



HL Quality Plan and EDMS Insights

Hector Garcia Gavela on behalf of the PDQR Office



CERN – 23 Feb 2024

Introduction and Goals

- Introduction and information for Newcomers
- Refresh about HL Quality Plan
- Procedures in place for preparing, sharing and releasing documentation
- Guidelines for documentation and use of Tools (EDMS, MTF)
- Information Workflow – E-Groups/Distribution Lists
- Nonconformities

Goal of HL-LHC

From EC-FP7 HiLumi LHC Design Study application of 2010

The main objective of HiLumi LHC Design Study is to determine a hardware configuration and a set of beam parameters that will allow the LHC to reach the following targets:

A peak luminosity of $L_{\text{peak}} = 5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ **with levelling**, allowing:

An integrated luminosity of **250 fb⁻¹ per year**, enabling the goal of

$L_{\text{int}} = 3000 \text{ fb}^{-1}$ twelve years after the upgrade.

This luminosity is more than ten times the luminosity reach of the first 10 years of the LHC lifetime.

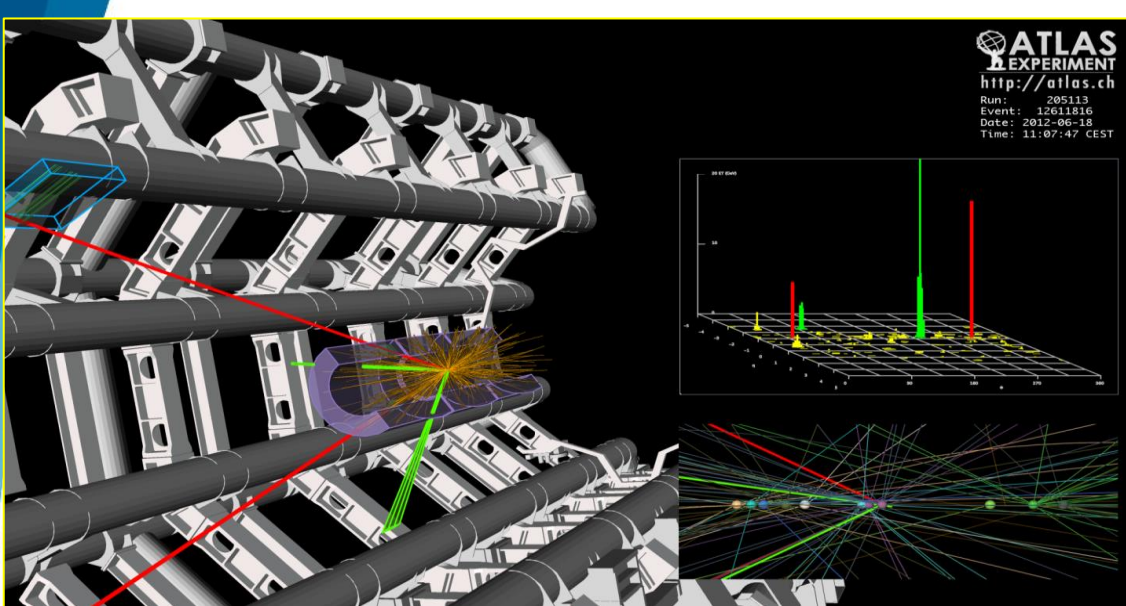
Ultimate performance established 2015-2016: with same hardware and same beam parameters: use of **engineering margins**:

$L_{\text{peak ult}} \cong 7.5 \cdot 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ and **Ultimate Integrated** $L_{\text{int ult}} \sim 4000 \text{ fb}^{-1}$

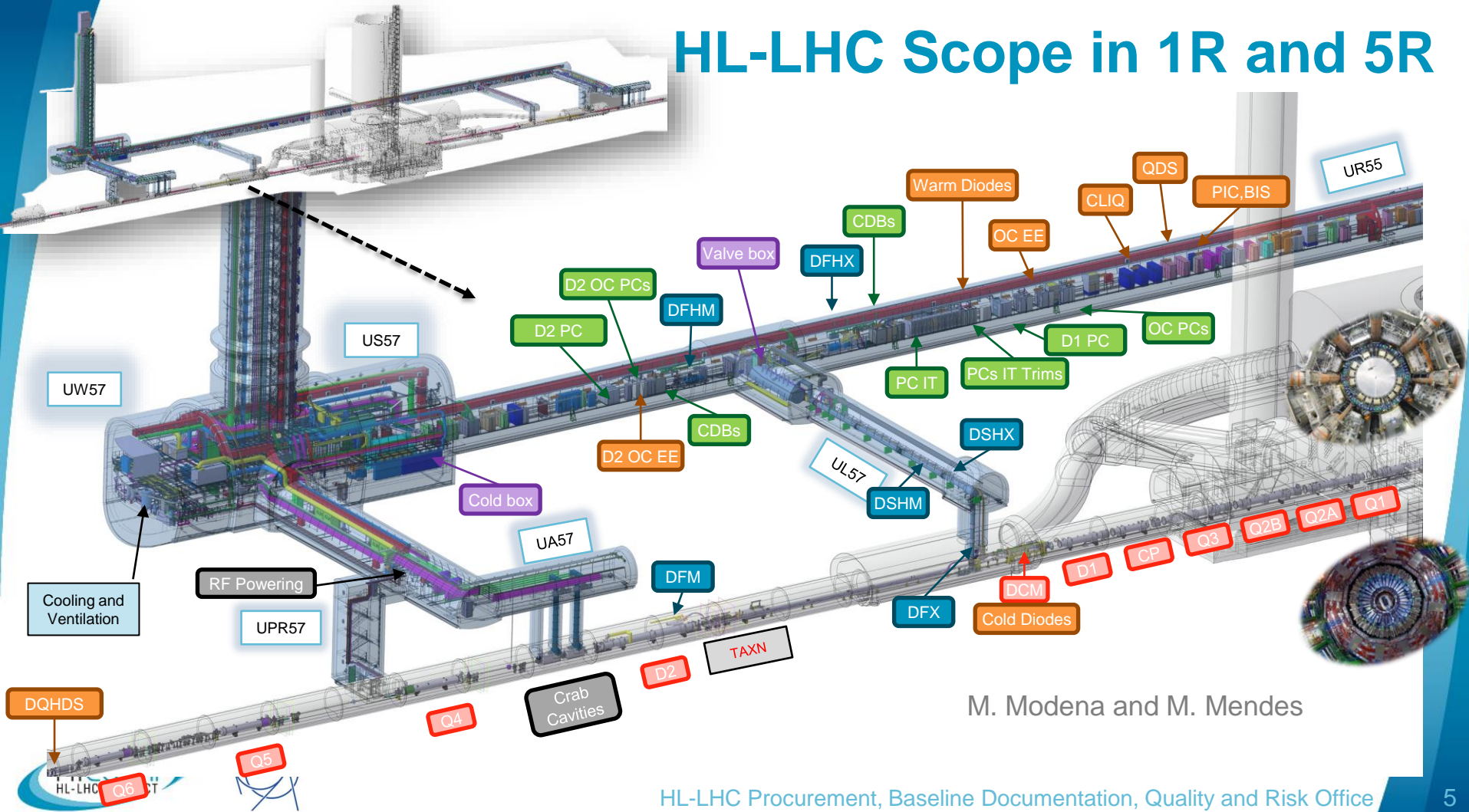
More luminosity ⇒ increased collision rate

Higgs: the needle in
the haystack

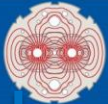
Picture repeated 40
millions times each
second



HL-LHC Scope in 1R and 5R



M. Modena and M. Mendes



LHC / HL-LHC Plan

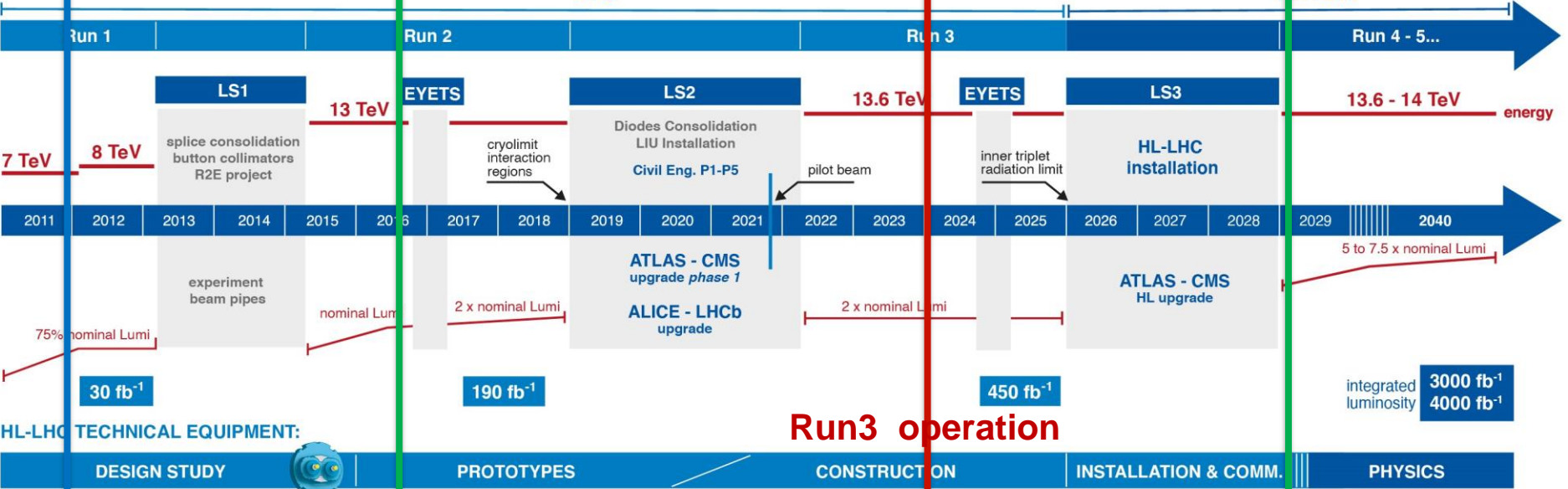


EU funded HiLumi Design Study

Approval of HL-LHC Project
LHC

We are here

HL-LHC Operation
HL-LHC



HL-LHC TECHNICAL EQUIPMENT:

