



CERN

European Organization for Nuclear Research

Organisation Européenne pour la Recherche Nucléaire

Long Shutdown 1 (LS 1)

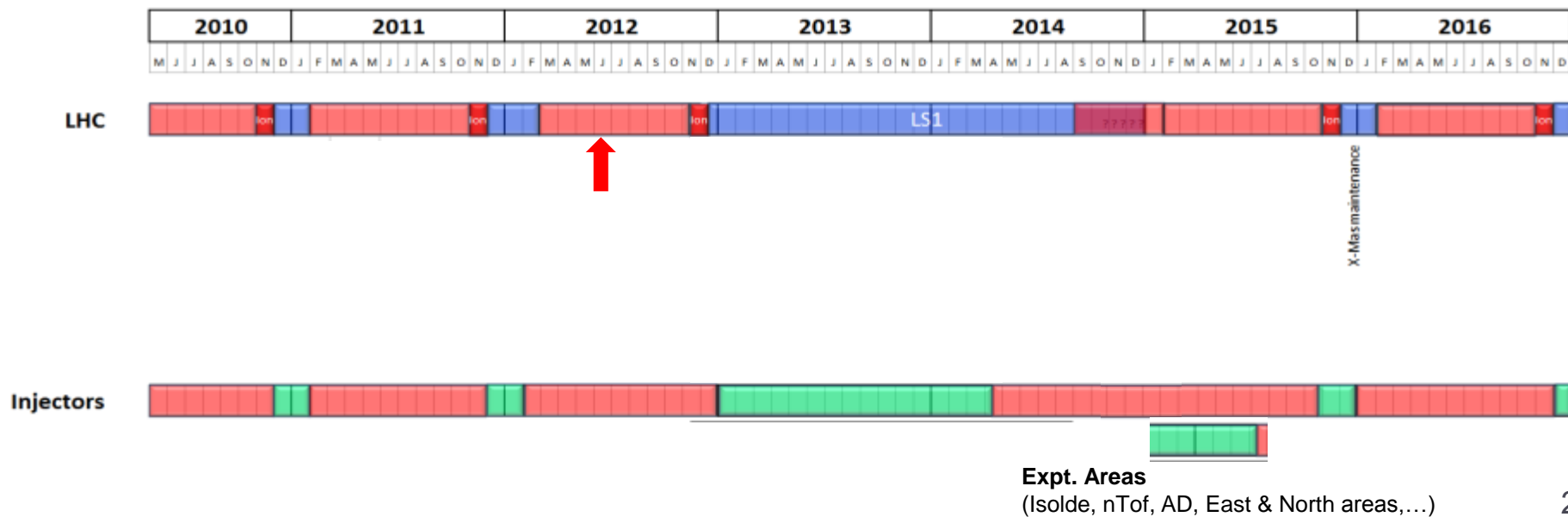
Methodology & proposals for decisions

Frédéric BORDRY



WHAT IS LS1?

- Not a project, but a time-frame (Nov-2012 to Sept-2014)
- Numerous projects and activities:
 - SMACC (Superconducting Magnets And Circuits Consolidation)
 - R2E
 - Massive shutdown maintenance after more than 3 years of operation
 - Several major consolidations
 - A lot of projects (Linac 4, HIE-Isolde, Elena, LIU, HL-LHC, 107,)
- Compared to previous shutdowns, an exceptional number of ...
 - Simultaneous activities (co-activities) – **Planning and safety**
 - Non-CERN workers (FSU, collaborations, contracts,...)- **Logistics: Registration, training, transport, parking, access, film badge, EPI, catering, accommodation,...)**

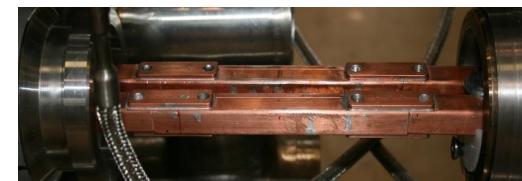




Why LS1? - Goals

Main priorities

- Repair defectuous interconnects (powering at 7 TeV)
- Consolidate ALL interconnects with new design
 - 10-15 % of interconnections to be opened and to be re-welded
 - 100% (10'170) to be consolidated
- Finish off pressure release valves (DN200; 4 sectors: 2-3, 4-5, 7-8, 8-1)
- Bring all necessary equipment up to the level needed for 7TeV/beam
- Repair He leaks (sectors 3-4 and 4-5)
- R2E (mainly Pt1, Pt5 and Pt 7)
- Maintenance of all the systems after 3 years of operation



Priorities set for LHC machine

- **P0: Safety**
- **P1: Beam to 7TeV, nominal performance**
- **P2: Reliable operation improvement**
- **P3: CERN approved projects**
- **P4: no CERN approved projects**



LS1 – Approval of activities

Meetings being held with key driver technical coordinators, in order

- To define the goal of the activities
- To understand the time key drivers
- To list the support needed from CERN

• First iteration:

Groups were invited to announce and describe their activities

• For accelerator complex: database of requests is being filled :

LHC and injectors

To detect conflict/overload and to decide what is compulsory, what we can afford and what we have to postpone to LS 2

Status: Proposed Priority:

Preliminary powering tests

Please indicate a title for your request

General Information

• **Group:** BE-OP Technical responsible: M. Pojer

• **Goal:** Complete test up to 7 TeV: of the missing 600 A circuits (RQS.L2B1, RQT13.R1B1, RQS.R2B2, RQTF.A45B2, RSS.A45B1, QT13.L5B1, RCO.A78B2, RQS.L8B1, RQS.R8B2) RD3.R4, RD3.R4, RD2.R8 and RQX.L5 Train 600A and 80-120A circuits to 7TeV – 2-quenches rule was introduced to shorten commissioning:RQT11.R5B1, RQTF.A45B2, RQS.R2B2, RQTF.A45B2

• **Mod. Operand:** Power the circuits up to 7 TeV equivalent current
 In case of quench, power again; repeat up to n quenches (number to be defined with MP3 and experts)
 If the circuit cannot reach 7 TeV, then diagnostics have to be carried out to identify the problem; in case of a serious problem, a decision must be taken
 Notes – Non conformities on splices, shorts and open circuits (already known and well documented) :

• In which period do you intend to perform the activity ? LS1

• Facility concerned: LHC-machine

Resources, schedule ,support

• **Resources:** (please describe your resources, and the external resources needed to perform the activity)

• **Duration:** 4 edays/sector – 2 sectors in parallel Constraints on schedule: before warm-up

• **Support needed from other groups**

CV <input type="checkbox"/>	HE <input type="checkbox"/>	CRG <input checked="" type="checkbox"/>	MSC <input checked="" type="checkbox"/>	MME <input type="checkbox"/>	OP <input type="checkbox"/>	ICE <input type="checkbox"/>	RP <input type="checkbox"/>
EL <input type="checkbox"/>	VSC <input type="checkbox"/>	SU <input type="checkbox"/>	MPE <input checked="" type="checkbox"/>	EPC <input type="checkbox"/>	CO <input type="checkbox"/>	MEF <input type="checkbox"/>	GS <input type="checkbox"/>

Information on support needed from other groups: Cryo OK needed

• Budget: N.A.

Other Relevant information

• Please describe the impact on other equipment: _____

• Please describe the impact on other facility: _____

• Please describe if a test is needed afterwards: _____

• Please describe the preparatory works needed (in particular if you need support from other groups): _____

• Please indicate any other relevant information: _____

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F. Bordry, LS1@LMC, 5th October 2011



LS1 – General frame

Start date: November 24th 2012 (ideally November 17th)

Duration :

- LHC machine: 20 months
 - ALICE: 12 months (up to 15 months)
 - ATLAS: 15 months (but from April 2013)
 - CMS: 20 months (no beam before 1st Sept. 2014)
 - LHCb: 12 months
- } **New vacuum pipe**



Some remarks and concerns

We must maintain regular discussions and meetings between accelerators (LHC and injectors) and experiments to finalise the best program

It's crucial that ALL the groups fill the "activity database" and announce the needed supports (LHC, injectors, experimental areas) to get a CERN-wide "resource-loaded planning".

Katy Foraz will start a tour of the groups

It'll be more and more difficult to move the LS1 start date

Concern with the double dosimetry for FSU and collaborations (RP action)
RP support for the experiments should be addressed

CSCM (Copper Stabilizer Continuity Measurement) and quench protection diode ("cold diode") work are not in the presented baseline schedule (CSCM could be inserted in the planning with slight implications; for the diodes, it'll depend on the required work)

More info after the next Xmas stop



Chamonix: Session 5 and 6 (13 talks)

January 2012

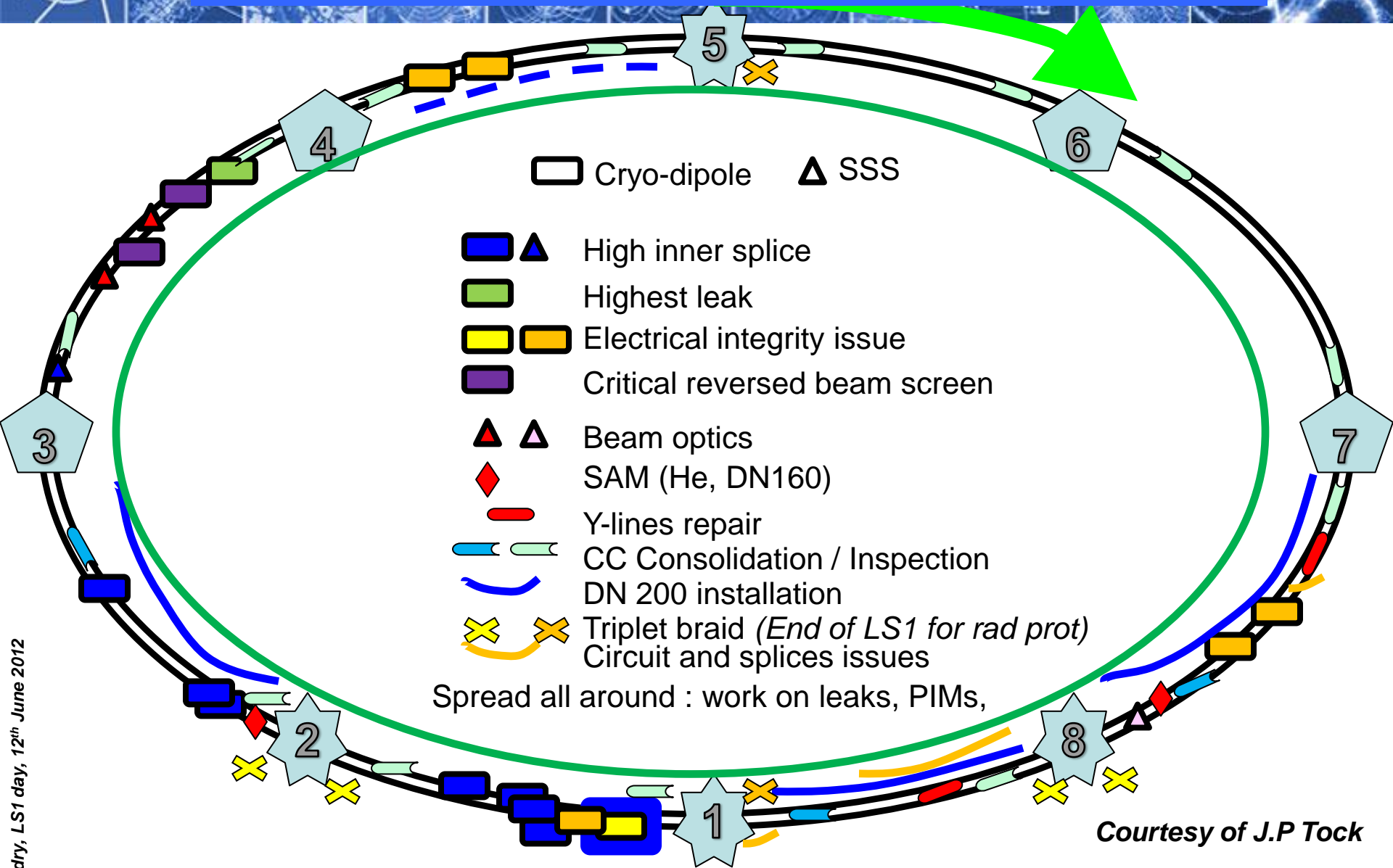
Session 5

- LS1 general planning and strategy for LHC, LHC injector Katy Foraz
- Powering tests before LHC warm-up: What is new from Chamonix 2011? Mirko Pojer
- LHC consolidation of the superconducting circuits Jean-Philippe Tock
- R2E strategy and activities during LS1 Anne-Laure Perrot
- Vacuum upgrade Jose Miguel Jimenez
- Cryogenics system: strategy to achieve nominal performance and reliable operation Laurent Taviani

