Open Science for Open Innovation in Japan and Practice in Materials Science

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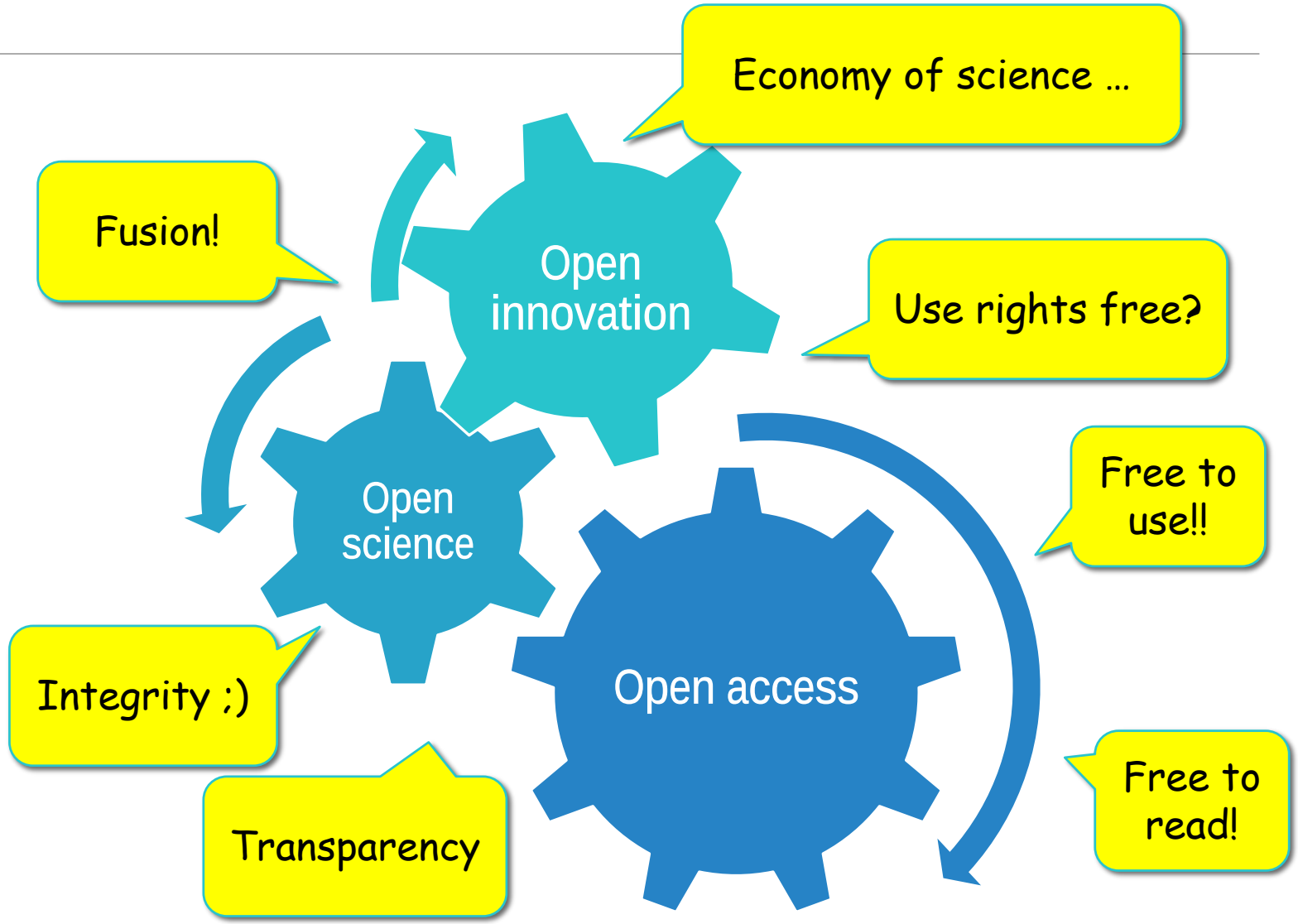
Deputy Managing Director, Materials Data Platform Center
National Institute for Materials Science (NIMS)

- Japan Cabinet Office – member of open science working group 2015 – 2016
- MEXT – member of Scholarly Journal Committee 2015 - 2016
- MEXT – member of Scholarly Information Committee 2017

