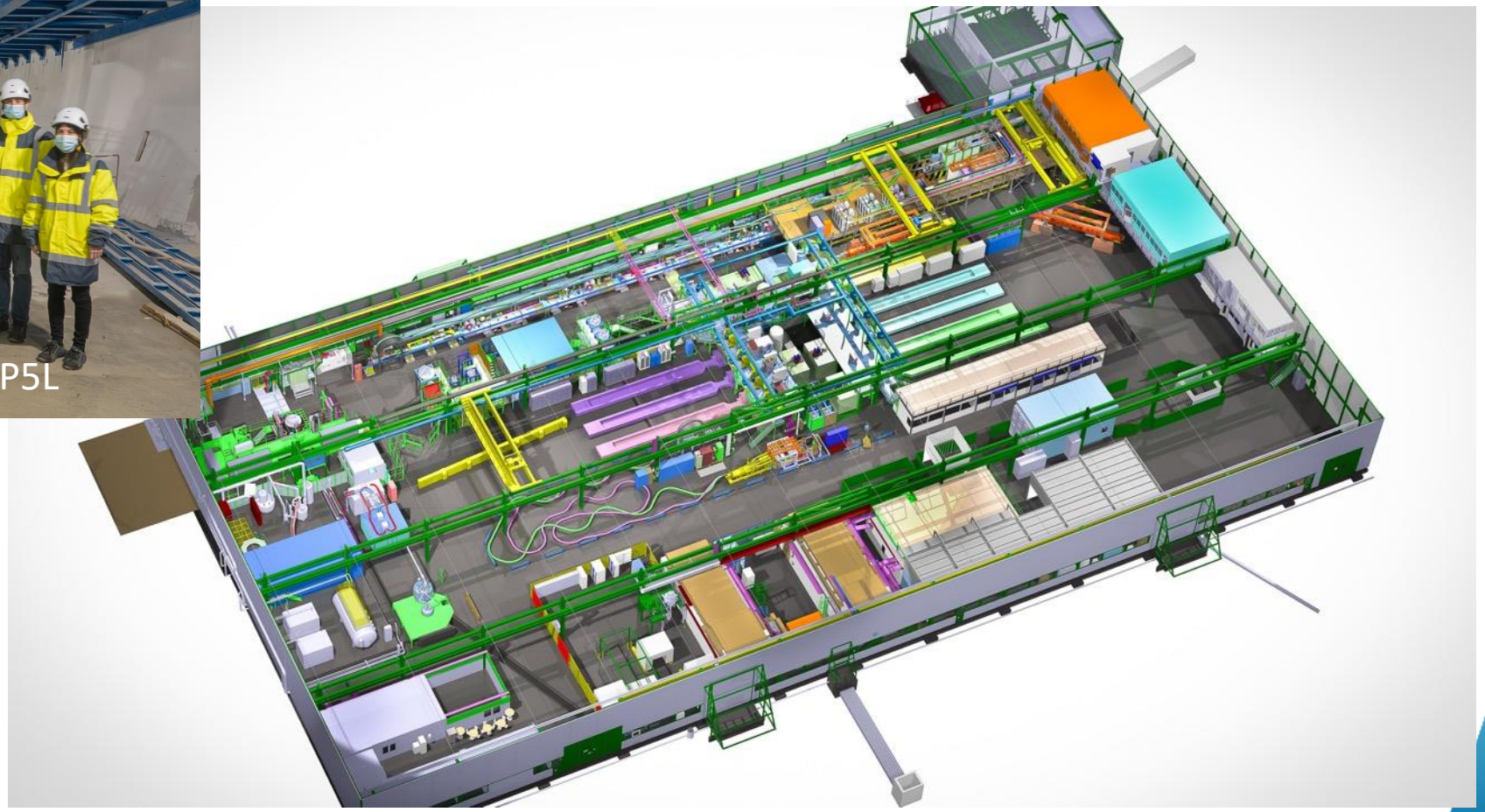
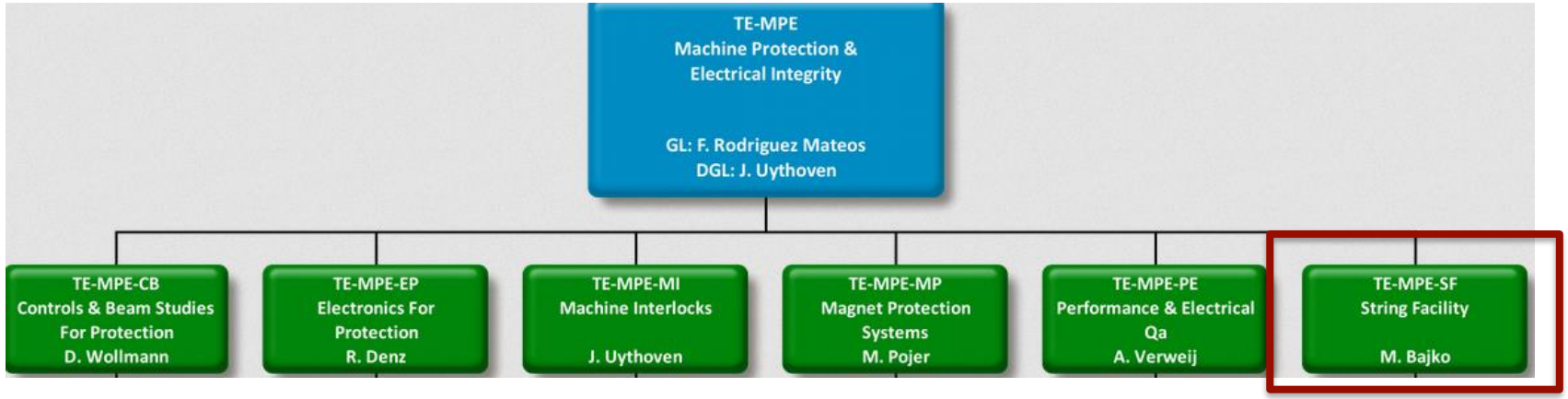
SF (String Facility) Section 2021


Visiting the P5L



M. Bajko
for the TE-MPE Annual Meeting 2021 Dec

String Facility Section



The String Facility section (SF)

- responsible for the coordination of the activities related to the integration, installation, commissioning and operation of the HL-LHC Inner Triplet (IT) String Facility in SM18.
- makes sure that the procedures, test program and required documentation are prepared timely and that the facility is equipped in accordance to the specificities of the measurements and experiments to be conducted.
- guarantees the implementation of the safety requirements both in terms of personnel and equipment, all along the different phases of the installation.
- performs a detailed follow-up of the superconducting magnet circuits during its lifetime cycle, ensuring the adequacy of the applied powering and protection engineering, as well as the required instrumentation and controls systems.



