

Prioritisation of PALS projects and facilities

As part of the Programmatic Review, a major component of the scrutiny undertaken by PALS was the evaluation of a prioritisation programme for the complement of current and future large scale facilities to ensure the delivery of optimal scientific development in the light of the current funding situation. These Programmes involve operation and development of all UK-based facilities including the major user facilities CLF, Diamond and ISIS, the proposed development programmes on next generation light sources, including ERLP and X-FEL, and the major overseas facilities in the PALS remit, ILL and ESRF. The initial prioritisation exercise found a generally very high degree of quality in the programmes of the major Facilities operated or supported by STFC; in most cases these are world-leading or world-class, as appropriate for the STFC mission for Facility provision to the UK scientific community. This finding underlies the subsequent prioritisation of future plans and potential developments of these Facilities that is outlined here.

The prioritisation contained in this document was arrived at first by considering a number of questions proposed as starting points by the STFC Executive Management, after discussion at Science Board.

1. What is the relative priority between:
 - Maintaining full year operations of ISIS;
 - Maintaining a facilities development fund for improvements to ISIS;
 - Support for the rapid commissioning of TS2.
2. Which should be a higher priority for STFC (a) spending on ISIS TS2 or on (b) additional ILL upgrade programmes?
3. What is the relative priority between (a) maintaining full year operations of Diamond and (b) support for rapid commissioning of Diamond Phase II beamlines?
4. Which should be a higher priority for STFC (a) spending on Diamond Phase III or (b) spending on the ESRF upgrade programme?
5. What is the relative priority between:
 - Operating ERLP as an accelerator R&D facility;
 - Fully supporting the project to develop a proposal for a Next Light Source;
 - Contributing modest support to LCLS in order to learn how to do science at ultra-fast light sources?
6. Which should be a higher priority for STFC (a) spending on operations and development for the high power laser programme or (b) on the lasers for science programme?

Having used these questions to focus on priorities within facility groups, the committee then constructed an overall prioritisation of the whole programme.

Further data on publication outputs (where appropriate) and analysis of research highlights from the facilities was used as a basis for discussion at PALS. The facilities web access bibliometric data sources were used. The alignment of the research mission with the DIUS priorities for UK science was also assessed by the committee.

HIGH PRIORITY

Diamond operations and commissioning

Diamond is a new 3rd generation synchrotron light source and represents a significant investment of £400M for Phases I and II (of which ~£350M was provided by STFC) in UK science, securing national research capabilities (<http://www.diamond.ac.uk/default.htm>). Diamond became operational during 2007 and the first users are now accessing the facility. PALS recommend that Diamond should operate within the current proposed budget, redeploying resources where possible to ensure that all Phase I beam-lines are operational and available for the greater benefit of the user community as soon as possible. This is increasingly important with the earlier than expected cessation of user operations at the SRS based at Daresbury Laboratories.

ESRF Upgrades (PALS notes that these must map onto UK priorities)

The ESRF is currently proposing an Upgrade Programme (<http://www.esrf.eu/AboutUs/Upgrade>) that is proposed to take place in two phases and run from 2008 – 2017. The cost of the Upgrade Programme will range from 189.87M€ (minimal Phase 1 only) to 286.70M€ (Phase 1 and Phase 2 with all additional options) in 2008 prices. Whilst some of the funding required (76.65M€) will be available from the regular budget, 200.68M€ of additional contributions will be required from the Member Countries in order to carry out the full Upgrade Programme (the Scientific Associates would be liable for the other 9.37M€). The maximum UK contribution would be 14% of the 200.68M€ i.e. 28.10M€. No decision has yet been made by the Member Countries on the level of support, if any, to be provided to the Upgrade Programme beyond 2008. The Upgrade Programme costs for 2008 are being funded from the regular budget. The ESRF is viewed as an internationally-leading Facility Partnership providing world-leading instrumentation and the Upgrade Programme will ensure that ESRF retains this position. PALS recommend that STFC should consider all of the options to fund the Upgrade Programme, including maintaining our current level of commitment to ESRF but recognise that in the current financial climate even those facilities considered to be a high priority may not receive all of the funding that they desire. STFC should also ensure that the ESRF Upgrade maps closely to the UK's scientific priorities as listed by DIUS and that beamline overlap between ESRF and Diamond Phases II and III should be minimised.

