

# ESS Operations Planning

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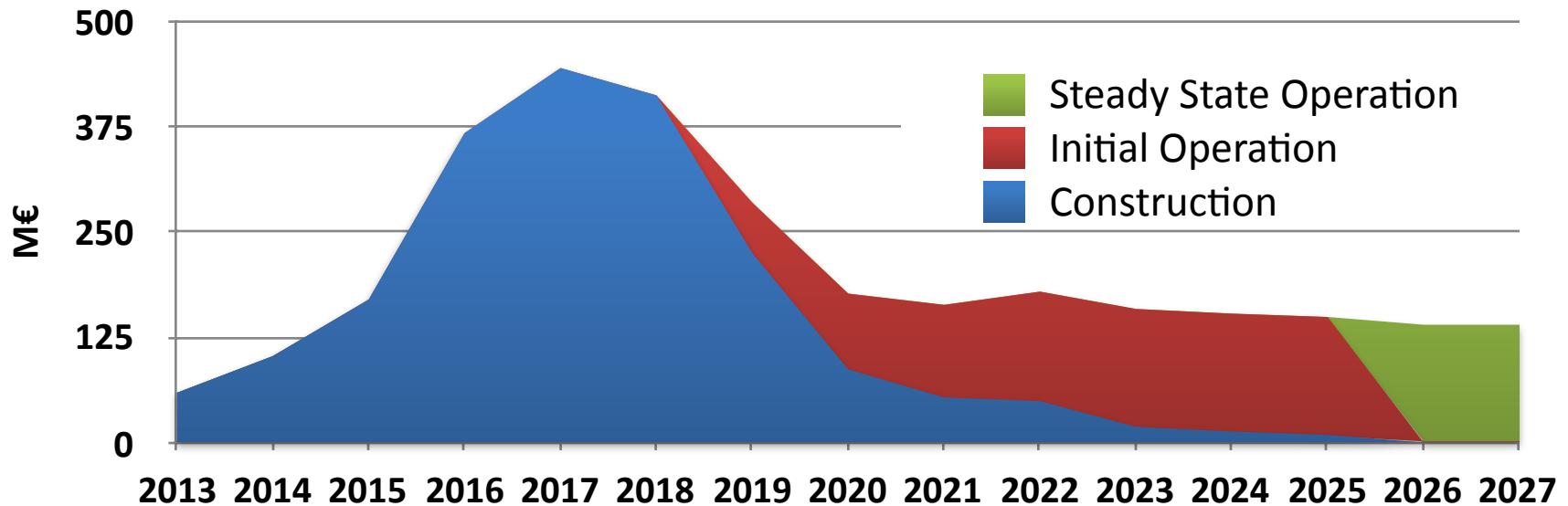
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SAC, May 9th, 2016

- Organisation for Operations
- Current Status for operations planning
  - Transition schedule from construction to operations
  - Trigger milestones for operations funding
  - Scheduled operational days and power
  - Budgetary ramp-up for ESS and NSS
- Framework for Operations
  - Mission and Vision
  - Strategic planning
  - Open issues
- Current understand of operations funding
  - Development and Review of operations cost baseline
- Conclusion

- **Established an Operations Planning Group (OPG)**
  - Coordinate and organise bottom-up planning activities for initial and steady state ops.
  - Group populated by high level mandated staff from each project
  - Develop P6-WBS using System Eng approach to define requirements and functions and identify overlaps
- **Established a Site Planning Group (SPG)**
  - Plan for the operations of the ESS site as a whole with input from all projects and stake holders
  - Contribute and coordinate Operations Planning, Licensing, Conventional Facilities, Campus Buildings, etc.
  - Scope: People flow from office(s) to work areas, Flow of goods, logistics, samples, waste, security, safety for site (not specific areas), control rooms, fire protection, roads, site access etc
- **ESS Council has established an Operations Working Group (OWG)**
  - Mandate to propose to Council a model for sharing the operations costs of ESS amongst members countries by the end of 2016.
  - Operations Planning supports this work by providing detailed costing of operations based on a defined mission of ESS and its operational needs.

# Transition from Construction to Operations Is Critical to Our Overall Success



- Initial Operations starts with accelerator commissioning and ends with completion of 16 user instruments (2019-2025)
  - Includes commencement of user program for first set of instruments in 2023
- Purpose for separating project vs. operations activities is based on need to separate project goals from operational goals
  - Operations success requires proper management of budget for utilities, consumables, maintenance, and spares --- both expenses and staff costs