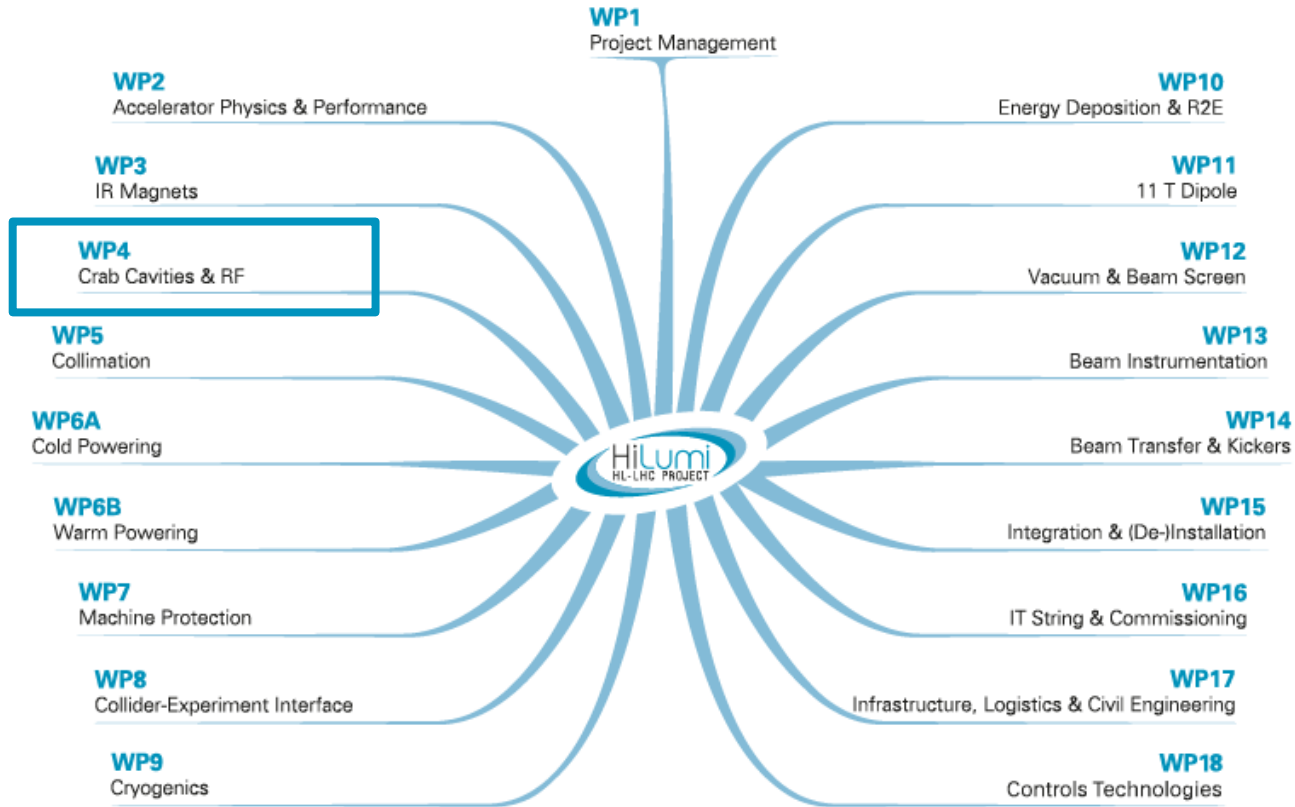
Run3 operation

HL-LHC CIVIL ENGINEERING DEFINITIVE

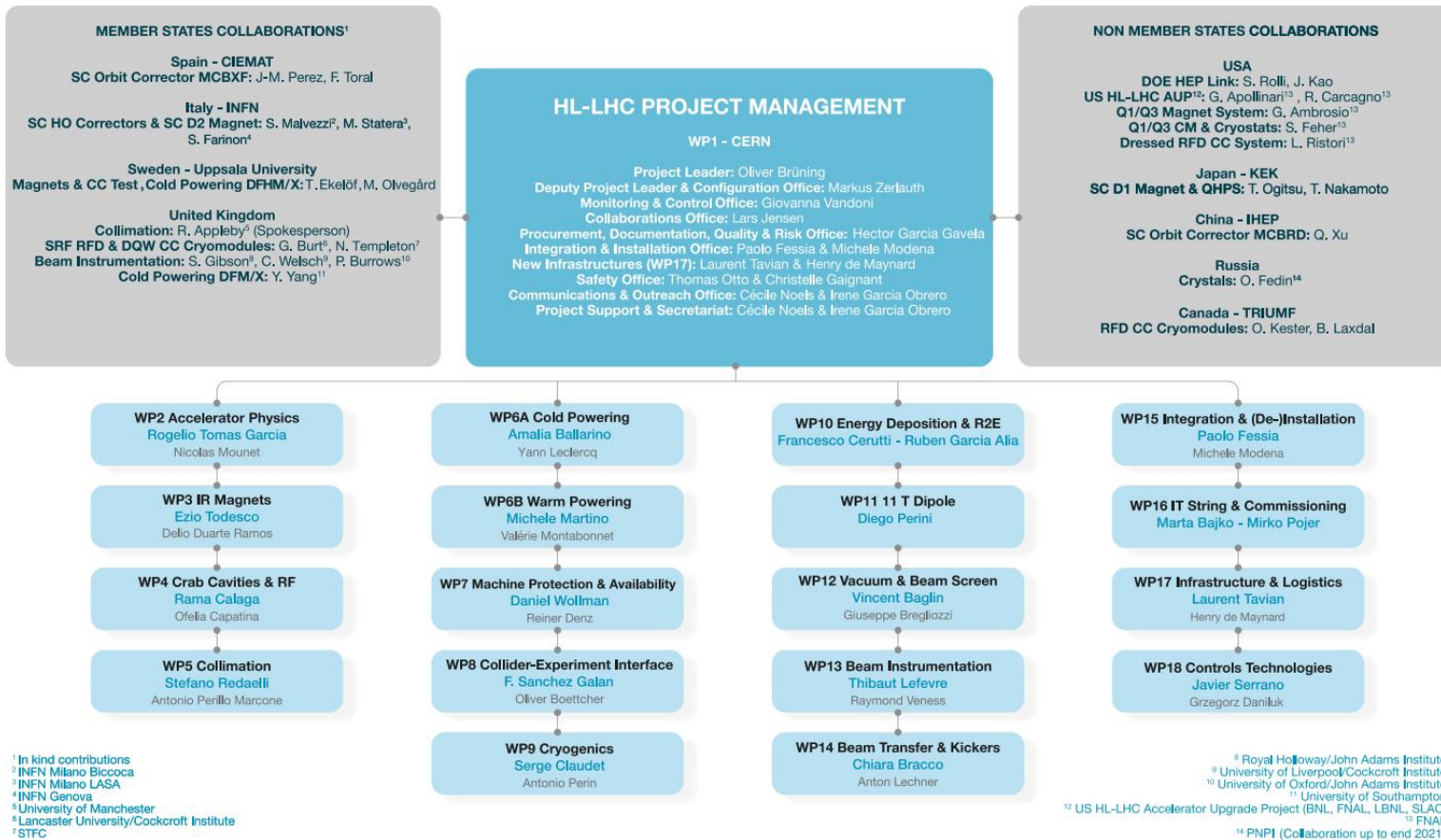
Over Half Way!
7 years since project approval
Less than 5 years until start Run4

Series production is well underway for all components!

HL-LHC Project



HIGH LUMINOSITY LHC PROJECT



HL-LHC Project Office



Cécile Noels

Communications & Outreach Office

Project Support



Irene Garcia Obrero



Michela Lancellotti

PROJECT MANAGEMENT

HL-LHC Project Leader



Oliver Brüning

Deputy & Configuration Office



Markus Zerlauth



Thomas Otto



Christelle Gaignant

Safety Office



Michel Bonnet

PLANNING

Monitoring & Control Office



Giovanna Vandoni

Collaborations Office



Lars Jensen



Maria Barberan



Thomas Bauler



Lidia Brozda



Sarah Fleury



Cécile Noels



Lars Jensen



Laura Martins



Evan Vedzessou



Estrella Vergara



Laura Martins

**New Infrastructures
WP17**



Laurent Taviani



Henry de Maynard



Thomas Bauler



Lidia Brozda

TECHNICAL COORDINATION

**Procurement, Documentation,
Quality & Risk Office**



Hector Garcia Gavela



Victor Guillen



Gorana Prica



Paolo Fessia



Michele Modena



Miguel Navarro





Francesca Nicoletti



Darshana Ramrekha



HL-LHC Quality Plan

 		EDMS NO. 1513591	REV. 2.0	VALIDITY VALID
REFERENCE : LHC_-_QA-0001				
PLAN				
HL-LHC QUALITY PLAN				
Abstract The HL-LHC project is committed to be a project of excellence respecting the best practises in project and quality management. The adoption of a quality management system is a strategic decision that aims to improve overall performance and provide a sound basis for sustainable development initiatives.				
This document provides an overview of the processes and procedures implemented on the HL-LHC Quality Management System (QMS).				
https://edms.cern.ch/document/1513591/2.0				
TRACEABILITY				
Prepared by: I. Bejar Alonso			Date: 2018-02-28	
Verified by: H. Gacia Gavella, Project Office			Date: 2018-03-14	
Approved by: I. Bejar Alonso, L. Rossi, Department Heads, F. Bordry			Date: 2018-04-20	
Distribution: Public				
Rev. No.	Date	Description of Changes (major changes only, minor changes in EDMS)		
2.0	2018-04-20	Version post FP7 replacing version 1 and the EU deliverable [1]		
This document is uncontrolled when printed. Check the EDMS to verify that this is the correct version before use				

2 SCOPE

The quality policies, procedures (documentation hereafter) systems, from R&D to production, it is understood the LHC equipment documentation produced by external contributors are. However all HL-LHC project quality documentation is under the Quality Assurance Plan [2].

4.3.2 Control of documents

The procedure for the control of documents used for the project.

4.3.3 Control of records

The HL-LHC project will provide evidence of management system performance. All records as those mentioned in phase. M

Quality Commitment

At the HL-LHC Project Office, Quality Assurance is a matter of highest priority. The HL-LHC Project Leader, Steering Committee and all remaining members of the Project Office ensure the development, implementation and continuous improvement of the HL-LHC quality management system.

As a project we shall meet all requirements and expectations from CERN Council, stakeholders and other LHC users through optimization of the available resources. As part of this commitment, we strongly believe that the definition of a HL-LHC quality policy and its implementation are of highest importance.

Oliver Brüning

HL-LHC Project Leader

Lucio Rossi

Former HL-LHC Project Leader



enables the use of the following documents; these are under the control of the project office ensuring an item is available for use that an agreement [12], certification & process is fully

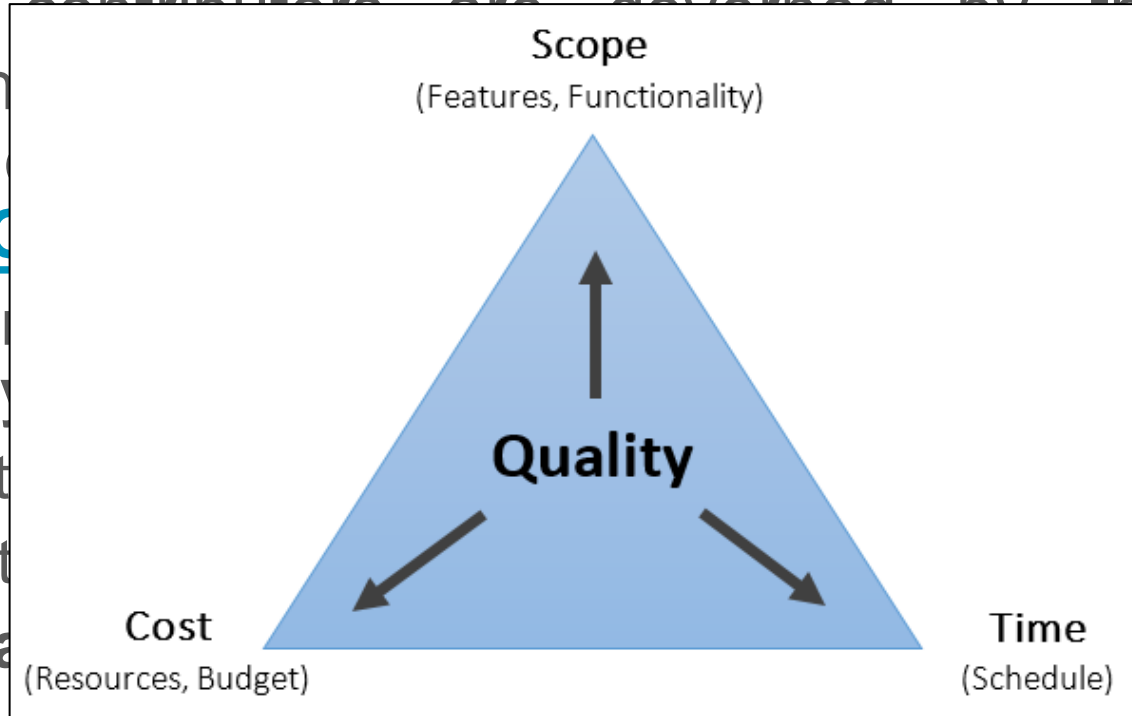


Pragmatic approach

External
managem

HL-LHC
HL-LHC C

- Hardware (primary)
- Fabricat
- Project t
- Corpora



the quality
however all
with the

in EDMS

t)
"illumiers"

HL-LHC is an upgrade of an existing machine



The LHC Quality Assurance Plan



[Foreword - LHC Project Leader](#) (pdf file)



Policy



Definitions



Procedures



Standards



Templates



Instructions



Links



CD-ROM

[LHC Quality Assurance Plan presentation](#) (pdf file)

Chapter 100 - Quality Assurance Policy

Definition of the quality assurance requirements for the LHC Project activities
(Click the link in "Number" to load the pdf file)

Number	Rev.	Status	Date	Title
LHC-PM-QA-100.00	1.4	Released	2003-04-02	Quality Assurance Policy and Project Organisation
LHC-PM-QA-101.00	1.4	Released	2003-04-28	Quality Assurance Plan Contents and Status

