Collaborative Secure Knowledge Management

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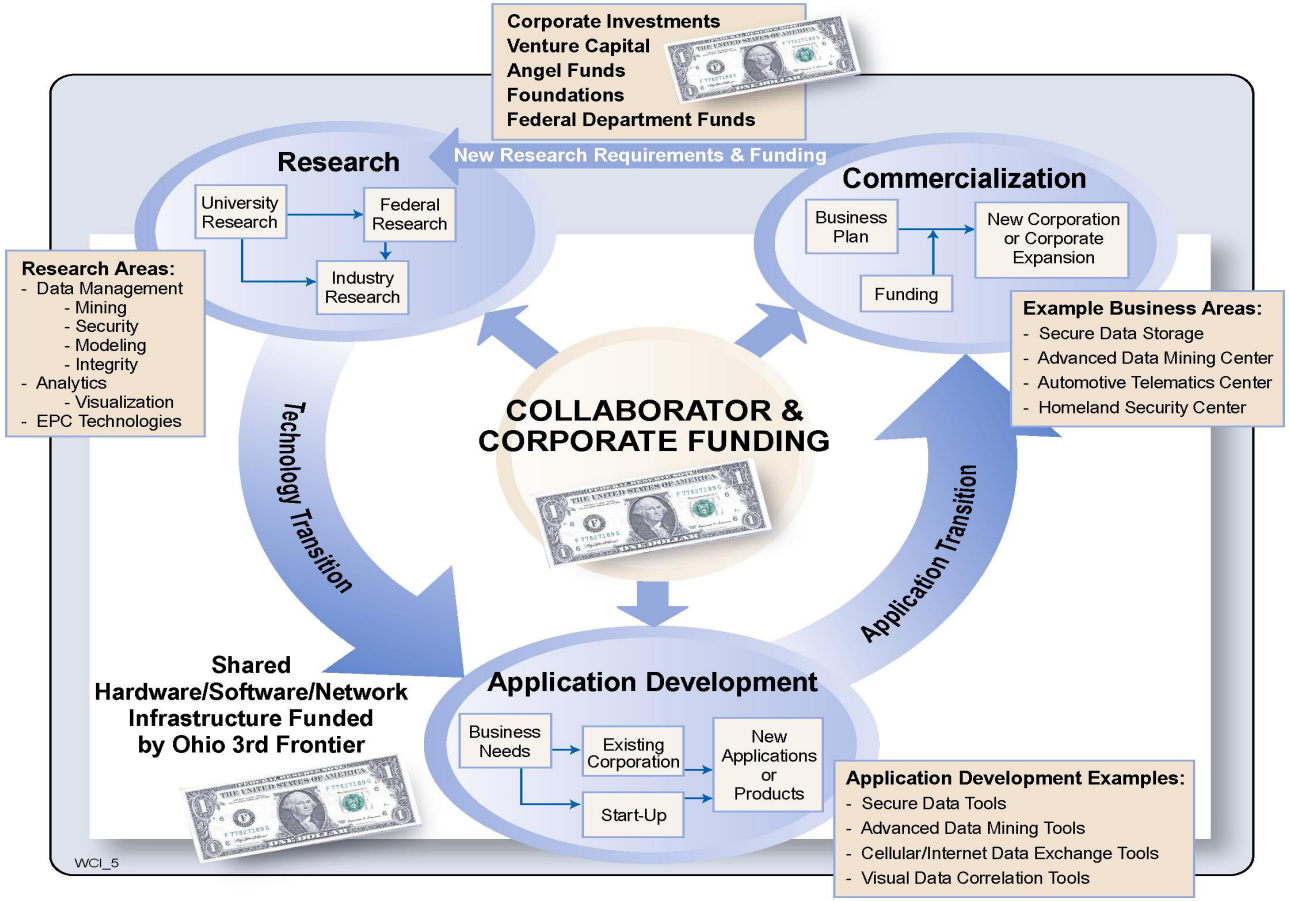
Outline

- Background & Objectives
- Research Program
- An Application - Virtual Capability Planning
- Summary

Ohio 3rd Frontier Technology Initiative



Wright Center of Innovation for Advanced Data Management and Analysis (WCI ADMA)

