Herausforderungen von Big Data für die Bibliotheks- und Informationswissenschaft

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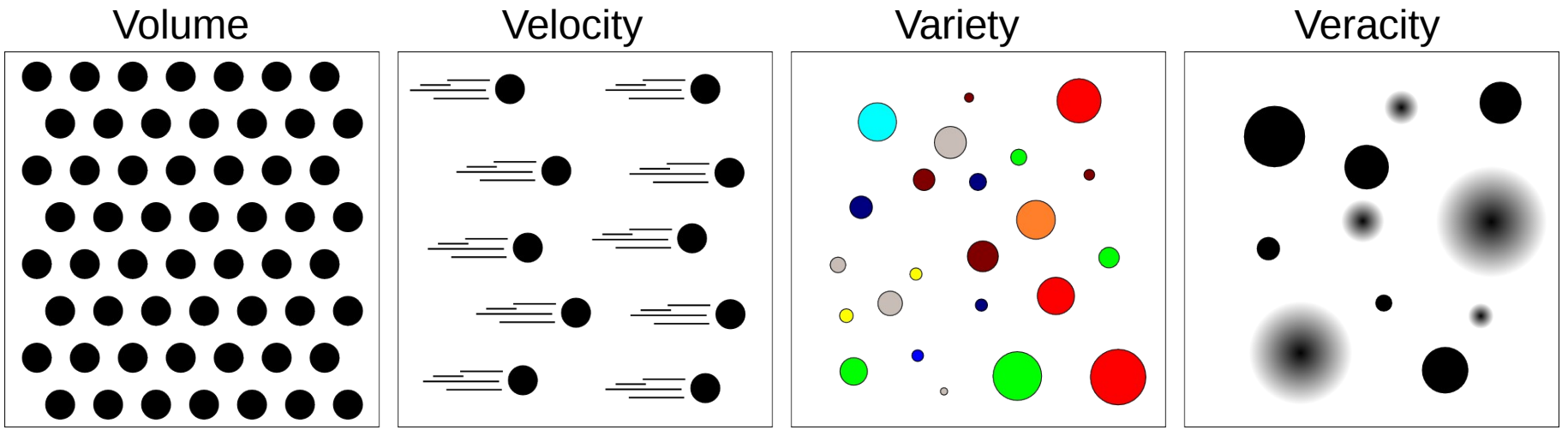
Leibniz Universität Hannover

Stand der Vorlesung

Kapitel 10: Big-Data-Technologien

- Einführung
- LIS und Big Data
- Methoden und Technologien



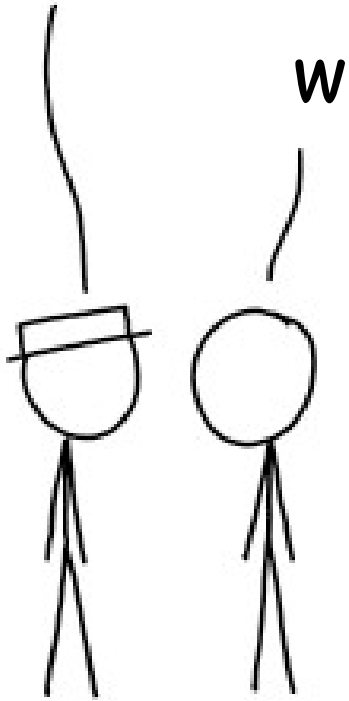
Thema und Lernziele

- LIS und Big Data
  - Fokus auf wissenschaftliche Bibliotheken

- Lernziele
  - verstehen, warum/wie Big Data Bibliotheken betrifft
  - den Unterschied zu traditionellen Medien verstehen
  - Herausforderungen für Bibliotheken (er)kennen und aus Fallbeispielen ableiten können

LIS und Big Data

What is the Library's role with “big data”?

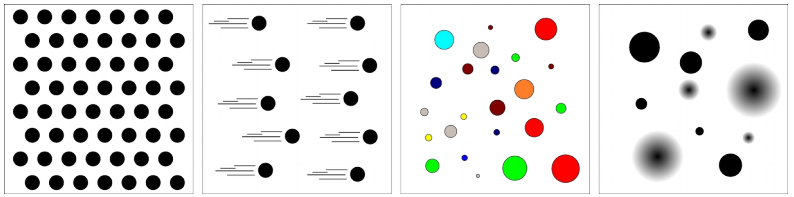


What is the Library's role with any information?

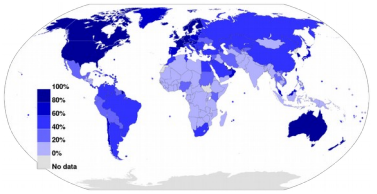
(R. Munroe/M. Furlough)

LIS und Big Data

1. Beispiele



2. Ursachen



3. Herausforderungen

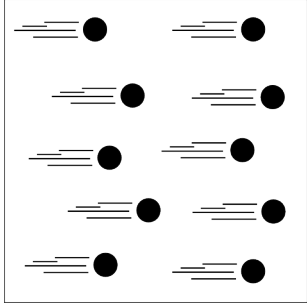
Sammeln

Erschließen

Vermitteln

4. Fallbeispiel: Web-Archivierung

INTERNET ARCHIVE
WayBackMachine



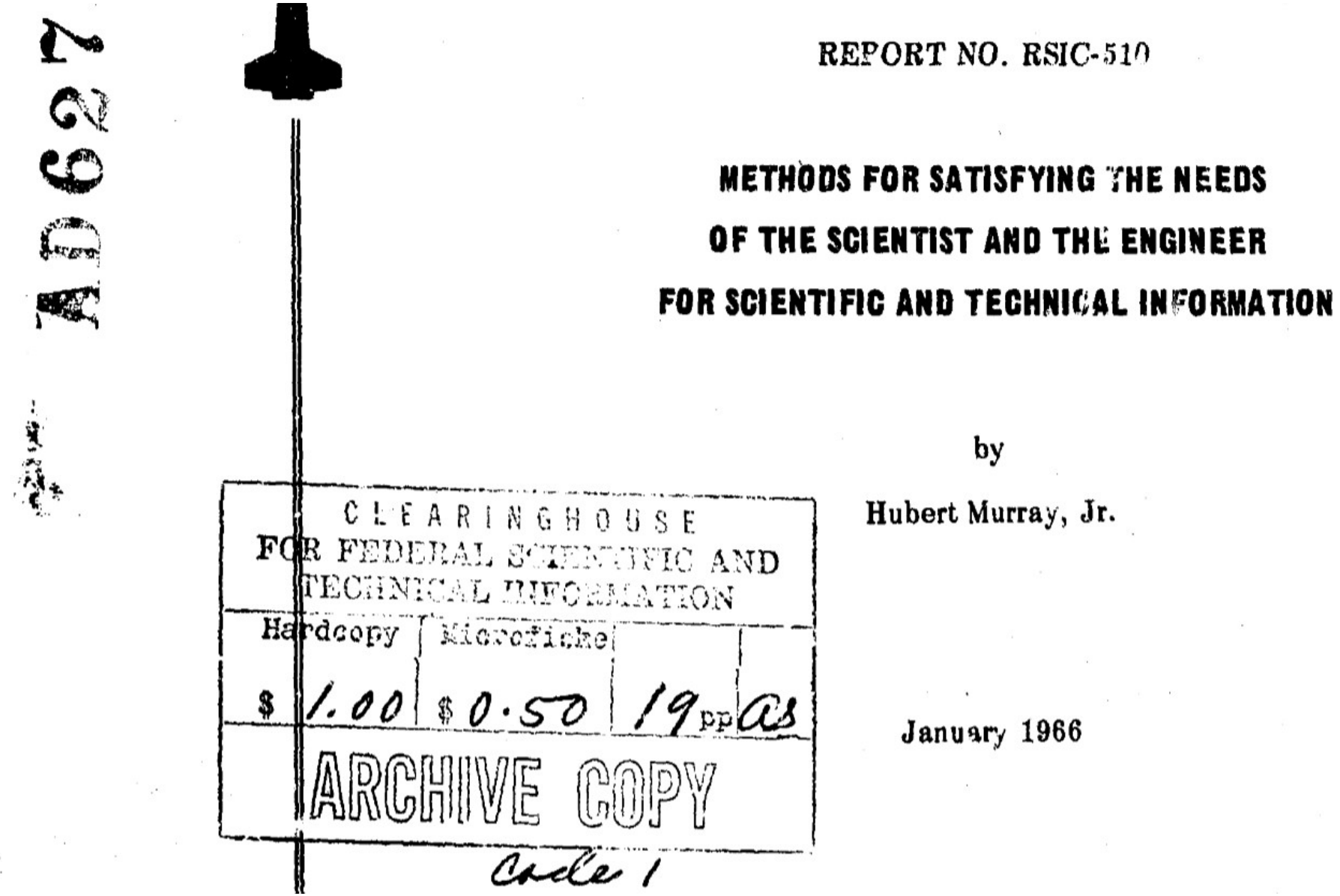
Velocity

In every 24-hour period approximately 20,000,000 words of technical information are being recorded. A reader capable of reading 1,000 words per minute would ***require 1.5 months****, reading 8 hours every day,* ***to get through 1 day's technical output****, and at the end of that period, he would have fallen 5.5 years behind in his reading!*

Velocity

In order to emphasize the problem, it is worthwhile to cite some figures. The rate at which technical documents are produced at the present time is estimated to be well over 500,000 per year. **In every 24-hour period approximately 20,000,000 words of technical information are being recorded. A reader capable of reading 1,000 words per minute would require $1\frac{1}{2}$ months, reading 8 hours every day, to get through 1 day's technical output, and at the end of that period, he would have fallen $5\frac{1}{2}$ years behind in his reading!** Even in attempting to read the portion of the literature in a single subject field such as chemistry, he would find himself falling behind an estimated 850,000 pages per year. This production rate of scientific information will undoubtedly increase as countries such as China and India begin to produce technical work commensurate with their size.