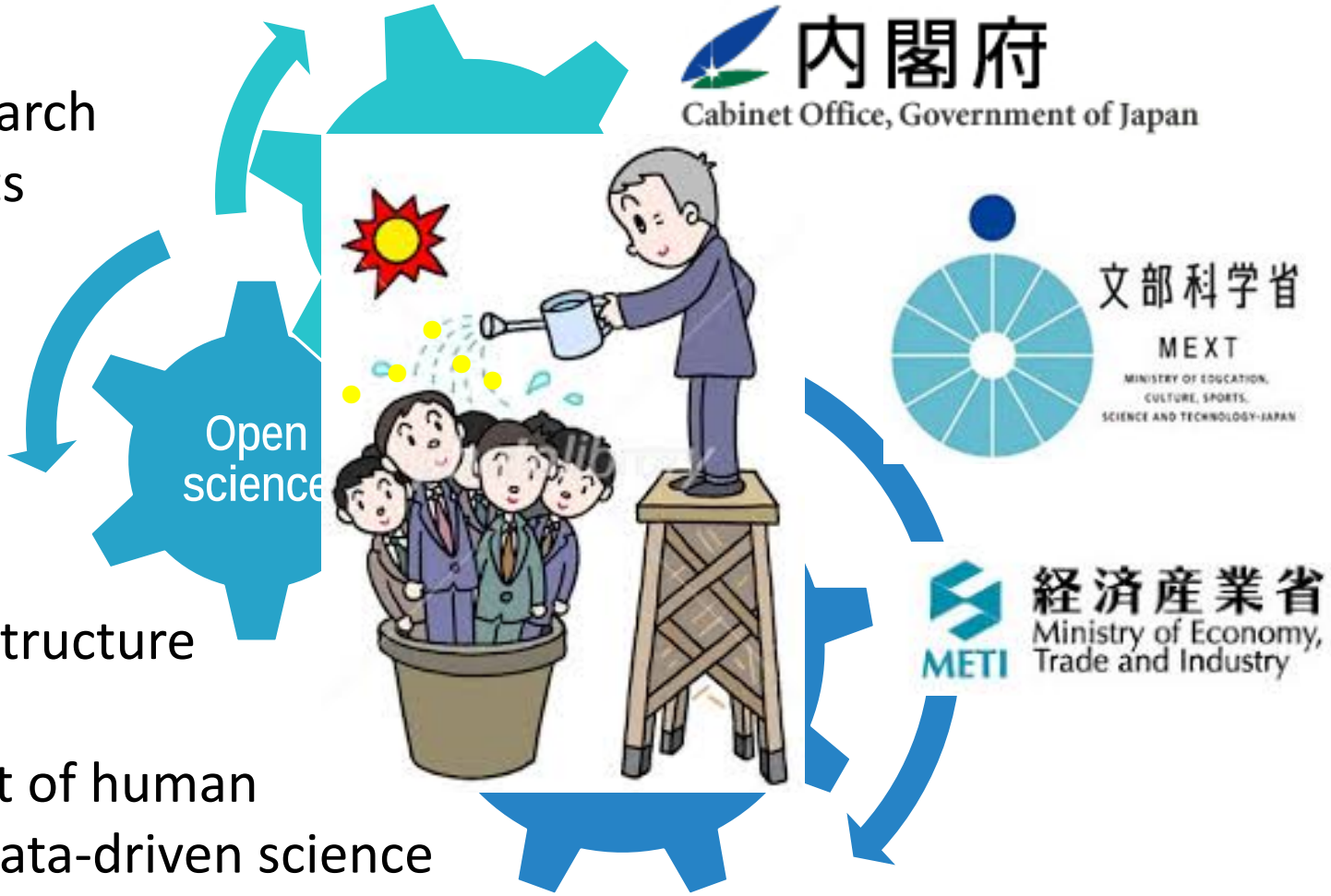
International Conference on Open Access Afterwards – Open Science and Research Integrity
June 16, 2017 at NTUH International Convention Center

Introduction



Introduction

- Research projects
- Library infrastructure
- Data infrastructure
- Development of human resources for data-driven science



Open access in Japan

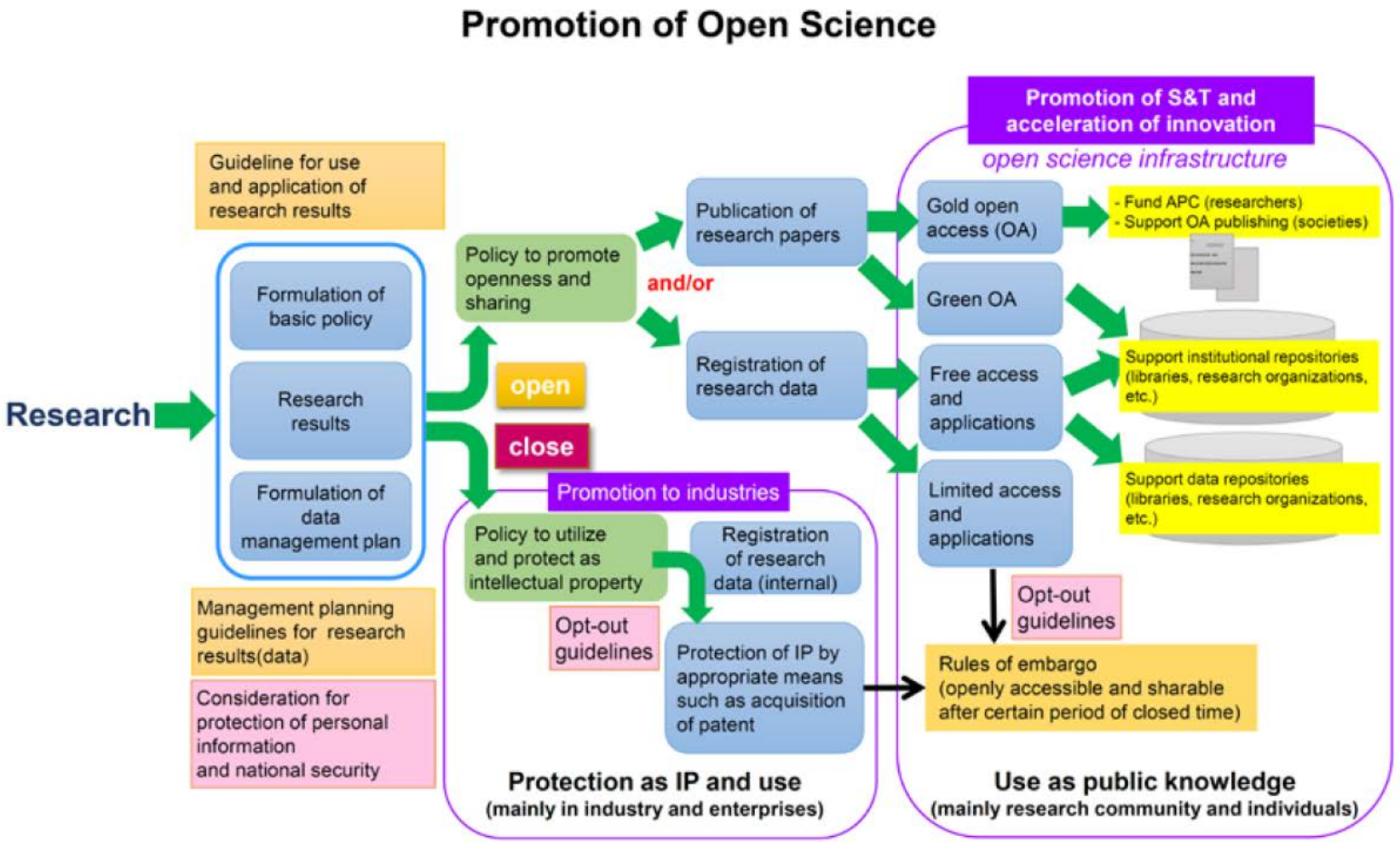
1. Discussions: open science 2015

Government

- Open science scheme, identified by Japan Cabinet Office
  - New roles for libraries and academic societies
  - New roles for data librarians and data scientists
  - New evaluation system for open data