[Top of Page](#)

Chapter 200 - Definitions

Definition of various common conventions in use throughout the Project
(Click the link in "Number" to load the pdf file)

Number	Rev.	Status	Date	Title
LHC-PM-QA-201.00	1.0	Released	1998-06-25	Quality Assurance Categories
LHC-PM-QA-202.00	1.2	Released	2003-04-03	Document Types and Naming Conventions
LHC-PM-QA-203.00	1.0	Released	1999-06-16	Glossary, Acronyms, Abbreviations
LHC-PM-QA-204.00	1.1	Released	2003-04-03	Equipment Naming Conventions
LHC-PM-QA-205.00	-	In-work	-	LHC Engineering Vocabulary
LHC-PM-QA-206.00	1.1	Released	1999-11-09	LHC Part Identification
LHC-PM-QA-207.00	1.0	Released	1999-11-16	Naming Conventions for Buildings and Civil Engineering Works

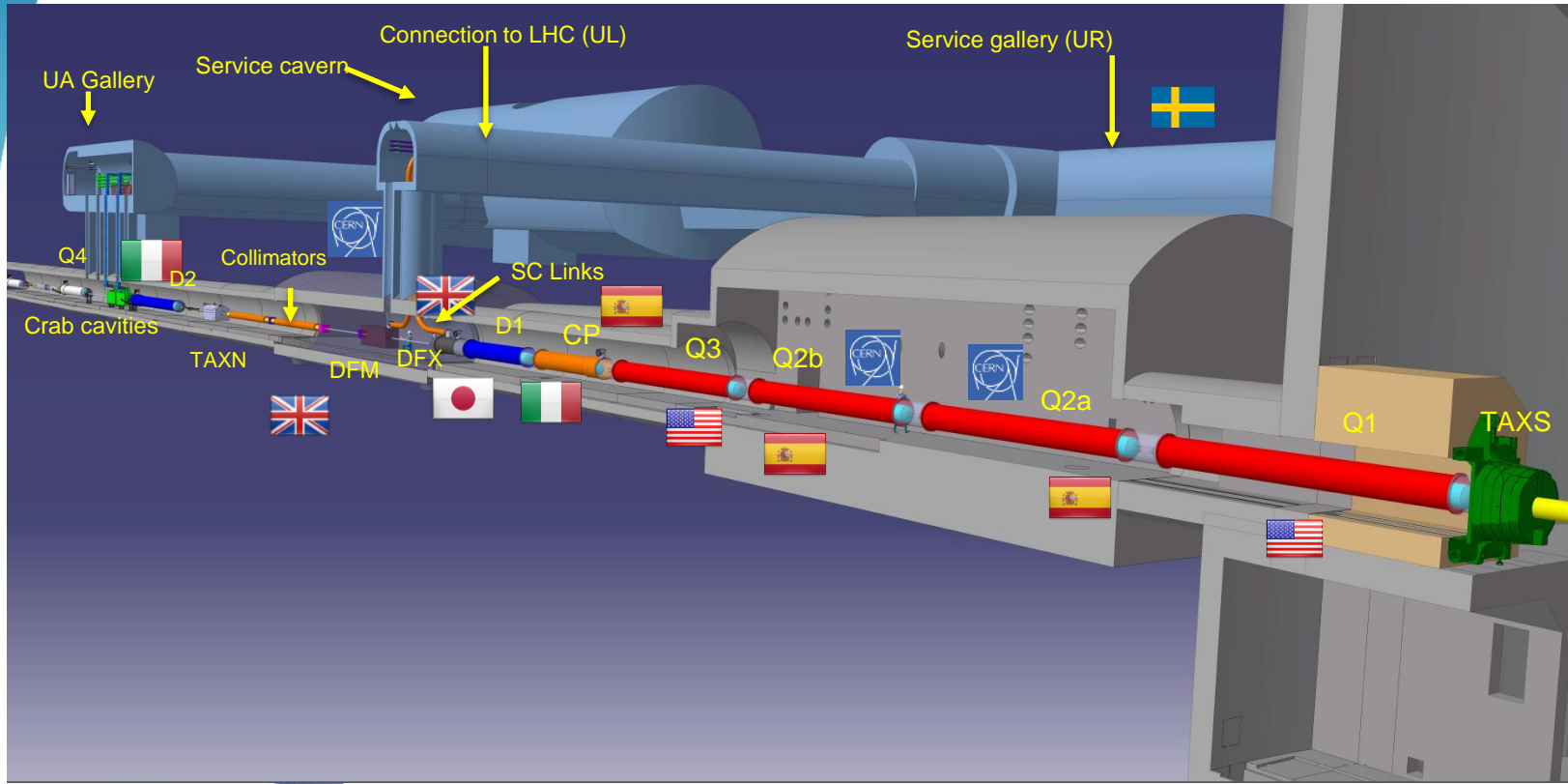
[Top of Page](#)

Chapter 300 - Procedures

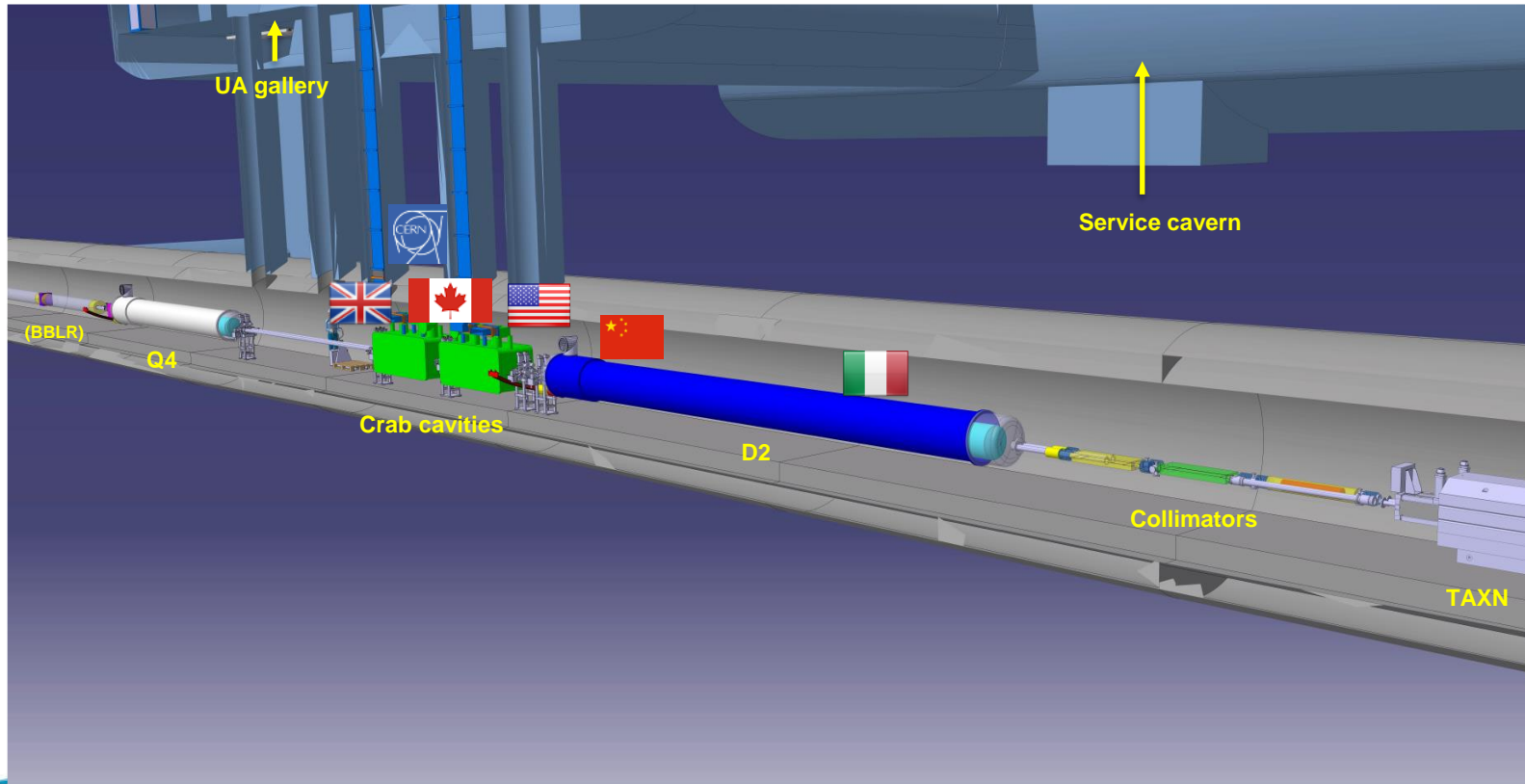
Description of the required course of actions to implement the Project QA policies
(Click the link in "Number" to load the pdf file)

Number	Rev.	Status	Date	Title
LHC-PM-QA-300.00	-	Planned	-	Product Breakdown Structure Process and Control

The Insertion Region (up to Q4)



The MS region with in-kind contributions





Pragmatic approach

External contributors are governed by the quality management plans of their home institute, however **all HL-LHC deliverables shall be compatible with the HL-LHC Quality plan**

- Hardware baseline documentation stored in **EDMS (primary tool for documentation at CERN)**
- Fabrication records in **MTF (Asset management)**
- Project technical information **accessible** to all “**Hilumiers**”
- **Corporate image** when representing the project

HL-LHC Quality Plan

 		EDMS NO. 1513591	REV. 2.0	VALIDITY VALID
REFERENCE : LHC --QA-0001				
PLAN				
HL-LHC QUALITY PLAN				
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Rev. No.	Date	Description of Changes (major changes only, minor changes in EDMS)		
2.0	2018-04-20	Version post FP7 replacing version 1 and the EU deliverable [1]		

This document is uncontrolled when printed. Check the EDMS to verify that this is the correct version before use

2 SCOPE

The quality policies, procedures, guidelines, plans and templates (also referred to as quality documentation hereafter) outlined in this document apply to all phases of the HL-LHC project and its systems, from R&D to preparation for dismantling of the future facility—in this context, as future facility it is understood the LHC equipment under the scope of the HL-LHC project-. This applies as well to documentation produced by third parties under the scope of the project.

External contributors are governed by the quality management systems of their home institution. However all HL-LHC project deliverables shall be compatible with what is stated in this Quality Manual.

The quality documentation presented in this Quality Manual complements/replaces the LHC Project Quality Assurance Plan [2].

4.3.2 Control of Documents

The procedures [11] and [12] describe how to handle HL-LHC documentation within the HL-LHC project.

EDMS is the tool used for the control of engineering documents and presentations. CDS is the tool used for the control of scientific documents and graphic records.

4.3.3 Control of Records

The HL-LHC Records Management [13] procedure describes how to handle the records established to provide evidence of compliance with the requirements and the effective operation of the quality management system.

All records related to Fabrication, Assembly and Verification of equipment belonging to HL-LHC, as well as those related to Installation and Commissioning, shall be stored by default until the dismantling phase. MTF is the tool used for the control of records.

HL-LHC Quality Plan:

<https://edms.cern.ch/document/1513591>

HL-LHC Quality – Some pillars

HL Quality Plan

HL-LHC QUALITY PLAN

PLAN

HL-LHC QUALITY PLAN

Abstract

The HL-LHC project is considered to be a project of excellence regarding the best practices management. The adoption of a quality management system is a strategic decision to ensure performance and provide a solid basis for continuous development and innovation.

This document provides an overview of the processes and procedures of the quality management system (QMS).

