EUROPEAN PLASMA RESEARCH ACCELERATOR WITH EXCELLENCE IN APPLICATIONS

EuPRAXIA

Chapter 26: Project cost, time line & management structure

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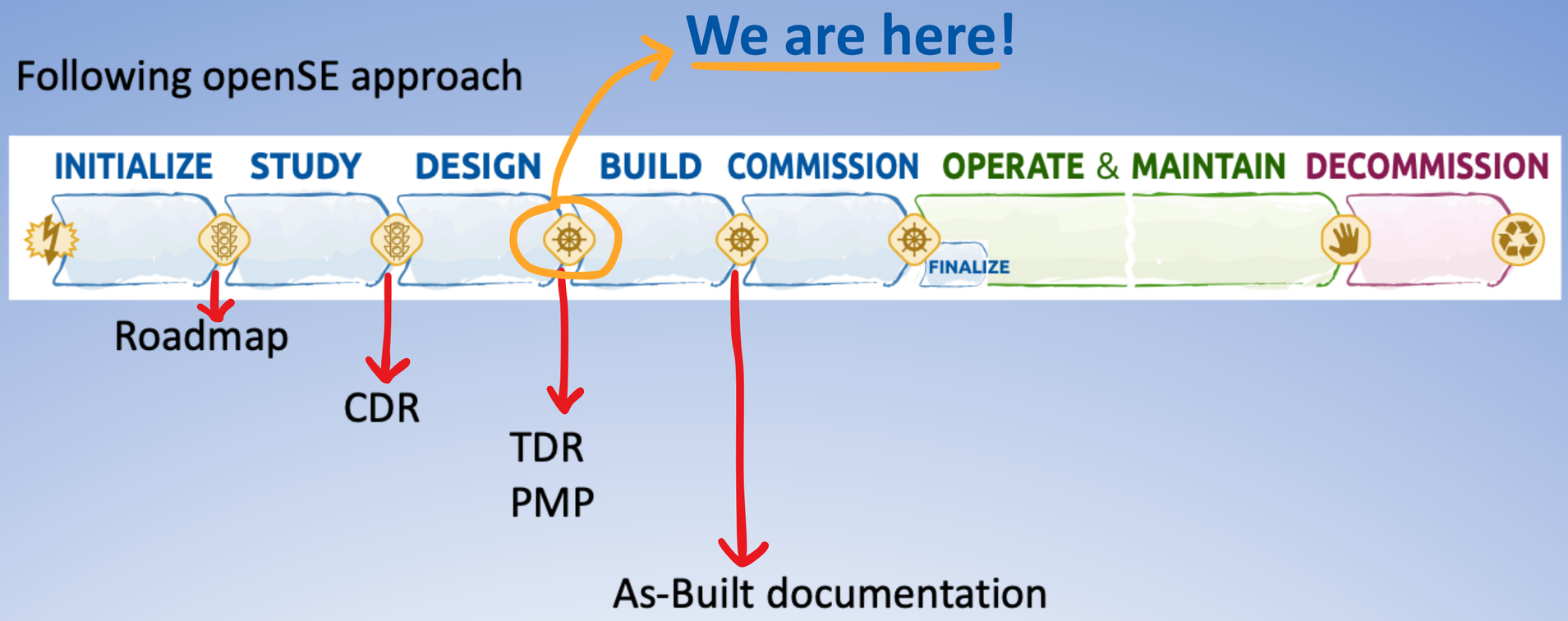
IX TDR Review Committee Meeting

June 16-18, 2025

My Area

Definition of the cost / schedule and management structure for the implementation phase.

From TDR approval to installation (no commissioning or operation).



Cost / Schedule

These topics are assessed also by a dedicated Cost & Schedule Review Committee.

2 session so far, next meeting is scheduled by the end of the year.

All the topics will be elaborated in more detail in the Project Management Plan thatwill be completed by the end of 2025.

In the TDR a summary of the mainoutcomes are summarized.

