

BIG DATA AND DIGITAL INFRASTRUCTURE RESEARCH AT UNB



In less than ten years, 50 billion connected devices will be generating massive amounts of data – “Big Data” in today’s vernacular.

In order to effectively manage and exploit big data, new techniques and technologies are needed to transport and transform it into actionable knowledge. Multi-disciplinary research at the University of New Brunswick (UNB) addresses the many facets of this evolving digital

ecosystem and its challenges: from advanced research in high-performance hardware, networks, and software – to its innovations in the disciplines of data management and data analytics; from novel research into human-computer interactions – to UNB’s notable contributions in the cybersecurity battle.

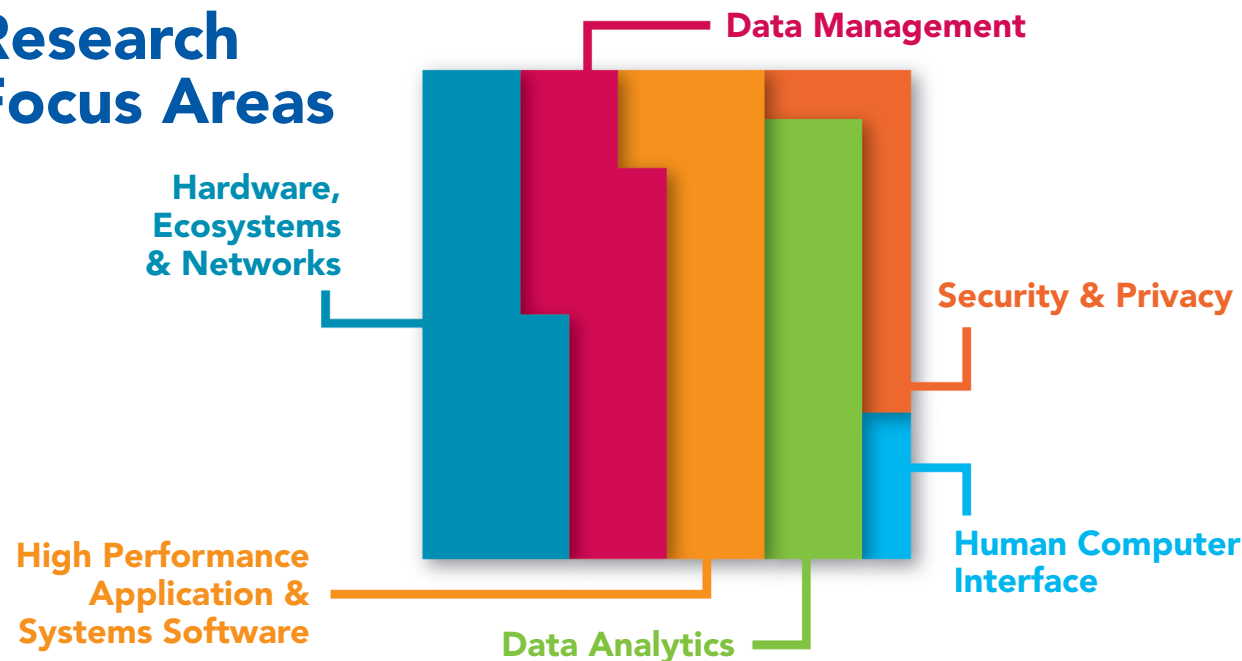
Research advancing data management and data analytics are both areas of significant focus at UNB. Multiple disciplines are involved in the

development of innovative tools, techniques and platforms for processing and organizing large amounts of data, both structured and unstructured, from disparate sources, so that it is assessable and ready for various applications, workflows, and analysis. UNB’s research in data analytics is also multi-disciplinary and is advancing many methodologies for use in many domains. Some examples include the designing of effective learning algorithms for data mining, the advancing of semantic analysis technologies for use in bioinformatics and genomics, innovative research in artificial intelligence, real-time analytics of massive Internet-of-Things (IoT) data, and inventive approaches to visual data analytics in several domains.

Considerable research effort at UNB adapts and develops software applications (high-level) and systems software (low-level) methodologies to take advantage of the processing speed of high-performance computing (HPC) hardware paradigms. These efforts provide tools that help advance research in many fields of fundamental and applied science.

Hardware, networks and ecosystems make up the infrastructure which permits digital data to be generated, stored, communicated, and analyzed.

Research Focus Areas



UNB research in these areas is both broad and deep. Some examples include research in HPC configurations, development of platforms and tools for chip design, embedded processing systems, wireless sensor networks, smart controls, and more. UNB currently hosts one of four HPC clusters as part of a consortium of universities in Atlantic Canada created to serve the

computationally-based research needs of almost 900 users at five universities.

UNB is recognized as a leader in cybersecurity research and development. The university has one of Canada's largest R&D centres specializing in network security. UNB is tackling some of the most pressing security issues, such as threats to

children and other vulnerable individuals on social media; automatic discovery, visualization and mitigation of botnets; security of large scale mobile networks; and exposing the origins of malware, and identifying the hackers who write it. The university has also been chosen to help adapt IBM's iconic Watson cognitive technology for the cybersecurity battle.

45

Average number of faculty undertaking research in this area each year

\$3.4 million

Average amount of funding received for research in this area each year

91

Average number of research projects in this area each year

19 Faculties and Departments pursuing research in this area

- **Arts (Fredericton)**
 - Economics
 - French
 - Sociology
- **Business (Saint John)**
- **Business Administration**
- **Computer Science**
- **Engineering**
 - Chemical Engineering
 - Civil Engineering
 - Electrical and Computer Engineering
 - Geodesy and Geomatics Engineering
 - Mechanical Engineering
- **Forestry and Environmental Management**
- **Kinesiology**
- **Science**
 - Biology
 - Chemistry
 - Mathematics and Statistics
 - Physics
- **Science, Applied Science and Engineering**
 - Biological Sciences
 - Computer Science

8 Facilities and Groups conducting research in this area

- **Institutes and Centres**
 - IBM Centre for Advanced Studies (CAS Atlantic)
 - Information Security Centre of Excellence (ISCX)
 - Information Technology Centre (ITC)
 - New Brunswick Institute for Research, Data and Training (NB-IRDT)
- **Labs and Research Groups**
 - Advanced Computational Research Laboratory (ACRL)
 - Big Data Systems and Analytics Lab
 - Intelligent and Adaptive Systems Research Group
 - People In Motion Lab

4 Research Chairs engaging in research in this area

- **Canada Research Chairs**
 - Advanced Geomatics Image Processing
- **Other Research Chairs**
 - Big Data
 - Cyber Security
 - Real-time Mobility Analytics