Sebastien BLANCHARD
Davide BOZZINI
Nicolas HEREDIA GARCIA
Samer YAMMINE
Julian ZAWILINSKI
Alvaro SANTIAGO FERRER *




* Alvaro started in 2021 Sept as with main activity on the MCF

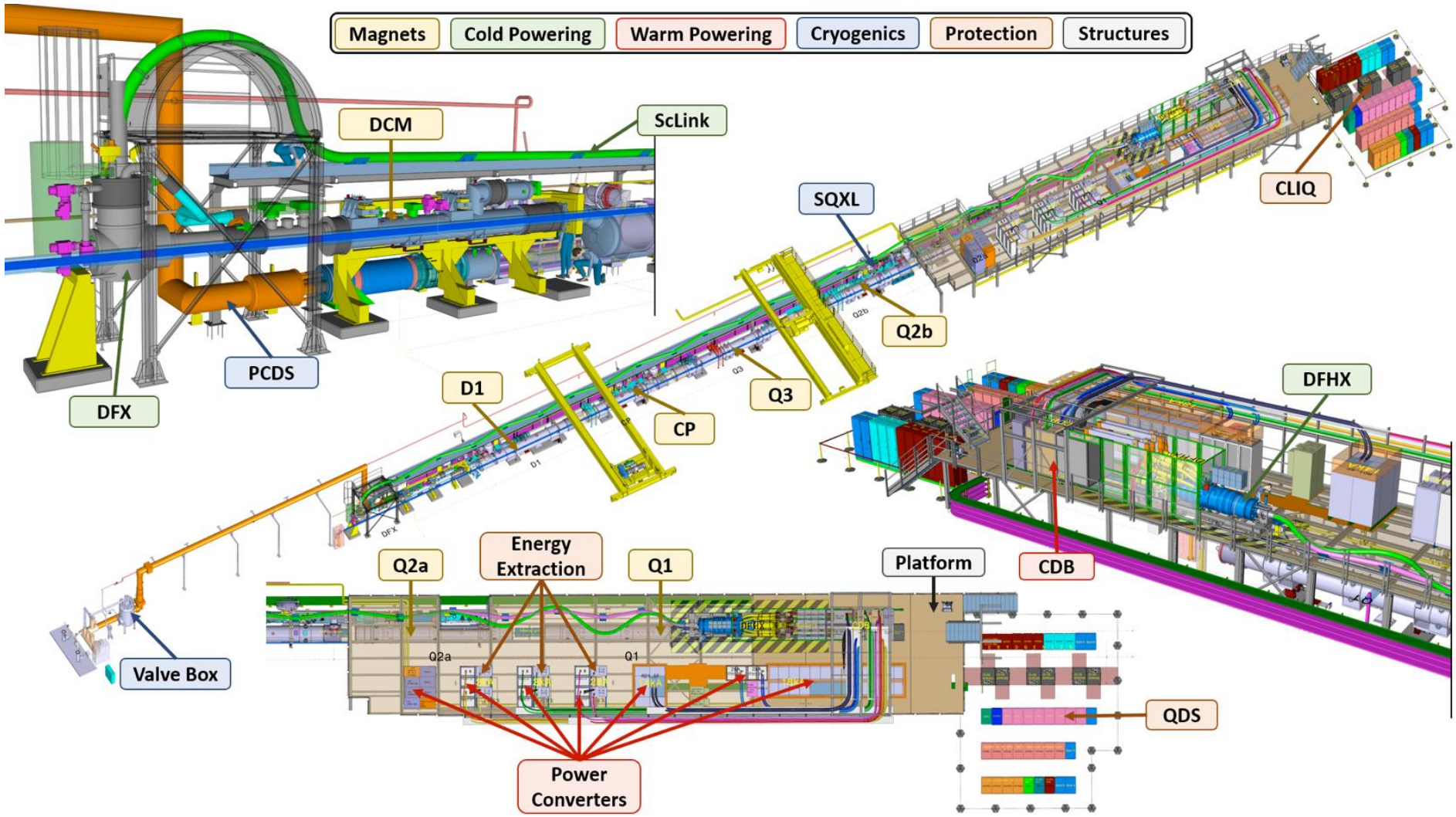
HL-LHC Inner Triplet String

HL-LHC IT **STRING** will deliver **the first complete experience** of installing and operating the IT zone

Scope of the HL-LHC IT STRING is to represent, as best as reasonably achievable in a surface building, the various operation modes to **STUDY and VALIDATE the COLLECTIVE BEHAVIOUR** of the different systems of the HL-LHC's IT zone : magnets, magnet protection, cryogenics for the magnets and the superconducting link, magnet powering, vacuum, alignment, interconnections between magnets and the superconducting link.

