Association of Biomolecular Resource Facilities (ABRF) Core Facility Ramp-Up Information
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The following document includes a series of considerations for the eventual ramp-up of core facility activities. Please note these are not official guidelines, but are meant to serve as a starting point for planning based upon input from ABRF members, core directors, and administrators. The information below does not supersede any governmental or institutional guidance, and is meant for informative purposes only. If you have any questions, contributions, or comments, please submit them here. Finally, please note that financial implications to facility operations have not directly been addressed below as these will vary extensively depending on the type of facility, location, and institutional guidelines and expectations.

Part 1: Covid-19 Infection and Epidemiological Considerations

Although in some cases core facilities have been actively contributing to the Covid-19 response, ranging from virus testing to basic and clinical research projects, the activity of many cores has been ramped down as part of reductions in institutional activities. The process of ramping back up research activities will likely occur in a gradual fashion, for example in stages, rather than all at once. Furthermore, the process followed for any individual core will depend upon specific characteristics of that facility, placed into the context of each particular campus, institution, and geographic region. Overall guidance for an ultimate return to normal core operations will begin with national and state-wide guidelines and regulations. Institution and campus-based instructions will then impact upon the strategies and plans for different cores and research resources. At an institutional level, it is critical that the hierarchical nature of decision making, strategic planning, and implementation are clear, and that adequate flexibility and opportunities for feedback exist. Thus communication between management and cores, and among cores, will be key.

Major considerations will likely include infection monitoring and health related issues. In some cases, Covid-19 virus testing, serological assessment for potential anti-Covid-19 immunity, symptom monitoring, or other types of screening may be implemented, potentially restricting access to campus for core staff and users. Access for individuals may be limited by quarantine or illness, and the impact of these types of restrictions could change over time based upon epidemiological issues, as well as the status of individuals. Thus organized and integrated strategies for managing staff, and communication at several levels will be key, including among Human Resources, research administration, core management, and staff. Contact tracing may also be required, and maintaining well-organized schedules, calendars, and access logs will likely provide assistance to these efforts. Restricted campus access may also impact

individuals not affiliated with an institution, including external users of core facilities, as well as vendor service personnel required for equipment maintenance, support, and repair.

Other constraints that may impede access to cores by facility staff and users could be the availability of personal protective equipment (PPE), physical distancing guidelines, or materials for decontamination and sanitization. These concerns must be considered both from the perspective of potential viral transmission, as well as standard laboratory procedures (see further information below). Thus both direct and indirect impacts of scarce availability, increased expenses, or decreased productivity must be evaluated.

Part 2: Space, Personnel, and Physical Environment

As core facilities plan to resume work many considerations about space, staffing, and the general physical environment will need to be made to plan for ramp up of operations. The initial action for many cores may include reaching out to your institutional Facilities and/or Health and Safety departments for guidance, and potentially a lab inspection before any return to work commences. Alterations to aspects of facility environments such as temperature, humidity, and gas or water delivery, may need to be returned to normal working conditions. Although many of the specific details will come from regional and local directives, core directors can start planning for changes using current CDC recommendations (see link in Additional Resources below). Below we expand on some of the main themes that will need to be included in ramp up plans for cores.

Physical Distancing:
One of the major planning components of any ramp-up plan will be centered around physical distancing and determination of appropriate occupancy levels. As with many aspects of ramp up planning this guidance may well change over time. Current CDC recommendations stipulate 6 ft for physical distancing in each direction. It is possible that some institutions might require other definitions of physical distancing, for example 10 ft in each direction. Floor plans, bench arrangements, and instrument locations can further impact this calculation to maintain physical distancing. Constrictions, such as hallways and lavatories, must also be considered in planning. In addition the following considerations should be included when making these decisions:
- Open face to face work areas such as laboratory benches or cubicle areas may not be able to be occupied at the same time
- Air flow/Ventilation in areas, especially small rooms, should be considered; according to official guidelines and/or professional recommendations, such as from German BioImaging (see link in Additional Resources below); 4-8x air exchange per hour might be required, although this may need to be determined in consultation with institutional Facilities and/or Health and Safety departments
- Consider adding additional engineering controls if possible, including physical barriers such as a piece of plexiglass to split lab benches or work areas. Keep in mind though,

that new space partitions could have unintended consequences to laboratory airflow, and may have to comply with guidelines or regulations
- Removal of excess seating to reinforce distancing

Monitoring Occupancy:
After determination of maximum occupancy levels, it will be important to come up with methods for monitoring occupancy rates and restricting access as necessary. Cores should clearly post occupancy limits outside each room/area. Cores should consider restricting access as much as possible according to capability to help prevent occupancy exceeding limits. Changes to standard SOPs should be considered, such as discouraging users from waiting in cores for their instrument reservations to begin, or unnecessary time spent in cores on sample preparation or data transfer, processing, or analysis. The ability of individual core facilities to restrict access will vary greatly depending on how access is controlled (e.g. key card access, key access, no limitations). It might prove to be important to also provide a mechanism for occupancy logging, if not automatic, in case this information is needed for contact tracing (see Part 4 below).

