



The AccTesting Framework – MPS recommissioning

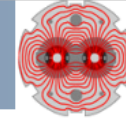
Kajetan Fuchsberger
LHC MPP, 2013-07-05

On behalf of the TE-MPE-MS Software Team:
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What is it all about?



Organization (2)



- Machine Protection will move from share-point site to AccTesting.
 - *MPP will profit to check the procedures and model them in the framework.*
 - *The framework will be used mostly for tracking (and not yet so much for automated execution).*
- We propose to move the dry-run and commissioning tracking into the same tool (away from share-point and Exel).
 - ***We must get as many teams on board as possible.***
 - *Each 'team' will have to define the test/commissioning sequence in the framework. Tools will be provided. This should not represent much extra work – support/help by OP & friends.*
 - *It is still time to place some requirements for the framework.*
 - *Re-usable for re-commissioning after TS, winter stops, future LS.*
 - *For example loss map sequences etc*

LBOC

02.07.2013

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MPS Commissioning in run 1

Introduction to AccTesting

What we (TE-MPE-MS) are working on

What would be required from Equipment Owners / MPP

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MPS commissioning documents

- MPS commissioning during run 1 based on EDMS documents prepared for individual MPS systems (LHC-OP-MPS-000*)
- Documents covered system overview, dependencies on other systems, and step wise commissioning from IST, machine checkout and commissioning with beam as seen from individual MPS subsystem

LHC-OP-MPS-0004 v.2 Doc. page	MPS Aspects of the Beam Interlock System Commissioning MPS-BIS-Commissioning_v2 doc (1 Mb) pdf (1 Mb)	Released
LHC-OP-MPS-0005 v.3 Doc. page	MPS Aspects of the Powering Interlock System Commissioning MPS_PIC-BIC_v6 doc (1 Mb) pdf (994 Kb)	Released
LHC-OP-MPS-0007 v.2 Doc. page	MPS Aspects of the Beam Dump System Commissioning MPS-bc-LBDSv5 pdf (977 Kb) doc (564 Kb)	Released
LHC-OP-MPS-0008 v.2 Doc. page	MPS Aspects of the Fast Magnet Current Change Monitors Commissioning MPS_FMCM-V0.6 doc (850 Kb) pdf (2 Mb)	Released
LHC-OP-MPS-0009 v.3 Doc. page	MPS Aspects of the Beam Loss Monitor System Commissioning MPS-BLM-v2_0 doc (517 Kb) pdf (883 Kb)	Released
LHC-OP-MPS-0010 v.2 Doc. page	MPS Aspects of the Warm Magnet Interlock System Commissioning MPS_WIC_v6 doc (429 Kb) pdf (563 Kb)	Released
LHC-OP-MPS-0016 v.3 Doc. page	2011 MODIFICATION OF THE LHC COLLIMATOR CONTROLS RELEVANT FOR MACHINE PROTECTION LHC-OP-MPS-0016 doc (93 Kb) pdf (74 Kb)	Released

7 documents found

Courtesy: M. Zerlauth

MPS commissioning

- Described tests were extracted, allocated to a commissioning phase and reflected in Share-Point site, amounting to a total of ~ 400 individual steps



Machine Protection web site

Machine Protection web site > MPS Task List 2012

MPS Task List 2012

MPS Task List 2012

Actions ▾

Test Name	Start Date	End Date
Phase : Beam Commissioning (127)		
System : BLM (7)		
System : Collimation (13)		
System : FMCM (3)		
System : Injection-Beam1 (6)		
System : Injection-Beam2 (5)		
System : LBDS-Beam1 (38)		
System : LBDS-Beam2 (38)		
System : MPS Global tests (2)		
System : SIS (6)		
System : SMP (9)		
Phase : Machine Checkout (220)		
Phase : MPS EoF Tests (4)		
Phase : System IST (55)		

<https://espace.cern.ch/LHC-Machine-Protection/Lists/MPS%20Task%20List%202012/Resume.aspx>

Courtesy: M. Zerlauth

MPS commissioning

The screenshot displays a web application interface for 'MPS Task List 2012'. On the left, a sidebar lists various systems and phases. The main content area shows a table of tasks under the 'Phase: MPS End Tests (4)' category. A yellow arrow points from the 'Voltage divider installation' task in the table to a detailed view window on the right.

MPS Activities History

- 2011
- 2012
- 2013

Discussions

- Team Discussion

Sites

People and Groups

- Recycle Bin

Machine Protection web site > MPS Task List 2012 > Voltage divider installation

MPS Task List 2012: Voltage divider installation

Close

Edit Item | Delete Item | Manage Permissions | Alert Me

System	FMCM
Test Name	Voltage divider installation
Contact Person	Markus Zerlauth
Phase	System IST
Start Date	01/01/2011
End Date	01/01/2011
Repetition	N - Never
EDMS Document	896393
Details	For each individual FMCM, verify correct installation of voltage divider and cabling towards the FMCM. Validate voltage measurement during a PC cycle at the monitoring outputs of the FMCM.
Status	Done
Results	Already done - test not applicable.
Locations Tested	Pt1; Pt2; Pt3; Pt5; Pt6; Pt7; Pt8
Attachments	FMCM-Voltage-Divider-Values.xls

Created at 27/01/2012 03:41 PM by Eric Veyrunes
Last modified at 27/01/2012 03:41 PM by Eric Veyrunes

Close

Courtesy: M. Zerlauth

'Manual' signature of tests by entering comments and eventually documents

MPS commissioning improvements

- System dependencies and boundary conditions for commissioning are very different, no sequence of steps is currently proposed/enforced
 - Not clear what needs to be done before going to next phase/intensity
 - No guarantee all necessary steps are completed before moving on
 - Results distributed in EDMS, logbook, SharePoint,...
 - No coherency for execution and analysis of repetitive tests (individual tools by BLM, COLL, PIC/WIC/BIS,....)

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8.4	PILOT OF $1 \cdot 10^{10}$ P* AT 7 TEV	10
8.5	43 BUNCHES OF $4 \cdot 10^{10}$ P* AT 7 TEV	10
8.6	156 BUNCHES OF $9 \cdot 10^{10}$ P* AT 7 TEV	10
8.7	936 BUNCHES OF $4 \cdot 10^{10}$ P* AT 7 TEV	10
8.8	936 BUNCHES OF $9 \cdot 10^{10}$ P* AT 7 TEV	10
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FMCM spec

LBDS spec

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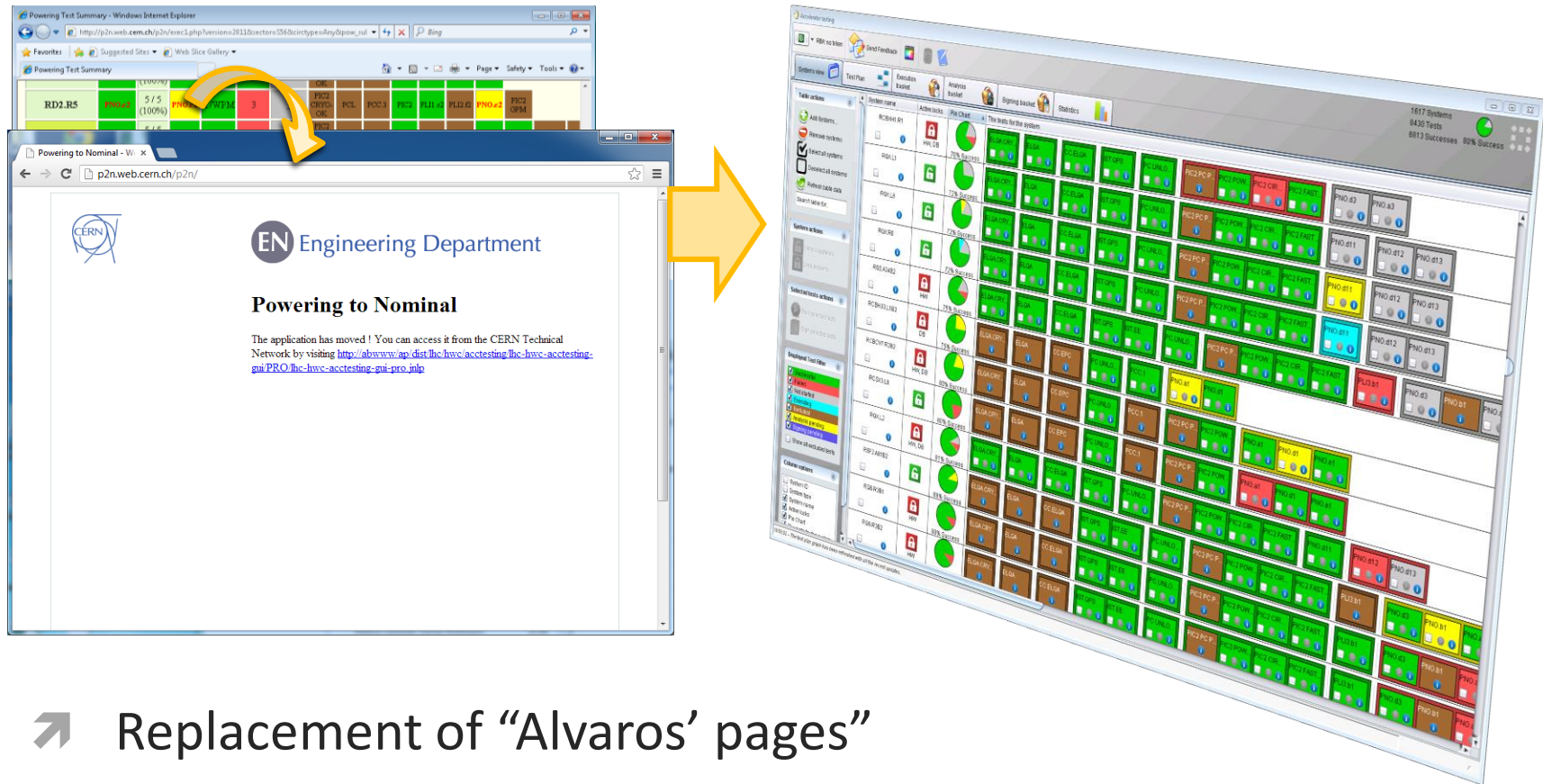
MPS Commissioning in run 1