Velocity



AD627

REPORT NO. RSIC-510

METHODS FOR SATISFYING THE NEEDS
OF THE SCIENTIST AND THE ENGINEER
FOR SCIENTIFIC AND TECHNICAL INFORMATION

by

Hubert Murray, Jr.

January 1966

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FOR FEDERAL SCIENTIFIC AND
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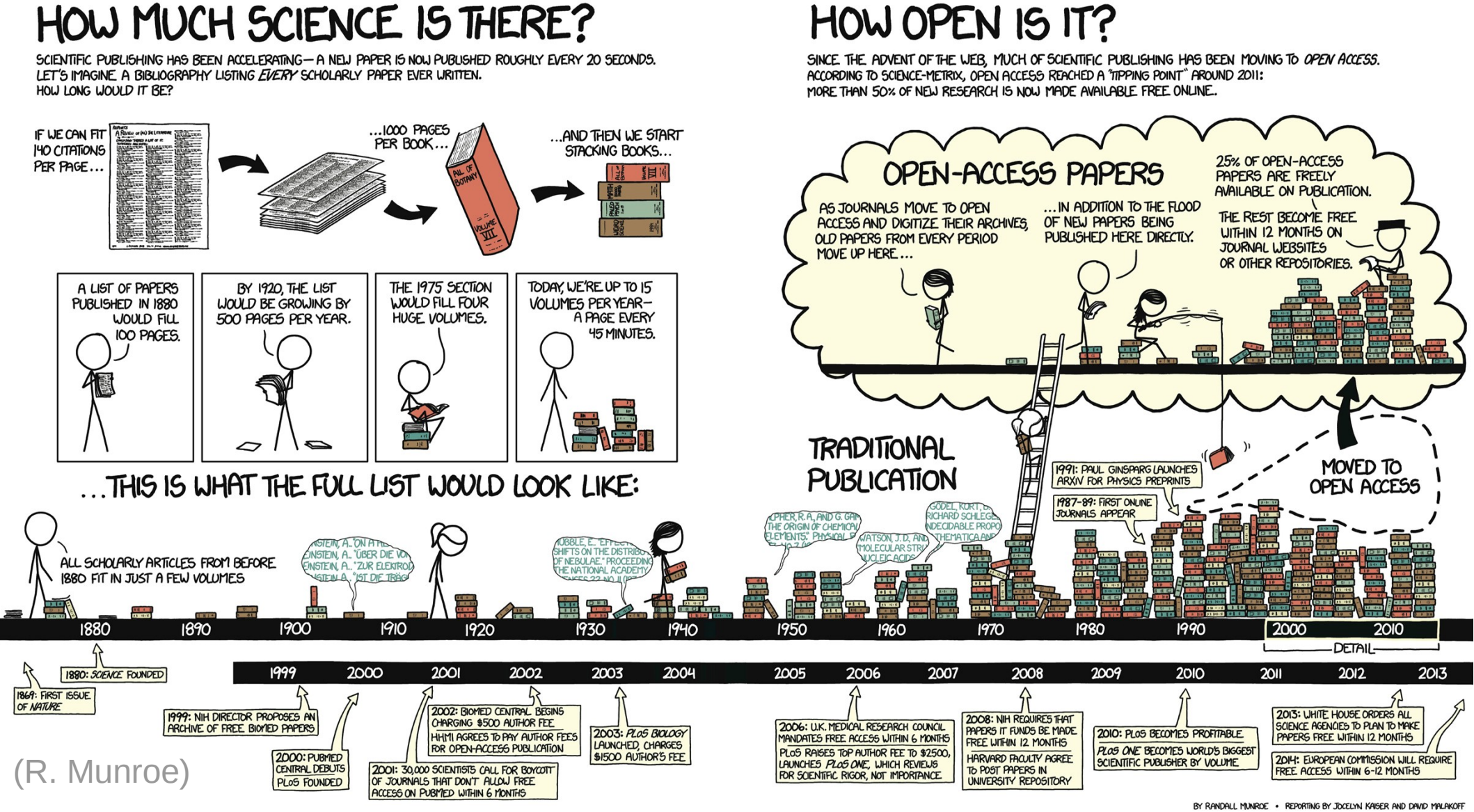
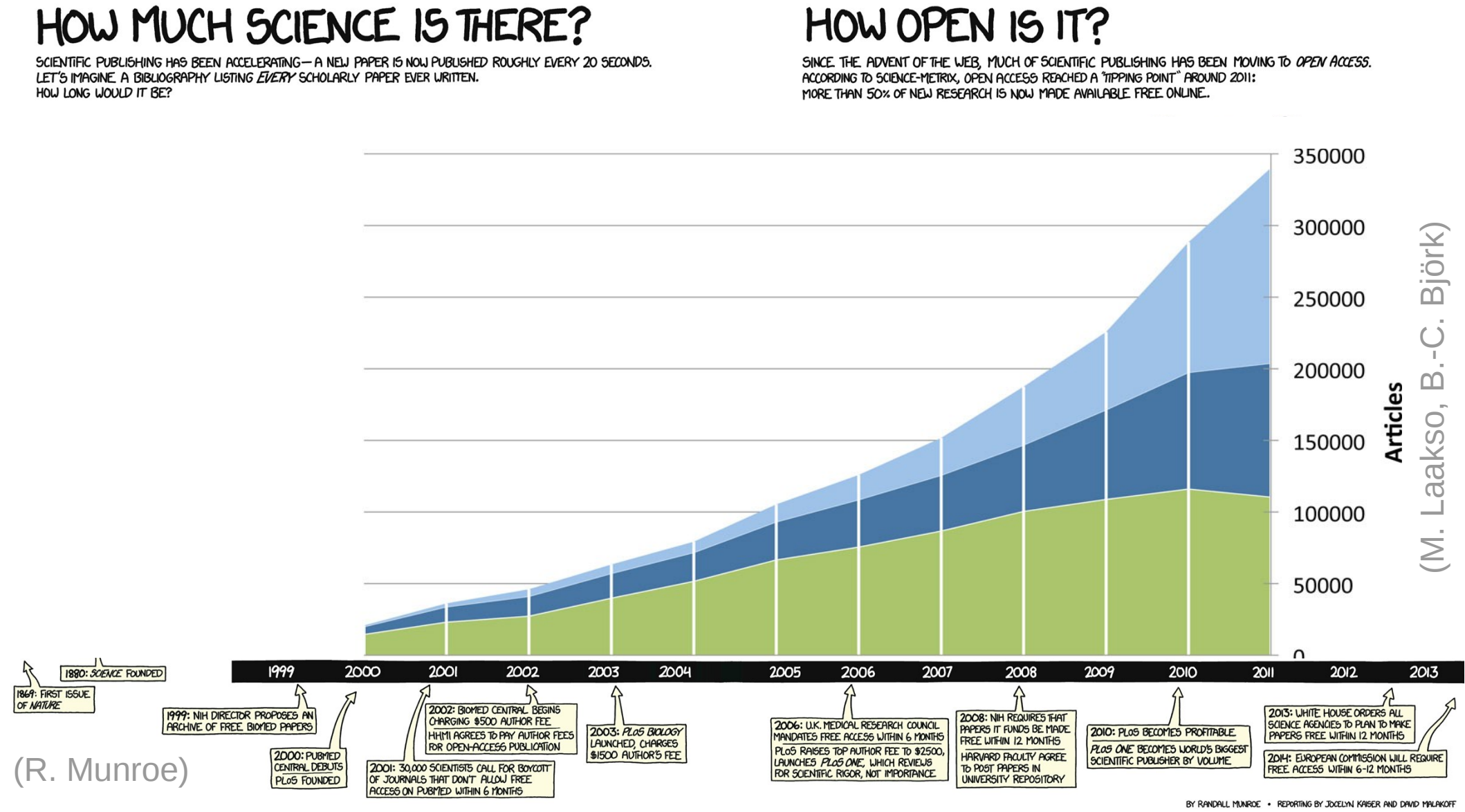


(R. Munroe)

