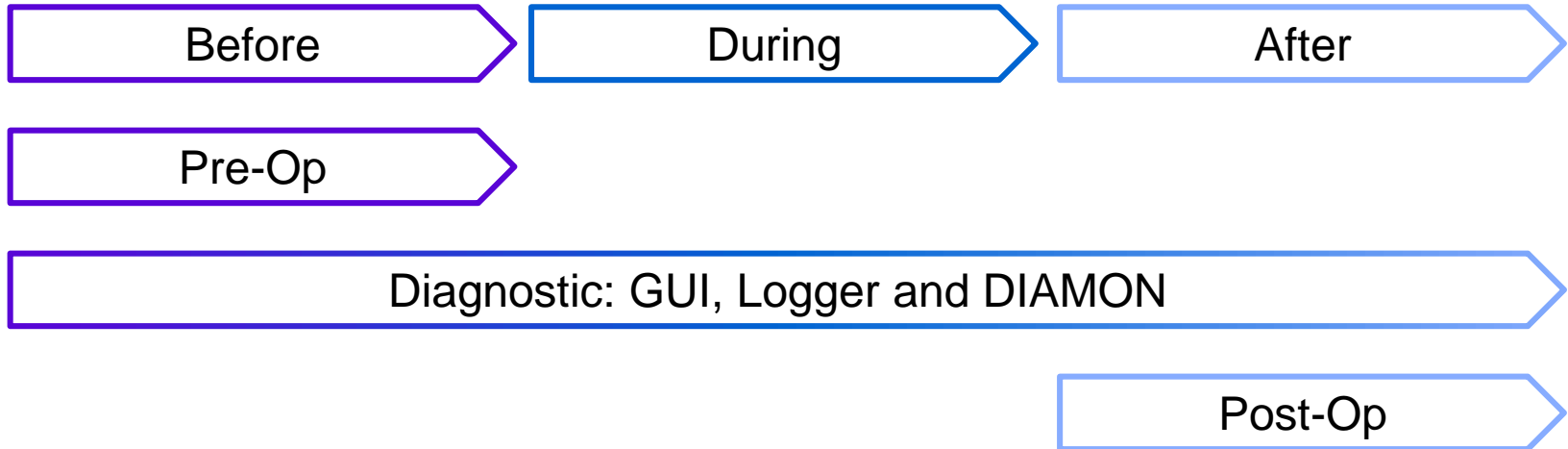
SMP : DIAGNOSTICS AND PRE-POST OPERATIONAL CHECKS

**JEAN-CHRISTOPHE GARNIER ON BEHALF
OF SMP SOFTWARE TEAM**

11/05/2012

Jean-Christophe Garnier

OVERVIEW



PRE-OP

Features

- Comparison of the SMP configuration with a Reference model from database (DB)
 - Firmware versions
 - Interconnections
 - Thresholds
 - etc ...
- Functional checks
 - LHC SMP connected to the Software Interlock System
 - Energy read from the SPS SMP correct for LHC injection
 - And much more ...
- Prevent operation in case of major problem

Java sequencer tasks for LHC and SPS

- Both in the LHC sequencer
- Executed before beam injection

PRE-OP

Results of the task

- 4 different severities – none < note < warning < error
- 4 notifications
 - Message in the LHC OP logbook
 - Notes written in TE-MPE logbook (id 333)
 - Warnings sent to the bis-smp-experts egroup
 - Errors interlock the SIS

Tests that interlock the SIS

- CISV did not receive the LHC flags from the GMT media
- Critical firmware version is incorrect on SMP boards
- SMP generator boards are not producing LHC parameters
- CISC is in test mode
- The SMP CIBUs are in test mode or cabling is incorrect
- RS485 connectivity is incorrect

DIAMON

Standard tool from BE/CO

Current monitoring

- Crate status
- Correct configuration of the SMP system
 - Device connections
- Correct behaviour
 - Parameter reception

