Metadata Standards and Technology Development for the NSF Survey of Earned Doctorates

Kimberly Noonan (NSF NCSES)
Pascal Heus (MTNA)
Tim Mulcahy (NORC)

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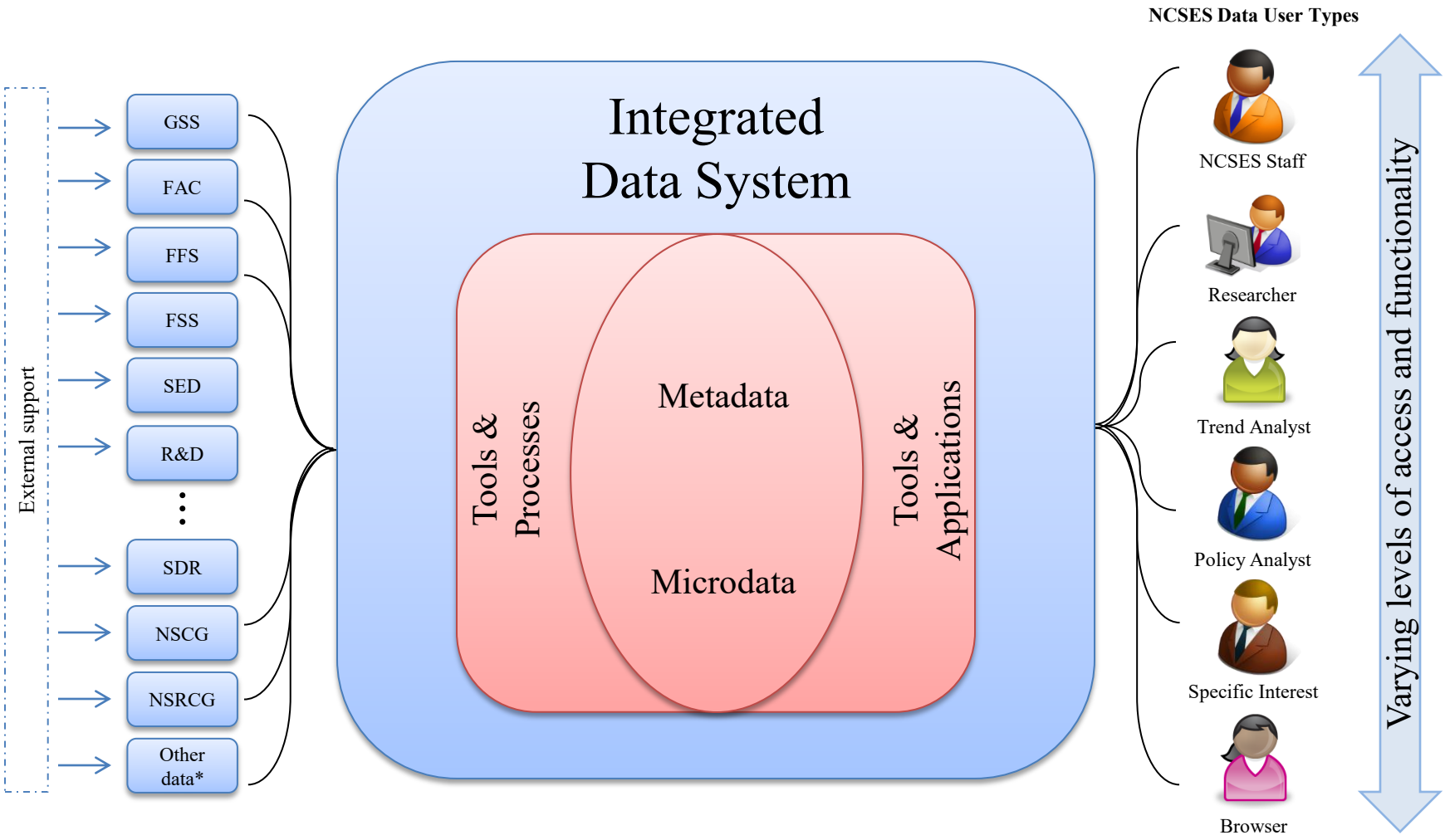
National Center for Science and Engineering Statistics (NCSES)

- A federal statistical agency within NSF
- Charged with the mission to provide a central clearinghouse for the collection, interpretation, and analysis of data on scientific and engineering resources
- 12 periodic data collections covering science and engineering
  - Research and Development
  - Education
  - Workforce
- Over 7 contracts for external support
- Building a central data system to store, maintain, and disseminate survey data in a faster, more flexible way

NCSES Data System



* Other data used regularly in NCSES publications

NCSES Data Delivery

- Develop data delivery requirements for all survey microdata and metadata
- Ensure comprehensive documentation
- Standardize delivery formats
- Adopt metadata standards
  - Data Documentation Initiative (DDI)
  - Globally recommended practices
  - Industry standards and technologies
- Automate data processing

NSF Metadata Project: SED a case study

Objectives

- Capture comprehensive survey metadata, in DDI format
- Automate generation of essential documentation, standard reports
- Generate delivery package compatible with the NCSES data systems
- Case study with Survey of Earned Doctorates (SED)
  - Extend to other NCSES surveys

Team

- **NSF NCSES**
  - Building next generation data system and management framework
- **NORC SED team**
  - Survey contractor, years of survey specific knowledge
- **Metadata Technology North America (MTNA)**
  - Domain and technology experts in statistical data management and its challenges

