

Self-Assessment: University of Manitoba

(Winnipeg, Manitoba, Canada) – November 1, 2012

Team members:

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- Jeffery Marcus, Canada Research Chair/Associate Professor, Department of Biological Sciences
- Gary Strike, Liaison Librarian, Elizabeth Dafoe Library

1 Organization

1.1 Organizational Structure – Research

- Office of the Vice President (Research and international): <http://umanitoba.ca/research/>
 - Vice President (Research and international): Digvir S. Jayas.
 - Associate Vice-President (Research): Gary Glavin
 - Office of Research Ethics and Compliance
 - Controlled Goods Animal Care and Use
 - Environmental Health and Safety
 - Protocol Management and Review
 - Education and Training
 - Veterinary Services Human Ethics
 - Research Ethics Boards
 - Education
 - Research Quality Management
 - Director of The Office of Research Services: Barbara Crutchley
 - Funding Sources
 - Internal Grants
 - Research Grant and Contract Services
 - Institutional Programs
 - Grant Facilitators (SSHRC and NSERC)
 - Research Information System
 - International Research
 - Executive Director: Technology Transfer Office (vacant)
 - Intellectual Property Management Services
 - Technology Development
 - Technology Commercialization
 - Raise IP awareness
- Organizational chart:
http://umanitoba.ca/research/ors/media/ORS_Org_Chart_August2012.pdf

There is an Associate Director (Research Grants), with several staff, but there appears to also be separate “facilitators”, two for SS & H (Elyssa Warkentin and Karen Schwartz), and one for NS & E (Chantal Bassett).

There is strong support from the Vice-President of Research’s office for developing an E-Science strategy at the University of Manitoba. They would like to see the Libraries take the lead on planning for and delivering the program. This would involve leading a team that would include representatives from Information Services & Technology, Research Services, faculties and others, to develop policies, procedures, training, services and infrastructure to support E-Science/E-Research at the University. It has been suggested that the program should be piloted first with individual or a group of researchers. It was acknowledged by the VP Office of Research that the Libraries would need to ask for additional funding support in order to develop and implement an E-Science strategy.

The Office of Research Services had concerns that researchers would not welcome the intrusion into their data management by other units within the organization. They felt that unless mandated by the funding agencies, researchers would resist internal policies and procedures for the formal management of data though the research life-cycle. They felt that since the Libraries was already seen as a repository, that the researchers would be more acceptable of their involvement in managing published data (though not raw data).

The Research Quality Coordinator has been trying to get support for the development of a Virtual Research Environment in order to satisfy the funding and privacy requirements of safely and securely storing and transmitting research data.

1.2 Organizational Structure – Technology

“Information Services and Technology (IST) , is an administrative unit reporting to the Vice-President (Administration), which provides computing and communications resources and expertise to support our clients in their teaching, learning, research, administrative and community service endeavors by providing information technology infrastructure and services and by providing leadership and expertise in information technology solutions and services thereby contributing to the creation, preservation and communication of knowledge in the community.”

Mike Langedock recently took over as the University’s Chief Information Officer overseeing the IST unit. In interviews with the CIO, it was acknowledged that historically, IST has provided a lot of support to the administrative arms of the University, but has not provided adequate support to researchers. The CIO hopes to change this going forward. However, when they have been approached by researchers to provide IT support to project, these partnerships have worked well and researchers have been pleased with the support they received.

IST does review grant submissions when the grant involves the purchase of significant technology, such as video conferencing, voice and data communication, etc. They will work with the researcher to ensure that they that the equipment listed in the grant application will be adequate for the research needs. They will also help the researcher to cost effectively procure the equipment.

In terms of organization, at least from looking at the organization charts of the University of Manitoba, there does not seem to be any organizational linkage between Research and Computing Support.

The Faculty of Science Strategic Plan (2009) states that they are investing heavily in Westgrid research computing, Access Grid video collaboration and visualization facilities, and other research and teaching computers. Led by researchers in the Faculty of Science, the University has recently joined the largest Canadian high performance computing (HPC) consortium, Westgrid, and was awarded close to \$5 million (total contributions) in a proposal submitted to the CFI National Platforms Fund. The faculty will continue its considerable efforts and investment towards creating a high performance computing presence for the University of Manitoba.¹ (One of the researcher interviewees commented that “Westgrid currently has a ‘silo’ for long-term storage, but it is not well integrated even with Westgrid, let alone anywhere else you might hope to bring the data”). This strategic plan will be revised in 2013.