Session 6

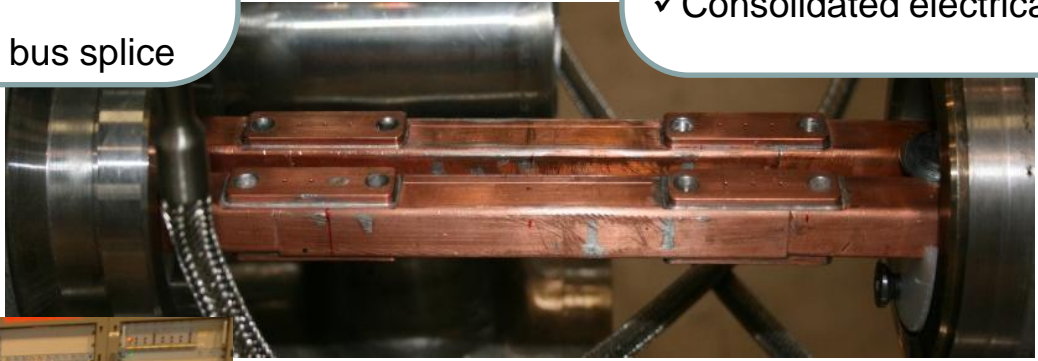
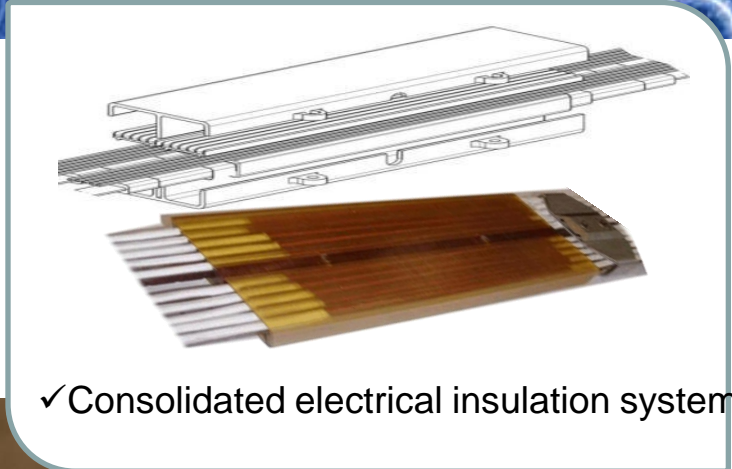
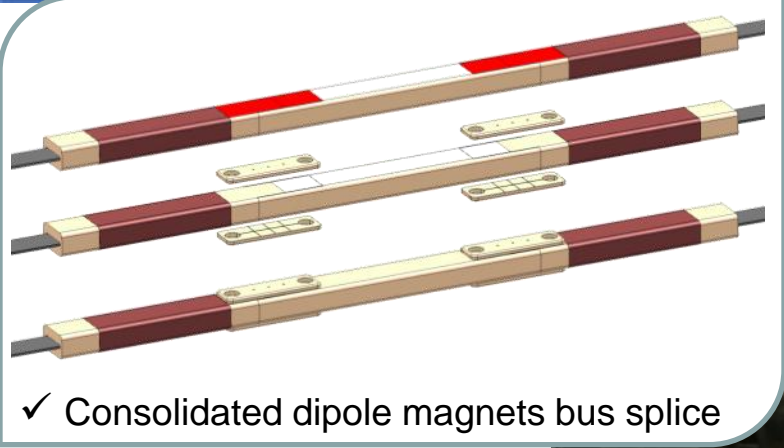
- LHC experiments upgrade and maintenance Marzio Nessi
- QPS upgrade and machine protection during LS1 Reiner Denz
- EN-EL upgrade and consolidation Francois Duval
- EN-CV upgrade and consolidation Mauro Nonis
- Access strategy in the accelerator complex and experimental areas Rui Nunes
- RF upgrade program in LHC injectors and LHC machine Erk Jensen
- What is the maximum reasonable energy? Ezio Todesco

SMACC planning : Start at P5 / clockwise

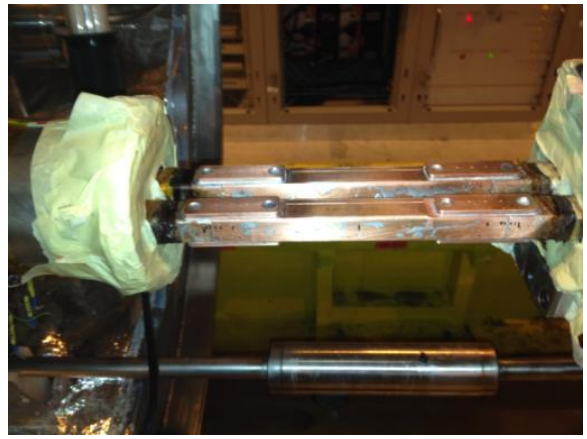


Courtesy of J.P Tock

Goal : Special interventions completed before the train arrives : To be checked

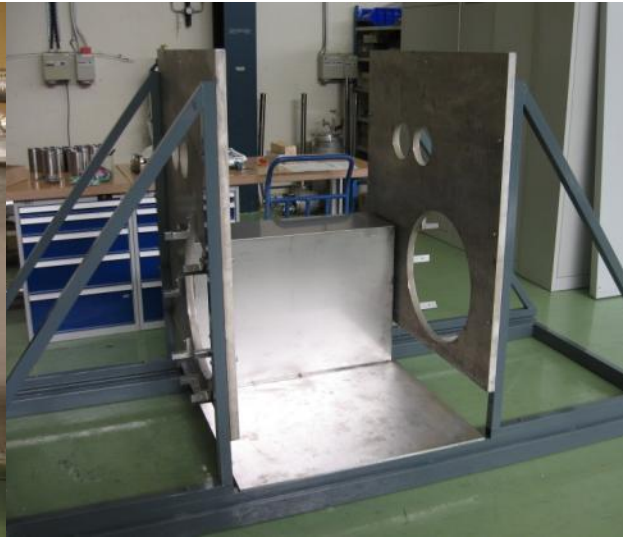


Design endorsed [2nd Splices Review (Nov 2011)] and under final validation in SM18

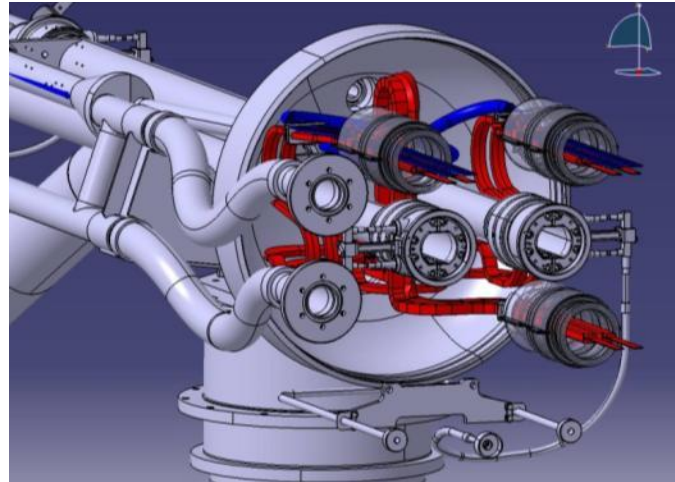


SMACC: DFBA consolidation

+ Solution under development for in-situ consolidation of 13kA splices (mock-ups)



+ Consolidation of busbars : need ? Procedure ? Resources ?



+ Strategy to be defined for DFBA not upgradable in-situ (DFBAK [6L]& P [8R])



Superconducting Magnets And Circuits Consolidation

SMACC J.Ph. Tock #221

Open/Close IC [DN200]
A Musso (A Chrul) #33

- Opening/ Closure of IC Partial and complete
- W bellows & ther. shields
- Installation of DN200

Main arc splices cons.
F Savary (H Prin) #52

- Sleeves cutting (JM Hubert)
- BB surfacing (M Dumas/C Lopez)
- Shunt installation (M Pozzobon)
- Insulation (M Parent)
- Splice de- & resoldering [15%] (D Etiembre / L Favier)

Quality Assurance
R Ostojic (X) #39

- Electrical QC: #17 C Scheuerlein (P Thonet)
- Welding QC: JM Dalin # 6
- Beam vacuum QC: C Garion #8
- Open/close IC QC: D Bodart #4 (6)
- QA manager support : M Struik
- Audits (TBD)

Special interventions "SIT"
N Bourcey (G Maury) #15

- Cryomagnets exchange
- Connect. Cryostat cons.
- PIMs
- Specific issues
- Heavy NCs

TIG welding [EN-MME]
S Atieh (X) #16 (+5)

- Orbital & manual

DFBA [TE-CRG]
A Perin (O Pirotte) [#12 (TBC)]

