OpenData and OpenScience
Opportunities and Responsible Research and Innovation

Claude Kirchner
Inria

Lirima@Tunis, September 13, 2017
Teasing
Teasing

Alice—For our projects, we need data, but they are so difficult to be found
Teasing

Alice—For our projects, we need data, but they are so difficult to be found.

Claude—Yes, that’s unfortunately true in general.
Teasing

**Alice**— For our projects, we need data, but they are so difficult to be found

**Claude**— Yes, that’s unfortunately true in general

**Claude**— Btw, what are you doing with the data you produce and you have control on?
PRELUDE
We are in a much deeper revolution that most of us imagine
A formidable opportunity
Source of innovations unimaginable yesterday
ALIX, LOOK A LITTLE TO WHAT YOU MAKE ME DO. FOR YOU, I HACKED THE SERVICE OF ADVERTISEMENT PANELS, COME BACK. I LOVE YOU,

GREG
Information, a fundamental concept
Information, a fundamental concept
Information, a fundamental concept
Information, a fundamental concept

Matter

Energy

Living
Information, a fundamental concept
Information, a fundamental concept

Any entity:
- gets
- sends
- transforms
- memorizes informations
Information, a fundamental concept

Any entity:
- gets
- sends
- transforms
- memorizes informations

Digitization allows for a unified representation
Information representations and human revolutions

Language, drawing

Michel Serres
Information representations and human revolutions

Language, drawing

Writing

Michel Serres
Information representations and human revolutions

Language, drawing

Writing

Printing

Michel Serres
Information representations and human revolutions

Language, drawing

Writing

Printing

Digital

Michel Serres
Humans and societies are deeply impacted

- The consequences of the digital reality induces deep transformations
- Laws are no more adapted
- Digitisation of all human activities: memory, image, health, administration, history, war, relations, economy, finance, industry, employment, education, science, …
Digital deeply transforms the way we do science

It has a major impact on
- The scientific discipline development
- The ways researches are conducted
- The publication and communication acts

Jim Gray (eScience / Science-2.0, 2007) shows in particular how the initial scientific paradigms of
- observation,
- theory elaboration and
- experimentation
are completed and even replaced by
- digital simulation and
- data digital exploration
Deep consequences on all sciences and their developments

- New horizons
- New methods
- New scientific vision
- New instruments
- New scientific experiences
- …
Main missions of scientists
Main missions of scientists

• Discover
Main missions of scientists

- Discover

- Communicate

Journals, conferences, social networks, projet calls, etc.
Main missions of scientists

• Discover

• Communicate
  Journals, conferences, social networks, projet calls, etc.

• Teach
Main missions of scientists

- Discover
- Communicate
  - Journals, conferences, social networks, projet calls, etc.
- Teach
- Transfer, administrate and manage
Main missions of scientists

- Discover
- Communicate
  Journals, conferences, social networks, projet calls, etc.
- Teach
- Transfer, administrate and manage
- New! re-think and re-invent the scientific information system
The scientists needs rely on the access and the control of data, informations and knowledges

- **Access to information**: read a book, a journal article, conference proceedings, access to corpuses of images or to discussions
- **Search into informations**: search in ALL full texts and other available data
- **Agregate, analyse, structure informations**: e.g. what do we know today about digital viruses or on the synthesis of the human genome?
- **Publish informations**: Results, programs, data, MOOCs
- **Share, qualify, certify professional informations**
New tools and services are available

- HAL, ISTEX, arXiv, Openaire, …
- ResearchGate, Mendeley, Academia.edu, PeerEvaluation, Twitter, …
- LinkedIn (26,2 billions dollars - 13 juin 2016)
- Digital lab books : eg the french start-up Shazino
- But also…
Get started with Watson

**Businesses**
Partner with IBM to bring your Powered by Watson app to market
Join the Watson Ecosystem

**Healthcare**
See how Watson's improving healthcare through cognitive computing tools
Check out Watson Health

**Developers**
Experiment with Watson APIs in the Watson Developer Cloud
Start building

**Universities**
Are you a student? Participate in a Watson hackathon or enroll in a course
Explore University programs
Elsevier is a world-leading provider of information solutions that help you make better decisions, deliver better care, and sometimes make groundbreaking discoveries in science, health, and technology.

