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# Teaching Research Data Management

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# TEACHING RESEARCH DATA MANAGEMENT: AN UNDERGRADUATE/GRADUATE CURRICULUM

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# Background

- IMLS Planning Grant to teach data management
  - Summer of 2010
- 21<sup>st</sup> century skills
  - Communication & collaboration
  - Scientific and numerical literacy
- UMass Medical School
- WPI

# Project Staff

- Project Manager
- Steering Committee
- Education Committee
  - Faculty
  - Librarians
  - Graduate student
- Consultants
  - Curriculum
  - Evaluation
  - Instructional design

# Student Interviews

- 30 Freshmen from the Great Problems Seminar at WPI
- 10 Graduate Students from WPI
- 10 Graduate Students from UMMS

# Student Interviews at WPI

- Great Problem Seminars - Dec. 13, 2010
- Nine poster sessions - 3 to 4 students each.
- Good projects - all with good data - in a variety of formats.
- Some had used librarians to assist with their research.
- Others used their own resources - Google, other search software.

# Student Interviews at WPI

- Data backed up in emails to each other and their professors, to SharePoint server, Google docs, external drive, left on personal laptops.
- Commercial software used for data - Excel, Sims 3 (modeling), Word, PowerPoint, Adobe Illustrator and Photoshop.
- No standard naming conventions used for directories and/or files.

# Student Interviews at UMMS

- Lab data protocol changes from lab to lab - usually at the call of the PI. (wet labs vs. dry labs)
- Some students have devised their own system (FMPro, Dropbox, Google [cloud], various naming conventions).
- Most rely on the network server for depositing collected data, some on individual lab computers. Backups were not consistent.



# Student Interviews at UMMS

- Many expressed a preference for electronic lab notebooks if they were available.
- Some discussed stronger data protocols in private sector before coming to UMMS.
- Some discussed software used with their data - Perl, GraphPad Prism, Filemaker Pro, SPSS, SAS, Envivo.

# Learning Objectives

- Identify the types of data
- Identify the various ownership levels of research data
- Describe the typical life cycle
- Categorize data storage requirements in terms of size/amounts
- Evaluate and appraise viable data publishing and storage options
- Indicate the various descriptors of raw data

# Learning Objectives cont...

- Record project identifiers for specific research data
- Define various naming conventions
- Recognize data format importance for long-term access needs
- List and select various ways to assure the security of their data
- Recognize data privacy requirements
- Identify data sharing and reporting requirements

# Approach

- Mix and match to meet needs of the group
  - Modules
- Format
  - Online / self-directed
  - In-person
  - One time, week, semester
- Activities
  - Case-based
  - Readings
  - Assignments

# Content Modules

## Introduction

The data management module focuses on various forms of data and the plan of the researcher to collect, store, retrieve and disseminate their data to collaborators according to policies and standards.

## Security

This module employs various measures to establish adequate data integrity and protection. Including: keeping data safe from corruption and insuring that access to it is suitably controlled.

## Sharing

This module employs various measures to establish adequate data integrity and protection. Including: keeping data safe from corruption and insuring that access to it is suitably controlled.

## Describing & Accessing

This module covers the creation of descriptive, structural or administrative metadata for researchers' data with an emphasis on deciding how or who will create the metadata for a given set of research data.

## Naming Conventions

This module covers the importance of rules which when applied to data, could result in a set of data elements which are described in a standardized and logical fashion.

## Storage

Coding of words, descriptions, figures, still or moving images, and sounds into digital format and onto an array of repositories that can be accessed by authorized users with standard search protocols.

## Life Cycle

Appropriate life cycles of specific research data are discussed in this module, along with the different time-dependent values of data and its management in different phases of its life cycle.

## Privacy & Restrictions

Information privacy and the relationship between the collection and dissemination of personally identifiable data are covered in this module.

# Mix and Match Scenarios

- Undergrad working on first research project
  - All 8 modules
- New graduate student in a lab
  - Introduction, describing & accessing, life cycle, naming, storage, privacy & restrictions
- Librarian leading a workshop for new faculty
  - Introduction, security, sharing, naming, privacy & restrictions
- Medical student collects personal data
  - Introduction, security, naming, storage, privacy & restrictions





# Next Steps

- Finalize curriculum
- Develop the introduction module
- Work with faculty
- Obtain additional funding

# Thank You to Our Sponsors

- Institute of Museum and Library Services
- National Network of Medical Libraries
  - New England Region
- University of Massachusetts Medical School
- Worcester Polytechnic Institute

# Thank You

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