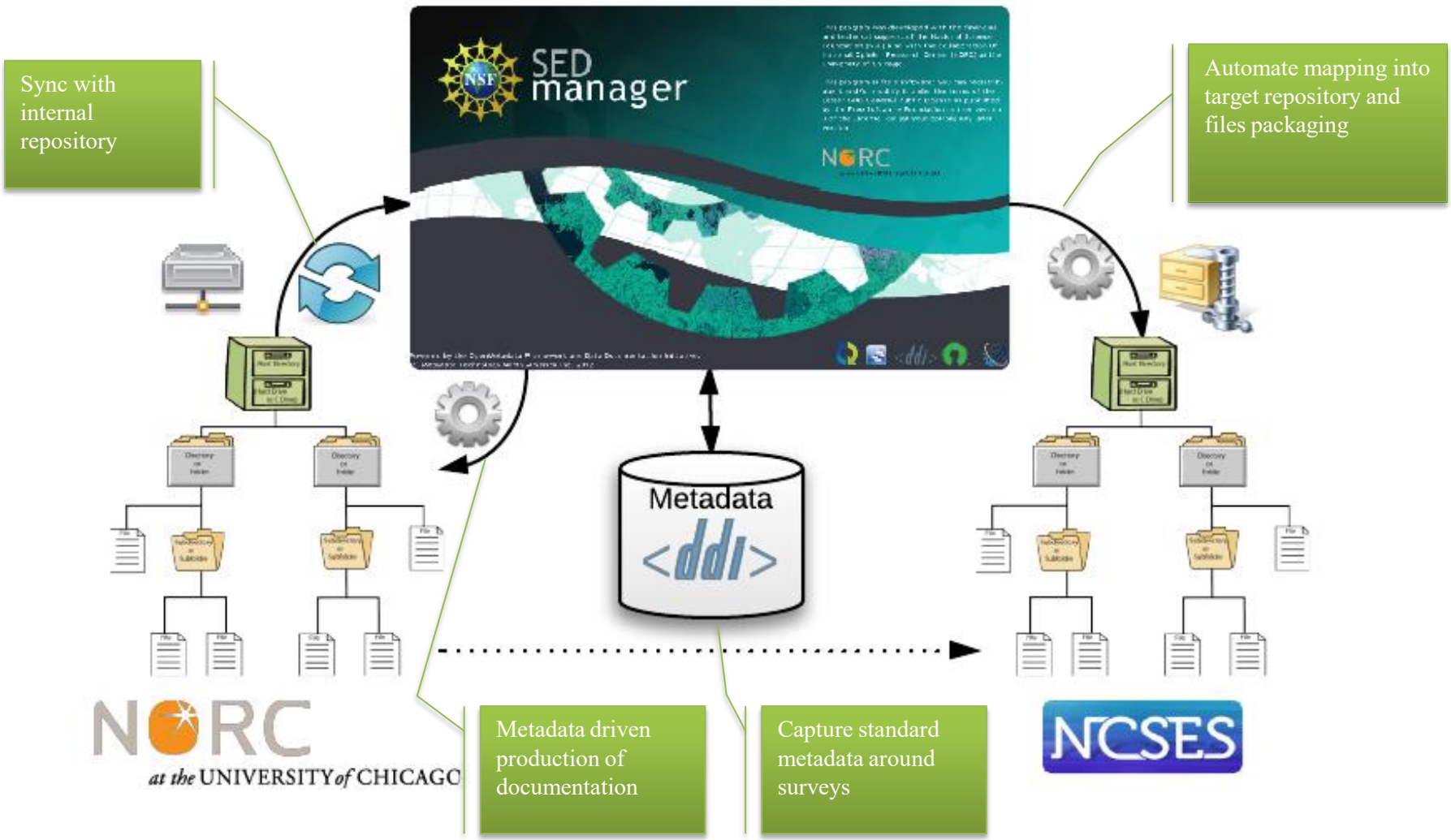
NSF Survey of Earned Doctorates

- **Began in 1958**
- **Annual survey**
- **All individuals receiving research doctoral degrees from accredited U.S. Institutions**
- **Results used to assess characteristics and trends in doctorate education and degrees**
- **Survey is currently conducted by NORC**
- **NCSES disseminates data, reports and documentation**
- **SED sponsors**
  - National Science Foundation
  - National Institutes of Health
  - US Department of Agriculture
  - Department of Education
  - National Endowment for the Humanities
  - National Aeronautics & Space Administration

SED Metadata Project Plan

- **Define SED metadata**
  - Assess current situation, file inventory
  - Capture comprehensive survey metadata
- **Develop SED metadata schema**
  - Develop metadata model
    - Based on metadata standards
    - Aligned with NCSES data system and dissemination needs
- **Prepare metadata for SED 2011**
  - Develop software tool, extend existing MTNA open source application
- **Automate SED metadata preparation for 2008, 2009, 2010**
  - Extend to additional survey cycles
- **Recommend maintenance and future steps**
  - Lessons learned
  - Next steps

SED NSF Manager



NSF SED Manager

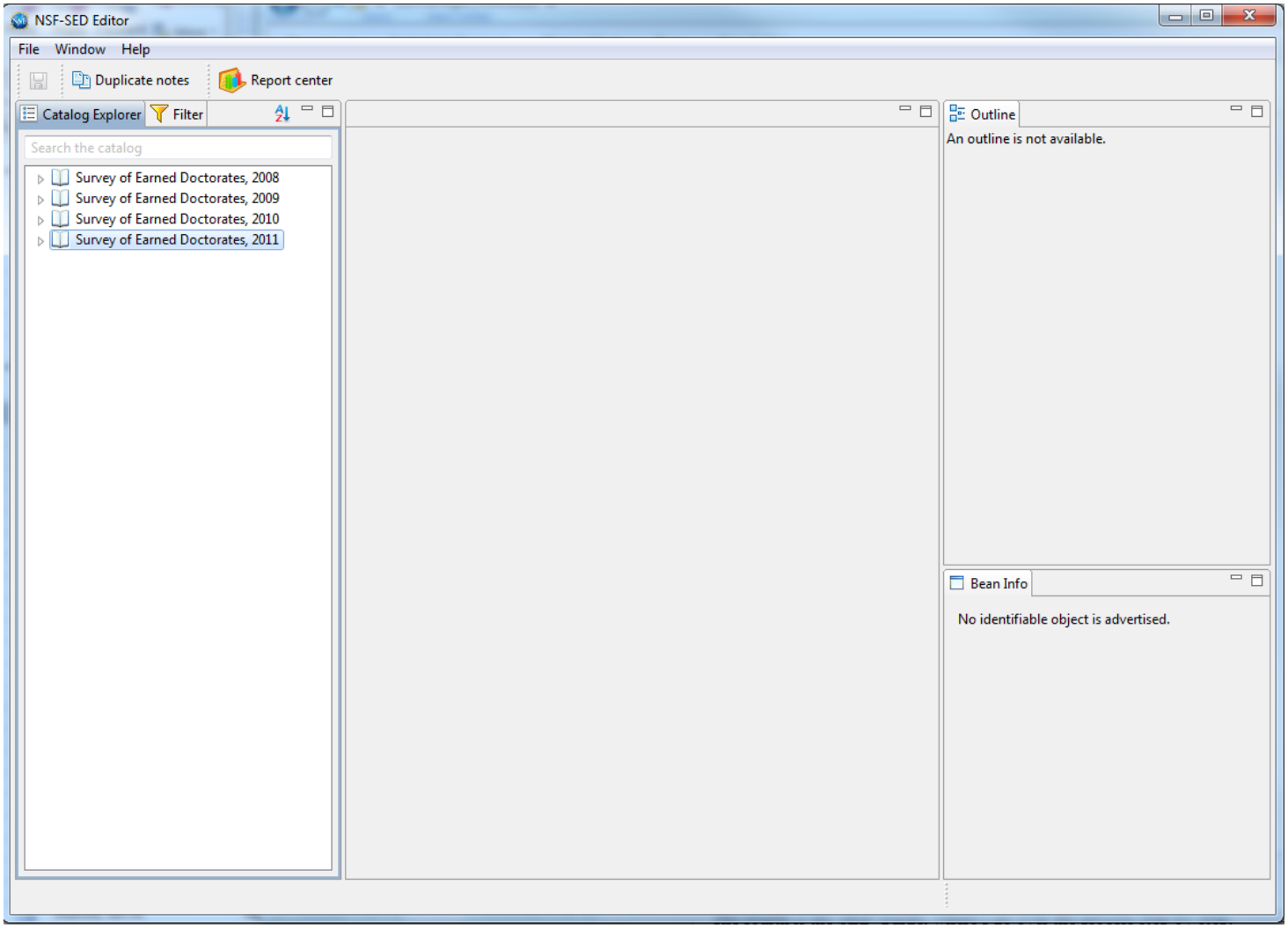
Features:

- **Catalog Explorer**
  - Import/create survey
- **Metadata Editors**
  - Survey, Questionnaire, Classification, Variables, Data, Documentation, Notes,
  - Repository packaging module
- **Report Center**
  - Codebook
  - Comparison reports, e.g. codebook comparison
  - Custom reports

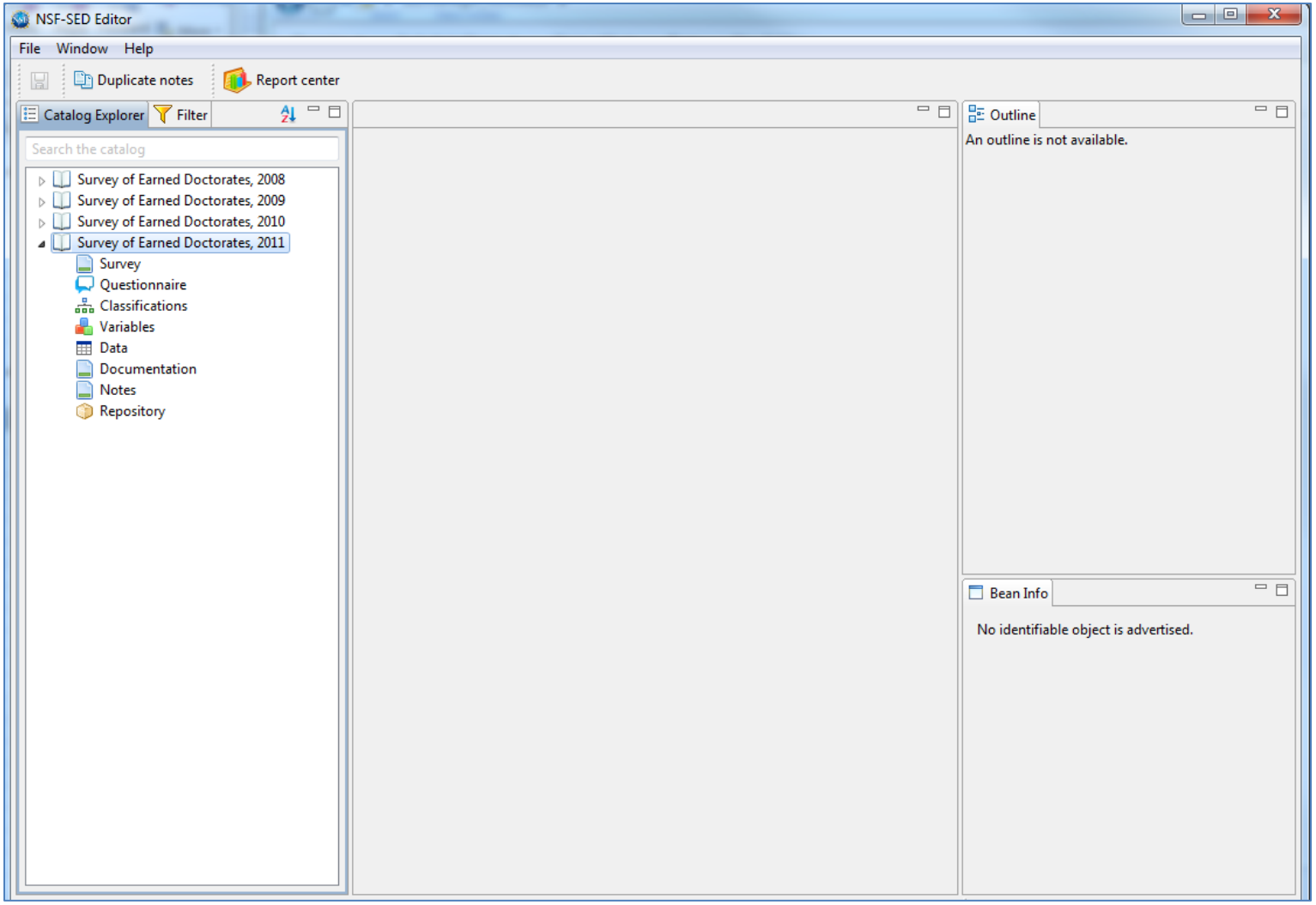
Benefits:

- Metadata are standardized
- Metadata are DDI compliant
- Metadata are automatically captured

