



# e-Science Experiences in NIMS eSciDoc: Self-archiving of profiled experimental data

谷藤幹子/Mikiko Tanifuji, 高久雅生/Masao Takaku

National Institute for Materials Science (NIMS)

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## Outline

### A reality of research environment in science

1. Background 1 –who we are
2. Background 2 –reality in research environment
3. Background 3 –popular tools, software, databases
4. Research cycle
5. What does “e-Science” mean to us

### Infrastructure for self-archiving of research data, “NIMS eSciDoc” towards e-Science

6. FedoraCommons and NIMS eSciDoc
7. Variations and diversity of research data
8. Profiles of experimental data –Materials Science
9. An experiment of image data repository –FACES
10. Conclusion and plans
11. A future vision of research library  
–what are the benefits to researchers?
12. Acknowledgement



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## Background 1 -who we are

1. Government-funded research laboratory
2. 5 campus, Japan
3. 2 satellites, Seattle and Cambridge
4. Researchers 500 / 1500 (non-Japanese 9%)
5. Budget ¥22 billion (Library 0.8%)
6. 33 research labs and centers
7. 4 joint graduate university program
8. 4 research collaboration centers with industrials



## Background 2 -a reality in research environment

1. 1400 paper published (2008)
2. 236 patents registered (2008)

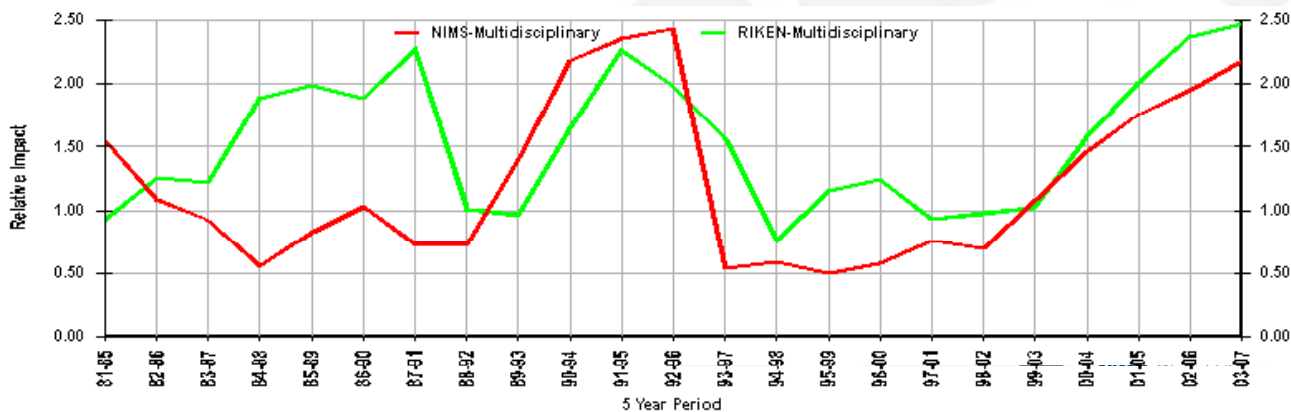
### World ranking status (Materials Science, 2004.1-2008.12)

|    | institution              | (1) Papers  | (2) Citations | (3) Citations Per Paper |
|----|--------------------------|-------------|---------------|-------------------------|
| 1  | CHINESE ACAD SCI         | 7864        | 26434         | 3.36                    |
| 2  | Max Planck Society       | 1730        | 13273         | 7.67                    |
| 3  | TOHOKU UNIV              | 2970        | 9676          | 3.26                    |
| 4  | <b>Natl Inst Mat Sci</b> | <b>2106</b> | <b>8926</b>   | <b>4.24</b>             |
| 5  | NATL UNIV SINGAPORE      | 1241        | 8008          | 6.45                    |
| 6  | MIT                      | 841         | 7940          | 9.44                    |
| 7  | AIST                     | 1972        | 7735          | 3.92                    |
| 8  | TSING HUA UNIV           | 2500        | 7477          | 2.99                    |
| 9  | SEOUL NATL UNIV          | 1410        | 6629          | 4.7                     |
| 10 | UNIV CAMBRIDGE           | 1021        | 6568          | 6.43                    |

