

e-Research: An Innovative Service of Academic Libraries

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A Book Related to e-Research

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- 第一章 導論 /陳雪華
- 第二章 各國 e-Research 之發展與現況 /陳雪華、黃文樺、何亞真、陳麗純
- 第三章 臺灣發展研究資料管理政策之芻議 /劉應琳
- 第四章 學術圖書館與資料度用 /曾品方
- 第五章 從研究人員觀點探討資料度用系統：以地理資訊應用領域為例 /黃文琪、蔣禮芸、秦韻涵
- 第六章 資料度用詮釋資料之探析 /林玉、劉京玫
- 第七章 e-Research 系統之服務與發展 /江玉婷、陳光華、黃乾綱
- 第八章 結論與建議 /陳光華



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Outline

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- Background
- e-Research
- Academic libraries in e-Research
- Data curation
- Data curation systems
- Conclusions



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Shift of Research Paradigm

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- Big data
 - Sensor-generated data
 - Model-generated data
 - User-generated data
 - Born digital data
 - etc.
- Interdisciplinary researches
 - Challenges & opportunities of new paradigm
 - Data available in different formats, channels, tools, and services



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Components of e-Research

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- Computing power and network bandwidth
 - Computer centers, cloud computing providers
- Data curation
 - Libraries, data centers
- Operating systems and algorithms
 - Domain experts, computer scientists



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Scales of Research Data

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- Research data collections
 - Outputs of one or more research projects
 - Limited management
- Resource or community data collections
 - For particular or single research community
 - No guarantee for long-term maintenance
- Reference data collections
 - For large-scale research communities
 - With better maintenance and management



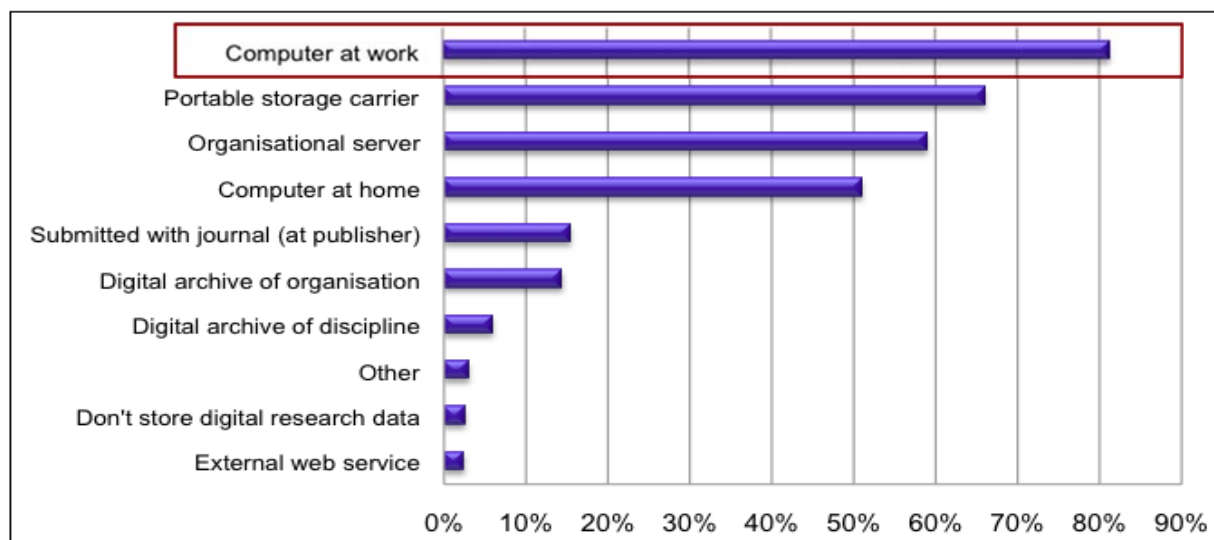
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Store Research Data

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Where do you currently store your research data? (researchers/multiple answers, N=1202)



Source: PARSE.Insight Consortium. (2010). PARSE.Insight: Science Data Infrastructure Roadmap.



