Title
Digital Libraries: Now here, or nowhere? (Keynote)

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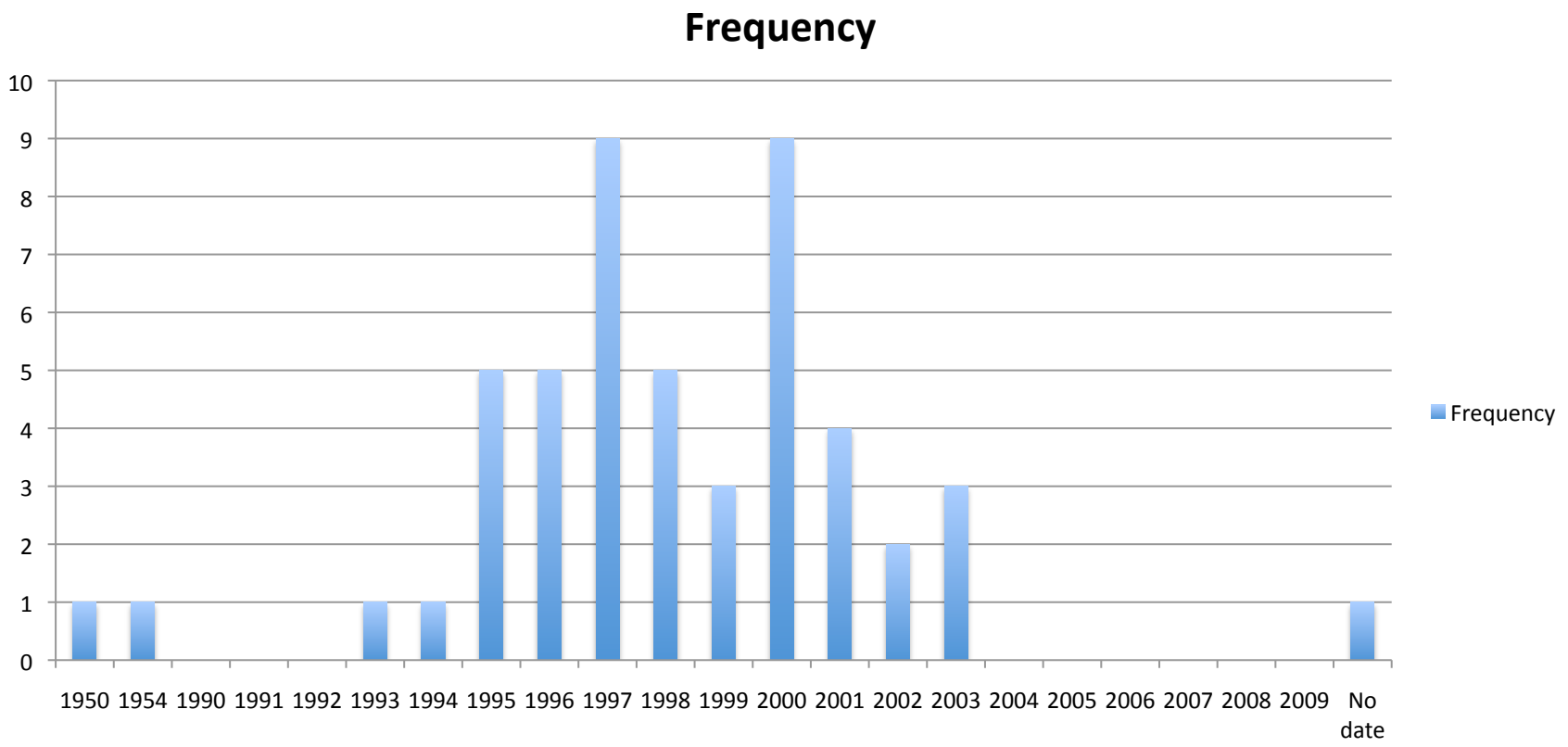
Digital Libraries: Now here, or nowhere?

Christine L. Borgman
Professor & Presidential Chair in Information Studies, UCLA
JCDL Keynote, Austin, Texas, 2009

Wordle of Borgman, 1999, What are digital libraries? Competing visions. Information Processing & Management

“Digital library” term usage



First 50 items retrieved in Google Scholar with term “digital library,” June 8, 2009

Digital Libraries, defined

Social Aspects of Digital Libraries, Report of NSF workshop, 1996

1. Digital libraries are a set of electronic resources and associated technical capabilities for creating, searching, and using information. In this sense they are an extension and enhancement of information storage and retrieval systems that manipulate digital data in any medium (text, images, sounds; static or dynamic images) and exist in distributed networks. The content of digital libraries includes data, metadata that describe various aspects of the data (e.g., representation, creator, owner, reproduction rights), and metadata that consist of links or relationships to other data or metadata, whether internal or external to the digital library.

2. Digital libraries are constructed—collected and organized—by [and for] a community of users, and their functional capabilities support the information needs and uses of that community. They are a component of communities in which individuals and groups interact with each other, using data, information, and knowledge resources and systems. In this sense they are an extension, enhancement, and integration of a variety of information institutions as physical places where resources are selected, collected, organized, preserved, and accessed in support of a user community. These information institutions include, among others, libraries, museums, archives, and schools, but digital libraries also extend and serve other community settings, including classrooms, offices, laboratories, homes, and public spaces.

Digital Libraries, deconstructed

- Action: create, search, use information
- Content:
  - digital data in any medium
  - data and metadata
- Access: distributed networks
- Relationships:
  - links to other data or metadata
  - internal or external to the digital library
- Design: community participation
- Capabilities: support community practices
- Institutions: libraries, museums, archives, schools, …

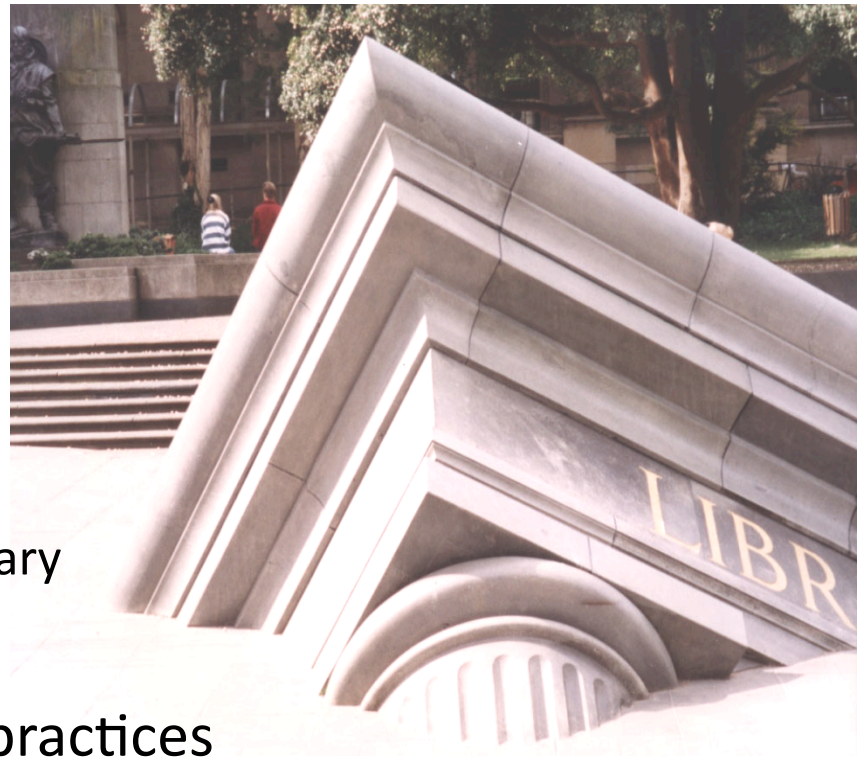
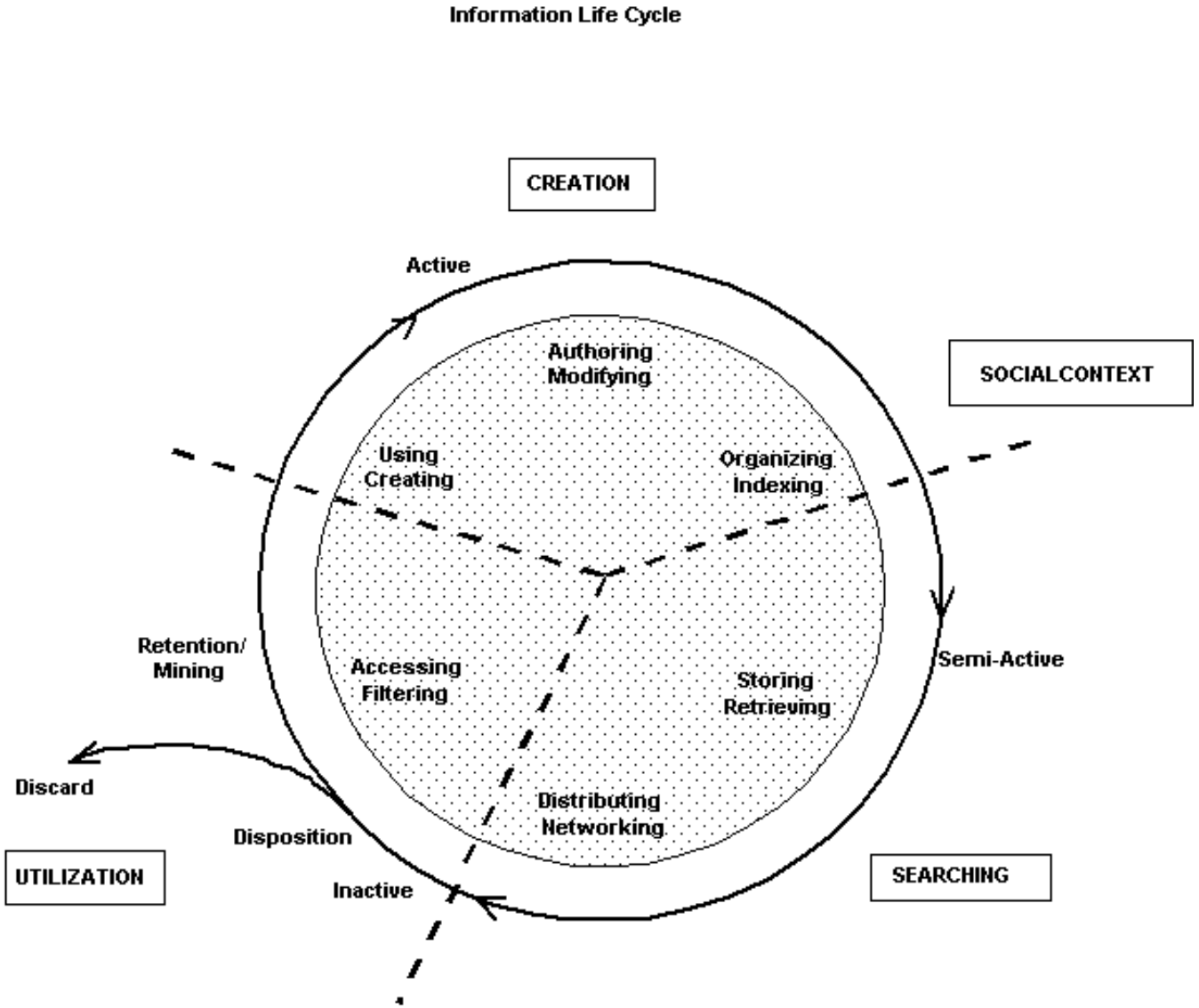


