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3 List of Abbreviations and Acronyms

AFC	Administration and Finance Committee
CESSDA ERIC	Consortium of European Social Science Data Archives
CLARIN ERIC	Common Language Resources and Technology Infrastructure
COBIS	Copenhagen Bio Science Park
DASTI	Danish Agency for Science, Technology and Innovation
DAQ	Data Acquisition and Experiment Control
DMSC	Data Management and Software Centre
ERIC	European Research Infrastructure Consortium
ESFRI	European Strategy Forum on Research Infrastructures
ESS	European Spallation Source
EU	European Union
FTE	Full-time employee equivalent
IDS	Instrument Data Scientist
ILL	Institut Laue-Langevin
INSTRUCT ERIC	Integrated Structural Biology Research Infrastructure
ISIS	ISIS Neutron and Muon Source
MoU	Memorandum of Understanding
OECD	Organisation for Economic Cooperation and Development (OECD)

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5 Executive Summary

The European Spallation Source (ESS) is a partnership of 13 countries committed to the goal of building and operating the world-leading facility for research using neutrons. The facility is constructed in Lund, Sweden while its Data Management and Software Centre (DMSC) is located in Copenhagen, Denmark. The ESS is not a distributed research infrastructure and thus the concept of two Host Countries is unique. Originally established as a Swedish limited partnership, ESS changed its legal status and became a European Research Infrastructure Consortium (ERIC) in October 2015. The statutory seat of the ERIC is Lund, Sweden. The fact that ESS has operated as an ERIC for almost three years does not mean that all aspects relating to the implementation of the framework have been resolved. BrightnESS supported ESS in evaluating open questions and finding solutions to issues stemming from the Organisation's new legal status.

In an earlier BrightnESS Deliverable 3.1 titled "ERIC Risk and Opportunity Plan", ESS shared its experience with its transition to an ERIC. The report highlighted questions on VAT taxation and accounting of in-kind contributions, the international staffing profile, and procurement. It is available on the BrightnESS website.[1] The Deliverable 3.5 you are reading now is titled "ERIC Operations Plan" and follows up on the earlier Deliverable 3.1. Operations programmes deal with day-to-day challenges and organisations need to be flexible in solving these issues as they emerge. The ERIC Operations Plan focuses on one specific operations issue which had recently emerged and affected ESS for several months. This report provides a thorough analysis of the problem and describes the solution implemented by the Organisation.

The problem was caused by the temporary removal of some of the ESS staff working at the DMSC office in Copenhagen from the Danish social security system. The DMSC is a division of the Science Directorate of ESS and provides scientific computing infrastructure for the ESS, the users of ESS, and the broader European neutron user community. Even though located on the other side of the Öresund Strait than the ESS facility, it is an integrated part of the ESS Organisation. Support provided by DMSC in the context of large-scale facilities research requires physical access to systems and personnel and cannot be taken as telephone support in the context of provisioning of basic IT systems. Because of this, DMSC staff needs to be able to work flexibly in both Host States. At a certain point, the Danish Ministry of Employment made an assessment that DMSC was not recognised as a Danish place of work. After intensive discussions with ESS, the Ministry and relevant agency agreed that DMSC was an official Danish workplace in spite of the fact that it is part of an ERIC hosted in Sweden.

The international character of the ESS Organisation demonstrates the collaborative spirit that lies at the very heart of ESS. However, it also creates problems and challenges unknown to for example national research infrastructures. Any operations plan is therefore likely to be affected by unexpected issues and it is of crucial importance that the Organisation responds in a timely manner. While the problem with social security highlighted in this report was solved within a few months, it is expected that there will be other areas where the ERIC status in Sweden and Denmark creates similar issues for either/and the organisation, the employees, in-kind partners or similar. One possible area is within VAT in a cross-border perspective.

