Open Infrastructure for a Better World

Dr Tim SMITH

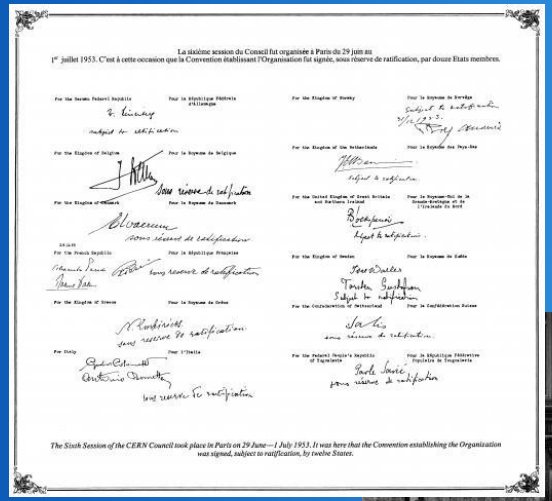
Indico 3.5 Workshop – 2023/03/20

Nurtured by the UN family

1950

Concept of CERN launched at UNESCO General Conference in Florence in June 1950, where physicist and Nobel laureate Isidor Rabi tabled a resolution authorising UNESCO to

"assist and encourage the formation of regional research laboratories in order to increase international scientific collaboration…"



The Sixth Session of the CERN Council took place in Paris on 29 June—1 July 1953. It was here that the Convention establishing the Organization was signed, subject to ratification, by twelve States.

The original of the CERN Convention and the instruments of ratification of all Member States are deposited with UNESCO

1951

At an intergovernmental meeting of UNESCO in Paris in December 1951, the first resolution concerning the establishment of a European Council for Nuclear Research was adopted

1952

Two months later, 11 countries signed an agreement establishing the provisional Council – the acronym CERN was born

CERN

Science for Peace

23 Member States
7+3 Associate MS
50 CA with non-MS

600 Universities
77 Countries
120 Nationalities

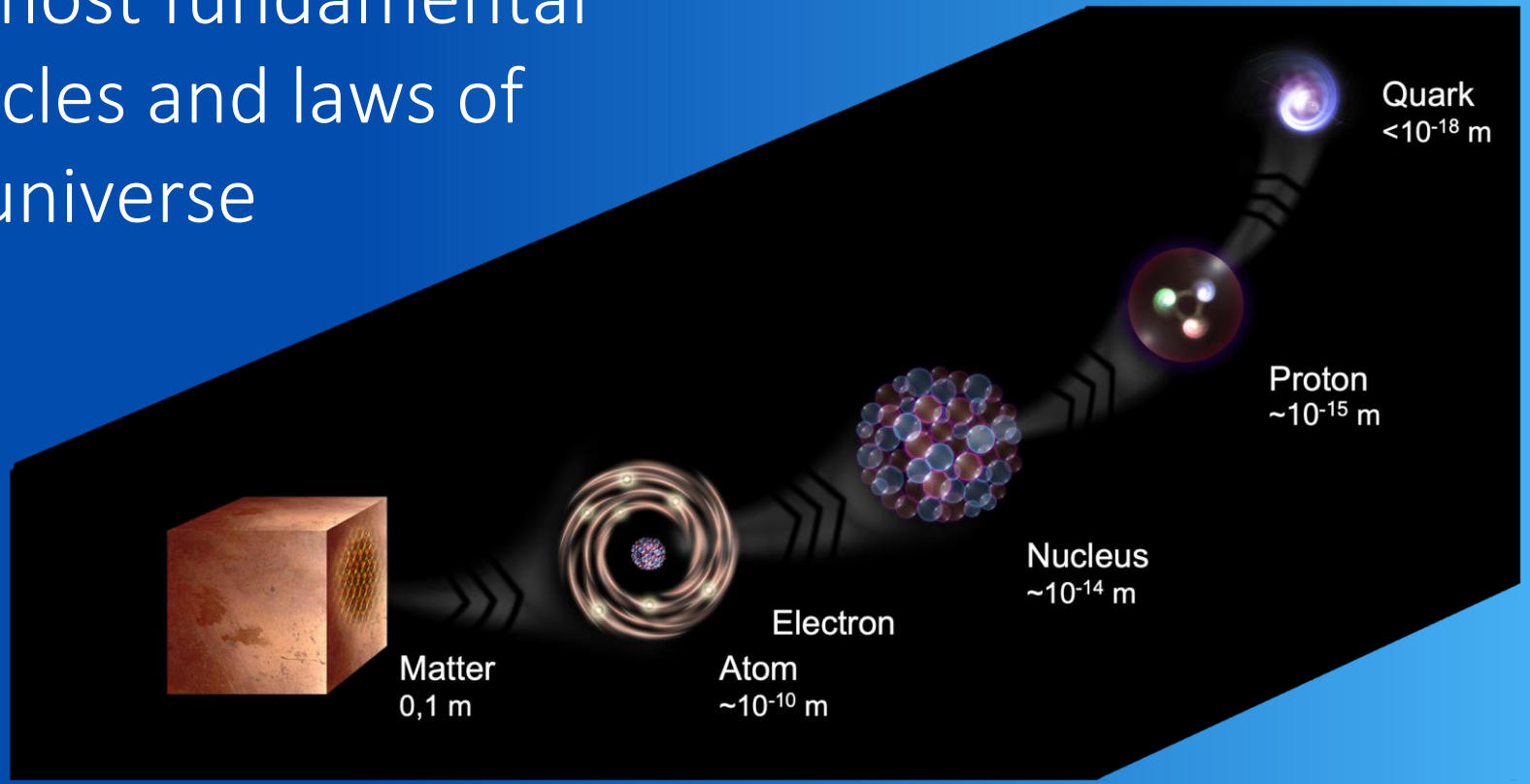
Fundamental Research

Collaboration

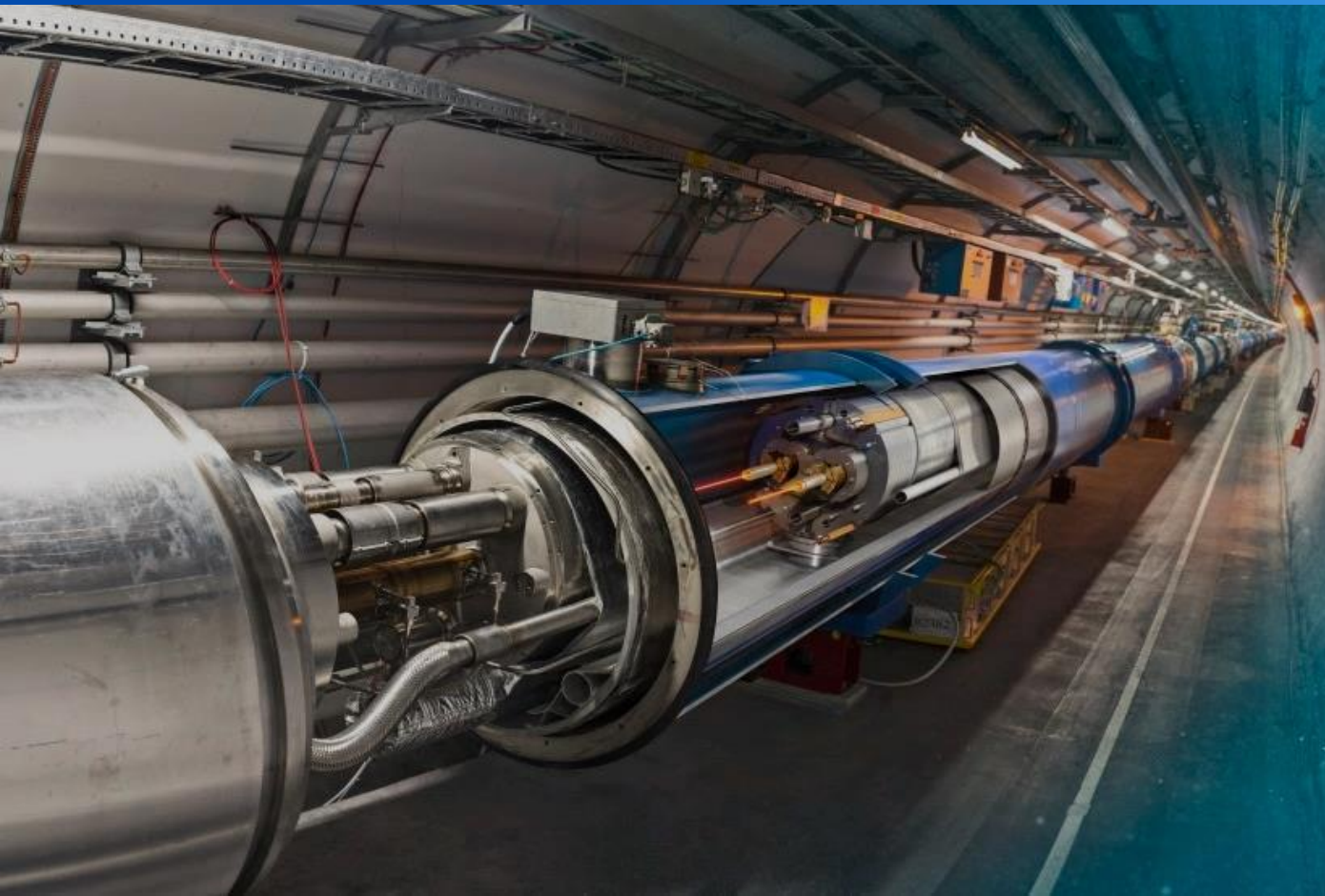
Education & Outreach

Technology & Innovation

To understand the most fundamental particles and laws of the universe



Large Hadron Collider (LHC)



