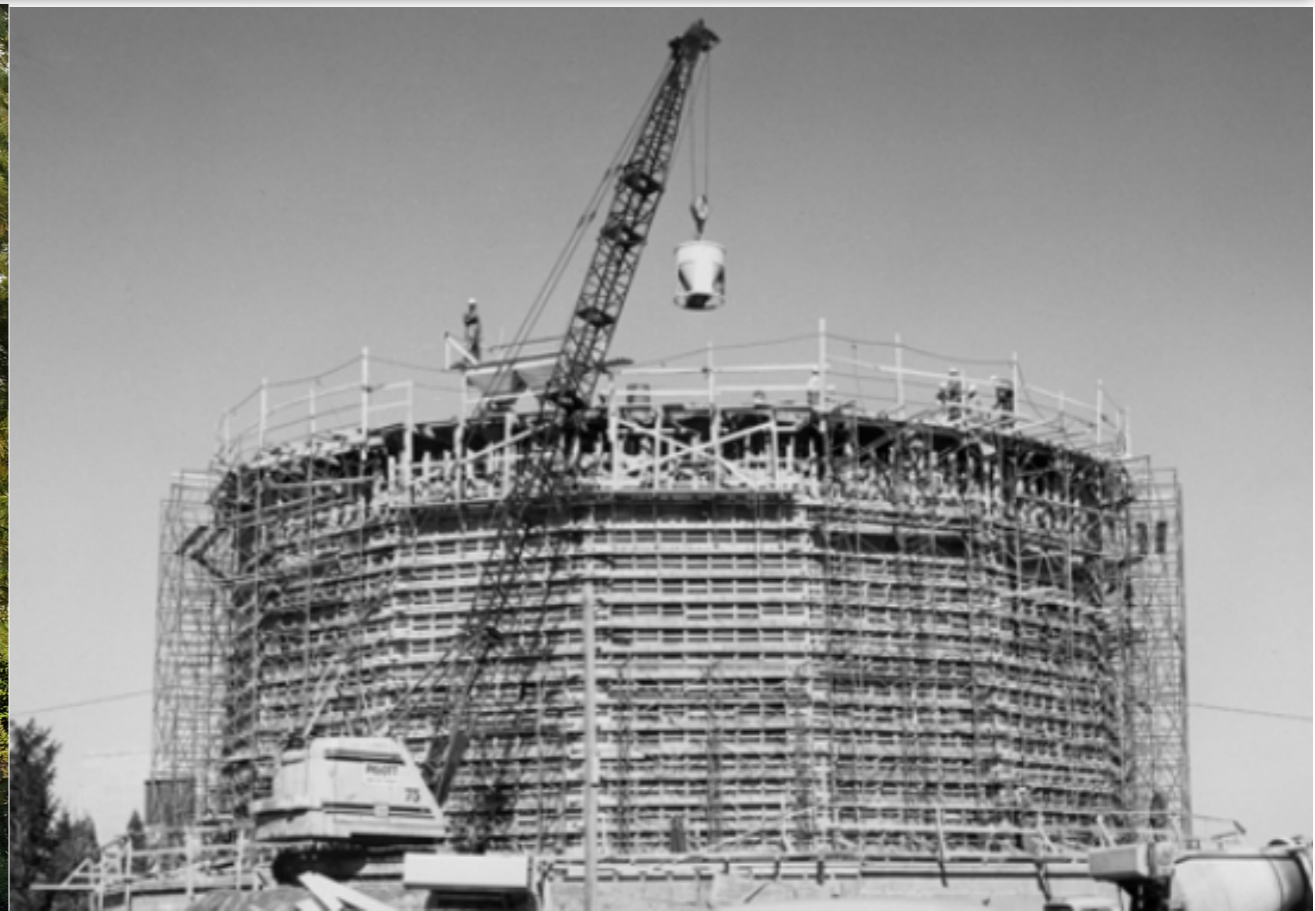


A Domestic Neutron Beam Science Program and the McMaster Nuclear Reactor



**McMaster Nuclear Reactor
2020**

**McMaster Nuclear Reactor
circa 1958**

Bruce D. Gaulin
McMaster University



**Brockhouse Institute
for Materials Research**



CFI IF “Building a Future for Canadian Neutron Scattering”