Open access in Japan

1. Discussions: open science 2015



Source: Promotion of Open Science in Japan - Opens up a new era in the advancement of Science - Executive Summary, Published March 2015 by Japan Cabinet Office

Open access in Japan

2. Open access for open science

Government

- (almost) mandated OA for publicly-funded research
- Data Management Plan, 2016 by JST
- Research funds cover costs of OA (article processing fees: APC)

Academia / societies

- Government funds for publishing OA journals (gold, hybrid)

Universities, Research Institutes

- Institutional Repositories (government funds IR infrastructure) – few universities have a policy of mandatory OA

Publishers

- Foreign-based publishers demonstrate the benefits of OA

Libraries

- Train librarians to assist researchers and students in digital archiving for IR and OA

Multifaceted 多面性

Source: Image of multifaceted of Prof. Kawabe, Faculty of Science, Toyama University

Multifaceted Open Science
- Common understanding

1. Science policy - *open access to research output*
   - Innovation – bring together human knowledge and research findings from the efforts of researchers
   - Integrity – transparent day-to-day research environment
   - Investment – effective use of research funds and acceleration of research
2. Changes to research environment– *provide more opportunities for studies*
   - Data-driven science
   - Research data to be stored, managed, analyzed and re-used
   - Infrastructure - standardization of research data
3. Science market movements *– more beneficial for the economy*
   - Investments in digital science
   - Data markets for innovation
   - Not only publishers, but also IT companies produce data-driven markets

Multifaceted Open Science
- Who are involved

Preprints
authors, readers

Journals
authors, readers

Journals
libraries

Data Repositories
authors, users

Data Journals
authors, readers, publishers

Data Business
authors, users, investors

Metrics for Assessments
funders

Data Government
politicians

Multifaceted Open Science
- What are happening

Preprints
Expanding subjects:
- 1991 arXiv
- 2013 BioRxiv, PsyArXiv,
- 2016 SocArXiv, EngrXiv, ChemRxiv
- Funded by funders, private sectors

Journals read & write
- more journals
- multiple formats
- Data oriented

Journal subscriptions
- OA brochures
- Usage based
- Text and data mining (TDM)

Data Business
- Data cataloguing (Figshare, DataCite)
- Data processing (Citrine, NanoHub, NOMAD)
- Reviewer database (PeerWith)

Metrics for Assessments
- Citations (CiteScore, SNIP, SJR, h-index
- Web IT (page rank, Altmetrics)

Data Journals
- Data publishing
- APC model
- Reviewed by SpringerNature, Elsevier…

Data Repositories
- Computer program (GitHub, DropBox…)
- Data (figshare, Dataverse, DataCite …)
- Data recipe (Mendeley, GoogleDrive..)
- 1867 repos (counted by re3data.org)
- Other public directory services

Data Government
- Several trials …

DATA.GOV

data.gov.in

European Union Open Data Portal

Multifaceted Open Science
- What are happening

Preprints

arXiv.org
bioRxiv beta — THE PREPRINT SERVER FOR BIOLOGY
PsyArXiv — free preprint service for the psychological sciences
SOCARXIV — open archive of the social sciences
engrxiv — ENGINEERING ARCHIVE
ChemRxiv™

Journals read & write

- more journals
- multiple formats
- Data oriented

Journal subscriptions

- OA brochures
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Data Business

figshare — credit for all your research
DataCite — FIND, ACCESS, AND REUSE DATA
Citrine Informatics
nanoHUB.org — ONLINE SIMULATION AND MORE FOR NANOTECHNOLOGY

Metrics for Assessments

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Data Government

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DATA.GOV
data.gov.in
OPEN DATA JAPAN
European Union Open Data Portal