27 km in circumference

About 100 m underground

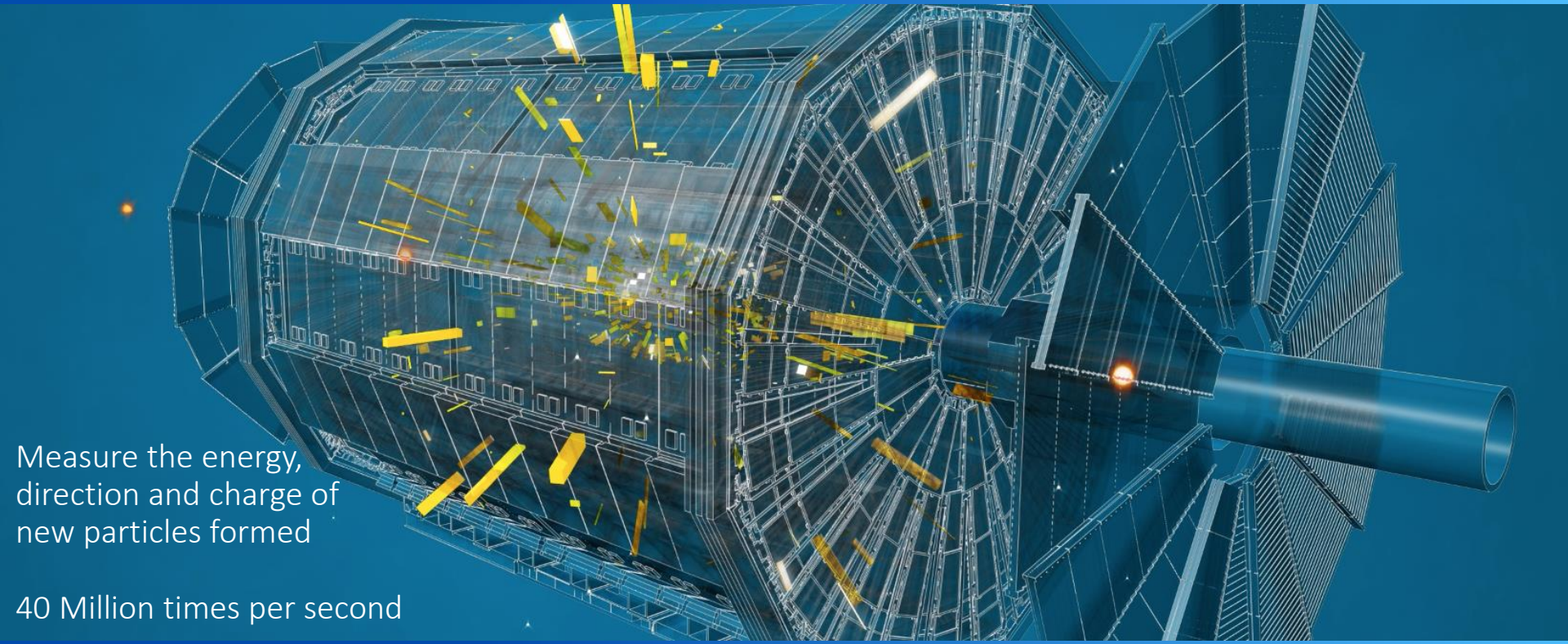
Superconducting magnets steer the particles around the ring

Particles are accelerated to 99.9999991% the speed of light

Ultrahigh vacuum

One of the coldest places in the Universe (1.9K; -271.3°C)

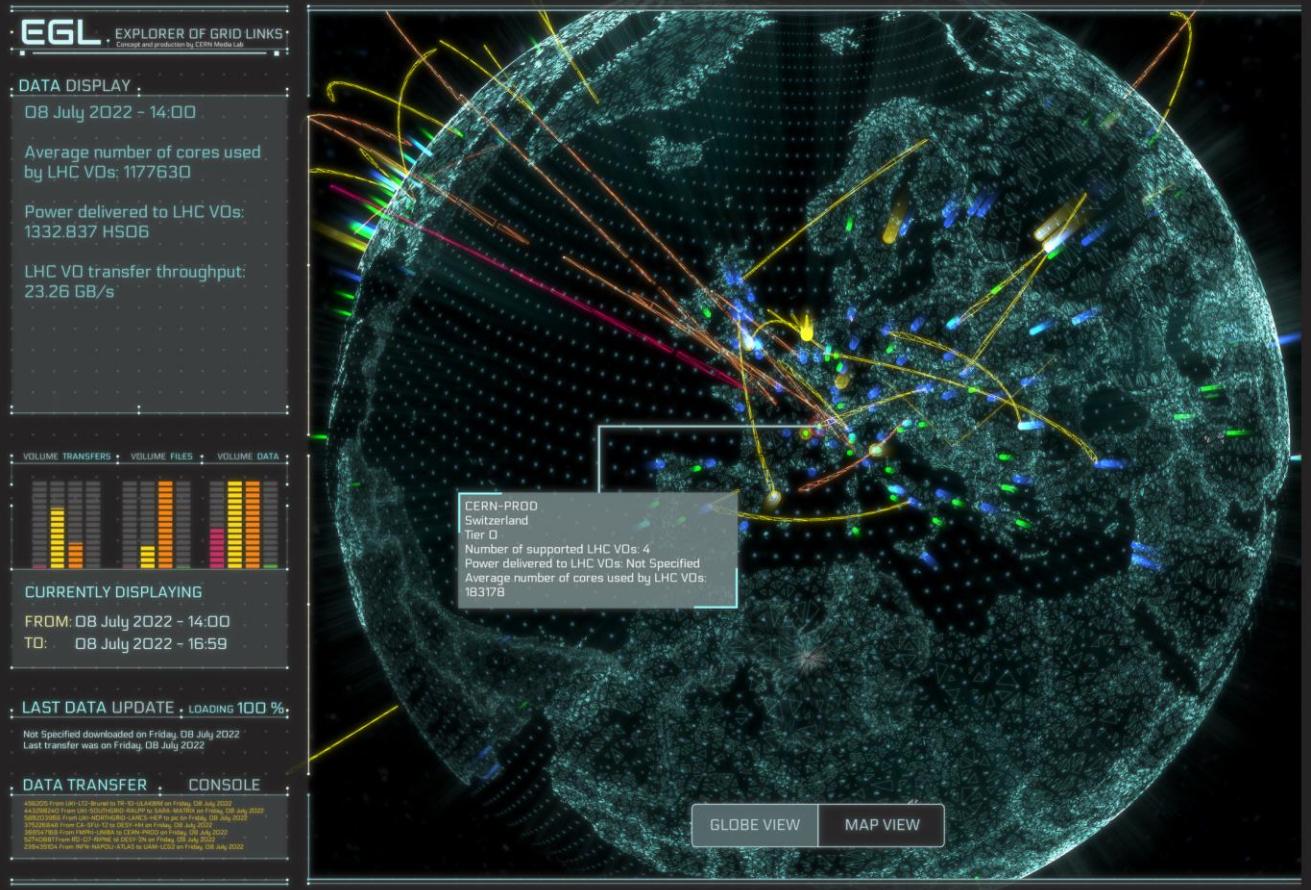
Giant detectors record the particles formed at the four collision points



Measure the energy, direction and charge of new particles formed

40 Million times per second

The Worldwide LHC Computing Grid (WLCG)



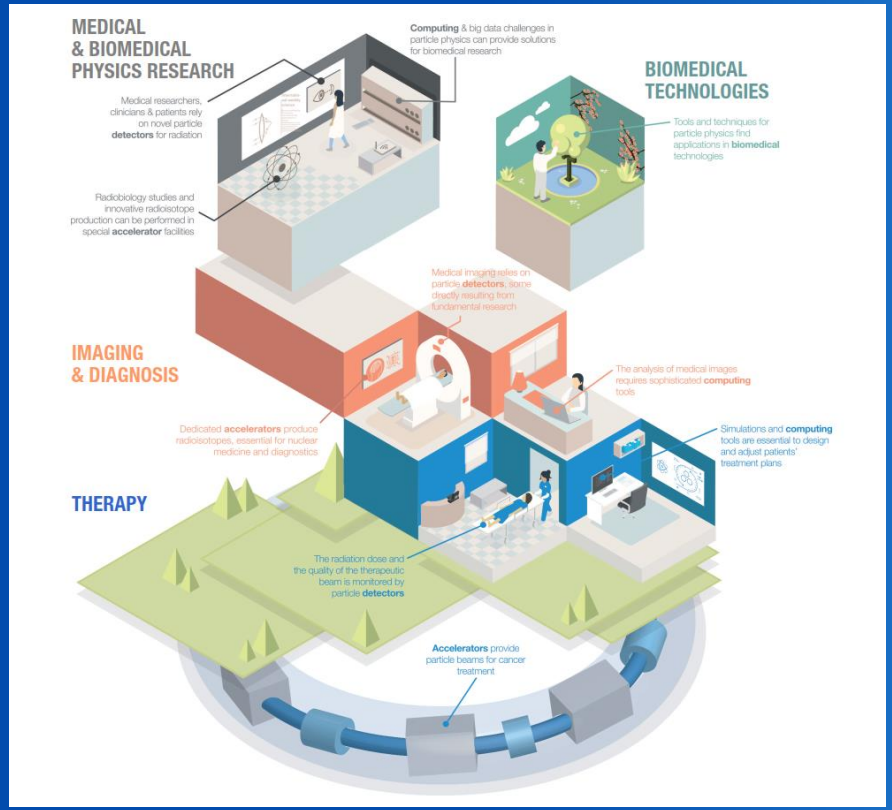
400PB @ CERN

Stores, distributes, processes and analyses LHC experiments' data

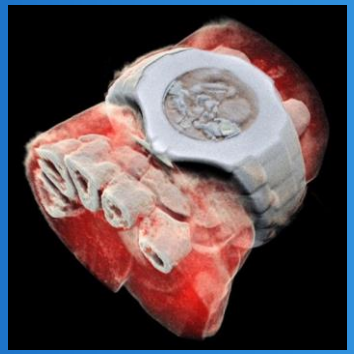
1.4 million processing cores in 170 data centres and 42 countries