# Operations Events and Plans

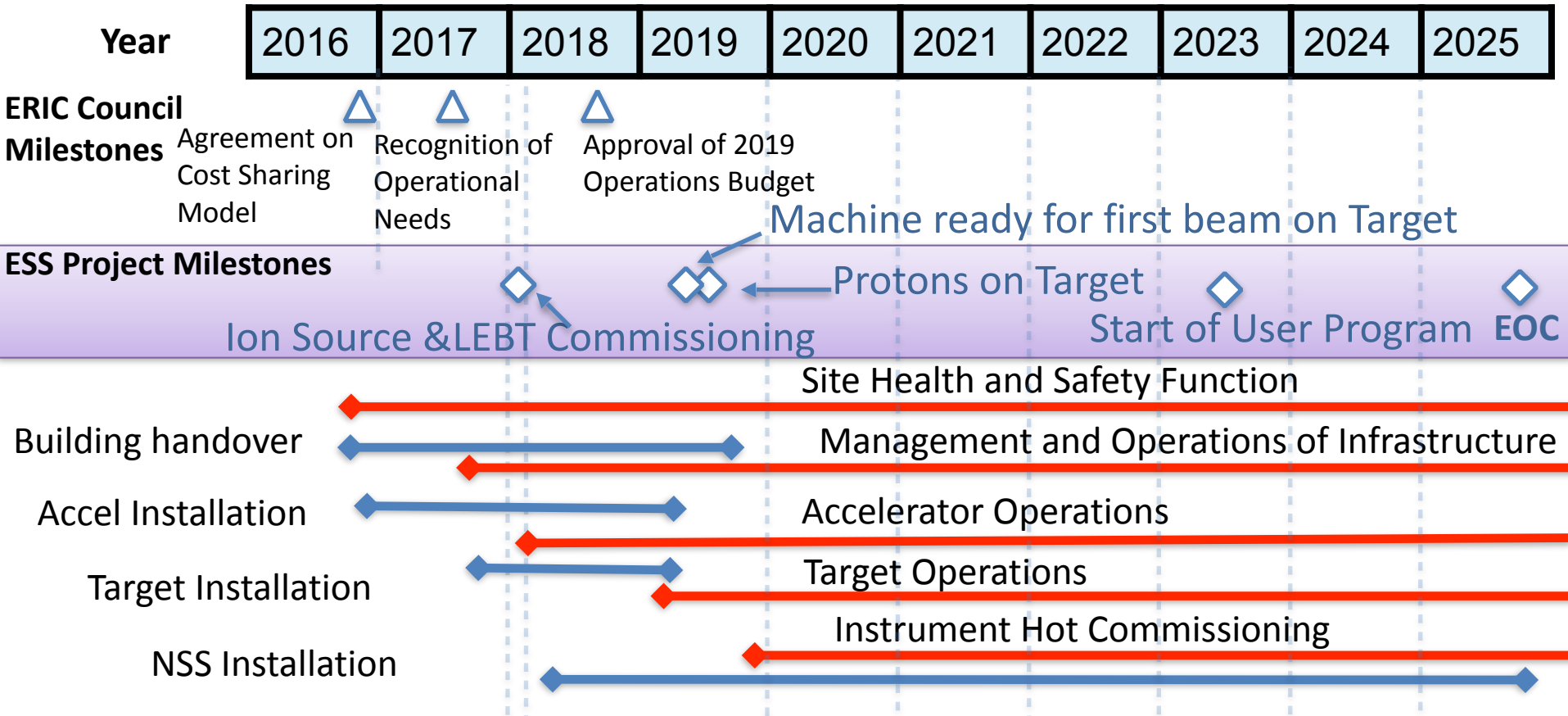
- Incremental transition from construction to initial operations is based on well-defined, major events:
  - Formal turn over of buildings from Skanska to ESS
  - Commissioning steps for Accelerator and Target
  - Commissioning NSS labs and Instruments 1-16
- Operations transition plan will be developed during 2016
  - Internal need for integrated construction and operations plans
  - Supports the work of the Council's Operations Working Group

# ESS Tentative Initial Operations Plan

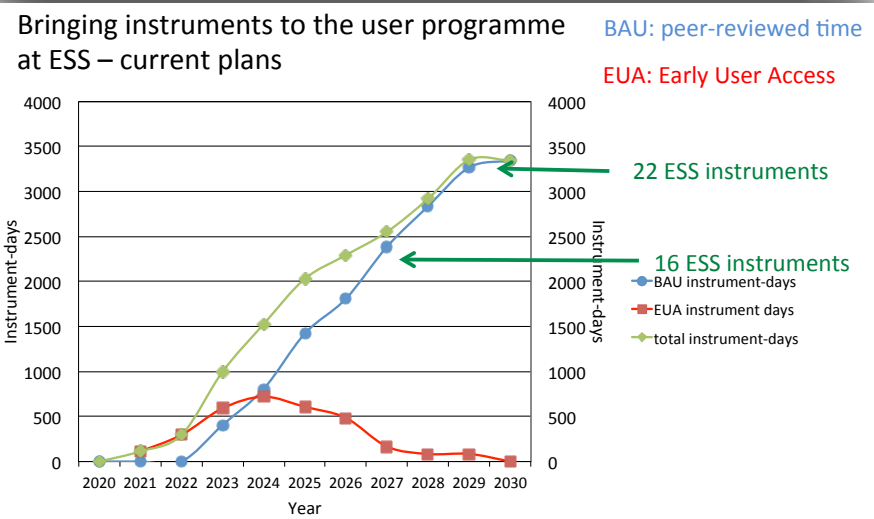
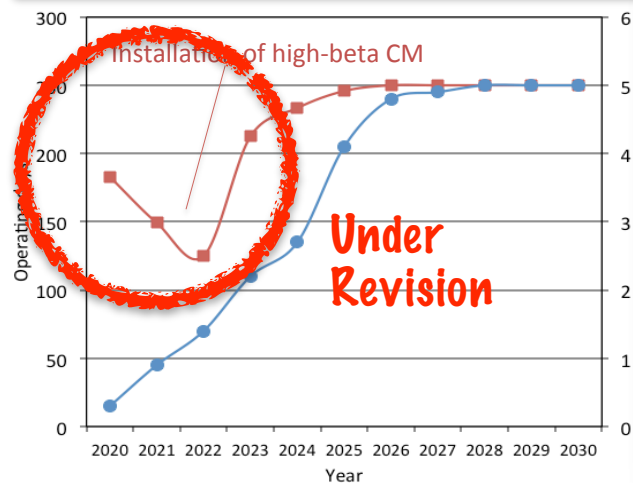


