# DMSC STAP meeting April 2020. Update from J Taylor

NSS: Neutron Scattering Systems – The project to deliver the 15 neutron instruments led by Shane Kennedy

SAD: The Scientific Activities Division, responsible for the user office, user labs and sample environment

ECDC: Experiment Controls and Data Curation

DAQ: Data Acquisition

ICS: Integrated Controls system division responsible for delivery of the core EPICS based control system and the ESS timing system. ICS perform a core function for controls including integration support and EPICS base development. ICS also hosts the central network team who coordinate network infrastructure at ESS.

SE: Sample Environment

SWAP : Scientific Web Applications Team.

IDS : Instrument Data Scientist

DM : Data Management

DRAM: Data Reduction Analysis and Modelling group

UO: User Office

## Introduction.

This document aims to update DMSC STAP members on progress and issues at DMSC since the last STAP meeting (24th-25th September 2019.) and act as a catalyst for discussion when taken together with the DMSC 2020 April STAP charge and the reports from DMSC group leaders.

## Actions from last STAP report.

The suggestion that LOKI be used to develop planning milestones has been actioned. Several meetings have been held with both the project division planning team (Shane Kennedy, Technical Dir.) and the LOKI team (Andrew Jackson GL / HOD Neutron Instruments Div. & LOKI scientist, Judith Housten, Clara Lopez). These (and other meetings like IKON) meetings have been useful and have highlighted some areas that still require clarification.

1. Instrument specific network & timing installation. It has been suggested that NSS should have a central infrastructure project to coordinate essential instrument service installation.
2. Early availability of physical systems for controls systems integration. Our strategy is to perform integration as early as possible during the installation phase. For this to be successful early delivery of systems should be scheduled. There is agreement on this as the basis for planning. Availability of sample environment for integration is an area of concern that is now being prioritized by SAD. Delays in permission to recruit staff has contributed to this.

## ESS Reorganization.

Overall the consensus of opinion is that the reorg has not detrimentally impacted progress at ESS. Tobias and the staff of ECDC are now organizationally located in the project division of Technical directorate. Our motivation for this move was to locate all staff working on instrument DAQ and controls together. Two staff were moved from motion control and automation group and the SAD division into ECDC. The ECDC group is in close collaboration with the integration group of ICS and in principle should coordinate the ICS contribution to instrument construction. Tobias will detail how the new NSS – ICS relationship is working out.

## Initial Operations

All DMSC staff (irrespective of organizational unit) are funded from the Initial operations budget. Initial operations covers the period 2019 – 2025.

The ESS ERIC statutes value Initial operations at 810M euro in 2013 Euros. Actual values are indexed by a council and admin and finance committee agreed indexation.

Originally the ESS council had indicated that ESS should plan for initial operations at an enhanced level of 891M euros (2013). The reasons for the agreed uplift was to cover deferments and spares which should be considered as orphan scope in initial operations.

In 2019 it became clear that the higher valuation of initial operations was not realistic and ESS should plan to the original value of 810M. This re-plan generates significant constraints to each directorate at ESS.

From the 810M budget the science directorate (including NSS division and under the old organizational structure) has been allocated a target of 132M euros (2013) for the period.

Each directorate has updated the initial operations work package dictionary – which define scope for each division.

The leading term in the initial operations budget is staff. The budget target represents a considerable reduction from the original science directorate staff plan (210 FTE in 2025).

For the re-plan staff positions were prioritized over equipment.

Across the organization the travel budget will be reduced by 10%.

For DMSC the effect of the re-plan is as follows.

1. A reduction of staff effort of 62 person years in the years XXX-XXX.
2. Deferment of the modelling and simulation group.
3. Deferment of some capital investment including upgrading the redundancy of the Copenhagen data center.

Areas that were suggested / or discussed for budget reduction that will not be actioned.

1. It was suggested that the User office software could be delayed until 2021
2. Reduction in capital investment – reducing storage capacity. We will in fact provide some capacity to other parts of the organization (IT) who had no capital investment budget for the initial operations period.
3. Reduction in capital investment- deferring instrument specific compute hardware for DAQ and processing for instrument 12-15. This will not be actioned as it impacts the cold commissioning completed milestone.