[1] BrightnESS Deliverable 3.1: ERIC Risk and Opportunity Plan is available at: https://brightness.esss.se/sites/default/files/deliverables/Deliverable%20Report%203.1%20ERIC%20Risk%20and%20Opportunity%20Plan.pdf

6 Introduction

Large-scale research infrastructures play a crucial role in advancing science and innovation. They are complex in nature and thus the building and operation of such facilities often requires a concerted international effort, combining the best available knowledge, human capital, funding and resources. In order to facilitate the establishment and operation of research infrastructures with a European interest, the European Commission set up in 2009 a new legal instrument – the European Research Infrastructure Consortium (ERIC) – which grants such facilities the status of an international body or organisation. The European Spallation Source (ESS) became an ERIC in 2015. The international character of ESS is visible in many aspects of the Organisation. Thirteen European countries have joined in the partnership and committed to deliver the world's most powerful linear neutron source. A total of 15 instruments will be built by 2025 with 22 foreseen overall to serve neutron users. The ESS works hand in hand with nearly 40 in-kind contributors and has established more than 120 global collaborations. There are around 50 different nationalities represented in the ESS staff. The ESS is hosted by Sweden and Denmark on both sides of the Öresund Strait. The facility is constructed and has its statutory seat in Lund, Sweden while the Data Management and Software Centre (DMSC) is located in Copenhagen, Denmark. The Host Countries have agreed to jointly cover 47.5% of the construction costs, where 35% will be provided by Sweden, and 12.5% by Denmark.

The ESS is not a distributed research infrastructure and thus the concept of two Host Countries is unique. Cross-border collaboration lies at the heart of ESS and the Organisation benefits from the knowledge of experts mobilised from all over the world. However, an international legal personality in combination with two Host States and international staff bring challenges of its own. One of such examples is questions that can arise in relation to the social security of employees and affect the Operations Plan. This report describes social security problems faced by ESS staff whose job requires them to be able to work flexibly at the ESS and DMSC offices in Sweden and Denmark. The aim of the report is to share the ESS experience with current and future ERICs for the benefit of a wider European community. ERICs often face similar challenges and thus can benefit from the experience of ESS presented in this document. This deliverable builds on an earlier BrightnESS Deliverable 3.1 titled "ERIC Risk and Opportunity Plan", in which ESS shared its experience with its transition to an ERIC. Deliverable 3.1 highlighted questions related to VAT taxation on and accounting of in-kind contributions, the international staffing profile, and procurement.[2]

7 The ESS Site Selection

The story of ESS dates back to 1993 when the European Neutron Scattering Association began to advocate for what would be the most ambitious and broad-based spallation source in the world. Meanwhile, research was continuing at the existing neutron sources and important discoveries were being made across a broad spectrum of scientific disciplines and industrial applications. Neutron science was becoming a critical tool in the development of industrial and consumer products worldwide. So much so that the Organisation for Economic Cooperation and Development (OECD) declared in 1999 that a new generation of high-intensity neutron sources should be built, one each in North America, Asia and Europe. The United States and Japan moved quickly to establish major spallation sources over the next decade.

[2] For more information see BrightnESS Deliverable 3.1: ERIC Risk and Opportunity Plan is available at: https://brightness.esss.se/sites/default/files/deliverables/Deliverable%20Report%203.1%20ERIC%20Risk%20and%20Opportunity%20Plan.pdf

Europe, home already to the two world-leading neutron sources – Institut Laue-Langevin (ILL) and ISIS – moved forward at a more deliberate pace. Looming ahead was the challenge of organising Europe's diverse collection of national governments, and an active research community numbering in the thousands. After a new design was adopted, a site selection process played out that left three candidates:

- Lund in Sweden,
- Debrecen in Hungary,
- Bilbao in Spain.

The definitive selection of Lund with negotiated endorsements of both Spain and Hungary was announced in May 2009. The selection process was facilitated by the European Strategy Forum on Research Infrastructures (ESFRI). One month before the selection of Lund was announced, on 3 April 2009, the Danish Minister for Science, Technology and Development and the Swedish Minister for Higher Education and Research signed a *Joint Declaration on ESS* which included a *Draft Agreement of a Swedish-Danish Memorandum of Understanding on Establishing ESS,* and an appendix about *ESS Data Management, Computing and Software Centre,* later renamed to DMSC. The purpose of the documents was to develop a Memorandum of Understanding (MoU) that could be presented to European governments as a joint Swedish-Danish undertaking to host ESS. The documents introduced the concept of two Host States: ". . . the Swedish and Danish governments are in agreement to co-host ESS with the ESS facility in Lund, supported by an ESS Centre in Copenhagen. [. . .] This Centre is part of the core business of ESS."[3] The joint Swedish-Danish bid was successful and two years later, in 2011, a MoU was signed, codifying the principles of the ESS project.