Introduction to AccTesting

What we (TE-MPE-MS) are working on

What would be required from Equipment Owners / MPP

The Roots of AccTesting



➤ Replacement of “Alvaros’ pages”

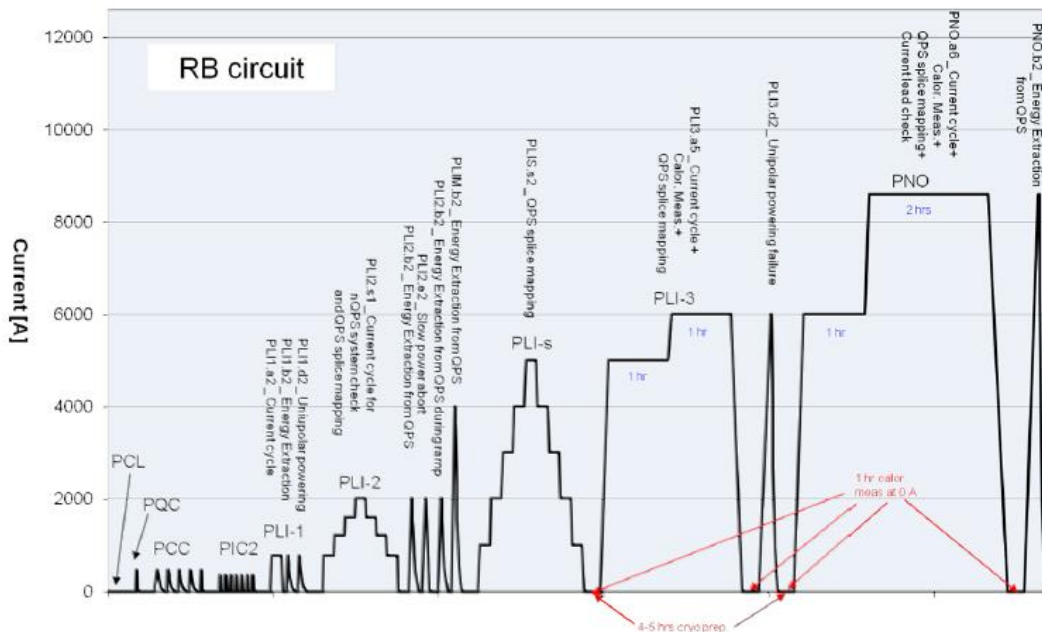
➤ Evolved into a general test execution and tracking framework.

AccTesting Concept

Tests

RQTL9.R3B1				100% Success	ELQA.CRY...	ELQA	CC.ELQA	IST.QPS	IST.EE	PC.UNLO...	PIC1.POW...	PIC1.CIR...	PIC1.FAST...
RQTL9.R3B2				100% Success	ELQA.CRY...	ELQA	CC.ELQA	IST.QPS	IST.EE	PC.UNLO...	PIC2.POW...	PIC2.CIR...	PIC2.FAST...

Test-Phases.



HWC - Workflow I

The screenshot displays the 'Accelerator testing' software interface. At the top right, it shows overall statistics: 1617 Systems, 8430 Tests, 6813 Successes, and an 80% Success rate. The main area is a table with columns for System name, Active locks, Pie Chart, and The tests for the system. The table lists various systems like RCBX1.R1, RQXL1, RQXL8, RQXR8, RSS.A34B2, RCBH33.L1B2, RBCV7.R3B2, RCSX3.L8, RQXL2, RSF2.A81B2, RQ6.R3B1, and RQ6.R3B2. Each system row includes a lock status icon, a pie chart showing success percentage, and a grid of test icons with their own status indicators. A yellow callout box is overlaid on the right side of the table.

1. User “expresses his wish” to execute one (or many) tests.

HWC - Workflow II

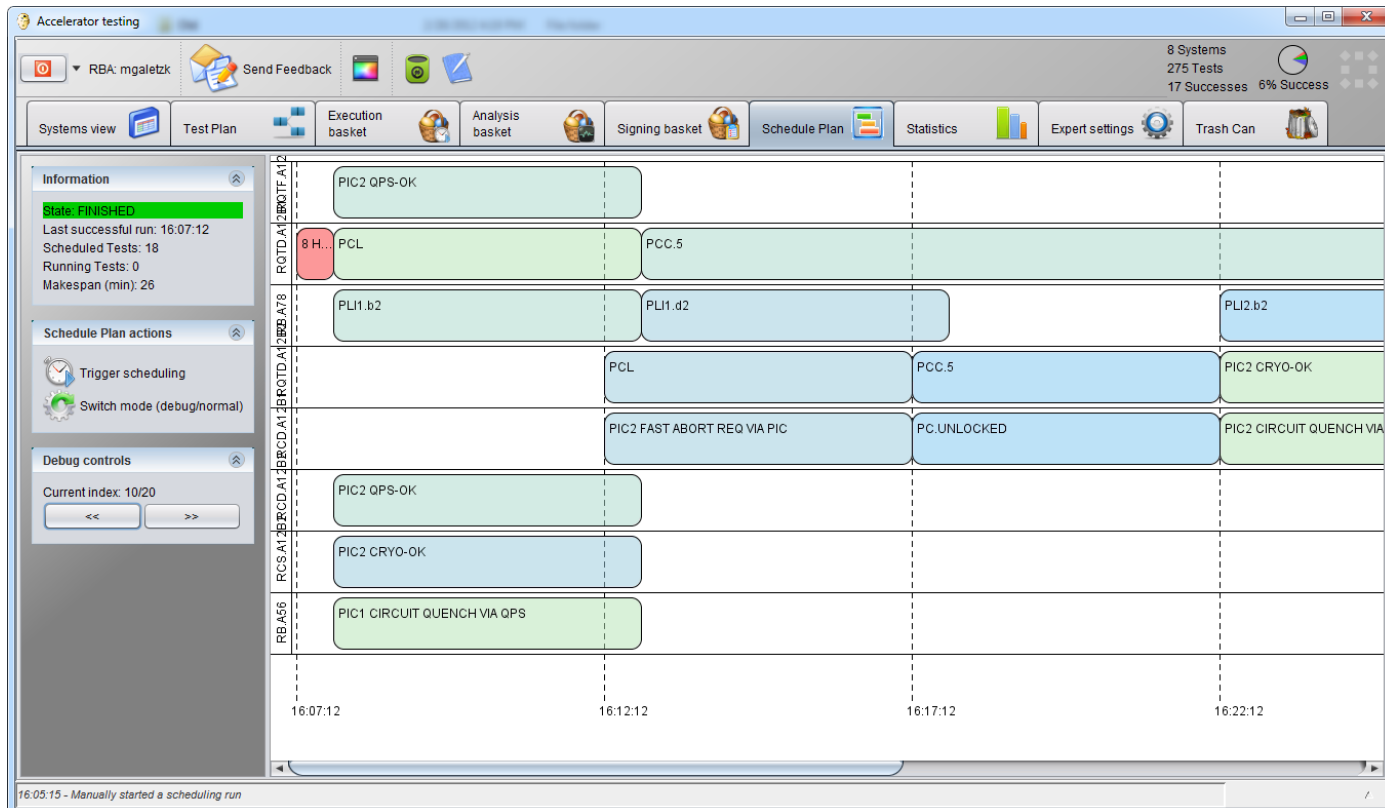
2. The Tests go to the Execution Basket (Server!)

