EUROPEAN SPALLATION SOURCE

Pool Equipment

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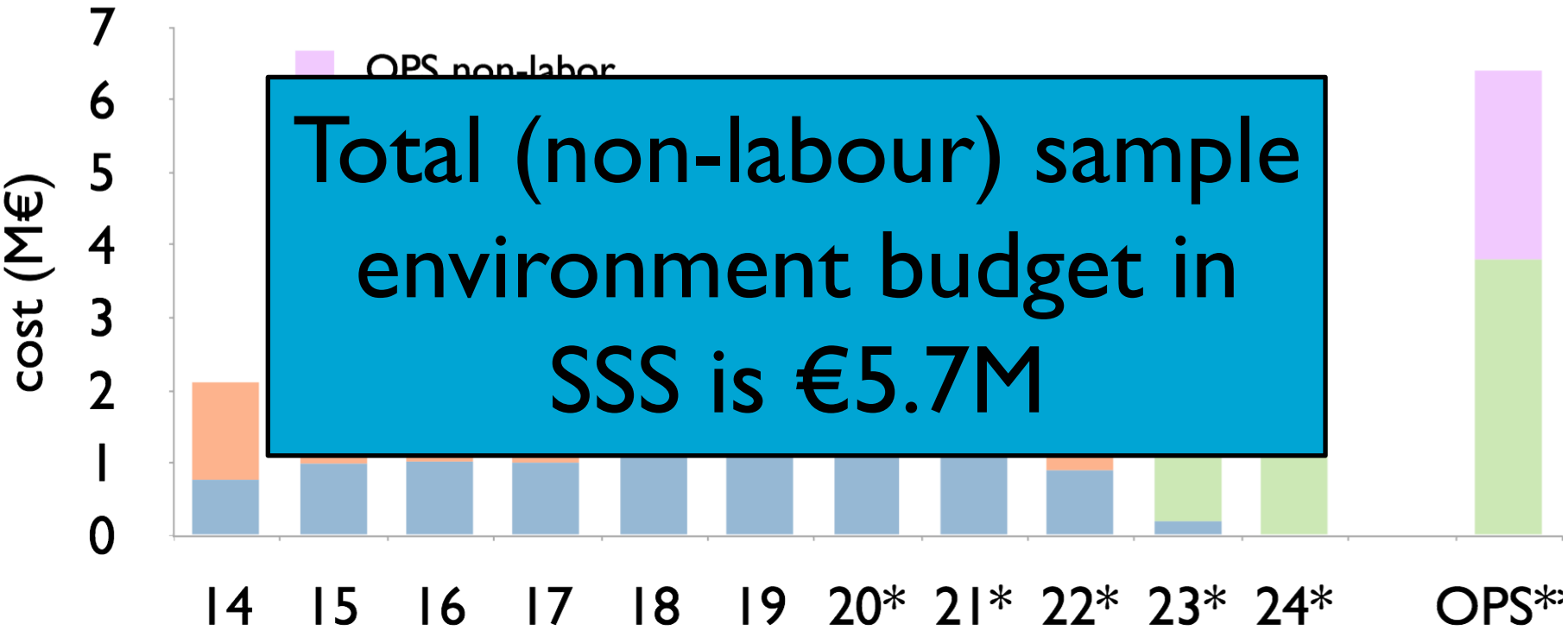
Science Support Systems (SSS)
Cost Estimate and Schedule

- Only core functionalities for first neutrons ensured by construction budget.
- Ramp up follows selected instrument construction schedule.
- Additional functions for operation require external funding sources.



Total (non-labour) sample environment budget in SSS is €5.7M

* requires operational funds

** without user reimbursement and PhD prg (~ 5 M€/y)

Sample Environment Budget breakdown

€5.7M (~ €630k/year)

- Establishing labs and infrastructure from scratch
- Procuring Pool equipment
- Consumables, utilities, supplies

Platform	Non-labour Budget (M€) in construction phase
Temperature and Fields (TEFI)	2.7
Pressure and Mechanical Processing (PREMP)	1.5
Fluids incl. Gases, Colloids and Suspensions (FLUCO)	1.1
Mechatronics and Software Integration (MESI)	0.4

Each platform: 1 scientist (now), 1 technician (from 2017-18)

Pool equipment – Scope during construction

Pool Scope (SSS):

- Only core functionalities enabling science case on initial suite of instruments

Example: Orange cryostats
ISIS pool has **16**
ESS pool has **1**

- Excluded: instrument specific equipment

If it will only be used by your instrument it needs to be in your budget

(Full pool requires pre-ops and ops funding)

