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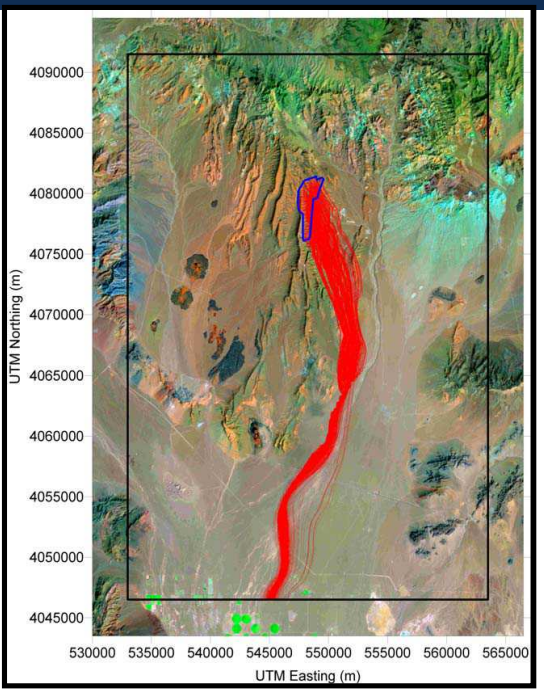
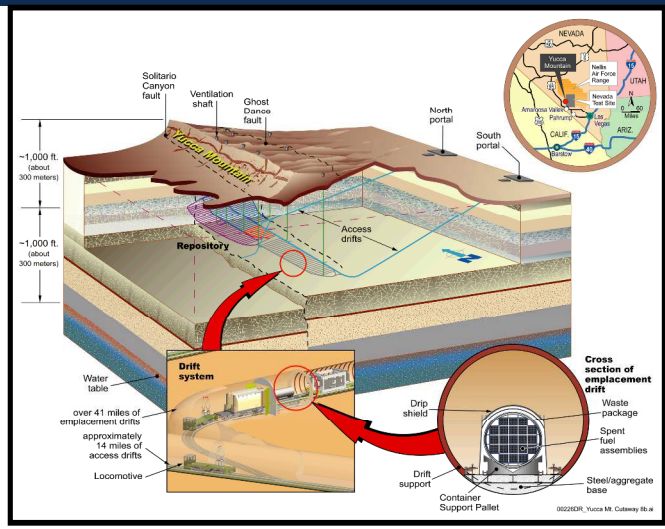


Knowledge Management Insights from Yucca Mountain



Gordon Appel, Sandia National Laboratories, Albuquerque, NM, USA

PMI Rio Grande Chapter, International Project Management Day

November 6, 2015

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

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Knowledge Management

- **Knowledge Management** - efforts directed at compiling, organizing, and leveraging an organization's knowledge to support organizational goals, (continuity, profitability, efficiency, etc.)
  - directed at important information necessary to maintain or improve current business models.

- **Knowledge Management in Repository Systems Context**
  - purely technical, well understood (certain), physical/chemical characteristics (waste packages materials, waste forms, corrosion, and waste locations);
  - less well understood (uncertain) characteristics, (natural fluid flow, volcanism, other low probability events);
  - very poorly definable characteristics, (cultural influences, societal characteristics).

