Policies and Issues of RDM at Japanese Academia — Efforts of AXIES

NATIONAL INSTITUTE OF INFORMATICS
• MIHO FUNAMORI

Meeting with KISTI
July 18, 2019
Today’s Talk

1. Introduction to NII and its Services
2. Open Science and RDM-related policy developments in Japan
3. Engaging the Academia in Japan with RDM
4. Issues of RDM at Academic Institutions
Introduction to NII and its Services
National Research and Development Agencies

- Ministry of Internal Affairs and Communications (1)
- Ministry of Finance (1)
- Ministry of Education, Culture, Sports, Science and Technology (10)
- Ministry of Health, Labour and Welfare (9)
- Ministry of Agriculture, Forestry and Fisheries (6)
- Ministry of Economy, Trade and Industry (3)
- Ministry of Land, Infrastructure, Transport and Tourism (6)
- Ministry of the Environment Government (1)

- National Museum of Nature and Science
- National Institute for Materials Science (NIMS)
- National Research Institute for Earth Science and Disaster Resilience
- National Institute of Radiological Sciences
- Japan Science and Technology Institute (JST)
- Japan Society for the Promotion of Science (JSPS)
- RIKEN
- Japan Aerospace Exploration Agency (JAXA)
- Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
- Japan Atomic Energy Agency (JAEA)
Japanese Postsecondary Institutions

Universities & Graduate Schools (大学, 大学院大学)
- National University Corporations (86) (国立大学法人)
- Public Universities (72) (公立大学)
- Private Universities (601) (私立大学)

Junior College – (短期大学)
- National (0), public (17), private (326)
  - Two years after senior higher school (12th grade). Granted associate bachelor’s degree.

Colleges of Technology – (高等専門学校)
- National (51), public (3), private (3)
  - Five years after junior higher school (9th grade).
  - Granted associate bachelor’s degree. Often transferred to University of Technology (技術科学大学).

Professional Training College – (専門学校)
- Specialized Training College (専修学校)
  - No higher education degree granted.

Inter-University Research Institute Corporation (大学共同利用機関法人)
- National Institutes for the Humanities (6) (人間文化研究機構)
- National Institutes of Natural Sciences (5) (自然科学研究機構)
- High Energy Accelerator Research Organization (4) (高エネルギー加速器研究機構)
- Research Organization of Information and Systems (4) (情報・システム研究機構)

SOKENDAI (Graduate University for Advanced Studies)
providing Research Infrastructure, Services, Grants
### Inter-University Research Institute Corporation

#### National Institutes for the Humanities (人間文化研究機構)
- National Museum of Japanese History – 国立歴史民俗博物館
- National Institute of Japanese Literature – NIJL (国文学研究資料館)
- National Institute for Japanese Language and Linguistics - NINJAL (国立国語研究所)
- International Research Center for Japanese Studies - Nichibunken (国際日本文化研究センター)
- Research Institute for Humanity and Nature (総合地球環境学研究所)
- National Museum of Ethnology (国立民族学博物館)

#### National Institutes of Natural Sciences – NINS (自然科学研究機構)
- National Astronomical Observatory of Japan – NAOJ (国立天文台)
- National Institute for Fusion Science – NIFS (核融合科学研究所)
- National Institute for Basic Biology – NIBB (基礎生物学研究所)
- National Institute for Physiological Sciences – NIPS (生理学研究所)
- Institute for Molecular Science – IMS (分子科学研究所)

#### High Energy Accelerator Research Organization – KEK (高エネルギー加速器研究機構)
- Institute of Particle and Nuclear Studies – IPNS (素粒子原子核研究所)
- Institute of Materials Structure Science – IMSS (物質構造科学研究所)
- Accelerator Laboratory (加速器研究施設)
- Applied Research Laboratory (共通基盤研究施設)

#### Research Organization of Information and Systems – ROIS (情報・システム研究機構)
- National Institute of Polar Research – NIPR (国立極地研究所)
- National Institute of Informatics – NII (国立情報学研究所)
- Institute of Statistical Mathematics – ISM (統計数理研究所)
- National Institute of Genetics – NIG (国立遺伝学研究所)
National University Corporation Act (enacted 2004)

- Providing corporate status and greater autonomy to all national universities.
- Reorganizing national research institutes and providing corporate status.

