

1st Accelerators Technology Sector Workshop

Chair: Mike Lamont

Engineering Design Tools and Processes
Project Management Methodologies and Tools



ATS
Accelerators and
Technology Sector

Establishing Project Management Workflows for Cooling and Ventilation Projects

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ATS
Accelerators and
Technology Sector

Agenda

01 Scope and Purpose

02 Motivations & challenges

03 EN-CV Project Management Strategy

04 Perspectives

05 Conclusion

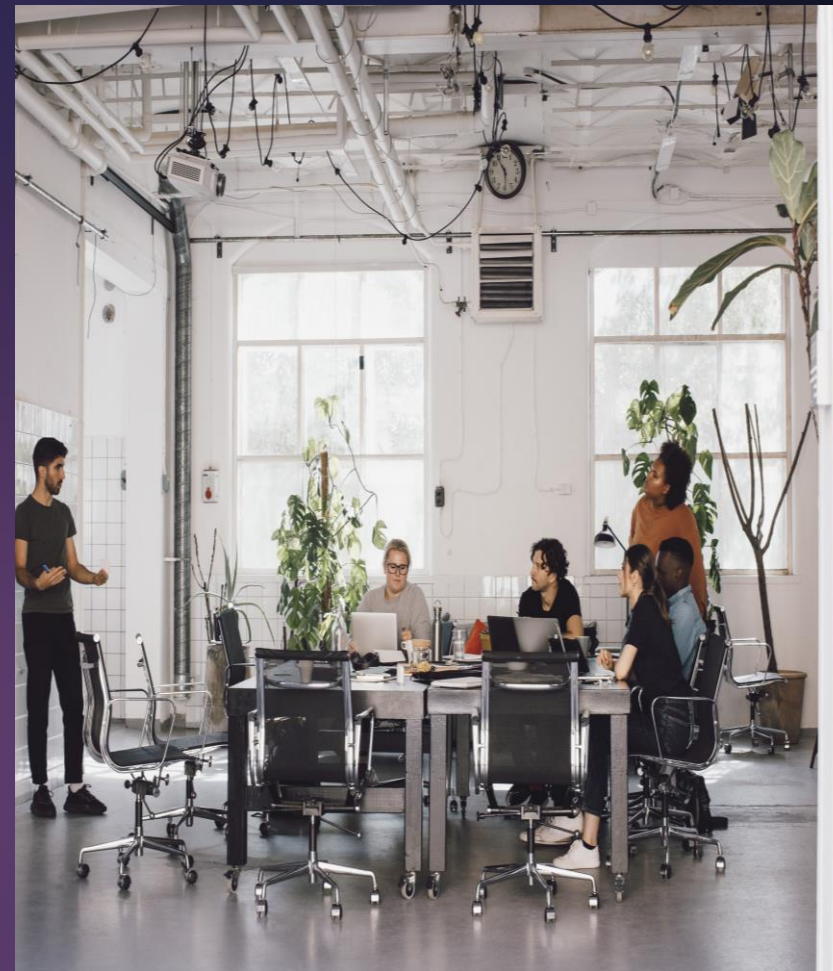
Purpose and Scope



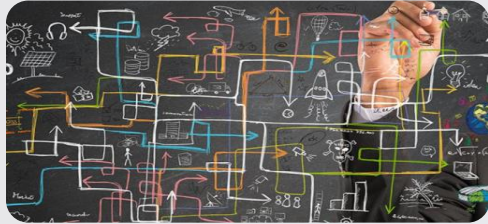
Expose the means made available by the CV Group to establish a global and unified project management process.



This process aims to define the internal CV organization, clarify the roles of the different stakeholders and detail the progress of CV projects from receipt of user requirements to the work site installations and commissioning.



