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ETD 2011 Cape Town

Data Curation Workshop

16 September 2011

Social science that makes a difference

Focus of this presentation

- **The role of data curation**
  - What is research data?
    - Research data – related concepts
  - What is data curation?
    - The curation process
  - Drivers for data curation
  - Why data curation?
  - Roles and responsibilities
- **Data curation implementation**
  - Barriers and challenges
  - What should be in place?
  - Where to start?

Focus of this presentation (cont.)

- What to do?
  - Engage with data producers
  - Develop facilitating workflows
  - Implement a suitable technology platform
  - Develop data curation policies
  - Create and pilot service models
  - Do change management

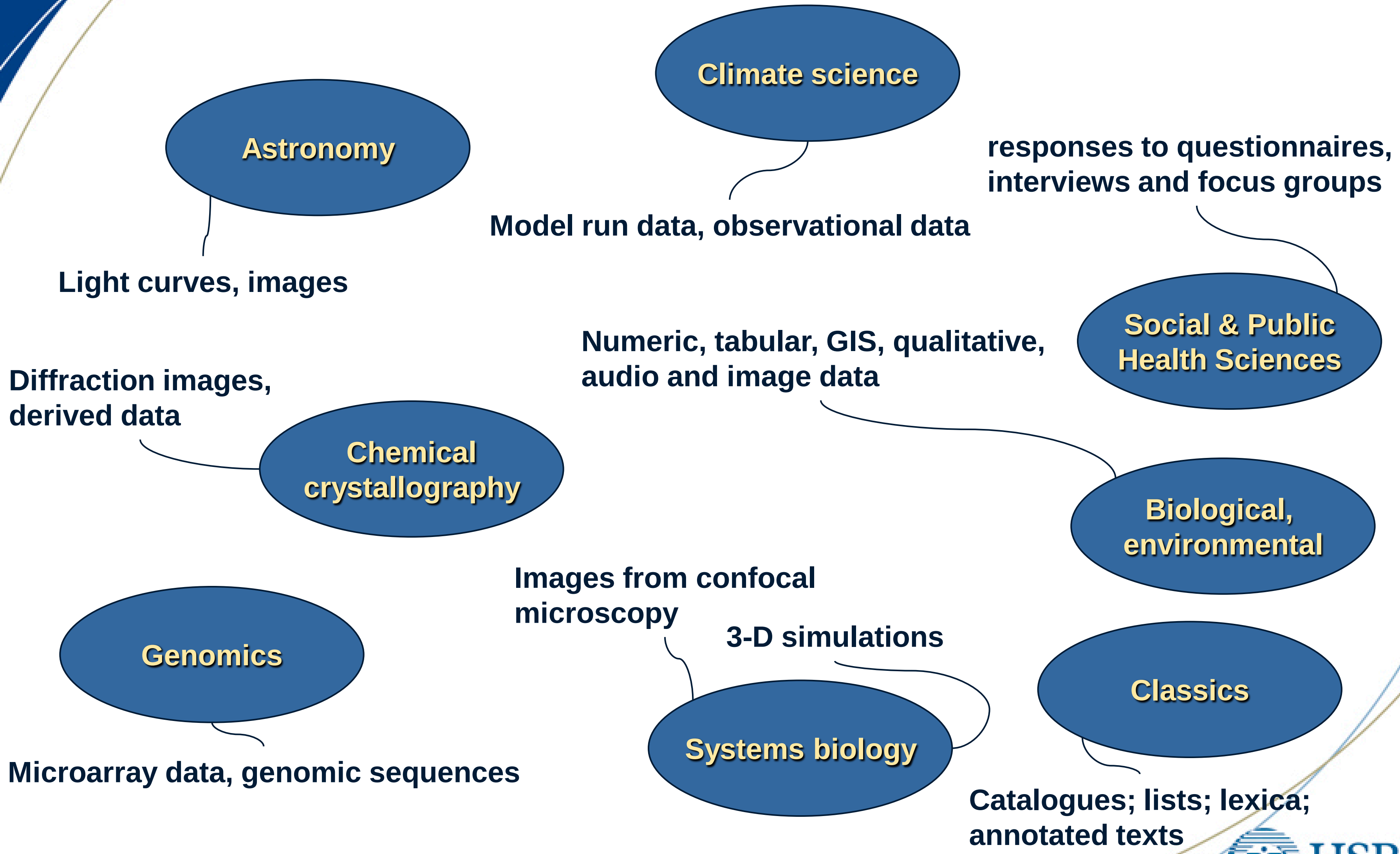
What is research data?

Collections of records or measurements used by researchers to undertake their research or provide an evidential record of their research

Attributes

- Digital
- Heterogeneous
- Contextual
- Valuable

Research data – Examples



Astronomy

Light curves, images

Climate science

Model run data, observational data

Social & Public Health Sciences

responses to questionnaires, interviews and focus groups

Chemical crystallography

Diffraction images, derived data

Biological, environmental

Numeric, tabular, GIS, qualitative, audio and image data

Genomics

Microarray data, genomic sequences

Systems biology

Images from confocal microscopy

3-D simulations

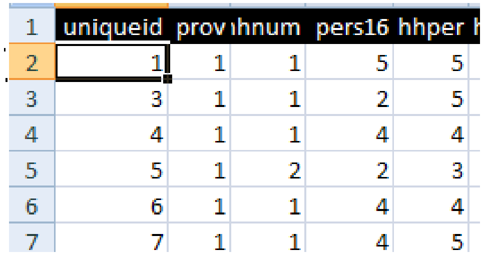
Classics

Catalogues; lists; lexica; annotated texts

Examples taken from Research Information Network (RIN) in association with the Joint Information Systems Committee (JISC) and the Natural Environment Research Council (NERC). (2008). *To Share or not to Share: Publication and Quality Assurance of Research Data Outputs Report commissioned by the Research Information Network (RIN).* Main report. June.

