



EUROPEAN
SPALLATION
SOURCE

ESS Status Update

BrightnESS General Assembly
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Recent ESS highlights

Overall



- Progress continues
 - No major new technical issues to report
 - Critical path schedule stable since Spring
- Important interventions on key procurement and in-kind deliveries
- Licensing application and follow-up for commissioning of the Normal Conducting Linac submitted on schedule
- New senior management team in place; reorganisation implemented on October 1st
- Good progress on the planning for initial operations within 810M€₂₀₁₃ envelope



Recent ESS highlights

Conventional Facilities



- Civil construction remains on schedule
- Handover of logistics building F03 and Instrument Hall E01
- Steelwork erection for target building high-bay and for D buildings now underway
- ESS offices and laboratory campus making rapid progress



Key challenges

- *Transitioning CF into basis of future ESS facilities management function*
- *Handling building handovers... onsite cooling water purity*

Recent ESS highlights

Accelerator

- Accelerator installation proceeding
 - Ion source and LEBT commissioned
 - MEBT installed
 - RFQ received and being commissioned
 - DTL received and being integrated
 - Waveguide installation completed in stubs
- Cryo-test stand permit received
 - 1st radiation monitors installed, commissioned and ready for operations

Key challenges

- *RFQ and DTL commissioning delayed*
- *Spoke cavity fabrication delays at IPNO - ongoing*
- *Accelerator not on critical path for ESS BOT but float being eroded*
 - *< 6 months remains (originally 14 mos, was 7 mos at Council.16)*



Recent ESS highlights

Target

- Target installation proceeding
 - High bay steelwork
 - Monolith shielding
- Major components in manufacturing
- Monolith vessel delivery Q1 2020
 - Watching this closely, challenges in fabrication
 - Cadinox (vendor) is working 24 x 7

Key challenges

- *Target RBOT now shows 3-4 months delay*
 - *6-7 month impact of neutron beam port blocks reported at C.16 has now been partially worked back*
 - *Steel delivered and machining underway*



Recent ESS highlights

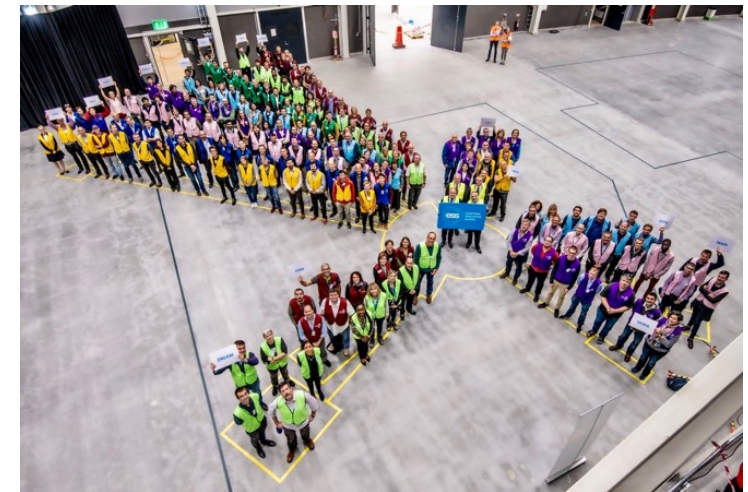
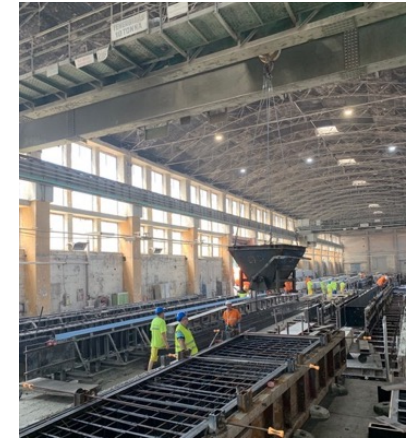
Instruments



- Bunker is in manufacturing
 - Schedule mitigations to reduce impact of target RBOT on First Science by modifying bunker installation sequence
- Instruments design phase complete – moving into construction
- All “First 3” instruments endorsed by IKRC
- Common shielding, chopper and monitor designs
- E01 building inauguration

Key Challenges

- *Need to move ahead with large procurements in IK partners – VAT issue with CH is now resolved*



