



Cultural, Artistic and Scientific knowledge
for Preservation, Access and Retrieval

Components for a Science Data Infrastructure – preservation and re-use of data

David Giaretta

← Alliance for Permanent Access →



The Consultative Committee for Space Data Systems



Information Society
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Cultural, Artistic and Scientific knowledge
for Preservation, Access and Retrieval

CASPAR Project

EU FP6 Integrated Project

Total spend approx. 16MEuro (8.8 MEuro from EU)



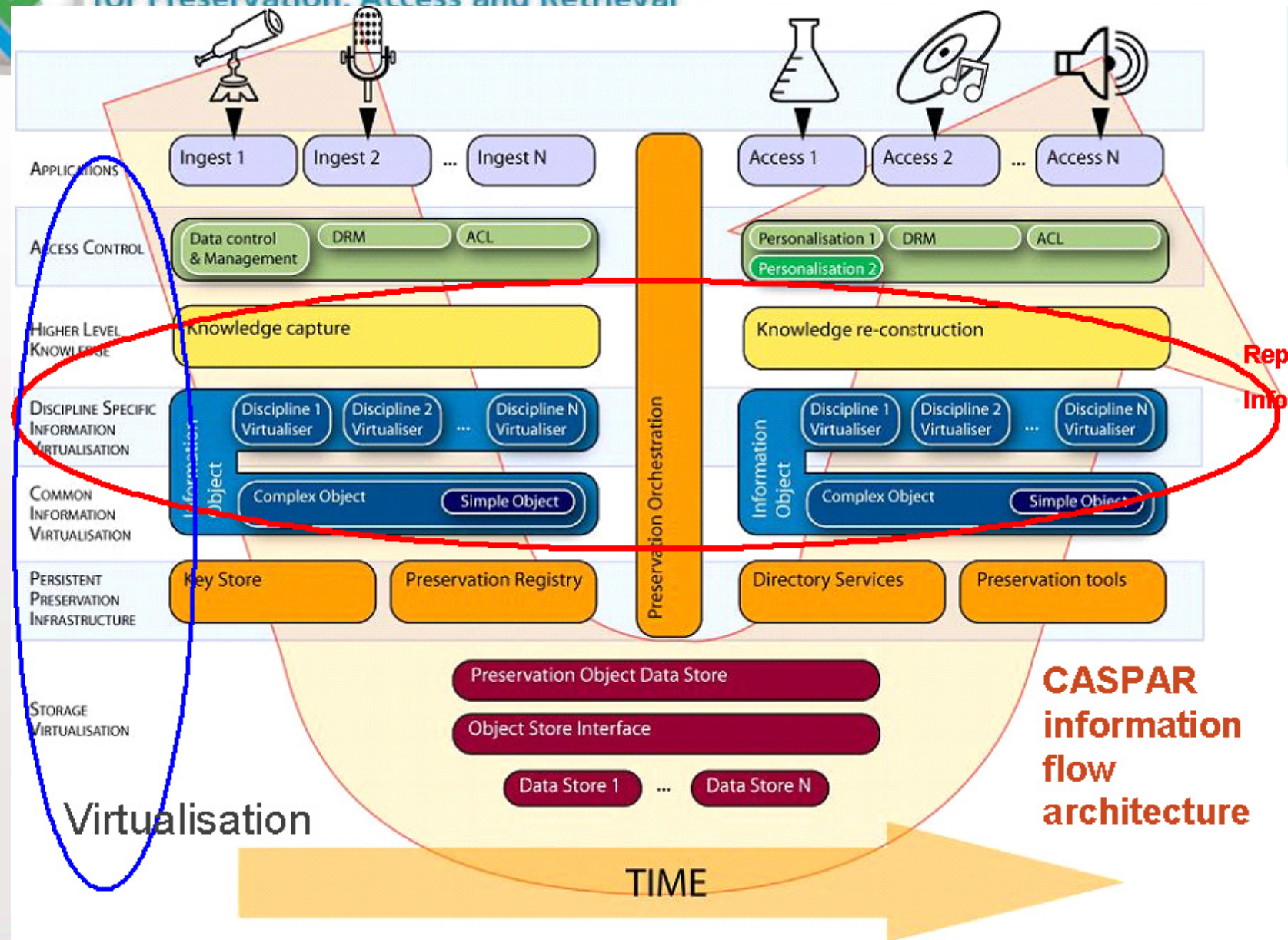
<http://www.casparpreserves.eu>



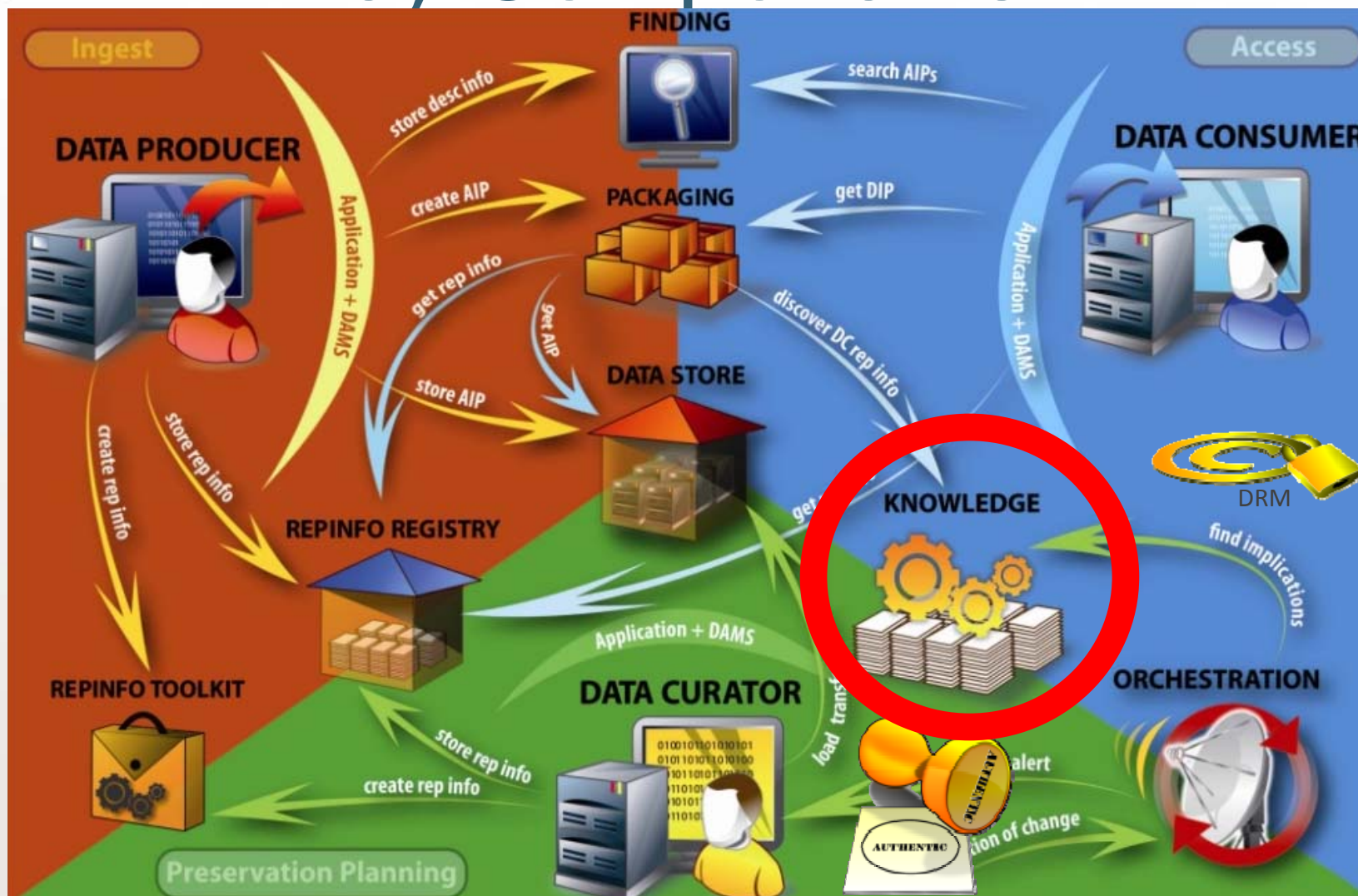




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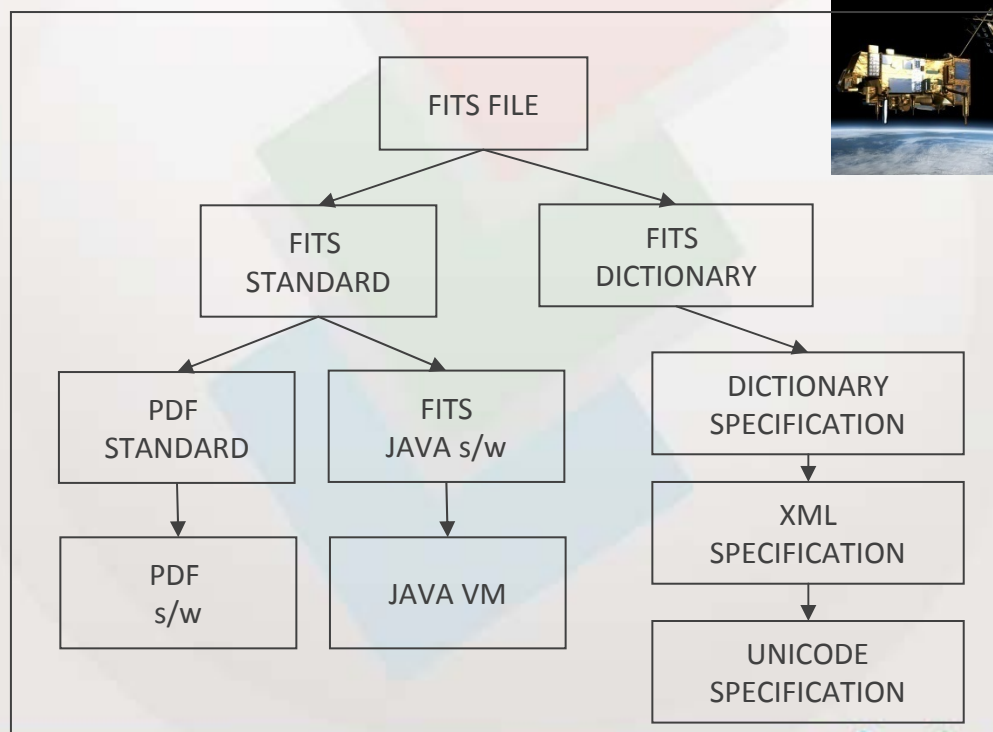
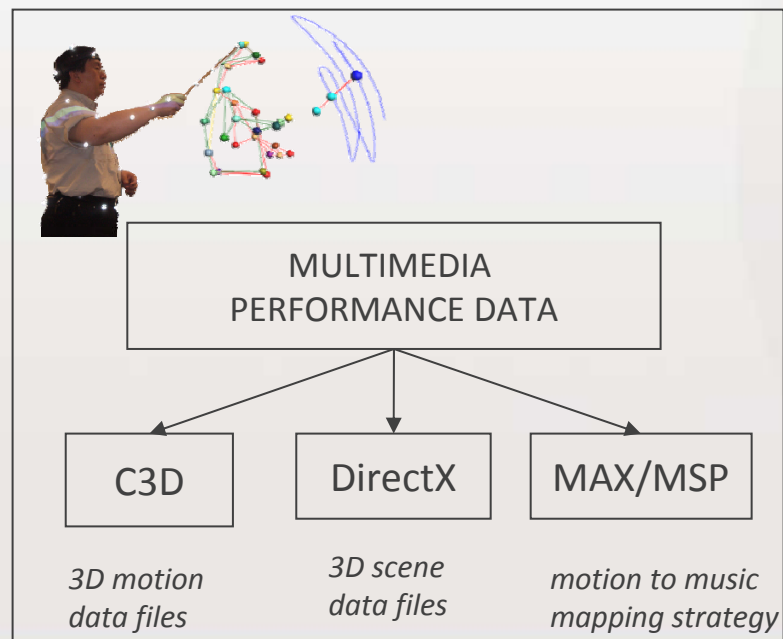
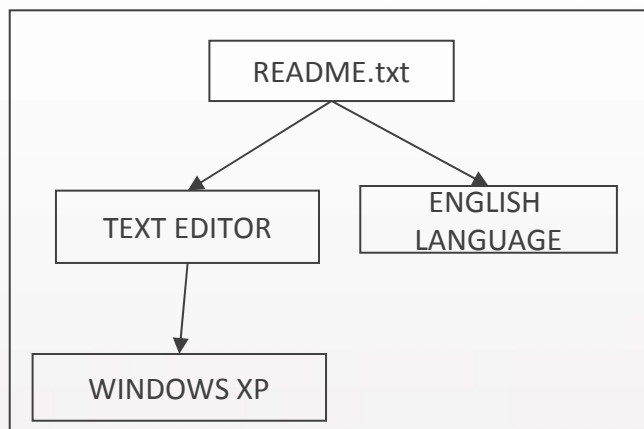


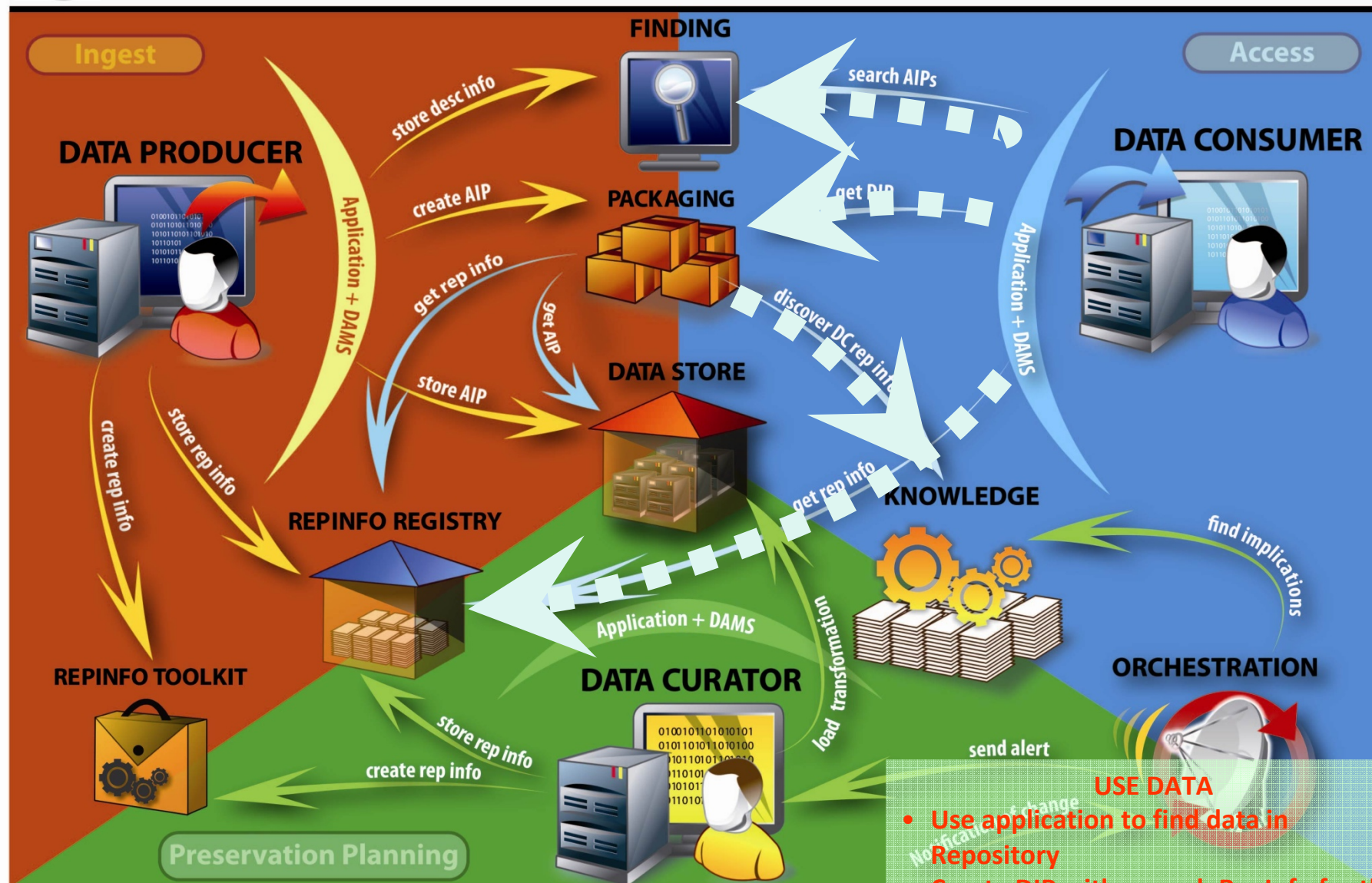
Key Components





Modules and Dependencies: defining the Designated Community





- USE DATA**
- Use application to find data in Repository
 - Create DIP with enough RepInfo for the user (via DC profile)
 - Obtain more RepInfo from Registry if necessary



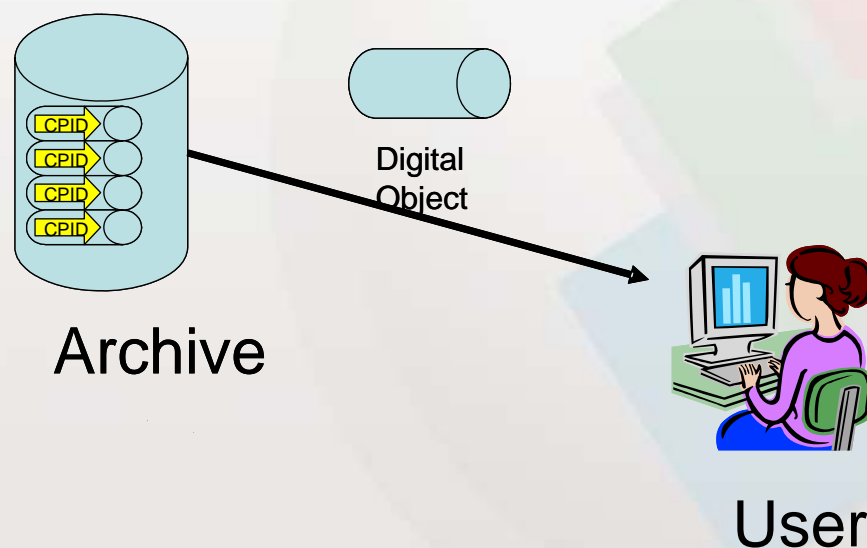
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Registry/Repository Scenario

User gets data
from archive.

User may be
unfamiliar with
the data so
needs
Representation
Information.
Some may be
packaged with
the data

The Digital Object
could
have some RepInfo
packed with it.

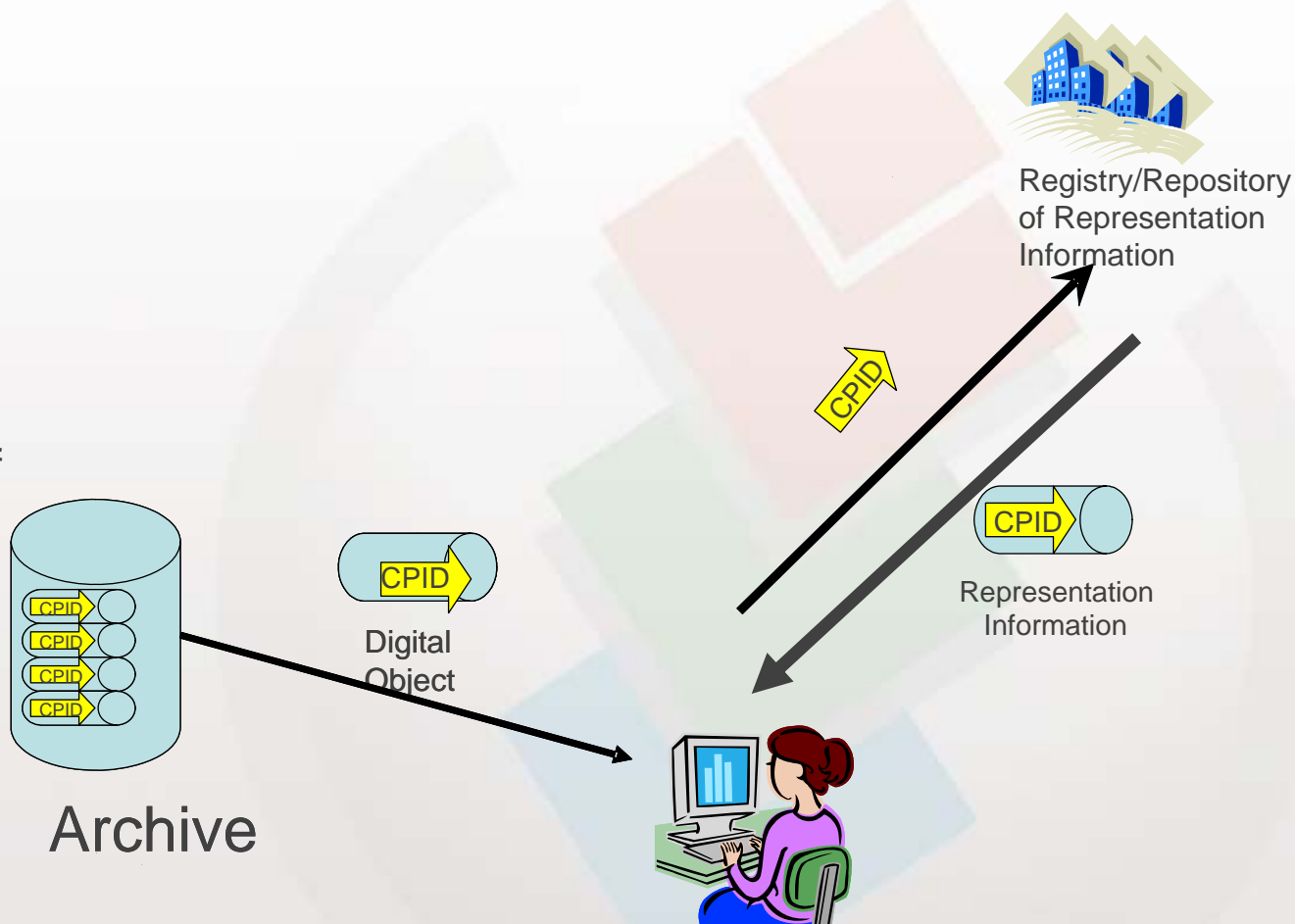




May need MORE
Representation
Information.

Obtain this from one
or more
Registry/Repository of
Rep.Info.

Do not want to
guess which
RepInfo is needed
– use an identifier
(CPID) associated
with the data





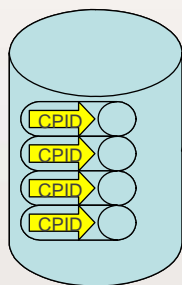
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At some point in the future there is a need for further Representation Information.



