Research Data Management (RDM) Needs of Science and Engineering Researchers: A View from Canada

Cristina Sewerin[1], Eugene Barsky[2], Dylanne Dearborn[1], Angela Henshilwood[1], Christina Hwang[3], Sandra Keys[4], Marjorie Mitchell[2], Michelle Spence[1], Kathy Szigeti[4], Tatiana Zaraiskaya[5]

[1] University of Toronto, [2] University of British Columbia, [3] University of Alberta, [4] University of Waterloo, [5] Queen's University

FACTORS DRIVING RESEARCH STUDY

- Looming changes in Canadian funding requirements around data sharing, data preservation and the submission of data management plans are prompting institutions across Canada to better understand Research Data Management (RDM) practices and needs
- Understanding researcher behaviour and workflow is instrumental to developing reflective service
- Various solutions at several levels (national, regional, institutional) will need to be implemented to better serve researchers

CORE QUESTIONS TO ADDRESS

- What are some of the characteristics of data produced by researchers at these institutions?
- How do researchers in different disciplines manage their data? Are there differences that can be observed between disciplines?
- What attitudes can be observed toward RDM support and services?

HIGHLIGHTED RESULTS

A majority of respondents showed a level of interest in all research data services queried. Highest responses received:

- Communication about funding and journal requirements
- Assistance preparing data management plans
- Institutional repository for data

A majority of respondents indicated that they are currently depositing research data in external data repositories.

A majority did not believe, or were unsure if there is sufficient documentation and description for another person outside their lab to understand and use their research data: may require guidance or assistance in documenting and describing their data.

Of 358 respondents who identified at least one of the three major federal funding agencies (CIHR, SSHRC, NSERC) as a funding source, 82.9% said they would need or want assistance with drafting a data management plan as part of a grant application.

SURVEY METHODS

- 19-23 question online survey run between April and December 2015
- University of Toronto created instrument, adapted by other institutions
- Topics surveyed included: working with research data, data sharing, funding mandates and research data management services, and demographic and general questions
- Five institutions have run the survey and analyzed data to date; four more scheduled to run survey
- Using the same core survey allows for comparison between institutions and disciplines, while remaining specific to individual needs and provide insight for local questions
- All ranks of science and engineering faculty and postdoctoral fellows; Queen's University also surveyed science and engineering graduate students

INSTITUTIONS PARTICIPATING IN STUDY

This poster reports results from five Canadian universities which have run the survey: University of Toronto, University of British Columbia, University of Waterloo, University of Alberta, and Queen's University.

Additional Canadian institutions to survey their researchers later this year, including: University of Ontario Institute of Technology, Dalhousie University, University of Ottawa, and McGill University. Outreach is planned to determine interest from other Canadian institutions.

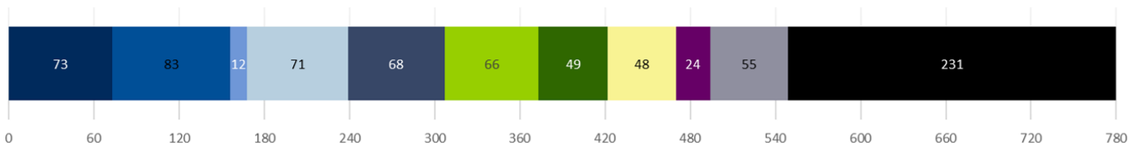
DEMOGRAPHICS

780 responses from the five universities were included: Queen's (400); U of A (128); U of T (95); UBC (94); and Waterloo (63).

The approximate total populations surveyed at each institution were: Queen's (1393; 594 faculty, 799 graduate students); U of A (825); U of T (1116); UBC (950); and Waterloo (786).

All institutions included only completed survey responses with the exception of Queen's, which included both the complete and incomplete responses in their data.

