



# BUILDING BIOINFORMATICS CAPABILITIES IN A PUBLIC HEALTH LABORATORY THROUGH PARTNERSHIPS WITH ACADEMIC INSTITUTIONS

## What public health laboratory (PHL) needs could be met by an academic partnership?

### Resources for Sequencing and Bioinformatics Infrastructure

The increase in public health applications of next-generation sequencing (NGS) has created new challenges, including additional demands for bioinformatics computing power. One potential solution to gain capacity is linkage with academic institutions' compute resources. Partnerships for sharing sequencing resources and specimen collections can improve both the capacity and efficiency of PHLs.

#### Bioinformatics Infrastructure

##### **Benefits:**

- Decreased cost for development and management of computer environments compared to direct PHL infrastructure investment.
- Easier access to software and tools, perhaps already utilized by the academic partner.
- Dynamic and quickly scalable computing at high performance computing (HPC) or supercomputing centers can allow the PHL to diversify operations to meet the demands of new projects.
- Easier sharing of infrastructure and resources between state/county public health departments and state academic institutions, instead of developing commercial contracts.
- Public institutions may be under the same information technology (IT) oversight policies and can promote collaborations for the public's benefit.

##### **Things to consider:**

- Data management specifics on university-owned academic partner servers, including security, routes of access, partitioning from the research environment and data retention.
- Include the PHL IT team from the start of the collaboration and in important discussions regarding security, data transfer, HPC access route, etc.
- Develop contracts and cost structures for procurement of computer resources, IT support and bioinformatics consultation.
- Set performance expectations and accountability, including the establishment of service level agreements (SLAs) as necessary.

#### Sample Sharing for Sequencing; Access to Specimen Collection or Sequencing Core Facility Resources

##### **Benefits:**

- Providing PHL high-throughput sequencing capacity to meet the needs of academic institutions lacking their own resources, or to supplement active research and/or student research projects. PHLs may charge for these services.
- Access to academic institution freezer repository samples which may have been otherwise inaccessible but are applicable to or necessary for the PHL's AMD projects and may impact public health investigations.
- Leveraging academic institution sequencing capacity for specialized sequencing projects or bulk low-priority tasks, allowing for better prioritization of PHL resources and increased consistency in budgeting and resource planning.

##### **Things to consider:**

- The challenge of establishing data transfer/sharing agreements, if necessary (need to consider data security, retention, protection of PII, and IRB requirements).
- Establish materials transfer, chain of custody and disposition agreements as required.
- Extend existing PHL quality management processes to include academic contract sequencing.

## Bioinformatics Expertise

The public health laboratory workforce has an increased need for competency in NGS data analysis terms, theories and applications. Academic institution partnerships can help to address this need by providing access to students and faculty with formal training and expertise in complex data analysis.

### Student and Academic Faculty Engagement in Projects of PHL Importance

#### **Benefits:**

- Academic consultation and development to address PHL-specific application needs.
- Attainment of workforce experience by students and ability to contribute to public health investigations.
- Academic institution faculty and researcher's capability to investigate unique public health datasets to bolster their own research.
- Academic students and researcher's awareness of and easier access to open-source bioinformatics tools and expertise to advise government institutions.
- Opportunity for workforce recruitment as students gain exposure to PHL projects and applications of bioinformatics to advance PHL mission.

#### **Things to consider:**

- Define upfront the goals, roles, approaches and performance expectations for each party (e.g. scientific focus, funding requirements for personnel and computing, time commitments, turn-around time expectations, and publication/authorship expectations).
- Discuss project continuity and sustainability at the outset of the partnership, since students may only be available for short-term projects.
- With academic partners, determine the long-term plan for issue resolution and oversight/administration of systems, programs and applications developed for PHL but housed within the academic partner's infrastructure.
- Work closely with the academic group to guide the validation of pipelines and documentation of software versions, performance characteristics, and operating procedures.

### PHL Workforce Development Training

#### **Benefits:**

- Instruction is provided by experienced educators with years of experience in the field.
- Potentially easier access to loaner equipment and third-party software.
- Trainings can be multipurpose and utilized by the academic partner for other applications/audiences.
- Gain of perspective by academic partners of how bioinformatics is being utilized in public health settings. This information that can inform curriculum decisions to ensure students are developing appropriate skills for their future public health careers.

#### **Things to consider:**

- Design curricula that balance strong basic science and applied public health focuses so that training meets the specific needs of PHL scientists.
- Identify common training concepts that are applicable to PHLs and academic students, so that time invested in training development is worthwhile for academia colleagues.
- Reduce actuality of establishing lasting collaborations when instructors are likely to be graduate students with a limited academic retention time.

## How to Get Started

- Since academic partnerships are novel for most PHLs, a discussion with laboratory administration about the precedent for and coordination of a collaboration is recommended. PHLs with existing academic partnerships may also be able to provide helpful advice.
- Research academic institutions to identify those with centers or programs focused on bioinformatics and data science. Research available resources and potential collaborators, and consider reaching out to discuss the possibility of a institution/PHL collaboration.
- Offer to meet in-person with center directors or professors to discuss goals of the collaboration and understand their interests or needs. Be open to suggestions for the partnership that may be beyond the scope of work initially considered.
- Discuss the potential benefits of the collaboration for the academic partner: access to high-throughput sequencing, access to PHL specimen collections and expertise, student internship potential, etc.
- Have potential partners visit the lab in order to familiarize them with the PHL. It will also create an opportunity to allow them, as experts in their field, to share their knowledge.
- Consider local engagement of academic faculty and students through meetings like local branch ASM, statewide biotechnology trade associations and interdisciplinary councils and committees for IT.
- Many PHLs have used guest lectureships and adjunct professorships to improve engagement with local academic institutions. Though these examples may represent a significant investment of PHL staff time, they provide an opportunity to engage with graduate classes and academic faculty, to serve on advisory committees and help establish academic research partnerships and activities that benefit local public health priorities.