- The University of Manitoba build a new \$2.6 million facility to house approximately \$4 million of computer equipment for the HPC
- Getting time on west grid is relatively easy.
- Doesn't cost anything
- Not a lot of support for learning how to use it. Expectation of a lot of prior knowledge.
- CRC/CFI Strategic Research Plan Summary barely mentions computing resources, only under 5. Innovative materials, Technologies ... (p.3 of 5) “The High Performance Computing Centre...”²
- <http://www.umanitoba.ca/computing/ist/systems/hpc/>
- Byron Southern is the WestGrid Principal Investigator. Doesn't show up on a People search?
- David Wyatt, WestGrid Technical Site Lead and System Administrator, IST System Administrator
- WestGrid additional information:
<http://www.umanitoba.ca/faculties/science/research/871.html>

The Faculty of Science's Systems Administrator provided information regarding research computing practices within the faculty. He indicated that most researcher manage their won data on their own equipment (hard drives, laptops, cloud storage, etc.). He does provide storage and networking capabilities for researchers on demand. In addition, he manages the on-site and off-site back-up of this data.

Earlier this year, the U of M's president was an honorary co-chair of the Digital Infrastructure Summit that was held in at the University of Saskatchewan. The goal of the summit was to:

Digital Infrastructure Summit 2012 will bring together stakeholders from government, granting agencies, the research community, universities and organizations responsible for various components of the digital infrastructure for research, education and innovation in Canada. The objective is to accelerate the

¹ Faculty of Science Strategic Plan 2009 -

http://umanitoba.ca/faculties/science/resources/Science_StrategicPlan_May09.pdf

² The University of Manitoba's CRC/CFI Strategic Research Plan Summary – April 2012

national dialogue towards a comprehensive, integrated and sustainable digital infrastructure ecosystem for Canada.

Specific deliverables will include:

- *A set of guiding principles and characteristics associated with the required infrastructure and supporting ecosystem (the vision);*
- *The activities, including the respective owners, needed to show measurable progress toward the vision by the 2013 Summit (the action plan); and*
- *A commitment to act by all involved.*

1.3 Policy and Decision Making

This would likewise seem to be with the Office of the Vice President (Research and international).

This Office has a “Policy and Guidelines” website³: Research ethics, Academic Fraud, Care and use of animals, Health and safety policy, and Radiation safety, etc. Not much about e-science.

The Guidelines on Responsibilities for Research Ethics states :

“A faculty member listed as the principal investigator or co-investigator should be able to verify the authenticity of all data, or other factual information, generated in his or her research, while ensuring the protection of confidentiality in those instances involving personally-sensitive information tied to individual subjects. Each faculty member shall set guidelines for how data will be recorded in his or her research group and require that the primary copy of that data remain in the University at all times. For example, original results should, where practical, be recorded in bound notebooks with numbered pages. Printout from machines should be affixed to the notebook or referenced in the notebook and filed for future use. Long term storage of the notebooks and associated material is the responsibility of the faculty member. Such material should not be destroyed while there is reasonable probability of questions from other investigators, colleagues or readers of resulting publications requiring access to the primary data.”⁴

There is a **Senate Committee on University Research**⁵ whose mandate is, in part, to:

1. Provide advice and recommendations to Senate and the University Administration on all matters related to research at the University including:

³ http://umanitoba.ca/research/policies_guidelines.html

⁴ Guidelines on Responsibilities for Research Ethics - http://umanitoba.ca/admin/governance/governing_documents/research/372.html

⁵ http://umanitoba.ca/admin/governance/governing_documents/governance/sen_committees/510.html

- a) Policies concerning research development and administration, reviewing such policies regularly and recommending revisions as appropriate;
 - b) Policies and issues related to ethics in the conduct of research, scholarly and artistic work;
 - c) Mechanisms for promoting the research mission of the University and recognizing research excellence;
 - d) Strategies for enhancing research performance and competitiveness;
 - e) Any other research-related matters which may arise from time to time or which may be referred to the Senate Committee on University Research by Senate or the University Administration.
2. To consider proposals to establish research centres/institutes for recommendation to Senate and conduct periodic reviews of these centres/institutes, reporting to Senate as appropriate;
 3. To consider, on behalf of the Senate and the University Administration, major reports of granting bodies affecting University research, responding where required;
 4. To act as a forum for the discussion of development, promotion and administration of University research, recommending to Senate and the University Administration as appropriate;
 5. To receive annual reports on the implementation and operations of Human and Animal research ethics;
 6. Subject only to subsequent report to Senate, to appoint and oversee the operation of any standing sub-committees (standing sub-committees shall report to SCUR annually and recommend to SCUR changes in policies related to their specific mandate);
 7. To appoint and monitor ad hoc committees as are deemed necessary to carry out the mandate of the Committee;
 8. To serve as a liaison with other research-related bodies and committees (e.g. Faculty of Graduate Studies, the University Animal Care Committee, the Human Ethics Resource Committee, the Senate Committee on Libraries, the Senate Committee on Academic Computing);

