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Research Data Management & Preservation: A Library Perspective

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BCNET Conference 2016

LIBRARIES & BIG DATA

A Historical Perspective

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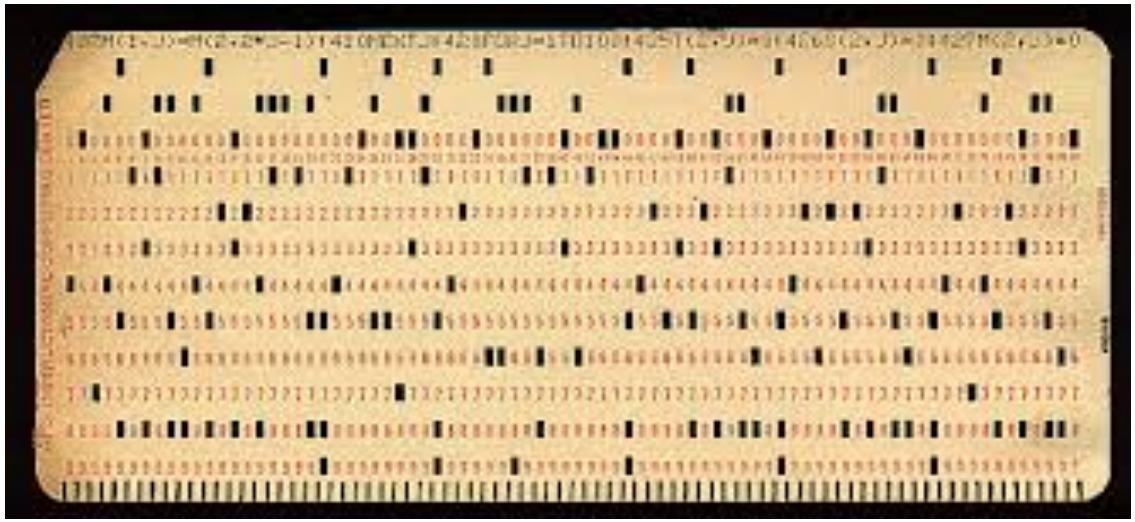
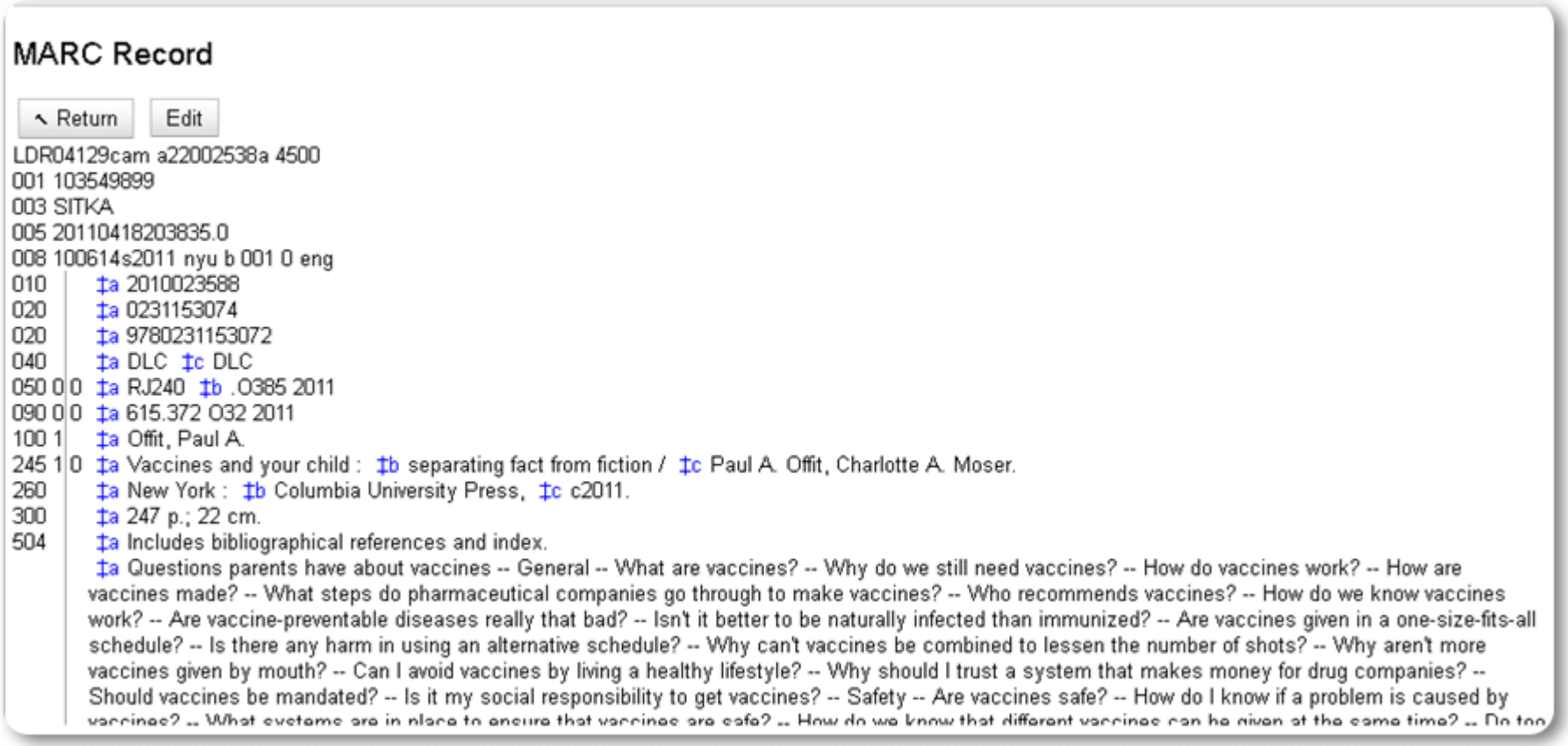
Big Data Infrastructure circa 1925