The construction of the facility started in 2014 in Lund and is now 46% complete. The permanent offices of DMSC were officially opened in 2016 in Copenhagen. The choice of location of DMSC, 71.4km from ESS was not made for technical reasons pertaining to the mission of DMSC or ESS. Materials science research using neutron scattering (or photon scattering) is not comparable to high energy particle physics or astronomy, where in both cases scientific computing can be delivered 'at a distance'. No operational large-scale neutron (or photon) facility co-locates the scientific computing division geographically away from the experimental operation for sound operational and business reasons, which will be described later in this document. Nevertheless, it is possible to perform software development with delocalised teams and it should technically be possible for ESS to operate with DMSC in Copenhagen. The challenges linked to the fact that ESS has two Host States are legal and administrative rather than technical. However, there is a risk that these challenges affect the technical and scientific performance of the facility.

Picture 1: DMSC staff in front of the permanent DMSC office in Copenhagen in the Copenhagen Bio Science Park (COBIS) building

[3] Draft Agreement of a Swedish-Danish MoU on Establishing ESS, pp. 2-3.

The next two chapters explain in detail the scope of DMSC, why its staff needs to be able to work flexibly in both Lund and Copenhagen, and also what uncertainties this creates vis-à-vis social security of the employees.

8 Data Management and Software Centre

The DMSC is a division of the Science Directorate of ESS and provides scientific computing infrastructure for the ESS, the users of ESS, and the broader European neutron user community. In the context of a large-scale facility, the scope of DMSC implicitly requires a close level of support to be provided by DMSC to the user programme at ESS and to the instrument teams and stakeholders. Annex 1 of the European Spallation Source ERIC Statutes states that DMSC is "a fully integrated part of the ESS organisation". Figure 1 below provides further details about the various functionalities of DMSC.

Data Acquisition and Instrument Control Software	Data management and data Curation	Atomistic Modelling and Simulation, Monte Carlo Code Support	Data Processing, Data Analysis and Data Visualisation	User services and web Portal
Develop, deploy and support Detector readout and neutron event formation system, Neutron data and meta data aggregation. Archival file writing Instrument and experiment control software Remote access to experiments Real time display of processed data to the user during the experiment On-site (ESS Lund) operation support On-site (ESS Lund) operation support	Data management and curation in accordance with the ESS policy for scientific data. Transport raw data to main servers for storage Development and deployment of the ESS experiment data catalogue. Web and mobile devices portal providing access to user data following EU rules	Provide capability and support for state of the art atomistic modelling and simulation of neutron data for key areas of the ESS science programme. Provide support for Modelling of instrument-sample-specific features for data analysis Develop and support Monte Carlo modelling software of neutron instruments On-site (ESS Lund) operation support	Develop and support data processing framework that provides automated data correction, processing and visualisation at close to real-time. Develop, curate and support data analysis and visualisation software for all core areas of ESS science programme Provide access to and support access of High-Performance computing Provide Instrument data scientists to support the ESS user programme. On-site (ESS Lund) operation support	Provide and support a web-based user portal for the submission and review of user proposals Provide and support web-based tools that aids users to access their data On-site (ESS Lund) operation support

Figure 1: DMSC functionalities

In the construction phase of ESS, DMSC designs and builds core scientific computing systems and commissions both the systems as well as the system interfaces with neutron instruments. In initial operations and commissioning of ESS, DMSC will provide ongoing feature development and support for scientific computing at the ESS. Figure 2 illustrates a typical data flow for a neutron scattering experiment.

