



# The Social Mission of 21st Century Research Libraries: Building Data Literate Communities

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# Building Data Literate Communities

## The Argument

- Data literacy is a fundamental requirement for all citizens
- Data literacy education is typically limited and partial, neglecting life-wide and life-course perspectives
- Research libraries are uniquely positioned to lead the way
  - broad and deep engagement with data
  - experience and expertise in literacy instruction
  - frameworks and models as structural foundations
  - academic and professional relationships and networks
  - roles and strengths as interdisciplinary facilitators

“Data literacy focuses on both the technical and social aspects of data. It encompasses activities related to data management, including data curation, data citation and fostering data quality.” (OECD, 2019, p. 4)

# The Social Mission of 21C Research Libraries

## Outline of Presentation

- Research context, methods and frameworks
- Datafication of society and data penetration of libraries
- The data literacy landscape
  - Recognizing the need, Analyzing a complex pluralist concept
  - Identifying the salient stakeholders
- Building blocks for library-led educational development
  - Models for service delivery, Innovations in library instruction
  - Collaborations with key stakeholders
- Questions for reflection and discussion



# Research Context

- Triple helix of university-industry-government interactions and relations
- The social turn in higher education and research
  - Knowledge exchange
  - Economic development
  - Community engagement
- Commercial, social, cultural and civic entrepreneurship
- Strategic alignment of library and university missions
- The rise of the data society...





# Data Society Terms and Concepts

# Data Capitalism

# Dataclysm

Interactivity

## Data Exhaust

# Data Deluge

# Data Explosion

# Data Revolution

# Connectivity

# Access

# Datafication

# Data Double

# Learning Analytics

# Data Fluency

Learn  
Data Literacy  
Data Privacy

# Data Security

Privacy

# Data Privacy

# Data Protection

# The Quantified Self

# Data Warehouses

# Precision Medicine

# Smart Cities

# Data Refineries

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## Data Sources & Methods

- Review and critical appraisal of related literature
  - academic, professional, trade
  - gov. docs., special reports, etc.
  - handbooks, non-specialist texts
- Environmental scan of salient organizations and websites
  - R&D funders/grant agencies
  - advocacy groups, education and training providers, membership organizations, research centres
- Stakeholder analysis and evaluation of data actors
  - collaborators, partners and sponsors for data literacy projects
  - roles and strengths of libraries

## Theoretical Frameworks

- Radical Change Theory
  - used to frame the complex pluralist environmental context (Dresang & Koh, 2009)
- Wicked Problem Theory
  - used to analyze the problem and identify potential solutions (Danken et al., 2016)
- Theory of Stakeholder Identification and Salience
  - used to identify interested actors and assess potential involvement (Mitchell, Agle & Wood, 1997)
- Intellectus Model of IC
  - used to review and appraise actual and potential library roles (Bueno et al., 2004)

## Datafication of Society

- Data-intensive science and digital computational humanities
- Open government data
- Volunteer data collection and citizen science
- Data journalism, infographics, and data-driven storytelling
- Biobanks and P4 medicine (predictive, personalized, preventive, and participatory)
- Activity tracking and personal health information management
- Data as the medium of exchange in business and scholarship

## Data Penetration of LIS

- Research data management and curation
- Bibliometrics and altmetrics
- Collecting and licensing internal and external datasets
- Data literacy instruction
- Consumption and publication of linked open data
- Consulting on and crowdsourcing for metadata
- Library/learning analytics and data-driven decision-making

*21C research libraries are data-intensive organizations*

Knowledge & opinion > Blog >



## Assessing data literacy needs in government

Thu Dec 14, 2017

Share

Peer networks | Skills and literacy

As part of its work with the OD4D-funded project Building an Africa Open Data Network (AODN), the ODI conducted a learning needs assessment of people working in government.

# Data Literacy: Recognizing the Need

**InfoWorld**

Search for  Go

IDG CONTRIBUTOR NETWORK Want to Join?

**THE DATA COMPLEX**  
By Doug Bordonaro, Contributor, InfoWorld | MAR 1, 2018  
Opinions expressed by ICN authors are their own.