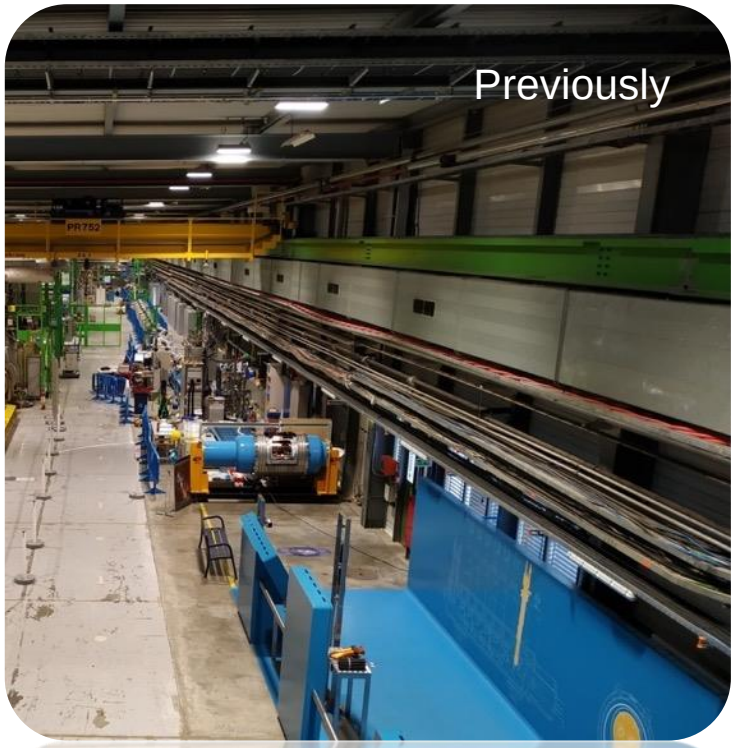
Main Achievements in 2021

Integration of the HL-LHC IT String in SM18



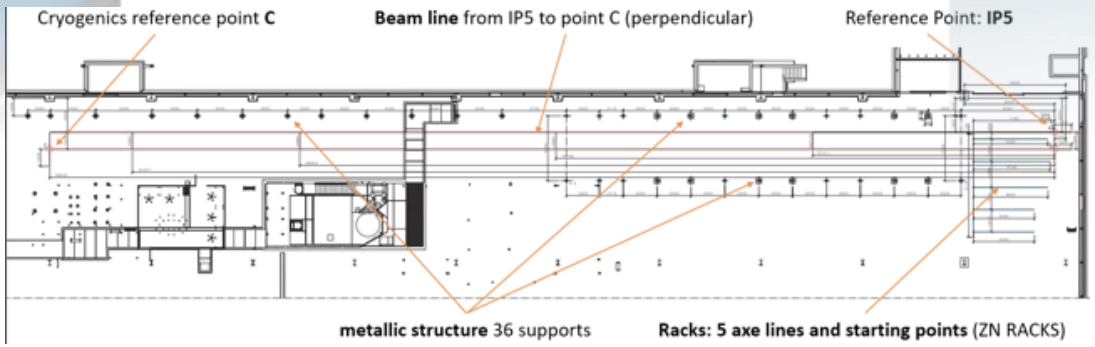
Work completed in close collaboration with the many stakeholders and with respect to the HL-LHC baseline

HL-LHC IT String Zone Preparation

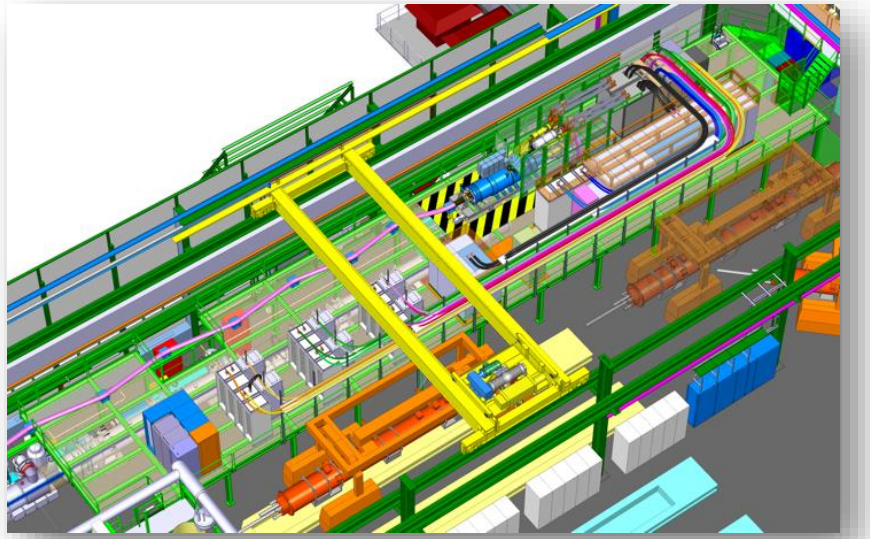


Zone was Vacated, Cleaned, Painted and Referenced for the major elements with a Virtual machine reference of IP5.

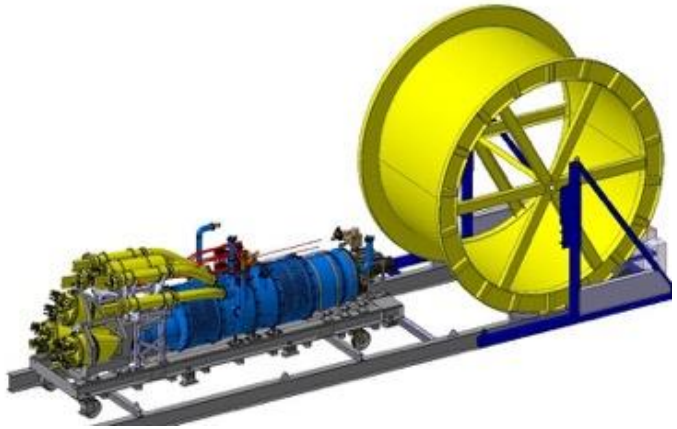
Work completed in collaboration with TE-MSC, SCE-SAM, BE-GM and EN-ACE.