Initial Operations Budgets (Millions of €) - Current Status. Will be review in 2016

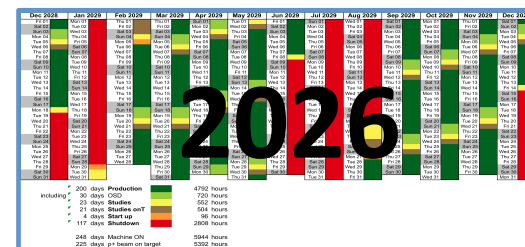
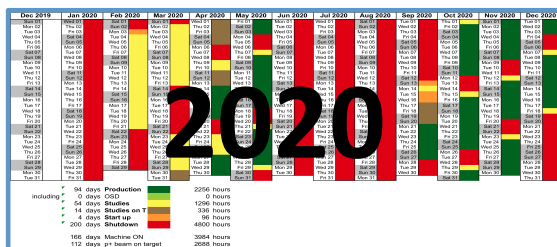
Bottom Up	0	2.4	9.8	44.0	89.2	102.7	129.6	141.7	147.5	143.5
Top Down	0	0	0	60	90	110	130	140	140	140



Slide from 2015 Annual Review: At present, beam schedule for 2019-2022 is being revised to better accommodate installation of instruments and accelerator components



Tentative operating schedules developed for planning purposes, finding problems.



# WBS Structure Status

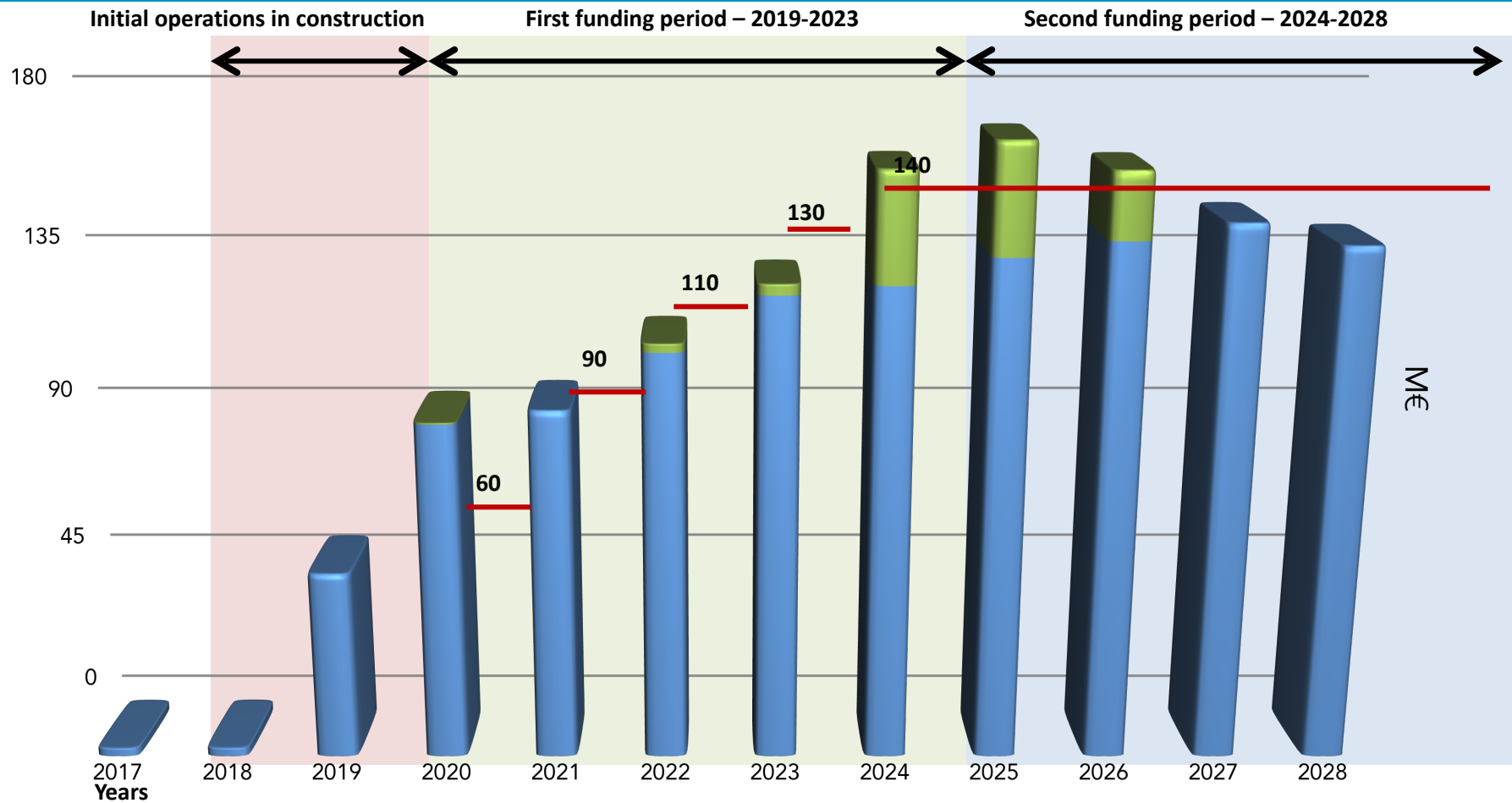
APRIL 2015				APRIL 2016			
Project	#WP's	#WU's	#Activities	Project	#WP's	#WU's	#Activities
Project Supp. & Admin	11	3	108	Project Supp. & Admin	9	10	195
ICS	9	0	102	ICS	6	4	177
D&E	3	10	124	D&E	3	7	165
NSS	11	24	478	NSS	6	25	817
Accelerator	6	0	96	Accelerator	7	10	301
Target	9	0	61	Target	8	11	188
Operating the Facility	1	7	61	Operating the Facility (In ADMIN)	0	0	0
ES&H	6	0	49	ES&H	8	0	56
Construction	3	0	5	Construction (in ADMIN)	0	0	0