The screenshot shows the 'Accelerator testing' application window. The top toolbar includes a power button, 'RBA: no token', 'Send Feedback', and system icons. The right side shows statistics: 957 Systems, 12300 Tests, 434 Successes, and 3% Success. The main navigation bar has tabs for 'Systems view', 'Test Plan', 'Execution basket', 'Analysis basket', 'Signing basket', and 'Statistics'. The 'Execution basket' tab is active, displaying a table of test requests. On the left, there is a 'Basket filter' section with radio buttons for 'Only my systems' (selected) and 'All systems', and a search box. Below it is a 'Basket actions' menu with icons for 'Refresh basket', 'Abort selected', 'Remove all selected', 'Remove sel. unscheduled', and 'Trigger scheduling'. A status bar at the bottom left shows the time '23:11:06' and the message 'The test plan graph has been refreshed.'

System name	Test name	Request status	Request ID	In basket since	Scheduler comment	Requested from
ROD.A56B1	PIC2 CIRCUIT QUENCH VIA QPS	WAITING_FOR_SCHEDULING	68849	84 d	The phase of the test can not yet be executed	cwe-513-vmw175
RQTL9.L3B1	CC.ELQA	WAITING_FOR_SCHEDULING	10081662	91 d	The phase of the test can not yet be executed	cwe-513-vmw175
RCS.A23B2	CC.ELQA	WAITING_FOR_SCHEDULING	10081664	91 d	The phase of the test can not yet be executed	cwe-513-vmw175
RQTL9.L3B2	CC.ELQA	WAITING_FOR_SCHEDULING	10081668	91 d	The phase of the test can not yet be executed	cwe-513-vmw175
RCS.A23B1	CC.ELQA	WAITING_FOR_SCHEDULING	10081673	91 d	The phase of the test can not yet be executed	cwe-513-vmw175
RSS.A23B1	CC.ELQA	WAITING_FOR_SCHEDULING	10081680	91 d	The phase of the test can not yet be executed	cwe-513-vmw175
RSS.A23B2	CC.ELQA	WAITING_FOR_SCHEDULING	10081681	91 d	The phase of the test can not yet be executed	cwe-513-vmw175
RQTD.A23B1	CC.ELQA	WAITING_FOR_SCHEDULING	10081709	91 d	The phase of the test can not yet be executed	cwe-513-vmw175

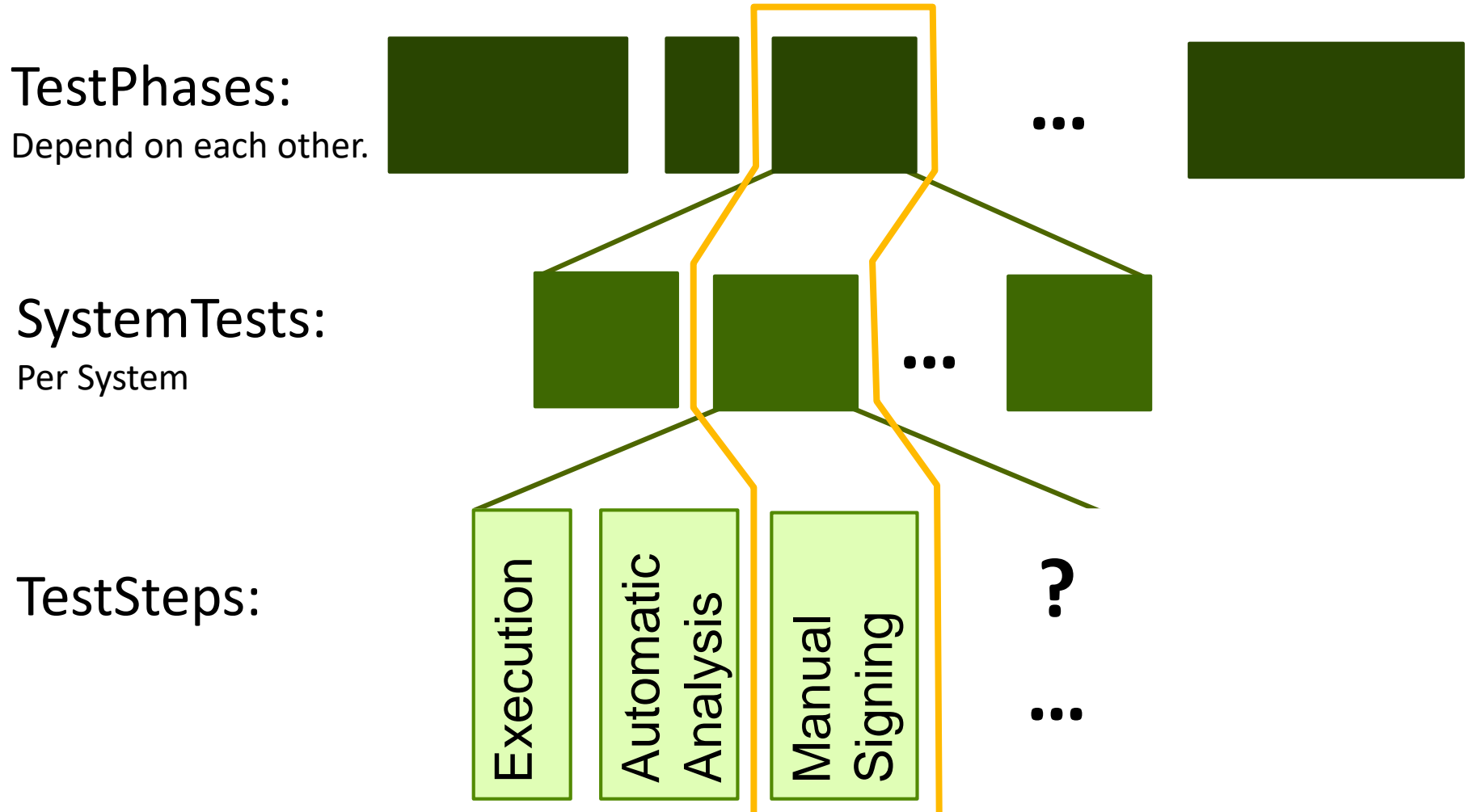
HWC - Workflow III

3. The Scheduler (on the Server) will decide when to start which test(s).



Why so complicated?

- Central Scheduling can respect all the conditions (Phases, Locks, Constraints ...), even if requests come from different GUIs.
- When conditions are fulfilled later, the tests are started automatically (No delays).
- No Need for reservation of Systems



Each MPS test = One test, which only requires signing.

Accelerator testing

RBA: no token | Send Feedback | ELQA

Campaign [Inactive]: 24 Systems
 Recommissioning 2011: 330 Tests
 183 Successes 55% Success

Systems view | Test Plan | Execution basket | Analysis basket | Signing basket | Schedule Plan | Statistics

Filters

CIRCUIT_TYPE

Select: All | None

MAIN DIPOLE

MAIN QUADRUPOLE

Executed Test Status

Select: All | None

SUCCESSFUL

FAILED

SOC

SUBSECTOR

Start date

Jan 31, 2011 | Mar 14, 2011

8:25:50 PM | 8:25:50 PM

LOCATION

Grouping

Grouping

CIRCUIT_TYPE

Executed Test Status

INTERLOCK_TYPE

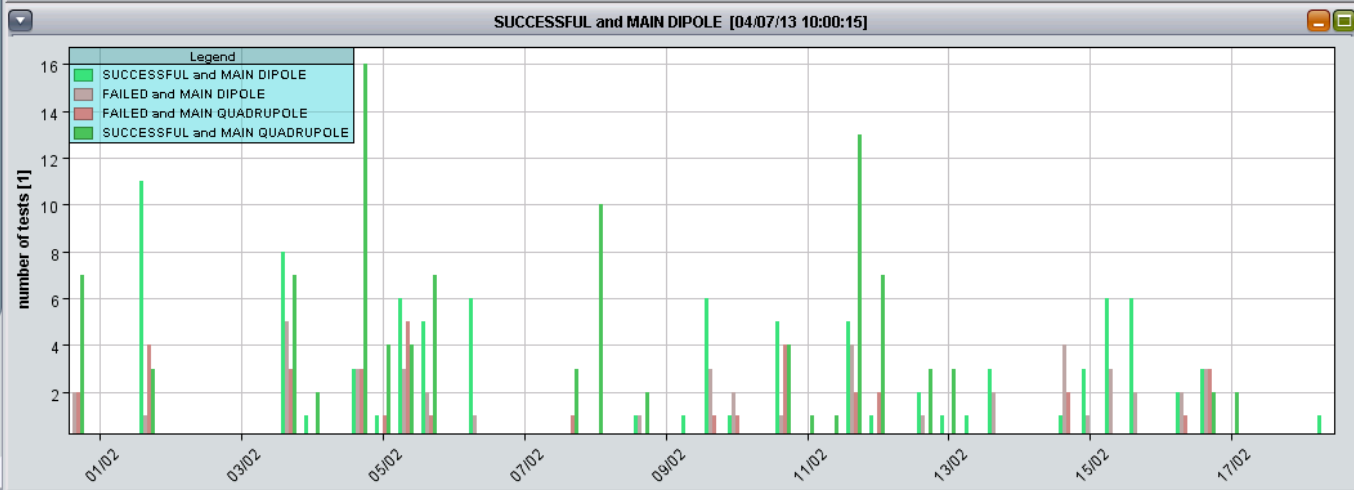
LOCATION

SOC

SUBSECTOR

Group by a single value

Group by set of values



09:59:14 - The test plan graph has been refreshed.