Before corporatization
- 99 National Universities
- 15 Research Institutes

After 2004 -
- 89 National University Corporation
- 4 Inter-University Research Institute Corporation
• The National Institute of Informatics (NII) seeks to advance integrated research and development activities in information-related fields, including networking, software, and content. NII also promotes the creation of a state-of-the-art academic-information infrastructure.
Collaboration and Promotion in Research and Education

**Resource**
- Promotion of academic information circulation and open access
- Collaborative promotion of institutional repository expansion

**Federation**
- Collaborative enhancement of authentication between universities

**Cloud**
- Dramatic cost reduction and enhancement of research and education environment by tailored cloud services
- GakuNin-Cloud Direct Connection

**Security**
- Network flow analysis and dynamic control
- Raise of security level for SINET users

**Network**
- Nationwide 100-Gbps backbone network and scalable network expansion
- High-speed direct international lines to USA, Europe, and Asia
- Introduction of new technologies such as SDN in response to user needs

May 1976: Research Center for Library and Information Science (RCLIS) is established at the University of Tokyo.

April 1983: Center for Bibliographic Information is established at the University of Tokyo, with the reorganization of the Research Center for Information and Library Science.

April 1986: National Center for Science Information Systems (NACSIS) is established, with the reorganization of the Center for Bibliographic Information, the University of Tokyo.

April 2000: National Institute of Informatics (NII) is established, with the reorganization of NACSIS and assumption of its functions.
NII is the Japanese NREN

- SINET is a Japanese academic backbone network for more than 800 universities and research institutions, and for about 3 million users.
  - SINET covers 100% of national, 78% of municipal, and 55% of private universities.

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<th>Number of Organizations</th>
<th>National Universities</th>
<th>Municipal Universities</th>
<th>Private Universities</th>
<th>Junior Colleges</th>
<th>Colleges of Technology</th>
<th>Inter-Univ. Research Institutes</th>
<th>Labs and Others</th>
<th>Total</th>
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<tr>
<td>National Universities</td>
<td>86 (100%)</td>
<td>71 (78%)</td>
<td>348 (55%)</td>
<td>62 (18%)</td>
<td>55 (97%)</td>
<td>16 (100%)</td>
<td>179</td>
<td>817</td>
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(As of March 2015)

- : SINET node
- : Domestic line (100Gbps or more)
- : International line (100Gbps)
- : International line (10Gbps)
Scholarly Information Infrastructure

Journal articles

CiNii Articles
Metadata and links of Japanese journal articles
19 M records

JAIRO
Metadata and links of Japanese institutional repositories
2.5 M records

Catalog information

CiNii Books
Catalog of materials held by universities
Bibliographic info 11 M records
Holding information 137 M records

Research Information

KAKEN
Project reports of MEXT supported scientific researches
820 K record

Integration

Compilation

Digitization

Linkage to other DB services

More than 1,300 libraries

More than 800 institutions

Universities and Research Institutions

Note: The record numbers are as of March 2017

CiNii Articles
JAIRO
CiNii Books
KAKEN
JAIRO
CiNii Books
KAKEN

Shared Repositories
NACSIS-CAT

J-Stage (JST)
NDL
Academic Societies

JSPS
MEXT

Institutional repository
Univ. Library

Compilation

Compilation

Compilation

NII Research Data Cloud

Discovery Platform
- Linking Func between Article and Data
- Researcher and Research Project Identification and Management Func
- Data Exchange with International Discovery Service

Discovery Service
- Search/Find
- Data User
- Data Depositor
- Exp/Store
- Archive
- Article
- Exp Data
- Storage Area for Long-term Preservation
- Re-use

Publication Platform
- Data oriented Self-Archiving Func
- Versioning and auto-Packaging Func
- User Dependent Personal Data Pseudonym Func

RDM Platform
- High Speed Access using SINETS
- Data Sharing Func using Virtual NW and ID Federation
- Effective Data Storage Switcher