We provide web-based, digital solutions — among them ScienceDirect, Scopus, Evolve, Knovel, Reaxys and ClinicalKey — and publish over 2,500 journals and more than 33,000 book titles.
Elsevier is a world-leading provider of information solutions that help you make better decisions, deliver better care, and sometimes make groundbreaking discoveries in science, health, and technology.

We provide web-based, digital solutions — among them ScienceDirect, Scopus, Evolve, Knovel, Reaxys and ClinicalKey — and publish over 2,500 journals and more than 33,000 book titles.
Elsevier is a world-leading provider of information solutions that help you make better decisions, deliver better care, and sometimes make groundbreaking discoveries in science, health, and technology.

We provide web-based, digital solutions — among them ScienceDirect, Scopus, Evolve, Knovel, Reaxys and ClinicalKey — and publish over 2,500 journals and more than 33,000 book titles.
TEACH AND LEARN
Harvard pour tous

Les cours des grandes universités sont accessibles en ligne.
Une révolution
Take the world's best courses, online.

Search Any Topic

See Full Catalog
FUN: Higher Education Excellence. Online, Free and Open Courses

Highlighted courses

#ecoresp
Concevoir un emballage responsable (ECORESP)
Ecole Centrale Lyon

NEW COURSE
Starts
oct 05 2018
Learn more

Introduction à la statistique avec R
Université Paris-Sud

SESSION 6
Starts
sep 12 2018
Learn more
Online learning provides a huge amount of data
Online learning provides a huge amount of data

- On knowledge itself
Online learning provides a huge amount of data

- On knowledge itself
- On learners
Online learning provides a huge amount of data

- On knowledge itself
- On learners
- On teachers
Is there a fundamental difference between these various platforms?
Is there a fundamental difference between these various platforms?

When a teacher uses to lecture

* a BOOK, he gives access to knowledge elaborated somewhere to the learners
Is there a fundamental difference between these various platforms?

When a teacher uses to lecture

- a BOOK, he gives access to knowledge elaborated somewhere to the learners
- a MOOC, he gives access to knowledge elaborated somewhere to the learners
Is there a fundamental difference between these various platforms?

When a teacher uses to lecture

- a BOOK, he gives access to knowledge elaborated somewhere to the learners
- a MOOC, he gives access to knowledge elaborated somewhere to the learners

AND
Is there a fundamental difference between these various platforms?

When a teacher uses to lecture

- a BOOK, he gives access to knowledge elaborated somewhere to the learners
- a MOOC, he gives access to knowledge elaborated somewhere to the learners

**AND**

he allows the platform to access to the learner profiles
Is there a fundamental difference between these various platforms?

When a teacher uses to lecture

- a BOOK, he gives access to knowledge elaborated somewhere to the learners
- a MOOC, he gives access to knowledge elaborated somewhere to the learners

AND

he allows the platform to access to the learner profiles

he takes the responsibility to oblige (sic) his learners to use the platform
Is there a fundamental difference between these various platforms?

When a teacher uses to lecture

- a BOOK, he gives access to knowledge elaborated somewhere
- a MOOC, he gives access to knowledge elaborated somewhere

AND

- he allows the platform to access to the learner profiles
- he takes the responsibility to oblige (sic) his lea
Is there a fundamental difference between these various platforms?
Is there a fundamental difference between these various platforms?