There is also the **Senate Planning and Priorities Committee**⁶ whose mandate is in part to:

1. Make recommendations to Senate regarding the following:
 - a) The general allocation of University resources with respect to their desirability and efficiency;
 - b) Proposed academic programs and physical plant development;
 - c) Any such studies, proposals or reports that it may initiate within itself, have referred to it by Senate, other Councils, Committees or Bodies, formal or otherwise;
2. On behalf of Senate advise and make recommendations to the President and report to Senate such actions regarding the following:
 - a) All matters requiring prioritization including: (i) the prioritization of new or modified programs with significant resource requirements; (ii) capital programs;
 - b) Matters of policy relating to operating and capital budgets;
 - c) Matters that Senate or Senate Executive may refer to it for comment or advice;

⁶ http://umanitoba.ca/admin/governance/governing_documents/governance/sen_committees/508.html

1.4 Research Funding

Information regarding research funding is tracked by Financial Services. The Faculty of Medicine receives the highest level of research funding of all faculties, schools, etc.

There are three main sources of research funding at the University:

1. Internal funding
2. External funding, e.g. NIH, CIHR, NSERC, SSHRC, Canadian Cancer Society Research Institute (CCSRI), Manitoba Institute of Child Health (MICH)
3. Institutional Funding, e.g. CFI, CRC, Networks of Centres of Excellence Canada (NICE), and Genome Canada

Research and Special Funds Revenues and Expenditures from External Sources⁷

- Total revenues for all faculties, schools, etc.: \$116M
- Total special funding for all faculties, schools, etc.: \$25.8M
- Agricultural & Food Sciences: revenues \$15.3M; special funds \$82K
- Dentistry: revenues \$593K;
- Engineering: revenues \$8.1M; special funds \$58K
- Environment, Earth and Resources: revenues \$7.5M; special funds \$12K
- Medicine: revenues \$57.8M; special funds \$22.7M
- Pharmacy: revenues \$1.4M
- Science: revenues \$8.2M
- Percentage of total spent on Science: revenues 85%; special funds 89%

Facts and Figures⁸:

- 2010-11, Total Sponsored Income of \$165.7 million: 70.4 Federal, 29.8 Provincial, 65.5 other
- Research Income from Granting Councils: Total \$ 38.7 million in 2010-11
- Social Sciences and Humanities Research Council (SSHRC): \$ 4.3 million
- Natural Sciences and Engineering Research Council of Canada (NSERC): \$ 16.3 million
- Canadian Institutes of Health Research (CIHR): \$ 18.1 million
- Canadian Foundation for Innovation (CFI): \$4.6 million in 2011 (plus \$6.7 million in matching funds provided by the Manitoba Research and Innovation Fund awards and MRIF funding to support other non-CFI funded areas of research). The University of Manitoba is also required to contribute 20% in matching funds.

1.5 Research Programs and Centres

The University's current research centres, institutes and facilities include:

- Aerospace Materials Engineering Facility
- [Applied Electromagnetics Facility](#)

⁷ <http://umanitoba.ca/admin/oia/finance/index.html>

⁸ <http://umanitoba.ca/research/facts/index.html>

- [Canadian Centre for Agri-food Research in Health and Medicine](#)
(with St. Boniface General Hospital and Agriculture and Agri-food Canada)
- [Canadian Wheat Board Centre for Grain Storage Research](#)
- [Centre for Aboriginal Health Research](#)
(with Health Sciences Centre)
- [Centre for Architectural Structures and Technology \(C.A.S.T.\)](#)
- [Centre for Defence and Security Studies](#)
- [Centre for Earth Observation Science \(CEOS\)](#)
- [Centre for Global Public Health](#)
- [Centre for Globalization and Cultural Studies](#)
- [Centre for Higher Education Research and Development \(CHERD\)](#)
- Centre for Human Models of Disease
- [Centre for Human Rights Research](#)
- [Centre for Professional and Applied Ethics](#)
- [Centre for the Research and Treatment of Atherosclerosis](#)
- [Centre on Aging](#)
- Crystallography and Mineralogy Research Facility
- Digital Image Analysis Facility
- Great-West Life Manitoba Breast Cancer Research and Diagnosis Centre
(with CancerCare Manitoba)
- [Health, Leisure and Human Performance Research Institute](#)
- High Performance Computing Centre
- [Institute of Cardiovascular Sciences](#)
(with St. Boniface General Hospital)
- [Institute for the Humanities](#)
- [Institute of Industrial Mathematical Sciences](#)
- [Internet Innovation Centre](#)
- Kleysen Institute for Advanced Medicine
- [Legal Research Institute](#)
- [Manitoba Centre for Health Policy](#)
- [Manitoba Centre for Proteomics and Systems Biology](#)
(with Health Sciences Centre)
- [Manitoba Institute of Cell Biology](#)
(with CancerCare Manitoba)
- [Manitoba Centre for Nursing and Health Research \(MCNHR\)](#)
- [Manitoba Institute for Materials](#)
- [Manitoba Regional Materials and Surface Characterization Facility](#)
- [Manitoba Research Data Centre](#) (Situated at U of M Bannatyne campus, but open to all provincial academic institutions)
- [National Centre for Livestock and the Environment](#)
- Nuclear Magnetic Resonance (NMR) Facility
- [RESOLVE \(Prairie Research Network on Family Violence\)](#)
- [Richardson Centre for Functional Foods and Nutraceuticals \(RCFFN\)](#)
- [SmartPark](#)
- [Spinal Cord Research Centre](#)
- [Transport Institute](#)