Facility Development grants

Funding for the Facility Development grant scheme was transferred from EPSRC to CCLRC in 2003. Since that time four calls have been held with a total of £24M being

allocated to facility development projects on the SRS, ISIS, Diamond and the CLF. Project values range from a few hundred thousand to multi-£M projects. The Facility Development grant scheme is considered to provide key funding that facilitates multidisciplinary collaboration between the user community and all of the UK based facilities. It encourages innovative development of the facilities and allows enhanced exploitation of the facilities for a modest cost. It is PALS recommendation that the Facility Development grant scheme be reconfigured as follows: (i) £2M is invested every two years to support time limited small value projects (up to £500k including fEC) via an appropriate call for proposals; (ii) all proposed Facility Development projects in excess of £500k in value should submit an expression of interest (EoI) to PALS for consideration, which, if taken forward would then become a separate project with its own funding line within the STFC portfolio. All projects of this value would be tensioned against all the other projects within the Science Programme Office portfolio.

ISIS Target Station 2 commissioning

ISIS is a world-leading pulsed spallation and muon source carrying out an excellent experimental and training programme. There is high demand for beam-time on ISIS from the user community both within the UK and internationally. A major capital investment funded by the large facilities capital fund (£140M), TS2, is currently near completion at ISIS. TS2 is seen as vital for the future for the facility and commissioning of the new beam-lines / instrumentation should not be delayed and should be prioritised within the current budget, reducing the operation of ISIS by one cycle per annum if necessary to do this.

LCLS: a contribution to the Stanford linac light source

The Linac Coherent Light Source (LCLS) will be the world's first x-ray free electron laser when it becomes operational in 2009(<http://www-ssrl.slac.stanford.edu/lcls/>). An opportunity has arisen for the UK to contribute to a 5th end station on the LCLS for a one-off contribution. We would aim to negotiate to give the UK user community 10% access to the LCLS as a whole as a result of this contribution. PALS is of the opinion that there is a compelling scientific case to support this as it will be a cost effective way for the UK community to obtain early access to FEL technology and applications, building user capacity for the European XFEL project of which the UK is a partner (funded through the large facilities capital fund). PALS recommended investment in the LCLS, but encouraged STFC to negotiate with LCLS with a view to reducing or re-profiling the contribution.

NLS – developing the Science case for the New Light Source

The main recommendation of the UK Light Source Review that was carried out in 2007 (<http://www.scitech.ac.uk/about/strat/council/adcom/uklsr/contents.aspx>) was the cessation of the 4GLS (4th generation light source) and Sapphire projects in their current format and a period of review and consultation with the user community on what form the next generation UK light source project should take. In order to carry out this

consultation process the NLS project has been initiated, along with the formation of the Photon Science Institute. PALS recommend that a sufficient level of funding is allocated to this project for a period of 18 months to enable the science case for the NLS to be developed, prior to consideration by PALS for further funding.

VULCAN upgrade

The initial technical design phase of the Vulcan upgrade programme was funded via Call 3 of the Facility Development grant scheme on the assumption that the Vulcan upgrade project itself would be funded from a later call, following satisfactory review of the initial phase in summer 2008. No committed funding has been allocated to date for this project (~£10M required). Following the suspension of the Facility Development grant scheme and the proposal to consider projects >£500k separately in the future this project has been considered separately during the programmatic review. The CLF is seen as a world-leading facility with an impressive publications record. Within this, the Vulcan upgrade project is seen to be the next-generation world-leading facility and should result in high profile fundamental science being carried out. In the current financial climate no new money is available to fund the Vulcan upgrade but PALS propose that the upgrade is funded through reprioritisation and savings elsewhere on the high power laser programme. This is seen as essential to maintain this facility at the scientific cutting edge and a world-leading facility.

MEDIUM PRIORITY

CLF high power laser programme

The CLF drives a broad-based science programme using ultra-fast, tuneable and high intensity lasers for its UK and international user community. The CLF currently provides world-leading capability in this area and carries out high profile fundamental science. In order to retain this world-leading capability, PALS recommends that the Vulcan upgrade is carried out (see high priority list above), whilst reprioritising activities elsewhere within the CLF in order to remain within the existing funding profile.

