



# Baseline changes, TDR and practical implementation of the documentation for HiLumi construction

Isabel Bejar Alonso on behalf of the HL-LHC PO - CERN  
HL-LHC Configuration, Quality, Risk & Resources Officer

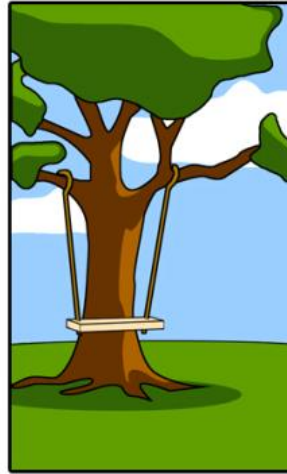


7th HL-LHC Annual Meeting – EDMS 1868556

# Baseline



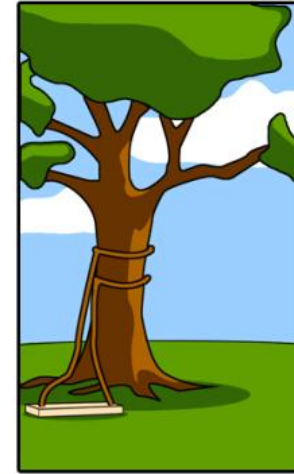
**How the customer explained it**



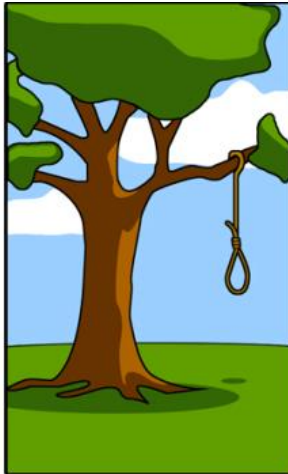
**How the project leader understood it**



**How the analyst designed it**



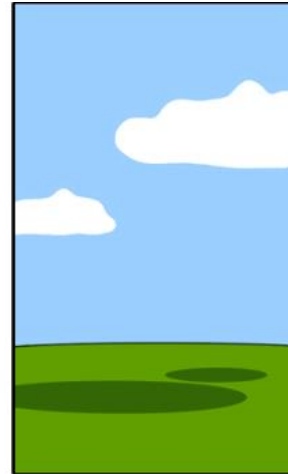
**How the programmer wrote it**



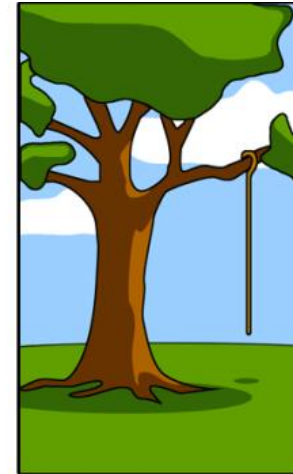
**What the beta testers received**



**How the business consultant described it**

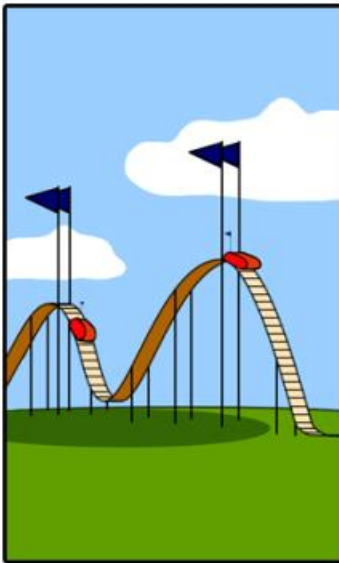


**How the project was documented**

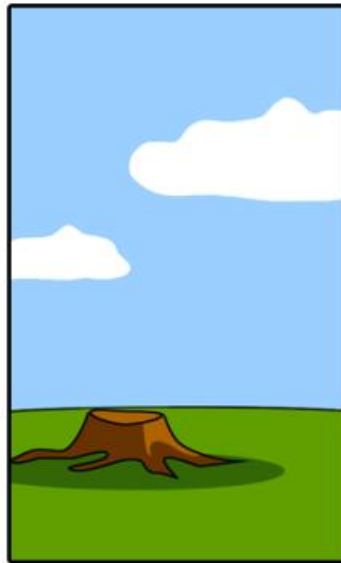


**What operations installed**

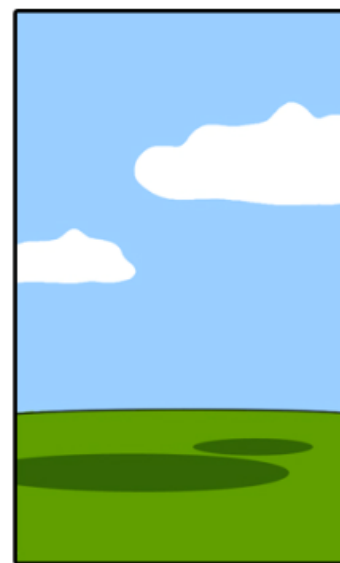
# Baseline



**How the customer was billed**



**How it was supported**



**How the project was documented**



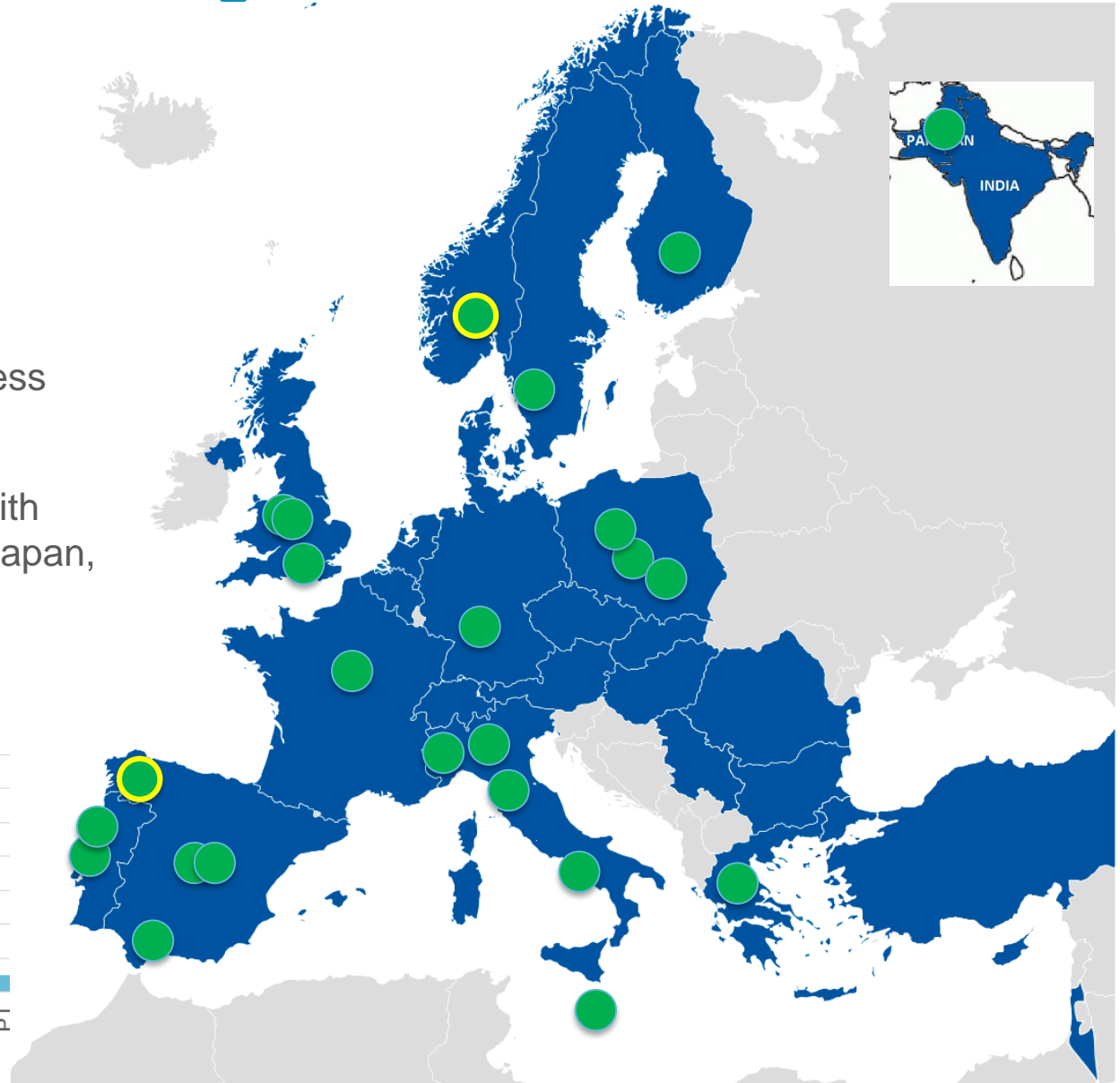
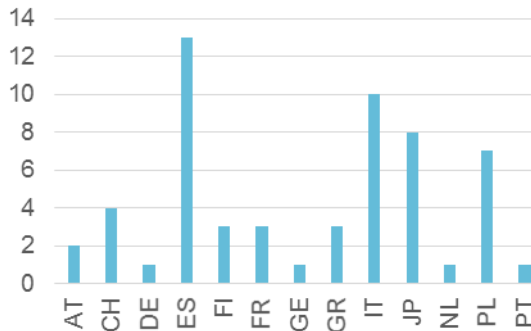
**What the customer really needed**

