Data Curation and Preservation

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Approach

- **Curation**
  - Assemble the information and knowledge needed to support future use of a collection of records
- **Then Preservation**
  - Management of technology while preserving authenticity and integrity

Discipline Expertise

- **Standard vocabulary**
  - Uniform Content Descriptors
- **Standard data format**
  - FITS, VOTable
- **Standard services**
  - SIAP, VOStore

- **Build collection - typically done by a data center**
  - Authenticity metadata
  - Integrity metadata
- **Standard curation and preservation services**
  - Workflow for automating application of services
    - Curation of data and metadata
  - Infrastructure independence

Curation versus Preservation

- **Convergence of requirements**
  - Digital library metadata to support discovery
  - Archivist metadata to support authenticity and integrity
- **Automated processing (digital libraries)**
  - Extract metadata
  - Register metadata and files
  - Validation of semantics and syntax
  - Validation of integrity
  - Packaging of data and metadata
  - Workflow templates to control curation and archival processes
- **Infrastructure independence (persistent archives)**
  - Standard operations for interacting with new technology

Curation and Preservation Communities

- **IVOA Preservation Interest Group**
  - IAU Commission 5 - Data
  - GGF Preservation Environments Research Group
- **Astronomy preservation bodies**
  - ADS - Bibliographies, references, cross-reference to data
  - CDS - Bibliographies, references, cross-reference to data
  - Project specific archives
  - Agency specific archivs
- **United States**
  - DSpace digital library - MIT
  - Fedora digital library - Cornell University
  - NHPRC InterPARES - International Research on Permanent Authentic Records in Electronic Systems
  - NSF Chronopolis - Federated Digital Preservation across Space and Time
  - Library of Congress NDIIPP - National Information Infrastructure Preservation Program
  - NARA Electronic Records Archive
- **European**
  - ERPAnet - Electronic Resource Preservation and Access Network
  - UK Digital Curation Centre
  - DELOS - Network of Excellence on Digital Libraries
  - DILIGENT - Digital Library Infrastructure on Grid Enabled Technology

Curation

- Set of processes to assemble the information needed to access, manipulate, and manage material

- Appraisal - selection of what to preserve
- Accession - controlled import of the data
- Arrangement - how to structure the material
- Description - how to provide the authenticity, descriptive, integrity metadata
- Preservation - creation of the archival form, and storage
- Access - discovery and manipulation

IAU Commission 5

- **Working Group Astronomical Data**, Chair: Ray Norris
  - Promoting open access to observatory archives
  - Promoting the concept of the Virtual Observatory
  - Promoting common formats for astronomical data to facilitate sharing and entry into public-domain databases.
- **Working Group Designations**, Chair: Marion Schmitz
  - IAU Recommendations for Nomenclature
- **Working Group Libraries**, Chairs: Uta Grothkopf & Fionn Murtagh
  - LISA (Library and Information Services in Astronomy)
- **Working Group FITS**, Chair: William Pence, vice-chair: François Ochsenbein
  - Standard data interchange and archiving format
- **Working Group Virtual Observatories**, constitution in progress, contact person: Françoise Genova
  - International Virtual Observatory Alliance
- **Task Force Preservation and Digitization of Photographic Plates**, Chair: Elizabeth Griffin
  - Pisgah Astronomical Research Institute archive

Preservation Environments Working Group

- **Co-chairs**
  - Bruce Barkstrom (NASA Langley)
  - Reagan Moore (SDSC)
- **Preservation principles**
  - Authenticity - ability to assert that the information needed to describe a digital record remains linked to the record
  - Integrity - ability to assert that the record remains uncorrupted and that the management of the record can be tracked
  - Infrastructure independence - ability to incorporate new technology within a preservation environment
- **GGF Requirements document**
  - Document being produced for GGF14 - June 26.
- **Synergy with IVOA**
  - Requirements for the preservation of collections
    - Standard vocabulary - Uniform Content Descriptors
    - Standard encoding format - FITS
    - Standard services for manipulating the encoding format

Digital Library Technology

- **DSPace - digital library that provides standard data curation services**
  - Import files, add metadata, validate, create METS profile, assemble collection, archive
- **DSpace - SRB integration**
  - Support distribution, replication of data
  - Support federation of DSpace instances
  - Based on a Java interface (JARGON) to the SRB
  - Integration done by David Little, UCSD Libraries
- **DSpace digital library services remained the same**
  - SRB provides a distributed data management system to support DSpace files
  - Goals are to support access of files at a remote site, distribution of files between sites, replication to a remote site,

Integration of Knowledge Management with Data Grids

- **Fedora - NSF NSDL project**
  - Digital Library technology that supports relationships on records (annotation, logical organization, display constraints, …)
  - Uses RDF to describe relationships
  - Plan to integrate with SRB in 2nd quarter FY05 for access to NSDL persistent archive
- **NSF ITR project on Constraint-Based Knowledge Systems (SDSC)**
  - Characterize constraints as relationships that may be imposed dynamically, reified (characterize application of constraint and save result), and updated (characterize state information about reification)
  - Classes of constraints for data administration, access control, organization, presentation, and transformation

Standards

- **Open Archival Information System - OAIS**
  - Archival Information Package - AIP
- **Metadata Encoding and Transmission Standard - METS**
  - Profiles for structuring metadata
- **Open Archives Initiative Protocol for Metadata Harvesting - OAI-PMH**
  - Simple API for retrieving metadata
- **Hierarchical Data Format version 5 - HDFv5**
  - Standard characterization of groups of files in a container
- **Data grid containers**
  - Physical mapping of files into containers
- **ISO Producer-Archive Interface Methodology**
  - ISO DIS 14721 - development of producer archive submission pipelines

Projects

- **InterPARES project**
  - Preservation of Canadian MOST collection
- **TeraGrid Data Intensive Analysis**
  - Replication of sky surveys onto Teragrid for data intensive analyses
    - Providing 50 TBs of on-line disk storage
  - Hyperatlas - Roy Williams
- **NSF Chronopolis**
  - Replication of sky survey image collections to mitigate risk of data loss
  - Integration of digital library technology with data grid technology to build preservation environments
- **Library of Congress National Digital Information Integration and Preservation Program - NDIIPP**
  - Migrate collections between preservation systems