Preservation Metadata Initiatives: Practicality, Sustainability, and Interoperability

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Presentation outline

- Categorisation of standards
- Practical issues
  - Implementation
  - Sustainability
- Interoperability
  - Registries of formats and metadata

Basics

- Digital preservation strategies depend - to some extent - on the creation, capture and maintenance of suitable metadata:
  - "Preserving the right metadata is key to preserving digital objects" (ERPANET Briefing Paper)
  - "It's all about metadata" (Kelly Russell, ca. 2000)
- Metadata fulfil various roles, e.g.:
  - Within a digital repository, “metadata accompanies and makes reference to each digital object and provides associated descriptive, structural, administrative, rights management, and other kinds of information” (Clifford Lynch, 1999)

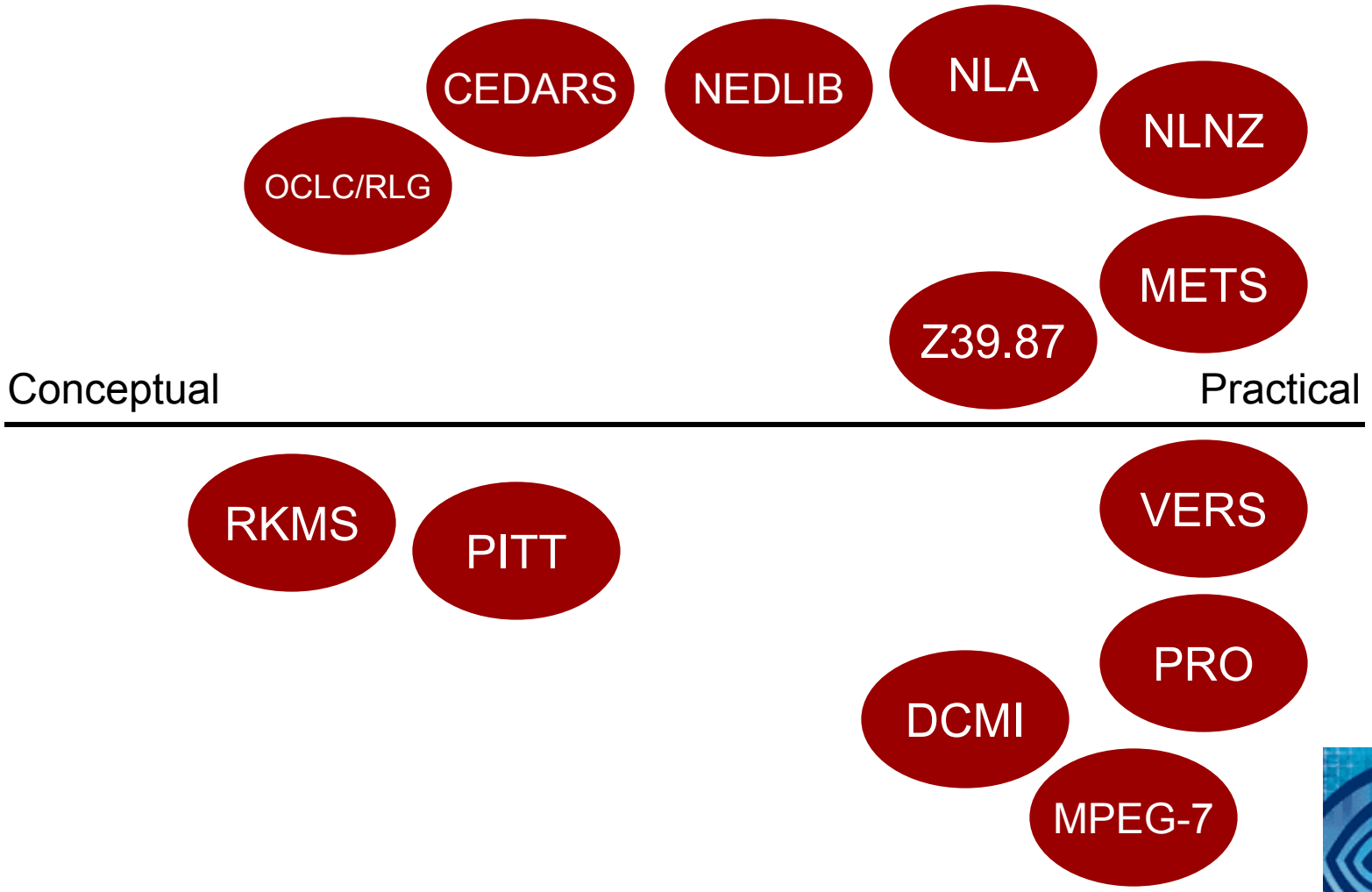
The OAIS model

- The Reference Model for an Open Archival Information System (OAIS):
  - ISO 14721:2003
  - Establishes a common framework of terms and concepts
  - Identifies basic functions:
    - Ingest, Data Management, Archival Storage, Administration, Access, Preservation Planning
  - Defines an information model, e.g.:
    - Information Packages
    - Types of metadata required (but not a schema)

Existing standards

- Developed from many different perspectives:
  - Generic
    - Applications of DCMES
  - Digital libraries:
    - OCLC/RLG Framework, Cedars, NEDLIB, NLA, NLNZ, METS, NISO Z39.87 …
    - OAIS influence has been greatest in this area
  - Recordkeeping:
    - Pittsburgh, RKMS, NAA, VERS, EAD …
  - Multimedia:
    - MPEG-7, SMPTE …
  - Rights management:
    - <indecs>, MPEG-21 …

Draft categorisation (1)



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Draft categorisation (2)

- Earliest schemas were largely conceptual in nature:
  - e.g. Pittsburgh BAC model, Cedars outline specification, OCLC/RLG WG I
- Gradually moving towards a more practical focus:
  - e.g., VERS, NLNZ, METS, OCLC/RLG WG II (Implementation Strategies)
  - Based on XML (DTDs and Schemas)
- But there is an urgent need for this experience to be shared
  - e.g., briefing papers, advice to implementers

Implementation

Focus on implementation issues is increasingly important:

- We need to prove the practical value of metadata frameworks and 'outline specifications'
- It can be difficult for implementers to use these as a guide to the design of *real* systems?
- We need to move from the conceptual to the practical, need to move beyond proof-of-concept
- Positive signs:
  - METS/NISO Z39.87
  - OCLC/RLG PREMIS WG looking at implementation strategies for preservation metadata

Creation and capture

Metadata creation/capture:

- Who?
  - Human agency vs. automatic capture
- How?
  - Much metadata already exists
  - The need for automatic (or semi-automatic) capture or conversion of metadata
- When?
  - Need for metadata to be captured at creation, ingest, migration, and at other appropriate points in object life-cycle

Sustainability (1)

Balance risks with costs:

- There is a perception that metadata creation and maintenance will be expensive
- But costs associated with data recovery are not trivial
- Need to balance the risks of data loss with the cost of creating metadata
  - Robust selection criteria
  - Co-operation between repositories
  - Re-use of existing metadata

Sustainability (2)

Avoid imposing unnecessary costs:

- Avoid large schemas
- Need to identify the *right* metadata ('core metadata'?)

Who pays?

- A more generic issue …

Interoperability (1)

Interoperability is important, e.g.:

- To support the reuse of existing metadata, e.g., on Ingest
- To support the exchange of digital objects between repositories
- "… there is a critical need to develop tools that automatically supply core metadata, extract metadata from resources at ingest, and restructure and manage metadata over time" - (Hedstrom, 2003)

Interoperability (2)

Some problems:

- The need to cope with a wide (and growing) range of metadata standards, object types, formats, etc.
- Heterogeneity
- No prospect of a single standard
- *Practical* interoperability not within easy scope of the OAIS model

Registries (1)

A potential role for registries?

- Format Registries
  - There is "… a pressing need to establish reliable, sustained repositories of file format specifications, documentation, and related software" (Lawrence, *et al*., 2000)
  - DSpace 'bitstream format registry'
  - Typed Object Model (TOM) project
  - IFLA Conference paper (Abrams & Seaman, 2003)

