Technical Galleries Consolidation Program – Budget and Schedule

Project Board #2– 28th April 2022 – Sébastien EVRARD, Project Leader on behalf of the Project Team

Content

TECHNICAL GALLERIES CONSOLIDATION

- **Project Management**
  - Budget
  - Schedule
  - Procurement Plan
- **Summary**
- **Questions and answers**

MTP 2022 fact sheets

16. Technical infrastructure

16b. Technical galleries part

Activities	Consolidate the technical galleries in the Meyrin and Prevessin sites, with the exception of trenches, buried network and beam tunnels.
Risks	Outage of one service may lead to activity interruption, including for accelerators and experiments. Work progress delay due to potential limited available resources (during technical stops and shutdown) may require further prioritisation or staging activities. The final consolidation cost of each gallery will depend on the compensatory measures needed to ensure uninterruptible services during the renovation (major supply backbones) and might be impacted by material cost increase.
2023 targets	Based on the lessons learned from the consolidation of the pilot technical galleries being completed in 2022, renovate the technical galleries of the West area of the Meyrin site, comprising a total of 10 sections.
Future prospects & longer term	The planning has been consolidated with the confirmed input on the installed services requirements and in synergy with other projects (e.g: the new Prévessin Computing Centre, the North Area Consolidation project etc.). Priority is first given to the most demanding Meyrin site galleries. Work impacting accelerators operation will only be planned during technical stops and shutdown. Approved resources will define the progress of the consolidation programme. The consolidation program also aims to enable probable future extensions and will improve the management of safety and environmental aspects.

CERN budget for 2022	Personnel (FTE)	Personnel (kCHF)	Materials (kCHF)	Total (kCHF	Comments
	6		3’461	3’461	