Data Journals

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Multifaceted Open science

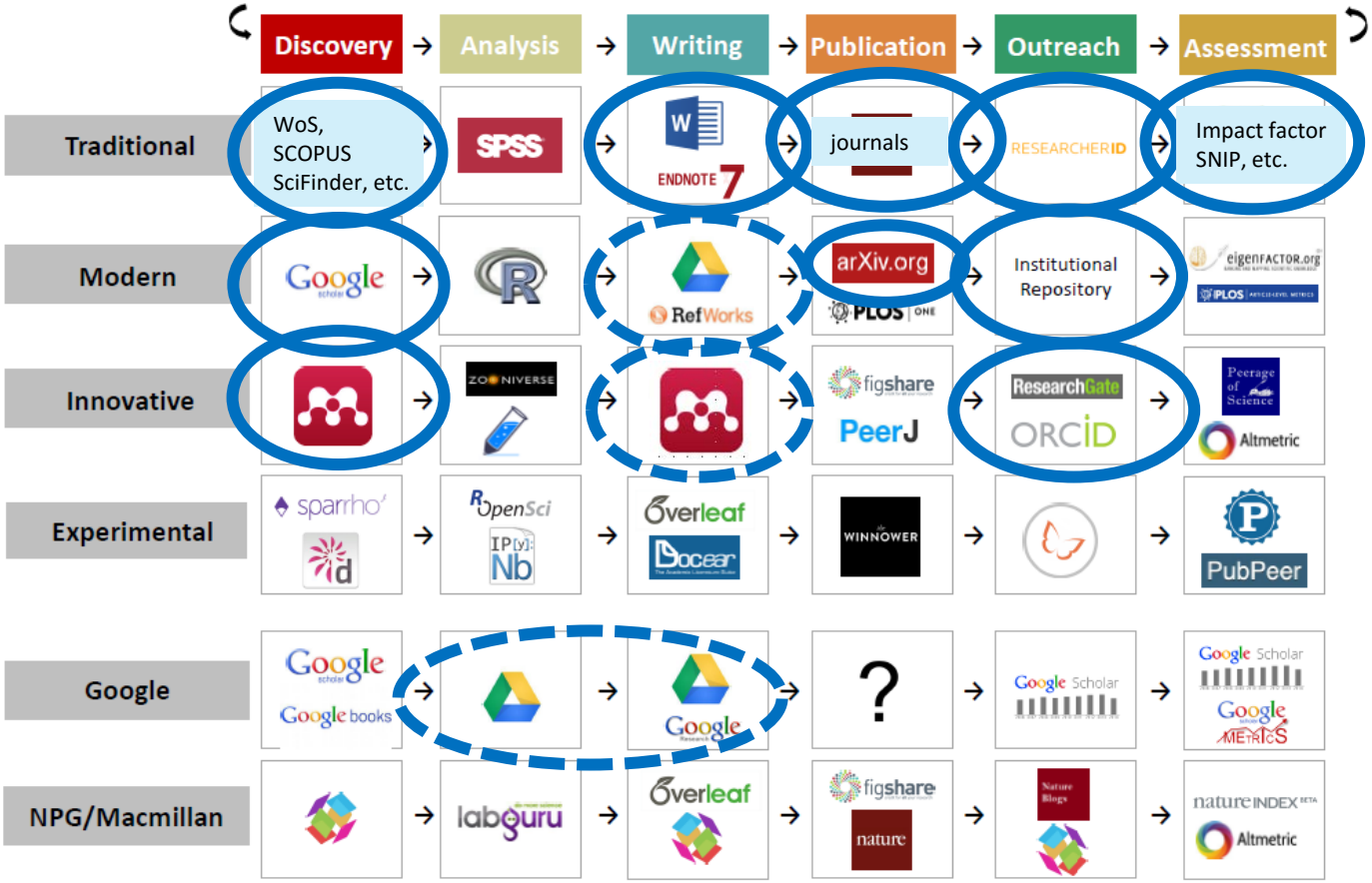
- What has happened? more investments to digital science

Typical workflow examples

Source: 101 Innovations in Scholarly Communication - the Changing Research Workflow, 2015, by Bianca Kramer and Jeroen Bosman

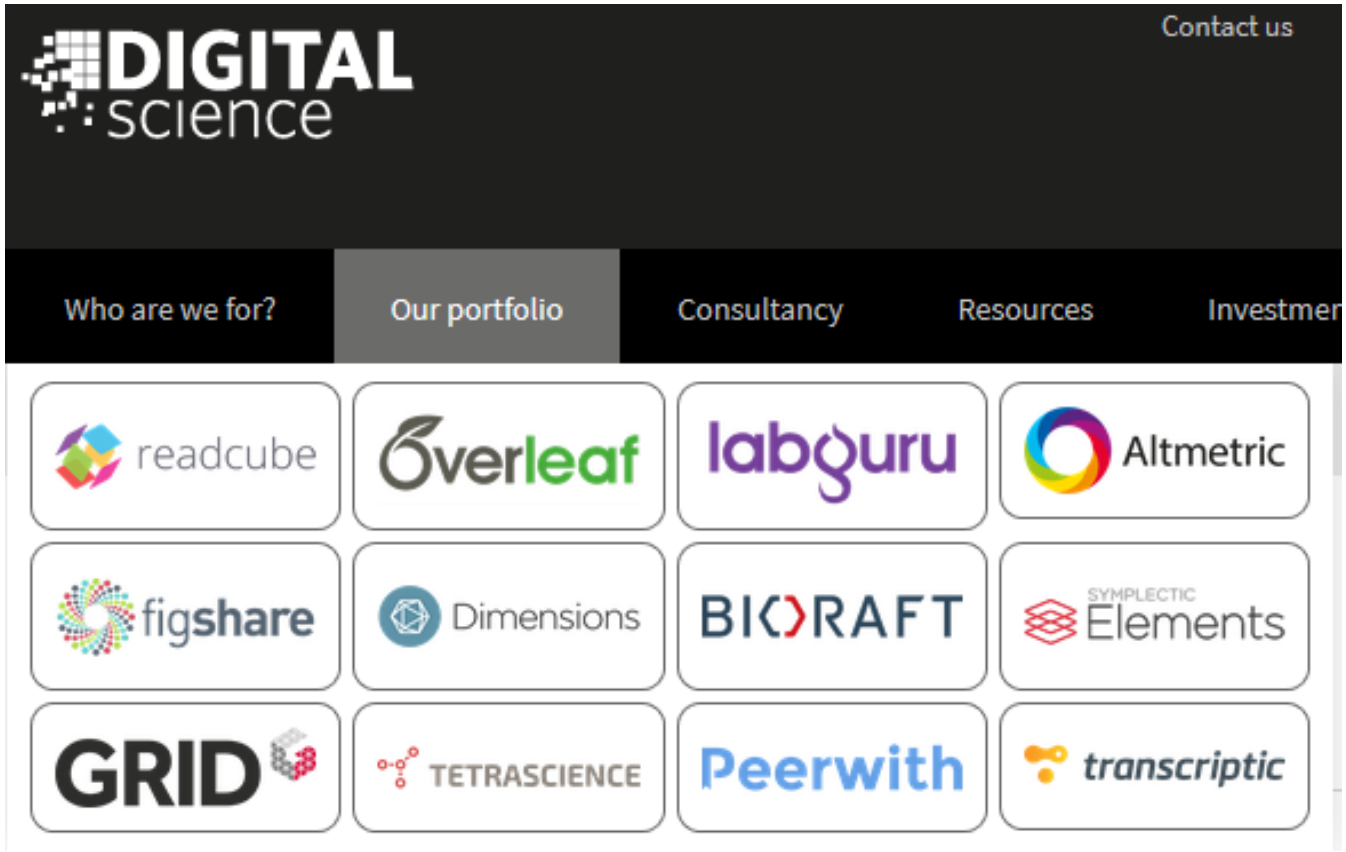
Multifaceted Open science
- Benefit to research environment?