TRACEABILITY	
Revision	Date
1.0	2018-01-01
1.1	2018-02-01
1.2	2018-03-01
1.3	2018-04-01
1.4	2018-05-01
1.5	2018-06-01
1.6	2018-07-01
1.7	2018-08-01
1.8	2018-09-01
1.9	2018-10-01
1.10	2018-11-01
1.11	2018-12-01
1.12	2019-01-01
1.13	2019-02-01
1.14	2019-03-01
1.15	2019-04-01
1.16	2019-05-01
1.17	2019-06-01
1.18	2019-07-01
1.19	2019-08-01
1.20	2019-09-01
1.21	2019-10-01
1.22	2019-11-01
1.23	2019-12-01
1.24	2020-01-01
1.25	2020-02-01
1.26	2020-03-01
1.27	2020-04-01
1.28	2020-05-01
1.29	2020-06-01
1.30	2020-07-01
1.31	2020-08-01
1.32	2020-09-01
1.33	2020-10-01
1.34	2020-11-01
1.35	2020-12-01
1.36	2021-01-01
1.37	2021-02-01
1.38	2021-03-01
1.39	2021-04-01
1.40	2021-05-01
1.41	2021-06-01
1.42	2021-07-01
1.43	2021-08-01
1.44	2021-09-01
1.45	2021-10-01
1.46	2021-11-01
1.47	2021-12-01
1.48	2022-01-01
1.49	2022-02-01
1.50	2022-03-01
1.51	2022-04-01
1.52	2022-05-01
1.53	2022-06-01
1.54	2022-07-01
1.55	2022-08-01
1.56	2022-09-01
1.57	2022-10-01
1.58	2022-11-01
1.59	2022-12-01
1.60	2023-01-01
1.61	2023-02-01
1.62	2023-03-01
1.63	2023-04-01
1.64	2023-05-01
1.65	2023-06-01
1.66	2023-07-01
1.67	2023-08-01
1.68	2023-09-01
1.69	2023-10-01
1.70	2023-11-01
1.71	2023-12-01
1.72	2024-01-01
1.73	2024-02-01
1.74	2024-03-01
1.75	2024-04-01
1.76	2024-05-01
1.77	2024-06-01
1.78	2024-07-01
1.79	2024-08-01
1.80	2024-09-01
1.81	2024-10-01
1.82	2024-11-01
1.83	2024-12-01
1.84	2025-01-01
1.85	2025-02-01
1.86	2025-03-01
1.87	2025-04-01
1.88	2025-05-01
1.89	2025-06-01
1.90	2025-07-01
1.91	2025-08-01
1.92	2025-09-01
1.93	2025-10-01
1.94	2025-11-01
1.95	2025-12-01
1.96	2026-01-01
1.97	2026-02-01
1.98	2026-03-01
1.99	2026-04-01
1.100	2026-05-01

EDMS 1513591

It provides the procedures to be used and it explains how quality is managed for HL-LHC.

Doc. Management & Control

PROCEDURE

HL-LHC DOCUMENTATION MANAGEMENT AND CONTROL

Non Baseline

Documents required for the well functioning of the project but which storage will not be critical other concerning.

Peer review process is generally managed by the author

Do not require special labelling

Stored in the

Baseline

Documents that will have to be stored in the Baseline of the HL-LHC project

Concerning one Workpackage

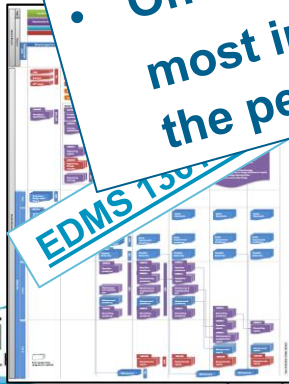
Some

of the project

EDMS 1513591

Documentation of documentation

Baseline Documents



- On top of the Quality Plan, guidelines, procedures and tools, the most important is the commitment and engagement of the people for these activities

Documents that need to be issued and stored up to the dismantling of the machine

Tools for HL



Tools available at CERN to manage documentation

All processes documented

Quality Document	Document Type				Stage of Use				Process			
	Procedure	Template	Plan	Guideline	Concept	Development	Production	Support & Use	O	T	P	A
Make or Buy	X	X	X			X						X
Administrative Acquisition	X					X						X
Guidelines: Specification Committee Process				X		X						X
Guidelines on How to Use EDH for Launching the Procurement				X		X						X
Contract Management Process	X					X	X	X				X
Supply Chain	X		X				X	X				X
Re-baselining and Assessment: Budget, Schedule and Scope	X				X	X	X					X
Scheduling Process	X				X	X	X					X
New Resources Allocation Process: M+M4P	X				X	X	X		X			
Technical Reviews Process	X				X	X	X	X				X
Risk Management Process	X				X	X	X	X				X
Risk Register: What if?		X			X	X	X	X				X
Crisis Communication Management Plan			X		X	X	X	X				X
Adverse Events Identification		X			X	X	X	X				X
Options management	X	X			X	X	X	X				X
Configuration Management Process	X				X	X	X	X				X
Engineering Change Request		X				X	X					X
Product Identification and Traceability Procedure	X											X
Issues and Problems Reporting		X			X	X	X	X				X
Documentation Management	X				X	X	X	X	X			
Non-conformity Process	X	X				X	X		X			
Deviation Process	X	X				X	X			X		
Engineering Specification Drafting		X				X					X	
Quality Management Plan			X		X	X	X	X	X			
Fabrication, Assembly and Verification Plan			X			X	X				X	
Communication Plan (Int. and Public Information Program Plan)			X		X	X	X	X	X			
Manage Stakeholders					X	X	X	X	X			
Quality Management Review Process	X				X	X	X	X	X			
Identification of Infrastructures Needed for HL-LHC		X				X	X			X		
Who is Who: name + role		X			X	X	X			X		
Definition of Roles				X	X	X	X			X		
Identification of all training processes by role				X	X	X	X			X		
Auditing Procedure	X				X	X	X					X

3
 (HLCB) - HL-LHC MoU Annex 2, EDMS [1767465](#)
 MS [1518364](#)

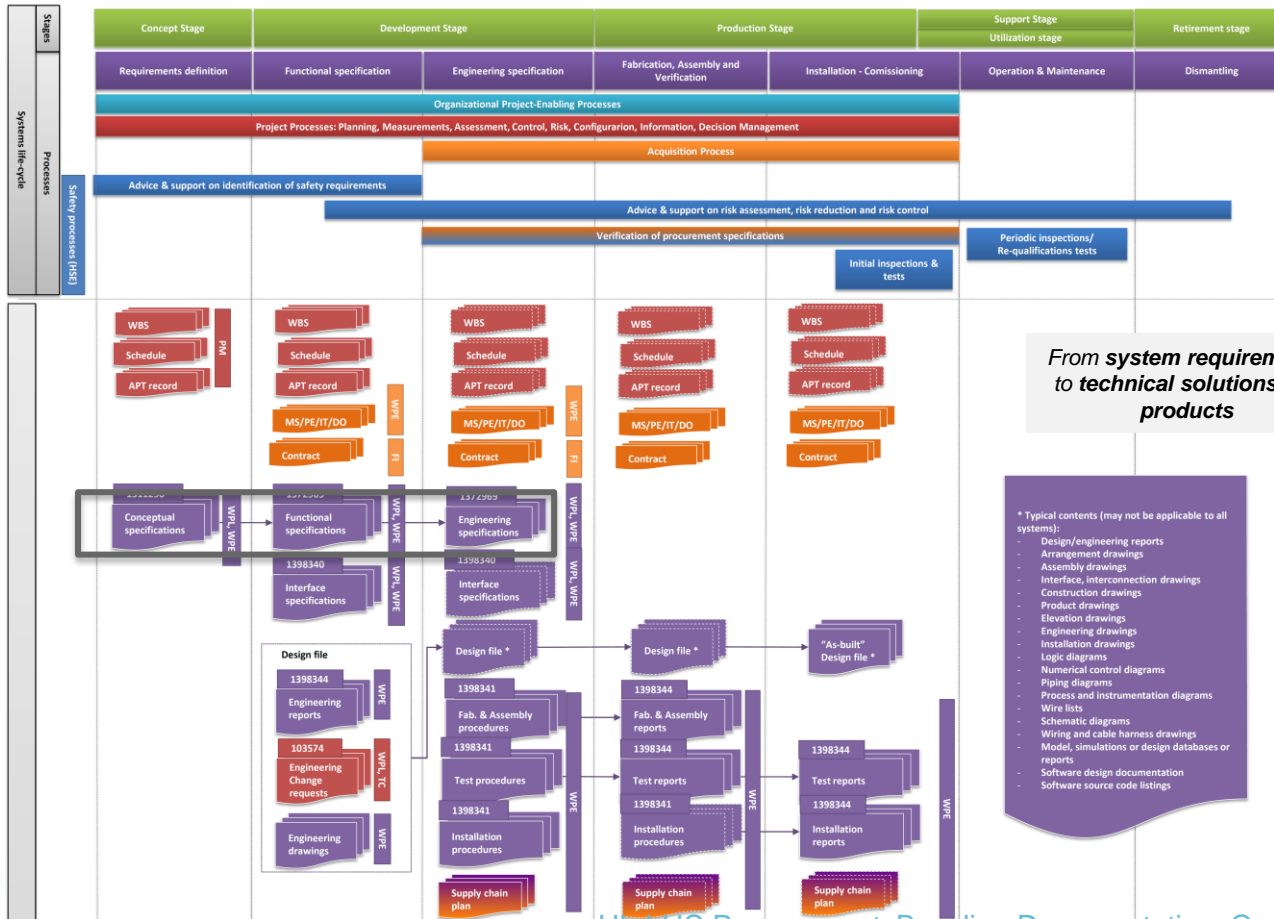
[L109](#)

[52] Deviation Procedure, EDMS [1506723](#)

[53] Deviation Request Template, EDMS [1506726](#)

Long term documentation (1/2)