YES, the way usage data are controlled and used
Deep profiles represent people

• Deep profiles are strategic information today and forever

• Who has the responsibility to make them available:
  ✓ The authors?
  ✓ The universities / schools?
  ✓ The nations?
Deep profiles are not Facebook ones.
Pedagogical and health data

1) are particularly sensible and the profiles issued from them are extremely precise

2) as personal data, they concern each individual but also its social neighborhoods and in particular its ascendants and descendants, immediately and forever

3) the PMF (personal medical file) and the PPF (personal pedagogical file) should be strongly protected, in particular their digital version

4) their provide an unprecedented scientific richness
Two periods in the history of every science
Two periods in the history of every science

- Astronomy before and after Galileo’s telescope
Two periods in the history of every science

• Astronomy before and after Galileo’s telescope

• Biology before and after Leenvenhoek’s microscope
Two periods in the history of every science

- Astronomy before and after Galileo's telescope
- Biology before and after Leenvenhoek's microscope
- Mathematics before and after computers
Two periods in the history of every science

- Astronomy before and after Galileo’s telescope
- Biology before and after Leenvenhoek’s microscope
- Mathematics before and after computers
- Pedagogy before and after eLearning and the data it provides (MOOCS, …)
CONTROL THE SCIENTIFIC DATA
Set-up a new project in cooperation
Set-up a new project in cooperation

- Organize audio or visio conferences
Set-up a new project in cooperation

• Organize audio or visio conferences

☆ not always in the main language of your country ;-)
Set-up a new project in cooperation

- Organize audio or visio conferences
  ★ not always in the main language of your country ;-)  
- Share documents
Set-up a new project in cooperation

- Organize audio or visio conferences
  ★ not always in the main language of your country ;-
- Share documents
  ★ Shall we give everything to dropbox ?
Set-up a new project in cooperation

- Organize audio or visio conferences
  - ★ not always in the main language of your country ;-)★
- Share documents
  - ★ Shall we give everything to dropbox ?★
- Write collaborative documents
Set-up a new project in cooperation

• Organize audio or visio conferences
  ★ not always in the main language of your country ;-)  

• Share documents
  ★ Shall we give everything to dropbox ?

• Write collaborative documents
  ★ mail ? googledoc ? …
What tools or services to keep control on our data?

Is this a problem to give all the contents of a project proposal to Google or Dropbox?
What tools or services to keep control on our data?

Is this a problem to give all the contents of a project proposal to Google or Dropbox?
DIGITAL AND SCIENTIFIC SOVEREIGNTIES
Sovereignties
Sovereignties

The historical concept of sovereignty refers to the capacity of the sovereign to control attributes that he claims to have the control of: frontiers, army, police, money, language, …
Sovereignties

The historical concept of sovereignty refers to the capacity of the sovereign to control attributes that he claims to have the control of: frontiers, army, police, money, language, ...

The fundamental concept that consists for a given entity to control the attributes that its claims generalizes the historical notion of sovereignty while keeping its name.
Sovereignties

The historical concept of sovereignty refers to the capacity of the sovereign to control attributes that he claims to have the control of: frontiers, army, police, money, language, ...

The fundamental concept that consists for a given entity to control the attributes that its claims generalizes the historical notion of sovereignty while keeping its name

What are the digital sovereignties?
Sovereignties

The historical concept of sovereignty refers to the capacity of the sovereign to control attributes that he claims to have the control of: frontiers, army, police, money, language, ...

The fundamental concept that consists for a given entity to control the attributes that its claims generalizes the historical notion of sovereignty while keeping its name

What are the digital sovereignties?

What are the scientific sovereignties?
Examples

Scientific sovereignty of

• Organisations
  ★ Research performing institutions, universities

• Communities
  ★ neurosciences or network science or informatics or mathematics, …

...
Examples

Digital sovereignty:

• Of organisations
  ★ nations, entreprises, organisations …

• Of communities
  ★ individuals of any age or NGOs, …

...
``... We may not have the power to create the world we want immediately, but we can all start working on the long term today.