Resource: Essential Science Indicators, 2008

## Background 2 -a reality in research environment

### Impact relative to a field, Multidisciplinary



Resource: University Science Indicators Japan, 1981- 2007

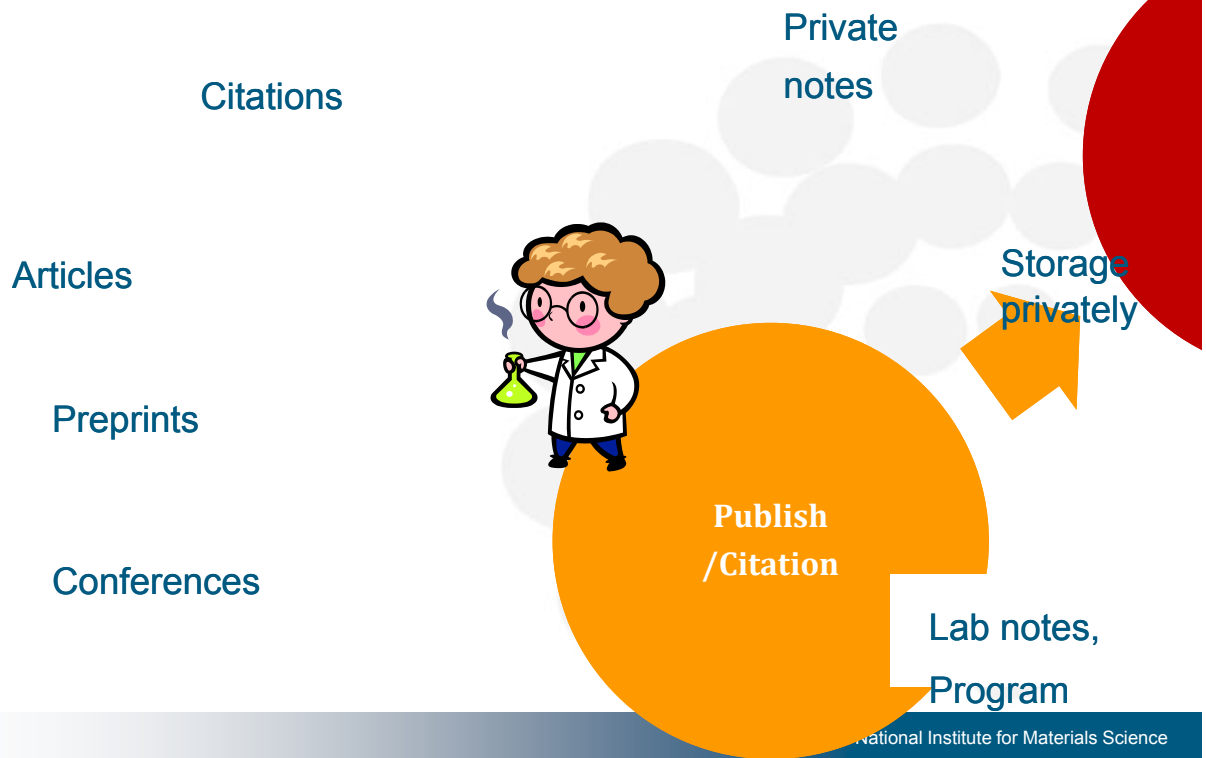
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## Background 3 -popular tools, software, databases

A collage of research tools and databases. On the left is the SCOPUS interface with a sidebar for 'All Databases' and 'Web of Knowledge'. In the center is the Google Scholar beta logo. On the right is the ResearcherID interface, featuring the tagline 'A Global Community Where Researchers Connect' and 'Identify. Communicate. Collaborate.' Below this is a search box for 'Search ResearcherID' with fields for 'Last / Family Name' and 'First / Given Name'. A 'Top 20 Key' list on the far right includes terms like 'analytical chemistry', 'biotechnology', 'nanotechnology', and 'systems biology'.

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## Research cycle



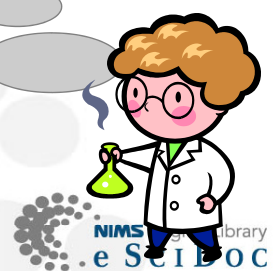
## What does “e-Science” mean to us?