Motivations & Challenges



Diversity and
complexity
of CV
Projects



Multiplication
of interfaces
and
contributors

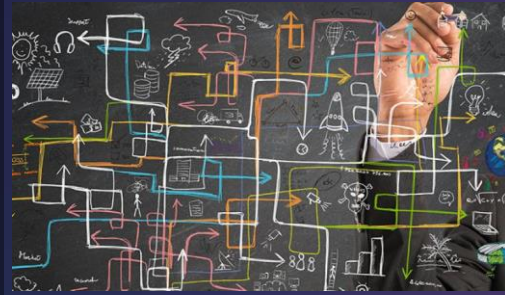


Retirement,
loss of
knowledge



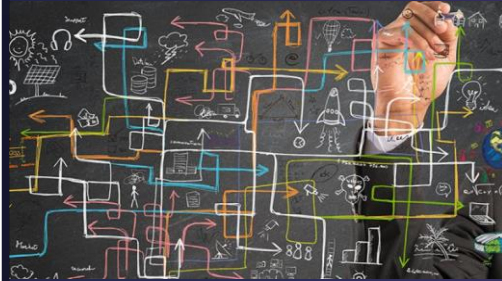
Significant
workload for
project
managers

Motivations & Challenges



Diversity and
complexity of CV
Projects

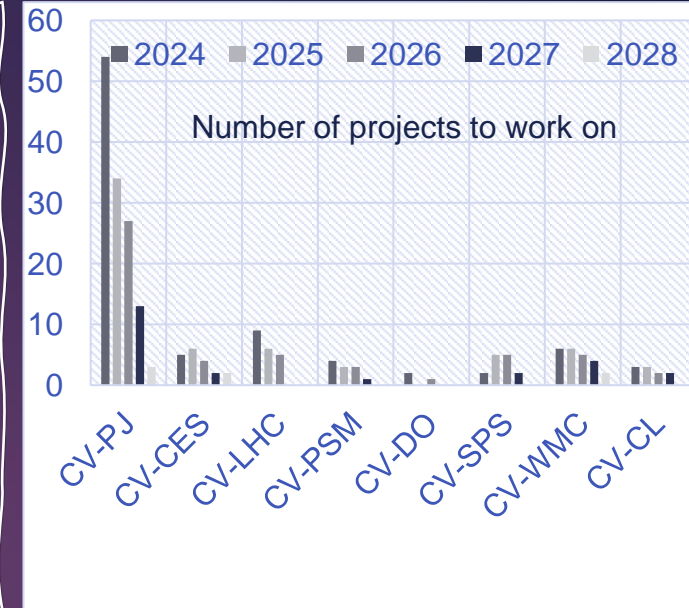
Motivations & Challenges



Diversity and complexity of CV Projects

CERN PROJECTS

- LHC
- SPS
- PS
- SRF
- ATLAS
- ACC-CONS
- AD-CONS
- AWAKE
- HL-LHC
- PS-CONS
- SPS-CONS



Motivations & Challenges



Diversity and complexity of CV Projects



Multiplication of interfaces and contributors

Motivations & Challenges



Multiplication of
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contributors

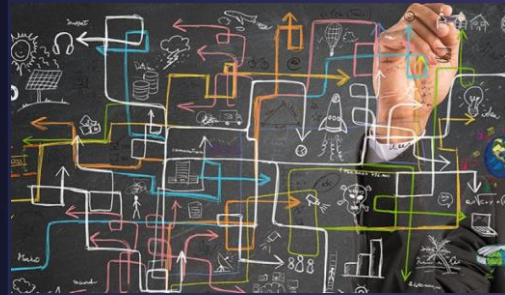
CV Sections

CV-PJ
CV-CES
CV-LHC
CV-PSM
CV-DO
CV-SPS
CV-WMC
CV-CL

CERN

EN-EL
EN-AA
EN-MME
EN-HE
EN-ACE
EN-IM
BE-EA
HSE
IT-CS

Motivations & Challenges



Diversity and complexity of CV Projects



Multiplication of interfaces and contributors



Retirement, loss of knowledge

Motivations & Challenges



Retirement, loss
of knowledge

Lack of common
procedures and
guidelines for PLs and
newcomers

Need training for
newcomers

Motivations & Challenges



Diversity and
complexity of CV
Projects



Multiplication of
interfaces and
contributors



Retirement, loss
of knowledge



Significant
workload for
PL

Motivations & Challenges

Time and energy must be saved in project coordination

Roles must be defined to better interact with all stakeholders



Significant
workload for
PL

EN- CV Project Management Strategy

CV project management strategy is to establish systematic methods and procedures that build a framework that helps structure the project while meeting user requirements.