# A global effort

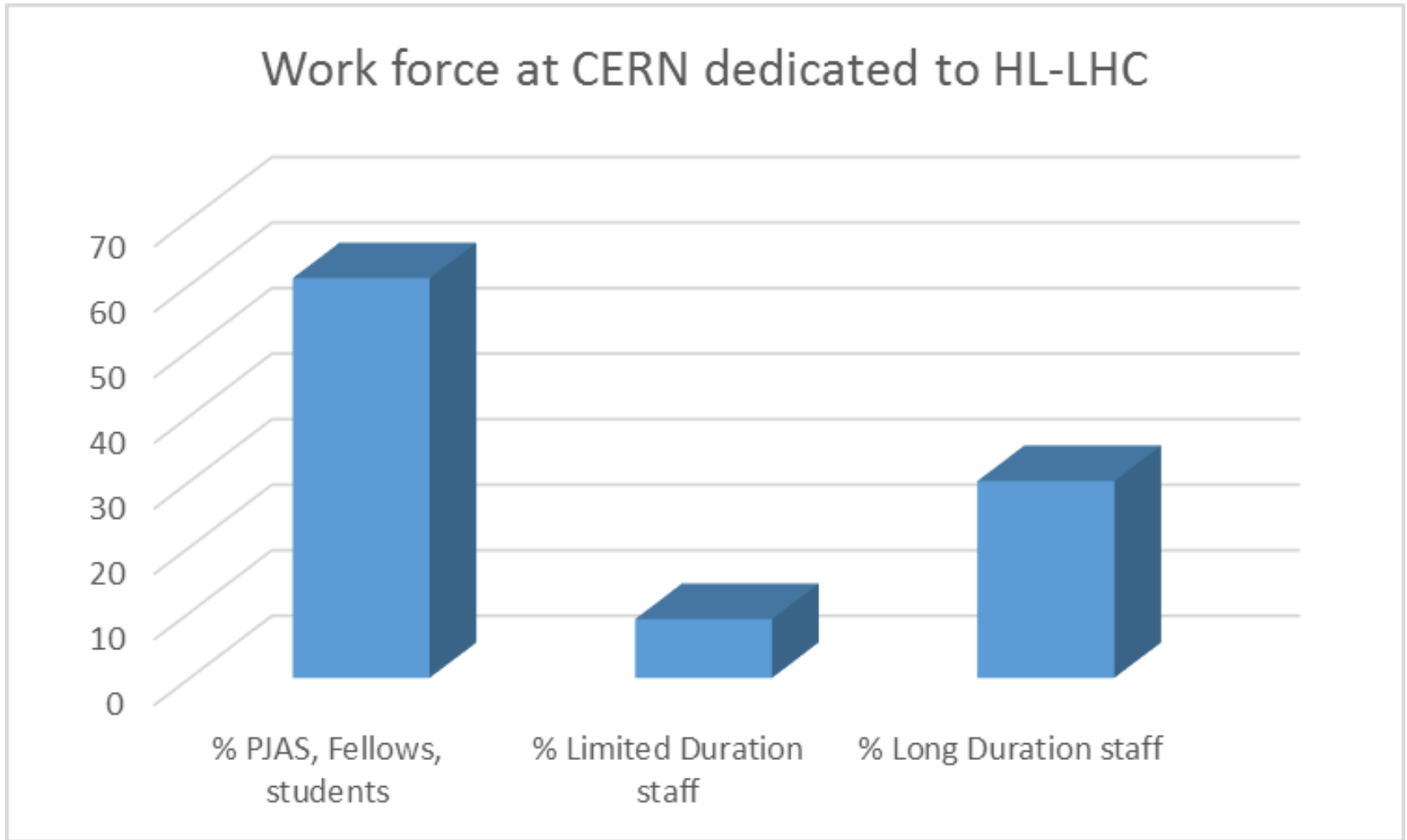
- HL-LHC
- Negotiation in process

Under discussion with  
Canada, Georgia, Japan,  
Russia, USA

Total

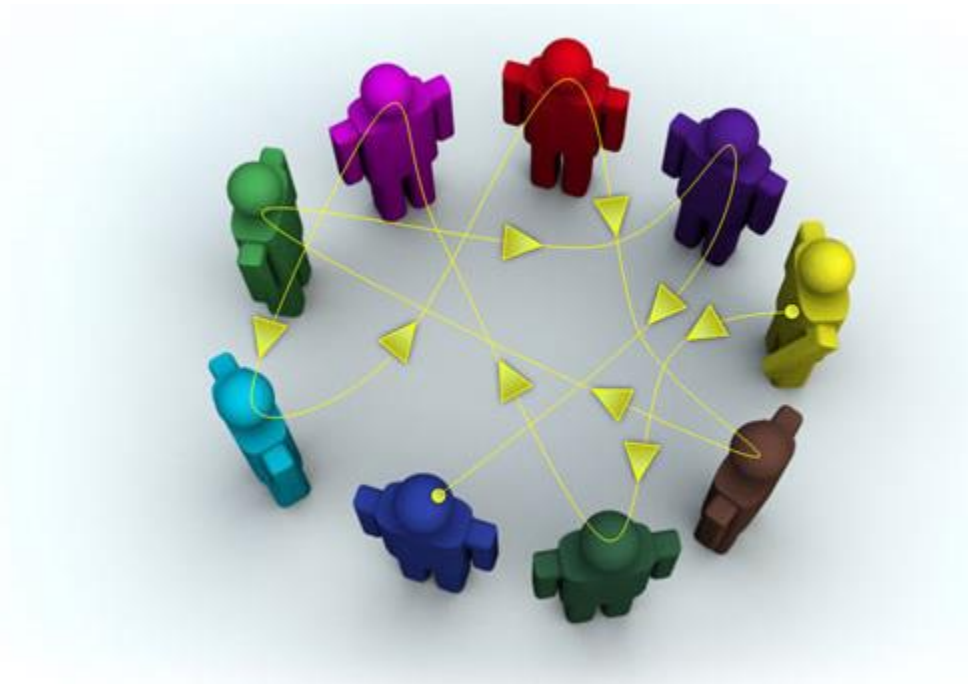


# Most people will work for the project < 3 years



# One project – Tens of teams a global effort

## We need a confederated system



# Scope

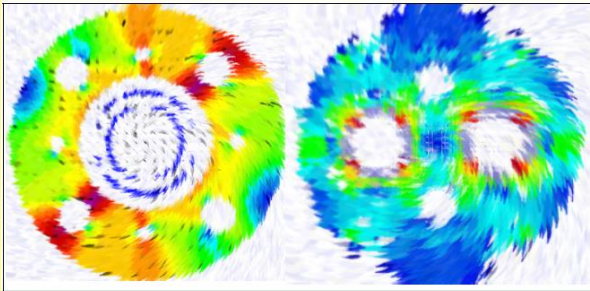
ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE  
**CERN** EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH



**High-Luminosity Large Hadron Collider (HL-LHC)**  
**Technical Design Report V0.1**

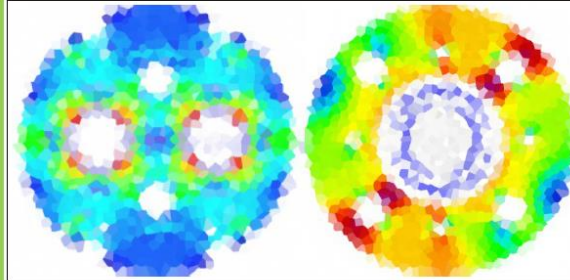
# On or way but not there yet

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**CERN** EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH



High-Luminosity Large Hadron Collider (HL-LHC)  
Preliminary Design Report

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE  
**CERN** EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH



