LEAPS Webinar – 'Learning to Run Again'

Held on June 15th, 2020

1. Introduction: aims, scope and format of the meeting

Research Infrastructures such as synchrotrons and Free Electron Lasers (FELs) play a crucial role in enabling some of the most significant fundamental scientific and societal challenges of our time to be tackled, and none more challenging than mounting an effective and enduring response to the COVID-19 pandemic from 2020. While much human activity stopped as COVID-19 swept across the world, many facilities developed ways to continue to run to support critical research on the Coronavirus and have provided critical new insights into the structure and function of the virus, and ways to inhibit infection pathways.

The operations of synchrotrons and FELs had to adapt to the constraints of working in a post-COVID-19 world, first to ensure that they could provide essential services for research on the virus, safely and reliably and then in the longer term provide facilities for a much wider range of research. Given that the challenges and likely solutions were mostly common across these infrastructures it is logical and highly desirable that they should share best practices and work together as much as possible towards common solution, be it through the development of new policies, practices and technologies. Within Europe the most obvious and effective way to co-ordinate this would be through LEAPS, the League of European Accelerator-based Photon Sources[1], and the first action of LEAPS was to organise a webinar to explore key challenges for its Members to restore the fullest possible level of operations for its tens of thousands of users in universities and industry as quickly and effectively as possible.

The event, held on June 15th 2020, focused on three areas: minimising risks to the safety of staff and users; development of a wider range of services for remote users; effective engagement with a user community that may be less free to travel for some considerable time to come. The meeting started with a plenary session in which representatives of three LEAPS Members outlined the current status of their facility, the challenges of the getting there and the greatest challenges they face in the future. This was following by three breakout sessions in the areas outlined above, each of which had a panel for discussion of points set by a facilitator while the wider audience of attendees could also submit questions. The conclusions of each session were then presented in a final plenary session by rapporteurs from the breakout session. Table 1 in the Appendix 1 presents all of the panel members, chairs, facilitators and rapporteurs.

[1] https://leaps-initiative.eu/

2. Outcomes and actions

The meeting was attended by up to 120 delegates, while the distribution across the three breakout sessions was approximately 20 for the safety session, 60 for the remote access session and 40 for the user engagement session.

2.1 Introductory session

The plenary session had representatives from the Paul Scherrer Institute (PSI), from ALBA and from the ESRF, all of which were at different stages of operation.

(i) **PSI.** The Swiss Light Source (SLS) had continued to operate throughout the entire pandemic crisis, though with much reduced operations, with the machine running only 5 days a week initially. However, from June this was back at 24/7 operations with external users on site, the guesthouse reopened, and from the start of July all staff will be allowed back on site. The limiting factor for experimental work appears to be the availability of users and samples, and experiments requiring larger teams for operando experiments, or for SwissFEL experiments. All MX experiments will be remote access only, while other beamlines will operate with a mixture of local and remote teams. A priority access channel for COVID-19 research was opened and will remain open until September 2020.

(ii) **ALBA.** A shutdown was imposed for weeks 12-15 of 2020, and then a phased restoration of operations was started: only COVID-19 research for 2 weeks, start-up of all remaining beamlines for the next 3 weeks (weeks 18-20), then after a week's break 'almost normal operation', with a mail-in service for weeks (22-25). Since week 24, 8 out of 8 beamlines are running, 3 of them are running at 75-100%, 4 are running at 50-75% and only 1 is running below 50% of service level compared to numbers before the lockdown. MX experiments run in remote access, while the other beamlines operate with a mixture of local and remote access. Maintenance and installation work were also rolled out in parallel from week 17, increasing the scale of the intervention over the following 5-6 weeks. Key challenges included ensuring that staff had proper teleworking conditions at home, lack of PPE and finding safe ways of lone working. Future challenges include getting more staff and then users back to ALBA, increasing the extent of remote access, and planning for a future outbreak. A priority access channel for COVID-19 research was opened and first experiments have been performed.

(iii) **ESRF.** The facility was just coming out of a very long shutdown for the EBS upgrade and preparing to resume operations when lockdown was imposed by the French state for almost two months (mid-March to mid-May). Beamline commissioning and a gradual increase in staff continues until mid-August and from late August there would be a return to user service mode (USM), but with no users on site. 80% of the beamlines will be available with the remaining 20% coming online when their respective upgrades are finished. Challenges had been to carry out work with greatly reduced numbers of staff and prepare for USM without users – currently available only for MX and Cryo-EM, but now being developed for 40+ beamlines taking into account all relevant issues such as mail-in workflows and cybersecurity. Remote access will be very demanding for complex sample environments and where user expertise is critical for operations. A priority access channel for COVID-19 research was opened and first experiments have been performed.