When do you need sharing and dissemination of your research?

- × not primary stage of the research cycle
- preprint stage, perhaps
- published papers, definitely + maybe supplementary materials
- find audience, who /where / how many / to which of mine

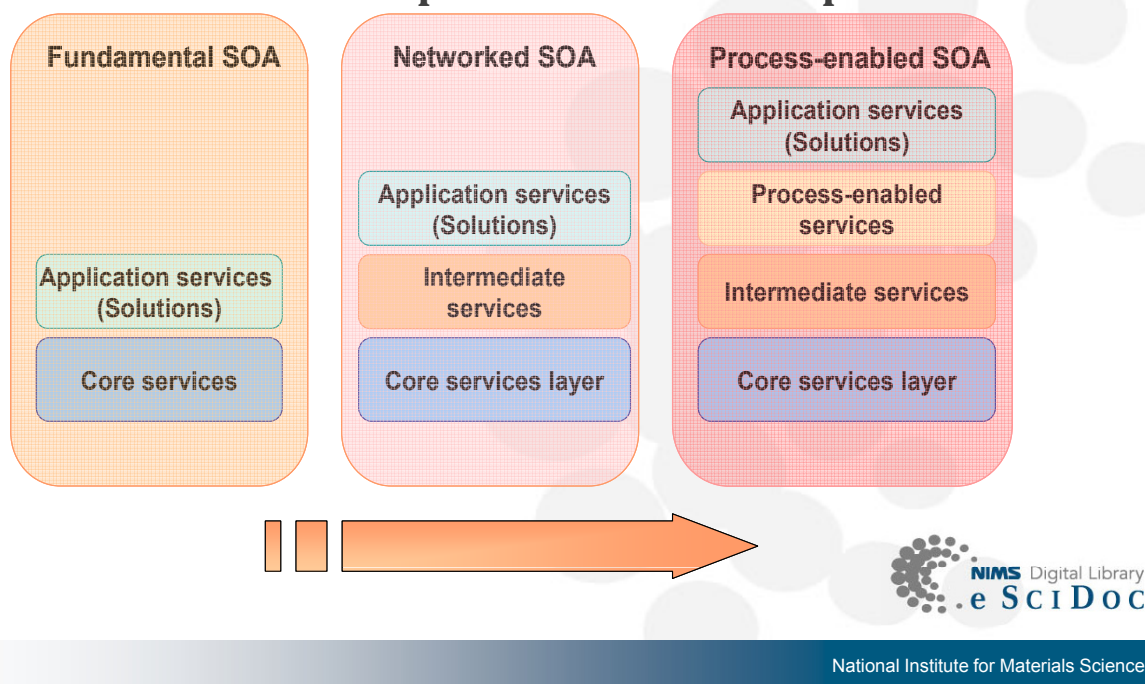
### Digital library towards e-Research environment;

- a secured storage, xml-web-based database
  - with simple user interface
  - that allows self-archiving of various items
  - with an access management (myself / NIMS only / OA)
  - and a visualized log access view by researchers
- a universal standardized schema.



