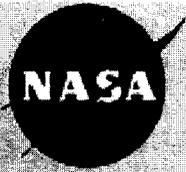


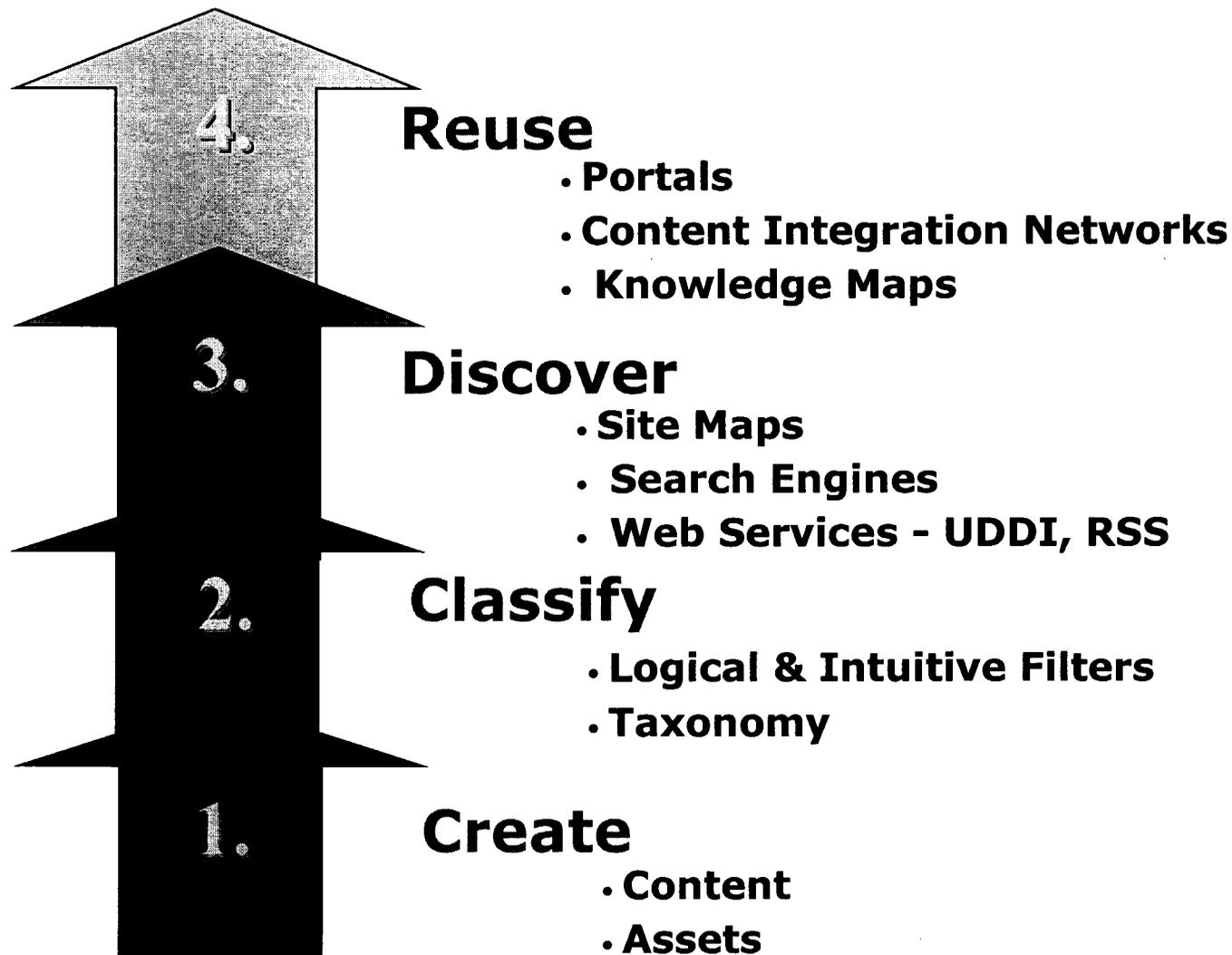
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NASA Taxonomy Development - Uncovering and Reusing Organizational Knowledge

*Jayne Dutra, Jet Propulsion Laboratory
California Institute of Technology, NASA,
Gilbane Content Management Conference
March 26, 2004*



Life Cycle of Electronic Content in the Real Time Organization

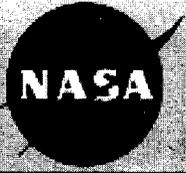




Project Benefits: Enable Knowledge Discovery



- Make it easy for various audiences to find relevant information from NASA programs
 - Provide quick access for NASA resources found on the Web
 - Share knowledge by enabling users to easily find links to databases and tools
 - Provide search results targeted to user interests
 - Enable the ability to move content through the enterprise to where it is needed most
- Comply with E-Government Act of 2002
- Participate in federal XML projects



Project Benefits: NASA Taxonomy Best Practices



- Design process that:
 - Incorporates existing federal and industry terminology standards like NASA AFS, NASA CMS, FEA BRM, NAICS, and IEEE LOM.
 - Provides for NASA XML namespace registry (DISA).
 - Complies with metadata standards like Z39.19, ISO 2709, and Dublin Core.
- Practices increase interoperability and extensibility.