- [Winnipeg Institute for Theoretical Physics \(with University of Winnipeg\)](#)
- W.R. McQuade Structural Engineering Laboratory

Research groups include:

- [Aquatic Biology Research Group](#)
- Community Acquired Infections Research Group
- Composite Materials and Structures Group
- [Developmental Health Research Group](#)
- [Education for Sustainable Well-Being Research Group](#)
- Experimental Media Research Group
- Gastroenterology Research Group
- Manitoba Group in Protein Structure and Function
- Military & Veteran Health Sciences Research Group
- [Mood and Anxiety Disorders Research Group](#)
- Palliative Care Research Group
- [Psychiatric Neuroimaging Research Group](#)
- [Qualitative Research Group](#)

1.6 Key Researchers

Researchers interviewed indicated that the amount of data they are collecting is continuing to grow (multiple Gigabytes) and that transmitting the data is becoming a real problem because of slow Ethernet connections. Any project trying to deal with e-science has to figure out whether it is just dealing with issues of storage, or whether analytical tools will be available in the same environment where the data are stored. If it is just storage, it needs to be really easy to move data out of the storage and into an environment where they can be viewed/manipulated/analyzed. If there are analytical tools in the same environment, someone is going to have to ensure that the right tools are available for all of the different kinds of data deposited there, and the tools will have to be maintained so that they remain up to date. Otherwise, it will be a challenge to convince people to use e-science resources in the right way. If it is too hard to get data on and off the e-science server, or if they have to be exported every time a manipulation is done to the data, or if the wrong or out of date applications are in the e-science environment, people are just going to work in other environments, and only upload the finalized data sets to the e-science server for archival purposes. Ideally the right tools would be present in the e-science environment so that the data don't have to be moved off for analysis and the final product moved back on again for archival purposes.

In terms of sharing data, the expectation in some disciplines is that the data would be released when the research is published, but not before the researcher has the chance to extract as many papers, patents, etc., out of the data before releasing it. Sometimes releasing the data with the publication of a thesis is not appropriate as the supervising researcher may still be making publishable discoveries with the data set.

The interviewees agreed that the amount of data that will be collected for research will continue to grow exponentially and that any tools that will help cope with storing, analyzing and securing data will

be very useful. One interviewee liked the idea of using cloud computing not just to store data, but also to analyze it. They would be happy to see new data storage capacities at the U of M, but would have to see what collaborative research environments/analytical tools are like in any new e-science resources before they would be interested in using them. Versioning of data is also seen as a problem. It is difficult to assure that everyone is working from the most recent version of the data.

One researcher felt that e-data commitments imposed would be largely Tri-council. She expects that granting agencies will likely be more demanding regarding how to deal with e-data. However, her big problem is how to clean up the data to make it useable by others.

Regarding the current situation on campus, it is not that simple to deal with e-data, especially for grad students or new / novice data users. We need something more systematic, less ad hoc. It's not just about the data on the final product. You have to start at the beginning, how do you design a good survey. What software are you going to use. Students will use SPSS or SAS, because that is what employers want to see on resumes, but the more hard-core researchers use "R". This software takes time to learn, but students may not see the benefit. So you have to start with the design, and questions, in order to ensure correct interpretation of the data in the analysis.

Researcher interviewees felt that the Libraries would be a natural choice to lead an e-science program at the University. "Librarians have experience curating information and assisting people in finding the stored information that they seek, so they are an obvious group of people to consult about the logistics of storing, curating, and accessing data". "The library has done a good job with MSpace, and I would trust them to take this on". Researchers could also use help with methodology problems. When you write an article, you are limited in how much of the methodology detail you can include. But the details of the methodology are crucial to understanding how the data was collected. They need some place to expand and explain the details of the methodology (i.e. metadata). Also, researchers can generate broad overview identifiers for their data, but could use help with more refined information about what is included (i.e. metadata).