EDMS #1361462

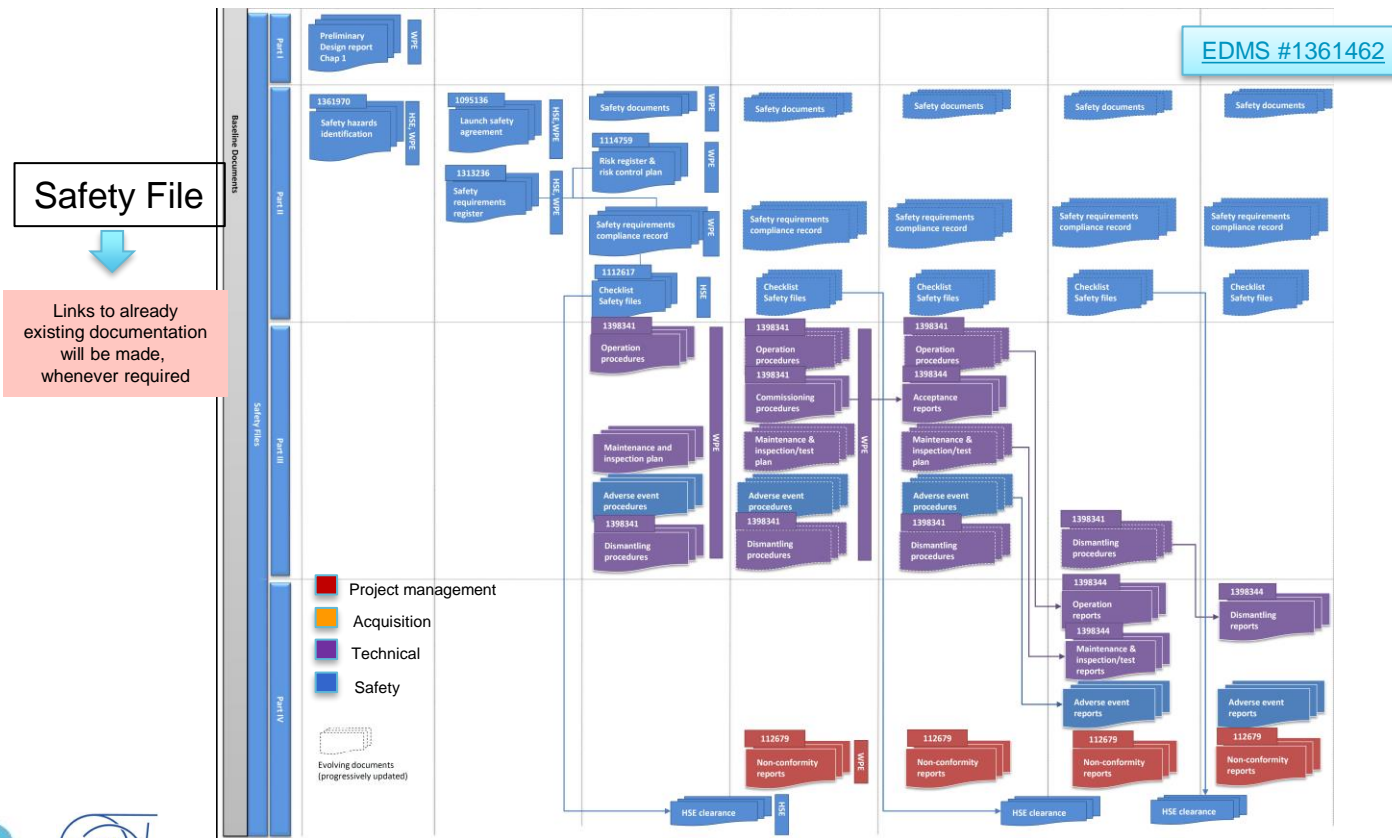


From system requirements to technical solutions and products

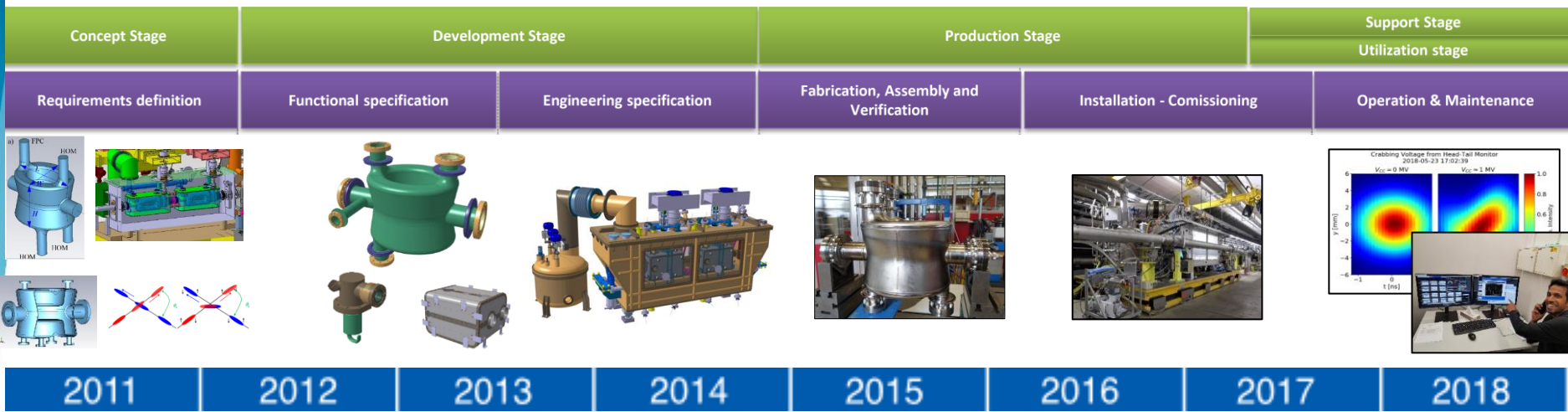
- * Typical contents (may not be applicable to all systems):
- Design/engineering reports
 - Arrangement drawings
 - Assembly drawings
 - Interface, interconnection drawings
 - Construction drawings
 - Product drawings
 - Elevation drawings
 - Engineering drawings
 - Installation drawings
 - Logic diagrams
 - Numerical control diagrams
 - Piping diagrams
 - Process and instrumentation diagrams
 - Wire lists
 - Schematic diagrams
 - Wiring and cable harness drawings
 - Model, simulations or design databases or reports
 - Software design documentation
 - Software source code listings



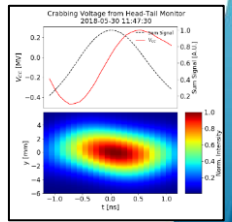
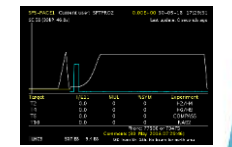
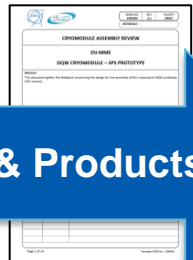
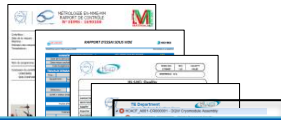
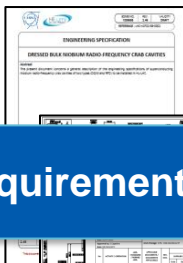
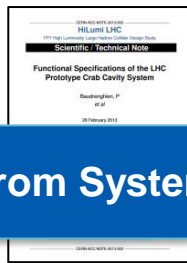
Long term documentation (2/2)



When – The full HL-LHC life-cycle



From Systems Requirements to Technical Solutions & Products





HL Quality Plan and EDMS Insights

Hector Garcia Gavela on behalf of the PDQR Office



CERN – 2nd Feb 2024 – EDMS [3027418](#)

How – CERN Tools integrated and supported

SmarTeam/CATIA

- Used to extract BOMs and check some assemblies by the QA
- Used thoroughly by the designers that make the 3D and 2D models

CDD

- Used for all internal drawings and for drawing control
- Used for upload and control of external drawings (collaborations and companies) w/ LHC Stamp, by import

EDMS

- Used to structure the Project in the different folders following the PBS [Configuration]
- Used for items
- Used for storage, approval, traceability and management of documentation (engineering, manufacturing, installation,...)
- Used to access CDD as the drawings are also EDMS documents
- Used to access assets linked to an item

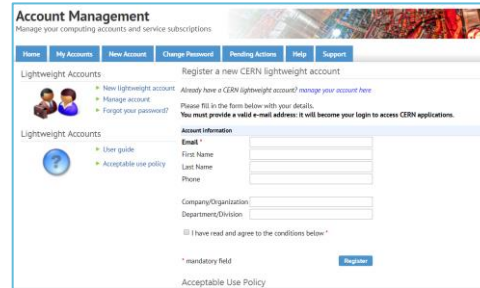
MTF/Infor

- Used for assets (equipment or batch) and EDMS documents links
- Used for manufacturing data storage
- Used for equipment production follow-up and their traceability
- Used for storage (KIOSK)
- Used for Layout links

EDMS – Requirements to access

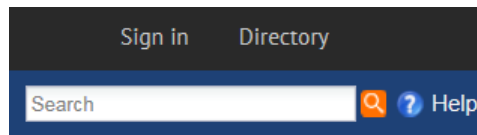
- CERN Lightweight account is required ([Link to create one](#)) to access to EDMS (Engineering & Equipment Data Management Service)

1. Follow the link to register your account

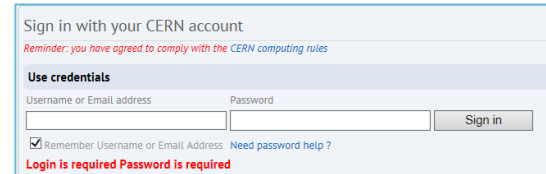


The screenshot shows the 'Account Management' page with a navigation bar containing 'Home', 'My Accounts', 'New Account', 'Change Password', 'Pending Actions', 'Help', and 'Support'. The main content area is titled 'Lightweight Accounts' and includes a 'Register a new CERN lightweight account' section. Below this, there are fields for 'Email', 'First Name', 'Last Name', and 'Phone'. A checkbox for 'I have read and agree to the conditions below*' is present, along with a 'Register' button. A note states: 'You must provide a valid e-mail address: it will become your login to access CERN applications.'

2. Go to [EDMS](#) and Log in with this account



The screenshot shows a dark blue search bar with the text 'Sign in Directory' at the top. Below the search bar is a white input field with the word 'Search' inside, followed by a magnifying glass icon and a 'Help' button with a question mark icon.



The screenshot shows the 'Sign in with your CERN account' page. It includes a reminder: 'Reminder: you have agreed to comply with the CERN computing rules'. Below this is a section titled 'Use credentials' with input fields for 'Username or Email address' and 'Password', and a 'Sign in' button. There is a checkbox for 'Remember Username or Email Address' and a link for 'Need password help?'. At the bottom, it states 'Login is required Password is required'.

3. You will then have access to the Documentation of the Project

EDMS – Requirements to access

- If you are going to use MTF (Equipment Management Folder), then a CERN Nice Account is required
- Please contact HL-LHC.Secretariat@cern.ch (Michela Lancellotti) in order to proceed
She will send you the details, the application form to be filled in and the documentation to be provided

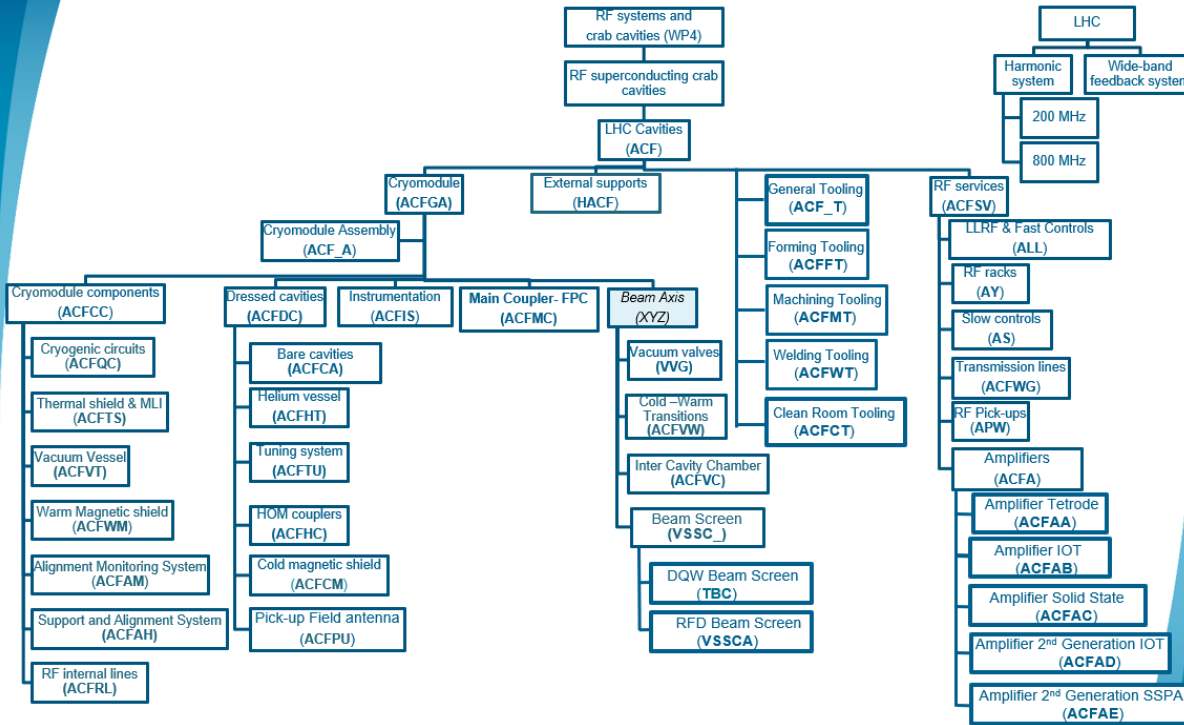
Registration under the heading "EXTERNAL"

Person concerned		
Name	Surname _____ First name(s) _____ (as on passport)	
Gender	<input type="radio"/> female <input type="radio"/> male e-mail _____	
Nationality	_____ Date of birth _____	
Employer's address ¹	Name _____ Address _____ Tel. _____ Fax _____ e-mail _____	
<input type="radio"/> I certify that I am in compliance with all laws applicable to my presence and activity at CERN, including the laws on work and residence permits. <input type="radio"/> I also certify that I am in compliance with applicable laws concerning social insurance and that in any event, I have health insurance cover against the financial consequences of illness and accident, at levels adequate in Switzerland and France.		
Signature	_____	
Period of association with CERN	Starting date _____ Scheduled end date _____	
Reason for registration	Address	Registration exclusively by
<input type="radio"/> Person accompanying a member of the personnel or a beneficiary of the Pension Fund who requires assistance with mobility	ACCO	Registration Service 1 year
<input type="radio"/> Member of an official CERN committees	COMT	Secretariat of Council, scientific committees and Pension Fund
<input type="radio"/> Lecturer or external participant in conferences... organised by CERN	CONF	4 weeks
<input type="radio"/> External participant in activities or projects, exclusively teleworking	DIST	1 year
<input type="radio"/> External participant in an EU project	EU/PR	Project's secretariat 1 year
<input type="radio"/> External participant in training courses organised by CERN	FORM	Training Service 1 year
<input type="radio"/> CERN Guide with dosimeter	GUID	Visits Service 1 year
<input type="radio"/> Honorary member	HONO	HR Department = Invitation
<input type="radio"/> Host state's authorities (e.g. labour inspector, works doctor)	HOST	Host States Relations Service 2 years
<input type="radio"/> Industrial Liaison Officer	ILOF	IFT Department = Mandate
<input type="radio"/> Child attending the CERN Kindergarten or the accompanying person not member of personnel	KIND	Staff Association or HR Department 1 year
<input type="radio"/> External participant in a project or specific activity (according to the exhaustive list available in the procedure)	PROJ	Service responsible for the project-activity 1 year
<input type="radio"/> Scientific activities of pensioners from institutes who have been previously USER	SCIE	DAO office of the EP Department 1 year
<input type="radio"/> Trainee invited directly by a department for an internship/job shadowing or participant in CERN's programs for highschool students	STAG	4 weeks
<input type="radio"/> Professional visitor	VISI	Registration Service 3 days
CERN Guarantor		
Name	Surname _____ First name(s) _____	
CERN ID	_____ Department _____	
By signing below, the guarantor engages his department's responsibility for the person concerned.		
Signature	_____	
Date	_____	

