Defining machine-actionable DMPs

This term refers to information that is structured in a consistent way so that machines, or computers, can be programmed against the structure.

Data Documentation Initiative
Stakeholders and benefits

Researchers

Institutions / Organizations

Repositories / Infrastructure

Funders

Publishers?
What do we want machine-actionable DMPs to do?

They should enable...

- Discovery
- Consistency
- Resource allocation
- Compliance monitoring
Review of current work (i): DMP vocabularies

- **CASRAI DMP Ethics Review vocabulary**
  - embargoes, intellectual property rights, security
- **DMP extension of the DataID ontology**
  - RDF, DMP lifecycle, includes re3data schema
- **DCC themes for DMPs**
  - 28 common topics addressed in DMPs used to tag questions and guidance in DMPonline
- **Data Practices and Curation vocabulary** (DPCVocab)
  - 3 categories—Research Data Practices, Data, Curation—with 187 terms
- **DDI white paper** on Active DMPs
Review of current work (ii): DMP standards

- **DART Project rubric for DMP evaluation**
  - Analytic rubric to standardize review of NSF DMPs
  - UK group using it to create rubrics for UK funders

- **Univ. of Colorado competition for best DMPs (2014 – )**
  - $2k prize for best DMPs from 5 disciplines
  - Guidelines for DMPs on library website

- **Ten Simple Rules for Creating a Good DMP (Michener 2015)**
  - Establish relation to relevant policies
  - Define & explain data structure, provenance, preservation
Review of current work (iii): DMP platforms

- **DMPTool-DMPonline merge**
  - Opportunity to support standards at the point of use

- **RIO Journal publishing DMPs**
  - All in JATS XML, can be updated

- **Process Management Plans**
  - proposed framework to capture entire research process

- Your ideas here...
Themes in DMPonline

- Existing Data
- Data Description
- Data Format
- Data Type
- Data Volumes

- Data Capture Methods
- Documentation
- Metadata
- Data Quality

- Ethical Issues
- IPR Ownership and Licensing
- Data Security
- Storage and Backup

- ID
- Project Description
- Related Policies

- Expected Reuse
- Discovery by Users
- Method for Data Sharing
- Timeframe for Data Sharing
- Restrictions on Sharing
- Managed Access Procedures

- Data Selection
- Period of Preservation
- Preservation Plan
- Data Repository

- Responsibilities
- Resourcing
Refining the themes

● 28 themes reduced to 16
● Used to tag funder questions with guidance; to address how, when, under what restrictions or agreements data will be shared.
● Implement for all DMP templates worldwide.
● DMPonline/DMPTool and hosted instances have > 30k users. Opportunity to test the potential of basic tagging, e.g., text mining, before exploring more specific vocabulary.
Common DMP vocabulary

- **Should map to and/or from**
  - elements of data management workflows
  - policy requirements
  - suitable controlled vocabularies, e.g., discipline-specific (if available)

- **Should keep in mind**
  - we still need a human-readable document with a narrative
  - researchers resent form-filling exercises
  - needs to be updatable throughout lifecycle
Use cases for maDMPs

- Data discovery
- Capacity planning / Resource allocation
- Aggregation / Integration
- Policy compliance
Use case: maDMPs as a discovery tool

- Could facilitate discovery using any element of the core data model, across DMPs
- For example, it would be possible to watch out for new data
  - Of a particular kind (e.g., MRI scans of Alzheimer’s patients)
  - Acquired with a particular method/ instrument
  - Acquired by particular people/ labs/ institutions
  - With a particular license
- By inference, it would be possible to learn about
  - Different teams producing or curating the same or related data
    - Who is doing what around the Zika virus outbreak right now?
  - Ongoing replications of the same original studies
  - Field trips planned by different teams to the same location
- Making them public broadens the community that can make use of this tool
Funder use cases: Horizon 2020

- Deposit of DMPs in repositories
  - Work planned under OpenAIRE, e.g., B2SHARE and Zenodo
- Compliance checking of data deposit in named repositories
  - DOI fed back into tool to update DMP
Funder use cases: NERC

NERC: Natural Environment Research Council, UK

- Notify designated NERC repositories of planned deposits
  - 7 disciplinary data centers
- Compliance checking of data deposit in named repositories
  - DOI fed back into tool to update DMP
- Support DMP lifecycle
  - trigger notification to begin next phase when project award made for funders with multi-stage requirements
  - push award details (grant IDs, etc.) back into DMPs
Repository use case (i)

Repository recommender service via re3data.org

- Automated function for data tracking
- Provides info about metadata standards, etc. at beginning of project
- Can notify repository of data in pipeline for planning (repository use case ii)
Repository use case (ii)

Text/data mine to ping data repositories or other collections (e.g., in biobanks, museums) when mentioned in a DMP, e.g., using:

- Substance Editor
- SciCrunch
- DMPonline themes to help identify relevant text to mine
Persistent identifiers (PIDs)

- Assign a DOI to DMP of record (i.e., submitted with grant proposal). Use this to get award details back into a DMP.
- Leverage other PIDs to populate DMP over time:
  - Researcher IDs ([ORCID](https://orcid.org))
  - Funder IDs ([FundRef](https://www.fundref.com))
  - Grant IDs
  - Research Resource IDs ([RRID](https://www.researchregistry.com))
    - antibodies, organisms, cell lines, tools
  - Etc.
- Also enables compliance monitoring
DMPonline API to create a plan