- Splices and BB

ELQA [TE-MPE]
K Dahlerup (G D'Angelo) #23

- Continuity
- HV test

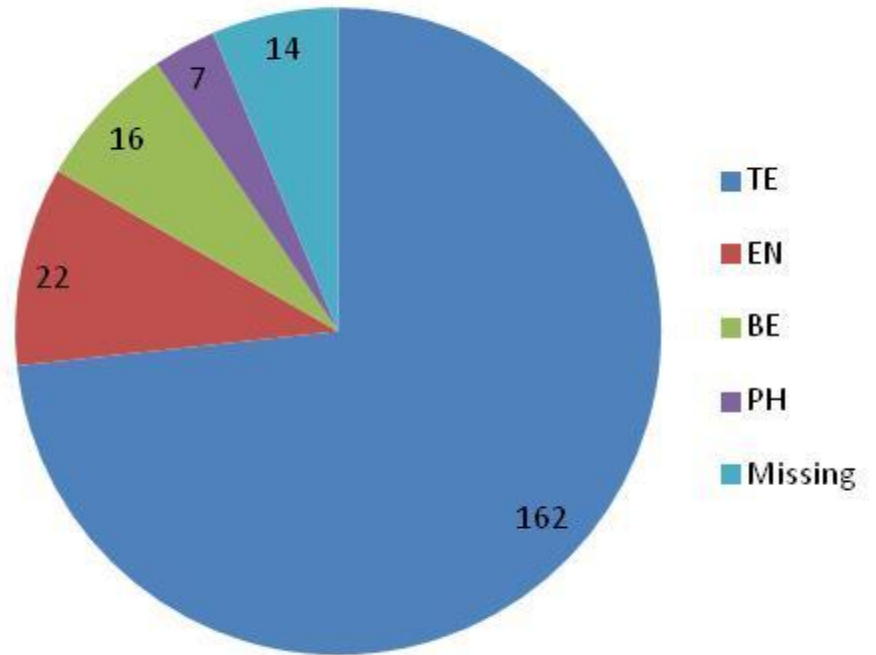
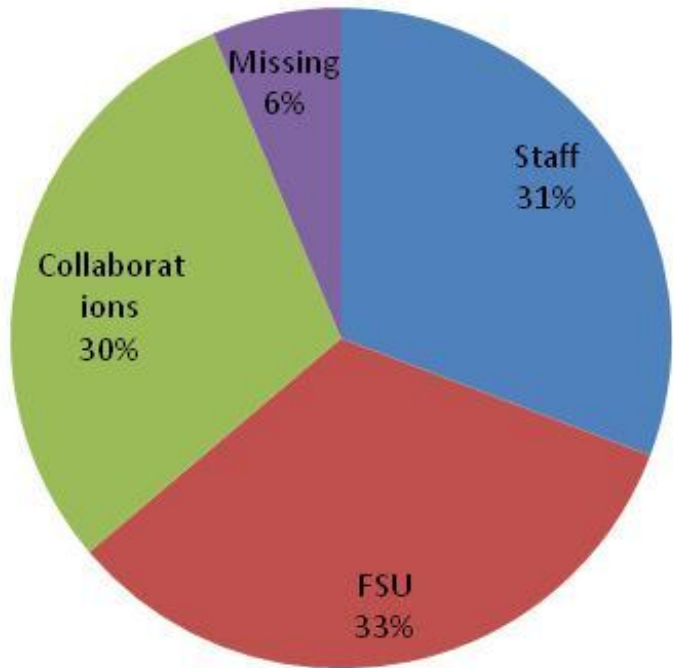
Leak Test [TE-VSC]
P Cruikshank (X) #19

- Beam lines
- Cryogenics lines
- Insulation vacuum

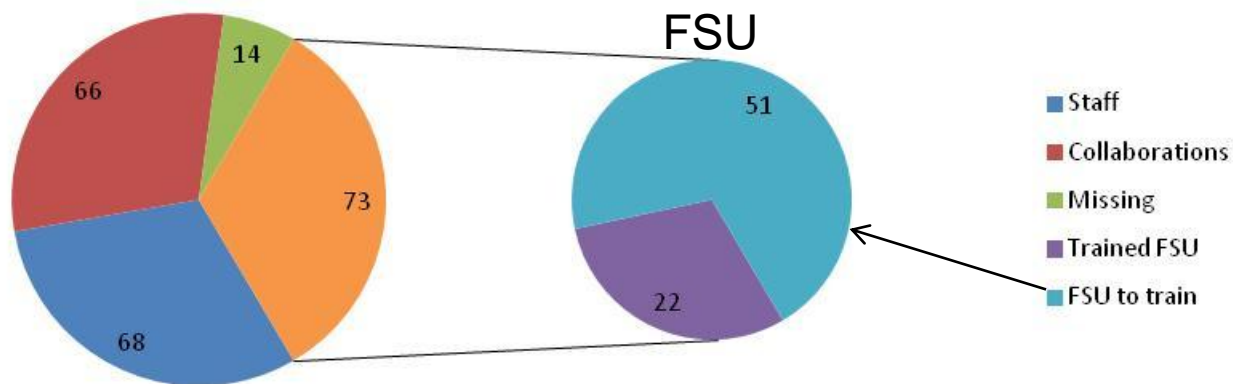
Project Office M Pojer (X) #11

- Radiation protection
- Safety, Access
- General logistics
- Pressure test
- Link to visits, media

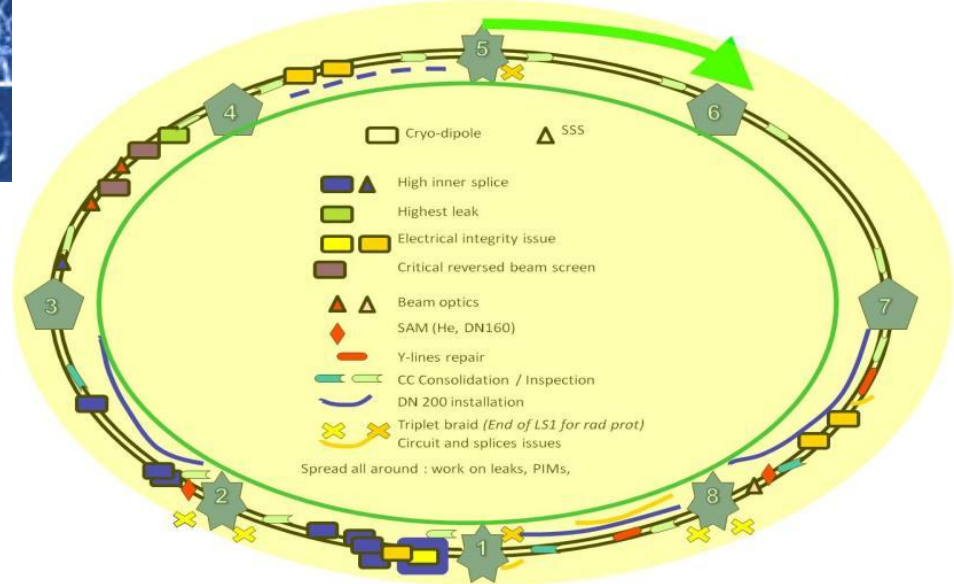
- Coordination with Survey, BLM, Instrumentation, Transport, LS1 planning, QPS, cryogenics,...
- Test teams on a chain of IC
- Reporting tools
- Administrative support (Budget, human resources, scientific secretary)



Resources by type



**SMACC
Manpower
(221)**



Courtesy of J.P Tock

Open management points

- Finalisation of the collaboration agreements (1/3 of the manpower)
- FSU ramp-up
- **Resources / Sizing of the team to cope with large NC and unexpected events**
- Budget to be reviewed
- **Date of the start of LS1**

Open organisation points

- **Efficient internet access in the LHC tunnel (optical fibres) : EN-EL/IT-CS for coordination and communication**
- **Parking places at the various points**
- **Access modalities (guards instead of standard access system)**

R2E Activities during 2013/2014



- **Major work impacting LHC areas**

- Shielding improvements
- Relocation
- **Important:**
 - **Re-installation of 4 points in ~1 year!!!**
 - **NO margin in planning so far**

**Focus
of Today
is Here**

- **Parallel R&D and Development**

- Rad-Tol Power-Converters
 - FGClite final development and deployment
 - 120A, 600A & 4/6/8kA prototyping
- SCL Studies (development, CE-studies)
- Important requirement
 - Irradiation test facility (PCs, BI, Cryo,...)

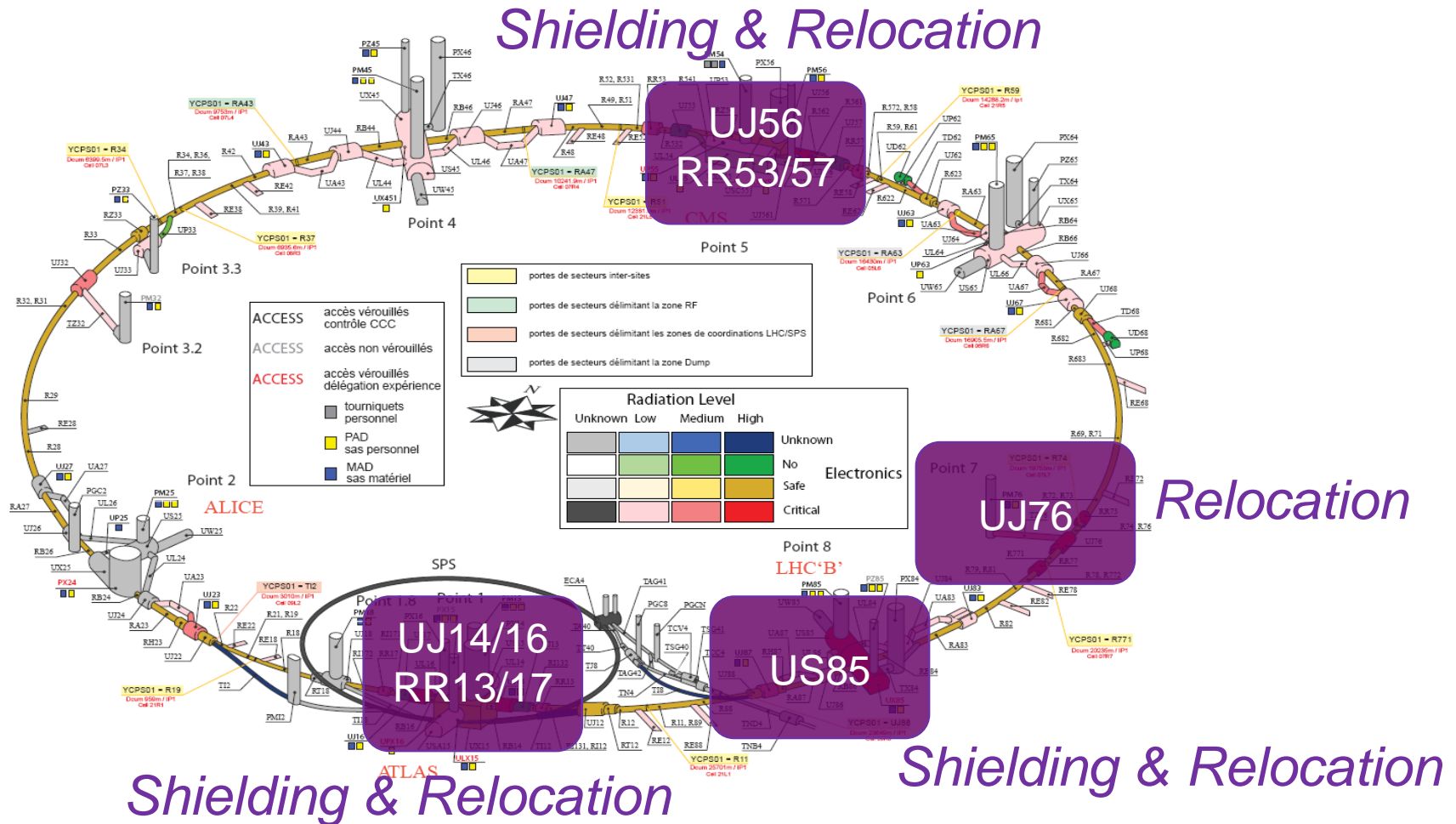
**To Be
Taken
Into
Account
(Resources,
Time)**