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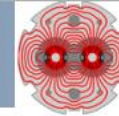
What we (TE-MPE-MS) are working on

What would be required from Equipment Owners / MPP

Jörg said ...



Commissioning plan



- ❑ Each team and system owner should prepare his commissioning plan with breakdown into steps.
 - *Plus beam and energy requirements.*
 - *This will serve as input for AccTesting.*
- ❑ 'Someone' will plug this data into the DB.

For the end of
2013/ early 2014

LBOC

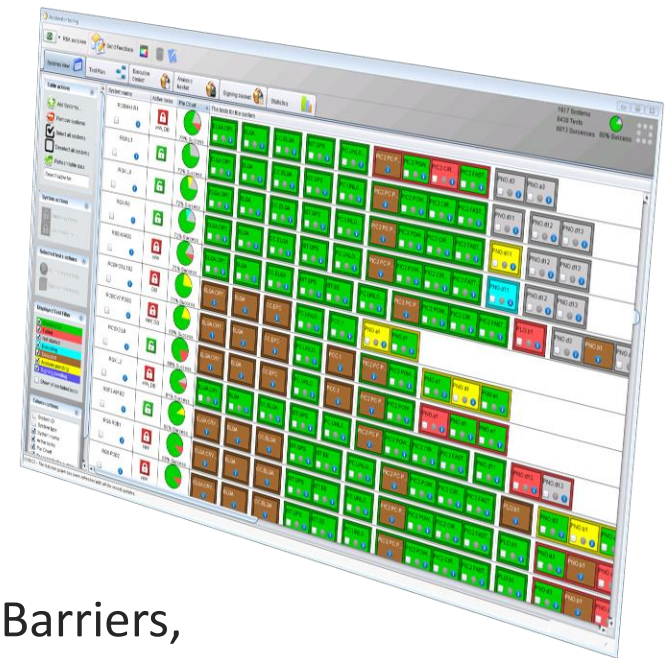
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Courtesy: J. Wenninger

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Editing of Test Plans

- Currently:
 - Database hacks to change the test plan ☹
- Basic Concepts:
 - All Possible Tests per System Type
 - Subset is active per Campaign
 - Campaign can be small (e.g. TS)
- We have to provide at least:
 - Creating campaigns
 - Activating/Deactivating Tests
 - Change Test Relations/Properties (Phases, Barriers, Composite Tests, Notifications)



Composite Tests

- E.g. One test for a composite system might consist of one test per System Component.

BLM - Crate A	TST.1
BLM1	TST.1
BLM2	TST.1
BLM3	TST.1
...	TST.1

<consists of>

Barriers

- When the commissioning of a system reaches a Barrier Point, it has to wait until all other systems (which have the same barrier) reach it also.



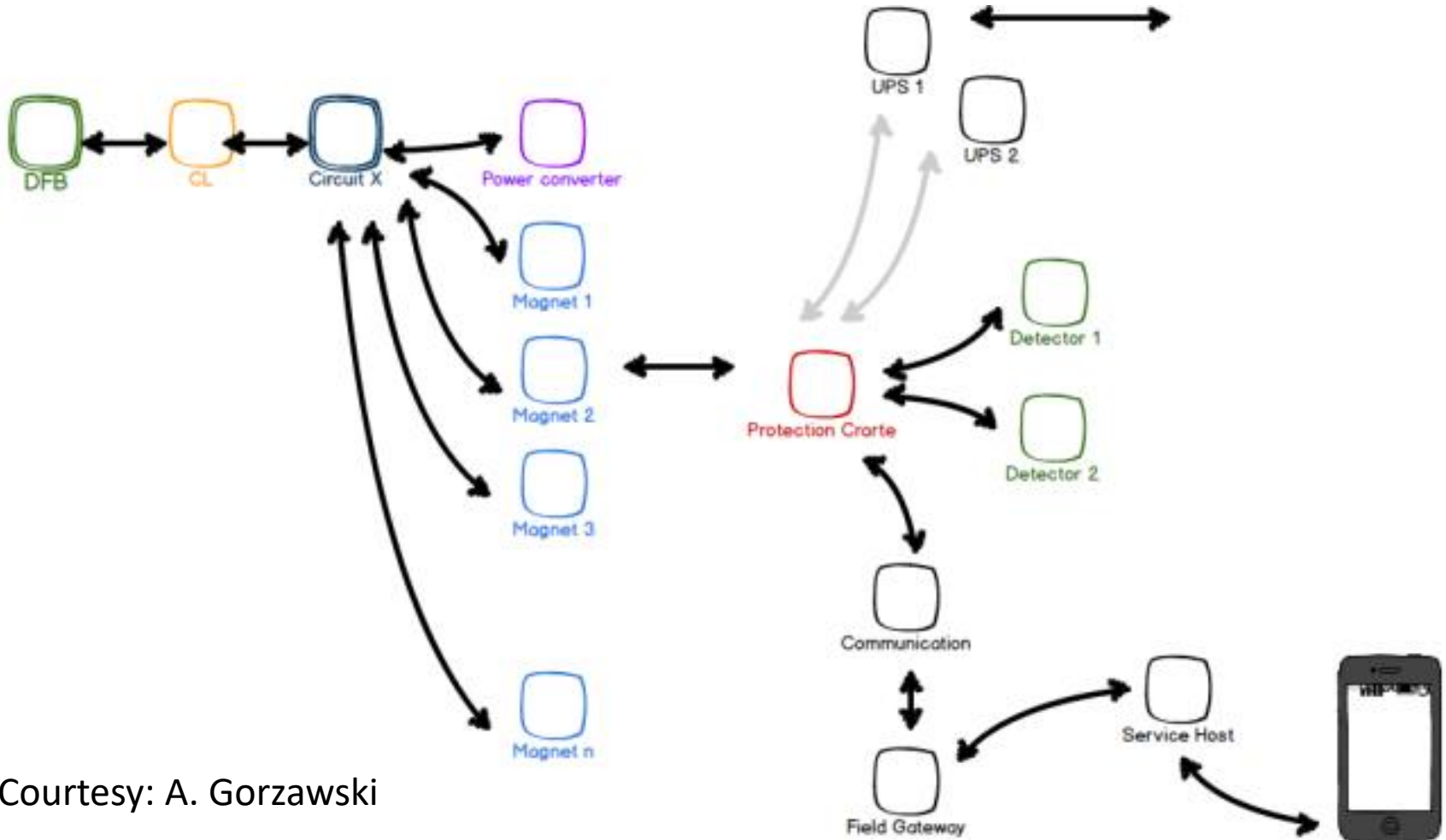
Ready for Powering

Ready for Injection

QPS	IST1						
BLM	IST2	IST3	IST4			INJ1	INJ2
BIS	IST5	IST6	IST7			INJ3	
LBDS	IST8					INJ4	
RQTL...	IST10	IST11		POW1	POW2		

- Knowledge of System-Relations required!