Work in progress

- Comparison with reference model from DB
- Preparation of DIAMON2 with CO

SMP GUI

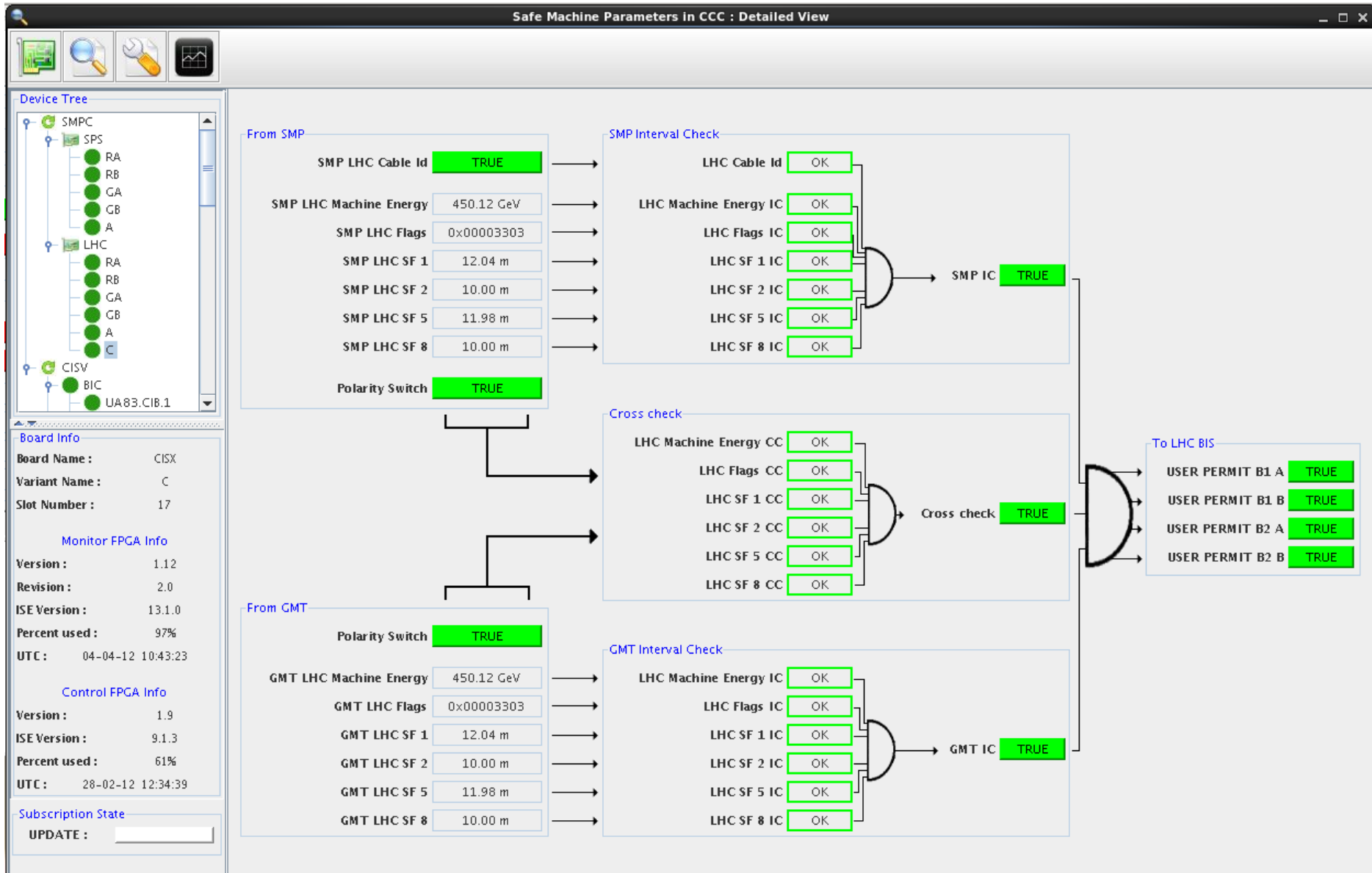
Features

- Decode and display all information from the SMP system
- Retrieve history buffers from any interval range