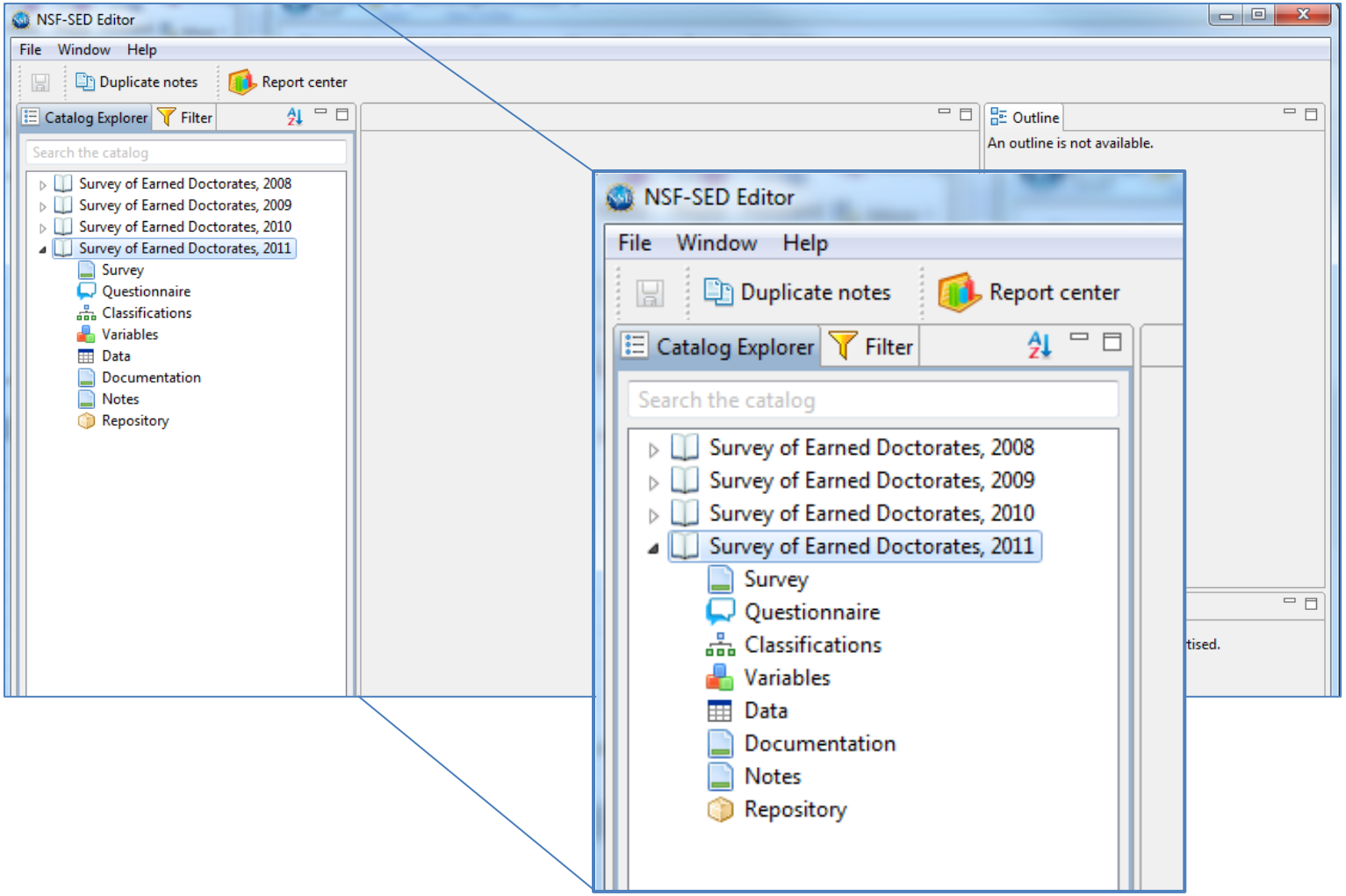
Catalog Explorer



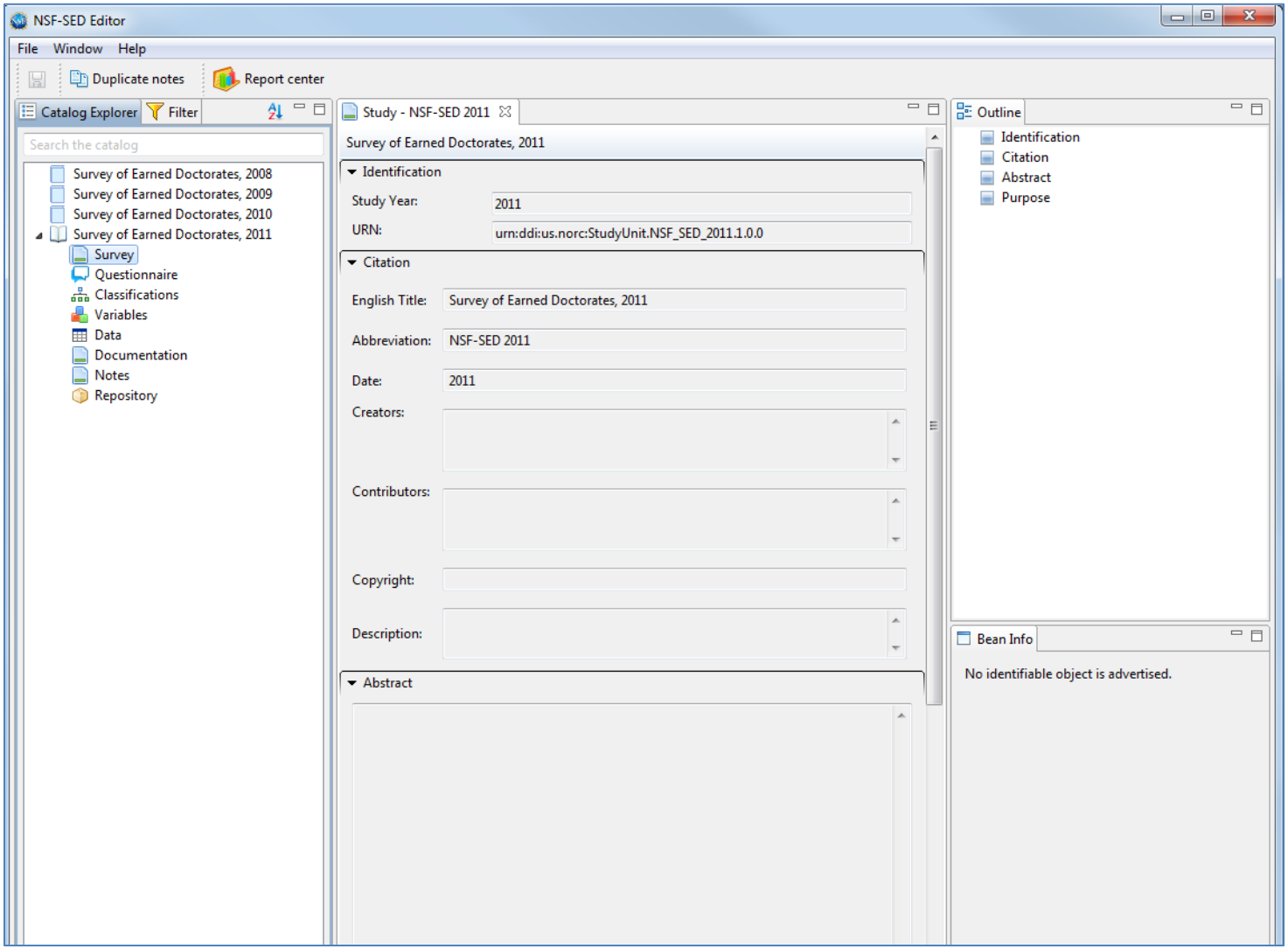
Metadata Editors



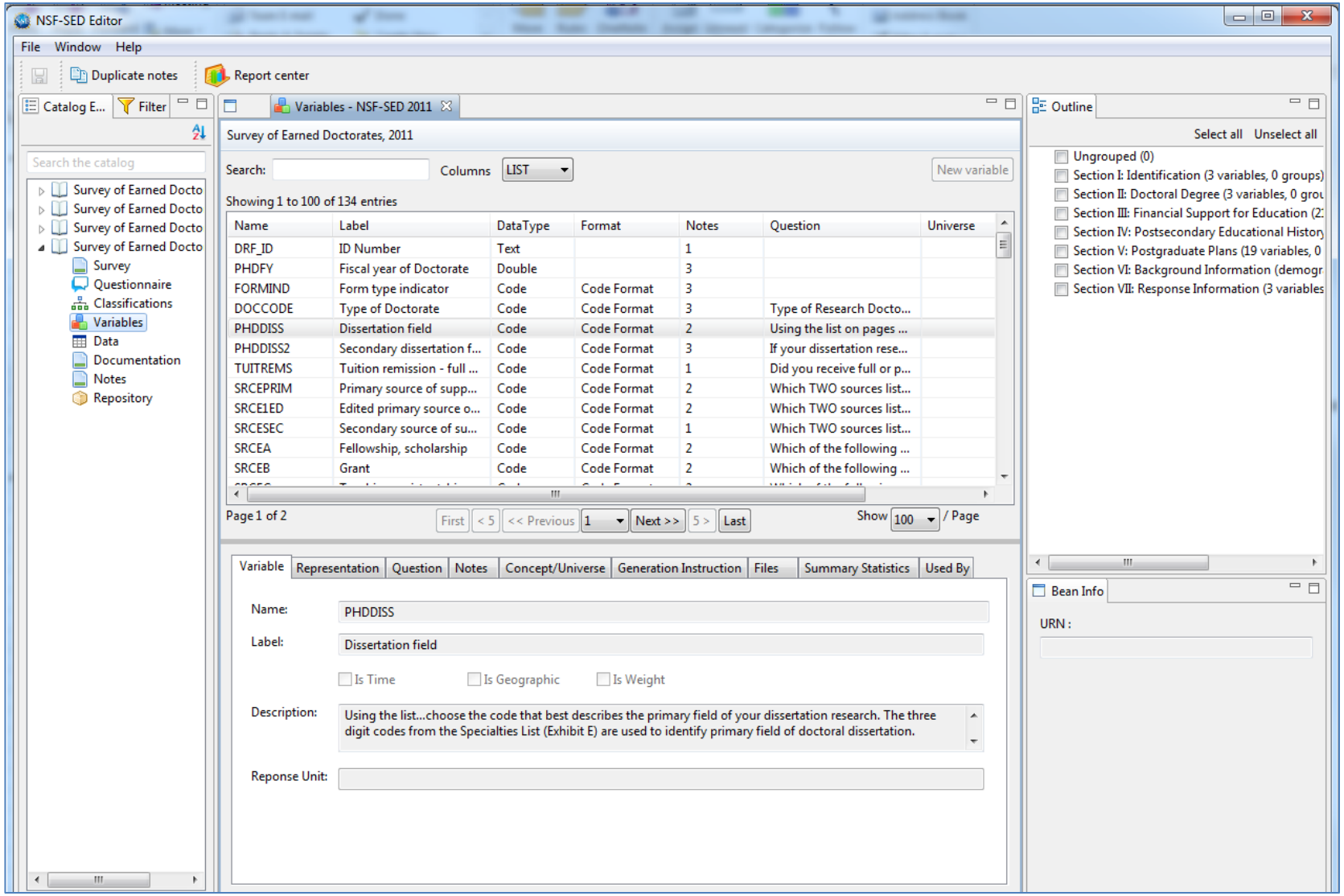
Metadata Editors



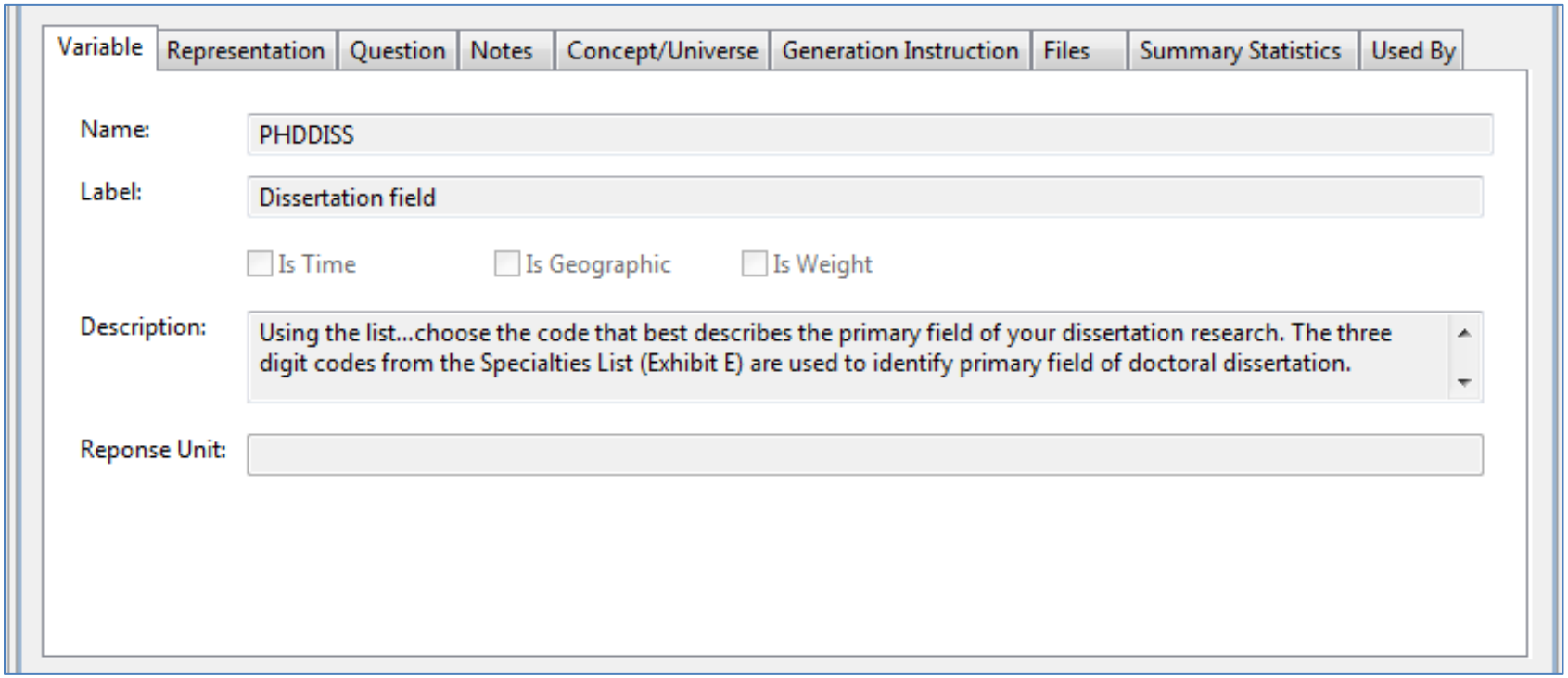
Survey Editor