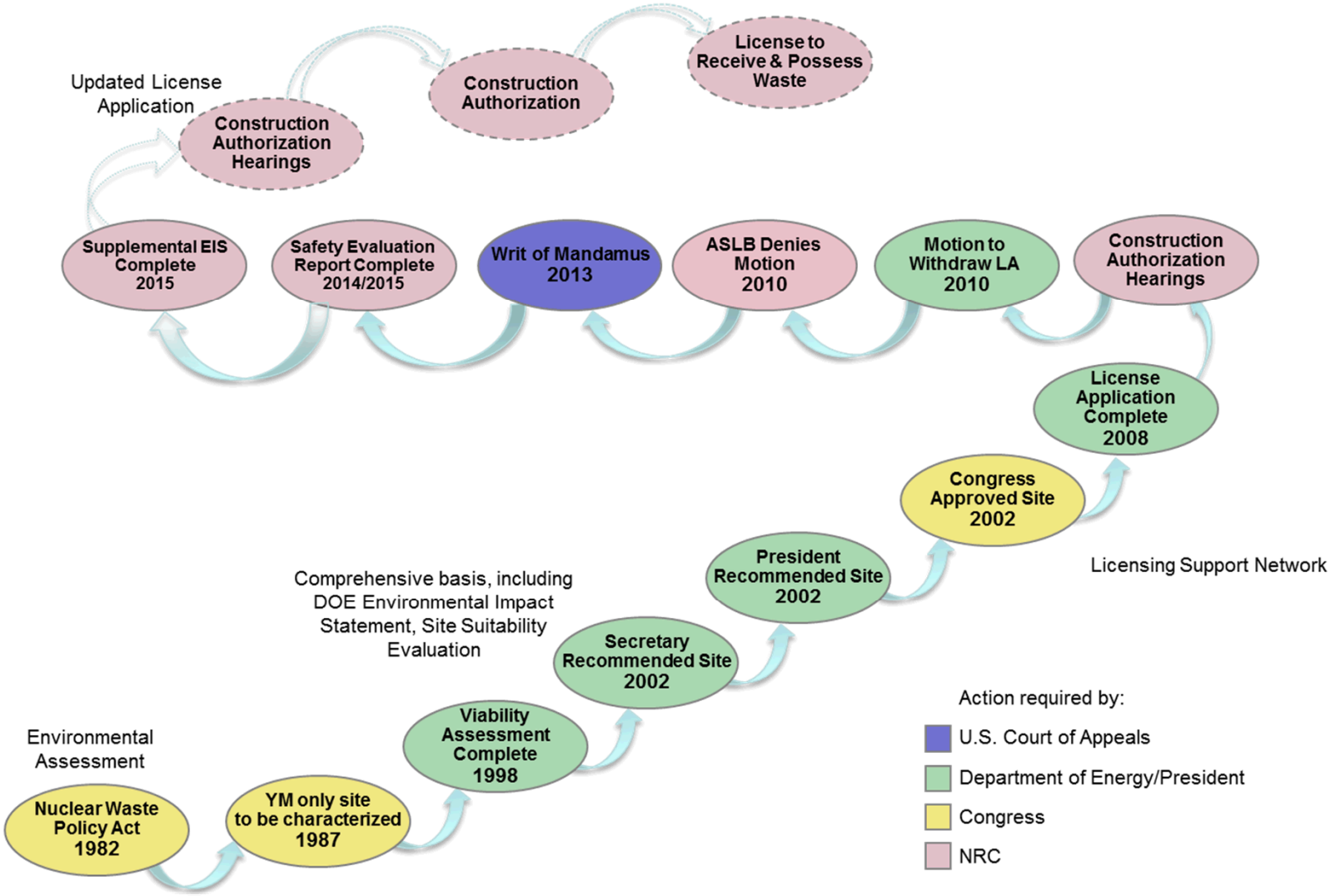
Knowledge Preservation

- **Knowledge Management for Repositories** - using knowledge management techniques to maintain the continuity of procedural processes (technical culture) over the decades of repository operations

- **Knowledge Preservation for Repositories** - efforts to safeguard our understanding of important issues for continuing long-term safety of the repository system by avoiding the loss of institutional and societal knowledge long after its closure

Yucca Mountain Knowledge Preservation

Yucca Mountain Project Timeline



Yucca Mountain Knowledge Preservation

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- **Current Status**
  - Licensing Proceeding is not concluded… future uncertain
  - SNL, DOE, and NRC preserved scientific, technical and procedural information from the project

- **Knowledge from Yucca Mountain Project is preserved** in the following systems:
  - USNRC ADAMS (Agency Document and Management System) Collection
  - USNRC ASLAB LSN (Licensing Support Network) Collection
  - USDOE Legacy Management Collection
  - Yucca Mountain Project Lead Laboratory Archive (SNL)
  - Other Proceeding Participant Collections (e.g., State of Nevada)

Yucca Mountain Knowledge Preservation

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- DOE's Legacy Management office has most comprehensive YMP collection
  - More than 62 million records, including:
    - over 3.6 million project documents in the LSN collection:
    - other artifacts (computer programs, etc.) related to research conducted in USDOE's Waste Management program over 30 years
- USNRC 'Licensing Support Network' (LSN)
  - Electronic system, established by the NRC and operated by the NRC's Atomic Safety and Licensing Board (ASLAB) to provide internet access to documents that may be used as evidence in the licensing proceedings
    - 3.6 million documents at the time of the license submittal
    - Public access to the LSN was terminated in August, 2011
    - USNRC committed to transfer this document collection to a publicly accessible library FY15