## Operations WBS Version April 2016

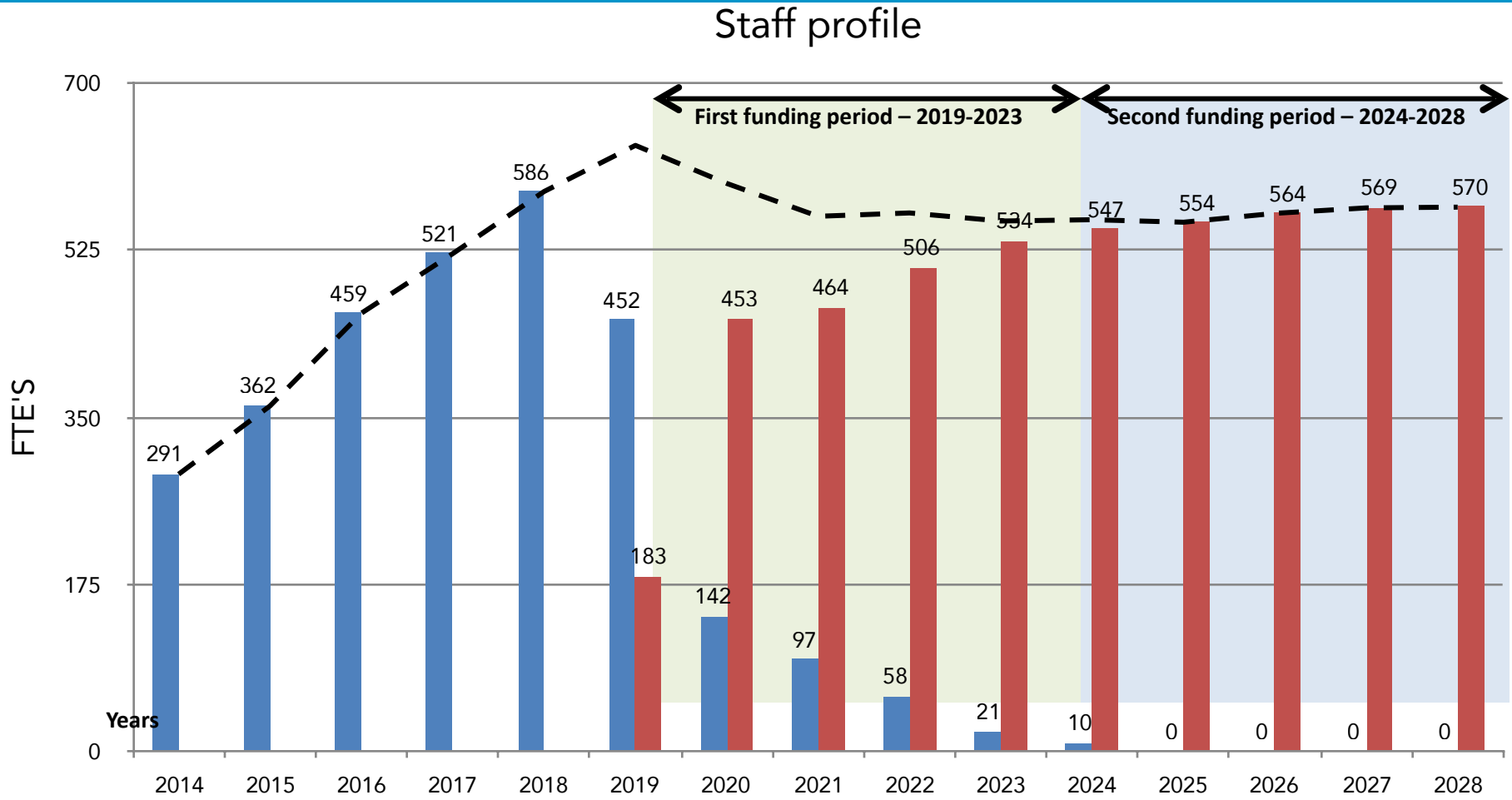
- Restructured to be consistent along all projects
- Reflects an Operational Organizational structure
- Costs divided into three categories, labour, operations and capital investments
- Staff roles are captured but we need to improve resolution and classification
- WBS Dictionary describing function (recurrent) under development
- WBS captures start-up activities(non-recurrent) but better resolution is needed



