

Comparative Evaluation of Major IR Systems for Preservation

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Outline

- Introduction
- Evaluation criteria
- Comparative Evaluation of Major IR Systems for Preservation
- Future work



Introduction

- Major open source IR systems (Fedora, DSpace, EPrints, Greenstone, etc) are used widely at home and abroad at present.
- Many institutions plan to build or are building digital preservation systems based on open source IR systems too.
- IR systems are different...
- How to make a choice?



Major Open Source IR Systems

- Fedora
- DSpace
- Eprints
- Greenstone
- aDORe
- DAITSS
-



Evaluation criteria

- OAIS mapping
 - functional model, information model*
- Preservation metadata
 - *PREMIS,...*
- Identifier
- Trust
 - Integrity, Authenticity...



Evaluation criteria

- Complex object and Versioning
- Packaging format
 - METS, MPEG21 DIDL...
- Ingest and export data
- Interoperability
 - OAI-PMH, OpenURL...
- Extensibility

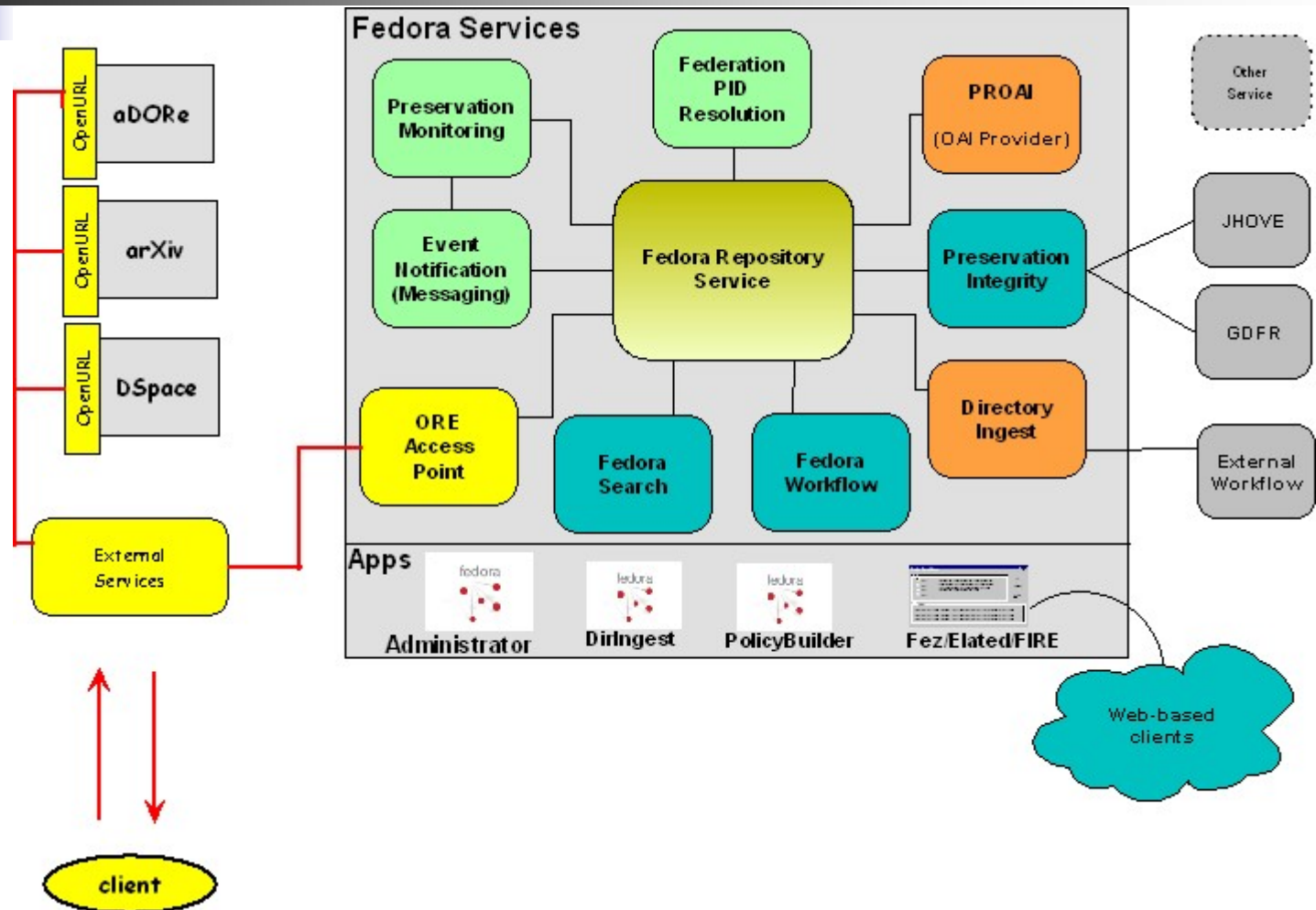


Comparative Evaluation of Major IR Systems for Preservation

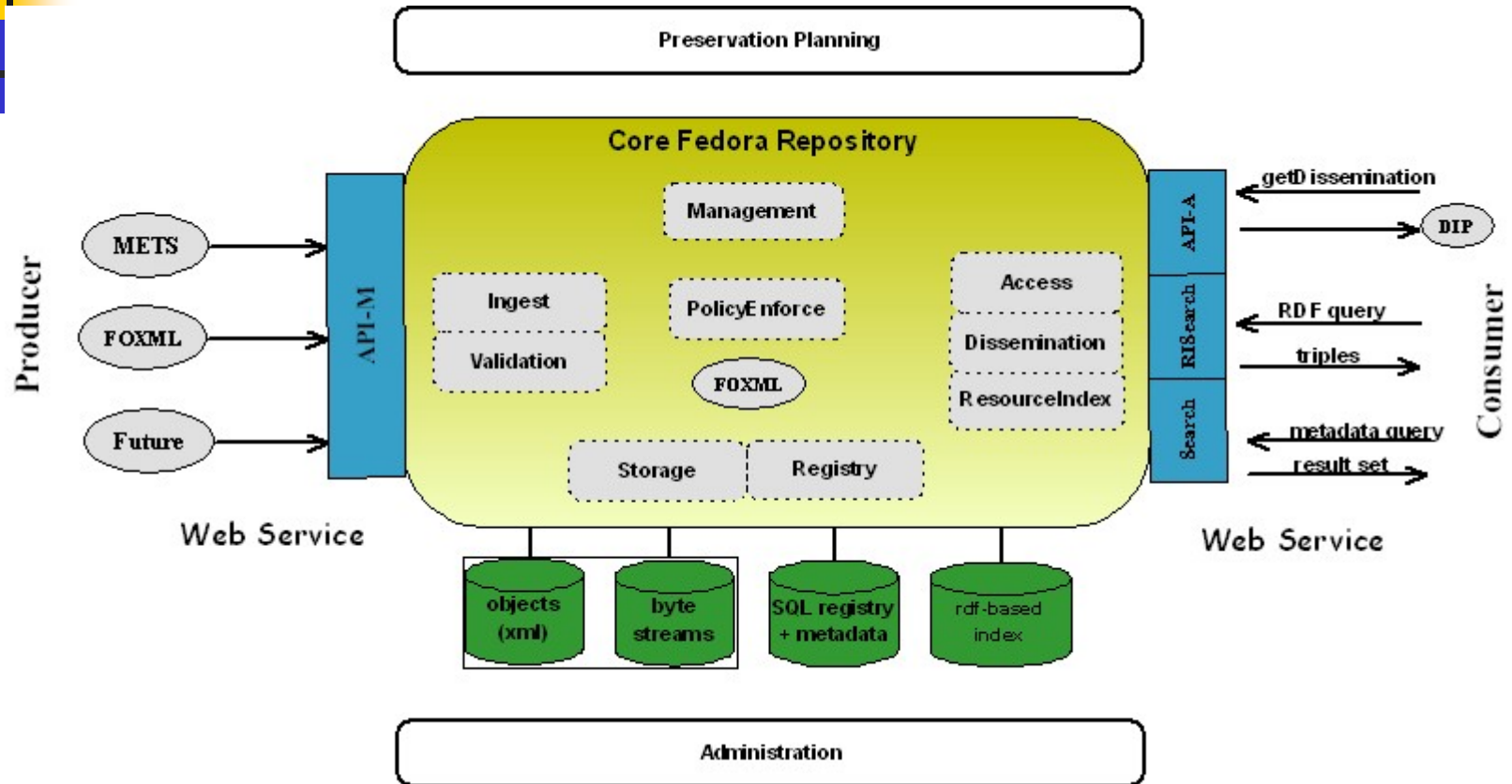
The latest version of the following:

- Fedora (2.2.1)
- DSpace (1.4.2)
- Eprints (3, briefly)

Fedora service framework



Fedora — OAIS mapping



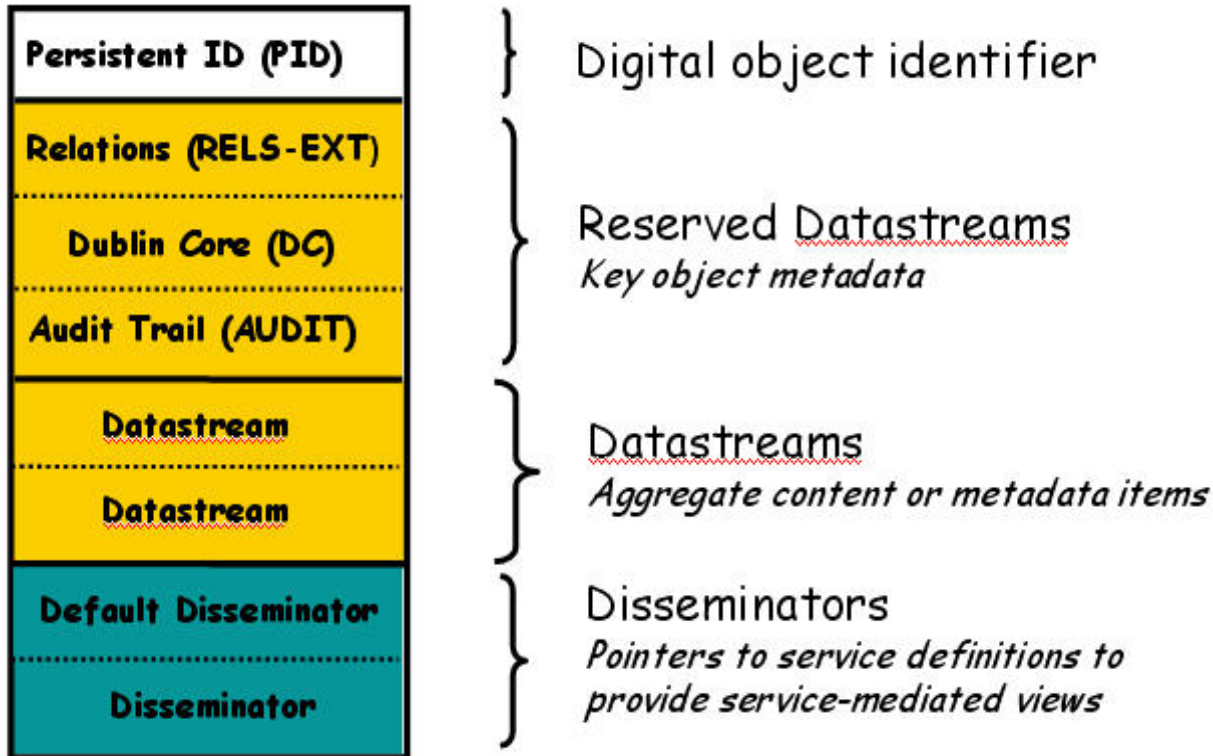
Coming from:

<http://www.fedora.info/download/2.2.1/userdocs/server/features/serviceframework.htm>



Fedora Digital Object Model

Container View





Fedora — Information Model

Preservation Description informaton:

- Reference informaton: PID, a persistent, unique identifier for the object
- Context informaton: Relations: RELS-EXT
- Provenance information: Audit Trail
- Fixity information: checksums

Packaging information:

- FOXML, METS



Fedora — Information packages

- SIP

FOXML, METS, and more in the future (MEPG21 DIDL)

- AIP

FOXML

- DIP

FOXML, METS , and more in the future (MEPG21 DIDL)



Fedora

- Preservation metadata
 - *PREMIS* (event management)
- Identifier
 - PIDS and Fedora URIs
- Trust
 - Integrity, Authenticity: checksum, audit trail, versioning, content model and object format validation (**active**), event management (**active**)

Working Group Preservation – FedoraWiki.

http://www.fedora.info/wiki/index.php/Working_Group:_Preservation

The logo consists of a vertical black line on the left, a horizontal black line below it, and three overlapping squares: a yellow one at the top left, a red one at the middle left, and a blue one at the bottom left. The word "Fedora" is written in a blue serif font to the right of the vertical line.

Fedora

- **Complex object and Versioning**
a generic digital object model, Content versioning
- **Packaging format**
FOXML, METS, and more in the future
- **Ingest and Export data**
FOXML, METS , and more in the future
- **XML Storage (FOXML)**

The logo graphic consists of a vertical black line on the left, a horizontal black line below it, and three overlapping squares: a yellow one at the top left, a red one at the middle left, and a blue one at the bottom left. The word "Fedora" is written in a blue serif font to the right of the vertical line.

Fedora

- **Interoperability**

OAI-PMH, SOA, web services

- **Extensibility**

SOA, Web Service Interfaces

- **Other**

Journaling - backup or mirror repository



Fedora – Our Practice

- Design and development of a massive digital resource management system (DRMS) based on Fedora 1.2
- Digital material: different types (ebook, e-journal, audio and video, etc), different metadata requirement, different index & search service



Fedora – Our Practice

- Our work
 - Cataloging and Preservation Toolkit
 - The virtual collection service
 - Index & search service
 - Interoperable service
 - Other service...
- Application: MathDL, MachDL...



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Digital Library on Chinese Mathematics



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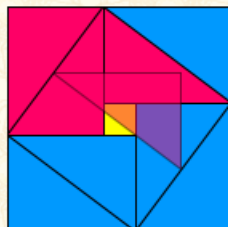
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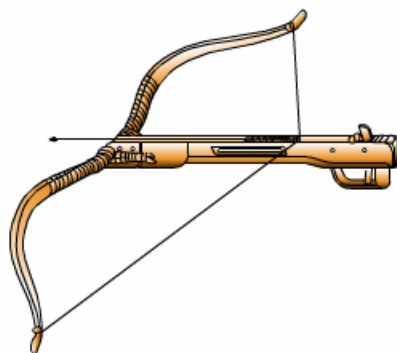
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人物专题