1500 Petabytes of CERN data stored world-wide

Frontier Science … Frontier Technology … Shared

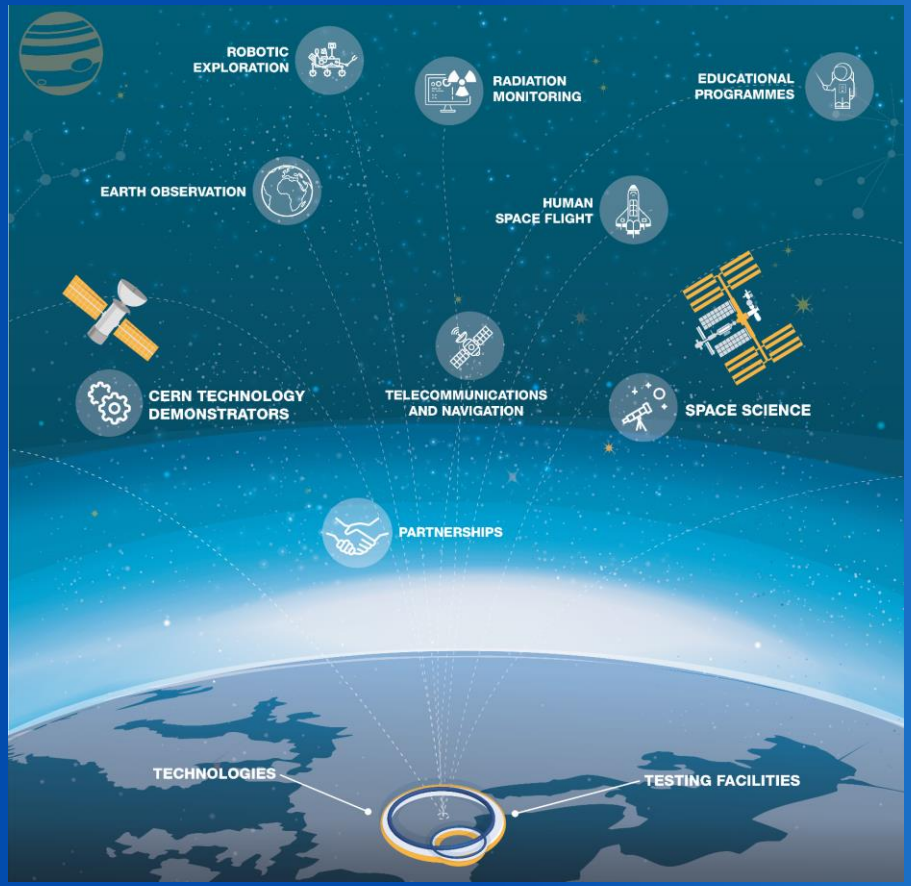


MedAustron started proton therapy treatments in December 2016



MARS Bio Imaging: next generation X ray finally in color using CERN chips

Aerospace Applications



Development of high energy beam for testing integrated electronic components with ESA

CERN's technological innovations have applications in many fields

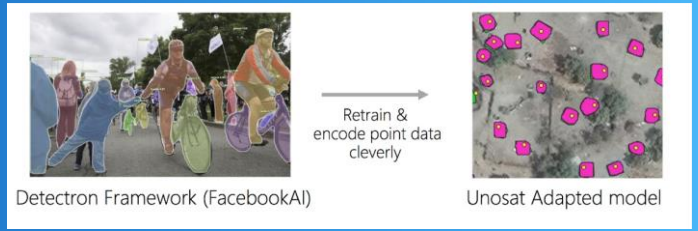
+ material science,
cultural heritage,
automotive,
environment,
health & safety,
industrial processes

InsightART: Using CERN Medipix detector to analyse art

CERN as a host

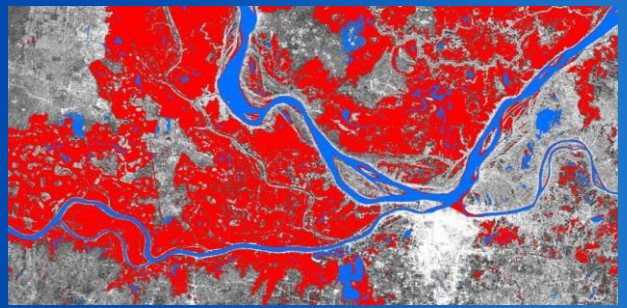
UNOSAT
established at CERN in 2001,
based on IT infrastructure

Mapping shelters in refugee camps



AI for Satellite
Imagery Analysis

Flood detection



CERN as neutral ground

1985 Disarmament Talks
The two delegations met in the evening at CERN, a neutral ground where both parties were respected

CERN is a model for open and inclusive collaboration

2600 Staff
800 Fellows
1500 Associates / Students
12,000 Visiting Scientists

Experiments: ATLAS
3800 physicists, 257 institutions, 42 countires

The CERN model…

ESO convention was modelled on CERN's and ESO Telescope Project Division at CERN to build 3.6m telescope

SESAME, a synchrotron light source in Jordan, is modelled on CERN's governance structure

69 years of Open Science at CERN

1953 CERN Convention:

The Organization shall provide for collaboration among European States in … research of a pure scientific and fundamental character

… the results of its experimental and theoretical work shall be ... made generally available

Spreading the (written) word

Evolution of knowledge sharing/preservation

1989
first Web proposal

1991
WWW software release

1993
CERN Preprint Server on the web

1996
CERN Web Library
...ooks, periodicals

2000
CERN Document Server
multimedia, internal notes, ...

2002
CDSWare released as FOSS

2006
Invenio is born
FOSS Digital Library
http://inveniosoftware.org

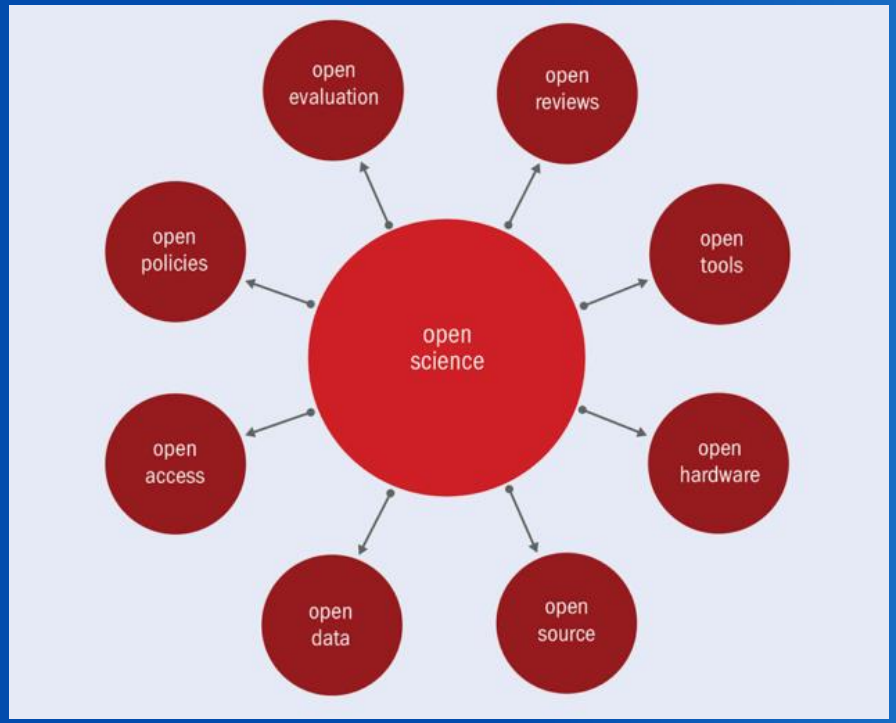
2013
Zenodo

2015
CERN Open Data Portal
https://opendata.cern.ch

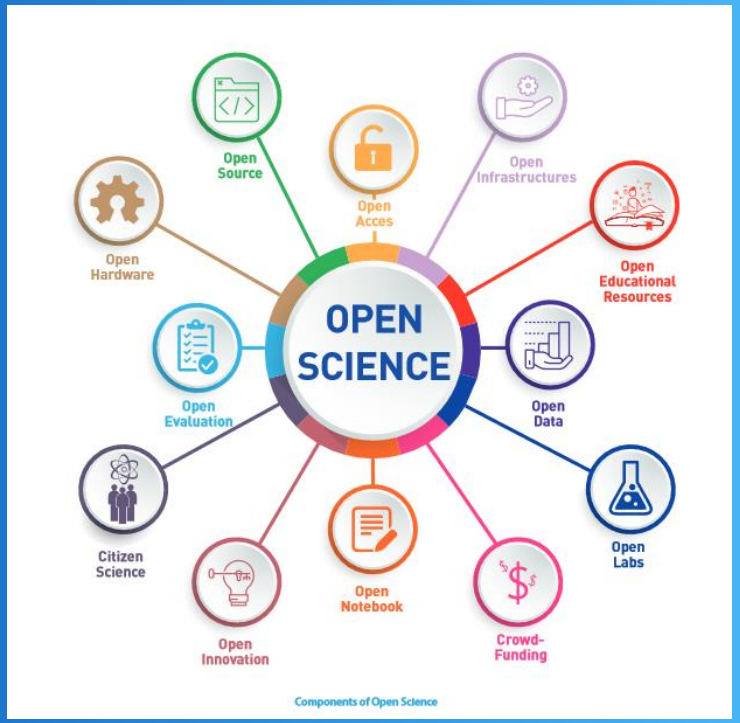
2020
InvenioRDM
Multidisciplinary Repository