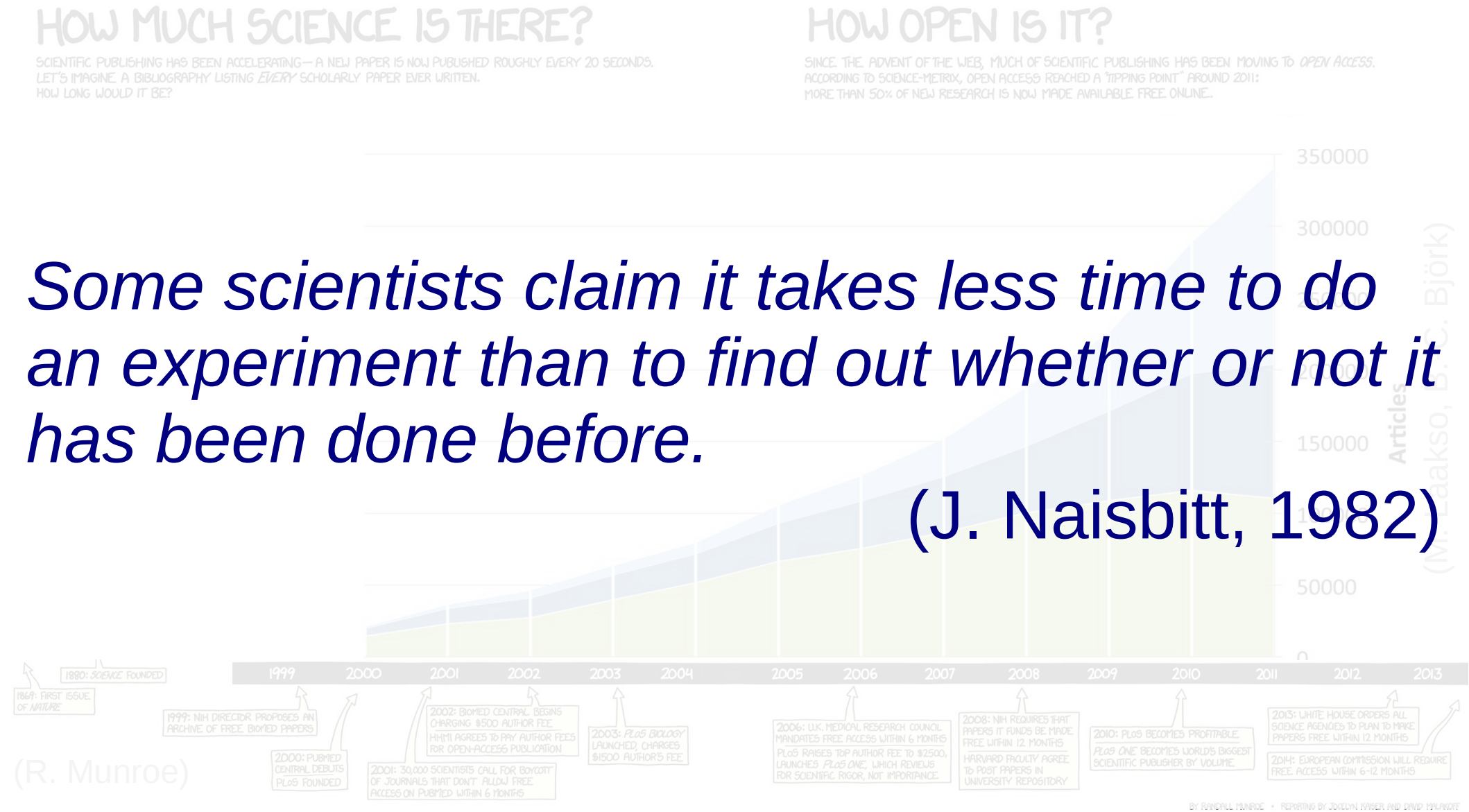
Volume



(M. Laakso, B.-C. Björk)

(R. Munroe)

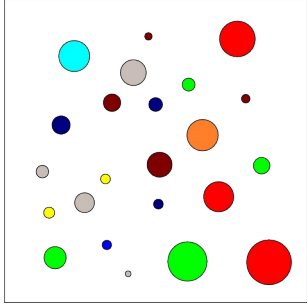
Volume



Some scientists claim it takes less time to do an experiment than to find out whether or not it has been done before.

(J. Naisbitt, 1982)

Variety



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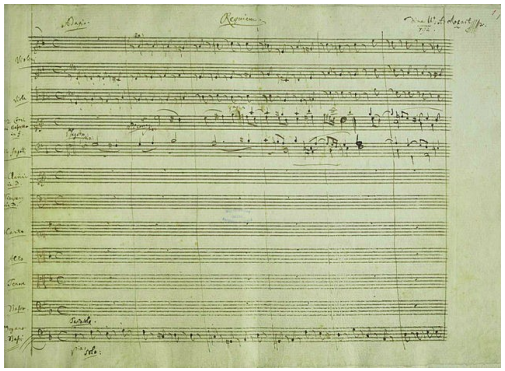

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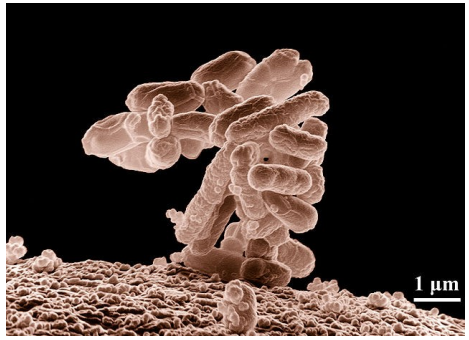

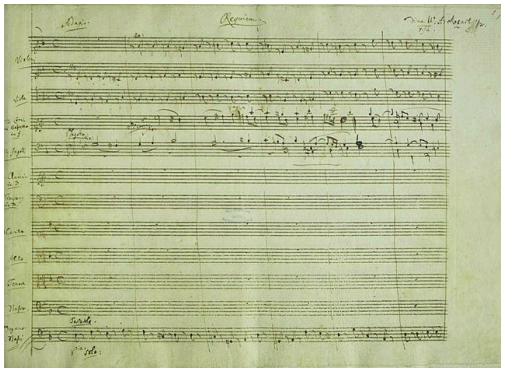

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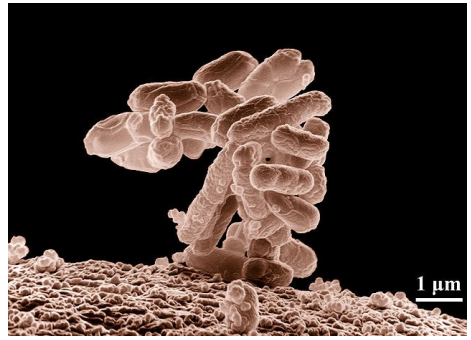

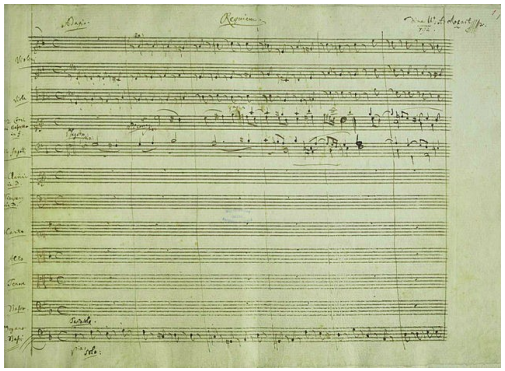

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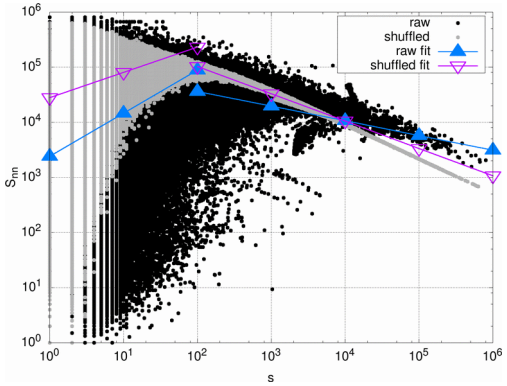

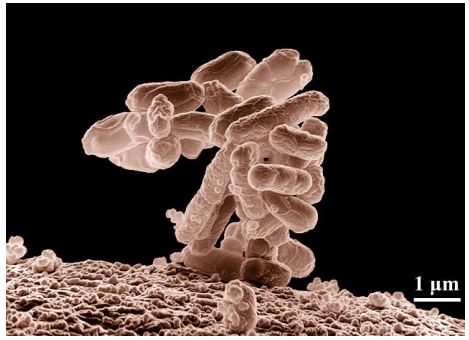

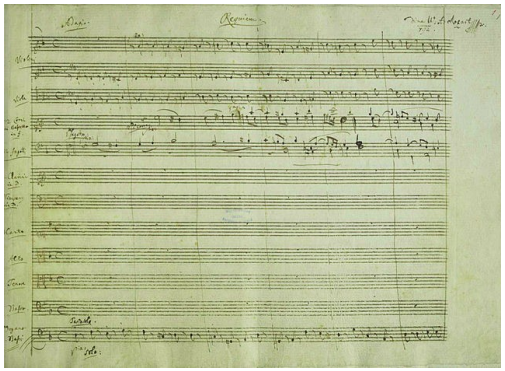

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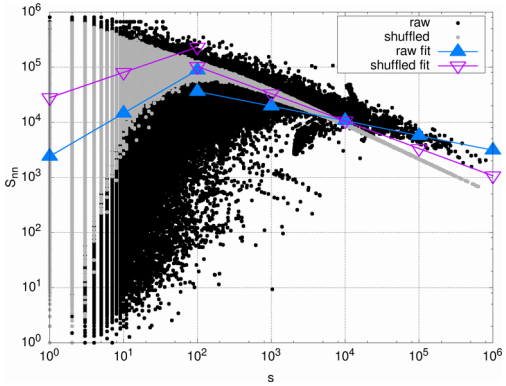

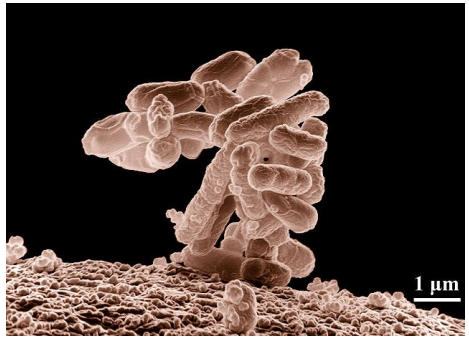

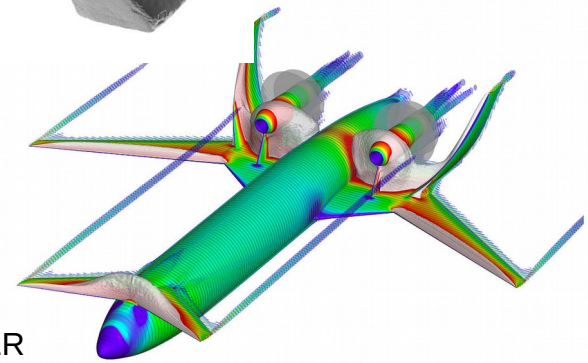

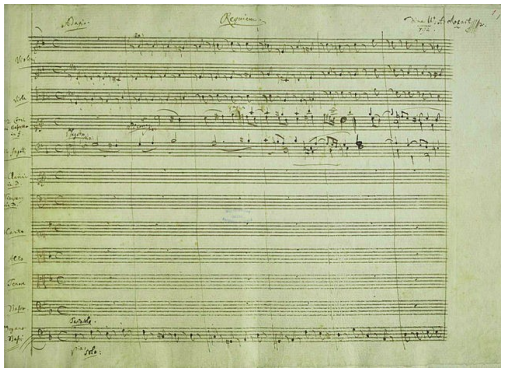

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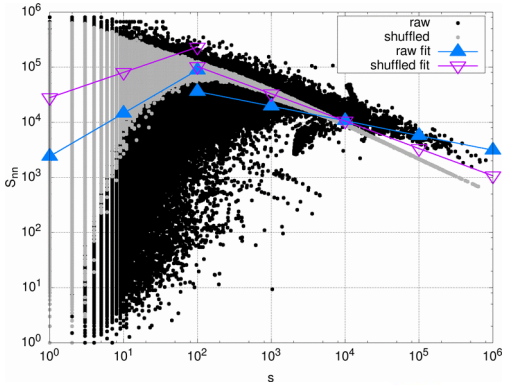