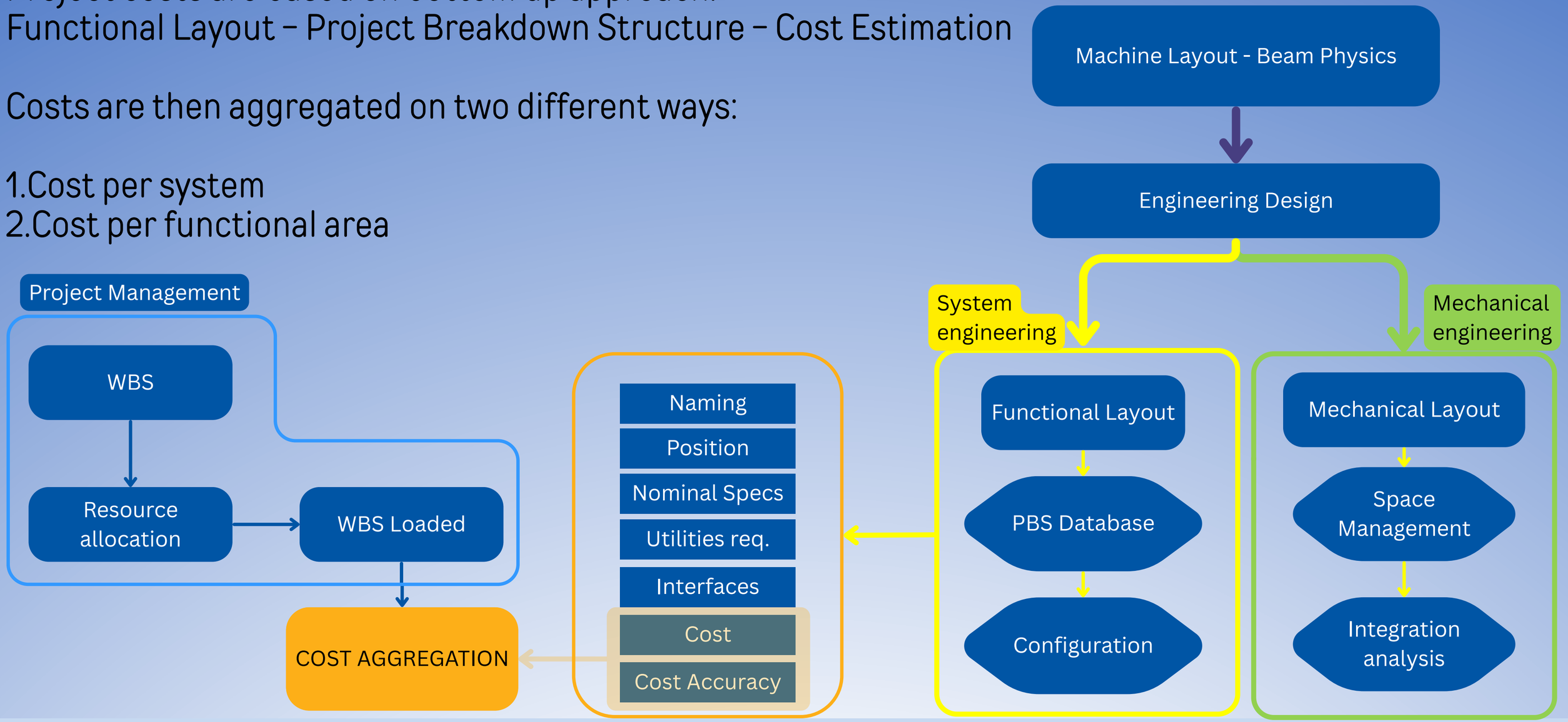
Cost are routinely updated considering the advancement of the project, the budgetary quotation we are receiving and more in general for a fine tuning.