Research Data Repository
- Private
- Shared
- Public
Open Science and RDM-related policy developments in Japan
Policy Trends on RDM and Open Science in Japan

- June 2013: A joint statement by the G8 Science Ministers on making research data open
- March 2015: Cabinet Office, "Promoting Open Science in Japan"
- January 2016: "The 5th Science and Technology Basic Plan"
- February 2016: Council for Science and Technology, "Promoting Open Access to Academic Information"
- July 2016: Science Council of Japan (SCJ), "Recommendations Concerning an Approach to Open Science that Will Contributes to Open Innovation"
- June 2018: Headquarters for Japan's Economic Revitalization, "Growth Strategy 2018 - Reform towards Society 5.0 and Data-driven Society"
- June 2018: Cabinet Office, "Integrated Innovation Strategy"
  - “Data infrastructure for Open Science” as one of three keys to make Japan an innovative country.

Promoting Open Science in Japan
Opening up a new era for the advancement of science

Executive Summary
Report by the Expert Panel on Open Science, based on Global Perspectives
Cabinet Office, Government of Japan
March 30, 2015

It is vital for Japan to participate in international discussions and to demonstrate a proactive approach to the promotion of open science. The Expert Panel on Open Science based on Global Perspectives has discussed various relevant issues of immediate importance for Japan. Based on these discussions, the Panel presented the guiding principles for promotion of open science in Japan.

I. The Importance of Open Science

"Open science" refers to a new approach to promoting innovation through knowledge creation in science and technology. This will be realized by facilitating access to and use of publicly funded research results such as scientific papers and their underlying data by the scientific community, industry and the general public. The concept of open science is spreading rapidly. At the G8 Summit held in June 2013, G8 Science Ministers issued a joint statement that endorsed the need for increasing access to publicly funded research, including peer-reviewed published research and research data. The statement triggered discussions in various forums worldwide.

Research community, and to the decline of Japan’s international competitiveness. Japan should keep pace with the global advancement of open science in a collaborative yet also strategic manner, so that the value of Japan’s latest research and development activities can lead to business activities at the next stage.

II. The Need to Promote Open Science

Open science may change scientific research. It will not replace traditional research methods, but will add new tools that help to advance science. It will make research results widely available in digital formats to all users including the scientific community, industry and the general public. This will enable additional value to be extracted from science and technology information, which will not only improve our knowledge, but will also reform innovation strategies.

For the scientific community, the acceleration of data-driven activities is expected to lead to new collaborations and to the prevalence of new research methods among researchers within the same research discipline and beyond. Industry and individuals are also expected to gain as they develop new products and services as a result of new research.

Framework of the Open Science in Japan

In reality, the major driving force for RDM is scientific misconduct prevention

- **MEXT:** “Guideline for Dealing with Scientific Misconduct” (2014)
  「研究活動における不正行為への対応等に関するガイドライン」
  - Strengthening the guideline in 2006.
  - Holds institutions to be responsible for research transparency and preventing scientific misconduct.

- **Science Council of Japan:** “Reply: For the Enhancement of Soundness of Scientific Research” (2015)
  日本学術会議「（回答）科学研究における健全性の向上について」
  - “Ten-Years Preservation Rule for Research Data”
    研究データ10年保存ルール
Reporting of evidence-data for research articles at Japanese universities

- Research office sends out Excel spread sheet to researchers to have them report evidence-data.
  - Only single row to report,
  - No direct link to data
  - Data difficult to find.

Research Data Preservation List (研究データ保管管理簿)

<table>
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<tr>
<th>No.</th>
<th>Title of Research Article</th>
<th>Conf.Name</th>
<th>Date</th>
<th>Prsv. Perio</th>
<th>Data delete planned</th>
<th>Storage place</th>
<th>Preserving data</th>
<th>Data deleted date</th>
<th>Other</th>
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Source: Kyushu Institute of Technology, “Policy for the Prevention of Research Misconduct,” 2014
https://db.juns.kyutech.ac.jp/cgi-bin/dbhub/dbh.cgi?Page=DERecord&aid=206&uid=296
Policies for RDM

- For National Research and Development Agency (研究開発法人)

- For Universities
  - No RDM policies are set yet.
  - Only the guideline for preventing scientific misconduct and 10 years data preservation.