- **Injector chain related activities**

LHC Relocation & Shielding



Main critical areas considered for LS1



Shielding & Relocation Activities Status



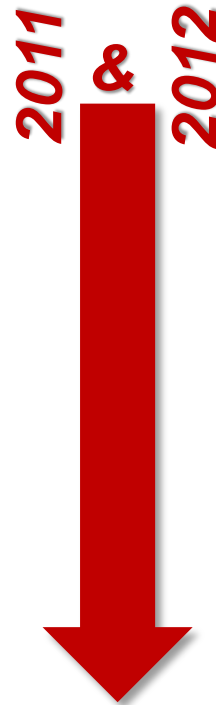
Integration studies

Shielding
Points 1, 5, 7 & 8 ✓

Relocation

Point 1 ✓
Point 5 ✓
Point 8 ✓
Point 7

Finished Under approval



Planning – LS1

R2E activities in

Point 1 ✓
Point 5 ✓
Point 7 ✓
Point 8 ✓

All integration & planning sequences are finished

Status of Documentation



ECRs for R2E LS1 activities

➤ Relocation

Completed by September 2012

- Point 1: 'Protection of equipment located in UJ14 and UJ16'
(edms: 1218906)
- Point 5: 'Protection of equipment in UJ56'
(edms: 1215705)
- Point 8: 'Protection of equipment located in US85 (phase II)
(edms: 1146827)
- Point 7: "Protection of equipment located in UJ76 (phase II)

under approval

approval closed

approved

In preparation

➤ Shielding

- 'R2E shielding for LHC Points 1, 5, and 8'
(edms: 1182068)

approved

Groups involved during LS1



	Equipment / activity
BE/APB	survey eqpt.
BE/BI	BTV, BLM
BE/CO	timing & remote-reset WorldFip
DGS/RP	RAMSES
EN/CV	cooling/ventilation eqpt
EN/EL	electrical eqpt & cabling activity
EN/HE	eqpt. transport shielding inst.
EN/STI	collimator control eqpt
GS/ASE	fire/ODH access
GS/SE-CEP	duct activities
IT/CS	ethernet
TE/CRG	cryogenics eqpt
TE/EPC	power converters
TE/MPE	QPS* PIC* current leads heaters BIS WIC
TE/VSC	vacuum eqpt

**Required support from
EN/CV-EL-HE & GS/SE**

is

quantified /planned & confirmed



**coordination & follow-up by
EN/MEF & BE/OP are confirmed**

Main Concerns for LS1



... no contingency in current planning!
... direct interaction with Katy Foraz (see next presentation)

Other critical points	⇒	Required action	Teams
➤ Material			
- procurement	⇒	Follow-up	Eqpt. owners & services
- storage before installation	⇒	Storage areas management	EN/MEF
➤ Installation & Control			
	⇒	In-situ supervision	BE/OP, EN/MEF
➤ Integration			
- Installation non conformities	⇒	Intermediate survey scans	BE/ABP
	⇒	Cross-checks with models	EN/MEF
➤ Delays versus planning	⇒	Follow-up & adaptation	EN/MEF



IEFC workshop: Sessions 5 and 6 (12 talks)

March 2012

Session 5

- A global view of the LS1 timeline in the injector chain
- What is foreseen to be operational during LS1
- Access system upgrade in the PS complex
- RF systems
- Magnet activities
- Beam transfer systems

- D. Mcfarlane
- V. Chohan
- E. Sanchez- Corral Mena
- E. Jensen
- J. Bauche
- L. Ducimetière

Session 6

- Vacuum systems
- Survey
- Power converters: SPS transformers and any other major works
- Cooling and ventilation activities
- Electrical distribution activities
- Cabling activities

- J.A. Ferreira Somoza
- D. Missiaen
- G. Le Godec
- M. Battistin
- F. Duval
- D. Ricci



LS1 activities, requests and schedule

Meetings being held with stakeholders
(LHC machine, Injectors and LHC experiments)

- ✓ Goal of activities
- ✓ Time key drivers
- ✓ Support needed

For accelerator complex:
database of requests is being filled :
LHC and injectors

1 Status: Proposed Priority:

Preliminary powering tests
Please indicate a title for your request

General Information

- Group: BE-OP Technical responsible: M. Pojer
- Goal: Complete test up to 7 TeV: of the missing 600 A circuits (RQS.L2B1, RQT13.R1B1, RQS.R2B2, RQTFA45B2, RSS.A45B1, QT13.L5B1, RCO.A78B2, RQS.L8B1, RQS.R8B2, RD3.R4, RD2.R8 and RQX.L5 Train 600A and 80-120A circuits to 7TeV - 2-quenches rule was introduced to shorten commissioning:RQT11.LR5B1, RQX.L5B1)
- Mod. Operandi: Power the circuits up to 7 TeV equivalent current In case of quench, power again; repeat up to n quenches (number to be defined with MP3 and experts) If the circuit cannot reach 7 TeV, then diagnostics have to be carried out to identify the problem; in case of a serious problem, a decision must be taken Notes - Non conformities on splices, shorts and open circuits (already known and well documented):
- In which period do you intend to perform the activity? LS1
- Facility concerned: LHC-machine

Resources, schedule, support

- Resources: (please describe your resources, and the external resurces needed to perform the activity)
- Duration: 4 edays/sector - 2 sectors in parallel Constraints on schedule: before warm-up
- Support needed from other groups
CV HE CRG MSC MME OP ICE RP
EL VSC SU MPE EPC CO MEF GS
- Information on supprt needed from other groups: Cyo OK needed
- Budget: N.A.

Other Relevant information

- Please describe the impact on other equipment:
- Please describe the impact on other facility:
- Please describe if a test is needed afterwards:
- Please describe the preparatory works needed (in particular if you need support from other groups):
- Please indicate any other relevant information:

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➤ To **detect** conflicts/overloads & to **decide** what is compulsory, what we can afford & what we have to postpone to LS2

F. Bordry, LS1@Chamonix follow-up, LMC, 28th March 2012

F. Bordry, LS1@Chamonix follow-up, LMC, 28th March 2012



LS1 : Beam to beam period (24 months)

Projects	Group 1	Group 2	Group 3		
SMACC*	P1-1 + M1-1	P2-1 + M2-2	P3-1 + M3-1		Σ SMACC	
R2E	P1-2 + M1-2	P2-2 + M2-2	P3-2 + M3-2		Σ R2E	
Consolidation	P1-3 + M1-3	P2-3 + M2-3	P3-3 + M3-3		Σ Consolidation	
LIU	P1-4 + M1-4	P2-4 + M2-4	P3-4 + M3-4		Σ LIU	
Maintenance	P1-5 + M1-5	P2-5 + M2-5	P3-5 + M3-5		Σ Maintenance	
Experiment upgrades (A&T + GS)	P1-6 + M1-6	P2-6 + M2-6	P3-6 + M3-6		Σ expt. Upgrades	
Collimators					Σ Collimators	
.....					Σ	
Linac4					Σ Linac4	
	Σ Group 1	Σ Group 2	Σ Group 3	Σ Group 4		

*SMACC: Superconducting Magnets And Circuits Consolidation

ACTION:

- continue the detailed collection of activities by groups (5 departments) and expt. technical coordinators (*especially needed support*)
- produce a P+M table per projects and sub-projects
- validate per group the P+M availability and reiterate
- propose coherent prioritizations

Proposal to have one day summing-up (beginning of June 2012) to present the global survey and the prioritization for final decisions

F. Bordry, LS1@Chamonix follow-up, LMC, 28th March 2012

F. Bordry, LS1@Chamonix follow-up, LMC, 28th March 2012



LS1 day : 12th June 2012

The aim is to announce the results of the survey and analysis of which activities will be performed during the first long shutdown (LS1), which activities might be performed subject to the availability of resources (call for extra manpower), and which activities will be postponed.

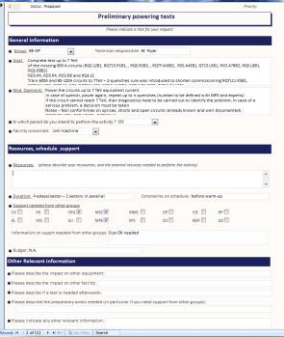
The LS1 day will also provide the latest update on LHC & injector planning.


The support groups will present their activities and organization during LS1. The aim is to crosscheck the requests from other groups and experiments, to avoid missing something and misunderstandings.

A summary of the LS1 day will be presented at the LMC meeting on June, 27th and at IEFC meeting on July 13th.

08:30 - 09:30	Methodology & Decisions <i>1h0'</i> Speaker: Frederick Bordry (CERN)
09:30 - 10:00	Update planning LHC <i>30'</i> Speaker: Katy Foraz (CERN)
10:00 - 10:20	Coffee break
10:20 - 10:50	Update planning injectors <i>30'</i> Speaker: Simon Baird (CERN)
10:50 - 11:20	Vacuum activities and organisation during LS1 <i>30'</i> Speaker: Dr. Jose Miguel Jimenez (CERN)
11:20 - 11:50	Survey activities and organisation during LS1 <i>30'</i> Speaker: Dominique Missiaen (CERN)
11:50 - 12:20	Site Engineering activities and organisation during LS1 <i>30'</i> Speaker: Dr. Luigi Scibile (CERN)
12:20 - 14:00	Lunch break
14:00 - 14:45	Electrical activities and organisation during LS1 <i>45'</i> Speaker: Francois Duval (CERN)
14:45 - 15:30	Cooling and Ventilation activities and organisation during LS1 <i>45'</i> Speaker: Mauro Nonis (CERN)
15:30 - 15:50	Coffee break
15:50 - 16:10	Handling activities and organisation during LS1 <i>20'</i> Speaker: Ingo Ruehl (CERN)
16:10 - 16:40	Controls activities and organisation during LS1 <i>30'</i> Speaker: Eugenia Hatziangeli (CERN)
16:40 - 17:10	Industrial Controls activities and organisation during LS1 <i>30'</i> Speaker: Philippe Gayet (CERN)

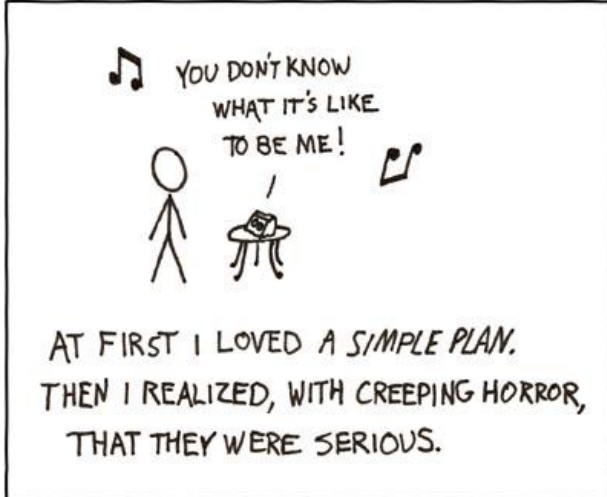
GETTING THE INFORMATION



- Series of meeting with LHC experiments technical coordinators
- Dedicated meetings 
- First tour of groups (between February and mid March 2012):
 - Huge amount of data presented in many different formats
 - What was understood as a «yes, we will do» by a requester, was understood as a «yes, please specify it and we will study what we can do» by support groups !! => no formal acceptance
 - Initial database tool was too limited for the complete analysis and follow-up