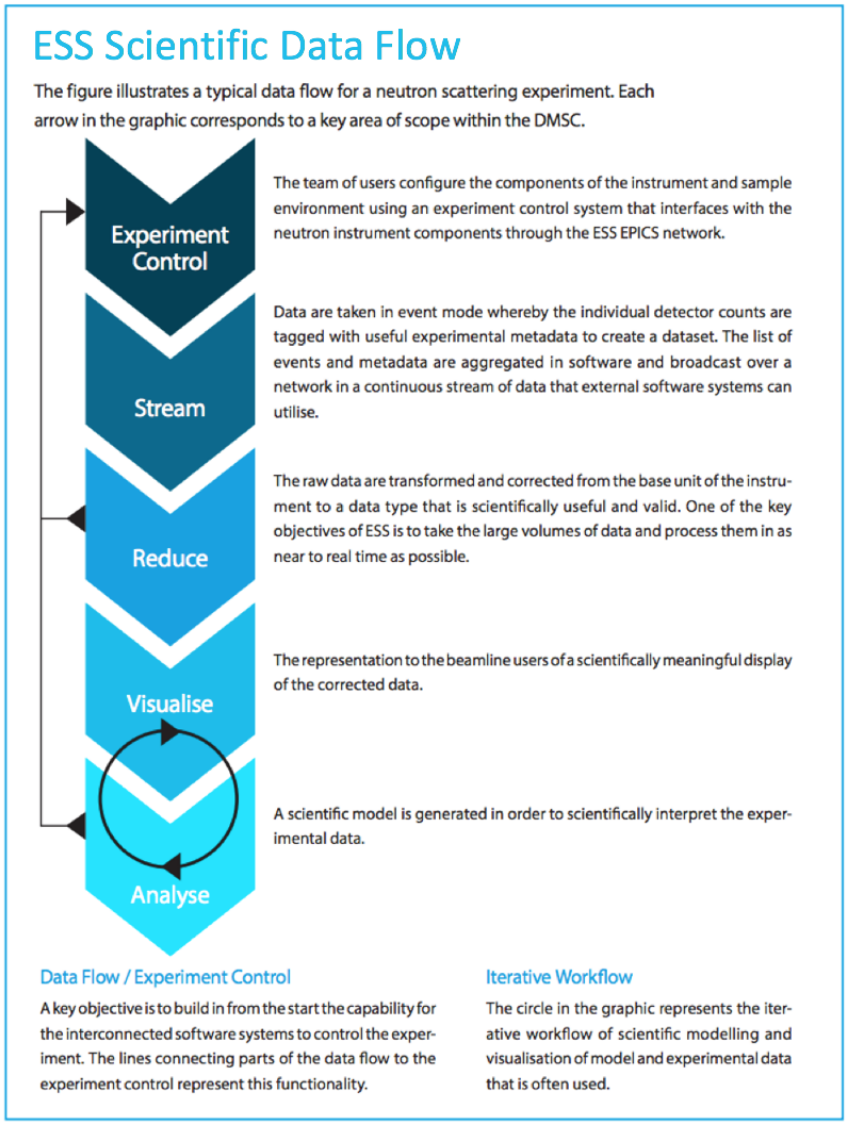

Figure 2: Typical data flow for a neutron scattering experiment

During the current construction phase the DMSC staff consists of 27 employees and 8 in-kind staff developing software and hardware for the control, analysis, and visualization of the experiments to be carried out at ESS. They are working in collaboration with partners at universities and research laboratories all over Europe. According to the European Spallation Source ERIC Statutes, the planned staff level at DMSC in steady state operation is 60-65 FTEs.

9 DSMC Scope and the Need for On-Site Access

The scope of the DMSC is highly correlated with the overall activity of the ESS, in particular of the Science Directorate and to a lesser extent to the Integrated Controls Systems Division and to Accelerator and Target, both in the construction and the operations phase.

Correlated in this context means that DMSC and its stakeholders have a level of interdependence that requires considerable collaboration. Collaboration means working together to design construct, install and support systems. This work involves meetings and discussions which from a technical viewpoint are far more efficient in person more over physical access to the systems in question are obviously essential. Installation of systems requires physical access to locations in ESS, and physical access to jointly owned laboratory areas in Lund.