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e-Research Initiatives

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- International level
- National level
- Funding agencies
- Research communities
- Publishers
- Research institutes



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Responsibilities of Different-level Organizations

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- International organizations
 - Visions & Principles
- National organizations & Funding agencies
 - Policies & Strategies
- Research communities & Research institutes
 - Promotion & Execution

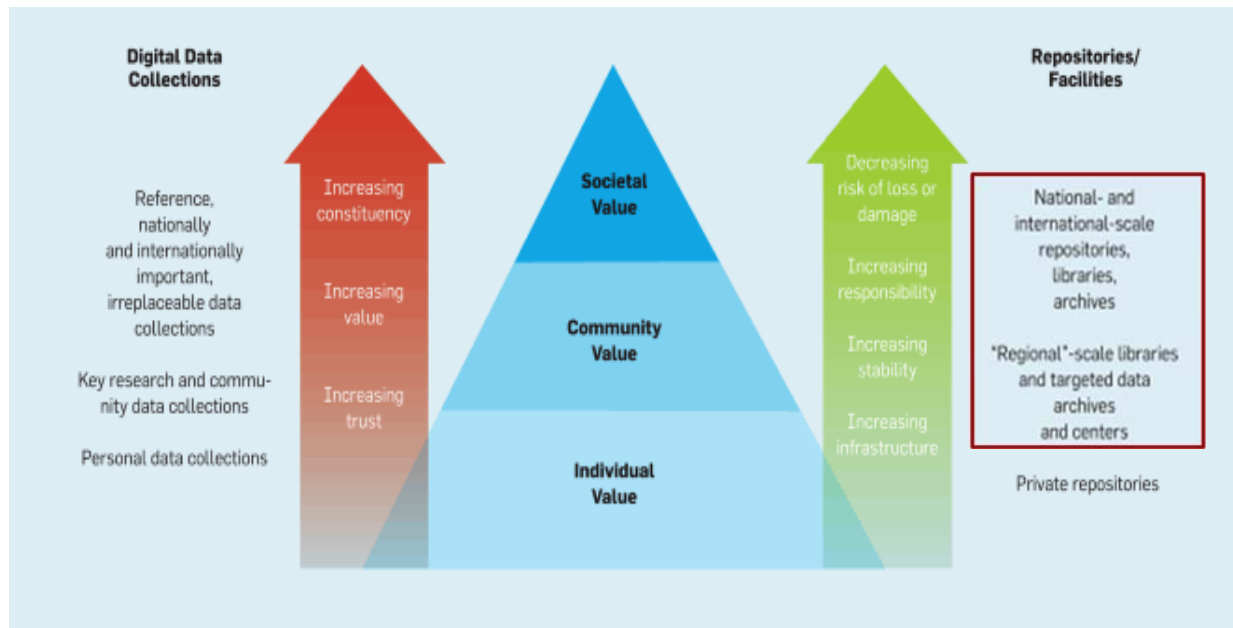


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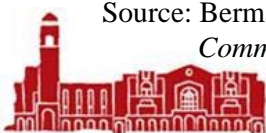
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Value-added Research Data

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Source: Berman, F. (2008). Got data?: a guide to data preservation in the information age. *Commun. ACM*, 51(12), 50-56. doi: 10.1145/1409360.1409376



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Open Government Dashboard 2012

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KEY:

- Meets Expectations
- Progress Toward Expectations
- Fails to Meet Expectations

Agency	High-Value Data	Data Integrity	Open Webpage	Public Consultation	Overall Plan	Formulating the Plan	Transparency	Participation	Collaboration	Flagship Initiative
Agency for International Development	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Agriculture	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Energy	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Education	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Commerce	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Defense	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Health and Human Services	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Homeland Security	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Housing and Urban Development	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of the Interior	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Justice	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Labor	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of State	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Transportation	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of the Treasury	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Department of Veterans Affairs	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets

Source: White House. (2012). *Open Government Dashboard*. Retrieved July 24, 2012, from <http://www.whitehouse.gov/open/around>



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Actions for Commitment of e-Research

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- Lessons learning
- Policies making
- Regulation implementing
- Incentives creating
- Roles positioning
- Systems developing
- Inter-disciplines cooperating