- Research offices can auto-generate plan with correct template, guidance, and basic plan details (PI, project name) when they know one is required
- Takes the burden off researchers
- Additional work planned to connect DMP tools with common research information management systems (e.g., PURE)
- Can integrate to assign DOI at point of grant submission
Layered DMP use case

- Higher-level plans to reduce burden of creating project-level plan where appropriate; interoperability across layers
- Can we map this to DMPonline/DMPTool? To see how existing descriptions of large-scale infrastructure can be mapped to tools we have?
- ‘Big Science’ projects (e.g., at CERN), infrastructure projects (e.g., ELIXIR), individual universities
Prioritization & next steps

- Core vocabulary and standard way to extend
- DMPTool-DMPonline merged platform
  - begin deploying use cases
  - continue collecting new ones
- Education/outreach to make DMPs better
  - hypothetical use cases are good, but DMPs need to be better for them to work
- Continue integrating systems
Making DMPs public, open, and discoverable

- On a website
- In a repository
- In a journal
- Elsewhere

- Formats
  - PDF, HTML, machine-actionable
- **Versioning**
- Licensing
- Archiving

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Example data management plans

- Several research funders require a data management plan (DMP) to be submitted as part of a grant application.
- DMPs vary in length depending on the funder requirement and the complexity of the data that will be generated; most are 1-4 pages long.
- The examples below are for illustration. Where possible, Leeds examples are used but there are also links to DMPs outside Leeds.

**AHRC**

*The Professional Career and Output of Trevor Jones*: this Technical Plan was highly rated by peer reviewers. This plan is for a large project which involves digitising an archive of film music. The Technical Plan format in this document comes from an old template. The AHRC provides a list of mandatory headings for your Technical Plan.

*Virtual Holocaust Memory*: data outputs from the project include several videos and a project web site. AHRC peer reviewers requested clarification about how the outputs would be looked after beyond the end of the project. The requirement was satisfied with a short letter from the RDL team with additional information about the Research Data Leeds repository service. The AHRC response underlines the importance of considering how and where data can be shared during and after your project.

**ESRC**

*Realist Evaluation of Adapted Sex Offender Treatment Programs for Men with Intellectual Disability*: This plan looks at managing quantitative and qualitative data, including audio interviews. The plan discusses ethical issues around a very sensitive dataset, including using consent and anonymisation to generate data which can be shared and reused.
Study on Mhealth and Reproductive Health in Teens

Rokicki, Slawa; Fink, Gunther, 2015, “Study on Mhealth and Reproductive Health in Teens”, http://dx.doi.org/10.7910/DVN/23418, Harvard Dataverse, V1

If you use these data, please add this citation to your scholarly resources. Learn about Data Citation Standards.

Description

The dataverse will include the necessary documents to replicate the Study on Mhealth and Reproductive Health in Teens. It includes the Data Management Plan, Statistical Analysis Plan, data, and code.

2 Files

- SMART Data Management Plan 11_18_13_2.docx
  - Unknown - 114.5 KB - Oct 22, 2015 - 1 Download
  - MD5: d12e40e65f0a131b11ce0234b2b500b
  - SMART Statistical Analysis Plan

- SMART Statistical Analysis Plan V2_3.docx
  - Unknown - 167.1 KB - Oct 22, 2015 - 0 Downloads
  - MD5: 406f653e5c65b8d7f0185c5e262b5478
  - Pre-specifies the statistical analysis for SMART.
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<th>Owner</th>
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<td>Multi-level Adaptive Agents for Search Space Control</td>
<td>NSF-ENG: Engineering</td>
<td>Missouri University of Science and Technology</td>
<td>Steven Combs</td>
<td>📃</td>
</tr>
</tbody>
</table>
Public Data Management Plans created with the DMPTool

This collection contains data management plans (DMPs) created with the DMPTool – a free online application that helps researchers build data management plans for specific U.S. funding agencies.

Data Management Plan for PhD Thesis "Climatic Limitation of Alien Weeds in New Zealand: Enhancing Species Distribution Models with Field Data"
Jennifer Pannell

- Data Management Plan
- doi: 10.3897/rio.2.e9664
- 05-04-2016
- Unique: 404 | Total: 657
- Reprint: €2.30

A Political Ecology of Value: A Cohort-Based Ethnography of the Environmental Turn in Nicaraguan Urban Social Policy
Josh Fisher, Alex Nading

- Data Management Plan
- doi: 10.3897/rio.2.e8720
- 05-04-2016
- Unique: 226 | Total: 421
- Reprint: €2.30

Coastal Data Information Program (CDIP)
Jennifer McWhorter, Darren Wright, Julia Thomas

- Data Management Plan
- doi: 10.3897/rio.2.e8827
- 15-04-2016
- Unique: 196 | Total: 321
- Reprint: €3.60
Realizing the greater potential of DMPs

We all want to move DMPs beyond a culture of compliance to promote culture change

This involves such lofty goals as:
- Linking DMPs to their actual implementation
- Advancing open scholarship
- Using the DMP as a training platform to accomplish these things
Outlook

- Which workflows can we imagine around machine-actionable & public DMPs?
- What role can public DMPs play in education & training for data management?
- What if DMPs were accessible via public Jupyter notebooks by default?
- How can DMPs interact with each other, within & across layers?
- Which versions of a DMP should be archived & for how long?
- Which resources should a DMP talk to/ be notified from?
- What actions could or should DMPs trigger?
- Who should know a DMP was updated?
- When should DMPs be updated?
- ...
Summary

Think of DMPs as key elements of a networked data management ecosystem:

- connected via a shared vocabulary
- actionable by humans and software
- versioned
- public