

National Consultation on Access to Scientific Research Data

**Report on the
National Consultation Event Design Task Force Meeting
Friday 11th June 2004**

**Report to Participants
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National Consultation on Access to Scientific Research Data
National Consultation Design Event – Friday 11th May 2004

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1. Executive Summary

The purpose of the National Consultation Design Event Task Force Meeting was to preview the consultation process for the full National Consultation Event planned for November 2004. The elements of particular study by the Task Force was: the nature and depth of pre-consultation briefing material; the process of introduction to achieve alignment on consultation objectives, broad understanding of the impact of the opportunity presented by ensuring access and stewardship of scientific research data, especially seminal data; and the consultation outcome ownership.

Individuals or teams of the Task Force participants agreed to develop descriptions of the 7 thematic clusters of the “Mind Map” that was created in the Design Event Task Force Meeting for circulation within the Task Force and Project Management team, and subsequently become a major part of the National Consultation pre-event briefing documentation.

The Task Force recommended that:

1. Substantial effort should be put into preparing pre-consultation material that outlines the state of Canadian and global initiatives in the drive to provide access to scientific research data and in identifying the benefits that are resulting from such initiatives. In particular, the Project Managers should create a “Vision” of the opportunity that would be created by providing broad access to such data. The Project Team should abbreviate the introduction highlighting only the key observations in this pre-consultation material. (See Addendum)
2. The process element of “Imagining the Future” should be designed to build on the outcome of the exercise undertaken in the Event Design Meeting rather than replicate it. In this context the “Mind Map” created should be used as the basis of this build-out.
3. The process recommended for the identification of the “Challenges and Inhibitors”, back-casting and the consultation element that will identify “Solutions and Actions” should be the major focus of the Consultation.

In addition, the Task Force agreed to help identify researchers across Canada from the widest range of disciplines (supported by NSERC, CIHR, CFI, and other federal and provincial Research sources) who are leaders of their research communities as well as being influential in their academic institutions, government laboratories and commercial research communities. These people will be added to the list from which the invitees to the National Consultation Event in November 2004 will be selected.

The Task Force Members agreed to make every effort to make themselves available for the National Consultation Event, so that their contribution to this important subject can be maximal.

2. Introduction

Today, information and communication technologies have and continue to transform the scientific enterprise. This transformation is based on new abilities to generate and manage vast amounts of research data: to store, access, mine, restructure, process, reuse and distribute them; not only within but also between disciplines, institutions, and countries. It is therefore more than timely to determine what has to be done to establish the requirements, management systems, legislative frameworks, and most importantly societal acceptance to make Canada a leader in access to scientific research data.

While Canada is clearly not amongst the current leaders in providing access to scientific research data, with only the social sciences and humanities research community in process of establishing their capacity, this may well be an advantage. The Engineering, Health and Natural Sciences communities can benefit from the experience and learning of others and thus can establish a world leading capability. This would not only transform the effectiveness and productivity of the Canadian research enterprise, but to allow Canada to develop the systems, approaches and tools that can be exported to others that are being challenged to provide such access to their own scientific research data.

In Canada, the challenges of implementing a system of collecting, cataloging, controlling the access to and the intellectual property rights over, storing and archiving scientific research data are substantial. These challenges span technological, institutional and managerial, financial, legal and policy, and cultural and behavioral issues.

Quoting from the OECD report on “Promoting Access to Public Research Data for Scientific, Economic, and Social Development”, these issues are broadly described as:

- **Technological Issues:** Broad access to research data and their optimum exploitation requires appropriately designed technological infrastructure, broad international agreement on interoperability, and effective data quality controls.
- **Institutional and Managerial Issues:** While the core open access principle applies to all science communities, the diversity of the scientific enterprise suggests that a variety of institutional models and tailored data management approaches are most effective in meeting the needs of researchers.
- **Financial Issues:** Scientific data infrastructures require continued and dedicated budgetary planning and appropriate financial support. The use of research data cannot be maximized if access, management, and preservation costs are an add-on or after-thought in research projects.
- **Legal and Policy Issues:** National laws and international agreements directly affect data access and sharing practices, despite the fact that they are often adopted without due consideration of the impact on the sharing of publicly funded research data.
- **Cultural and Behavioral Issues:** Appropriate reward structures are a necessary component for promoting data access and sharing practices. These apply to both those who produce and those who manage research data.

