EUROPEAN SPALLATION SOURCE

Neutron Scattering Systems Status and Overview

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In-kind and Design Update

The NSS project managed a total of 47 in-kind contributions that are part of the “ESS Design Update Phase”. The last ones were recently presented to the Preliminary In-Kind Review Committee (PIKRC).

Lessons learnt

Negotiating deliverables

Experiencing in-kind framework

Identified potential in-kind partners and interact with them…one-to-one, EoI’s or IKON meetings…

In-kind and Procurement

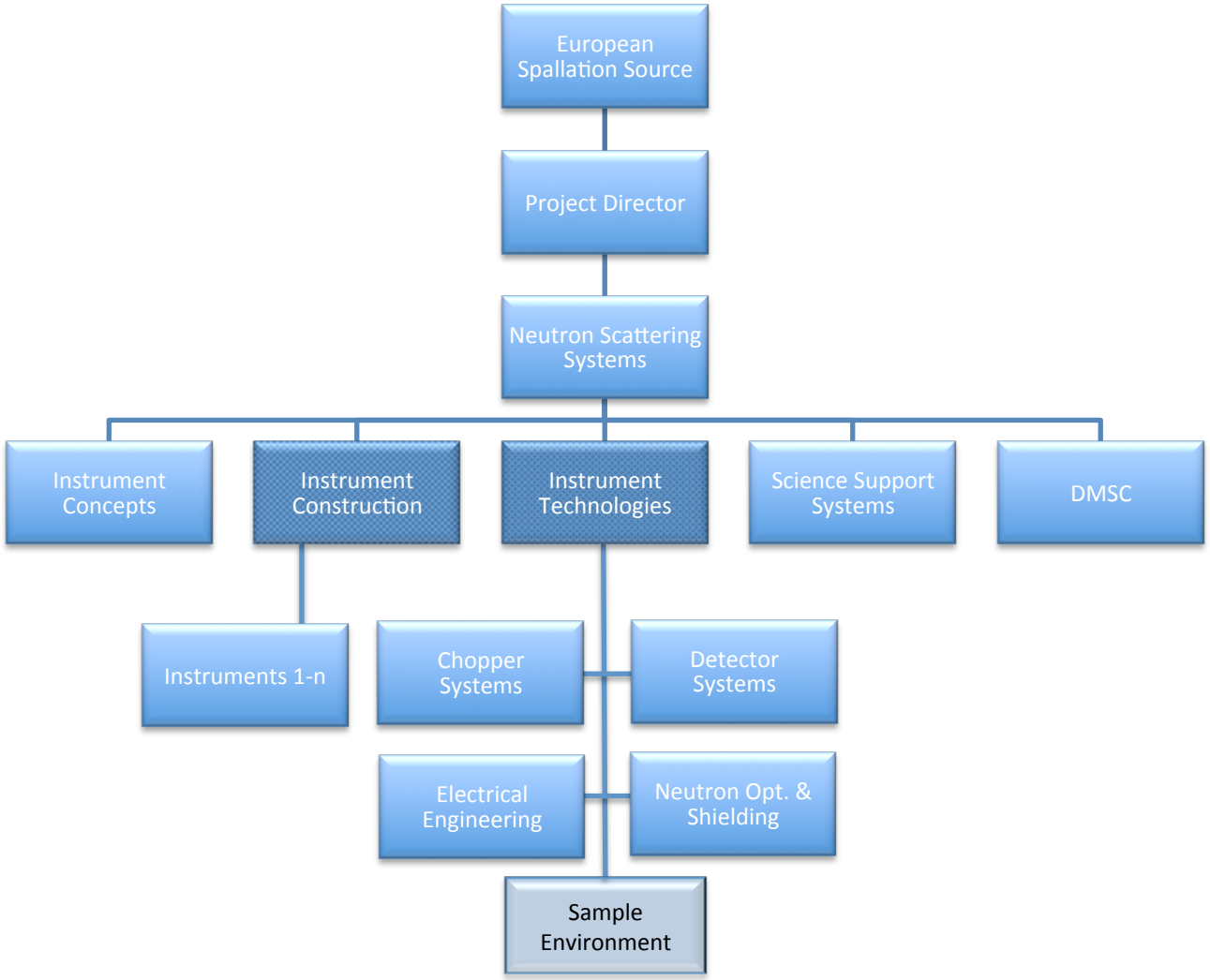
Potential for in-kind contributions

- *Instrument Concepts*
  - ≥30%
- *Science Support Systems*
  - ≥30%
- *Instrument Construction (*per instrument ≤70%)
  - Total ~70%
- *Instrument Technologies*
  - ≥16%
- *DMSC*
  - ≥20%