Java application

- For experts and for operators
- <http://abwww.cern.ch/ap/dist/smp/smp-gui/NEXT/SMPGUI.jnlp?arg0=CCC>

SMP GUI - CISC PANEL



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SMP GUI - CISC PANEL

Safe Machine Parameters in CCC : Detailed View

Device Tree

- SMPC
 - SPS
 - RA
 - RB
 - GA
 - GB
 - A
 - LHC
 - RA
 - RB
 - GA
 - GB
 - A
 - C
- CISV
 - BIC
 - UA83.CIB.1

Board Info

Board Name : CISX
 Variant Name : C
 Slot Number : 17

Monitor FPGA Info

Version : 1.12
 Revision : 2.0
 ISE Version : 13.1.0
 Percent used : 97%
 UTC : 04-04-12 10:43:23

Control FPGA Info

Version : 1.9
 ISE Version : 9.1.3
 Percent used : 61%
 UTC : 28-02-12 12:34:39

Subscription State

UPDATE :

From SMP

SMP LHC Cable Id TRUE

SMP LHC Machine Energy 450.12 GeV

SMP LHC Flags 0x00003303

SMP LHC SF 1 12.04 m

SMP LHC SF 2 10.00 m

SMP LHC SF 5 11.98 m

SMP LHC SF 8 10.00 m

Polarity Switch TRUE

SMP Interval Check

LHC Cable Id OK

LHC Machine Energy IC OK

LHC Flags IC OK

LHC SF 1 IC OK

LHC SF 2 IC OK

LHC SF 5 IC OK

LHC SF 8 IC OK

From GMT

Polarity Switch TRUE

GMT LHC Machine Energy 450.12 GeV

GMT LHC Flags 0x00003303

GMT LHC SF 1 12.04 m

GMT LHC SF 2 10.00 m

GMT LHC SF 5 11.98 m

GMT LHC SF 8 10.00 m

GMT Interval Check

LHC Machine Energy IC OK

LHC Flags IC OK

LHC SF 1 IC OK

LHC SF 2 IC OK

LHC SF 5 IC OK

LHC SF 8 IC OK

Cross check

LHC Machine Energy CC OK

LHC Flags CC OK

LHC SF 1 CC OK

LHC SF 2 CC OK

LHC SF 5 CC OK

LHC SF 8 CC OK

LHC Machine Energy cross-check details

Last received warning : never received

Total number of warnings : 0

Last received interlock : never received

Total number of interlocks : 0

	SMP	GMT MATCH ?
0	59.52 GeV	59.52 GeV
1	59.52 GeV	59.52 GeV
2	59.52 GeV	59.52 GeV
3	59.52 GeV	59.52 GeV
4	59.40 GeV	59.52 GeV
5	59.40 GeV	59.52 GeV
6	59.40 GeV	59.52 GeV
7	59.52 GeV	59.52 GeV
8	59.52 GeV	59.52 GeV
9	59.40 GeV	59.52 GeV