System Relations



Courtesy: A. Gorzawski

Key	Name	Additional information	Class	Object[SUT]
type=CIRCUIT;circuitsId=33	RCBH27.R8B2	CircuitType: 60A; InterlockType: D	circuit.impl.CircuitImpl	AbstractNamedKeyIdentified [name=RCBH27.R8B...
type=BUS_SEGMENT;busSegmentId=-578162597	DCBB.B20L8.L	-- no extra info --	qps.domain.system.impl.BusSegmentImpl	AbstractNamedKeyIdentified [name=DCBB.B20L8...
type=QPS_CRATE;qpsCrateId=33	B18R1	Loc: 12 / B18R1	qps.domain.device.impl.QpsCrateImpl	AbstractNamedKeyIdentified [name=B18R1.getN...
type=CIRCUIT;circuitsId=32	RCBH27.R7B1	CircuitType: 60A; InterlockType: D	circuit.impl.CircuitImpl	AbstractNamedKeyIdentified [name=RCBH27.R7B...
type=QPS_CRATE;qpsCrateId=32	B16R1	Loc: 12 / B16R1	qps.domain.device.impl.QpsCrateImpl	AbstractNamedKeyIdentified [name=B16R1.getN...
type=CIRCUIT;circuitsId=27	RCBH27.R2B2	CircuitType: 60A; InterlockType: D	circuit.impl.CircuitImpl	AbstractNamedKeyIdentified [name=RCBH27.R2B...
type=QPS_CRATE;qpsCrateId=27	B9R1	Loc: 12 / B9R1	qps.domain.device.impl.QpsCrateImpl	AbstractNamedKeyIdentified [name=B9R1.getNa...
type=CIRCUIT;circuitsId=26	RCBH27.R1B1	CircuitType: 60A; InterlockType: D	circuit.impl.CircuitImpl	AbstractNamedKeyIdentified [name=RCBH27.R1B...
type=QPS_CRATE;qpsCrateId=26	B11R1	Loc: 12 / B11R1	qps.domain.device.impl.QpsCrateImpl	AbstractNamedKeyIdentified [name=B11R1.getN...
type=BOARD;boardId=1749888848	DQQD5.B11L4.RB.A34-U.REF_N1	-- no extra info --	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DQQD5.B11L...
type=CIRCUIT;circuitsId=29	RCBH27.R4B2	CircuitType: 60A; InterlockType: D	circuit.impl.CircuitImpl	AbstractNamedKeyIdentified [name=RCBH27.R4B...
type=QPS_CRATE;qpsCrateId=29	B10R1	Loc: 12 / B10R1	qps.domain.device.impl.QpsCrateImpl	AbstractNamedKeyIdentified [name=B10R1.getN...
type=CIRCUIT;circuitsId=28	RCBH27.R3B1	CircuitType: 60A; InterlockType: D	circuit.impl.CircuitImpl	AbstractNamedKeyIdentified [name=RCBH27.R3B...
type=QPS_CRATE;qpsCrateId=28	B8R1	Loc: 12 / B8R1	qps.domain.device.impl.QpsCrateImpl	AbstractNamedKeyIdentified [name=B8R1.getNa...
type=CIRCUIT;circuitsId=40	RCBH28.L7B...			KeyIdentified [name=RCBH28.L7B...
type=QPS_CRATE;qpsCrateId=40	B32R1			KeyIdentified [name=B32R1.getN...
type=POWER_CONVERTER;powerConverterId=10...	RPLA.22L3.R...			KeyIdentified [name=RPLA.22L3.R...
type=BOARD;boardId=1259840185	DCBA.18L4.L...			KeyIdentified [name=DCBA.18L4.L...
type=CIRCUIT;circuitsId=41	RCBH28.L8B...			KeyIdentified [name=RCBH28.L8B...
type=QPS_CRATE;qpsCrateId=41	B34R1			KeyIdentified [name=B34R1.getN...
type=BOARD;boardId=1402909465	DCBQ.11R1.L...			KeyIdentified [name=DCBQ.11R1.L...
type=CIRCUIT;circuitsId=38	RCBH28.L5B...			KeyIdentified [name=RCBH28.L5B...
type=QPS_CRATE;qpsCrateId=38	B28R1			KeyIdentified [name=B28R1.getN...
type=CIRCUIT;circuitsId=39	RCBH28.L6B...			KeyIdentified [name=RCBH28.L6B...
type=QPS_CRATE;qpsCrateId=39	B30R1			KeyIdentified [name=B30R1.getN...

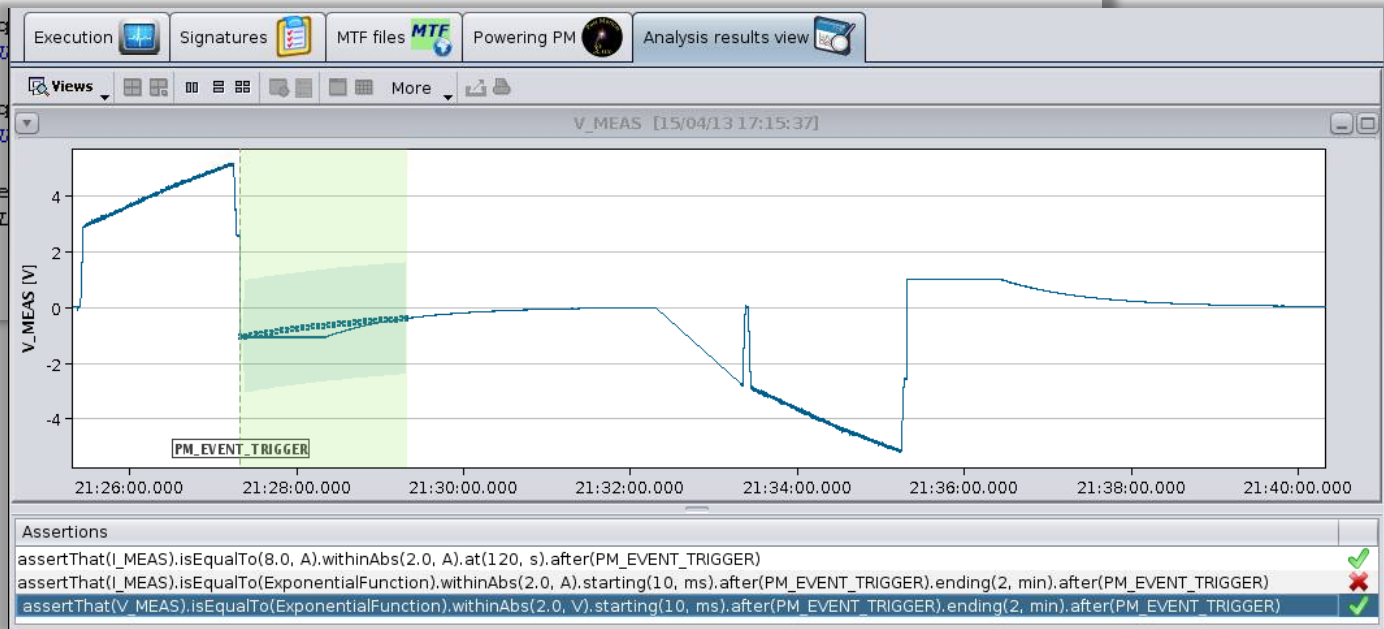
Key	Additional information	Class	Object[SUT]
type=BOARD;boardId=1860389541	DQQD5.B30R1.L...	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DQQD5.B30R...
type=BUS_SEGMENT;busSegmentId=1863989371	DCBQ.31R1.L...	qps.domain.system.impl.BusSegmentImpl	AbstractNamedKeyIdentified [name=DCBQ.31R1.L...
type=BOARD;boardId=546987584	DCQFB.C31R...	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCQFB.C31R...
type=BUS_SEGMENT;busSegmentId=-1435941587	DCBB.A31R1.L...	qps.domain.system.impl.BusSegmentImpl	AbstractNamedKeyIdentified [name=DCBB.A31R1...
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type=BOARD;boardId=546982643	DCQFB.C31R...	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCQFB.C31R...
type=BOARD;boardId=971848969	DCBB.A31R1.L.U_RES	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCBB.A31R1...
type=BOARD;boardId=1061573343	MQ.29R1.U_DIODE_RQF	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=MQ.29R1.U...
type=BOARD;boardId=1188839042	MB.B31R1.U_DIODE_RB	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=MB.B31R1.U...
type=BUS_SEGMENT;busSegmentId=1952872800	DCQDB.C31R1.L	qps.domain.system.impl.BusSegmentImpl	AbstractNamedKeyIdentified [name=DCQDB.C31R...
type=BOARD;boardId=1661074903	DCBQ.31R1.L.U_RES	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCBQ.31R1.L...
type=BOARD;boardId=-1843496251	DCBB.30R1.L.U_RES	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCBB.30R1.L...
type=BOARD;boardId=1183863490	MB.C30R1.U_DIODE_RB	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=MB.C30R1.U...
type=BUS_SEGMENT;busSegmentId=1490714601	DCBB.30R1.L	qps.domain.system.impl.BusSegmentImpl	AbstractNamedKeyIdentified [name=DCBB.30R1.L...
type=BOARD;boardId=-2090035452	MB.A30R1.U_DIODE_RB	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=MB.A30R1.U...
type=BOARD;boardId=971844028	DCBB.A31R1.L.U_MAG	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCBB.A31R1...
type=BOARD;boardId=538001148	DCQDB.C31R1.L.U_RES	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCQDB.C31R1...
type=BOARD;boardId=16246084	DQQD5.B30R1.RB.A12:U.REF_N1	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DQQD5.B30R...
type=BUS_SEGMENT;busSegmentId=1559845796	DCQFB.C31R1.R	qps.domain.system.impl.BusSegmentImpl	AbstractNamedKeyIdentified [name=DCQFB.C31R...
type=BOARD;boardId=1661069962	DCBQ.31R1.L.U_MAG	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DCBQ.31R1.L...
type=BOARD;boardId=849272291	DQQD5.B30R1.RQF.A12:U.REF_N1	qps.domain.device.impl.QpsBoardImpl	AbstractNamedKeyIdentified [name=DQQD5.B30R...