InvenioILS
Book Loan Circulation

Open Science Scope…

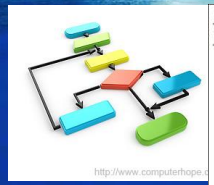


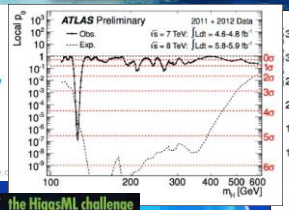
CERN Courier Volume 59, Number 2, March/April 2019

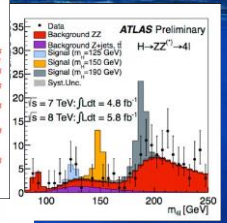


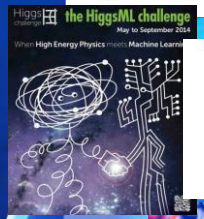
UNESCO, 2021

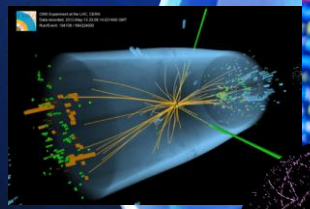
Research Iceberg

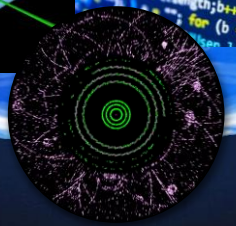












kB
1,000

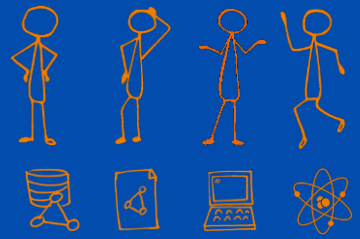
MB
1,000,000

GB
1,000,000,000

TB
1,000,000,000,000

PB
1,000,000,000,000,000

CERN Open Data

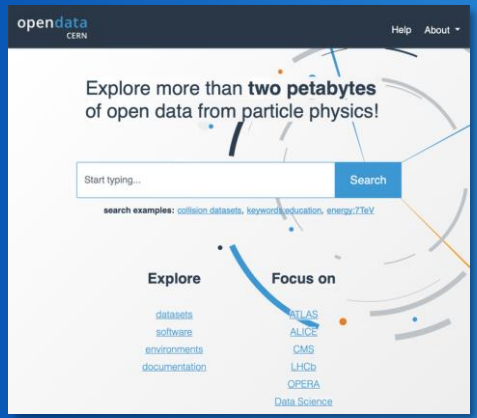


+

INVENIO
Powering Open Science

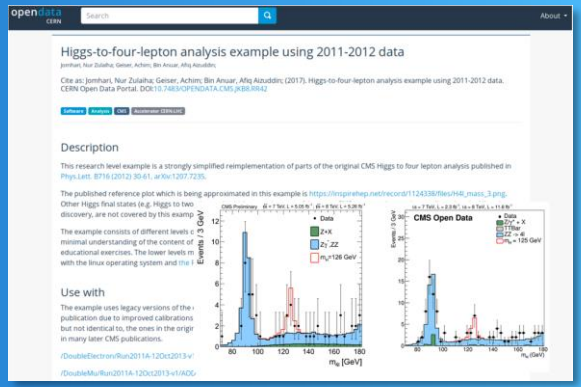
+

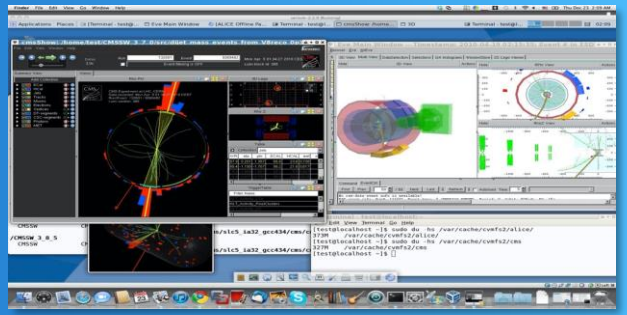
400 PB



http://opendata.cern.ch

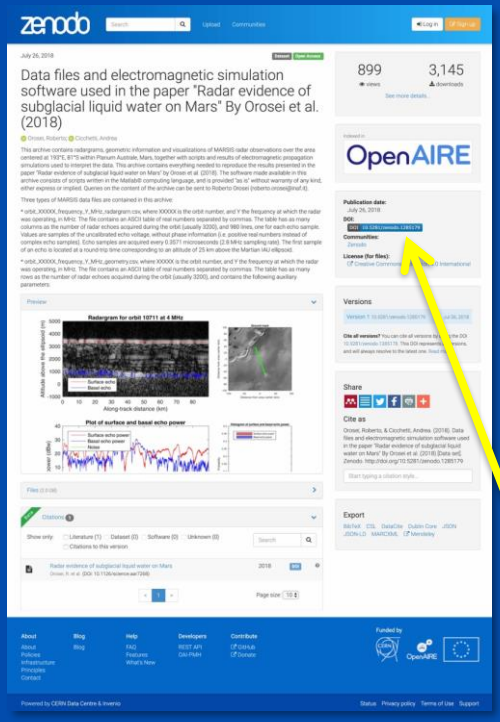
Education



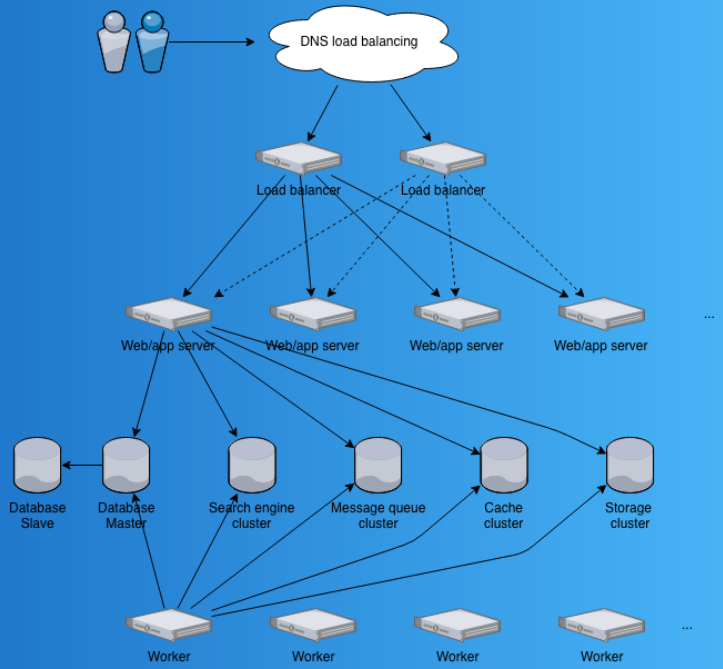