The University's CRC/CFI Strategic Research Plan outlines the University's major research thrusts, and details how the Canada Research Chair (CRC) and Canada Foundation for Innovation (CFI) programs have been and will be used to enhance research capabilities in these areas and thereby meet these objectives. It identifies eight major thrusts for research and research training are identified in which to develop or maintain excellence:

1. Healthy, safe food and novel bioproducts;
2. Sustainable prairie and northern communities;
3. Human rights and social justice;
4. Innovations in public and population health;
5. Innovative materials and technologies;
6. Culture and creativity;
7. Indigenous peoples' health, culture and governance; and
8. Biomedical sciences.

These thrusts represent areas in which the University has a critical mass of internationally recognized and/or exceptionally promising researchers, as well as emerging areas where the University is building institutional capacity and encouraging new collaborative efforts. In carrying out its research mandate, the University supports both fundamental and applied work in areas outside these major thrusts as part of its role in advancing economic, social and cultural well-being of peoples in Manitoba, Canada and the world.⁹

“The University of Manitoba currently holds 47 Canada Research Chairs and one Canada Excellence Research Chair, and is an active participant in 12 of Canada’s Networks of Centres of Excellence. The university is also home to, or a partner in, 53 research centres, institutes and shared facilities that foster collaborative research and scholarship in a wide variety of fields.¹⁰

In October 2011, the Canada Research Chair program announced an investment of \$7.3 million for research at the University of Manitoba.¹¹

In 2011-2012, researchers at the University received \$126.8 million in sponsored or assisted research support through grants or contracts from federal and provincial governments, various foundations, business and industry, and individuals.¹²

- Of total net research expenses of \$113.4M in 2010-11, investment was highest in the faculty of Medicine at 52%, followed by the Faculties of Agricultural and Food Sciences at 12%, Science at 8%, and Engineering and Environment both at 7%.¹³
- Science and Medicine related disciplines account for around 67% of the full-time faculty.¹⁴
- Canada Excellence Research Chair: <http://umanitoba.ca/research/cerc.html>
- Canada Research Chairs: http://umanitoba.ca/research/chairs/research_crc.html
- Tier 1 chairs – university receives \$200,000 annually for seven years
- Tier 2 chairs – university receives \$100,000 annually for five years
- Chair holders are also eligible for infrastructure support from CFI, up to 40% of costs
- <http://www.chairs-chaire.gc.ca/program-programme/index-eng.aspx>

Top Research Grant Recipients (2007-2012)¹⁵

- David Barber, Faculty of Environment, Earth and Resources, Environment and Geography: \$7.86M

⁹ The University of Manitoba’s CRC/CFI Strategic Research Plan Summary – April 2012

¹⁰ University of Manitoba 2012 Annual Financial Report - http://umanitoba.ca/admin/financial_services/media/2012_Annual_Report.pdf

¹¹ University of Manitoba 2012 Annual Financial Report - http://umanitoba.ca/admin/financial_services/media/2012_Annual_Report.pdf

¹² University of Manitoba 2012 Annual Financial Report - http://umanitoba.ca/admin/financial_services/media/2012_Annual_Report.pdf

¹³ University of Manitoba’s Strategic Planning and Budgeting Framework 2012-2013

¹⁴ FTE, Assistant, Associate, and Full professors, 2010-2011 (Faculties of Agricultural & Food Sciences, Dentistry, Engineering, Environment, Earth & Resources, Medicine, Medical Rehabilitation, Pharmacy, Science)

¹⁵ <http://www.outil.ost.ugam.ca/CRSNG/Outil.aspx?Langue=Anglais>

- Frank Hawthorne, Faculty of Environment, Earth and Resources, Geological Sciences: \$1.6M
- Shelley Page, Faculty of Science, Physics & Astronomy: \$1.58M
- Peter Loewen, Faculty of Science, Microbiology: \$1.45M
- Lotfollah, Sharai, Faculty of Engineering, Electrical & Computer Engineering: \$1.35M
- Søren Rysgaard, Faculty of Environment, Earth and Resources, Geological Sciences: \$1.25M
- Peter Jones, Richardson Centre for Functional Foods: \$1.2M
- Tapash Chakraborty, Faculty of Science, Physics & Astronomy: \$1.1M
- Kumar Sharm, Faculty of Science, Physics & Astronomy: \$980K
- Douglas Buchanan, Faculty of Engineering, Electrical & Computer Engineering: \$841K

1.7 Collaboration

Over the past decade, the university has garnered 8 Synergy Awards for Innovation, established by the Natural Sciences and Engineering Research Council of Canada to recognize outstanding university-industry collaborations.