Image: Christine L. Borgman, 1995

Information Life Cycle

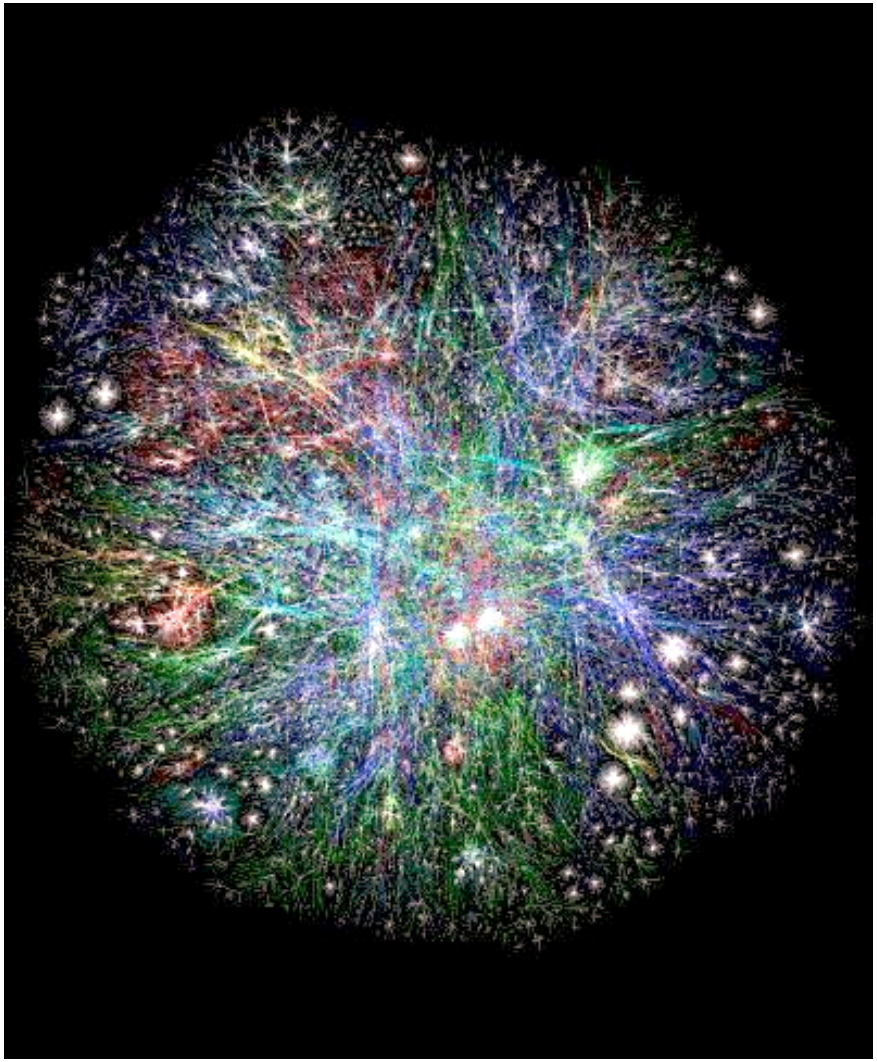


NOTE: The outer ring indicates the life cycle stages (active, semi-active, and inactive) for a given type of information artifact (such as business records, artworks, documents, or scientific data). The stages are superimposed on six types of information uses or processes (shaded circle). The cycle has three major phases: information creation, searching, and utilization. The alignment of the cycle stages with the steps of information handling and process phases may vary according to the particular social or institutional context.

Borgman et al.: Workshop Report on Social Aspects of Digital Libraries: http://www-lis.gseis.ucla.edu/DL/

Digital libraries – consolidation or connectedness*?

- NSF Digital Libraries Initiative
  - Phase 1, 1994-1998
  - Phase 2, 1999-2004
- Search engines
  - Archie, 1990
  - Google, 1998
- World Wide Web, 1994
- Cyberinfrastructure, 2003



http://www.ibiblio.org/hhalpin/homepage/presentations/de2007/webearth.jpg

*Metaphor by Matthew Mayernik

The Anatomy of a Large-S
Web Search E

Sergey Brin and Lawrenc

Computer Science Depar
Stanford University, Stanford, C
sergey@cs.stanford.edu and page@

Abstract

In this paper, we present Google, a prototype of a large-
use of the structure present in hypertext. Google is desig
and produce much more satisfying search results than ex
text and hyperlink database of at least 24 million pages i
To engineer a search engine is a challenging task. Searcl
millions of web pages involving a comparable number o
millions of queries every day. Despite the importance of
very little academic research has been done on them. Fu
technology and web proliferation, creating a web search
years ago. This paper provides an in-depth description o
first such detailed public description we know of to date
traditional search techniques to data of this magnitude, t
with using the additional information present in hyperte
paper addresses this question of how to build a practical
additional information present in hypertext. Also we loo
with uncontrolled hypertext collections where anyone ca

Keywords

World Wide Web, Search Engines, Information Retriev

Computer networks and ISDN systems, 1998 vo

DLI-1 award to Winograd and Garcia-Molina

National Science Foundation
WHERE DISCOVERIES BEGIN

SEARCH
NSF Web Site

HOME | FUNDING | AWARDS | DISCOVERIES | NEWS | PUBLICATIONS | STATISTICS | ABOUT | FastLane

Discoveries

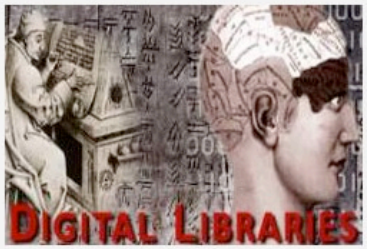
Discoveries
Search Discoveries
About Discoveries

Discoveries by Research Area
Arctic & Antarctic
Astronomy & Space
Biology
Chemistry & Materials
Computing
Earth & Environment
Education
Engineering
Mathematics
Nanoscience
People & Society
Physics

Discovery

On the Origins of Google

Even in the early days of the Internet, people saw the need for better interfaces to growing data collections. A graduate student supported by an NSF digital library project at Stanford University uncovered the missing links in Web page ranking.



Portion of Digital Libraries I logo.
Credit and Larger Version

August 17, 2004

In the primordial ooze of Internet content several hundred million seconds ago (1993), fewer than 100 Web sites inhabited the planet. Early clans of information seekers hunted for data among the far larger populations of text-only Gopher sites and FTP file-sharing servers. This was the world in the years before Google.

Even in this primitive Internet world, the need for more accessible interfaces to growing data collections had already been recognized. The National Science Foundation led the multi-agency Digital Library Initiative (DLI) that, in 1994, made its first six awards. One of those awards supported a Stanford University project led by professors Hector Garcia-Molina and Terry Winograd.

None of the early DLI proposals -- submitted before the World Wide Web experienced its Cambrian explosion -- explicitly included research into the Web. However, by the time DLI funding began, the information landscape had changed.

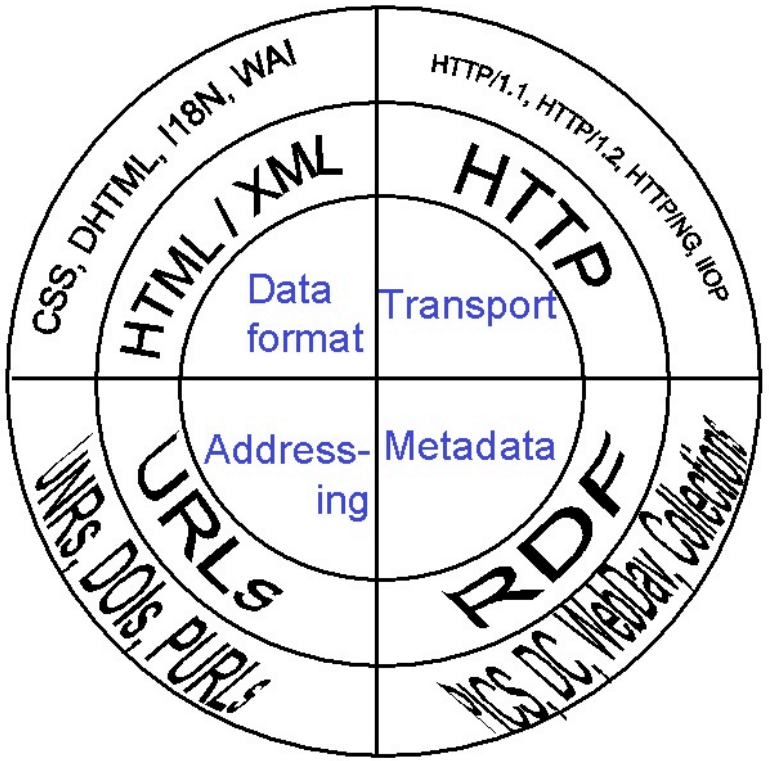
In 1994, some of the first Web search tools crawled out of the Internet sea. Two Stanford students started Yahoo!, a manually constructed "table of contents" for Web sites. Other early search engines emerged, such as Lycos and WebCrawler, and began automatically indexing Web pages, focusing on keyword-based techniques to rank search results.

Around the same time, one of the graduate students funded under the NSF-supported DLI project at Stanford took an interest in the Web as a "collection." The student was Larry Page.

