Rescuing EDL Data

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Background

• The EDL-R task is funded by the NASA Engineering and Safety Center.
  – The task began in April, 2007
  – 3 NASA centers are involved:
    • Ames Research Center
    • Jet Propulsion Laboratory
    • Langley Research Center
Motivation

• Older NASA EDL material has been lost due to:
  – Damage
  – Misplacement
  – Decay
  – Obsolescence
  – Disregard

• The **EDL Repository (EDL-R)** is intended to rescue this type of material in addition to providing access to contemporary EDL mission data so that it can be used to design future EDL systems
Examples of At-Risk Missions

• Early planetary atmospheric entry tests
• Mercury (1959-1963)
• Apollo (1961-1972)
• Project Fire (1962)
• Gemini (1965-1966)
• Viking I & II (1976)
• Pioneer Venus (1978)
• Galileo [entry & descent] (1989)
• Magellan [aero-braking data] (1989)
EDL-R Content

- Types of material
  - Raw engineering flight data
  - Time reference data
  - Calibration, scale factors, etc.
  - Aerodynamic data base
  - Mass properties (detailed)
  - Software design documents
  - Process or reconstructed data
  - Development and test data
  - Reports and analysis
  - Bibliographic references to published papers
EDL-R Disciplines

- Aerodynamics
- Propulsion & decelerators
- Guidance & control
- Thermal Protections Systems
- Separation systems
EDL-R File Formats

• Formats
  – Text: .txt, .rtf, PDF, .doc, HTML
  – Raster Images: .tif, .jpg
  – Vector Graphics: .cgm
  – Audio: .wav, .mp4
  – Video: .avi, .mov
  – Spreadsheet: .xls, .csv
  – Pseudo code and software source code
  – Presentation: .ppt, Keynote (mac)

• Size
  – Files or sets of files larger than 2GB must be compressed
    • Limitation due to Apache web server and some browsers
Implementation of the EDL-R

• A Trade Study was performed in ‘07 to select an open-source digital library
  – Requirements: open-source, web-based, archival standards-compliant, mature, large user community, active developer community

• 24 tools were considered and 3 were selected for in-depth examination:
  – DSpace
  – EPrints
  – Greenstone

Users preferred workflow, navigation, ease of installation
How the EDL-R Works

Diagram showing the process:
- End User
- Curator
- HTTP
- Migration Process
  - Specify metadata
  - Upload file(s)
  - Database
  - Query/Download
  - Authorization
  - Authentication
  - Review/Approve
  - Email Notice
  - File System
Security

• Passwords
  – Access to the system is password-protected

• Data encryption
  – All data transferred between the client and server are encrypted

• User Authorization levels
  – Each user is assigned an authorization level based on their:
    • Nationality
    • Affiliation with NASA, e.g. employee, contractor
    • System administration level
Submission Process

• 5-step Workflow:
  – Type: of material being submitted
  – Upload: of file(s) and sensitivity level
  – Details: metadata describing the material
  – Subjects: associate subject keywords
  – Deposit: the item for Review

• Personal work-area to save incomplete submissions
Review Process

- The EDL-R Curator will review submissions for:
  - Completeness
  - Accuracy
  - Approvals and cover sheets, if applicable
    - Copyright
    - Document Release approval
    - ITAR, NASA-sensitive coversheet
- The Curator may return the submission to the user’s work-area if critical information is missing
- The submission will be released for access once it has been cleared
Searching Repository
Browse Method

• Browse: allows the user to navigate through various topics:
  – Author
  – Mission
  – Subject
  – Year
Browse Example

Subject: Aerodynamics (General)

- Entry Descent and Landing Subjects (38)
  - Aerodynamics/Astrodynamics (18)
    - Aerodynamics (General) (17)
      - Aero-thermodynamics/Aeroheating (5)
      - Aerodynamic Configurations (5)
      - Aerodynamic Flow (10)
      - Aerodynamic Forces (3)
      - Stability and Control (4)

Number of items at this level: 2.


Query Method

• Query: allows the user to specify keywords to search on
  – Quick Search
  – Simple Search
  – Advanced Search
Advance Search Example

Full Text matches "Rovers" AND Title matches "Landing"


Unique Features

• Email Notification: users can save search criteria and configure it to trigger at specified times, and search results will be emailed.

• Most Wanted List: a bulletin board for users to post requests for unique and rare material
Most Wanted List

Welcome to the EDL Repository

Username: [ ]
Password: [ ]
Login

Forgot Your Password? Request an Account Contact the Curator

EDL Release Presentation EDL Beta Test Instructions
Note: you must have cookies enabled.

Most Wanted Documents
Example most wanted item for IPPW
To demo most wanted list at the PPW. This item will be deleted soon after the PPW demo.

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Future Capabilities

• Virus Checking
• Batch Submissions
• Improved User Interface
Maintenance & Preservation

- During operations the SA and Curator are responsible for:
  - Maintenance
    - Focuses on periodic upgrades to the software system and hardware as technology improvements are made
      - EPrints, Web server, database
      - Faster machines, storage expansion
  - Preservation
    - Ensures that the stored material can continue to be read as technology changes
      - Migration to newer file formats, transferring data from decaying media, replacing outdated tools with current versions
Questions and Comments
General Info

EDL Repository Location:
https://edlr.jpl.nasa.gov

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