RepInfo
Toolkit

Someone creates the necessary RepInfo using whatever tools are appropriate.



Archive



Digital
Object

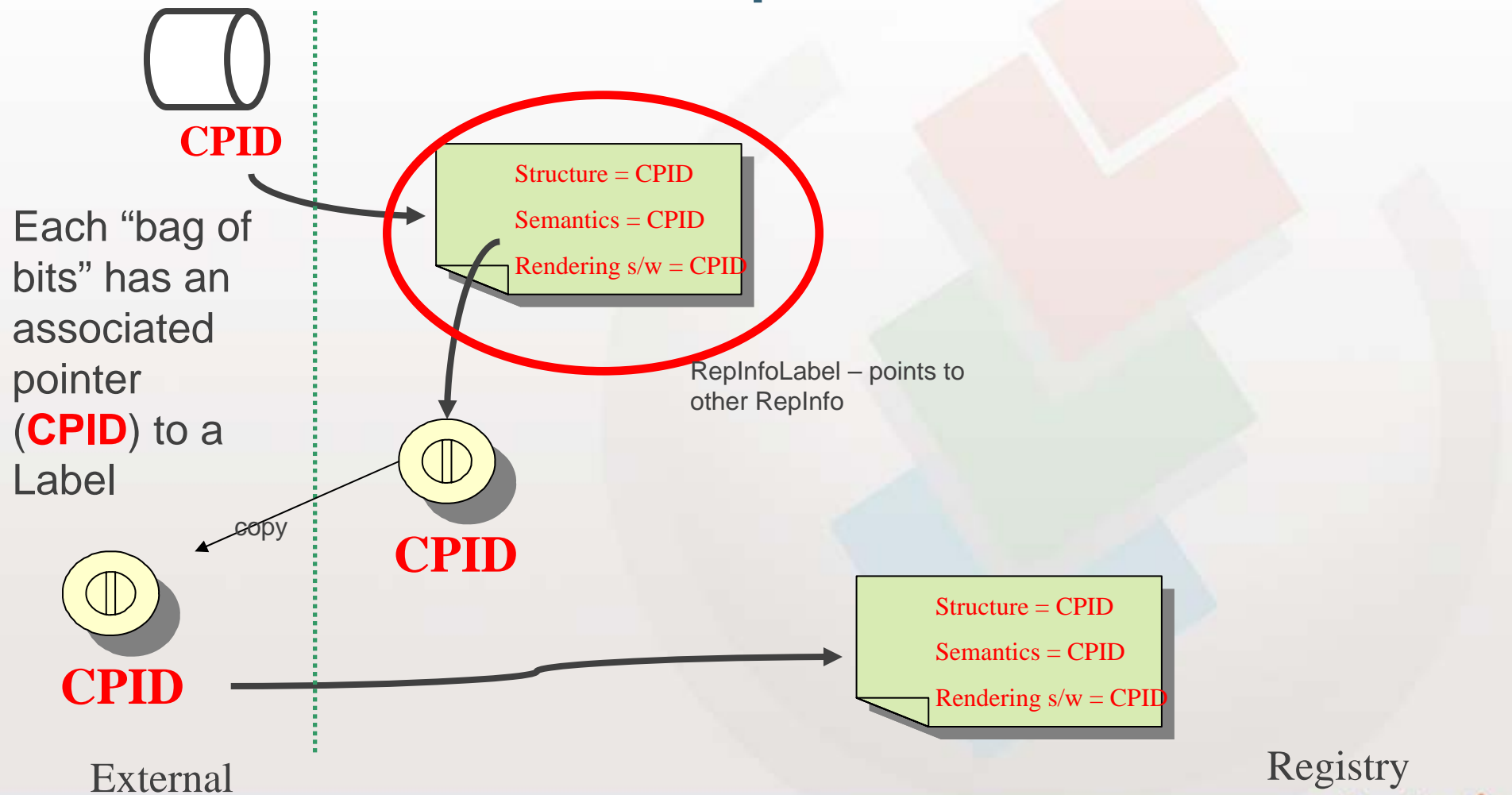


Registry/Repository
of Representation
Information



Representation
Information

Use of RepInfo





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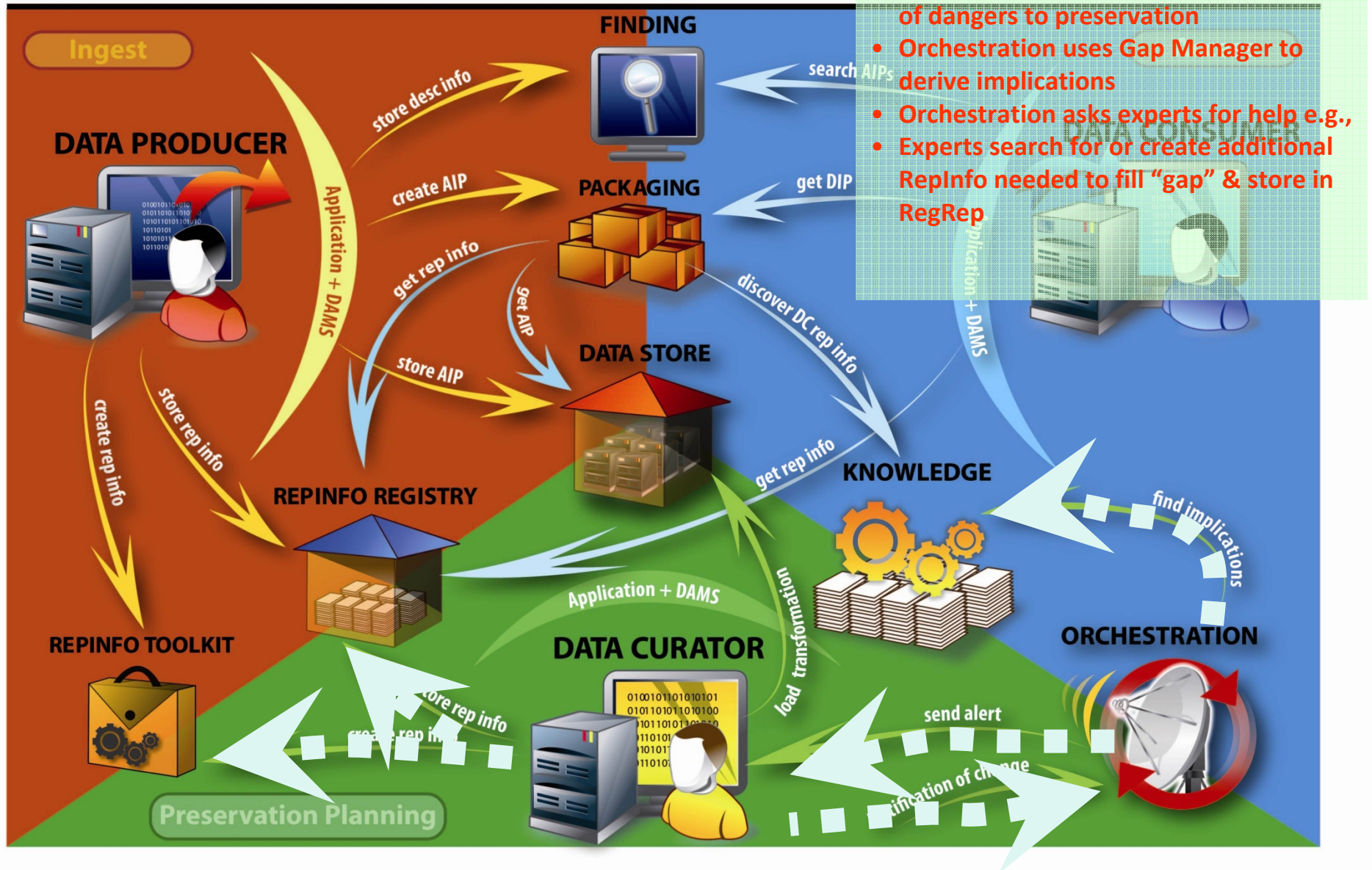


<http://www.youtube.com/watch?v=Yun9hkPPF9M>

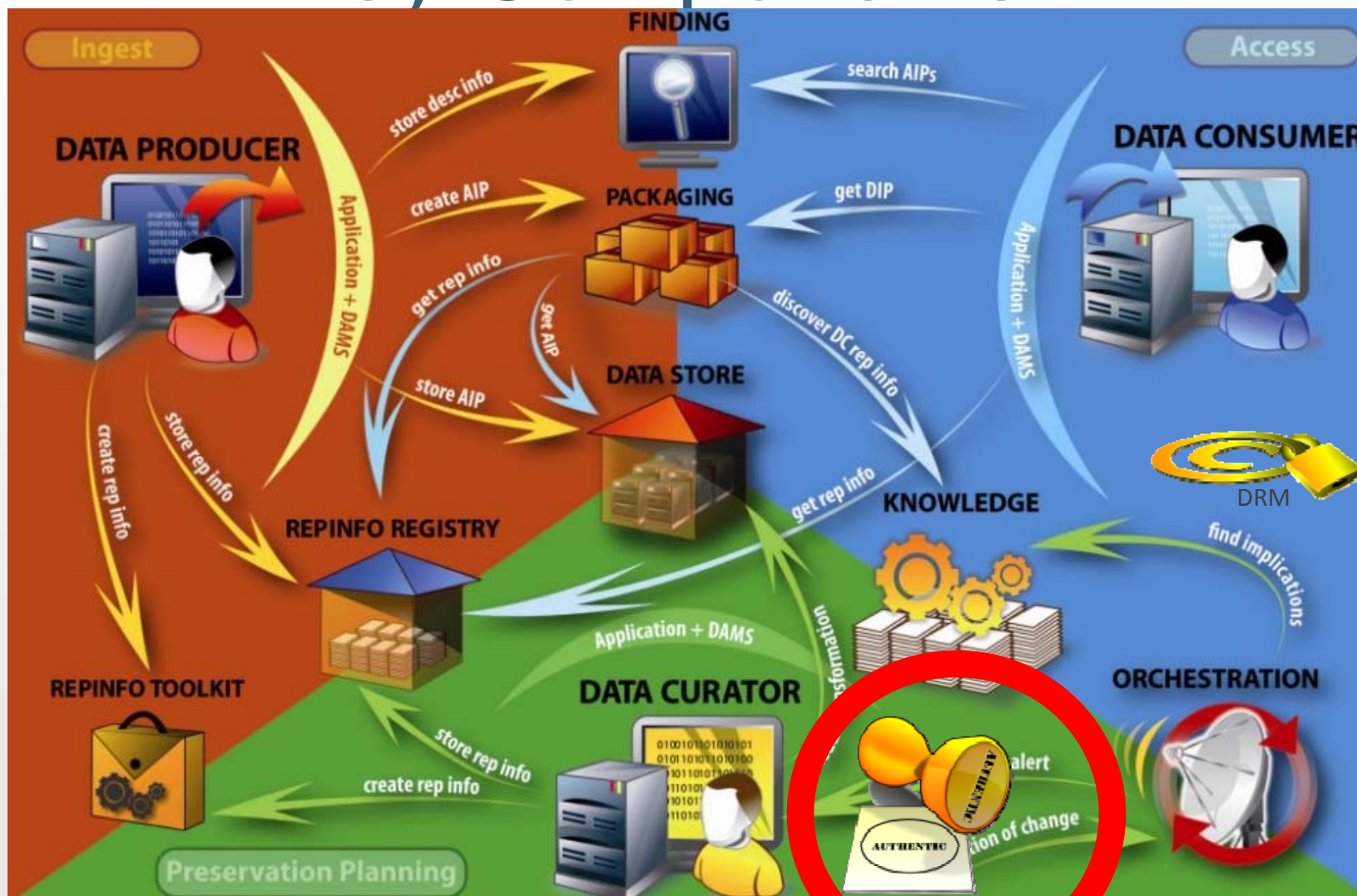


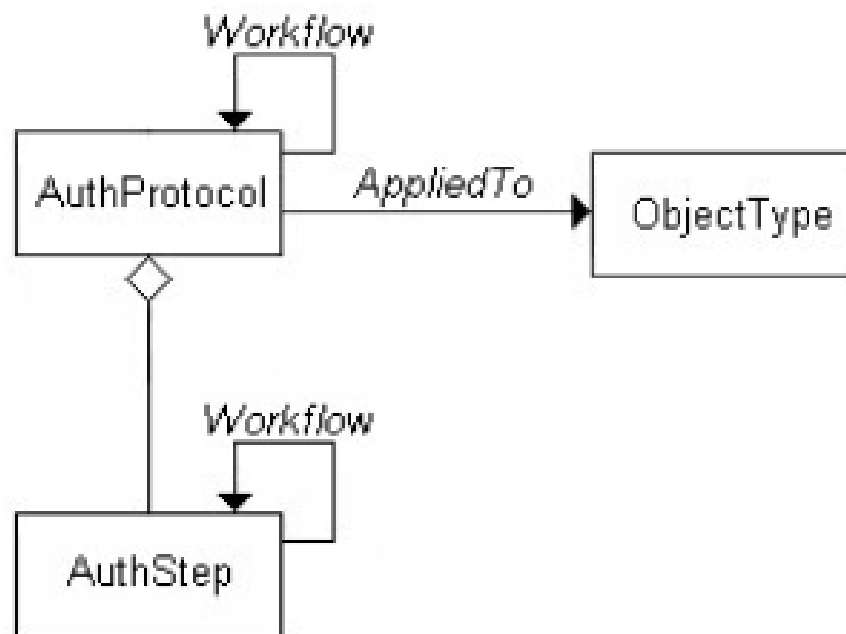
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and Media



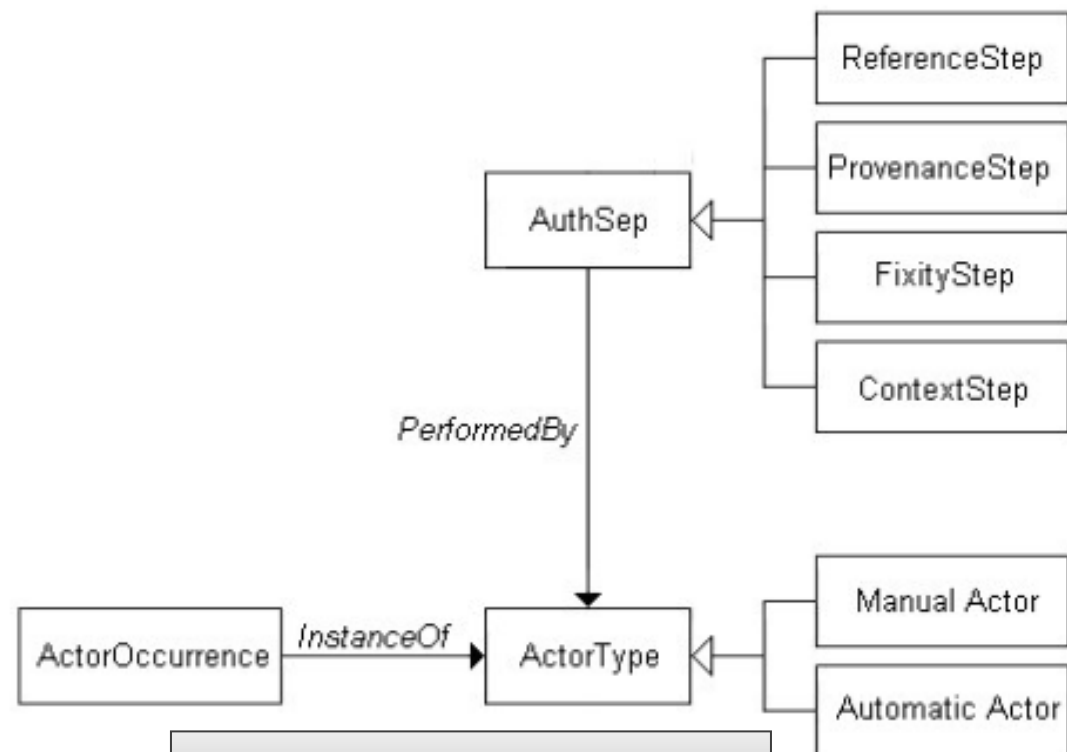


Key Components

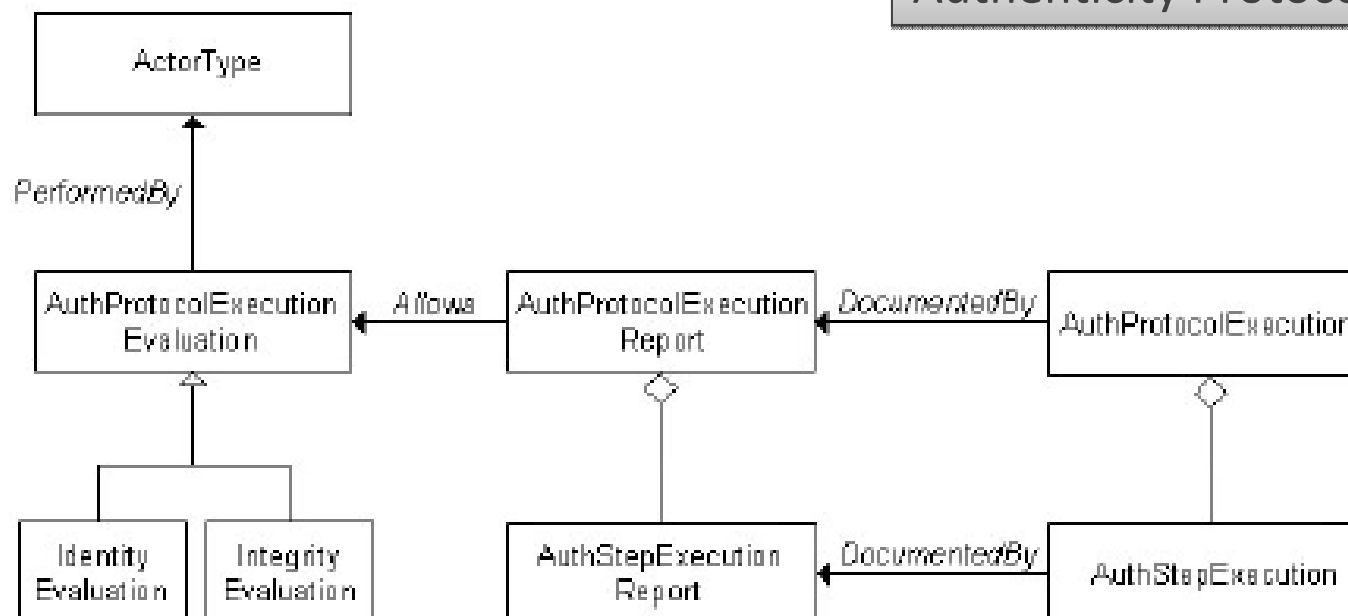
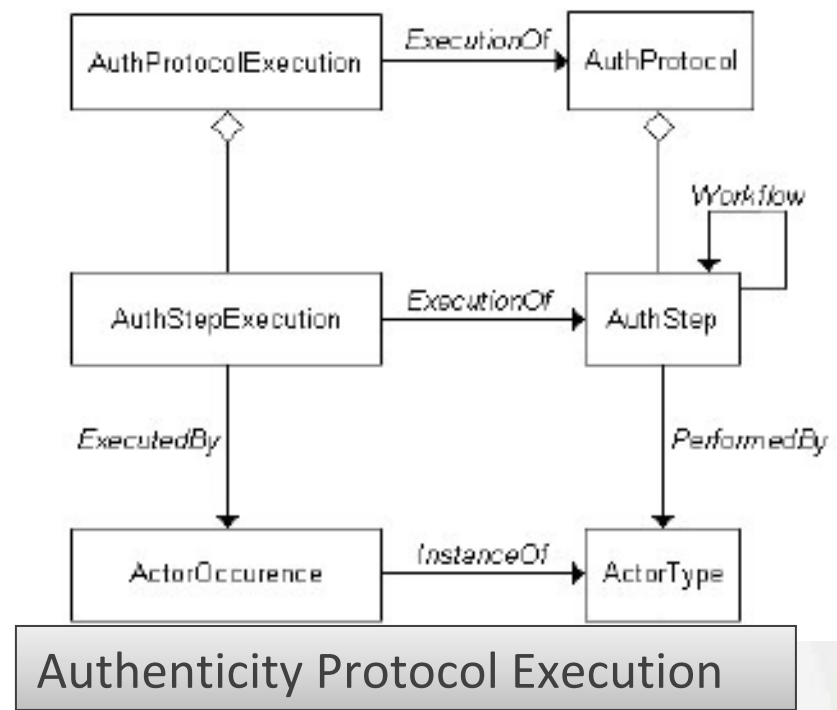




Authenticity Protocol



Authenticity Step





Being implemented by IBM – built into Preservation Data Store





Transformation Protocol

- Transformation of received data files into IIWG format
- Recommendation (Policy)

“For the received data file to be deemed as sufficient quality to support data analysis it must have been successfully transformed into standard IIWG data format, the use of processing software must be recorded”




- Steps will capture
 - Details of transformation used
 - Software details including name, version, source
 - Time/date of process
 - System details
 - Details of person responsible
 - Reason for believing this software is reliable
 - Details of Transformational Information Properties checked
 - Information Property descriptions
 - Values checked
 - Details of how checked
 - Details of who was responsible for the check