Staffing adjustments:
After determination of occupancy levels, changes in policies can help increase safety for core staff and researchers. Staggered work schedules including out-of-hours work, if appropriate, can reduce density in buildings but requires planning. Cores will need to adjust on site staffing to follow institutional guidance, match space limitations and/or possible work schedule modifications. It will be important to establish methods to allow for remote assistance (see Part 4 below) to prevent face to face interactions. In addition planning for safe practices to prevent individuals from working alone should be determined, especially for dangerous procedures. In many cases, common areas such as conference rooms and communal eating spaces will likely be restricted, which could impact staff. Flexibility will also be required when planning work schedules and setting expectations of service. Core directors will need to factor in staff that have caretaker roles or increased risk of Covid-19 or other limitations which could impact their schedules.

For equipment cores that normally train and support user operation, additional considerations in planning include:
- Allow only a single user for each piece of equipment
- Restrictions in the number of reservations per day for equipment, to permit time between users, and reduce the total number of individuals within the facility per day
- Require gaps (15-30 minutes) in scheduling to ensure users don't overlap, and provide time for cleaning between users
- Switch to have core staff run equipment instead of users and/or having users supported remotely by core staff through electronic means (this may involve developing entirely new SOPs - see below "Monitoring" section)

For service cores that generally process samples for researchers, additional considerations in planning include:

- Modify sample drop off procedures to avoid physical contact; may require additional signage and secure storage (cabinetry or refrigeration) to modify drop-off SOPs
- Schedule pick-up times for deliverables to customers or establish delivery options
- Changes to staffing and productivity will be likely

Cleaning/Disinfecting Core Facilities:

A major component for staff safety will be the proper cleaning and disinfecting of work spaces. Making clear policies and requirements will be important. Creating a clean desk/bench policy is recommended to make surface cleaning easy to complete between people. This might require core staff removing clutter from bench surfaces as much as possible, and procurement of new resources, for example waterproof keyboards. Alternatively, keyboards can be covered in plastic wrap that can be regularly replaced.

In many cases SOPs for research activities may need to be harmonized with considerations focused on strategies for infection control. Guidance from institutional Health and Safety, and other resources, should generally be included in decision making processes. One major consideration is the question of gloves in core facilities, for example when operating instruments or other shared items, and how new SOPs might be developed, shared, and monitored.

Clearly post the following information at the entrance of all rooms and throughout the work space as needed:
- PPE requirements for entering facilities (keeping in mind N95 masks likely will not be available for non-medical use for quite some time)
- Glove policy for using computers and high-touch surfaces
- Detailed SOPs for disinfecting equipment and work areas, which should be done before and after work has been done

When planning your SOP for disinfecting equipment and work areas be aware that standard cleaning supplies may not be available (see Part 5 below). When switching disinfectants be careful to not switch to a product that will damage equipment: vendor consultation is recommended before making changes. A list of disinfectants for use against SARS-CoV-2 is available on the EPA website (see link in Additional Resources below) and consultation with local Health and Safety officials can help identify potential replacement options. Another potential consideration with regular cleaning in confined spaces is that exposure to some cleaning products can be potentially toxic, for example if inhaled. Be aware that toxic by-products can also be produced when certain cleaning products are combined.

In addition to policies for cleaning areas between independent users, cores should plan for additional staff time to complete cleaning during the day to ensure areas are kept clean. Also ensure that hand washing supplies and/or hand sanitizer is available in all rooms.

Part 3: Equipment Issues

Another major issue that core facilities will have to deal with during ramp up procedures is equipment restart, calibration, and maintenance. Anticipation of possible issues will help ensure cores have a smooth restart, in particular considering potential issues scheduling vendor service calls due to both increased demand and limited access. Below we expand on the major issues to consider in planning for resumption of research activities.