刘仙洲 (1890-1975)
河北完县人, 工程教育家, 机械工程专家



古代发明争鸣



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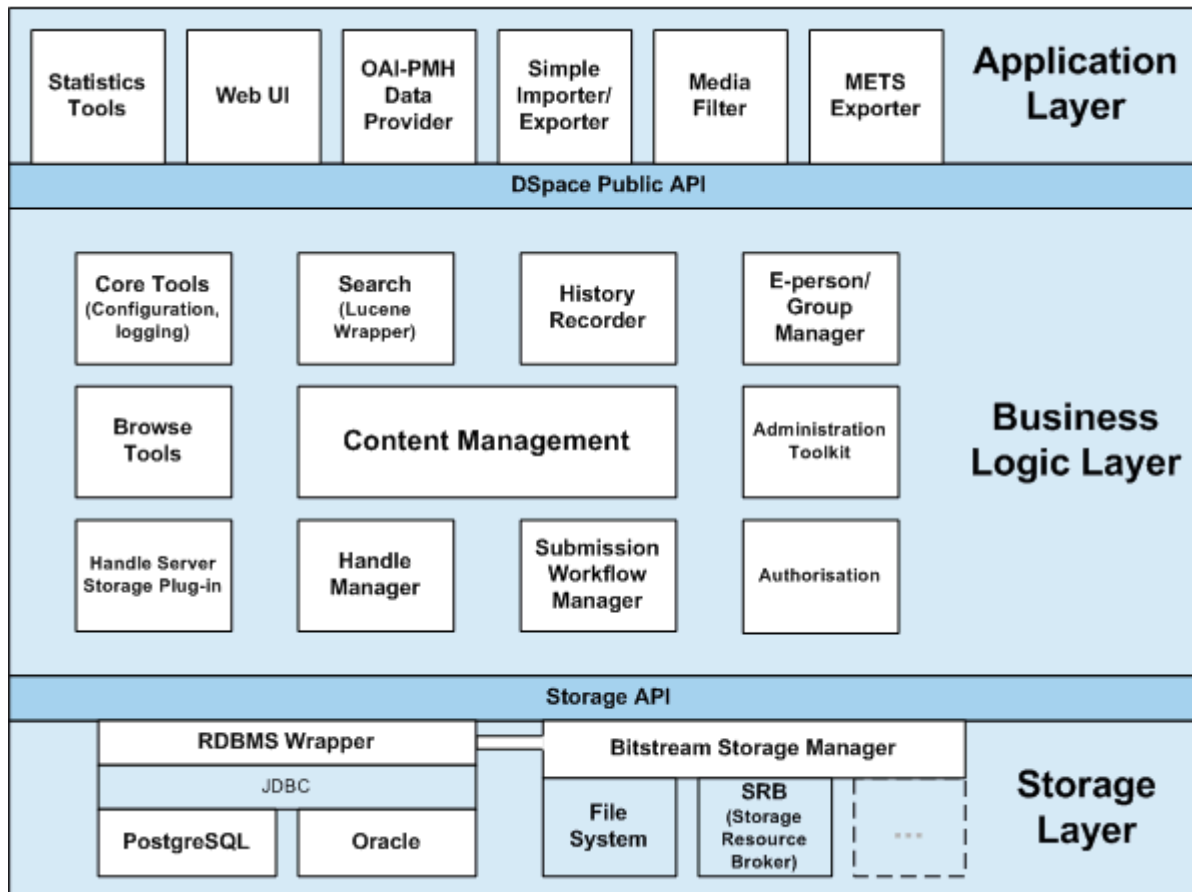
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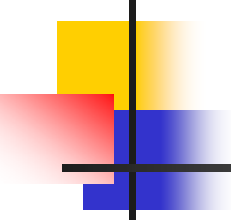


Fedora — our practice

- A universal way to handle complex object
- More scalable and flexible to do extensions on it.
- More IT professional requirements.