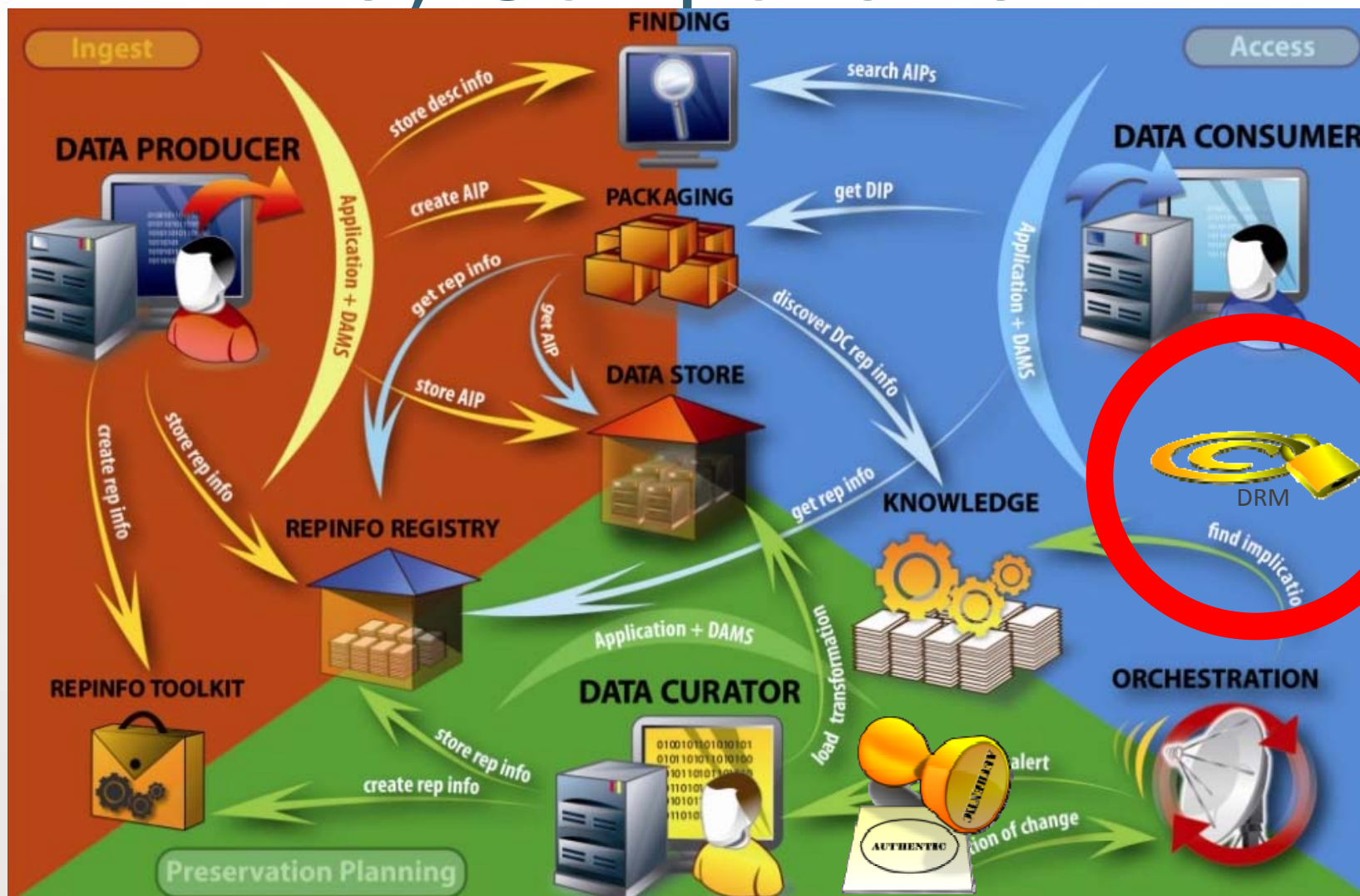
» Browse the Authenticity Catalogue

Select a Project:

Instance Name	Instance Created	Project Owner	Instance Status	View Capture
newInstance1	21-08-2009 12:08:08	Matt Dunckley		View
newInstance2	21-08-2009 12:08:54	Matt Dunckley		View

Protocol	Step	PDI	Value	Confidence
Ingestion	Source of dataset	Station ID	147 <i>Captured by: Matt Dunckley on 09-09-2009 15:09:36</i>	
		Station Location	BUDAPEST - HUNGARY Geographic Latitude (WGS-84) 47.00°N Geographic Longitude (WGS-84) 19.00°E Magnetic Latitude (IGRF-10(2005) 45.93°N Magnetic Longitude (IGRF-10(2005))	
		Station Name	BUDAPEST	
		Source ContactName		
		Instrument Name		
		Instrument		

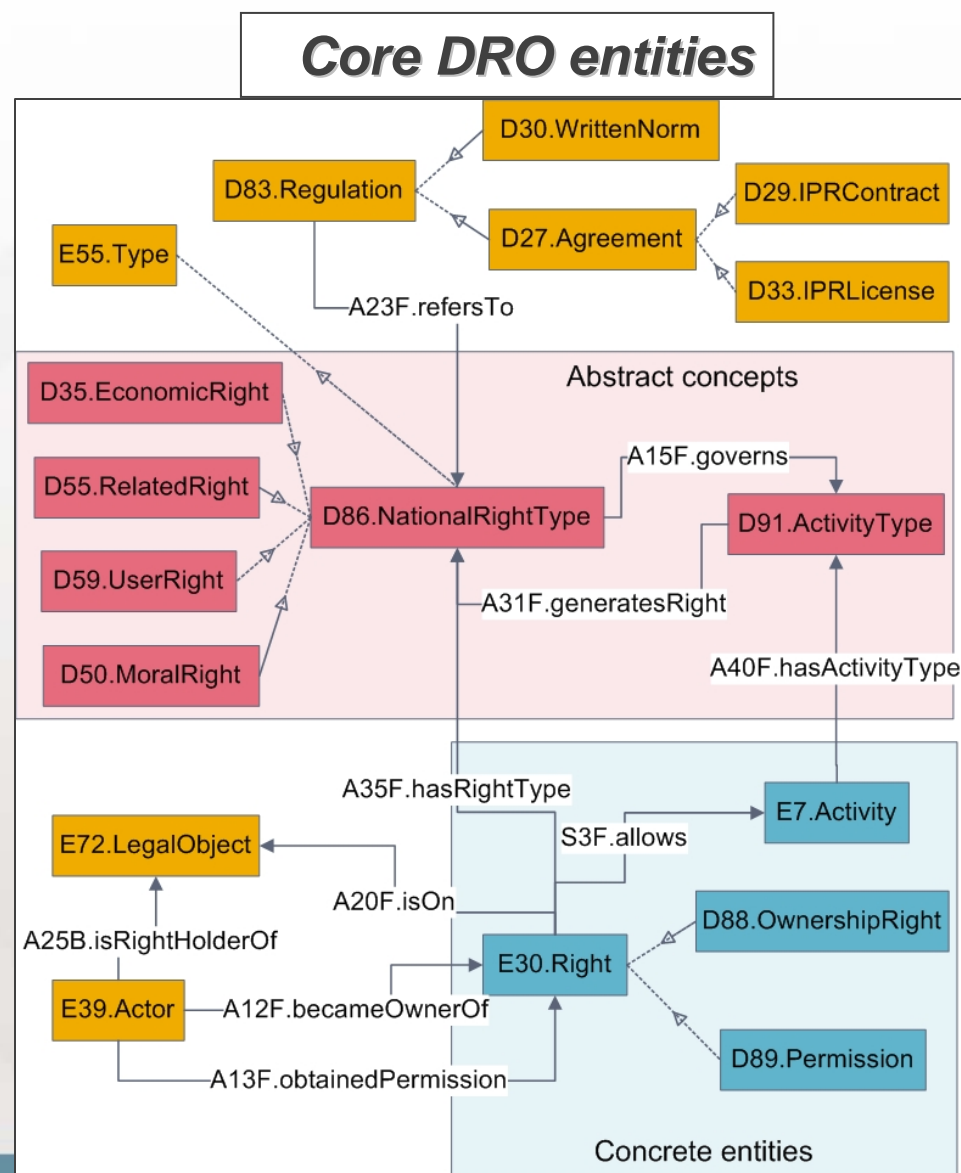
Key Components



Digital Rights Ontology

A Domain ontology

- *About Intellectual Property Rights*
- *To describe all aspects that are relevant to evaluate rights*
 - Attributes of rights
 - Validity in time and space
 - Laws and Agreements
 - People
 - Actions
 - Licenses
 - Constraints and Conditions
 - ...
- *Harmonized with CIDOC CRM and FRBRoo*



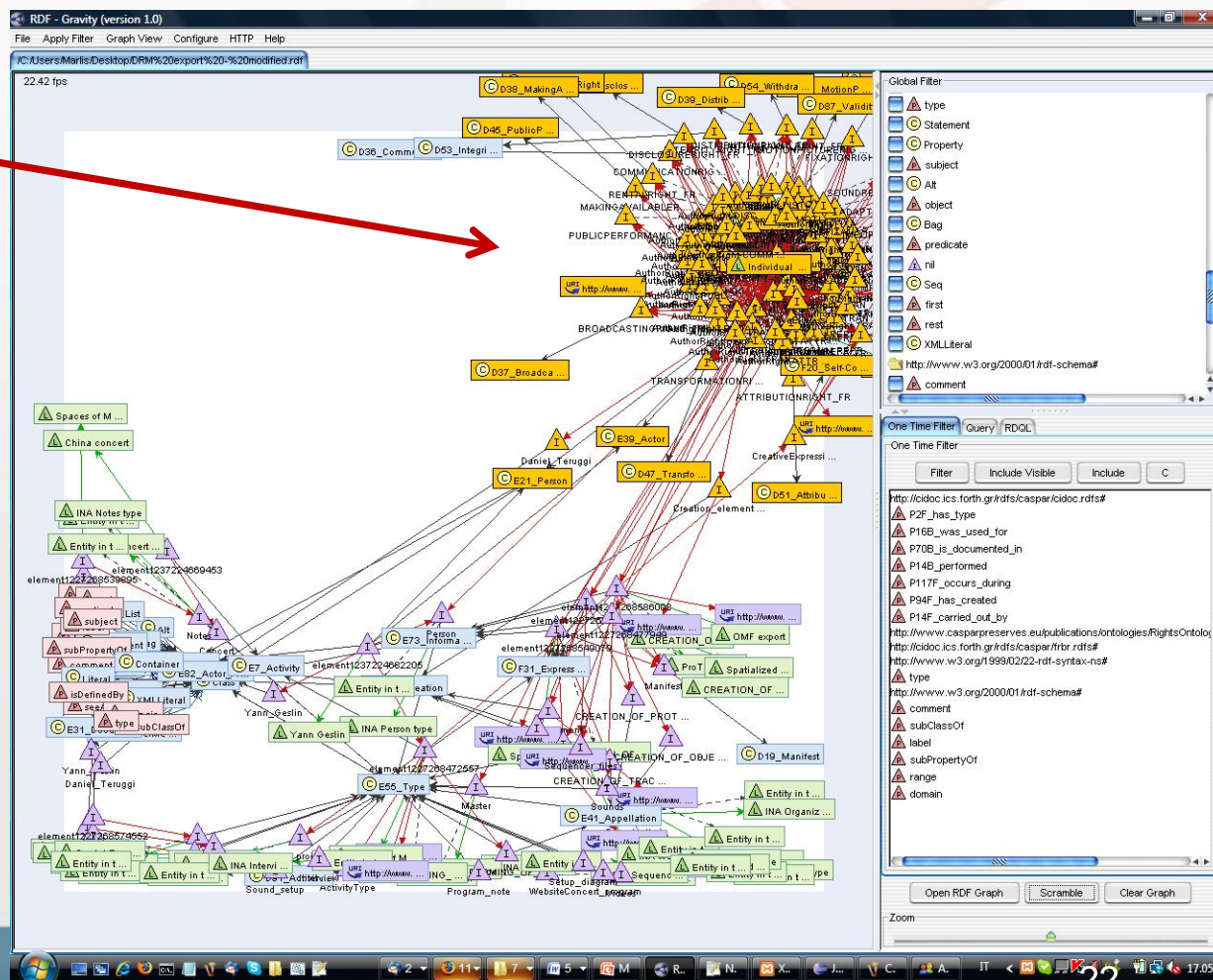


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Interoperable Provenance Information (1)

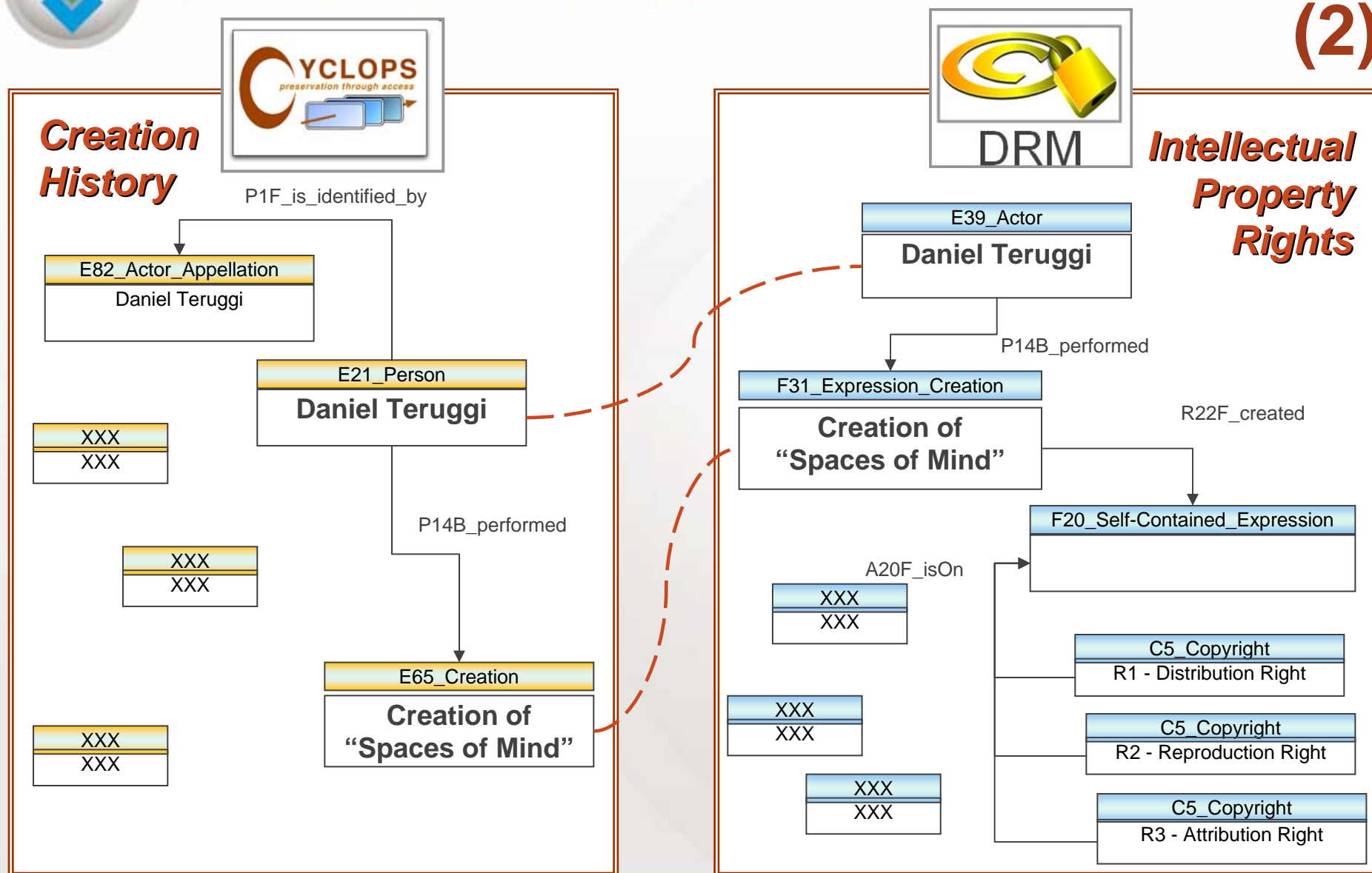
*Intellectual
Property Rights*

Life Cycle





Interoperable Provenance Information (2)





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Insight: stakeholders

Funding/policy

- National Funding organisations
- European funding
- Corporate funding



Research

- Research institutes (non-profit)
- Universities
- Academic libraries



Data management (preservation)

- Data centres (profit / non-profit)
- Libraries
- Archives



Publishing

- General (cross-community) publishers
- Specific (community) publishers



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Surveys to stakeholders

Funding/policy
< responses

Research
1397 responses

Data management
(preservation)
273 responses

Publishing
186 responses



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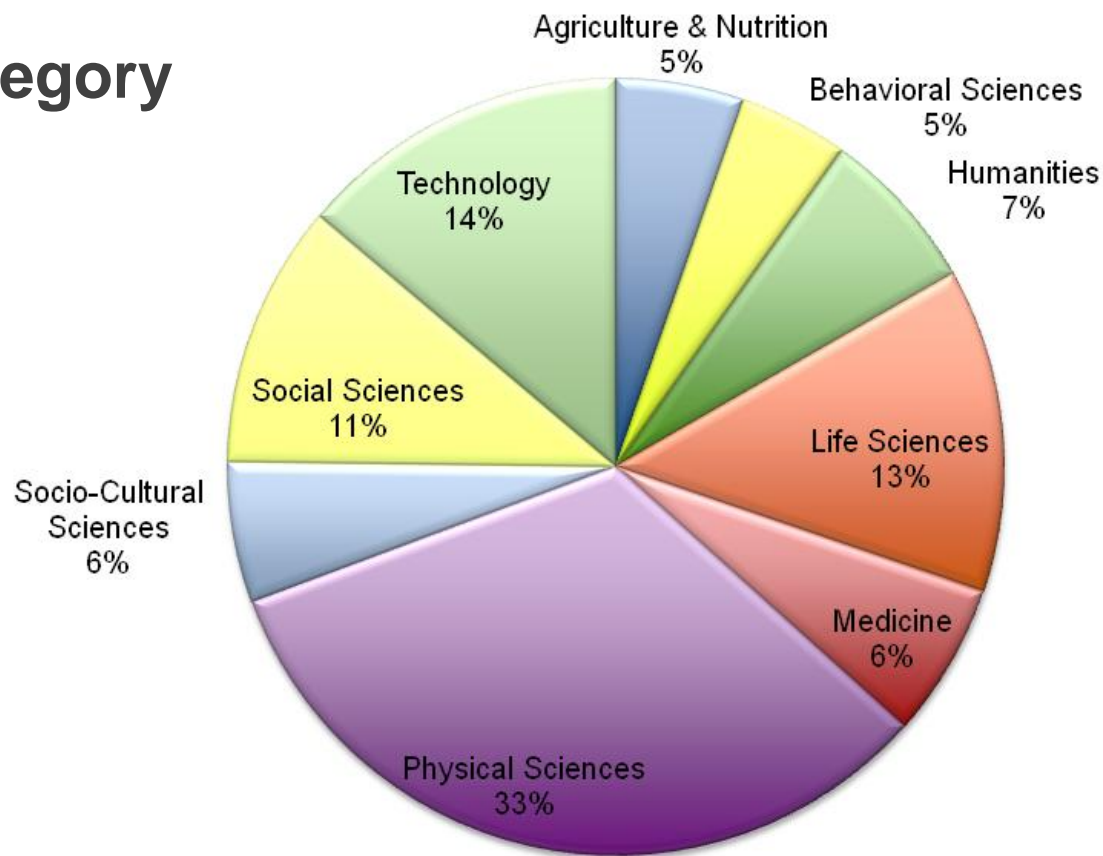




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About researchers

Per category



EU 44%, USA 33%, Other 23%



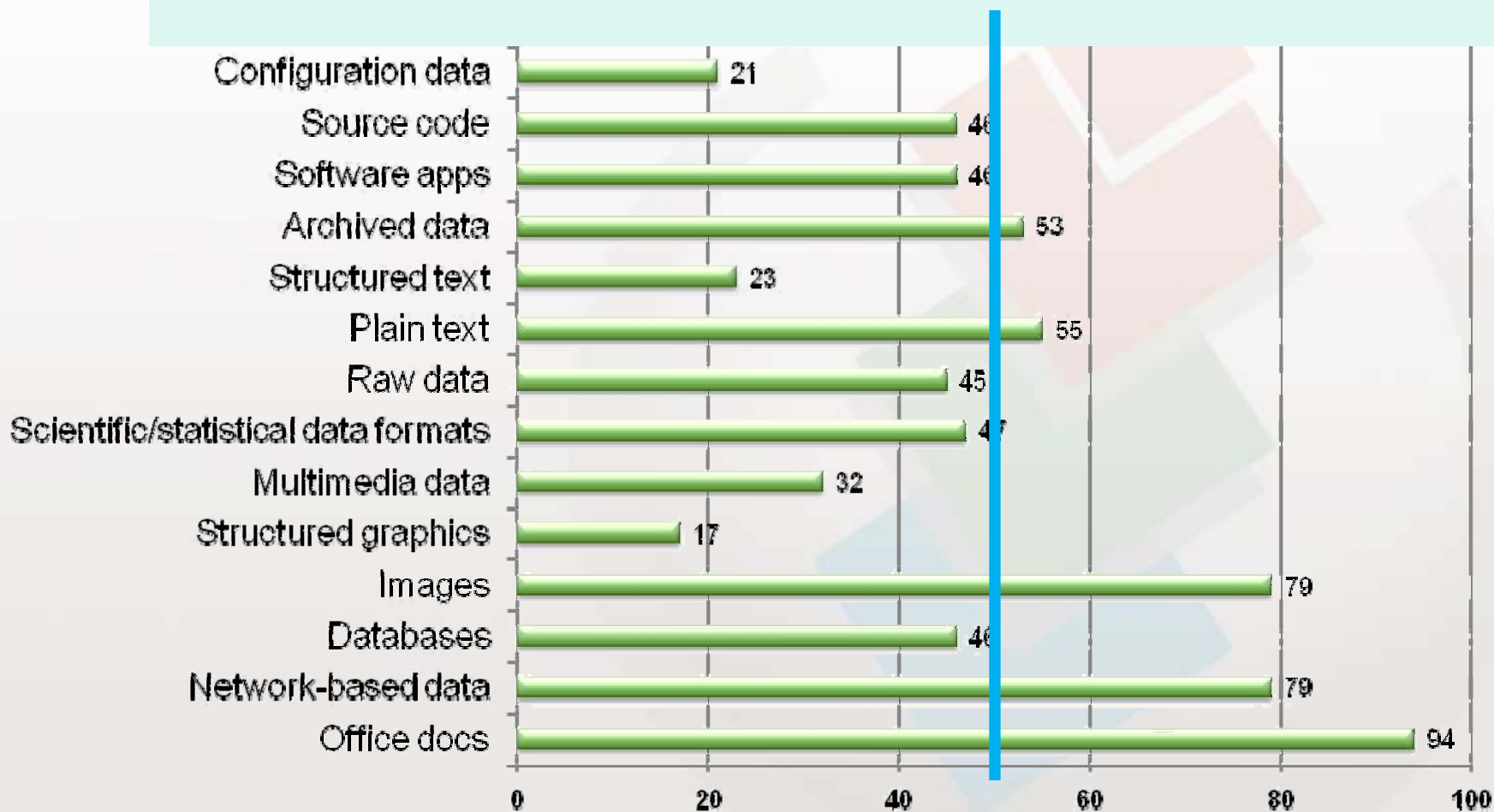
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Data spectrum (R)



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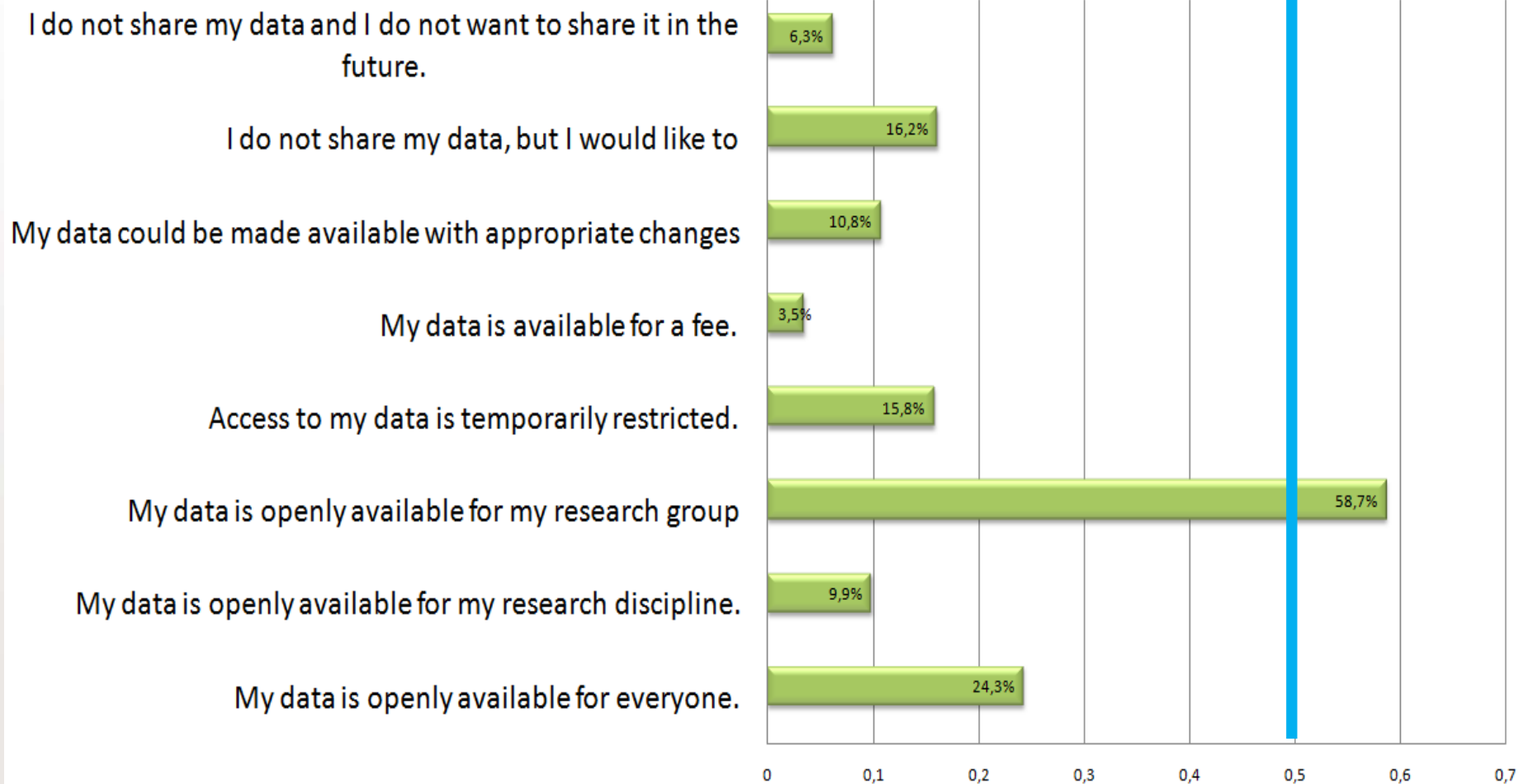




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Sharing of data (R)

How open is your data?