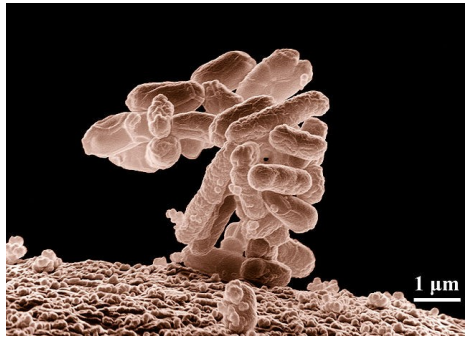

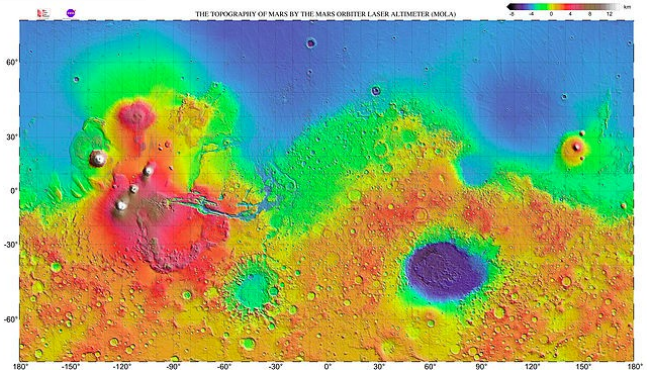

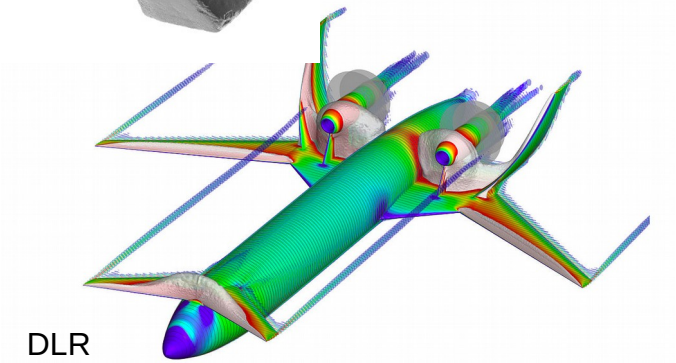

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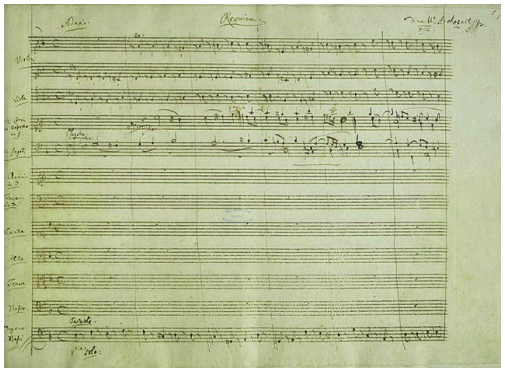

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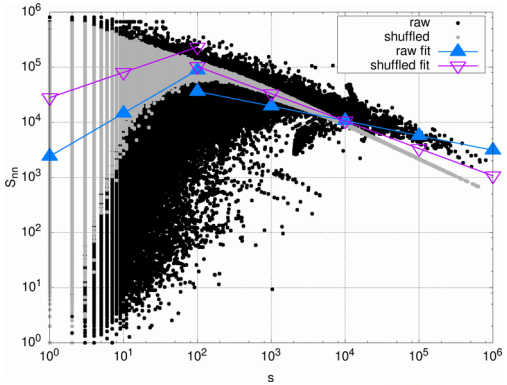

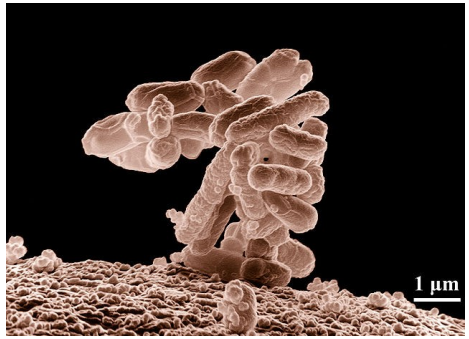

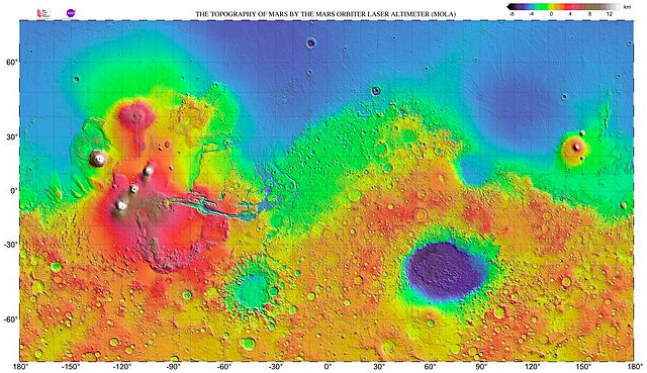

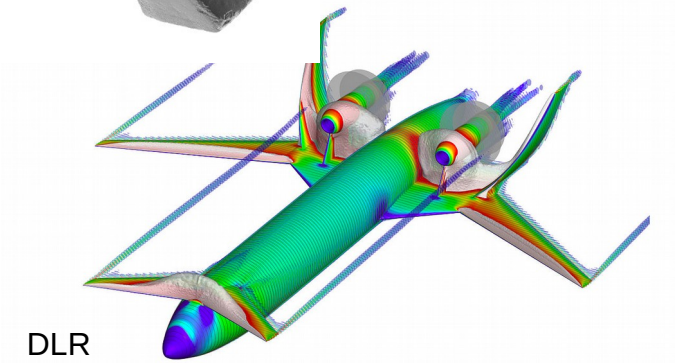

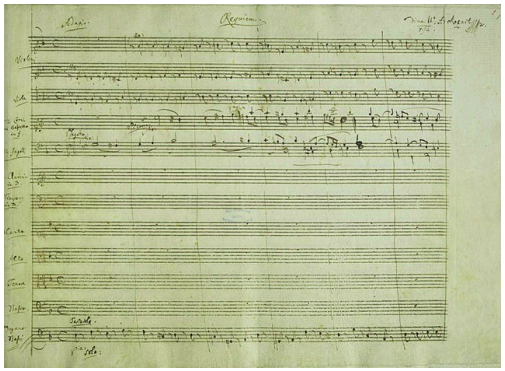

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```
for row in reversed(rows):
    url = self.urls[row]
    if self.url_is_publisher(url):
        # a true positive found
        tp_rate.append(tp_rate[-1] + 1)
        fp_rate.append(fp_rate[-1])
        tp_count += 1
    else:
        # a false negative found
        tp_rate.append(tp_rate[-1])
        fp_rate.append(fp_rate[-1] + 1)
        fp_count += 1

# remove first (artificial) element
fp_rate.pop(0)
tp_rate.pop(0)

return np.array(fp_rate)/float(fp_count),
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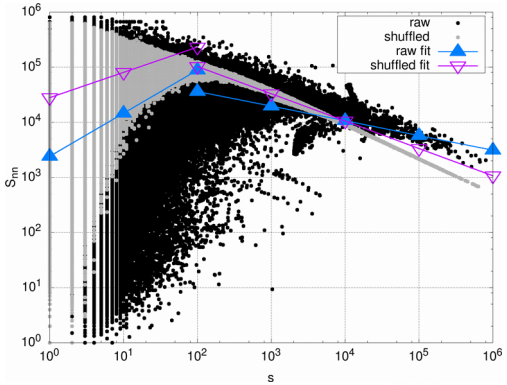
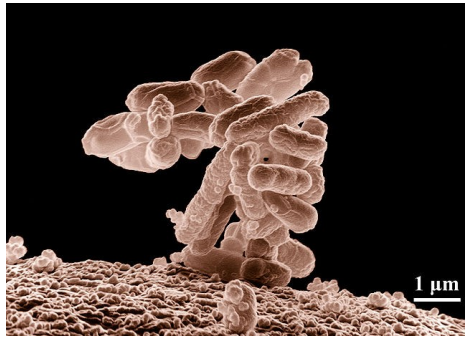
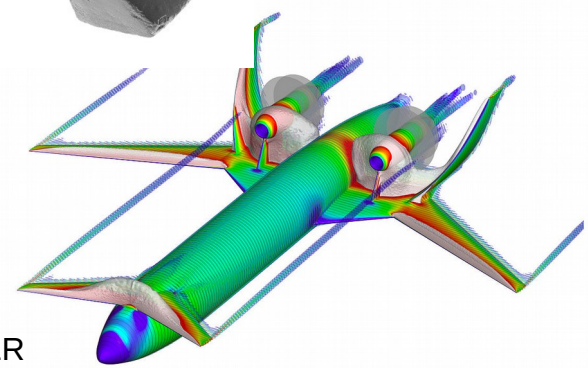
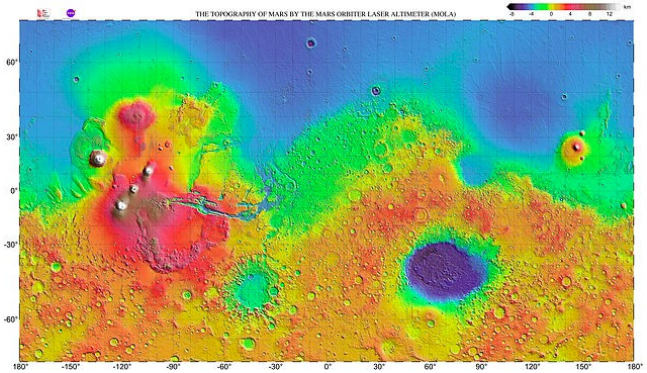
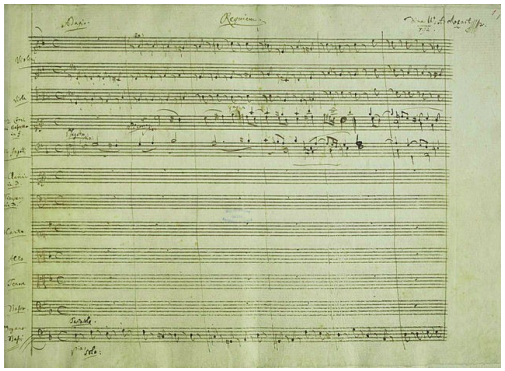
Variety