WCI Partnerships

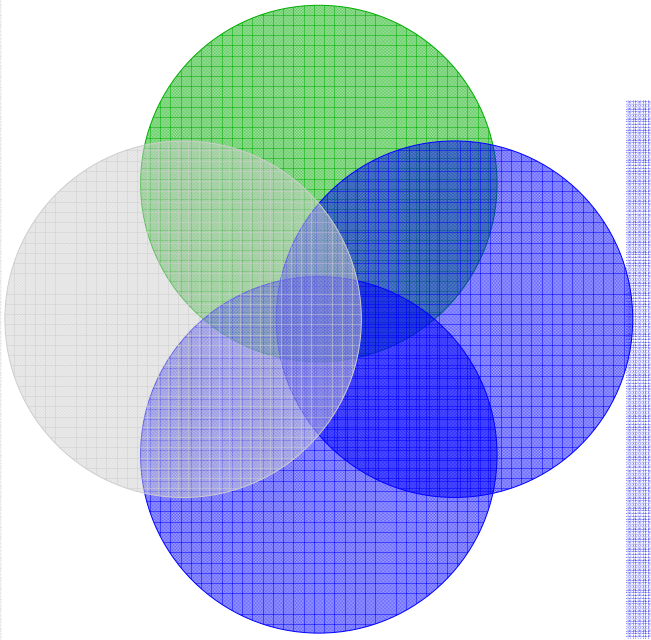
Wright Brothers Institute (WBI)
Air Force Research Lab (AFRL)

GOVERNMENT

Lexis-Nexis
NCR
P&G
Reynolds & Reynolds
SAIC

INDUSTRY

EDS
Standard Register
CDO Technologies
CINCOM
Cincinnati Bell
Intelliseek
James Gregory
Solve Intreactive



Wright State (WSU)
Ohio State (OSU)

ACADEMIC

Kent State (KSU)
Cincinnati (UC)
Dayton (UD)
Miami

NON-PROFIT

Uniform Code Council (UCC)
Online Computer Library Center (OCLC)
State/Regional Development Groups

A Knowledge Management Definition

What Is Knowledge Management About?

Knowledge management is an integrated, systematic approach to identifying, managing, and sharing all of an enterprise's information assets, including databases, documents, policies, and procedures, as well as previously unarticulated expertise and experience held by individual workers. Fundamentally, it is about making the collective information and experience of an enterprise available to the individual knowledge worker, who is responsible for using it wisely and for replenishing the stock. This ongoing cycle encourages a learning organization, stimulates collaboration, and empowers people to continually enhance the way they perform work.

Source: Army Knowledge Online–An Intelligent Approach to Mission Success, U.S. Department of the Army, Washington, D.C., 1999.