Vision :

- **Optimally exploit MNR for neutron *diffraction* programs over a broad range of materials science and engineering problems**
- **Initiate partnerships with world leading neutron beam centres for immediate access to neutron *spectroscopy* and other specialized applications**

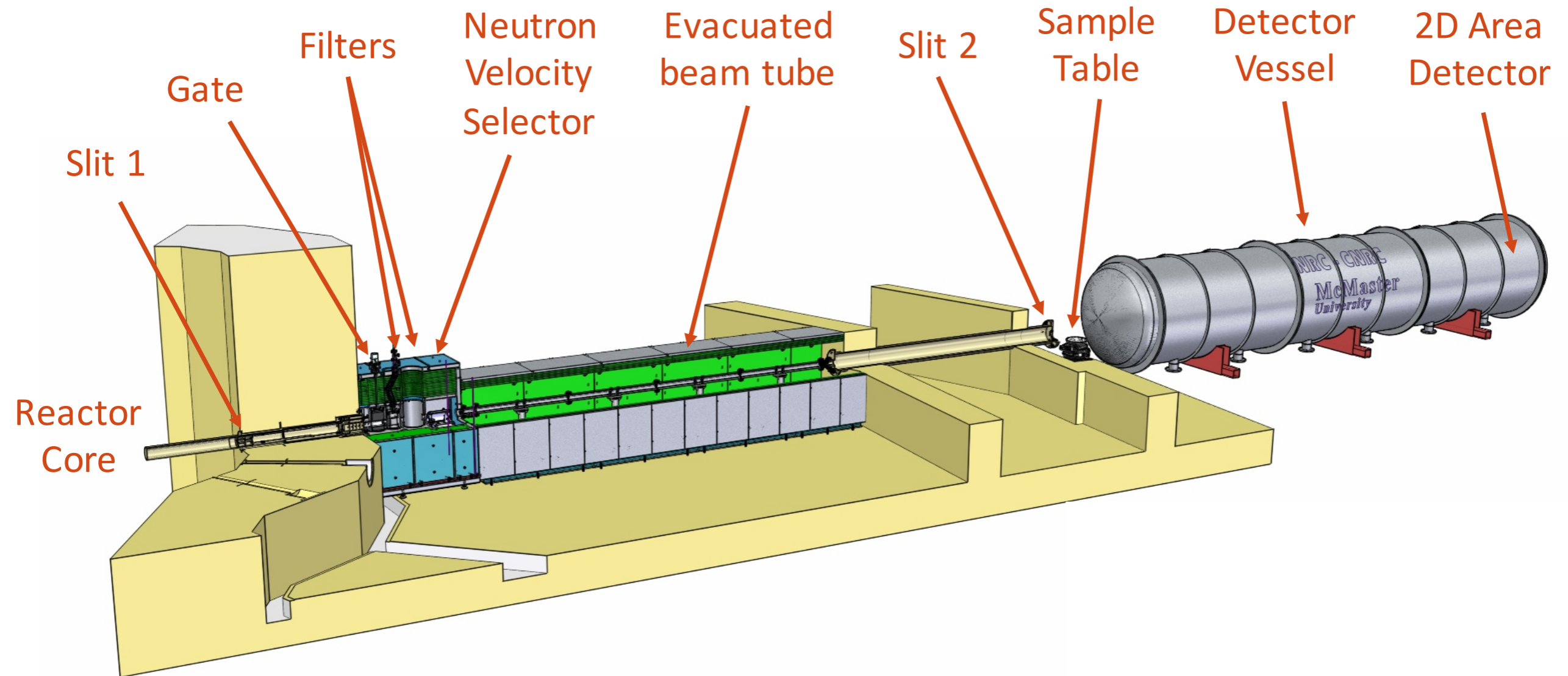


Neutron Beam Science and McMaster University



- 1- CFI International Access Fund Award 2002 \$14M**
“Canadian Participation at the SNS” - 2008-2018 enhanced access
- 2- Completion of the CFI IF “SANS for Nanostructured Materials” \$7M**
 - **beam port insert set to be installed in new year shutdown**
 - **2D Detector set for delivery in April 2021**
 - **Should complete construction in summer 2021**
- 3- CNL and NRC surplus neutron diffraction equipment are now funded be moved to MNR (from an NSERC RTI grant ~ \$150K, PI Gaulin). Delays due to COVID, but OK for spring 2021.**
- 4- 2 NSERC RTI’s supporting sample environment for SANS were funded in the last two years (for soft matter research PI Drew Marquardt, U Windsor, ~ \$150K, and for quantum materials, PI Gaulin, ~ \$150K). Should complete spring 2021.**
- 5- CFI - IF “Building a Future for Canadian Neutron Scattering” \$47M total project - \$14M from CFI; \$13M from provincial matches**