Page uncovered the missing links, so to speak, in Web page ranking. His evolutionary leap was to recognize that the act of linking one page to another required conscious effort, which in turn was evidence of human judgment about the link's destination. Individually, each link was a simple but effective tool. But collectively, millions of these links provided a

World Wide Web

- Web architecture and services
  - Initial architecture, 1990
  - Mosaic browser, 1993
  - “Year of the Web,” 1994
- NSF Digital Libraries Initiative
  - Phase 1, 1994-1998
  - Phase 2, 1999-2004
- Open Archives Initiative
  - Protocol for Metadata Harvesting
  - Objective Reuse and Exchange



http://www.ukoln.ac.uk/web-focus/events/conferences/ucisa-tlig98/talk/images/web-archi-more.gif


http://gallery.photo.net/photo/6426520-lg.jpg

Google shakespeare first folio Search Advanced Search Preferences

Web Show options... Results 1 - 10 of about 1,260,000 for shakespeare first folio. (0.34 seconds)

The Shakespeare First Folio
The following sources were used in compiling the **First Folio** database: Mr. William **Shakespeares** comedies, histories, & tragedies. Published according to the ...
etext.virginia.edu/**shakespeare**/**folio**/ - Cached - Similar

University of Virginia Shakespeare Resources Online
The Electronic Text Center's holdings include a variety of **Shakespeare** resources that range from early Quartos, the complete 1623 **First Folio**, ...
etext.virginia.edu/**shakespeare**/ - Cached - Similar

First Folio - Wikipedia, the free encyclopedia
The **First Folio** of **Shakespeare**, Introduction by Doug Mostin, ... Greg, W. W. The **Shakespeare First Folio**: Its Bibliographical and Textual History. ...
en.wikipedia.org/wiki/**First_Folio** - Cached - Similar

Image results for shakespeare first folio - Report images


William Shakespeare - The First Folio
Visit this William **Shakespeare** site including information about the **First Folio**. Educational resource for the **First Folio** and William **Shakespeare**.
www.william-**shakespeare**.info/william-**shakespeare**-**first**-**folio**.htm - Cached - Similar

First Folio Shakespeare Festival
Equity, not-for-profit theatre specializing in outdoor summer **Shakespeare** productions and educational touring. Based at the Peabody Estate at Mayslake ...
Show map of 146 Juliet Ct, Clarendon Hills, IL 60514
Macbeth - Design for Living - Dan Allar - Dining & Lodging
www.**firstfolio**.org/ - Cached - Similar

Preface to Shakespeare's First Folio
Apr 4, 2008 ... Prefatory Material to **Shakespeare's First Folio**, 1623.
shakespeare.palomar.edu/**folio**1.htm - Cached - Similar

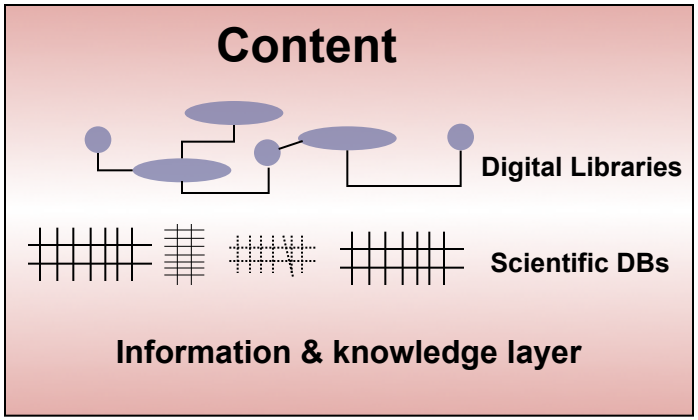
Amazon.com: The First Folio of Shakespeare: The Norton Facsimile ...
Amazon.com: The **First Folio** of **Shakespeare**: The Norton Facsimile: Folger **Shakespeare** Library, William **Shakespeare**, Charlton Hinman, Peter WM Blayney: Books.
www.amazon.com/**First**-**Folio**-**Shakespeare**-Norton-Facsimile/dp/0393039854 - Cached - Similar

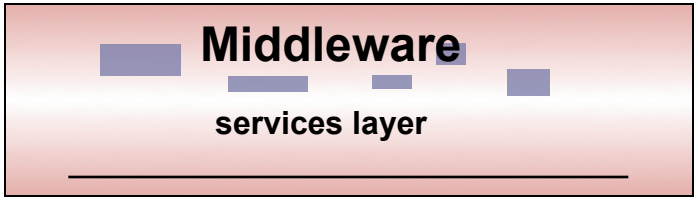
News on the Rialto: William Shakespeare first folio gets £435250 ...
Jun 6, 2008 ... A rare **first folio** of **Shakespeare's** plays, regarded as the most important book in the history of English literature, has sold for £435250 at ...
shakespearemag.blogspot.com/2008/06/william-**shakespeare**-**first**-**folio**-gets.html - Cached - Similar

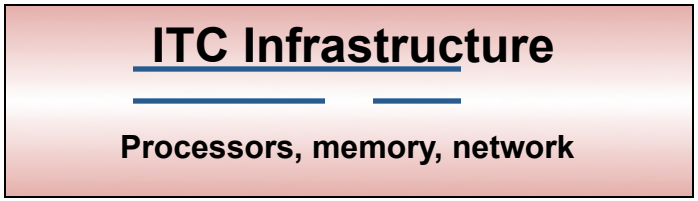
Infrastructure

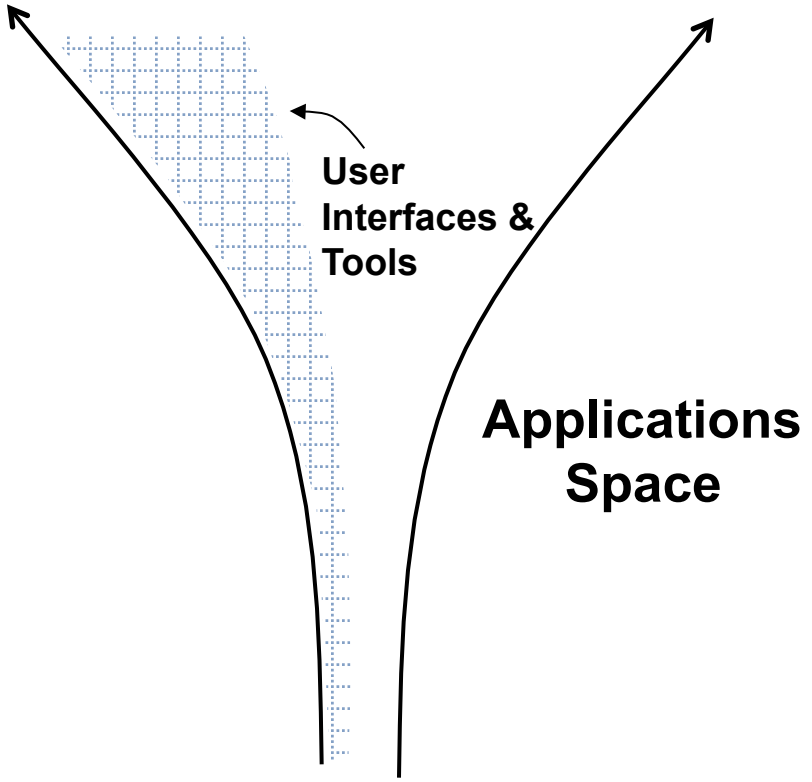
http://www.warwickshire.gov.uk/Web/corporate/pages.nsf/Links/5C513189873EB0B180257122003E3FB3/$file/28_04_06+071.jpg

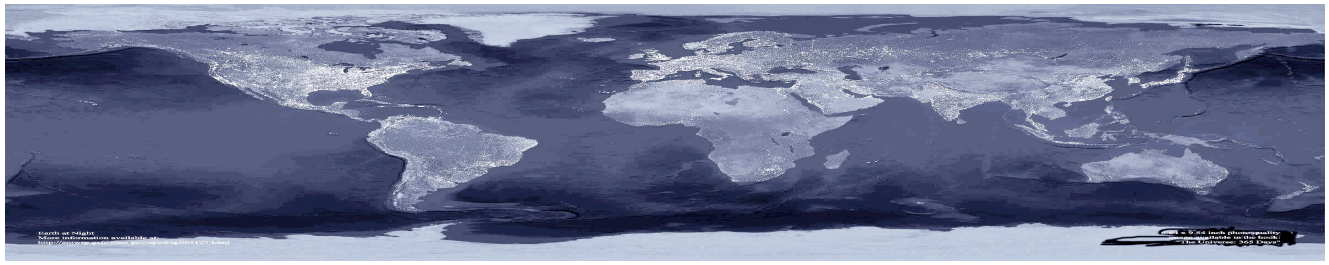
Cyberinfrastructure: Layered Model









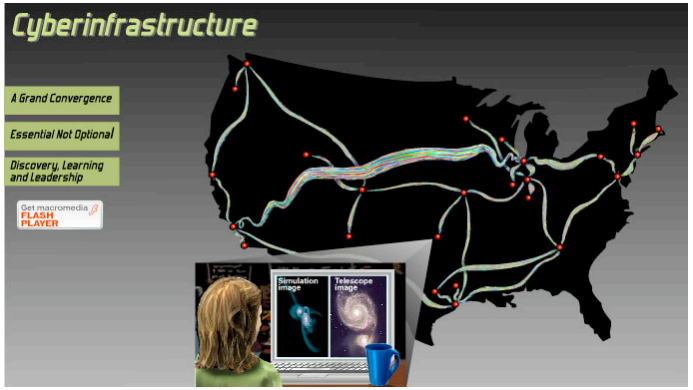


Slide courtesy of Stephen Griffin, NSF, and Norman Wiseman, JISC, 2005

Scholarly Information Infrastructure

- Cyberinfrastructure, eScience, eSocial Science, eHumanities, …eResearch

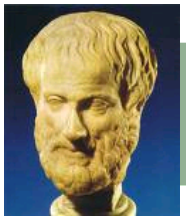
- Goal: enable new forms of scholarship that are
  - information-intensive
  - data-intensive
  - distributed
  - collaborative
  - multi-disciplinary



