Test Facility (Demonstrator)

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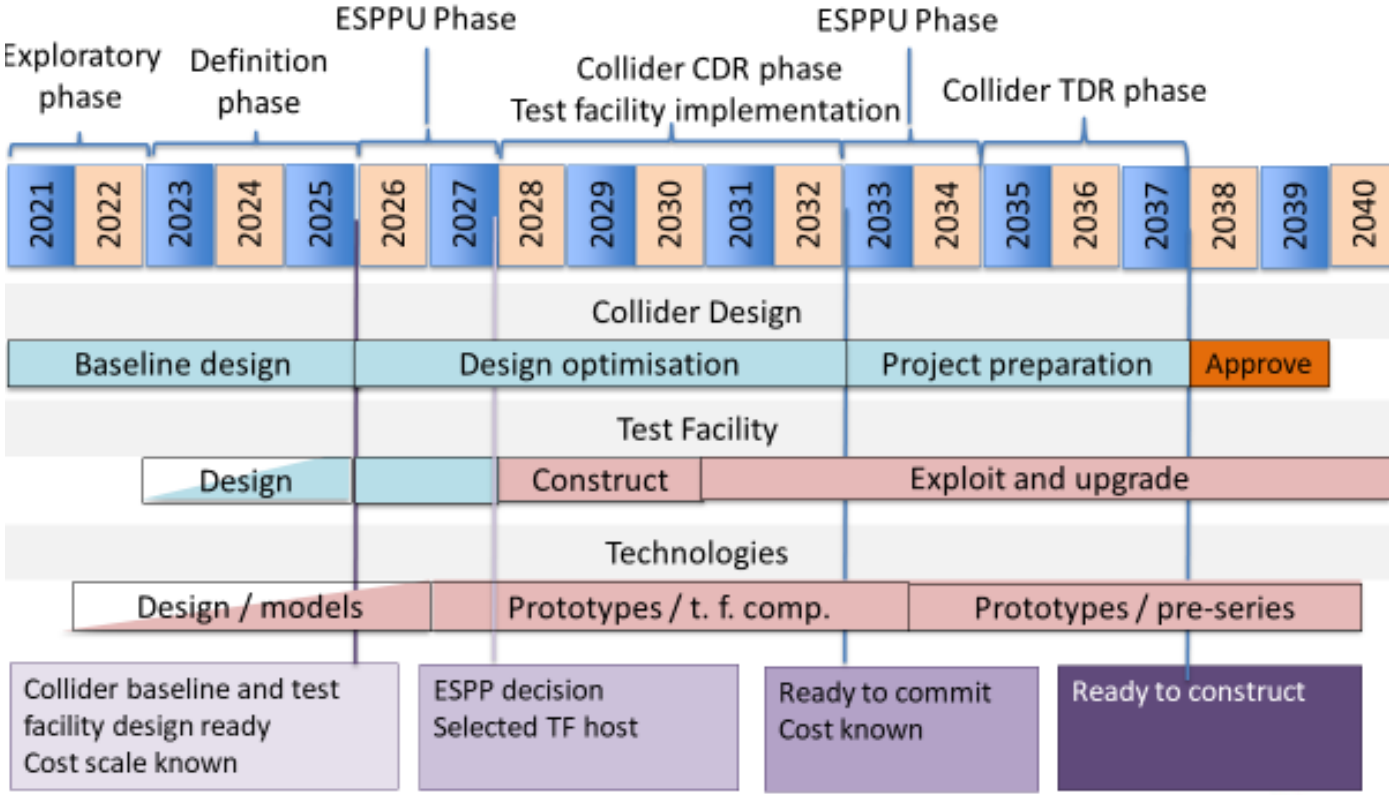
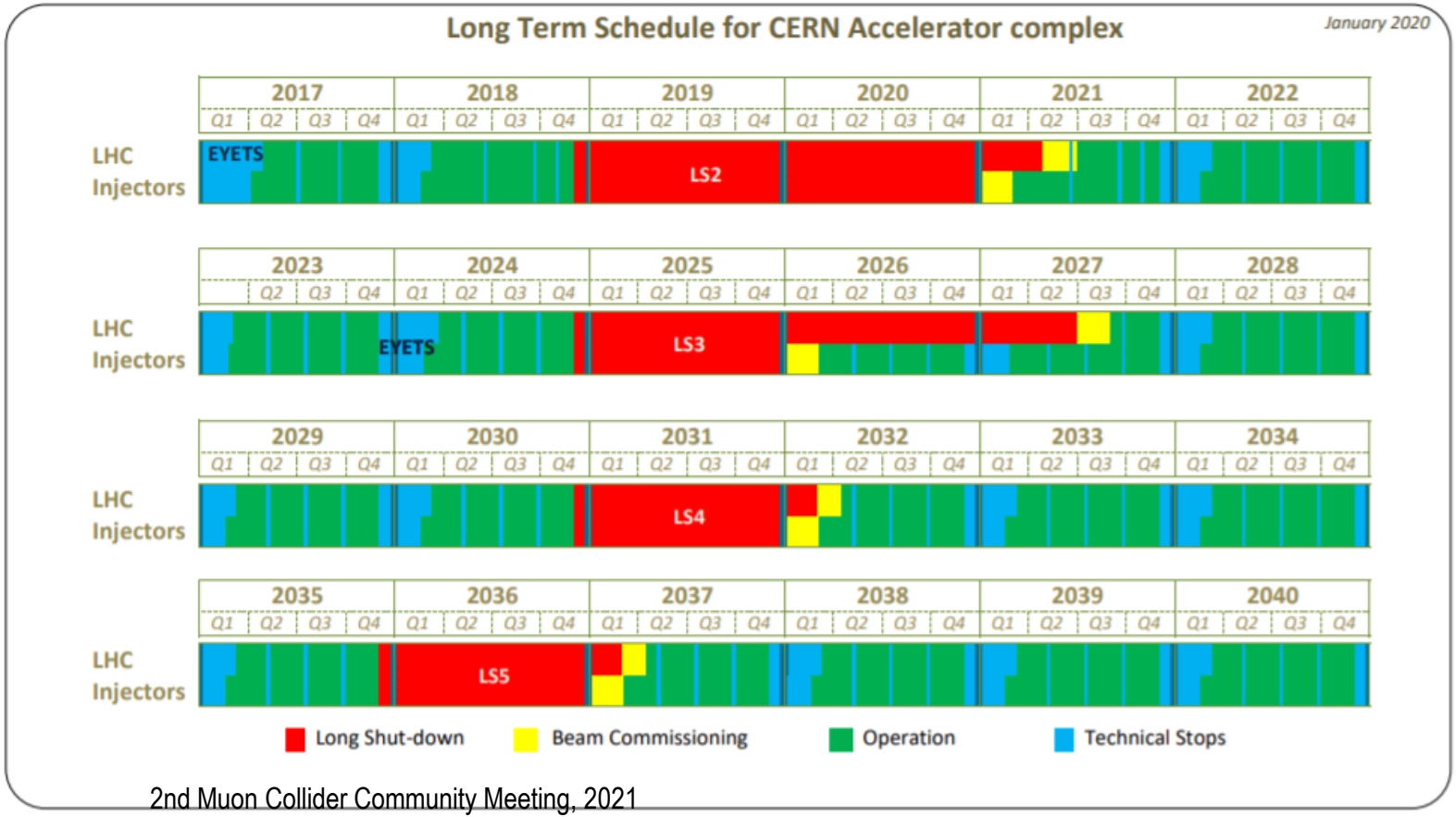
CERN-ATS-DO