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Current Services in Academic Libraries

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- PULL-based services
 - Priced resources
 - Open resources
- PUSH-based services
 - Special collections
 - Digital repository
 - Web archives
 - Institutional repository

All efforts related to final products of researches, but few efforts in collecting research data



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- From institutional repository to research data repository
- Data curation with supports of policies and strategies
- Collaboration with office of research and development
- From institutional level to national level



Data Curation

- Data
 - Raw data, created data, output data, etc.
- Curation from "curare" means "care for"
- Research data has to be collected and managed carefully for later access and reuse
- Data curation is to maintain, preserve, and add value to research data and to construct reliable digital repository for current and future use



e-Research vs. Data Curation

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- Data curation could be regarded as one of components in e-Research framework
- Data curation is the answer to storage and management of research data in e-Research
- In addition, data curation could be the hub to connect to other components of e-Research



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Why Data Curation is Important

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- Data deluge
 - Sensor-generated data, model-generated data, etc.
- Data loss
 - Characteristics of digital data, scholars' behaviors, no preservation strategies, etc.
- Data effectiveness
 - Insight, verification, innovation, etc.



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Niche for Academic Libraries towards Data Curation

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- Libraries have focused on acquisition for final products of researches, although there were few efforts in acquisition for research data
- Librarians are professionals of data organization, information access, collection management, and institutional repository
- That is librarians are experienced data experts



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Librarians' Roles in Data Curation

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- Consultant of data acquisition and organization
- Partner of educational activities
- Disseminator of research data
- Manager of data curation system
- Hub of data and researchers
- Participant of research collaboration



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Academic Libraries' Strategies for Data Curation

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- Participate research activities
- Aggregate research resources
- Educate research librarians
- Develop research partnership
- Execute research projects



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Case Study -- Interview with Geospatial Researchers of NTU



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Geospatial Researchers' Responses

-- Genre of Research Data

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- GIS shapefile
- Digital maps
- Sensor-generated data
- Simulated models
- Topical data



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Geospatial Researchers' Responses

-- Current Status of Preservation & Sharing

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- Store data in respondents' computers
- Data backup using optical disks, hard disks, and other computers
- Data organization based on research projects or assistants
- No respondents submitted their data to online data repositories
- Data sharing via personal social network



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Geospatial Researchers' Responses

-- Comments on Data Curation

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- Agree with ideas of developing data curation systems
 - Consensus in data sharing
 - Long-term goal of geospatial researchers
 - Before submitting data to curation system, data should be re-organized.
- No time to participate activities of data curation
- Willing to use data curation system as one of backup mechanisms



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Geospatial Researchers' Responses

-- Requests for Data Curation

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- Regulations
 - Coverage for deposited data
 - Not all data should be available
 - Rules for data organization and description
 - Pre-defined rules v.s.
 - Adoption of common standards
 - E.g., GML v.s. ArcGIS
- Supports
 - Policies & fundings
 - Supporting Staffs



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Geospatial Researchers' Responses

-- Features of Data Curation System

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- Excellent searching & browsing features
 - Better if layered geospatial data are available for searching and browsing
- Storage is always available
- Citation in different formats

- E.g Carstairs deprivation scores by CATT2, 1981, 1991, 2001

Download Dataset

Show full item record

Title: Carstairs deprivation scores by CATT2, 1981, 1991, 2001

Data Creator: Richardson, Elizabeth A

Date Available: 2011-09-30

Citation: Richardson, Elizabeth A. (2009). Carstairs deprivation scores by CATT2, 1981, 1991, 2001, 1981-2001 [Dataset]. University of Edinburgh. School of GeoSciences.



