Land management system (LMS)

- 1997 – 2002 effort
- Started by Director of R&D for Corps of Engineers
- 3 person team tagged to lead (all in program management, from 3 of the 7 labs)
- Purposes
  - Improve tech infusion success from R&D & help solve more complex problems
  - Develop a “framework” for technology delivery
  - Nurture teaming - to bring the best team to each problem

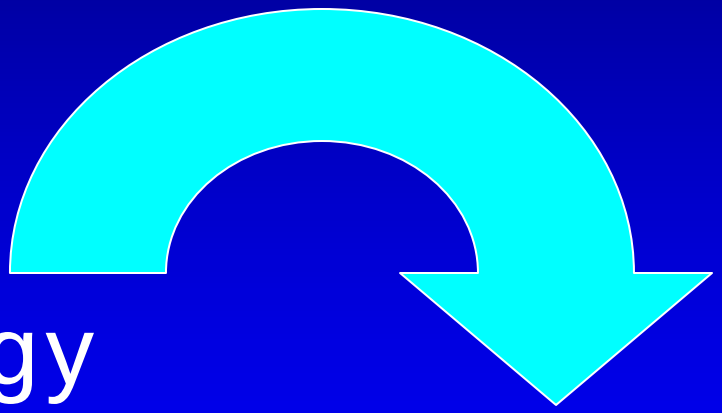
Land management system shaped and helped launch other initiatives

- Technology Planning/Infusion (Strategy)
  - Science and Engineering Technology (SET) 2002
- Framework (Architecture)
  - Common Delivery Framework (CDF) 2001
- Teaming (Collaboration & Implementation)
  - Field demonstrations (hood, benning, upper mississippi) 1999-continuing
  - *product lines* for each community of interest (built on common framework) 2002

Strategy and Implementation

Architecture

CDF



Strategy

SET

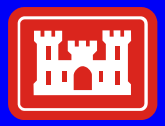
Tech planning
Technology support services
Enterprise coordination

Implementation

Product Lines
Communities of Practice
Application Examples

Definitions for Key Components

- ***Product Line*** **– an integrated set of specific S&E tools and data, sharing a common, managed set of features, that is specifically designed to satisfy the lifecycle needs of a given customer group or mission area. Product Lines contribute to and use components from the CDF.**
- ***Product Life Cycle Plan*** **– a plan that includes all the life cycle elements (development or acquisition, fielding, sustainment) for products intended for field use. Follows a common template for each product line.**
- ***Technology Line*** **– set of reusable, related S&E tools that share a common technological base and are used as interoperable components of one or more product lines.**
- ***Common Delivery Framework (CDF)*** **– is a managed set of corporate assets (guidance, software, catalogues, data linkages, metadata, etc.) that provide capabilities for development and delivery of information and technology.**