Recent ESS highlights

Installation and Integration



- Installation underway
 - Steel framing, piping, cables, cryogenics, RF

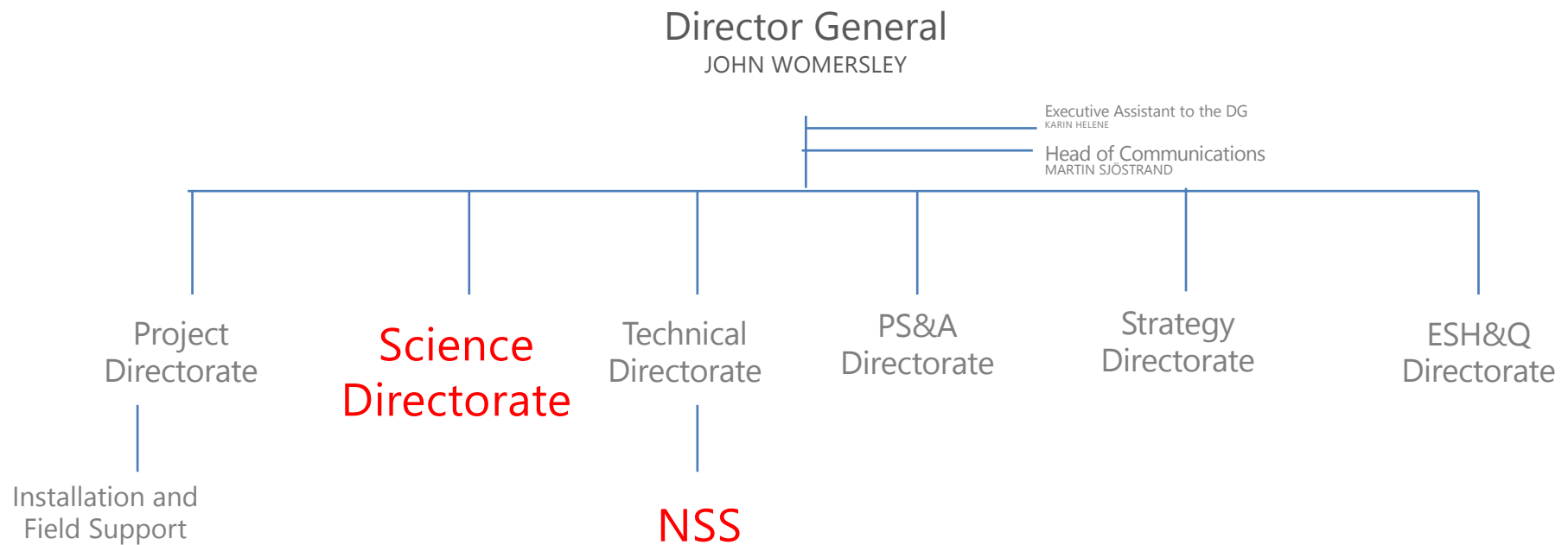
Key challenges

- *Learning from experience*
 - *input to the design is late or is changing*
 - *e.g. cable routing for beam instrumentation in conduit*
- *Big ramp up of work in second half of 2019*
 - *Accelerator cryomodules*
 - *Target equipment – main installations start end of this year*
 - *ICS server room*
 - *First instrument infrastructure in E01*
- *Implemented new organisational structure to better deliver*



ESS Organisational Structure

as of 1 October 2019



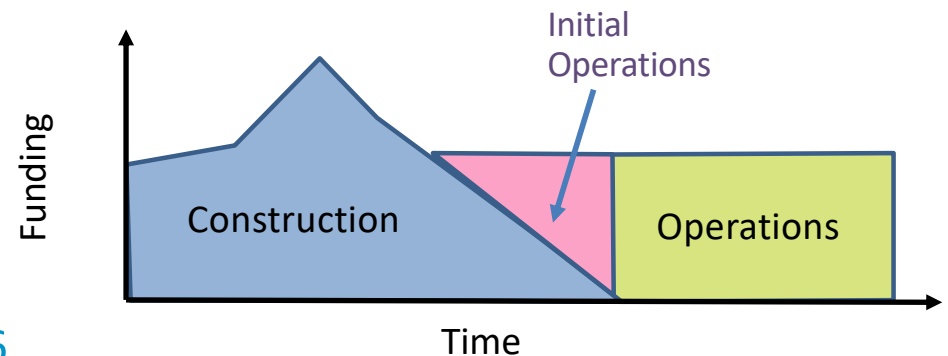
What we are watching...