Cost / Schedule

Project costs are based on bottom up approach.
Functional Layout – Project Breakdown Structure – Cost Estimation

Costs are then aggregated on two different ways:

1.Cost per system
2.Cost per functional area



Cost / Schedule

Several criteria have been adopted to have a sound and comparable assessment and to minimize personal bias:

1.Contingency (5% allocated on average depending on the item)

2.Accuracy : AACE methodology is applied, considering knowledge cost maturity

3.Scaling factors: NO scale economy has been considered (i.e. Tot cost = Unit cost x # units)

4.Budgetary quotation whenever is possible (especially for the most expensive items).

Cost / Schedule

FUNCTIONAL AREA

Functional Area	Cost estimated (M€)
Injector	10,999
Low Energy Linac (X-Band)	9,596
Bunch Compressor	1,180
High Energy Linac (X-Band)	9,761
Plasma Module	2,222
Tot Linac	**33,758**
AQUA Undulators	12,062
AQUA Beamlines	7,096
Tot AQUA FEL lines	**19,158**
Transverse Elements	3,940
Tot Machine	**56,856**
Building	51,578
Cooling & HVAC (Hi-tech utilities)	6
TOTAL	**114,438**

SYSTEM

SYSTEM	Amount (€)	Error	Best Case	Worst Case
A - Acceleration	4.976.000	-5% - +5%	4.727.200	5.224.800
B - Beam Instrumentation	3.442.000	-5% - +5%	3.269.900	3.614.100
I - Circuits	2.443.200	-5% - +10%	2.321.040	2.687.520
M - Magnets	5.653.000	-5% - +10%	5.370.350	6.218.300
R -RF Power Source	15.561.720	-5% - +10%	14.783.634	17.117.892
T - Target	252	-10% - +20%	226.8	302.4
U - Undulators	10.468.000	-5% - +5%	9.944.600	10.991.400
V - Vacuum	3.997.900	-5% - +5%	3.798.005	4.197.795
W - Laser & Optical System	3.195.100	-5% - +5%	3.035.345	3.354.855
X - Experimental Users	2.930.000	-10% - +25%	2.637.000	3.662.500
General elements	3.940.740	5% - +5%	3.747.703	4.137.777
Machine COST	**56,856,000**	**-5,3% - +8,4%**	**50.113.874**	**57.371.562**
Building	51.578.552	-10% - 0%	46.420.697	51.578.552
Utilities	6.000.000	5% - +5%	5.400.000	7.200.000
TOTAL	**114.438.212**		**105.678.274**	**120.287.891**