**Data literacy: What it means and why it's essential for your business**

Putting data in the hands of a few experts is a powerful thing, but making it available throughout an organization can be a game-changer

9,600 views | Oct 11, 2018, 03:58pm

**Why All Employees Need Data Skills In 2019 (And Beyond)**

Laurence Bradford Contributor  
Careers  
I write about tech companies, careers, and in-demand skills.

Data: it's not just for the analytics team anymore. While data scientists are still in demand, the newest conundrum facing today's organizations concerns the rest of the staff. Data isn't used in a vacuum: it touches many other roles, and those employees need the literacy to handle it effectively.

Let's explore why data skills matter company-wide, what data literacy involves, and how anyone can start learning it to grow in their careers.

**Smarter With Gartner**

**CDOs Must Take the Lead to Improve Data Literacy**

Data & Analytics

October 23, 2018 | Contributor: Sarah Hippold

**Data and analytics leaders need to encourage an organizational culture that is data-literate and that values information as an asset.**

Literacy is no longer defined as just the ability to read and write. There are several other skills people must master in order to solve problems and gain knowledge. Data literacy — the ability to read, write and communicate data in context — is among the most important abilities for organizations today.

**ET**

Blogs > Higher education > The importance of data literacy in higher education

**The importance of data literacy in higher education**

Oliver Brown, Academic Programme Manager EMEA at Qlik, says that education institutions need to provide the data skills that employers are looking for

Friday 5th January 2018

The job market has changed. Academic Programme, literate, with the ability when they enter the work

**Information/Age**

**2017: the year of data literacy?**

Over the past 12 months there has been an explosion of data, an increase in processing it and a move towards information activism

Topics  
Cloud & Edge Computing

Analytics meeting people  
ons developed to support  
d situation, as well as the  
etting out to do some data

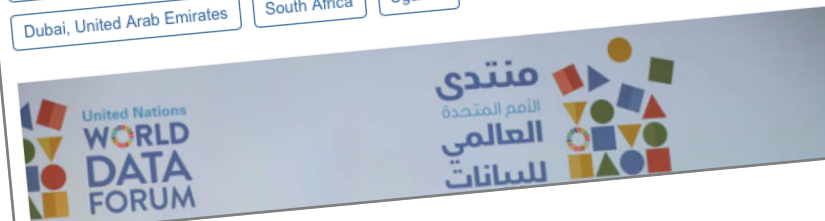
of data means  
ees actively able to  
– the huge amounts  
, such as data  
velopers, and  
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## Data literacy and storytelling at the UN World Data Forum

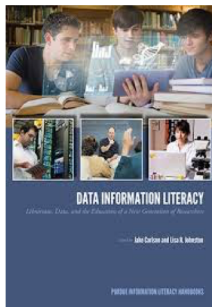
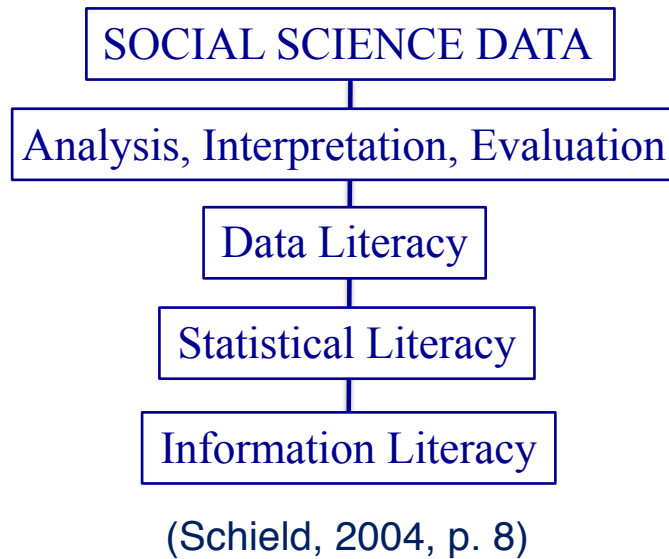
By Lisa Cornish // 25 October 2018

Media And Communications | Innovation & ICT | Social/Inclusive Development | Trade & Policy