2022 Material Budget

version 2_
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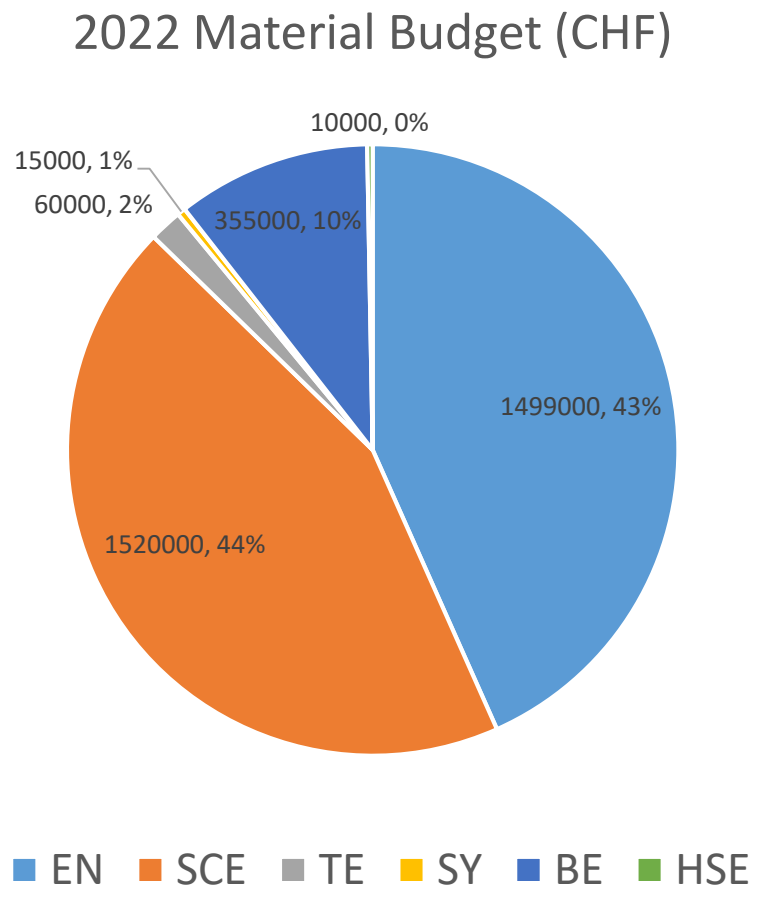
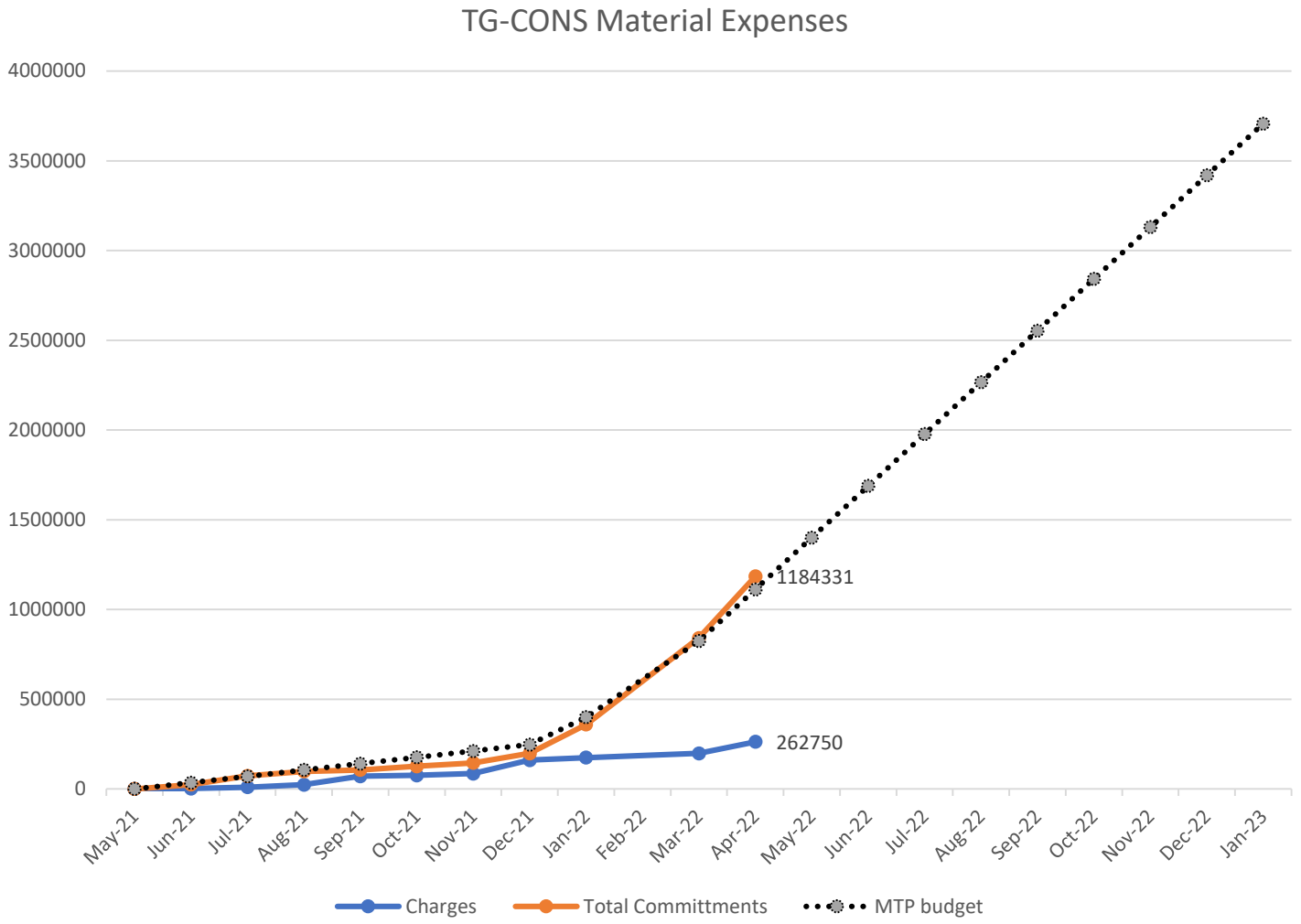
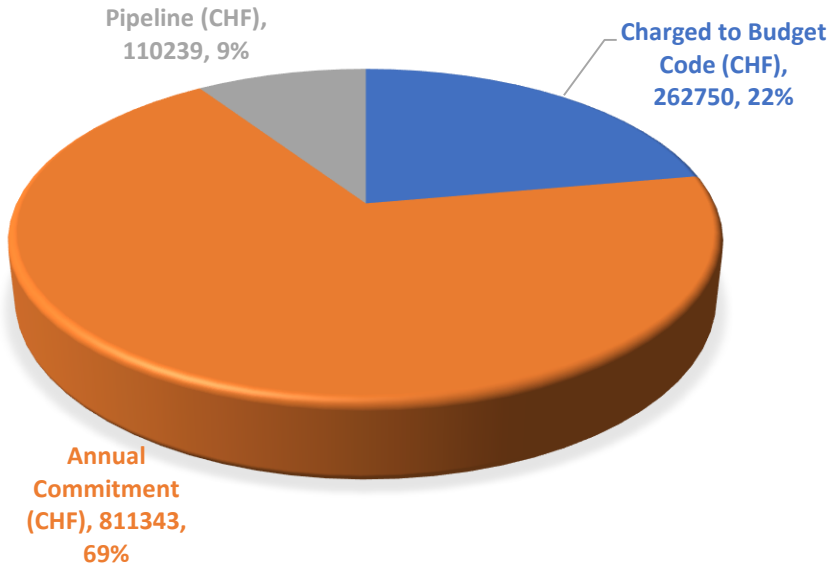
Budget Code	Dept	Group	Budget Code Description	1st Materials Release Year N in CHF
54800	EN	CV	Technical Galleries - support EN	100000
54802	EN	CV	TGC3 - Cooling and Ventilation	750000
54803	EN	EL	TGC4.1 - Power Distribution	50000
54804	EN	EL	TGC 4.2 - DC cabling	49000
54805	EN	CV	TGC 19.5 - Signal Cabling	30000
54806	EN	EL	TGC 4.3 - Optical Fibre	100000
54807	EN	AA	TGC 5 - Alarms	100000
54808	TE	CRG	TGC 6 - Technical Galleries-Cryogenics	60000
54809	SY	EPC	TGC 7 - Power Converters	10000
54810	SY	ABT	TGC 8 - Beam Transfer	5000
54812	BE	CEM	TGC 10 - Controls, electronics	5000
54813	EN	HE	TGC 11 - Installation, Transport and Handling	100000
54814	EN	CV	TGC 12 - Project Safety	5000
54815	BE	EA	TGC 13 - Experimental Areas	350000
54818	EN	ACE	TGC 16 - CP2 - Engineering	100000
54820	HSE	OHS	TGC 18 - CP4 - Integrated Safety	10000
54821	EN	CV	TGC 19 - CP5 - Decabling / Cabling campaigns	115000
54822	HSE	RP	TGC 18 - CP4 - RP Classification	0
76125	SCE	SAM	TGC 2-15-17 - Civil Engineering - Logistics - I-Gallery	1520000
			Total	**3459000**