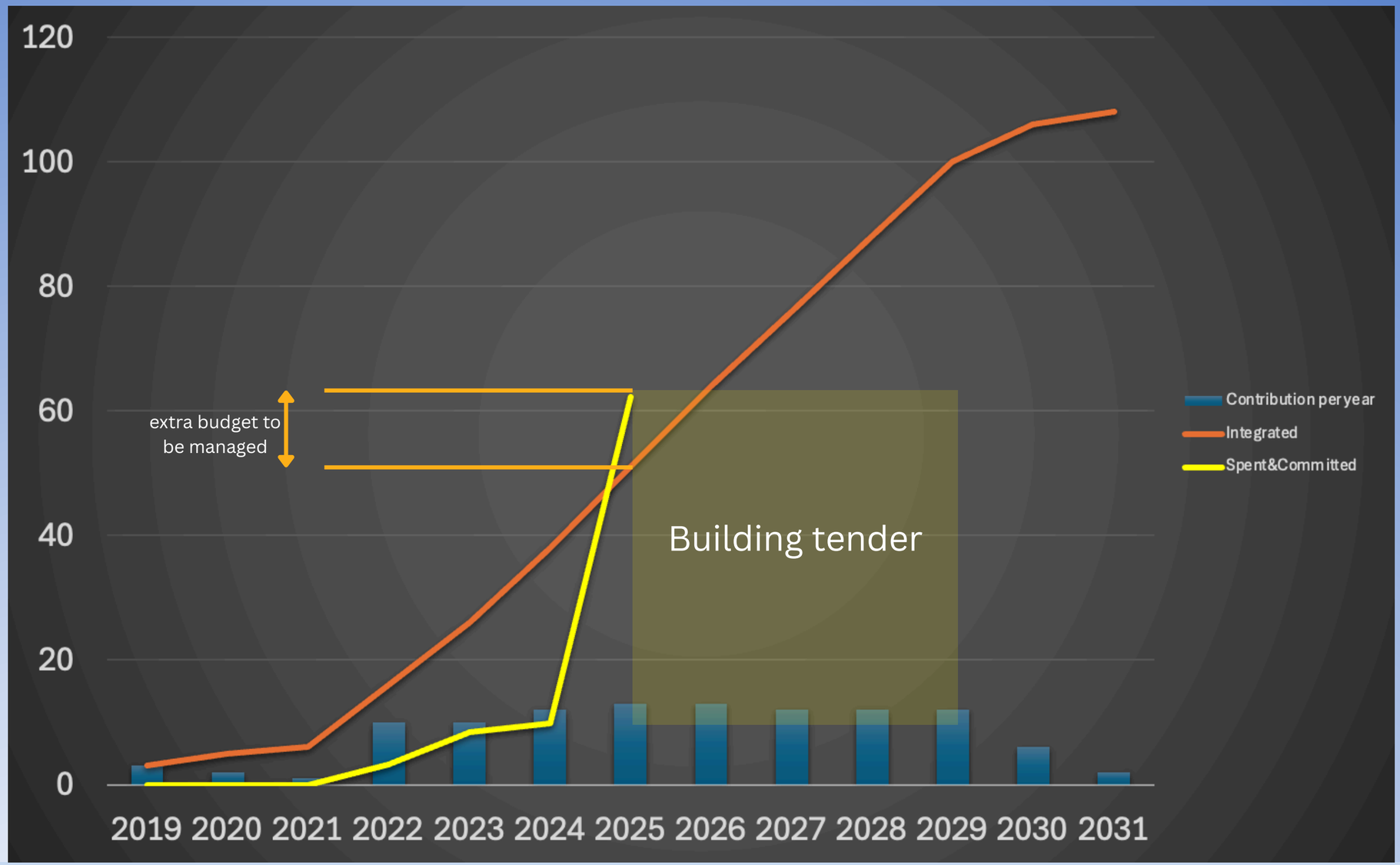
Cost / Schedule

Financial Planning

Contribution from Italian Government.

Up to now 51M€ integrated (around 8 M€ to be subtracted for R&D)

Some expenses so far (R&D, acquisition of new building)



Cost / Schedule

Financial Planning

We are in the process to build up a financial committment profile for the next year (the rest of the yellow curve in the previous plot). to be submitted to the INFN management as part of the TDR & Project Management Plan package.