Lead Laboratory Archive

- Yucca Mountain Project Lead Laboratory Archive
  - Sandia National Laboratories (SNL) was DOE's lead national laboratory for the project,
  - principally responsible for post-closure analyses of the YMP repository system. symbol
- SNL developed two integrated tools to access project information using SharePoint© technology, conventional file storage, and the YMP information model
  - License Support Warehouse (LSW) - allows searches of an electronic warehouse for data and documents collected from YMP information systems.
  - Search and Report Center (SRC) - allows creating, distributing, and managing business information from information systems using existing or tailored reports

Recommendations and Suggestions

- The YM experience, and other (weapons development) increased our appreciation of the need for what is commonly called ‘knowledge management’.
- Particularly in the context of long-duration nuclear endeavors
  - likely to extend beyond the career durations of 2-3 generations of the workforce.
- Conventional practice of knowledge management can improve day-to-day operations;
- In the context of long-term endeavors it may offer an approach to overcome the 'tribal knowledge' syndrome.

Recommendations and Suggestions

- Less Conventional Knowledge Management
  - establish a knowledge base that will endure for hundreds of years
- Why is this necessary?
  - We often presume that nuclear endeavors will proceed along a pre-ordained timeline (How's that working out so far?)
- The US example:
  - In 1987 did we think Knowledge Management was necessary?
  - YM was to receive waste in 1998 (What year is it now!?)
- One approach: create and maintain a position responsible for knowledge management

Recommendations and Suggestions

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- Information Systems
  - Need to be unified, with a common operational basis (both Business and Technical systems)
  - Limit electronic file storage to one networked location
    - Provide for regular (nightly) backups to a remote location
  - Plan on system aging (obsolescence) and keep them current

- System Integration
  - Integrate compliance systems (e.g., Corrective Action and Quality Assurance systems) with the technical support and business systems to minimize manual transfer of information.
  - Records management, document control, and correspondence control are all processes that contribute greatly to explicit knowledge management and need to be completely integrated

Recommendations and Suggestions

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- Employ organized and explicit knowledge management
  - Three fundamental IT components: collaborative software, a robust database, and very substantial file storage
- All information assigned a single unique accession number independent of the nature of the information
  - (e.g., documents, correspondence, email, software, data packages, and physical items (objects)
- Define Metadata schema with great attention to detail
- E-mail - use a single e-mail system and retain all email
- Keep track of people: their involvement and roles in the endeavor

Back up slides

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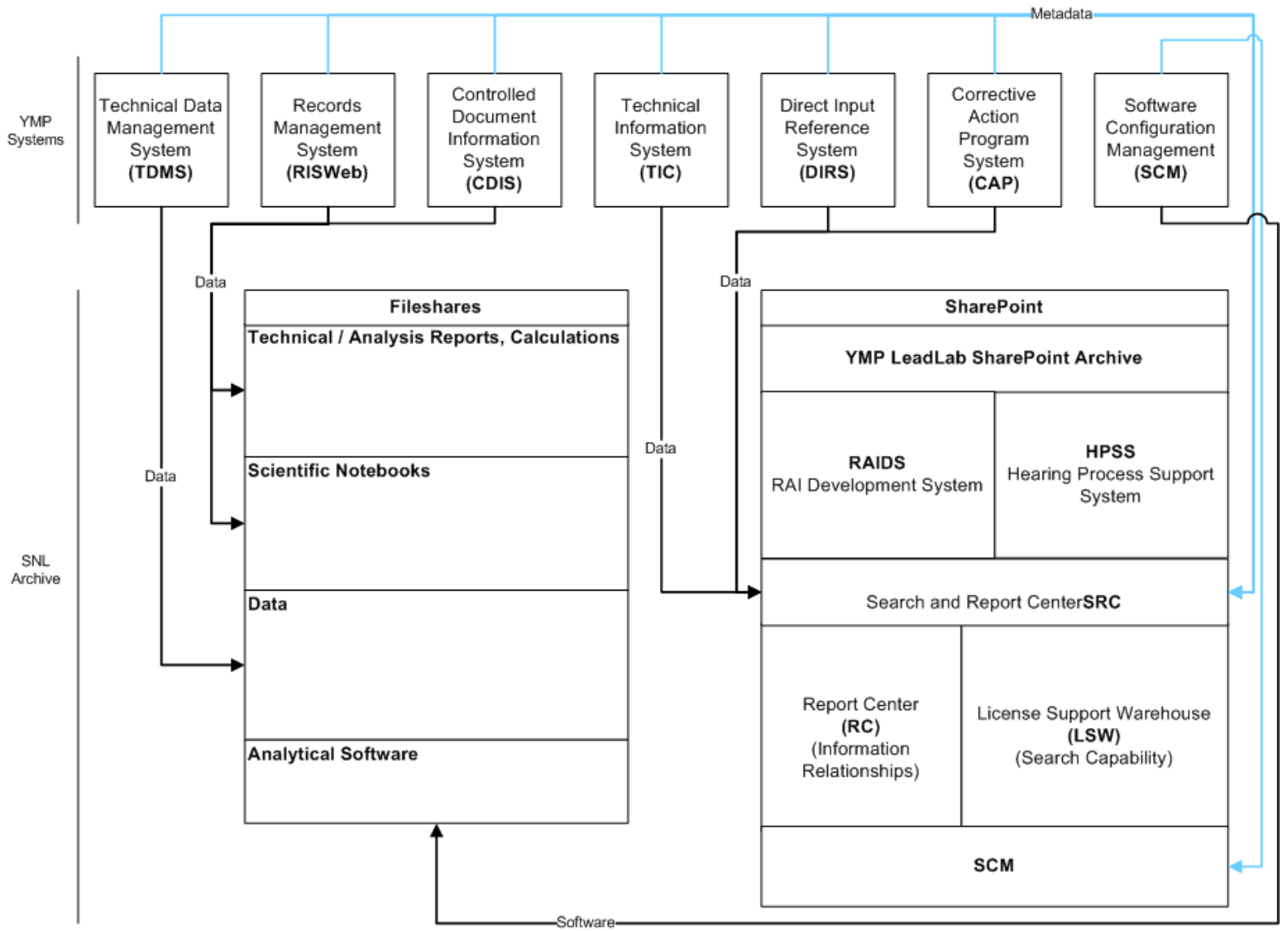
Simplified Diagram of SNL Archive Origins