Support in the context of large-scale facilities research requires physical access to systems and personnel and cannot be taken as telephone support in the context of provisioning of basic IT systems. For ESS to deliver against the schedule instrument installation and commissioning activities will be time critical. For DMSC to commission its systems for ESS instruments in Lund physical access is required, moreover given the scope of Experiment control and data acquisition we envisage (from previous facility experience) that instrument teams will expect a considerable presence of DMSC staff in Lund to assist in installation and commissioning activities. It is not uncommon at existing facilities that queues form of instrument staff waiting for support frm controls and Data Acquisition and Experiment Control (DAQ) teams. A scenario where there is limited presence of staff in person will create considerable delay to the ESS project.

In the context of the DMSC mission support also includes providing service level data analysis provision to the ESS user community. It is not feasible to expect that this support can be provided remotely without physical access to the experiment team in Lund. It is also not feasible to expect the experimental team in Lund to de-locate during beamtime to Copenhagen to discuss data analysis requirements provided by DMSC.

Estimates for this have been made for the initial operations and commissioning of ESS, with 200 user beam days per year. An estimate has been made that describes the percentage of time required to be spent at ESS in Lund against job role and group within DMSC. An overview is given in the figure below and subsections of this chapter provide further details.

	Expected number of FTEs in initial operations and commissioning to be working in Lund	Working level (percentage of operational days)	Number of operational days equaling working level
Data Acquisition and Experiment Control (DAQ)	12 FTEs	90%	180 days
Data Processing and Data Analysis Software	12 FTEs	30%	60 days
Instrument Data Scientists (IDS)	8 FTEs	90%	180 days
Atomistic Modelling and Simulation	5 FTEs	60%	120 days
Admin and User Office Support	3 FTEs	50%	100 days

Figure 3: Estimate of percentage of time required to be spent at ESS in Lund against job role and group within DMSC during initial operations and commissioning

For initial operations, installation and commissioning, a period of effort in Lund will be required above the anticipated steady state levels, this is an important distinction that must be made at this stage of the project as the overall schedule for instruments and for ESS will have a critical path that touches DMSC scope. At that point limiting work in Lund will only delay the project unnecessarily.

Whilst estimates for staff numbers in for these cases have been made, it would be far more beneficial to ESS for a general solution to be found that gives all staff flexibility and therefore gives ESS flexibility. It would be an unfortunate situation to recruit staff into a next generation research infrastructure and then limit staff access to the actual infrastructure, either their ability to contribute to the mission, or access to the infrastructure for their own research.

9.1 Data Acquisition and Experiment Control (DAQ)

In initial operations and commissioning we expect 12 FTEs to be working in Lund for at a level of 90% of the operational days for ESS. This is circa 180 days.

DMSC holds the scope to design, construct and support the DAQ system for ESS instruments. The DAQ system is the core system that takes data from neutron detectors and neutron instrument subsystems in a synchronous manner with the accelerator operation and writes that data to disk. The DAQ system of a spallation neutron source is necessary complex. Neutron instruments are complex systems and synchronous acquisition of data with an accelerator-based neutron source contains more complexity than at reactor based facilities.

The DAQ system for any given instrument has specific functionality depending on the design and scientific scope of the instrument. Whilst DMSC will deliver the DAQ as a system, it cannot be delivered without considerable interactions and co-design with key stakeholders at ESS in Lund. Such interactions in the construction phase are lab based test systems prototyped with stakeholders in Lund. This requires staff to be able to physically access lab systems in Lund regularly.

For staff, what is essential in this area, is support, functionality development and maintenance. The DAQ system is so closely coupled to the neutron instrument that in order to develop and deploy the system, DMSC staff must have a tight integration with the instrument and key neutron technology stakeholders.

The DAQ system is mission critical, i.e. if the system fails during a user cycle, the instrument is out of operation until it can be fixed. Support therefore must always be available. In order to support the DAQ, staff are more efficient if they are present on-site. It is inefficient to fix a DAQ system remotely. Support means that staff should be able to physically access instruments systems in Lund when issues arise. In operations there is a time critical financial aspect to this i.e. issues need to be addressed quickly as down time is not cost neutral.

9.2 Data Processing and Data Analysis Software

In initial operations and commissioning we expect 12 FTEs to be working in Lund for at a level of 30% of the operational days for ESS. This is circa 60 days.