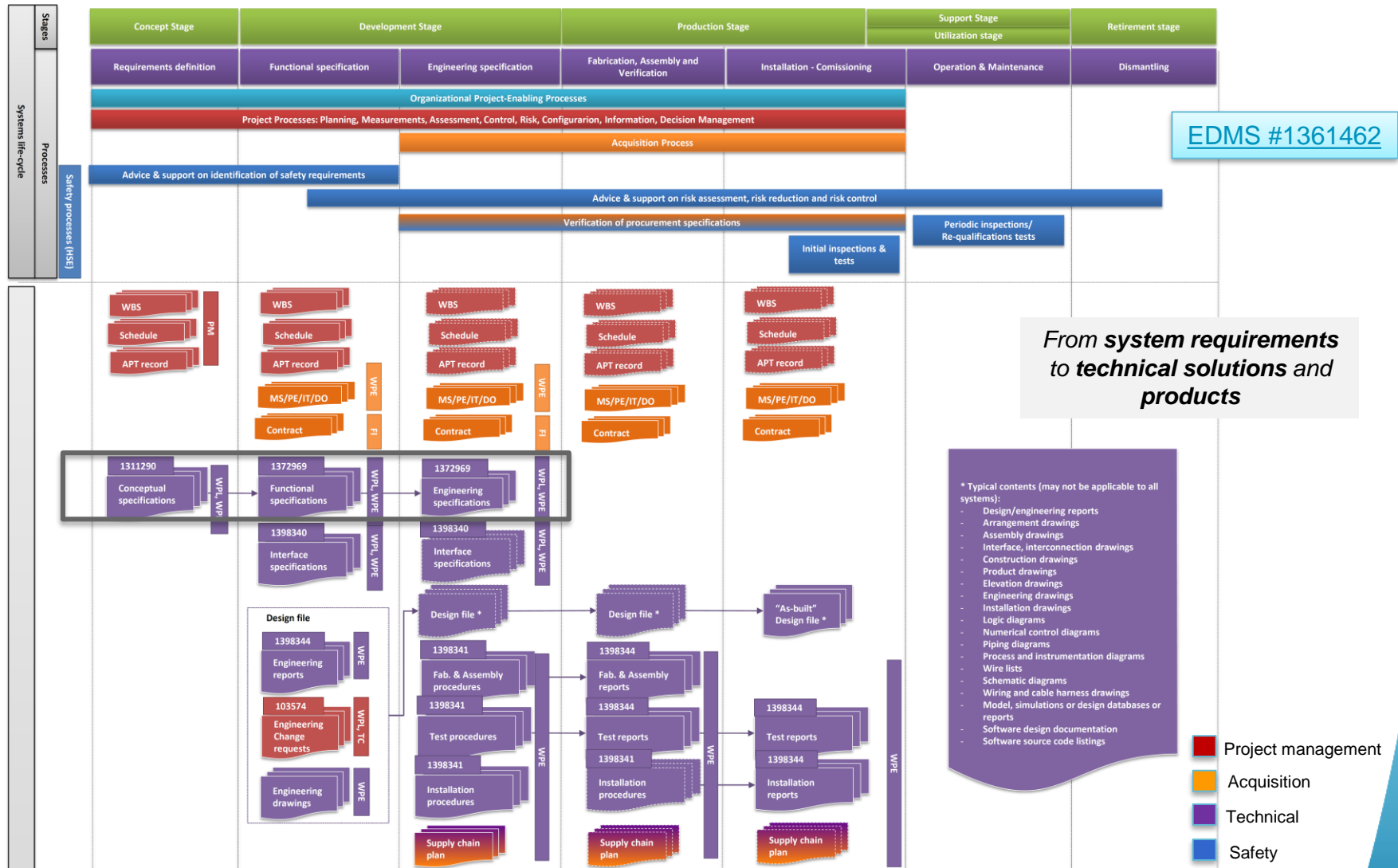
High-Luminosity Large Hadron Collider (HL-LHC)  
Technical Design Report V0  
EU Deliverable D1-10

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE  
**CERN** EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH



High-Luminosity Large Hadron Collider (HL-LHC)  
Technical Design Report V0.1

# Baseline documentation (1/2)



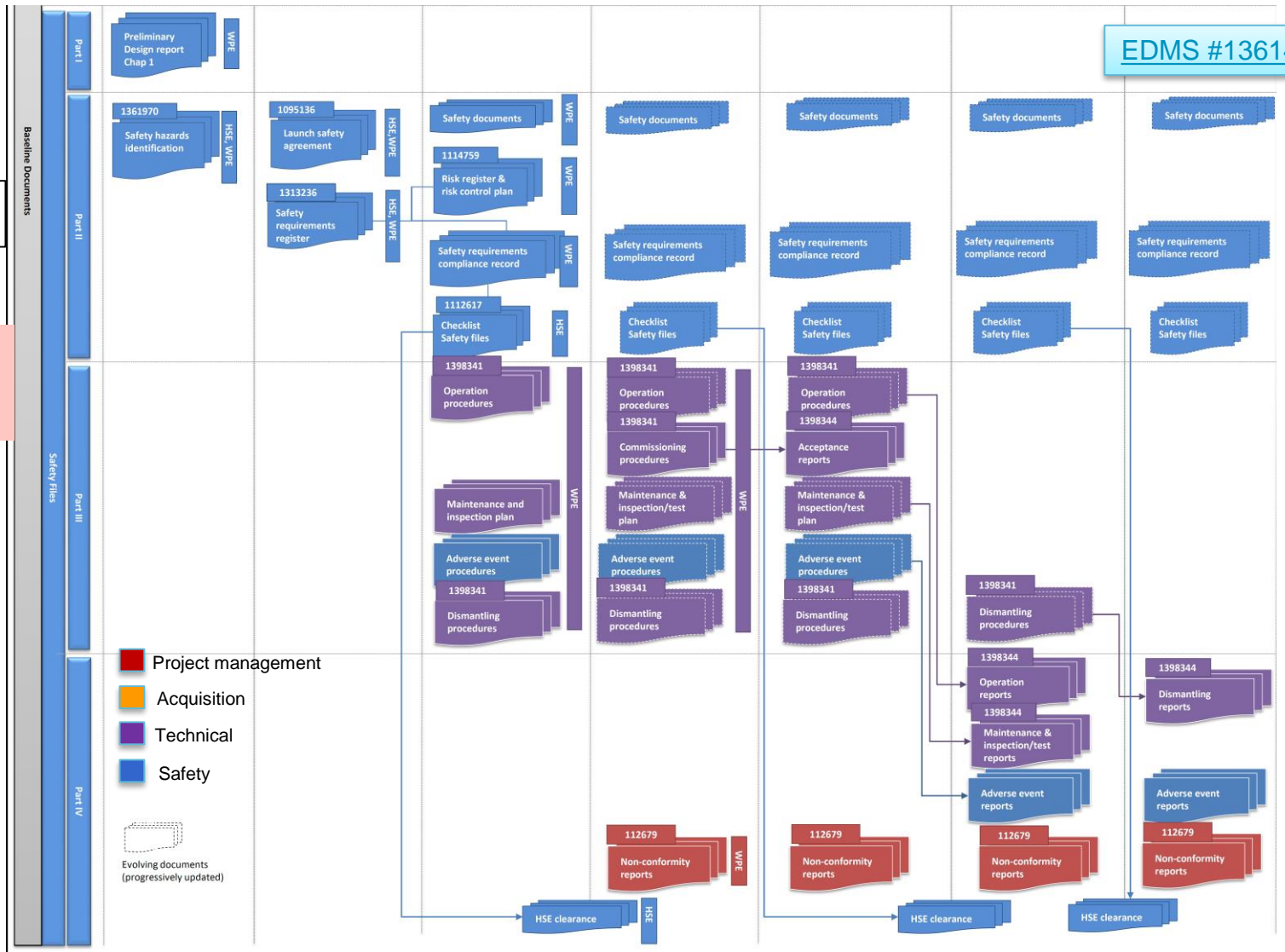
# Baseline documentation (2/2)

EDMS #1361462

**Safety File**

↓

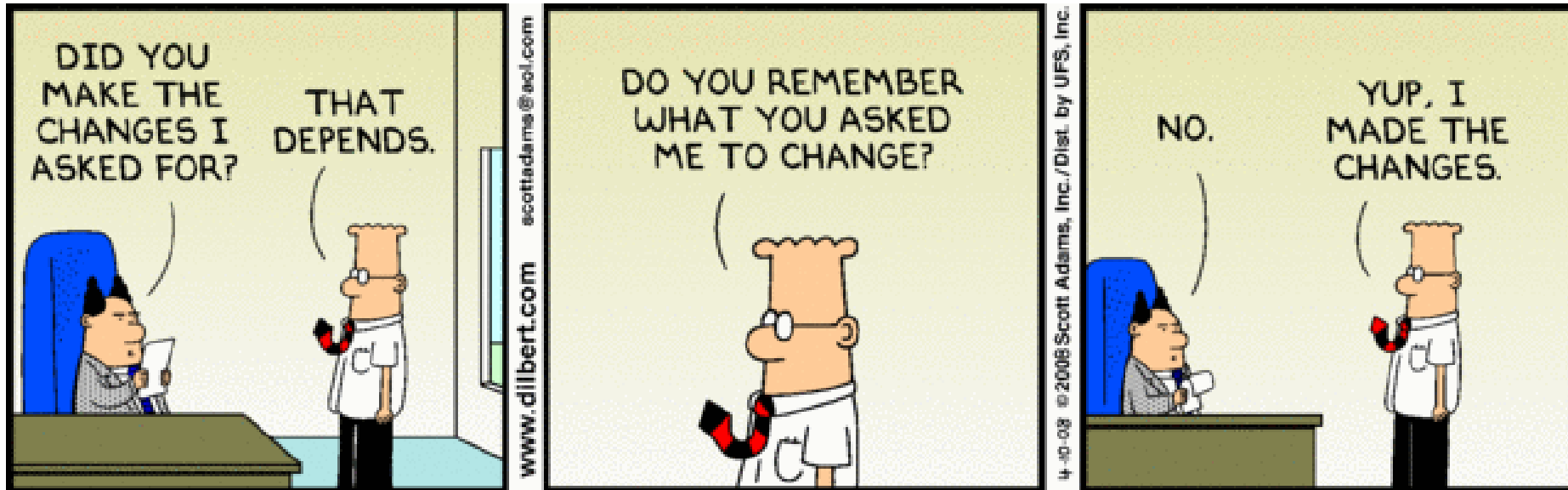
Links to already existing documentation will be made, whenever required



- Project management
  - Acquisition
  - Technical
  - Safety
- Evolving documents (progressively updated)



# And document change



# The Project Baselines

- A Baseline is a set of attributes at a point in time.
- It serves as a basis for defining change.
- HL –LHC maintains Scope, Schedule and Cost Baselines.
- Our TDR is our present Scope Baseline
- Our MS Planning is our present Schedule Baseline
- Our MTP is our present Cost Baseline

The three together are our **Configuration Baseline**

# Tracing changes / Typology

## Changes **not affecting** the configuration Baseline

The Template for Decisions Reporting will be used to trace decisions for an existing type of component or on components that are evaluated for the Baseline. Typically will be used to formalize a technical decision between several options, an internal re-scheduling not affecting the baseline or a reevaluation of the cost, a technical decision to be shared.