Air Force Critical Future Capabilities

Information Superiority

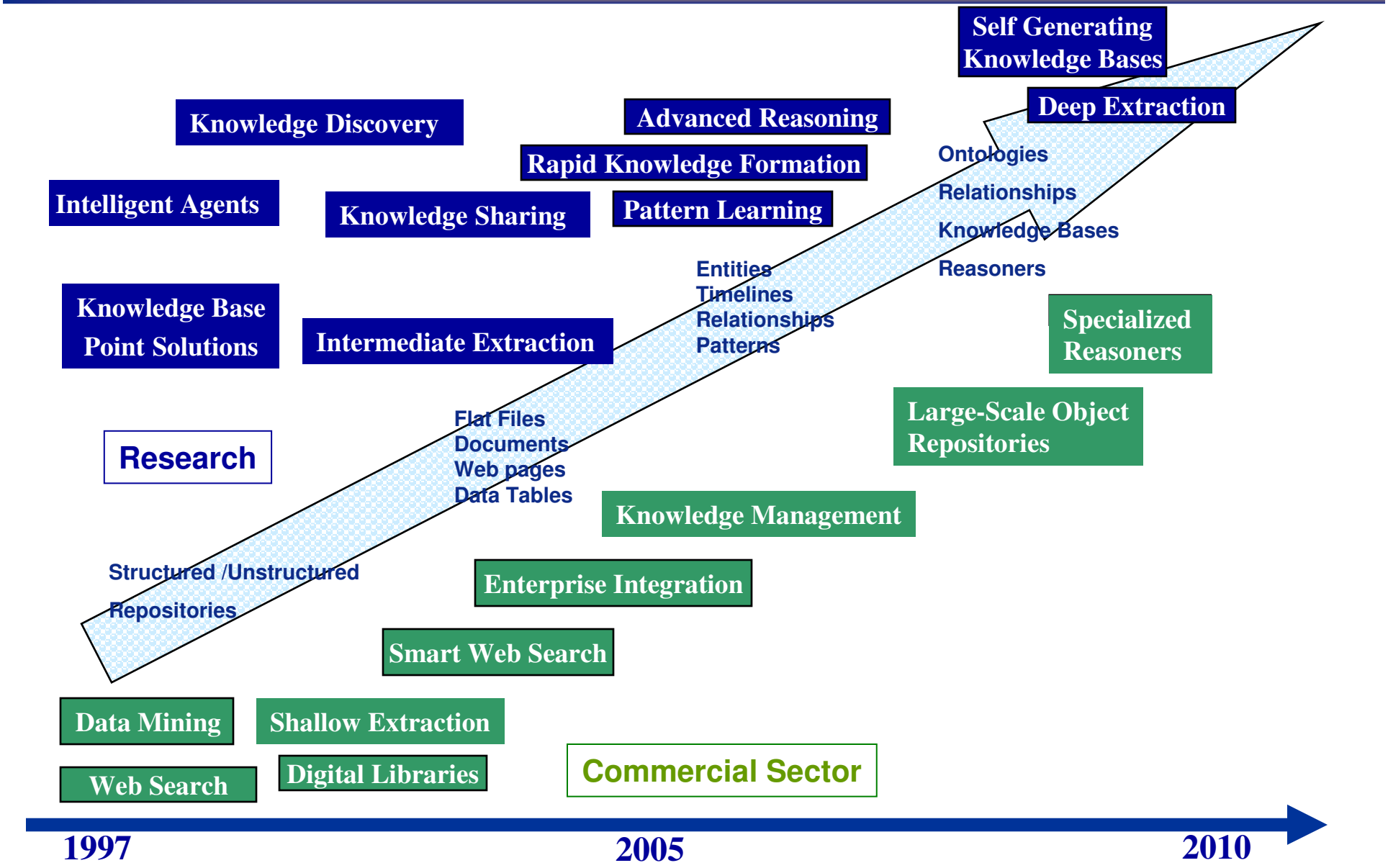
. . . Provide continuous, *tailored information* within minutes … ensure our use of the information domain unhindered … be able to provide different levels of information depending on the needs of the user ….

"The ability to share awareness, *create knowledge, and support collaboration* …. will transform the information advantage into an operational advantage"

Air Force Strategic Plan, Volume 3 "Long-Range Planning Guidance"

- **Fuse *information from a variety of sources* into high-level "knowledge"**
- **Provide *knowledge based representations* of situation, planning, and execution status**
- **Manage, exchange, and understand the *large volume of relevant information***
- **Rapidly (re)configurable applications (asset assignment in real-time)**
- **Interoperability with legacy systems and among joint & coalitions forces**
- ***Reusable, domain-independent* and efficient reasoning and *inference techniques***
- **Automated capability to predict location and disposition of TCT's**
- **Planning and assessment with incomplete, wrong, and approximate information**
- ***Automated analytical support tools* to assemble large numbers of disparate facts in order to reach valid conclusions.**

Technology Timeline



WCI Secure Knowledge Management

Objective: To provide revolutionary and visionary technologies in information & knowledge creation and sharing for efficient, secure, and meaningful enhanced decision support in the Air Force Enterprise Management and Aerospace Operations.