Research

Open Research as a Service



DOI 10.5281/zenodo.1285179



Experience at Scale

Share ≠ Publish ≠ Preserve

Dataset

Software

Article

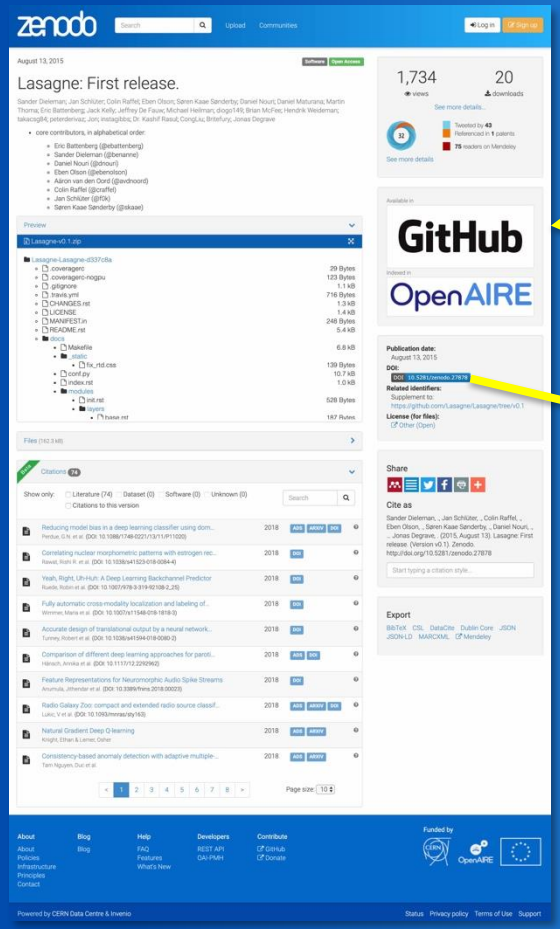
Image

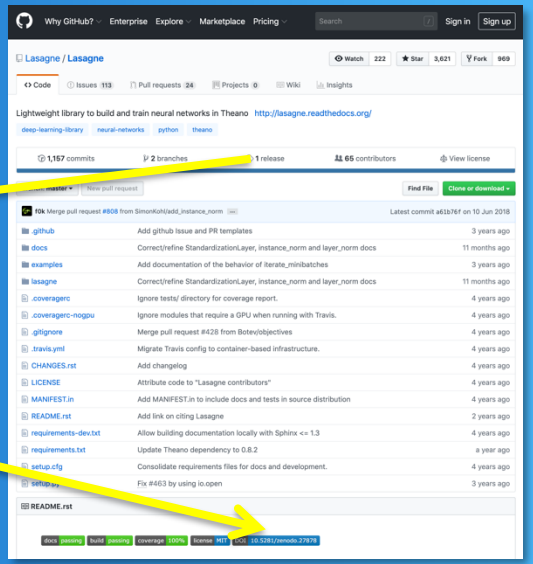
Video

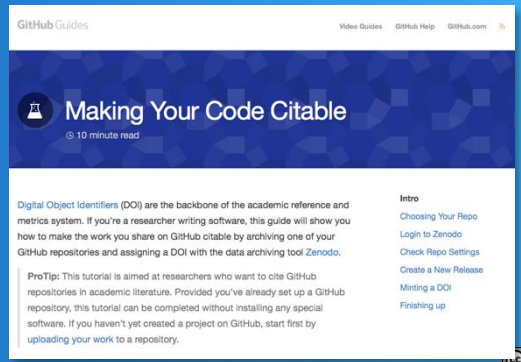
Poster

Presentation

Lesson







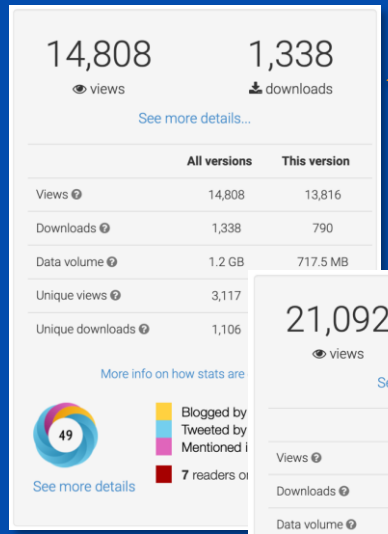
CERN

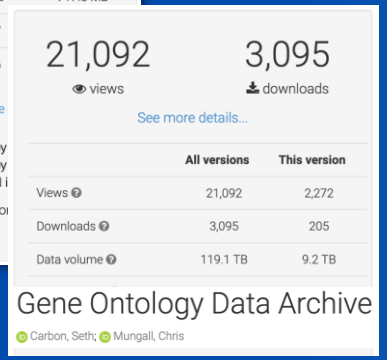
OpenAIRE

@TimSmithCH

Scholarly Innovation

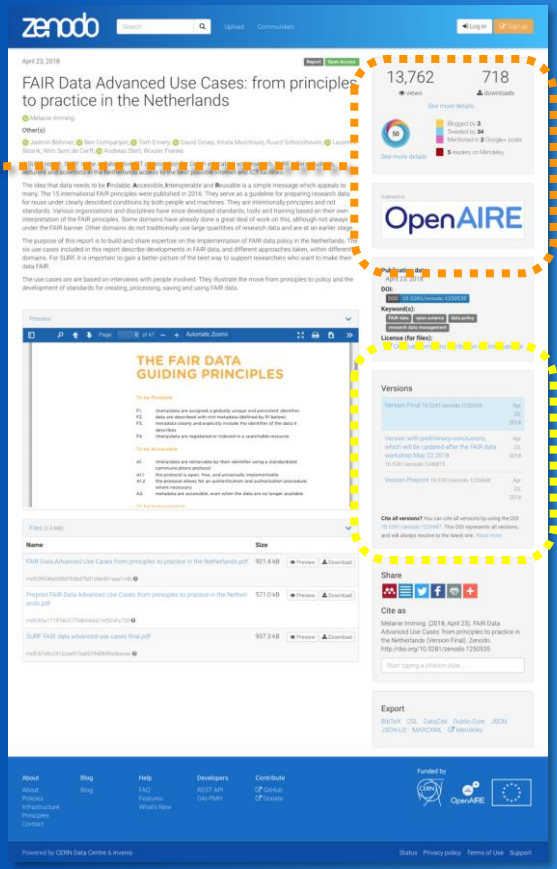
Usage Statistics:



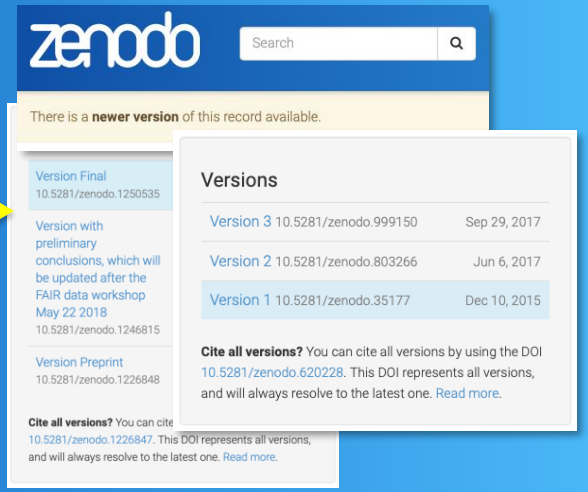


COUNTER
CONSISTENT CREDIBLE COMPARABLE

MAKE DATA COUNT



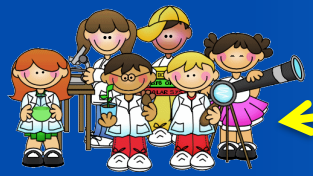
Versioning:



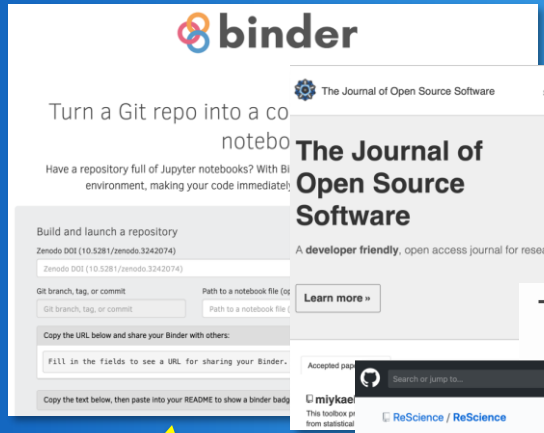
CERN OpenAIRE

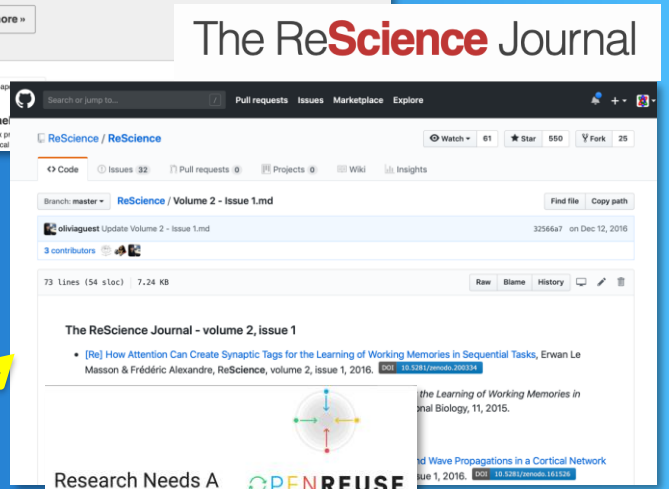
Multi-Disciplinary Digital Age Scholarship