New \$7M McSANS instrument at MNR Beam Port 4 Completion set for June 2021

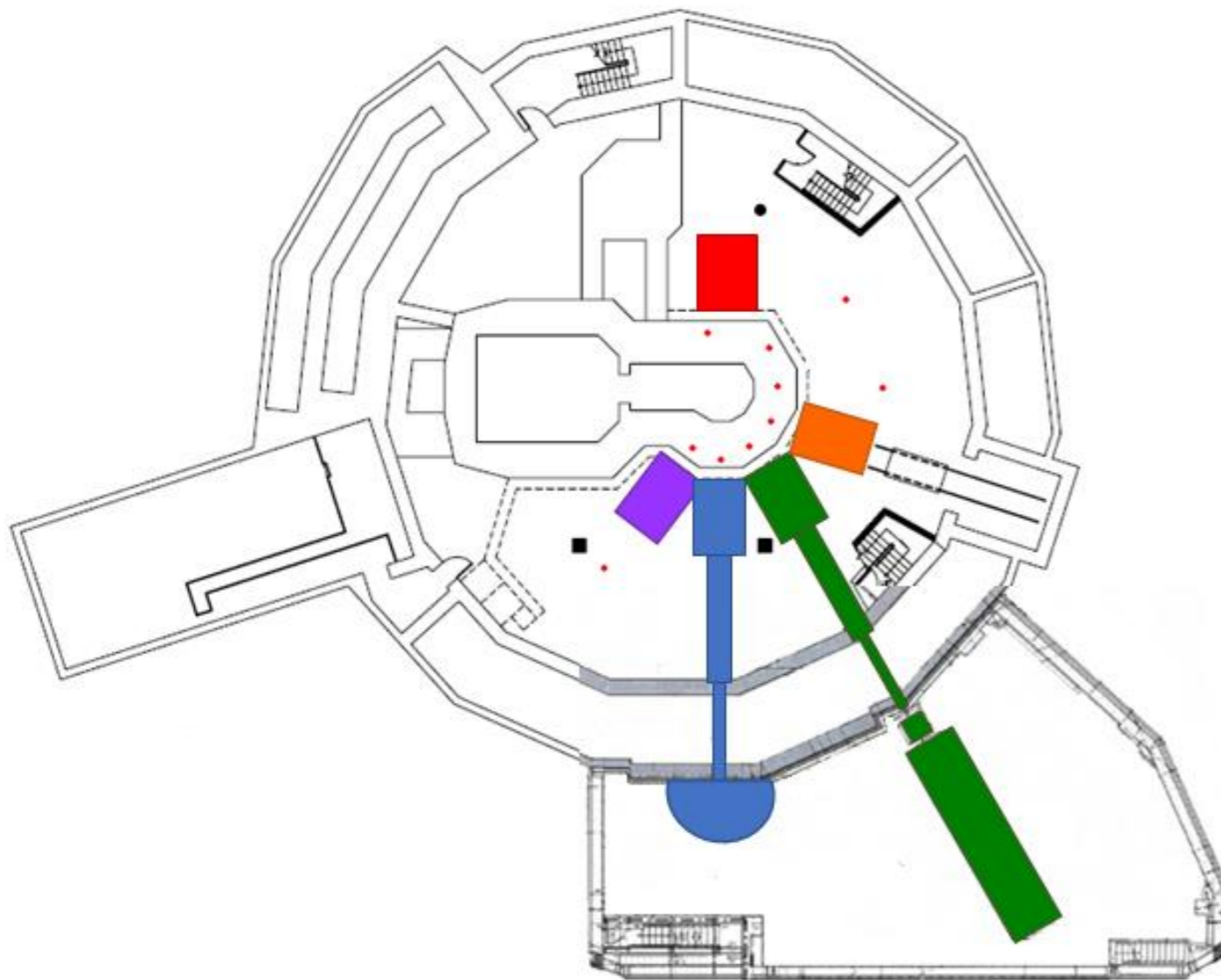


Beam Port insert set for installation
during New Year 2021 shutdown

2D detector
delivered
~ April 2021

CFI IF “Building a Future for Canadian Neutron Scattering”

~ \$20 M in new neutron instrumentation for MNR



BP#0: Neutron Reflectometer

BP#3: General Purpose Diffractometer (MAD), shared with Prompt Gamma Facility

BP#4: Small Angle Neutron Scattering (MacSANS)

BP#5: Neutron Powder Diffractometer, shared with Intense Positron Beam Facility

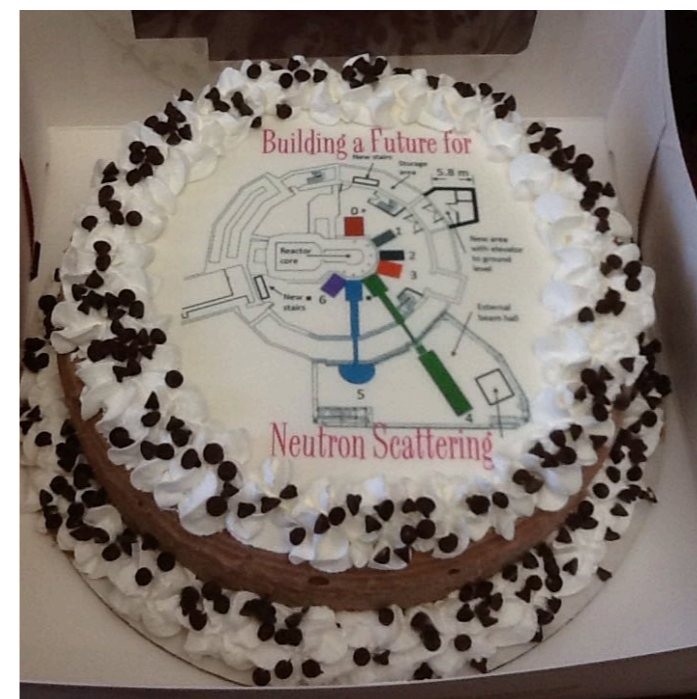
BP#6: Neutron Stress Scanner Industrial Diffractometer

CFI IF “Building a Future for Canadian Neutron Scattering”

Table 1: Team members’ research themes. Asterisks () denote the 10 primary team members.*

Quantum Materials (Q)	Energy Materials (E)	Structural Materials (S)	Biomaterials (B)	Instrument Development
Gaulin*, McMaster	Frisken*, SFU	Daymond*, Queen’s U.	Marquardt*, U. Windsor	Daymond*
Hallas*, UBC	Huot*, UQTR	Chapman*, U. Saskatchewan	Cranston, UBC	Gaulin*
Kim*, U. Toronto	Tutolo*, U. Calgary	MacKay, Nemak	Hoare, McMaster	Kim*
Wiebe*, U. Winnipeg	Goward, McMaster	Noel, Western	Dutcher, U. Guelph	Noel
Aronson, UBC	Nazar, U. Waterloo	Rogge, CNL	Harroun, Brock	Rheinstadter
Bianchi, U de M	Ryan, McGill	Sediako, UBC	Leonenko, U. Waterloo	Rogge
LeBlanc, MUN	Mozharivskyj, McMaster		Rheinstadter, McMaster	Yamani
Monchesky, Dalhousie			Unsworth, U. Alberta	
Yamani, CNL				