## FedoraCommons and NIMS eSciDoc

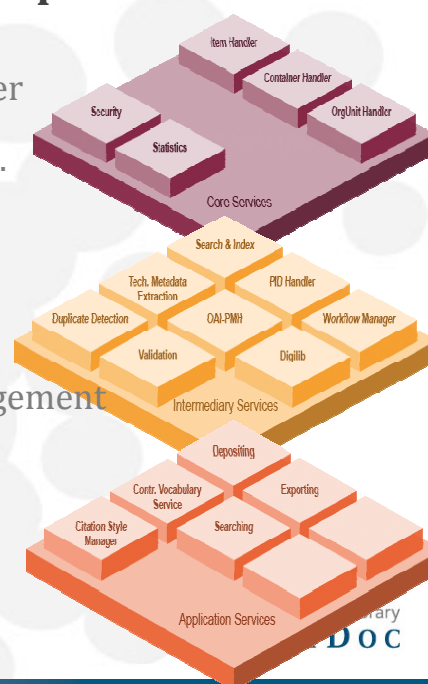
### Service development: SOA roadmap



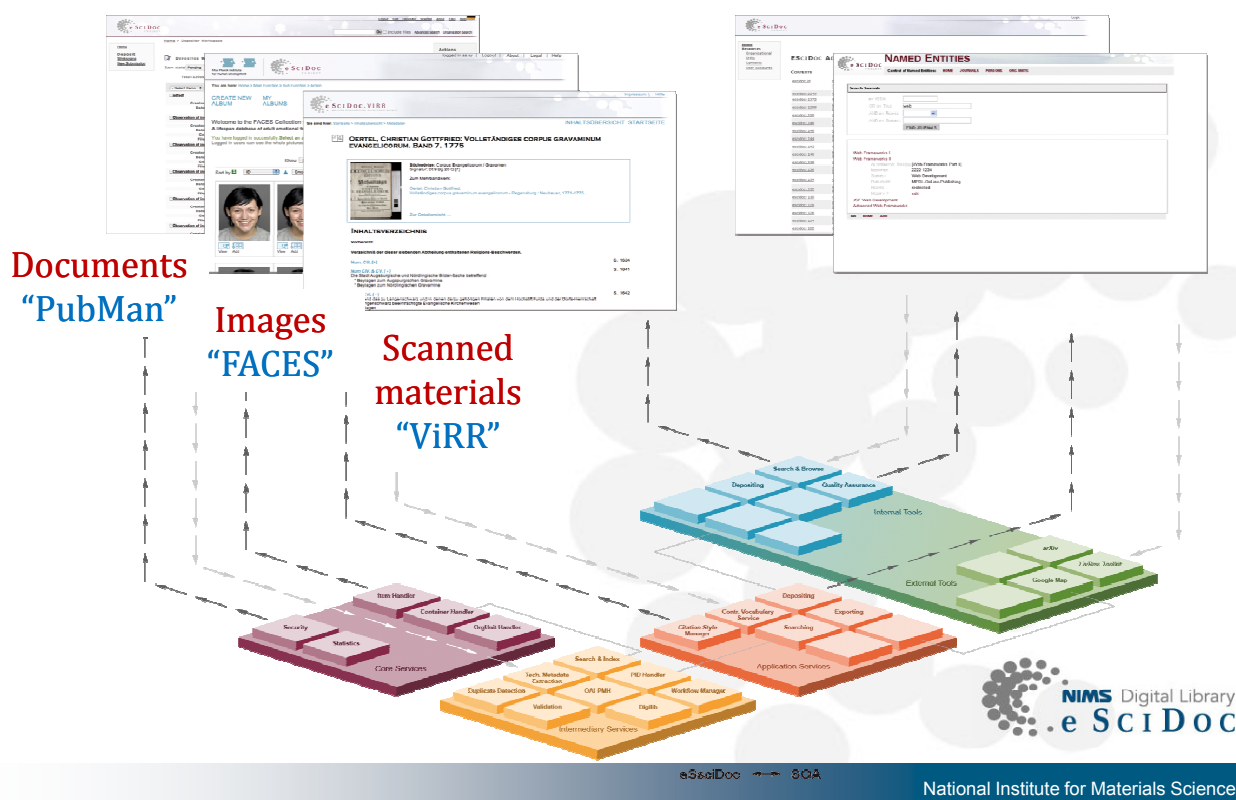
## FedoraCommons and NIMS eSciDoc

### Service development: SOA composition

- 1. Core services**  
 Context handler, Item handler, Container handler  
 Organizational units handler, Role handler  
 Content model handler. Semantic store handler.
- 2. Intermediate services**  
 Duplicate detection, Image handling  
 Metadata handler, Validation of data  
 Retrieval/download statistics, Workflow management
- 3. Application services**  
 Depositing, Publishing, Quality assurance  
 Citation manager, Export manager  
 SearchAndOutput, Controlled vocabularies