Article Centric



zenodo





Research Centric

InvenioRDM

inveniosoftware.org/products/rdm

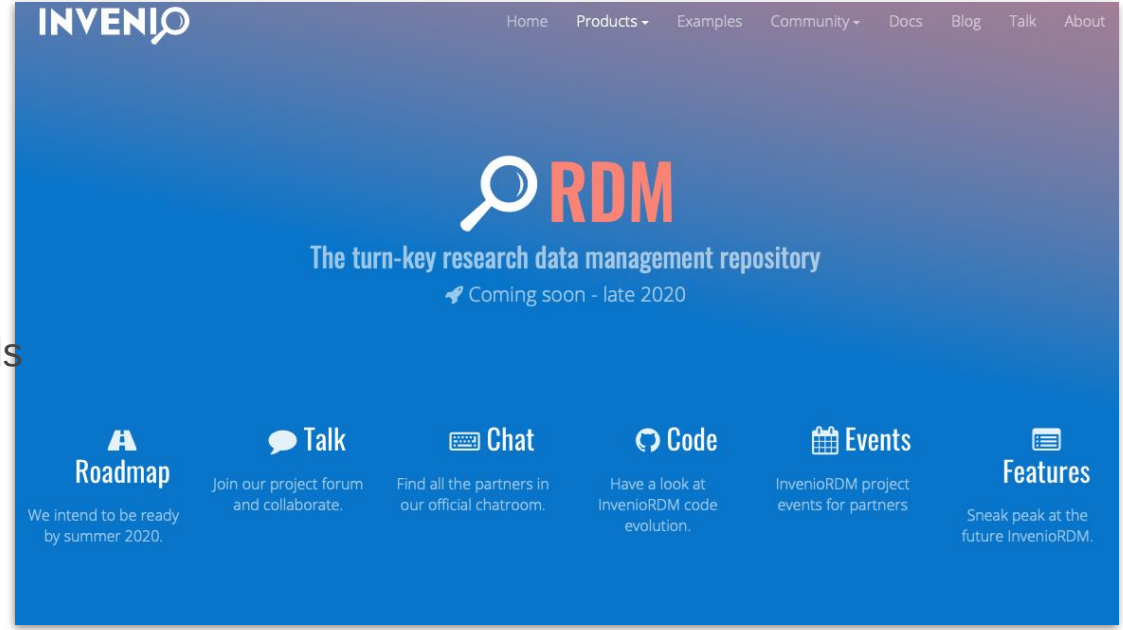
InvenioRDM

inveniosoftware.org/products/rdm

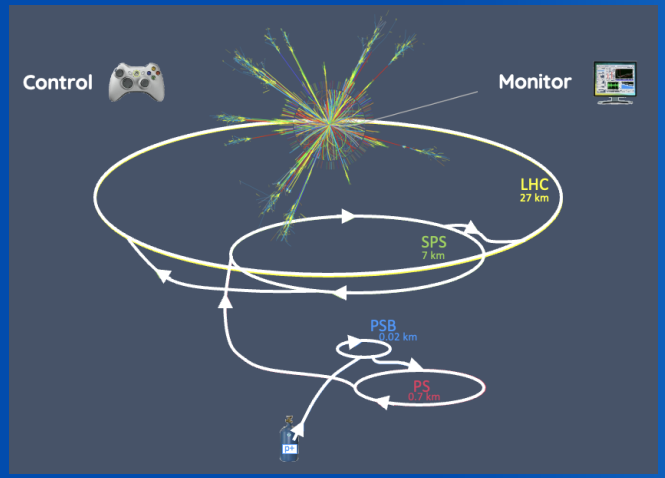
OPEN SOURCE

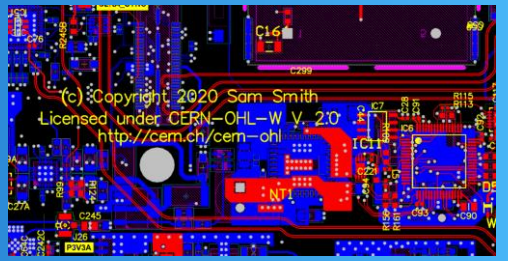
Free Open Source Software
Customisable: adapt to your style
Flexible: adapt to your case
Fast: tested with big files
Reliable: tested at scale
Interoperable: OAI-PMH & standards
Secure: providing upgrades

Multi-domain and FAIR
making knowledge accessible
beyond physical science



Open Hardware





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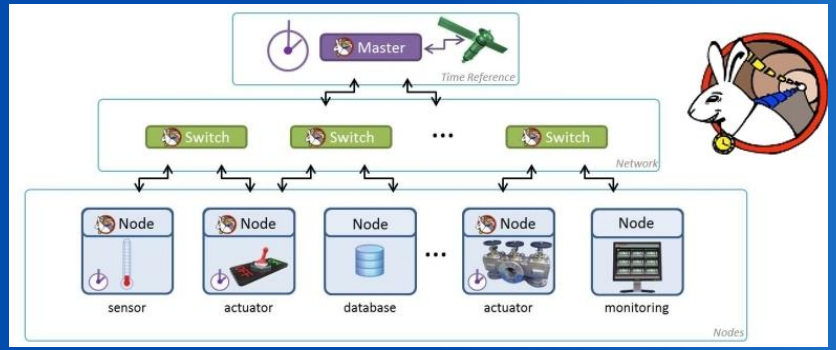
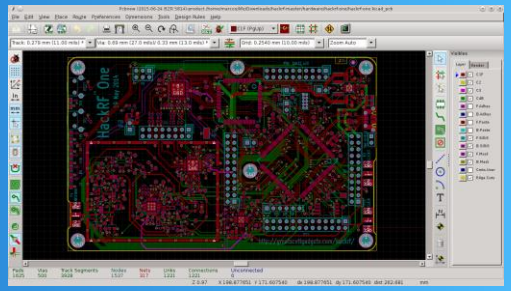
https://ohwr.org/cernohl