http://www.nsf.gov/news/special_reports/cyber/images/noflashintro.jpg

http://images.iop.org/objects/cern/cern/46/3/14/CCEbig1_04-06.jpg

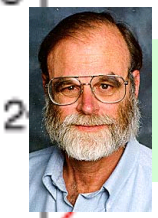
New problem solving methods



Empirical

Theory

Simulation



Data

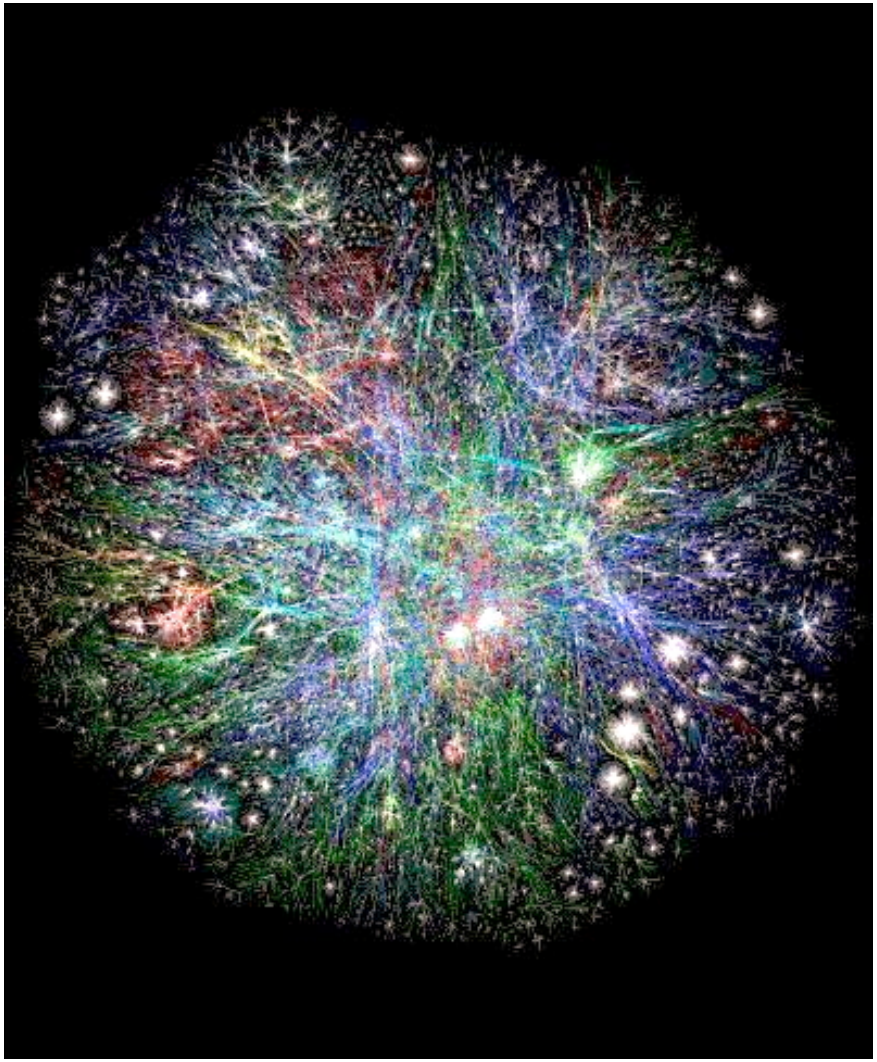
"Applied computer science is now playing the role that mathematics did from the 17th through the 20th centuries: providing an orderly, formal framework and exploratory apparatus for other sciences"

– G. Djorgovski

Slide courtesy Ian Foster, 2009

Digital libraries
Consolidation, Connectedness, Communities, Collaboration

- Alexandria Digital Earth, 1994-2005
- Data practices in embedded networked sensing, 2002-
- Cyberlearning, 2008-
- Cyberinfrastructure, 2003-
  - Life under your feet
  - Teachingwithdata.org
  - Rome Reborn
  - Worldwide Telescope



http://www.ibiblio.org/hhalpin/homepage/presentations/de2007/webearth.jpg

Evaluating a Digital Library for Undergraduate Education: A Case Study of the Alexandria Digital Earth Prototype (ADEPT)

Christine L. Borgman

University of California, Los Angeles

ADEPT PI: Terence Smith, UCSB

Co-Investigators, Education & Evaluation team:

Anne Gilliland-Swetland, Gregory Leazer, UCLA; Richard Mayer, UCSB

Student Researchers: Jason Finley, Rich Gazan, Laura Smart, Annie Zeidman (UCLA); Tricia Mautone, Rachel Nilsson, UCSB

Research funded by U.S. National Science Foundation, Digital Libraries Initiative

Project scope

- Alexandria Digital Library
  - DL-1, 1994-1998, T.R. Smith et al
  - DL of primary data sources in geography
    - Maps
    - Satellite Observations
    - Remote Sensing
    - Physical observations
- ADEPT
  - DL-2, 1999-2004, Smith, Borgman, et al
  - Build learning layer on ADL
  - Study science learning and pedagogy

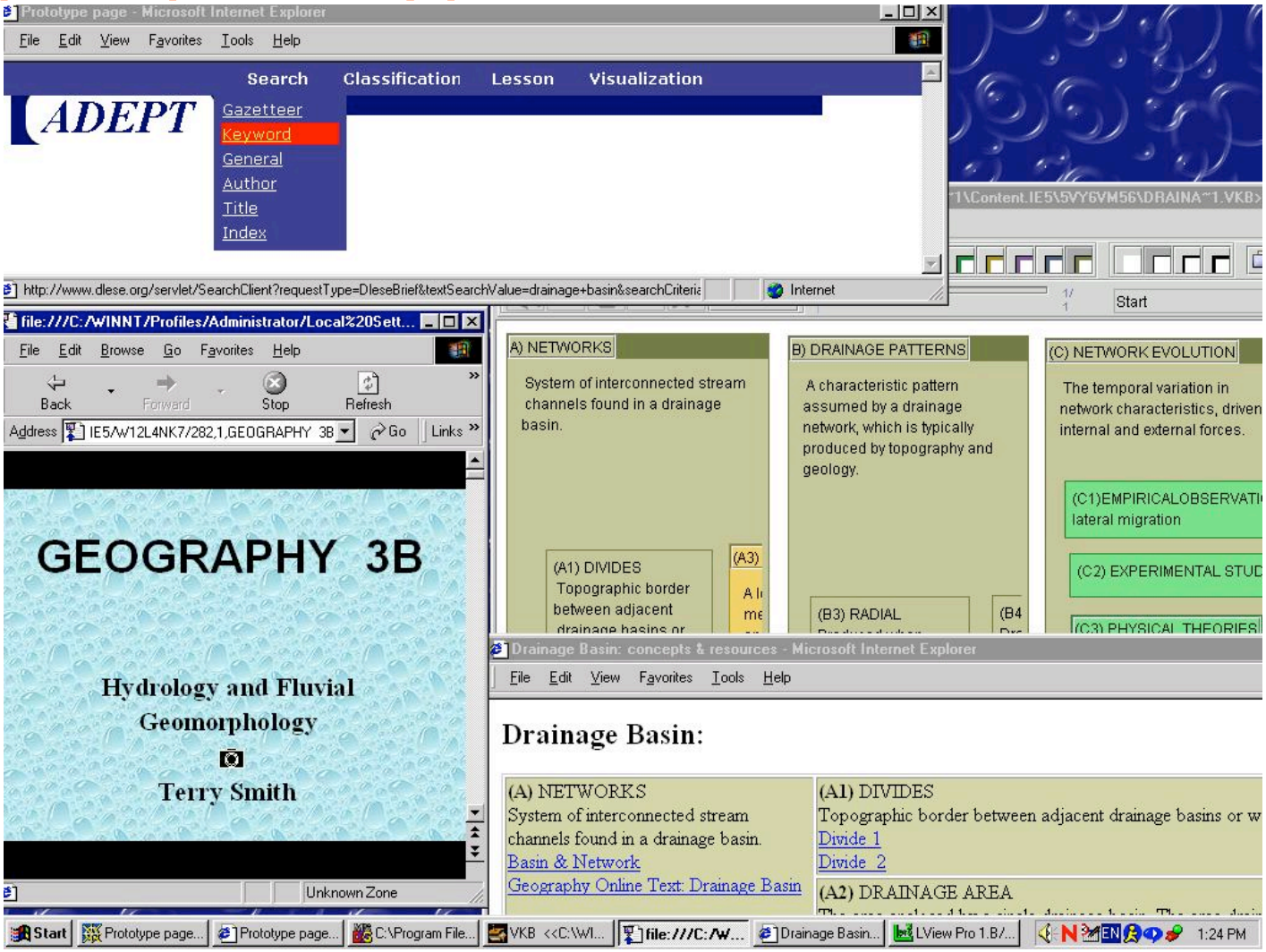
Studying digital libraries in context

- Instructional applications
  - Facilitate distributed access to content
  - Facilitate instructional design
    - Content in useful formats
    - Services to construct lectures, labs, lessons
    - Student learning environment
- University infrastructure
  - Content delivery for teaching
  - Technical capacity for distributed delivery

ADEPT instruction scenario: river networks

- Instructor
  - Prepare class lecture with ADEPT
    - Discover relevant geographic objects
    - Describe objects for personal and shared use
    - Integrates objects into personal digital libraries
  - Present lecture to students using ADEPT
- Teaching assistants
  - Review topics in lab sessions using ADEPT
  - Prepare study sessions using ADEPT
- Students
  - Use ADEPT for lab exercises
  - Use ADEPT to study for exams

Alpha prototype



ADEPT presentation, 2002

What did we learn?

- We built it and they did not come…
- Why were geography faculty not interested in using ADEPT?
  - Mismatch of ADL content to their courses
  - Mismatch of ADEPT capabilities to their teaching practices
  - Lack of university infrastructure
- What did they like about ADEPT?
  - Tools to make own data useful for teaching
  - Construct personal digital libraries

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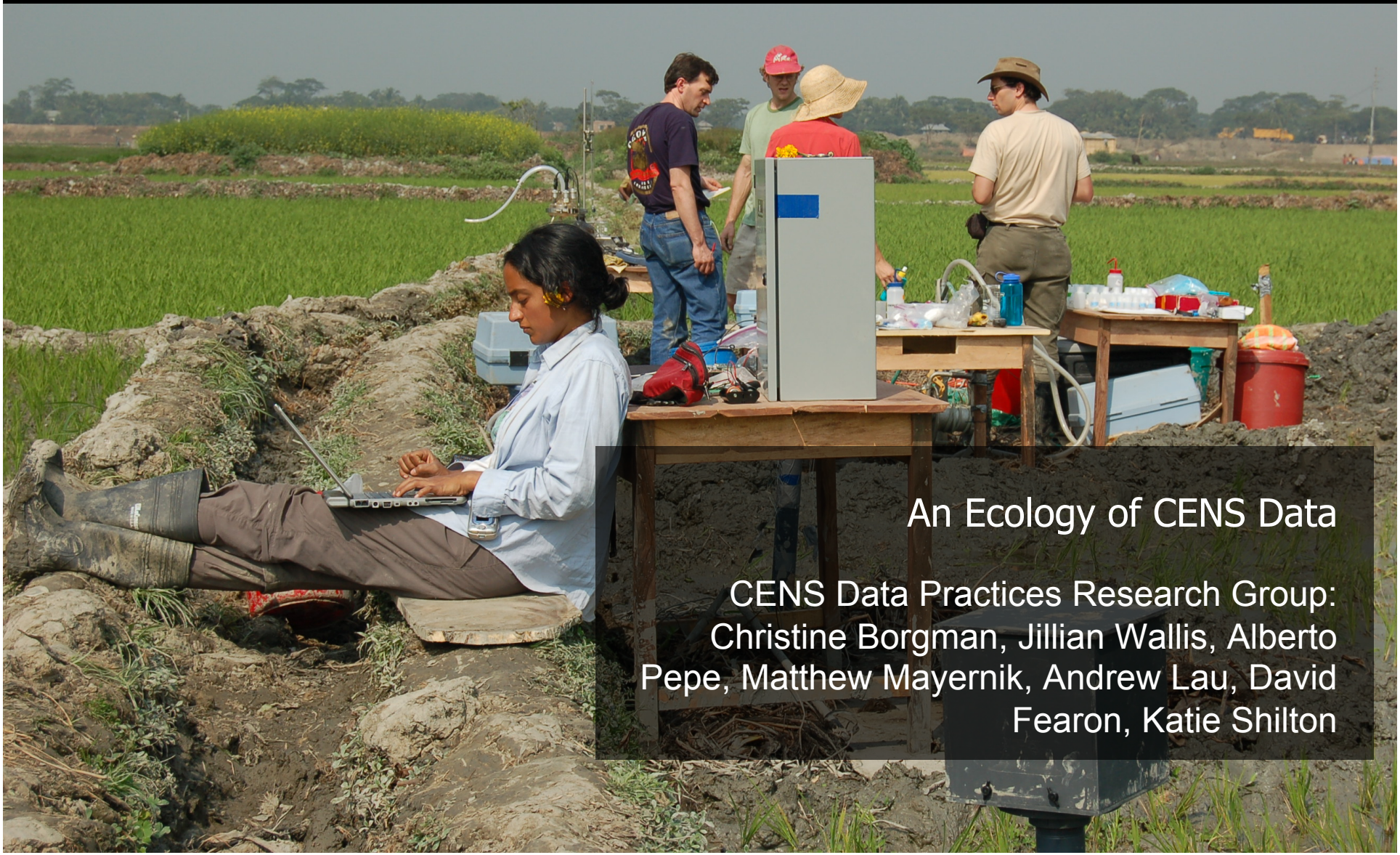