Cross-Check OK : YES

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SMP GUI – CISV PANEL

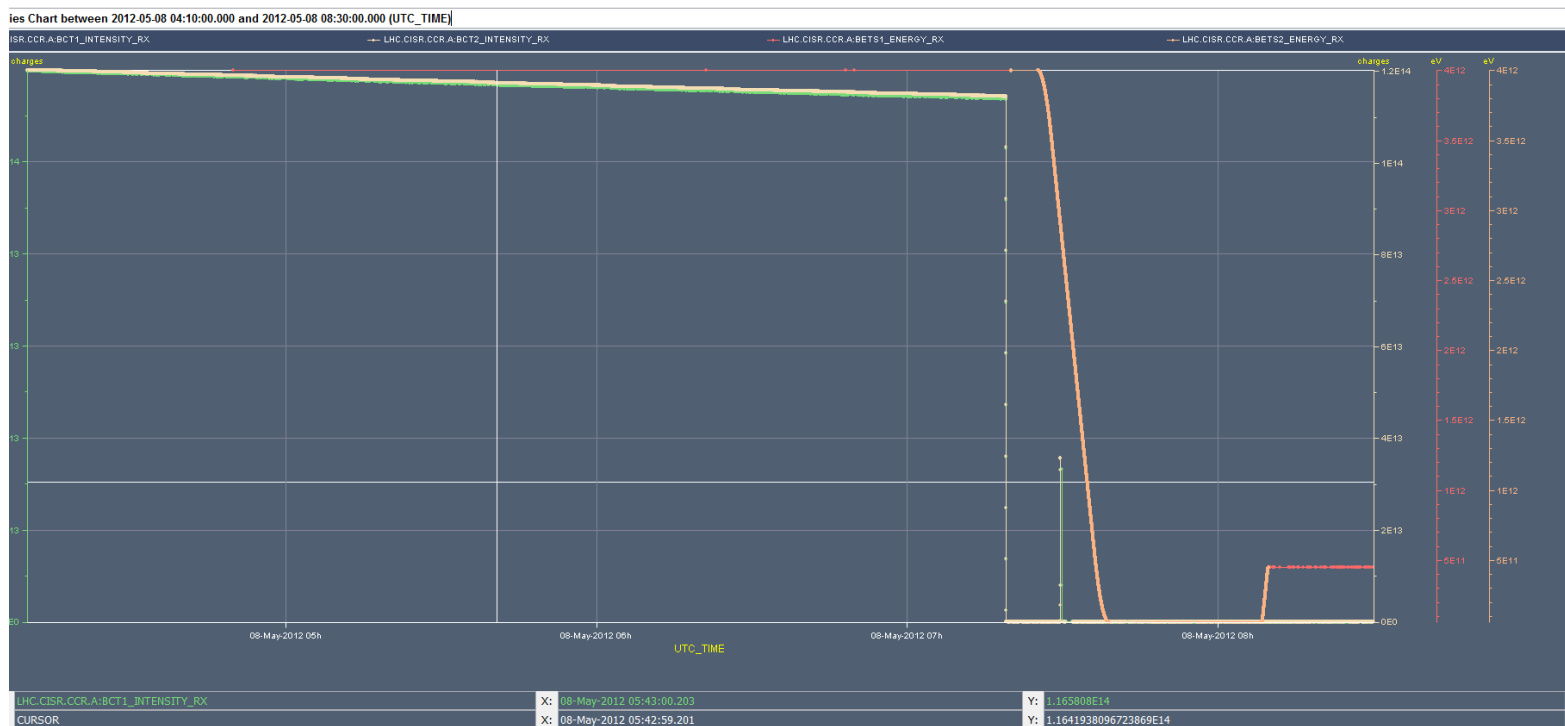
The screenshot displays the 'Safe Machine Parameters in CCC : Detailed View' window. On the left is a 'Device Tree' showing a hierarchy of components under 'CISV', including BIC, BLM, Injection, and Experiments. The main area is divided into several sections:

- Detailed view**:
 - Current Time**: 08-05-12 11:08:09
 - General information**:
 - VHDL version: 1218811625
 - Cable delay: 2043 ns
 - GMT Rx OK: TRUE
 - PLL locked OK: TRUE
 - Output status**:
 - SBF 1: TRUE
 - SBF 1 A: TRUE
 - SBF 1 B: TRUE
 - SBF 2: TRUE
 - SBF 2 A: TRUE
 - SBF 2 B: TRUE
 - MDI: FALSE
 - STB: FALSE
- Errors status**:
 - Synch errors: 12
 - Parity errors: 0
 - Code violation errors: 0
 - Queue errors: 1
 - Total errors: 13
 - Milliseconds Missed: 184427 (at last time: 09-03-12 09:56:0)
 - PLL errors: 37613 (at last time: 09-03-12 09:56:0)
 - Frame errors: 942746 (at last time: 09-03-12 09:56:0)
- Subscription State**: UPDATE: [input field]