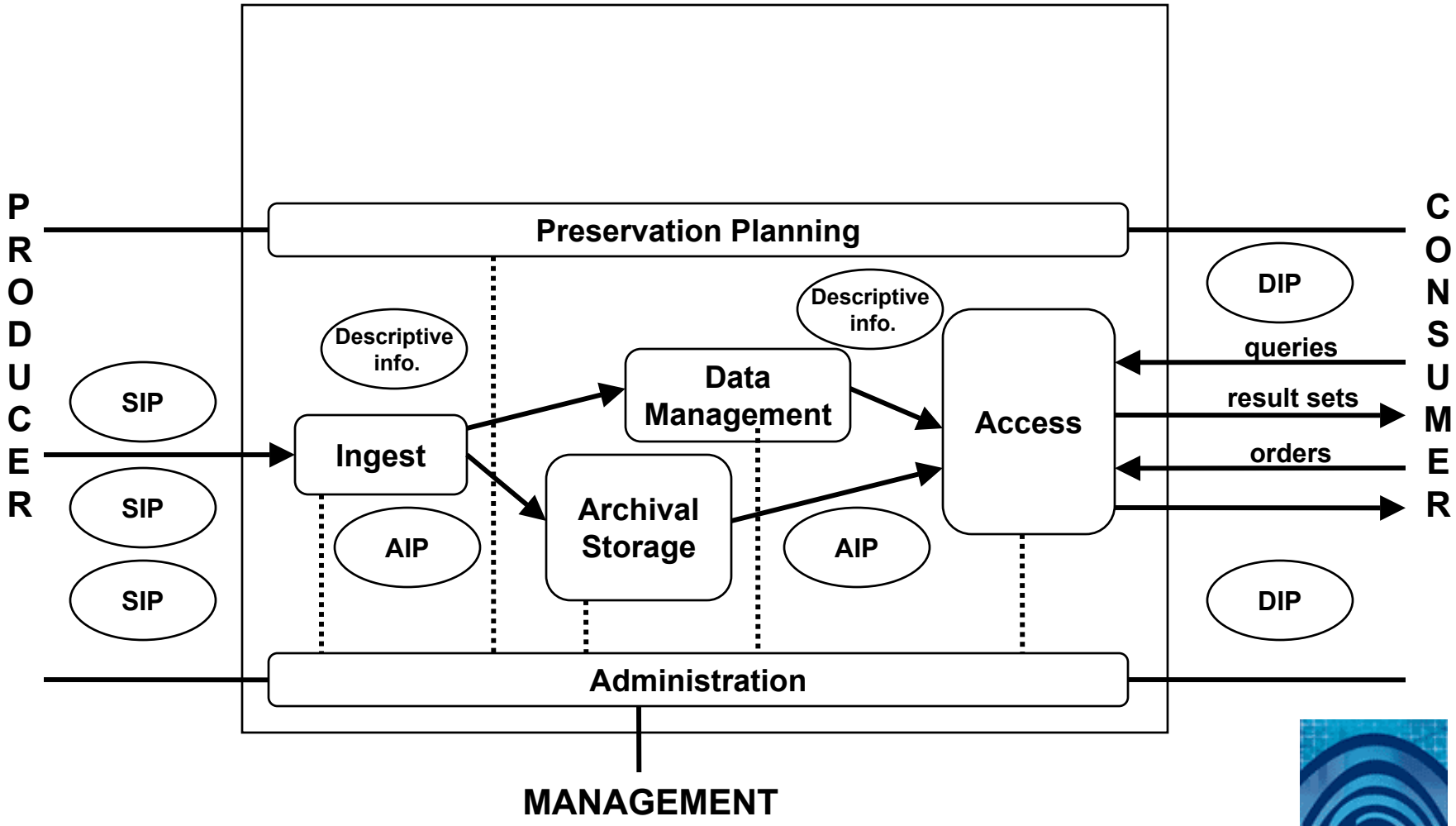
Registries (2)

- Metadata registries
  - "… formal systems that can disclose authoritative information about the semantics and structure of the data elements that are included within a particular metadata scheme" (Heery, *et al*., 2000)
  - Existing registries include the XML.org Registry and Repository (OASIS), and metadata registries set up by DCMI and SMPTE
  - There has been some experimentation with RDF registries as part of Semantic Web development

Registries (2)