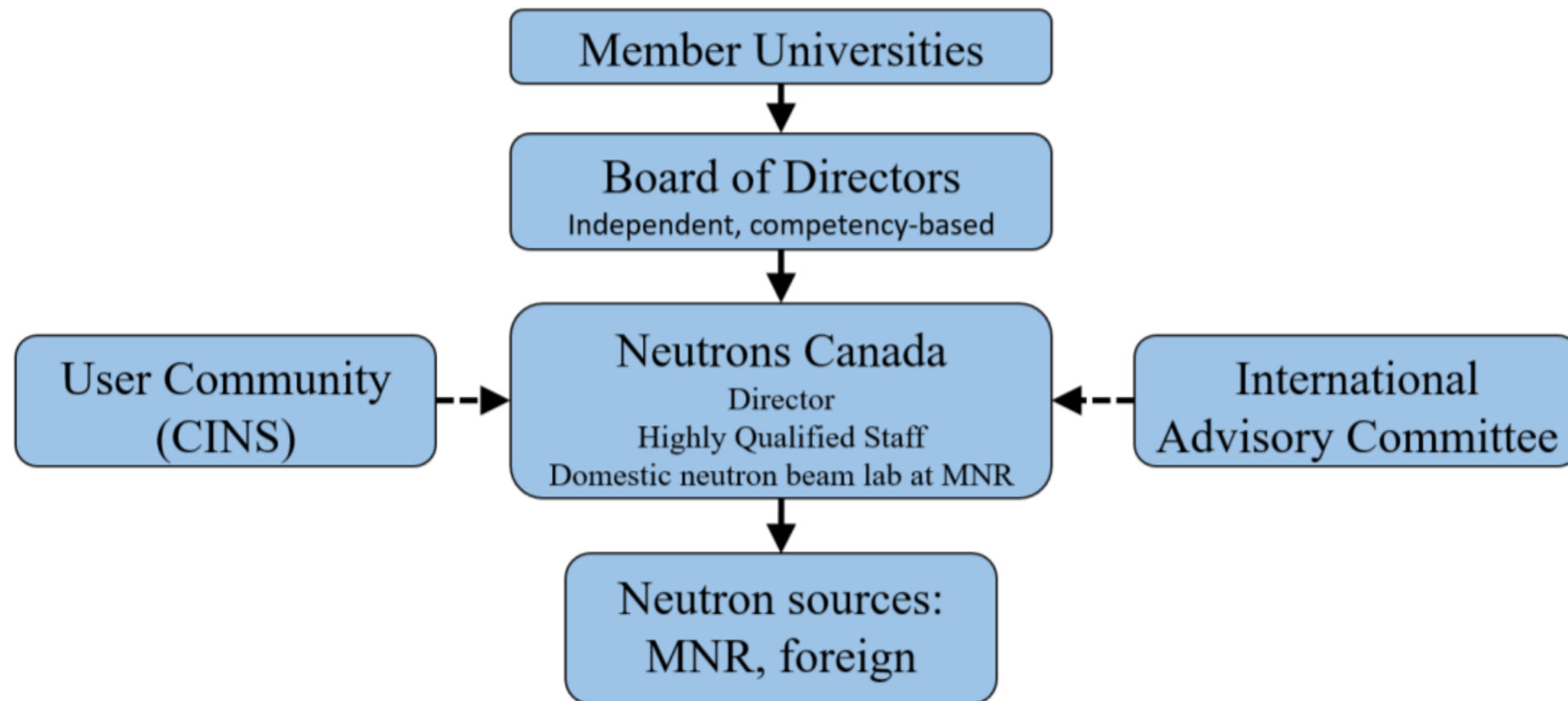
19 Canadian universities from coast to coast participated



Success!

NEXT STEPS: CFI IF “Building a Future for Canadian Neutron Scattering”

- **Evolve towards National Facility Status**
- **National governance structure**
~ finalization + 5 years



- **Secure long term operating funds for national program ~ \$2M/year +**
- **Renew foreign partnerships beyond 1st term**