Budget Situation on April, 25th 2022





- Total commitments: 1,2 MCHF
- Charged: 263 kCHF
- Pipeline: 110 kCHF
- 2021 material budget: 247 kCHF
- 2022 material budget: 3461 kCHF

Resources – M2P

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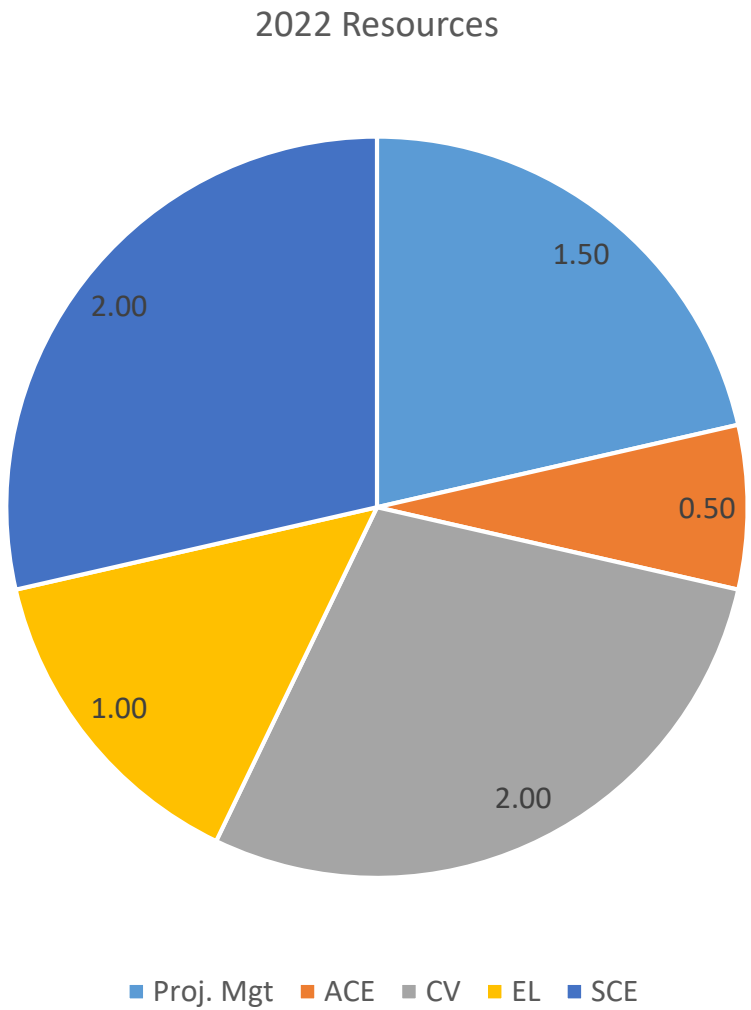
Group	Fellow/VIA (FTEs)	FSU (FTEs)
Proj. Mgt.	1.5	
EN-EL		1
EN-CV		2
EN-ACE		0.5
SCE-SAM		2
TOTAL	**1.5**	**5.5**

- Same figures for 2023, 2024 and 2025.
- To be noted: request from HSE to fund a M2P position (fellow) to give support to TG-CONS, discussion on-going