They are internally discussed in the WP and brought to the TCC for final validation.

## Changes **affecting** the configuration Baseline

The Template for HL-LHC ECR will be used to trace decisions and actions that will come from changes on components already in the configuration Baseline and that are not in the present LHC machine.

All are discussed in the TCC.

## Changes **affecting the present LHC**

The LHC ECR template will be used to trace changes in the present LHC machine and follows the normal LHC ECR.

All are discussed on the LMC

## Pre analysis to help on the decision process

To ensure or at least to help the "objectivity of the decision" exists a template to help to put the pros and cons based on the SWOT analysis

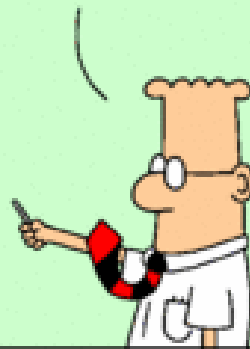
# Impact of changes must be analysed

THE PROJECT WAS MOVING ALONG WELL UNTIL MANAGEMENT CHANGED OUR CODING LANGUAGE AND METHODOLOGY.



www.dilbert.com scottadams@aol.com

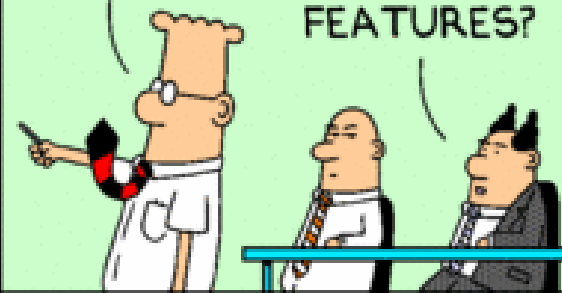
NOW OUR TIMELINE IS REPRESENTED BY THIS M.C. ESCHER PRINT OF AN ENDLESS STAIRWAY.



© 2005 Scott Adams, Inc./Dist. by UFS, Inc.

THIS DEEP-SEA SUB-MARINE IS LOOKING FOR OUR MORALE.

WOULD THIS BE A BAD TIME TO ADD A FEW FEATURES?



# Documenting



→ EDMS-NO.	→ REV.	→ VALIDITY
→ 1342285	→ 1.1	→ RELEASED

REFERENCE: HL-PM-QA-0001

## PROCEDURE

### HL-LHC DOCUMENTATION MANAGEMENT AND CONTROL



EDMS NO.	REV.	VALIDITY
1812095	1.0	VALID

QUALITY

PUBLIC

### HL-LHC: Documents Approval Process

**Author:** member of the project that prepares the document



EDMS NO.	REV.	VALIDITY
1501017	1.1	VALID

QUALITY

PUBLIC

### HL-LHC: Quality management

#### Documentation Management in EDMS HL-LHC WP Workspace

- All HL-LHC WP Members (declared in e-groups for HL-LHC)



# Baseline – Non Baseline

- Baseline documents: Documents that will have to be stored and updated until the dismantling of the LHC.
- Non-baseline documents: documents that are required for the well functioning of the project but that wich storage will not be considered critical after the commissioning phase.

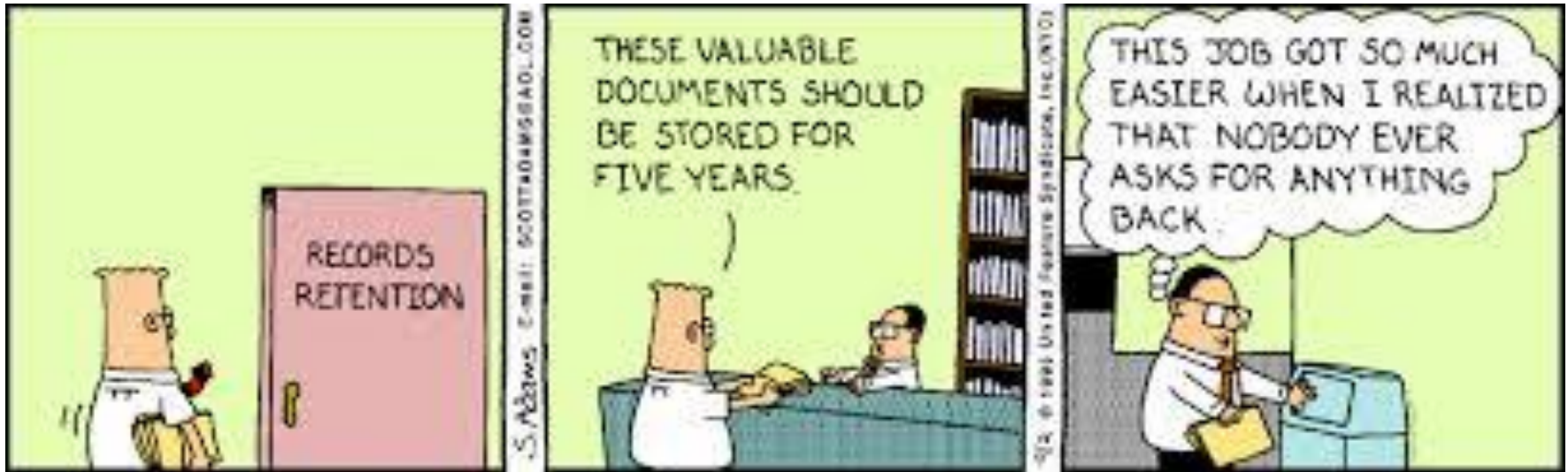
# Approval - Authority

- Baseline documents shall be peer reviewed (verification process) by a group of people knowledgeable on the subject and those interfacing with the system/process described in the document. This group of people can be a permanent committee (HL-TCC) or a committee created by the Project office.
- Concerning Authorization the process is adapted to the type of document. As a general rule:
  - One Workpackage, shall be authorized by WPL.
  - More than one workpackage, shall be authorized by the Project Office.
  - The project, shall be authorized by the Project Leader.

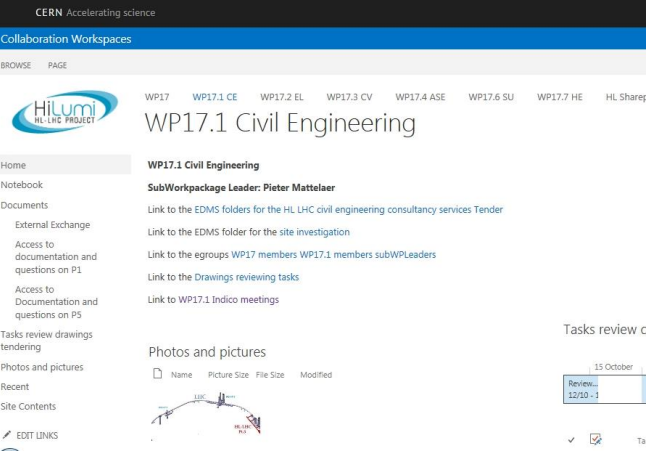
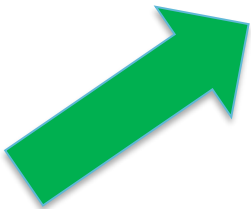
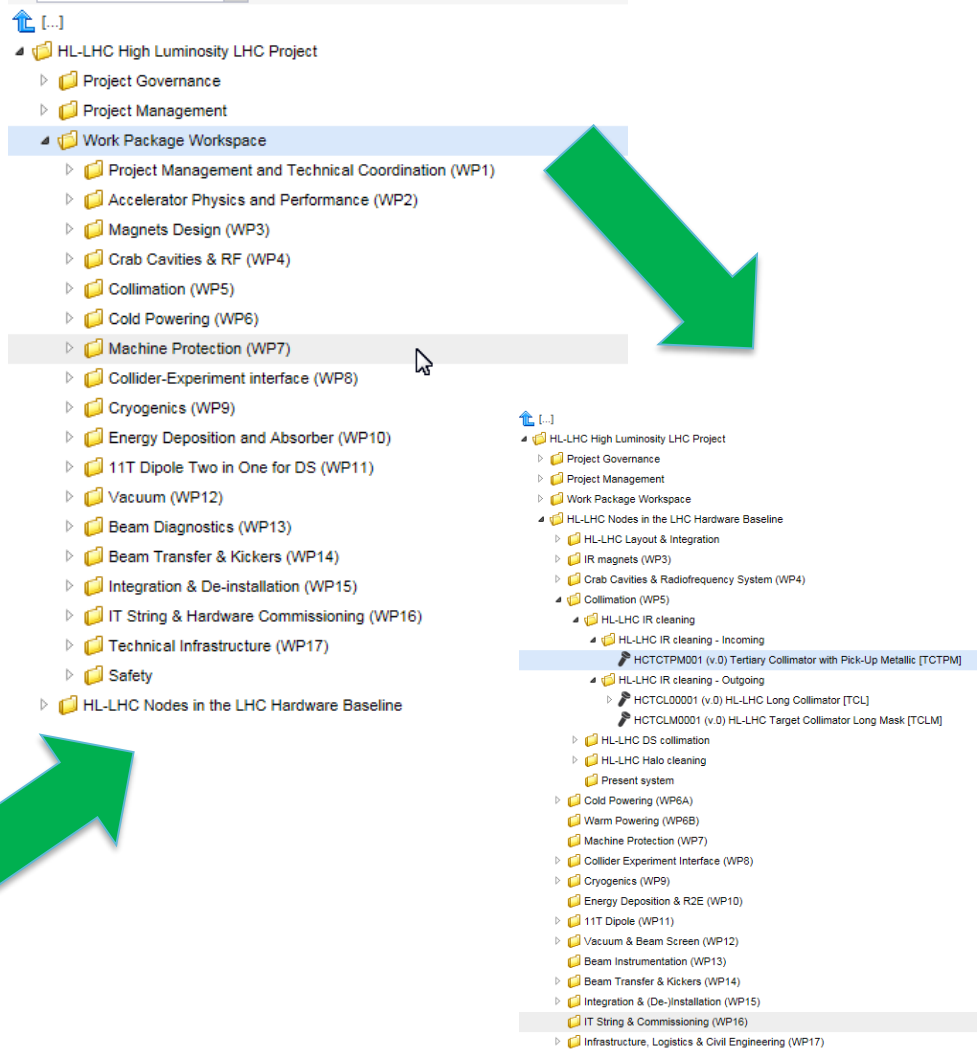
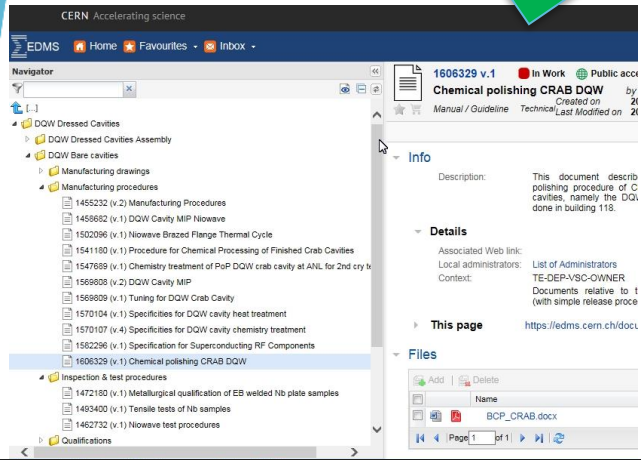
# Information should reach the right persons