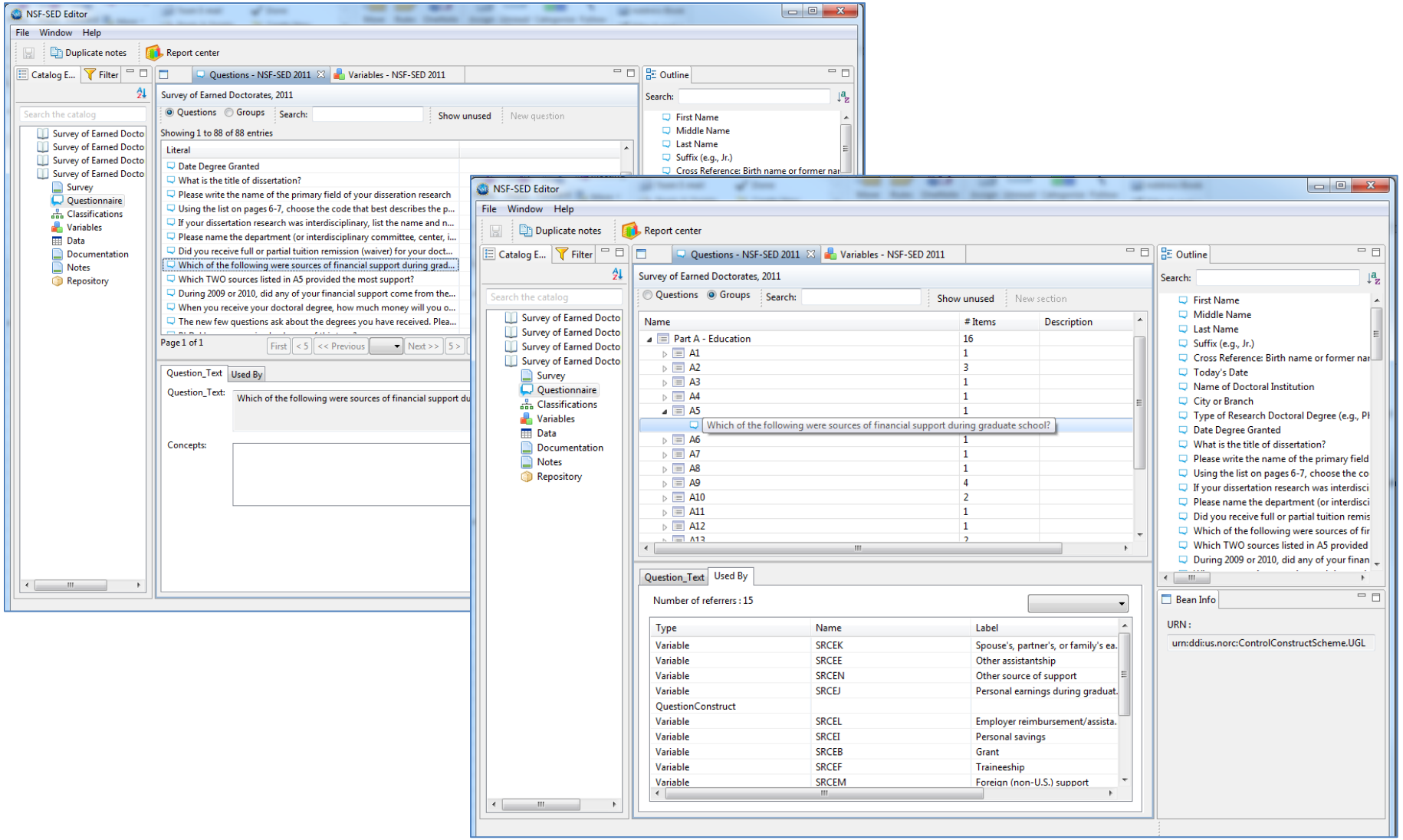
Variable Editor



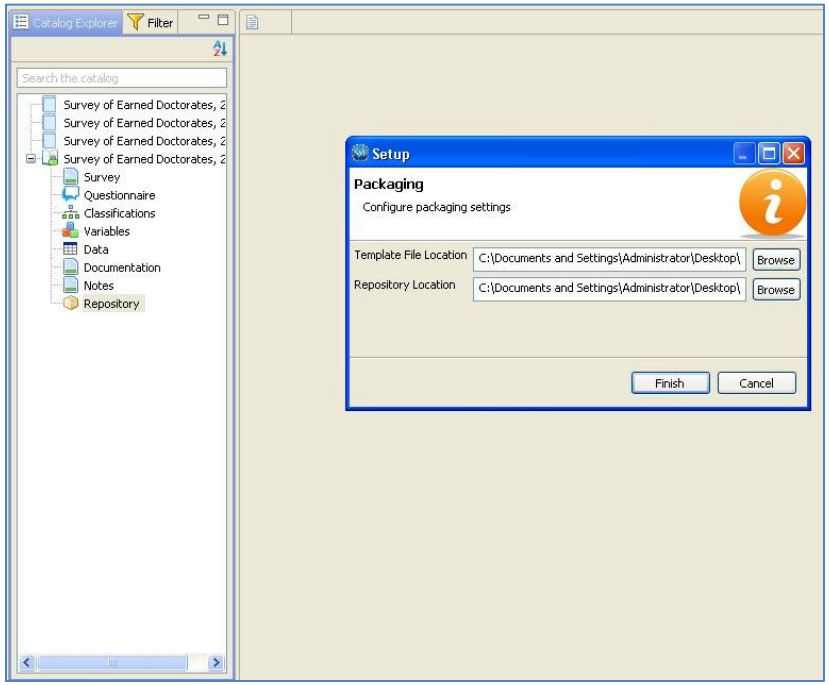
Variable Editor

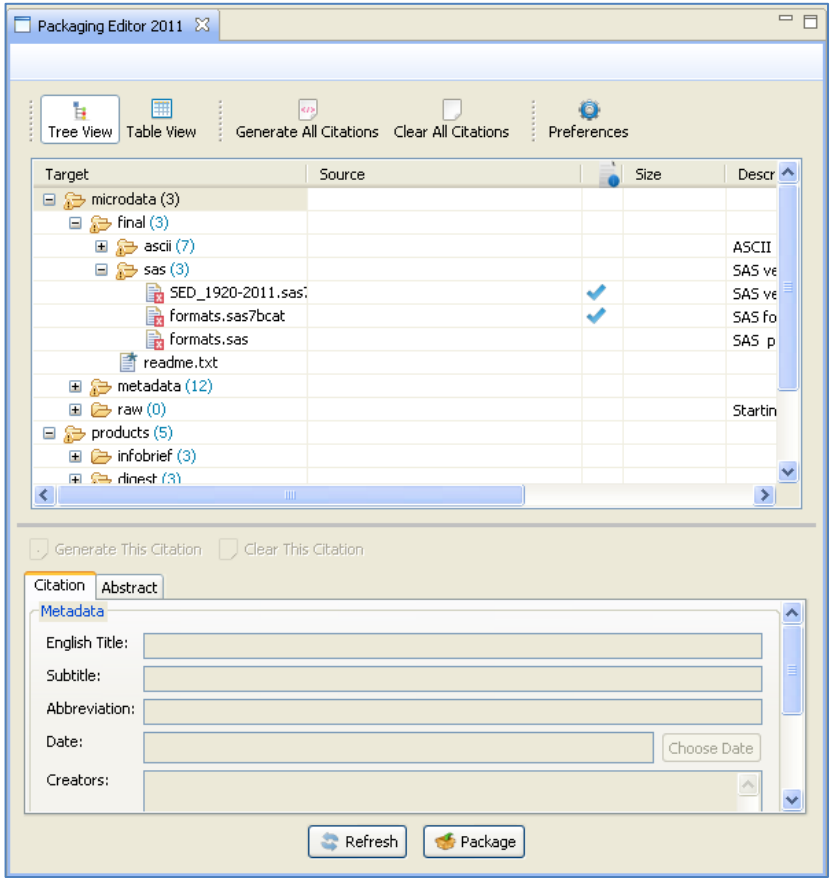


Questionnaire Editor

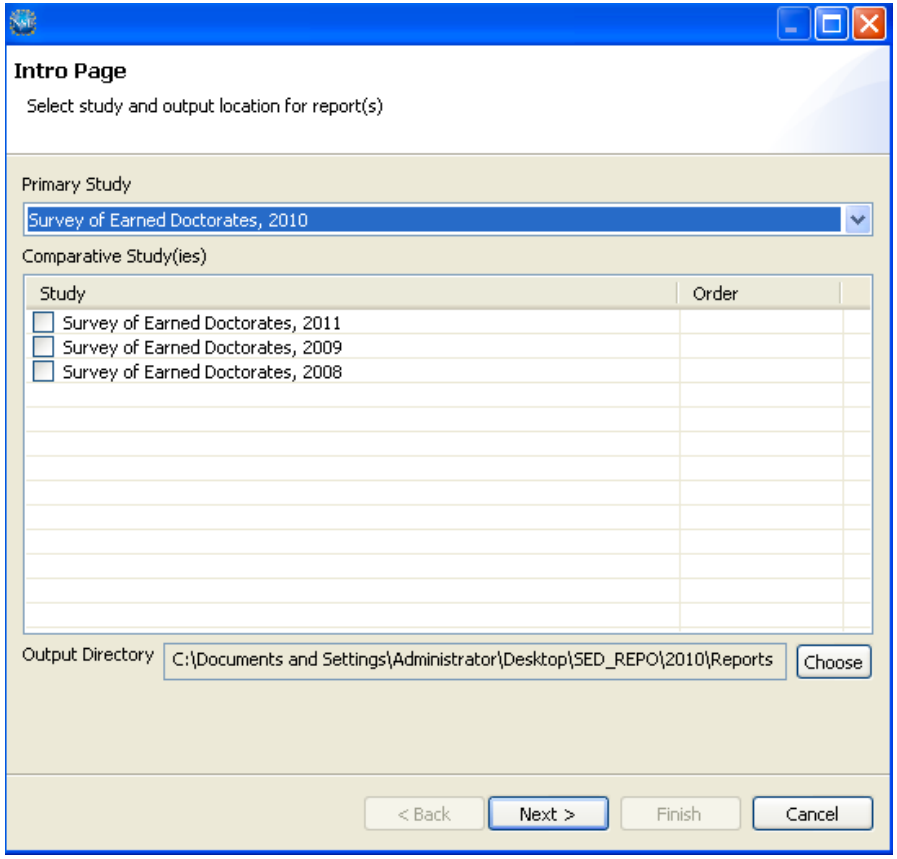


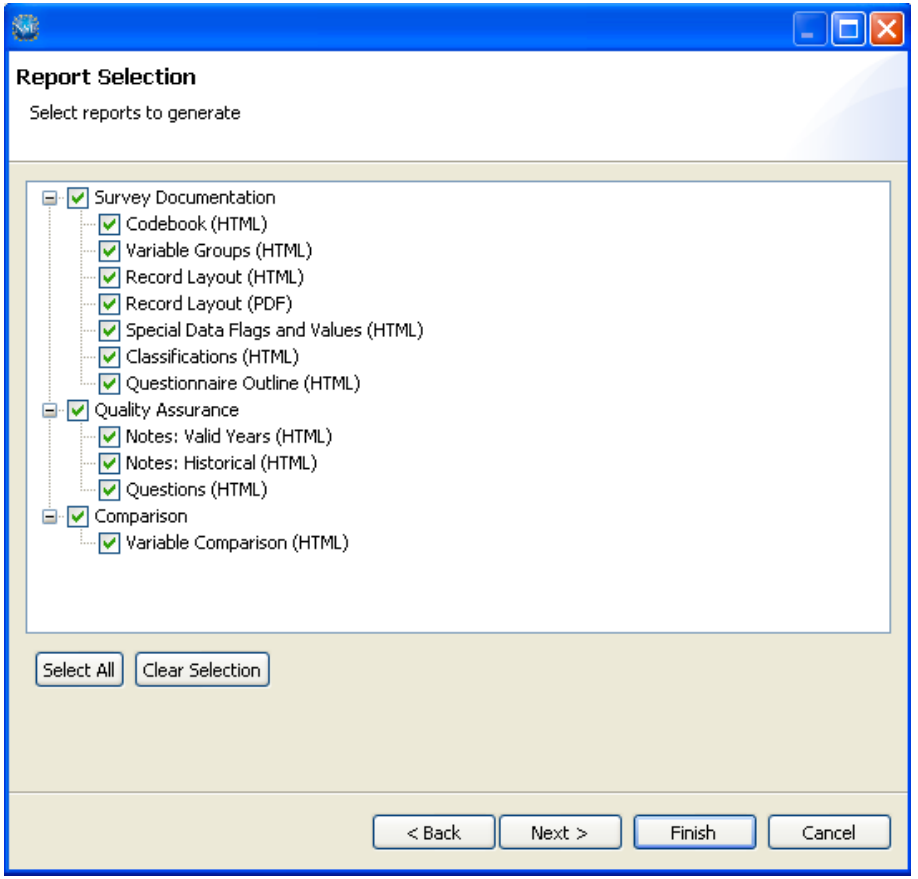
Repository Editor