Service, that currently provides:
 ~ 17000 Systems
 ~ 48000 Relations
 ~ 200 MB Data (in memory)

For interface cern.mpe.systems.core.domain.SystemUnderTest manager has 17370 entries.

Automated Analysis

```
public class PnoD1On60A extends AnalysisModule {  
    {  
        assertThat(I_MEAS).isEqualTo(8.0, AMPERE).withinAbs(2.0, AMPERE).at(120, SECOND).after(PM_EVENT_TRIGGER);  
  
        assertThat(I_MEAS).isEqualTo(ExponentialFunction).withinAbs(2.0, A).starting(10, ms).after(PM_EVENT_TRIGGER).ending(2, MINU);  
  
        assertThat(V_MEAS).isEqualTo(ExponentialFunction).withinAbs(2.0, V).starting(10, ms).after(PM_EVENT_TRIGGER).ending(2, MINU);  
  
        assertThat(I_MEAS).isLessThan(ExponentialFunction).withinAbs(2.0, A).starting(10, ms).after(PM_EVENT_TRIGGER).ending(10, MILLI);  
    }  
}
```



- Simple description of test-expectations (assertions) on signals resulting from tests (Java).
- Will have access to PM, Logging, ...

Contents

MPS Commissioning in run 1

Introduction to AccTesting

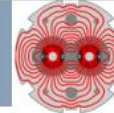
What we (TE-MPE-MS) are working on

What would be required from Equipment Owners / MPP

What would be needed from System Owners / MPP Members?



Commissioning plan



- Each team and system owner should prepare his commissioning plan with breakdown into steps.
 - *Plus beam and energy requirements.*
 - *This will serve as input for AccTesting.*

For the end of 2013/ early 2014

- 'Someone' will plug

- Review of the Test Procedures
- Help defining the 'Test Plan' within AccTesting
- Give Feedback
- (Think about automation ...)
- Use it!

Courtesy: J. Wenninger

6

Time scale

- End of 2013:
Ready for Testplan editing (TE-MPE-MS)
- Spring 2014:
Finalization of Test Procedures
- Summer 2014:
Creation of Test Plan
(Responsible ?)

For Discussion

- Attachements? E.g. Links to Logbook? (!!)
- Interlocks on (uncomplete) active Test plan?
- Could we even profit from other AccTesting Features?
 - Scheduler?
 - Constraints?
 - Notifications?
 - Execution?
 - Analysis?
- Anything else missing?

Summary

- AccTesting can provide:
 - Reusable Test Plans
 - Consistent Tracking & Test History
 - Enforcement of order
 - Enforcement of Signatures
 - Automation for the future
- Still some work to be done
 - Test Plan Editing
 - New Concepts (Composite Tests, Barriers)
- Aiming to be ready for “feeding DB” end of 2013

Thank you for your Attention!



Questions?

The screenshot shows the Accelerator testing interface. The top toolbar includes buttons for 'Systems view', 'Test Plan', 'Execution basket', 'Analysis basket', 'Signing basket', 'Schedule Plan', and 'Statistics'. The main area displays a test plan graph with the following phases and tests:

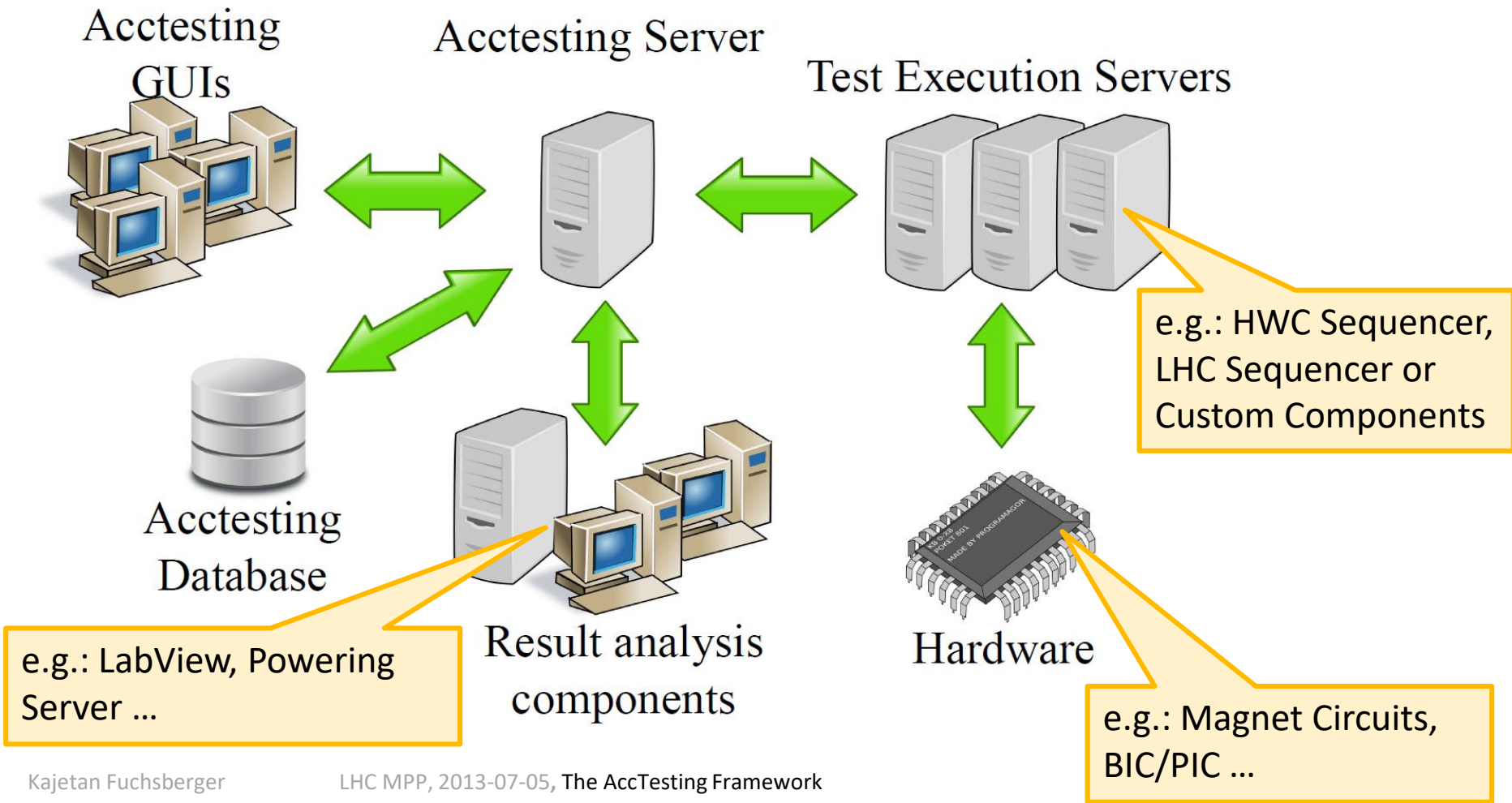
- PIC2** (Green box):
 - PIC2 PC PERMIT (# Systems: 3)
 - PIC2 POWERING... (# Systems: 24)
 - PIC2 CIRCUIT QU... (# Systems: 24)
 - PIC2 FAST ABOR... (# Systems: 24)
 - PIC2 DISCHARGE... (# Systems: 2)
 - PIC2 DISCHARGE... (# Systems: 24)
- PLI1** (Green box):
 - PLI1.b2 (# Systems: 1)
 - PLI1.d2 (# Systems: 10)
- PLI2** (Red box):
 - PLI2.b2 (# Systems: 8)
 - PLI2.b3 (# Systems: 2)
 - PLI2.e2 (# Systems: 24)
- PLIM** (Green box):
 - PLIM.b2 (# Systems: 1)
- PLIS** (Green box):
 - PLIS.s2

Callout boxes provide additional information:

- TestPhase contains one or more Tests
- Tests within a test phase can be executed in arbitrary order.

10:05:00 - The test plan graph has been refreshed.

Overview



System Relations & Information

➔ Key Concept: Re-use of existing Sources!

➔ Cooperation between TE-MPE-MS software team and BE-CO-DO (S. Baggiolini, D. Csikos).



Clients
(e.g. AccTesting,
Diamon,)



System
Information
Server

System Providers:

- Lsa
- Layout Db
- ...

Information Providers:

- Status
- Issues (Jira)
- Deployments
- Faults? ...

Relation Providers:

- Layout Db
- Runtime info (JMS)
- Java code analysis
- ...

Interlocks based on Test Plan?

- Examples:
 - Prohibit, that circuit can be powered, before all the tests are done.
 - Do not allow injection of beam before all necessary MPS tests are done.

- Possibly: Enforce Tests after changes:
 - E.g. Which tests have to be executed, after a change of a QPS – card?
 - Pre-defined test plans or (partially) auto-generated?
 - → Knowledge about System-Dependencies required!