An Ecology of CENS Data

CENS Data Practices Research Group: Christine Borgman, Jillian Wallis, Alberto Pepe, Matthew Mayernik, Andrew Lau, David Fearon, Katie Shilton

Field Deployment of Embedded Sensor Networks

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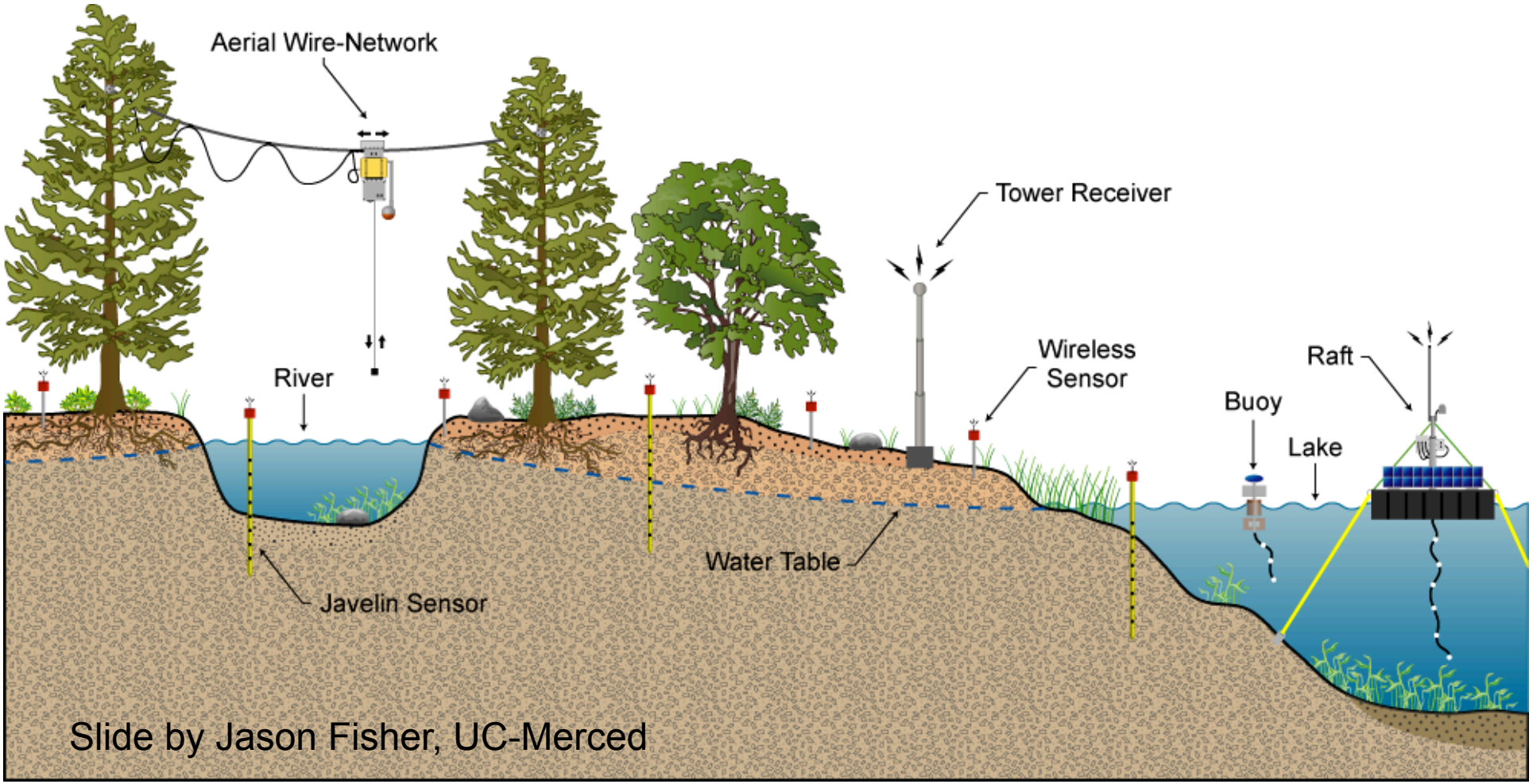

Slide by Jason Fisher, UC-Merced

Science and Education Data Models

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METADATA FOR SENSOR DATA FOR HABITAT MONITORING			METADATA FOR EDUCATION MODULES FOR HABITAT MONITORING		
CENS Schema	**SensorML**	**EML 2.0**	**LOM**	**GEM**	**ADN**
CENS_Node.Node_Name Name of Node	***Sml:IdentifiedAs*** (2.2.2)				
CENS_Node.Node_Desc Description of Node	***AssetDescription: sml:description*** (2.2.12)				
CENS_Location.Location_ID Unique location ID	***CrsID*** (2.2.5)	***Eml-Coverage*** (2.4.4)			
CENS_Location.X_Pos (Position on X axis)	***HasCRS*** (2.2.5) ***ObjectState*** (3.3.6)	***Eml-Coverage-GeographicCoverage*** (2.4.4)			
CENS_Location.Time_Recorded Time location was captured		***Eml-Coverage-TemporalCoverage*** (2.4.4)			
CENS_Location.Time_Type_ID Refers to type of time of Time_Type ID table		***Eml-Coverage*** (2.4.4)			
			Educational-Typical Age Range (5.7)	***Audience-Age***	***Audience***
			Life Cycle-Contribute (2.3)	***Creator***	***Resource Creator***
			General-Coverage (1.6)	***Coverage-Spatial, Temporal***	***Coverage (spatial and temporal)***
			Life Cycle-Date (2.3.3) ***DateTime*** (8)	***Date***	***Creation date Accession date***
			General-Description (1.4)	***Description***	***Description***
			Educational (5)	***Pedagogy***	***Educational***

Filtering data for multiple communities

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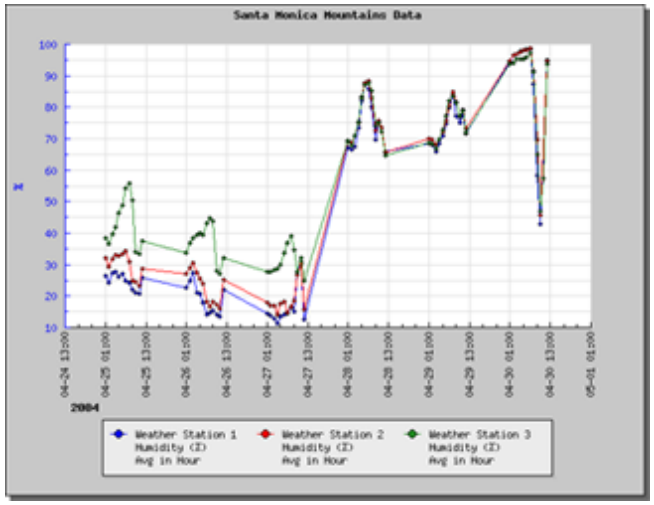
DateTime	Value	RawValue	SiteKey	MeasurementKey	SensorKey	DataKey
2004-04-30 11:17:27	57.25	0	3	1	0	32271
2004-04-30 11:17:27	22.09	0	3	2	0	32270
2004-04-30 11:17:27	41.3	0	3	3	0	32269
2004-04-30 10:59:05	46.25	0	1	1	0	10758
2004-04-30 10:59:05	23.63	0	1	2	0	10757
2004-04-30 10:59:05	1591.3	0	1	3	0	10756
2004-04-30 10:57:27	40.75	0	3	1	0	32268

Sets of ***Data*** collected

run through
Filters and Tools



to produce understandable
Tables, Charts and Graphs

CENSEI interface

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Step 1 **Choose Variables and Locations**

Location 1: Weather Station 1
Variable 1: Humidity

Location 2: Weather Station 3
Variable 2: Humidity

Step 2 **Choose Date Range**

Start Date: 2004-03-14
End Date: 2004-08-19

Daylight Only (6a-6p) All Day

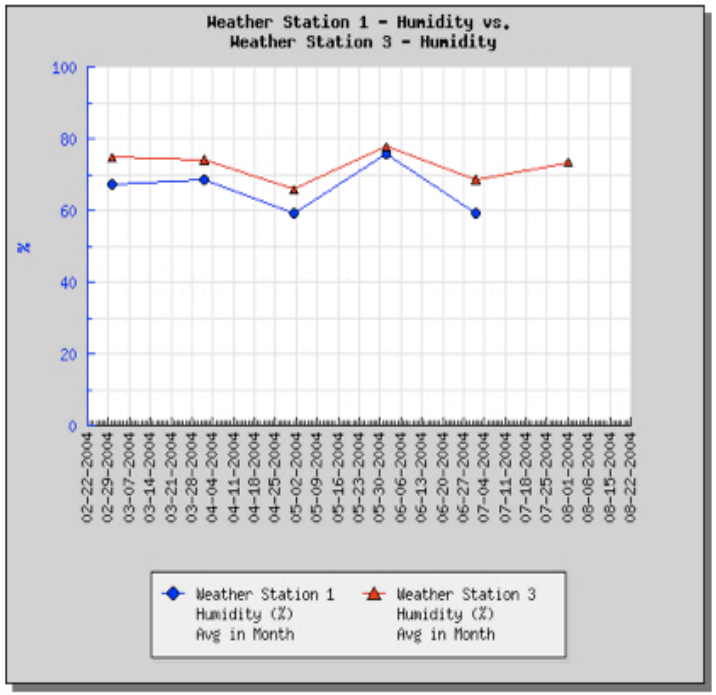
Step 3 **Choose Value and Interval**

Value: Average
Time Interval: By Month
Show Graph

Step 4 **Enter Notes & Save**

You MUST enter a note to save your graph!