Suggested Items for Data Policy
1. Purpose of the policy particular to the institution
2. Definition and constraints of research data to be managed
3. Preservation, management, maintenance, security of research data
4. Metadata, identifier, format of research data
5. Belonging and intellectual property right of research data
6. Availability, embargo period, citation of research data

Universities need to move fast, to design their own RDM policy
Open Science in Japan still at its infancy

- **OS in Japan** in mainly driven by policymakers and infrastructural work by NII.
  - The term OS is becoming familiar but most people do not understand what it means.

- **Strong emphasis on research data preservation to prevent scientific misconduct.**
  - In this case, data does not need to be open.

- **Need to merge these two issues and direct RDM in Japan for positive purpose.**
Engaging the Academia in Japan with RDM
Necessity to engage the Japanese academia into Open Science

1. The idea of OA and OS not well understood.

2. RDM in an academic institute involves multi-stakeholder approach.
   - Meaning, nobody takes leadership to start OS.
   - Hiring RDM manager does not work if there is no RDM policy justifying his/her work.

3. Need to direct RDM at Japanese universities to positive direction.
   - Implementing RDM for the sake of scientific misconduct prevention does not make researchers happy.
Multi-stakeholder Approach needed to implement RDM at universities.

Grad students, technicians, lab manager, etc.: data generation, RDM

Depart. admin offices: coordination

Research Admin Office
- R admin
- R integrity

Research Support Unit (URA Station)
- R evaluation
- R support

Univ. Library
- D preservation
- D publishing

ICT Center
- E-infrastructure
- IT policies

Univ-wide policies & strategies
- Research VP
- Library
- CIO

Multi-Stakeholder Approach

I want to make the university research competitive!
Why an RDM Charter?

Participants at AXIES-RDM session started to claim,

“*We need a charter in order to convince the university administration and to get the researchers and staff engaged!*”

✓ AXIES
- Academic eXchange for Information Environment and Strategy
- Community of CIOs and ICT centers of universities in Japan.
- Counterpart to EDUCAUSE in the US
“RDM Charter for Academic Institutions”

- RDM Charter
  - Not for researchers, but
  - For academic institutions!

- Purpose of RDM Charter
  - Give university administration ideas and options to implement RDM in respective institutions.

Don’t dare to tell me how to manage my data! I know what I’m doing!
RDM implementation in an academic institute

### Decision-making on RDM implementation

- **President**
- **Research Administration Office**
- **Research Strategy**
  - Drafting of research strategy
  - Research Evaluation
  - Finding research collaborators

### INST. REPOS.
- **Open/Closed/Embargo**
  - Publishing func.
  - Storing func.
  - Preservation func.

### STORAGE
- **Closed**
  - Access control func.
  - Version control func.

### Univ. Library
- Running Inst. Repositories
- Adding metadata
- DMP support
- RDM Training etc.

### Research Strategy
- **Research Strength Info.**
- **Data generation, store, access**
- **R Data Info**
- **DMP Info**
- **R Integrity (10 yrs preserv)**
- **Grant Mgmt (DMP)**

### Lab
- **Grad students, technicians, lab manager, etc.**

### ICT center
- Provision of e-infrastructures

### Key Roles and Responsibilities
- **Researcher**
- **Acad. Inf. Discovery Service**
- **Researcher**
- **Researcher**

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**Notes**
- Access control func.
- Version control func.
- Publishing func.
- Storing func.
- Preservation func.