At a high level the constraints of the initial operations budget have the effect that DMSC staffing is not commensurate with the original high level NSS schedule.

Hot commissioning (an initial ops activity) for the last 3-4 instruments will be deferred along with the capital investment for SE equipment for those instruments.

The staff effort reduction of DMSC results in a staff profile remaining flat at 41 staff from 2021 – 2025.

This staffing level is not commensurate with the NSS schedule 4.2 which has 8 instruments entering hot commissioning soon after beam on target is achieved.

It is expected that the NSS schedule 4.2 will change, such that the number of instruments entering hot commissioning is reduced. This situation is ‘more’ commensurate with the availability of staff from DMSC.

The overall FTE requirement for DMSC was generated by producing a staff profile on an instrument by instrument basis for each area of scope following a similar approach to the 2018 rebaseline exercise.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **project year** | | **1** | **2** | **3** | **4** | **5** |
|  | **DRAM staff profile** |  | 1.0 | 1.5 | 2.0 | 1.5 | 1.0 |
|  | **ECDC BCT** |  | 1.0 | 1.5 | 2.0 | 1.0 | 0.5 |

Table1 shows staff profile for Scientific computing as a function of instrument project year across the phases -installation, hot commissioning and operations. For the 2020 re-planning exercise this profile is used for instruments 1-3 and 4-8.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **project year** | | **1** | **2** | **3** | **4** |
|  | **DRAM staff profile** |  | 0.5 | 0.5 | 0.5 | 0.5 |
|  | **ECDC BCT** |  | 1.0 | 1.0 | 0.0 | 0.4 |

Table 2 shows the staff effort estimated for instruments 9-15 used for 2020 initial operation re-planning. A considerable reduction of effort in applied across all scope. (Year 2,3 & 4 occurs outside of the initial operations period for instruments 12 -15)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | ECDC | DRAM  dev | DRAM  IDS | SWAP | DST | Admin & HOD | |
| FTE 2021-25 | 11 | 7 | 7 | 5 | 7 | 4 |  |
| Mcstas Peter W |  | 0.3 |  |  |  |  |  |

Table 3 – FTE per area across DMSC resulting in a total of 41 staff. Externally funded (either grant funded or coming from other parts of ESS due to the reorg or effort from ICS) are not included.

Table 3 shows the staff split across groups which covers the instruments 1-8 into operations 9-12 to hot commissioning and 12-15 to the cold commissioning toll gate (the tollgate that indicates readiness for hot commissioning.) **Whilst this situation is not ideal, we ask the STAP to comment on staffing at DMSC in the initial operations period.**

During the re-planning it was clear that a re-baselined schedule for instruments will be essential to enable successful planning of the support aspects of ESS.

The re-planning exercise has placed additional governance of the ESS hiring process. The initial operations budget for 2020 is set and for DMSC there is an agreed staff profile for hiring that is being delayed. This has delayed (again) hiring staff for SWAP, which is impacting activities for development of the User office and data catalogue.

Overall the situation is less than ideal, however DMSC continues to be supported at all levels at ESS. DMSC is no more or less impacted than any other technical area at ESS.

It is a concern that the user office development is seen as an easy target, this is possibly understandable given the high-level situation.

The outcome of the initial operations re-plan is not yet finalized and continues to be discussed.

## In-Kind during initial operations.

In-kind during operations has been briefly discussed internally (as a result from an enquiry from the host states) **The IDS was considered as an in-kind position, we ask the STAP to comment on where we could leverage in-kind in initial operations.**

## Overall Progress.

Detailed reports will be written / presented for the individual group activities at DMSC.

Since the last STAP significant progress has been made.

1. Hardware move to Cph server room completed
2. Development of a greater level of detail for capital investment for instruments (The capital investment budget remains ˜6M euro for the period.
3. Final experiment at V20 partially successful – was impacted by a shutter failure and closure of the source.
4. Development and release of a lot of software for all science and DM areas (see separate reports for details)
5. User office proposal system development and support for the second DEMAX proposal round.
6. Development of the YMIR test infrastructure in the Utgaard lab.
7. Start of user python training during IKON meeting (˜25 participants)
8. ECDC governance structure updated to new organization structure.
9. Increased activities to compile an integrated schedule between DMSC and instrument teams/ NSS planners.