DSpace — System Architecture





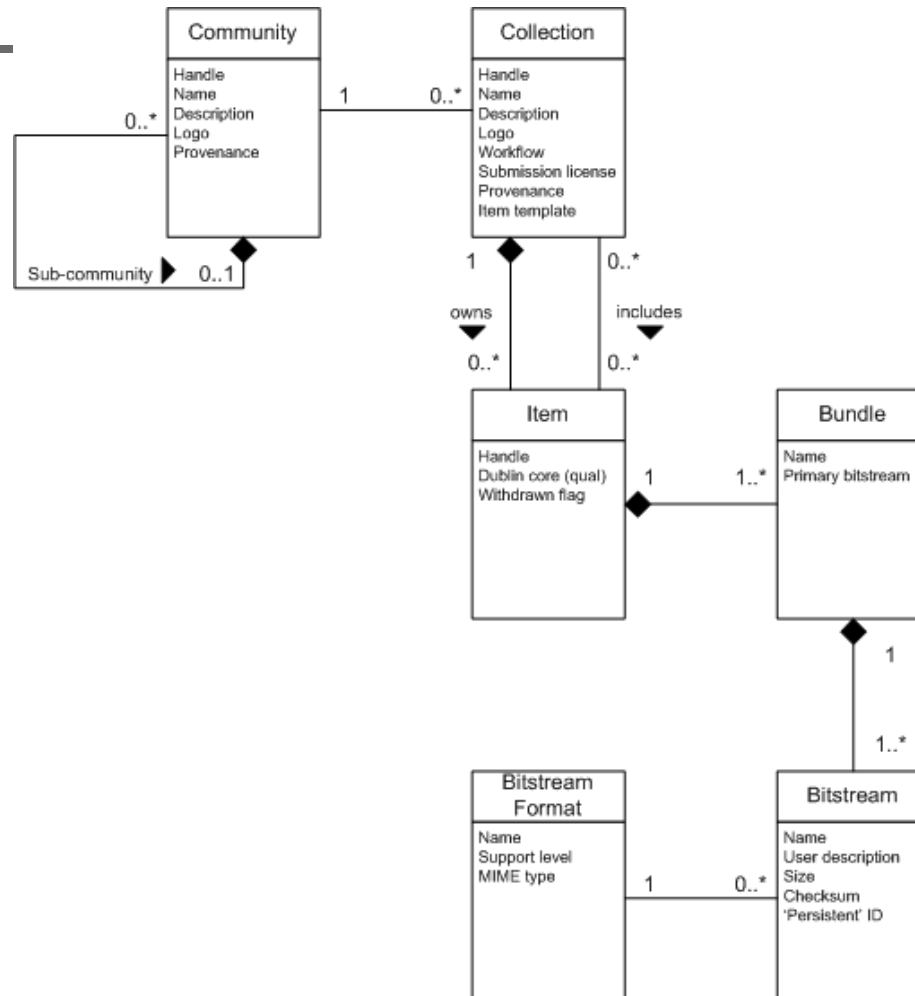
DSpace — OAIS mapping

(function model)

- **Ingest**
Web UI, batch import (workflow)
- **data management**
RDBMS: E-people, Authorisation, Authentication, Metadata indices.
- **archival storage**
RDBMS+Bitstream Store (**active work on AIP and Asset Store**)
- **Access**
search and browse, OpenURL, RSS, OAI-PMH, batch export...
- **preservation planning, administrative and management roles** (**active work on policy system and history system**)

ECDL 2003, Robert Tansley, etc. DSpace as an Open Archival Information System: Current Status and Future Directions
From DSpace Wiki. <http://wiki.dspace.org/index.php/DevelopmentAreas>

DSpace — Data Model





DSpace — OAIIS mapping *(information model)*

- Content data object: Bitstream
- Representation information: Bitstream Format
- PDI
- Reference information: Handle as default AIP Identifiers and content information Identifiers, QDC
- Context information: Structural Metadata (Bundle), QDC
- Provenance information: Administrative Metadata, history system (**RDF data**)
- Fixity information: checksum
- Packaging information
 - AIP is currently a logical object that is located in DB tables and files.
(**active work on METS-based AIP**)
- AIC: community, collection



DSpace — Metadata

- Descriptive Metadata
 - QDC
- Administrative Metadata
 - preservation metadata, provenance and authorization policy data.
- Structural Metadata



DSpace — Identifier

- DSpace uses the CNRI Handle System for creating objects identifiers by default.
- Support Other identifier schemas (**active**)

Making identifiers 'pluggable' (Handles, ARKs...)