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In the Canadian context, there is a particular concern about the Charter of Rights and Freedoms guarantees over the confidentiality of personal information and data. This concern presents a particular challenge in the field of healthcare, but is certainly not restricted to that field of research. A further particularly Canadian concern occurs in the cultural and behavioral area where existing some researcher reward systems and some institutional intellectual property rights management practices are diametrically opposed to the concepts of data sharing.

Within these contexts, the Task Force Meeting to consider the National Consultation Event Design was held to help the NCASRD Chair and Project Management Group define an effective process to engage the academic, government and some industrial research communities. The consultation is being undertaken to align the research community leaders with the motivation, vision, policies, recommendations and actions for the establishment of a composite framework of access and archival capacities for scientific research data.

3. Event Agenda

Time	Activity	
0730-0800	Registration	
0800-0815	Welcome and Opening Remarks	David Strong
0815-0830	Agenda and Logistics	Jac van Beek
	Session 1 – “What we have been doing” - Plenary	
0830-0845	International Experience	Paul Uhlir
0845-0900	Canadian experience to date	David Moorman
	Session 2 – Imagining - Plenary	
0900-0920	Elements of a vision for accessibility	Paul Uhlir and David Moorman
0920-0930	“What are we here to do”	John ApSimon
0930-1000	Questions and comments	
	Break	
	Session 3 – Exploring the potential - Workshop	
1020-1130	Opportunities	
1130-1200	Challenges	
	Lunch	
	Session 3 continued – Exploring the potential - Workshop	
1230-1300	Challenges continued	
	Session 4 – Action Planning - Plenary	
1300-1430	Actions	
	Break	
	Session 5 – Building for the future – Plenary	
1445-1545	Further exploration of the issues	
1545-1615	Summarizing the discussions	Jac van Beek
1615-1700	Preliminary recommendations and ideas for the national consultation	
1700	Close	

4. Presentation Summaries

4.1. Paul Uhler – International experiences

Paul Uhler is the Director of the Office of International Scientific and Technical Information Programs in the National Academies, Washington, DC.

Mr. Uhler started his presentation with observations about the current forces driving open access to scientific research data and the inhibitors to such sharing.

Major trends towards open access

- Democratization of many governments post USSR
- Internet and open digital networks
- Information commons

Major trends towards information control

- National security / counter-terrorism
- Information security / digital technology controls
- Privatization / commercialization of public information
- Stronger IPR in all areas of information and technology

He noted particularly the substantial proportional decrease of public sector funding of research and the increasing priority in government laboratories on commercialization of publicly funded research outcomes.

He observed that there are compelling reasons for placing government-generated and government-funded research data in the public domain. In particular, restricting access to publicly collected data undermines government transparency. The compelling reasons include: the economic benefit; the growth of larger research initiatives and teams; the rate of new discovery; and discoveries in fields other than the field of the original research. The value of sharing of research data is a highly non-linear function that depends more on the degree of openness than the investment made in public sector research. In particular, countervailing policies and practices frustrate the societal and economic benefits. These include:

- Statutory exemptions for security, personal privacy, and intellectual property exploitation
- Full-recovery costs of providing access
- Bureaucratic failure to disseminate and preserve data
- Competition and replication of data that is better provided in the private sector
- Management of Intellectual Property Rights of data provided for Government use by the private sector or by individuals.

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- The loss of control over public data, when they are used in other domains and in projects that differ substantially from the purpose for which the data were originally requested or acquired.