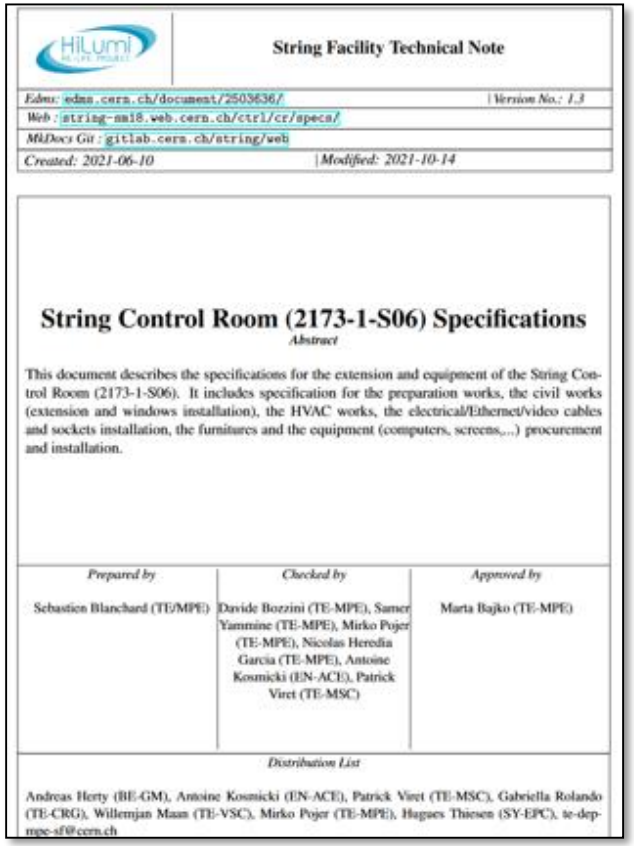
Preparation of the Handling for Cold and Warm Powering



Overhead Crane was installed and tested in 2021 in collaboration with EN-HE



HL-LHC IT String Control Room



String Facility Technical Note

Edms: edms.cern.ch/document/2503636/ | Version No.: 1.3

Web : string-sm18.web.cern.ch/ctrl/cr/specs/

MkDocs Git : gitlab.cern.ch/string/web

Created: 2021-06-10 | Modified: 2021-10-14

String Control Room (2173-1-S06) Specifications

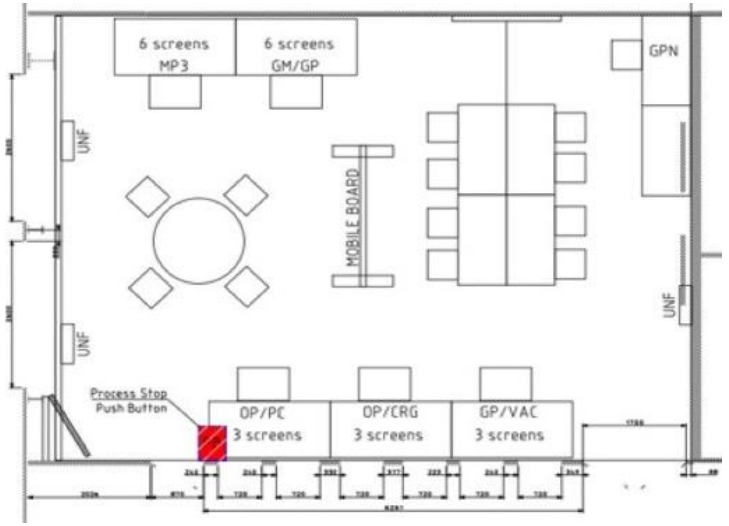
Abstract

This document describes the specifications for the extension and equipment of the String Control Room (2173-1-S06). It includes specification for the preparation works, the civil works (extension and windows installation), the HVAC works, the electrical/Ethernet/video cables and sockets installation, the furnitures and the equipment (computers, screens,...) procurement and installation.

Prepared by	Checked by	Approved by
Sebastien Blanchard (TE/MPE)	Davide Bozzini (TE-MPE), Samer Yammine (TE-MPE), Mirko Pojer (TE-MPE), Nicolas Heredia Garcia (TE-MPE), Antoine Kosmicki (EN-ACE), Patrick Viret (TE-MSC)	Marta Bajko (TE-MPE)