# Storage



# EDMS – From your group, to the workspace to the Hardware Baseline



# EDMS Growing and adapting to your needs

The screenshot displays the EDMS web interface. At the top, it shows 'CERN Accelerating science' and 'Signed in as: bejar'. The main navigation bar includes 'Home', 'Favourites', 'Inbox', and a search bar. The left sidebar shows a tree view of folders: 'DQW Dressed Cavities', 'DQW Dressed Cavities Assembly', 'DQW Bare cavities', 'Manufacturing drawings', 'Manufacturing procedures', 'Inspection & test procedures', and 'Qualifications'. The main content area shows details for document '1606329 v.1 Chemical polishing CRAB DQW' by Leonel MARQUES ANTUNES FERREIRA, created on 2016-03-21 and last modified on 2016-04-01. The document is marked as 'In Work' and has 'Public access'. The 'Info' section includes a description: 'This document describes the chemical polishing procedure of CRAB bulk niobium cavities, namely the DQW type as it will be done in building 118.' and an external reference: 'CRAB, BCP, B118'. The 'Details' section lists associated web links, local administrators (List of Administrators), and context (TE-DEP-VSC-OWNER). The 'Files' section shows a table with one file: 'BCP\_CRAB.docx' (271.7 K, 2016-03-21 15:03:14, by Leonel MARQUES ANTUNES FE...). The footer of the interface reads 'Engineering & Equipment Data Management Service (EDMS) EDMS 6.1 © CERN | EDMS Support / Feedback'.

# SharePoint Growing and adapting to your needs

CERN Accelerating science Signed in as: bejar (CERN) [Sign out](#) [Directory](#)

Collaboration Workspaces [Newsfeed](#) [OneDrive](#) [Sites](#)

BROWSE PAGE  SHARE FOLLOW EDIT

WP17 WP17.1 CE WP17.2 EL WP17.3 CV WP17.4 ASE WP17.6 SU WP17.7 HE HL Sharepoint Search this site

## WP17.1 Civil Engineering

**WP17.1 Civil Engineering**  
**SubWorkpackage Leader: Pieter Mattelaer**

Link to the EDMS folders for the HL LHC civil engineering consultancy services Tender

Link to the EDMS folder for the site investigation

Link to the egroups WP17 members WP17.1 members subWPLeaders

Link to the Drawings reviewing tasks

Link to WP17.1 Indico meetings

Home  
 Notebook  
 Documents  
     External Exchange  
     Access to documentation and questions on P1  
     Access to Documentation and questions on P5  
 Tasks review drawings tendering  
 Photos and pictures  
 Recent  
 Site Contents  
 EDIT LINKS

### Photos and pictures

Name	Picture Size	File Size	Modified

### Tasks review drawings tendering

15 October	21 October	27 October	02 November	08 November	14 November
Review... 12/10 - 1	Review Poin... 21/10 - 27/10		Review P... 11/11 - 16/	Review P... 18/11 - 23/	

<input checked="" type="checkbox"/>		Task Name	Due Date	Assigned To



# Indico Growing and adapting to your needs

What it is linked to the main HL-LHC Indico page is uploaded in December automatically in EDMS <https://indico.cern.ch/category/3063/>

# Records



# MIP as the basis of MTF Set up

**HL-LHC: Quality Manufacturing and Inspection Plan**

Project No. HL-2015-001  
 Inspector: (blank) / Rev. No.: 1.0 / Date: 2015-07-26  
 Item No. HL-2015-001 / Rev. No.: 1.0 / Date: 2015-07-26

IN	ACTIVITY / OPERATION	APPL. EQUIPMENT / TOOLS	APPLICABLE DOCUMENTS / PROCEDURES	REQ. DOC.	SUPPLIER / CONTRACT	QUEST / VERIFICATION	APPROVED / APPROVED	PREPARED / PREPARED	REV. / REV.	NOTES / COMMENTS
1.0	Inspection of materials									
1.1	Inspection of materials									
1.2	Inspection of materials									
1.3	Inspection of materials									
1.4	Inspection of materials									
1.5	Inspection of materials									
1.6	Inspection of materials									
1.7	Inspection of materials									
1.8	Inspection of materials									
1.9	Inspection of materials									
1.10	Inspection of materials									
1.11	Inspection of materials									
1.12	Inspection of materials									
1.13	Inspection of materials									
1.14	Inspection of materials									
1.15	Inspection of materials									
1.16	Inspection of materials									
1.17	Inspection of materials									
1.18	Inspection of materials									
1.19	Inspection of materials									
1.20	Inspection of materials									



**Equipment Identifier:** HCACFCA004-CR000001  
**Other Identifier:** CERN-DQW-ACFCA001  
**Description:** DQW Bare Cavity (variant #1)

Main | Made of | Equipment data | Manufacturing | Operation | Non-conformities | Documents | History | Map

Actions: Edit | View summary

**Physical**  
 Manufacturer: CERN  
 Resp. Technique: Manufacturing  
 Status: CERN-DQW-ACFCA001  
 Other Identifier: Manufacturing  
 Parent Equipment: CERN-DQW-ACFCA001  
 Parent Slot:  
 Location:  
 State: Good

**Safety**  
 RP Classification:

**Comments**  
 Item in ABS: DQW Bare Cavity (variant #1) (ver.0)

**Design**  
 Item in ABS: DQW Bare Cavity (variant #1) (ver.0)

**Audit**  
 Created on: 2015-07-26 by:  
 Last modified on: 2016-07-26 by:  
 EDMS owner: HGACIAG EDMS group

**Equipment Identifier:** HCACFCA004-CR000002  
**Other Identifier:** CERN-DQW-ACFCA002  
**Description:** DQW Bare Cavity (variant #1)

Main | Made of | Equipment data | Manufacturing | Operation | Non-conformities

Actions: Edit | View summary

**Physical**  
 Manufacturer: CERN  
 Resp. Technique: Manufacturing  
 Status: CERN-DQW-ACFCA002  
 Other Identifier: Manufacturing  
 Parent Equipment: CERN-DQW-ACFCA002  
 Parent Slot:  
 Location:  
 State: Good

**Safety**  
 RP Classification:

**Comments**  
 Item in ABS: DQW Bare Cavity (variant #1) (ver.0)

**Design**  
 Item in ABS: DQW Bare Cavity (variant #1) (ver.0)

**Audit**  
 Created on: 2015-07-26 by:  
 Last modified on: 2016-07-26 by:  
 EDMS owner: HGACIAG EDMS group

Main | Made of | Equipment data | Manufacturing | Operation | Non-conformities | Documents | History | Map

Actions: Add extra step

Workflow Diagram  
 No workflow diagram is defined for this equipment.