Current estimate of in-kind potential is about 35% of the NSS total budget (~123 Mio€)

Opportunity to access expertise, knowledge and skills that ESS as a "Green Field" site does not yet have
Note: Not a complete list of partners

Organisation



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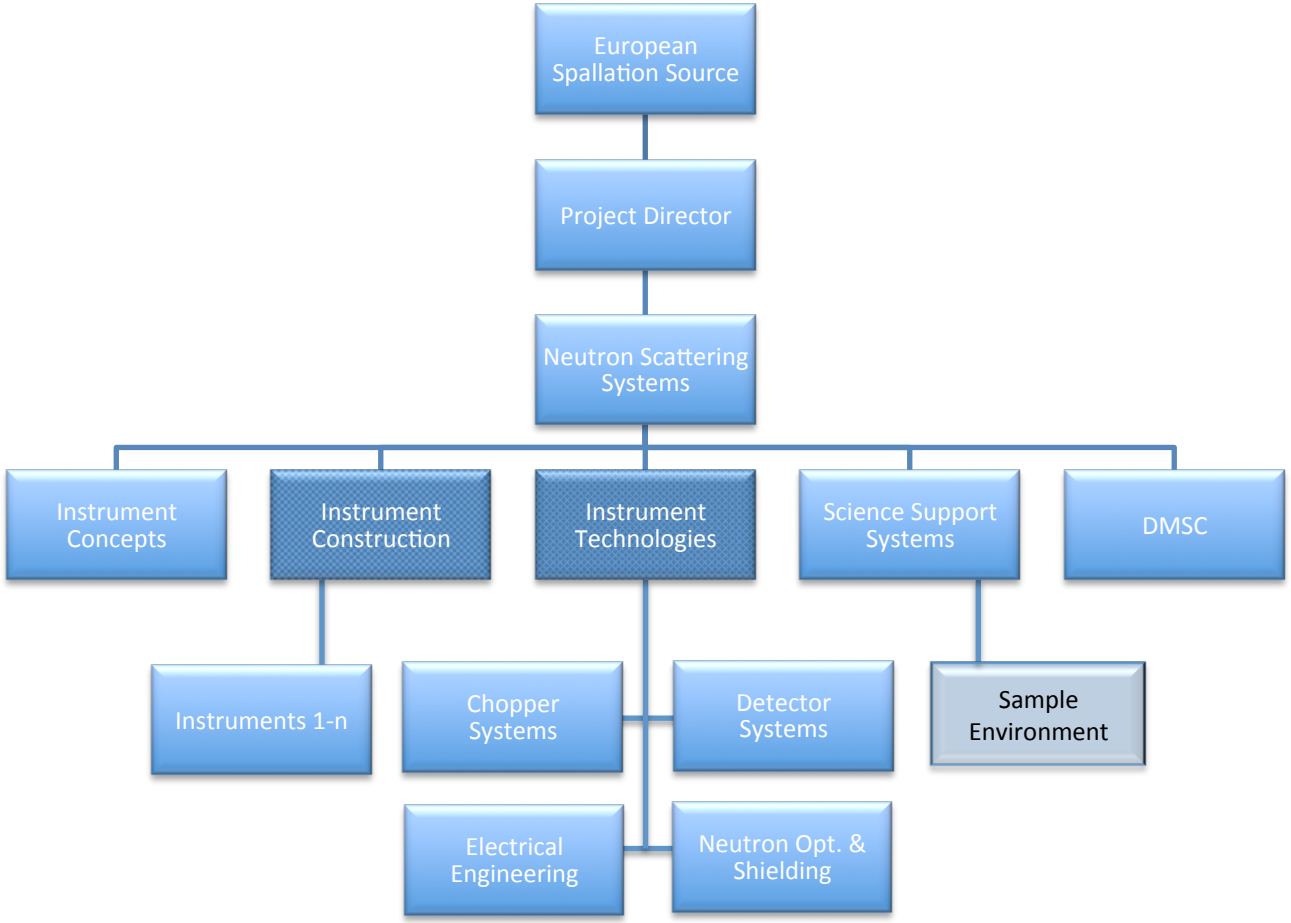