Research data – Related concepts

- Raw / micro data vs. aggregated / summarized / derived data (Micro data are data in which every record is at the unit of analysis level and all records must be added up to get the totals for each data item)



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3	3	1	1	2	5
4	4	1	1	4	4
5	5	1	2	2	3
6	6	1	1	4	4
7	7	1	1	4	5

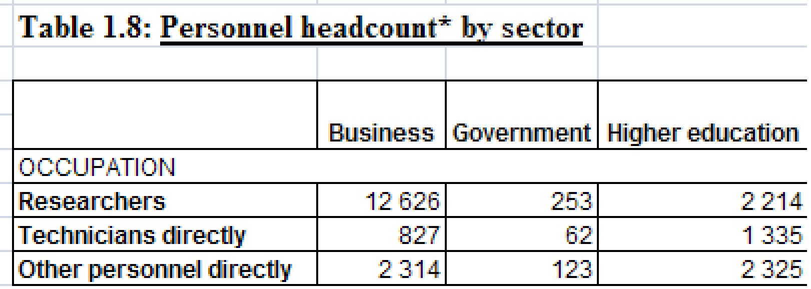


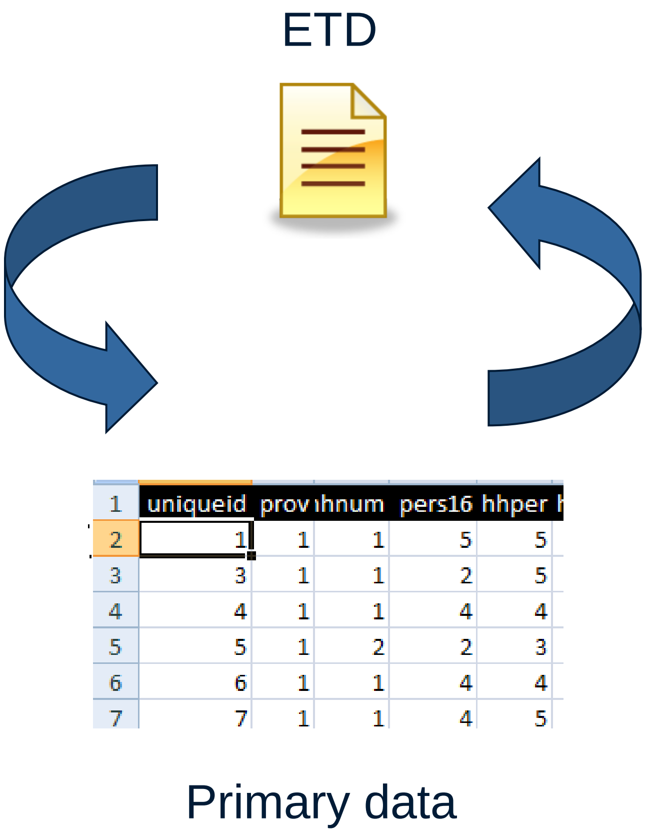
Table 1.8: Personnel headcount* by sector

	Business	Government	Higher education
OCCUPATION			
Researchers	12 626	253	2 214
Technicians directly	827	62	1 335
Other personnel directly	2 314	123	2 325

- Primary data (created for the first time and there is no previous source available, did not exist before) vs. secondary data (readily available data)

ETDs and Data

- Digital objects
  - Metadata
    - Descriptive
    - Provenance
    - Access
    - Use
    - Preservation
- ETD and Data relationship
  - Context, provenance
  - Evidence



ETD

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3	3	1	1	2	5
4	4	1	1	4	4
5	5	1	2	2	3
6	6	1	1	4	4
7	7	1	1	4	5

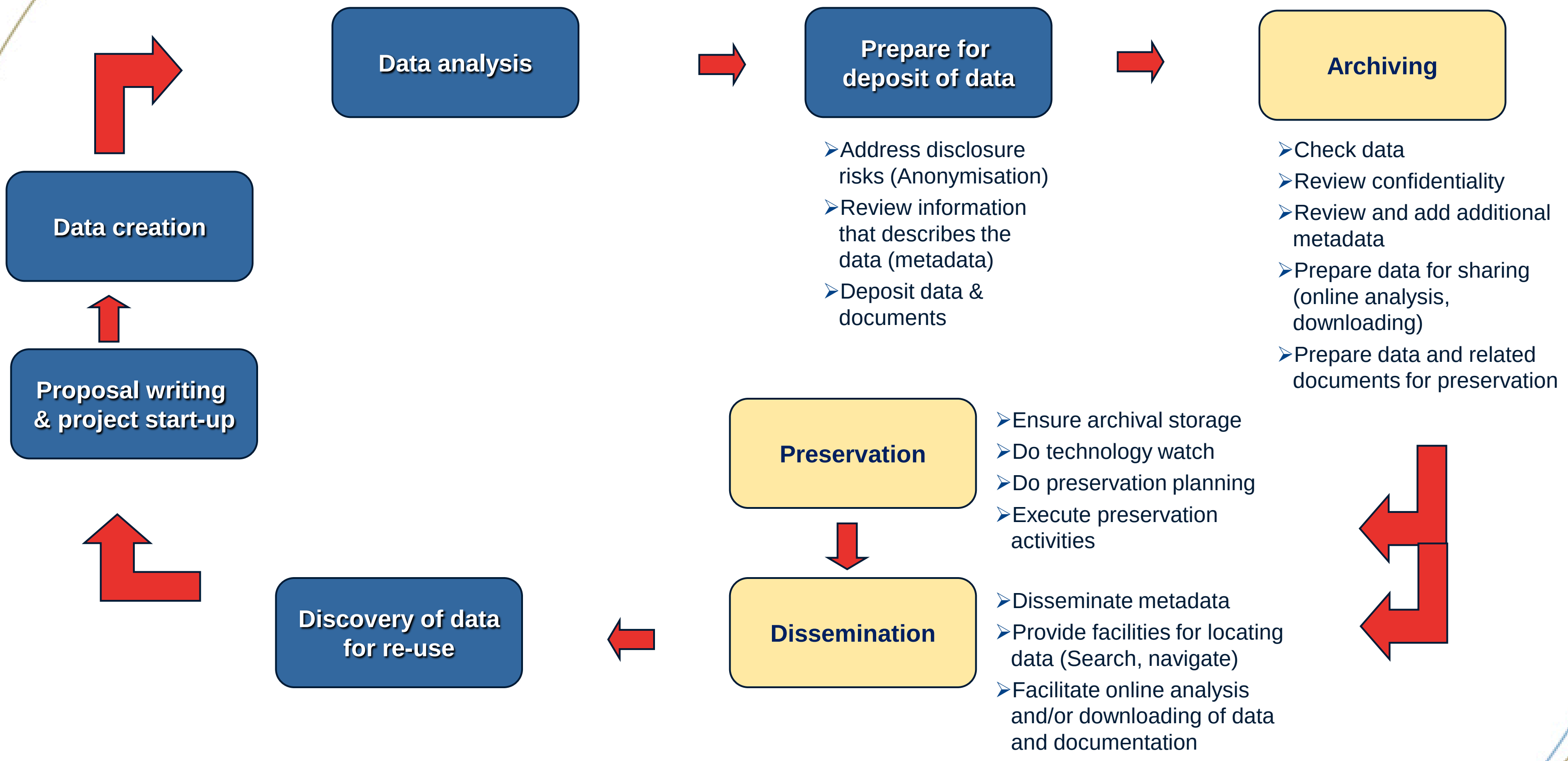
Primary data

Defining data curation

The activity of, managing and promoting the use of data from its point of creation, to ensure it is fit for contemporary purpose, and available for discovery and re-use