- End of March 2012, help was asked to AIS (thanks to Jurgen De Jonghe and his team)

- Beginning of May 2012, first version of **plan.cern.ch** was available





Plan Item - 10943

Title #: MS septa replacement LSS6
 Executing Group: TE-ABT Technical Responsible: CEDRIC BAUD Type: Maintenance

GENERAL

Proposed Project: SPS machine mainten? Accepted Project: SPS machine mainten?
 Proposed Priority: P2 Accepted Priority: P2

PERSONNEL RESOURCES AND BUDGET

Year: 2013 Budget (kCHF): 50 FTE (S1): 1 FTE (S2): 0 Avail.: Yes

Category	Profile Name	FTE(S1)	FTE(S2)	Avail.
Staff	TE-ABT-SE staff	1		Yes

GROUP CONTRIBUTIONS

Group Needed*	Phase	Description*	Year	Budget (kCHF)	FTE (S1)	FTE (S2)	Availability
EN-HE	Work	Handling during removal and installation of tanks.	2013		0	0	Not filled
			2014		0	0	Not filled
TE-VSC	Work	Venting sector. Opening sector and vacuum connections.	2013		160	0	Yes
BE-ABP	Work	Alignment.	2013		0	0	Pending
			2014		0	0	Pending
BE-BI	Preparator	Renovation of BI equipment in pumping modules.	2013		0	0	Pending
			2014		0	0	Pending
DGS-RP	Work	Indicate radiation levels and monitor working conditions.	2013		0	0	Not filled
			2014		0	0	Not filled

To prioritize and to take decisions, it is essential to know:

- What groups intend to do ?
- What is the goal, and the impact if it is postponed or not done ?
- Activity duration and when could be done ?
- Are the resources of the requester available ?
- What is the support needed from other groups, and are the resources of the support groups available ?

What are the differences between PLAN , APT, EVM and IMPACT ?

- **PLAN is for “tactical” planning: what do we need to do to implement CERN's strategic objectives ? Group activities and support needs. It's a decision support tool.**
- **APT is more on the resource side (per group and department), it helps comparing the resource allocations with MTPs (Medium Term Planning).**
- **EVM is a tracking tool to evaluate on line the earned value, the cost and schedule variance**
- **IMPACT is an operational planning tool for interventions. It cares about safety aspects, locations and participants; connected to the access system.**

All these tools should be linked in the future

Data: Actual situation

Quantity

- **Contains now ~80% of what is to be done during LS1**
- **~30% was unknown from some of the support groups !**
- **very few inputs from LHC experiments**

Quality:

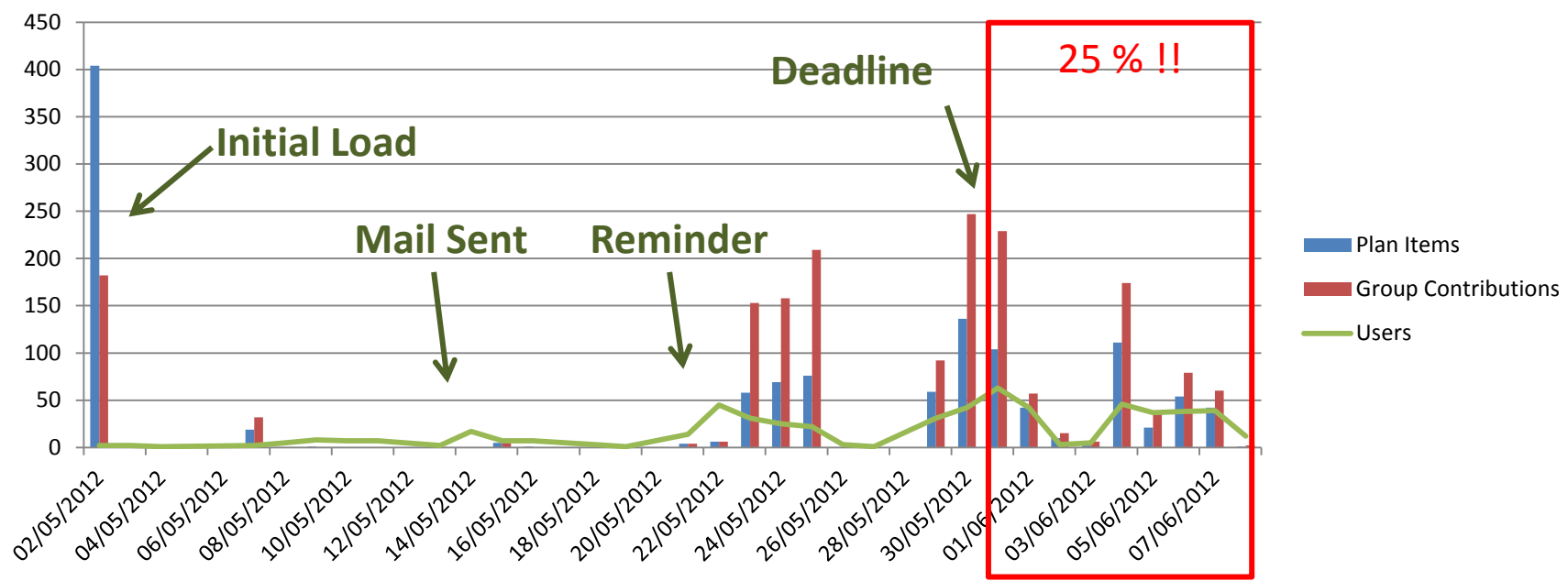
- **Some double entries**
- **Granularity varies from one group to another**
- **Lot's of [resources availability] not yet filled**

Short term

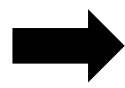
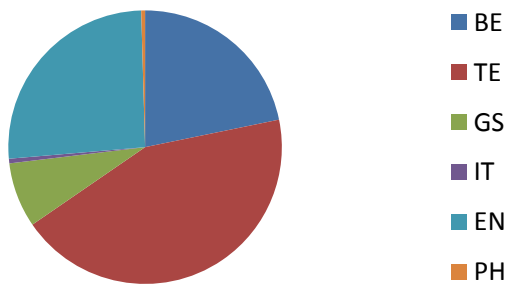
- **Get missing information**
- **Set status to plan items**

Mid/Long Term:

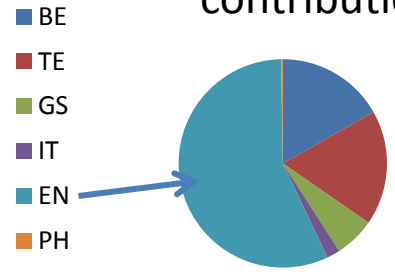
- **Feedback from users**
- **Discuss link with APT**
- **Associate workflow**
- **Preparation of winter stops and LS2**



Plan Items



Support groups contributions






Plan data Analysis

- SMACC: OK (DFBA upgrade should be finalised)
- R2E: OK (in spite it's very tight)
- Equipments are OK with their own works, their maintenance, consolidation and main projects (Chamonix and IEFC workshop presentations and special meetings)
- Clear confirmation of the support group overload and especially for EN-EL (cabling and fibre activities) and EN-CV
- Prioritization **MUST** be done

Plan data Analysis (Cont'd)

- EN-CV and EN-EL very busy in 2012 (studies, call for tenders, work preparation) and in 2013 (LHC, injectors, facilities), busy in the 1st semester 2014 and better after.
- EN-CV : long list of activities, especially in 2013; postponed activities: see next slide 



Activities postponed for EN-CV


Project will start in 2014

- ISOLDE
 - New ventilation for the extension of storage for target area
 - ISOLDE robot installation
 - Hot cell installation
 - Integration of Rabbit in the ventilation system
- ELENA: ventilation new building (LS1 only building construction)
- nTOF EAR2: ventilation new building
- Meyrin site: cooling or ventilation plant for laboratories or surface premises for EPC, EL, IT, CLIC, IT Dept.
- NA62:
 - NA62 will run in 2014 without the separation requested by RP of the target area (compensatory measures)
 - Racks cooling
 - Gigatracker detector cooling

To be done after 2014

- PSB new building (for new 2GeV Power Converter): cooling and ventilation plant
- RF Upgrade new building: cooling and ventilation plant
- Cooling circuits in SR1 and SR5 for new switch-mode converters (FMCM problem)
- PT 18: ventilation for new storage bldg (SMS18) and visitor extension
- Consolidation ventilation in TCC2 / TDC2

Plan data Analysis (Cont'd)

- EN-CV and EN-EL very busy in 2012 (studies, call for tenders, work preparation) and in 2013 (LHC, injectors, facilities), busy in the 1st semester 2014 and better after.
- EN-CV : long list of activities, especially in 2013; postponed activities: see next slide 
- EN-EL should be OK for the main activities BUT CANNOT do all the increasing cabling and fibre *requests (numerous requests the last days !!! i.e new WorldFip segments for quench detection system (QDS) ; these activities are not analysed and by default not approved)*
- Others support groups (transport, survey, controls, vacuum, civil engineering,...) have severe resources planning issues (see following presentations)



LS1 workload: EN-EL cabling activities (beginning May 2012)

EN/EL LS1 Workplan Cabling activities (Copper & Fibres)