KiCad



Further History of Collaborative Software

1996

Virtual Room Videoconferencing System

1999

2002-4

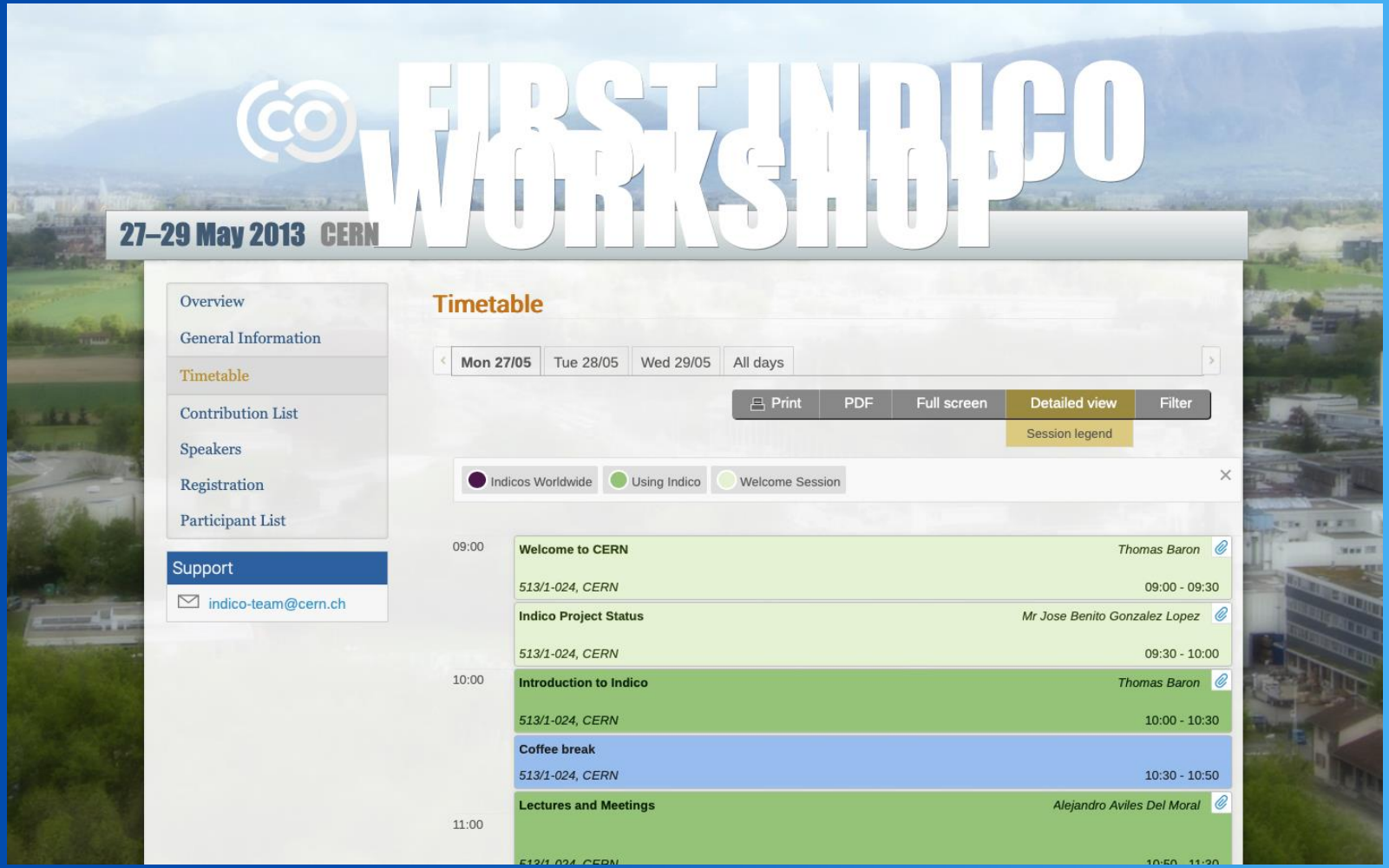
2007-9

Room Booking
Video Services

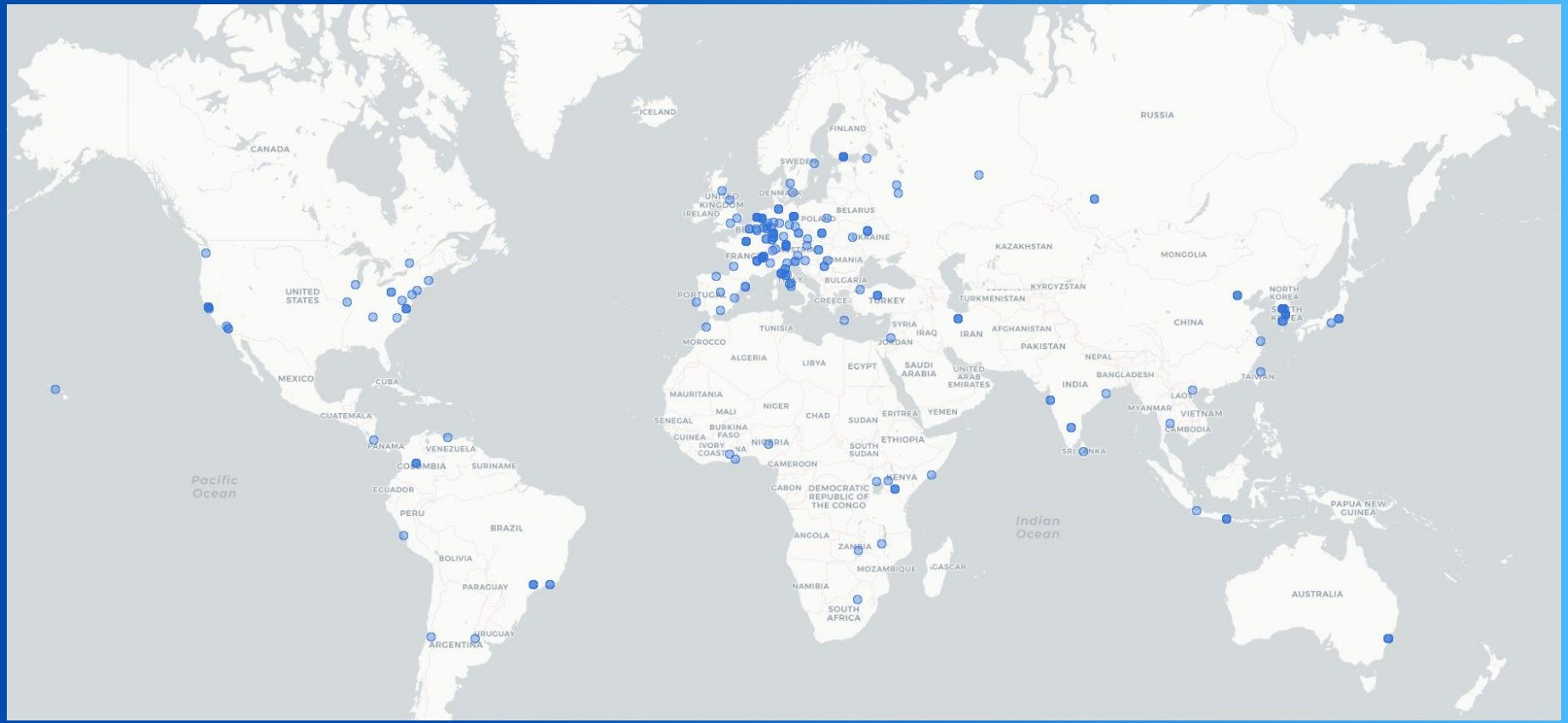
2012

Collaboration Hub

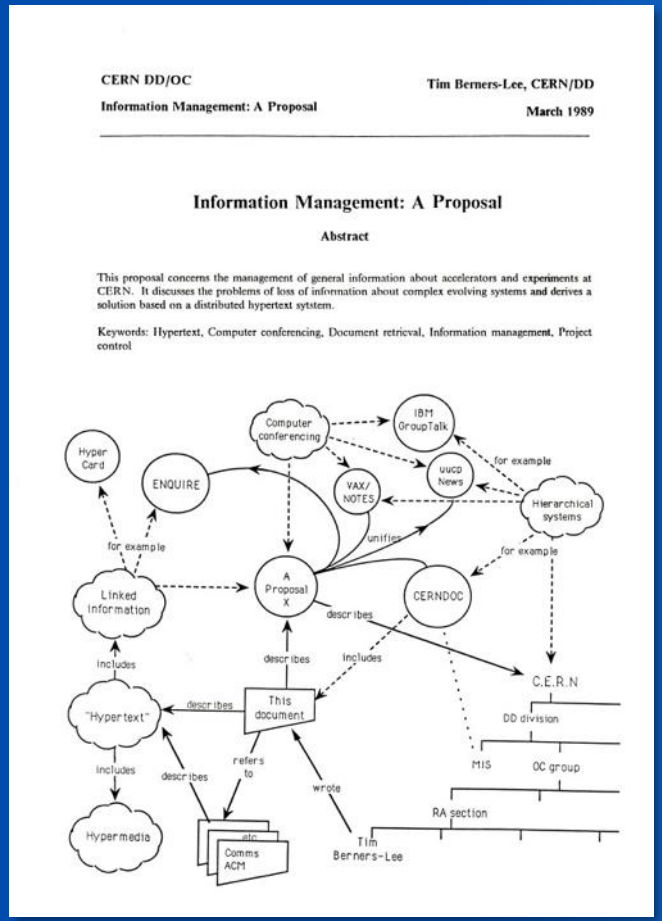
2016


FIRST INDICO WORKSHOP
27–29 May 2013 CERN
Overview
General Information
Timetable
Contribution List
Speakers
Registration
Participant List
Support
indico-team@cern.ch
Timetable
Mon 27/05
Tue 28/05
Wed 29/05
All days
Print
PDF
Full screen
Detailed view
Filter
Session legend
Indicos Worldwide
Using Indico
Welcome Session
09:00
Welcome to CERN
Thomas Baron
513/1-024, CERN
09:00 - 09:30
Indico Project Status
Mr Jose Benito Gonzalez Lopez
513/1-024, CERN
09:30 - 10:00
10:00
Introduction to Indico
Thomas Baron
513/1-024, CERN
10:00 - 10:30
Coffee break
513/1-024, CERN
10:30 - 10:50
Lectures and Meetings
Alejandro Aviles Del Moral
11:00

Community



Born in Science



CERN DD/OC

Tim Berners-Lee, CERN/DD

Information Management: A Proposal

March 1989

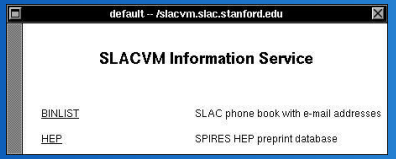
Information Management: A Proposal

Abstract

This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext sytstem.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project control

©CERN

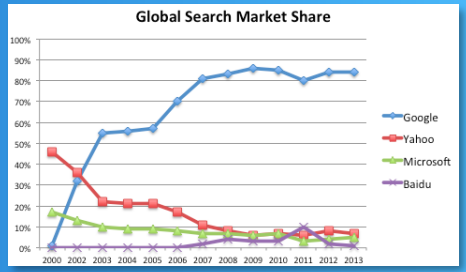


Collaborative development of new tools
Universal access to information - a human right

Theme of Concern:
monopolies as gatekeepers
steer for profit, not for humanity

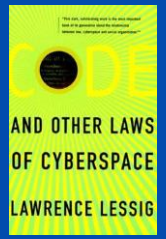
The Concentration of Power

Handful of platforms control which ideas and opinions are seen and shared



Ads

Engagement platforms
Competitive advantage from User giving data



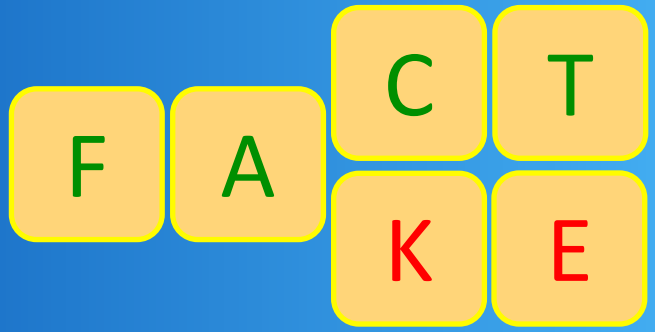
SW creators decide fundamental issues like freedom and privacy
Which content to remove, which users to kick-off
Private Law: EULA

WEAPONIZED AT SCALE

Conspiracy theories trend on social media platforms
Fake Twitter and Facebook accounts stoke social tensions
External actors interfere in elections

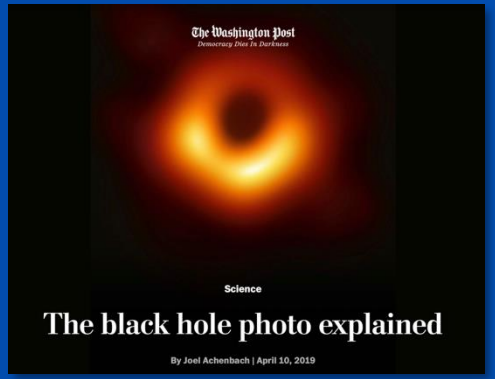
The {Mis|Dis}Information Age

- Word-of-the-Year 2018: Misinformation
  - Election tampering
  - Weaponization of falsity
  - Surveillance capitalism
  - Fake news
- Word-of-the-Year 2020: Pandemic
  - Vaccine distrust
  - Climate Change denial
  - Alternative facts



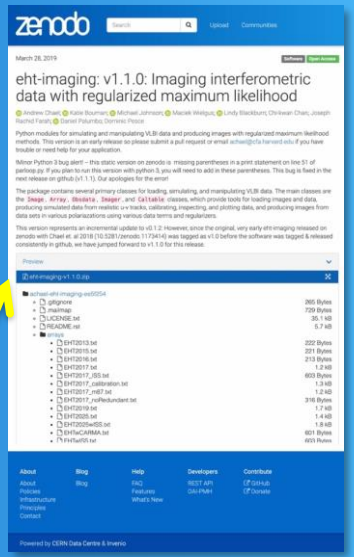
- Public mistrust
- Skepticism amoung government leaders