Lord, P. & Macdonald, A. (2003). *Data curation for e-Science in the UK: an audit to establish requirements for future curation and provision.* e-Science Curation Report prepared for: The JISC Committee for the Support of Research (JCSR) http://www.jisc.ac.uk/uploaded_documents/e-ScienceReportFinal.pdf

Data curation – A process



Proposal writing & project start-up

Data creation

Data analysis

Prepare for deposit of data

- ➢Address disclosure risks (Anonymisation)
- ➢Review information that describes the data (metadata)
- ➢Deposit data & documents

Archiving

- ➢Check data
- ➢Review confidentiality
- ➢Review and add additional metadata
- ➢Prepare data for sharing (online analysis, downloading)
- ➢Prepare data and related documents for preservation

Preservation

- ➢Ensure archival storage
- ➢Do technology watch
- ➢Do preservation planning
- ➢Execute preservation activities

Dissemination

- ➢Disseminate metadata
- ➢Provide facilities for locating data (Search, navigate)
- ➢Facilitate online analysis and/or downloading of data and documentation

Discovery of data for re-use

(Based on ICPSR Guide to Social Science Data Preparation and Archiving, 2009:5)

Drivers for data curation

- Technology obsolescence of digital objects, media, etc.
- Open access to data from public funded research
- Best practices
  - Accountability - Future requirement for access to data when publishing in accredited journals/publications
  - Potential for creating 'new' knowledge from existing data is recognised
  - Institutional asset management
- Shift towards e-research and participation in the global research arena
- Promoting the institution, research group or individual

Day, M. (2008). *Current and Emerging Scientific Data Curation Practices*. 4th Summer School on preservation in digital libraries, Tirrenia, Italy, 12 June.

Why data curation?

- Contribute to advance science
- Contribute to data quality improvement
- Ethical management of research data
- Cost effective
- Data is intellectual currency – valuable, competitive edge
- Minimise data-at-risk

Roles and responsibilities

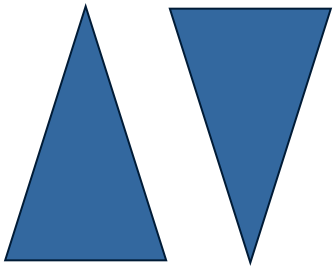
- Scientist
- Institution
- Data centre
- User
- Funder
- Publisher
- Government

Lyon, L. (2007). *Dealing with Data: Roles, Rights, Responsibilities and Relationships Consultancy Report*. Paper delivered at the JISC Digital Repositories Conference, Manchester, June.

http://www.jisc.ac.uk/media/documents/programmes/digitalrepositories/dealing_with_data_report.pdf:

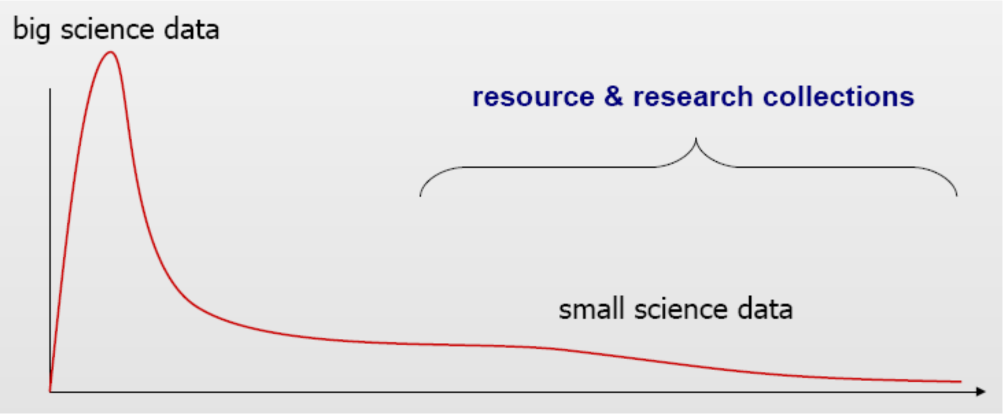
Digital repository types

- Three levels of collections
  - Research
  - Resource
  - Reference



ETD Collections?

National Science Board (2005). *Long-Lived Digital Data Collections: Enabling Research and Education in the 21st Century*. National Science Board, USA.
http://www.nsf.gov/pubs/2005/nsb0540/



Palmer, C.L. (2008). *Contouring Curation for Disciplinary Difference and the Needs of Small Science*. Sun PASIG Fall 2008 Meeting. 26 October.

Barriers and challenges

- Existence of data
- Nature of the data
- Technical
- Policies
- Research culture
- Cost
- Confidentiality

Day, M. (2008). *Current and Emerging Scientific Data Curation Practices*. 4th Summer School on preservation in digital libraries, Tirrenia, Italy, 12 June.

What should be in place?

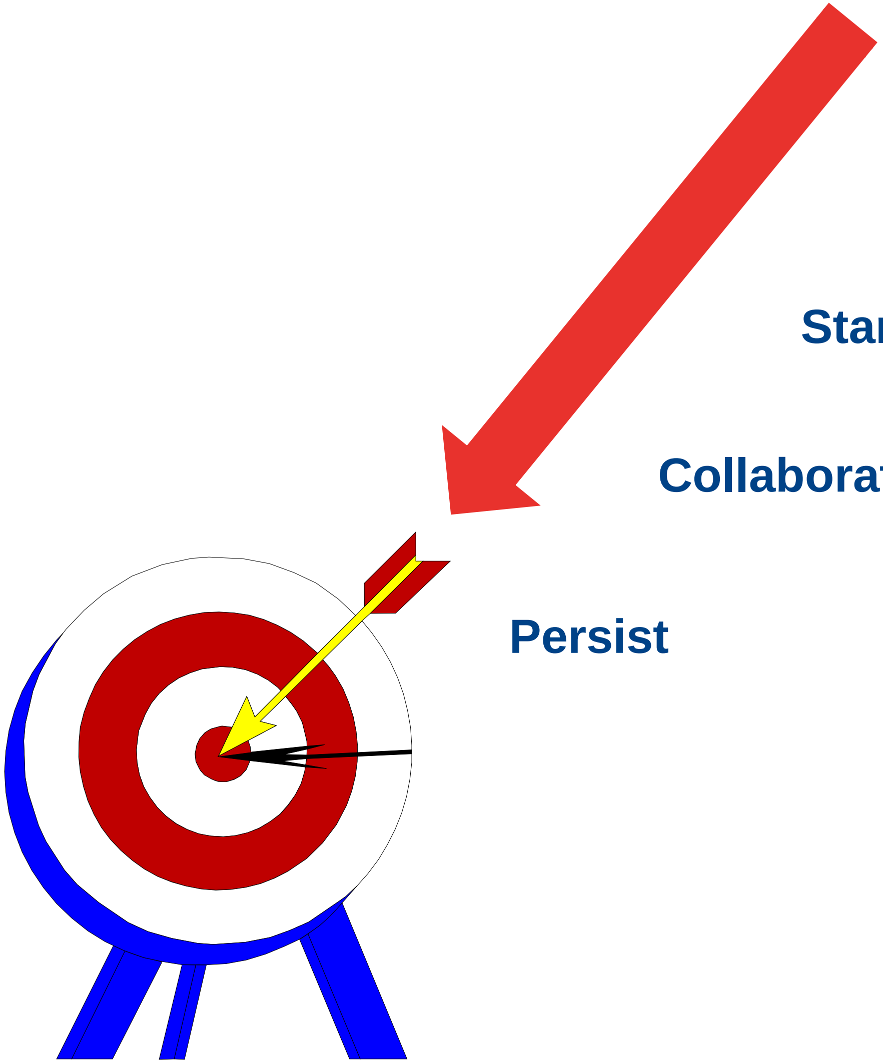
- Collection development
- Depositor support
- Digital object management
- Promotion of secondary data discovery and use