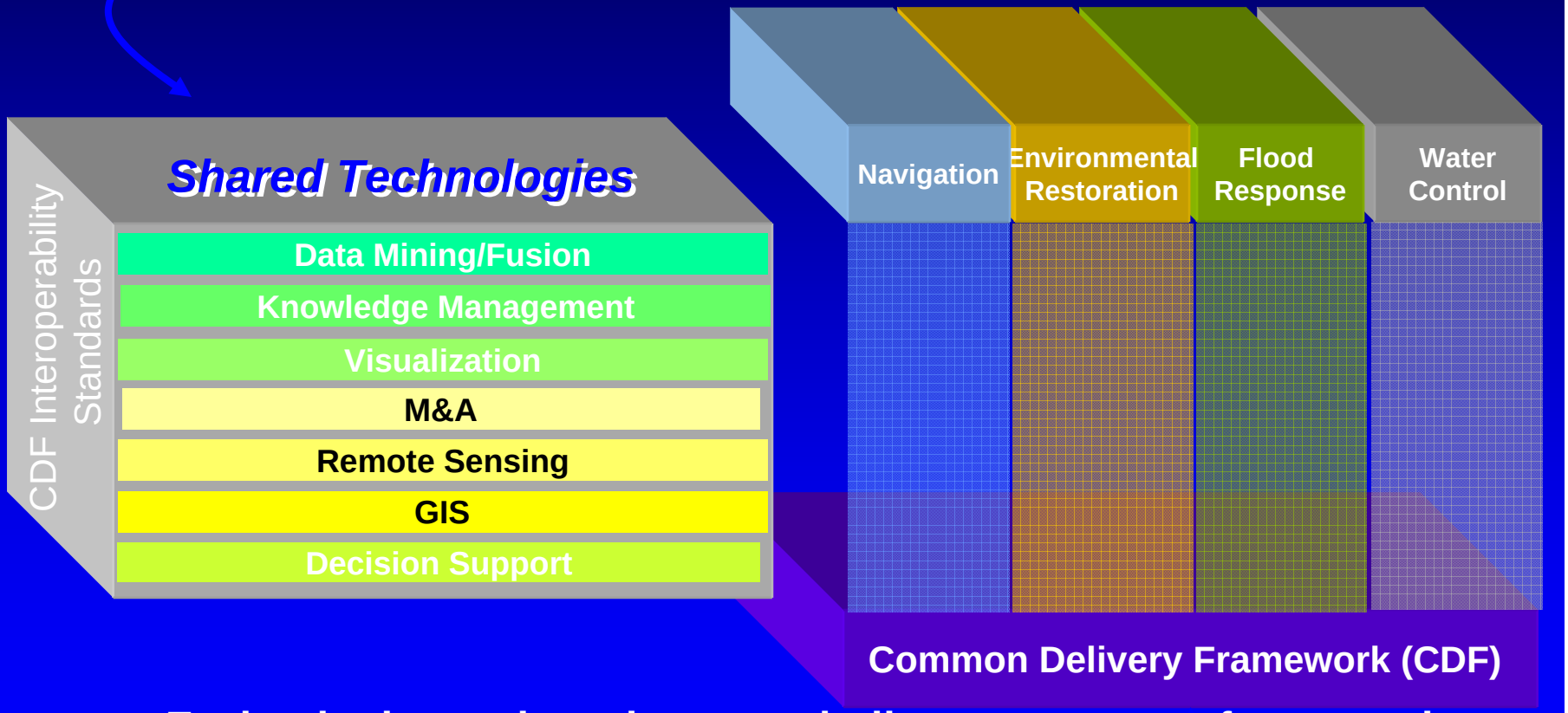


US Army Corps
of Engineers

Engineer Research and Development Center

A Common Approach to Building S&E Products

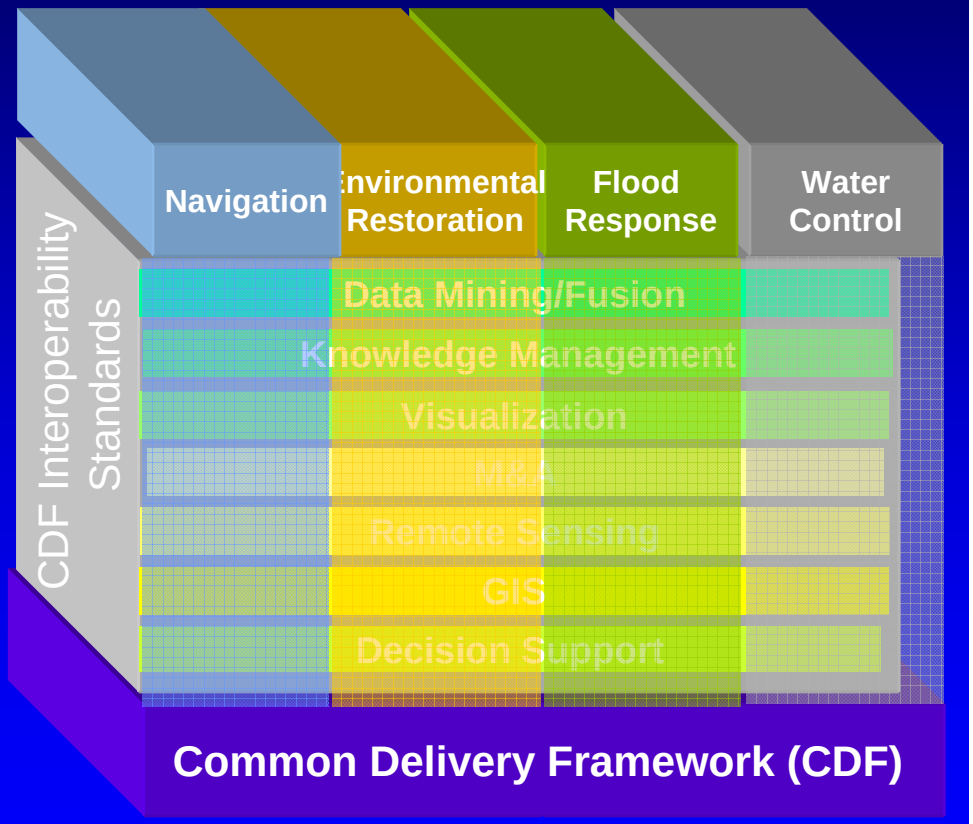
- R&D programs collectively contribute capabilities for sharing.