Supplies required for restart:
Planning ahead for parts, consumables, and reagents that will be needed for equipment can streamline the restart process. Determining the best time to order supplies could be difficult due to the uncertainty of when research operations will resume, and with what type of pace. Preparing a list of needed supplies early will make sure orders are ready to be placed when the time comes for items that can't be ordered ahead. Make sure that replacement fluids, gaskets, consumables that may have degraded during down-time are included, and communicate with your Procurement and/or Receiving departments as early as possible.

Equipment restart plans:
In addition to supplies, plans for restarting equipment should be made. All equipment should be thoroughly cleaned, checked for performance and have all needed calibrations and QC monitoring run before opening them up for use. Any equipment utilizing fluidics will need careful vetting. The fluidics will likely require a flush of the system and checks to make sure that tubing isn't blocked. This goes for water lines, as well as things like coolants, hydraulics, and lubricants. This may involve communication with your institutional Facilities and/or Health and Safety departments, especially for checking things like facility plumbing, and safety equipment in laboratories, including eye wash stations, chemical showers, fume hoods, and bio-safety cabinets.

Instrument relocation:
As discussed in Part 2, maintaining physical distance will be imperative. One method that can be considered by core directors to assist in maintaining physical distance will be relocation of particular pieces of equipment to increase the distance between instruments. Depending on an instrument's usage and the available laboratory configuration, relocation of instruments into the labs of super-users or larger open spaces outside of the core could provide easier access under current guidelines. Relocation of some instruments might not be appropriate, and health and safety assessments may need to be performed before attempting to move equipment.

Equipment disinfection procedures:
As discussed in Part 2, clear disinfection SOPs will be of vital importance. Consultations with vendors is recommended if assistance is needed in determining instrument specific protocols. Many companies and professional societies have been posting appropriate protocols to follow for many types of instruments. In the Additional Resources section at the end of this document several links are provided that have detailed information to assist in the formation of core

specific SOPs. As stated above, prepare for the unavailability of standard cleaning supplies, and consider obtaining alternatives.

Clearly post at each instrument:
- Instrument Disinfection SOP
- Bench/Work Area SOP
- PPE Requirements and Glove Policy for using the instrument
- Capacity Limits

In addition to clear procedures, consider additional engineering controls to assist in infection control. For example, using disposable or washable alternatives (e.g. washable keyboards), installing plexiglass panels to separate areas, and removing parts such as eyepiece cups to streamline disinfection routines.

Technical support issues:
Many instruments that have been shut down for a long period of time will require service engineer visits. Depending on the timing when various locations come back online scheduling of service visits is likely to be challenging. Scheduling of any needed service visits should be planned as soon as possible since a surge in demand is expected. External personal, either from local areas or requiring travel, could be restricted from locations due to regional, local, or institutional guidelines. Currently some states have added quarantine requirements for individuals traveling from out of state. This will likely make getting service difficult until such restrictions are lifted. Due to possible travel restrictions evaluation of options for remote vendor support will be important. This may require additional investment and coordination with local IT departments.

In preparation for service visits you will need to develop a protocol that maintains recommended physical distancing and sanitation procedures. You will also need to clarify the responsibilities for practices, PPE and supplies during restart. Be sure to communicate any local requirements that the technicians will need to follow while on site.

New training SOPs:
Although training users on instruments may not be possible during the initial ramp-up period, eventually this could have to proceed before return to full normal operations is reached. Several best practices have been suggested which could be implemented following consideration of local regulations and logistics. One potential silver lining is that development of new training SOPs could result in permanent changes that improve upon or otherwise streamline previous tools and methods. Below are a series of different, potentially modular, suggestions to consider when developing new training SOPs.

- Develop slide decks with labelled screenshots that cover general principles, as well as general introduction to software and hardware components.
- Record model training activities including,

- - ○ important series of software operations
      - ■ video clips can be recorded in Windows 10 through the Game Bar tool
    - ○ videos of core staff modeling training activities recorded with a webcam
  - Install desktop sharing and/or control software to facilitate remote training and support.
  - Use of a webcam or document camera can help during filming of training sessions, but could also be used to facilitate remote assistance.in combination with the software mentioned above. Smart-phone cameras can be useful for video-calls but can be extremely difficult to effectively utilize for assistance with instrument operation, and raise some potential concerns regarding infection control issues.
  - If documents or webcams are not available, take pictures of your instrument and put them in a folder on the desktop of the acquisition computer so they can be referred to unambiguously, keep a duplicate set on your computer for reference and synchrony.
  - If your acquisition computer is normally kept off-line by principle or policy, consider working with your IT department to put it online to facilitate remote support, especially during the early post-training period. This may require putting the computer behind a firewall e.g. in the event that your version of Windows is old and not allowed on the local network.