Source: "Edinburgh DataShare," by University of Edinburgh, 2010, Retrieved Sep. 30, 2011, from <http://datashare.is.ed.ac.uk/handle/10283/19>

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e-Research Service Platform

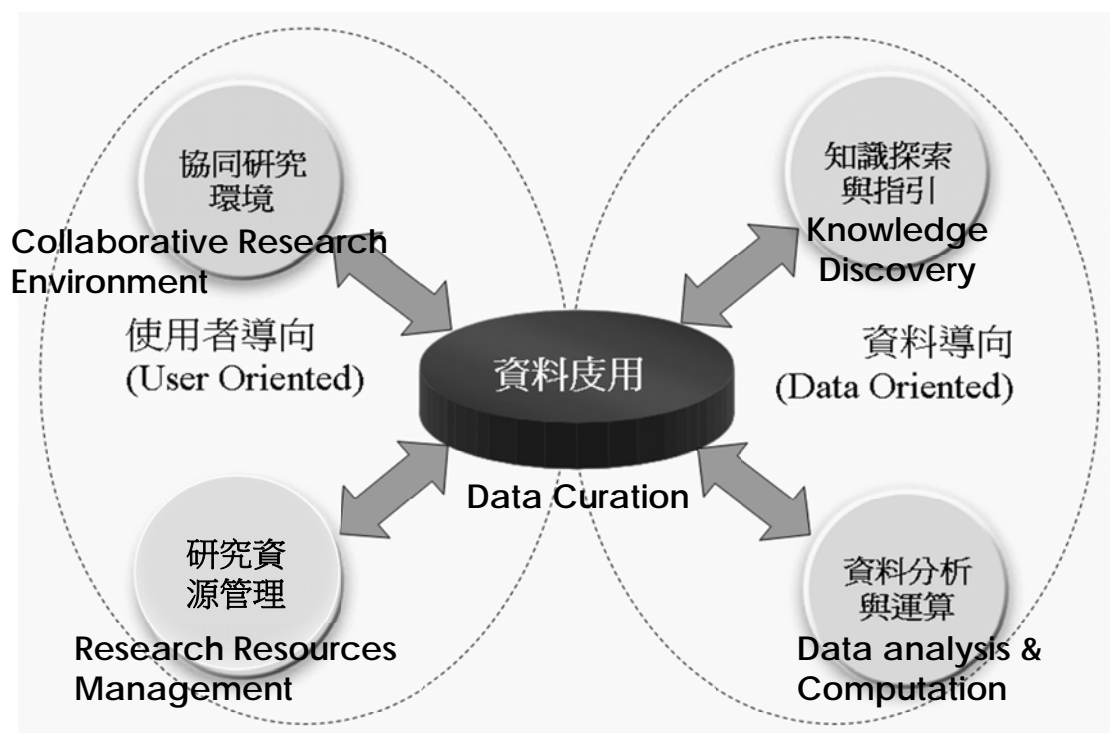


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- One-stop-shop service
- Five components
 - Data Curation
 - Knowledge Discovery
 - Data analysis & Computation
 - Collaborative Research Environment
 - Research Resources Management



Data Curation as the Hub of e-Research Service



■ Three components of knowledge discovery

- All data has standard format
 - Resource Description Framework, RDF
 - Ontology Web Language, OWL
- Everything has its own URI
- Data modeled as bidirectional relationships

Source: "A Closer Look at VIVO," by E. Cramer, 2010, *Charleston Conference: VIVO, libraries, and users*, Retrieved August 30, 2011, from http://www.ithaka.org/about-ithaka/events/Ellen_Cramer.pptx

■ Related software tools

- Protégé, Jena .NET Framework, RDF Pro
- VIVO

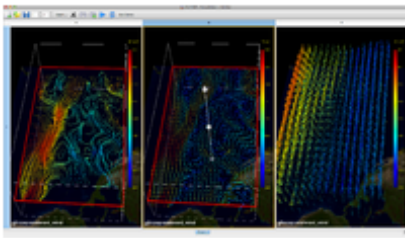


Data Analysis & Computation

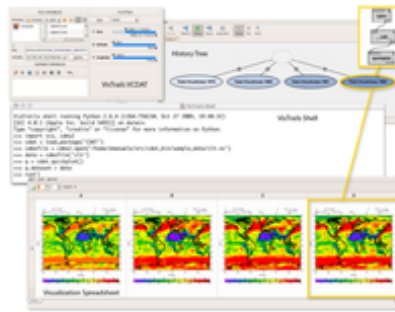
- Online and offline analysis
- Computation
 - Distributed computing
 - Grid computing
 - Cloud computing
- Data visualization