Save



Sandoval et al UCLA

Use and reuse of CENS research data

- **Research questions:**
  - What are CENS data?
  - When, how, and with whom will they share data?
  - What contextual information is necessary to interpret the data?
  - What resources exist to provide metadata?
- **Application of results:**
  - Architecture to capture, manage, and provide access to CENS data
  - Leverage data resources for research and learning

Documenting Data for Interpretation

- ***"Temperature is temperature."***
- ***"There are hundreds of ways to measure temperature.***
  'The temperature is 98' is low-value compared to, 'the temperature of the surface, measured by the infrared thermopile, model number XYZ, is 98.' That means it is measuring a proxy for a temperature, rather than being in contact with a probe, and it is measuring from a distance. The accuracy is plus or minus .05 of a degree. I [also] want to know that it was taken outside versus inside a controlled environment, how long it had been in place, and the last time it was calibrated, which might tell me whether it has drifted.."

What are CENS Data?

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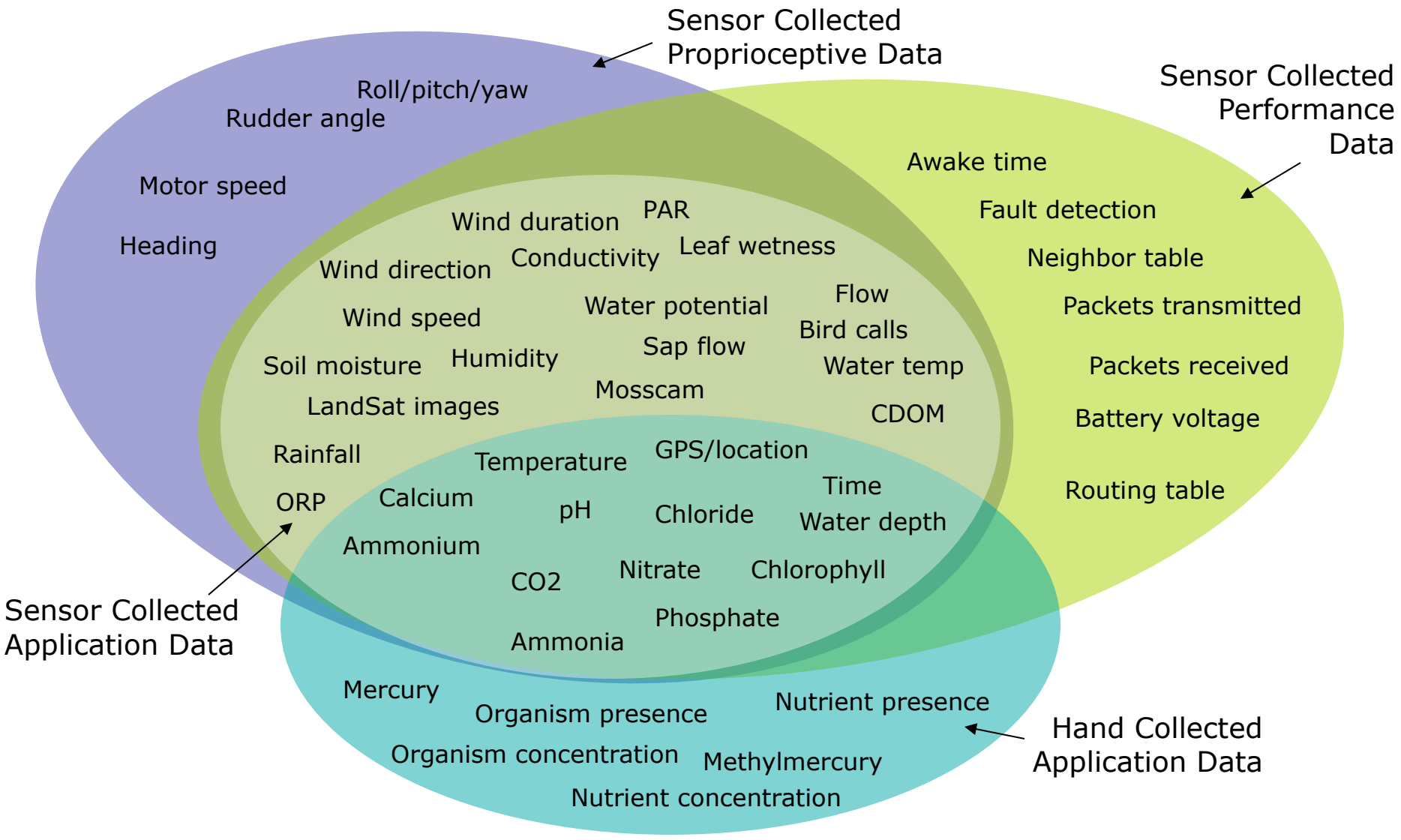

Figure by Jillian Wallis, UCLA

What Data Exist to Release?

- **What are the states of the data?**
  - Raw data
  - Processed data
  - Verified data
  - Certified data
  - Models
  - Software & algorithms
- **Where are the data?**
  - Refrigerators
  - Hard copies
  - Computers of individual students, staff, faculty
  - Lab servers
  - On CENSWEB, SensorBase

Artifacts and the Scientific Life Cycle

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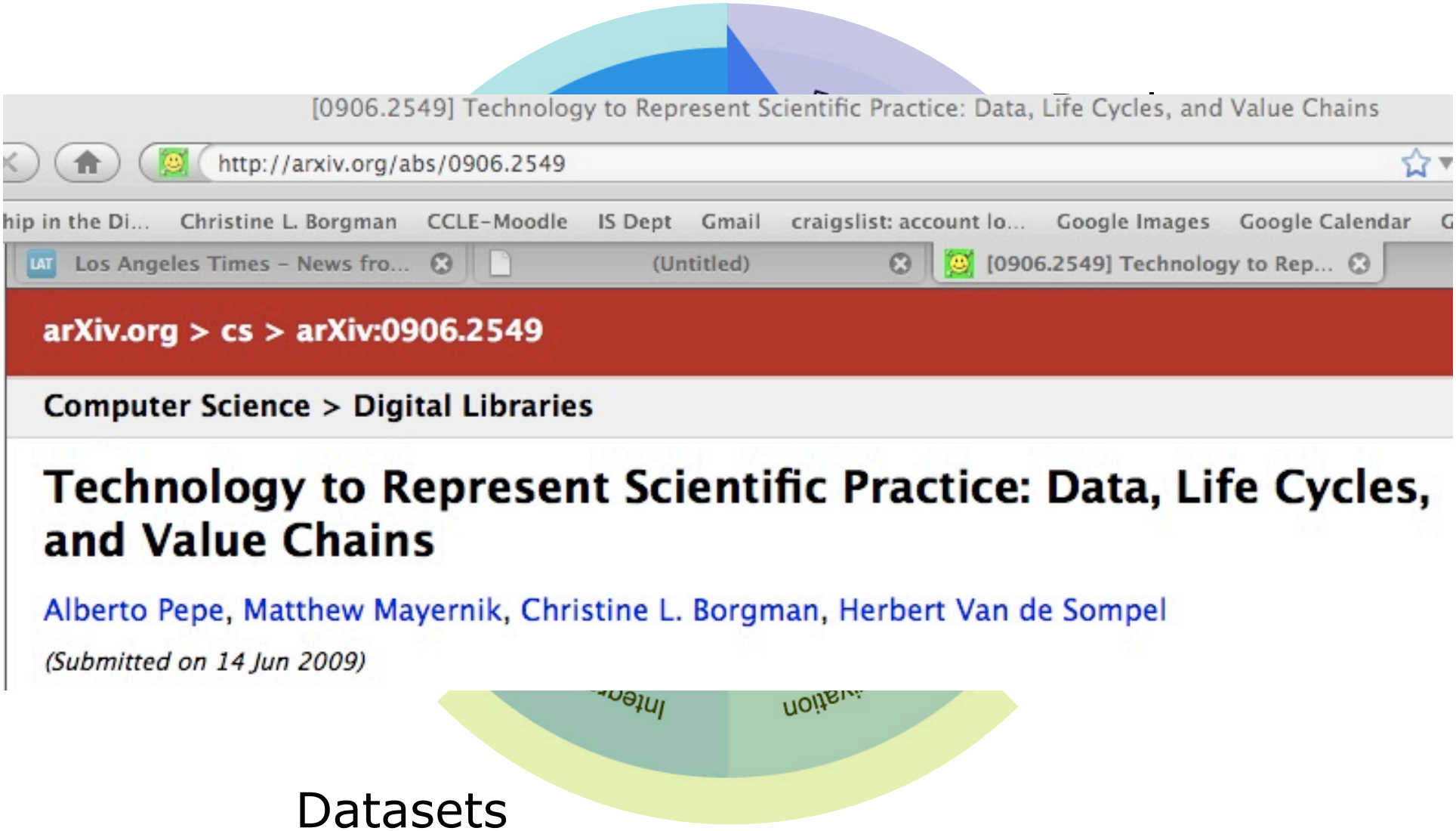
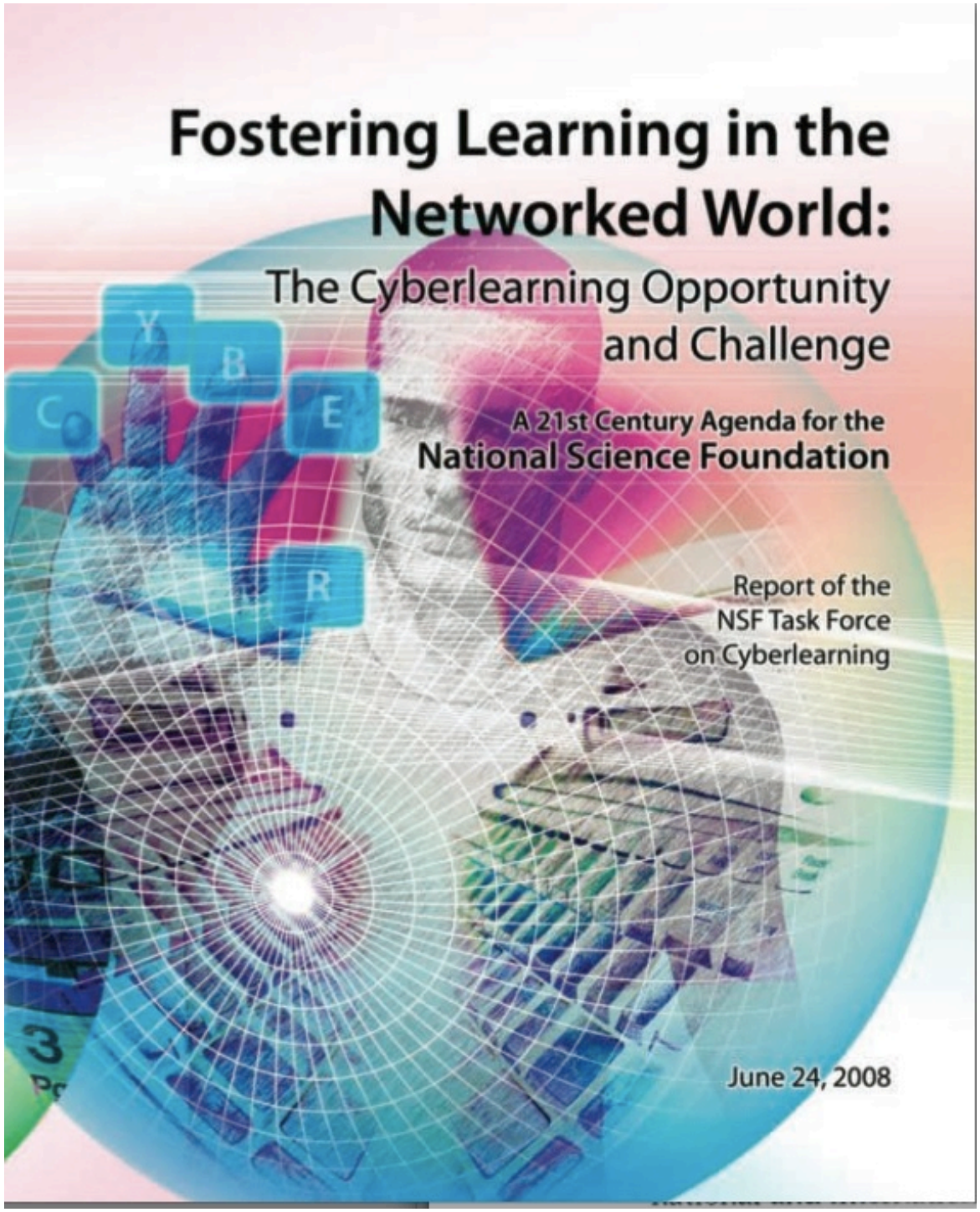