Big Data Access Devices circa 1925

Big Data circa 1975



Big Data in Libraries circa 1975



MARC Record

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050 0 0 ‡a RJ240 ‡b .O385 2011
090 0 0 ‡a 615.372 O32 2011
100 1 ‡a Offit, Paul A.
245 1 0 ‡a Vaccines and your child : ‡b separating fact from fiction / ‡c Paul A. Offit, Charlotte A. Moser.
260 ‡a New York : ‡b Columbia University Press, ‡c c2011.
300 ‡a 247 p.; 22 cm.
504 ‡a Includes bibliographical references and index.
‡a Questions parents have about vaccines -- General -- What are vaccines? -- Why do we still need vaccines? -- How do vaccines work? -- How are vaccines made? -- What steps do pharmaceutical companies go through to make vaccines? -- Who recommends vaccines? -- How do we know vaccines work? -- Are vaccine-preventable diseases really that bad? -- Isn't it better to be naturally infected than immunized? -- Are vaccines given in a one-size-fits-all schedule? -- Is there any harm in using an alternative schedule? -- Why can't vaccines be combined to lessen the number of shots? -- Why aren't more vaccines given by mouth? -- Can I avoid vaccines by living a healthy lifestyle? -- Why should I trust a system that makes money for drug companies? -- Should vaccines be mandated? -- Is it my social responsibility to get vaccines? -- Safety -- Are vaccines safe? -- How do I know if a problem is caused by vaccines? -- What systems are in place to ensure that vaccines are safe? -- How do we know that different vaccines can be given at the same time? -- Do too

Big Data circa 2016

- · 1000 Bytes = 1 Kilobyte
  · 1000 Kilobytes = 1 Megabyte
  · 1000 Megabytes = 1 Gigabyte
  · 1000 Gigabytes = 1 Terabyte
  · 1000 Terabytes = 1 Petabyte
  · 1000 Petabytes = 1 Exabyte
  · 1000 Exabytes = 1 Zettabyte
  · 1000 Zettabytes = 1 Yottabyte
  · 1000 Yottabytes = 1 Brontobyte
  · 1000 Brontobytes = 1 Geopbyte

Big Data circa 2020?