The strategy consists of three main components:



Definition of criteria & requirements:

Specifications
Flowcharts and
Procedures

Control and Monitoring

Supervision of on-site work
Reception of installations
Documentation management

Continuous Improvement

Reporting
KPI

EN-CV Technical Prescriptions

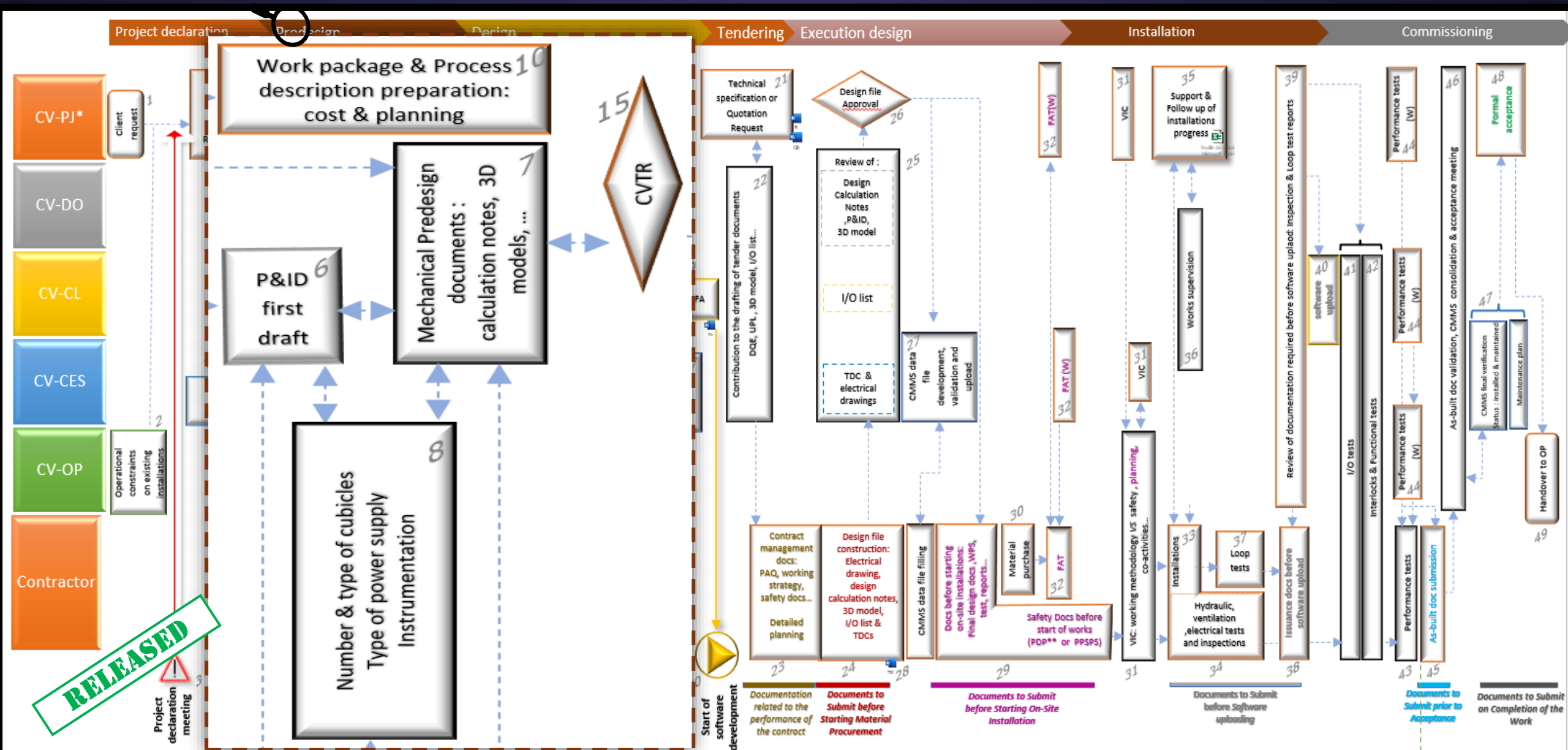
CVTPs describe the technical requirements for the supply and installation of the various equipment linked to CERN's cooling and ventilation systems.