In times like these, the most important thing we at Facebook can do is develop the social infrastructure to give people the power to build a global community that works for all of us. ...”

in Building Global Community
MARK ZUCKERBERG·THURSDAY, FEBRUARY 16, 2017
We may not have the power to create the world we want immediately, but we can all start working on the long term today.

In times like these, the most important thing we at Facebook can do is develop the social infrastructure to give people the power to build a global community that works for all of us."
We may not have the power to create the world we want immediately, but we can all start working on the long term today. In times like these, the most important thing we at Facebook can do is develop the social infrastructure to give people the power to build a global community that works for all of us.

---

**ZERODIUM Payouts for Mobiles**

- Up to $1,500,000
- Up to $1,000,000
- Up to $500,000
- Up to $150,000
- Up to $100,000
- Up to $50,000

RJB: Remote Jailbreak with Persistence
RCE: Remote Code Execution
LPE: Local Privilege Escalation
SBX: Sandbox Escape or Bypass

**iOS**
- iPhone RJB
- WeChat RCE+LPE
- Viber RCE+LPE
- FB Messenger RCE+LPE
- Signal RCE+LPE
- Telegram RCE+LPE
- WhatsApp RCE+LPE
- iMessage RCE+LPE
- SMS/MMS RCE+LPE
- Email App RCE+LPE
- Media Files RCE+LPE
- Documents RCE+LPE
- Chrome RCE+LPE
- Safari RCE+LPE
- LPE to Kernel
- SBX for Chrome
- SBX for Safari

**Android**
- Code Signing Bypass
- Baseband RCE+LPE
- WiFi RCE+LPE
- SS7
- Code Signing Bypass
- Secure Boot
- RCE via MitM
- LPE to Root
- Chrome RCE w/o SBX
- Chrome UXSS/SOP
- Safari UXSS/SOP
- Safari RCE w/o SBX
The knowledge ecosystem is a scientific sovereignty issue, much more than a question of capitalistic revenues.

Important and visible

Fundamental but uneasy to see and delimitate
Towards new models

- **Controlled** by scientists for the access to scientific production and data
- Strongly **connected** to scientific social networks
- Allowing to **publish** texts, specifications, data, protocols, programs, videos, MOOCs, slides, proposals, ...
- **Archiving** forever
- **Respecting** the scientists and **augmenting** their capacities
- Objet of **ethical thinkings**
And… in practice

How to prepare, run, share and evaluate my scientific projects?
Open Access
First scientific journals

1665 : Denis de Sallo / Henry Oldenburg
Journals evolutions

- Part of the research processes
- Set research results mpaternity
- Records and labels results
- Used to perform measures
- Used for “evaluating” people, teams, institutions, countries
- Provide a big data source of knowledge
Journals evolutions
Journals evolutions

- 28,000 active journals in 2012
Journals evolutions

- 28,000 active journals in 2012
- 1.8 million articles published per year [Mabe 2012]
Journals evolutions

- 28,000 active journals in 2012
- 1.8 million articles published per year [Mabe 2012]
- Elsevier example: ~1.3 million articles submitted per year, 30% accepted
Journals evolutions

- 28,000 active journals in 2012
- 1.8 million articles published per year [Mabe 2012]
- Elsevier example: ~1.3 million articles submitted per year, 30% accepted
- Over lucrative market
Profits by Elsevier

- 2002: £429m profit on £1295m revenue: 33.18%
- 2003: £467m profit on £1381m revenue: 33.82%
- 2004: £460m profit on £1363m revenue: 33.75%
- 2005: £449m profit on £1436m revenue: 31.25%
- 2006: £465m profit on £1521m revenue: 30.57%
- 2007: £477m profit on £1507m revenue: 31.65%
- 2008: £568m profit on £1700m revenue: 33.41%
- 2009: £693m profit on £1985m revenue: 34.91%
- 2010: £724m profit on £2026m revenue: 35.74%
- 2011: £768M profit on £2058M revenue: 37.3%

Source: http://svpow.com/2012/01/13/the-obscene-profits-of-commercial-scholarly-publishers
The world is digital…
… so are the ways we do research

- Researchgate,
- Mendeley,
- Academia.edu,
- PeerEvaluation,
- etc
It’s time to change the way we do research.