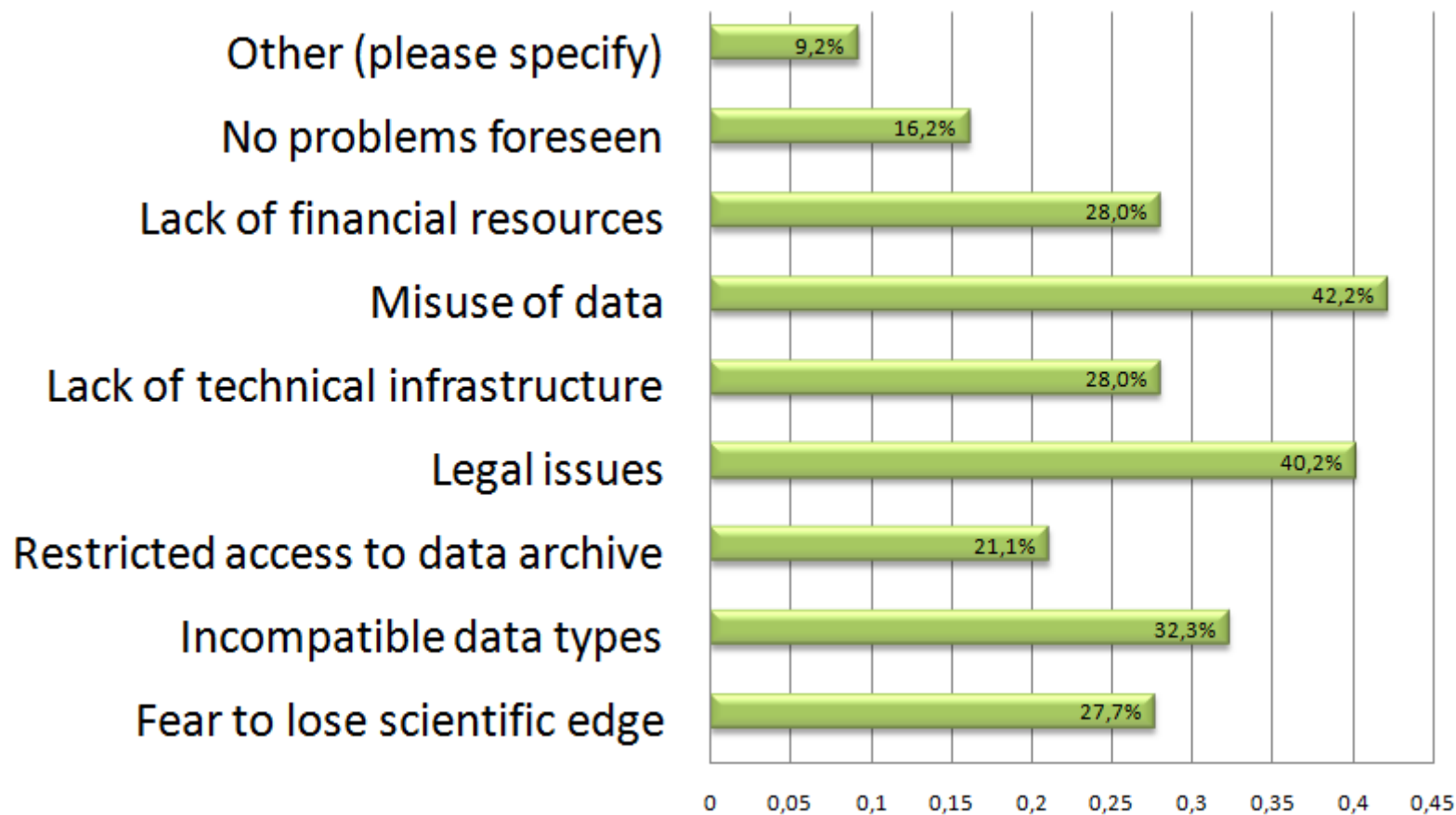




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Sharing of data (R)

Which constraints do you see in making data open?



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Threats to preservation (R)

The ones we trust to look after the digital holdings may let us down

The current custodian of the data may cease to exist

Loss of ability to identify the location of data

Access and use restrictions may not be respected in the future

Evidence may be lost

Lack of sustainable hardware/software

Users may be unable to understand or use the data



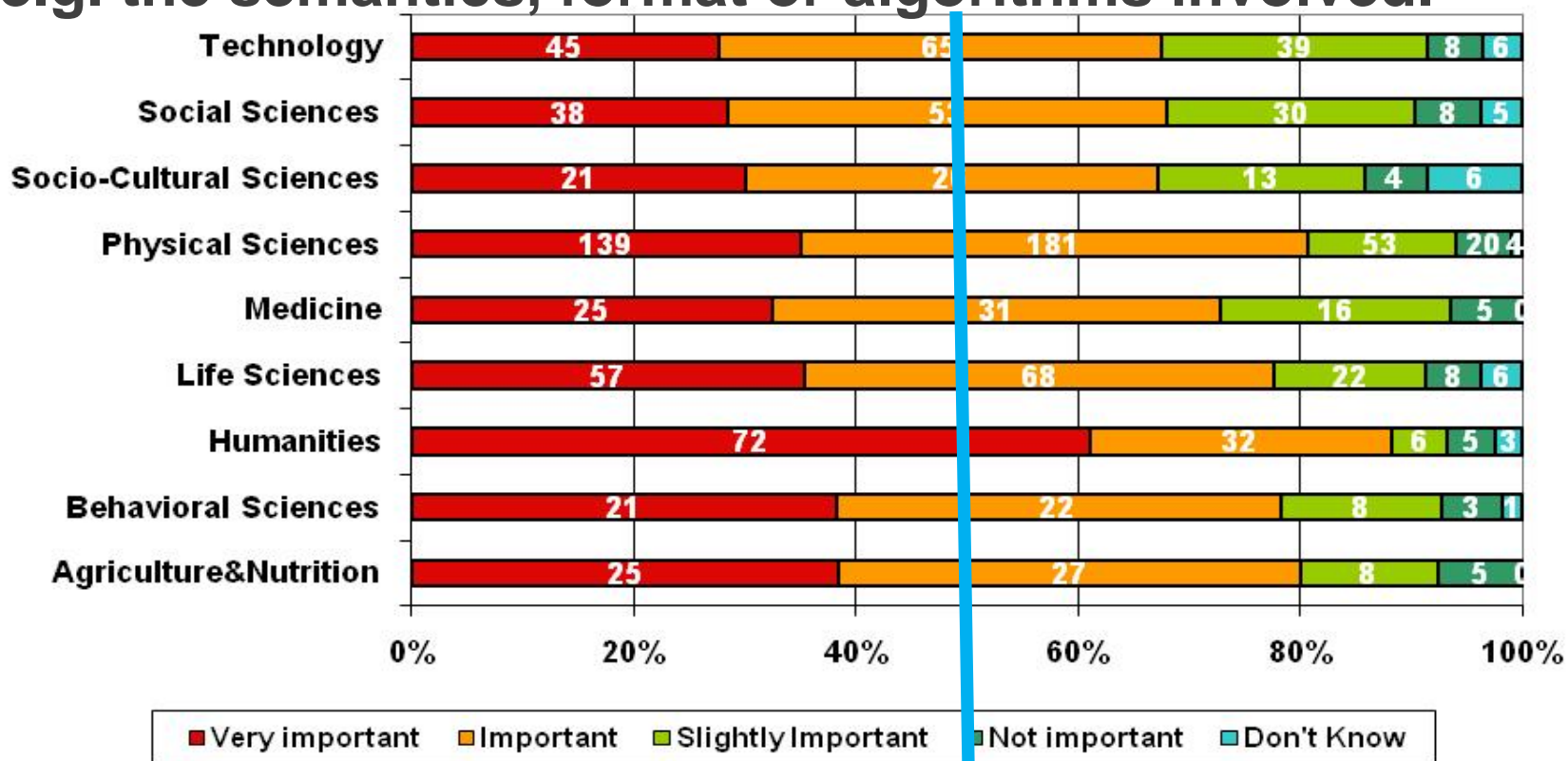
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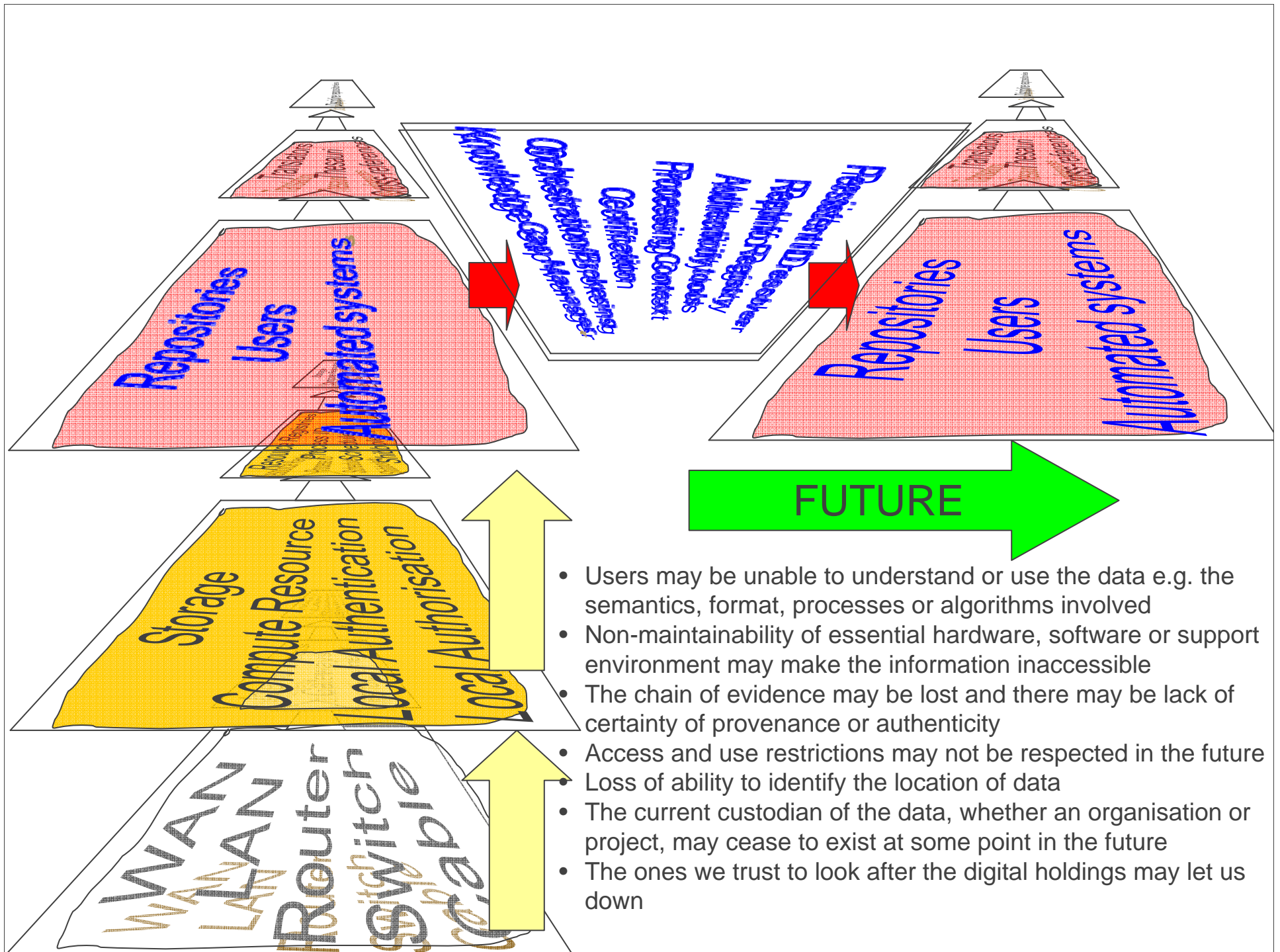


Threats to preservation (R)

Users may be unable to understand or use the data
e.g. the semantics, format or algorithms involved.



Threat	Requirement for solution
Users may be unable to understand or use the data e.g. the semantics, format, processes or algorithms involved	
Non-maintainability of essential hardware, software or support environment may make the information inaccessible	
The chain of evidence may be lost and there may be lack of certainty of provenance or authenticity	
Access and use restrictions may make it difficult to reuse data, or alternatively may not be respected in future	
Loss of ability to identify the location of data	
The current custodian of the data, whether an organisation or project, may cease to exist at some point in the future	
The ones we trust to look after the digital holdings may let us down	





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Links

- CASPAR:
 - www.casparpreserves.eu
 - <http://www.casparpreserves.eu/training/advanced-digital-preservation-training-lectures/>
 - <http://developers.casparpreserves.eu:8080>
- PARSE.Insight:
 - www.parse-insight.org
 - <http://sourceforge.net/projects/digitalpreserve>
- Alliance for Permanent Access:
 - www.alliancepermanentaccess.eu
- Digital Curation Centre:
 - www.dcc.ac.uk
- YouTube cartoon:
 - www.youtube.com/watch?v=Yun9hkPPF9M
- OAIS:
 - <http://public.ccsds.org/publications/archive/650x0b1.pdf>
 - <http://public.ccsds.org/sites/cwe/rids/Lists/CCSDS%206500P11/Overview.aspx>



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END

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About researchers

Communities aggregated to:

- Agriculture & Nutrition
- Behavioural Sciences
- Humanities
- Life Sciences
- Medicine
- Social Sciences
- Physical Sciences
- Socio-Cultural Sciences
- Technology

Based on KNAW classification (Royal Netherlands
Academy of Arts and Sciences)



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Reasons for preservation

1. It is unique.
2. It potentially has economic value.
3. It may stimulate inter-disciplinary collaborations.
4. It allows for re-analysis of existing data.
5. It may serve validation purposes in the future.
6. It will stimulate the advancement of science (new research can build on existing knowledge).
7. If research is publicly funded, the results should become public property and therefore properly preserved.



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Reasons for preservation (R)

It is unique

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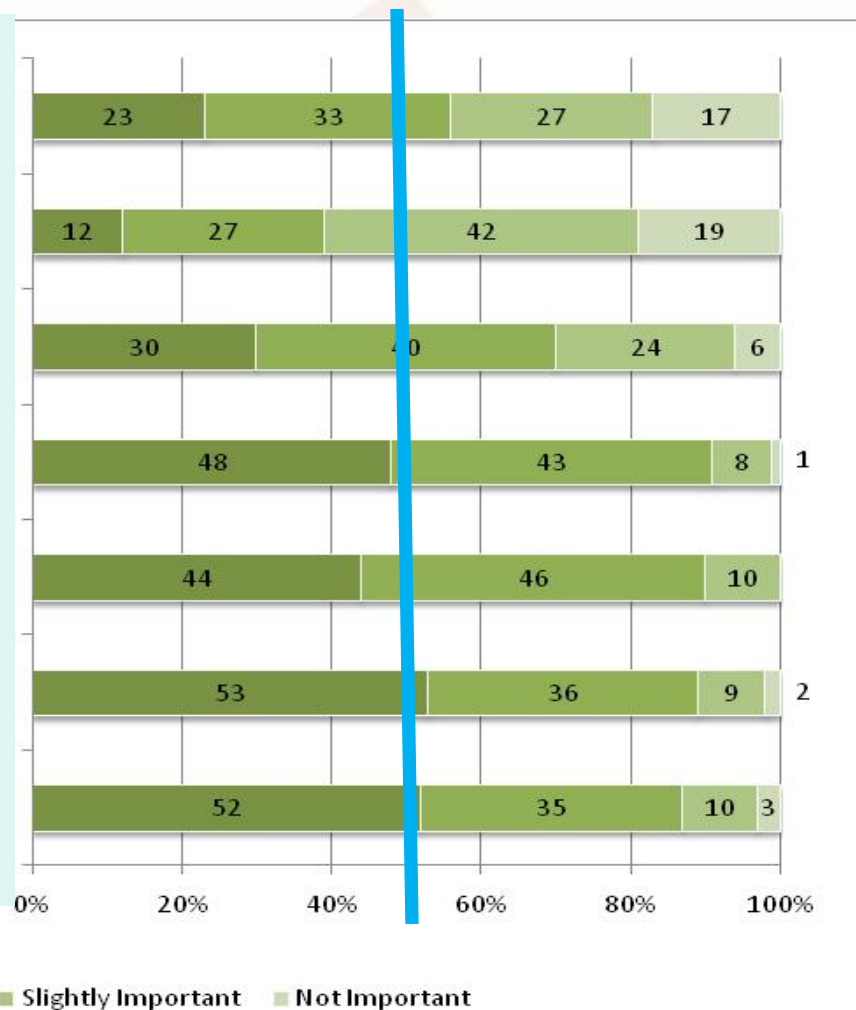
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Reasons for preservation (DM)

It is unique

It potentially has economic value

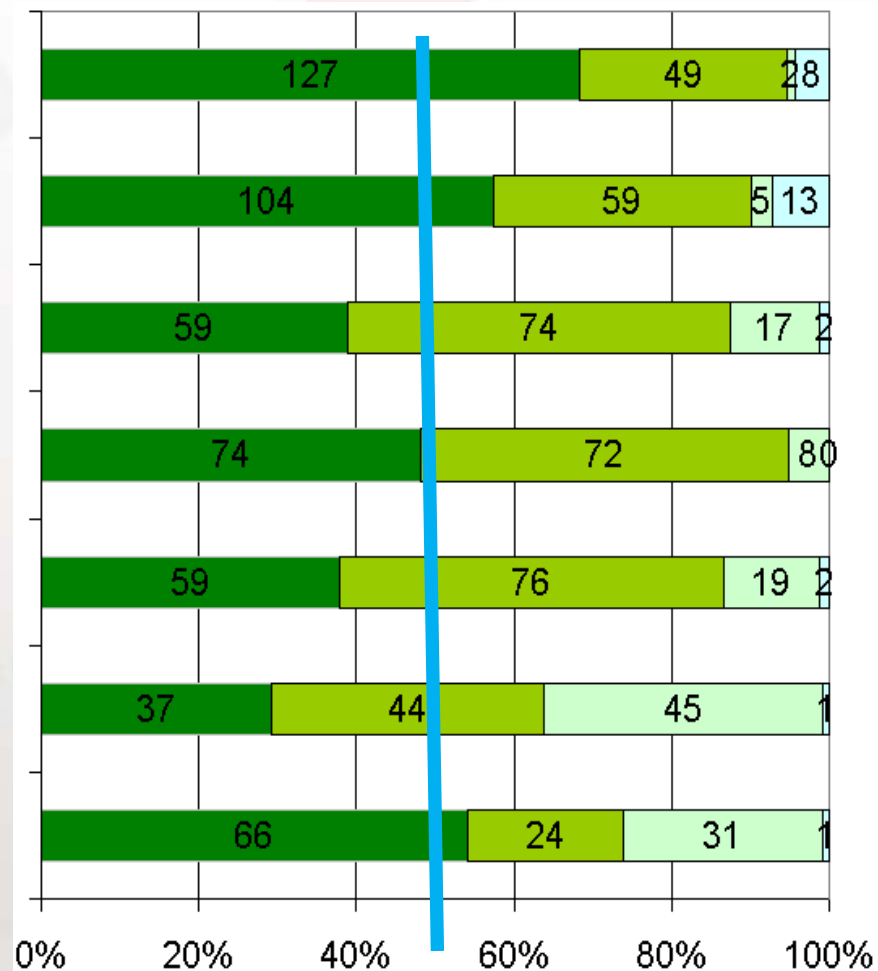
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Reasons for preservation (P)

It is unique

It potentially has economic value

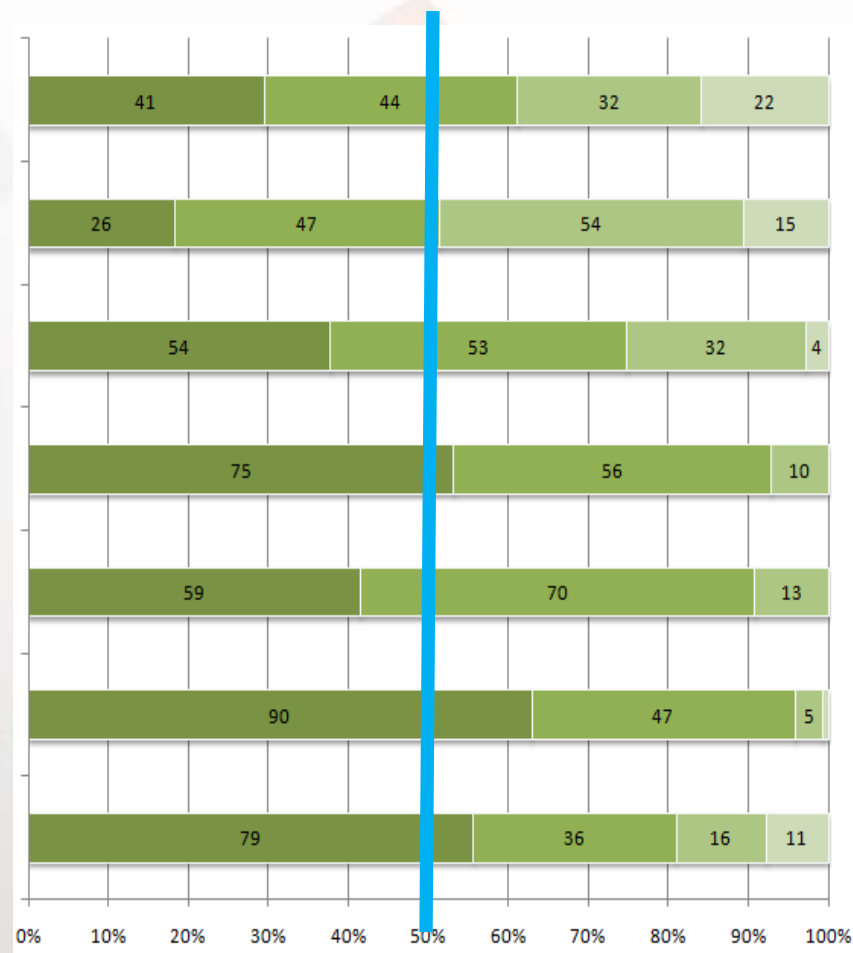
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It will stimulate the advancement of
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If research is publicly funded, the results
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therefore properly preserved.