Instruments – Round 1

Estblished "Instrument Teams" for Phase 1


- LOKI (SANS)
  - Andrew Jackson (Lead Instrument Scientist)
  - Stewart Pullen (Interim, dedicated Instrument Engineer to start in March)


- NMX (Macromol. Diffractometer)
  - Esko Oksanen (Lead Instrument Scientist)
  - Guiseppe Aprigliano (Instrument Engineer)


- ODIN (Imaging)
  - Markus Strobl (Lead Instrument Scientist)
  - Stewart Pullen (Instrument Engineer)

Instruments – Round 2

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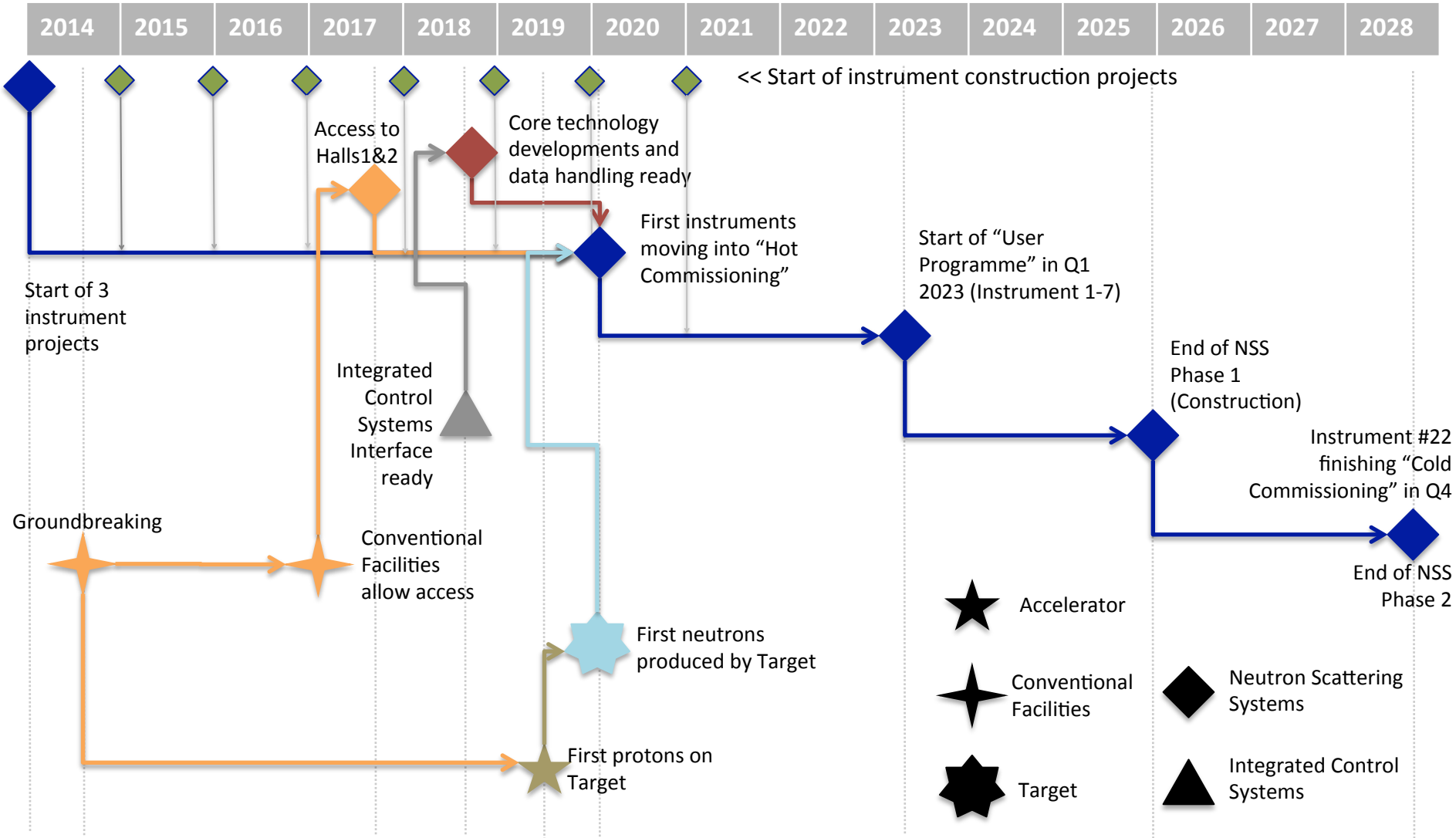
Small Angle Neutron Scattering (STAP meeting Jan 2014)		
SKADI - high resolution polarised SANS	FZJ, LLB, TU Delft	DE, FR
Compact SANS for small samples	U Copenhagen, PSI	CH, DK
Reflectometry (STAP meeting Jan 2014)		
THOR - versatile liquids reflectometer	ESS	ESS
Vertical reflectometer	JCNS, HZG	DE
ESTIA - focusing reflectometer for small samples	PSI, U Copenhagen, U Southern DK	CH, DK
FREIA - fast horizontal reflectometer	ESS	ESS
Powder Diffraction (STAP meeting Dec 2013)		
POWHOW - bispectral powder diffractometer	JCNS	DE
HEIMDAHL - hybrid diffraction, SANS and imaging	U Aarhus, U Copenhagen, PSI, DTU	CH, DK
MODI - monochromator-based general-purpose powder diffractometer	ESS	ESS
Materials & Engineering Diffraction (STAP meeting Feb 2014)		
BEER - engineering diffractometer	HZG, NPI Rez, TU Clausthal	CZ, DE
Direct-Geometry Spectroscopy (STAP meeting Dec 2013)		
C-SPEC - cold chopper spectrometer	TUM, LLB	DE, FR
VOR - wide bandwidth chopper spectrometer	ESS	ESS
T-REX - bispectral chopper spectrometer	JCNS	DE
TEMPUS FUGIT - time-focusing crystal-monochromator spectrometer	U Perugia, UP Marche, U Messina, U Roma Tre	IT
Indirect-Geometry Spectroscopy (STAP meeting Dec 2013)		
CAMEA - crystal-analyser spectrometer	EPFL, U Copenhagen, DTU, PSI	CH, DK
Spin Echo Spectroscopy (STAP meeting Dec 2013)		
ESSENS - high resolution neutron spin echo	JCNS	DE