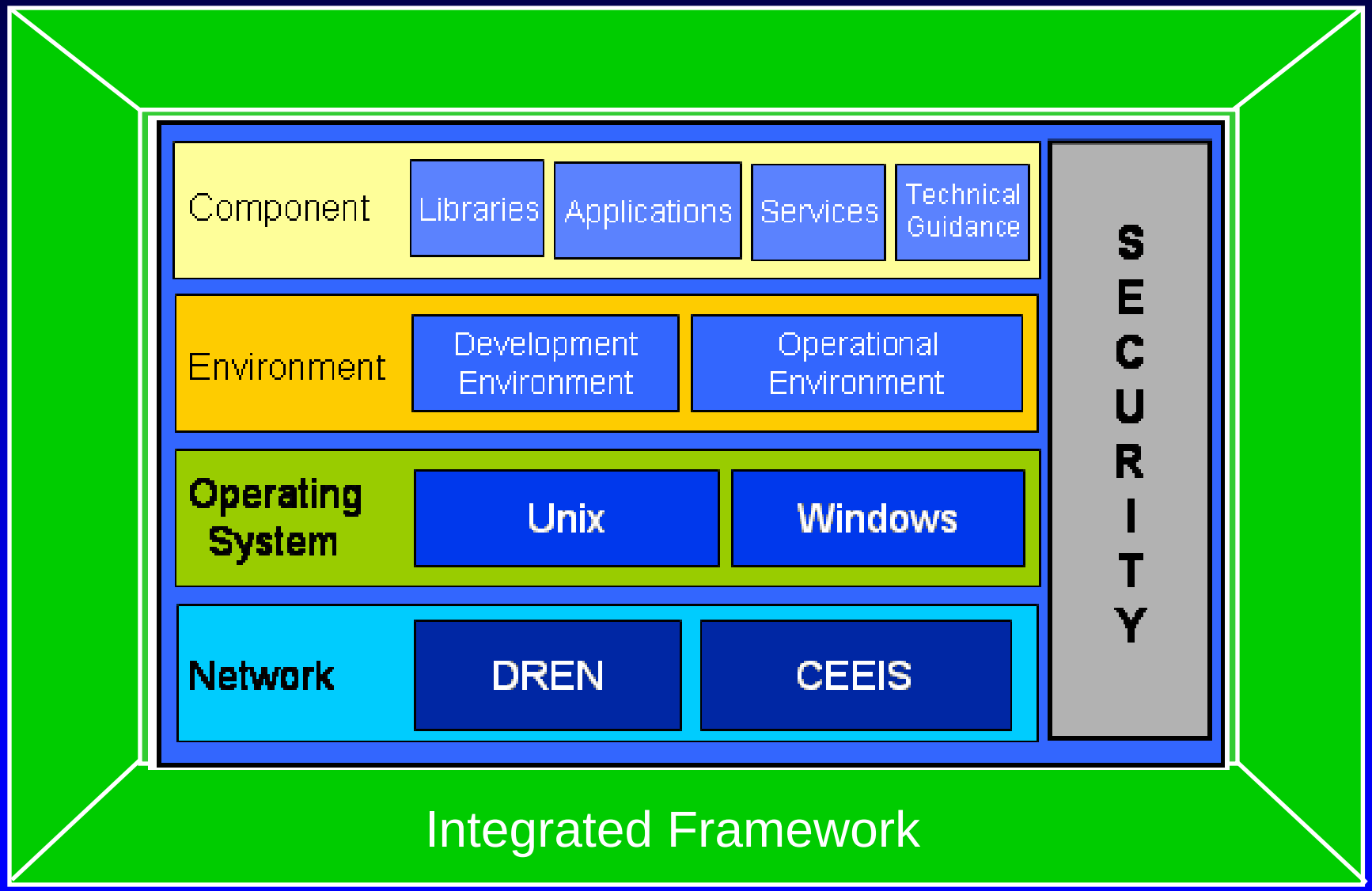
Technologies and products are built on a common framework; therefore, products are sharable across programs.

A Common Approach to Building S&E Products

- R&D programs collectively contribute capabilities for sharing.



Integrated Framework



Components of CDF

- **Services** - common access to functionality and information via a Service Registry
- **Applications** – central point of downloadable apps via an Application Registry
- **Libraries** – downloadable code libraries via Application Registry
- **Guidance/Tech Notes** - promote a consistent technical approach

Generic Model Data Format (XMDF)

Objectives:

- To develop, promote, and deploy a generic modeling format that facilitates data storage, exchange, access, analysis, and discovery of scientific and engineering data.
- Common format allows common tools & sharing