■ Very Important ■ Important ■ Slightly Important ■ Not Important





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Threats to preservation

1. The ones we trust to look after the digital holdings may let us down.
2. The current custodian of the data, whether an organisation or project, may cease to exist at some point in the future.
3. Loss of ability to identify the location of data.
4. Access and use restrictions (e.g. Digital Rights Management) may not be respected in the future.
5. Evidence may be lost because the origin and authenticity of the data may be uncertain.
6. Lack of sustainable hardware, software or support of computer environment may make the information inaccessible.
7. Users may be unable to understand or use the data e.g. the semantics, format or algorithms involved.



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Threats to preservation (DM)

The ones we trust to look after the digital holdings may let us down

The current custodian of the data may cease to exist

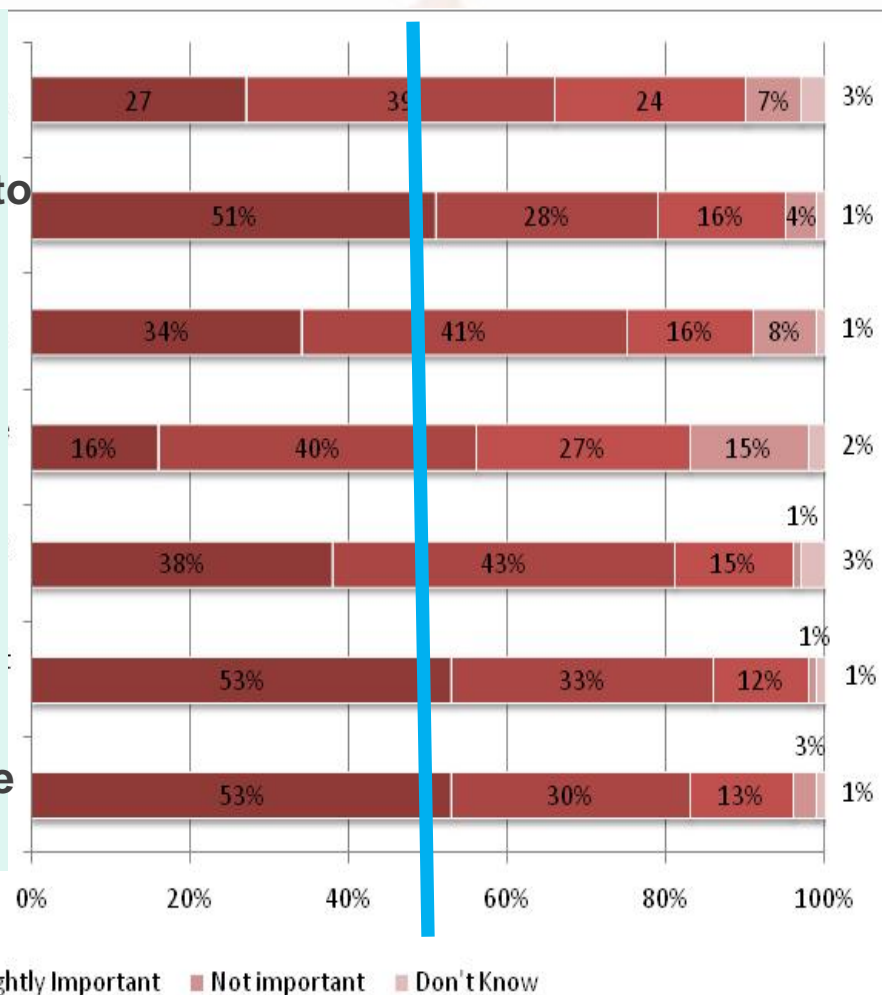
Loss of ability to identify the location of data

Access and use restrictions may not be respected in the future

Evidence may be lost

Lack of sustainable hardware/software

Users may be unable to understand or use the data



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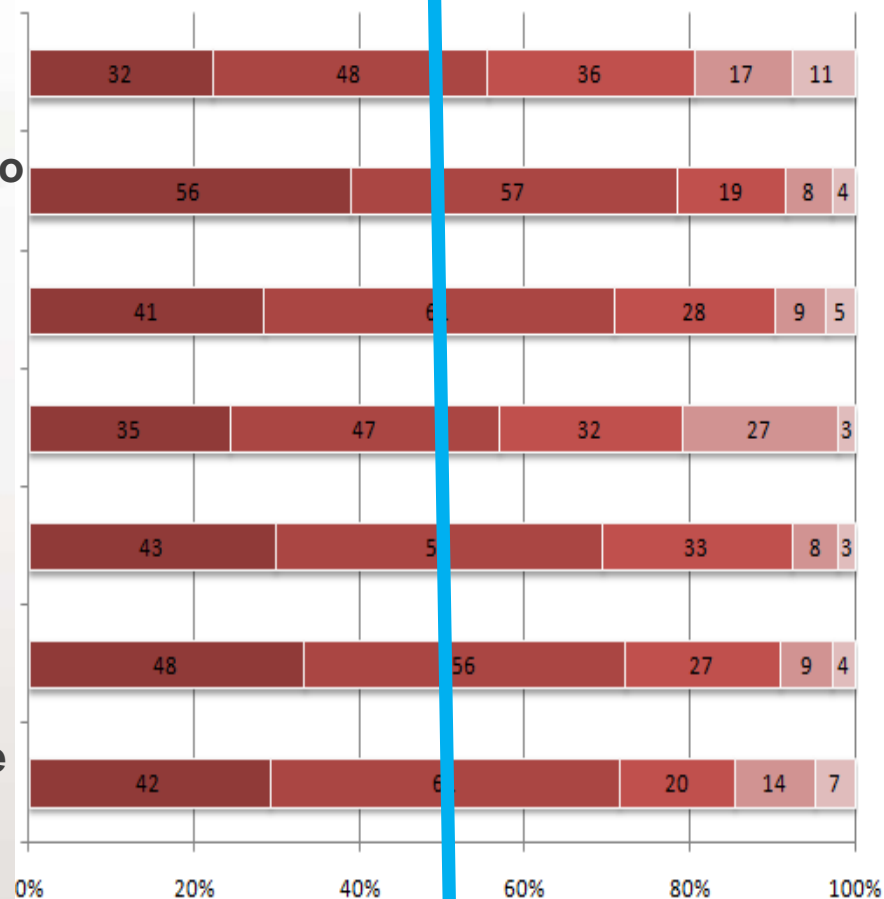
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■ Very Important ■ Important ■ Slightly Important ■ Not Important ■ Don't Know

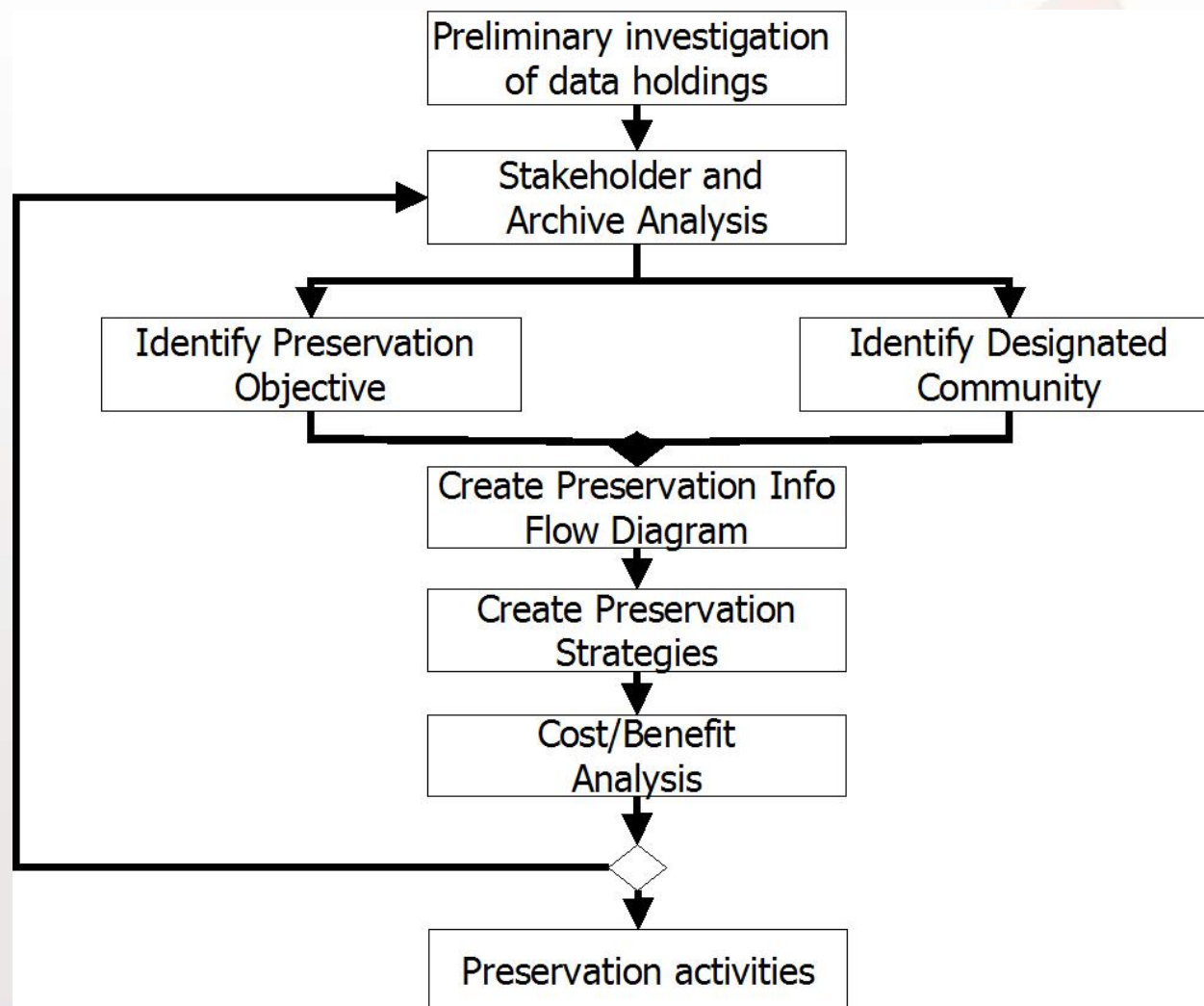


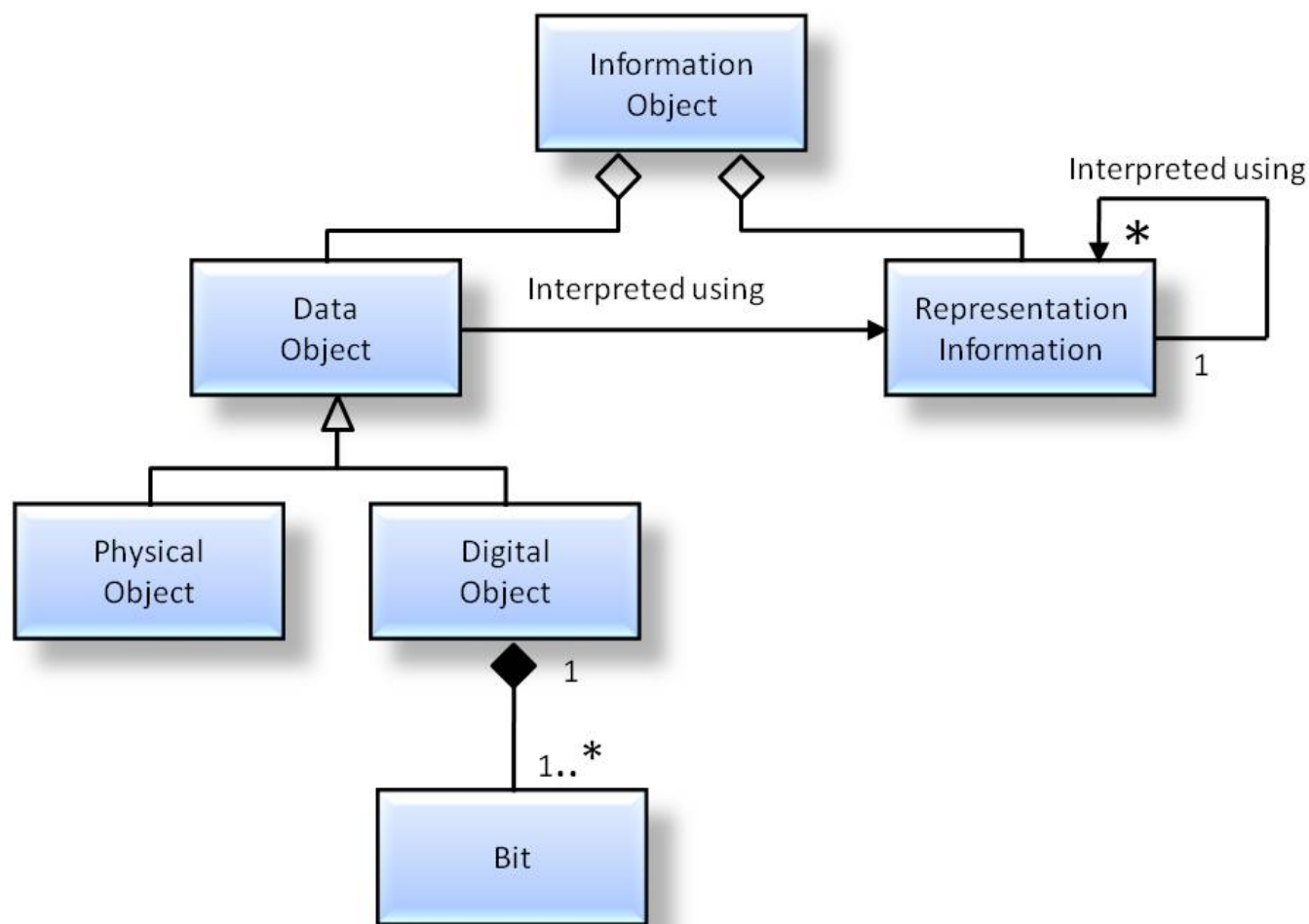
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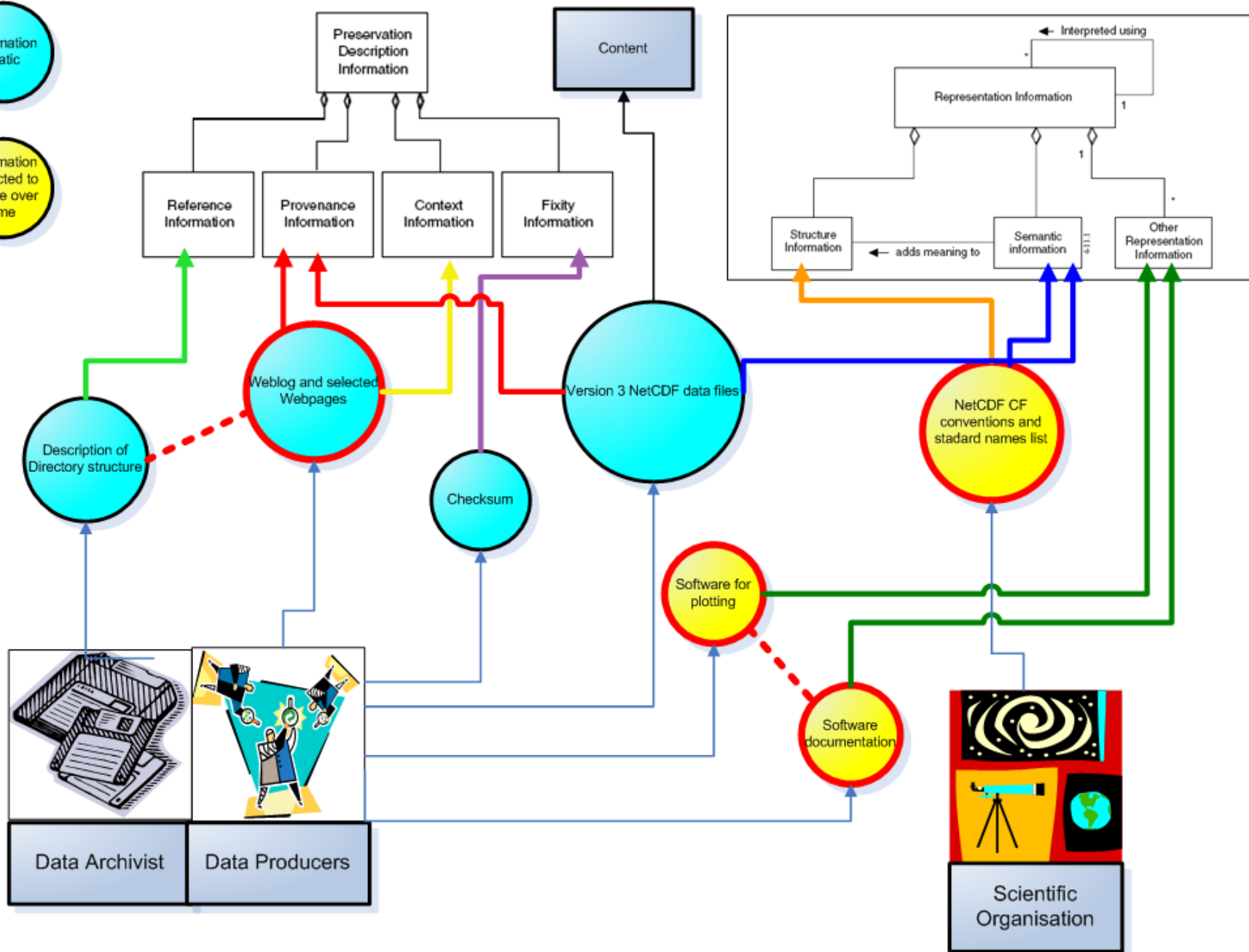
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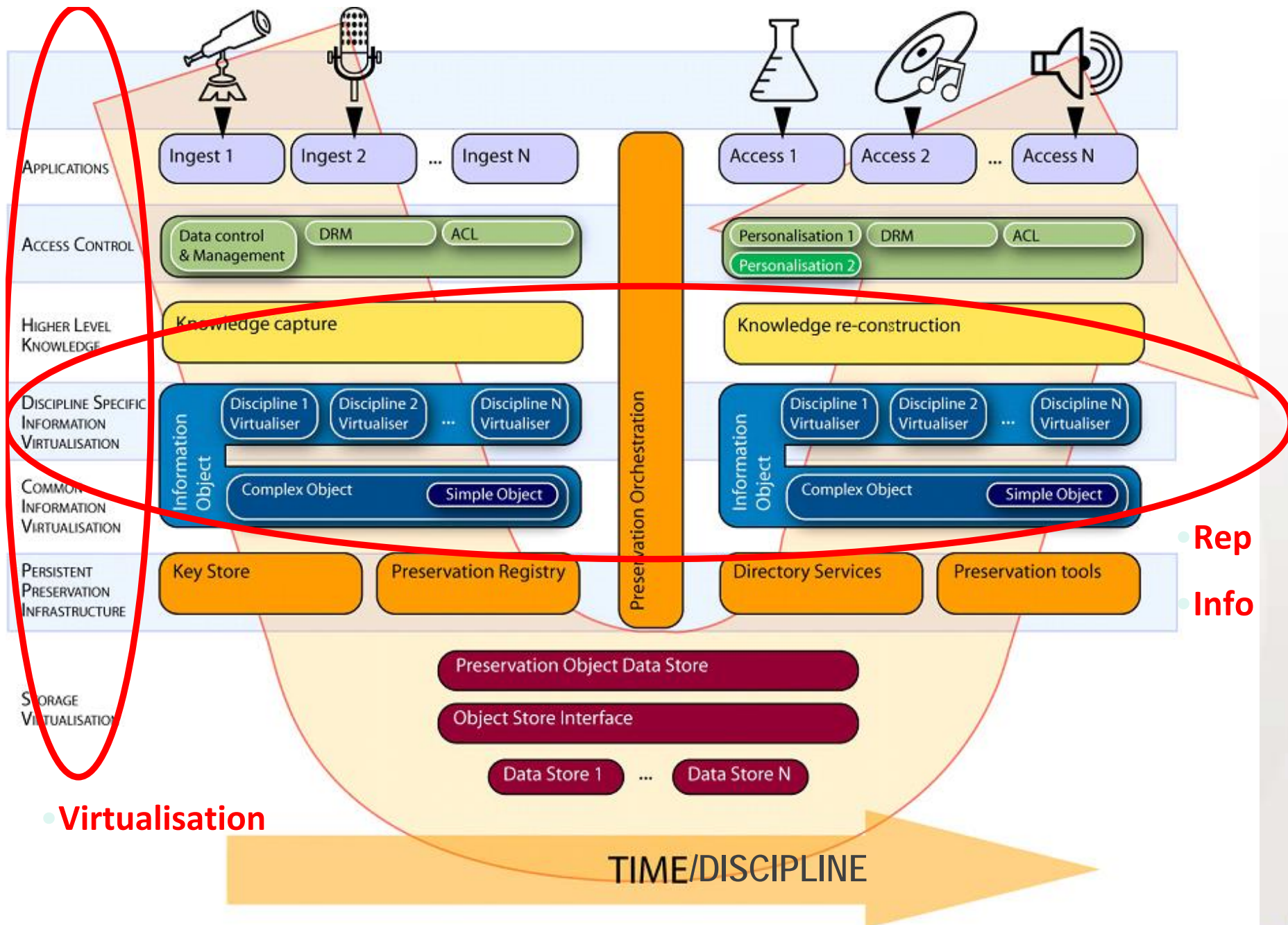