- Ventilation system
- Piping and accessories system
- Control and regulation
- Electrical Installation
- Hydraulic Instrumentation
- Documentation
- CMMS (*Computerized Maintenance Management System*)
- Identification of HVAC components
- Compressed Air Instrumentation
- Identification of Hydraulic components
- Pneumatic Control system
- Compressed Air Pipeline equipment
- Equipment I/O Interface Rules and Naming
- Standard Electrical Drawings

EDMS:

<https://edms.cern.ch/document/1271868/11.0>

-  1271866 (v.4.13) CVTP - Control and Regulation
-  1271867 (v.3.0) CVTP - Hydraulic Instrumentation
-  1271868 (v.11.0) CVTP - Electrical Installations
-  1271869 (v.3.0) CVTP - Identification of HVAC components
-  1271896 (v.3.0) CVTP - Documentation
-  1271902 (v.3.0) CVTP - CAMMS Database
-  1272594 (v.1.0) CVTP - Compressed Air Instrumentation
-  1324480 (v.3.0) CVTP - Identification of hydraulic components
-  1470287 (v.1.0) CVTP - Pneumatic Control Systems
-  1470288 (v.1.0) CVTP - Compressed Air Pipeline Equipment
-  2155161 (v.1.0) CVTP - Equipment I/O Interface Rules and Naming Convention
-  2369279 (v.2.0) CVTP - Standard electrical drawings
-  1064206 (v.4.0) CVTP - Labeling of equipment
-  1271864 (v.6.0) CVTP - Ventilation Systems



(*) Or any other project leader outside of CV PJ section
 (***) PDP drafted jointly by PJ, OP & contractor

- Acronyms:**
- CV: Cooling and Ventilation group
 - PJ: Project section
 - OP: Operation sections (including PSM, SPS, LHC & WMC)
 - QR: Quotation Request
 - WP: Work Package
 - DQE: Detailed Quantitative Estimate
 - FA: Functional Analysis
 - DO: Design Office section
 - CL: Control section
 - CES: CMMS, Electricity, Store section
 - SLD: Single Line Diagram
 - QF: Quotation Folder
 - I/O: Input/Output
 - CVTR: Cooling & Ventilation Technical Review
 - PAQ: Plan Assurance Qualité (Quality Assurance Plan)
 - VIC: Visite Inspection Commune (Joint Inspection)
 - FAT: Factory Acceptance Test
 - PDP: Plan De Prévention (Prevention Plan)
 - UPL: Unit price list
 - TDC: Technical Documentation of Component
 - PPSPS: Plan Particulier de Sécurité et de Protection de la Santé
- Workflow Legends:**
- START OR END
 - DECISION

EN-CV Project Management Procedure

The purpose of this document is to describe in an exhaustive way the different stages of the project, deliverable review & acceptance process workflow and milestones.