He observed that a majority of public data are used in research that is not driven by a profit motive and is therefore complementary with the objectives of the sharing of research data. However, different disciplines are driven by different market pressures. Even though data are perceptually an upstream source of value, they can still create new technologies, knowledge and applications that have a substantial impact on society, on commercial exploitation and on economic growth. The result is significantly differing perceptions in different communities of the commercial value of research data.

Modern computing and communications networks are the key enablers to the new capacity to generate and share data, and they are resulting in data-driven science with a growing ability to transform and re-interpret data for new applications and understanding. These capabilities are accelerating scientific discovery and facilitating entirely new forms of distributed research collaboration and information production. However, the networks are also simultaneously responsible for the transitory nature of scientific data. While they permit sharing of current data and information, archiving and preservation are not undertaken on any systematic basis and there are few entities that have management responsibility for these functions and these only operate in very narrowly defined research domains.

Networks have already enabled the creation of research activities that would have not been possible historically, such as: the Open Source Software movement; open public domain data, e.g. Genbank; federated data management networks e.g. World Data Centers and GBIF; community-based open peer review; collaborative virtual environments e.g. CERN; virtual observatories e.g. IVO and Digital Earth; and open access journals.

There is a clear need to get individual agencies out of the management of data and to reduce the level of government and bureaucratic control. The data that are gathered at public expense should not be managed in the short term as a means of control over the information and individual citizens, and should not be discarded in the longer term as they become a potential source of reinterpretation and embarrassment of government or researcher and at an expense to the department or research activity that generated them. These requirements lead to certain preferences in the management model that need to be established over scientific research data so that they are accessible and preserved.

Mr. Uhlir also noted that the management of intellectual property is being driven more by the entertainment industries than the scientific enterprise and thus much of the legal framework is not engineered to encourage the sharing of

research data. Where the management of scientific data is turned over to private commercial interests, there is a risk that monopoly control will result. Any involvement of the private sector must contain substantial obligations to provide access at reasonable prices, guarantees of availability, and guarantees of return should the private sector partner become uncompetitive, their business interests or ownership should change or their service become unsatisfactory.

4.2. David Moorman – Canadian experience to date

David Moorman is a Senior Policy Advisor to the Social Sciences and Humanities Research Council of Canada and was central to the discussions and actions that resulted from the National Data Archives Consultation for social science research data.

At present, SSHRC is the only national funding agency in Canada with an explicit archiving and sharing policy. This operates on similar principles and processes as the National Sciences Foundation (NSF) and National Health Institute (NIH) in the USA.

Mr. Moorman noted that there is no such policy within the Natural Sciences and Engineering Research Council (NSERC) or in the Canadian Institutes for Health Research (CIHR), and there are significant needs within the research community that are not being met. Further, he noted that there was growing friction at the international level as various countries introduce data sharing while others delay. This is exacerbated by substantially differing access and preservation conditions and requirements between countries.

It is clear however that the Canadian situation is different from that in the US, particularly in respect to the gathering and use of healthcare data, the protection of Intellectual Property, the institutional legal framework and infrastructure. Thus the option to copy the US model is unlikely to be viable or appropriate in the Canadian context.

The SSHRC study identified three primary recommendations for the creation of a Canadian “Research Commons for Scientific Research Data”:

- Preservation of data is an embedded requirement of all SSHRC funded research
- Managing data includes quality control, preservation decisions, developing meta-data standards, authentication and security, and use control.
- Establishment of comprehensive library services that have the capacity to manage the legal framework requirements, cataloging, and the interchange and access requirements with other international repositories.

Canada remains one of the major global generators of scientific data and knowledge relative to its population but these are estimated to be only about 4%

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of global scientific knowledge. As a result, our future success is more dependent on data sharing internationally than most other global leaders. The largest barrier to our ability to lead globally in data sharing is cultural and organizational rather than technological. One of the early steps that has been taken by the Federal Government is the integration of the National Library and National Archives (announced near the end of May 2004) but it will be some time before the necessary budget allocation catches up with this integration. In addition to the policy framework established by SSHRC, NRC, NSERC, CIHR and CFI are now engaged in addressing the sharing and preservation issues. CIHR are moving forward but the issue of confidentiality of data and informed consent must be resolved prior to implementation of any access provisions.