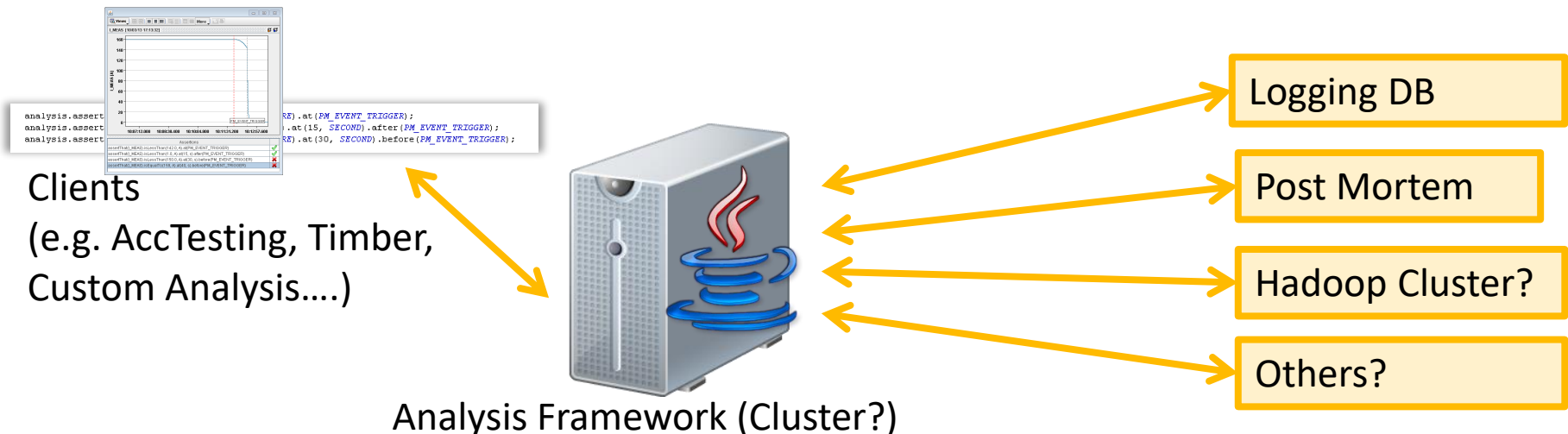
- What to interlock?
 - E.g. Additional Circuit lock on PIC level which allows tests?
 - Injection interlock?

Automation?

- Automate whatever can be automated!
(Avoid Errors, Reproducibility)
- First steps: Concentrate on systems, where many interlocks of same type:
 - BIC/PIC: Already dedicated tool, in the pipeline to be integrated with AccTesting
 - Collimators
 - Integrate BIS connection Test?
 - Do we really have to look 'by eye' on lossmaps?
 - Could there be a Hierarchy-check without a reference?
 - Vacuum
 - BLMs:
 - E.g.: Test Of Latency: Close collimators: Done in pt3, pt7: Could be done for more, if automatic.
 - Others?

Data Analysis Service

- TE-MPE-MS Vision: More general Data Analysis Framework
- Key Concept: Perform analysis as close as possible to the data!
- (Potential) Collaboration with BE-CO-DA to optimize resources, avoid duplication of efforts
- First Implementation in place.



BIC Communication Tests

- Testing communication between PICs, WICs and FMCMs to BICs.
- Migration of existing GUI + dedicated Db Tables to Generic Framework + DB
- Re-Usage of existing Code.

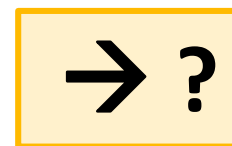
The screenshot displays the 'BIC-USER TESTS' application window. It features a 'DOMAIN selection' dropdown set to 'LHC' and a 'BIC selection' dropdown set to 'CIB.US15.L1.B1'. The main area is divided into two tables: 'List of Users' and 'List of Connections'. The 'List of Users' table has columns for Channel Nb, User Name, and Test, with 14 rows. The 'List of Connections' table has columns for Channel Nb, User Name, and Test, with 14 rows. Below the tables is a 'Start Test...' button. At the bottom, a 'Console' window shows the following log output:

```
14:44:45 - loginPolicy: DEFAULT, showRolePicker: false
14:44:45 - Login policy = DEFAULT
14:44:57 - Login policy = DEFAULT
14:45:00 - Login successful
appToken REAToken[serial=0x6edca0cc;authTime=2012-11-21@14:45:00;endTime=2012-11-21@22:44:00;application=AppPrincipal[name=BIC-USERS TESTS, critical=f
masterToken REAToken[serial=0xa2b6b28d;authTime=2012-11-21@14:45:00;endTime=2012-11-21@22:45:00;application=AppPrincipal[name=BIC-USERS TESTS, critical=f
14:45:45 - Validating existing token...
14:45:45 - There is no token, or it's valid
```

Courtesy: I.R. Ramirez

Custom Reports

- To be used for:
 - Notification
 - Status reports
 - Periodical reports
 - Generation of Procedure Documentation
 - Combination with analysis language?
- Export to different Formats (e.g. html, pdf, xml, csv....)
- Various Libraries under investigation



Migration of MPS Commissioning Proc.

- Transform all the MPS commissioning steps to AccTesting (simple sign-only tests).
- Replace one by one with automated tests.
- Automate whatever can be automated!
(Avoid Errors, Reproducibility)
- First steps: Concentrate on systems, where many interlocks of same type:
 - Collimators
 - Vacuum
 - BLMs

Summary

- AccTesting operational since 2012.
- Done:
 - Db migrated
- Ongoing:
 - Analysis Language
 - ELQA Integration
 - System Relation Management
- Plans & Visions:
 - MPS Commissioning Integration
 - Editing of Test Plans
 - Reporting

AccTesting Server



- Orchestrates the whole process:
 - Test Execution
 - Test Analysis
- Exclusively reads/persists data in the database.
- Notifies all the GUIs about changes.
- Robust Design:
 - Continuously persists relevant data to be able to recover in case of a crash.
 - Gracefully handles unexpected behaviour of Execution- and Analysis Components.

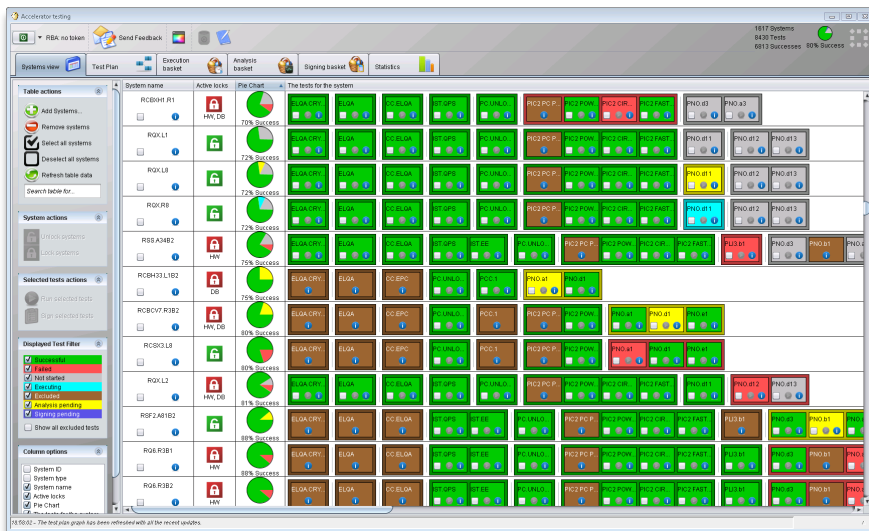
Constraints

- Simple Extension Point, which has to decide if one Test is allowed to be run together with another one. (Simple Yes/No decision)
- Used to formulate requirements like:
“Only start one test on one of the four circuits on the same QPS controller.”
- Checked by the Scheduler, to decide if a certain test-configuration is allowed or not.
→ See Michael’s presentation.

Test Step Handlers

- Responsible for executing a specific TestStep (execution, analysis) for a certain type of tests.
- Is itself responsible for communicating with other systems, if required.
- Examples:
 - HwcTestExecutionHandler: Communicates with HWC Sequencer to execute the tests
 - DaemoneAnalysisHandler: Communicates with LabView system to retrieve analysis results
 - ... Future: PicBicTestExecutionHandler?

The AccTesting Framework



- Designed from the experience of Hardware Commissioning.
- Successfully Used in HWC Campaigns 2012, 2013
- Enforces Correct Order of Tests
- Many additional features:
 - Automatic Scheduling
 - Constraints
 - Statistics

Notifications



- Precondition for ELQA Tests
- Grouping/Aggregation wrt different conditions (Systems, Tests)
- Currently manually triggered
- Later: Triggered automatically
- Useful also for Beam Commissioning?