1st Community meeting of the International Muon Colliders Design Study - 20 May 2021

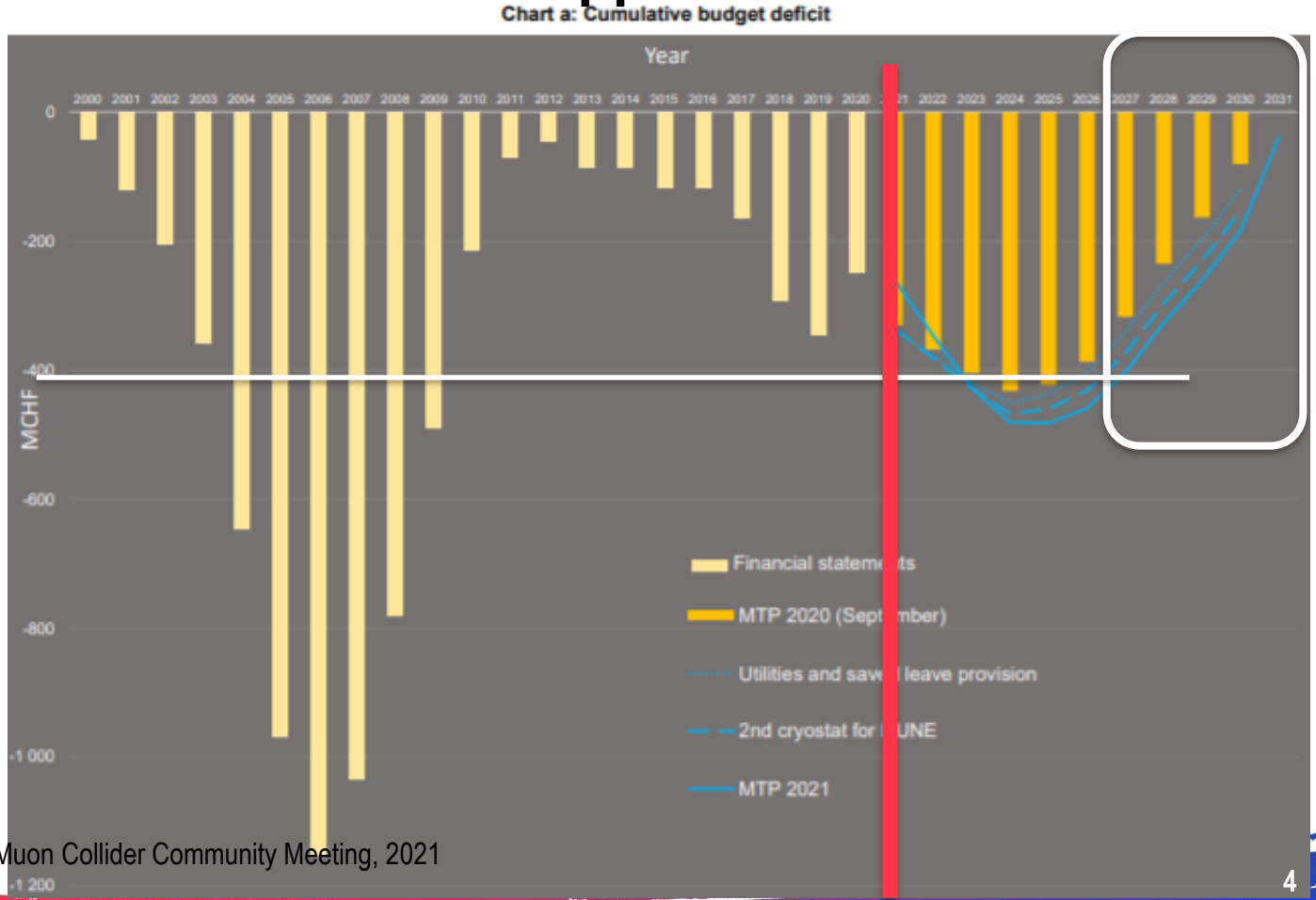
Technically Limited Long-Term Timeline



2nd Muon Collider Community Meeting, 2021


Long Term Schedule for CERN Accelerator complex
January 2020
2017
2018
2019
2020
2021
2022
Q1 Q2 Q3 Q4
LHC Injectors
EYETS
LS2
2023
2024
2025
2026
2027
2028
EYETS
LS3
2029
2030
2031
2032
2033
2034
LS4
2035
2036
2037
2038
2039
2040
LS5
Long Shut-down
Beam Commissioning
Operation
Technical Stops