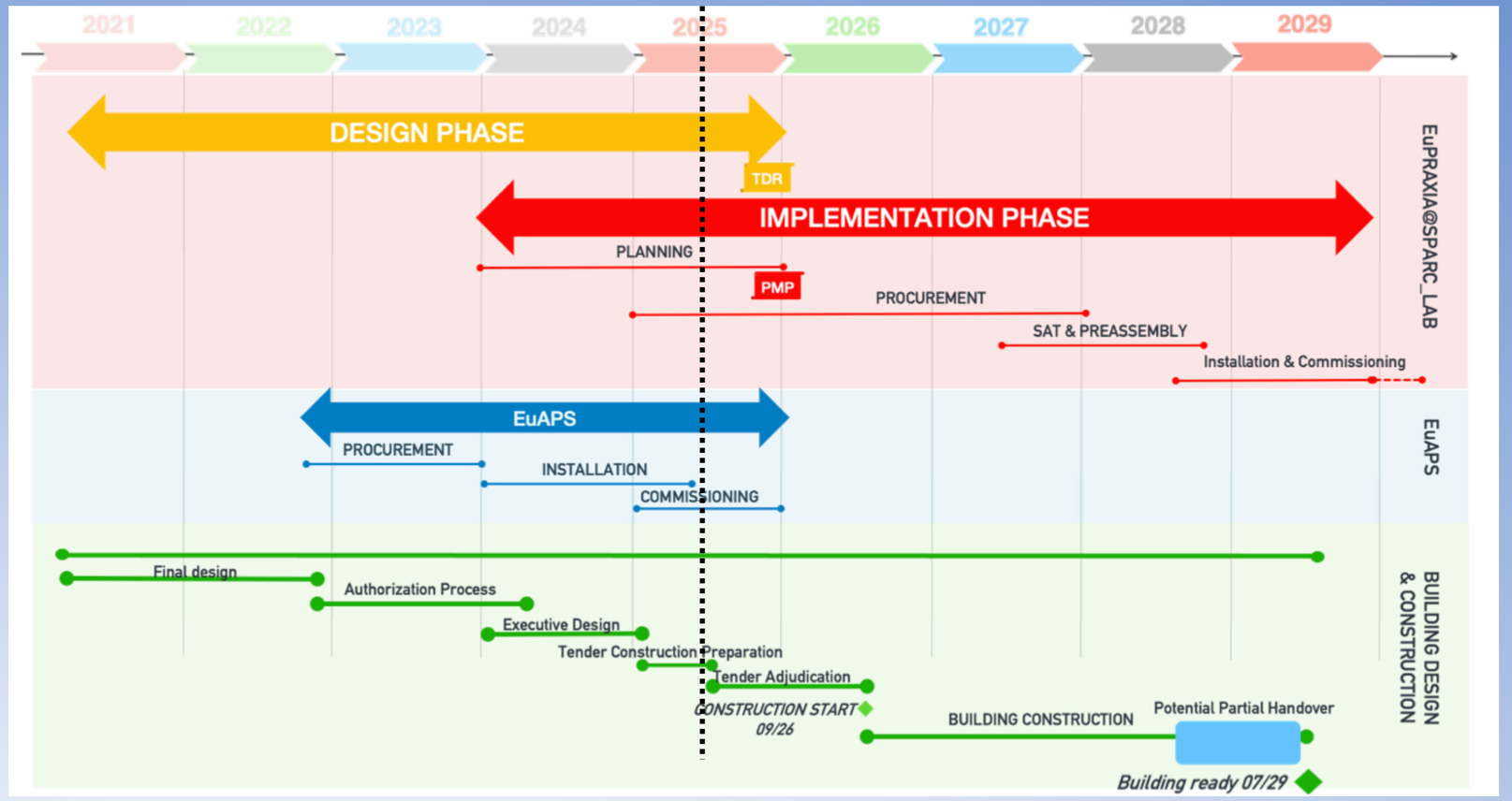
In order to do so several actions are required and are ongoing:

- Interaction with main suppliers to agree on cost & production time
- Designing of ARIA proposal to Lazio Region. This has an impact on the overall financial plan and implementation schedule.
- Finalization of the technical implementation strategy
- Discussion on procurement issues (what kind of tender, possibility to buy raw material in advance etc...).