Schedule & Milestones



Annual Review – 12.-14. November '13

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"Lehman" style review

The purpose of the review was to evaluate the project's progress and readiness to start construction in mid-2014, and included an assessment of technical areas, the overall cost, schedule, and management aspects of the project

NSS - Mandate and subject to be reviewed

- Review the technical design and specifications of NSS
- To assess the maturity of scope definition, cost, schedule and risk of NSS
- To assess the readiness of NSS management team and adequacy of staffing for move to construction phase
- To assess the appropriateness of the plans for managing in-kind contributions

8 Recommendations

- Conduct a project level review of the NSS budget to reduce the risk of delivering less than 16 instruments to an acceptable level
- Establish an acceptable scope for NSS, consistent with budgetary constraints and seek endorsement of stakeholders
- Establish agreements with in-kind partners for implementation of instrument development and construction, and for bringing those instruments to full potential
- Reassess instrument construction costs, with due consideration of the impact of a high proportion of in kind contributions
- Focus existing personnel on attracting in-kind contributions and establishing interfaces /standards to accommodate those
- Maximize consolidation of procurements for key components with other subprojects (e.g. steel, concrete...)
- Establish a detailed work program for the Data Management and Software Centre including a time-line for recruiting staff
- Conduct an independent assessment of instrument construction cost, with 1st level cost differentiation (e.g. low, medium and high cost prototypes)

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- Conduct an inde cost differentiat

Internal workshop on 27. & 29. of November
Reassessment of all work packages (strategy, work units, costs)

Internal follow up on
- Chopper Systems (13. December 2013)
- Detector Systems (17. January 2014)