# Fedora Commons and NIMS eSciDoc -landscape



# Profiles of experimental data –Materials Science

|   | Options  |   | Properties |           |                    |             |           |                   |
|---|--|---|------------|-----------|--------------------|-------------|-----------|-------------------|
|   | 作成時解像度<br>Resolution<br>(Max-Min)<br>by no of pixels | Reference URL<br>(ex. DOI,<br>PubMan etc) | Color      | Mechanism | Condition          | Temperature | Date      | Brief Details     |
| Polished synthetic diamond plate viewed in transmission (white, violet, green or red light), crossed polarizers and luminescence (337 nm exc.). The butterfly originates from cutting through specific growth sectors. Stripes in the green and red images are interference; green luminescence and brown color is due to Ni-N complexes. Image width 2 mm. | 1428x1718  |   | -          | HPHT      | Optical microscope | 300 K       | 2009/3/26 | synthetic diamond |
| Polished synthetic diamond plate viewed in transmission (white, violet, green or red light), or luminescence (337 or 515 nm exc.). Stripes in the violet and red images are interference; green and red luminescence is due to dissimilar Ni-N complexes. Image width 2 mm.   | 1426x1720  |   | -          | HPHT      | Optical microscope | 300 K       | 2009/3/26 | synthetic diamond |
| Polished synthetic diamond plate viewed in transmission (white, violet, green or orange light), crossed polarizers (plate flipped) or luminescence (337 nm exc.). Violet bands are due to nitrogen; horizontal stripes in the green and orange images are interference; green luminescence is due to Ni-N complexes. Image width 2 mm.                      | 1372x1720  |   | -          | HPHT      | Optical microscope | 300 K       | 2009/3/26 | synthetic diamond |

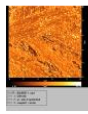


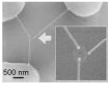
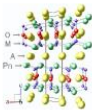


# An experiment of image data repository –FACES

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Welcome to the image collection in materials science.

Diamonds is a set of collections of diamond images. There are 5 collections so far:

|  |   |
|--|---|
| <b>Eiji Akiyama's collection</b>           |  |
| <b>Hisao Kanda's collection</b>            |  |
| <b>Konstantin Yakubovskii's collection</b> |  |
| <b>Kazutaka Mitsubishi's collection</b>    |  |
| <b>Tadashi C. Ozawa's collection</b>       |  |

**NIMS News**  
 NIMS NOW2009, Vol.7 No.8  
 2009年11月06日  
 The Forefront of High Temperature/  
 / FACE/ NIMS NEWS/ Hello from  
 NIMS

**Dr. Seiji Kuroda Receives the Title**  
 2009年10月27日  
 (Oct.27, 2009) Dr. Seiji Kuroda,  
 managing director of Hybrid  
 Materials Center of NIMS, has been  
 elected to the College of ...

**Success in Development of**  
 2009年10月22日  
 A group headed by Kiyoshi  
 Shimamura, Group Leader and  
 Garcia Villora, Senior Researcher of  
 the Frequency Conversion Group, ...

**Symposium on Frontiers in**  
 2009年10月15日  
 Date:2009/10/23 (Fri)

**NIMS signs a sister institute**  
 2009年10月13日  
 (Oct. 13, 2009) The Workshop  
 Nanostructured Materials for  
 Sustainable Development was held  
 at Villa Mondragone, University of  
 ...

**Test Drive Event at NIMS with**  
 2009年10月13日  
 (October 13, 2009) An exchange of  
 views on fuel cell automobiles with  
 Toyota Motor Corporation and a  
 test drive event with a ...



eSciDoc.Faces - National Institute for Materials Science.

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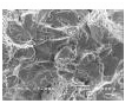
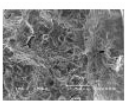

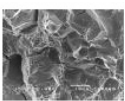
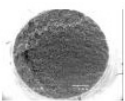

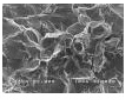

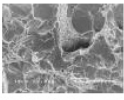
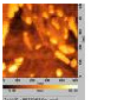
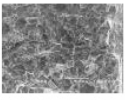
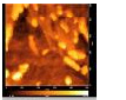
## Browse

153 images to browse

Show  of 153 hits

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1 | 2 | 3 | 4 | 5 | Next ▶▶
Go to page  of 13