OAIS Archival Information Package (AIP)





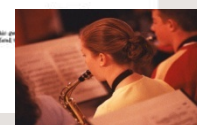
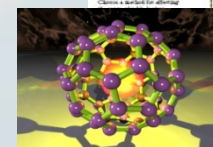
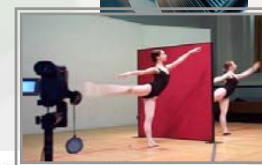
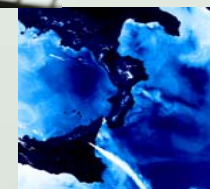
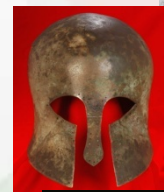
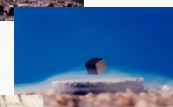
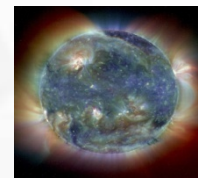


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CASPAR Consortium

EU FP6 Integrated Project

Total spend approx. 16MEuro (8.8 MEuro from EU)



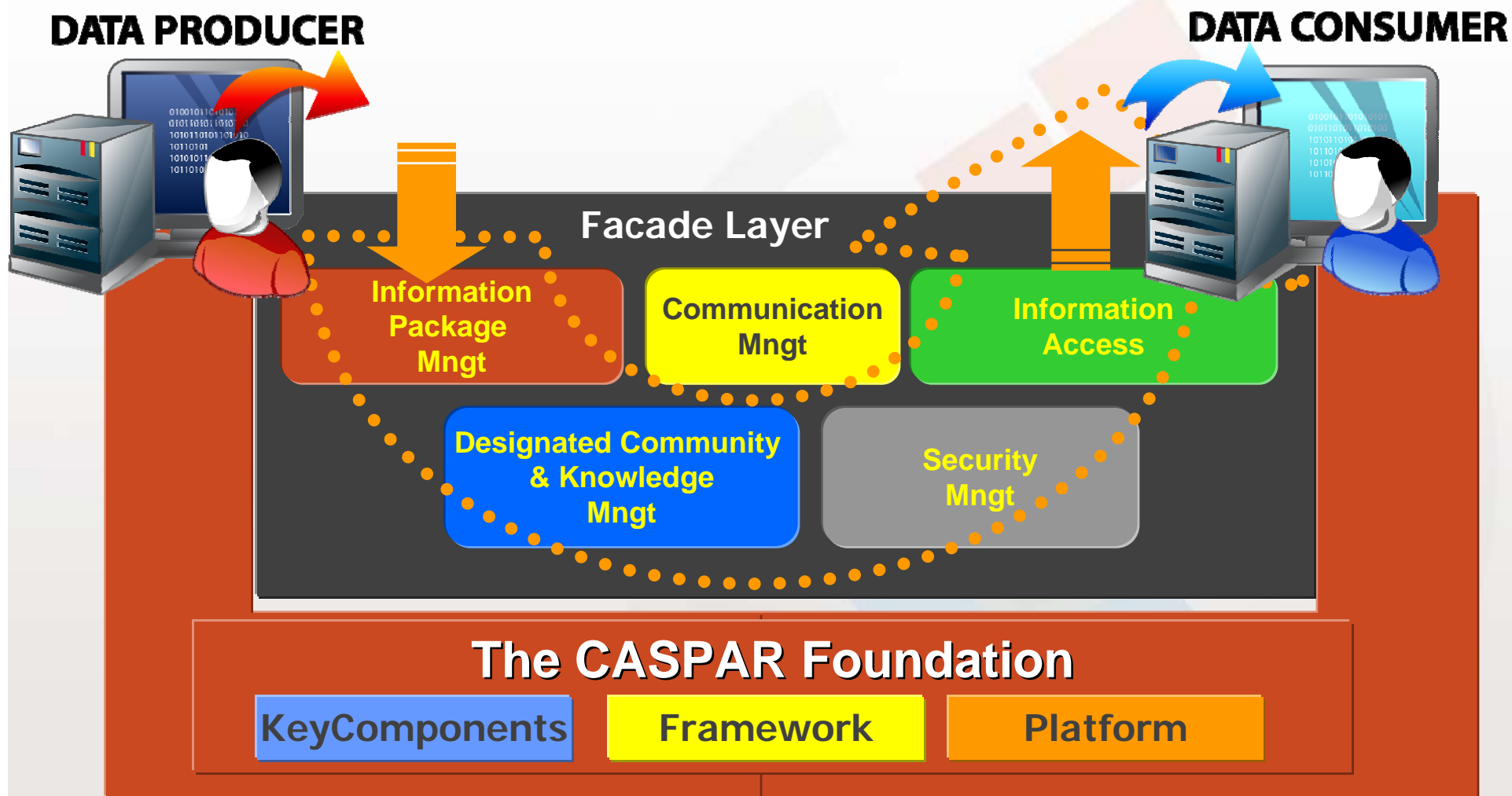
<http://www.casparpreserves.eu>





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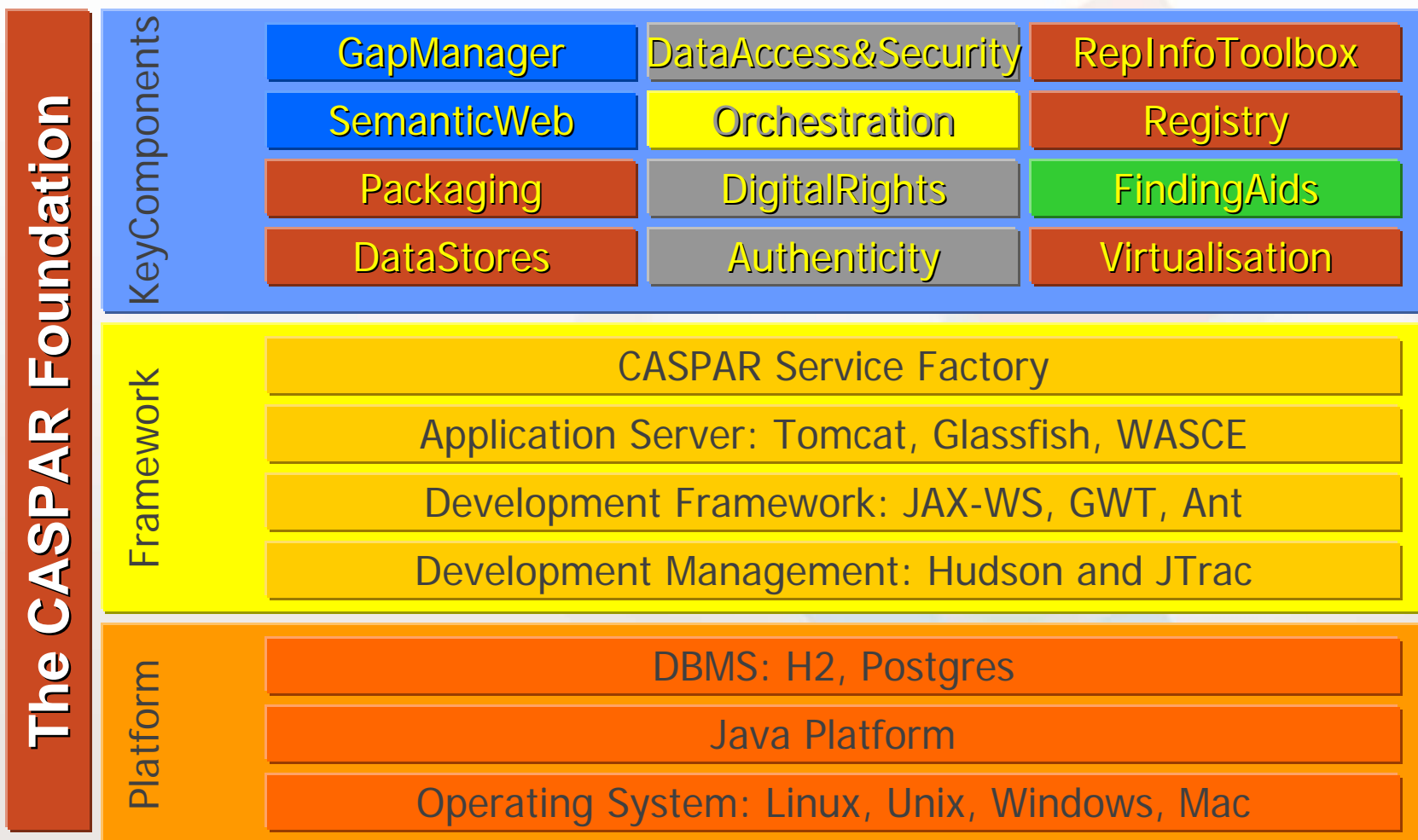
CASPAR Solution





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CASPAR Foundation





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Preservation Issues 1...

1. How To guarantee a digital information may be **accessed and understood** in the future
2. How To guarantee a proper **information package management** within and OAIS Archive
3. How To guarantee **long-time preservation maintenance** of any information package
4. How To guarantee **retrieval** of Archival Information



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Preservation Issues 2...

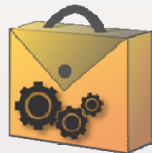
4. How To guarantee **intelligibility** within heterogeneous Designated Communities and their digital information
5. How To guarantee preservation actors are **informed about change events**
7. How To guarantee an adequate **security access** with the proper **rights** to any resource and functionality within an OAIS Archive
8. How To guarantee an adequate **integrity and identity** for any Archival Information





Answer - 1

- To guarantee a digital information may be **accessed and understood** in the future, you need an adequate **OAIS Representation Information**



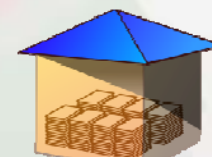
REPINFO

RepInfo ToolBox



VIRT

Virtualisation



REG

Registry





Answer - 2

- To guarantee a proper **information package management** within and OAIIS Archive, you need to create an adequate **OAIIS Information Package**



PACK
Packaging





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Answer - 3

- To guarantee **long-time preservation maintenance** of any information package, you need an implementation of **OAIS Archival Storage**



PDS

Preservation DataStores





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Answer - 4

- To guarantee **retrieval** of Archival Information, you need an **OAIS Finding Aids**



FIND
Finding



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Answer - 5

- To guarantee **intelligibility** within heterogeneous Designated Communities and their digital information, you need to manage **Designated Community Profiles** and their **Knowledge Base**



KM

Knowledge





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Answer - 6

- To guarantee preservation actors are **informed about change events**, you need an adequate management of **message exchange**



POM

Orchestration



Answer - 7

- To guarantee an adequate **security access** with the proper **rights** to any resource and functionality within an OAIS Archive, you need a **Security and DRM Management**



DAMS

Data Access Manager
& Security



DRM

Digital Rights Manager



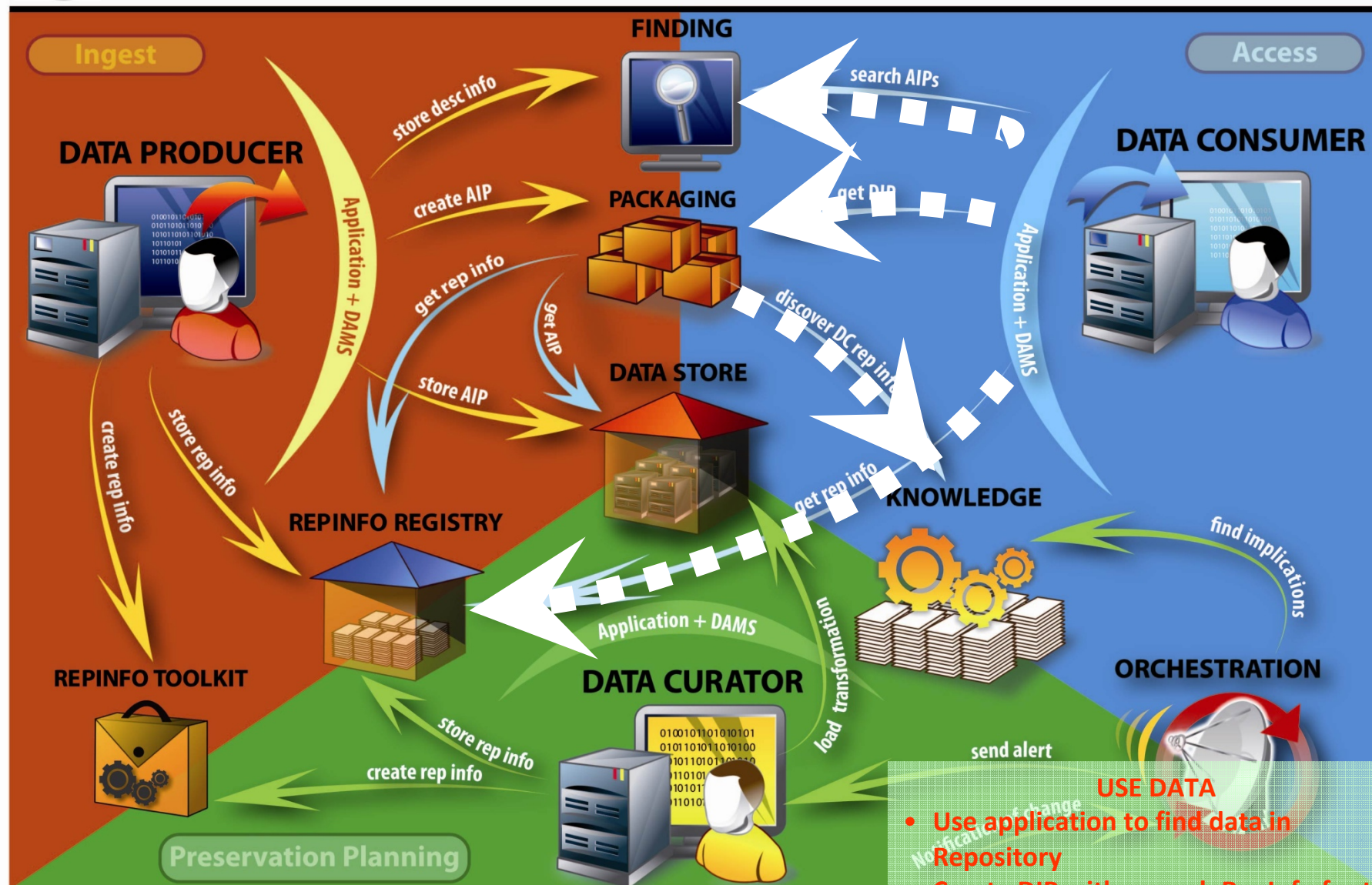
Answer - 8

- To guarantee an adequate **integrity and identity** for any Archival Information, you need an **Authenticity Tool**



AUTH
Authenticity





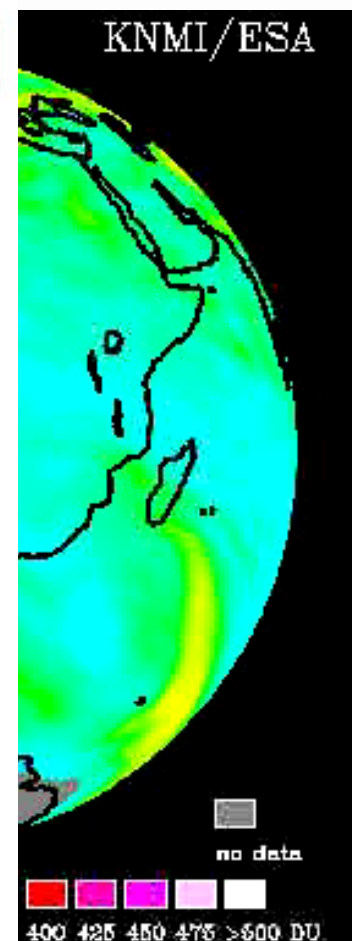
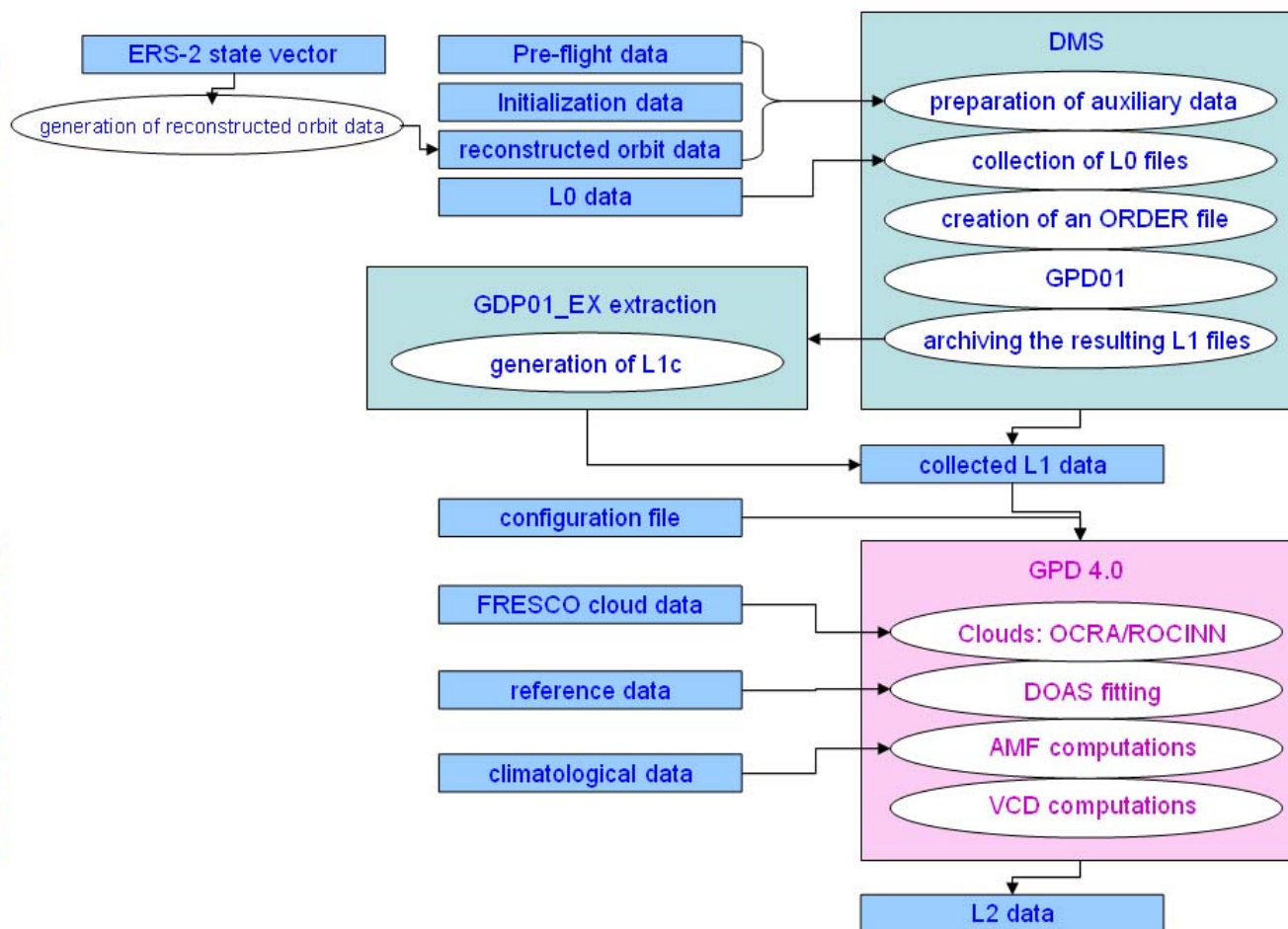
- Use application to find data in Repository
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- Obtain more RepInfo from Registry if necessary

Data...