- Policies
- Procedures
- Technology
- Capacity
- Financial resources

Models, standards

- OAIS
- TRAC

Can this become a reality?



Learn

Start small

Collaborate

Persist

Where to start?

- **Bottom-up**
  - What is research and data all about?
  - What are researcher expectations?
  - How can researchers be supported?
  - How do researchers manage and document data?
  - What are the domain specific ontology, thesaurus, or metadata scheme?
  - Which data repository services do the researchers use?
- **Top-down**
  - What is the organisations priorities?
  - What is aim of the repository?
  - What is organisational commitment, policies, procedures, resources?

Walters, T.O. (2009). Data Curation Program Development in U.S. Universities:
The Georgia Institute of Technology Example. The International Journal of Digital Curation
3(4):83-92. www.ijdc.net/index.php/ijdc/article/view/136/153

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Where to start? (cont.)

- **Outside-in**
  - What are the policies of the top journals in the domain?
  - What are legislatory, regulatory requirements?
  - What is the research culture like?
  - What are the policies of funders of research in the domain?
- **Inside-out**
  - What resources, technology, capacity can be used?

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Data Repository Prospectus

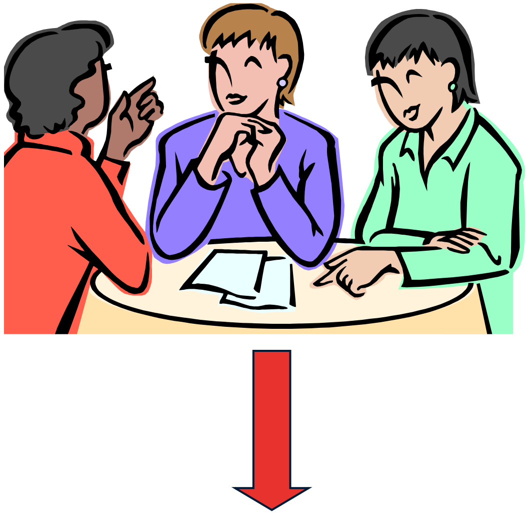
What to do?

- Engage with data producers
- Develop facilitating workflows
- Implement a suitable technology platform
- Develop data curation policies
- Create and pilot service models
- Do change management

Walters, T.O. (2009). Data Curation Program Development in U.S. Universities:
The Georgia Institute of Technology Example. The International Journal of Digital Curation 3(4):83-92.
www.ijdc.net/index.php/ijdc/article/view/136/153

Engage with data producers

Data interview



Data management plan (DMP)

A DMP describes the data that will be authored as well as how the data will be managed and made accessible throughout its lifetime.

National Science Board (2005). *Long-Lived Digital Data Collections: Enabling Research and Education in the 21st Century*. National Science Board, USA.
http://www.nsf.gov/pubs/2005/nsb0540/

Data management planning

- The contents of a data management plan (DMP)
  - The types of data to be authored
  - The standards that would be applied for format, metadata content, etc.
  - Provisions for archiving and preservation
  - Access requirements and provisions and
  - Plans for eventual transition or termination of the data collection in the long term future

http://www.researchdata.monash.edu.au/guidelines/deposit.html

Develop workflows

- Part of research / data life cycle / Embedded within the workflows of particular research communities
  - Data management planning
  - Data documentation
  - Ethics approval
- Cater for lifecycle steps that are
  - essential in terms of digital object management
  - most critical to an institution's scientists
- Tools
  - Consider collaboration environments as an implementation mechanism

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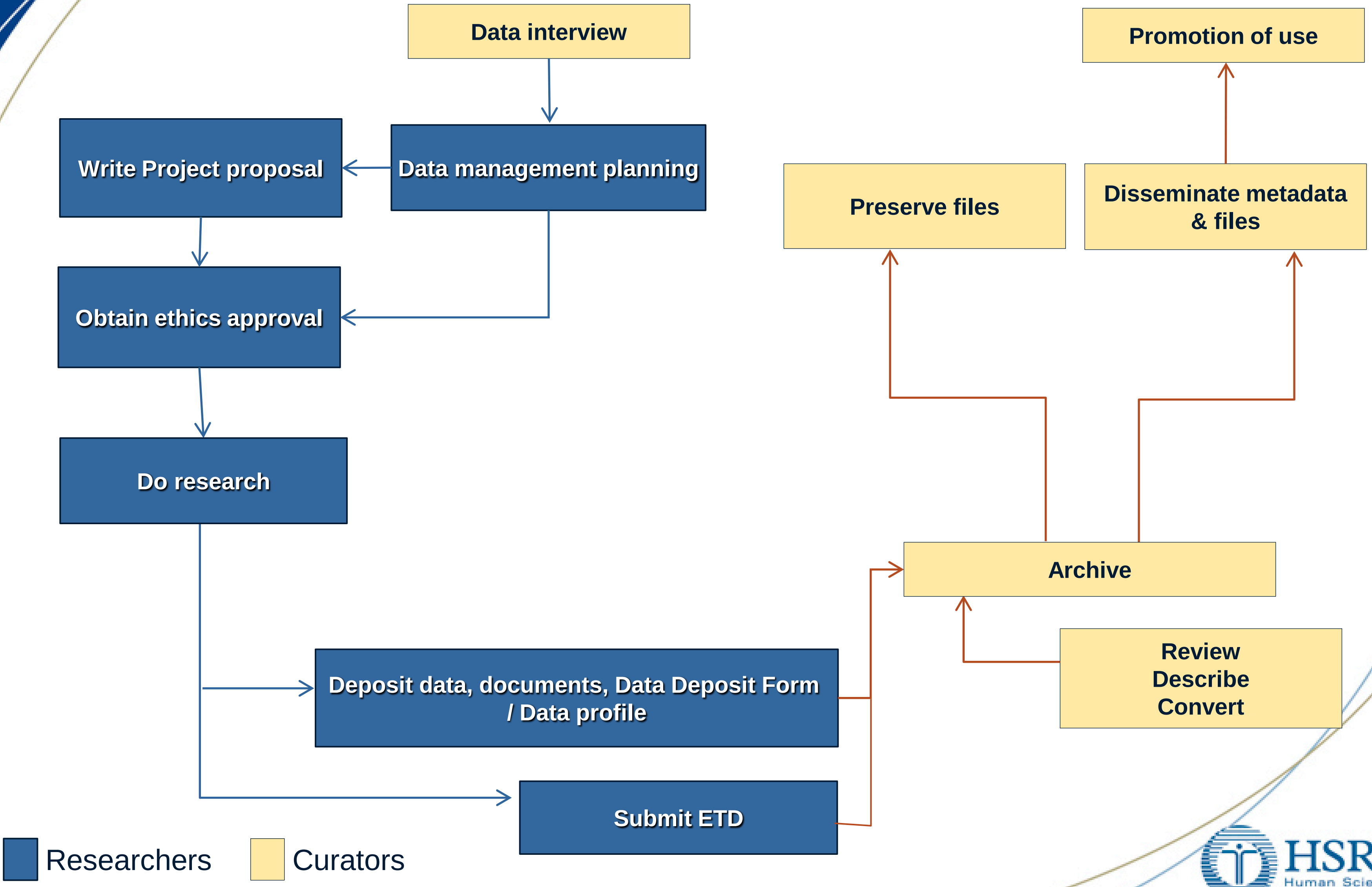
Process flow - Example