Involvement in a number of ‘AI’ meetings and workshops. Proposal to the Novo Nordisk data science call has been submitted in collaboration with KU.

Discussion with Hannah Griffin and her team around collaboration in UO development.

## 2020 Strategy.

Our plan for 2020 was to recruit and start to plan and develop instrument specific systems.

At the end of 2019 there was a lack of clarity on the instrument schedule, this coupled with the reorganization and initial operations funding issues had not in Q1 progressed as far as hoped. There were still some uncertainties in the instrument schedule and it was clear from ECDC / ICS that there was not an increase in systems that required instigation into the control system. We had decided to use 2020 to continue to develop core frameworks, whilst at the same time developing an instrument specific plan for ongoing development post 2020.

The initial operations re-plan has impacted the recruitment, although not critically. ECDC and DRAM are currently recruiting.

During the last IKON we started to socialize the idea that for successful integration into the control system real physical devices needed to be onsite.

We also communicated to the instrument teams that we would not be developing detailed data reduction workflows for each instrument before hot commissioning, rather we would test a reduction example from other facilities with ESS simulated data on our systems. Data reduction development would then be prioritized during hot commissioning coordinated by the instrument data scientist. This would generate increased capacity to develop core data processing against a currently uncertain schedule.

## Instrument Data scientists.

We are currently recruiting an IDS for imaging, and have identified existing staff who are working as IDS for diffraction (Celine) and SANS (Wojtek) covering (we hope) the first three instruments)

The role of the IDS is primarily to link the instrument team to DMSC by providing data support for the instrument and its user community.

During the installation and commissioning phase the original idea was that the IDS would project manage delivery of software / compute for each instrument project.

For instruments 9-15 the IDS is the only resource available for DRAM scope (.5FTE)

The following tasks have been identified:

* Project / product managing the deliverables from DMSC to the instrument teams in order to maximize the scientific impact from those instruments.
* Working with your colleagues at DMSC and the instrument team(s) on providing the best user experience.
* Co-developing data processing and analysis software with your colleagues at DMSC using requirements from users and instrument team(s) across all domains and techniques.
* Providing direct support (including acting as local contact) to the experimental programme assisting users with analysis of their data once the instruments have entered the ESS user programme.
* Co-creating with instrument teams a world leading user programme for time-of-flight <science technique>
* Advance the domains of <Science technique>.

The following skills are identified as desirable.

* Experience with development or maintenance of instrumentation at a neutron source or similar research infrastructure
* Experience in providing user support as part of a user programme at a research infrastructure
* Experience with development of scientific user software
* Mastering Python at an advanced level for solving scientific problems
* Expertise in modelling and simulations of relevance for imaging and / or engineering diffraction (e.g. ray-tracing simulations, finite element modelling)
* Experience with project management and / or agile development methodologies
* Experience with product management
* Knowledge or experience with modern software development practises (e.g. continuous integration)
* Experience with development of free and open source software (FOSS)

**It would be very useful for us to discuss the IDS role, in particular how the IDS can effectively coordinate delivery during installation and hot commissioning and how we can ensure that the role remains scientifically active.**

During operations the IDS will be available as a local contact at 20% for the instrument team. **Other than IDS working with instrument teams and performing experiments what else can we do to train staff for this?**

The role sits within the DRAM group, but it is still important that the IDS can contribute to ECDC activities. Originally, we had considered a mix of staff skills in this position, but within the current initial ops plan this looks difficult. **What advice can the STAP give on how we can manage this role to maximize the impact of the IDS?**

## Covid19.

Whilst it is clear that the current world situation will impact ESS, it is currently unknown what that impact will be. All staff that can work from home are currently doing so.

We are used to remote collaboration so whilst this situation is maybe not impacting productivity, it certainly impacts social interaction and is certainly not ideal for the well-being of staff.

We have adjusted our work environment risk assessment and home working equipment can be supplied by ESS.