Canadian action has been committed by the OECD Ministerial Declaration on Access to Research Data from Public Funding to which Canada is a signatory and Canada is being strongly encouraged by the UNESCO initiative to implement data archiving and preservation for the protection of Canadian heritage including the protection of scientific data for heritage. It is now necessary to “hold the politicians’ feet to the fire” to promote the legal and policy frameworks under which sharing and preservation will be established and managed.

5. Imagining

David Strong observed that Canada has consistently reduced the proportion of public sector research in Canada over recent years. While there have been increases in the funding that flows through the Research Councils, substantially less has been directed to Government laboratories or contracted by government departments and agencies. He asked the participant to think about the people that could influence governmental decisions in support of increased research funding at both the Federal and Provincial levels so that we can invite them to the Forum.

5.1. Paul Uhlir / David Moorman – Vision Elements

David Moorman led the discussion. He expressed concern about the diminishing Government investment in Government information and recommended that initiatives be mounted to secure a response to the OECD Ministerial Declaration and to build on the maturing open access movement. In this context, there is a rapidly growing need to invest in data recovery. Very substantial amounts of data have already been lost and even greater losses are imminent. Even today, data stored on 5¼ inch floppy discs are being lost and the ability to recover these are declining exponentially.

There is a longer-term vision already forming in the leading open access groups for the formation of a national research data management system for all sciences. This is based on concepts of: diversity and flexibility; responsiveness to different disciplines; the engagement of researchers in data selection for long-term preservation; and the ability to manage, control and solve data handling and integrity problems.

David Moorman concluded with the observation that a “1% Solution” was a rational idea, i.e. reserve 1% of all grants for the funding for research data storage infrastructure and management.

Paul Uhlir asserted that, as far as research data are concerned, the future is here already – in science we are already in the digital age. Many large and sophisticated databases are already online as the result of a huge volunteer effort. These initiatives are continuing to grow, but there are some very large impending challenges to the economic sustainability of such volunteer efforts. Continuing management, efficient and effective control of access, data contamination and theft, sheer magnitude of the storage requirements and the active decision process for preservation are all challenges that such volunteer effort cannot sustain.

Dr. Chuck Humphrey introduced and discussed the participants in the “research data economy”, classifying the players by their openness and acceptance of the

“barter marketplace” - a framework for the conditional exchange of data in a closed network of researchers - as follows:

- Commonwealth – data open for sharing
- Barter – free exchange under conditions and equivalence of value
- Commercial – commodity sale or license at the price that the market is willing to bear either by those claiming ownership or those claiming secondary distribution rights
- Non-market – data hoarders who are not willing to share at all.

Dr. Humphrey commented that one of the key issues is that of ownership versus stewardship

The vision espoused by David Moorman for the implementation of a Canadian Data Commons is described as:

1. All major granting organizations adopt data access as a prerequisite and obligation under funding contracts
2. Build repository infrastructure in every major institution and require that all owners of large data sets take responsibility for the capture, management, preservation and open access protocols of the data.
3. National Library and Archives of Canada undertake responsibility for long-term preservation
4. University Libraries (and other major institutional libraries) assume the function of data set cataloging and catalog exchange management
5. Grant recipients are made responsible for data capture and access policy implementation in accordance with contract requirements.

5.2. John ApSimon – Opportunities and Challenges

John ApSimon concluded the session with a series of observations that represented the challenges to be addressed:

- The need to move to a cohesive approach to data access and archiving
- The group will need to get a briefing to all the Consultation participants if the agenda is to be completed and well thought out actions are to result.
- There are already a lot of archiving systems and processes in use, and we need to become members of a scientific commonwealth
- There are substantial institutional concerns which need to be actively addressed
- There are also substantial individual concerns which need similar consideration and resolution
- There are substantial government concerns in which the benefits must be demonstrated while the risks are minimized.