¹ It is compulsory to state your employer's address if you require a dosimeter or for registration with the reason VISI.
FSP-DND-TP-13.13.2020



From system architecture to EDMS Structure

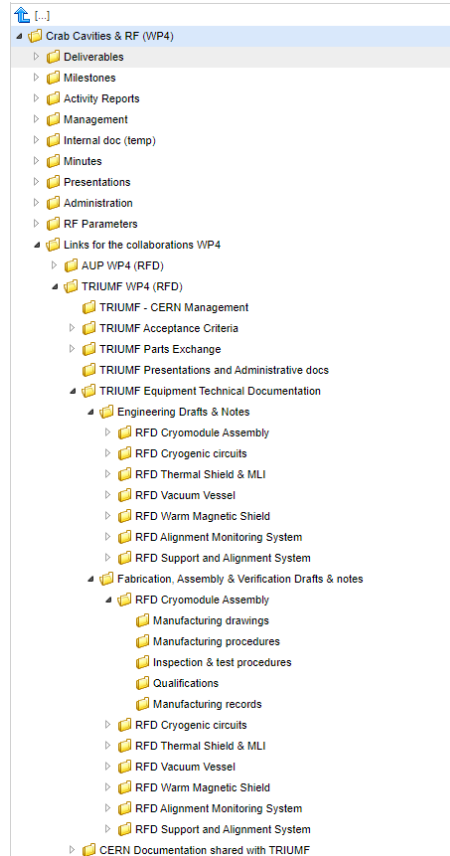
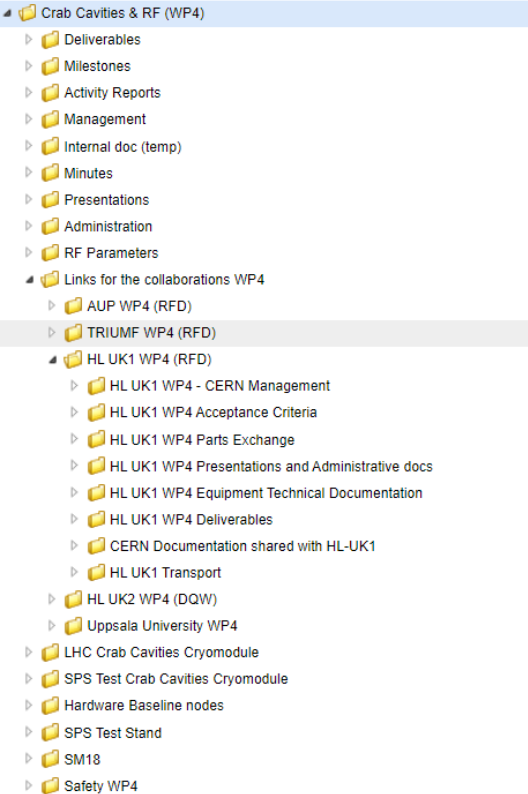


[...]

Crab Cavities & RF (WP4)

- ▶ Deliverables
- ▶ Milestones
- ▶ Activity Reports
- ▶ Other
- ▶ Internal doc (temp)
- ▶ Minutes
- ▶ Presentations
- ▶ Administration
- ▶ RF Parameters
- ▶ Links for the collabo
- ▶ LHC Crab Cavities (
- ▶ SPS Test Crab Cavi
- ▶ Hardware Baseline
- ▶ SPS Test Stand
- ▶ SM18
- ▶ Safety WP4
- ▶ Engineering drafts & notes
 - ▶ DQW Crab Cavities Cryomodule (SPS Test)
 - ▶ RFD Crab Cavities Cryomodule (SPS Test)
 - ▶ RFD Cryomodule Assembly
 - ▶ RFD Cryomodule Components
 - ▶ RFD Cryogenic circuits
 - ▶ RFD Thermal Shield & MLI
 - ▶ RFD Vacuum Vessel
 - ▶ RFD Warm Magnetic Shield
 - ▶ RFD Alignment Monitoring System
 - ▶ RFD Support and Alignment System
 - ▶ RFD RF Internal Lines
 - ▶ RFD Dressed Cavities
 - ▶ RFD Dressed Cavities Assembly
 - ▶ RFD Bare cavities
 - ▶ RFD Helium tank
 - ▶ Amplifier IOT (ACFAB)
 - ▶ RFD H-HOM Suppressors (Variant #3)
 - ▶ RFD V-HOM Suppressors (Variant #4)
 - ▶ RFD Cold Magnetic Shield
 - ▶ RFD Tuning System
 - ▶ RFD Pickup Field Antenna
 - ▶ RFD FPC Main Coupler
 - ▶ RFD Instrumentation
 - ▶ RFD Beam Axis
 - ▶ RFD Vacuum valves
 - ▶ RFD Beam Screen
 - ▶ RFD Plug In Modules
 - ▶ RFD Extremity Vacuum Chamber
 - ▶ RFD Vacuum Ancillaries

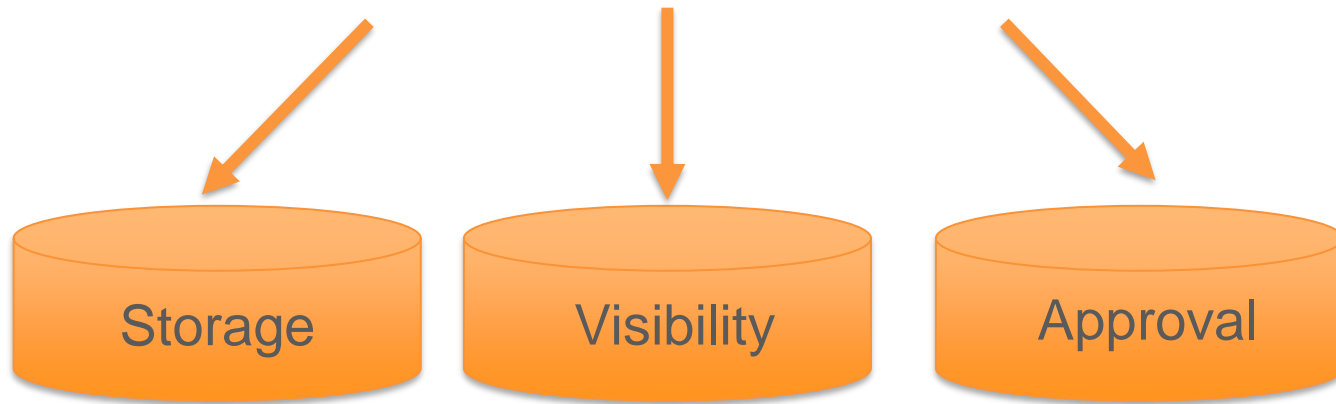
Specific Nodes for Collaborations



- Dedicated node for each Collaboration within the main WP4 Structure
- To access to CERN tools, colleagues from Collaborations need to set a lightweight account (only for EDMS access) or Nice Account (EDMS and MTF access required)
- All members of HL will have the rights to create/edit documents in EDMS (under the corresponding Context)

Documentation - Key concepts

- Baseline / Non Baseline
- In my Work package / In several Work packages
- Confidential (Cost, Resources, ...)



Documentation in one page (EDMS 1398333)



EDMS NO. 1398333 REV. 2.0 VALIDITY VALID
REFERENCE: LHC_QA-0003

PROCEDURE

HL-LHC DOCUMENTATION MANAGEMENT AND CONTROL

Abstract

Documentation Management is a process that provides an efficient way of sharing knowledge, information and thinking among the project's participants.

Documentation Control is a process that defines the controls needed:

- To approve documents for adequacy prior to issue.
- To review and update as necessary and re-approve documents with modifications.
- To ensure that changes and the current revision status of documents are identified.
- To ensure that relevant versions of applicable documents are available.
- To ensure that documents remain legible and readily identifiable.
- To prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose, and
- To ensure that documents of external origin, determined by HL-LHC management to be necessary for the project are identified and their distribution controlled.

This document focus on the methodology used in HL to identify documents that shall be managed and control to accomplish the HL-LHC project.

TRACEABILITY 2.0

Prepared by: I. Bejar Alonso Date: 2020-04-20

Verified by: B. Almeida Ferreira Date: 2020-04-21

Approved by: I. Bejar Alonso Date: 2020-04-21

Distribution: Public - HL-LHC members

Rev. No.	Date	Description of Changes (major changes only, minor changes in EDMS)
1.1	2015-11-11	Update logo and roles and references to Quality assurance management plan (all)
1.2	2018-02-22	Update number of characters for the eq. codes, adapted distribution periodicity and spelling errors (all)
2.0	2020-04-21	Update of the document with the new release procedures and uses in EDMS

Page 1 of 7

Template EDMS No.: 1311288

Non Baseline

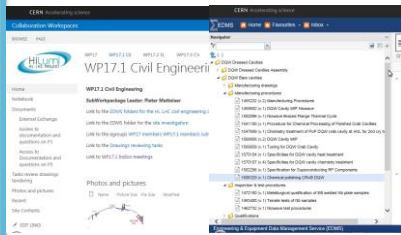
Documents required for the well functioning of the project but which storage will not be critical after commissioning



Peer review process is generally managed by the author

Do not require special labelling

Stored in SharePoint or EDMS requiring approval process



Baseline

Documents that will have to be stored and updated until the dismantling of the LHC

Concerning one Workpackage



Shall be peer reviewed by a group of people knowledgeable on the subject and those

interfacing with the system /process described in the document.

Approved by the WPL

Requires labelling

Can be prepared using the SharePoint but is stored in EDMS

Concerning more than one Workpackage or the project



Shall be peer reviewed by a group of people knowledgeable on the subject and those interfacing with the system /process described in the document.

Approved by the Project Office or by the Project Leader

Requires labelling

Can be prepared using the SharePoint but is stored in EDMS

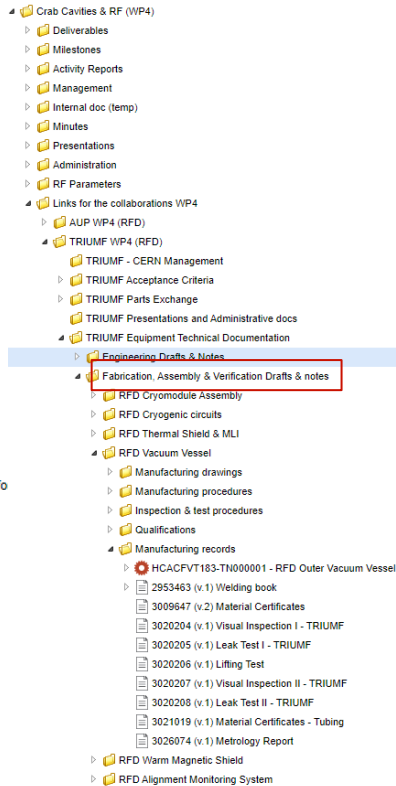
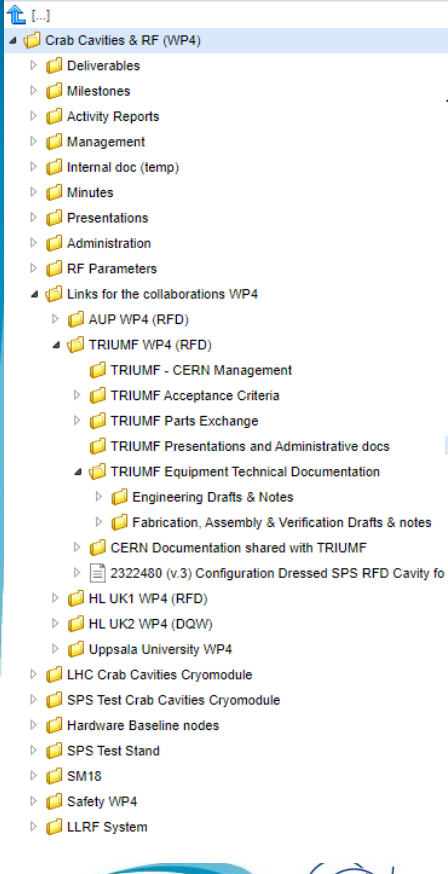
Commercial documents are always baseline

While technical documents are all open to all the members of the project, Commercial, financial and HR documents are limited to the WPLs, DWPLs and PO.