Detailed

Project
 declaration

Purpose	<ul style="list-style-type: none"> Review and update (if necessary) of all documents required to start site installation. Notification to CV shareholders of the start of site installation. Support, coordination and supervision of the contractor works.
Main Reference Document(s)	Fiche de poste [XXV] Acceptance procedure for CV installations [XXXII] Contractual documents
Relevant Dates	Expected process start date: The VIC meeting should be held before the start of CERN site installation.
Key Stakeholders	Responsible of Production: Contractor Accountable: PJ Contributors: CES, CL, OP, and contractor Informed: Group Leader and Users
Scope	<p>Definition: After the issuance of the documentation (31) required for the start of installation, the VIC meeting (31) should be held to allow the contractor to launch the installation works. Installation is carried out by the contractor, works supervision is realised by OP sections and installation support is provided by PJ.</p> <p>Inputs required: Before starting site installation, the contractor shall submit all documents related to installation launch and safety aspects (29): Design Calculation Notes, P&ID, 3D models, TDC, electrical drawings, I/O list, working strategy, PAQ, WPS, reports, PDP, etc.</p> <p>Key steps</p> <ol style="list-style-type: none"> The contractor submits safety documents (29) to prepare the VIC meeting. The PL sets up VIC meeting (31) with contractor, supervisors, CES and HSE. If all points discussed during VIC are agreed, the HSE responsible with PL give the green light to the contractor to start installation. The contractor starts site installation works (33). OP sends transport requests to EN-HE. PL or OP send a scaffold request to BE-EA. PL or CES requests cubicle electrical supply connection to EN-EL. CES requests also cubicle powering to EN-EL. The contractors carry out "hydraulic, electrical & ventilation" tests at CERN site. The PL with OP supervisor follow up the work progress, tests, inspections, and non-conformities. The contractor performs the loop test (37). PL with OP supervisors review & accept test reports and NCR to start commissioning and control tests.

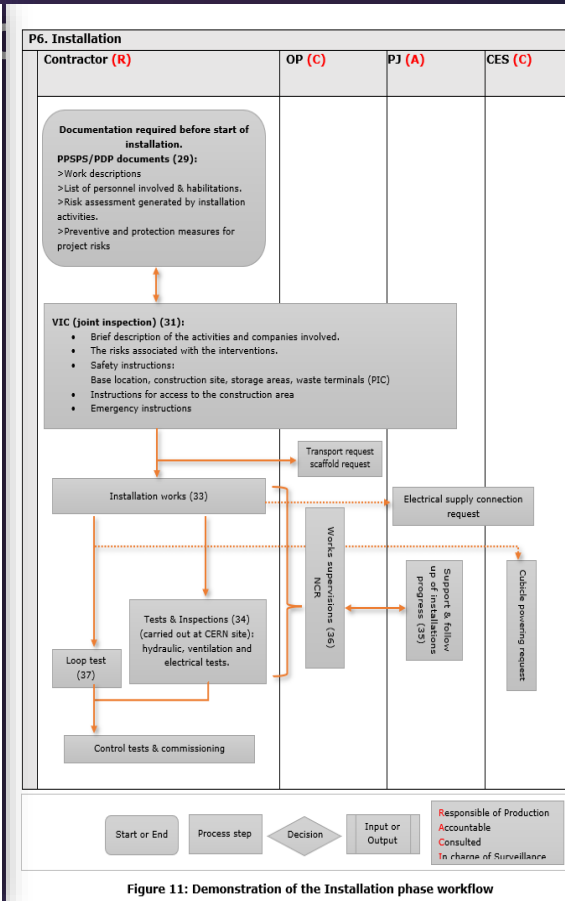
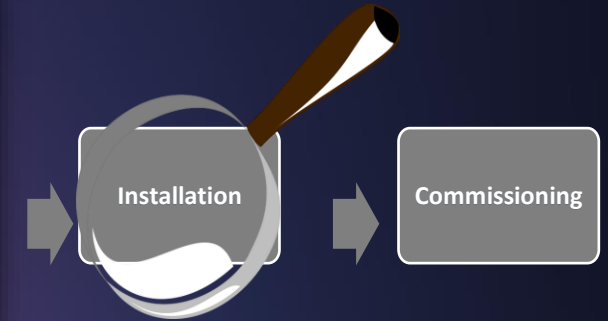


Figure 11: Demonstration of the Installation phase workflow



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Control and Inspection Plan

CV Control plan is part of CV management strategy focused on inspection and supervision. The CV control plan will allow work site supervisors and project leaders to check the progress of the work carried out on CERN site.