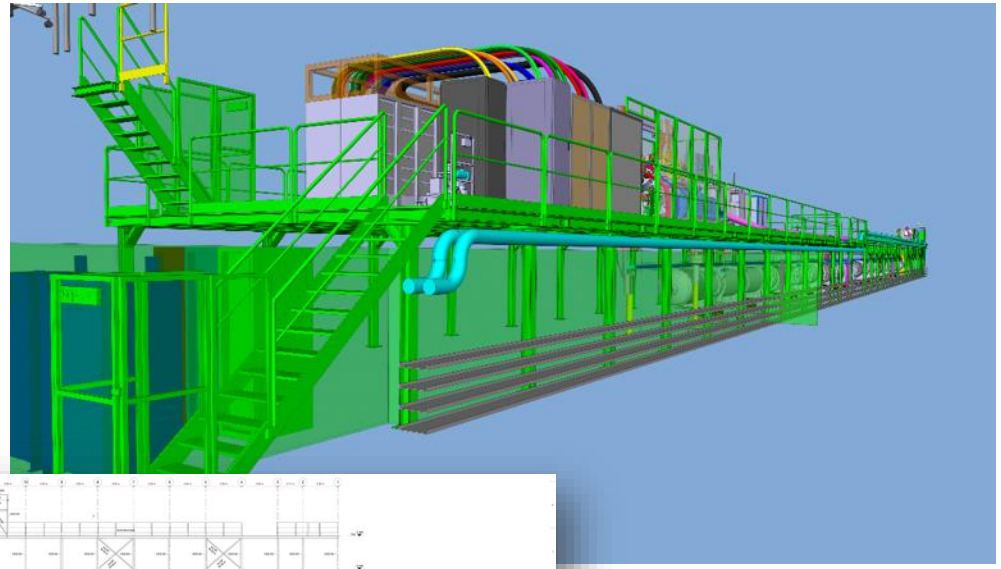
Distribution List

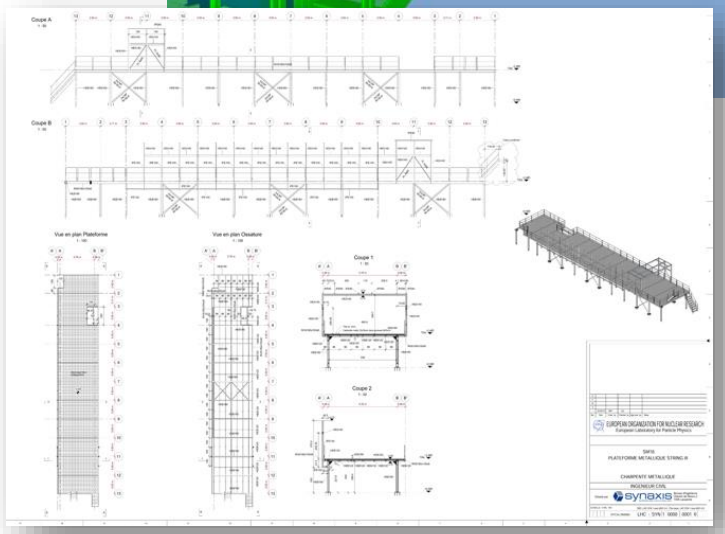
Andreas Herty (BE-GM), Antoine Kosmicki (EN-ACE), Patrick Viret (TE-MSC), Gabriella Rolando (TE-CRG), Willemjan Maan (TE-VSC), Mirko Pojer (TE-MPE), Hugues Thiesen (SY-EPC), te-dep-mpe-sf@cern.ch



Control Room modification has started in 2021, target delivery date: March-April 2022

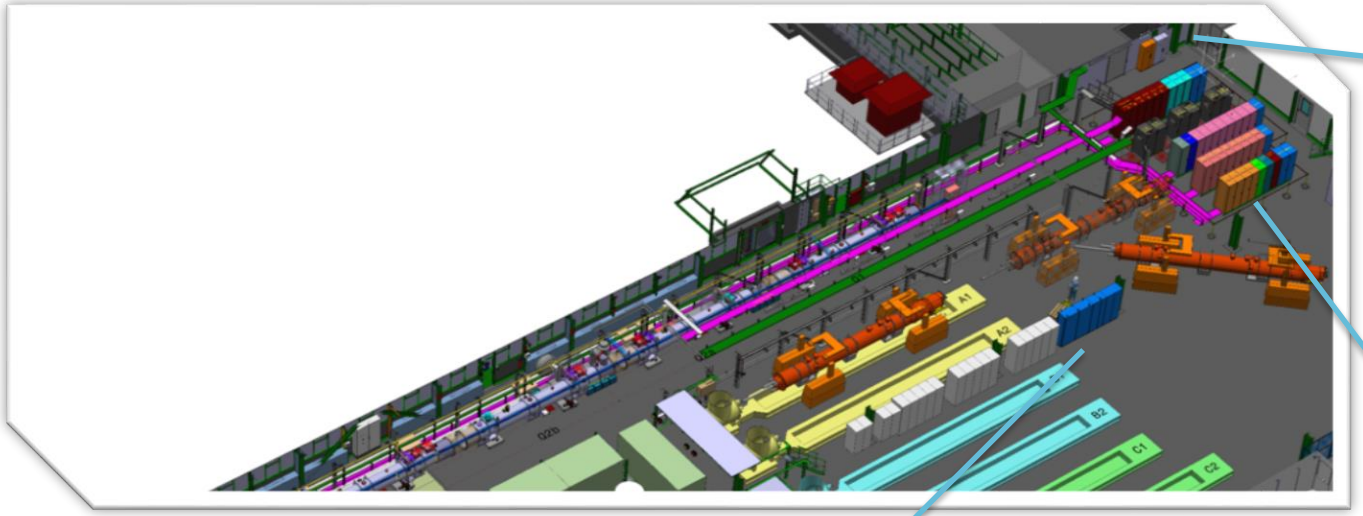
HL-LHC IT String Metallic Structure

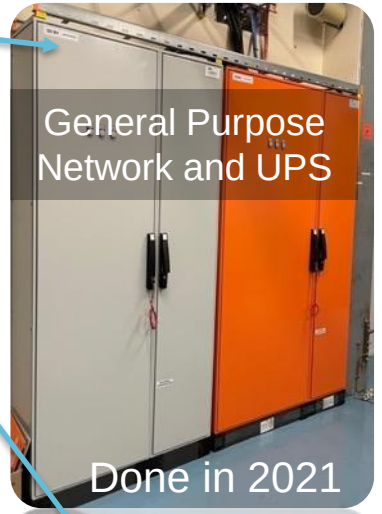


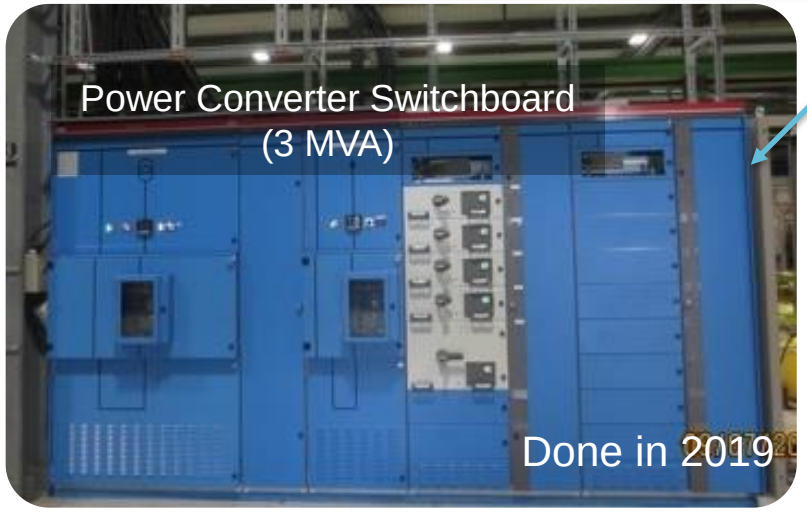


Metallic Structure was challenging from the integration and design point of view, but quite standard in terms of manufacturing. Work in collaboration with SCE-SAM-CE.