LOGGER

Automatic Java process

- History buffer conversion to workable format



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POST-OP

Tools in post mortem analysis framework

- History buffer and register decoder
 - Convenient display of all registers and history buffers from all devices
- SMP status analyser (work in progress)
 - Comparison of data from SMP and GMT in the cross-checker
 - Check that the cross-checker did not interlock the BIS
 - Non blocking for further operations
 - SMP itself will be interlocking the BIS

SUMMARY

PmAnalysisModuleVersions

no version

GENERAL CISX.CCRLHC.C CISX.CCRLHC.A CISX.CCRLHC.GB CISX.CCRLHC.GA CISX.CCRLHC.RB CISX.CCRLHC.RA

HEADER

System LHC
 Class CISX
 Source CISX.CCRLHC.GB
 Event stamp 08/05/12 10:27:48.488500
 Version no version
 Encoding LHC/CISX
 Qualifier UNTESTED

HISTORY STAMPS

Index	Timestamp	Delta[sec]	Visibility	Type	Description	Value
599	08/05/12 10:2...	000422.85235...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
600	08/05/12 10:2...	000422.85235...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
601	08/05/12 10:2...	000422.85235...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
602	08/05/12 10:2...	000422.85235...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
603	08/05/12 10:2...	000418.85240...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
604	08/05/12 10:2...	000418.85240...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
605	08/05/12 10:2...	000418.85240...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
606	08/05/12 10:2...	000418.85240...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
607	08/05/12 10:2...	000414.85247...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
608	08/05/12 10:2...	000414.85247...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
609	08/05/12 10:2...	000414.85247...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
610	08/05/12 10:2...	000414.85247...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
611	08/05/12 10:2...	000410.85244...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
612	08/05/12 10:2...	000410.85244...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
613	08/05/12 10:2...	000410.85244...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
614	08/05/12 10:2...	000410.85244...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
615	08/05/12 10:2...	000406.85237...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
616	08/05/12 10:2...	000406.85237...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
617	08/05/12 10:2...	000406.85237...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
618	08/05/12 10:2...	000406.85237...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
619	08/05/12 10:2...	000402.85242...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
620	08/05/12 10:2...	000402.85242...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
621	08/05/12 10:2...	000402.85242...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
622	08/05/12 10:2...	000402.85242...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
623	08/05/12 10:2...	000398.85241...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
624	08/05/12 10:2...	000398.85241...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
625	08/05/12 10:2...	000398.85241...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
626	08/05/12 10:2...	000398.85241...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
627	08/05/12 10:2...	000394.85239...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
628	08/05/12 10:2...	000394.85239...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
629	08/05/12 10:2...	000394.85239...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
630	08/05/12 10:2...	000394.85239...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
631	08/05/12 10:2...	000390.85245...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
632	08/05/12 10:2...	000390.85245...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
633	08/05/12 10:2...	000390.85245...	ALL	OPERATOR	SQUEEZING_F...	11.98 m
634	08/05/12 10:2...	000390.85245...	ALL	OPERATOR	SQUEEZING_F...	10.00 m
635	08/05/12 10:2...	000386.85239...	ALL	OPERATOR	SQUEEZING_F...	12.04 m
636	08/05/12 10:2...	000386.85239...	ALL	OPERATOR	SQUEEZING_F...	10.00 m

