



NDRIO White Paper

Bridging the Accessibility Gap

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Current Issues

Researchers at the University of Waterloo see Compute Canada Federation (CCF) resources as essential to the national research landscape and describe it as a national asset. However, in consultation with our researchers, many identified a key opportunity to exploit and develop this asset further, by increasing accessibility to high performance computing resources. Accessibility can be improved by developing more short term, “quick access” compute resources, developing better on-ramps to computing resources, training and developing researchers and students to use these resources, and expanding resources using the power of being a “big buyer” in the research software area.

Convenience and Efficiency:

To date, many of Compute Canada Federation (CCF) resources have been focused on high performance computing, with less attention on some of the other computing services needed by researchers. In particular, the availability of commercial services creates a tension for researchers. While commercial services are more expensive, they are very convenient and can be set up quickly. There are many process steps for access to Compute Canada infrastructure. For shorter-term needs, commercial services such as AWS, GoogleCloud and Azure tend to be more convenient. Sometimes researchers need a substantial amount of computing resource for just a few days, and it would be more efficient to not go through the process of the development of a long proposal in that situation. While the CCF’s Rapid Access Service (RAS) is a step in the right direction, researchers still noted the temptation to turn to the commercial cloud because of their efficient handling of such requests.

A National Strategy

The services offered by CCF, Compute Ontario (CO) and SHARCNET have been welcome. However, having a national strategy is important, especially for “deep-learning” resources. This national strategy may need to be discipline-specific in order to meet researcher needs. For example, researchers in Humanities (who may tend towards needing more powerful persistent

cloud resources) and researchers in deep-learning (who may require more powerful GPUs) require different resources.

Accessibility

Challenges in accessibility arise. Currently, resources are migration-based. For example, if a researcher uses a particular resource extensively for a few weeks, the current resource allocation process will reduce their access and it may be a few weeks before they can return to the resource. There is competition from commercial providers that can provide negotiated lower rates, offering a very cost-effective solution for research users.

Management of Research Data

Managing research data can be confusing, with researchers faced with options from the Federated Research Data Repository (FRDR), the Dataverse project, and locally hosted data repositories. Researchers are often unaware of the differences between these repositories and need to understand the different benefits of each repository. Managing research data and research software are also important issues. Because of the multitude of data repositories, researchers would appreciate clearer guidance on data curation and housing. Managing a very large data set requires significant expertise. There is an opportunity for NDRIO to simplify data management.

Knowledge of the System

Many researchers are unclear what computing resources are available or how to access them. Though there is much information disseminated, for those using the systems, knowledge of digital research infrastructure has been acquired by word of mouth when one researcher tells another researcher. Understanding better how to communicate and reach researchers to make them aware of resources still needs further work.

Future State of Digital Research Infrastructure

A well-rounded digital research infrastructure for Canada would include the provision of research software as well as computing capability. Many software licences are expensive for individual researchers to purchase but could be purchased nationally through NDRIO and made available to researchers to use.

Training of highly qualified personnel should also be part of a cohesive infrastructure. Training researchers and students on digital research tools and resources would develop the Canadian ecosystem further, as well as increase the skills of emerging computing talent.

Many of the tools available are poorly understood. The digital research infrastructure ecosystem needs to become more accessible, to more researchers. Achieving this goal would require a stronger effort to educate researchers on what is available in the digital research infrastructure ecosystem.

How to Bridge the Gap

Modernize Compute Resource Services:

- Develop a short-term service that is competitive with the commercial cloud. The keys to this service are flexibility and accessibility. NDRIO could likely offer these services with more competitive pricing. Researchers need a way to access substantial compute resources for short periods of time without the need to prepare extensive proposals.

Exploit the “Big Buyer” Opportunity:

- NDRIO, as a “big buyer” of computing services could negotiate bulk pricing from AWS, GoogleCloud or Microsoft Azure. NDRIO could provide the on-ramp to access these commercial services for Canadian researchers. This could provide a surge capacity for researchers who need short-term bursts of computing power, beyond what NDRIO would have as physical equipment.
- Consider group purchases of commercial software packages. NDRIO can be a voice for bulk software purchases.

Provide a clear on-ramp to available resources:

- Develop a clear approach to research data management. Make storing research data seamless, with minimal overhead in entering meta-data. Connect clearly to other research data platforms and external services like DOI provision and GitHub.
- Develop a clearer relationship with provincial organizations and provincial resources. Provincial clusters manage their queues differently. Either coalesce to the same strategy or explain the differences in management of the provincial clusters.

Develop an educational approach to encourage greater use of research computing:

- Build case studies for how digital research infrastructure was used. Use these case studies as examples for others to follow. These case studies can spread the word on what resources are available.
- Develop training tools that students and researchers can access.
- Develop new ways to inform researchers what resources are available and how to access them. Reach out and offer services.
- Take advantage of the knowledge resource of researchers and research teams with deep experience using digital research infrastructure. Although Compute Canada has a wiki page, it is largely unknown that it can be edited. A more widely advertised forum for knowledge sharing would be helpful.