Data interview

Write Project proposal

Data management planning

Obtain ethics approval

Do research

Deposit data, documents, Data Deposit Form / Data profile

Submit ETD

Archive

Review
Describe
Convert

Preserve files

Disseminate metadata & files

Promotion of use

🟦 Researchers 🟨 Curators

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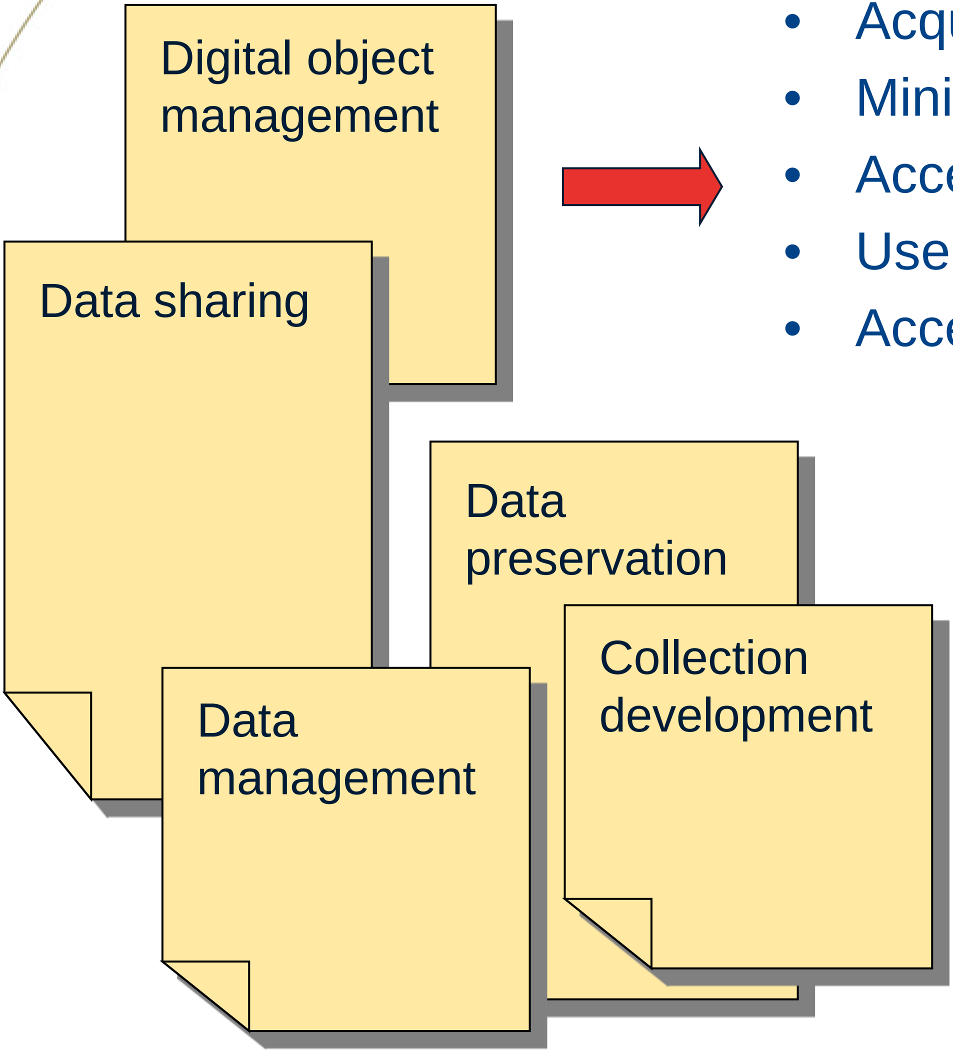
Develop data curation policies



- Acquisition
- Minimally required metadata
- Acceptable digital formats
- Use and re-use parameters
- Access regulation

Walters, T.O. (2009). Data Curation Program Development in U.S. Universities: The Georgia Institute of Technology Example. The International Journal of Digital Curation 3(4):83-92. www.ijdc.net/index.php/ijdc/article/view/136/153