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SKM Research Program

- **University Research**

  -- SKM 5 Year Research Roadmap

  -- Core Research
  - **Use and Integration of Knowledge from Different Sources**
  - **Parallel and Distributed Database Access and Database Machines**
  - **Collaboration Science, Decision Science & Collaborative Use of Knowledge**
  - **Security in Knowledge Knowledge-based Systems**
  - **Transformation from Data to Information to Knowledge**
  - **World Wide Web Networked Knowledge Bases**

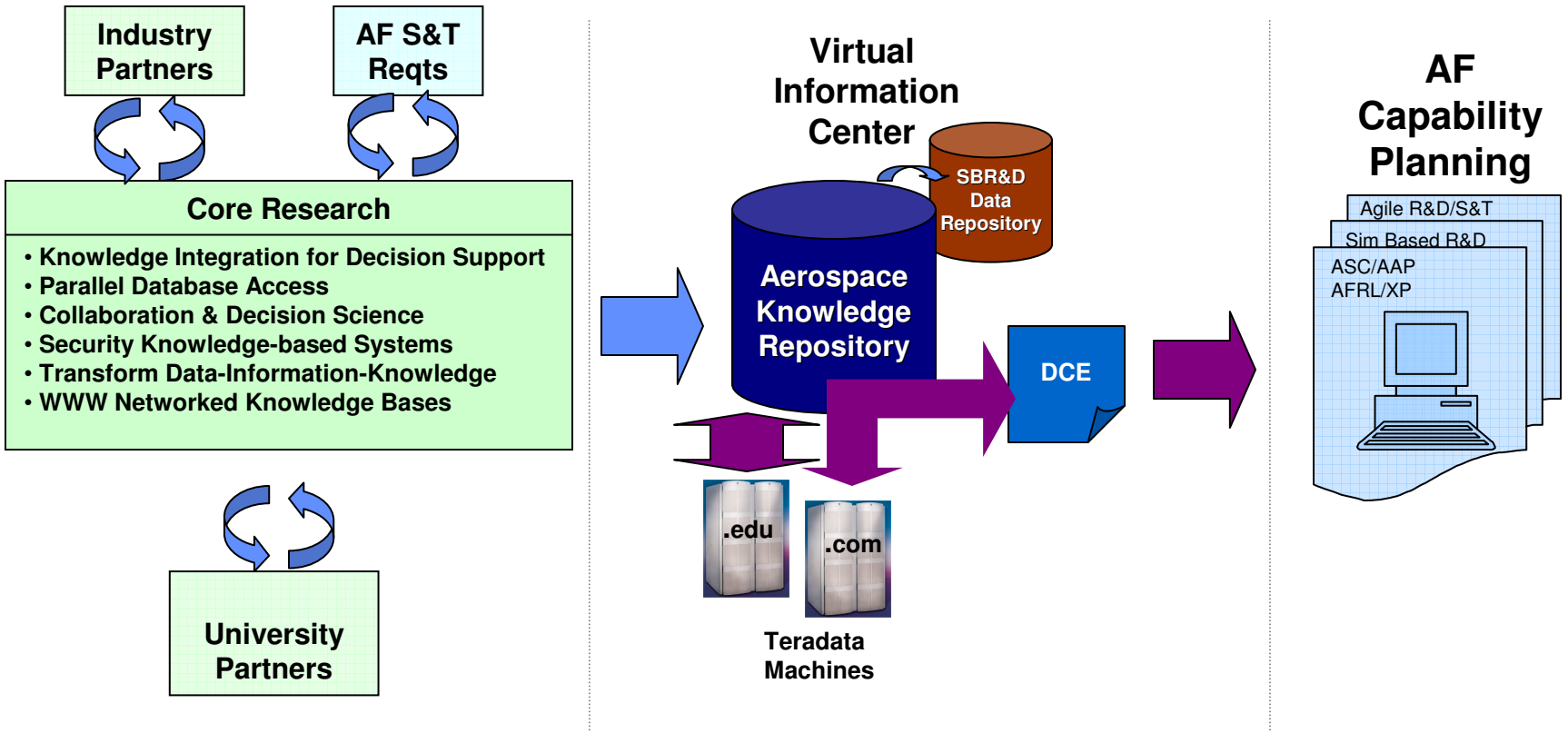
  -- Knowledge Management Workshops

- **Aerospace Knowledge Repository Prototype**

- **Application to Capability Planning**

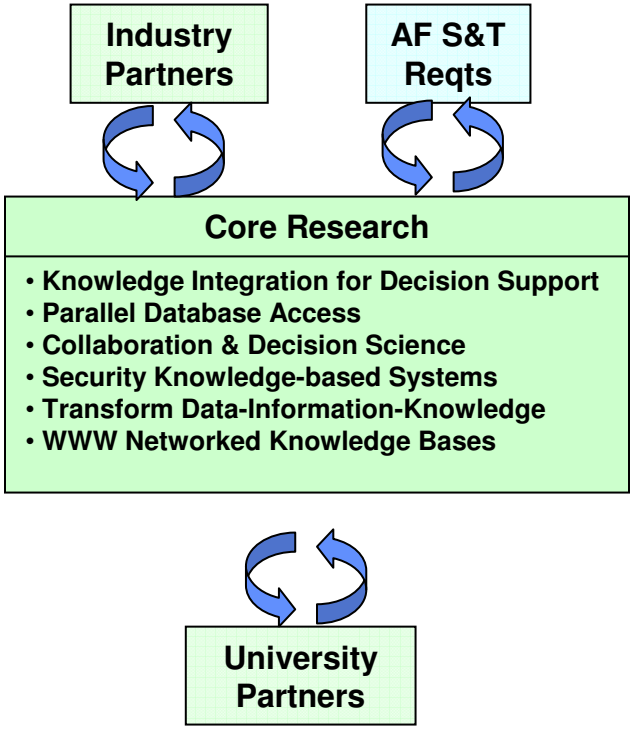
Secure Knowledge Management

Research Components



Secure Knowledge Management

University Research



Facilitated by Wright Brothers Institute

- Collaboration with world-class visionaries
- Partnering Industry/universities for revolutionary technologies
- University technology demonstrators
- Accelerate university research
- Integrate commercial technology
- University involvement to create next generation of designers
- Continuous education and workshops

University Research Areas

- **Use and Integration of Knowledge from Different Sources for Decision Support**
  - -- *An Architecture for Multi-Critical Decision Making : Use & Integration of Knowledge from Different Sources for Decision Support,* B. Chandrasekaran, Ohio State
  - -- *Data Mining Algorithms based on Implicit Integration of Distributed Databases,* R. Bhatnagar, Univ of Cincinnati
- **Parallel and Distributed Database Access and Database Machines**