Taxonomy Basics



What is the NASA Taxonomy?

- The classification scheme is meant to encompass all of NASA web content (NASA web space) including internal as well as external material. It is a means for tagging content so it can be used and reused in different contexts.

How to Use the NASA Taxonomy

- This is a generic taxonomy from which specializations can be derived for specific purposes.
 - **Not all Facets need to be used in each instance**
 - **A facet is repeatable**
 - **The taxonomy is modular and dynamic**



Early Task Objectives



- Understand current strategies and practices for creating, collecting, and organizing information across NASA.
- Observe how information is used and organized, the audiences for this information, and the information needs of these audiences.
- Elicit goals, hopes, and concerns for an information architecture solution.
- Start building a community of interest.



Key Findings



- Most (70%) NASA content already has some tagging or is categorized.
 - Most (70%) owners add tag content with metadata.
 - Almost half (45%) use a standard metadata schema, but many different standards are used.
 - Most (60%) use a controlled vocabulary, but lots of different controlled vocabularies are used.
- Different NASA constituencies care deeply about what schemas are specified, and what vocabularies are used because ...



Audience Uses Vary Widely



Admin

- Better understand the program in total, and obtain scheduling information, project status and best practices.
- Access procurement rules and examples, and procurement action synopses.

Sci Tech

- Engineering specifications.
- Scholarly research, competitive intelligence, and general aerospace research.

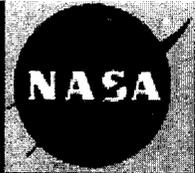
Public

- Develop educational products, support current products, learn, etc.
- Topic research and fact finding, topic background research, and downloading curriculum support materials.
- In the classroom as stand alone items, hands-on learning opportunities, class projects, to expand on a student's learning potential.
- Find NASA contact information on services, information about student opportunities, information about career opportunities, and latest educational news.



Test and Validation Phase

- Qualitative validation
 - Confirm stakeholders and communities
 - Focus on Projects, Engineering & Science
- Quantitative validation
 - Select and build test collection
 - Stratify automated categorizer
- Extend taxonomy value space as needed



Extend Taxonomy Value Space as Needed



NASA Taxonomy Facets (Top Level)

- Access Requirements
- Audiences
- Business Purpose
- Competencies
- Content Types
- Industries
- Instruments
- Locations
- Missions and Projects
- Organizations
- Subject Categories
- Dates
- Collections

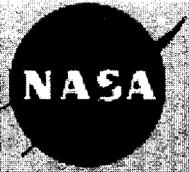
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- http://eis.jpl.nasa.gov/~jedutra/NASA_Taxonomy_04/



Taxonomy Depth and Breadth



Facets	# Terms	# Levels Deep
Access Requirements	5	2
Audiences	62	6
Business Purpose	96	4
Competencies	169	4
Content Types	96	4
Industries	22	3
Instruments	56	3
Locations	106	8
Missions/Projects	648	6
Organizations	323	6
Subject Categories	78	3
Total	1656	



• Content Types

- . Announcements
- .. Press Kits
- .. Press Releases
- . Articles, Notes, and Papers
- . Calendars and Schedules
- .. Agendas
- . Case Studies
- . Catalogs and Databases
- . Correspondence
- .. e-Mails
- .. Memos
- . Databases
- .. Bibliographic Databases
- .. Image Databases
- . Designs and Specifications
- .. Configuration Controls
- .. Notebooks
- .. Quality Control
- .. Requirements
- . Drawings
- . Educational Materials
- .. Activity Guides
- .. Educational Toys
- .. Educator's Guides

Configuration Controls

Broader Terms:

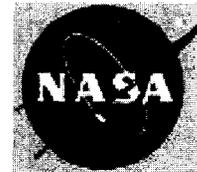
Designs and Specifications

Scope Note:

Records of changes to documentation or hardware, including engineering change requests and waivers.