Create and pilot service models

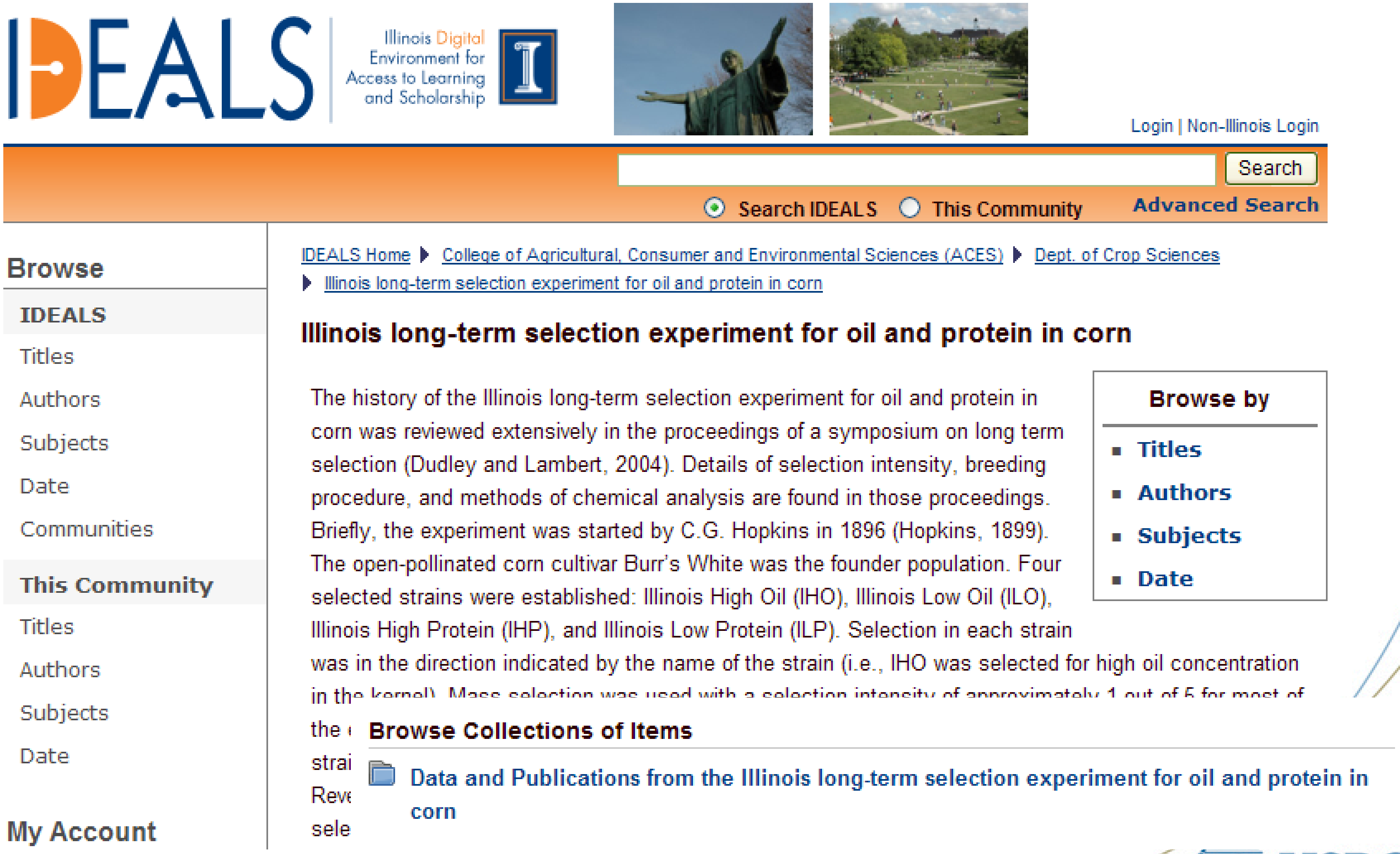
- For depositors
  - Guidance, support
- For digital objects
  - Storage, description, access management, preservation
- For data users:
  - Data discovery (promotion)
  - Data use (training)

Implement a technology platform

- Functionality
  - Ingest, describe, store, access, share, reuse, preserve
- Metadata
- Access (including monitoring of data use)
- Storage
- Connectivity
- Security and disaster recovery
- Preservation
- Persistence

Technology platform - Example

Institutional repository of the University of Illinois at Urbana-Champaign



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IDEALS Home ▶ College of Agricultural, Consumer and Environmental Sciences (ACES) ▶ Dept. of Crop Sciences ▶ Illinois long-term selection experiment for oil and protein in corn

Illinois long-term selection experiment for oil and protein in corn

The history of the Illinois long-term selection experiment for oil and protein in corn was reviewed extensively in the proceedings of a symposium on long term selection (Dudley and Lambert, 2004). Details of selection intensity, breeding procedure, and methods of chemical analysis are found in those proceedings. Briefly, the experiment was started by C.G. Hopkins in 1896 (Hopkins, 1899). The open-pollinated corn cultivar Burr's White was the founder population. Four selected strains were established: Illinois High Oil (IHO), Illinois Low Oil (ILO), Illinois High Protein (IHP), and Illinois Low Protein (ILP). Selection in each strain was in the direction indicated by the name of the strain (i.e., IHO was selected for high oil concentration in the kernel). Mass selection was used with a selection intensity of approximately 1 out of 5 for most of the
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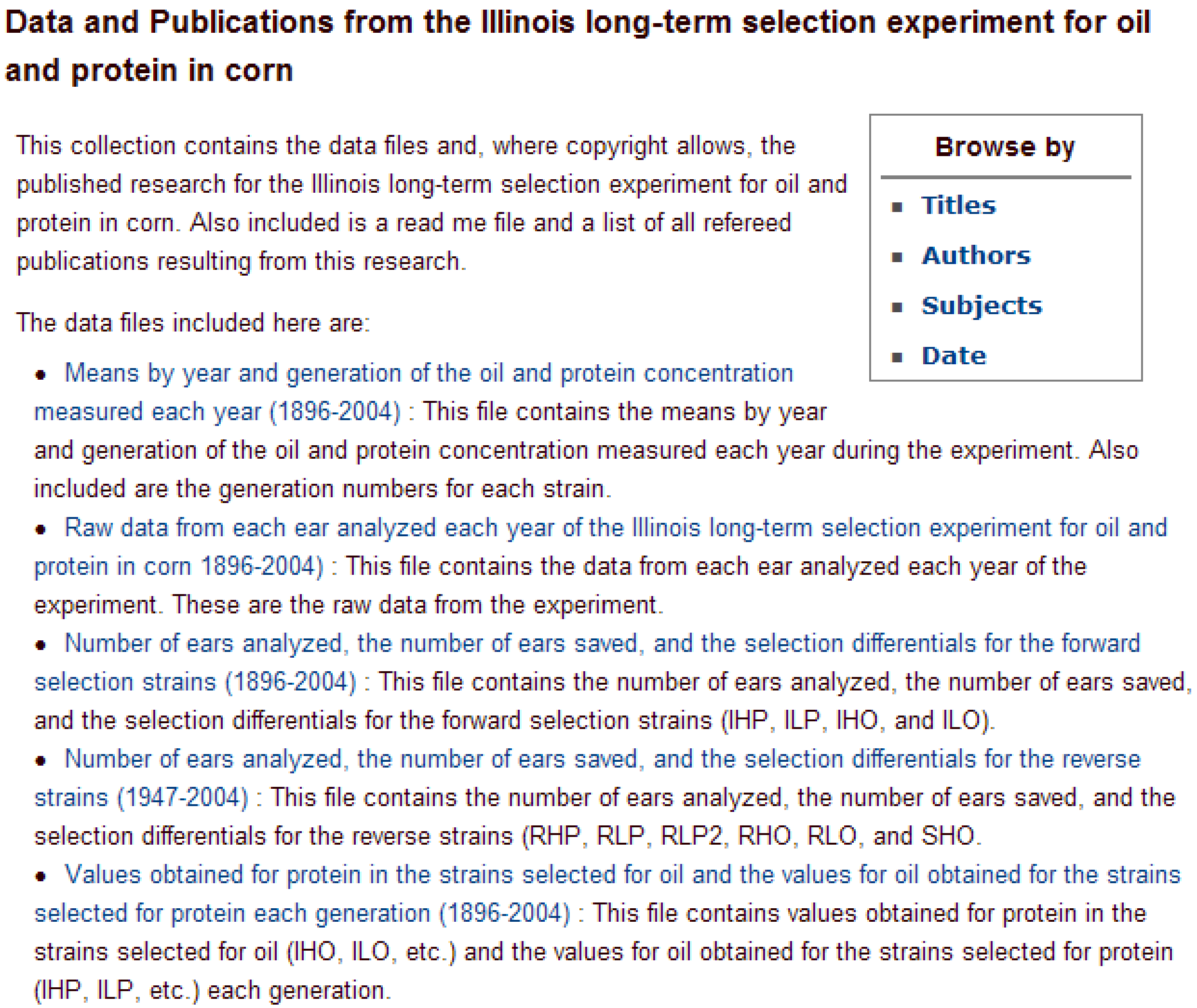
Browse Collections of Items