1. Healthy, safe food and novel bioproducts;
 - a. Richardson Centre for Functional Foods (AAFC Cereal Research Centre, Canadian Grain Commission, NRC, Canadian International Grain Institute, Portage Food Development Centre, University of Laval)
 - b. Canadian Centre for Agri-Food Research in Health & Medicine (St. Boniface General Hospital)
 - c. Canadian Wheat Board Centre for Grain Storage Research (collaborations with researchers from China, India, Israel, Poland, Scotland and USA)
 - d. CFI-funded Gut Microbiome Laboratory
 - e. CFI-funded National Centre for Livestock and the Environment (Research partnership with Gov't agencies and U. of Saskatchewan)
2. Sustainable prairie and northern communities;
 - a. Research vessel and icebreaker, the Amundsen, and the Sea Ice Environmental Research Facility
 - b. Centre for Community-Based Resource Management within the Natural Resources Institute
3. Human rights and social justice;
4. Innovations in public and population health;
 - a. Manitoba Centre for Health Policy
 - b. Centre for Global Public Health (with China, India and several African countries, spread of HIV/AIDS)
 - c. Centre on Aging

5. Innovative materials and technologies;
 - a. Crystallography and Mineralogy Research Facility
 - b. Manitoba Regional Materials and Surface Characterization Facility
 - c. Manitoba Institute for Materials
 - d. TRIUMF, Argonne
 - e. Jefferson Lab
 - f. NASA's SWIFT satellite
 - g. Applied Electromagnetics Laboratory
 - h. High-Performance Computing Centre part of Compute Canada / Westgrid

6. Culture and creativity;
 - a. CFI-funded Bioanthropology Digital Image Analysis Laboratory

7. Indigenous peoples' health, culture and governance; and
 - a. Manitoba First Nations Centre for Aboriginal Health Research

8. Biomedical sciences.
 - a. Kleysen Institute for Advanced Medicine
 - b. Institute of Cardiovascular Sciences
 - c. Canada-Kenya International Collaboration on Infectious Diseases Research
 - d. Manitoba Centre for Proteomics and Systems Biology

Smartpark Development Corporation is a subsidiary corporation of the University of Manitoba. As a separate legal entity from the University, with its own Board of Directors, the Corporation has the mandate to develop a designated 100 acres of university land as Smartpark Research and Technology Park.

Smartpark's vision is to "Build a Community of Innovators" on the doorstep of the University of Manitoba. It does this by developing land and space for lease to research and technology companies and organizations involved in the following broad research areas that coincide with research expertise at the University:

- Information and Communications Technology
- Engineering and Advanced Materials
- Health and Biotechnology
- Agricultural and Nutritional Sciences

Research-intensive universities and their respective communities worldwide are developing research and technology parks. The parks:

- Facilitate university-industry research collaborations and innovation,
- Create high-tech clusters that potentially attract similar companies to the region, and

- Nurture an environment and culture that assist in retaining highly skilled students and researchers in the region instead of moving elsewhere for opportunities – in our case, away from Winnipeg and Manitoba.

Faculty of Agriculture and Food Sciences

Winnipeg Institute for Theoretical Physics, U of M and U of Winnipeg

The community of theoretical physicists in the province of Manitoba is one of significant size. The combined group of 18 theorists (4 at Brandon University, 11 at the University of Manitoba, and 3 at the University of Winnipeg) comprises one of the largest active theoretical physics groups in Canada. In order to further strengthen this research environment the Winnipeg Institute for Theoretical Physics (WITP) was formed in 1990. The WITP was given official institute status by the University of Manitoba and the University of Winnipeg in 1993. In addition to the 18 permanent members of the Institute, there are typically 5 or 6 associate members (post-doctoral fellows, research associates and long-term visitors), as well as graduate students in theoretical physics.

The purpose of the Institute is to increase the cooperation and collaboration between theoretical physicists in Manitoba, thereby strengthening the community, and to initiate and sustain research collaborations between the members of the Institute and first class researchers from all over the world. The activities of the Institute also expose graduate students to different people and ideas, through seminars and lecture series, thereby increasing the quality of training provided. In the long term this will further attract high quality students from Canada and abroad.

Arctic Science Partnership with Denmark and Greenland

A new research and education partnership between the University of Manitoba, Denmark's Aarhus University, and the Greenland Institute of Natural Resources brings together more than 200 of the world's leading Arctic researchers.¹⁶

2 Library

2.1 E-Science/E-Research Support

The University of Manitoba Libraries (UML) is in the very early stages of defining its role in e-science and e-research support services. Both the UML and the University are in the exploratory stage of e-research/e-science initiatives and services. Relationships, collaborations, responsibilities, goals and objectives, and strategy all need to be investigated and defined.