DISCIPLINES SURVEYED



FUTURE STEPS

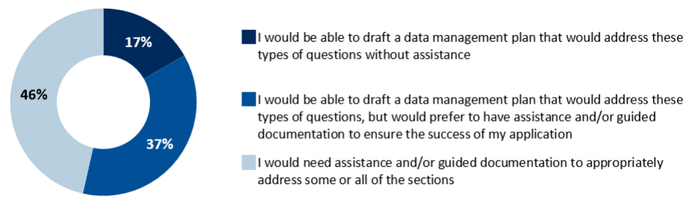
- Looking to expand the collaborative effort and rollout of the science and engineering survey to other interested Canadian institutions; investigating translation to French
- There is a social sciences and humanities survey in development based off of these questions, which will give a broader disciplinary understanding of research practices by discipline at Canadian institutions, as well as allow comparisons to the science and engineering results
- A medicine and health sciences survey may be developed next

RESEARCHER FUNDING SOURCES

Most noted funding sources researchers (n=379) used in the last five years or plan to use in the next five years:

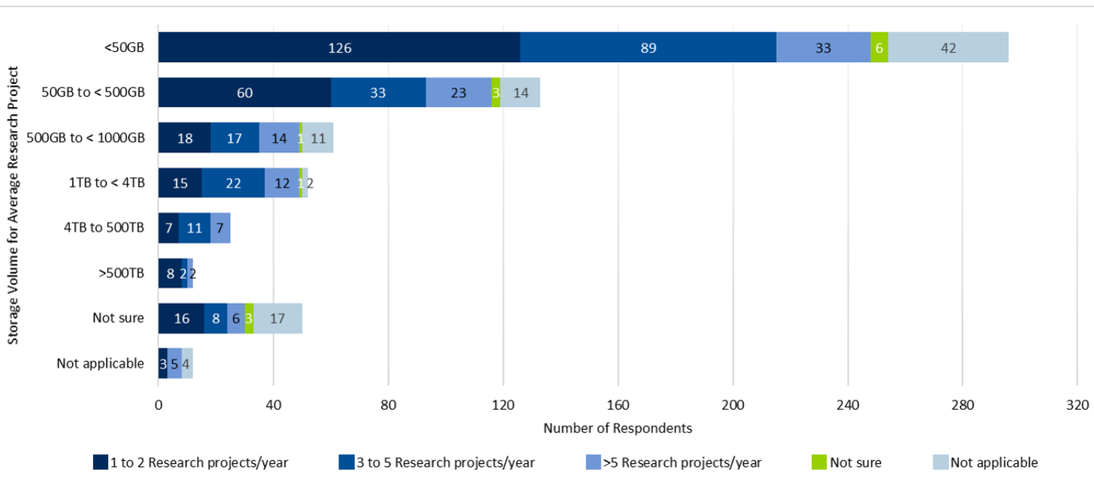
- 86.3% Natural Sciences and Engineering Research Council of Canada (NSERC) grant
- 33.2% Canadian Foundation for Innovation (CFI) grant
- 25.3% Industry

DRAFTING A DATA MANAGEMENT PLAN



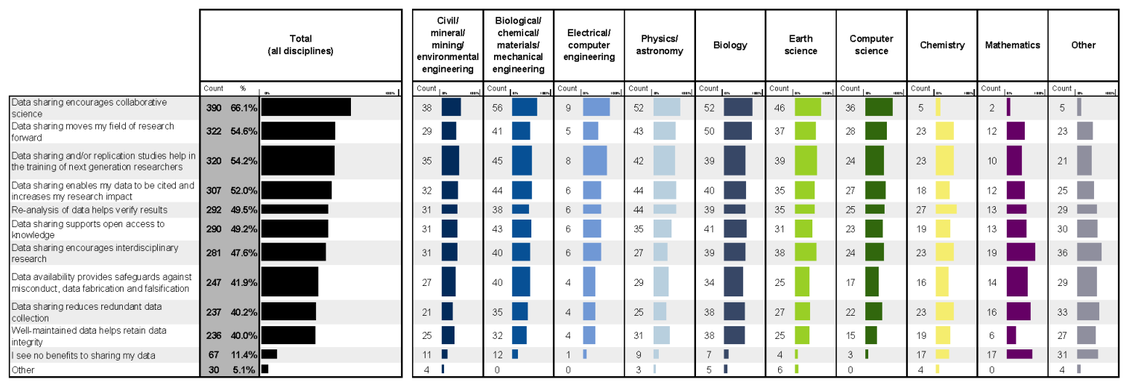
Responses to question "If you were asked to draft a data management plan as part of a grant application, which of the following statements would best describe your situation?" (n=551)

WORKING WITH RESEARCH DATA



Responses to the question "How many research projects did you lead in the past year, for example, as a Principal Investigator or project lead?" (n=643) in relation to responses to the question "How much data storage do you estimate you use in an average research project?" (n=643)