Racks, AC Infrastructure, Control Cabling

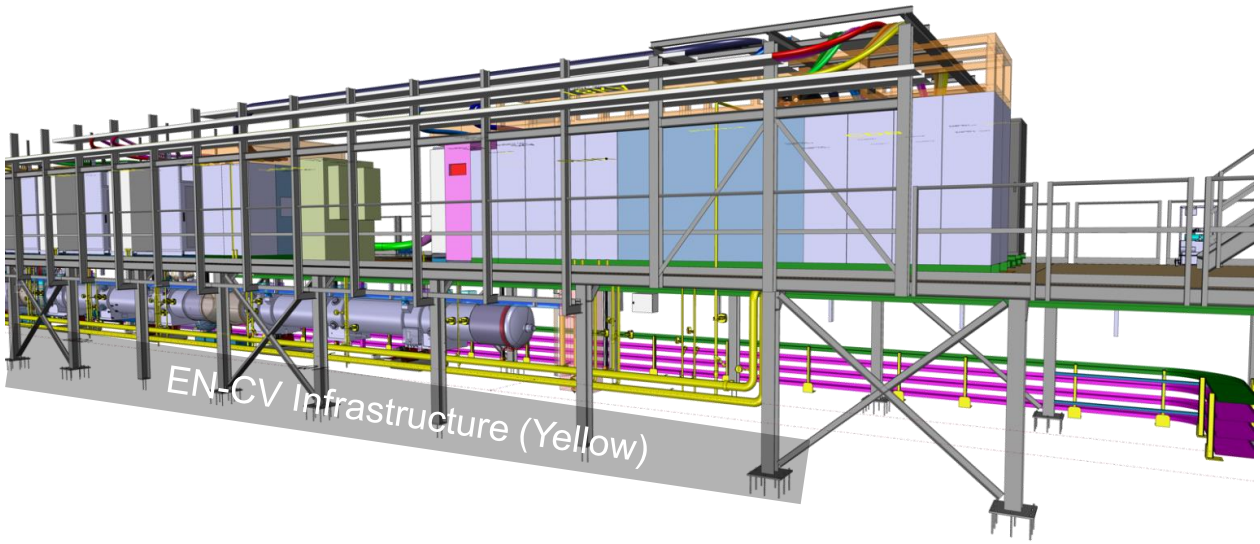


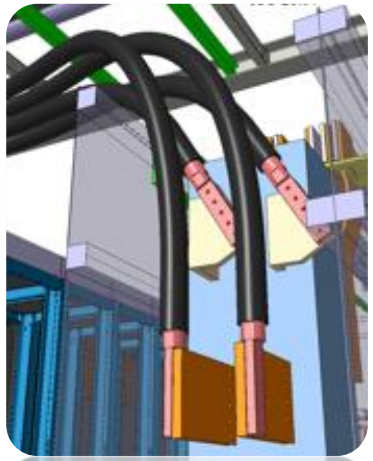


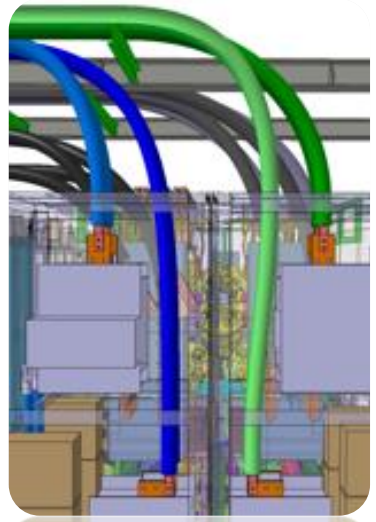


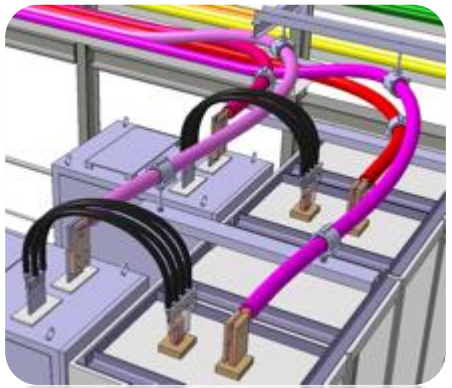
Installation of the switchboards has been completed in collaboration with EN-EL and the installation of the AC Infrastructure to be pursued in 2022.

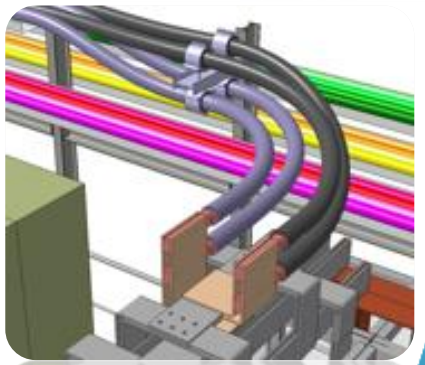
Warm Powering and Water Cooling











Major advancements have been made in the **Warm Powering System Interfaces** including the Power Converters, Circuit Disconnectors, Water-Cooled Cables, and Water-Cooling Systems in collaboration with EN-EL, EN-CV, EN-ACE, SY-EPC.

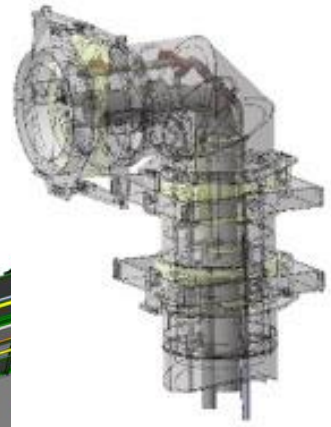
Integration layout differs from the HL-LHC. Ad-hoc studies are therefore necessary.