Case study - Materials Science



Source: 101 Innovations in Scholarly Communication – modified by M. Tanifui

Multifaceted Open science
- Synergy benefit from private sectors?



Multifaceted Open science
- Future of science – then what we want?

→ **Added-value**

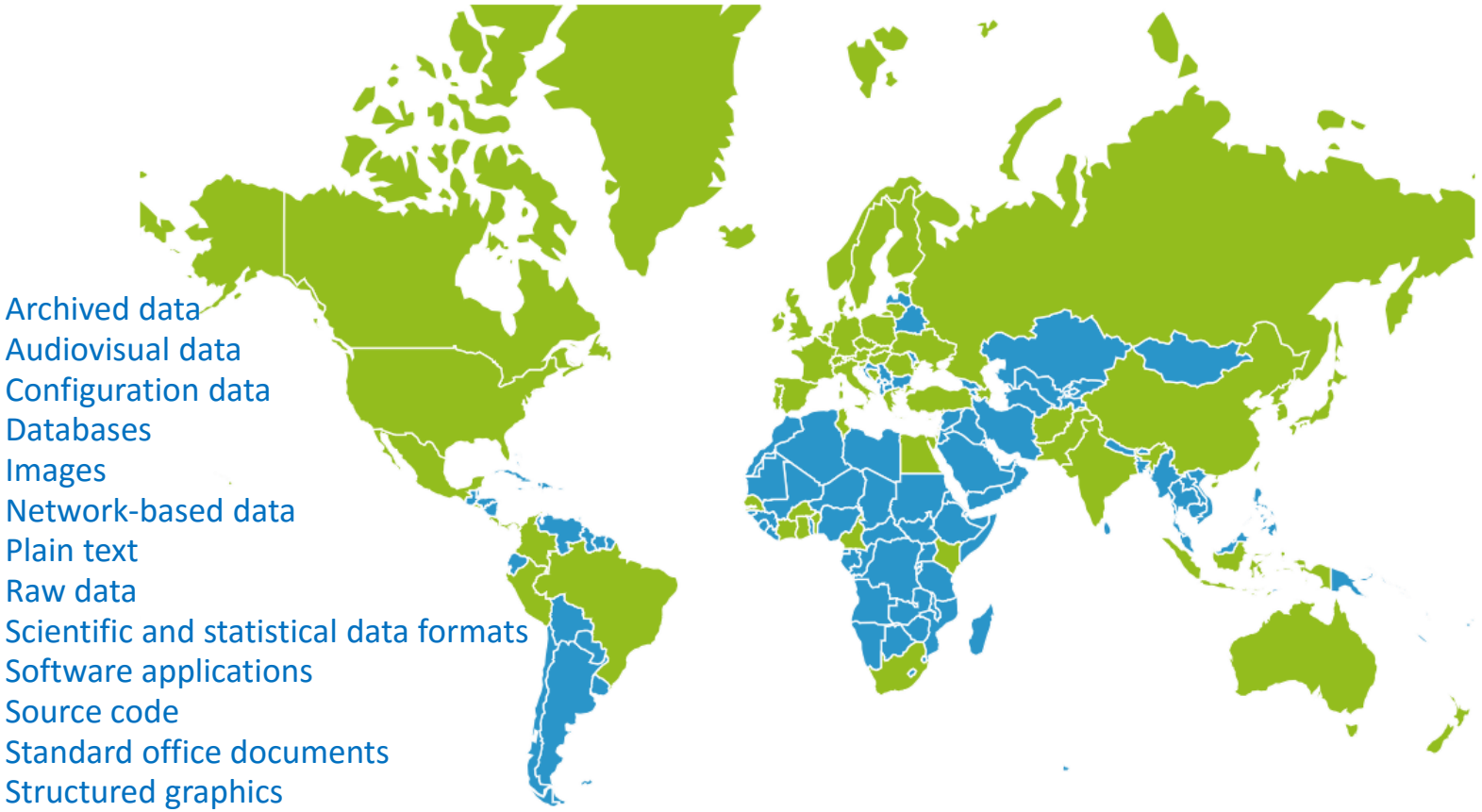
- Data, not simply 're-used'
- Create comprehensive metadata for data
- Interoperable data platform

→ **Machine-learning** → **Game change???**

- more data archived with smart metadata
- more opportunities for research topics/methods/investments suggested by computer systems

may eventually result in changes to the practice of science…

Registry of Research Data Repository - re3data.org



Archived data
Audiovisual data
Configuration data
Databases
Images
Network-based data
Plain text
Raw data
Scientific and statistical data formats
Software applications
Source code
Standard office documents
Structured graphics
Structured text
other

(green: available / blue: none)