- Maintaining schedule
 - Especially in-kind deliveries – only takes a couple of issues to knock us off course
- Managing cost to complete
 - Project contingency is a big challenge. Still five years to go.
 - Initial Operations Plan therefore contains funding for construction risk reduction.
- Integration and installation ramping up
- Management agility: need to intervene when necessary
 - issues on major procurements, on in-kind (including policy questions like VAT)
- Safety, Quality and In-kind
 - further developing existing framework and processes based on lessons learned

Initial Operations Plan

- Supports all ESS activities over the period 2019-25 necessary to:
 - Support host laboratory functions
 - Bring completed equipment into operation
 - Deliver science to users from 2023, and
 - Bring ESS into steady state operation in 2026, establishing a sustainable foundation for long-term stewardship of the facility
- Initial operations proceed in parallel with the construction project
- Plan endorsed by Council as a sound basis for planning
 - Key decisions needed in February on cost sharing between Member States



Aims of the Initial Operations Plan



- Budget for initial operations set to 810 M€₂₀₁₃, consistent with the ESS Statutes
- Plan optimised to deliver:
 - First Science with up to three instruments in 2023
 - Start of the user programme in 2024
 - All 15 instruments in commissioning by the end of 2025
- The Initial Operations Plan details the capital and staff investments needed to accomplish these goals and the risk remediation strategy
- Peak spending takes place in 2021-22 to manage overall risk during installation and commissioning of the machine and first instruments
- This front-end loading of the budget is critical to achieving First Science in 2023

Financial Summary



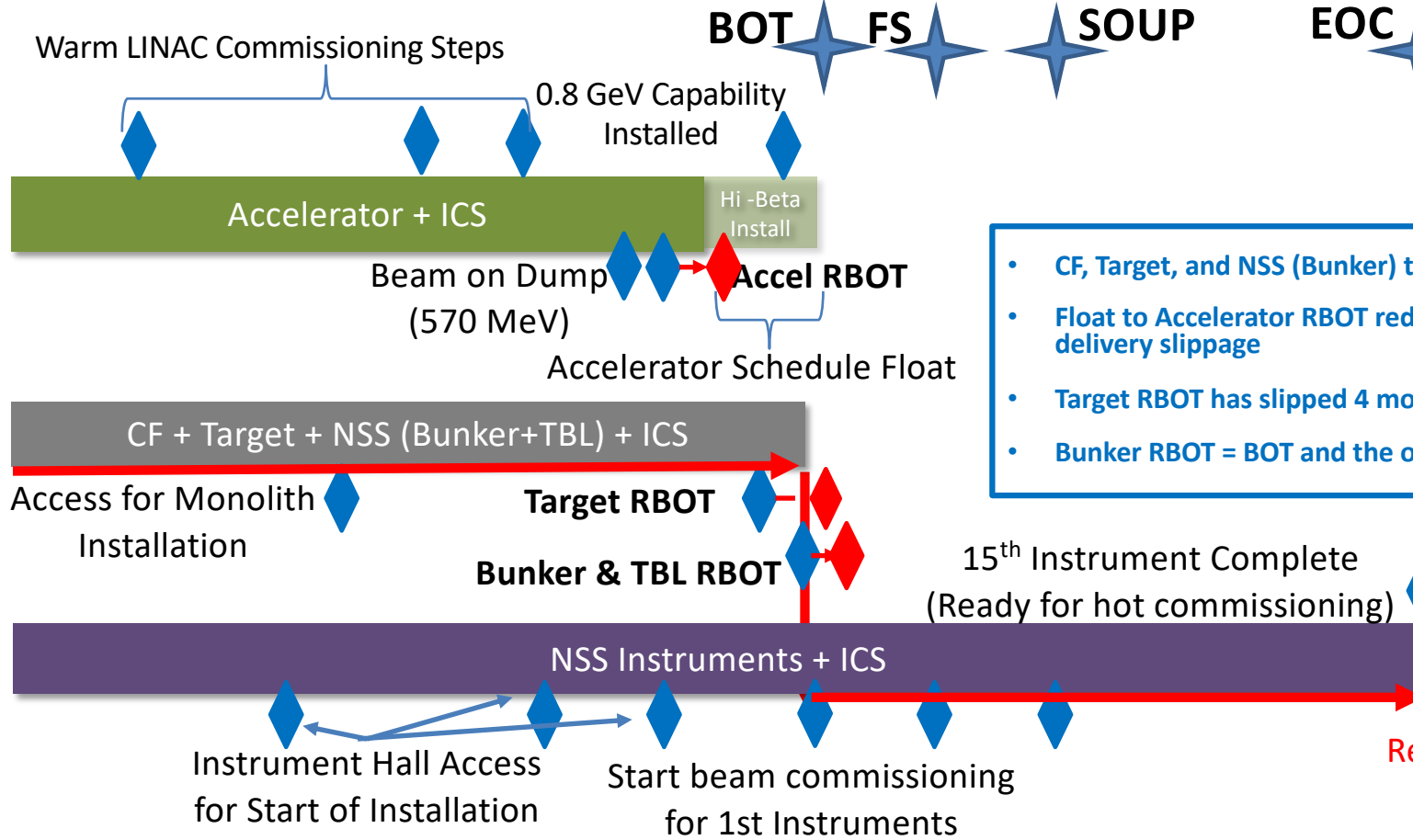
- All work is based on detailed, multi-year, resource loaded plan
- Expenditure benchmarked to actual 2019 costs for staff, services and equipment
- Cost basis explored by PAC