Dubai, United Arab Emirates | South Africa | Uganda

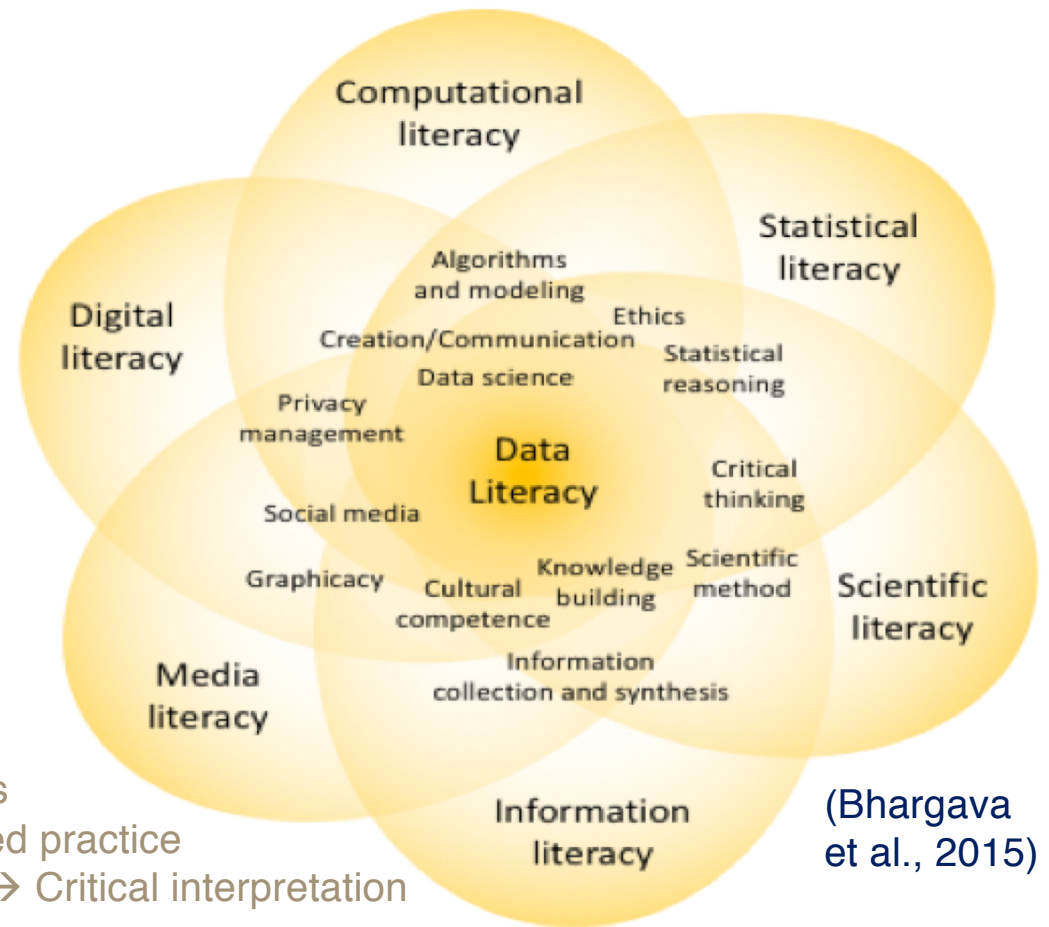


# Evolving Conceptions of Data Literacy



(Carlson & Johnston, 2015)

Technical skills  
 → Applied practice  
 → Critical interpretation

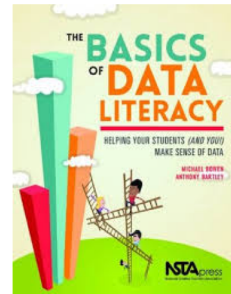


(Bhargava et al., 2015)

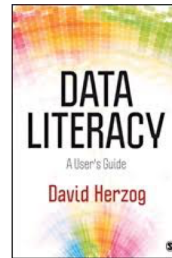


# Alternative Conceptions of Data Literacy

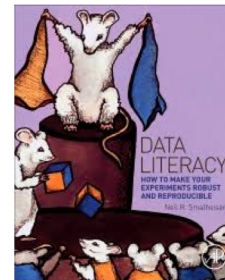
2013



2016

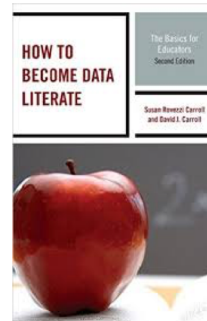


UG Research Skills  
(Secondary Data)