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# remove first (artificial) element
fp_rate.pop(0)
tp_rate.pop(0)

return np.array(fp_rate)/float(fp_count),
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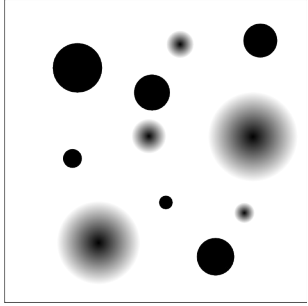
Veracity



REFERENCES

16. NEED CITATION FROM TELECOM-CITIES
17. PBS. (n.d.). *Forensic anthropology*. Retrieved September 24, 2005, from PBS Web site: http://www.pbs.org/opb/historydetectives/techniques/forensic.html
18. Multidisciplinary Center for Earthquake Engineering Research (2005) Ibid.
19. Washington State Department of Transportation. (1940)*"Galloping Gertie" collapses November 7, 1940.* Retrieved September 30, 2005, from Washington State Department of Transportation Web site: http://www.wsdot.wa.gov/TNBhistory/Connections/connections3.htm
20. Institute for the Future. NEED CITATION FROM TEN YEAR FORECAST?

Ursachen

- Wissensgesellschaft
- Wachstum und Wohlstand
- globaler Wettbewerb
- Digitalisierung
- Open Science
- Anforderungen aus Politik und Gesellschaft
- Data-intensive Science
- Wandel der Rolle von Bibliotheken

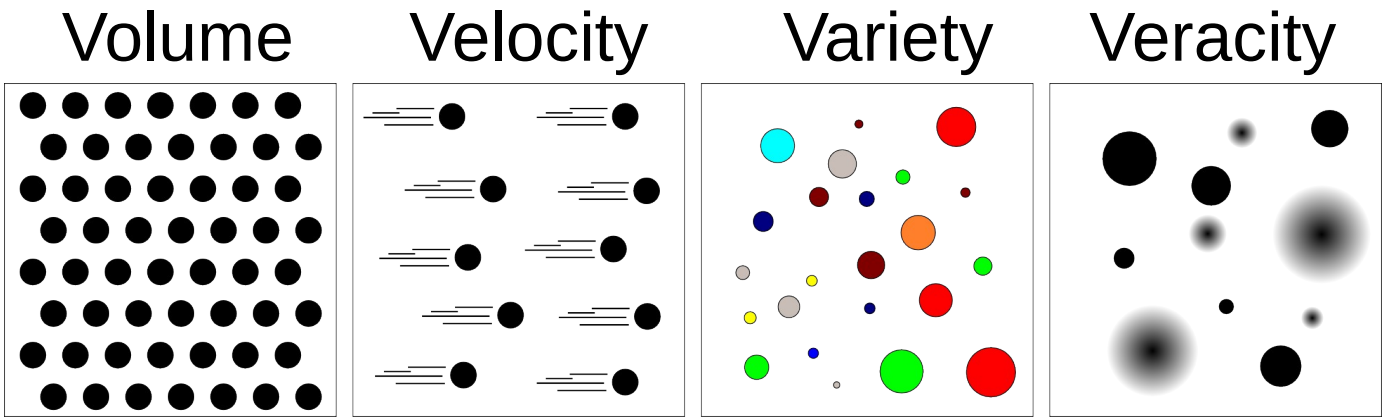
Herausforderungen

Sammeln

Erschließen

Vermitteln

Herausforderungen

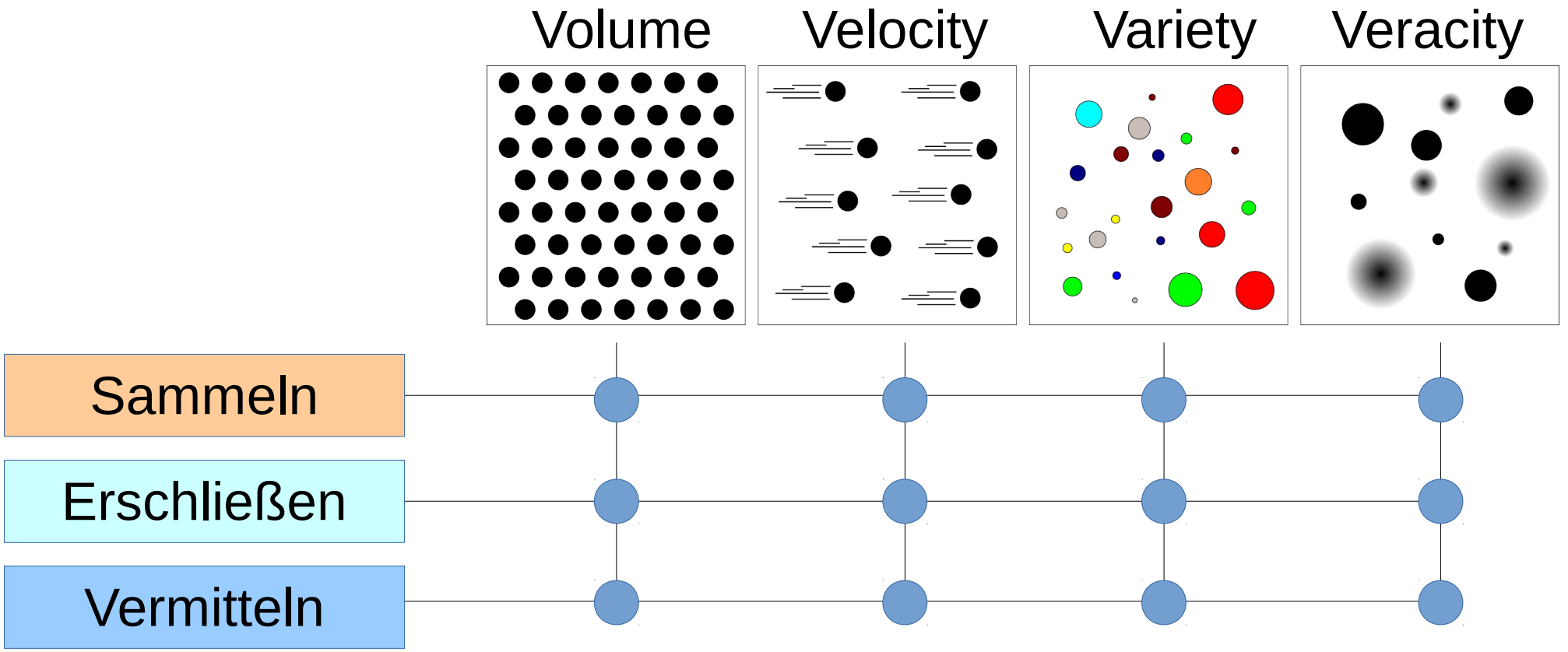


Sammeln

Erschließen

Vermitteln

Herausforderungen

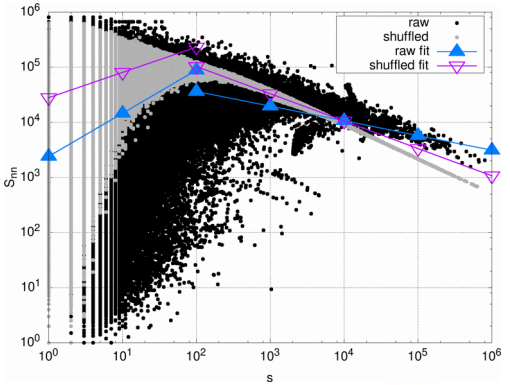


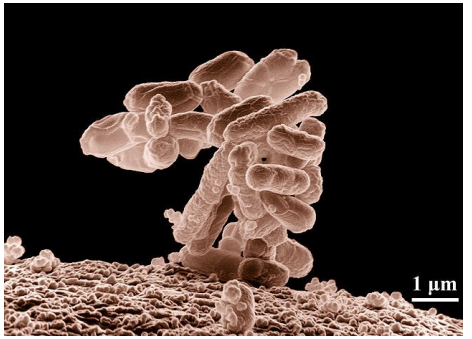
Herausforderungen

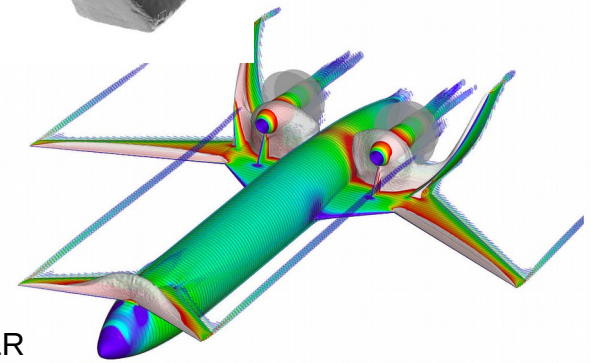
poorly organized collections; poor search tools and lack of accessibility and findability of internal data sets; lack of awareness of available third-party data sets; and copyright and intellectual property issues