Resources – CERN staff

			YEARS	2022	2023	2024	2025
Budget Code	Dept	Group	Budget Code Description	FTEs	FTEs	FTEs	FTEs
54800	EN	CV	Technical Galleries - support EN	0.4	0.5	0.5	0.5
54802	EN	CV	TGC3 - Cooling and Ventilation	1.0	1.0	0.8	0.8
54803	EN	EL	TGC4.1 - Power Distribution	0.05	0.05	0.05	0.05
54804	EN	EL	TGC 4.2 - DC cabling	0.1	0.1	0.1	0.1
54805	EN	CV	TGC 19.5 - Signal Cabling	0.05	0.05	0.05	0.05
54806	EN	EL	TGC 4.3 - Optical Fibre	0.15	0.15	0.15	0.15
54807	EN	AA	TGC 5 - Alarms	0.1	0.1	0.1	0.1
54808	TE	CRG	TGC 6 - Technical Galleries-Cryogenics	0.1	0.1	0.1	0.1
54809	SY	EPC	TGC 7 - Power Converters	0.05	0.05	0.05	0.05
54810	SY	ABT	TGC 8 - Beam Transfer	0.02	0.02	0.02	0.02
54812	BE	CEM	TGC 10 - Controls, electronics	0.02	0.02	0.02	0.02
54813	EN	HE	TGC 11 - Installation, Transport and Handling	0.05	0.05	0.05	0.05
54814	EN	CV	TGC 12 - Project Safety	0.1	0.1	0.1	0.1
54815	BE	EA	TGC 13 - Experimental Areas	0.1	0.1	0.1	0.1
54818	EN	ACE	TGC 16 - CP2 - Engineering	0.1	0.1	0.1	0.1
54820	HSE	OHS	TGC 18 - CP4 - Integrated Safety	0.2	0.2	0.2	0.2
54821	EN	CV	TGC 19 - CP5 - Decabling / Cabling campaigns	0.1	0.1	0.1	0.1
54822	HSE	RP	TGC 18 - CP4 - RP Classification	0.02	0.02	0.02	0.02
76125	SCE	SAM	TGC 2-15-17 - Civil Engineering - Logistics - I-Gallery	0.6	0.6	0.6	0.6
			Total	**3.61**	**3.71**	**3.51**	**3.51**

Missing staff in red, M2P to fund staff position ?

M2P funded positions + staff = 10 FTEs per year for 2022, 2023, 2024 & 2025

Master Schedule

2021		2022		2023		2024		2025		2026		2027		2028		2029		2030	
S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
	Phase 1 Pilot																		
				Phase 2															
										Phase 3									
																Phase 4			

Based on a failure analysis, consolidation activities should focus on Meyrin site as first priority, then on Prevessin site

818, 825 (new) & 835

1 - Meyrin West Area

2 -Prevessin* 847

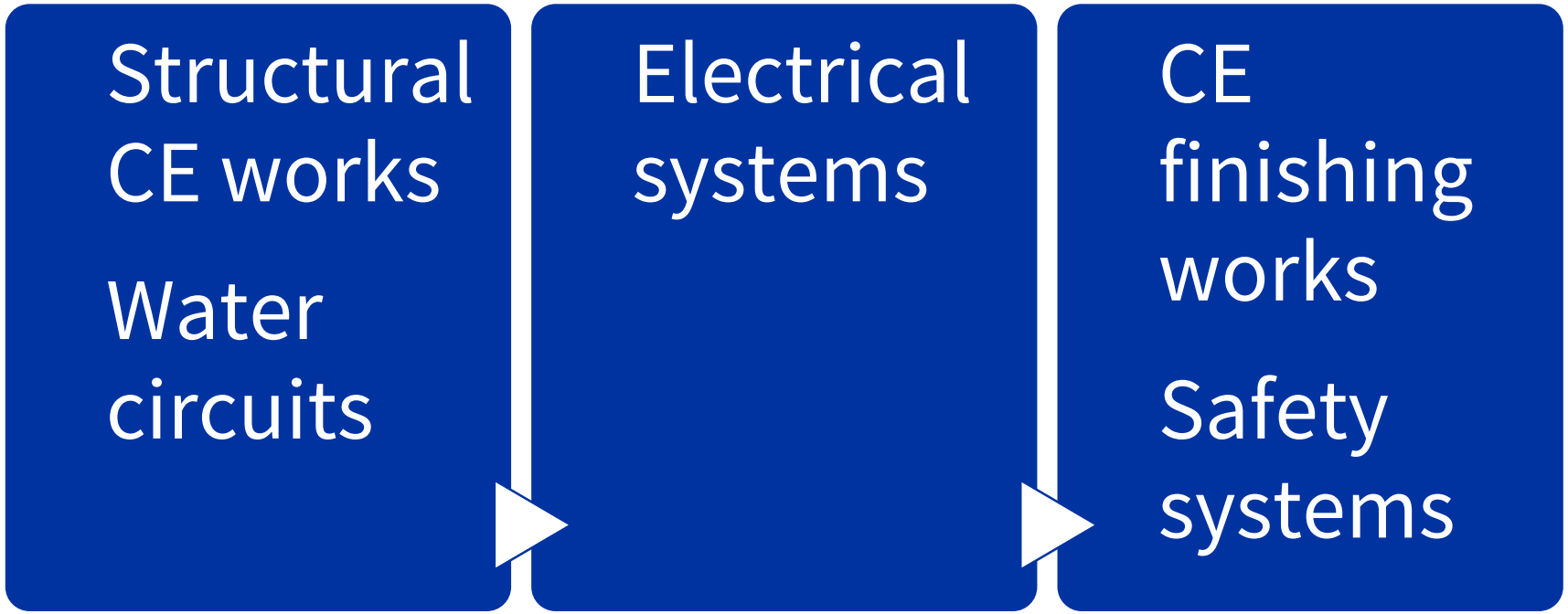
825	1770
826	190
827	167
829	20
830	37
831	37
832	25.5
835	186
836	123
839	115
GHWE3-b.183	181.5
GHWE1-b.180	696