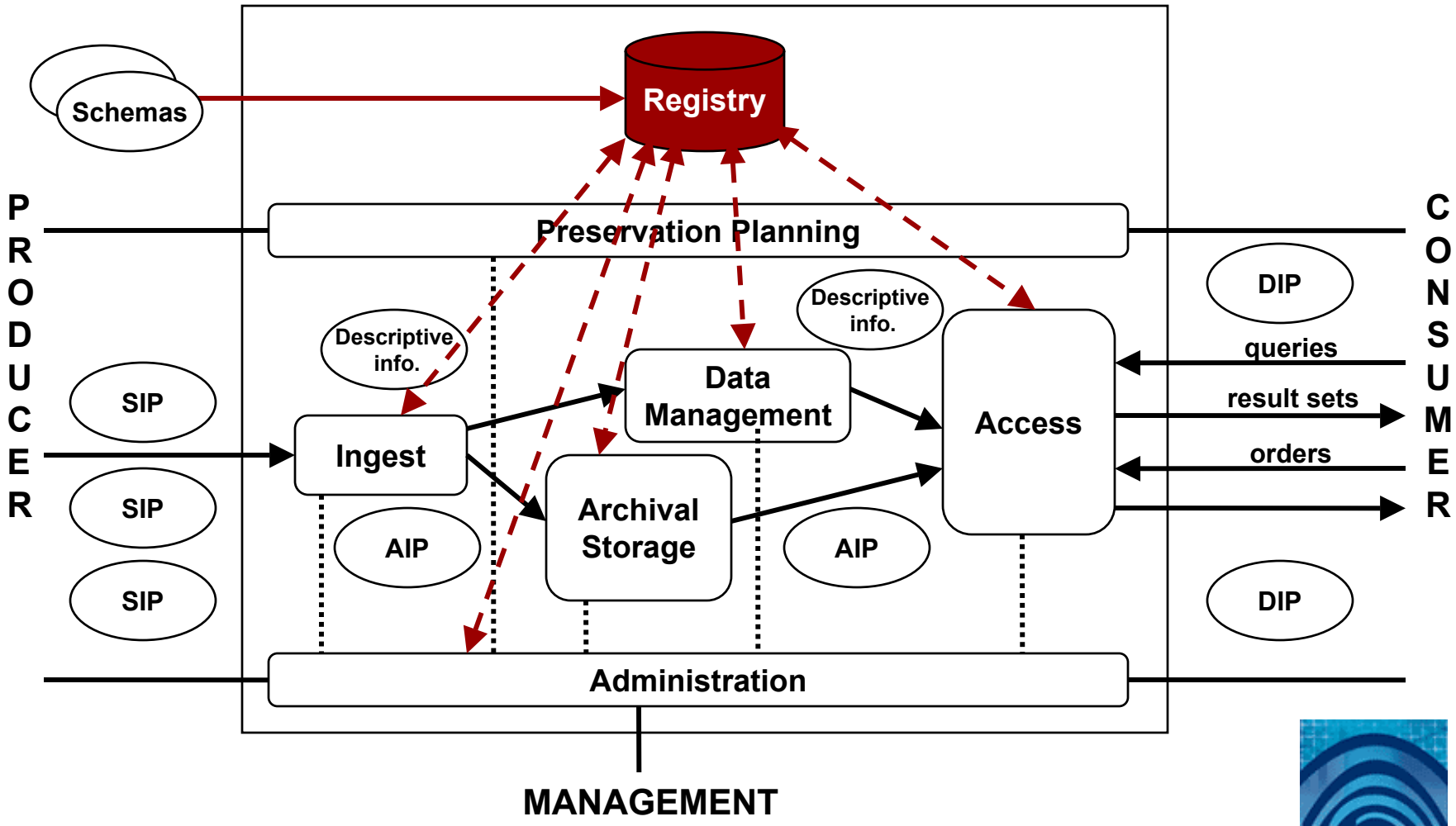
- Registry Functions:
  - Provides support for the ingest process
  - May also provide support for the access function
    - The export of Dissemination Information Packages
    - The exchange of data objects (AIPs?) with other repositories; conversion to exchange standards
  - Can link metadata where there are multiple instances
  - Can help to manage schema evolution

Registry functions



OAIS Functional Entities (Figure 4-1)

Registry functions



OAIS Functional Entities (Figure 4-1)