Data and Publications from the Illinois long-term selection experiment for oil and protein in corn

https://www.ideals.illinois.edu/handle/2142/3524



Data and Publications from the Illinois long-term selection experiment for oil and protein in corn

This collection contains the data files and, where copyright allows, the published research for the Illinois long-term selection experiment for oil and protein in corn. Also included is a read me file and a list of all refereed publications resulting from this research.

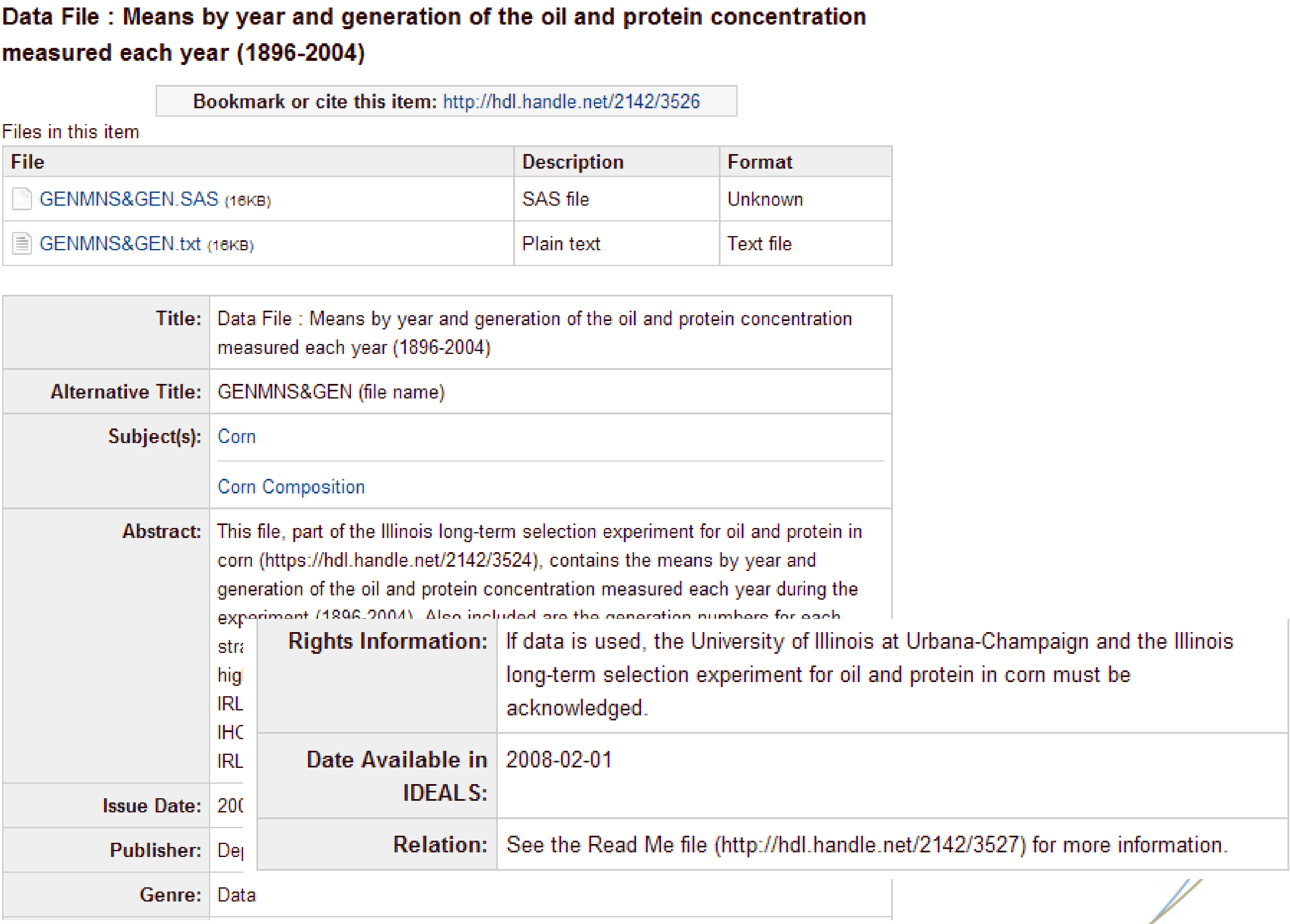
Browse by

- **Titles**
- **Authors**
- **Subjects**
- **Date**

The data files included here are:

- Means by year and generation of the oil and protein concentration measured each year (1896-2004) : This file contains the means by year and generation of the oil and protein concentration measured each year during the experiment. Also included are the generation numbers for each strain.
- Raw data from each ear analyzed each year of the Illinois long-term selection experiment for oil and protein in corn 1896-2004) : This file contains the data from each ear analyzed each year of the experiment. These are the raw data from the experiment.
- Number of ears analyzed, the number of ears saved, and the selection differentials for the forward selection strains (1896-2004) : This file contains the number of ears analyzed, the number of ears saved, and the selection differentials for the forward selection strains (IHP, ILP, IHO, and ILO).
- Number of ears analyzed, the number of ears saved, and the selection differentials for the reverse strains (1947-2004) : This file contains the number of ears analyzed, the number of ears saved, and the selection differentials for the reverse strains (RHP, RLP, RLP2, RHO, RLO, and SHO.
- Values obtained for protein in the strains selected for oil and the values for oil obtained for the strains selected for protein each generation (1896-2004) : This file contains values obtained for protein in the strains selected for oil (IHO, ILO, etc.) and the values for oil obtained for the strains selected for protein (IHP, ILP, etc.) each generation.