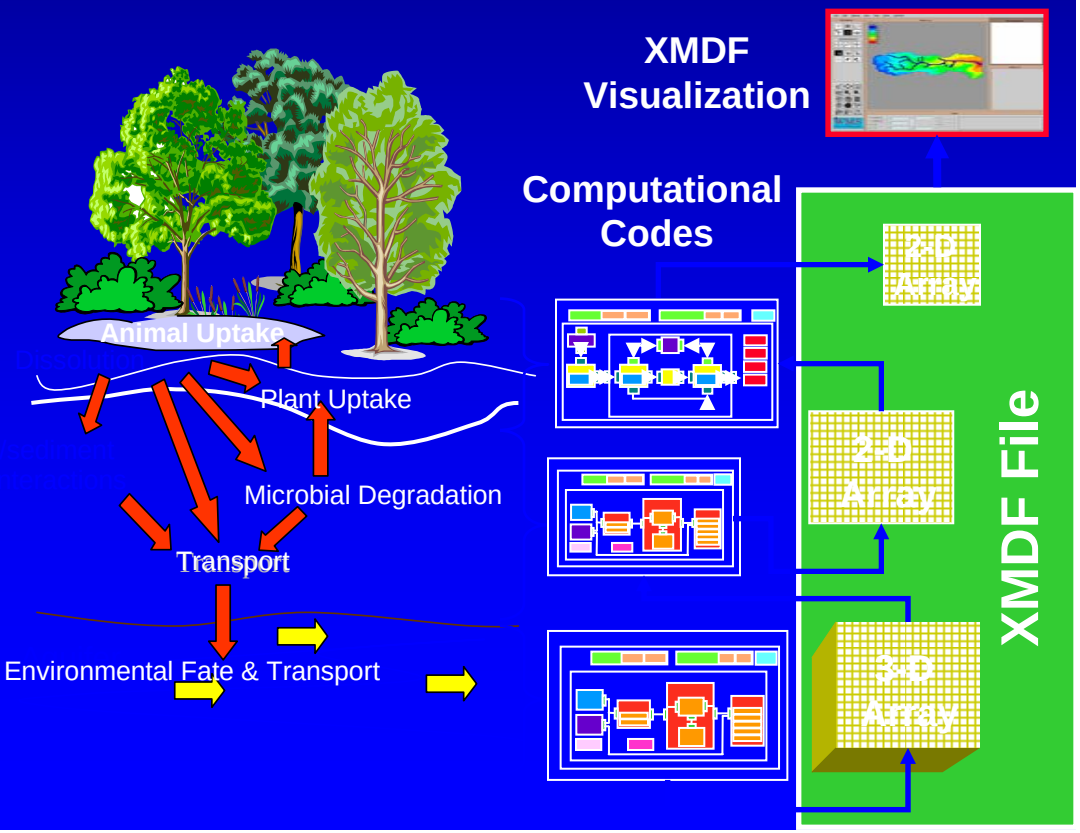
Motivations:

- No data standard in the S&E modeling community, thus making integration difficult
- Models execute on a diverse set of hardware platforms, thereby limiting sharing potential
- Models generate huge files (Terabytes today, Petabytes tomorrow)
- Too many disparate formats and media
- Difficult for users to manipulate model-generated information
- Model data are difficult to manage and archive

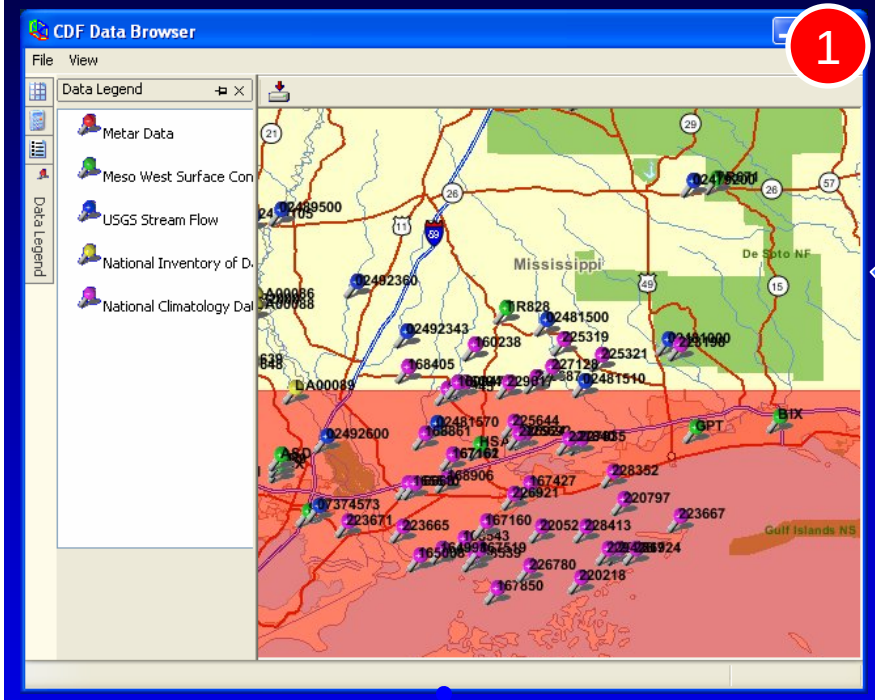
Rob Wallace = lead

Approach:

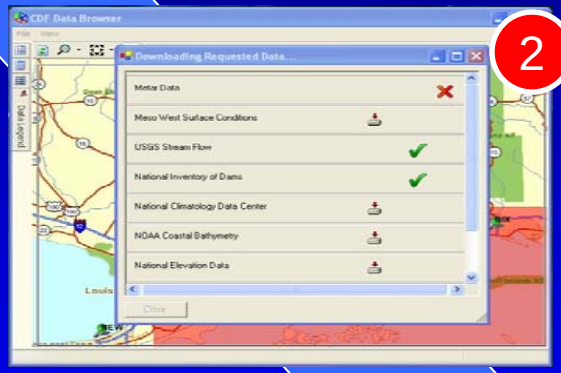
- XMDF is based on NCSA HDF5 product
- XMDF defines the format for how scientific data are organized in HDF5
- XMDF API is a common set of I/O functions to read and write CMDF standard data
- XMDF Visualization tool provides a common viewer for XMDF files



S&E Data Browsing (SEDB)

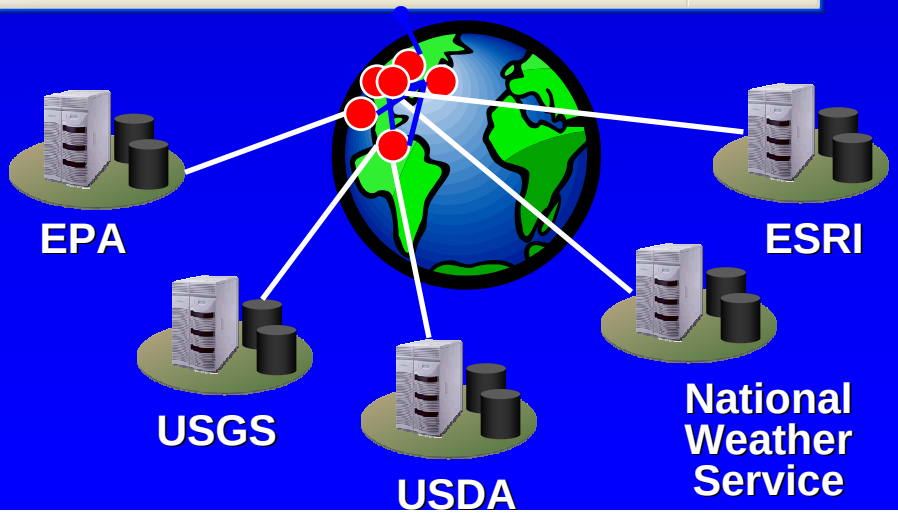


1 Browse



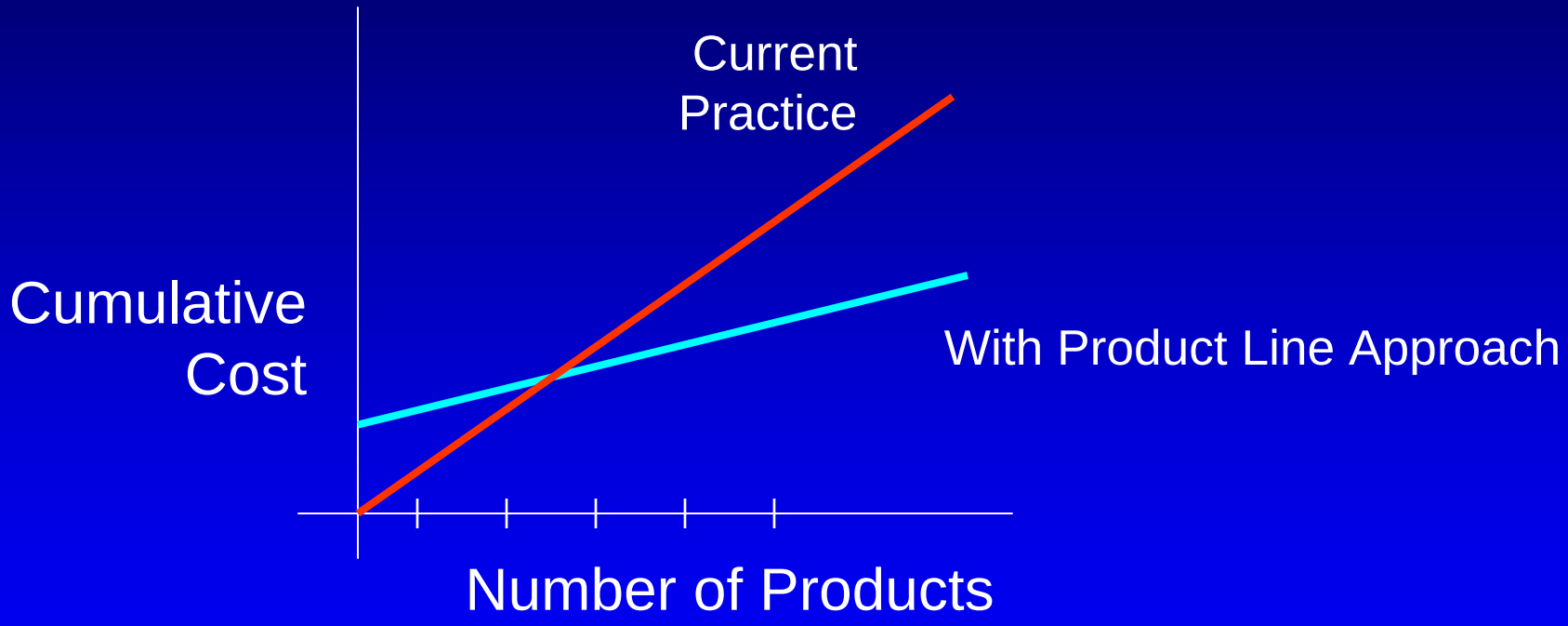
2 Assemble

3 Download



Economics of product lines

Initial costs become savings as products are fielded through product lines.



Informatics

Informatics **focuses on methodologies to combine scientific data and models and render their results specific to a problem. Informatics-related activities are addressed within five technology areas:**