Sorted by Diamond Elements ▲ Shape ▲ Mechanism ▲ Sort

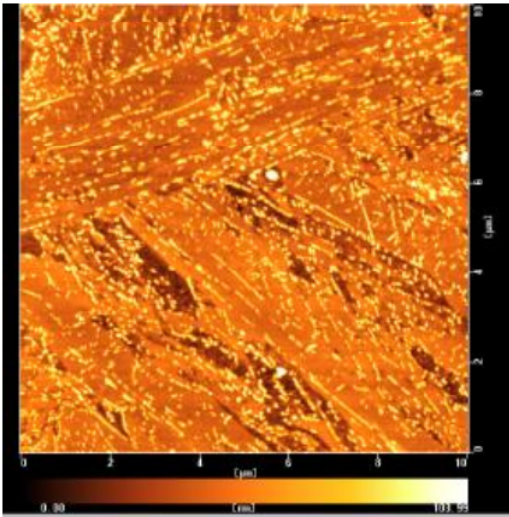
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| <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> |
| <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> |

Show  of 153 hits
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1 | 2 | 3 | 4 | 5 | Next ▶▶
Go to page  of 13

Detail View

[Back to result list](#)      [◀ Previous](#)   [Next ▶](#)

Attributes



ファイル名: 00o06011\_xqd  
コメント 1: 5CM440  
コメント 2: as electropolished  
コメント 3: sample2 center

**Diamond Elements :**

**Shape :**

**Color :**

**Mechanism :**

**Condition :**

**Temperature :**

**Description :**

**Abstract :** "steel,SCM440QTas-P"

**Date :** 2009-10-06

**Identifier :** 00o06011

**Creator :**


Person :

Complete Name : Eiji Akiyama  
Given Name : Eiji  
Family Name : Akiyama  
Identifier :  
Organization :

Address :  
Identifier :

Kazutaka Mitsubishi's collection

You have logged in successfully!

 published

**Album Url**      http://vm29.mpdl.mpg.de/album/escidoc:260807

**Dates**      Date Created: 2009-11-05 at 16:46:06 CET      Date published: 2009-11-05 at 17:07:02 CET

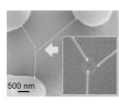
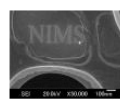


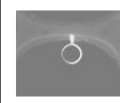
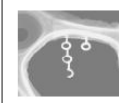

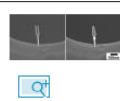
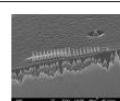
**Author**      Mitsubishi , Kazutaka      National Institute for Materials Science

**Description**      This is the Diamonds collection of Kazutaka Mitsubishi.

Export Album

Show 12 of 9 hits      [◀◀ Previous](#) 1 [Next ▶▶](#)      Go to page  of 1

Sorted by **Diamond Elements** ▲ **Shape** ▼ ▲ **Mechanism** ▼ ▲ **Sort**

|   |   |   |   |  |   |
|---|---|---|---|--|---|
| <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> |
| <br><a href="#">View</a> | <br><a href="#">View</a> | <br><a href="#">View</a> |   |  |   |



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Export Kazutaka Mitsuishi's collection

Please Note: At the moment it is only possible to download a maximum of 1000 pictures. We apologize for any inconvenience.