Baseline Documentation, Quality and Risk Office



EDMS Fabrication, Assembly, Verification node



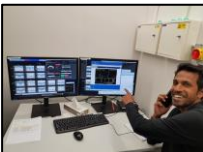
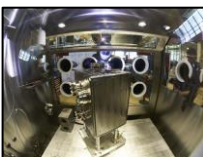
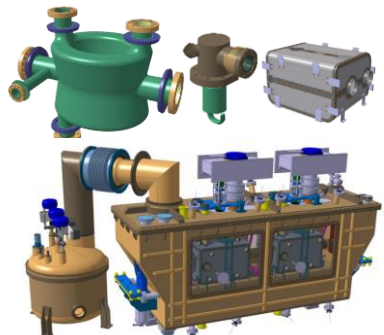
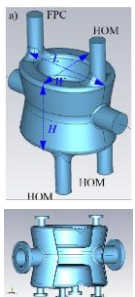
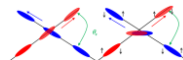
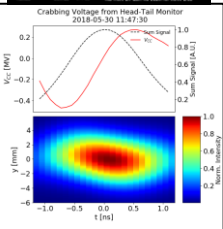
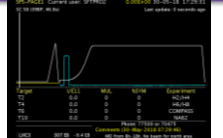
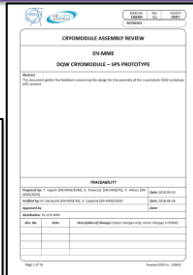
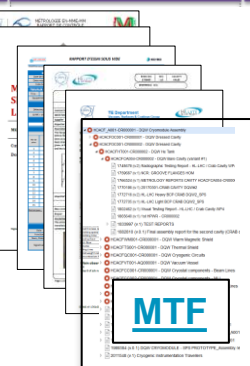
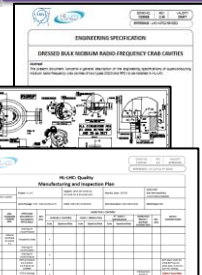
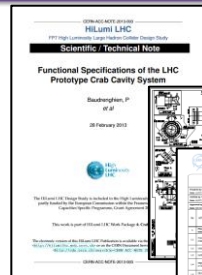
Documentation during this phase

- Manufacturing Procedures
- Test Procedures
- Assembly Procedures
- Manufacturing and Inspection Plans
- Qualifications
- Manufacturing Records – **MTF**

<https://edms-service.web.cern.ch/faq/EDMS/pages/tutorials.html>

EDMS Tutorials

CC for SPS – The full HL-LHC life-cycle

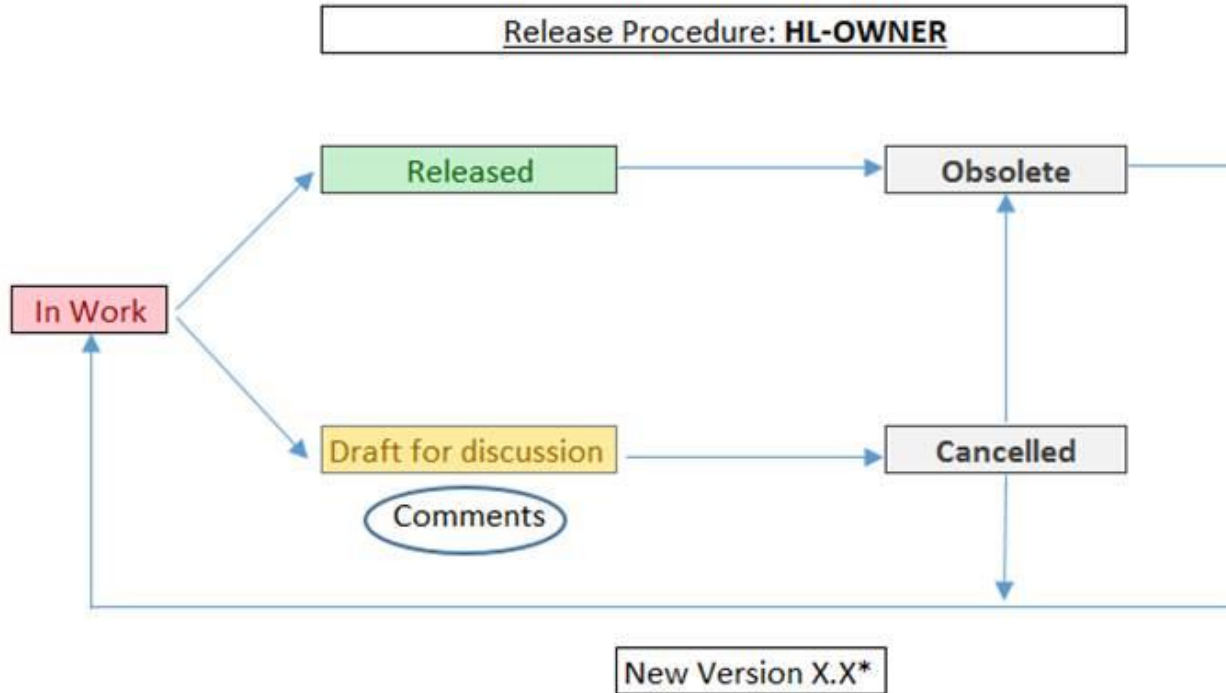


EDMS Release Procedures

- **EDMS Documents (specifications, MIPs, procedures)** issued by the Collaboration will be issued under the Context: **HL-LHC-WP4-CANADA** or **HL-LHC-WP4-CANADA-MTF** **HL-LHC-WP4-UK-MTF**
- **MTF Documents (production reports/certificates/nonconformities)** issued by the Collaboration will be issued under the Context: **HL-LHC-WP4-CANADA-MTF** or **HL-LHC-WP4-UK-MTF** (For our cryomodule or equipment **HL-LHC-WP4-MTF**)

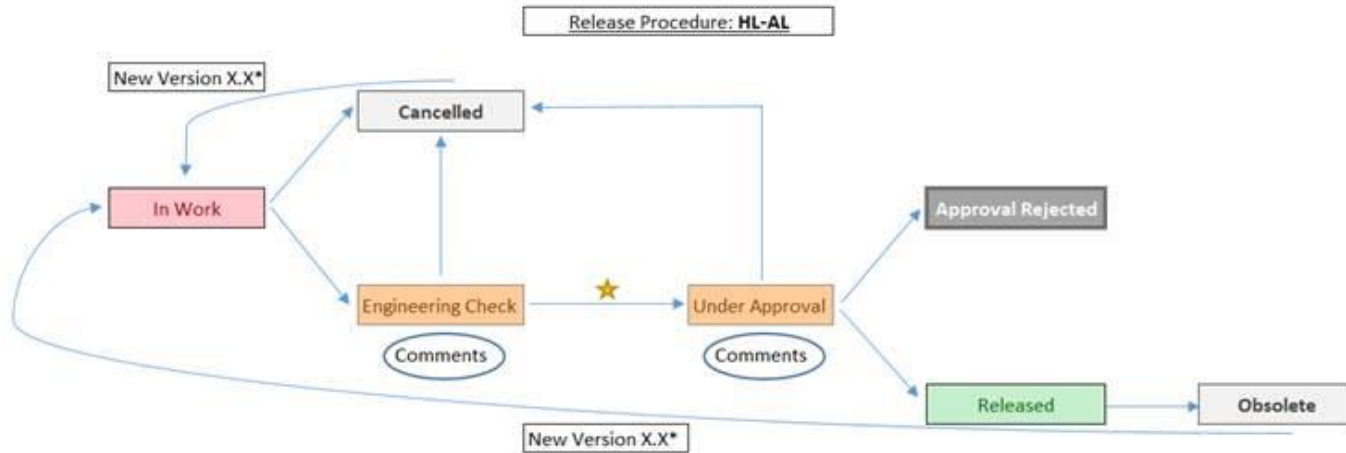
Summary Doc. Type & Rel. Proc. Eq. code Dist. List Users & Roles Read Access for Collaboration Used In									
Actions: Edit Add Remove Copy doc. Type & Rel. Proc from									
ORDER BY Id Type R									
Summary Doc. Type & Rel. Proc. Eq. code Dist. List Users & Roles Read Access for Collaboration Used In									
Actions: Edit Add Remove Copy doc. Type & Rel. Proc from									
ORDER BY Id Type Release Procedure Public Allowed									
Id	Type	Attribute	Code	Release Procedure	Default	Public allowed	CERN Internal allowed	Text when public flag set	Synonym for the release procedure
31	Engineering/1								
31	Engineering/1								
46	Fabrication Pr								
46	Fabrication Pr		46	Fabrication Procedure	FP	HL-AL	✘	✘	✓
47	Fabrication R		47	Fabrication Report	FR	HL-OWNER	✘	✓	✓
47	Fabrication R	Non conformity	366	Report	QN	HL-NCR	✓	✓	✓
157	CAD 3D Mode	Test	366	Report	FR	HL-OWNER	✓	✓	✓
168	Memorandum		950	Drawing Folder	DF	HL-OWNER	✘	✓	✓
253	Drawing								
256	Illustration / Picture	EI		HL-OWNER	✘	✓	✓		
257	Letter / Fax / E-mail	COM		HL-OWNER	✓	✓	✓		
258	Manual / Guideline	MAN		HL-AL	✘	✓	✓		
258	Manual / Guideline	MAN		HL-OWNER	✘	✓	✓		
261	Minutes	MIN		HL-AL	✘	✓	✓		
261	Minutes	MIN		HL-OWNER	✓	✓	✓		
262	Note	NOT		HL-OWNER	✘	✓	✓		
264	Presentation / Publication	PP		HL-OWNER	✘	✓	✓		
265	Procedure	PRD		HL-AL	✘	✓	✓		
265	Procedure	PRD		HL-OWNER	✘	✓	✓		
266	Report	RPT		HL-AL	✘	✓	✓		
366	Report	RPT		HL-AL	✓	✓	✓		
366	Report	RPT		HL-OWNER	✓	✓	✓		
950	Drawing Folder	DF		HL-AL	✘	✓	✓		
950	Drawing Folder	DF		HL-OWNER	✘	✓	✓		

EDMS Release Procedures



*Create a new version everytime you have a new file to be uploaded

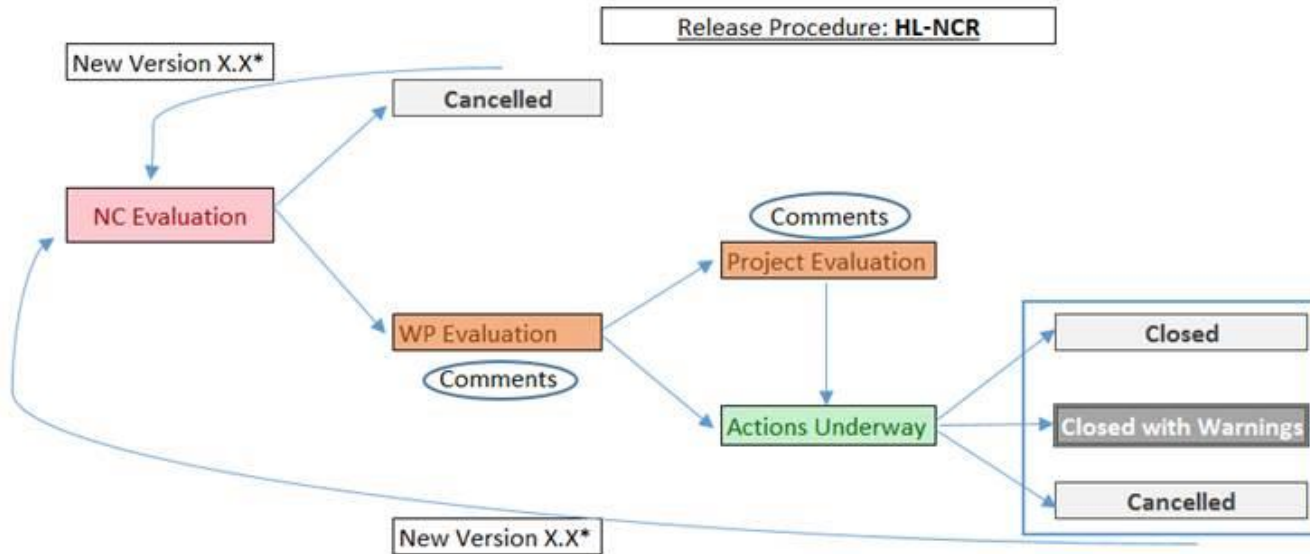
EDMS Release Procedures



* Create a new version everytime you have a new file to be uploaded

★ Only a few people can do it

EDMS Release Procedures



*Create a new version when you have a new file to be uploaded.