The UML does support and manage an institutional repository, MSpace, which is dedicated to collecting, storing, preserving and making accessible digital versions of the intellectual output of UM community

¹⁶ <http://umanitoba.ca/news/blogs/blog/2012/08/20/new-partnership-bolsters-arctic-research-to-unprecedented-levels/>

members. The Libraries work with University units to build communities and populate collections in MSpace with academic research material. Items can be submitted to both a publisher and to MSpace, depending on the publisher's copyright agreement and electronic publishing policies.

So far, we are mostly working with Grad Studies, to post theses online. We have some other forms of scholarly output, such as articles and one set of research data, the Engineering CSV files, in MSpace, but they provide the technical support, and don't usually deal directly with other groups.

Digital Initiatives staff don't really have any direct contact with researchers. In most cases, they would expect the liaison librarians to be the intermediary between faculty and the Libraries. In terms of services, they have worked with Brett, the digital archivist. As per Brett's advice, they have set TIFF as the archival standard. LETS does some checking, such as hash tags and bits in a file, as a preservation strategy. So, they have been working in a limited way with file formats as a strategy for preservation. However, they haven't really looked at moving materials to different software or versions as a means of preservation of materials.

Research data can be viewed as a kind of special collection, part of the University's capital. The Libraries should have some hand in it, but it depends on the type of data.

Right now, who knows what data is being collected and by whom? If data exists, how would anybody know where to go to access it? The Libraries could be involved in creating an inventory of the data that is managed around campus. If we wanted to go further, and be a resource for researchers to work with, we could start out with a pilot project to see what comes up, figure out how to deal with it, and then extrapolate a plan from that. It would be a means to increase the respect for or value of the Libraries to the researchers.

The Sciences and Technology Library has a goal in its Strategic Plan to partner with the Faculty of Science on Scholarly Communications and Data Curation projects.

The Libraries sees itself providing meta-data services only to an institutional e-science initiative. Though through our participation in the E-Science Institute, the attitude is changing.

2.2 Strategic Planning / Change Management

The Libraries has an unstructured strategic planning process. The last strategic plan was drafted by all of the librarians through Librarians' Council. The plan was recently review by a task group who provided recommendations for improving future strategic planning processes. A revised plan was recently drafted by management and discussed and refined by Librarians' Council. It was posted on the Libraries intranet for comment by all library staff.

Recently the Libraries underwent a major reorganization of its Technical Services department and management structure. This reorganization went rather smoothly. The largest library on campus is undergoing a significant renovation that will see major changes in staffing levels, staff competencies,

and service workflow. The change management process was started nearly two years ago to prepare staff for the changes.

One of the biggest changes in the Libraries over the last 4 years has been our attitude towards maintaining our print collections. We have overcome our aversion to refining our collection through the weeding of print materials and the addition of more electronic resources. Library staff have also readily adopted and integrated mobile technologies into their operations.

2.3 Sustainability

The Library consistently seeks additional funding for staff, resources, etc., for new programs and/or services that contribute to both the University's and Libraries' strategic plans. The Libraries major priority is supporting the University's strategic priority of "Delivering an excellent student experience".

The Library requested and received additional funding from the University to support its digitization initiative.

LETS is the technical support group, so they would do what they can to support any library initiative that is proposed from the Libraries. However, it is really a collection type issue first, so it would be up to the Director and liaison librarians to determine if the Libraries should be involved, and if so, to what extent. Then LETS would provide whatever support they are able to provide.

LETS is already stretched beyond capacity by current projects, so she doesn't see LETS taking a big role in the short term. It may become more of a key role for libraries in the future, but it needs to be thought out. For example, even dealing with the metadata, wouldn't the researchers be better equipped to describe their own data? It would be tough for someone who is not trained in this type of work. LETS staff do not have any real expertise in dealing with large data sets, especially if it involves specialized software for processing and visualization, and they don't have any experience in creating a virtual research environment. In this sense it would also be a question of the resources needed to get involved in such an endeavour.

2.4 Cyberinfrastructure

In the past the Libraries has employed their own IT staff, as we did not get the service that we required. However, the University has recently implemented a shared-services model whereby IST will provide computer and technical support to all faculties, departments, etc., including the Libraries. The Library has also had difficulty getting server space from IST for its institutional repository and digitization project. As a result the digitization projects have been moved to the Cloud. The library itself does not have the IT resources or expertise to support an e-science service on its own.

There is a long list of IT projects that have been on the books for several years. An e-science initiative would need significant support from the University's administration in order to get it on IST's agenda.

The Head of Discover and Delivery is concerned about managing expectations when it comes to implementing an E-Science program at the University. The University does not have the storage

capacity to take on such a project unless it significantly upgrades its capacities or moves to cloud storage. The Libraries do not have the manpower to properly support an E-science initiative. Any initiative would require significant start-up and ongoing funding support.