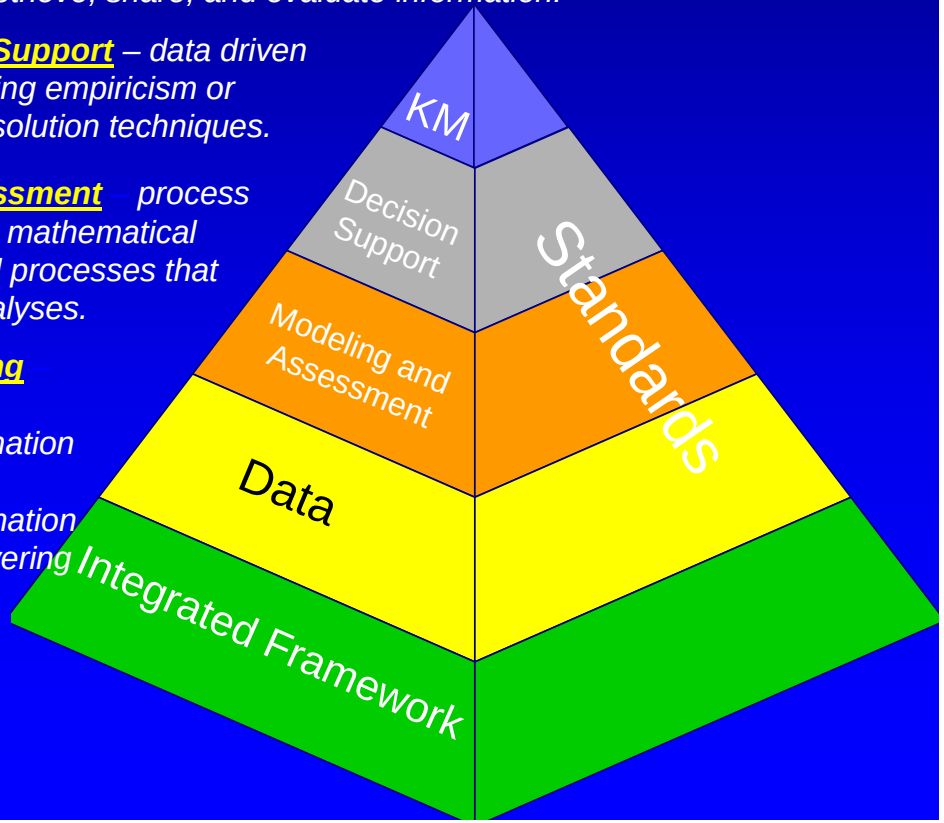
5 ***Knowledge Management*** – *integrates information sources to identify, capture, retrieve, share, and evaluate information.*

4 ***Decision Support*** – *data driven models using empiricism or analytical solution techniques.*

3 ***Modeling and Assessment*** – *process driven using complex mathematical depictions of physical processes that require numerical analyses.*

2 ***Data Fusion/Aggregation/Mining***
- *Effective use of data from heterogeneous, distributed information sources*
- *Consolidation of disparate information sources for the purpose of discovering useful knowledge*

1 ***Integrated Frameworks*** – *provide a common framework to structure and deliver information and technology.*



On-Line Knowledge Center (OKC)