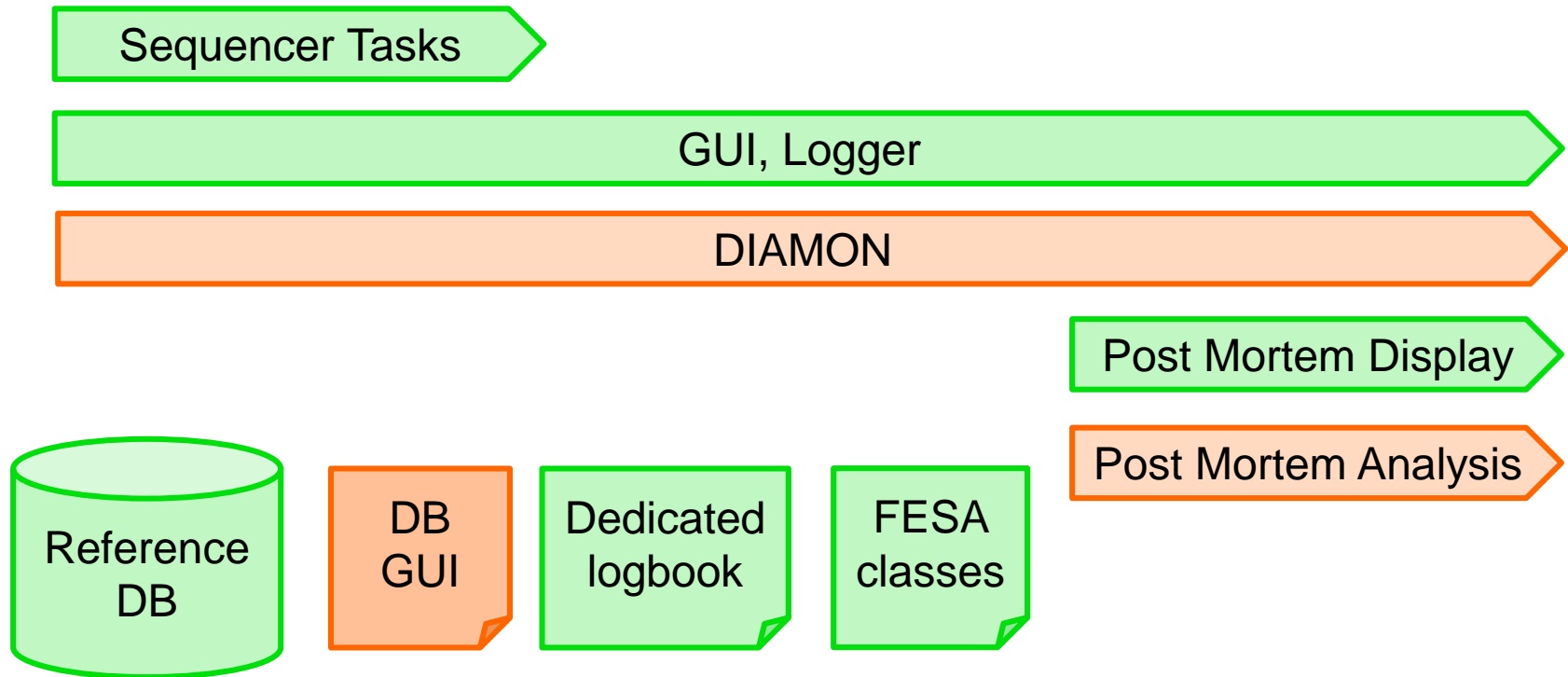
REGISTERS

Register Name	Value
LAST_INTENSITY_2_B	0.0E0 [p]
INTENSITY_2_B_HEADER	0x0000002B
INTENSITY_2_B_TIMEOUT	5356.80 GeV
SERIAL_STATUS	0x00000000
SQUEEZING_FACTOR_1	12.04 m
SQUEEZING_FACTOR_1_UPPER	0.65
SQUEEZING_FACTOR_1_UPPER_LIMIT	400.0
SQUEEZING_FACTOR_1_LOWER	0.56
SQUEEZING_FACTOR_1_LOWER_LIMIT	0.04
SQUEEZING_FACTOR_2	10.0
SQUEEZING_FACTOR_2_UPPER	3.04
SQUEEZING_FACTOR_2_UPPER_LIMIT	400.0
SQUEEZING_FACTOR_2_LOWER	2.95
SQUEEZING_FACTOR_2_LOWER_LIMIT	0.04
SQUEEZING_FACTOR_5	11.9
SQUEEZING_FACTOR_5_UPPER	0.65
SQUEEZING_FACTOR_5_UPPER_LIMIT	400.00 m
SQUEEZING_FACTOR_5_LOWER	0.56 m
SQUEEZING_FACTOR_5_LOWER_LIMIT	0.04 m
SQUEEZING_FACTOR_8	10.00 m
SQUEEZING_FACTOR_8_UPPER	3.04 m
SQUEEZING_FACTOR_8_UPPER_LIMIT	400.00 m
SQUEEZING_FACTOR_8_LOWER	2.95 m
SQUEEZING_FACTOR_8_LOWER_LIMIT	0.04 m
PHYSICS_ENERGY_UPPER	4002.24 GeV
PHYSICS_ENERGY_UPPER_LIMIT	7002.00 GeV
PHYSICS_ENERGY_LOWER	3994.68 GeV
PHYSICS_ENERGY_LOWER_LIMIT	448.44 GeV
MACHINE_ENERGY	450.12 GeV
MACHINE_ENERGY_STATUS	0x00000000
INTENSITY_8_1	0.0E0 [p]
INTENSITY_10_1	0.0E0 [p]
INTENSITY_1_STATUS	0x00000008
INTENSITY_8_2	9.0E8 [p]
INTENSITY_10_2	0.0E0 [p]
INTENSITY_2_STATUS	0x00000008
SETUP_BEAM_FLAG_LIMIT	5.0E11 [p]
SETUP_BEAM_FLAG_TIME_LEFT	0 ns

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CONCLUSION



CISV software cross-checker?

**THANK YOU FOR
YOUR ATTENTION**

QUESTIONS

BACK-UP SLIDES

Diagram:	SMP_E_R Model
Author:	zmakonne
Created on:	2012-04-26 08:41:27 CEST
Modified on:	2012-04-26 08:55:22 CEST
Changed by:	zmakonne