Source: re3data.org

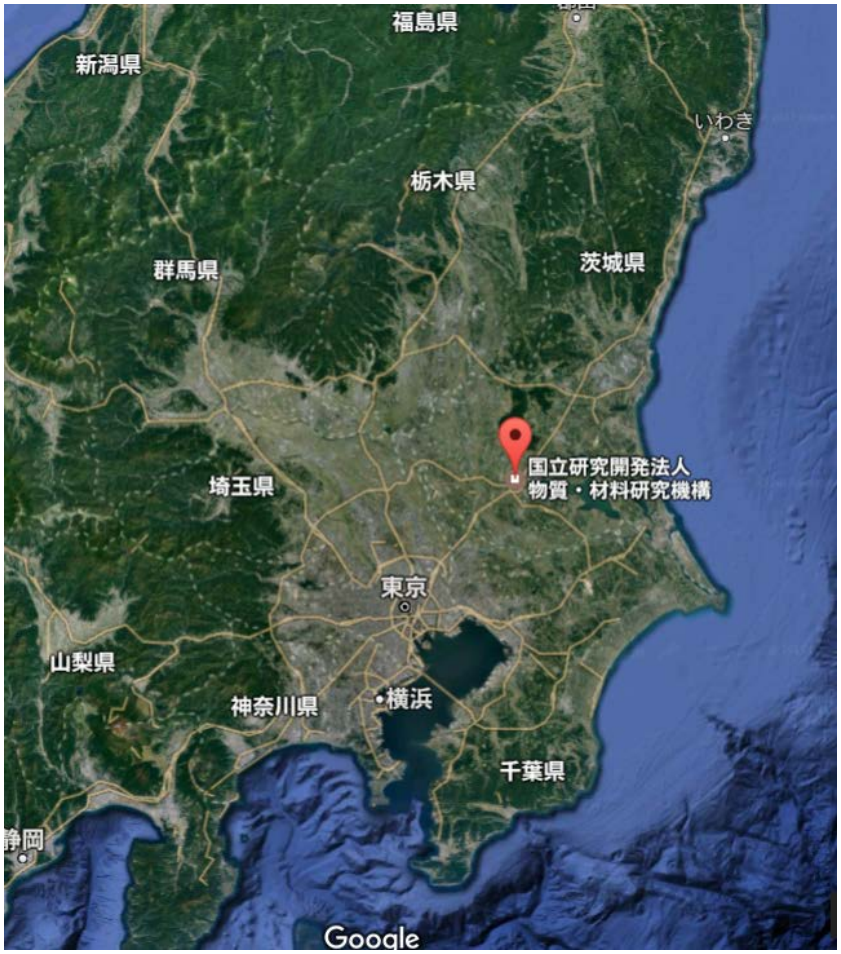
Aspects of Research Data Repository - re3data.org

Partners: Berlin School of Library and Information Science,GFZ German Research Centre for Geosciences, Library of the Karlsruhe Institute of Technology, Cooperations: Databib,BioSharing,DataCite,OpenAIRE. Funded by the German Research Foundation (DFG)

Source: re3data.org

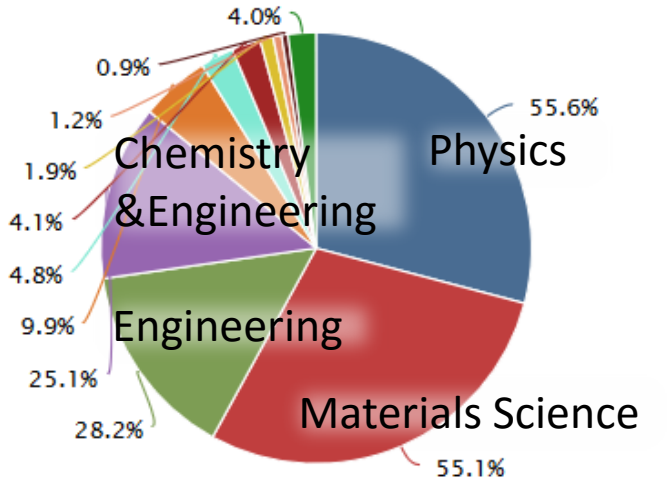
NIMS

- a national research institute in materials science



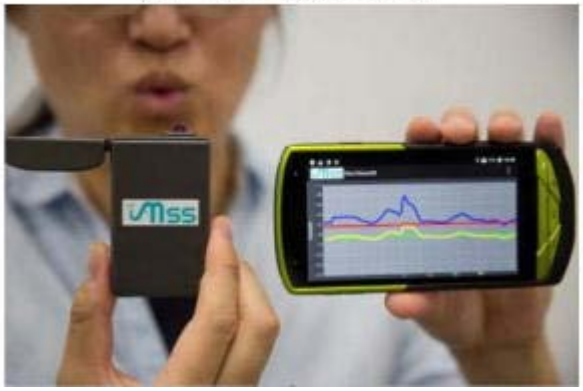
About 70 km from Tokyo, 45 mins by Tsukuba Express train.

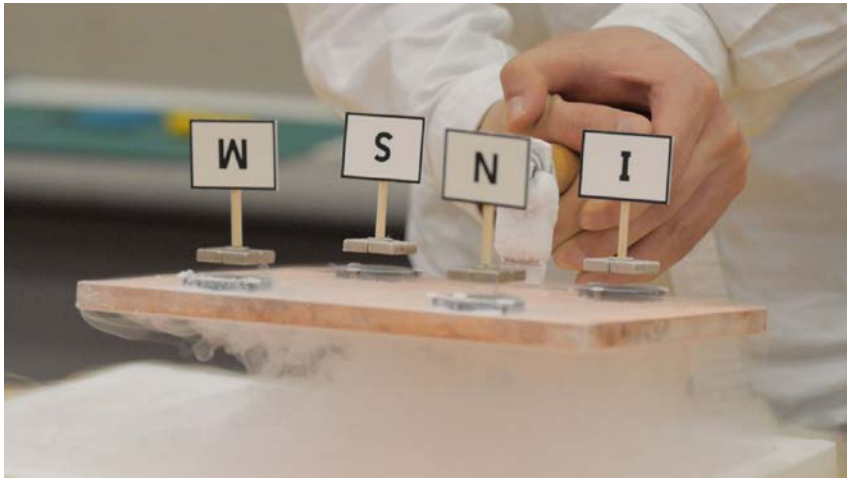
- 1000 researchers / 1500 staff
- 223億円budget
- 3 campus
- 8 R&D divisions
- 1657 papers / yr