1 - Meyrin: ISR & PS galleries
2 - Prevessin **: 816 & 847 + GHNs

* Only Building services
** only Injector/machine services

Schedule

- Carry out all types of work at the same time is not possible
- Very restricted environment → impossible to have many teams, many people at the same time
- From «heavy works» to «finishing works»
- Water circuits are the schedule driver



Schedule

Strategies for water networks: 5 options identified

- Distribution in **loop network** (redundancy, water supply from two sources, example drinking water for b.378):
  - A. Renovation by sectors (source) → no service disruption
- Distribution in a **straight line** (1 or 2 lines):
  - B. Install new line then remove old line (Ex: heating 835 South) → no service disruption but needs more space
  - C. Remove old line then install new line (Ex: heating 835 North) → service disruption and bears a risk
  - D. Temporary lines (flexible hoses) → minimal service disruption
- Distribution no longer needed due to re-engineering
  - E. Lines to be removed after replacement by other means → no service disruption

Schedule water circuits in GT835

We make profit of the Pilot gallery renovation in 835 to test the various options and learn as much as possible

Place	Activity	Localisation	Group	Planning
GT835	Dismantling Chilled water line (2 pipes)	Side north of GT835	EN-CV	Mar-Jun 2022
GT835	Dismantling EPF not in service line	All GT835	EN-CV	Mar-Jun 2022
GT835	Installation AC and Helium line	All GT835	EN-CV	Mar-Jun 2022
GT835	Connection to new AC line	North side GT835	EN-CV	Mai 2022
B.112	Installation Chilled water line for RF: connection to SCE network (Necessary to dismantle the chilled water lines in service in the side south of GT835)	B.112	EN-CV	Mar-Jun 2022
GT835	Dismantling old hot water lines	Side north of GT835	SCE	Jun-Oct 2022
GT835	Installation new hot water lines	Side north of GT835	SCE	Jun-Oct 2022
GT835	Dismantling Chilled water lines (in service)	Side south of GT835	EN-CV	Nov 2022-Jan 2023 (after Installation in 112)
GT835	Installation new line EP DN150	GT835	EN-CV	Nov 2022-Apr 2023
GT835	Connection to new line EP *Final connection will be done after SCE works (July 2023)*	GT835	EN-CV	Jan 2023
GT835	Connection new Compressed air line	Side south GT835	EN-CV	YETS 2022
GT835	Dismantling bypass between Eau Incendie/EIF	Side south of GT835	EN-CV	Mar-2023
GT835	Dismantling Lines EIF and Eau incendie	GT835	EN-CV	Feb-May 2023
GT835	Installation new Hot water lines	Side south of GT835	SCE	Apr-May 2023
GT835	Dismantling old hot water lines and Compressed air line	Side south of GT835	SCE	Jun-July 2023