Documentation

Type of Document	Examples	Context to be used	Release Procedure
Procedures	Assembly Procedures, MIPs	HL-LHC-WP4-CANADA (CAN) HL-LHC-WP4-UK (UK) HL-BASELINE (CERN)	HL-AL
Procurement Specifications	Specifications used for the procurement of cryomodule components	HL-LHC-WP4-CANADA (CAN) HL-LHC-WP4-UK (UK) HL-BASELINE (CERN)	HL-OWNER
Calculations		HL-LHC-WP4-CANADA HL-LHC-WP4-UK	HL-OWNER
Manufacturing Records	Material certificates, dimensional reports, leak check reports, NDTs reports, etc.	HL-LHC-WP4-CANADA-MTF (CAN) HL-LHC-WP4-UK-MTF (UK) HL-LHC-WP4-MTF (CERN)	HL-OWNER
Nonconformities	NCRs arisen during production	HL-LHC-WP4-CANADA-MTF (CAN) HL-LHC-WP4-UK-MTF (UK) HL-LHC-WP4-MTF (CERN)	HL-NCR

If Deviation Requests need to be issued, then contact WP4 (Marco) and HLPO (PDQR Office). We will take care of the formal approval (HL-BASELINE with HL-AL release procedure)

HL-LHC Quality Plan – Traceability of Changes

Document	Purpose	Reference	EDMS Docs
Engineering Change Request	<p>Modification of the current Project Baseline:</p> <ul style="list-style-type: none"> There is a modification on the scope defined in the technical baseline (TDR) There is a need of extra funds to pay for an object that was in the baseline and can not be funded by internal reorganization of the budget for the same equipment (Budget ECR) <p>If the modification affects the present LHC machine an ECR is submitted using the normal LHC ECR circuit</p>	<p>TDR – Scope Baseline PBS – Project Breakdown Structure MTP – Cost Baseline</p>	<p>Process 2429904 Template HL-LHC ECRs 1508429 LHC ECRs Link</p>
Schedule Change Request	<p>Trace and record relevant variances in the Master Schedule wrt. the one endorsed and approved in the last Cost & Schedule Review (CSR). For deliverables related to LHC installation or IT String installation:</p> <ul style="list-style-type: none"> If the shift is > 2 months (LHC installation) : An SCR shall be issued. If the shift is > 1 months (IT String): An SCR shall be issued. 	<p>MS – Master Schedule</p>	<p>Process 2735444 Template 2725175</p>
Decision Management Reports	<p>Trace managerial decisions without modifying the Project Baseline.</p> <ul style="list-style-type: none"> Formalize a technical decision between several options or sharing of managerial decisions Internal re-scheduling w/o affecting the baseline Revaluation of the cost 		<p>Template 1501719</p>
Deviation Requests	<p>Request to do something different from an established requirement for a limited number of components, for a brief period, or for a specific use</p>	<p>Engineering Specifications Design/Manufacturing files Technical Specifications</p>	<p>Process 1506723 Template 1506726</p>
Safety Request	<p>In case the deviation concerns exclusively a safety requirement. If so, it is not necessary to create a deviation request on the top of the Safety request.</p>	<p>Safety Requirements Technical Specifications Engineering Specifications</p>	<p>Template 1770077</p>
Nonconformity	<p>Non fulfilment of an established requirement (they are more production oriented)</p>	<p>Engineering Specifications Design/Manufacturing files Technical Specifications</p>	<p>Process 1499015 Template 1501109</p>

Manufacturing Records in MTF

- Manufacturing drawings
- Manufacturing procedures
- Inspection & test procedures
- Qualifications
- Manufacturing records
 - HCACF_A004-UK000001 - RFD Cryomodule Prototype
 - HCACFVT004-UK000001 - RFD Vacuum Vessel Prototype
 - HCACFWM004-UK000001 - RFD Warm Magnetic Shield Prototype
 - HCACFVS004-UK000001 - RFD Vacuum Shield Prototype
 - HCACFCC004-CR000001 - Miscellaneous material for UK
 - HCACFMC004-CR000001 - RFD FPC Main Coupler
 - HCACFMC004-CR000002 - RFD FPC Main Coupler
 - HCACFDC004-CR000001 - RFD Dressed Cavity Prototype CERN
 - HCACFDC004-CR000002 - RFD Dressed Cavity Prototype CERN
 - HCVVGS001-VT000001 - RF all-metal Gate Valve
 - HCVVGS001-VT000002 - RF all-metal Gate Valve
 - HCVVGS001-VT000003 - RF all-metal Gate Valve
 - HCVVGS001-VT000004 - RF all-metal Gate Valve
 - HCVBMCC032-CR000001 - Short CWT Cavity line
 - HCVBMCC033-CR000001 - Short CWT Secondary line
 - HCVBMCC034-CR000001 - Long CWT Cavity line
 - HCVBMCC035-CR000005 - Long CWT Secondary line
 - HCACFAH037-UK000001 - RFD Blade Support Assembly
 - HCACFAH037-UK000002 - RFD Blade Support Assembly
 - HCACFAH037-UK000003 - RFD Blade Support Assembly
 - HCACFAH037-UK000004 - RFD Blade Support Assembly
 - LHC-ACFVW-QN-0001 (v.2) RFD Short CW Transition LHCVMCC0033 Dent



- MTF is an integral part of EDMS.
- This tool is used to store the manufacturing data during production and grant traceability (what goes where)
- Workflow (more or less complex) shall be integrated following the Manufacturing & Inspection Plan (MIP)
- Manufacturing reports shall be provided to CERN along the production (including Nonconformities)

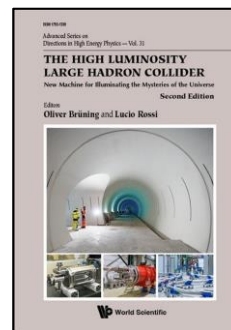
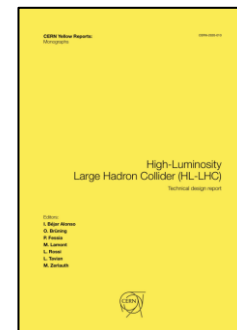
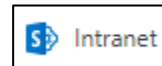
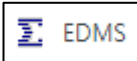
For reference – MTF Training given in June 2020 to the UK Colleagues: <https://edms.cern.ch/document/2385803/1.0>

(Some) Conclusions

- Everybody should feel responsible for Quality and not just the people that are more devoted to this activity
- Documentation is a key part of any project
 - It provides provision of objective evidence;
 - It proves the conformity of the requirements established by a customer;
 - It enables repeatability and traceability of the work done
- HL-LHC is an upgrade of an existing machine (LHC). Existing rules are to be followed Pragmatic Approach with our Collaborations
- HL-LHC tried to implement an industrial approach within the boundary conditions of the Research centers: Traceability, documentation, control of changes etc. are 'a must' for any project at large scale
- Important to keep traceability (what goes where) along the full life-cycle
- The correct use of EDMS/MTF is of paramount importance in order to store, handle and retrieve information in later stages
- Standardization for all the CERN members and Collaborations
- Continuous improvement as a quality principle and support from PDQR Office

Some useful Links

- EDMS for HL-LHC : <https://edms.cern.ch/project/CERN-0000096404>
- Sharepoint (Intranet) : <https://cern.sharepoint.com/sites/HL-LHC>
- Indico : <https://indico.cern.ch/category/3063/>
- HL-LHC Website: <https://hilumilhc.web.cern.ch>
- Industry Website : <https://project-hl-lhc-industry.web.cern.ch>
- Link to Technical Design Report (TDR v1.0 published in 2020): <https://e-publishing.cern.ch/index.php/CYRM/issue/view/127>
- HL-LHC Quality Plan – [EDMS Link](#)
- HL-LHC in CDS : [Link](#)
- HL-LHC Documentary (Video): [Link](#)
- Hilumi Book 2nd edition: [Link](#)



What use to happen at the end ~~X~~ of the projects other



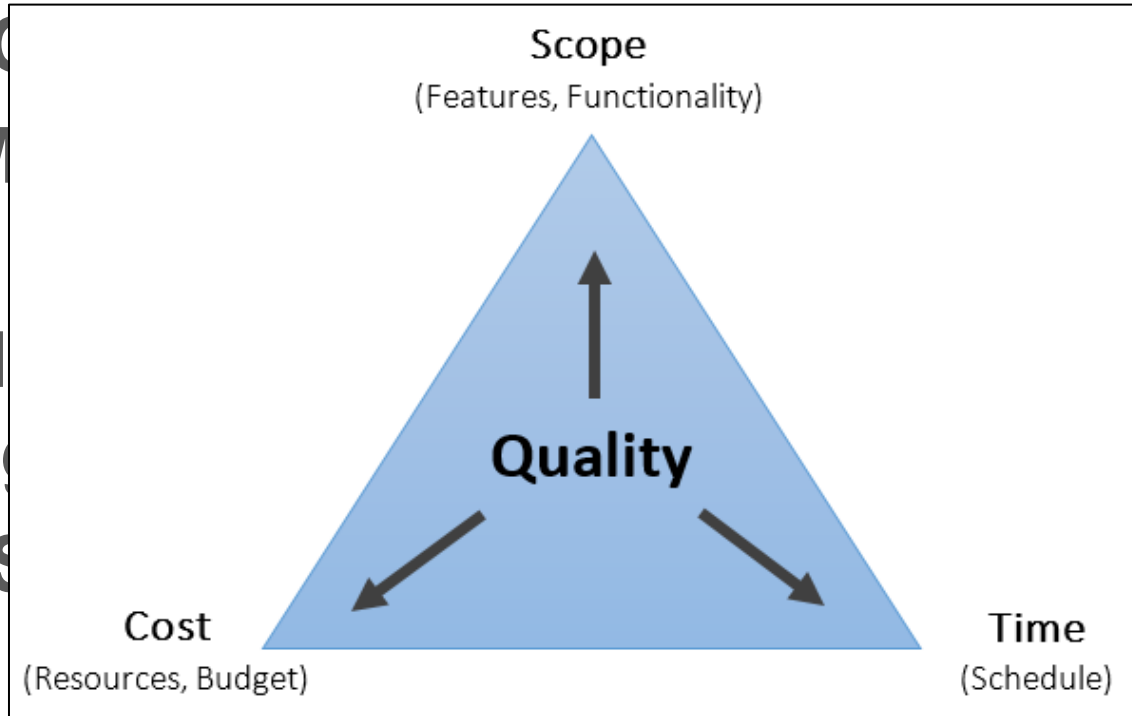


Thank you for your attention
Link to EDMS



Why the office was created

- **SUPPORT**
- **OPTIMIZATION**
on the
- **HARMONIZATION**
working
- **RULES**



st papers
entrate
es
N groups
lete