Integrated YMP Lead Lab Search Model

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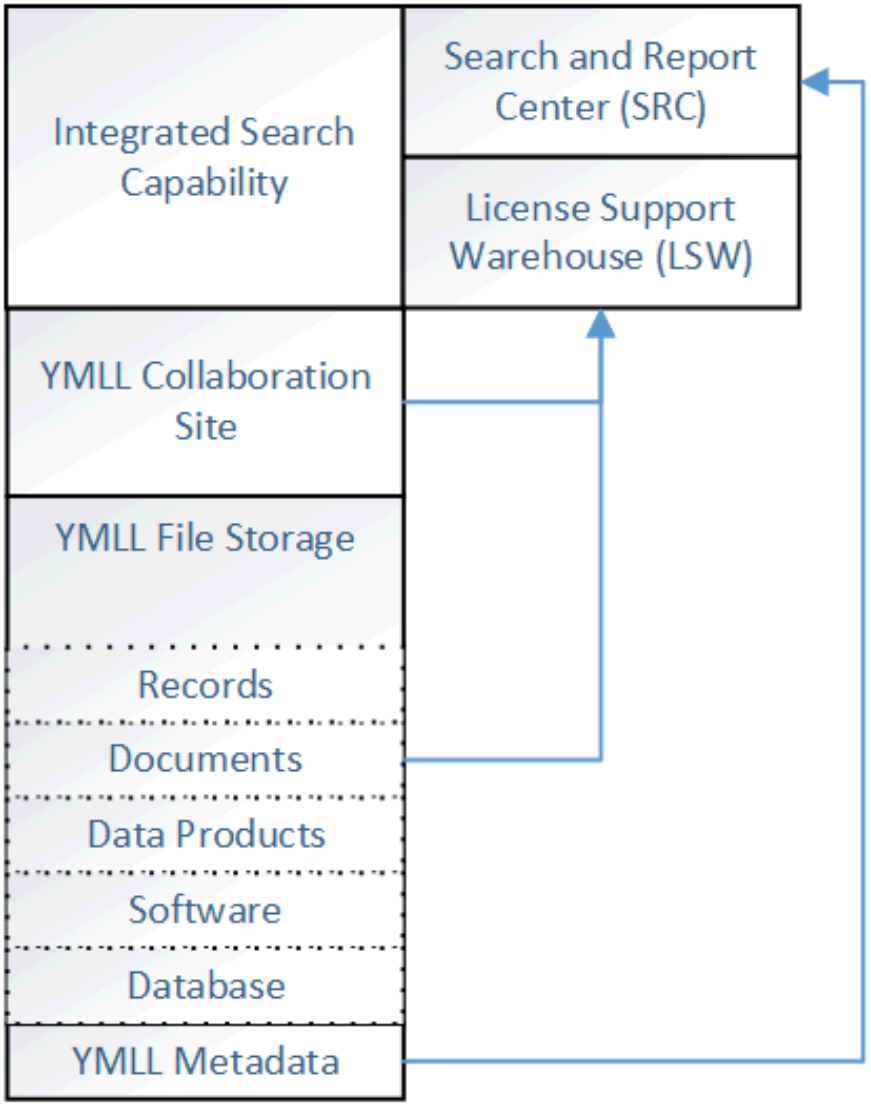
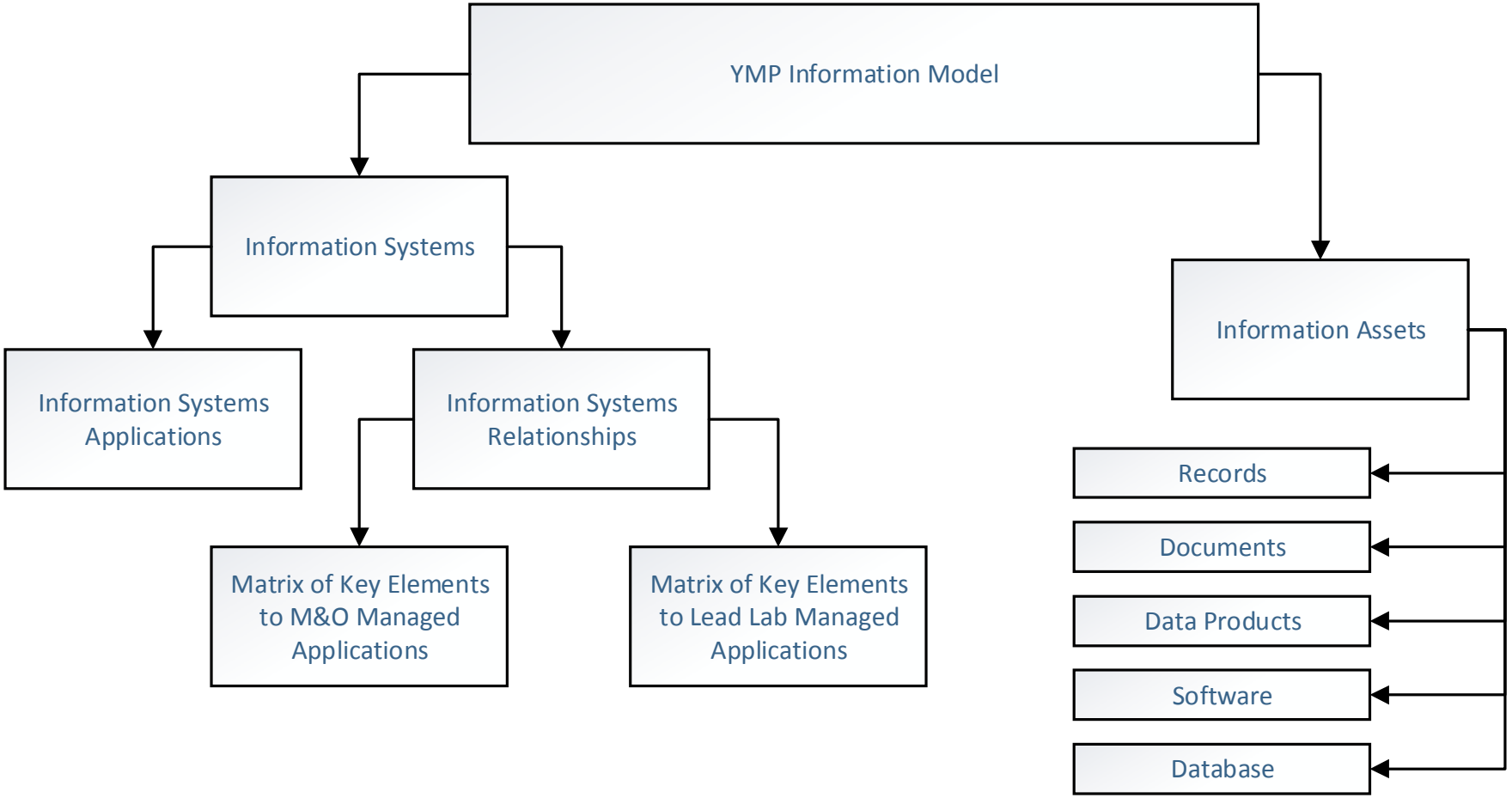


YMP Lead Lab Information Model



The information model was developed to structure and integrate the information from the YMP 'Stove-piped' systems

Operational YMP Information Relationships