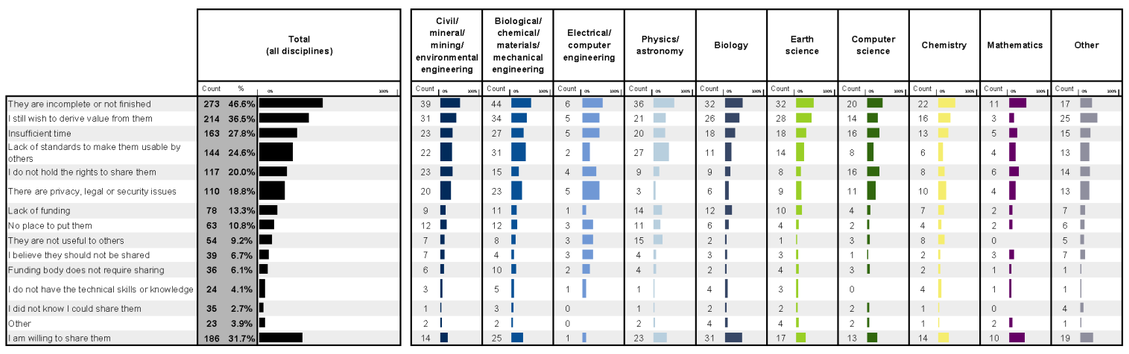
PERCEIVED BENEFITS OF SHARING



	Total (all disciplines)		Civil/ mineral/ mining/ environmental engineering	Biological/ chemical/ materials/ mechanical engineering	Electrical/ computer engineering	Physics/ astronomy	Biology	Earth science	Computer science	Chemistry	Mathematics	Other
	Count	%	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
Data sharing encourages collaborative science	390	66.1%	38	56	9	52	52	46	36	5	2	5
Data sharing moves my field of research forward	322	54.6%	29	41	5	43	50	37	28	23	12	23
Data sharing and/or replication studies help in the training of next generation researchers	320	54.2%	35	45	8	42	39	39	24	23	10	21
Data sharing enables my data to be cited and increases my research impact	307	52.0%	32	44	6	44	40	35	27	18	12	25
Re-analysis of data helps verify results	292	49.5%	31	38	6	44	39	35	25	27	13	29
Data sharing supports open access to knowledge	290	49.2%	31	43	6	35	41	31	23	19	13	30
Data sharing encourages interdisciplinary research	281	47.6%	31	40	6	27	39	38	24	23	19	36
Data availability provides safeguards against misconduct, data fabrication and falsification	247	41.9%	27	40	4	29	34	25	17	16	14	29
Data sharing reduces redundant data collection	237	40.2%	21	35	4	25	38	27	22	23	16	33
Well-maintained data helps retain data integrity	236	40.0%	25	32	4	31	38	25	15	19	6	27
I see no benefits to sharing my data	67	11.4%	11	12	1	9	7	4	3	17	17	31
Other	30	5.1%	4	0	0	3	5	6	0	4	0	4

Responses to the question "What benefits do you see to sharing your research data?" (n=590) in relation to total responses, by discipline