6. Workshop Sessions

6.1. Introduction Effectiveness

Members of the NCASRD Task Force were asked to give their opinion on the value and appropriateness of the session introduction they had just listened to and a broad range of opinions were voiced and a number of different introduction scenarios postulated.

The key recommendations arising were:

- Even in a two day consultation, there is no real chance of achieving the multiple objectives of raising the level of understanding of the problem, generating the vision of the future that the participants will buy into, discussing the challenges, constraints and inhibitors and devising action plans and recommendations.
- The need to raise the level of understanding and the creation of a vision should be undertaken ahead of the consultation and the vision should be debated as the opening item – not with the purpose of fully refining it but to get overall alignment with its underlying premises.
- The agenda for the consultation should be built around the required outcomes, being the following:
 - Recommendations to the Granting Councils for their policy development of a data management requirement in all grant proposals that ensure life management during the active research phase and relevant archiving plans for preservation.
 - Recommendations to Government (s) for a legal and financial framework for the data management of government information and for the preservation of scientific data at the national level once its immediate relevance to on-going scientific research finishes
 - Recommendations on specific discipline issues (such as privacy in healthcare data), which need further resolution by the relevant agencies and disciplines.
- These agenda outcomes should be framed in the context of the 5 OECD issues of technology; institutional flexibility and managerial effectiveness; financial support; legal and policy frameworks; and culture and behavioral change.

Substantial work by the Project Management Group, with assistance from the Task Force, will be required over the summer and fall period to generate the briefing information and such information should be provided to the participants as far in advance of the consultation as possible.

6.2. Exploring the potential

Team 1

Team 1 created a series of subjects that encompassed their ideas of the potential results of the sharing of data within the timeframe of 2010. No attempt was made to estimate when these impacts might be anticipated and much will obviously depend on the response of all the relevant stakeholders to the need and the timeliness of these response initiatives.

After submission of the ideas these were clustered into the following groups:

- 1. Removal of traditional discipline and geographic boundaries – Integrated data and science environment**
 - Research team not as geographically bound to local institutions and local networks
 - Higher cross disciplinary research – Bio-XYZ and Nano-XYZ
 - Discovery of important findings derived from data gathered from disciplines outside one own field.
 - Interdisciplinary research has started as a result of data access
 - Integrated data base resources as part of a computational environment
 - Access to the appropriate computational environment – local, national and international
 - New standards in meta-data have allowed transversing of data across disciplines creating new views and interpretations of old data.
 - Emergence of international research programs (funded by multiple jurisdictions)
 - Increased collaboration has resulted in greater synergies, more output
 - Data used across disciplines
- 2. Virtual laboratories and a virtual teaching environment**
 - New education paradigm – student virtual mobility
 - Educational changes – K to Post-Graduate Studies through access to data
- 3. Intrinsic reward mechanisms for sharing data**
 - National and international research team and consortia form without the initial infusion of grants
 - SWAT approach to problem solving through “volunteer” contribution enabled by data sharing
 - Institutional reward mechanisms changed to reward discovery rather than research process and publication and reward overall value and contribution rather than individual effort

- 4. Barrier-free access to research and government data resulting in increased research output.**
 - Immediate access to publicly-funded research data in Canada and other participating countries
 - At the desktop, data management systems provide instant access to environmental, geographic, spacial and health data for correlation studies
 - Research achieving significantly reduced time to discovery
 - Major reduction in “red-tape” in access to Government data achieved
 - Data re-use has become widespread and resulted in increased output
 - Instant communications to data sources and researchers doing related work
 - Data quality issue has been solved
 - Supplementary, electronically- stored data not previously accessible, incorporated into scientific discovery papers

- 5. Canada a leader and substantial participant in international data management (with a ‘National Data Archive’ function)**
 - Long-term base funding for data generation and curation embedded in funding system
 - National Data Archive has given Canada international leadership in preserving research data
 - National Data Archive represents Canada leading international fora in the establishment of standards for data preservation and exchange
 - Access to the best investigatory and analysis tools
 - Canada has become a leader in the development of tools that assist discovery from data, many of which are derived from outside the discipline of the research team