https://www.ideals.illinois.edu/handle/2142/3525



Data File : Means by year and generation of the oil and protein concentration measured each year (1896-2004)

Bookmark or cite this item: http://hdl.handle.net/2142/3526

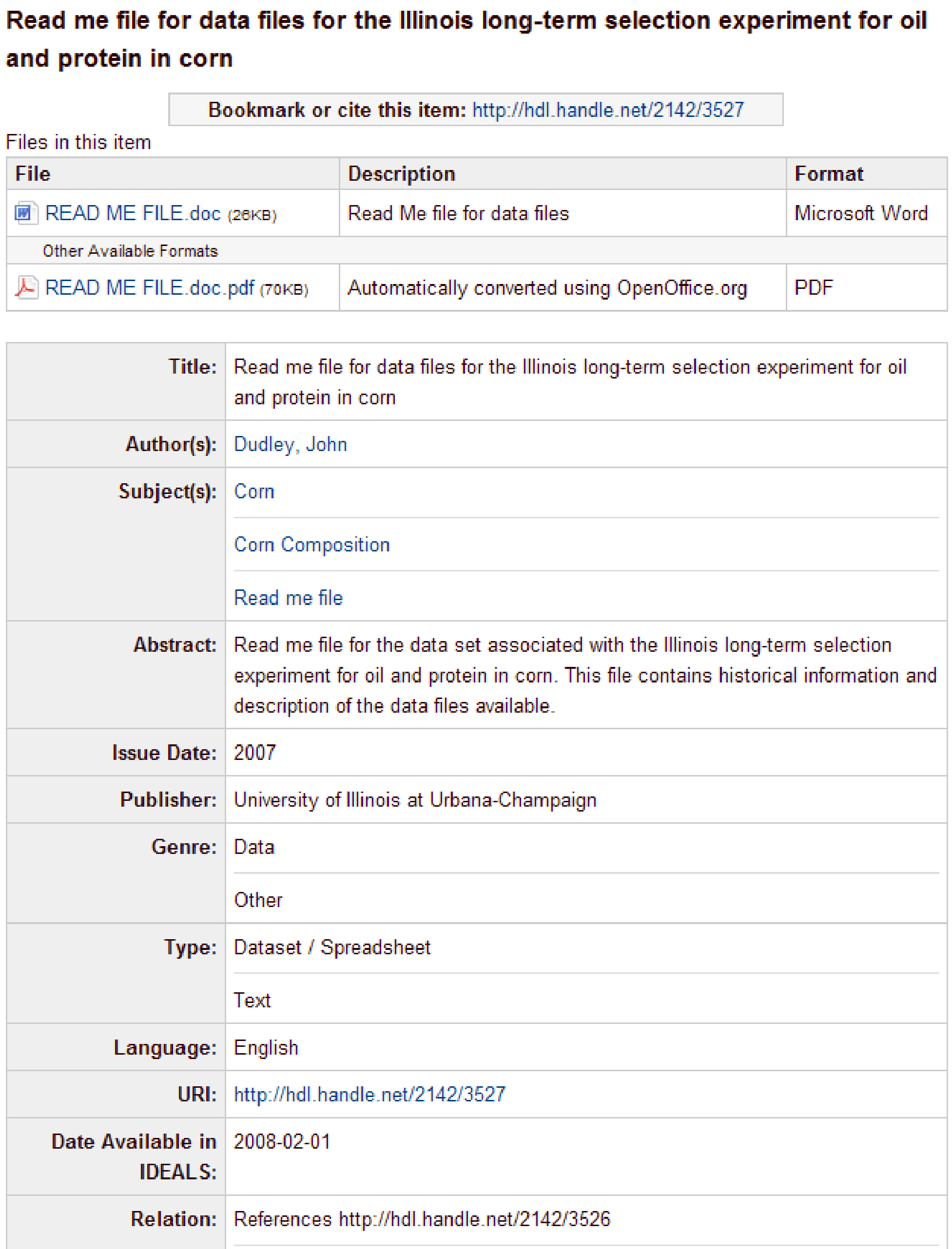
Files in this item

File	Description	Format
GENMNS&GEN.SAS (16KB)	SAS file	Unknown
GENMNS&GEN.txt (16KB)	Plain text	Text file

Title:	Data File : Means by year and generation of the oil and protein concentration measured each year (1896-2004)
Alternative Title:	GENMNS&GEN (file name)
Subject(s):	Corn Corn Composition
Abstract:	This file, part of the Illinois long-term selection experiment for oil and protein in corn (https://hdl.handle.net/2142/3524), contains the means by year and generation of the oil and protein concentration measured each year during the experiment (1896-2004). Also included are the generation numbers for each stra hig IRL IHC IRL
Issue Date:	200
Publisher:	Dep
Genre:	Data

Rights Information:	If data is used, the University of Illinois at Urbana-Champaign and the Illinois long-term selection experiment for oil and protein in corn must be acknowledged.
Date Available in IDEALS:	2008-02-01
Relation:	See the Read Me file (http://hdl.handle.net/2142/3527) for more information.

https://www.ideals.illinois.edu/handle/2142/3526



Read me file for data files for the Illinois long-term selection experiment for oil and protein in corn

Bookmark or cite this item: http://hdl.handle.net/2142/3527

Files in this item

File	Description	Format
READ ME FILE.doc (26KB)	Read Me file for data files	Microsoft Word
Other Available Formats		
READ ME FILE.doc.pdf (70KB)	Automatically converted using OpenOffice.org	PDF

Title:	Read me file for data files for the Illinois long-term selection experiment for oil and protein in corn
Author(s):	Dudley, John
Subject(s):	Corn Corn Composition Read me file
Abstract:	Read me file for the data set associated with the Illinois long-term selection experiment for oil and protein in corn. This file contains historical information and description of the data files available.
Issue Date:	2007
Publisher:	University of Illinois at Urbana-Champaign
Genre:	Data Other
Type:	Dataset / Spreadsheet Text
Language:	English
URI:	http://hdl.handle.net/2142/3527
Date Available in IDEALS:	2008-02-01
Relation:	References http://hdl.handle.net/2142/3526

http://www.ideals.illinois.edu/handle/2142/3527

Do change management

- Do advocacy
- Demonstrate success and value incrementally
- Obtain executive custody
- Do training and provide support
- Build relationships

Thank you

Building the bridge between
research, policy and action

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