From DSpace Wiki. <http://wiki.dspace.org/index.php/DevelopmentAreas>



DSpace

- Trust

Integrity, Authenticity..., Checksum Checker, history system(**active**), event mechanism (**active**)

- Complex object and Versioning

no support yet (**active work on METS-based AIP, versioning support**)

- Packaging format

package plugins and Crosswalk plugins (**active work on METS-based AIP**)

- Ingest and export data

package plugins and Crosswalk plugins (DIM, METS)

From DSpace Wiki. <http://wiki.dspace.org/index.php/DevelopmentAreas>



DSpace — Interoperability

- Supports OAI-PMH Data Provider
- supports the OpenURL protocol from SFX, RSS
- SRU/W, Web Services (**active**)
- Other Network Interfaces (**active**)



DSpace — Extensibility

- Provides plugin manager
- Provides Content management API
- Modularity mechanism (**active**)
- AddOn mechanism (**active**)
- Extension framework (**discussion**)

From DSpace Wiki. <http://wiki.dspace.org/index.php/ArchReviewFrameworks>

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DSpace

- Preservation tools
 - TechMDExtractor (**awaiting integration**)
 - Workflow Pre-ingest Step (**awaiting integration**)
- Asset store
 - Standards-based AIP Storage layer for easier preservation (**active**)
- History system
 - ABC Harmony (**active**)
- Policy system (**active**)

From DSpace Wiki. <http://wiki.dspace.org/index.php/DevelopmentAreas>



DSpace – Our practice (1)

- E-journal digital preservation experiment based on DSpace 1.4:
- Type: IEEE database (CD)
- Scope: from the beginning to the end of 2005
- Feather: simple digital object (per article=one pdf file)
- Quantity: over 1,100,000 records
- Ingest Process:
 - Data check for viruses, integrity...
 - Verify format
 - Data analysis
 - Metadata extraction
 - Data prepare
 - Mass import



清華大學圖書館數字資源保存與管理平台

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DSpace – Our Practice

- Access
 - access control
- Some problems
 - Mass ingest
 - Index mechanism: performance
 - History system: record too much information in the DB
 - Too many database access
 - Local development and upgrade



DSpace – Our Practice (2)

- Institutional Repository
- Phase one: the construction of OAPS (Outstanding Academic Papers by Students) database based on DSpace 1.3.2.
- Type: Final Year Project report, Course report, SRT report,...
- Scope: 2005, 2006, 2007
- Feather: simple digital object
- Ingest Process:
 - Data check for viruses, integrity...
 - Data analysis
 - Metadata extraction
 - File normalization
 - Data prepare
 - Mass import or Web UI submit
- Access
 - access control



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Eprints

- repository functions of ingest, data management and dissemination
- Preservation Support in EPrints 3
 - Complex-Object Export: METS and DIDL plugins
 - History Module
 - Preservation Rights Declaration



Eprints

- Two related JISC-funded projects
 - PRESERV (PReservation Eprint SERVICES)
 - SHERPA Digital Preservation: Creating a Persistent Preservation Environment for Institutional Repositories
- The basic idea
 - Digital Preservation Services for Institutional Repositories can be provided by the third party.



Summary

- Fedora has better support for complex object and versioning at present.
- Fedora is more scalable and flexible to do extensions on it. But it requires more IT professional expertise.
- DSpace is actively exploiting some digital preservation R&D work.
- Fedora is a toolkit, and DSpace is an out of the box application. But they are learning from each other at present.



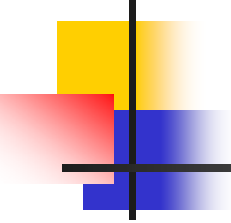
Some observations

- IR systems are developing continually, including some digital preservation R&D work.
- Some preservation features can be built into IR system, some through external services or extensions.
- digital preservation is complex and context related, local development or integration work is necessary, so interoperability and extensibility are important for IR systems.



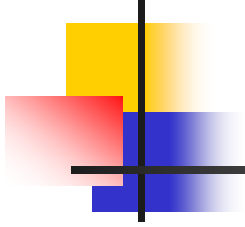
Future work

- Perfect the evaluation criteria
- Improve the evaluation methodology
criteria and weight, survey and experiment
- Comprehensive evaluation of repository software for preservation
fairly basic at present
- Guides for repository software selection and use



If you have any suggestions or questions, please contact us:

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- Dong Li, dongli@lib.tsinghua.edu.cn



Thank You!