# Operations WBS: Spend Profile to 2028

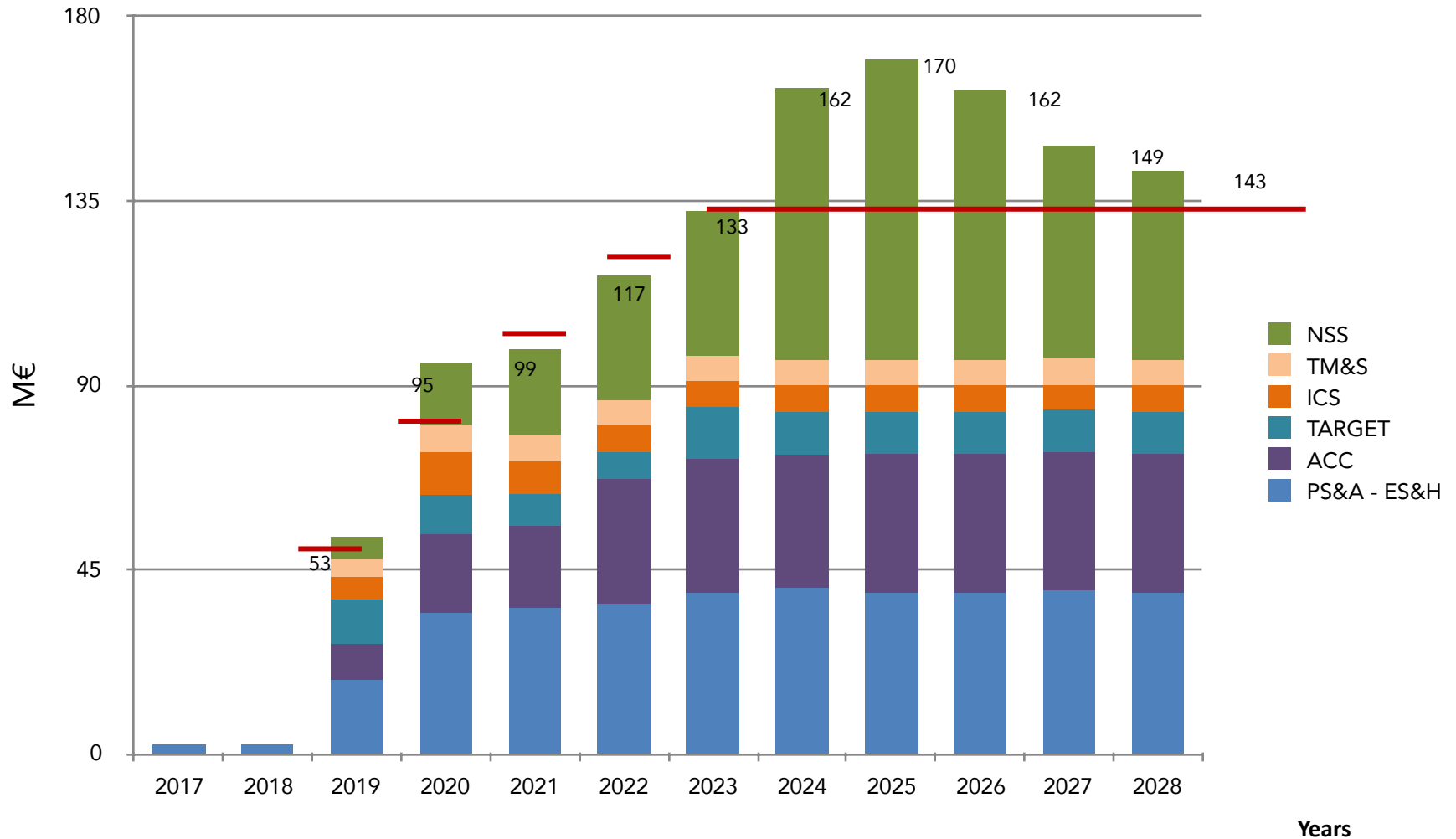


# Construction – Operations: Staff Profile



# Operations WBS: Total Cost Breakdown

## Budgeted Total Cost



# Vision and Mission of ESS in it's Operations Phases - Outcome from Interaction with OWG



- The vision for the European Spallation Source is to be a world leader in research using neutrons and an international hub for it's scientific community.
  - Success is a vibrant ESS with a European and international user community that has a scientific impact by conducting experiments on the most pertinent scientific questions of the time. It's success is measured by its impact through scientific publications and citations and engagement with industry.
- The mission of the European Spallation Source is to operate reliably a world leading “user” facility for science and innovation using neutrons.
- Leading is interpreted as continue to
  - Foster a scientific culture and staff that enable leading science from ESS
  - Interact with, engage and support the user community
  - Upgrade the facility wherever possible or necessary
  - Continue to develop and build neutron beam instruments
  - Continue to develop support technologies that enhance and expand the use of neutrons in research and innovation

# Funding Framework



- Members contributions should be aligned with their use of the facilities.
  - A site premium has been foreseen and needs further discussion.
- Define funding in term of 5-year “time periods” that match ESS development and needs.
  - Each time period will commit management and council to clear goals and deliverables financed from defined income streams
  - Includes potential upgrades of the neutron source and instruments
  - Commit potential non-cash contributions to specific projects that meet the time period’s goals.
  - Allow for flexible income streams.
  - Include all non-cash contributions in the estimates of fair return to member countries.
  - Non-cash contributions may be used in all areas of the ESS organisation.
  - We will need an in-kind structure as in the construction phase to handle non-cash contributions

