



Putting Tools and Technologies at Big Science Facilities in the Virtual Hands of Researchers across the Country

Imagine you are a researcher at any university in Canada—Memorial University of Newfoundland, the University of Victoria or any one of the many in between—who can virtually perform experiments at multi-million dollar big science facilities such as the Canadian Light Source (CLS) in Saskatoon, Saskatchewan. You have the ability to manipulate equipment, conduct tests and analyze results using leading-edge technologies that are housed in a world-class facility hundreds or even thousands of kilometers away—directly from your desk. Too good to be true?

A multidisciplinary team led by Dr. Michael Bauer and Dr. Stewart McIntyre at the University of Western Ontario, with participation from Concordia University, IBM, and the CLS, are developing a research platform that provides this capability to researchers from coast to coast.

Leveraging \$1.7 million in funding through CANARIE's Network-Enabled Platforms program, the group has developed Science Studio, a web-based system that allows scientists to control all steps of the experimental process at elite research facilities, without having to leave their own labs. The system is initially configured to provide access to the VESPERS Beamline located at CLS and the Focused Ion Beam Facility located at the University of Western Ontario.

With Science Studio, a researcher can remotely schedule time to use specific equipment or devices; control the experiment; source, visualize and analyze the resulting data; and invite others to observe and collaborate. Experiments are performed in real time, enabling the user to monitor test results and make adjustments if required. This improves researcher productivity, as it eliminates wait time for outcomes, as well as the travel costs and time that is typically required to conduct experiments at these facilities. This easy-to-use, browser-based tool is helping to optimize Canada's investment in big science by increasing the use of highly sophisticated and costly equipment in specialized labs across the country.

According to Dr. Bauer, Professor of Computer Science at the University of Western Ontario, the ability to effectively conduct real-time experiments and exchange the massive volumes of data they generate requires high-performance computing power, and the advanced networking capability provided by CANARIE and its provincial partner ORION, the Ontario Research and Innovation Optical Network. Science Studio could not operate without it.

"CANARIE provides a critical lightpath, a direct end-to-end 1 gigabit connection, that enables researchers to access the high bandwidth required to perform this type of work," Dr. Bauer says. "By using the advanced networks managed by CANARIE and ORION, Science Studio allows scientists across the country to expand their research capacity and work together in highly productive and cost-effective ways."

According to Dr. Stewart McIntyre, a Professor of Chemistry at the University of Western Ontario, the potential impact of Science Studio exceeds a specific type of research or scientific discipline. "This online system creates a dynamic training environment for students, increases the visibility of different regional and national research initiatives, and encourages scientific collaboration," he says. "We are currently exploring how to create access to international science facilities to deliver even greater value to our research community."

For scientists from coast to coast, and those beyond our borders, Science Studio is a tool that could revolutionize the conduct of research, and further exploit government investment in big science in Canada and around the world.