**Workflow Steps**

Step ID	R/E	Other name	Description	Status	Result	INC
1	0		Traceability of materials - Main Body	Accepted	OK	
2	0		Cutting and bending - Main Body	Accepted	OK	
3	0		E-beam Welding longitudinal W01A/B (*)	Accepted	OK	
3.1	0		Visual Inspection W01A/B (*)	Accepted	OK	
3.2	0		Radiographic examination W01A/B (*)	Accepted	OK	
3.3	0		Dimensional check before forming (*)	Accepted	OK	
4	0		Forming - Main Body	Accepted	OK	
5	0		Visual inspection after forming	Accepted	OK	
5.1	0		Metrology control after forming (*)	Accepted	OK	
5.2	0		Machining holes plus extrusion steps plus machining	Accepted	OK	
6	0		Metrology control final - Main Body (*)	Accepted	OK	
7	0		Forming - Bowl	Accepted	OK	
8	0		Visual inspection	Accepted	OK	
8.1	0		Metrology control final (*)	Accepted	OK	
8.2	0		Machining - Bowl	Accepted	OK	
9	0		Metrology control (*)	Accepted	OK	
9.1	0		Cutting and machining - Harlots & Pin	Accepted	OK	
10	0		E-beam Welding longitudinal W02A/B/C & W29 - Lunette (*)	Accepted	OK	
11	0		Visual Inspection W29A/B/C & W29 (*)	Accepted	OK	
11.1	0		Radiographic examination W29A/B/C & W29 (*)	Accepted	OK	
11.2	0		Forming - Lunette (*)	Accepted	OK	
12	0		Metrology Control (*)	Accepted	OK	
12.1	0		E-beam Welding circumferential W03A/B/C & W31 - Lunette (*)	Accepted	OK	
13	0		Visual Inspection W03A/B/C & W31 (*)	Accepted	OK	
13.1	0		Radiographic examination W03A/B/C & W31 (*)	Accepted	OK	
13.2	0		Deep drawing - Calibration Extrusion - Lunette	Accepted	OK	
14	0		Metrology Control (*)	Accepted	OK	
14.1	0		Visual inspection after machining of lunette (*)	Accepted	OK	
15	0		E-beam Welding circumferential W04A/W04B - Diabolo Subassemblies (*)	Accepted	OK	
16	0		Visual Inspection W04A/W04B (*)	Accepted	OK	
16.1	0		Radiographic examination W04A/W04B (*)	Accepted	OK	
16.2	0		E-beam Welding circumferential W07 - Pin up (*)	Accepted	OK	
17	0		E-beam Welding circumferential W07A/W07B - Diabolo Subassemblies (*)	Accepted	OK	
18	0		Visual Inspection W07A/W07B & W07B (*)	Accepted	OK	
18.1	0		Radiographic examination W07A & W07B	Accepted	OK	
18.2	0		Visual Inspection W07A/B & W08 - Bowl Subassemblies (*)	Accepted	OK	
19	0		Visual Inspection W09A/B & W10A - Bowl Subassemblies (*)	Accepted	OK	
19.1	0		Visual Inspection W09A/B & W10A - Bowl Subassemblies (*)	Accepted	OK	
19.2	0		Metrology Flatness and profile (*)	Accepted	OK	
20	0		E-beam Welding W05A/B/C & W24 - Extremities (*)	Accepted	OK	
20.1	0		Visual Inspection W05A/B/C & W24 (*)	Accepted	OK	
20.2	0		Radiographic examination W05A/B/C & W24 (*)	Accepted	OK	
20.3	0		Machining internal ring (*)	Done	Not OK	
20.4	0		Machining internal ring	Accepted	OK	
21	0		Leak Test	Cancelled	Cancelled	
22	0		E-beam Welding W02A/B - Bowl	Accepted	OK	
22.1	0		Visual Inspection W02A/B (*)	Accepted	OK	
22.2	0		Radiographic examination W02A/B (*)	Accepted	OK	
22.3	0		Metrology Control (*)	Accepted	OK	
22.4	0		RF Trimming	Accepted	OK	
22.5	0		Metrology Control	Accepted	OK	
23	0		E-beam Welding W01A - Final Assembly	Accepted	OK	
23.1	0		Visual Inspection W01A	Accepted	OK	
23.2	0		Visual Inspection W03A Radiographic examination W03A	Accepted	OK	
23.3	0			Accepted	OK	
24	0			Accepted	OK	
24.1	0			Accepted	OK	
24.2	0			Accepted	OK	
24.3	0			Accepted	OK	
24.4	0			Accepted	OK	
24.5	0			Accepted	OK	
25	0			Accepted	OK	
25.1	0			Accepted	OK	
25.2	0			Accepted	OK	
25.3	0			Accepted	OK	
26	0			Accepted	OK	
27	0			Accepted	OK	
28	0			Accepted	OK	



# Assembly Breakdown Structure

## Assembly Breakdown Structure (ABS)

ABS allows to keep traceability of the components that are used to build the equipment (these components to have their MTF as well)

We just have to attach the 'child' (component) that have been previously set up within the system

### Equipment Folder : Made Of

**Equipment Identifier:** HCMQYYP001-CR000001  
**Other Identifier:** None  
**Description:** Insertion Region Enlarged Aperture (90mm) Quadrupole - Prototype

Main Made of Equipment data Manufacturing Operation Documents History Map  
 Actions: **Attach child** ABS Comparison: Show  
 Order # | Type | Id/Missing Part Number | Other Id

#### Attach New Child to Equipment

1 Search child ... 2 Select child ... 3 Confirm data ... 4 Attach

Search child  
 Input a search criteria for the desired child  
 Identifier:   
 Description:   
 Type: Any

EDMS Home Favourites Inbox Caddie  
 Navigator  
 Manufacturing procedures  
 Inspection & test procedures  
 Qualifications  
 Manufacturing records  
 HCMBXC004-KJ000001 - Cold Mass for Single Aperture (150mm) SC Separation Dipole (D1) 2m Model  
 HCMBXC004-KJ000001 - Splice box  
 HCMBXC005-KJ000001 - Wires  
 HCMBXC006-KJ000001 - Half shells

D1 - Separation Magnet

Level	Eq. Code	Item Description	Category/Item	Own Class	Quantity
	MBXFM	Separation Dipole			1
	LMBXFM	Cold Mass	HCLMBXFM001		1
	MBXFC	End covers	HCMBXFC001		2
	MBXFC	Nozzles	HCMBXFC002		Batch
	MBXFC	Beam tube	HCMBXFC003		1
	MBXFC	Splice box	HCMBXFC004		Batch
	MBXFC	Wires	HCMBXFC005		Batch
	MBXFC	Half shells	HCMBXFC006		2
	MBXFC	End plates	HCMBXFC007		Batch
	MBXFC	Yoke-stacks	HCMBXFC008		Batch
	MBXFC	Keys	HCMBXFC009		Batch
	MBXFC	SS Collars	HCMBXFC010		Batch
	MBXFC	GFRP Lead Collars	HCMBXFC011		Batch
	MBXFC	Quench heaters	HCMBXFC012		Batch
	MBXFC	Ground Insulations	HCMBXFC013		Batch
	MBXFC	Brass protection	HCMBXFC014		Batch
	MBXFM	Magnet	HCMBXFM001		1
	MBXFC	Upper Coil	HCMBXFC015		1
	MBXFC	Cable	HCMBXFC016		1
	MBXFC	Wedges	HCMBXFC017		Batch
	MBXFC	End spacers	HCMBXFC018		Batch
	MBXFC	Layer Ramp Box	HCMBXFC019		Batch
	MBXFC	Lead Cover	HCMBXFC020		Batch
	MBXFC	Lower Coil	HCMBXFC021		1
	MBXFC	Cable	HCMBXFC022		1
	MBXFC	Wedges	HCMBXFC023		Batch
	MBXFC	End spacers	HCMBXFC024		Batch
	MBXFC	Layer Ramp Box	HCMBXFC025		Batch
	MBXFC	Lead Cover	HCMBXFC026		Batch

Main Made of Equipment data Manufacturing Operation Documents History Map  
 Actions: **Attach child | Suffix child | Detach child** ABS Comparison: Show

Order #	Type	Id/Missing Part Number	Other Id
40	Batch	<a href="#">HCMBXFC004-KJ000001</a>	
		Splice box	1 Unit(s)
50	Batch	<a href="#">HCMBXFC005-KJ000001</a>	
		Wires	1 Unit(s)
60	Equipment	<a href="#">HCMBXFC006-KJ000001</a>	
		Half shells	
60	Equipment	<a href="#">HCMBXFC006-KJ000002</a>	
		Half shells	
70	Equipment	<a href="#">HCMBXFC007-KJ000001</a>	
		End plates	
70	Equipment	<a href="#">HCMBXFC007-KJ000002</a>	
		End plates	
80	Batch	<a href="#">HCMBXFC008-KJ000001</a>	
		Yoke-stacks	1 Unit(s)
90	Batch	<a href="#">HCMBXFC009-KJ000001</a>	
		Keys	1 Unit(s)
150	Equipment	<a href="#">HCMBXFM001-KJ000001</a>	MBXFS01 (a&b) D1
		Single Aperture (150mm) Separation Dipole (D1) 2m Model	

- HCMBXFC024-KJ000001 - End spacers
- HCMBXFC025-KJ000001 - Layer Ramp Box
- HCMBXFC026-KJ000001 - Lead Cover

# Manufacturing Workflow

**Equipment Identifier:** HCLMBXF001-KJ000001  
**Other Identifier:** MBXFS01 (a&b) D1 (LMBXFM)  
**Description:** Cold Mass for Single Aperture (150mm) SC Separation Dipole (D1) 2m Model