Diamond Phase II

Capital funding for Diamond Phase II has been provided via the large facilities capital funding with the operational budget to run the beam-lines once built being provided via STFC (86%) and the Wellcome Trust (14%). It is envisaged that Phase II beamlines will start to become operational during this CSR period. With the imminent closure of the SRS, PALS recommend that the development of the Phase II beamlines is prioritised to enable those beam-lines that are most likely to deliver the greatest benefit to the user community become operational first. At the same time, savings on the projected operational budget should be made by re-profiling / delaying the installation of some instrumentation.

Diamond Phase III

Funding for Phase III of Diamond is proposed in the Large Facilities Capital Fund; release of this funding and Phase III becoming operational (with consequences for running costs) is outwith this spending review period and was not discussed further at this point.

ISIS operations

ISIS is a world-leading pulsed spallation and muon source carrying out an excellent experimental and training programme and is seen as a key UK facility. There is high demand for beam-time on ISIS from the user community, both within the UK and internationally. In order to meet the overall savings required PALS recommends a marginal reduction in the running costs, reducing the operation of the facility by one allocation period per year if necessary.

ISIS TS2 Phase II

Phase I of ISIS TS2 will provide an initial suite of seven new instruments. Funding has been earmarked in the large facilities capital fund for an additional five instruments (TS2 Phase II) that are currently in the conceptual design phase. PALS recommend that the operational costs incurred by implementation of these additional instruments (when capital funding is released from the large facility capital fund) is staggered / re-profiled to enable additional savings to be made.

NLS – developing the accelerator design for the New Light Source

As stated above, the NLS project is seen as a priority following the outcome of the UK Light Source Review and the closure of the 4GLS and Sapphire projects. This line provides support for the NLS project (over and above the support listed in the high priority list for developing the Science Case) to produce leading-edge innovative accelerator design to meet the needs of the science case for the NLS project. It should be noted that the NLS project will run for a period of 18 months, within which a science case should be developed for consideration by PALS for further funding.

LOWER PRIORITY

ISIS facility enhancements to TS1

This funding line was to provide additional funding (over and above the day-to-day operational costs) to ISIS to for Facility enhancements to be carried out on ISIS TS1. With TS2 coming on-line for ISIS and the need to maintain ISIS running at as high an operational level as possible to meet user needs, facility enhancements to TS1 were considered to be a lower priority.

ILL upgrades

STFC recognises the quality of science produced by ILL and has agreed to contribute to the ILL Millennium Programme Phase 0 and Phase 1. STFC has been contributing to the Millennium Programme since its beginning and is contributing an additional 2M€ per annum from 2005-2009 for the next phase, which will be matched by the other Associates. An additional funding line was proposed to provide further funding over and above the 10 M€ already being committed to (a) allow the ILL management to realise the Millennium Programme on a quicker timescale [current date for completion of Phase 1 is 2015] and (b) allow the ILL Management to carry out additional upgrades and/or facility development work in addition to that already included in the Millennium Programme. In the current financial circumstances this additional investment was not regarded as urgent.

ERLP/ALICE operations

The ERLP project was funded in April 2003 to enable the technical challenges of 4GLS (a separate multi-light source project focussing on soft-X ray to THz wavelengths on the RCUK Large Facilities Capital Fund roadmap) to be addressed. Following the recommendations of the UK Light Source Review carried out in 2007 (<http://www.scitech.ac.uk/about/strat/council/adcom/uklsr/contents.aspx>), the 4GLS project was stopped and the New Light Source project initiated. PALS considered whether STFC should provide additional funding to ERLP to allow ERLP to be operated as (a) a test-bed for accelerator R&D and (b) a new user facility in its own right. PALS recommend not to pursue a photon science user programme on ERLP/ALICE but is open to using ERLP/ALICE as an accelerator R&D facility to the level that funds permit.

CLF lasers for science programme

The scientific quality of the output from the CLF lasers for science facility (LSF) programme was felt to be good but the science programme was considered not to map well onto STFC's strategic objectives. PALS were of the opinion that if the lasers for science programme could be embedded within a HEI, the quality and quantity of the outputs generated would be even higher than those currently obtained. Consideration should be given to reprofiling and transferring the lasers for science programme to a HEI in the future.

6 March 2008