- "Trends project a demand for 1-3 million Haswell-equivalent cores by 2020, and more than an **exabyte** of persistent storage. These projections may turn out to be underestimates, since some existing disciplines making extensive use of Compute Canada resources today anticipate needing over 1 million cores or 1 **exabyte** of data just for their own projects by 2020." (Compute Canada Technology Briefing, November 12, 2015)

Library of Congress 2016

Library of Congress Holdings

- 32 million cataloged books and other print materials in 470 languages
- 61 million manuscripts
- over 1 million U.S. government publications
- 1 million issues of world newspapers
- 5.3 million maps
- 6 million works of sheet music
- 3 million sound recordings
- 4.7 million prints and photographic images including fine and popular art pieces and architectural drawings

Library of Congress = Unit of Measurement

- "Every Six Hours, the NSA Gathers as Much Data as Is Stored in the Entire Library of Congress"
- "There are 25 Petabytes (10^15) created every day and thrown into the internet. This is 70 times larger than the Library of Congress."
- "Facebook's photo collection has a staggering 140 billion photos, that's over 10,000 times larger than the Library of Congress."
- "Walmart handles 1 million plus customer transactions every hour, which is imported into databases estimated to contain more than 2.5 petabytes of data - the equivalent of 167 times the information contained in all the books in the Library of Congress"

RESEARCH DATA MANAGEMENT & PRESERVATION

A Library Perspective

BCNET Conference 2016

Stakeholders

- Compute Canada, CANARIE → Research Data Canada
- CFI, CIHR, NSERC, SSHRC
- CANFAR, CBRAIN
- U15, CUCCIO, CASRAI
- Institutional: VP Research, Research Ethics, IT Services
- CARL- Canadian Association of Research Libraries
- And don't forget…researchers