Term Number:

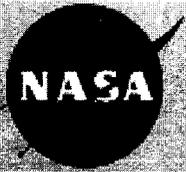
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NASA Taxonomy

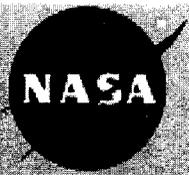


- Query link into FirstGov
- Quick access to Google
- A-Z index of facet branch
- Easy navigation to top level facet and term index



Dublin Core Mapping and XML Schema Development

- Complete Dublin Core mapping
- Create any necessary NASA specific tags
- Develop XML schema from metadata
- Review results with stakeholders and report to CIO Council
- Register schemas in DISA Registry
- Educate and train publishing communities



Taxonomy and XML



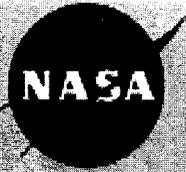
- NASA Taxonomy provides controlled vocabularies used to populate elements of more complex metadata schema such as the Dublin Core (www.dublincore.org)
- The taxonomy facets map to these schema elements



NASA Taxonomy – Dublin Core Map (Draft)



Dublin Core Elements	Definition	NASA Taxonomy Mapping
Creator	Content maker.	dc:creator dc:creator.employee dc:creator.organization
Subject	Content topic.	dc.subject.organization dc.subject.missionsProjects dc.subject.disciplines
Publisher	Publisher of this manifestation.	dc:publisher.organization
Contributor	Content contributor.	dc:contributor dc:contributor.employee dc:contributor.organization
Type	Genre.	dc:type.information
Coverage	Space, period, date, jurisdiction, etc.	dc:coverage.locations dc:coverage.chronology
Audience	Content audience.	dcTERM:audience
Non DC	NASA missions and projects.	nasa:missionsProjects
Non DC	Business functions.	nasa:functions
Non DC	Technical specialties.	nasa:disciplines
Non DC	Standard industry categories.	naics:industries



Project Outcomes: NASA Taxonomy Benefits



... at the NASA Level

- Metadata specification for all NASA content publishers
- XML schema registered in accordance with agreed standards (to enable appropriate use and reuse)
- Enhancement of Agency Web publishing processes
- Integration with NASA public portal content management system for:
 - Reduced publishing cycles
 - Coordinated message themes by the Agency
 - Better quality of Web materials
- Integration with NASA Search Engine, Web Site Registration System
- Application in many technical areas, including engineering and science disciplines (STEP and science data dictionaries)



Project Outcomes: NASA Taxonomy Benefits

JPL

... at the Federal Level

- NASA taxonomy development leadership role in accordance with e-Gov Act of 2002
- Integration with FEA at the BRM & DRM level
- Increased interoperability with other federal agencies through common data models and standards
- Better interoperability with industry partners for increased speed of mission development
- Enhanced results in First Gov search engine
- Readiness to actively participate in E-Gov initiatives



Working Towards Robust Reuse



JPL Knowledge Base

- Standardized project content and data architecture – core metadata
- Common data dictionaries
- Integration of:
 - Engineering repositories and applications
 - Document repositories and applications
 - E-mail archives
 - Financial repositories and applications
 - Multimedia assets
 - Knowledge repositories and applications
- Searchable via Web Services model and meta data registry

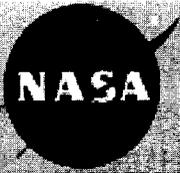


Knowledge Maps and JPL Projects



Building Blocks

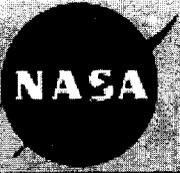
- Creating Knowledge Maps/Ontologies for Projects and Disciplines
 - Faceted views of the knowledge space
 - Faceted by:
 - Role, discipline, project life cycle, process, organizational requirements, more
- Created by:
 - Use case scenarios
 - Customer observation
 - Mental modeling of work processes



Content Integration Networks



- Reuse work from taxonomy and information architecture tasks
- Content tagged with topic or discipline markers
- Mapped to role and WBS team membership
- Aggregation of content through portal channels based on semantic frameworks for communities of practice
- Utilizes Web Services infrastructure to make content portable
- Embed content into business processes



Upwards Integration



- JPL Knowledge Maps to be interoperable with larger NASA taxonomy
- JPL Knowledge Maps and NASA taxonomy interoperable with larger federal taxonomies and data reference models
- JPL Knowledge Maps and NASA taxonomy interoperable with commercial taxonomies, schema and data reference models



Eventual Outcomes

JPL

- Taxonomy work results in machine addressable schema that enable cross-application transactions
- We all speak the same language – facilitate partnerships
- Improved odds of successful mission outcomes by leveraging JPL's knowledge for better decision making and trade studies

Thank you for your time!

- **White Paper on Content Integration Networks for NASA**
Dutra, Xiao, 2/4/2004

https://pub-lib.jpl.nasa.gov/pub-lib/dscgi/ds.py/Get/File-118/Content_Integration_Networks_WP_02_11_04.doc