This covers three areas:

Installation acceptance readiness:
Technical inspection visit
Formal acceptance



Documentation control:
EDMS Structure
Naming convention

Monitoring of on-site work:
Electricity
Hydraulics
Ventilation
Tests

Project Documentation Structure

- ▶ A_Design and Tendering Phase
- ▶ B_Execution Phase
- ▶ C_Execution Documentation Part 1
- ▶ D_Execution Documentation Part 2
- E_As-built Documentation Package



A	Design and Tendering Phase
10	Roadmap
20	Administration CERN
21	Minutes and Presentations
22	Quality and Organization
23	Cost
24	Planning
25	Service Orders and Correspondence
30	Project Definition
31	User Requirements
32	Work Package
33	Engineering Change Request
34	Engineering Specifications
35	Safety
40	Design
41	Mechanical
42	Electrical
43	P&ID and Layout
44	Simulations
50	Tendering
51	Market Survey
52	Invitation to Tender/Quotation Request
53	Quotations
54	Contract/Orders
55	Invoices
60	Photos

B	Execution Phase
70	Minutes and Presentations
71	Working Strategy
72	Safety
73	Quality
74	Cost
75	Planning
76	Progress Reports
77	Commissioning Reports
78	Warranty Interventions
79	Photos
C	Execution (As-built) Documentation Part 1
1	Process and Instrumentation Diagrams (P&IDs)
2	Electrical Drawings
3	Technical Documentation of Components (TDCs)
3.1	TDC - Hydraulic
3.2	TDC - Ventilation
3.3	TDC - Compressed Air
4	Equipment Settings