# The first Funding Period: 2019-2023



The deliverables for this period will be outlined in a more detailed document and briefly are:

- Hot commissioning of the accelerator and confirmation of its performance with respect to quality objectives.
- Hot commissioning of the target and confirmation of its performance with respect to quality objectives.
- Ramp-up of power according to operational plan while monitor performance of accelerator and target systems.
- Hot commissioning of initial instruments and confirmation of their performance with respect to quality objectives.
- Performance of first demonstration experiments by instrument teams.
- Readiness of user support and services to commence user programme in 2023
- Successful commencement of scientific programme with first external user experiments.
- Design studies and plan development for the next 6 instruments.
- Development and construction of an inventory of critical components spares.

# The second Funding Period: 2024-2028



- The second Funding Phase will see the consolidation of ESS and the preparation of the final plans for instruments towards the completion of the full ESS project.
- By 2026;
  - The ESS accelerator will deliver proton beams at a 5MW power.
  - The ESS neutron source will produce 180 neutron days per year to 16 instruments in full user mode.
- ESS will set in place a proper maintenance programme and apply all necessary corrections to unexpected problems, while it looks to bring its instrument suite to its full 22-compliment.
- These decisions will be taking place within significant shifts in the neutron landscape in Europe and Members will be required together with ESS look broadly to address the needs of the European scientific community.
- Bringing the instrument suite to its full construction scope will be an important priority of this funding period. Here ESS will need to:
  - **Bring the 16 instruments realised in the construction phase to their full scope.**
  - **Bring the instrument suite to its full 22- compliment scope by constructing six more instruments.**

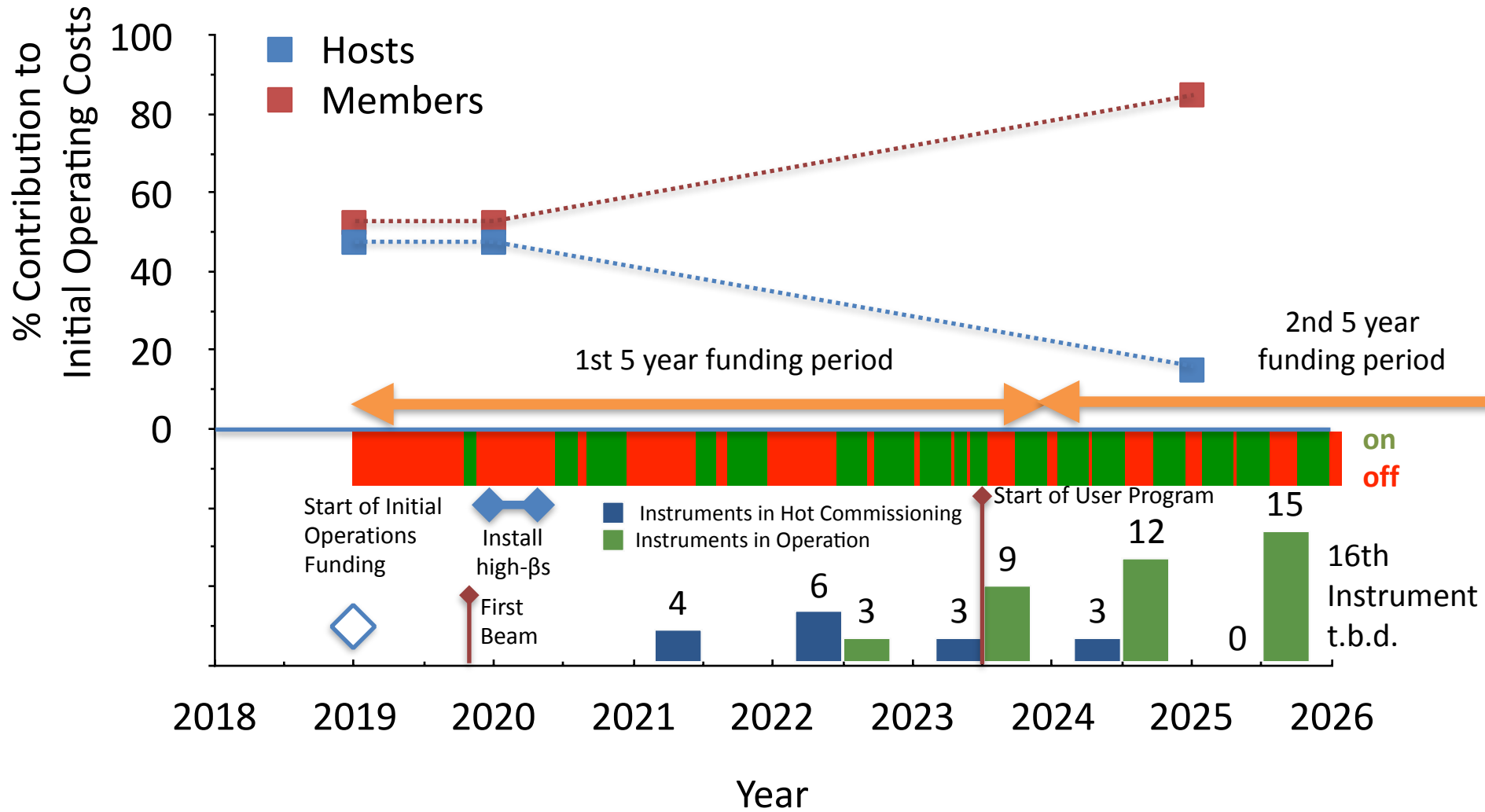
# Current Status of Funding ESS Operations