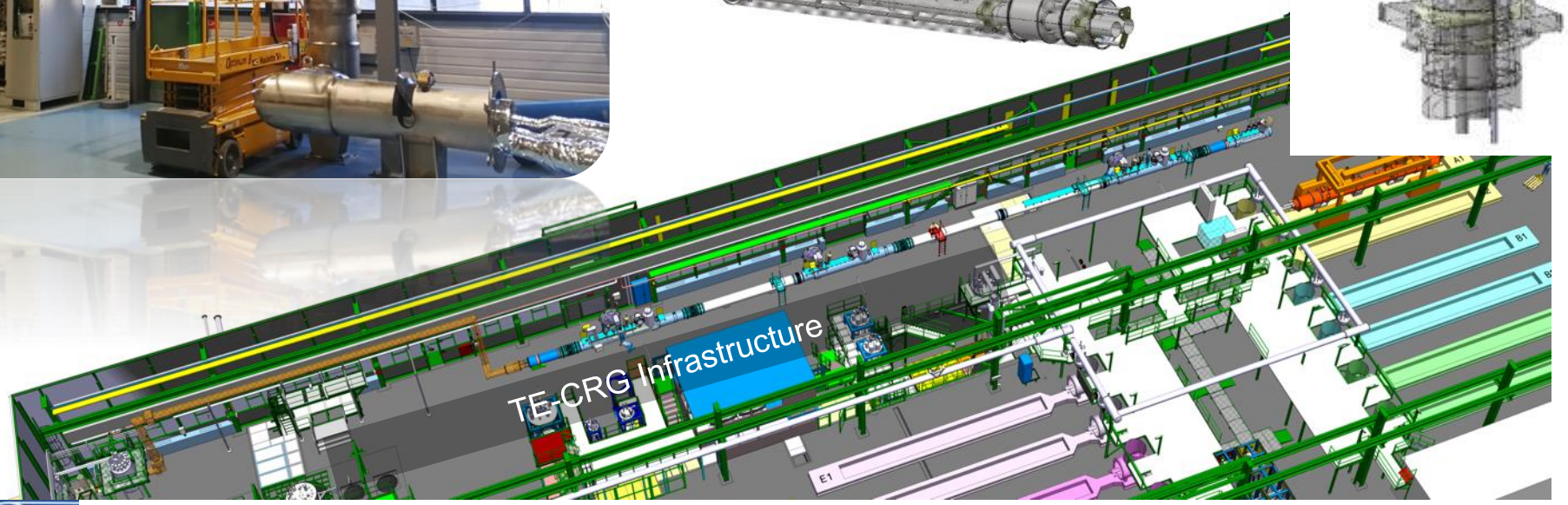
HL-LHC IT String Cryogenic Infrastructure

Proximity Cryogenics are installed in 2021 and the SQXL will be installed and tested in 2022 by TE-CRG in collaboration with EN-ACE and EN-HE.

Jumper Assembly

D1-DFX Service Module

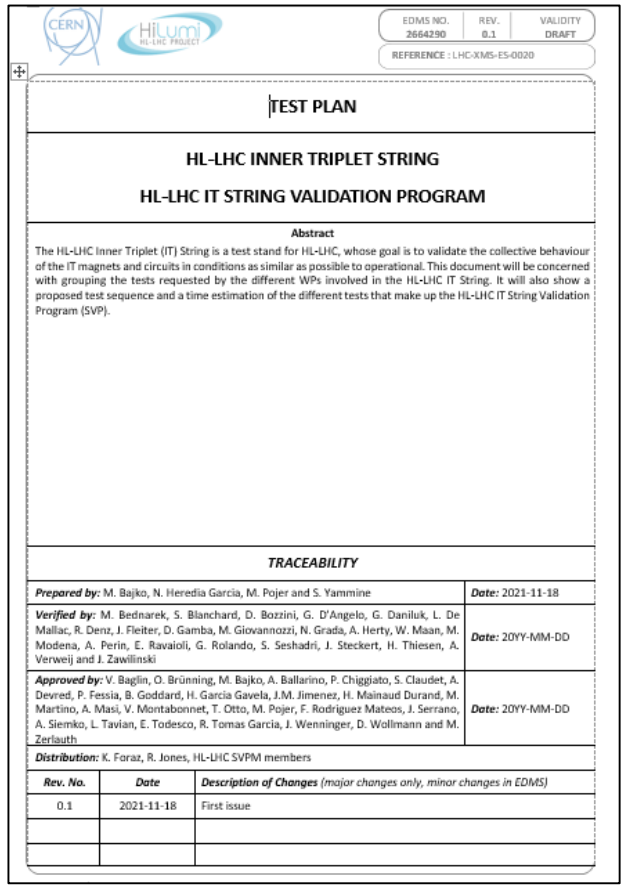




Preparation of the HL-LHC IT String Validation Program

No.	Test Name	HWC or String Specific	Time Duration
1	Protection System IST	HWC	2 w
2	PIC Tests at Zero Current (PIC1)	HWC	1 w
3	Powering Tests for 120A Circuits (I_{nom})	HWC	2 w
4	Powering Tests for RCBX + RQSX3 Circuits (I_{nom})	HWC	3 w
5	Powering Tests for RD1 Circuit (I_{nom})	HWC	2 w
6	Powering Tests for RQX Circuit (I_{nom})	HWC (8w) and String Specific (3w)	11 w
7	Powering of Grouped Circuits	HWC	1 w
8	Bayonet Heat Exchanger Test	String Specific	1 w
9	Cross Talk Studies	String Specific	4 w
10	Operation Powering Cycles	String Specific	3 w
11	Flux Jump Measurements	String Specific	3 w
12	Powering beyond Nominal	String Specific	3 w
13	Thermal Cycle (ElQA and Alignment Tests included)	N/A	13 w
14	Protection System IST	HWC	2 w
16	PIC Tests at Zero Current (PIC1)	HWC	1 w
17	Powering Tests for 120A Circuits (I_{nom})	HWC	1 w
18	Powering Tests for RCBX + RQSX3 Circuits (I_{nom})	HWC	1 w
19	Powering Tests for RD1 Circuit (I_{nom})	HWC	1 w
20	Powering Tests for RQX Circuit (I_{nom})	HWC	4 w
21	Powering of Grouped Circuits	HWC	1 w
22	Powering beyond Nominal	String Specific	1 w
23	Final ElQA Tests at Nominal Conditions	HWC	1 w
24	Warm-up (ElQA and Alignment Tests included)	N/A	5 w