GOME Level 0 → 2 data processing: processing chain

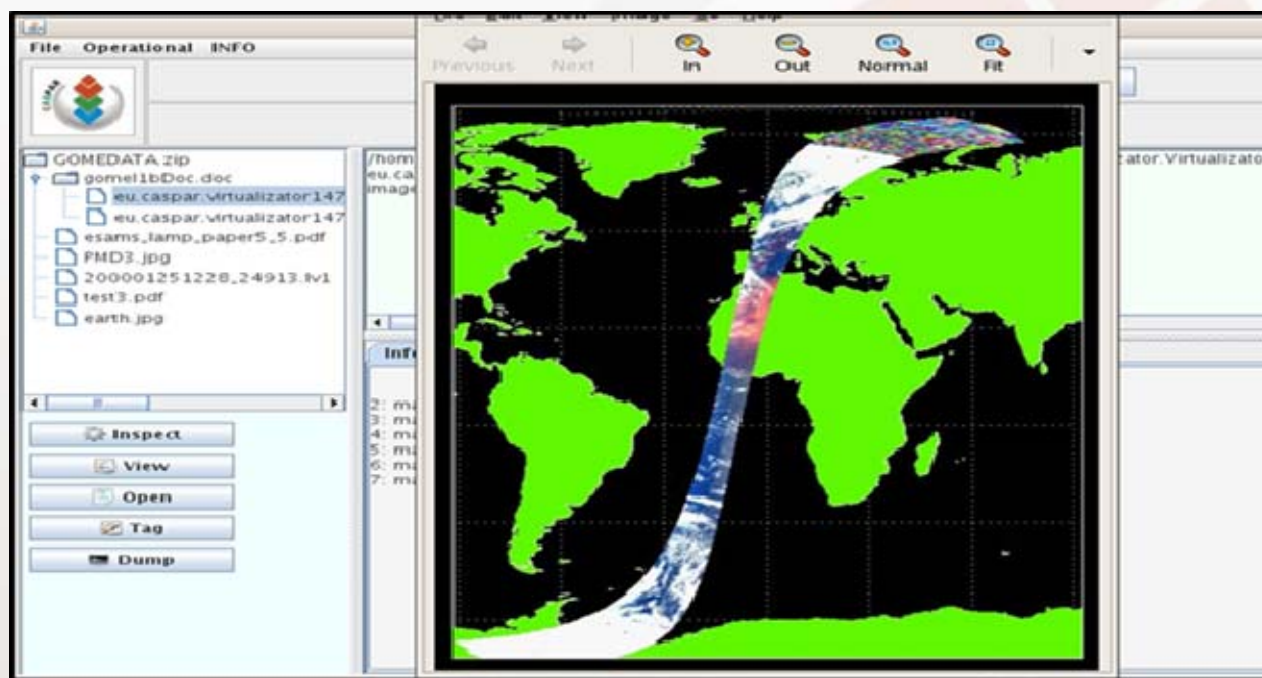
Level 1 processing

Level 2 processing





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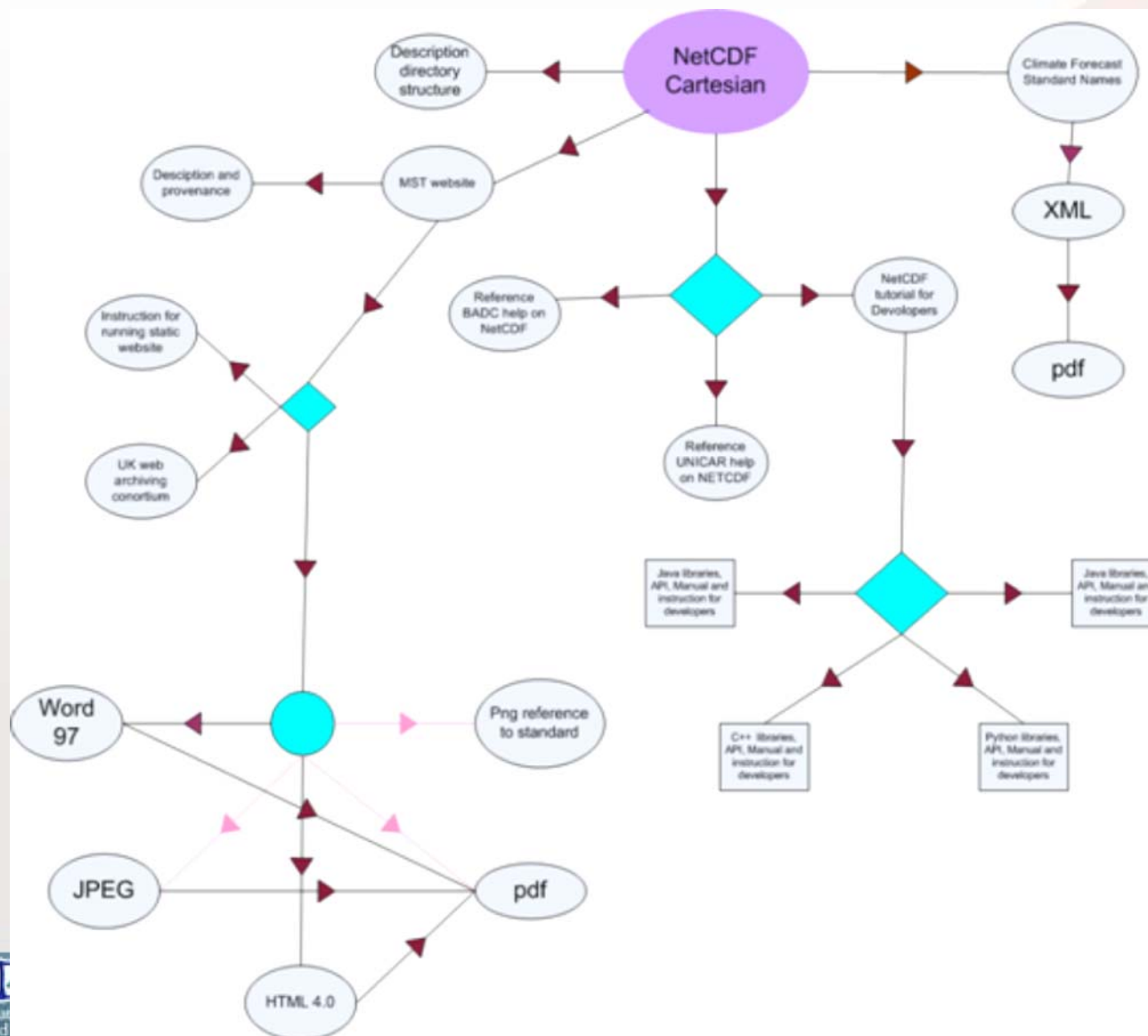
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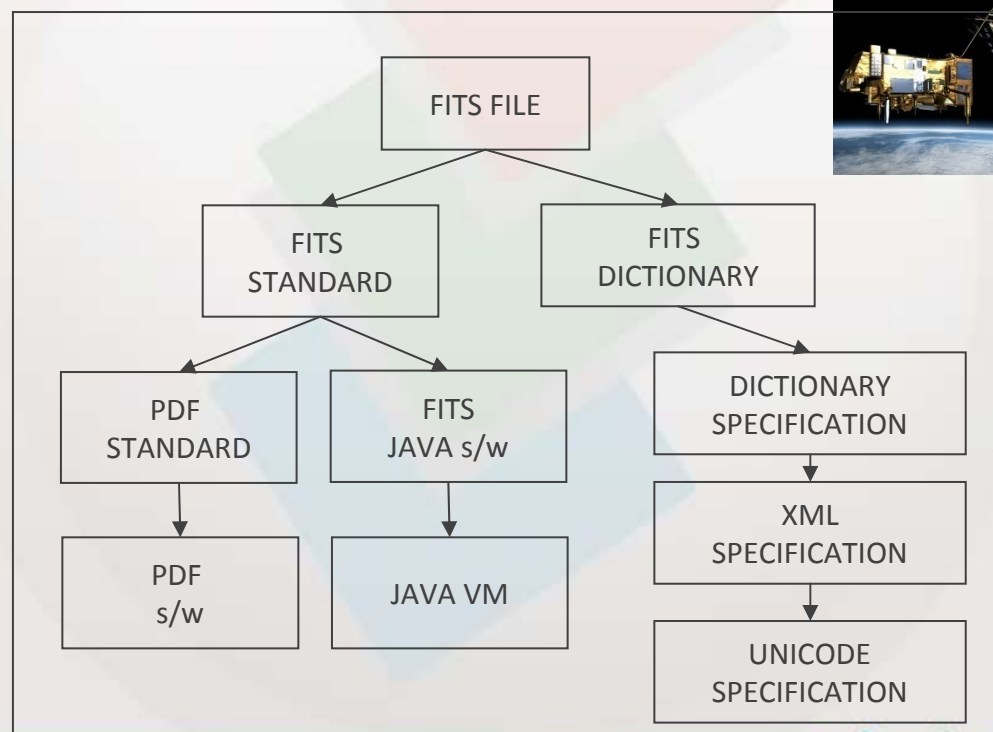
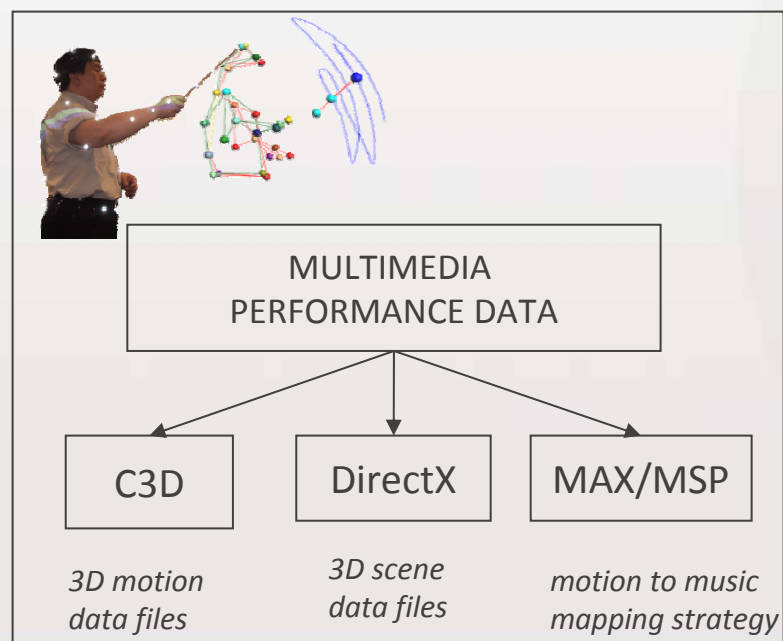
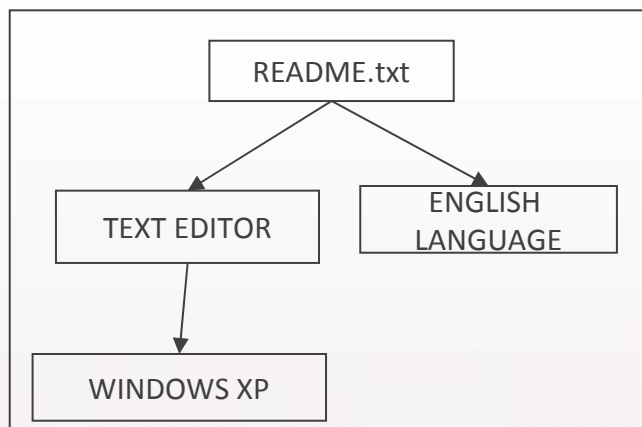
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Representation Information Network





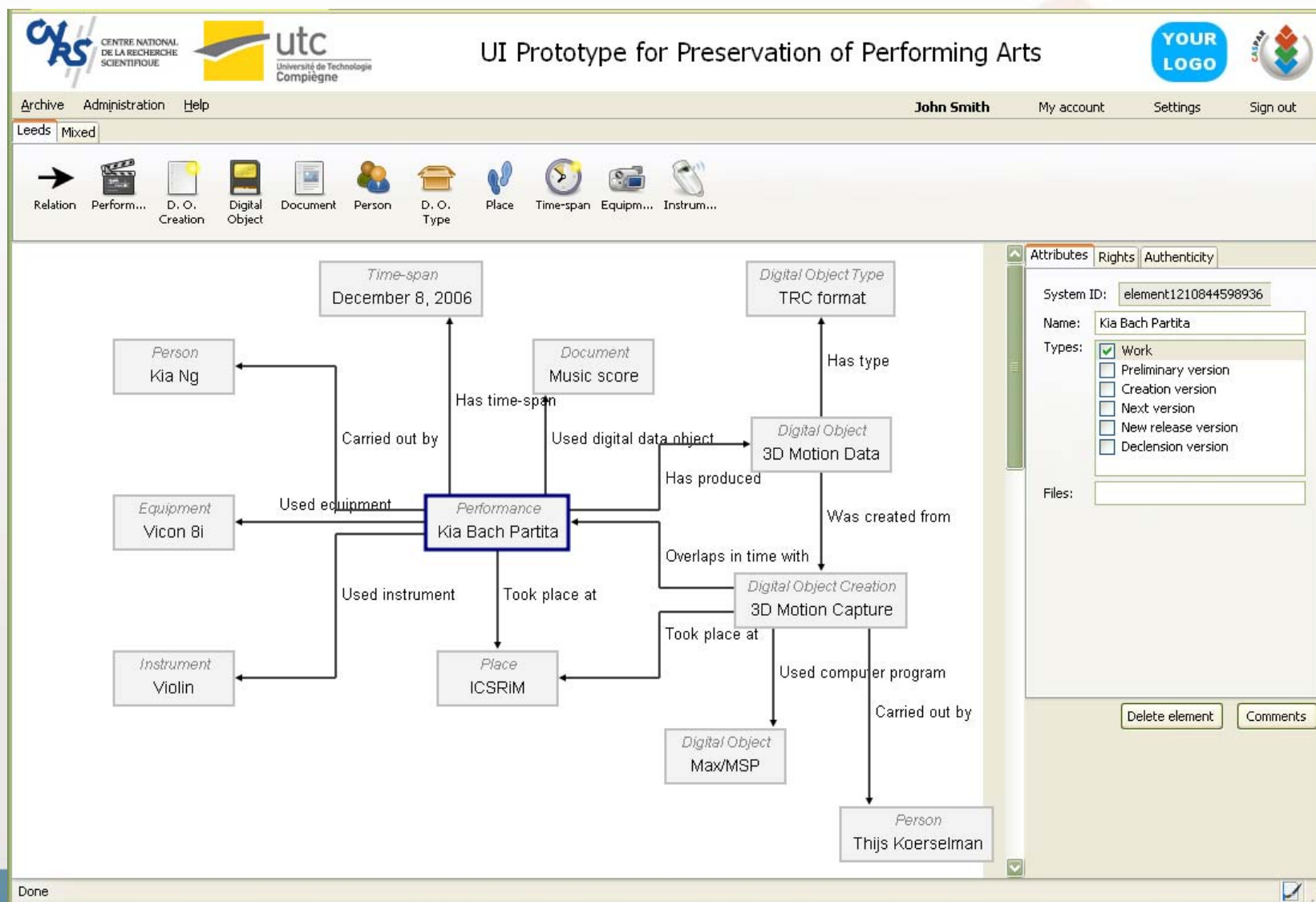
Modules and Dependencies: defining the Designated Community



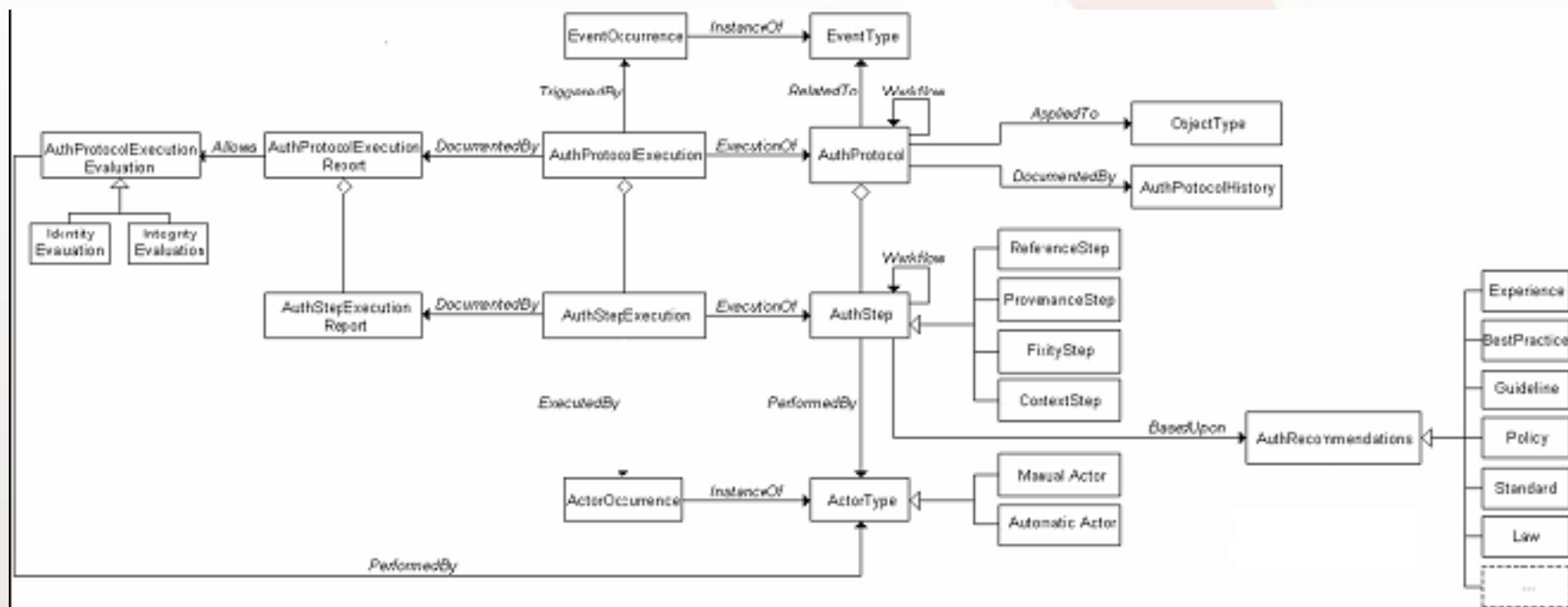


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Provenance: Performing Arts



Authenticity Model

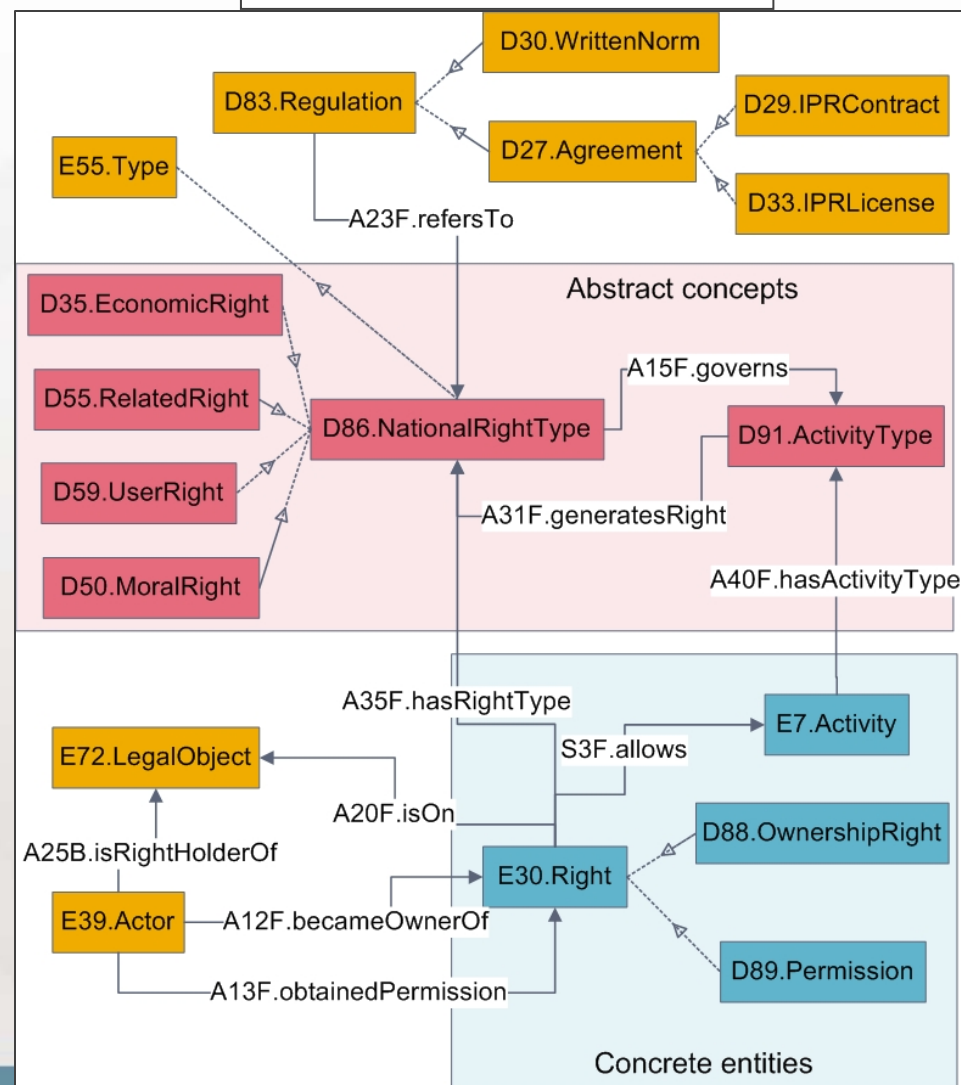


Digital Rights Ontology

A Domain ontology

- *About Intellectual Property Rights*
- *To describe all aspects that are relevant to evaluate rights*
 - Attributes of rights
 - Validity in time and space
 - Laws and Agreements
 - People
 - Actions
 - Licenses
 - Constraints and Conditions
 - ...
- *Harmonized with CIDOC CRM and FRBRoo*

Core DRO entities





Services of the DRM component

A user or an application **registerers the creation history** of a creative work

- Title of the work, when and where it was made public for the first time
- Who contributed in some part of the work
- What is the precise contribution of each involved person
- ...



DRM

The DRM **derives the existing Copyrights**

- Who owns the rights
- Details of the rights
 - Author Rights vs Related Rights
 - Economic Rights vs Moral Rights
- Country of origin of the rights
- When do the rights expire

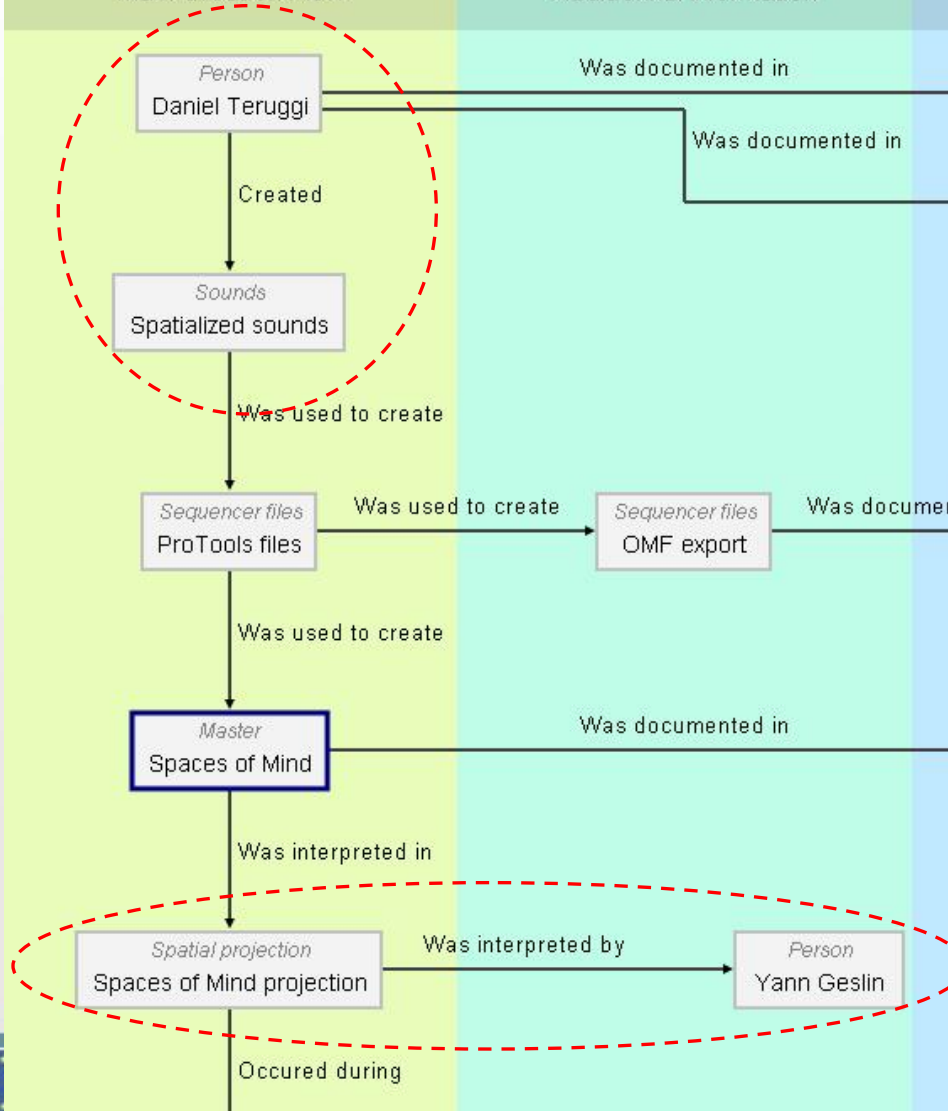


Archive Help



Main Creation Flow

Additional Information



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Compiègne

Archive Help

- New Archive
- New Archive From Template...
- Open Archive
- Save Archive
- Save Archive As...
- Save Archive As New Template...
- New Template
- Edit Existing Template...
- Save Template
- Save Template As...
- Export Archive As
- Update DRM information