  - -- *Development of Parallel Data Mining Algorithms for Text & Formatted Databases,* S. Chung, Wright State
- **Collaboration Science, Decision Science & Collaborative Use of Knowledge**
  - -- *Human-centered Collaboration Science with Knowledge Construction and Decision Making Infrastructures*, Waleed Smari, U Dayton
  - -- *Collaborative Science, Decision Sciences, Secure Knowledge Management***,** Chia Y. Han, Univ of Cinn
  - -- *Multi-agent team formation & collaboration in complex dynamic environments,* M. Cox, Wright State
- **Security in Knowledge Management, Databases and Knowledge-based Systems**
  - -- Synthesizing WWW documents retrieved from different resources and securing their confidentiality, N. Bourbakis and J.Lu, Wright State

University Research Areas

- **Transformation from Data to Information to Knowledge**
  - -- *Discovering Similar Knowledge in Large Repositories,* G. Dong, Wright State
  - -- *Putting User at the Center: A Research Program in Knowledge Management,* B. Chandrasekaran, Ohio State
  - -- *Transformation from Data to Information to Knowledge,* D. Agrawal, Univ of Cinn

- **WWW Networked Knowledge Bases**
  - -- *Information Extraction from Semi-Structured Documents,* K. Thirunanarayan, Wright State
  - -- *Computer System & Network Security,* B. Wang, Wright State
  - -- *Analysis and Knowledge Extraction from Archival Video & Audio,* R. Parent, J. Davis, R. Machiraju, D. Wang, Ohio State
  - -- *Knowledge Mining & Management in Networked Multimedia Databases,* C-C. Lu, Kent State
  - -- *Fault Tolerant Adaptive Agent Based Systems ,* A. Bansal, Kent State