Source: SCOPUS

呼気のにおいを高精度に判別する小型センサー
デバイスに応用した例





NIMS
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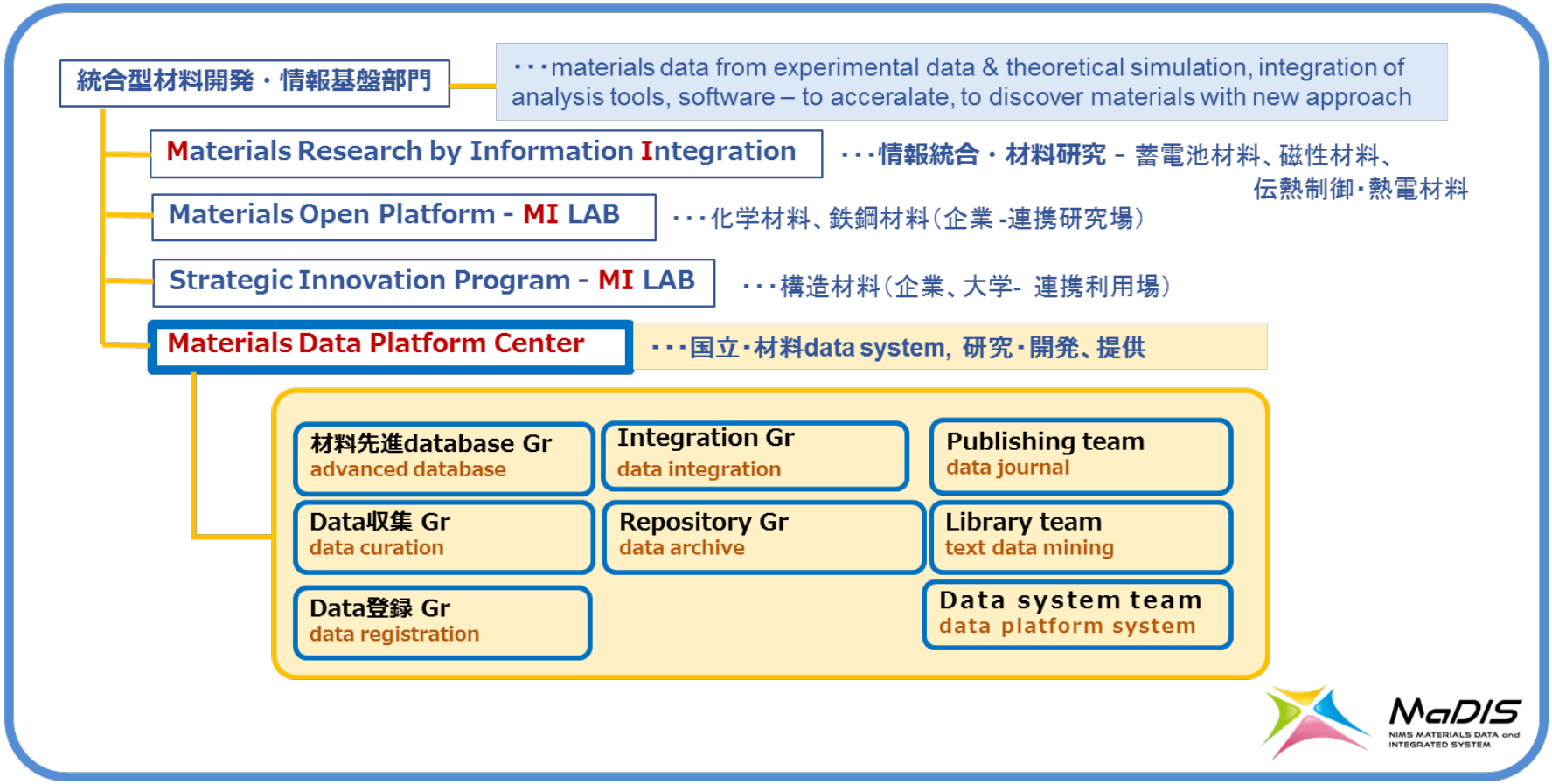
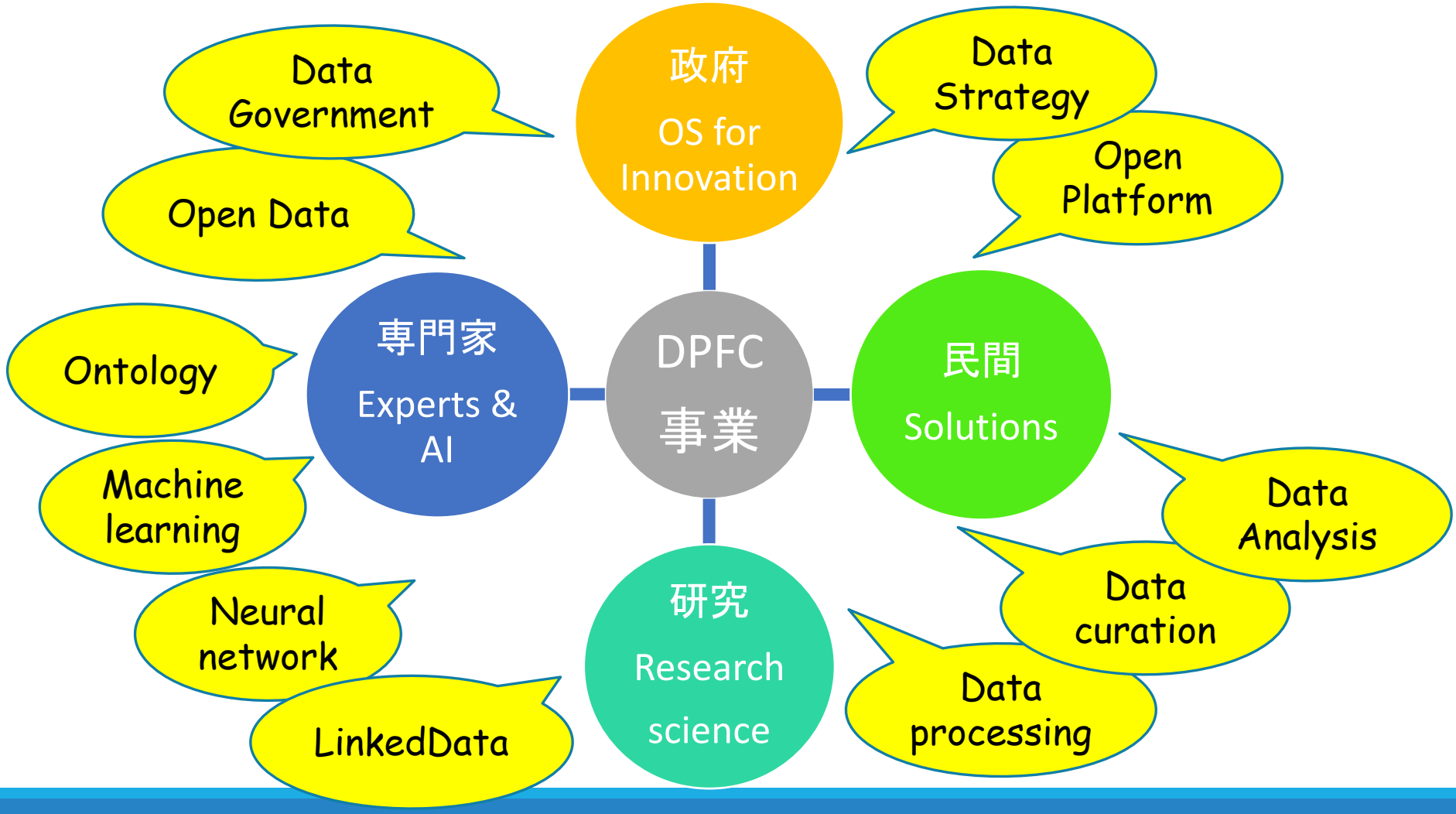
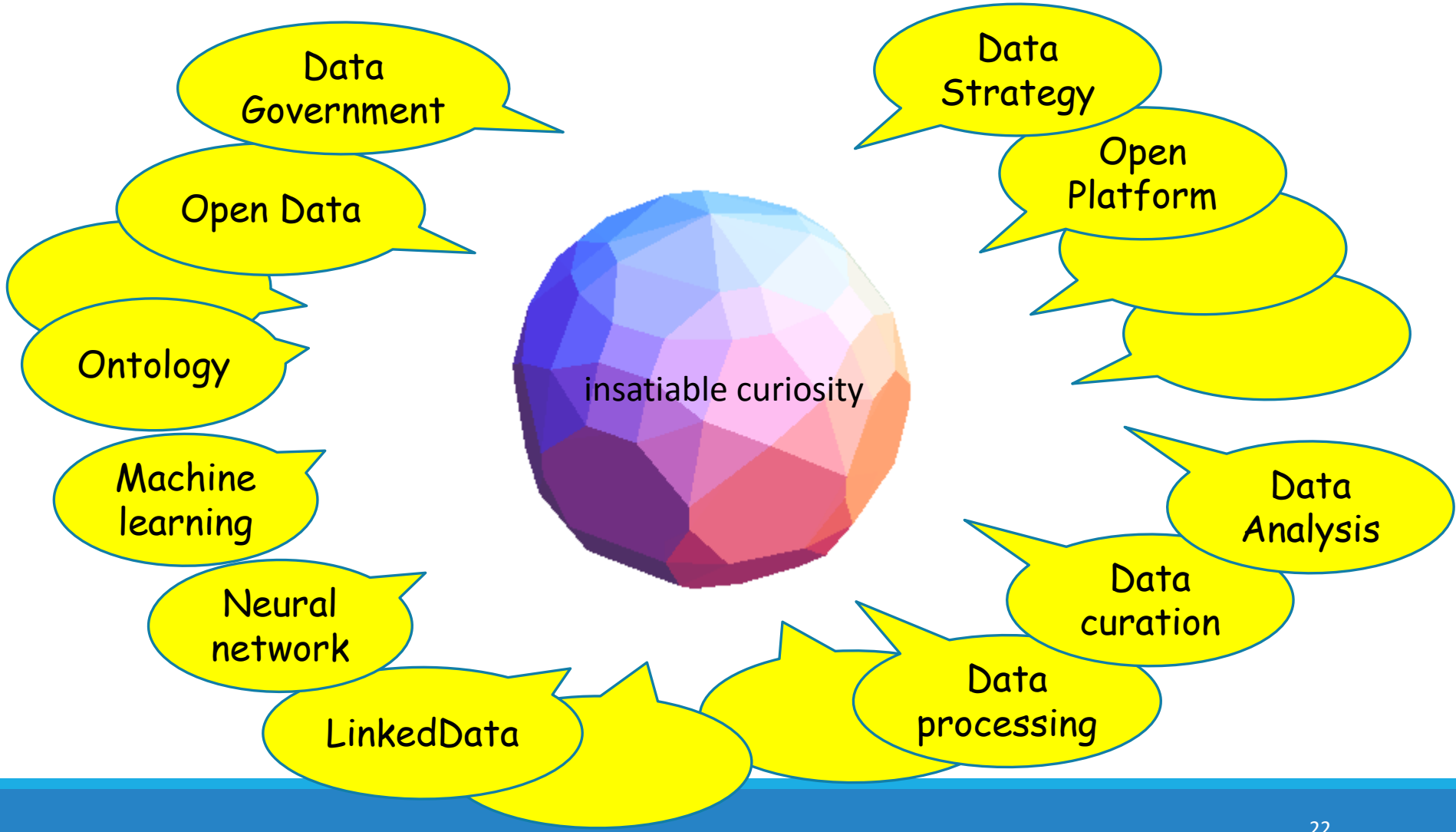


NIMS

- concept as a National Data Plat Form Center
  definitely moving forward to data-driven world



Conclusion
- it is hard homework, but…



Conclusion

- Opening up a new era for the advancement of science

終わり