- The ESS-ERIC Council is engaged to arrive at an understanding of
  - what the operations costs of ESS are and
  - how they will be paid amongst the members countries
- The ERIC statutes already pay down the ground work for a sharing the operations costs. Article 18 of the European Spallation Source ERIC Statutes affirms that:
  - 1. The members shall contribute to the operating costs of the Organisation proportionally to their use of the ESS. The general principles for the use of the facility and the apportionment of members' contributions to the operating costs shall be documented in a stand-alone policy agreed by the Council.*
  - 2. The Council shall create the prerequisites to avoid a lasting and significant imbalance between the use of the ESS facility by the scientific community of a member and the contribution of that member to the Organisation.*



# Current Understanding of Boundary Conditions for Host and Member Contributions to Initial Operating Costs



# Current Understanding from discussions with OWG and Council



- Until at least 2023, “usage” is not a key metric that sharing of operations costs can be based.
  - Likely until 2023, contribution by members will be at the levels of construction commitments.
  - Host countries are committed to ramp-down their contribution to a total of 15% of operations funding by 2025.
- The UK, DE and FR are unable to make commitment that are higher than what they contribute to construction.
  - Possibly this may change in the future
  - Consequence is that in the ramp-up period we may have a small deficit in balancing the ESS budget requests
  - In steady state operations (after 2023), the deficit will grow significantly.
  - Instrument budget for the last tranche is under significant pressure
  - Council is favouring a mixture of cash and non-cash contributions as well as 3rd party funding.
- How robust is the steady state budget of €140 Mil/year
  - Vitally important that ESS budget requests are credible, in-line with ESS mission and exactly what is needed to deliver what has been promised to the European scientific community.
  - Plans to develop, scrub-down and external review the operation budget for steady state.