C
E
D
E
B

Roadmap for pilot galleries

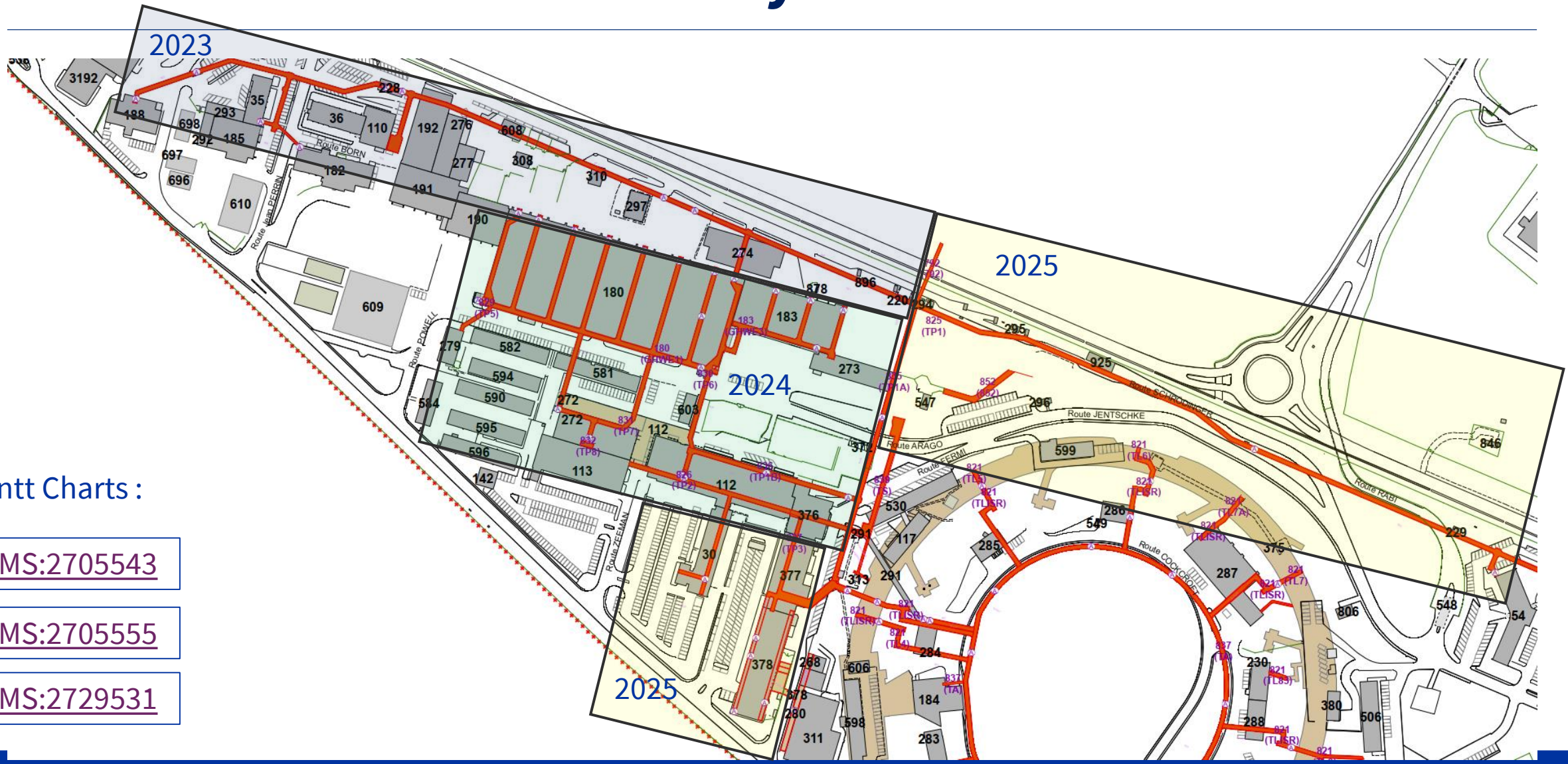
835	Water circuits						Gas circuits				
Part	**EPF**	**EI ***	**AC**	**super heated**	**Demin.**	**Chilled water**	**He LPR***	**He HPR***	**Ar**	**CO2**	**Kr**
North (112-825)	New - B	tb removed E	New - B	New - C	No change	tb removed E	New - B	N/A	N/A	N/A	N/A
South (112-378)	New - B/D	tb removed E	New - B/D	New - B	No change	tb removed E	New - B	N/A	N/A	N/A	N/A
		*new distribution via EPF									

*low/high pressure helium recuperation

818	Water circuits							Gas circuits				
Part	**EPF**	**EI**	**AC**	**super heated**	**Demin.**	**Primary**	**Chilled water**	**He LPR**	**He HPR**	**Ar**	**CO2**	**Kr**
whole gallery	New - B	to be studied	No change	No change	No change	to be studied	N/A	New-B	No change	N/A	N/A	N/A

825	Water circuits						Gas circuits				
Part	**EPF**	**EI**	**AC**	**super heated**	**Demin.**	**Chilled water**	**He LPR**	**He HPR**	**Ar**	**CO2**	**Kr**
1 (835-274)	New - B	tb removed - E	New - B	New - C	DN25	N/A	N/A	N/A	N/A	N/A	N/A
2 (274-110)	New - B	tb removed - E	New - B	New - B	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3 (110-35)	New - B	tb removed - E	New - B	tb studied	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4 (35-188)	New - B	tb removed - E	New - B	tb studied	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Schedule for Meyrin West Area



Gantt Charts :