DMSC is responsible for the development and deployment of the core data processing infrastructure and for development, deployment and support of data analysis software packages. Whilst technically,

data processing and data analysis are separate, what is common is the necessity to have specific solutions for data processing and analysis for each individual instrument. That is to say, in operations, each instrument has a bespoke data processing and data analysis workflow. Moreover, these workflows may again bifurcate at the individual level, i.e. each neutron instrument may have separate workflows for different types of investigation.

From the perspective of deploying staff in an efficient manner, it is important to realise that for effective data processing and data reduction workflows to be developed, those staff developing software must be able to understand and appreciate the workflow and the user experience.

Until recently this type of task was performed by instrument scientists. It is common at large-scale facilities now to centralise the critical tasks to avoid single points of failure. i.e. More than one staff member is responsible for critical software systems and the entire system is developed by a central group to ensure maintainability for the facility. Limiting any teams ability to work directly with their stakeholders as and when needed will create a point of inefficiency in the software development workflow and would jeopardise operations and the scientific efficiency of the ESS. Whilst software can be developed at any location, what is important is face to face discussion and access to experimental systems such that staff can understand requirements and workflows.

9.3 Instrument Data Scientists (IDS)

In initial operations and commissioning we expect 8 FTEs to be working in Lund for at a level of 90% of the operational days for ESS. This is circa 180 days.

The instrument data scientist is a role that is created to ensure that visiting users and instrument teams have a direct interface with the technology and development of data processing and data analysis. This is to ensure that there are specific staff at ESS who understand both the scientific objectives of the instrument user programme from the experimental perspective and also the scientific computing perspective.

The IDS role is an essential bridge between those who develop software and those that define scientific requirements for software development.

The IDS will be an integral part of the instrument team, responsible for user support, with responsibility for direct user support as a local contact. Specifically, they will be ensuring that the scientific programme of the instrument can be delivered with the tools available. The IDS is expected to be a domain expert and be research active at ESS. This role requires a high level of physical access to ESS in Lund and is part of the neutron instrument staff strategy for delivery of the ESS user programme.

9.4 Atomistic Modelling and Simulation

In initial operations and commissioning we expect 5 FTEs to be working in Lund for at a level of 60% of the operational days for ESS. This is circa 120 days.

DMSC will provide user support for atomistic modelling of neutron data. Support in this context is more than making modelling frameworks available on supported infrastructure. In order to maximise the scientific efficiency of the user programme, a certain number of experimental proposals will have direct support for advanced data analysis, thus ensuring that users do not have to be modelling

experts. The staff who perform this role will be domain experts and research active. One should expect that direct interaction with the facility users is needed for the duration of the supported experiment.

9.5 Admin and User Office Support

In initial operations and commissioning we expect 3 FTEs to be working in Lund for at a level of 50% of the operational days for ESS. This is circa 100 days.

The admin role is that of the head of division who currently works on average 50% between the two locations. For user office support DMSC provide the development effort for the ESS user portal, this project is jointly development between ESS and our neighbour MAX IV.

10 Cross-Border Workers from DMSC

The Öresund region where the ESS and DMSC offices are based is very dynamic and characterised by strong cooperation between Sweden and Denmark. According to the blog post by Astrid Aulnette on the Futurium platform hosted by the European Commission, "The Öresund region between Denmark and Sweden has become an economic hub, accounting for around 25 % of total gross domestic product in both countries. Also, it generates nearly 80 % of all jobs in the service sector and manufacturing accounts for 20 % of employment. This is partly due to the very good cross-border cooperation between the two countries which intensified following the opening of a fixed-link bridge in 2000."[4]

Picture 2: Staff from the DMSC office in Copenhagen at the ESS construction site in Lund

The Öresund Bridge connects the Danish capital Copenhagen with the third most populated Swedish city, Malmö and provides a connection for trains and cars between the two countries. A train ride from the centre of Copenhagen to the centre of Lund takes only around 50 minutes. The statistical portal "Öresundsstatistik och analyser" informs that "96% of the Öresund commuters live in Sweden and work in Denmark. Of this, Swedes number 40% and thus have the greatest share, while Danes number 37%. The remainder were born outside Sweden and Denmark."[5]