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**Researcher**
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**Presidential**
- President

**Researcher**
- Researcher

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**Acad. Inf. Discovery Service**
- Search

**Researcher**
- Researcher

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**Researcher**
- Researcher
“RDM Recommendation for Academic Institutions”...Composition

- The Recommendation
  - Addresses the viewpoints why academic institutions needs to take RDM seriously.
  - Viewpoints in bullet points:
    I. Role of academic institutions in RDM
    II. Policies and organizations for RDM needed in acad. Institutions
    III. RDM procedures in acad. Institutions
    IV. RDM Purpose options in acad. Institutions
    V. Digital platform functions needed for RDM in acad. Institutions
    VI. Human resources development for RDM in acad. Institutions
    VII. Reuse and service options of research data in acad. institutions

- Appendix
- Glossary
- References
“RDM Recommendation for Academic Institutions”...Main Text

1. Need for RDM at academic institutions
   - Research data used at every research process in every discipline
   - Researcher who manages research data controls research competitiveness in the digital age

2. Infrastructure for RDM should be provided by institution
   - Inefficient if every researcher cares for his/her own environment

3. Efficiency that the RDM infrastructures are common across institutions and AXIES role

4. Expectation that this recommendation will be referred at academic institutions
Various RDM implementing purposes in an academic institution

- **Competitiveness**
  1. Raising visibility of acad. Institution
  2. Attracting top researchers and collaborators
  3. Research evaluation within the institution

- **Accountability and Compliance**
  4. Complying to funding agencies’ mandates
  5. Complying to scientific misconduct guideline

- **Outreach and Education**
  7. Outreach to industries and society in general
  8. Provide education and training for data-intensive work
Issues of RDM at Academic Institutions
WG on RDM at Academic Institutions

- Project funded by Research Organization of Information and Systems (ROIS)

- Participating universities
  - The University of Tokyo
  - Kyoto University
  - Nagoya University
  - Shinshu University
  - Toyohashi University of Technology
  - National Institute of Informatics
Issues of RDM at Academic Institutions

...Organizational Structure

- Multi-stakeholder approach difficult to make it work!

  - Meeting held with related department and units. However, each unit is concerned with its own agenda and collaboration across units not working.

  - Administration (VP for research, CIO, Director of Library) receives report from respective units but do not cooperate among themselves.

  - Some units difficult to get involved (Research Office, Library, URAs)
Issues of RDM at Academic Institutions

...Formulating Policies

- What should be the basis of RDM policy?
  - Research integrity, 10 yrs data preservation rule
  - Open science, sharing research data
  - Accountability, DMP, supplements for research article
  - University strategy, branding, industrial cooperation

- Who should take the lead within institution?
  - Bottom-up from related units?
  - Top-down by the president or VP for acad. Information?

- Need for some supporting organization outside academia needed
  - For instance, some organization which could give advice on “right-holder of research data.”
Issues of RDM at Academic Institutions

...Asset Management of Research Data

- If research data (RD) is asset of institution...
  - The value of RD needs to be assessed
  - The cost for providing RD according to its value needs to be assessed
  - Depreciation and disposition of RD needs to be considered
  - Right of institution and researcher needs to be made clear

- What RD are valuable?
  - Primitive and universal data (temperature, physical properties)
  - Rare data (one-shot data, data whose acquisition cost is high)
  - High-quality data (What about negative data?)
  - Are RD which cannot be made available open valuable for institution?
  - How are the value of RD assessed? Is the institution able to do so?

Maybe, RD should be made available on the researcher’s website.
Issues of RDM at Academic Institutions

...Infrastructural Development

- **Storage**
  - Need to estimate *size and budget of storage*
  - *Efficient* if institution provides storage, rather than researchers acquiring by themselves
  - *Providing IT services based on researcher’s request*, rather than top-down

- **Expectation for GakuNin RDM**
  - Institution can meet compliance issues
  - Using it also for administrative document management
  - Automatic synchronization of files
Issues of RDM at Academic Institutions

...RDM development within institution

- Killer Example needed
  - Some killer example to convince the staff within institution needed
  - Killer example with specific discipline? Grassroots RDM activities? Single researcher?

- Focus interviews and questionnaire survey needed
  - How researchers manage RD
  - Needs for storage and/or RDM platform
  - How much storage is needed

Maybe, we should have a nation-wide Questionnaire survey!
Next Steps of AXIES

☐ GOAL

➢ Make sure that RDM platform is not just provided as system but make it work within institution!

☐ Activities

➢ Designing questionnaire survey template
➢ Establishing RDM case studies
➢ Developing RDM policies and guidelines