Peer review (TAP)
- Neutron Optics&Shielding (23. & 24. January 2014)
- Detectors & Choppers – March 2014

Updated project plan in place by 31. March 2014

Recommendations

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Scope of NSS – 350 Mio € (ring fenced)

16 instruments funded out of Construction budget
3 distinct tranches
Supporting infrastructure

Gradual increase to 22 instruments accessing pre-operational and operational funds; instrument construction finished in 2028

Revised plan by 31. March 2014

Recommendations

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Workshop with partners to discuss e.g. Cooperation Centers and the implementation process for instrument

Follow on activities with partner /at partner labs

Due date to have process finalised: 31. December 2014

Recommendations

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Scope of NSS

Utilise the full set of instrument proposals and the basis of estimations to compare with existing spallation source instruments, and work with partners with knowledge of in-kind contributions to better understand the impact.

Revised projections of instrument costs by 30. April 2014

Recommendations

- Focus existing personnel on attracting in-kind contributions and establishing interfaces /standards to accommodate those
- Maximize consolidation of procurements for key components with other subprojects (e.g. steel, concrete...)
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Connect personnel at all levels of the organization with partners with the intent of finding areas of interest for in-kind contributions.

Ongoing effort that already started by e.g. identifying postdocs from France working on instrument concepts.

Recommendations

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Work with other parts of ESS to coordinate this information;
Consolidated procurement plan instrument construction

Delivery date: 31 December 2014

Recommendations

- Establish a detailed work program for the Data Management and Software Centre including a time-line for recruiting staff
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Establish the scope of the DMSC as part of the internal project review, and develop a detailed project plan for the DMSC which includes a staff time-line accessing pre-operational and operational funds.

Partially done during workshop in November – presentation to SAC during this meeting

DMSC plan by 31. March 2014

Recommendations

- Conduct an independent assessment of instrument construction cost, with 1st level cost differentiation (e.g. low, medium and high cost prototypes)
- Conduct a project level review of the NSS budget to reduce the risk of delivering less than 16 instruments to an acceptable level
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Cost differentiation/categories

Started as part of the revision of the ESS Cost Book
Internally reviewed in December 2013 / January 2014