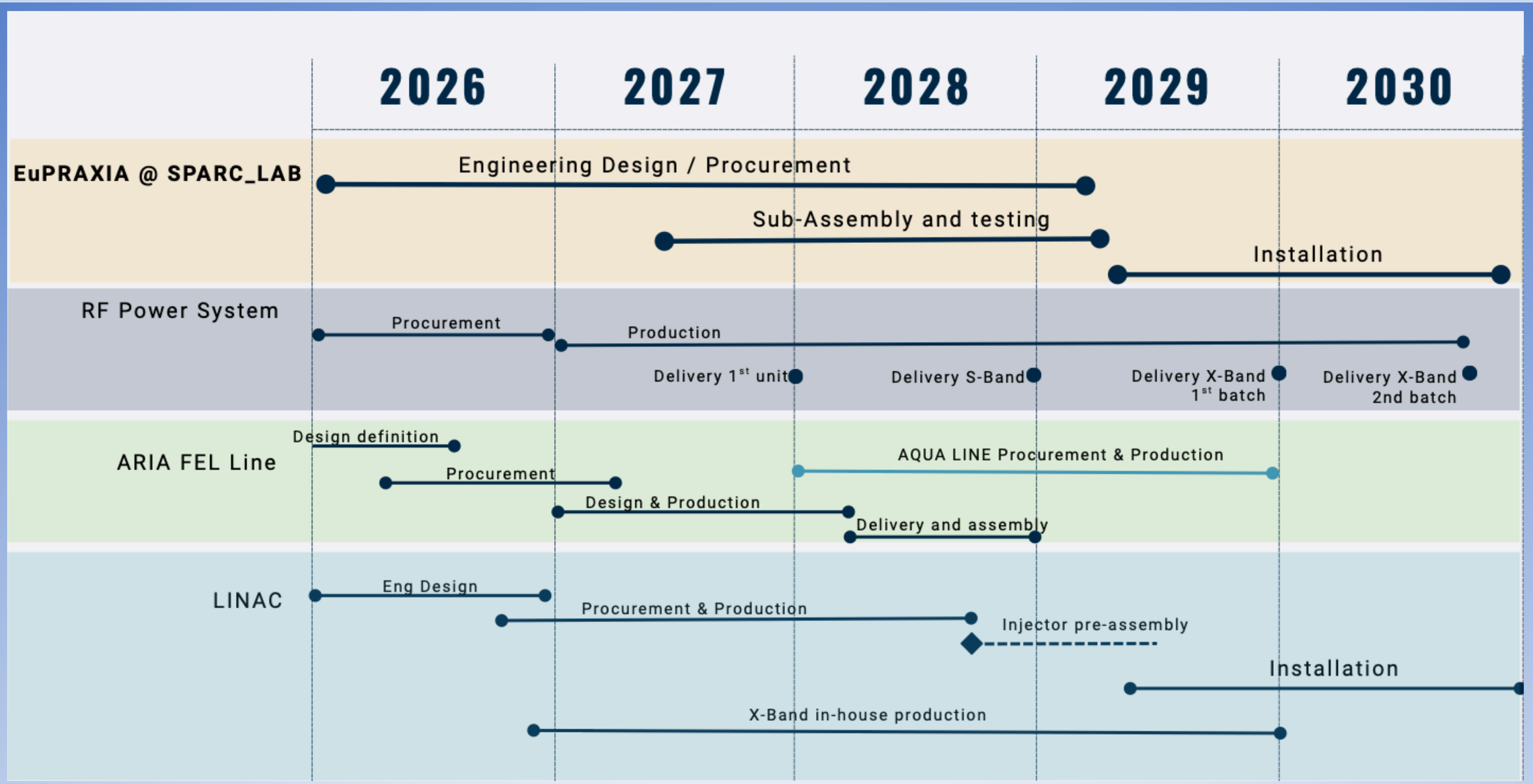
Cost / Schedule

This has to be considered as a general guideline for the upcoming years.
Maybe this can be fully integrated and aligned with respect to the procurement plan (sketched in the next slides but to be finalised.)

- A detailed schedule is still in progress some delays experienced due to boundary condition definitions and final estimation of production time.
- Also the ARIA beamline will have an impact in the schedule due to the constraints imposed by the Local Government funding scheme.
- No significant delays so far