(G.-L. Murnane, 2012)

Fallbeispiel: Web-Archivierung







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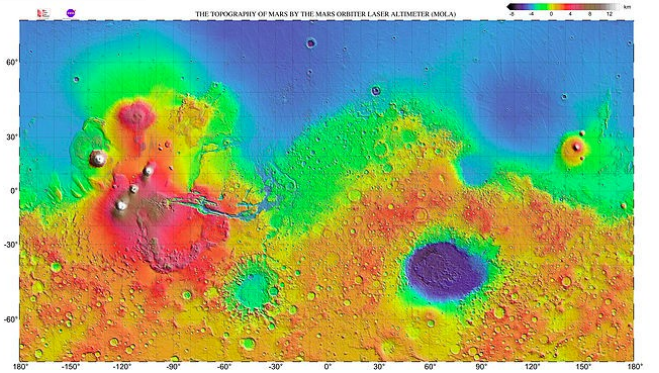

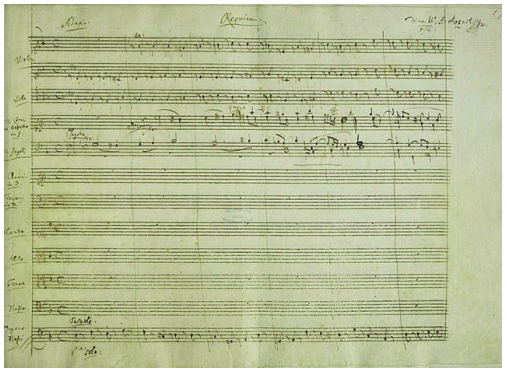

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Tue Mar 11 18:58:53 +0000 2014  4434610715052154 88  30198750  http://nyas.org/ML2014
Tue Nov 11 04:15:45 +0000 2014  5320238524620103 68  30198750  http://m.imdb.com/title
```

```
for row in reversed(rows):
    url = self.urls[row]
    if self.url_is_publisher(url):
        # a true positive found
        tp_rate.append(tp_rate[-1] + 1)
        fp_rate.append(fp_rate[-1])
        tp_count += 1
    else:
        # a false negative found
        tp_rate.append(tp_rate[-1])
        fp_rate.append(fp_rate[-1] + 1)
        fp_count += 1