Mendeley is a free reference manager and academic social network that can help you organize your research, collaborate with others online, and discover the latest research.

- Automatically generate bibliographies
- Collaborate easily with other researchers online
- Easily import papers from other research software
- Find relevant papers based on what you’re reading
- Access your papers from anywhere online
- Read papers on the go, with our new iPhone app
- View more features...

First name
Last name
E-mail address

…or sign in with Facebook

Sign up & Download

"Mendeley Throws Open the Doors to Academic Data."
Dear Dr. Kirchner,

We are delighted to announce that Elsevier has acquired the cloud-based research management and social collaboration platform, Mendeley.

We believe Mendeley is an outstanding company with a great culture and much talent. It is innovative, open, and collaborative - all attractive traits we value. Joining forces with Elsevier will only strengthen that offering and provide us both with a myriad of opportunities to better address the day to day challenges researchers face.

- **The opportunities to develop new researcher tools will be greatly enhanced.** Innovation will be spurred by a powerful blend of Elsevier's content, data analytics products, and long-standing publisher/society relationships with Mendeley's workflow tools, collaboration platform, and altmetrics data.

- **This acquisition will allow Mendeley's "Freemium" model to remain in place with expanded free categories and storage size.** We acquired Mendeley to enhance its products and its talent and to provide a better experience for researchers.
Dear Dr. Kirchner,

We are delighted to announce that Elsevier has acquired the cloud-based research management and social collaboration platform, Mendeley.

We believe Mendeley is an outstanding company with a great culture and much talent. It is innovative, open, and collaborative - all attractive traits we value. Joining forces with Elsevier will only strengthen that offering and provide us both with a myriad of opportunities to better address the day to day challenges researchers face.

- **The opportunities to develop new researcher tools will be greatly enhanced.** Innovation will be spurred by a powerful blend of Elsevier's content, data analytics products, and long-standing publisher/society relationships with Mendeley's workflow tools, collaboration platform, and altmetrics data.

- **This acquisition will allow Mendeley's "Freemium" model to remain in place with expanded free categories and storage size.** We acquired Mendeley to enhance its products and its talent and to provide a better experience for researchers.

Probable amount of the transaction between $69 million and $100 million
Towards other models

- Master access to scientific production and data
- Strongly connected to social networks
- Allow to publish data, experiments, programs, specs, videos, MOOCs, slides, …
- Forever archiving
- Respecting and empowering people
Overlay journals
Scientific Knowledge:
Four main complementary actions
Scientific Knowledge:
Four main complementary actions

Publish
Scientific Knowledge:
Four main complementary actions

Publish

Qualify
Scientific Knowledge:
Four main complementary actions

Publish
Qualify
Validate
Scientific Knowledge:
Four main complementary actions

Publish
Qualify
Validate
Communicate
Publish

- Blog
- Twitter
- Web page
- Journal
- Conference
- Public archive
- E-learning platform
- ...

- Short note, Tweet
- Full article
- Images, Sounds, Videos
- Programs
- Experiments
- Data
- MOOCs
- ...

...
Qualify a publication

- Originality
- Interest
- Writing quality
- Importance of topics and results
- Reproducibility of results
- ...

Publishing and teaching at the digital age
Validate - Certify

• Give a label
• E.g. accepted for publication in
• Yes / No action
Overlay Journals

• On top of public archives (eg HAL, ArXiv, CWI, …)
• Strongly connected to social networks
• Open access
• Mass data access
• Ethical management of referee reports on the long term
• We are implementing this…
The open archive HAL

HAL is an open archive where authors can deposit scholarly documents from all academic fields.