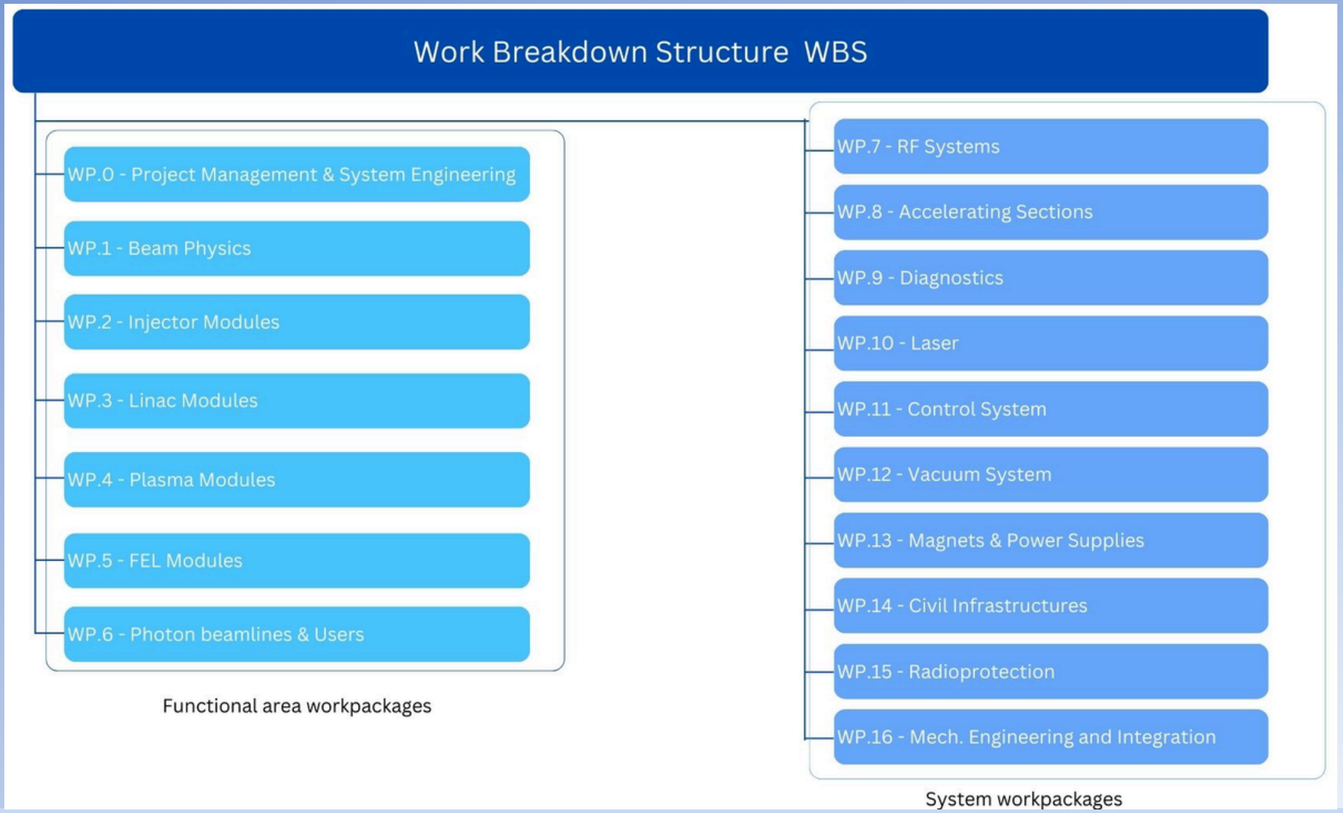


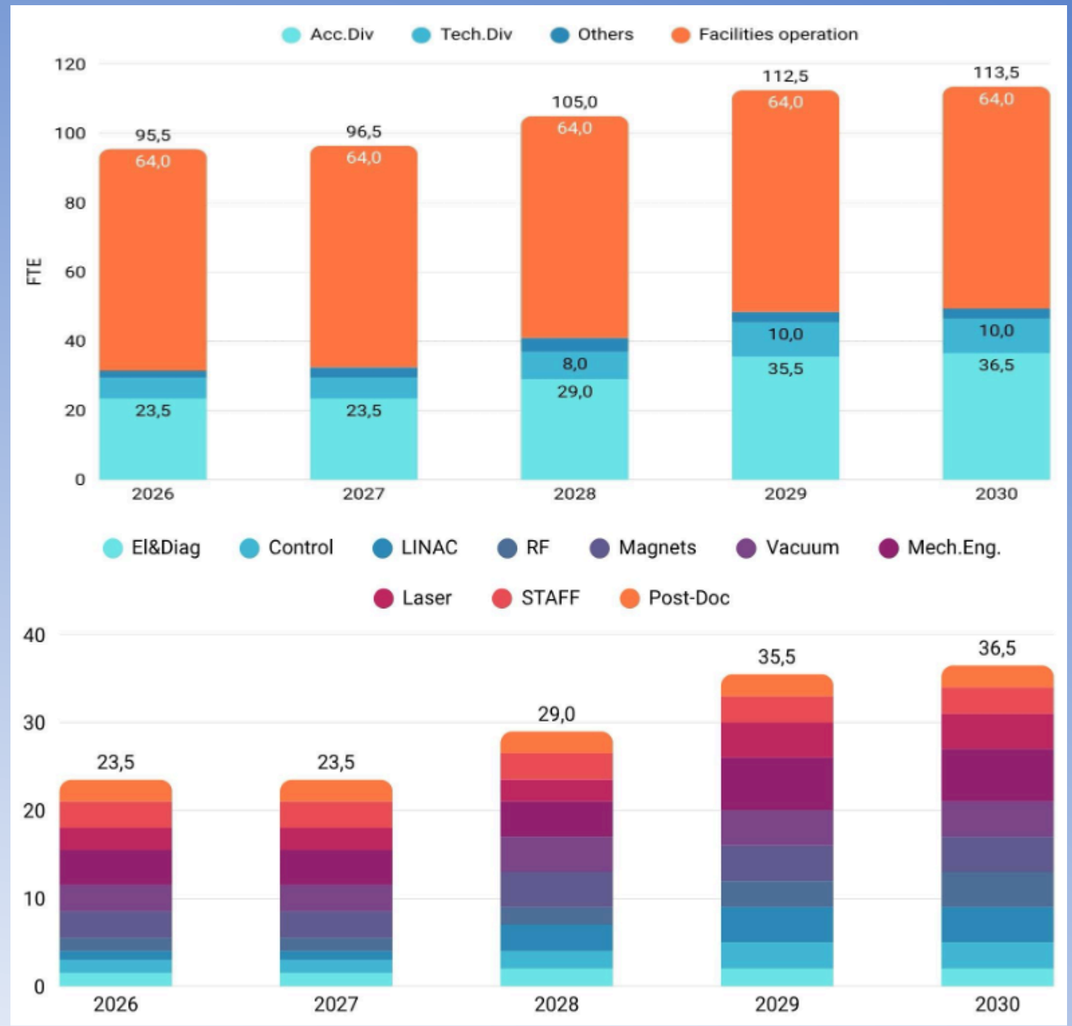
Schedule for procurement of main parts



Cost / Schedule

The overall project will be executed using a structured WBS Loaded. A preliminary estimation of the resources from Acc.Division and Technical Division has been assessed. In principle this is sufficient for a proper installation although some areas need to be reinforced (beamlines, mechanical engineering, vacuum).





Pending items

Pending Items

- Finalize the schedule and the cost profile. End of summer.
- Resource allocation well advanced but still to be agreed. End of 2025

Dependencies

In order to finalize the schedule and the cost profile along time several points need to be clarified (in progress)

- Definition of the production time from main suppliers
- Funding availability currently under discussion with central administration
- Outcome of the building tender as critical milestones for machine installation (it will require an update in 2026).

Conclusions

- The cost estimation has been done through a bottom up approach. Considering all the elements that have been generated during the design phase, integrated in the mechanical layout and in the functional layout.

- Budgetary quotations are available for most of the components (especially the most expensive ones).

- A missing gap with respect of the total available budget is being assessed and a strategy to cope with that is being developed. In principle we will start with a phasing approach for the critical components. Once savings from the building are clear we will make a further assessment.

- S-Curve for financial commitments is being prepared and it will be part of the Project Management Plan that will be assessed by the corresponding review committee.

- Remind that the cost&schedule is NOT only an activity that concerns INFN-LNF but it is embedded in the EU proposal, constrained by ESFRI committments and fully integrated in the overall distributed architecture proposal.