External review to be scheduled

Endorsement by 31. April 2013

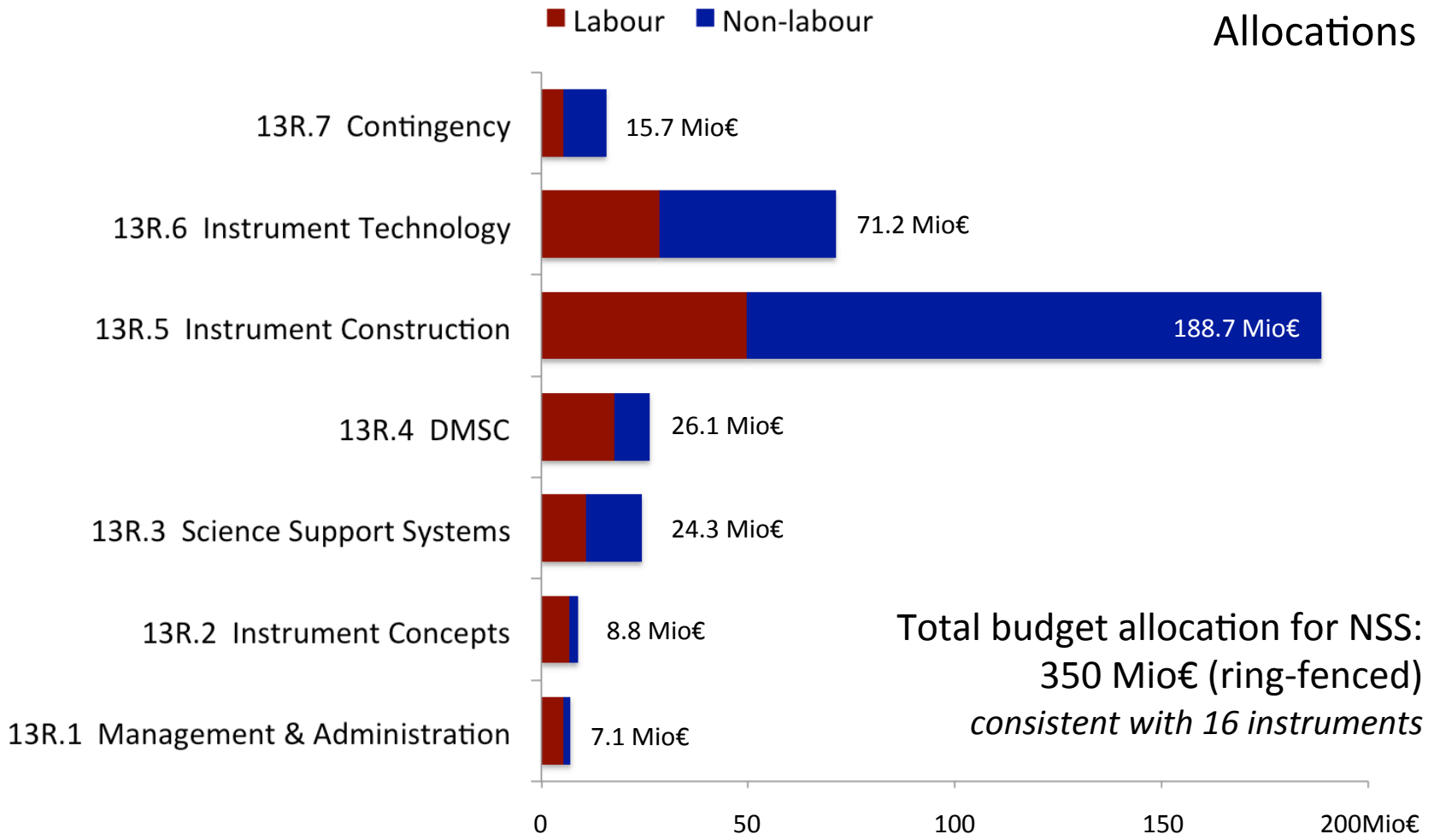
Provide an independent assessment and recommendations on NSS Status and Brief Description of Present Achievements

The NSS project team has done a commendable job in the establishment and implementation of a process for engaging