# Preparation for Operations Costs Review

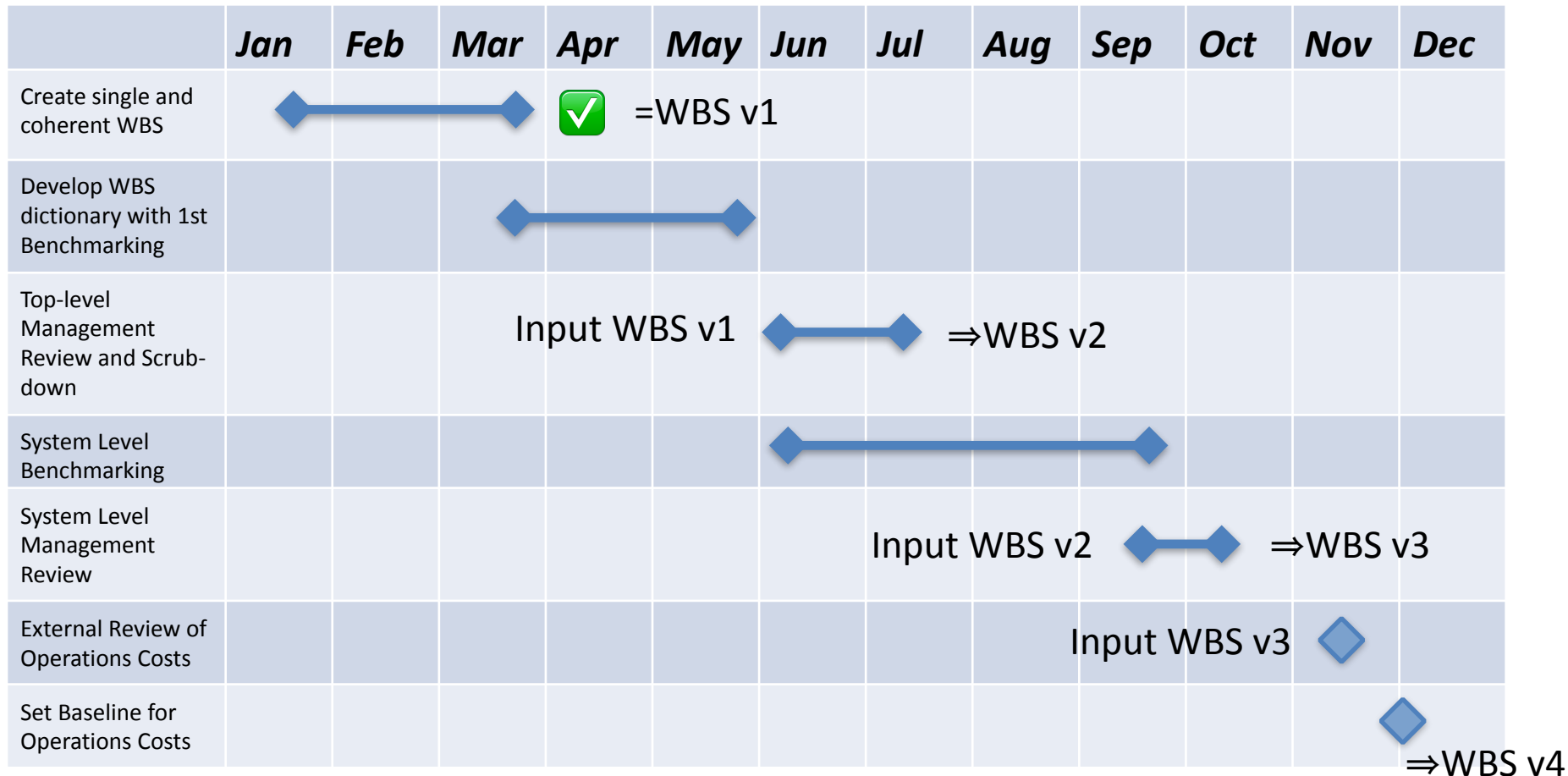


- Plan to have a review of operations costs in Q3-Q4 of 2016.
  - Important in gaining acceptance by Council on our needs for operations funding.
  - Define quality objectives (eg 95% reliability)
  - We will need a detailed WBS down to a system level
  - Each system level will need to be compared to an equivalent system in a currently operating facility. Best means of validation for operating costs

# Plan to Complete an Operations Cost Baseline for ESS



2016



⇒WBS v4

# 2013 Review of Operating Costs



- Documents Reviewed:**
- Programme Plan
  - Cost Report
  - Detailed Operations Costing and Benchmarking
  - Transition to Operations Specification
  - Operations Specification

**Table 1: Staff/FTE: Facility (number of Instruments)**

	ESS (22)	SNS(21)	ESRF (31)**	ILL (27+10)***	ISIS(27+4)	PSI(21)
Acc	110	98	70	119 (a)		
ICS	40	32	80	(d)		
NSS	165	169	360	263 (b)		
Target	30	22				
DMSC	62	59		20 (c)		
Project	5	3		?		
Adm+fac.	82	99	85	100		
<b>Total</b>	<b>494</b>	<b>482</b>	<b>600</b>	<b>502</b>	<b>400</b>	<b>320*</b>

**Table 2: Capital Costs (MEuro)**

	ESS	SNS	ESRF *	ILL **	ISIS	PSI
Acc	15	10.7	8.4	2.1+6.4		
ICS	1	0.4				
NSS	16	5	13.6	10.2+4.5		
Target	5	2.3		7.9		
Rent	4	0		0		
Fac. Sup.	6	9.2	10.4	See below		
Adm	5	1.5	2.3	0.6+4.8		
<b>Total</b>	<b>52</b>	<b>29.1</b>	<b>34.7</b>	<b>36.5</b>	<b>34.8</b>	<b>23</b>

# Next Six – Nine Months



- Develop and validate a realistic Operations Cost Baseline that delivers success and gains acceptance from ESS stakeholders.
  - Key deliverable for 2016 - Secures transition to operations
- Develop a realistic transition to operations plans based on construction schedule
  - Define start-up of key components
  - Define quality factors for early operations
  - Prepares ESS for start of a full service user program in 2023
- Internal Work in
  - Continue refinement of new “coherent” WBS
  - Develop a WBS dictionary down to group/system level
  - Perform system level benchmarking with currently operating facilities to understand and defend cost requests.
- Support the work of Council to develop a cost sharing model for the operations phase of ESS

**Conclusion:** Lots of hard work ahead !