For the attention of the authors

- The deposit must be made in agreement with the co-authors and in the respect for the policy of the publishers.
- The deposit is subject of a control, HAL reserves the right to refuse items that do not meet the criteria of the archive.
- Any deposit is definitive, no withdrawals will be made after the on-line posting of the publication.
- Text files in pdf format or image files are sent to CINES for long-term archiving.

For the attention of the readers

- In a context of electronic distribution, each author keeps their intellectual property rights.

LAST SUBMISSIONS IN HAL


Bertrand Heib. Développement de vernis d'isolation électrique présentant des propriétés thermomécaniques améliorées. A RESO, Arts-Université de Graphie 2014, France. <HAL-01055902>
EPI-journal Principles
EPI-journal Principles
EPI-journal Principles
EPI-journal Principles
EPI-journal Principles
EPI-journal Principles

Evaluation Platform

Editorial Board

User
EPI-journal Principles
EPI-journal Principles

Submit -> Evaluation Platform -> Editorial Board

User

Write

arXiv.org

HAL - Inria

CWI

ProdINRA
EPI-journal Principles

Submit

Evaluation Platform

User

Write

Editorial Board

Referees

P

HAL - Inria
Archive ouverte / Open archive

CWI

arXiv.org

ProdINRA
EPI-journal Principles

Evaluation Platform

Submit

User

Write

P

HAL - Inria
Archive ouverte / Open archive

CWI

Referees

Editorial Board

read

Submit
EPI-journal Principles

- New Data: Evaluations, Discussions
- Submit
- Evaluation Platform
- User
- Write
- P
- HAL - Inria
- CWI
- ProdINRA
- Editorial Board
- Referees
- read
EPI-journal Principles

New Data:
- Evaluations
- Discussions

Evaluation Platform

Submit

User

Write

Read

Editorial Board

Referees
EPI-journal Principles

New Data:
- Evaluations
- Discussions

Evaluation Platform

Submit

User

Write

Editorial Board

Referees

read

P

P’

P”
Families of EPI-Journals

New Data:
- Evaluations
- Discussions

Evaluation Platform

Editorial Board

Referees

User

arXiv.org

HAL - Inria

CWI

ProdINRA
Families of EPI-Journals

New Data:
- Evaluations
- Discussions

Evaluation Platform

Editorial Board
Referees

Editorial Board
Referees

User
Families of EPI-Journals

New Data:
- Evaluations
- Discussions

Evaluation Platform

Editorial Board

Referees

Editorial Board

Referees

Editorial Board

Referees
Families of EPI-Journals

New Data:
- Evaluations
- Discussions

Evaluation Platform

Editorial Board

Referees

User

arXiv.org
Several platforms

New Data:
- Evaluations
- Discussions

Evaluation Platform

User

Other

CCSD

J1
J2
DMTCS
JDMDH

New Data:
- Evaluations
- Discussions

Evaluation Platform
Questions!

- Who decide supporting journals?
- What economic model?
- Who owns the new data collected?
- Who controls the access and persistence of the evaluation data?
- Who asserts the quality of the platforms?
- Who validates the relationship between the platforms and the archives?
Some answers

- Support by CNRS, Inria, University of Lyon, **new**: INRA is joining
Some answers

- Support by CNRS, Inria, University of Lyon, **new**: INRA is joining
- Set-up of a meta editorial committee in charge of journal validation and periodic review
Some answers

- Support by CNRS, Inria, University of Lyon, **new**: INRA is joining
- Set-up of a meta editorial committee in charge of journal validation and periodic review
- Project to extend the schema to a general scientific social network

![Diagram showing connections between J1, J2, DMTCS, JDMDH, and CCSD]
Some answers

- Support by CNRS, Inria, University of Lyon, **new**: INRA is joining
- Set-up of a meta editorial committee in charge of journal validation and periodic review
- Project to extend the schema to a general scientific social network
- Offer to host existing or new journals in Informatics or Applied Mathematics
Recently published

**Fair Simulation for Nondeterministic and Probabilistic Büchi Automata: a Coalgebraic Perspective**
*Authors: Urabe, Natsuki; Hasuo, Ichiro.*

> Notions of simulation, among other uses, provide a computationally tractable and sound (but not necessarily complete) proof method for language inclusion. They have been comprehensively studied by Lynch and Vaandrager for nondeterministic and timed systems; for Büchi automata the notion of [...]  