The response of the different facilities is very different and appears to depend to some extent on the country in which it is set. COVID-19 was at higher levels in Spain and France than in Switzerland and activities were much more constrained in those countries, with longer, more restrictive lockdowns. However, they all established COVID-19 research support as soon as possible, introducing clear working protocols, and saw remote access as a key future challenge.

Further action. Survey the extent of roll-out of beamline services for LEAPS Members for the medium and long-term, including the number of beamlines available and the proportion of time available as a function of time, as well as a commentary on the developments required for each stage of increased activity.
Further action. Develop enhanced remote access facilities (see below).

2.2 Breakout session 1: Safety

Representatives of ALBA, DESY, HZDR and SOLEIL with a facilitator from PSI. The arrangements made for safety, and the period of any shutdown, appeared to depend strongly on the country in which the facility is located. Key points made were as follows.

(i) **Who decides who goes back to work and when?** All facilities have a controlling emergency board, and the subsidiarity principle applies. The rate of return is very different: PSI and DESY saw rapid return, much slower at ALBA and SOLEIL.

(ii) **How is the safe occupancy of working areas and movement between them controlled?** Some principles are common: physical distancing (though limits vary from 1 to 2 m), rooms have occupancy limits, but these vary greatly (from single to multiple occupancy of rooms). The importance of strict enforcement of rules was stressed. There are variations over requirements to wear masks, from none at all, to masks mandatory in all common areas and multiple occupancy space.

(iii) **Are there testing measures in place?** None disclosed

(iv) **What protective equipment are staff required to use and when?** Almost all facilities required the use of face masks for working with a particular distance (1 or 2 m), with various specifications (surgical masks or DDP2 masks). Some facilities require face masks throughout much of the facility – in any common areas and multi-occupancy spaces (ALBA, ESRF), or where the ventilation system was not ideally set up to replace air with fresh air (ESRF, Soleil).

(v) **How is a safe working culture instilled?** Common features included: simple rules that are easy to follow and facilitated by putting in place suitable measures e.g. sanitizers in areas with no hand-washing facilities nearby; good communication, regularly updated; management leading by example.

(vi) **Measure to aid wellbeing of staff?** Regular contact with line managers and team meetings; provision of equipment to aid homeworking (chairs, IT equipment);

allowing working flexibility (e.g. around child care) and communicate that reduced productivity may be expected in the case of those with caring responsibility; training (VC) to enhance skill set and individual coaching for parents.

(vii) **How is additional flexibility provided to take into account work-family issues?** As for (vi) but also to permit home-office for all staff and to encourage staff to take holidays.

(viii) **Are measures aligned to those of the host country?** Generally, yes plus most facilities added further ones (e.g. more extensive mask wearing).

Further Action: a wider survey would be useful – see that conducted by ERF/CERIC[2]
Further Action: sharing of safety protocols/guidelines among Members, as well as wellbeing measures.
Further Action: further exploration of evidence of efficacy of some protocols, especially where there is variation between Members e.g. mask wearing, extent of distancing.

2.3 Breakout session 2: Remote access

There was considerable variation among the participants – EUXFEL, Diamond and DESY – which is to be expected for EU-XFEL compared to the other two as experiments tend to have much larger teams and often involve more complex set-ups and are much less amenable to true 'remote access' and this was seen to be a general, long-term problem that would only be solved properly and extensively when users could come back.

Among synchrotrons, some types of beamline are already extensively remote (MX, CryoEM), or moderately extensively remote (powder diffraction, small molecule crystallography). Some types of beamlines have little or no remote access. The distinction between those that were readily accessed remotely and those that were not could be largely related to those set up for 'measurements' (more routine, standard data collection) and those that are for 'experiments' (often bespoke, often requiring complex sample environments).

Future challenges/actions include:

- Greater levels of staff-assisted experiments or enhanced connection with remote users
- Beamlines and processes may need redevelopments
    - Greater degrees of automation - more robotics and (standardised) sample holders to enable shipping or straightforward mounting
    - Data Acquisition + Analysis + Management in many cases need improvement
    - Workflows need to be developed and enhanced
    - Computational support
    - Enhanced measures regarding cybersecurity.

Constraints will continue for the foreseeable future - social distancing/lower density occupation of space – safety and working practice challenges to address.