Some of the ESS and DMSC staff also travel across the bridge on daily basis to commute to work. Cross-border workers in the EU are subject to the legislation[6] and social security system of only one country. The basic rule to determine which country is responsible is that a person is a subject to the legislation of the country where s/he works regardless of where s/he resides. It is relatively straightforward to

[4] Aulnette, A. (2018, 30 May). Öresund Strategy: Denmark and Sweden's Cross-Border Commuters, https://ec.europa.eu/futurium/en/blog/oresund-strategy-denmark-and-swedens-cross-border-commuters.
[5] Commuting Across Öresund. http://www.orestat.se/en/analys/commuting-across-oresund.
[6] Regulation (EC) No 883/2004 of the European Parliament and of the Council of 29 April 2004. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:166:0001:0123:en:PDF

determine which country is responsible for social security of those who live in Denmark and work 100% at the ESS office in Sweden.

The assessment is more complicated when the person works in more than one country like DMSC staff, working for a single ERIC organisation in two separate EU Member States. In this case, the person needs to work less than 25% in the country of residence to be covered by the legislation of the work country. If a person is pursuing a substantial part of his or her activity in the country of residence, s/he is covered by the legislation of that country.

Limiting DMSC staff living in Sweden to 25% working in Lund causes problems already during the construction phase and may create operations problems in the future especially if the scope of DMSC remains as it is in 2018. As the figure below illustrates, DMSC has the scope for all neutron data acquisition from detector electronics to disk, and all scope for experiment control, data processing and analysis. In addition, DMSC covers 0.5 FTE of each instrument team. These activities require on-site support at a level above 25%. Further details about each group at DMSC and the need for their physical presence in Lund were provided in chapter 9 of this report.

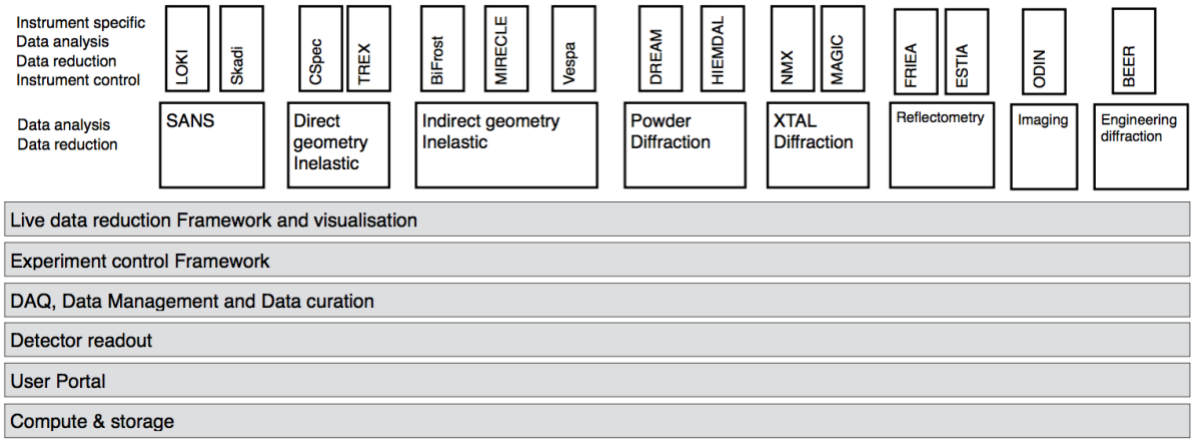

Figure 4: ESS instruments and the scope of support from DMSC

There is a possibility to apply for an exemption (so-called Öresund Agreement) which allows more time to be spend in the country of residence. Human Resources at ESS therefore applied for an exception to allow 50% work in Lund for staff with direct contact with instrument projects and core architecture. The applications were sent in to the competent authority Udbetalning in June 2017.

It is expected that for successful commissioning, it will be essential to have around 23 FTEs in Lund in a direct support role. Other activities could be successfully performed in Denmark with less than 25% working, in other words 37 FTEs could be placed in Copenhagen.

The DMSC staff who live in Sweden and work more than 25% in Sweden were officially informed that they were not covered by social security in Denmark during spring 2018. For a period of time it was unclear if all staff including those living and working in Denmark would be affected in the future.