It might be considered that at least initially training could be limited only experienced facility users should be trained, on additional instruments within the facility, before any new users (e.g. starting grad students) are allowed to onboard with overall facilities SOPs and receive instrument training. Similarly users could be allowed to only train on instruments that share acquisition software platforms with systems that they can already run. One potential overall model that would combine many of the options above as appropriate would include:

1. Providing users with a presentation file, or some other document, to introduce a new instrument, and guide training and operation;
2. Include videos files of specific software actions or physical interactions with known samples and the instrument;
3. Conduct a live session with a user's sample with them watching remotely.
4. Provide remote computer support and telephone/video conferencing during on-site training, and/or during first imaging session(s) after training.

Part 4: Remote Work, Monitoring and Documentation

Remote Work:
Core staff and users should always act in accordance with regional and local directives and should look for ways to facilitate productivity wherever possible. Best practices for promoting productivity remotely will largely hinge on whether your core is an instrument core (self-service) or a service core. In a service core, core staff are responsible for processing samples with limited or zero input from the client. In a self-serve instrument core, staff are responsible for providing training, access, and support to well-maintained equipment that the user will operate. User operation of instruments maintained by core staff is generally autonomous, although

assisted utilization modalities are also common. Ideas to promote productivity remotely at each type of center may include:

Common to Service cores and Instrument cores:
- Planning for experimental consultation and data discussions to be done remotely.
- Pursuing opportunities from vendors who may be offering additional access to software packages.
- Exploring options for operating instruments remotely. This could mean by core staff or lab user depending on the type of core and instrument being considered.
- Encouraging users to plan ahead to maximize their productivity at each visit to a core while allowing scheduling space for other users. Try to balance using instruments to maximum productivity capacity and throughput, while maintaining physical distancing, and appropriate sanitization. Other changes to SOPs may be considered to maximize productivity, such as modifying the shortest or longest time allowed for reservations or the number of users per day.

Service core:
- Looking for opportunities where remote sample drop-off locations can be established to minimize personal contact.
- Expanding "open" hours as appropriate at existing drop-off locations to help reduce the potential for person-person contact during drop off.
- Considering whether drop-off needs to be expanded, moved, or altered, for example whether a small refrigerator in a hallway could replace in-person drop-off procedures.
- Developing electronic communication tools in place of existing modes of communication. For example many service cores have forms that researchers fill out when dropping off samples; now would be a good time to replace these with online resources.

Instrument core:
- Doing more service-work than your facility normally accommodates; a plan for this will also need to include how this type of work will be billed.
- Employing web-apps that facilitate communication and screen sharing for core staff to assist users while operating instruments, or for researchers to direct core staff operating the instrument with samples provided by the user.
- Installing webcams to promote efficient communication between users and off-site staff, particularly in areas where cell phone coverage is limited, such as in basement rooms. Alternatively, if webcams are not available, smart-phones connected to the internet can be used for this purpose employing video conferencing apps.
- Using software that allows a remote user to control the equipment could be very useful, but must be used with caution to avoid damage. Core personnel could be stationed within the facility to provide "monitored" use for capable users who don't need a dedicated assistant. This could be done in parallel with multiple users operating different instruments depending on the user experience level.

- Consulting with local IT departments to ensure any software used for remote access meets security requirements for your institution will be required.
- Scheduling dedicated time to assist with users of a particular instrument when webcam placement can be set up ideally for that instrument.
- Training new users may need to be postponed until research activities return to normal and/or new training SOPs that make use of online resources may need to be developed.

Monitoring and Documentation:
Core facilities will need to come up with multiple ways of monitoring to ensure physical distancing can be maintained as much as possible and to ensure occupancy records exist which can be used for contact tracing if necessary. These may include:

- Equipment reservation monitoring: On the planning and scheduling side, facility directors can distribute and post guidelines for each of their core spaces based on square footage and airflow specifications per broader campus directives (see also Part 2). Core directors will have a key role in interpreting these guidelines locally because as equipment footprints vary, the degree of occupiable space changes and is not necessarily reflected in raw space numbers.

  When possible core directors develop means to prohibit simultaneous booking of instruments that are physically too close. Most online booking systems can be employed for this use, as well as for blocking a period between reservations to provide time for sanitization. For equipment that is not normally reserved with an online booking system, physical logs should be made available to help track usage.