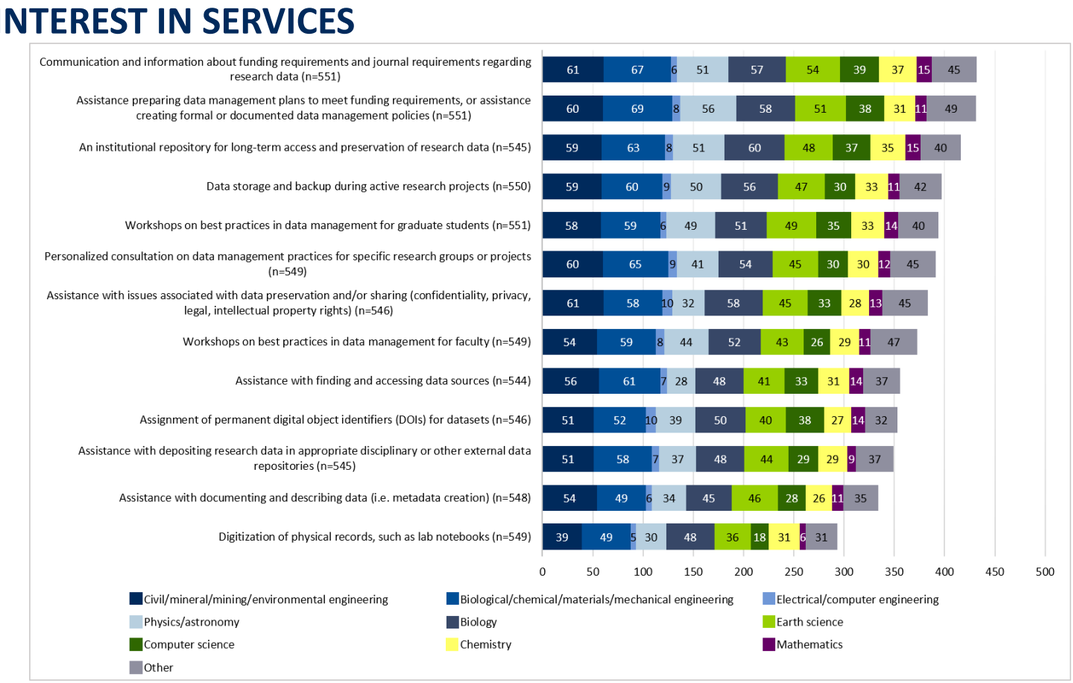
REASONS FOR NOT SHARING



	Total (all disciplines)		Civil/ mineral/ mining/ environmental engineering	Biological/ chemical/ materials/ mechanical engineering	Electrical/ computer engineering	Physics/ astronomy	Biology	Earth science	Computer science	Chemistry	Mathematics	Other
	Count	%	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
They are incomplete or not finished	273	46.6%	39	44	6	36	32	32	20	22	11	17
I still wish to derive value from them	214	36.5%	31	34	5	21	26	28	14	16	3	25
Insufficient time	163	27.8%	23	27	5	20	18	18	16	13	5	15
Lack of standards to make them usable by others	144	24.6%	22	31	2	27	11	14	8	6	4	13
I do not hold the rights to share them	117	20.0%	23	15	4	9	9	8	16	8	6	14
There are privacy, legal or security issues	110	18.8%	20	23	5	3	6	9	11	10	4	13
Lack of funding	78	13.3%	9	11	1	14	12	10	4	7	2	7
No place to put them	63	10.8%	12	12	3	11	6	4	2	4	2	6
They are not useful to others	54	9.2%	7	8	3	15	2	1	3	8	0	5
I believe they should not be shared	39	6.7%	7	4	3	4	3	3	1	2	3	7
Funding body does not require sharing	36	6.1%	6	10	2	4	2	4	3	2	1	1
I do not have the technical skills or knowledge	24	4.1%	3	5	1	1	4	3	0	4	1	1
I did not know I could share them	35	2.7%	1	3	0	1	2	2	2	1	0	4
Other	23	3.9%	2	2	0	2	4	4	2	1	2	1
I am willing to share them	186	31.7%	14	25	1	23	31	17	13	14	10	19

Responses to the question "What, if any, are the reasons you would not be willing to share your research data and associated methods/algorithms?" (n=368) in relation to total responses, by discipline

INTEREST IN SERVICES



A level of interest shown in services, as broken down by discipline. Note that 'not applicable' and 'not interested' answers are not included

UNIVERSITY OF TORONTO LIBRARIES

QUEEN'S UNIVERSITY LIBRARY

UNIVERSITY OF WATERLOO

a place of mind THE UNIVERSITY OF BRITISH COLUMBIA

UNIVERSITY OF ALBERTA LIBRARIES

SURVEY INSTRUMENTS

Barsky, E., Mitchell, M., Buhler, J. (2016). UBC Research Data Management Survey. Retrieved from http://hdl.handle.net/11272/10364. V1 [Version].

Hwang, C. (2016). Research Data Management Faculty Survey, University of Alberta. Retrieved from https://goo.gl/f1NJ4q.

Sewerin, C., Dearborn, D., Henshilwood, A., Spence, M., & Zahradnik, T. (2015). Research Data Management Faculty & Postdoctoral Survey, University of Toronto. Retrieved from http://hdl.handle.net/1807/69144.

Szigeti, K. (2016). University of Waterloo Survey Instrument Dec. 2015. Retrieved from http://hdl.handle.net/10864/11649. V2 [Version].

Zaraiskaya, T., Cooper, A., Moon, J., Murphy, S., Saleh, N. (2016). Queen's University RDM Survey. Retrieved from http://hdl.handle.net/10864/11651. Data Services [Distributor] V1 [Version].

Scan this code to link to the survey questions