The reason for the removal of Danish social security was because the Danish Ministry of Employment ("Beskaeftigelses ministeriet" in Danish) made an assessment that DMSC was not recognised as a Danish place of work. DMSC was registered in Denmark as European Spallation Source ERIC. This decision was the legal basis for Udbetalnings decision. The company was classified as "another foreign entity" as the Danish company registrant had no precedent for the ERIC structure.

The solution was to convince the relevant Danish Ministry and agency that DMSC was an official Danish workplace in spite of the fact that DMSC is part of an ERIC hosted in Sweden. After numerous telephone calls, meetings and documents provided the decisions were changed and all of the affected staff got corrected decisions that they do belong to the Danish social security system also while working up to 50% in Sweden.

The European Spallation Source is not the only ERIC where Denmark is a collaborating country. In the other two cases the representing agency is listed as the Danish Ministry for Higher Education and Science. It is not known how staff working for the other ERICs operating in Denmark are employed. It is likely that they are employed by university or other Danish not-for-profit organisations and therefore their employment and social insurance status is clear. The underlying reason for the rejection of coverage from the Danish state was that DMSC is a part of an ERIC organisation and acts directly as an employer in Denmark but appeared to the Danish agencies as a non-Danish organisation. Thus when the rules for EU coordination of social security were applied it appeared that Sweden not Denmark was the Host State whose social system should take precedence which was not in line with the spirit of European Spallation Source project with two Host States.

It is quite expected that there will be other areas where the ERIC status in Sweden and Denmark creates similar issues for either/and the organisation, the employees, in-kind partners or similar. One possible area is within VAT in a cross-border perspective.

11 The ESS: A Single-Sited Research Infrastructure with Two Host States

The statutory seat of an ERIC must be located on the territory of a member where at least some of its activities are carried out. According to Article 1.3 of the European Spallation Source ERIC Statutes, ESS has its statutory seat in Lund, Sweden. The fact that ESS is not a distributed research facility, and that it has only one statutory seat but two Host States with offices located in both Sweden and Denmark creates a certain level of ambiguity. In that sense, ESS is a unique single-sited research infrastructure.

The ESS operated as a Swedish limited partnership, or AB, owned jointly by the Swedish and Danish governments from 2010 to 30 September 2015. On 25 March 2011, DMSC-Filial of ESS AB was created in Denmark as a branch of a foreign limited company. The ESS changed its legal status and became an ERIC in October 2015. Under advice of the Danish Business Authority ("Ehrvervstyrelsen" in Danish), European Spallation Source ERIC was registered in Denmark on 1 October 2015 as other foreign business. Currently, DMSC is considered both:

- As European Spallation Source ERIC, a Swedish organisation operating in Denmark,
- As DMSC-filial of a liquidated Swedish AB.

DMSC staff are employees of the European Spallation Source ERIC registered in Denmark. The staff at DMSC are *de facto* Danish employees of the European Spallation Source ERIC. The ESS does not have a special representing body for its Host Countries.

Denmark is a member of other ERICs, including Common Language Resources and Technology Infrastructure (CLARIN ERIC), Consortium of European Social Science Data Archives (CESSDA ERIC), and Integrated Structural Biology Research Infrastructure (INSTRUCT ERIC). All three have the Danish Agency for Science, Technology and Innovation (DASTI) of the Danish Ministry for Higher Education and Science as their representing entity and none of these ERICs is registered as an organisation in Denmark.

The issue related to social security of DMSC staff was linked to the question how ESS was viewed in Denmark and what legal entity does ESS have outside its host seat. Other international research infrastructures solve similar problems by employing their staff through representing bodies, but ESS does not have this possibility.

12 Conclusion

For DMSC to be successful, its staff must to be able to work at ESS in both Denmark and Sweden in a flexible manner. Staff at DMSC are cross-border workers, working for a single ERIC organisation in two separate EU Member States. The DMSC is an official Danish workplace in spite of the fact that DMSC is part of an ERIC hosted in Sweden. The problems DMSC employees faced with respect to their social security demonstrates that the international character of ERICs can create issues of similar nature for either/and the organisation, the employees, in-kind partners or similar.