Sequential Tests at Cold (including the Thermal Cycle)



EDMS NO. 2664290 | REV. 0.1 | VALIDITY DRAFT

REFERENCE : LHC-XMS-ES-0020

TEST PLAN

HL-LHC INNER TRIPLET STRING

HL-LHC IT STRING VALIDATION PROGRAM

Abstract

The HL-LHC Inner Triplet (IT) String is a test stand for HL-LHC, whose goal is to validate the collective behaviour of the IT magnets and circuits in conditions as similar as possible to operational. This document will be concerned with grouping the tests requested by the different WPs involved in the HL-LHC IT String. It will also show a proposed test sequence and a time estimation of the different tests that make up the HL-LHC IT String Validation Program (SVP).

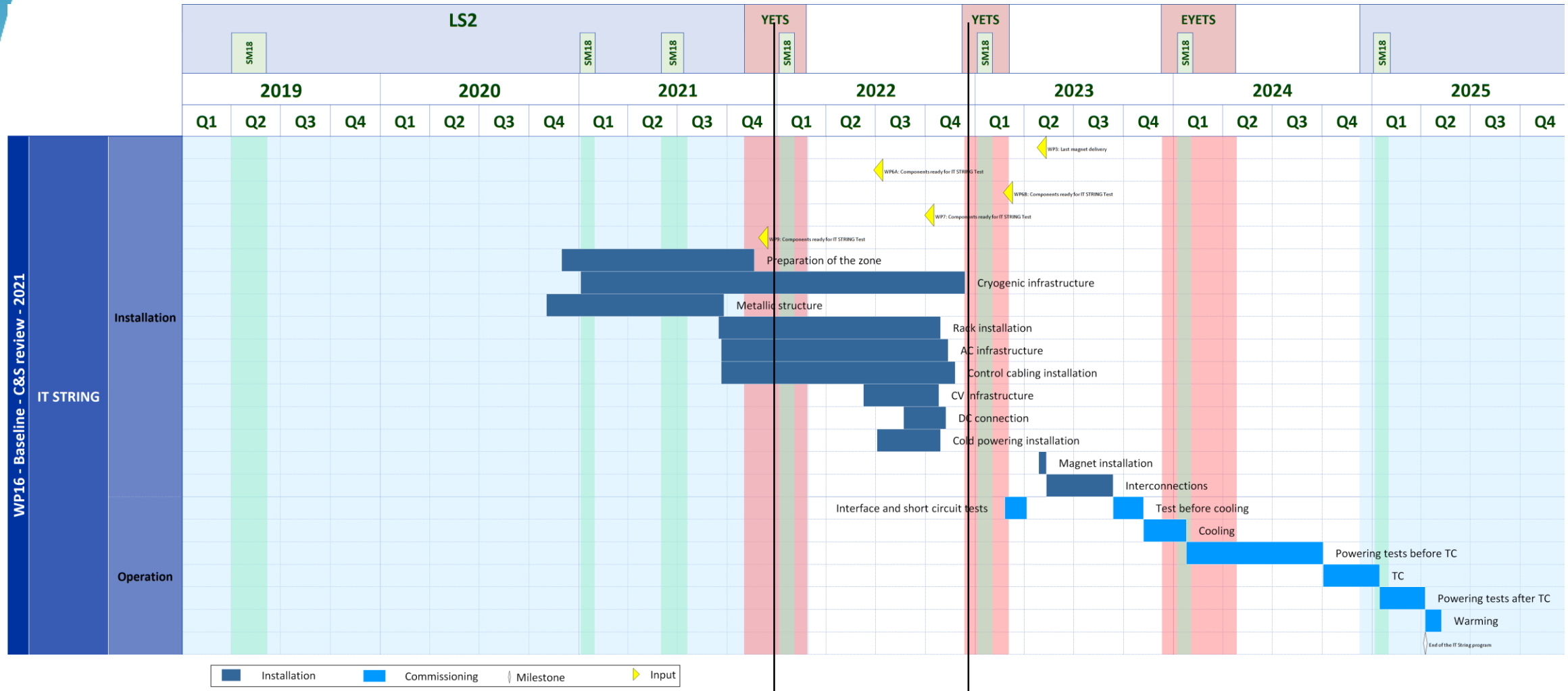
TRACEABILITY

Prepared by: M. Bajko, N. Heredia Garcia, M. Pojer and S. Yammine	**Date:** 2021-11-18
Verified by: M. Bednarek, S. Blanchard, D. Bozzini, G. D'Angelo, G. Daniluk, L. De Mallac, R. Denz, J. Fleiter, D. Gamba, M. Giovannozzi, N. Gradia, A. Herty, W. Maan, M. Modena, A. Perin, E. Ravaioli, G. Rolando, S. Seshadri, J. Steckert, H. Thiesen, A. Verweij and J. Zawilinski	**Date:** 20YY-MM-DD
Approved by: V. Baglin, O. Brünning, M. Bajko, A. Ballarino, P. Chiggiato, S. Claudet, A. Devred, P. Fessia, B. Goddard, H. Garcia Gavela, J.M. Jimenez, H. Mainaud Durand, M. Martino, A. Masi, V. Montabonnet, T. Otto, M. Pojer, F. Rodriguez Mateos, J. Serrano, A. Siemko, L. Tavian, E. Todesco, R. Tomas Garcia, J. Wenninger, D. Wollmann and M. Zerlauth	**Date:** 20YY-MM-DD
Distribution: K. Foraz, R. Jones, HL-LHC SVPM members	

Rev. No.	Date	Description of Changes (major changes only, minor changes in EDMS)
0.1	2021-11-18	First issue

EDMS no. 2664290

Outlook for 2022 and Beyond



Today

2022: String Infrastructure Installation

2023-2025: String Magnet Installation and Validation Program