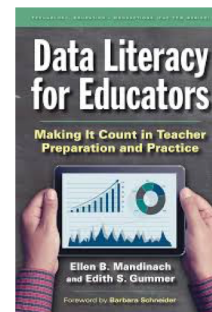


PG Research Methods  
(Primary Data)

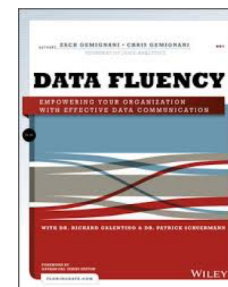
2017



2015

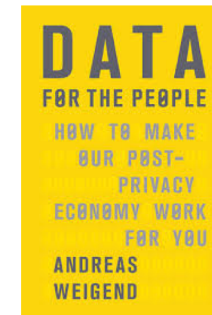


2016



Building a  
Data Culture

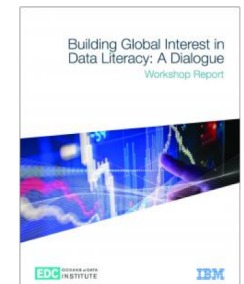
2014



2017



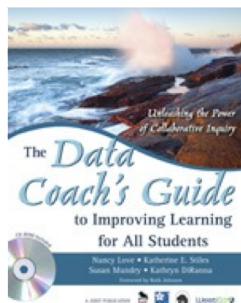
2015



2016

Statistical Literacy

Data-Based Decision Making



2008

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## Common Conceptions – Data Literacy is about...

- **Data protection, security and privacy** for participating in social networks and managing personal data – understanding digital footprints and data silhouettes
- **Life skills** for everyday problem-solving – enabling community engagement, citizen empowerment, activity tracking and personal health management
- **Data-based and data-driven decision-making**, supporting business strategy, classroom practice, library assessment, etc. – implementing applied analytics
- Required education for the human subjects of business and learning analytics – explaining data doubles, practising business ethics and professional conduct
- **Data-driven storytelling** in the media and business – producing and interpreting data visualizations or infographics
- **Research skills** for students and professionals – accessing existing data sets to produce and communicate new knowledge, making original scientific experiments robust and reproducible
- Building blocks – a critical success factor for rolling out data science in business, government and research
- The new *lingua franca* or second language for organizations

# Data Literacy Stakeholders

1996



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1950



International Association for Social Science  
Information Services & Technology

1974



WORLD DATA SYSTEM

2008

UK Data Service



2012



2013

**DQC**  
DATA QUALITY  
CAMPAIGN

2005



ASSOCIATION of PUBLIC DATA USERS

1975

**TeachingWithData.org**  
Pathway to Quantitative Literacy in the Social Sciences

2008



RESEARCH DATA ALLIANCE

2013



2004

**EDC** OCEANS of DATA  
INSTITUTE

2013

Open  
Government  
Partnership



2011

2013

**DATA CARPENTRY**  
BUILDING COMMUNITIES TEACHING UNIVERSAL DATA LITERACY



open  
data  
institute

2012

2015

**DATAETHICS**



2018

**DataKind**

2011



2012

2017



United Nations  
**WORLD  
DATA  
FORUM**



# Tiered Delivery Model for Research Data Services

(University of Pittsburgh ULS  
RDM Working Group,  
Version 5, 2016)

+ Internal Library Education Model  
Learning by Teaching about RDM  
(Mattern, Brenner & Lyon, 2016 )

## **Level 3 – Specialist RDM Service Providers**

Explicit job responsibilities:  
understanding of local, national and  
global RDM landscape; collaborating  
with RDM stakeholders at Pitt and in region;  
expertise in one or more specific aspect/s  
(e.g., DMP, metadata, data storage)

## **Level 2 – Advanced RDM Service Providers**

Volunteer RDM team members – points of contact for disciplines:  
aware of relevant funder requirements; understanding of disciplinary  
research workflows; familiar with DMPTool, and subject data repositories  
and practices (e.g., file formats and naming, data storage and documentation)

## **Level 1 – Basic RDM Service Providers**

All public-facing university library staff – first point of contact for reference questions:  
basic understanding of RDM, drivers, research lifecycle, and how RDM applies to cycle;  
familiar with ULS RDM web resources; knowledge of RDM services, staff, and who to contact.