- 6. Solution to “Scale” problem / synthesis at the meta-level**
 - Meta-studies are producing more solutions to research problems
 - Large scale data sets of the building blocks of life accessible in public and private repositories
 - Quality, accuracy and validity issues of large scale data sets are understood and protocols for quality assurance are being introduced
 - Better understanding of complexities of life from genomics to eco-systems has resulted from data accessibility
 - Researchers starting to understand the mechanisms of “life”
 - Genetic identification of novel organisms

- 7. Greater insights from data / circumstantial findings become commonplace**
 - Private sector and others make unforeseen uses of scientific data

Team 2

Team two generated success objectives in the 2010 context, and slotted these into groupings that were developed in parallel with the creation of these success objectives.

1. Efficient research

- Ability to start new research with up-to-date background – reduction in “re-invention”
- Reduced re-work – less effort on re-collection of data due to lack of accessibility or loss
- Sharing of computational resources for processing intensive analysis
- Shorter time to formal publication
- Direct links to data bases in support of all research articles published online.
- Better access to rare/scarcely information on materials/objects

2. International leadership

- Canada has become a larger and high quality “player” in the scientific research community
- Canadian meta-file strategy accepted as an international standard
- New methods for data submission suitable for data mining/searching instead of free-text publication, some developed in Canada, as a compatible set of global standards
- Improved quality of research by reduced inconsistent / inappropriate / poor analysis and reporting by providing transparency and replicability

3. Return-on-Investment

- More investment in research secured as politicians can see, and more importantly convey to their constituencies, the value of funding research
- Politicians are convinced that the Granting Councils and Government research institutions are delivering value for money due to an order of magnitude increase in data and discoveries represented in the registry (repository)

4. New methods

- New methods provide a better understanding of climate change, the links to the impact on indigenous peoples, links between climate scenarios and local knowledge archives with confirmation through online interviews
- Facilitated “fast science” through easily generated data and supported by new methods for more specialized analysis

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- International community well advanced in the formation of a consensus on a standard nomenclature of materials, objects and systems.
- Comprehensive tracking of land use changes allows more rational management of public lands
- Comprehensive meta-biomic monitoring system enables global monitoring of public health, weather etc, one person at a time.
- Allow negative results to be collected
- Development of more effective data storage and access solutions

5. New discoveries

- New discoveries based on the mining of large data sets and/or comparison of data from different databases of natural phenomena, objects, etc.
- Discoveries based on test-beds and resources in Computer Science
- Resolution to the unknowns of the health and eco-system effects of: genetically modified foods; in vitro fertilization; genetic manipulation of cells, organs and organisms etc.
- Rapid meta-analysis of international studies increases assessment of cross-cultural effectiveness
- Ability to predict drug response from analysis of genetic determinants – discovery of rare events and drug combination impacts

6. Enhanced education – Capacity building

- Junior high school science students help scientists recognize a problem, which results in a toxicogenomics study.
- Teach classes with current examples from various archives e.g. satellite of the sea-level; ocean profiles of temperature; El-Niño index from climate databases; fisheries sales from Peru.
- Neighborhood watch citizen/researcher recognizes risk of newly imported packaging

7. Network effects

- Sharing of large volumes of environmental data from studies of trans-disciplinary environmental impact and change
- Ability to contact data-builder scientist / experts to access their data and knowledge
- Expanded awareness of research issues and methods in other disciplines and the potential serendipitous impact on a researcher's "worth"
- More cross-disciplinary research teams
- Canada leads the world in developing diagnostic instrumentation from generating reliable and understandable information about health and disease

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- New business start-ups based on access to and commercial exploitation of public data
- Greater collaboration in the science discover enterprise due to searchability of databases and data access

8. Enhanced public policy

- Creation and widespread use of open access Canadian land use database
- Better enforcement of existing environmental regulations by public access to environmental data, and identification of illegal activities
- All national meteorological databases with in-situ and remote observations are integrated globally to improve climate modeling and prediction
- Improved participation of citizens in public-interest activities through better access to public data and better understanding of issues
- 10% of the Canadian population has volunteered to allow their anonymized health records to be used for the public good.