Was used to create

Sequencer files
ProTools files

Was used to create

Sequencer files
OMF export

Source of: file:///C:/Documents%20and%20Settings/Marlis/Desktop/3.rdf - Mozilla Firefox

File Edit View Help

```

<rdf:RDF
  xmlns:cidoc="http://cidoc.ics.forth.gr/rdfs/caspar/cidoc.rdfs#"
  xmlns:cidoc-digital="http://cidoc.ics.forth.gr/rdfs/caspar/cidoc_digital.rdfs#"
  xmlns:rights-onto="http://www.casparpreserves.eu/publications/ontologies/RightsOntology/rights-ontology-v0_5_5"
  xmlns:frbr="http://cidoc.ics.forth.gr/rdfs/caspar/frbr.rdfs#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:drm-data="http://eu.casparpreserves/resource/DRM/data#" >
  <rdf:Description rdf:about="http://eu.casparpreserves/resource/DRM/data#ATTRIBUTIONRIGHT_FR">
    <rdfs:comment xml:lang="en">Right as defined in FR on 18-03-2009</rdfs:comment>
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    <rights-onto:A33F_hasValidity rdf:resource="http://eu.casparpreserves/resource/DRM/data#Validity_06-03-2009_nu">
    <rights-onto:A35F_hasRightType rdf:resource="http://eu.casparpreserves/resource/DRM/data#TRANSFORMATIONRIGHT_FR">
    <rdfs:comment xml:lang="en">Individual ownership right held by a person on a precise creative contribution to
    <rdfs:type rdf:resource="http://cidoc.ics.forth.gr/rdfs/caspar/cidoc_digital.rdfs#C5_Copyright"/>
  </rdf:Description>
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    <rdfs:comment xml:lang="en">Individual ownership right held by a person on a precise creative contribution to
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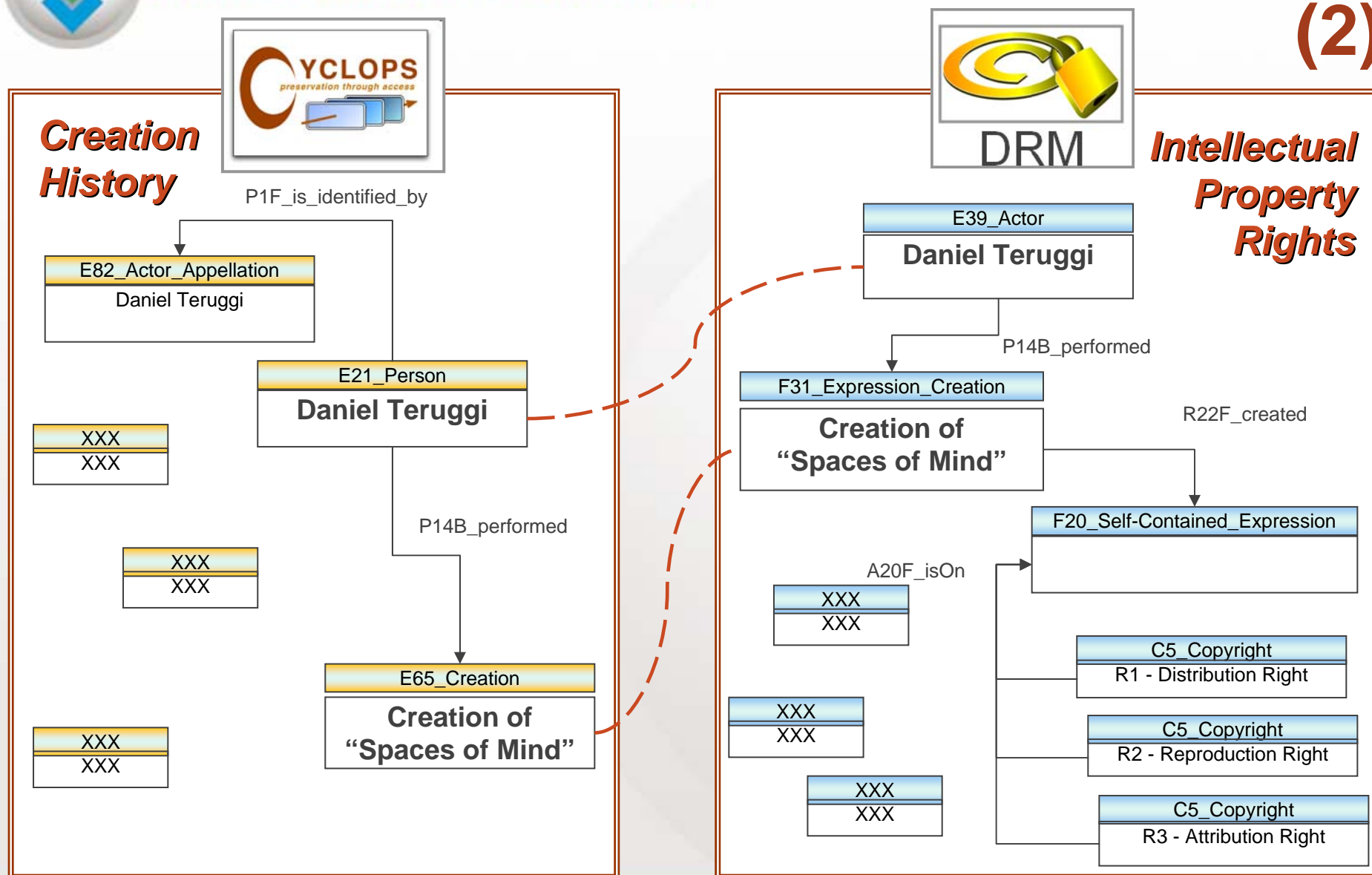
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Life Cycle



Interoperable Provenance Information (2)





Scenario: Change in Copyright Law

- **Goal**
 - Demonstrate that the system withstands changes in Law
- **Scenario:**
 - An amendment to a Copyright Law clarifies who can be considered a performer, hence eligible to related rights

• Current IPR Law No. 92–597 of July 1, 1992, Art. 212-1 says:
“... persons who act, sing, deliver, declaim, play in or otherwise perform literary or artistic works, variety, circus or puppet acts.”

- A hypothetical amendment could extend the definition of performers including also people who project and interpret acousmatic sound files

→ We have more rightholders



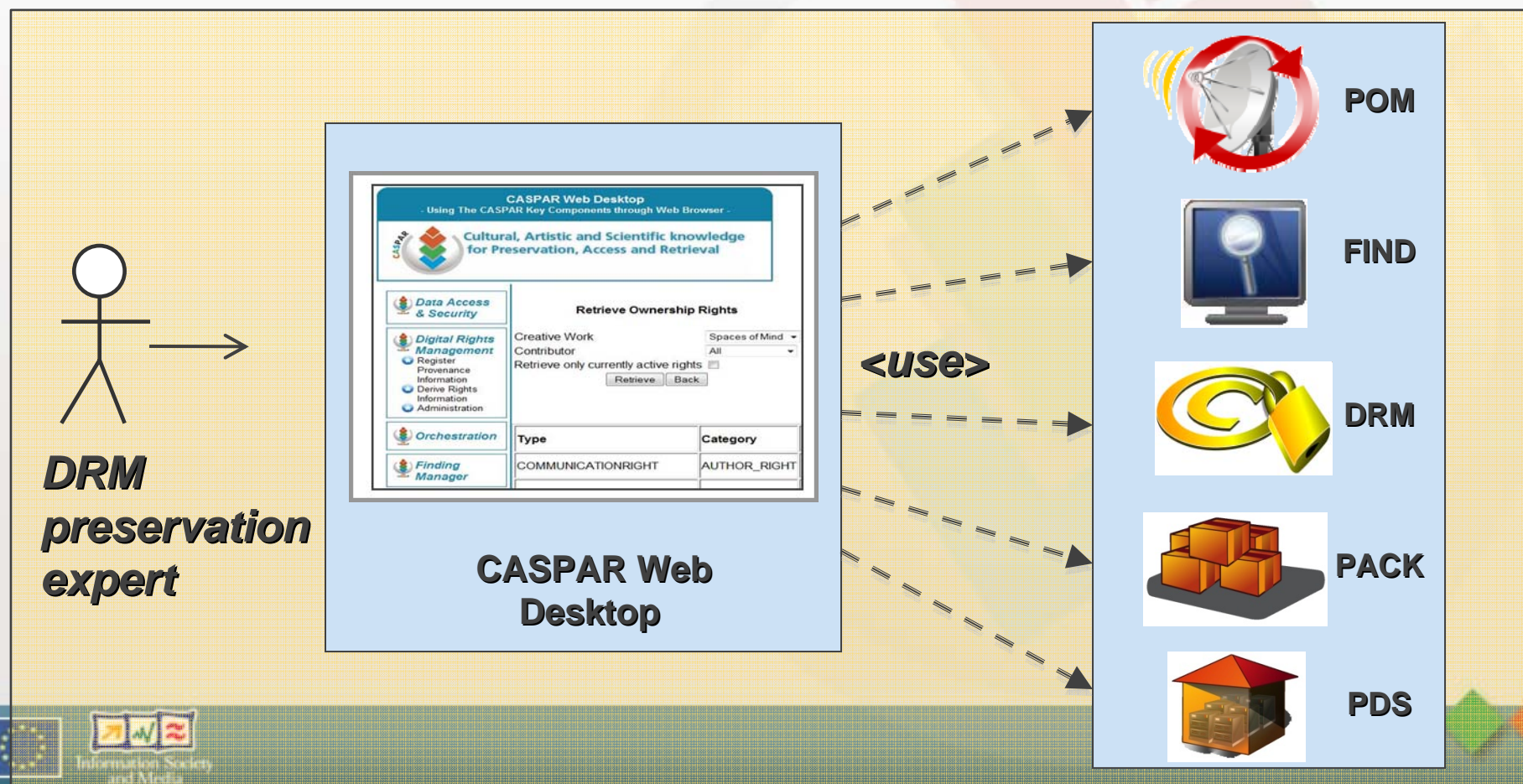


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Scenario 2

Update of PDI (Provenance)

- Update Intellectual Property Rights after a Change in Law





Scenario: Change in Copyright Law (2/2)

0. A notification is sent to the DRM Preservation Expert
 - Through the POM

Actions to do:

1. The rules for correctly deriving existing rights must be updated
 - Through the DRM Administration Interface
2. Rights information (PDI-Provenance) must be updated for all affected archive holdings
 - The affected AIPs are retrieved (FIND Key Component)
 - The rights are re-calculated (DRM Key Component)
3. The new Provenance is packaged in the AIPs and stored
 - Through the PACK and PDS Key Components





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Repository Audit and Certification

- Standard for certification in OAIS Roadmap
- Initial work produced TRAC
- Now an official CCSDS Working Group
- Open virtual meetings, notes and documents:
<http://www.digitalrepositoryauditandcertification.org>
- **Draft standard submitted to CCSDS/ISO to form the basis of an international audit and certification process**



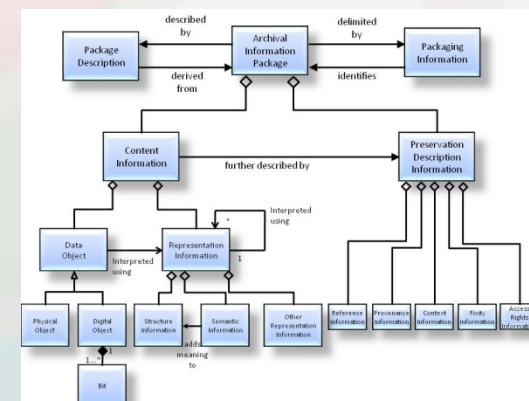
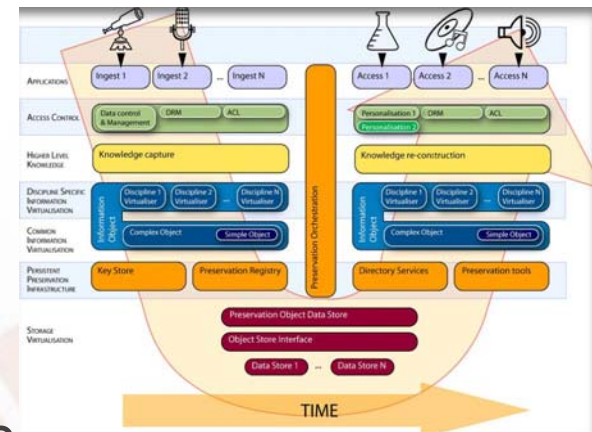
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Conclusions

- Preservation
 - needs more than format information
 - needs more than Significant Properties
- Many layers of information (**metadata**)
- This extra information
 - must be created – tools are needed
 - must itself be preserved
- Made easier by
 - being integrated with (e-)infrastructure
 - addressing users' concerns
- Must deal with all types of digital objects



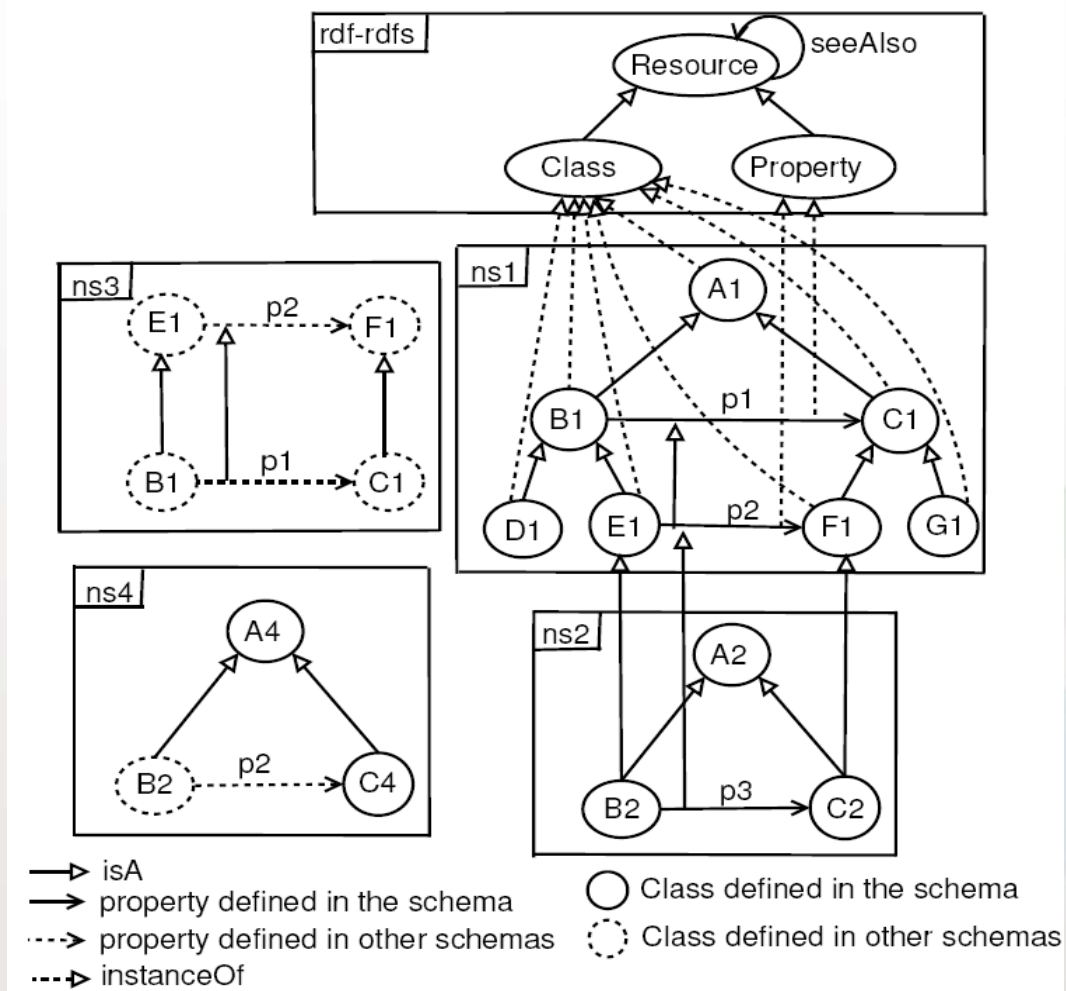


- From OAIS: OAIS conformance

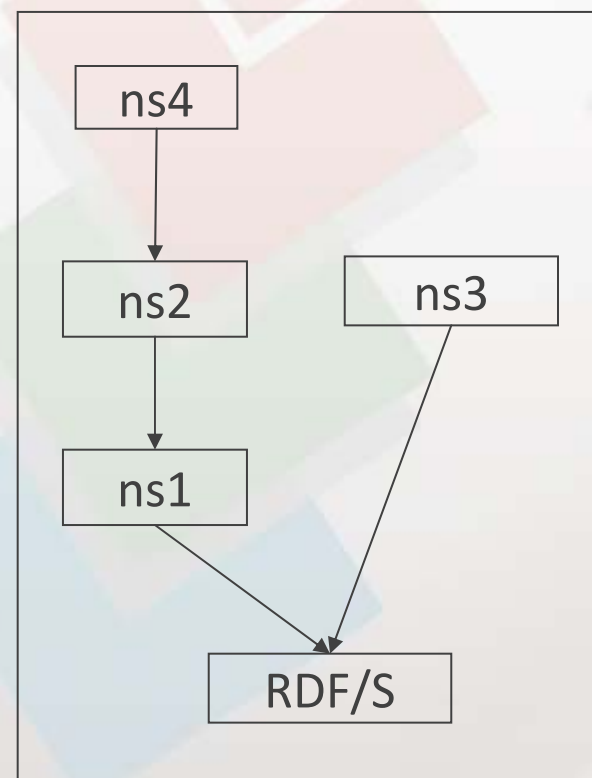
- *A conforming OAIS archive implementation shall support the model of information described in 2.2. The OAIS Reference Model does not define or require any particular method of implementation of these concepts.*
- *A conforming OAIS archive shall fulfill the responsibilities listed in 3.1. Subsection 4 provides examples of the mechanisms that may be used to discharge the responsibilities identified in 3.1. These mechanisms are not required for conformance. It is expected that a separate standard, as noted in section 1.5, will be produced on which accreditation and*



Modules and Dependencies: Examples (Semantic Web data)

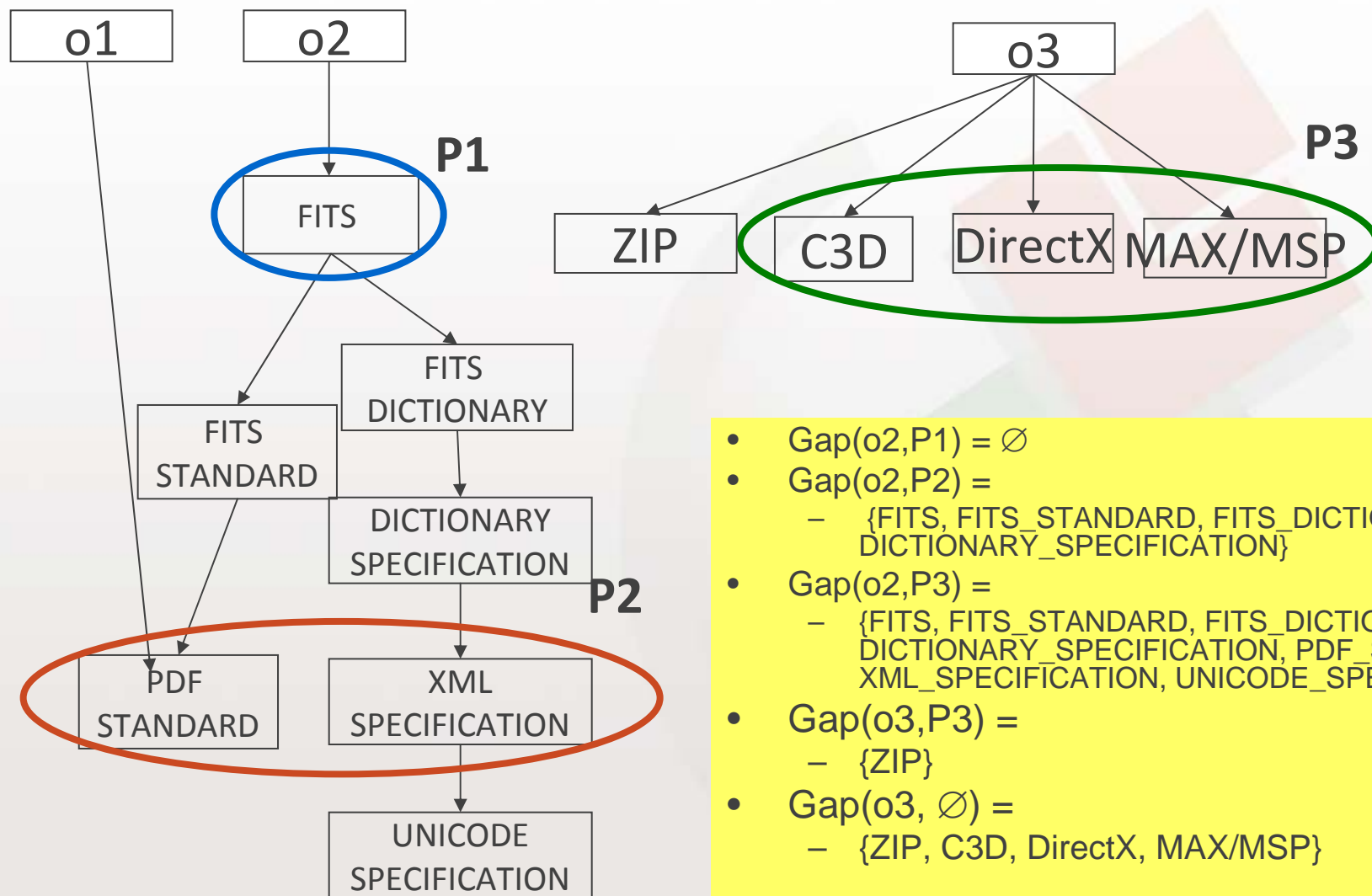


modules and dependencies





Scenario: Intelligibility-aware Packaging



Threat	Requirement for solution
Users may be unable to understand or use the data e.g. the semantics, format, processes or algorithms involved	
Non-maintainability of essential hardware, software or support environment may make the information inaccessible	
The chain of evidence may be lost and there may be lack of certainty of provenance or authenticity	
Access and use restrictions may make it difficult to reuse data, or alternatively may not be respected in future	
Loss of ability to identify the location of data	
The current custodian of the data, whether an organisation or project, may cease to exist at some point in the future	
The ones we trust to look after the digital holdings may let us down	



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Creating an OAIS Archival Information Package