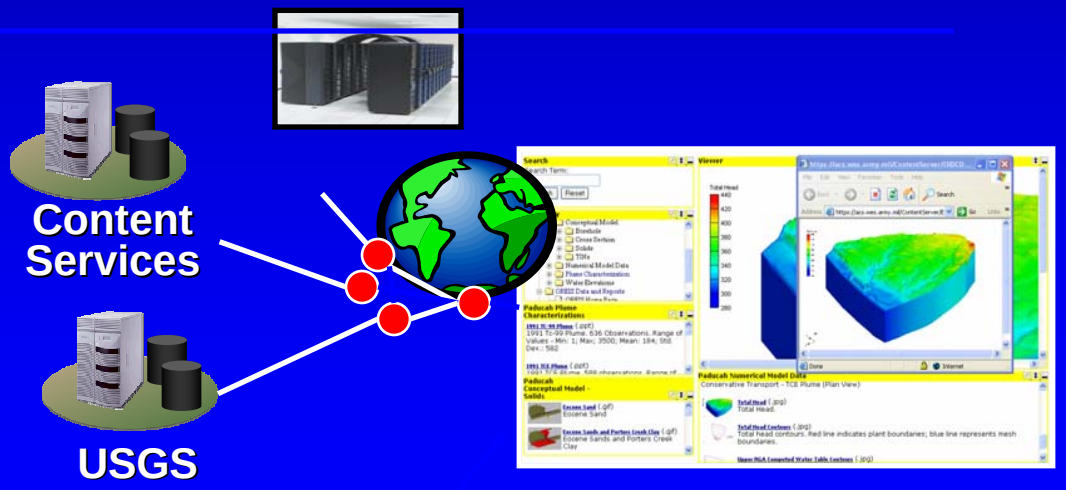
OKCs are Web portals that access distributed heterogeneous resources connected to CDF.

Objectives:

- Provides users access to analysis and visualization capabilities via the global Internet
- Minimizes the technology footprint of ERDC products
- Expands usage of ERDC products – “everyone can use a browser”
- Provides direct/indirect access to computational and data resources
- Accesses information resources both inside and outside USACE
- Personalizes information
- Interacts with the HPC via computational gateway

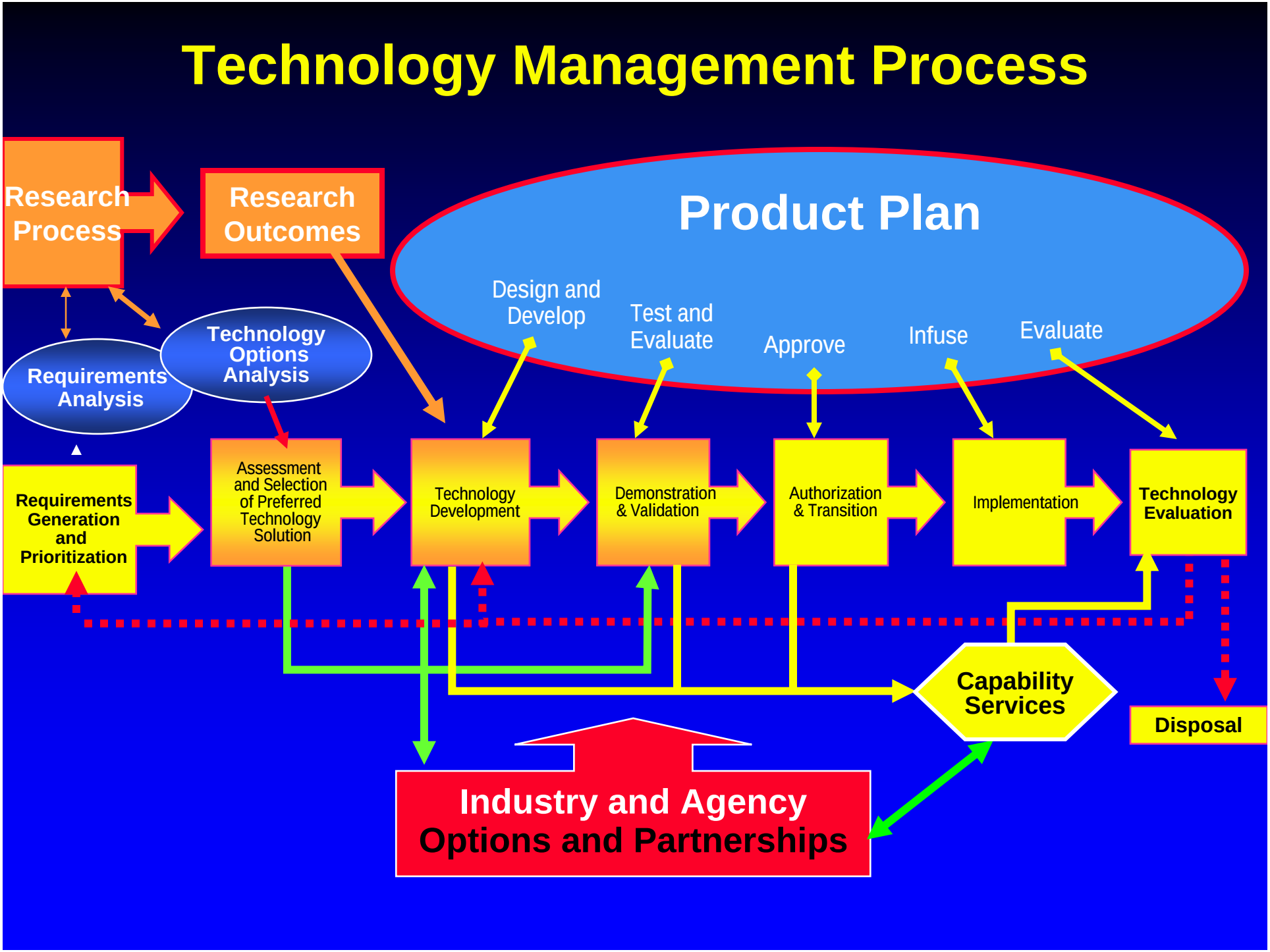
Applications:

- Organize business areas into a suite of OKCs
- Share information among partnering OKCs
- Minimum effort required to create new OKCs
- Apply to Internet, Intranet, and Extranet types of problems

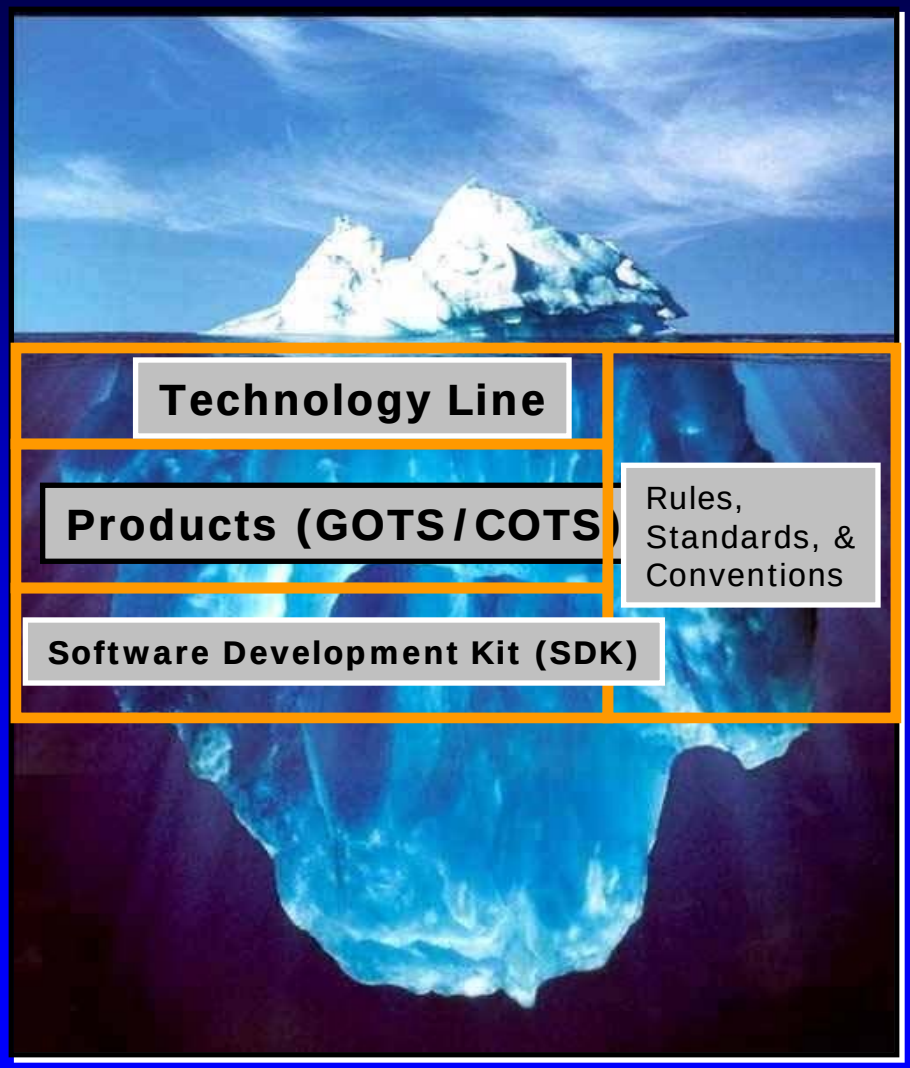


- OKC portals are an assembly of components that can deliver content (information) and serve as gateways to computational and data resources.

Technology Management Process



The Big Picture



Common Delivery Framework (CDF)

Agency & Industry Standards

Product Lines

- **Packaging of technologies to satisfy customers' requirements**
- **Product line specific functionality**

Status

- Strategy
  - SET: major effort in 2002-3, but then Corps of Engineers 2012 re-organization & overseas conflicts have diverted focus and resources.
  - ERDC Infomatics Strategic Plan 2003 –completed, not implemented
- Architecture
  - CDF: in full development. Contributing also to Corps of Engineers strategic architecture
- Implementation & Collaboration
  - Lab's under 1 structure facilitating cross-lab collaboration
  - Demonstrations: some still underway (benning, hood). Product lines now linked to Corps of Engineers Communities of Practice (part of 2012 re-organization)
  - Two large integrative research efforts – Fort Future (installation simulation 3 scales), System-wide water resources (watershed planning/mgmt)

Technology Management Process