Medium term Plan approved in June 2021



Proposed Workpackage Description

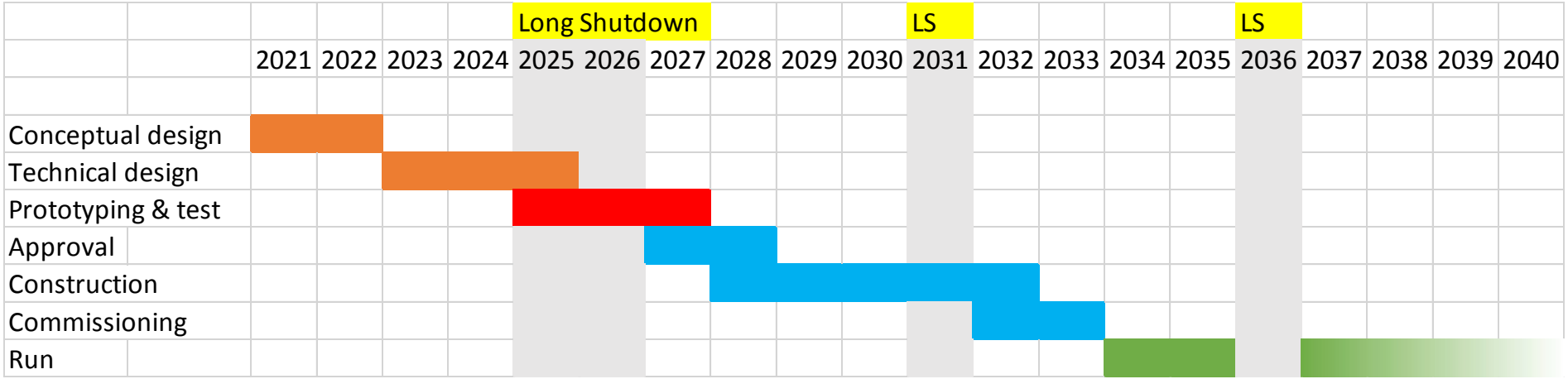
- **A beam test facility is key to demonstrate items of critical importance to achieve the required luminosity in the Muon Collider, namely, 6D cooling, the integrated engineering of the cooling cells.**

- **The workpackage deliverable will the design and cost estimate of a test Facility including:**
  - Muon production and capture, including collimation and momentum selection at a level of at least 10^6 muons per pulse
  - 6D cooling based on HFOFO rectilinear cooling, including full conceptual engineering design of the cell.
  - Study eventual alternative cooling schemes as defined by the Muon Production and Cooling working group
  - Coordinate the site dependent studies, entirely funded by each interested laboratory, in order to provide a full cost estimate for a given test facility
  - Collaborate with the other working groups to establish a list of ancillary test facilities (e.g. high power targets, RF, magnets, Proton Beam preparation etc…) in order to avoid duplication of efforts and ensure optimal use of resources.
  - The muon production working group will be asked to assess whether one can use in a first stage a horn instead of a Superconducting solenoid in order to reduce cost.
  - Synergy with other facilities/experiments to be investigated

Proposed Workpackage Tasks

- **Simulations & Engineering design**
  - Proton beam preparation and evolution (Accumulator, compressor, mainly connection to Proton Complex WG)
  - Extraction and transfer line
  - Infrastructure (civil Engineering and services)
  - *Muon production (target+horn)*
  - *RP, Remote handling, waste management, environmental impact (if necessary).*
  - *Momentum selection, collimation & proton beam dump*
  - Cooling based on schemes developed by the cooling, RF and Magnet WG
  - Beam Instrumentation
  - Synergy (ESS, NuStorm, Enubet…)

Proposed Workpackage Timeline (test Facility at CERN)



Proposed Workpackage Resources for CDR & TDR

Task	Staff [pm]	postdoc [pm]	student [pm]	Cash [kEUR]	Comment
Proton beam preparation	-	-	-	-	Funded and coordinated by proton Complex WG
Extraction and transfer line					Funded (and coordinated) by CERN
Civil Engineering & Infrastructure					Funded and coordinated by CERN
Muon Production					
RP, Remote handling, waste management, environmental impact (if necessary).					Funded and coordinated by CERN
Momentum selection, collimation & proton beam dump					
Cooling					
Beam Instrumentation					
Synergy					Funded by CERN and Synergic experiments/facilities.

Consideration on CERN budget

- If ESPPU is accepted in Dec. 2027, fresh budget can be injected in the June 2028 MTP document, if approved budget would become available in Jan. 2029.
- EU seed budget essential for the CDR/TDR phase
- Present level of CERN funding (2 MCHF/year, M+P) would not be sufficient in the 2025÷2029 period to sustain a prototyping phase

International MUON Collider Collaboration

CERN

Thank you
for your attention