the EU community in the instrument selection process

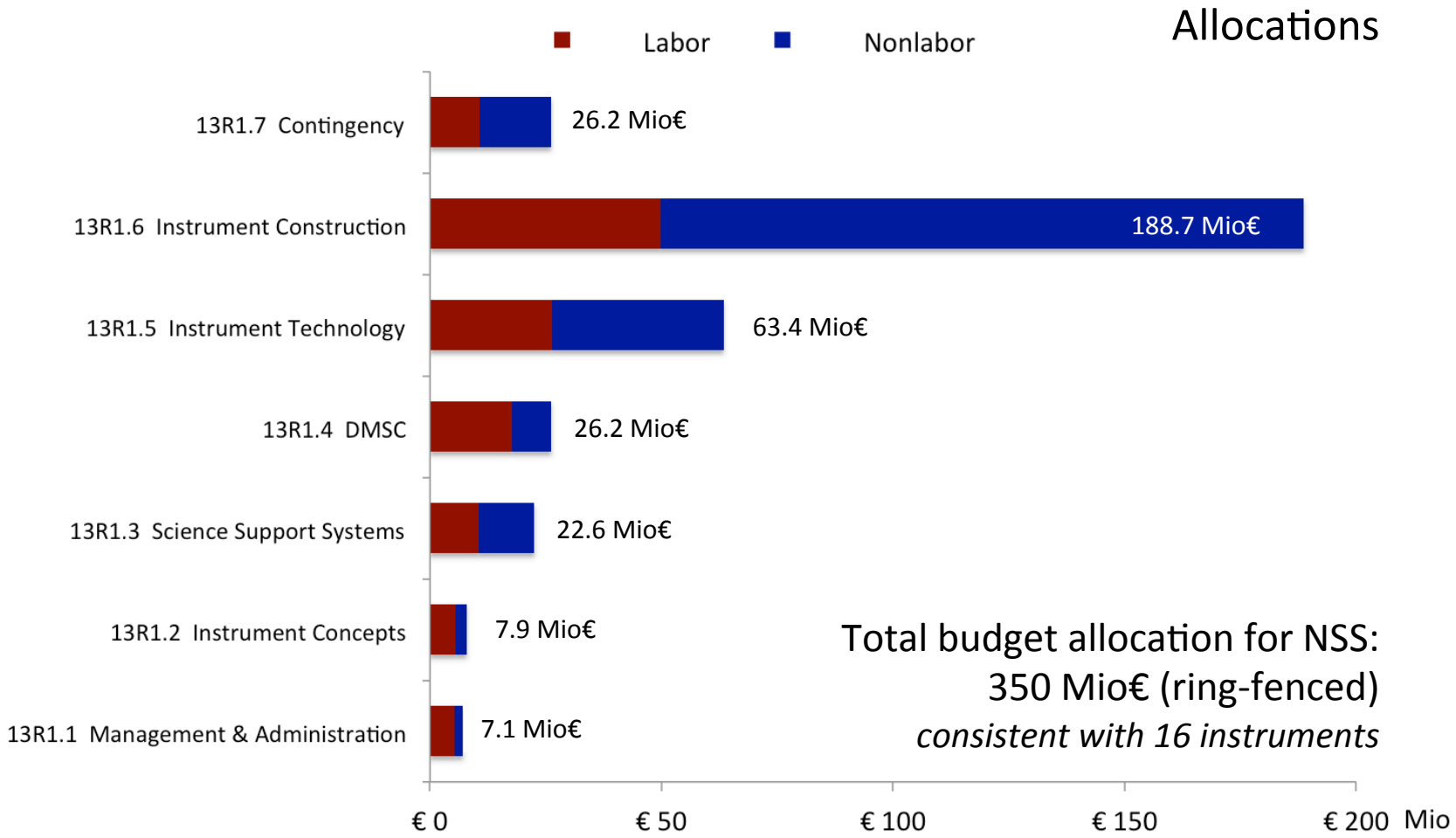
Neutron technologies division has identified key competencies required to be managed in-house and recruited competent leaders in all those areas
Progress towards initiation of construction of the first three instruments is well advanced