Design:	Untitled_1
Model:	SMP_E_R Model

SMP_THRESHOLDS	
P * ID	NUMBER
U * THRESHOLD_NAME	VARCHAR2 (100 BYTE)
* THRESHOLD_VALUE	NUMBER
SMP_THRESHOLDS_PK (ID)	
SMP_THRESHOLDS_UK (THRESHOLD_NAME)	

COMPUTERS	
P * COMPNAME	VARCHAR2 (20 BYTE)
* COMPTYPE	VARCHAR2 (8 BYTE)
COMPNO	NUMBER (4)
DIRECTORY	VARCHAR2 (8 BYTE)
COMPDESCRIP	VARCHAR2 (40 BYTE)
PLSMACHINE	VARCHAR2 (6 BYTE)
DIGIOMBNO	NUMBER (5)
RESETVAL	NUMBER (6)
LASTUSER	VARCHAR2 (40 BYTE)
CONCENTRATOR	VARCHAR2 (8 BYTE)
CONSPORT	NUMBER (5)
SERVER	VARCHAR2 (8 BYTE)
SERVPORT	NUMBER (5)
BUILDING	VARCHAR2 (5 BYTE)
ROOMCODE	VARCHAR2 (10 BYTE)
RACK	VARCHAR2 (20 BYTE)
HOSTNAME	VARCHAR2 (20 BYTE)
CONSOLE	NUMBER
PRIORITY	NUMBER (3)
TGM_NETWORK_ID	NUMBER (38)
COMP_FAMILY_ID	NUMBER
LHCLAYOUT_ID	NUMBER
* OPERATIONAL_FLAG	VARCHAR2 (1 BYTE)
PERSON_ID	NUMBER
FLOOR	VARCHAR2 (2 BYTE)
RBAC_CHECK_POLICY_ID	NUMBER
* DIAMON_FLAG	VARCHAR2 (1 BYTE)
PLC_GROUP_ID	NUMBER
SYSTEM_ID	NUMBER
EXPLOITATION_INFO	VARCHAR2 (4000 BYTE)
SUBSYSTEM_ID	NUMBER
TO_BE_RENOVATED	VARCHAR2 (1 BYTE)
SCHEDULED_RENOVATION_DATE	DATE
RENOVATED	VARCHAR2 (1 BYTE)
RENOVATED_DATE	DATE
RBAC_EXPECTED_CHECK_POLICY_ID	NUMBER
* RULE_FLAG	VARCHAR2 (1 BYTE)
U * RULE_TAG_ID	NUMBER
U * TEMPLATE_ID	NUMBER
U * COMPUTER_ID	NUMBER
RENOVATION_DETAILS	VARCHAR2 (4000 BYTE)
ACCELERATOR	VARCHAR2 (6 BYTE)
* SMP_ENABLED	VARCHAR2 (3 BYTE)
SMP_VERSION	VARCHAR2 (45 BYTE)
COMPUTERS_PK (COMPNAME)	
COMPUTERS_RULE_TAG_ID_UK (RULE_TAG_ID)	
COMPUTERS_COMPUTER_ID_UK (COMPUTER_ID)	
COMPUTERS_LCSS_I_FK (SUBSYSTEM_ID, SYSTEM_ID)	
COMPUTERS_COMPTYPES_FK (COMPTYPE)	