# remove first (artificial) element
fp_rate.pop(0)
tp_rate.pop(0)

return np.array(fp_rate)/float(fp_count),
```

Fallbeispiel: Web-Archivierung

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theguardian

News | Sport | Comment | Culture | Business | Money | Life & style

News › Politics › Conservatives

Conservative party deletes archive of speeches from internet

Decade's worth of records is erased, including PM's speech praising internet for making more information available

Randeep Ramesh and Alex Hern
The Guardian, Wednesday 13 November 2013 15.40 GMT

Jump to comments (1284)

A speech in which David Cameron said the internet would help people hold politicians to account was among those deleted. Photograph: Barcroft Media

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Losing My Revolution

How Many Resources Shared on Social Media Have Been Lost?

Hany M. SalahEldeen and Michael L. Nelson

Old Dominion University, Department of Computer Science
Norfolk VA, 23529, USA
{hany,mln}@cs.odu.edu

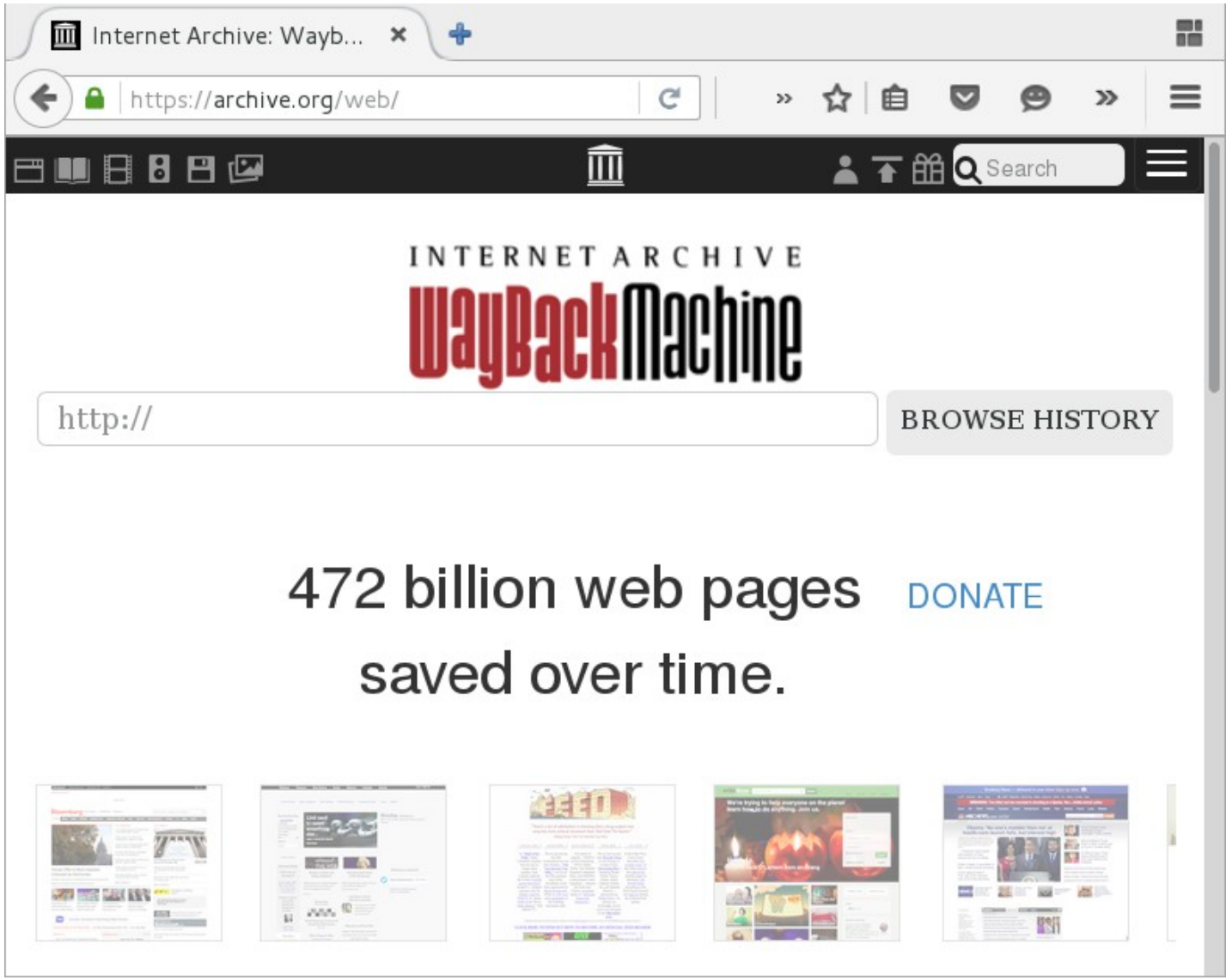
Abstract. Social media content has grown exponentially in the recent years and the role of social media has evolved from just narrating life events to actually shaping them. In this paper we explore how many resources shared in social media are still available on the live web or in public web archives. By analyzing six different event-centric datasets of resources shared in social media in the period from June 2009 to March 2012, we found about 11% lost and 20% archived after just a year and an average of 27% lost and 41% archived after two and a half years. Furthermore, we found a nearly linear relationship between time of sharing of the resource and the percentage lost, with a slightly less linear relationship between time of sharing and archiving coverage of the resource. From this model we conclude that after the first year of publishing, nearly 11% of shared resources will be lost and after that we will continue to lose 0.02% per day.

Fallbeispiel: Web-Archivierung

To do a large-scale social, political, or economic history of periods after the mid 1990s will at the very least be considerably enhanced by an understanding of Web data.

(William J. Turkel, Professor of History, 2015)

Fallbeispiel: Web-Archivierung



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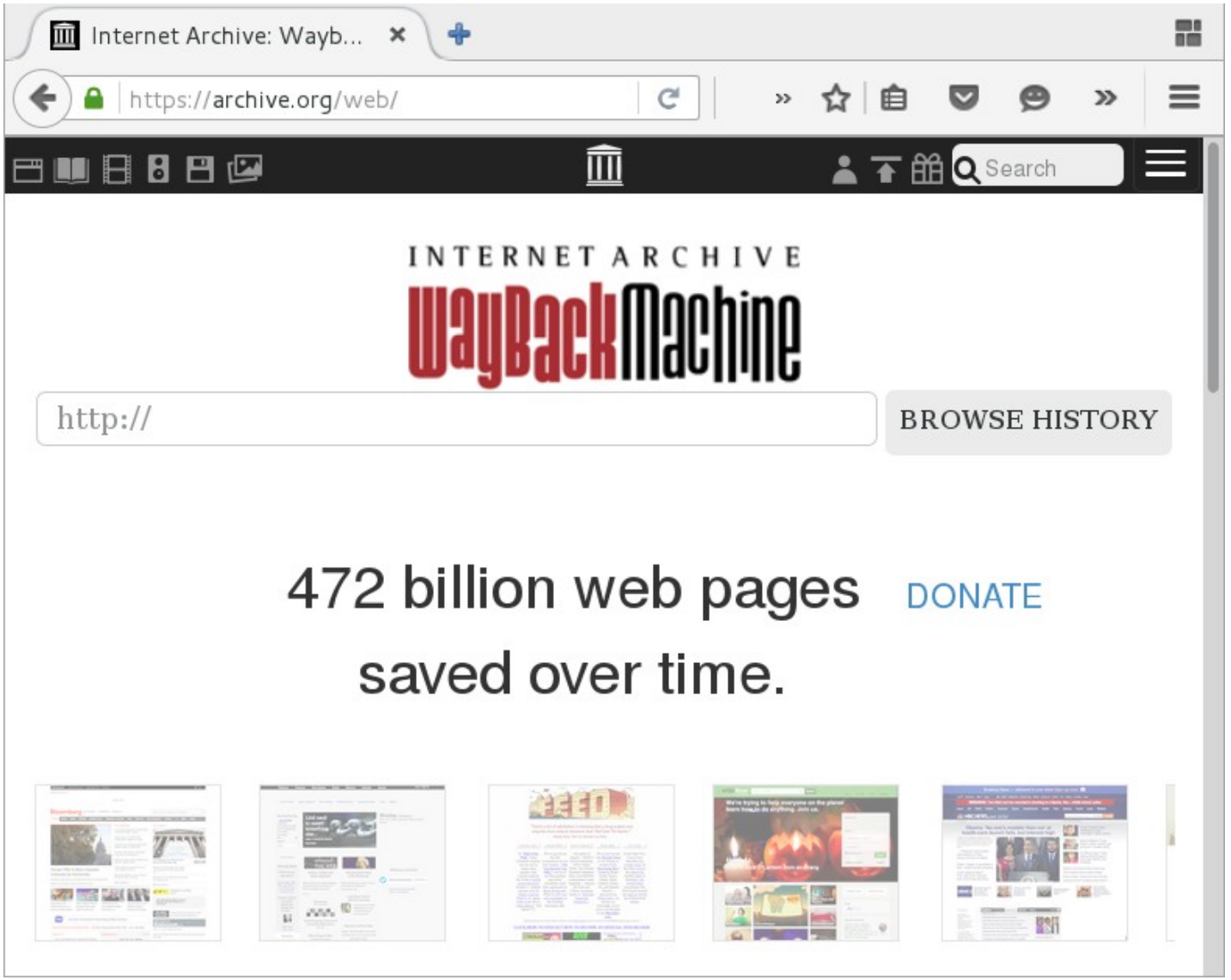

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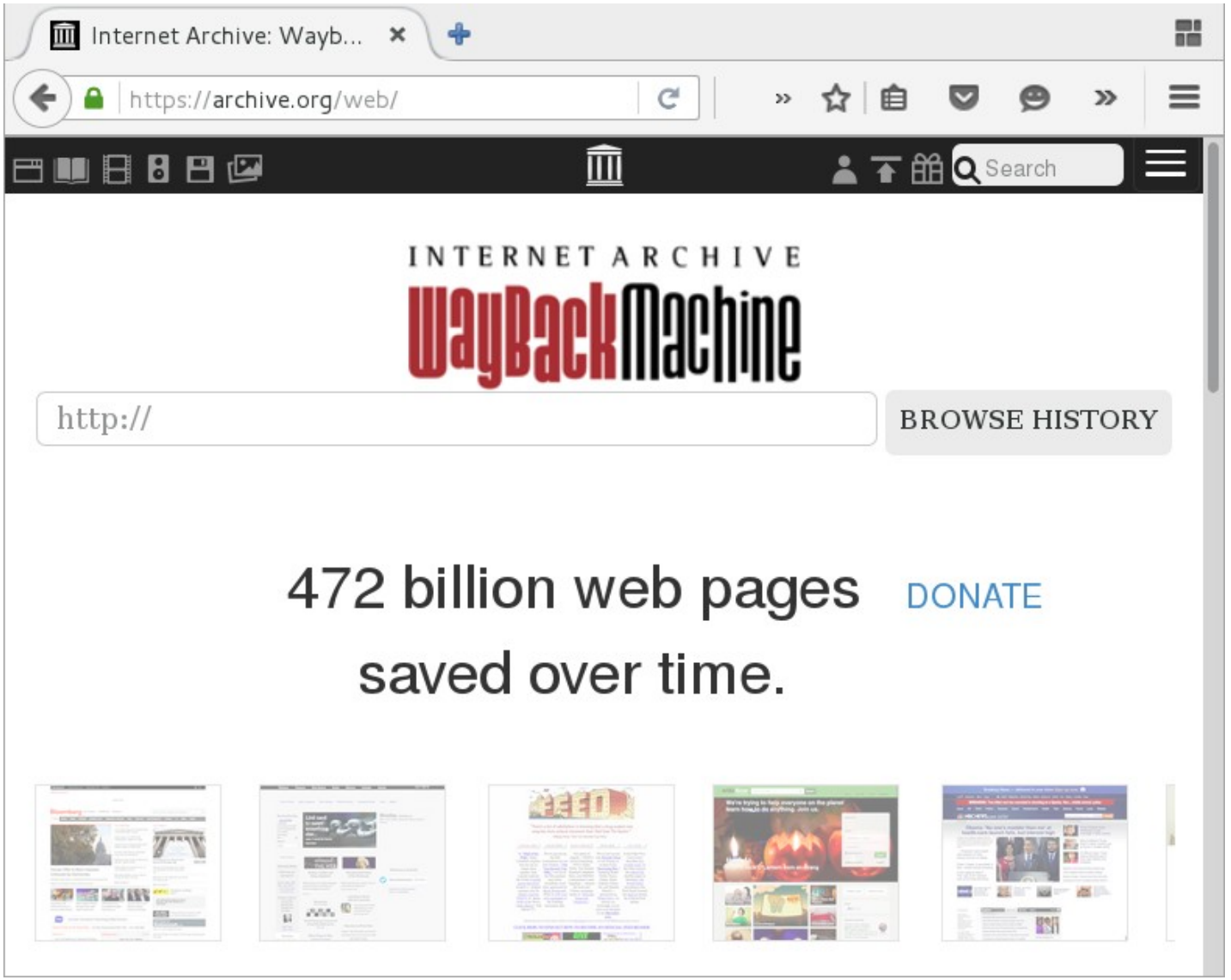

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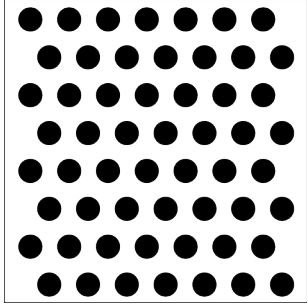
Volume

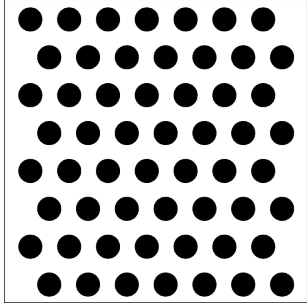


- Google[1]: 60 Bill. Seiten

  100 PB Index
- Internet Archive[2]: 19 PB (2014)
- LOC 2013[3]: 170 Mrd. Tweets

[1] http://www.google.com/insidesearch/howsearchworks/thestory/
[2] https://archive.org/web/petabox.php
[3] https://blogs.loc.gov/loc/2013/01/update-on-the-twitter-archive-at-the-library-of-congress/

Volume



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Was ist relevant?

Welche physikalischen Ressourcen stehen zur Verfügung?

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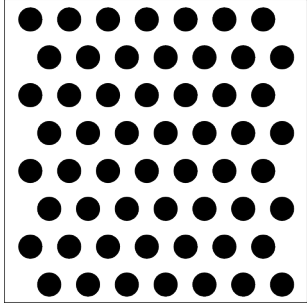