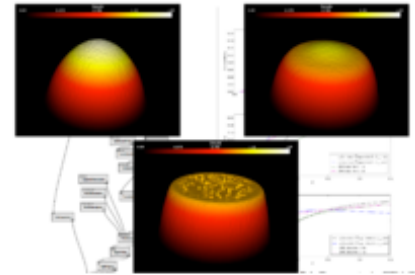
NASA Climate Data Analysis



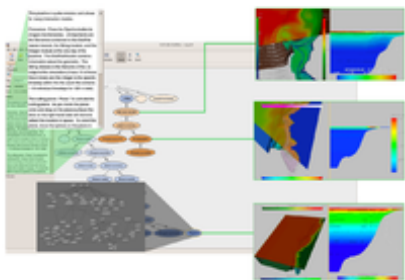
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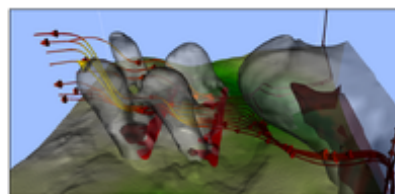
ALPS Simulations



NSF STC CMOP



NSF CDI Wildfire



NSF DataONE-EVA



Source: "VisTrailsWiki," Retrieved August 30, 2012, from http://www.vistrails.org/index.php/Main_Page#Screen_Shots

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Collaborative Research Environment

- Support activities for collaborative researches
 - Web2.0 community
 - Collaborative authoring
 - Management for meetings, events, documents
- Aggregation and organization of related resources



- Research projects management
- Human resources management
- Workflow management
- Object management
- Risk management
- Research materials management



Data Curation Systems



Features in Data Curation Systems

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- Data retrieval
- Data access
- Data management
- User interface
- Value-added processing
- Data storage
- System management



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Suggestions for Construction of Data Curation System

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- Based on available open sources
- Customized open sources to fulfill other required features
- DSpace vs Fedora Commons

	DSpace	Fedora Commons
System Deployment	Better	
Content Construction	Better	
Usability of UI		Better with packages
Flexibility of Data Structure		Better
System Expansion & Re-development		Better



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- Base on DSpace1.8 since it is a quick solution
- Features in the first release
 - Flexibility in schema design for Collection-level and Item-level metadata
 - Inter-linking among data elements via URI
 - Application of research data
 - Authorization of research data



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NTU eResearch

DSpace首頁 → DSpace首頁

搜尋DSpace

執行

進階搜尋

分類檢視(Discovery)

作者

Tzeng, WN (5)
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Cheng, PW (2)
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test (1)
Tsai, WN (1)
Tsai, YC (1)
乾綱 黃 (1)
光華 陳 (1)
冠瑩 江 (1)
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班表 (1)
Date Issued

2012 (9)
2011 (2)
2010 (1)
2009 (2)

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日期: 2012-07-05

 標題: [Timing of metamorphosis and estuarine arrival across the dispersal range of the Japanese eel *Anguilla japonica*](#)
作者: Tzeng, WN; Cheng, PW
日期: 2012-05-04

 標題: [日本鰻鰻線\(glass eel\)耳石日周輪電子顯微鏡照片](#)
作者: Cheng, PW; Tzeng, WN
日期: 2012-05-04

 標題: [Otolith microstructure and daily age of *Anguilla japonica*. Temminck & Schlegel elvers from the estuaries of Taiwan with reference to unit stock and larval migration](#)
作者: Tsai, WN
日期: 2012-04-30

 標題: [日本鰻鰻線\(glass eel\)耳石日周輪電子顯微鏡照片](#)
作者: Tzeng, WN
日期: 2012-04-30

社群

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Conclusions

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- Conduct requirement survey carefully
- Promote concept of e-Research
- Start from institutional repository to data curation
- Enhance interactivity among researchers and data
- Educate supporting staffs for data curation
- Develop flexible data curation system
- Persuade decision-makers and collect money



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Thank You



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