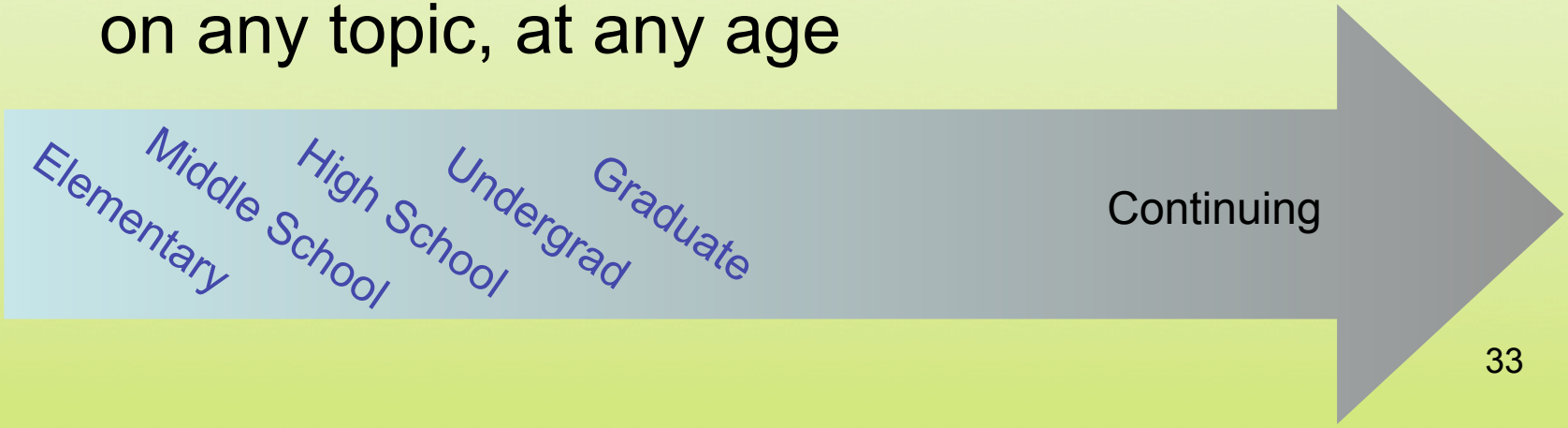
Datasets



Borgman, C. L., Abelson, H., Dirks, L., Johnson, R., Koedinger, K. R., Linn, M. C., Lynch, C. A., Oblinger, D. G., Pea, R. D., Salen, K., Smith, M. S. & Szalay, A. (2008). *Fostering Learning in the Networked World: The Cyberlearning Opportunity and Challenge. A 21st Century Agenda for the National Science Foundation. Report of the NSF Task Force on Cyberlearning. Office of Cyberinfrastructure and Directorate for Education and Human Resources. National Science Foundation.* http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf08204

What Is Cyberlearning?

- The use of *networked* computing and communications technologies to support learning
- Interactions among communities of learners across space and time
- Customized interaction with diverse materials, on any topic, at any age



Why Is Cyberlearning Important?

- Leverages learning through
  - Communication technologies
  - Students' technology skills
- Extends capacity of educational institutions into life-long learning opportunities
  - Increases public understanding of science
  - Prepares citizens for complex, evolving, global challenges

War

Recession

Global Warming

Epidemics

Poverty

Enable Students to Use Data

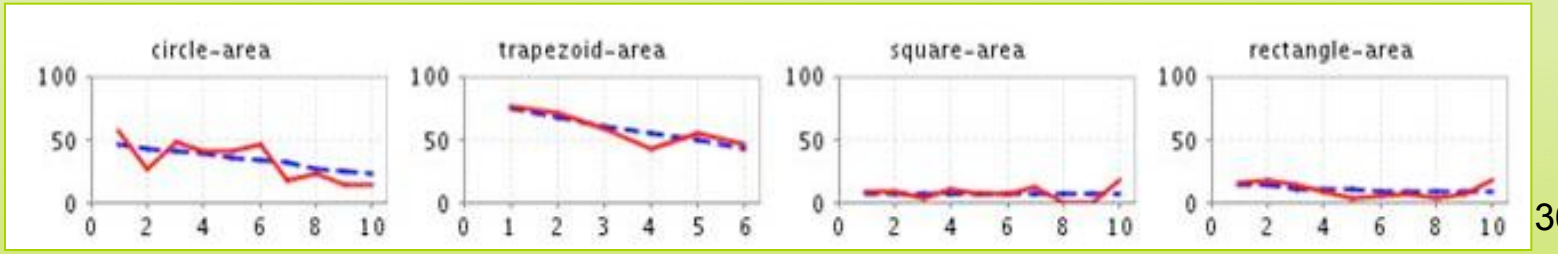
- **Strategy:** Transforming STEM disciplines and K–12 education
  - New ways of looking at and understanding content
  - Preparing students for “computational thinking”
- **Opportunity:** Teaching students and teachers how to harness large amounts of data
  - Scientific research
  - Responsible use of data

Astronomer Caroline Zunckel uses the galaxyzoo.org website to classify a spiral galaxy.
Credit : www.galaxyzoo.org

GALAXY ZOO .org

Harness Learning Data

- **Strategy:** Leveraging the data produced by cyberlearning systems
  - Teachers interacting with students and their school assignments
  - Students' educational histories
- **Opportunity:** Encouraging shared systems that allow large-scale deployment, feedback, and improvement



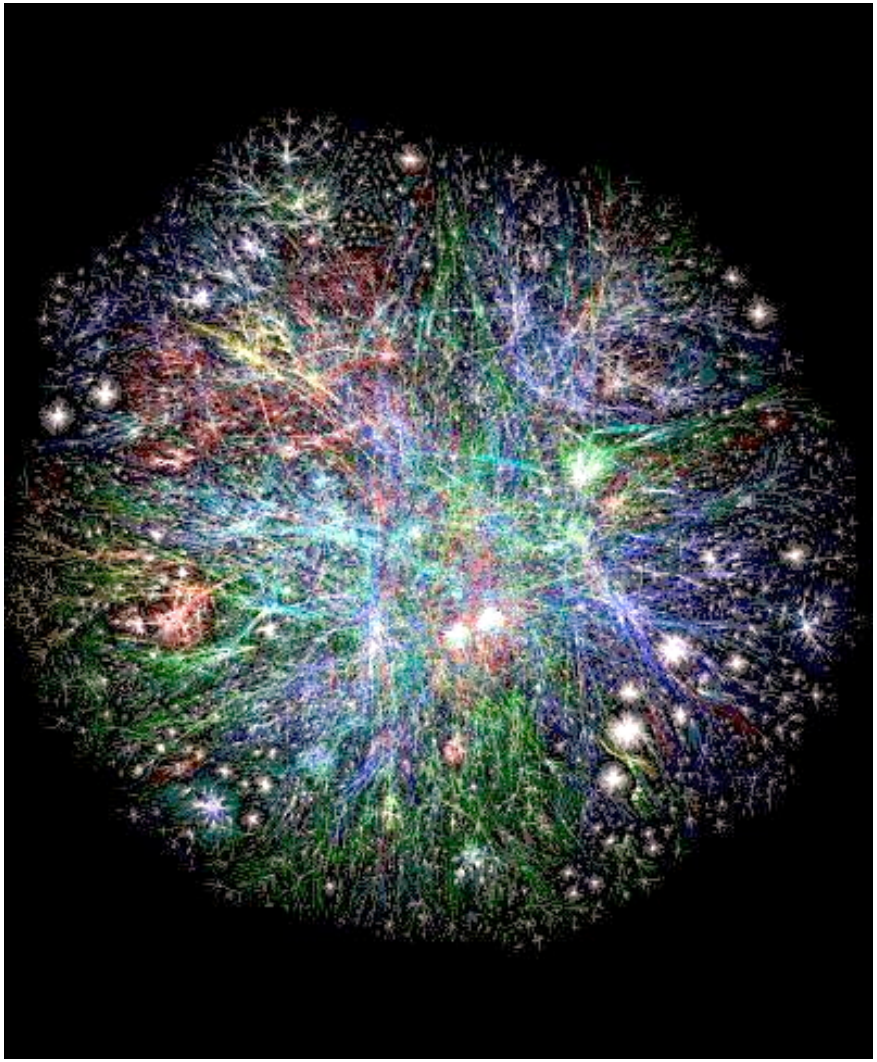
Pittsburgh Science of Learning Center's DataShop: learnlab.web.cmu.edu/datashop

Promote open educational resources

- Make materials available on the web with permission for unrestricted reuse and recombination
- New proposals should plan to make their materials available and sustainable