- Space Occupancy monitoring: In addition to the information captured on instrument scheduling calendars, means for logging actual utilization may need to be developed and employed. These logs can serve as an additional record of actual instrument use and can be used for contact tracing. Additionally, if work that does not involve instrument access must be performed in your facility, for example sample preparation that cannot be conducted elsewhere, consider placing log sheets at these workspaces to capture occupancy.

Because some people may feel vulnerable at work during periods of low building occupancy, some may prefer to log their actual space occupancy in a way that is not publically available in real time. Online monitoring systems should be designed to allow for this where possible. If appropriate, rather than requiring someone to register their entrance to a building at their arrival, consider providing an option for the log to be filled out after the workspace has been vacated by the researcher. Privacy and safety considerations will have to be balanced with the importance of providing tools for tracing. Anything that makes monitoring requests easier to comply with, such as providing direct QR code links to logs, is likely to increase participation at locations where the data are not already being collected automatically.

Part 5: Ordering, Supplies, and Logistics

Core facilities may be challenged to obtain PPE, disinfectants, and other supplies related to safe laboratory activities that are now prioritized for medical settings. Additionally, some routine laboratory consumables may expire during work suspensions and may be in high demand as institutions resume operations. Long lead times, delivery delays, and off-site coordination present challenges to consider. An institutional crisis supply management group or strategic sourcing unit can be invaluable, if available. Early and continued communication between core directors, Procurement, and Receiving departments is critical. Here are several key areas for consideration:

- Review and replenish stocks of supplies for normal operations
    - Check expiration of reagents and consumable supplies
    - Check availability of regularly used PPE, disinfection products and other supplies that may be in high demand by medical personnel
    - Verify or resume delivery of gases and cryogen (e.g. carbon dioxide and liquid nitrogen)
- Determine additional COVID-19 related PPE and disinfection supplies
    - Follow campus, local and state guidelines for protecting personnel and increasing sanitation of shared spaces and surfaces
    - Work with your procurement office or strategic sourcing groups to secure supplies
    - Clarify responsibility for ordering, provision and use of supplies for core staff, core users, vendors (Does core supply all needed materials? Who pays for increased required PPE and cleaning supplies?)
- Coordinate access for deliveries
    - Coordinate access for closed buildings or unattended loading docks
    - Mitigate safety risks and potential for theft or misplacement in unattended areas
    - Coordinate delivery from receiving area to cores
    - Consider posting mobile numbers or installing wireless doorbells
    - Consider effects of personnel restrictions (off-campus or out-of-state vendors)
- Anticipate shortages in critical supplies (e.g. face masks, face shields, gloves, disinfectants)
    - Determine if substitutions are allowed for approved protocols (e.g. IRB, IACUC, Safety)
    - Consult the EPA list of disinfectants for possible alternatives (see Additional Resources below)
    - Explore options for local production or in-house mixture (pending approval from campus or other relevant units)

Additional Resources

CDC Reopening Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Businesses, Schools, and Homes
https://www.cdc.gov/coronavirus/2019-ncov/community/reopen-guidance.html?deliveryName=USCDC_2067-DM26911

OHSA Guidance on Preparing Workplaces for COVID-19
https://www.osha.gov/Publications/OSHA3990.pdf

CDC Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 (COVID-19)
https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html

German BioImaging recommendations for operating Imaging Core Facilities in a research environment during the SARS-CoV-2 pandemic
https://www.gerbi-gmb.de/sites/default/files/2020-04/GerBI-GMB_Corona_Recomm_2020-01-04.pdf

EPA List of Disinfectants for Use Against SARS-CoV-2
https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2

Institutional and Agency Responses to COVID-19 and Additional Resources
https://www.cogr.edu/institutional-and-agency-responses-covid-19-and-additional-resources

Cleaning recommendations from vendors and professional societies:

- Leica How to Sanitize a Microscope | Learn & Share
- Nikon Recommended Handling and Disinfecting Procedures for Nikon Microscope products to reduce spread of infectious agents including SARS-CoV-2 (Coronavirus)
- Olympus How to Clean and Sterilize Your Microscope
- Zeiss https://p.widencdn.net/xovbuw/EN_quick-guide_cleaning-disinfecting-microscope
- GE Healthcare COVID-19 faq cleaning and disinfection
- Okolab Cleaning recommendations for Okolab products
- ISAC Biosafety Standards https://isac-net.org/page/Biosafety
- University of Chicago CAT Facility Instrument Guides Instrument Guides | Cytometry and Antibody Technology