

Research Impact: Dedicated Research Software Support Speeds Pandemic Forecasting Model

Every three weeks, the Ontario Modelling Consensus Table (MCT) meets to review COVID-19 forecasting scenarios from several different research teams and create a consensus view to help the Ontario government make decisions about health care. The Mac-Theobio Research Group at McMaster University is one of the research teams creating these scenarios using sophisticated mathematical modelling.

“We began developing our software, the [McMasterPandemic](#) R Package, in March 2020, specifically to support governments and public health authorities in making epidemic-related decisions,” says Dr. David Earn, Professor of Mathematics and Faculty of Science Research Chair in Mathematical Epidemiology at McMaster University. [McMasterPandemic](#) has also been adopted by the Public Health Agency of Canada.

Dr. Earn leads the Mac-Theobio team jointly with McMaster professors Dr. Ben Bolker (principal architect of [McMasterPandemic](#)) and Dr. Jonathan Dushoff. For decades, Earn, Bolker and Dushoff have been using mathematical modelling to study epidemics, whether that be the global spread of measles in the 20th century or the spread of bubonic plague across the 14th to 17th centuries — a project that required extensive resources to uncover and digitize records dating back nearly 700 years.

The team, which includes post-doctoral fellow Dr. Irena Papst and adjunct assistant professor Dr. Michael W.Z. Li, now produces COVID-19 forecasts for governments and public health authorities across Canada and in other countries. But their ability to provide this crucial service in a timely manner has been constrained until recently by the many hours it takes to recalibrate the model every time the ever-expanding data streams are updated.



Left to right: Dr. David Earn with former graduate students Dr. Chai Molina (middle) and Dr. Dora Rosati, discussing infectious disease modelling

Enter SHARCNET, a consortium of 19 academic institutions that provides researchers with access to advanced computing resources and services via the national advanced research computing platform. SHARCNET provided half-time programming support from Weiguang Guan, a C++ programmer who worked with the McMaster team’s principal data scientist, Dr. Steve Walker, to speed up the software package by a factor of ten — a huge increase that will allow the team to move with greater agility and speed to support pandemic response in Ontario and elsewhere.