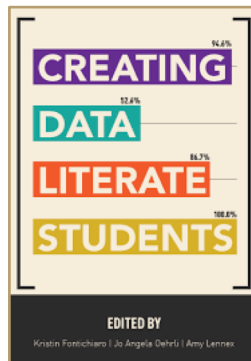
## Examples of Pedagogical Innovations

- Data Information Literacy Instruction in Business and Public Health: Comparative Case Studies (Macy & Coates, 2016)
  - Liaison librarians at Indiana University-Purdue University Indianapolis used Calzada Prado and Marzal's (2013) Data Information Literacy framework to prepare undergraduate and postgraduate students for workplace data use  
<https://www.ifla.org/publications/ifla-journal>
- A Multi-Framework Approach to Teaching Data: A Case Study in Modern Languages (Pullman & Zilinski, 2017)
  - A liaison librarian and research data specialist at Carnegie Mellon University combined/adapted the ACRL Framework and Maybee and Zilinski's (2015) principles for Data Informed Learning to teach a postgraduate workshop  
<https://commons.emich.edu/loexquarterly/vol44/iss2/5/>
- Show Me the Learning: Navigating Information Literacy through Multiple Life Perspectives (Ruleman, Horne-Popp & Hallis, 2017)
  - Librarians at U Central Missouri used scenario assignments in a gen ed course to help students meet academic, professional and personal information needs  
<http://www.ala.org/acrl/conferences/acrl2017/papers>

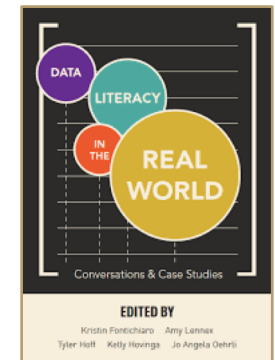
# Examples of Stakeholder Collaborations

- Creating Data Literate Students: Supporting Librarians in Adding Data Literacy Skills to Information Literacy Instruction
  - University of Michigan iSchool faculty member and UMich learning librarian collaborating with data and curriculum experts to support school librarians teaching data literacy in classroom research projects and real world contexts  
<http://datalit.sites.uofmhosting.net> (funded by IMLS, 2015–2018)
- Civic Switchboard: Connecting Libraries and Community Networks
  - University of Pittsburgh Library System partnering with the Carnegie Library of Pittsburgh, Western Pennsylvania Regional Data Center and local civic data intermediaries to build data literacy and technical skills

<https://civic-switchboard.github.io> (IMLS, 2017–2019)



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# Building Data Literate Communities

## Questions for Reflection and Discussion

- *What model should we adopt or adapt to teach data literacy?*  
e.g., abilities and understandings, specialist lenses (SCONUL)  
frames/threshold concepts, knowledge practices and dispositions (ACRL)  
high-level definition, supporting statement and key contexts (CILIP)
- *How should we present or pitch data literacy to stakeholders?*  
e.g., survival skill, personal empowerment, workplace requirement,  
employability enhancement, scholarly competence, scientific expertise...
- *Who should we work with to develop and deliver data literacy?*  
e.g., participants and collaborators in our libraries and on campus,  
people in our local communities, practitioners in public libraries,  
professional associations, funding agencies, other bodies...





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Repositioning data literacy as a mission-critical competence.

Roundtable discussion. *ACRL 2019: Recasting the Narrative*, April 10-13, Cleveland, OH. Discussion handout available at <http://d-scholarship.pitt.edu/36975/>

The wicked problem of data literacy: A call for action. Long presentation.

*LILAC: The Information Literacy Conference*, April 24-26, Nottingham, UK. Slides and references available at <http://d-scholarship.pitt.edu/36759/>