Digital libraries
Consolidation, Connectedness, Communities

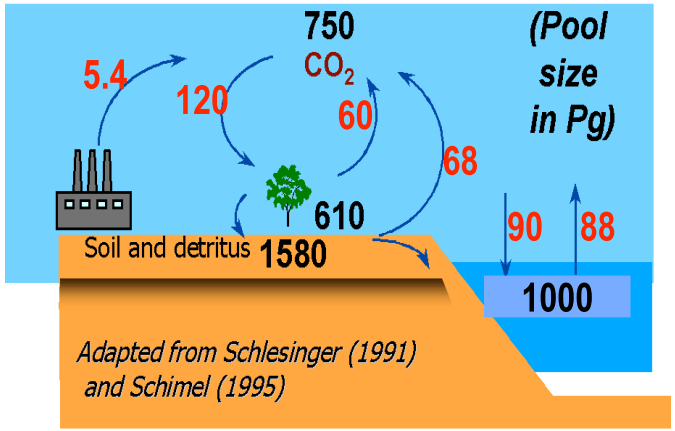
- Alexandria Digital Earth, 1994-2005
- Data practices in embedded networked sensing, 2002-
- Cyberlearning, 2008-
- Cyberinfrastructure, 2003-
  - Life under your feet
  - Teachingwithdata.org
  - Rome Reborn
  - Worldwide Telescope

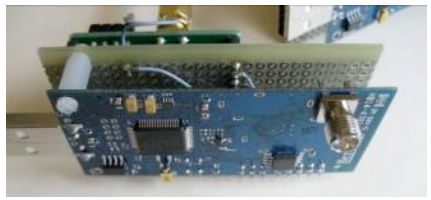


http://www.ibiblio.org/hhalpin/homepage/presentations/de2007/webearth.jpg

Life Under Your Feet

- **Role of the soil in Global Change**
  - *Soil CO_2 emission thought to be >**15 times** of anthropogenic*
  - *Using sensors we can measure it directly, in situ, over a large area*
- **Wireless sensor network**
  - *Use many wireless computers (motes), with 10+ sensors each, monitoring*
    - Air +soil temperature, moisture, …
    - Few sensors measure CO_2 concentration
  - *Long-term continuous data, >20M measurements/year*
  - *Complex database of sensor data, built from the SkyServer*
  - *Data on SensorNet*





with K.Szlavecz (Earth and Planetary), A. Terzis (CS)

http://lifeunderyourfeet.org/

Slide courtesy of Alex Szalay, JHU, 2009

Data Archive Home Page

http://www.sscnet.ucla.edu/issr/da/

ucla social science data

IS Dept | UCLA Library | ISI Web of Knowledge | MyUCLA | DOI resolver | Netflix: Queue | Google Calendar | Google Images | Basecamp | CCLE

Page Load Er... | Quick Takes ... | Symposium P... | nsf.gov – Pu... | Evangelical S... | UCLA Inform... | Relief Band®... | Data Archive ...

ISSR Social Science Data Archive

Archive Home | Arc

| Home | A-Z index | Site map | Contact | Login | Search: Search text web site for data GO

Links to related services: Select service

Archive Help

Dataarchive is o... leave a message

Type here and hit enter t... offline message.

edit nickname: meebogues

- What's New?
- How to Search this
- Quick Links
- Data Portals
- Other Archives
- Government Sites
- U.S. National Surve
- Archive Policies

UKDA UK Data Archive

The UK Data A... data in the soc... provides resou... Deposit by The...

The speciality o... medical data s... Programme Da... co-ordination o...

ICPSR | INTE... POLIT...

Data | Courses & Learning Tools

SEARCH

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- [x] Web Site
- [x] Data Holdings
- [ ] Publications based on our data

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QUICK LINKS

Select a link

Established in 1962, ICPSR is...

largest archive of digital social...

We acquire, preserve, and dist...

research data and provide trai...

QSSDL

http://www.teachingwithdata.org/

Google

stine L. Borgman | IS Dept | Gmail | craigslist: account lo... | CERLALC | Moodle | Google Images | Google Calendar | Google Scholar

mes – News fro... | QSSDL

Quantitative Social Science Digital Library (QSSDL)

Set to launch in September 2009

The Quantitative Social Science Digital Library (QSSDL) is a repository of educational materials designed to improve quantitative literacy skills in social science courses. Built especially for faculty teaching post-secondary courses in such areas as demography, economics, geography, political science, social psychology, and sociology, the materials include stand-alone learning activities, tools, and pedagogy services.

Our goal is to make it easier for faculty to bring real social science data into courses across the curriculum ranging from introductory classes to senior seminars. Many of the activities can be used without the need for any additional statistical software.

About the QSSDL

QSSDL will provide a single portal where faculty can find and use real data in post-secondary classes. It will infuse quantitative reasoning throughout the social science curriculum by providing user-friendly, data-driven instructional materials. While building quantitative literacy skills, students will be exposed to the creativity and excitement of empirical research. Exposing students to data in early courses – even at the introductory-level – while the focus is primarily on content, can minimize the disconnect that students feel between substantive courses and research methods or statistics courses. At the same time, they will get a better idea of how social scientists work.

Two key components of the developing pathway are the Social Science Data Analysis Network and ICPSR's Online Learning Center. Both of these resources provide:

- Data extracts
- Online analysis tools
- Student exercises
- Other materials that help instructors integrate data from the U.S. Census, opinion polls, and advanced social science surveys in their courses.

QSSDL will provide comprehensive links to these materials and other resources promoting quantitative literacy, such as teaching modules, social science data sources, applications

Join our listserv

Sign up to receive announcements about additions and updates to the QSSDL Web site. The first announcement will be the launch of the site and subsequent announcements will include notices of new teaching resources and tools and upgrades. This is strictly an announcement-only list and the volume of messages is likely to be fairly low.

Contact Us

If you have materials you would like to see included in the QSSDL or any other questions or comments related to the project, please contact either John DeWitt or Lynette Hoelter.

Roman Forum, Western End, ca. 400AD, copyright Regents of the University of California

Microsoft® Research
WorldWide Telescope

Home | What is WWT | Experience WWT | Support | Authoring | Media

Experience WorldWide Telescope

Immerse yourself in a seamless beautiful environment.

WorldWide Telescope (WWT) enables your computer to function as a virtual telescope, bringing together imagery from the best ground and space-based telescopes in the world. Experience narrated guided tours from astronomers and educators featuring interesting places in the sky.

Install WorldWide Telescope

Windows® System Requirements
(For Mac OS X use the Web Client)

Preview the WorldWide Telescope Web Client

A Web-based version of WorldWide Telescope that enables seamless, guided explorations of the universe from within a web browser on PC and Intel **Mac** OS X by using the power of Microsoft Silverlight 2.0.

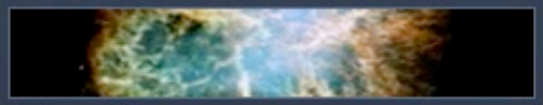
Preview the Web Client

Mac & PC - Compare Client Versions

What is WorldWide Telescope?

WWT is an application that runs in Windows that utilizes images and data stored on remote servers enabling you to explore some of the highest resolution imagery of the universe available in multiple wavelengths.

Learn More



Take a Tour

Watch and see what you are missing. You can see videos of the guided tours within WorldWide Telescope or if you have WWT already installed, you can download a tour and interactively explore what you see.

Tours

Share the Experience

Why keep the seamless exploration of the universe WorldWide Telescope can provide a secret? Tell your friends and family!

Share WWT

 | Contact Us | Terms of Use | Privacy Statement | Disclaimer

Why openness matters

- Interoperability trumps all
  - Import and export in open formats
  - Mixup and mashup
  - Add value
  - Avoid lock in
- Discoverability of related
  - Documents
  - Data
  - Assorted digital objects
- Usability and reusability
  - For research
  - For learning

http://pzwart.wdka.hro.nl/mdr/research/lliang/mdr/mdr_images/opencontent.jpg/

Inflection point?

Digital libraries are a set of electronic resources and associated technical capabilities for creating, searching, and using information.

Digital libraries are constructed—collected and organized—by [and for] a community of users, and their functional capabilities support the information needs and uses of that community.

http://www.metanature.org/graphics/time1.jpg

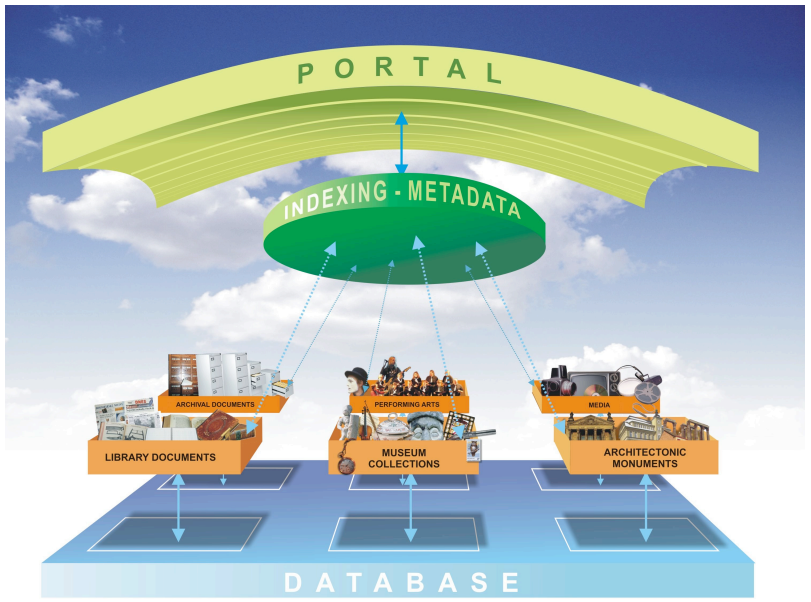
Digital Libraries: Now here, or nowhere?

- Is it digital or is it a library?
- Now here: Scope foreseen in DL initiative
- Nowhere: “digital library”

Image: Christine L. Borgman, 1995

Digital library lessons learned

- If we build it they may not come
- Communities are rarely as homogeneous as they appear
- Community partnerships in design are essential
- Favor connectedness over consolidation
- Interoperability is still a major challenge
- Be open to new opportunities



http://www.ndk.cz/obrazky/ifontes_en/

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  - Towards a Virtual Organization for Data Cyberinfrastructure, #OCI-0750529, C.L. Borgman, UCLA, PI; G. Bowker, Santa Clara University, Co-PI; Thomas Finholt, University of Michigan, Co-PI.
  - Monitoring, Modeling & Memory: Dynamics of Data and Knowledge in Scientific Cyberinfrastructures: #0827322, P.N. Edwards, UM, PI; Co-PIs C.L. Borgman, UCLA; G. Bowker, SCU; T. Finholt, UM; S. Jackson, UM; D. Ribes, Georgetown; S.L. Star, SCU)
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  - Clifford Lynch, CNI
  - Carl Lagoze, Cornell
  - Ann O'Brien, Loughborough, UK
  - Herbert van de Sompel, Los Alamos National Labs

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