Step ID	Step Description
10	Collared Coil
15	Collaring
20	Dimensional Measurement
25	Electrical Integrity Test
50	Yoke Assembly
55	Perform Yoking
60	Removal of mandrel
65	Dimensional Measurement
70	Electrical Integrity Test
100	Shell Welding
105	Shell Welding
110	Inspection of Welding
115	End-ring Welding
120	Inspection of Welding
125	Applying Axial Force to the Coil
130	Dimensional Measurement
135	Alignment, Marking
140	Holes Welding
145	Dimensional Measurement
150	Electrical Integrity Test
155	Documents for Pressure Codes
200	Splice Work
205	Splice Box Assembly
210	SC Leads Soldering
215	V -tap Wires Soldering
220	Dimensional Measurement
225	Electrical Integrity Test
250	End Cover welding
255	End Cover Welding
260	Inspection of Welding
265	Dimensional Measurement
270	Alignment, Marking
275	Electrical Integrity Test
280	Pressure Test
285	Documents for Pressure Codes
300	Mechanical assembly
310	Electrical test
320	Cold test
330	Magnetic measurements
340	Shipping to CERN

Main Made of Equipment data Manufacturing Operation Documents History Map						
Actions: Add extra step						
Workflow Diagram						
No workflow diagram is defined for this equipment						
Workflow Steps						Last Repeated
Step ID	R/E	Other name	Description	Status	Result	INC
10		()	Collared Coil (*)	Cancelled		
15		()	Collaring	Done	Ok	
20		()	Dimensional Measurement	Done	Ok	
25		()	Electrical Integrity Test	Done	Ok	
50		()	Yoke Assembly	Done	Ok	
55		()	Perform Yoking	Done	Ok	
60		()	Removal of Mandrel	Done	Ok	
65		()	Dimensional Measurement	Done	Ok	
70		()	Electrical Integrity Test	Done	Ok	
100		()	Shell Welding	Done	Ok	
105		()	Shell Welding	Done	Ok	
110		()	Inspection of Welding	Cancelled		
115		()	End-ring Welding	Done	Ok	
120		()	Inspection of Welding	Done	Ok	
125		()	Applying Axial Force to the Coil (*)	Done	Ok	
130		()	Dimensional Measurement	Done	Ok	
135		()	Alignment, Marking	Cancelled		
140		()	Holes Welding	Cancelled		
145		()	Dimensional Measurement	Cancelled		
150		()	Electrical Integrity Test	Done	Ok	
155		()	Documents for Pressure Codes	Cancelled		
200		()	Splice Work	Done	Ok	
205		()	Splice Box Assembly	Done	Ok	
210		()	SC Leads Soldering	Done	Ok	
215		()	V -tap Wires Soldering	Done	Ok	
220		()	Dimensional Measurement	Done	Ok	
225		()	Electrical Integrity Test	Done	Ok	
250		()	End Cover Welding	Cancelled		
255		()	End Cover Welding	Cancelled		
260		()	Inspection of Welding	Cancelled		
265		()	Dimensional Measurement	Cancelled		
270		()	Alignment, Marking	Cancelled		
275		()	Electrical Integrity Test	Cancelled		
280		()	Pressure Test	Cancelled		
285		()	Documents for Pressure Codes	Cancelled		
300		()	Mechanical assembly	Done	Ok	
310		()	Electrical test	Done	Ok	
320		()	Cold test	Done	Ok	
330		()	Magnetic measurements	Done	Ok	
340		()	Shipping to CERN	Cancelled	Ok	

The manufacturing workflow is set in the input file and contains all those operations (at least) subject to be controlled (checks).

The workflow will allow us to follow up the manufacturing and upload the QC reports to the corresponding activity.

Workflow is not rigid. Extra Steps may be added and defined steps may be cancelled

# Handling of Non Conformities (1/2)

If during an inspection a deviation is found, then a Non Conformity to be issued.

<u>20</u>	( )	E-Beam welding W06A/B/C & W24 - Extremities ( *)	Accepted	Ok
<u>20.1</u>	( )	Visual Inspection W06A/B/C & W24 ( *)	Accepted	Ok
<u>20.2</u>	( )	Radiographic examination W06A/B/C & W24 ( *)	Accepted	Ok
<u>20.3</u>	(E)	Machining Internal Ring ( *)	Done	Not Ok
<u>20.4</u>	(E)	Machining Internal Ring	Accepted	Ok
<u>21</u>	( )	Leak Test	Cancelled	Cancelled
<u>22</u>	( )	E-Beam Welding W02A/B - Bowl	Accepted	Ok
<u>22.1</u>	( )	Visual Inspection W02A/B ( *)	Accepted	Ok
<u>22.2</u>	( )	Radiographic examination W02A/B ( *)	Accepted	Ok
<u>22.3</u>	( )	Metrology Control ( *)	Done	Not Ok
<u>22.4</u>	( )	RF Trimming	Done	Not Ok
<u>22.5</u>	(R)	Metrology Control	Accepted	Ok
<u>22.6</u>	(R)	RF Trimming	Accepted	Ok
<u>23</u>	( )	E-Beam Welding W03A - Final Assembly	Accepted	Ok
<u>23.1</u>	( )	Visual Inspection W03A	Accepted	Ok
<u>23.2</u>	( )	Visual Inspection W03A Radiographic examination W03A	Accepted	Ok

**1**Select Document ... **2**Confirm data

Select the existing EDMS Document

Input the Document Number (in case you know it)  
or click on the first blue arrow to jump to the EDMS Search page  
or click on the second blue arrow to jump to EDMS create document wizard

EDMS Document Number

or

[▶ Click to search for documents in EDMS](#)

or

[▶ Click to create a new document in EDMS](#)

The step subjected to a Non Conformity shall be repeated (unless we accept the non-conformity as it is) and a new extra step is added to the manufacturing workflow.

**1**Repeat Step? ... **2**Attach Non-Conformity?

Chose if the step is to be repeated

Do you wish this step to be repeated?

**Equipment** HCACFCA004-CR000001  
DQW Bare Cavity (variant #1)

**Step** 22.4  
RF Trimming

Yes, create a new repeated step!

No, thanks.

Non-conformities that have a non-negligible impact on budget and/or schedule or on another WPs will be presented at HL TCC (Technical Coordination Committee)

# Handling of Non Conformities (2/2)

## Non-Conformity Report (NCR) EDMS 1501109

EDMS NO. 1501109		REV. 1.0	VALIDITY VALID
REFERENCE: N/A			
<b>HL-LHC Quality Non Conformity Report</b>			
<b>NCR Description</b>			
Contract No.	N/A	Date of issue	2016-12-12
Work Package	WFE	Equipment	HMCATCAB05
Supplier	EN-AWAC	Drawing No.	HMCATCAB05-HMCATCAB05-1
Inspector	EN-AWAC	Inspector	EN-AWAC
Description of the NC: The extremities HMC A/B/C and F/H of the Bars cavity (part HMCATCAB05-CR000001) have between 1.4mm extra length each one with regard to the theoretical dimension.			
Theoretical Dimension: 75.760mm		Theoretical Dimension: 76.760mm	
The NCR has been detected during the metrology control (Report EDMS 1501093 attached) of the subassembly Luminex Bowl-Extremities Top and Bottom.			
Luminex Bottom		Luminex Top	
Inspector's Signature	Paulo Frejedo Almeida	Supplier's Signature	OFite Capotone

EDMS NO. 1501109		REV. 1.0	VALIDITY VALID
REFERENCE: N/A			
<b>HL-LHC Quality Non Conformity Report</b>			
<b>NCR Description</b>			
Contract No.	N/A	Date of issue	2017-02-07
Work Package	WFE	Equipment	HMCATCAB05
Supplier	EN-AWAC	Drawing No.	HMCATCAB05-HMCATCAB05-1
Inspector	EN-AWAC	Inspector	EN-AWAC
Description of the NC: The flange of the extremities HMC A/B/C of the Bars cavity (part HMCATCAB05-CR000001) S. CR000001 are machined before the assembly according to the drawing HMCATCAB05, additional horizontal grooves to facilitate the degreasing, had been included later on due to the possible foreign material during the metal phase. Design change has been implemented at a later stage as it is production. This change has been detected just because a new drawing had been given, in fact the NC was detected with the additional grooves had not been engaged to the workshop by the design office and this is why the grooves had not been done.			
Drawing: HMCATCAB05		HMC A/B/C flange without horizontal groove	
Inspector's Signature	Paulo Frejedo Almeida	Supplier's Signature	OFite Capotone
<b>WFE Decision</b>			
Non Conformity Critical <input type="checkbox"/> Non Conformity Non-Critical <input checked="" type="checkbox"/>			
Repair <input type="checkbox"/> Regrade <input type="checkbox"/> Scrap <input type="checkbox"/> Return <input type="checkbox"/> Concession <input type="checkbox"/>			
Corrective Action(s) The action taken has been to machine these grooves on the 2007 flange of the HMC's parts in axis + 2 units manufactured in the new workshop according to the drawing HMCATCAB05 (attached to the NCR), which will be connected directly on the cavity.			
before machining		after machining	

A Non Conformity Report is attached to the step and the decision about the NC is provided in the document