Version 4 - 11 May 2012

Priority	Sub-priority	No.	Site	Project Name	Proj. Leader	CF Budg.-kCHF	Type of activity	FTE CF 2012	FTE CF 2013	FTE CF 2014	FTE CF total	Integrated 2012	Integrated 2013	Integrated 2014	Integrated total	Remarks
0	0a	34	LHC	New cable tray P3 (ALARA)	S. Myers (DG-DE)	400	Cabling	0.7	0.7	0	1.4	0.7	0.7	0	1.4	
1	1a	24	LHC	Déplacement R2E Pts 1,5,7 +WCC P5	M. Brugger (EN-STI) H.Thiesen (TE/EPC)	5300	Cabling & fibres	3.108	3.108	3.864	10.08	3.808	3.808	3.864	11.48	
1	1b	28	LHC	Replacement of WCC hoses - P4,5,8	CF Section	2000	Cabling	2.028	2.028	1.014	5.07	5.836	5.836	4.878	16.55	
1	1c	43	CERN-wide	Radiation sensitive fibres - Replacement campaign + New rad.resistant fibre contract	CF Section	1300	Fibres	2.182	2.182	1.179	5.543	8.018	8.018	6.057	22.093	
1	1d	32	LHC	Consolidation RF firewell cables LHC P4	D. Valuch (BE-RF)	250	Cabling	0	0	0.512	0.512	8.018	8.018	6.569	22.605	
1	1e	33	LHC	Consolidation fibre duct infrastructure LHC	CF Section	110	Fibres	0.558	0.558	0	1.116	8.576	8.576	6.569	23.721	
1	1f	27	LHC	Monitoring WCC hoses	CF Section	0	Cabling	0.179	0.179	0	0.358	8.755	8.755	6.569	24.079	
1 & 2	2a	47	CERN-wide	Various works for VALUUM	Group TE-VSC	250	Cabling	1.452	1.452	0	2.904	10.207	10.207	6.569	26.983	
1	2b	6	PS/Meyrin	Centre de Calculs (bât. 513)	P. Peplinger (EN-CV), E. Saliaz (IT-CS)	150	Fibres	0.558	0	0	0.558	10.765	10.207	6.569	27.541	
2	2c	12	SPS/Preveessin	Replacement irradiated cables SPS TS1+, TCC2-TDC2, RAL	CF Section	2800	Cabling	2.015	3.029	1.014	6.058	12.78	13.236	7.583	33.599	
2	2d	1	PS/Meyrin	PSS: System access Meyrin	P. Ninin (GS-ASE)	3200	Cabling & fibres	1.726	1.726	0	3.452	14.506	14.962	7.583	37.051	
2	2e	21	SPS/Preveessin	Cable clean-up campaign SPS-PS	CF Section	3200	Cabling	1.041	1.041	0	2.082	15.547	16.003	7.583	39.133	
2	2f	2	PS/Meyrin	LINAC4 + transfert line	M. Vetrener (BE-RF)	2700	Cabling & fibres	1.726	2.495	0.769	4.99	17.273	18.498	8.352	44.123	
2	2g	16	SPS/Preveessin	SPS Power cables consolidation	D. Bozzini (EN-EL)	0	Fibres	0.558	0	0	0.558	17.831	18.498	8.352	44.681	
2	2h	9	SPS/PS/Meyrin	Fibre infrastructure consolidation - Preveessin+Meyrin	CF Section	270	Fibres	1.116	1.116	0.558	2.79	18.947	19.614	8.91	47.471	
2	2i	18	SPS/Preveessin	Nouveau bâtiment RF	E. Pommesma (BE-RF)	500	Cabling & fibres	0	0.821	0.821	1.642	27.647	28.432	13.596	69.678	
3	3d	57	PS/Meyrin													
3	3e	46	Development													
3	3f	8	PS/Meyrin													
3	3g	5	PS/Meyrin	CERN extra low energy Antiproton	S. Maury (BE-ABP)	250	Cabling	0.567	0.567	0	1.134	32.097	32.882	16.707	81.686	
3	3h	40	LHC	TETRA (RF Pompiers)	F. Chapron (IT-CS)	400	Fibres	0.703	0.703	0	1.406	32.8	33.585	16.707	83.092	Avec l'aide de IT
3	3i	41	LHC	UMTS900 data GSM	F. Chapron (IT-CS)	300	Fibres	0.703	0.703	0.703	2.109	33.503	34.288	17.41	85.201	Avec l'aide de IT
3	3l	57	PS/Meyrin	Upgrade East Hall 157	L. Gaignon (EN-MEP)	1000	Cabling	0	0	1.066	1.066	33.503	34.288	18.476	86.267	
3	3m	31	LHC	TOTEM	H. Burkhardt (BE-ABP)	400	Cabling	0.7	0.7	0	1.4	34.203	34.988	18.476	87.667	LHC?
3	3n	10	PS/Meyrin	HFM test station + test bench evolution SM18	M. Bajko (TE-MSC)	180	Cabling	0	0.306	0	0.306	34.203	35.294	18.476	87.973	
3	3o	15	SPS/Preveessin	NA62	G. Maire (PH-DT)	100	Cabling & fibres	0.559	0	0	0.559	34.762	35.294	18.476	88.532	
4	4a	47	Development	New fibre monitoring system	CF Section	150	Fibres	0.558	0.558	0.558	1.674	35.32	35.852	19.034	90.206	
4	4b	19	SPS/Preveessin	Video SPS	D. Vaxelaire (GS-ASE)	250	Fibres	0.558	0.558	0	1.116	35.878	36.41	19.034	91.322	Pas de nouvelles
								total	35.878	36.41	19.034	91.322				
								Total Available staff	14	14	14	42				
								Missing staff	-21.878	-22.41	-9.034	-49.322				

Thanks to positive answers from BE-OP, equipment groups and experiments to provide their support for the supervision of cabling activities

See François Duval presentation for details and support definition

EL/CF staff will be 19; 5 of them doing management and day to day business

F. Bordry, LS1 day, 12th June 2012



LS1 workload: EN-EL cabling activities (June 2012 with Plan)

EN/EL LS1 Workplan Cabling activities (Copper & Fibres)

Version 9 - 2 June 2012

Priority	Sub-priority	Cat.	Site	Tunnel / Surface	Project Name	Proj. Leader	CF Budg. kCHF	Type of activity	FTE CF 2012	FTE CF 2013	FTE CF 2014	FTE CF total	Integrated 2012	Integrated 2012Sem1	Integrated 2012Sem2	Integrated 2013	Integrated 2013Sem1	Integrated 2013Sem2	Integrated 2014	Integrated 2014Sem1	Integrated 2014Sem2	Integrated total	Remarks						
0	0a	24	LHC	Tunnel	New cable tray PS (ALARA)	S. Myers (DG-DI)	400	Cabling	0.301	0.400	0.000	0.701	0.30	0.00	0.30	0.40	0.00	0.40	0.00	0.00	0.00	0.70							
1	1a	19	LHC	Tunnel	Deployment RZE Pts 1,5,7 + WCC PS	M. Brugger (EN-STT), H.Thiesen (TE/EPC)	5300	Cabling & fibres	2.610	4.036	0.000	6.646	3.11	1.26	1.85	4.44	1.82	2.62	0.00	0.00	0.00	7.55							
1	1b	20	LHC	Tunnel	Replacement of WCC hoses - P4,6,8	CF Section	3000	Cabling	0.697	2.422	0.186	3.304	3.83	1.26	2.55	6.66	2.47	4.30	0.19	0.00	0.19	10.85							
1	1c	29	CERN-wide	Tunnel	Radiation sensitive fibres - Replacement campaign + New red-resistant flow contrast	CF Section	1260	Fibres	2.214	1.736	0.000	3.952	6.02	1.38	4.64	8.50	3.73	4.87	0.19	0.00	0.19	14.80							
1	1d	21	LHC	Tunnel	Consolidation RF (New) cables LHC-24	D. Valuch (BE-RF)	250	Cabling	0	0.461	0	0.461	6.02	1.38	4.64	9.06	4.19	4.87	0.19	0.00	0.19	15.26							
1	1e	22	LHC	Tunnel	Consolidation fibre dust infrastructure LHC	CF Section	250	Fibres	0.396	0.362	0.000	0.718	6.38	1.38	5.00	9.40	4.37	5.05	0.19	0.00	0.19	15.98							
1	1f	37	LHC	Tunnel	Monitoring WCC hoses	CF Section	0	Cabling	0.316	0.316	0.316	0.948	6.69	1.54	5.15	9.74	4.53	5.21	0.50	0.16	0.34	16.93							
1	2b	5	PS/Meyrin	Surface	Centre de Calculs (bât. 513)	P. Pipinater (EN-CV), E. Sellaz (IT-CS)	150	Fibres	0.525	0.065	0.000	0.590	7.22	1.54	5.68	9.80	4.59	5.21	0.50	0.16	0.34	17.52							
1 & 2	2a	30	CERN-wide	Tunnel	Various works for VACUUM	Group TE-VSC	0	Cabling	0.319	0.405	0.000	0.724	7.54	1.54	5.88	10.20	4.59	5.21	0.50	0.16	0.34	18.24							
2	2d	1	PS/Meyrin	Surface	PSG: System access Meyrin	P. Nérin (DS-AGE)	3200	Cabling & fibres	1.297	0.704	0.000	2.001	8.52	2.06	6.46	10.50	5.02	5.49	0.50	0.16	0.34	19.52							
2	2f	2	PS/Meyrin	Surface	LINAC4 + transfer line	M. Veltner (BE-RF)	2700	Cabling & fibres	1.770	0.936	0.452	3.159	10.29	2.76	7.52	11.44	5.48	5.96	0.95	0.38	0.57	22.68							
2	2g	14	SPS/Preaccel	Tunnel	SPS Power cables consolidation	D. Bozzini (EN-EL)	0	Fibres	0.366	0.352	0.000	0.718	10.65	2.76	7.89	11.79	5.66	6.13	0.95	0.38	0.57	23.40							
2	2h	7	SPS/PS/Meyrin	Surface	Fibre infrastructure consolidation - Preaccel-Meyrin	CF Section	270	Fibres	0.757	0.369	0.000	1.126	11.41	2.76	8.54	12.16	5.74	6.42	0.95	0.38	0.57	24.52							
2	2i	28	CERN-wide	Surface	Optical fibre for EL (Protection 66 kV, etc.)	Sections BT, HT, CD (EN-EL)	100	Fibres	0.195	0.293	0.090	0.578	11.60	2.76	8.84	12.46	5.95	6.51	1.04	0.38	0.66	25.10							
2	2j	12	SPS/Preaccel	Surface	CCC upgrade - BE91	N. Dos Santos (EN-EL)	50	Fibres	0.153	0.214	0.000	0.367	11.76	2.76	8.99	12.67	6.05	6.62	1.04	0.38	0.66	25.47							
2	2m	3	PS/Meyrin	Surface + Tunnel	PS power house B355	K. Kalin (TE-EPC)	250	Cabling	0.348	0.409	0.000	0.757	12.10	2.90	9.20	13.08	6.26	6.82	1.04	0.38	0.66	26.23							
2	2n	25	LHC Experiments	Surface + Tunnel	LHC: Replacement DAQ system + Consolidation of VC + HPS420	A. Ricci, C. Fernandez, K. Potrzakowski (PH)	1075	Fibres	0.861	1.054	0.104	2.019	12.97	2.90	10.06	14.13	7.00	7.14	1.15	0.38	0.76	28.25							
2	2o	26	LHC Experiments	Surface + Tunnel	LHC: replacement DAQ system	L. Roy (PH-UAT)	510	Fibres	0.396	0.590	0.000	0.976	13.35	2.90	10.45	14.72	7.00	7.73	1.15	0.38	0.76	29.22							
2	2q	31	CERN-wide	Tunnel	Various works for BE (Ind. L1U)	Group BE-BE	0	Cabling	0.478	0.582	0.000	1.060	13.83	2.90	10.45	15.30	7.00	7.73	1.15	0.38	0.76	30.28							
2	2r	43	PS/Meyrin	Surface	Connection to Hungarian computer centre	J. Shade (IT-CS)	60	Fibres	0.237	0.000	0.000	0.237	13.59	2.90	10.69	14.72	7.00	7.73	1.15	0.38	0.76	29.46							
3	3b	18	SPS/Preaccel	Tunnel	SPS BPM Upgrade (new SPS fibre infrastructure)	E. Calvo-Granda (BE-BE)	2000	Fibres	0.656	0.826	0.000	1.482	14.25	2.97	11.28	16.55	7.41	8.14	1.15	0.38	0.76	30.94							
3	3c	15	SPS/Preaccel	Surface	Nouveau bâtiment RF	E. Montenegro (BE-RF)	530	Cabling & fibres	0.000	0.000	0.949	0.949	14.25	2.97	11.28	16.55	7.41	8.14	2.10	0.38	1.71	31.89							
3	3f	6	PS/Meyrin	Surface	HIE ISOLDE	Y. Kadi (EN-HOO)	260	Cabling	0.102	0.470	0.000	0.572	14.38	2.97	11.38	16.02	7.41	8.61	2.10	0.38	1.71	32.46							
3	3g	4	PS/Meyrin	Surface	ELENA Extra Low Energy Acceleration	S. Maury (BE-ABP)	250	Cabling	0.102	0.470	0.000	0.572	14.45	2.97	11.40	16.49	7.54	8.84	2.10	0.38	1.71	33.03							
3	3o	27	LHC	Surface	TETRA (BF-Dowcor)	F. Chagnon (IT-CS)	490	Fibres	0.718	0.000	0.000	0.718	15.17	2.99	12.18	16.40	7.64	8.84	2.10	0.38	1.71	33.75	Avec l'aide de IT						
3	3s	38	LHC	Surface + Tunnel	LMT5000 data GSM	F. Chagnon (IT-CS)	250	Fibres	0.415	0.303	0.000	0.718	15.58	2.99	12.60	16.79	7.95	8.84	2.10	0.38	1.71	34.47	Avec l'aide de IT						
3	3m	23	LHC	Tunnel	TOTEM	H. Burkhardt (BE-ABP)	400	Cabling	0.301	0.400	0.000	0.701	15.88	2.99	12.90	17.19	7.95	9.24	2.10	0.38	1.71	35.17	LHC?						
3	3o	13	SPS/Preaccel	Surface	NAG2	G. Mairé (PH-DT)	200	Cabling & fibres	0.563	0.000	0.000	0.563	16.45	3.27	13.18	17.19	7.95	9.24	2.10	0.38	1.71	35.73							
5	5c	11	SPS/Preaccel	Tunnel	Replacement irradiated cables SPS TS1+, TCC2-TC2, RAL	CF Section	2800	Cabling	1.785	3.987	0.000	5.772	18.23	3.50	14.73	21.18	8.50	12.66	2.10	0.38	1.71	41.51							
5	5d	17	SPS/Preaccel	Tunnel	Cable clean-up campaign SPS-PS	CF Section	3200	Cabling	0.799	1.062	0.000	1.861	19.03	3.58	15.45	22.24	9.35	12.89	2.10	0.38	1.71	43.37							
5	5p	8	CERN-wide	Surface	New computer centre hub + switches replacement (HP2910)	E. Sellaz, J. Shade (IT-CS)	700	Fibres	0.547	0.761	0.000	1.308	19.58	3.58	16.00	23.00	9.81	13.19	2.10	0.38	1.71	44.67	Gallerie pleine, pas possible en l'état						
5	5a	32	Development	Surface + Tunnel	Fibre registration database	CF Section	200	Fibres	0.444	0.190	0.047	0.681	20.02	3.58	16.44	23.19	9.90	13.29	2.14	0.41	1.73	45.35							
5	5d	36	PS/Meyrin	Tunnel	L1U LHC Injectors Upgrade (PGB, PS, SPS)	R. Garoby (BE-HOO)	4400	Cabling	1.970	3.759	0.287	6.016	21.99	3.58	18.41	26.95	10.46	16.40	2.43	0.41	2.02	51.37	Après nettoyage des zones impliquées						
5	5a	33	Development	Surface	Fibre comparative test	CF Section	0	Fibres	0.101	0.091	0.018	0.210	22.09	3.58	18.51	27.04	10.51	16.53	2.43	0.42	2.03	51.58							
5	5r	39	PS/Meyrin	Surface	Upgrade East Hall 157	L. Gatignon (EN-MEP)	1015	Cabling	0.000	0.000	1.068	1.068	22.09	3.58	18.51	27.04	10.51	16.53	3.51	0.42	3.10	52.65							
5	5n	9	PS/Meyrin	Surface	HFM test station + test bench evolution SM18	M. Bekko (TE-MEC)	180	Cabling	0.017	0.293	0.000	0.310	22.11	3.58	18.53	27.33	10.65	16.69	3.51	0.42	3.10	52.96							
5	5a	34	Development	Surface + Tunnel	New fibre monitoring system	CF Section	150	Fibres	0.355	0.130	0.078	0.563	22.47	3.58	18.88	27.46	10.71	16.75	3.59	0.46	3.14	53.52							
5	5b	16	SPS/Preaccel	Surface	Video SPS	D. Vecellio (DS-AGE)	250	Fibres	0.359	0.204	0.000	0.563	22.82	3.58	19.24	27.67	10.81	16.85	3.59	0.46	3.14	54.00	Pis de nouveaux						
5	5c	42	LHC Experiments	Surface	New satellite room P1	T.M. Henric Wickstroem (PH-UAT)	45	Fibres	0.174	0.020	0.000	0.194	22.64	3.58	19.06	27.40	10.73	16.75	3.59	0.46	3.14	53.72							
5	5d	40	PS/Meyrin	Surface	Sunrise Telecom Operator	J. Shade (IT-CS)	60	Fibres	0.237	0.000	0.000	0.237	22.70	3.58	19.12	27.46	10.71	16.75	3.59	0.46	3.14	53.76							
5	5a	44	LHC	Tunnel	Detaction fibres for collimators	S.Montesano (EN-STT)	100	Fibres	0.121	0.266	0.000	0.387	22.94	3.58	19.36	27.93	10.81	17.12	3.59	0.46	3.14	54.47							
Total projects									17,248	18,172	2,622	37,042																	
Management/Day-to-Day business									4,145	3,875	1,045	9,065																	
Total Available staff									15	15	15	45,000																	
Missing staff									-2	-3	13	7	EL/CF staff w EL/CF staff w EL/CF staff will be 19; 4 of them doing management and day to d and day to demand day to day business																