Pool equipment – SSS Strategy

- **Priority:** deliver and support mission critical SE to enable of the first 8 instruments
- **Staging:**
  - Synchronise deliverables with instrument timelines
  - New technologies and in house expertise are urgent
  - “Off the shelf” procurements can come later
- **Standardisation:**
  - Key policy of the pool. Allows interchangeability, maintenance, flexibility, cost savings…
- **Communications:**
  - Robust channels with instrument teams are essential
  - Community input also critical

Temperature and Field Pool Equipment

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Core technologies	Development projects	Infrastructure
1 x Orange-type cryofurnace 1.5-600K	In-situ χ measurement	Support laboratory with non-magnetic areas for magnet testing
2 x PTR cryostat 3-300K	Peltier sub-cryostat (RUC)	Basic machining capabilities
11T horizontal Wet cryostat magnet system	Side-access PTR with robotic changer (JP MLZ)	Liquid Helium supply and recovery system.
9T vertical Wet cryostat magnet system		Liquid nitrogen supply
3He sorption stick 0.3-300K		
2 x High temperature furnaces 300 – 2000 K		
IR furnace 300 – 1500K		
3T electromagnet		

Temperature and Field Pool Equipment

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3He sorption stick 0.3-300K		
2 x High temperature furnaces 300		
IR furnace 300 – 1500K		
3T electromagnet		

Desired but out of budget
Dilution insert
HTS >20T horizontal field magnet
HTS >20T vertical field magnet
40 T Pulse field magnet
6kV electric field system

FLUCO (Fluids incl. Gases, Vapor and Complex Fluids)

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Core Technologies	Support laboratories	In-situ technologies
Gas-processing systems Flushing, filling, heating w. gases, up to 300˚C	Sample preparation / handling	In-situ light scattering, DLS/SLS/Raman
	Cell / chamber calibration	Rheometer with SANS, RheoSANS, shear cell, Taylor-Couette Cell Quench option, heating
Humidity chamber <=5 %rh-100%rh, 5-95˚C	Engineering/testing/setup off methods	
Rotating cell magazine	Gas-processing-system setup, p<=200 bar	
Stopped flow cell, Up to 6 different liquid mixtures	General tools/lab equipment/ maintenance	
Existing : Laser pump probe technique/setup	Rheometer setup	
	Benches	
	Consumables	
	Fume cupboard	

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	Cell / chamber calibration	Rheometer with SANS,
Humidity chamber <=5 %rh-100%rh, 5-95˚C	**Desired but out of budget**	
Rotating cell magazine	Chemical processing cell, in-situ and operando measurements	
Stopped flow cell, Up to 6 different liquid mixtures	Liquid surface troughs	
	SANS magazine 5x10 positions equal thermalized	
Existing : Laser pump probe technique/setup	SANS Magazine 5x10 positions individually thermalized	
	6kV electric field system	
	In - situ gas adsorption measurement	
	In - situ thermal analysis measurement	

Pressure and Mechanical Processing (PREMP)

Pool sample environment equipment:

Pool Item	number	Max. sample Volume (mm^3)	Pressure range	Temperature range
Gas cells (up to 1 GPa)	3	2000	< 1 GPa	4-500
Clamp cells (up to 3 GPa)	2	2000	< 3 GPa	4-500
Paris-Edinburgh cell + seats/anvils	1	100	< 10 GPa	100-300
Diamonds cells + stages	3	0.05-1	3-50 GPa	4-300
portable stress-strain rig	1 (partial contribution)	?	?	?
portable Raman system	1	N/A		

Pressure and Materials Processing (PREMP)

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portable stress-strain rig	1 (partia contribu			
portable Raman system	1	N/A		

Desired but out of budget

portable laser heating assembly

corrosive gas manifold

Pressure and Materials Processing (PREMP)

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Supporting laboratory infrastructure:

Gas/Hydraulic laboratory

- Pressure control systems
- Gas loading capability (0.3 GPa)
- Pressure testing bunker

Small samples laboratory

- Microscope
- Micro-machining

Conclusions

- Resources in construction phase are limited
- In-kind partners sought
- We do need input now from instrument teams and wider community to prioritise and plan for infrastructure and future resource needs
- Not urgent ≠ Unimportant
- Be patient

What we need from you…

READ THE REFERENCE DOCUMENTS!

Download them from http://ow.ly/YfXhQ

(account needed – contact zsuzsa.helyes@esss.se if you don't have one)

Leave comments on the website

Come to the SAD booth on Wednesday and talk to us

It is NOT too late to have your say, if you don't, you will have to live with the consequences!