Cost Category	2019 (Forecast)	2020 (Planned)	2021	2022	2023	2024	2025	TOTAL
Employee Cost	25 791	38 633	54 029	58 816	55 818	51 357	49 319	333 764
Contracted Staff	6 054	6 253	1 786	2 856	2 531	1 090	967	21 536
Travel	920	1 313	1 585	1 759	1 996	1 832	1 945	11 350
Equipment Capital Investment	3 357	8 592	22 666	22 357	12 000	11 985	10 862	91 818
Services	23 550	27 736	33 587	40 984	42 827	43 391	45 047	257 122
— Consumables	3 108	5 692	9 516	14 152	15 262	15 647	15 713	79 091
— Consultancy and Ext Services	4 376	4 917	4 036	4 163	3 866	3 938	2 816	28 112
— Office Administration Cost	5 862	4 562	2 523	2 660	2 970	3 010	3 248	24 835
— Premises	7 233	8 536	13 175	14 226	15 037	15 294	17 751	91 253
— Other Personnel Cost	1 100	1 285	1 594	2 581	2 034	1 843	1 861	12 298
— Cash Facility Cost	1 870	0	1 500	1 201	500	0	0	7 071
— Proposed Cash Facility Estimated Costs		744	1 244	2 000	3 158	3 658	3 658	14 462
Initial Operations Risk	0	3 389	10 060	12 346	9 145	9 145	9 145	53 232
Mitigation								
Construction Project Risk Mitigation	0	4 573	18 291	9 145	9 244	0	0	41 253
Total in k€₂₀₁₃	59 673	90 489	142 002	148 263	133 562	118 800	117 285	810 075

Summary Schedule and Critical Path for Remaining Work

2018	2019	2020	2021	2022	2023	2024	2025
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Baseline
 BOT - Beam on Target July 22
 FS - First Science March 23
 SOUP - Start of User Prog Dec 23
 EOC - End of Construction project
 RXXX - Ready for XXX



- CF, Target, and NSS (Bunker) teams holding zerofloat Critical path to BOT
- Float to Accelerator RBOT reduced from 14 months to 6 months due to IK delivery slippage
- Target RBOT has slipped 4 months, due to material issues, July 2022
- Bunker RBOT = BOT and the overall slip is down to 3 months, Oct 2022

Red diamonds are NOT a revised schedule

A 3D molecular model of a protein-ligand complex. The protein is shown as a grey surface with cyan ribbons. The ligand is a complex molecule with various colored atoms (pink, blue, green, yellow, orange, red) and is bound in a pocket of the protein. The background is a dark red color with some purple and green highlights.

First Science in 2023!