SMP_CISV	
P * ID	NUMBER
U * CISV_NAME	VARCHAR2 (45 BYTE)
DESCRIPTION	VARCHAR2 (100 BYTE)
LOCATION	VARCHAR2 (45 BYTE)
CRATE_NUMBER	NUMBER
SERIAL_NUMBER	NUMBER
* CABLE_DELAY	NUMBER
* VHDL_VERSION	NUMBER
F FEC_INSTALLED_ID	NUMBER
F * CISV_FAMILY_ID	NUMBER
F FEC_CONNECTED_ID	NUMBER
SMP_CISV_PK (ID)	
SMP_CISV_UK (CISV_NAME)	

SMP_CISV_FAMILIES	
P * ID	NUMBER
U * CISV_FAMILY_NAME	VARCHAR2 (45 BYTE)
DESCRIPTION	VARCHAR2 (100 BYTE)
SMP_CISV_FAMILIES_PK (ID)	
SMP_CISV_FAMILIES_UK (CISV_FAMILY_NAME)	

SMP_BOARDS	
P * ID	NUMBER
U * BOARD_NAME	VARCHAR2 (100 BYTE)
* VARIANT_NAME	VARCHAR2 (50 BYTE)
* SLOT_NUMBER	NUMBER
DESCRIPTION	VARCHAR2 (200 BYTE)
CLASSV_ID	NUMBER
* CONTROL_VERSION	VARCHAR2 (45 BYTE)
* CONTROL_ISEVERSION	VARCHAR2 (45 BYTE)
* CONTROL_UTC	NUMBER
* MONITOR_VERSION	VARCHAR2 (45 BYTE)
* MONITOR_REVISION	VARCHAR2 (45 BYTE)
* MONITOR_ISEVERSION	VARCHAR2 (45 BYTE)
* MONITOR_UTC	NUMBER
DETAILED_HISTORY_MODE	NUMBER
* RS485_MASK	NUMBER
F COMPUTER_ID	NUMBER
SMP_BOARDS_PK (ID)	
SMP_BOARDS_UK (BOARD_NAME)	

SMP_CIBF_CONFIGS	
P * ID	NUMBER
U * CIBF_NAME	VARCHAR2 (45 BYTE)
DESCRIPTION	VARCHAR2 (100 BYTE)
* CIBF_VERSION	VARCHAR2 (45 BYTE)
F COMPUTER_ID	NUMBER
F CHANNEL_ID	NUMBER
IDENTIFIER	NUMBER
SMP_CIBF_CONFIGS_PK (ID)	
SMP_CIBF_CONFIGS_UK (CIBF_NAME)	

LOV_CIBF_CHANNELS	
P * ID	NUMBER
U * DATA_VALUE	VARCHAR2 (20 BYTE)
LOV_CIBF_CHANNELS_PK (ID)	
LOV_CIBF_CHANNELS_UK (DATA_VALUE)	

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