**Export**

Export Formats

XML files and pictures in zip files  
  Only XML  
  Pictures only in zip files

Picture Resolution for Export

File format: JPG

Thumbnails  
  Web resolution

Cancel   Download



## Future possibility

### 26 Fe

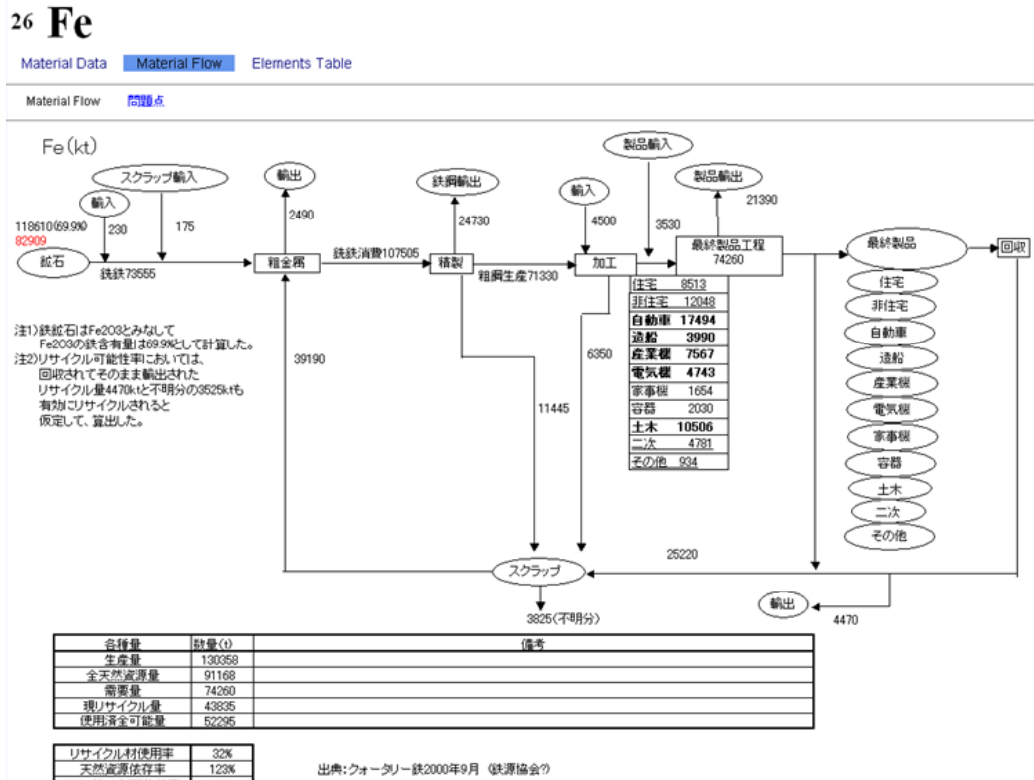
Material Data   Material Flow   Elements Table

元素名 Name 鉄 [英 iron]

|        |                           |  |
|--------|---------------------------|--|
| 原子番号:  | Atomic number             | 26                                       |
| 原子量:   | Atomic weight             | 55.847(3)                                |
| 族:     | Group                     | 8  |
| 周期:    | Period                    | 4  |
| 電子配置   | Shell configuration       | 2,2,6,2,6,6,2                            |
| 電気陰性度: | Electronegativity         | 1.83                                     |
| 単体融点:  | Melting point             | 1540°C                                   |
| 単体沸点:  | Boiling point             | 2750°C                                   |
| 融解熱    | Heat of fusion            | 15.1kJ/mol                               |
| 蒸発熱    | Evaporation heat          | 354kJ/mol                                |
| 熱容量    | Thermal capacity          | 25.1J/K·mol                              |
| 熱伝導率   | Thermal conductivity rate | 80.3W/m·K                                |
| 線膨張率   | Linear expansion rate     | 0.138×10 <sup>-4</sup> /K                |
| 単体密度   | Density                   | 7.87g/dm <sup>3</sup> (20°C)             |
| ヤング率   |                           | 193~200×10 <sup>9</sup> N/m <sup>2</sup> |
| 抵抗率    |                           | 9.71×10 <sup>-8</sup> Ωcm                |
| 備考:    | Other                     |  |