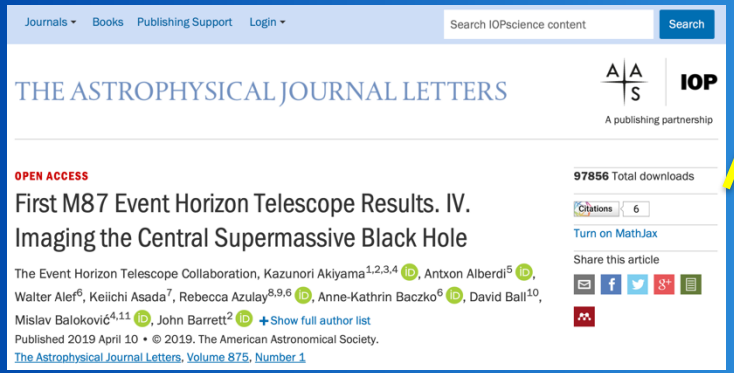
Related Items, not Ads



Users of this SW also downloaded…

Frequently used with…



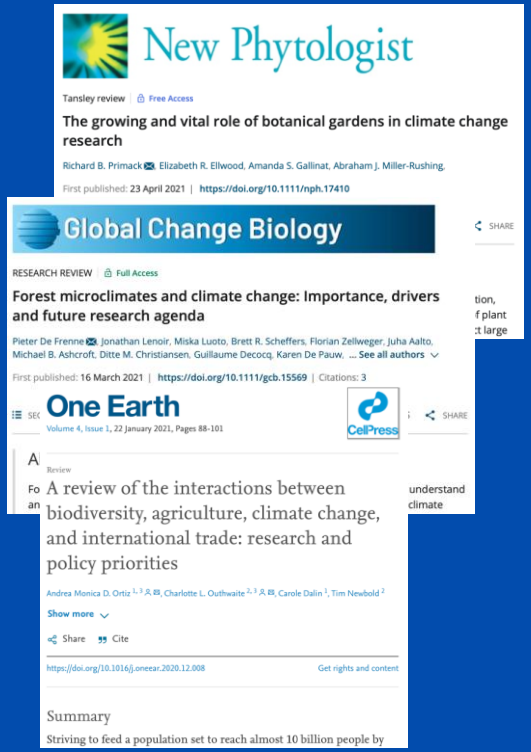


Other fields which use this algorithm…

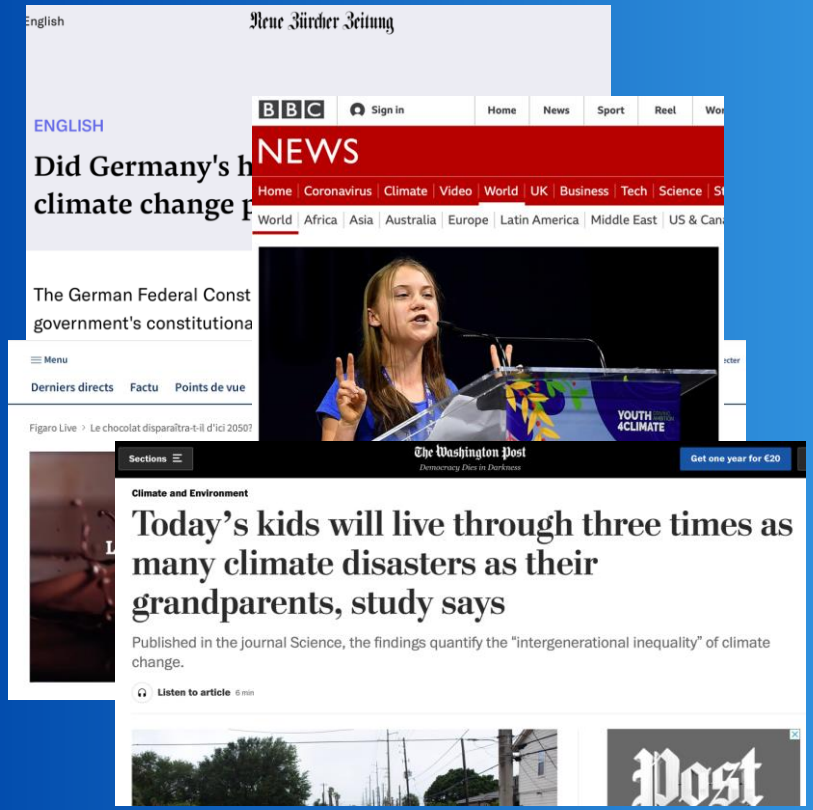
Different algorithms used for this technique…

Views

From Academia



From News Media



From Social Media

Evidence Chains

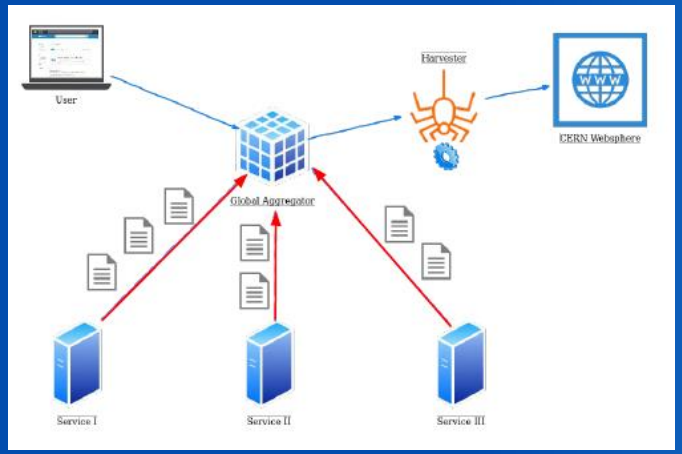
The research behind this announcement…

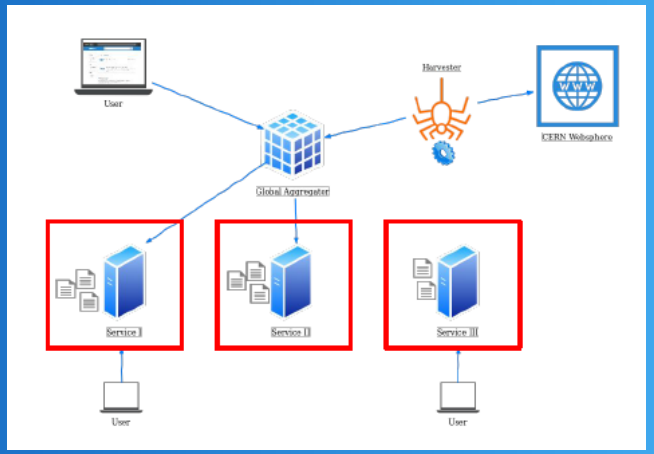
The data this research was based on…

The dominant theory in academia
The alternatives being discussed

Search @ CERN

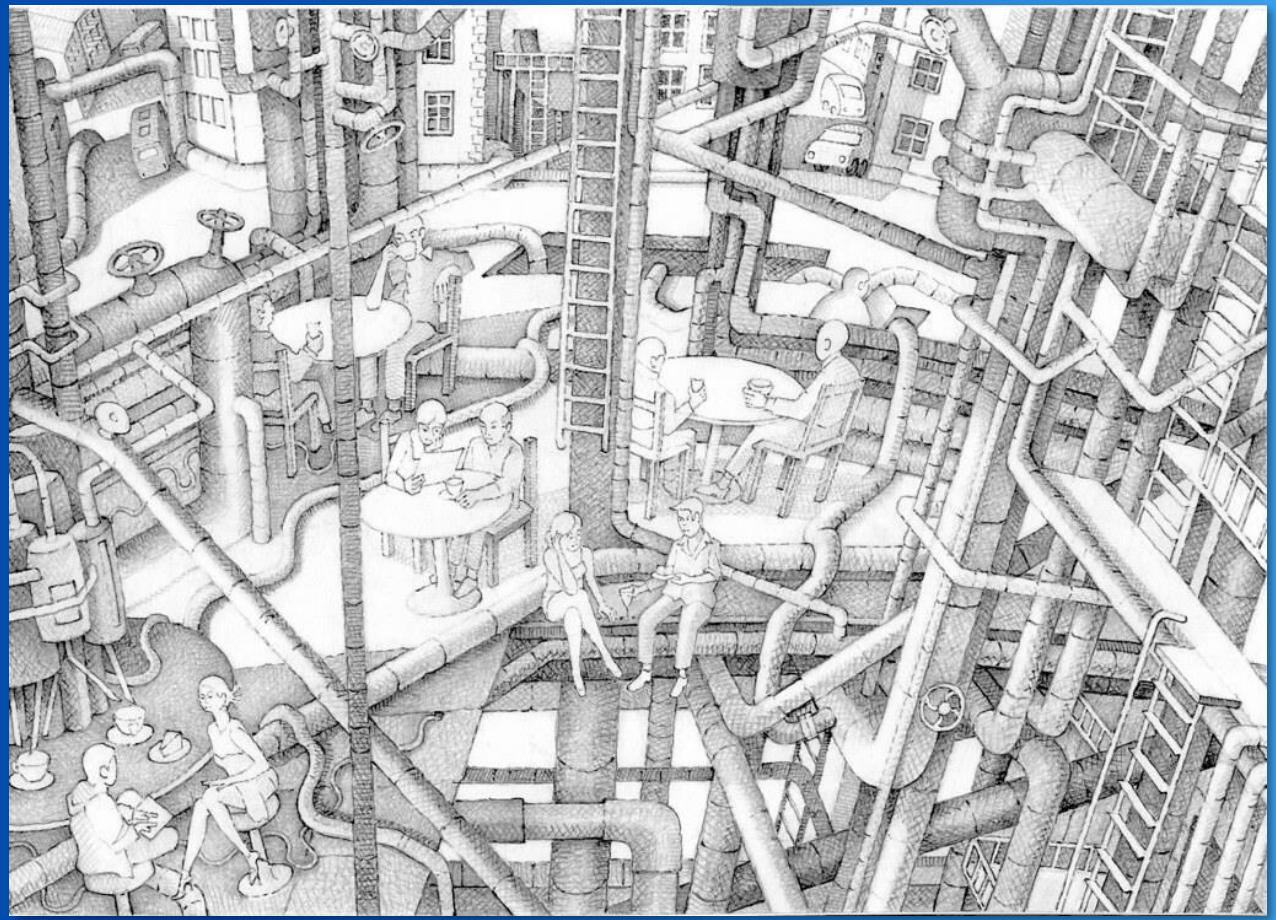
Moving from a centralized commercial Enterprise Search solution …





... to a distributed Open Source Enterprise Search solution

Decentralisation … Openness



Internet
Plumber's Delight
https://flic.kr/p/s4HtVd

OPEN ~~Science~~ Infrastructures

to make multilingual knowledge openly available, accessible and reusable for everyone, to increase collaborations and sharing of information for the benefits of science and society

to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community