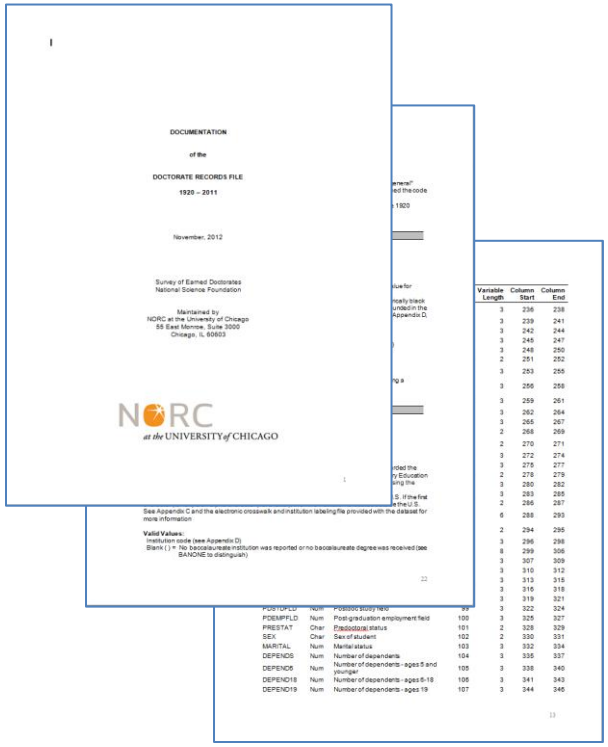
Report Center



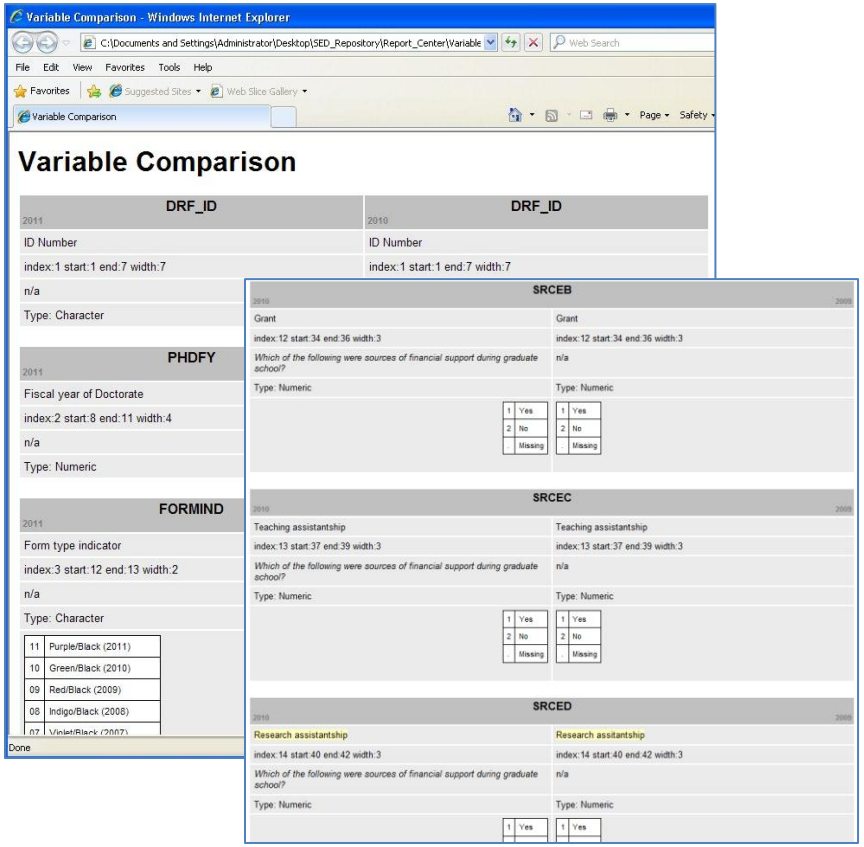


Example Reports

Codebook



Comparison report



Next Steps

- Production and maintenance mode
  - Enhance user manual
  - Apply tool to SED 2012
  - Apply minor fixes and enhancements
- Metadata driven environment
  - Currently data driven
  - Metadata must be considered earlier in process
  - Establish variable/classification/question banks
- Integrate in NCSES Data Repository
- Extend to other NCSES surveys
  - NSF SED Manager based on existing tool
  - Based on common framework, DDI with extensions
  - Open source

Thank you!

Contact information:

Kimberly Noonan
knoonan@nsf.gov

Pascal Heus
pascal.heus@metadatatechnology.com

Tim Mulcahy
Mulcahy-Tim@norc.org