*Volume:* Volume 13, Issue 3  
*Published on:* September 6, 2017

**Path Checking for MTL and TPTL over Data Words**
*Authors: Feng, Shiguang; Lohrey, Markus; Quaas, Karin.*

> Metric temporal logic (MTL) and timed propositional temporal logic (TPTL) are quantitative extensions of linear temporal logic, which are prominent and widely used in the verification of real-time systems. It was recently shown that the path checking problem for MTL, when evaluated over finite [...]
A moving landscape...
We are in an exciting exploratory phase
A moving landscape...
We are in an exciting exploratory phase

→ Institutional endeavor

• The involvement of **scientists** is essential

• **Academics bodies** shall become more responsible of their scientific information policies/strategies

• Foster **cross-institutional** initiatives
A moving landscape...
We are in an exciting exploratory phase

→ Institutional endeavor

• The involvement of **scientists** is essential

• **Academics bodies** shall become more responsible of their scientific information policies/strategies

• Foster **cross-institutional** initiatives

→ Towards new peer-review models

• **Open peer-review**: Identification of the reviewer becomes possible, and reviews could become publication objects of their own

• «**Invisible college**» Social networks allows discussions, feedback and many other forms of knowledge sharing and building. **All data issued from these networks are a fundamental richness that should be deontologically open.**
CONCLUSIONS
Impressive new initiatives

• new access to publication: Open access
• new access to knowledge: eLearning
• new access to softwares: softwareheritage.org
We are building the universal software archive

We collect and preserve software in source code form, because software embodies our technical and scientific knowledge and humanity cannot afford the risk of losing it.

Software is a precious part of our cultural heritage. We curate and make accessible all the software we collect, because only by sharing it we can guarantee its preservation in the very long term.

Discover our mission

Do we already have your code?

We harvest publicly available source code from many software projects and keep up with development happening there. As of today our archive already contains and keeps safe for you:

<table>
<thead>
<tr>
<th>Source files</th>
<th>Commits</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,666,486,366</td>
<td>838,772,669</td>
<td>65,321,448</td>
</tr>
</tbody>
</table>
Scientific knowledge and data are in joint ownership

- Knowledge and knowledge graphs are a deep richness
- These richness are often in hands of private entities
- New global organizations and funding models should be found to allow for the fair sharing of these richness
Open Access is part of a wider scientific information concept

- **Research organizations need a scientific information strategic plan**
  - Open access to publications and research data is a component thereof
  - A prerequisite to go for OpenScience
- **Need for a better coordination of scientific information policies**
  - Shared e-Infrastructures;
  - Joint endeavors to improve the dissemination of research assets
- **Exploring new models for scientific information**
  - Financing schemes, attribution-based licensing,
  - new modes of scholar assessment, virtual research environments
Some strategic questions

How to *raise awareness* of scientists, teachers and the students to the underlying issues?

How to *collaborate and mutualize* at the national, continental and international levels?

How to allow *new fields of innovation* and manage public-private interactions?

More globally, *what kind of knowledge ecosystem* do we want to implement?
Goal, for a public scientific research institution

All data, informations and knowledges:

- **scientific**: writings, experimental data, programs, project proposals, contracts, discussions, …
- **organizational**: human resources, administration, finance, budget, …

must be freely accessible to the institution:

- immediately
- forever
- in particular for analyses, evaluations and strategic purposes
For scientists, towards Responsible Research and Innovation

As scientists, this is our responsibility, present and future, to control all the digital elements allowing us to make science, now and tomorrow.
Merci
 شكرا
 Thank you

claude.kirchner@inria.fr