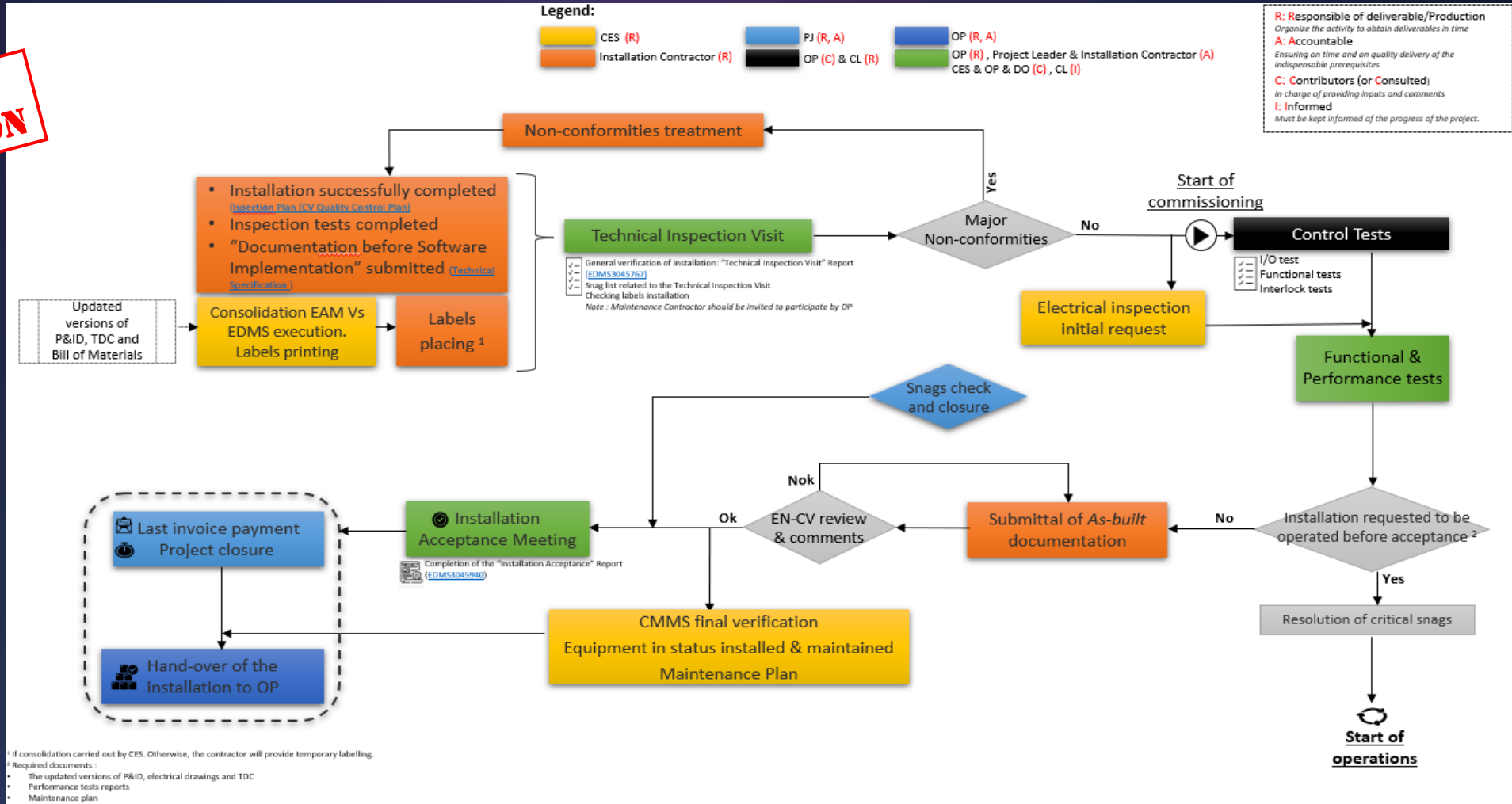
D	Execution (As-built) Documentation Part 2
5	IOM Instructions
6	Calculation Notes
6.1	Mechanical Calculation Notes
6.2	Electrical Calculation Notes
7	Critical Spare Parts List
8	Tests
8.1	Test reports - Factory/Outside CERN
8.2	Test reports - At CERN
9	CMMS Data
9.1	Equipment List
	Maintenance Plan
	Control
	Specifications
10.2	Control Tests
11	Certificates
11.1	Calibration Certificates
11.2	Material Certificates
12	Drawings
12.1	Mechanical/Layout Drawings
12.2	3D Models
13	Acceptance and Start of Warranty
E	As-built Documentation Package

PRINTED

NOT PRINTED

Installation Acceptance Workflow

UNDER DISCUSSION



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KPI

Continuous improvement

CV group wishes to maintain two areas of improvement:



Reporting



KPIs

Reporting: What happened?



Each Project Leader monitors the status of project-related milestones, prerequisites, authorized deviations and closure of deviations.



Develop a “dashboard” to enable consistent monitoring of CV projects.

Key Performance Indicator

KPIs are used to **evaluate the performance of the group/department** or the company in general. These KPIs allow to **quantify the achievements** of the group in terms of **planning, quality of work on site, commissioning, reduction of non-conformities and costs**. The indicators are numerous, and it is up to the group to choose the **metrics according to its expectations and in relation to its activity**.

What are the most important quality KPIs?



Milestones on Time



Reliability of installations



Contractors' performance



Non conformances ratio



Perspectives



Finalization of the CV process management procedure



Update of CV technical prescriptions



Developing new technical templates



Raising awareness among CV teams and other groups to follow the new CV management process



New software integration study to manage the project schedule, define responsibilities and team involvement to follow the documentation review process and milestones



Help other groups develop their own management process if needed

Conclusion

Building CV management process is the key to delivering superior service and consistently meeting customer expectations.





Thank you!

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