9. Culture shift – “Researcher as Citizen”

- Paradigm shift on the part of individual researchers from focus on personal benefit to that of the public good
- Scientists working more laterally with colleagues and the public instead of vertically (in silos)
- Greater respect and appreciation for the work and contribution of librarians and archivists by researchers and vice-versa.

Integrated Mind Map

The final exercise in the Opportunities analysis was the creation of an integrated “Mind Map”. Based around the objective of developing a composite vision for 2010 of the impact of implementing an aggressive program to provide broad, effective, free or cheap, well managed access to scientific research data, a number of central themes were developed. These were based on the Teams clusters, but generated a different view of the linkages and interactive benefits from those developed by each team independently. The clusters were called “Bubbles” and the Task Force undertook to develop “Bubble” descriptions. The writer or writing teams are shown against the “Bubble” titles – Principal authors are shown in bold.

- **Removal of Discipline Boundaries** **John Spray**
- **New Methodologies** **Ellsworth LeDrew**
John Rodgers
Andrew Pollard
- **International Leadership in Data Management** **Peter Pennefather**
Paul Uhlir

- **Enhanced Education**
 - **Data Stewardship**

 - **Capacity building for data archiving**
 - **Network Effects**
 - **Efficient Research**
 - **New Discoveries**
- John ApSimon**
Chuck Humphrey
Joyce Garnett
Chuck Humphrey
Guy Baillargeon
Richard Rachubinski
Robyn Tamblin (Health)
Steven Jones (Bio)
Ellsworth LeDrew (Env)
Andrew Pollard (Eng/Inst)

6.3. Challenges and Inhibitors

In the session, time was originally allocated to continue with National Consultation Forum proposed agenda, but it was decided that little would be achieved in the time that remained available. Further there was broad consensus that the exercise of back-casting to identify the key challenges and inhibitors (that would have to be addressed by action recommendations) would be both valuable and would generate the information necessary to define these actions. Additionally, the process outlined would also help identify the target influencers who could carry this agenda within the various governments and their science based agencies, in the granting councils, the universities and in other key players in Canada's science enterprise.

7. Actions

Actions that were identified as necessary in preparation for the National Consultation Forum in November are:

- ***Achievements Backgrounder***
 - Timing: Complete by first week in September
 - Review Committee (Task Force) responsibilities
“Bubble Groups” to sign off
 - Timing: end July
 - Responsibility: GW
 - Package and ship to teams
 - Timing: First week August
 - Responsibility: GW
 - Task Force responses
 - Timing: end of August
 - Responsibility: GW

 - ***Participants***
 - Each to nominate 3-4 people for the Forum
 - Timing: end of June
 - Responsibility: GW
 - Broad discipline representation
 - Age spectrum (especially younger)
 - Academic, Government labs and private sector
-
- ***Communications***
 - Output to media
 - Audience is very diverse – final report to be widely disseminated
 - 300 word call-out for decision makers
-
- ***End-Point***
 - Consensus on draft document
 - Document(s) to Councils and Government Labs
-
- ***Guests to Forum***
 - Presidents of Councils – lunch on second day
 - Science Advisor to PM – Introduction on first day and as much participation as possible
-
- ***Provide International and Canadian perspectives***
-
- ***Design***
 - Present achievements – (see above for responsibility and timing)
 - Add building blocks – advances
 - Iterative Issues development process
 - intra-discipline groups
 - inter-disciplinary groups

8. Appendix 1 - List of Participants

David Strong
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Non-Participant Members of Project Management Team

Catherine Betz
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Dennis Blinn
Natural Sciences and Engineering
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Tony Damiani
Industry Canada

Katy Nau
Canada Foundation for Innovation

Stephanie Robertson
Canadian Institutes for Health Research

Administrative Support

Carolyn Ahern
National Research Council