EDMS:2705543

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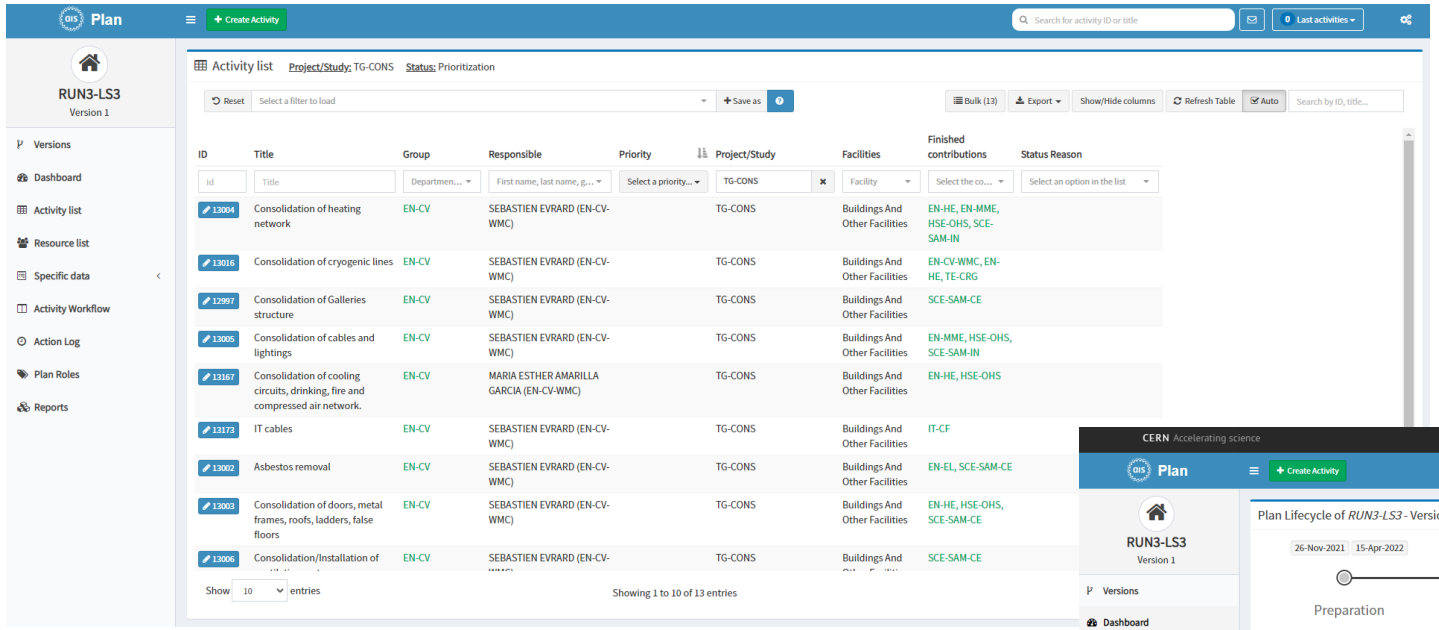
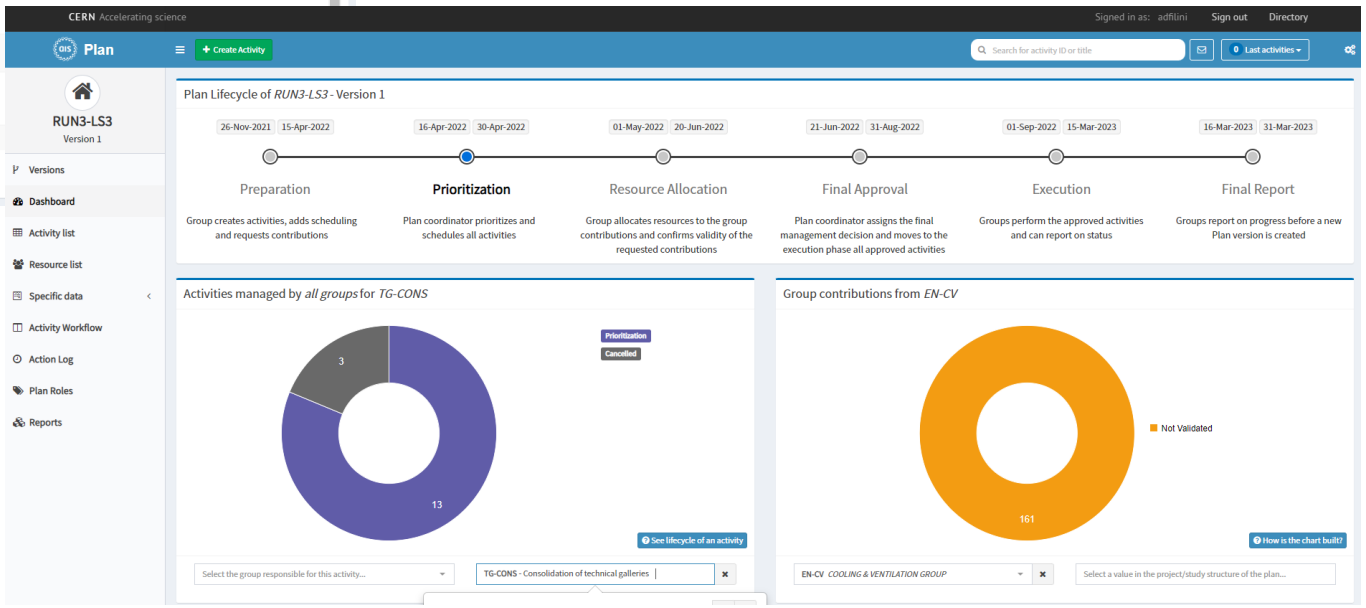
PLAN tool