The Libraries does do development, but we are not generally in the business of creating work environments in which researchers can work. She would have expected IST to provide most services. She knows that IST is largely responsible for administrative systems such as payroll, student records, etc. However, there is also WestGrid which would seem to be designed for research functions.

2.5 Institutional Initiatives

There are currently no institutional initiatives to develop e-research strategy at the University.

3 Institutional Culture

3.1 Importance of Science and Engineering

The university has traditionally emphasized the applied sciences, with agriculture, engineering, and medicine, being the disciplines that have garnered the most consistent long-term institutional support.

The University's Mission is to create, preserve and communicate knowledge, and thereby, contribute to the cultural, social and economic well-being of the people of Manitoba, Canada and the world. There is no specific mention of science, but one may consider that the "commitment to create, preserve, and communicate knowledge" would include data as well.

The University identifies a number of strategic priorities for which the sciences play a major role.

These include:

Academic Enhancements Goal:

The University of Manitoba will be nationally and internationally recognized for its teaching, research, and creative excellence, sought after by students and faculty alike as their preferred site of study.

The University identified six themes in which they will focus their efforts. Four of these themes are directly related to the sciences and engineering disciplines. Emphasis is on applied science.

- Healthy, safe, secure and sustainable food and bioproducts;
- Sustainable prairie and northern communities;
- Innovations in public and population health; and
- New materials and technologies.

Outstanding Employer - Goal:

The University of Manitoba will be an employer of first choice, offering and expecting respect for all staff and faculty, providing opportunities for leadership, growth and development, and recognizing the contributions made at all levels of the organization.

- We will also work to ensure that the people employed at the University of Manitoba have the tools, supports and facilities they need to succeed in their work.

3.2 Entrepreneurial or Traditional Culture

The culture at the UM is traditional with new services/programs undergoing a comprehensive review and approval process at the level of the Department, Faculty, and University Senate (and in many cases at the Manitoba Counsel on Post-Secondary Education (COPSE)). There is administrative oversight at each level. At the same time, reaching out to other faculty members or to members of the administration is generally not difficult. Meeting with some senior administrators usually just requires making an appointment with their confidential secretary.

Any new large project such as a university-wide e-science initiative would need to be recommended to the President and/or Senate by an officer of the university, i.e. University Librarian, Dean, CIO Director, etc. In the case of e-science, the approval process would likely begin with the Vice Presidents of Research, Academic, and/or Administration.

The Dean's Collaborative Clusters Project was initiated to facilitate collective work on stated priorities through activities including among other things:

- collaborative strategic planning and development of academic programs (teaching and research) and public outreach/community engagement initiatives;
- working collectively to reduce barriers and foster faculty and student mobility within and between units;
- sharing administrative services and resources, and working together to address common administrative and budgetary issues;
- review and, where appropriate, make recommendations/provide advice on changes to the University's existing academic structure (faculty/school, departmental) that would advance our academic effort; and,
- identify and pursue opportunities for joint resource planning and utilization and, in so doing, foster a greater focus on our collective.

The Collaborative Clusters Project is a mechanism to reinforce and enhance university-wide collaboration and a focus on the collective good. While the initiative organizes members of Provost's Council into clusters with similar disciplines, interests and/or issues, it is not intended to limit collaborative efforts between clusters. Indeed, the aim is to explore and support synergies and opportunities university-wide.¹⁷

¹⁷ University of Manitoba's Strategic Planning and Budgeting Framework 2012-2013

3.3 Research Importance

The University has traditionally emphasized the applied sciences, with agriculture, engineering, and medicine, being the disciplines that have garnered the most consistent long-term institutional support. These disciplines are in separate Faculties (i.e. Colleges) from other science disciplines (in the case of Medicine, several different faculties). Each of these disciplines also has its own library separate from the Science and Technology Library at UM.

- Engineering (chemical/electrical/civil/mechanical/etc.)
- Agronomy/agriculture
- Health sciences/Medicine

The bulk of the basic science disciplines are organized into the Faculty of Science, and which is served primarily by the Science and Technology Library.

- Chemistry
- Microbiology
- Biological sciences
- Computer science
- Statistics
- Physics and Astronomy
- Mathematics

Two other smaller faculties that do considerable amounts of scientific work, but which do not have their own separate libraries are:

- Human Ecology
- Environment, Earth, and Resources

Finally, some science-related disciplines are in the Faculty of Arts, which is served by the main branch of the library at UM (Elizabeth Dafoe)

- Economics and Social Sciences

3.4 Interdisciplinary Research

Departmental boundaries are not major barriers to collaboration. People seek out other workers with complementary expertise or similar interests regardless of departmental affiliation.