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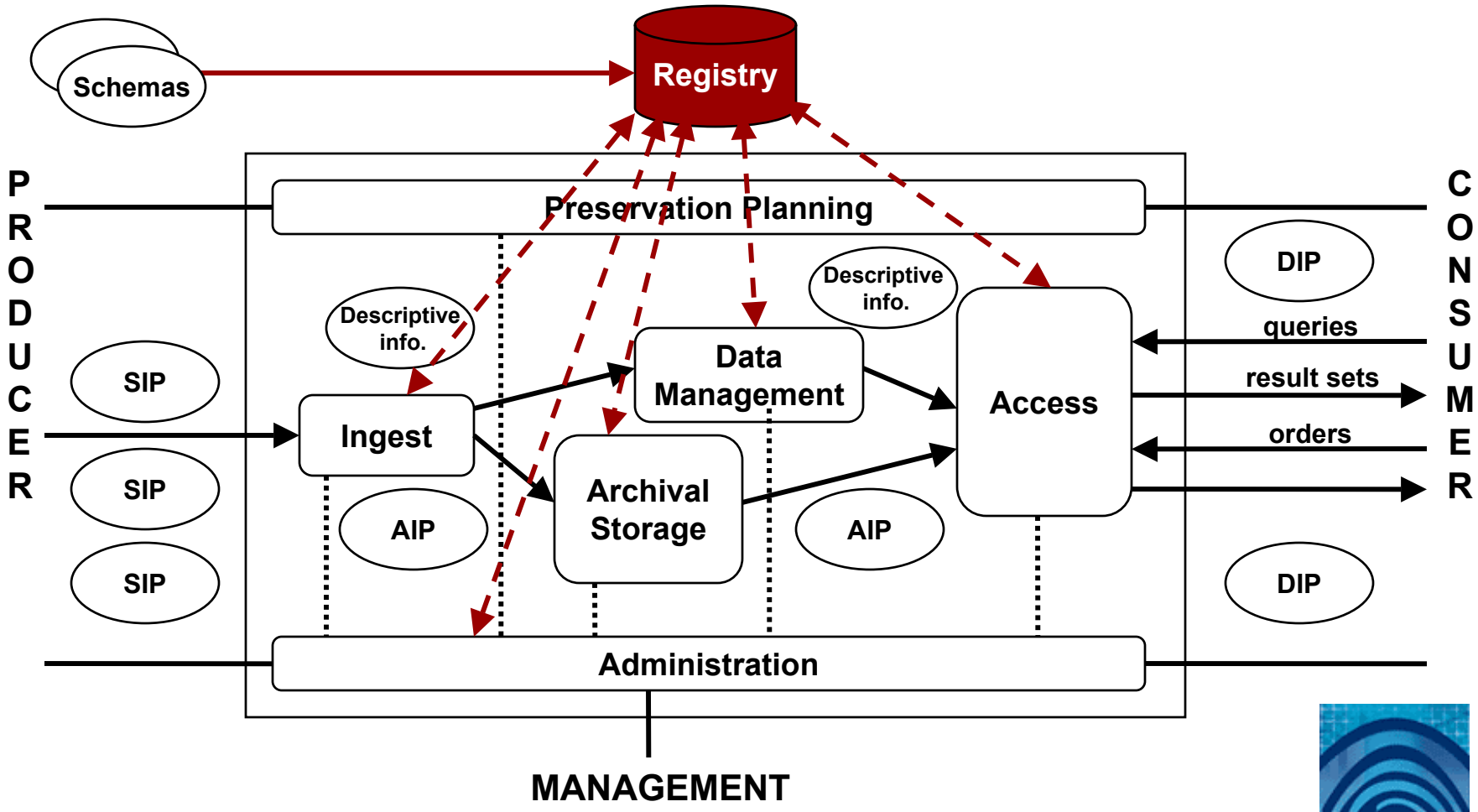
Registry functions



OAIS Functional Entities (Figure 4-1)