## Future possibility



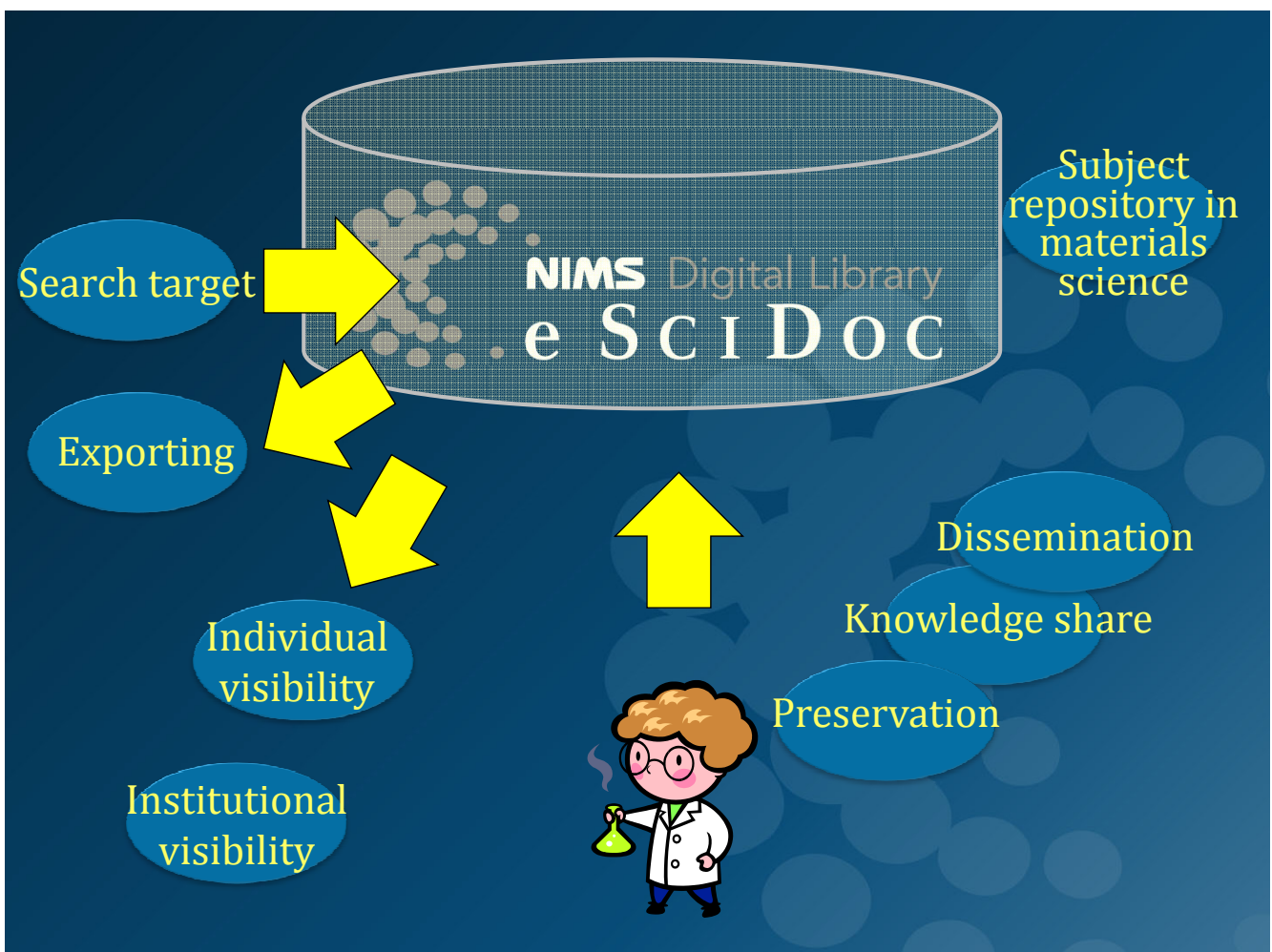
## Conclusion and Plans

- Repository as a self-archive system -
  - flexibility of xml schema depending on data sets
  - easily manageable interface
  - secured and sustainable repository server.
- Repository as a knowledgebase -
  - interlinking
    - preprints ⇔ published articles ⇔ data sets ⇔ translations
    - ⇔ research reports ⇔ ...

### Our plans working with researchers 2009-2010;

- Standardization of "data schema" based on variations and diversity in materials science.
- Improvement of ingesting process of data to FACES
- Provision of linking functions between self-archived items.

# Future visions of NIMS eSciDoc -researchers' satisfaction towards e-Science



# Acknowledgement

We thank our colleagues for data repository and our development partners;

**[National Institute for Materials Science, Tsukuba, Japan](#)**

Dr. Shin-ichi Todoroki, Optical Materials Research Center

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Dr. Katsuhiko Ariga, WPI/ Supermolecules

Dr. Masashi Hase, Quantum Beam Center

Dr. Kazutaka Mitsuishi, Quantum Dot Center

Dr. Konstantin Iakoubovskii, Scientific Information Office

eSciDoc collaborations;

**[Max Planck Digital Library, Munich, Germany](#)**

Malte Dreyer, eSciDoc solution

**[FIZ Karlsruhe, Karlsruhe, Germany](#)**

Matthias Razum, eSciDoc infrastructure