[2] https://www.ceric-eric.eu/2020/05/06/erfs-review-of-working-practices-of-analytical-facilities-during-the-pandemic/

Some aspects of this should be seen as much as an opportunity as a challenge e.g. improving (remote) communication with users.

Change will be needed in process and culture – e.g. manipulating schedule to optimise beamtime use, rethinking control system and access modes (though note cybersecurity)

Future action: LEAPS to play a significant role in co-ordinating co-operation and collaboration in (i) standardisation; (ii) hardware solutions outlined above; (iii) data and computational challenges outlined above; (iv) process and culture.

2.4 Breakout session 3: User engagement

A number of strong, clear message emerged from this session, which included an ESUO representative, as well as representatives from HZB, ELETTRA, ESRF and MAX IV. In particular, it was felt very strongly that it is vital to get users back at facilities as soon as possible.

- IT technology cannot substitute face-to-face interactions, particularly when breakthroughs are targeted.
- Physical proximity is very important – increases the chances of success by solving complex experimental issues faster.
- Facility staff are less stressed if they can share the workload, diverse experiences and skills with users at site.

The different questions for the panel discussion drew further responses.

(i) **How to hold user meetings and workshops?** Smaller workshops and internal panels can be conducted satisfactorily with video tools; larger events benefit greatly from face-to-face/physical meetings. Consider hybrid meeting – allowing video access of 'physical' meetings could increase the number of participants.

(ii) **Do users miss workshops?** Answer not clear – included 'tutorials not possible by video'?

(iii) **Travelling and legal difficulties?** Facilities need to be flexible to accommodate difficulties with user travel, and back-logs may build up. Travel is likely to be more expensive in future so more TNA may be required where facilities do not themselves support this.

(iv) **Experiments run with mixed teams?** Travel restrictions will not make this any easier and sometimes not possible so facilities should be set up to enable remote video access. However, this is far from ideal and such users will miss out on the essential activity of 'playing' with the infrastructure, plus the international dimension -which is also a key benefit of such activity -will be diminished.

(v) **Opportunities?** 'Necessity is the mother of invention' so there is the chance that something innovative will come out of this. Opportunity to provide workshops with good attendance for small budget. However, facilities do not appear very prepared for such

engagement and it is vital that something effective is done at this time – to provide tools for remote access, workshops and meetings.

Further points were made:

- There is a risk that the number of users will decrease
- Some PhD students may have to change their topics
- Operation without users, in particular young scientists, may lead to a depletion of the pool of available candidates for staff positions at the facilities
- Reiteration of the need to fund TNA (where facility doesn't provide such support) and reimburse sample shipment
- Reiteration of the opportunities to set up hybrid remote-local meetings if face to face not possible.

Further action: LEAPS to promote collaboration and initiatives to develop tools for remote access, workshops and meetings.
Further action: LEAPS to promote collaboration and initiatives to find ways to get users back at facilities asap.

Webinar organisers and support: Lotta Åbjörnsson (Lund University), Robert Feidenhans'l (EU-XFEL), Filippo Guizzetti (MAX IV), Tutti Johansson Falk (MAX IV), Andrew Harrison (Diamond), Julia Hauk (DESY), Jana Kolar (CERIC-ERIC), Montse Pont (ALBA), Mirjam van Daalen (PSI), Edgar Weckart (DESY)

Appendix

Session	Chair/Facilitator	Rapporteur	Panelist	Panelist	Panelist	Panelist
Welcome	Caterina Biscari, Chair of LEAPS (ALBA)					
Plenary	Andrew Harrison (DLS)		Oliver Bunk (PSI)	Harald Reichert (ESRF)	Montse Pont (ALBA)	
Safety	Oliver Bunk (PSI)	Mirjam van Daalen (PSI)	Oliver Seeck (DESY)	Jean-Pierre Laurent (Soleil)	Montse Pont (ALBA)	Michael Klopf (HZDR)
Remote Access	Georgios Kourousias (ELETTRA)	Dani Salvat (ALBA)	Edgar Weckert (DESY)	Dave Hall (DLS)	Adrian Mancuso (XFEL)	
User Engagement	Harald Reichert (ESRF)	Antje Vollmer (HZB)	Franz Hennies (MAX IV)	Maya Kiskinova (ELETTRA)	Derek Logan (ESUO)	
Feedback and Summary	Robert Feidenhans'l (EU-XFEL)		Mirjam van Daalen (PSI)	Dani Salvat (ALBA)	Antje Vollmer (HZB)	

Table 1. Panel members, chairs, facilitators and rapporteurs for each session of the webinar