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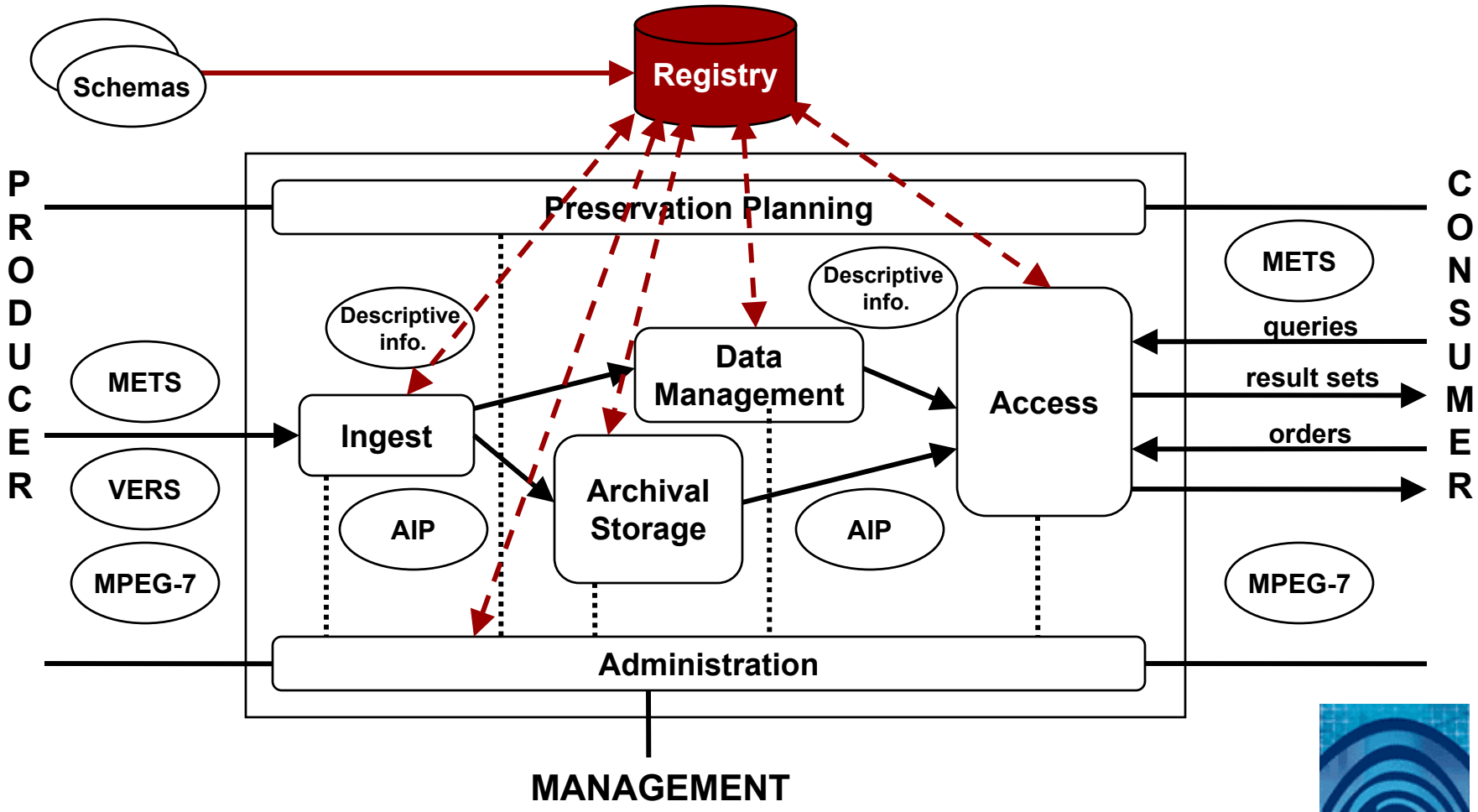
Registry functions



OAIS Functional Entities (Figure 4-1)

Open issues (1)

Organisation of registries:

- Registries are part of infrastructure
- Distributed vs. centralised approaches:
  - Hedstrom (2003) suggests that format and metadata registries could/should be 'shared services'
  - Experimental distributed registries are based on Resource Description Framework (RDF)
    - CORES Registry
    - Encourage *re-use* of metadata (the 'application profile' concept)
    - Are other technologies more suitable?
- Who should be responsible?

Open issues (2)

Metadata quality:

- Standards often deal with metadata semantics, but not always with 'content rules'
- Recent experience with use of unqualified Dublin Core by OAI data providers suggests that metadata quality varies widely, e.g.:
  - DC underutilized, e.g. 5 of 15 elements used 71% of the time, many records have just 'title' and 'creator' elements (Ward, 2003)
  - Some quality problems with records being imported before their refinement by libraries (Halbert, 2003)
- Authority control, de-duplication, etc.

Open issues (3)

Different data models:

- How does the OAIS model fit into other data models being developed for (digital) objects?
  - Examples:
    - Functional Requirements for Bibliographic Records (FRBR) - IFLA
    - ABC Ontology and Model - Harmony project
    - CIDOC Conceptual Reference Model (CRM)
    - …

Summing up

- Implementation issues:
  - A need to focus on the practical issues of implementing preservation metadata standards within *real* systems
  - Then feed what is learnt through this back into the schema design (iterative process)
  - If it doesn't work, start again …
- Interoperability:
  - For reuse and exchange of metadata
  - Possible role for format and metadata registries - but the concept needs extensive testing (and registries are not a panacea)

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