## Non-Conformity via MTF

Sub-Document		Approved Document	Need	Access Rights	Content & other info
Description: External Reference and Keywords					
<b>Description</b>		Suite à l'inspection de la bobine HCBMH_C005-CR000004 après polymérisation de la couche interne, l'isolation du câble est défectueuse au niveau du saut de couche (voir photos du défaut). La gaine en fibre et le mica ont été sectionnés, le câble, mis à nu lui, semble intact. Après analyse, ce défaut semble dû à l'écrasement du câble au niveau du saut de couche par la coquille de polymérisation de la tête de bobine côté connexion (plan LHCBMHST0420, voir photo jointes).			
<b>External Reference</b>					
<b>Keywords</b>					
<b>Special Properties</b>					
<b>Class</b>	Mechanical / Geometry				
<b>Disposition</b>	Use-35-15				
<b>Importance</b>	Non critical				
<b>Files of the Document</b>					
Defaut-cable-saut-de-couche_(1)	<a href="#">JPG</a> (2 KB)				
Defaut-cable-saut-de-couche_(1)	<a href="#">JPG</a> (2 KB)				
Defaut-cable-saut-de-couche_(2)	<a href="#">JPG</a> (2 KB)				
Defaut-cable-saut-de-couche_(4)	<a href="#">JPG</a> (2 KB)				
coquille-HCBMHST0420	<a href="#">JPG</a> (2 KB)				
<b>Sub-Documents</b>					
<b>Associated URL (CDD Drawing Folder, Library...)</b>					
<b>Content</b>					
<b>What's next ?</b>					
List of <a href="#">Local Administrators</a> for any questions regarding this document (access rights, lifecycle...)					
<b>Context</b>					
LHC-NCR: Release Procedure for NCRs					
<b>Equipment Code</b>					
LHCMBH_C - Magnet Bending High Field - Colored Cell Assembly					
<b>EDMS Hyperlinks</b>					
<b>This page</b>					
<a href="#">https://edms.cern.ch/Files/1501109/1</a>	<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(1)_JPG</a> - Restricted access				
<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(1)_JPG</a>	<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(1)_JPG</a> - Restricted access				
<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(2)_JPG</a>	<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(2)_JPG</a> - Restricted access				
<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(4)_JPG</a>	<a href="#">https://edms.cern.ch/Files/1501109/1/Defaut-cable-saut-de-couche_(4)_JPG</a> - Restricted access				
<a href="#">https://edms.cern.ch/Files/1501109/1/coquille-HCBMHST0420.jpg</a>	<a href="#">https://edms.cern.ch/Files/1501109/1/coquille-HCBMHST0420.jpg</a> - Restricted access				
<b>File(s)</b>					

The NC is fully managed via MTF. The decision about the NC is provided in the system

## Decision about Non Conformity

Repair	<input type="checkbox"/>	Regrade	<input type="checkbox"/>	Scrap	<input type="checkbox"/>	Return	<input type="checkbox"/>	Concession	<input type="checkbox"/>
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# MTF Growing and adapting to your needs

CERN Accelerating science

Signed in as: bejar Sign out Directory

EDMS Home Favourites Inbox

1520850 Caddy EDMS 5 Hel

Navigator

- QW HOM Couplers (Variant #1)
  - Manufacturing drawings
    - 1494836 (v.1) Drawing folder - DQW - HOM
  - Manufacturing procedures
    - 1520850 (v.1) Manufacturing Inspection Plan (HOM)
  - Inspection & test procedures
    - 1507831 (v.1) DQW-HOM-Nb part 2 LHCACFHC0003
    - 1507831 (v.2) DQW-HOM-Nb part 2 LHCACFHC0003
  - Qualifications
  - Manufacturing records
    - HCACFHC001-CR000001 - DQW HOM Couplers (Variant #1)
    - HCACFHC001-CR000002 - DQW HOM Couplers (Variant #1)
    - 1519777 (v.1) Niobium Material certificates- HOOK HOM
    - 1688036 (v.1) WELDING BOOK HOM-DQW

Equipment Identifier: HCACFHC001-CR000001  
 Other Identifier: None  
 Description: DQW HOM Couplers (Variant #1)

Main Made of Equipment data Manufacturing Operation Documents History Map

Actions :

Workflow Diagram

No workflow diagram is defined for this equipment

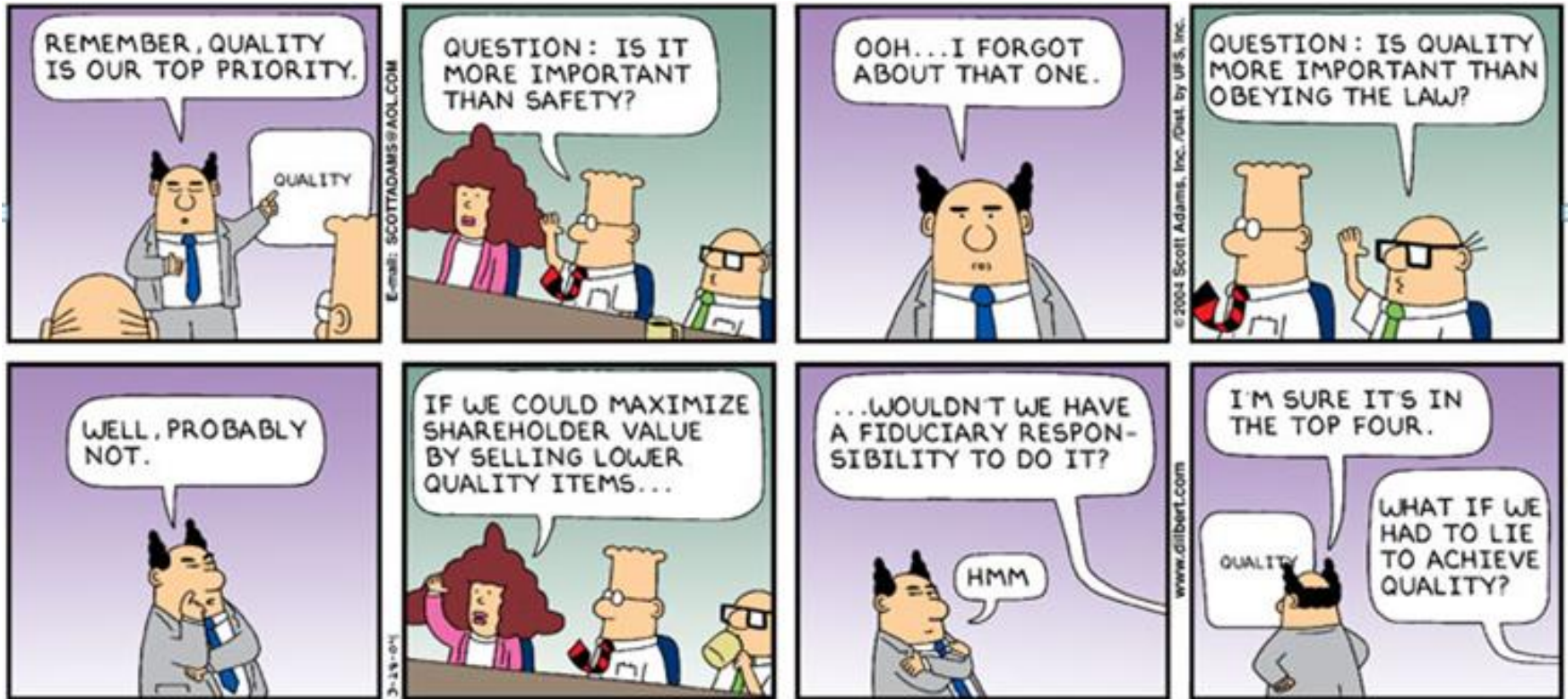
Workflow Steps

Step ID	R/E	Other name	Description	Status	Result	NC	Last Repeated
1			Metrology Control before welding (HOOK Nb parts 1 and 2)	Pending			
1.1			Welding inspection W010 (HOOK Nb parts 1 and 2)	Pending			
1.2			Metrology Control after welding (HOOK Nb parts 1 and 2)	Pending			
1.3			Metrology Control before welding (HOOK Nb part 3)	Pending			
1.4			Welding inspection W040 (HOOK Nb parts 2 and 3)	Pending			
2			Metrology Control before welding (DN63 Nb parts 4 and 5)	Pending			
2.1			Welding inspection W020 (DN63 parts 4 and 5)	Pending			
2.2			Welding inspection W030 (DN63 parts 4 and 5)	Pending			
2.3			Metrology Control after welding (HOOK Nb parts 1 and 2)	Pending			
2.4			Leak tightness test (DN63- Nb part 4-part 5-S.S flange)	Pending			
3			Welding inspection W050 (DN63; Nb part 4-5-flange - HOOK; Nb part 1-2-3)	Pending			
4			Metrology Control before welding (DN35 Nb parts 6 and SS flange)	Pending			
4.1			Welding inspection W110 (DN35 parts 6 and SS flange)	Pending			
4.2			Metrology Control after welding (DN35 Nb parts 6 and SS flange)	Pending			
5			TTH Bellows Stiffener	Pending			
6			Welding inspection W120 (Bellow-DN35 Flange)	Pending			

Engineering & Equipment Data Management Service (EDMS) EDMS 6.1 © CERN | EDMS Support / Feedback

We can create all the assets for you, add the steps and documents and adapt them after the prototype phase

# And if I have a question?



# The project Office is there for you

- The Project Office has reorganized to be more agile to contribute to the common effort to harmonize practices and put in place common tools or systems to make compatible data.
- We are there also to impulse existing initiatives, federate efforts and spread good practices.
- We are also the door to access CERN teams on communication, Knowledge transfer and Outreach



***We count on you !***