10/33

(Cat. 10, 35) (Cat. 10, 35)

F. Bordry, LS1 day, 12th June 2012



Activities which CANNOT be done during LS1

- **Booster cable cleanup campaign (all the work for Booster 2 GeV during LS2)**
- **Replacement irradiated cables SPS TS1+, TCC2-TDC2, (*but TCC2 : vacuum renovation between Splitter 1 and Splitter 2 => to review for the replacement of the irradiated cables*)**
- **Cable clean-up campaign SPS-Pt 5**
- **Cabling preparatory work for Linac4 connection to the PSB (160 MeV)**

BUT: LIU cabling: PSB, PS and SPS priority 1 should be done during LS1 or at least during the 1st winter stop (2015-2016)


- (i.e
- **trajectory measurement in PSB to prepare H⁻ injection**
 - **new wall current monitor in PS for ghost bunch detection**
 - **fibre duct in one SPS sector for the new MOPOS test)**

- **Recommendation: to take advantage of the LS1 and/or the 2 winter stops before LS2 to trace PSB and SPS cables for the LS2 cleanup campaign**

- **New computer centre hub + switches replacement (HP2910)**
 - **HFM test station + test bench evolution SM18** *(to revisit when it'll be possible or if temporary solution is not possible; to not delay HL-LHC R&D)*

 - **Fibre registration database**
 - **Fibre comparative test**
 - **New fibre monitoring system**
- } Internal EN-EL activities
- **No work from EN-EL and EN-CV for FAIR test place (bldg 180) and in general test places (exceptions should be discussed)**

 - **Video SPS (not clear activity...)**
 - **New satellite room P1**
 - **Sunrise Telecom Operator**
 - **Detection fibres for collimators**

- ALICE UPS project (new building, ventilation, UPS, cabling): large project not entirely specified (many versions, budget ? , workload,..);
Not in the approved activities. Should be better studied
- AD, Elena , Gbar: Elena is expected to start beam commissioning in 2016 and physics with Gbar and the other experiments in 2017.
During LS1, only construction of the new building; no displacement of the kickers in the AD ring.
Infrastructures will be installed from mid 2014.
- TOTEM & ALFA request for installing extra cables 
- New LHCb control room and data centre: “à la 107” by GS
- CMS SL 53 (new offices, conference room, visitors gallery) : “à la 107” by GS
- Running facilities in 2013 will be presented by Simon Baird

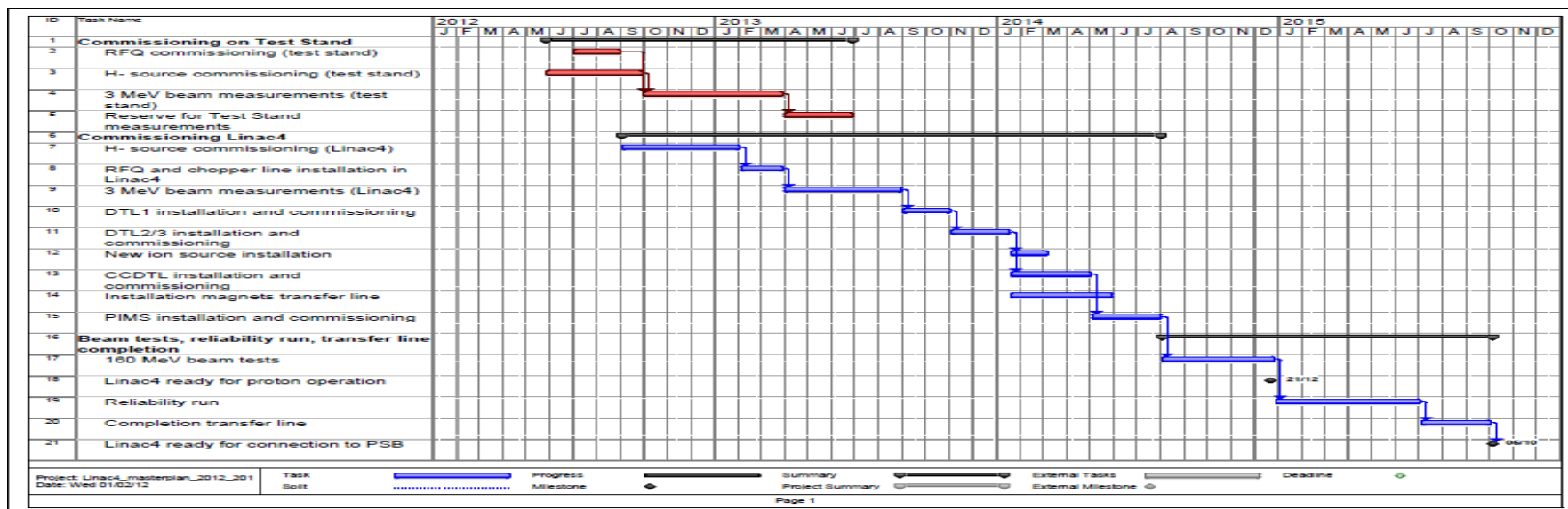


Linac 4 schedule

- No connection of Linac 4 during the LS1 (connection during the LS2)
- Beam commissioning foreseen in 2014 and reliability run in 2015
- Hardware to connect Linac 4 to PSB by end of 2015
- No possible to prepare the cabling for Linac4-to-PSB during LS1
(8 months => 12 months, Linac 2 will be repaired !; ~~LS 1.5~~)