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Wie kann der Crawlprozess dokumentiert werden?

Was sind geeignete Sammlungen?

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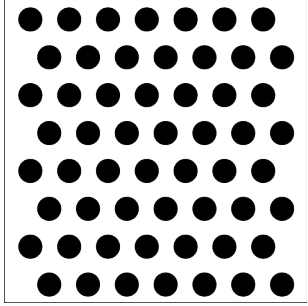

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Wie kann die Infrastruktur vorgehalten werden?

Was sind skalierbare Methoden für Indexierung, Suche und Retrieval?

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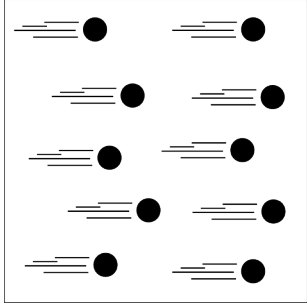

Velocity

- mittlere Lebensdauer einer Webseite[1]: 100 Tage
- max. Tweets pro Minute[2]: 618725 (13.7.2014)

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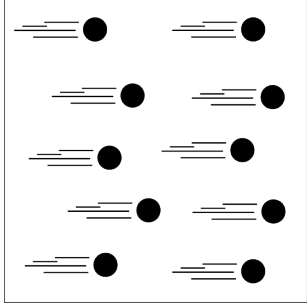

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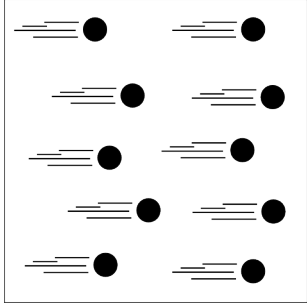

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Wie aktuell sind die Metadaten?

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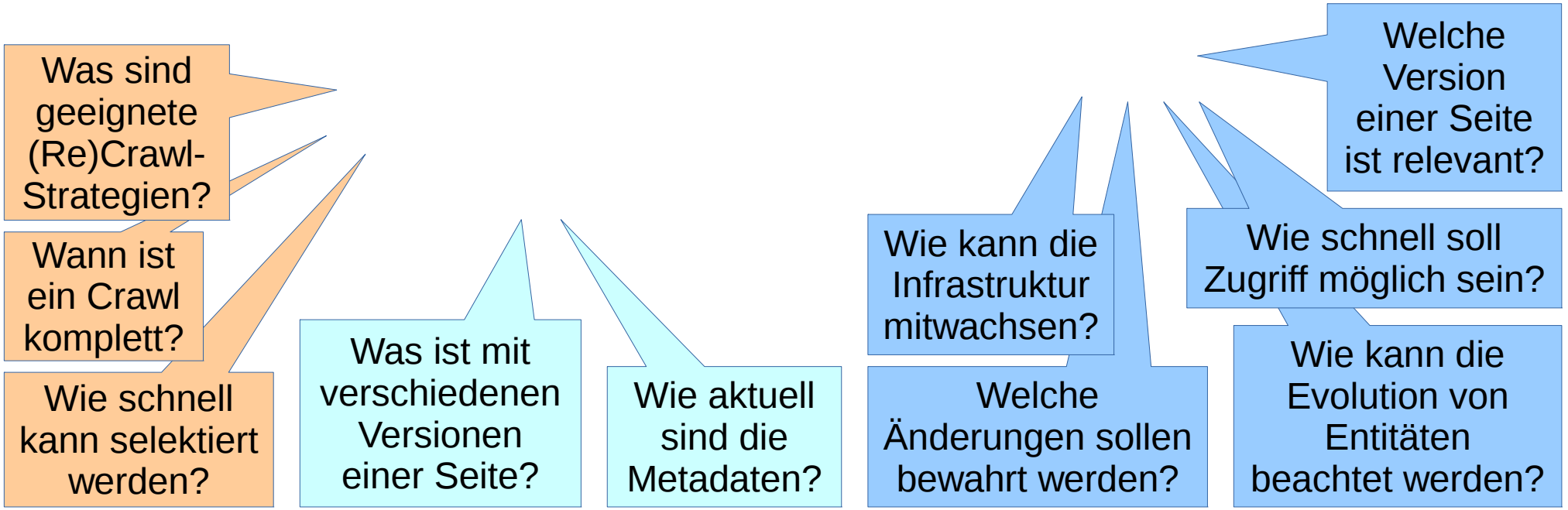

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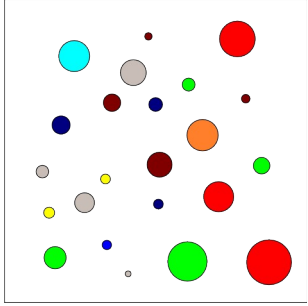

Variety

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- Social Media, Datenbanken, APIs, etc.
- Standards: 11x HTML, 5x CSS, …

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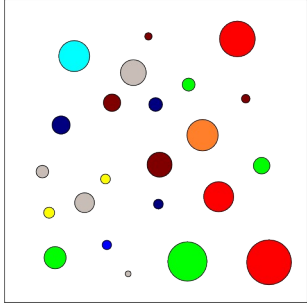

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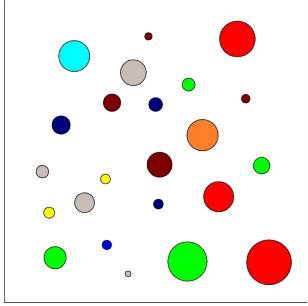

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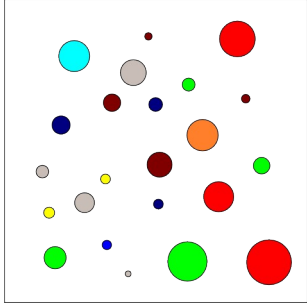

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Wie sah eine Webseite zu ihrer Erstellungszeit aus?

Wie können wir Zugang bewahren?

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Veracity

error 404 - page not found

Sorry, the requested page does not exist on our server.

Fazit

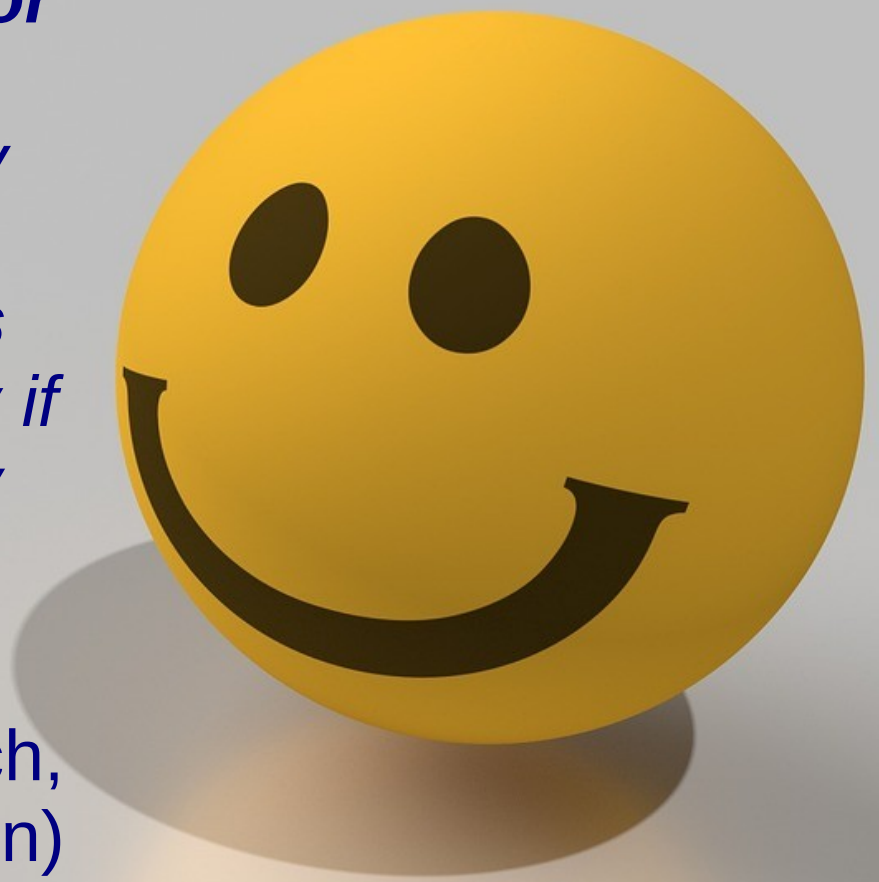
big data affects libraries directly and tangentially: directly because your library can ***use big data tools to analyze your big data sets****; and tangentially, as the faculty at your school will increasingly* ***incorporate big data into their research***

(Mark Bieraugel: Keeping up with... Big Data, 2013)

Fazit

There has probably never been a better time to be a librarian or an information professional.
We live in an information society with access to more information than ever before, and ***librarians have an important role to play*** *if people are going to successfully avoid the much discussed information overload.*

(D. Stuart, Centre for e-Research, King's College London)



Kontrolle des Lernerfolgs

- Wie sind die LIS-Aufgabenbereiche durch Big Data betroffen?
- Welche Herausforderungen ergeben sich bei der Web-Archivierung?
- Erarbeiten Sie für ein anderes Fallbeispiel die Herausforderungen, die sich für LIS durch die Eigenschaften von Big Data ergeben.

Literatur

- G.-L. Murnane, 2012: Big Data: A Big Opportunity for Librarians
- M. Bieraugel, 2013: Keeping up with... Big Data
- F. Lohmeier, J. Mittelbach, 2014: Offenheit statt Bündniszwang
- D. Salo, 2010: Who owns our work?
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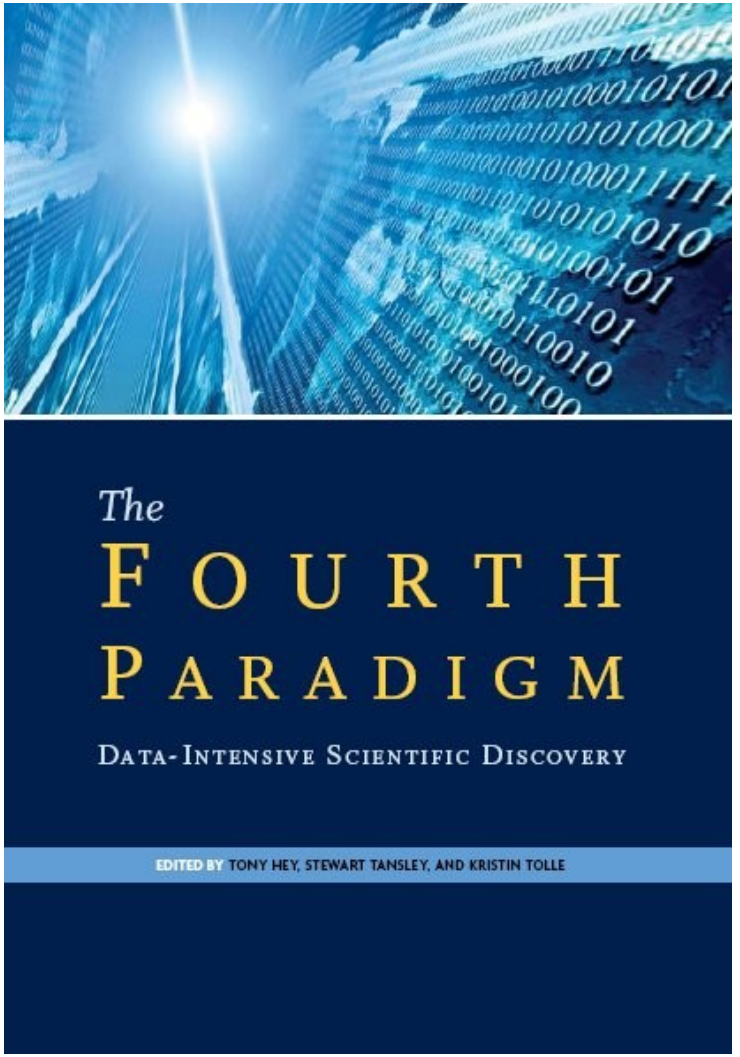

Stand der Vorlesung

Kapitel 10: Big-Data-Technologien

- Einführung
- LIS und Big Data
- Methoden und Technologien