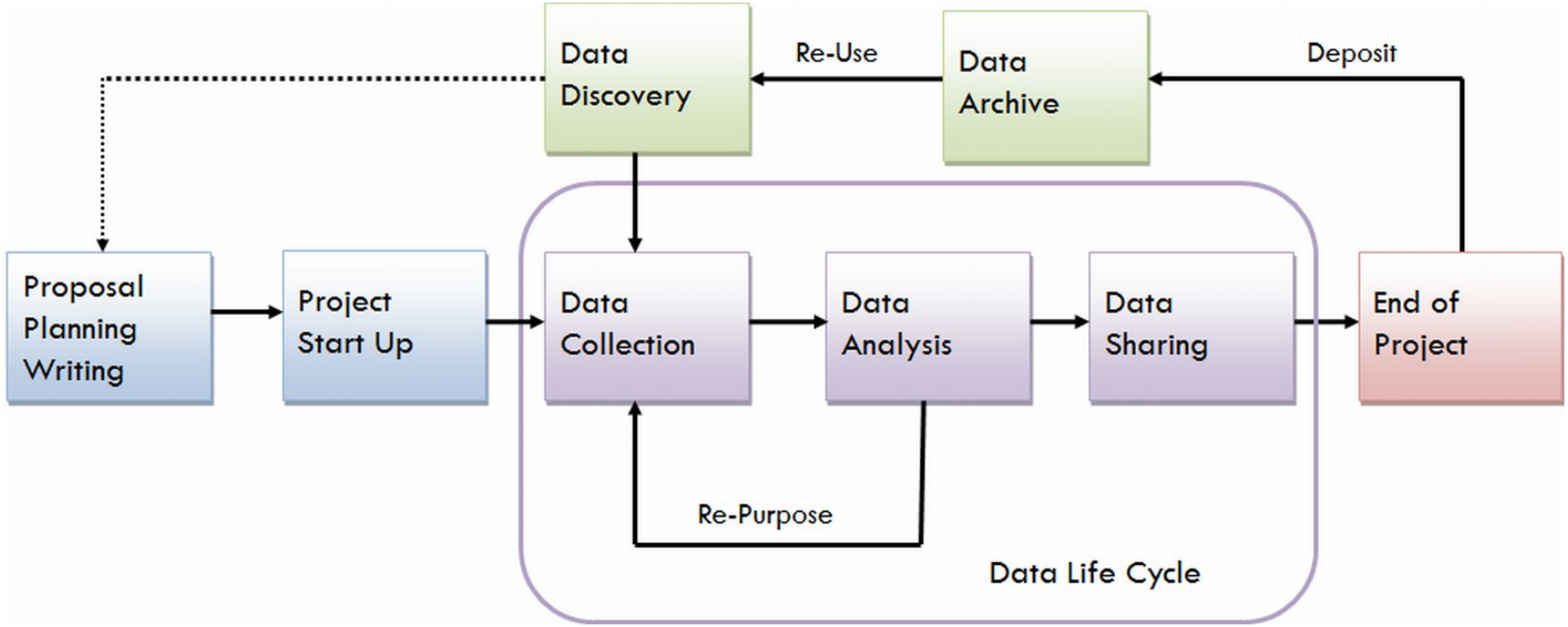
RDM Spectrum

- Canadian Genome Centres
  - Currently 24 petabytes
  - Estimate 219 petabytes by 2020
- Canadian Astronomy Data Centre
  - 1.2 petabytes currently on Westgrid
  - Estimate 30-100 petabytes eventually needed
- Ocean Networks Canada (Neptune, Venus)
  - 300+ terabytes of data archived
  - 170 gigabytes of data collected every day
  - 230 gigabytes of data are distributed every day
- Pacific Herring Project
  - 26 narrative videos totalling about 5 megabytes

Data Curation

- Digital curation is maintaining and adding value to a trusted body of digital research data for current and future use; it encompasses the active management of data throughout the research lifecycle.

Research Data Lifecycle



Research Data Management Issues

- data integrity
- preservation
- discovery, access and authentication
- re-use
- policies and procedures (local, national, funding agencies; also intellectual property)
- inter-operability and participation in larger national and international initiatives
- standards and metadata

Canadian Association Of Research Libraries (CARL)

portage
SERVICES PARTAGÉS POUR LES DONNÉES DE RECHERCHE
SHARED STEWARDSHIP OF RESEARCH DATA

- Developing a national research data culture
- Fostering a community of practice for research data
- Building national research data services and infrastructure

Data Management Plans

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SHARED STEWARDSHIP OF RESEARCH DATA

- **DMP Assistant** is a bilingual tool for preparing data management plans (DMPs). The tool follows best practices in data stewardship and walks researchers step-by-step through key questions about data management.
- https://assistant.portagenetwork.ca/

Discovery and Preservation

- Library-based projects (2012-15)
  - SFU: Research data repository & preservation
  - UBC: Research data repository & preservation
  - Univ. of Alberta: Canadian Polar Data Network
  - OCUL & Scholars Portal: Repository & Cloud Storage

- Outcomes
  - Prototypes and limited production systems
  - Experience

Discovery and Preservation

- Research Data Canada Federated Pilot (2014-15)
- Participants: Compute Canada, CANARIE, CARL
- Software Platforms:
  - Dataverse/Islandora (Discovery)
  - Archivematica (Preservation)
  - Globus (Replication & Discussion)
- Libraries: repository and preservation tools, metadata standards, researcher needs
- Compute Canada: replication tools, robustness and scalability assessment
- Outcomes
  - More experience

CARL & COMPUTE CANADA MOU (2016)

- CARL/Portage:
  - research data management expertise,
  - metadata and workflow design / implementation
  - contributing to requirement specifications and design
  - obtaining research data for test purposes
  - liaising with researchers, repository services, and preservation software developers
- Compute Canada:
  - software development and computational resources,
  - Globus liaison
  - for liaising with Globus
  - costs of conducting these activities

Conclusions

- "state of churn"
  - Storage and infrastructure requirements
  - RDM platforms, tools and workflows
  - Policies and procedures
  - Roles and responsibilities
  - Costs to sustain

Thank You

Questions?

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