All activities declared in Plan and in prioritization phase for run 3



Procurement Plan

Context:

- **Period of uncertainties at the global market level (energy, materials, services)**
- **High volatility in prices**

Strategy:

- **ad hoc decision between use of existing frameworks contract and new tendering process**
  - Price Enquiry sent for scan services
  - Use of framework contracts for piping works (dismantling, new installation) after a competitive process
    - Dalkia (SCE-SAM) and EGTIM (EN-CV)
    - For the next 2 years, the price list is frozen → a kind of protection against cost increase

Summary

- Based on a failure analysis, consolidation activities should focus on Meyrin site as first priority, then on Prevessin site
- 825 as new pilot gallery in addition to 835 and 818
- Meyrin West area as phase 2 priority
- Good progress of all Coordinated Packages
- Methodology defined to minimize service disruption
- Re-engineering of services allowing TG layout simplification/streamlining
- Awaiting some confirmations, guidelines from HSE (SRF)
- Use of framework contracts with competitive process → currently one single contractor for all water network modifications
- Phase transition: from studies to worksite (already started for dismantling activities)

Actions defined at the last PB#1

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1. Contact SCE regarding the Integrated Safety documents update.
2. Define the detailed scope of the TG-CONS Project.
3. Consider rearrangement of SCE and CV piping works.
4. Distribute specific guidelines to clarify the ECR process
5. Prepare M2P request for MTP exercise.
6. Check the official French/Swiss regulations on how often specific systems must be replaced.
7. Contact SCE, CV and other relevant services (e.g.: HSE) regarding Desired temperature range of heating system.
8. Create a global budget request regarding maintenance and operation after the completion of galleries' renovation.

Scope of the project

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Consolidation consists in replacement/renovation of equipment at their end-of-lifetime

- An equipment can no longer be used with sufficient reliability
- The equipment has been exposed to levels of radiation that compromise its functionality
- Commercially available spare parts are lacking
- Technical support is no longer available for components or software
- The systems no longer meets safety regulations and standards

Indicators and driving factors for Consolidation

- Failing equipment, fault tracking, observed failure rates
- Impending end-of-lifetime, need for anticipation
- Increasing maintenance costs
- Decreasing availability of spares

From Chamonix 2022
ACC-CONS - R. Billen

Guidelines perfectly applicable to TG-CONS

Consolidation needs are driven by the Equipment Groups

- The group's recurrent operational material budget is insufficient to cope with these expenses
- All equipment groups of the A&T Sector and a few more
- The group's workforce is required to execute Consolidation activities

Interfaces with other project/program

TECHNICAL GALLERIES CONSOLIDATION

Consolidation

General services & General Safety

- **TG-CONS approval through CWR provided by the groups**
- **Integration by TG-CONS team**

- **Funding by TG-CONS if approved**
- **Examples:**
  - Heating and drinkable circuit networks consolidation
  - Alarm systems
  - Orphan & decommissioned systems to clear 100% of the gallery from obsolete systems

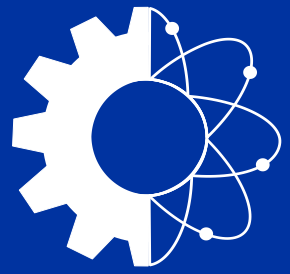
Project

New Equipment/connection in Tech. Gal.

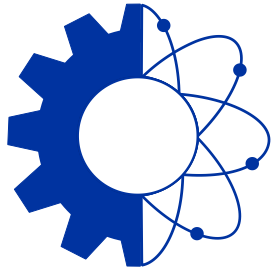
- **TG-CONS approval through ECR provided by the projects**
- **Equipment 3D model by Project team, then integration by TG-CONS teams**
- **Funding by Projects**
- **Examples:**
  - PCC connections in GT818
  - New Prevessin Heating plant connections in GT818
  - NA-CONS, EL-CONS (what is included in their mandate and scope)

Questions/Topics for discussion

- **825 as new pilot gallery in addition to 835 and 818 ?**
- **Is the project's procurement plan reasonable ?**
- **Interface with building/ surface equipment**
  - Removal of obsolete hydrants/RIA
  - Removal of obsolete burried pipes
- **Gallery handled area by area ?**
- **Any other topic ?**



Engineering Department



ENGINEERING
DEPARTMENT