Designed for Extension

➤ Server Extension Points:

- TestStepHandler (handle certain types of SystemTests)
- Constraints (Restrict Test Execution)
- LockProvider (PIC, Db, ...)
- SystemInformationProvider (e.g. Issues)

➤ GUI Extension Points:

- TestResultsViewer (E.g. Powering Server)

Analysis Consistency Check GUI

Send Feedback Campaign [Inactive]: Recommissioning 2012

Filters

CIRCUIT_TYPE

Select: All | None

- 600A EE
- 600A no EE
- 600A no EE crowbar
- 60A
- 80-120A
- IPD

Executed Test Status

Select: All | None

- SUCCESSFUL
- FAILED
- ANALYSIS_PENDING
- SIGNING_PENDING

Start date

Feb 3, 2012 Jan 25, 2013

4:02:36 PM 4:02:36 PM

Test type

Select: All | None

- CC.ELQA
- CC.EPC
- ELQA
- ELQA.CRYO.READY
- IST.EE

INTERLOCK_TYPE

LOCATION

SOC

System	Test	System type	Old overall result	Old analysis result	New analysis result	Consistency check	Test comments	Test start time
RQT12.L1B2	PIC2 POWERING F...	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-03 16:02:...
RQT12.L1B2	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-03 16:14:...
RQT12.L1B2	PIC2 CIRCUIT QU...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-03 16:17:...
RQT12.L1B2	PIC2 FAST ABORT ...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-03 16:25:...
RQT12.L1B2	PNO.d3	Circuitmpl	FAILED	SUCCESSFUL			; [errors: Expected n...	2012-02-03 16:37:...
RCBCH5.L1B2	PCC.1	Circuitmpl	FAILED				was a try to get to Pl...	2012-02-07 11:00:...
RCBCH5.L1B2	PCC.1	Circuitmpl	FAILED	SUCCESSFUL			; [errors: Wait timed...	2012-02-07 11:08:...
RCBCH6.L1B1	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL				Automatic confirmat...	2012-02-08 10:45:...
RCBCH5.L1B2	PCC.1	Circuitmpl	FAILED	SUCCESSFUL			; [errors: Wait timed...	2012-02-08 11:42:...
RCBH14.R2B1	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL	Error:The 'analysis mo		; [no errors], [no war...	2012-02-10 19:32:...
RCBH32.L3B1	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL	Error:The 'analysis mo		; [no errors], [no war...	2012-02-10 19:32:...
RCBH12.R2B1	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL	Error:The 'analysis mo		; [no errors], [no war...	2012-02-10 19:32:...
RSF2.A23B1	PIC2 POWERING F...	Circuitmpl	FAILED		Error:The 'analysis mo		Sequence problem...	2012-02-10 19:42:...
RSF1.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED		Error:The 'analysis mo		; [errors: dev not rea...	2012-02-10 19:42:...
RSF1.A23B1	PIC2 POWERING F...	Circuitmpl	FAILED				; [errors: dev not rea...	2012-02-10 19:42:...
RSF2.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				; [no errors], [no war...	2012-02-10 19:44:...
RCBV32.L3B2	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-10 19:44:...
RCBV14.R2B2	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-10 19:44:...
RCBV12.R2B2	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-10 19:44:...
RSF2.A23B1	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 19:49:...
RSF2.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Problem with the F...	2012-02-10 19:54:...
RSF1.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Problem with the F...	2012-02-10 19:56:...
RSF1.A23B1	PIC2 POWERING F...	Circuitmpl	FAILED				Problem with FGC...	2012-02-10 19:57:...
RSD2.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Problem with FGC...	2012-02-10 19:58:...
RSD1.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Problem with FGC...	2012-02-10 19:58:...
RSD2.A23B1	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 19:59:...
RSD1.A23B1	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 19:59:...
RSF1.A23B2	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:03:...
RSF2.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:04:...
RSF1.A23B1	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:08:...
RSD2.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Failed to check if F...	2012-02-10 20:09:...
RSD2.A23B2	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:11:...
RSD1.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Failed to check if F...	2012-02-10 20:12:...
RSD1.A23B2	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:14:...
RQTD.A23B1	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:15:...
RQTD.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Switch vs FGC prob...	2012-02-10 20:16:...
RQTD.A23B2	PIC2 POWERING F...	Circuitmpl	SUCCESSFUL	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:17:...
RQTF.A23B2	PIC2 POWERING F...	Circuitmpl	FAILED				Switch vs FGC prob...	2012-02-10 20:21:...
RCBV13.R2B1	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-10 20:23:...
RCBV11.R2B1	PCC.1	Circuitmpl	SUCCESSFUL	SUCCESSFUL			; [no errors], [no war...	2012-02-10 20:23:...
RCBV31.L3B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBH16.R2B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBH22.L3B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBH33.R2B2	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBH34.L3B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBV11.L3B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBH24.R2B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBV14.L3B2	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBV18.R2B2	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:25:...
RCBV19.R2B1	PNO.a1	Circuitmpl	FAILED	SUCCESSFUL			Automatic confirmat...	2012-02-10 20:26:...

Process consistency checks on selected tests

00:02:53 - pmp_server.properties=playback_pro



Analysis result - example

Analysis failed

Test info: [system='RCBH11.L2B1', test='PNO.d1']

The test 'PNO.d1' for the system 'RCBH11.L2B1' has the following execution history:

Start time	End time	Status	Valid	Description	Signatures
2012-02-21 21:25:11	2012-02-21 21:41:33	SUCCESSFUL	true		2/1

Execution | Signatures | MTF files | Powering PM | Analysis results view

Views | L_MEAS [15/04/13 17:11:14]

Assertions

```
assertThat(I_MEAS).isEqualTo(8.0, A).withinAbs(2.0, A).at(120, s).after(PM_EVENT_TRIGGER)
assertThat(I_MEAS).isEqualTo(ExponentialFunction).withinAbs(2.0, A).starting(10, ms).after(PM_EVENT_TRIGGER).ending(2, s)
assertThat(V_MEAS).isEqualTo(ExponentialFunction).withinAbs(2.0, V).starting(10, ms).after(PM_EVENT_TRIGGER).ending(2, s)
```

re-analyze

Sign test as: Successful Failed

Role selection: [dropdown]

Comment: [text area]

Sign tests | Sign tests and close dialog | Close

Test Analysis

➤ Vision:

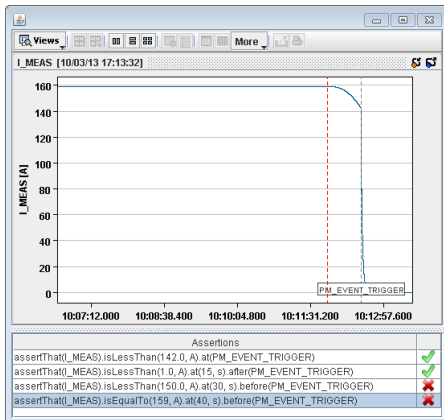
- Simple description of test-expectations (assertions) on signals resulting from tests (Java).

```
analysis.assertThat(I_MEAS).isLessThan(142, AMPERE).at(PM_EVENT_TRIGGER);  
analysis.assertThat(I_MEAS).isLessThan(1, AMPERE).at(15, SECOND).after(PM_EVENT_TRIGGER);  
analysis.assertThat(I_MEAS).isLessThan(150, AMPERE).at(30, SECOND).before(PM_EVENT_TRIGGER);
```

- Universal GUI components to visualize problems.

➤ First Implementation:

- Cooperation between TE-MPE-MS software team and BE-CO-DA (R. Gorbonosov, A. Jalal)
- Used in AccTesting
- could be used e.g. in future PM modules. (Maybe also in sequencer tasks and other checks?)



BIS: Channel-Status
BIS: Disabled Channels

MPS Procedure Tasks

- MPS Task List 2013
- Calendar
- Planning
- Full Month
- MPS-Summary
- MPS Task List 2009
- MPS Task List 2010
- MPS Task List 2011

MPS Task List 2012

MPS Activities History

- 2011
- 2012
- 2013

Discussions

Team Discussion

Sites

People and Groups

Recycle Bin

Phase : Beam Commissioning (127)

Phase : Machine Checkout (220)

- System : BIS (2)
- System : BLH (1)
- System : Collimation (9)
- System : Experiments (8)
- System : Injection (2)
- System : Injection-Beam 1 (25)
- System : Injection-Beam 2 (25)
- System : LHCIS-Beam 1 (54)
- System : LHCIS-Beam 2 (54)
- System : PIC (4)
- System : RF (2)
- System : SIS (22)
- System : SMP (8)
- System : Spectrometers (2)
- System : Vacuum (1)
- System : WTC (1)

Phase : MPS End Tests (4)

- System : FMCM (4)

Phase : System IST (55)

- System : BIS (5)
- System : BLH (13)
- System : Collimation (4)
- System : FMCM (4)
- System : PIC (30)