Concept development and design of essential neutron beam infrastructure (transport systems, detection, automation, DAE etc.) is progressing in timely manner

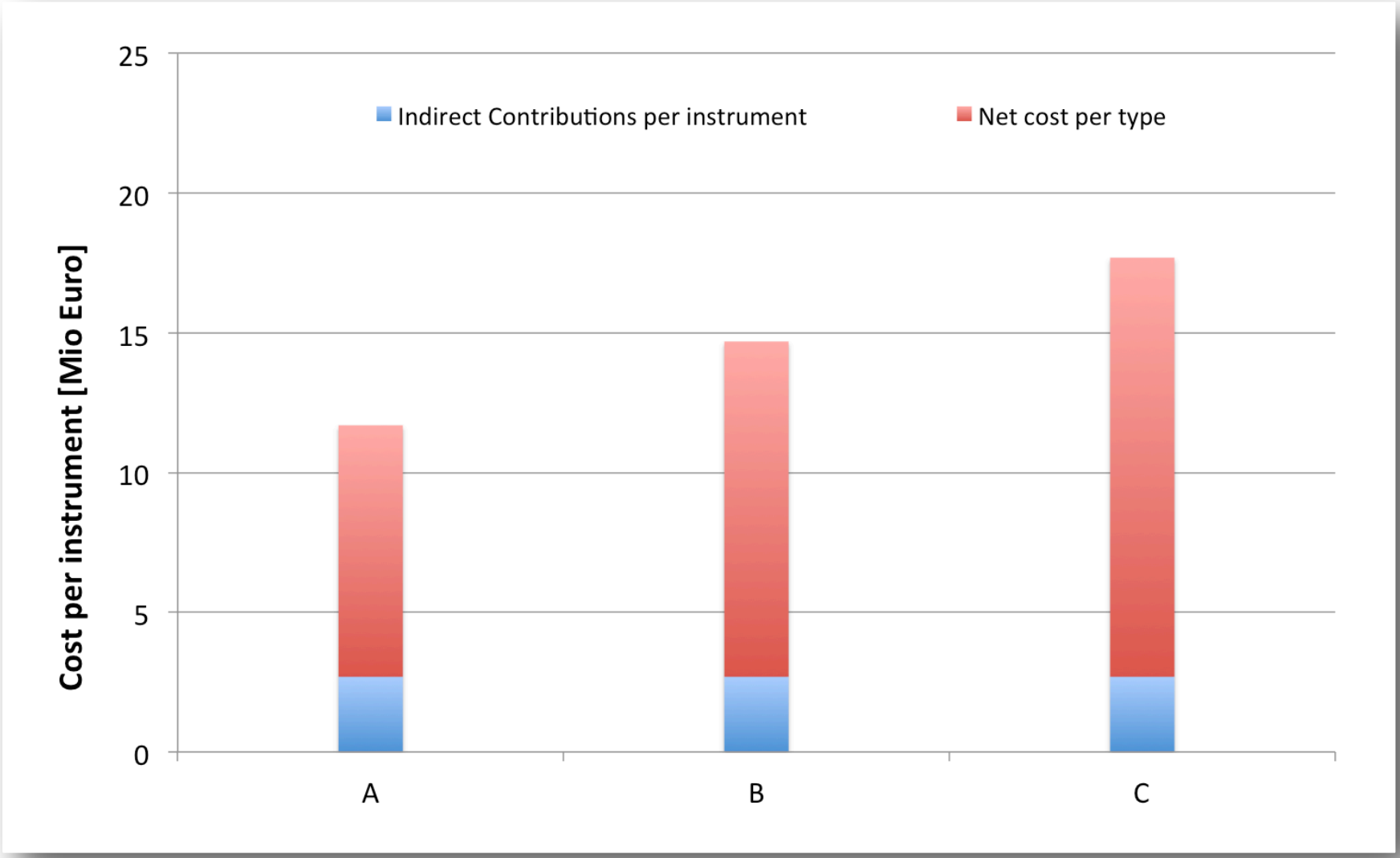
Costs per work package – pre-review



Cost per workpackage – post review



Cost per instrument category



Cost Book - Update

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Cost per average instrument

The average cost per instrument at ESS includes activities, which are due to e.g. standardisation efforts, distributed across different projects. Likewise, general development efforts required e.g. for ^{10}B based detector technology are decoupled from the individual instrument projects, and coordinated by dedicated technical groups. Such centralised approach will reduce not only financial, schedule and technological risks to the individual instrument project, but also positively affect operations of instruments and consequently lower operational costs of ESS, which is significant considering the lifetime of the facility. It is also assumed that some of the investment for supporting technology will contribute 'indirectly' to the overall cost of an average instrument.

	Value in Mio € per instrument	In-kind potential	Project	WBS Code	Comment
Integrated Control Systems (ICS) Contributions	0.17	Yes	ICS	ICS 14.12	Hardware and programming efforts related to EPICS and Control Boxes for instruments
Instrument Project Administration & Common Systems Engineering	0.21		NSS	NSS 13.6.1	Management & Administration
Instrument Construction Preparation	0.17	Yes	NSS	NSS 13.6.1	Management & Administration
Guide Bunker & Monolith Shroud	1.25	Yes	NSS	NSS 13.6.2	Guide Bunker & Monolith shroud
Instrument Technologies Contribution (*)	0.58	Yes	NSS	NSS 13.5.1 NSS 13.5.2 NSS 13.5.3 NSS 13.5.4	Chopper Systems Neutron Optics&Shielding Electrical Engineering Detector Systems
Science Support Systems Contributions (&)	0.07	Yes	NSS	NSS 13.3.4	Sample Environment
DMSC Contributions (^)	0.24	Yes	NSS	NSS 13.4.2 NSS 13.4.3 NSS 13.4.4	Technology and Systems Operations Data Acquisition, Reduction and Management Analysis, Modeling, Simulations and Visualisation
SUM	**2.69**				
Net cost Type A Type B Type C	 9.00 12.00 15.00	Yes	NSS	NSS 13.6.3 ->	Instrument Construction Resources
Total cost Type A Type B Type C	 **11.69** **14.69** **17.69**	**per instrument type A/B/C, including standardisation activities distributed across other WP's**			

Note: Estimated 'indirect' investment

(*) 20% (&) 15% (^) 20%

Instrument Program