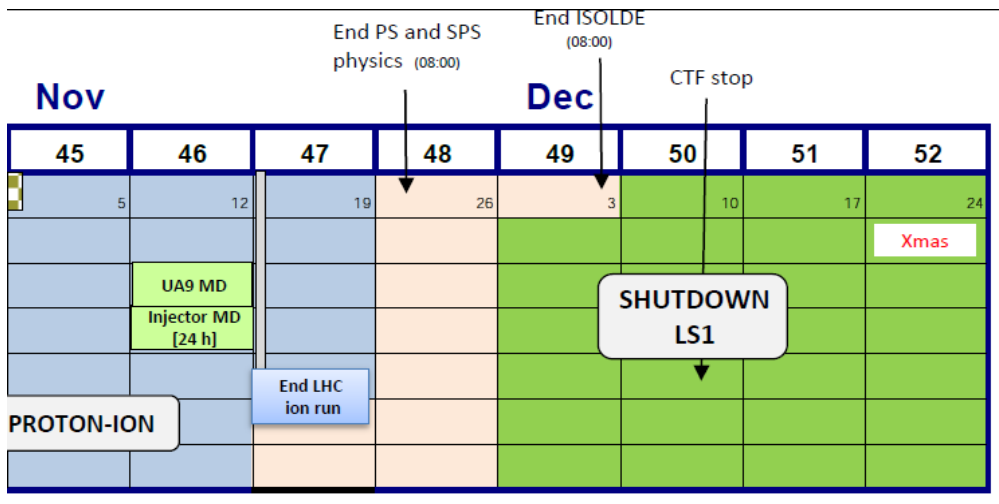
Proposal to smooth the project (not a hold) :

- 3 MeV test asap (RFQ test)
- H⁻ beam commissioning in 2015 (see following presentations for advantages)
 - Linac 4 with proton injection ready for mid 2014 in case of Linac 2 catastrophe ? : implications, is it useful due to LHC performance limitation ?
 - Linac 2 must be operational up to 2017 (consolidation and mitigation)

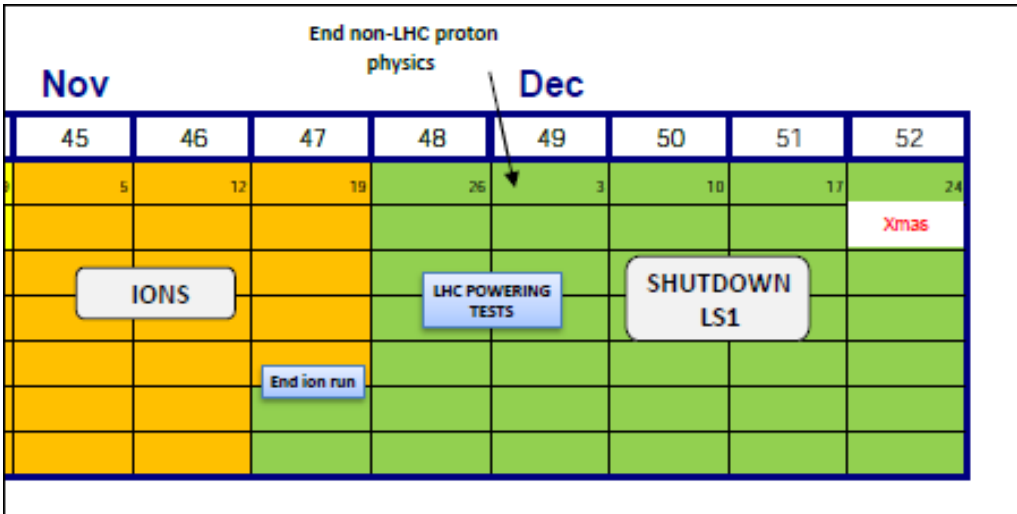




LS1 start dates: Break point 19th June 2012 and 30th August 2012



LHC injectors:
 end of physics
 26th November 2012: end of PS and SPS physics
 3rd December 2012: end of Isolde physics



LHC :
 end of physics
 23rd November 2012

(it'll better 17th November 2012 for all the tests before Xmas break (see Katy's talk)

It'll be more and more difficult and costly to move the LS1 start date

Conclusion

- LS1 focus on LHC upgrade (towards 7 TeV: interconnects, R2E and consolidations) and LHC injectors maintenance
 - LHC injectors and experimental facilities closure in 2013: Resources redirected towards LHC upgrade and consolidation*
- Massive and solid preparation work **(Thank you)**.
Need to continue to review and optimise the support activities. Some open points (DFBA, CSCM, quadrupole diodes,...)
- Some important activities (maintenance, consolidation, LIU,...) cannot be done during 2013-2014
- Proposal to postpone the beam commissioning of LINAC 4 (smoothing of the project and not a hold)
- Planning is already well advanced (*see Katy and Simon presentations*) but must be optimized with the new decisions
- Safety shall be our priority during LS1 - Logistics will be crucial
- Cost increase to cope with the schedule: collaborations, FSU, more work than foreseen



Industrial support; FSU contracts evolution & forecast

2004 to mid 2011: S107, S108

Since mid-2011: S144, S145, S146

Per Department (FTE)

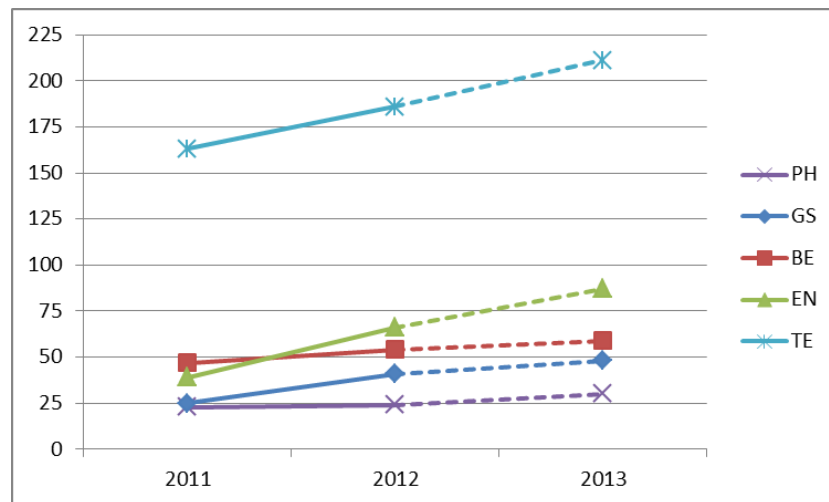
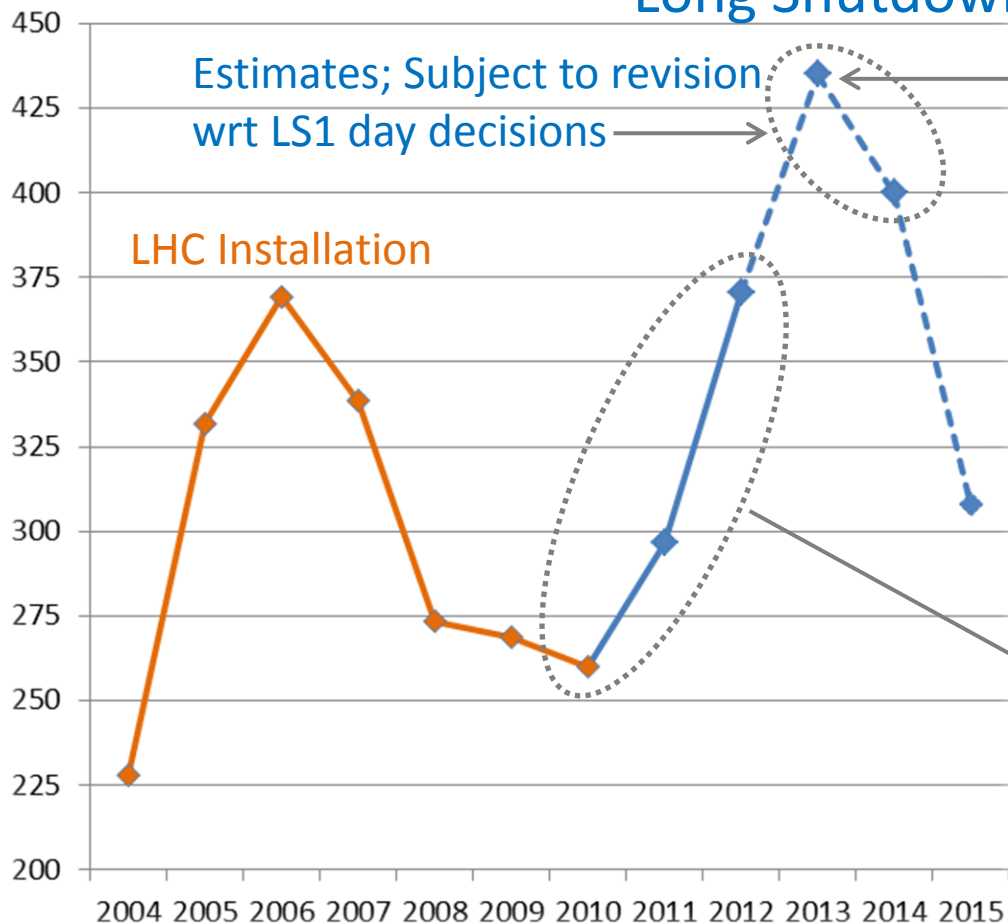
2013	FSUnits	FTE	%
BE	5	59	14%
EN	8	87	20%
GS	4	48	11%
PH	3	30	7%
TE	14	211	49%
TOTAL	34	435	100%

FSU resources (FTE)

Long Shutdown 1

Estimates; Subject to revision wrt LS1 day decisions

LHC Installation



2011-2012:
LS1 support build-up (76 FTE) and
new activities (34 FTE)

2013: 65 additional FTE expected

Courtesy of D. Delikaris



Final conclusion

Accelerators:

LS1 \equiv LHC 7 TEV

LS2 \equiv LIU

LS3 \equiv HL-LHC





LS1 meetings

**“LHC superconducting magnets and circuit during LS1 meeting” (SMACC meeting) chaired by Jean-Philippe Tock
Every two weeks: Wednesday 9h00-10h30**

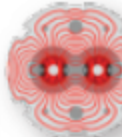
**To coordinate the activities for the consolidation of the SC magnets and circuits.
*And dedicated technical meetings, replacing the Splices Task Force***

**“LHC LS1 Coordination meeting” chaired by Katy Foraz –
Every two weeks: Thursday 9h00-10h30**

The objective is to list the activities of each group (presentations) and prepare a detailed schedule of LS1

Katy is also organizing preparatory meeting with all the groups.





Adding cables in LS1 relevant for high-β

Follow up of action item from [LMC#124](#) on cables for matching quads for installation in LS1

Reporting back after consultations with experts :

Francois Duval
Valerie Monin
Luca Bottura
Markus Zerwas
Jörg Wenniger

Summary of the 132nd LMC Meeting held on 9 May 2012

DECISION: Order extra cables for TOTEM/ALFA high-beta, test magnet powering range for beam 1 and beam 2 in a bench measurement, and get input from TOTEM and collimation

Confirming
D. Nisbet
F. Duval
H. Burkhardt

ACTION: Decision on installing extra cables for TOTEM & ALFA during LS1 needed by the directorate before 12 June (Steve Myers)

LMC#32 minutes : **DECISION: The LMC approved the preferred solution (extra cables) for the TOTEM high-β optics including a few additional cables**

Apply to both IP1 & 5

Minimize the extra beam-time needed for high-β

by running IP1&5 together using the same procedure whenever possible

Q4