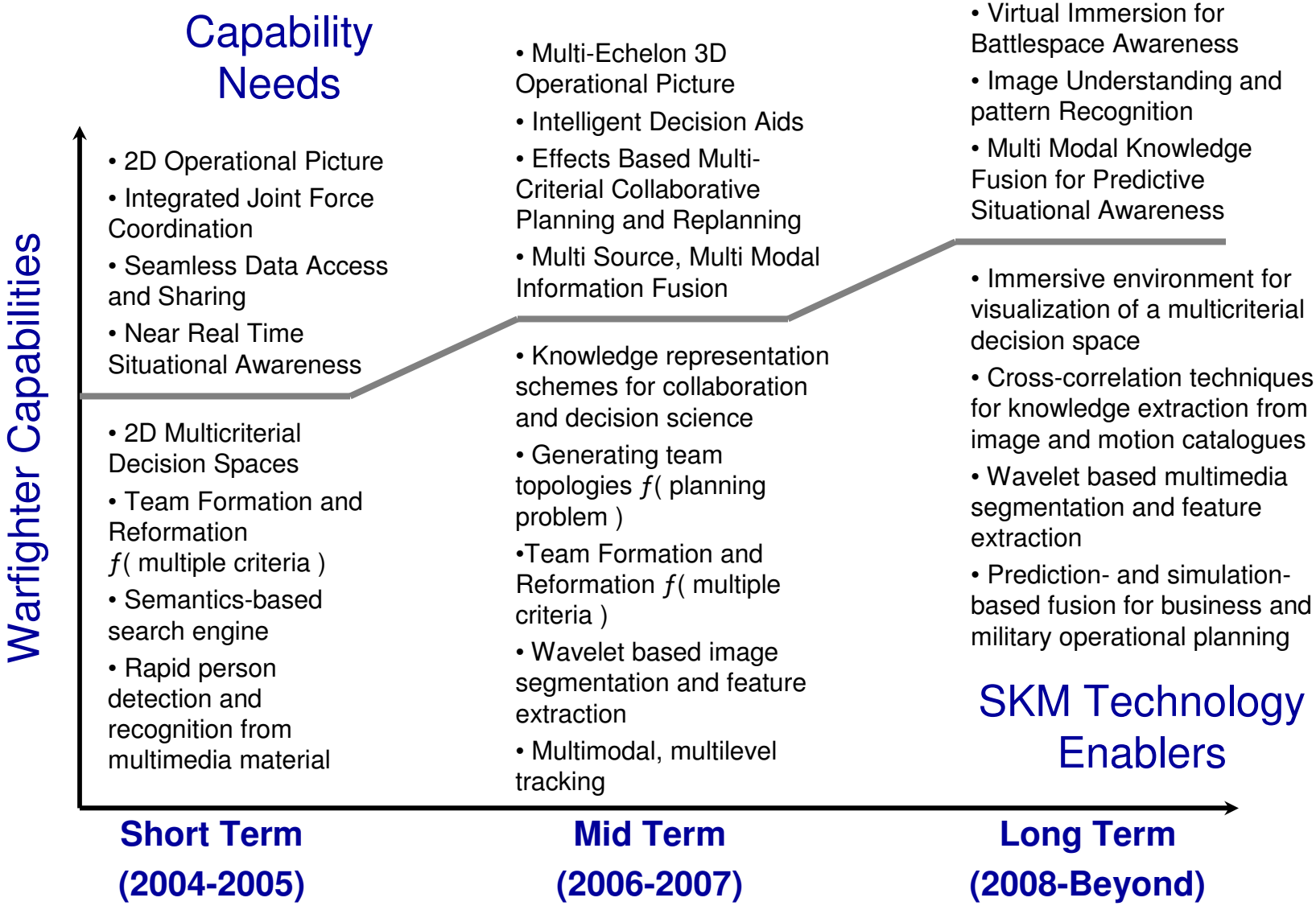
Technology Roadmap

Focus on SKM support to DoD planning & decision making

- **Identify and assess critical SKM technologies**
- **Assess technology readiness and maturity levels, both current and projected**
- **Consider *emerging and disruptive* technologies**
- **Assess technology dependencies and interrelationships**
- **Identify technology gaps**
- **Chart a course for SKM technology investment over the next 5-10 years**

Enabling the 21st Century Warfighter

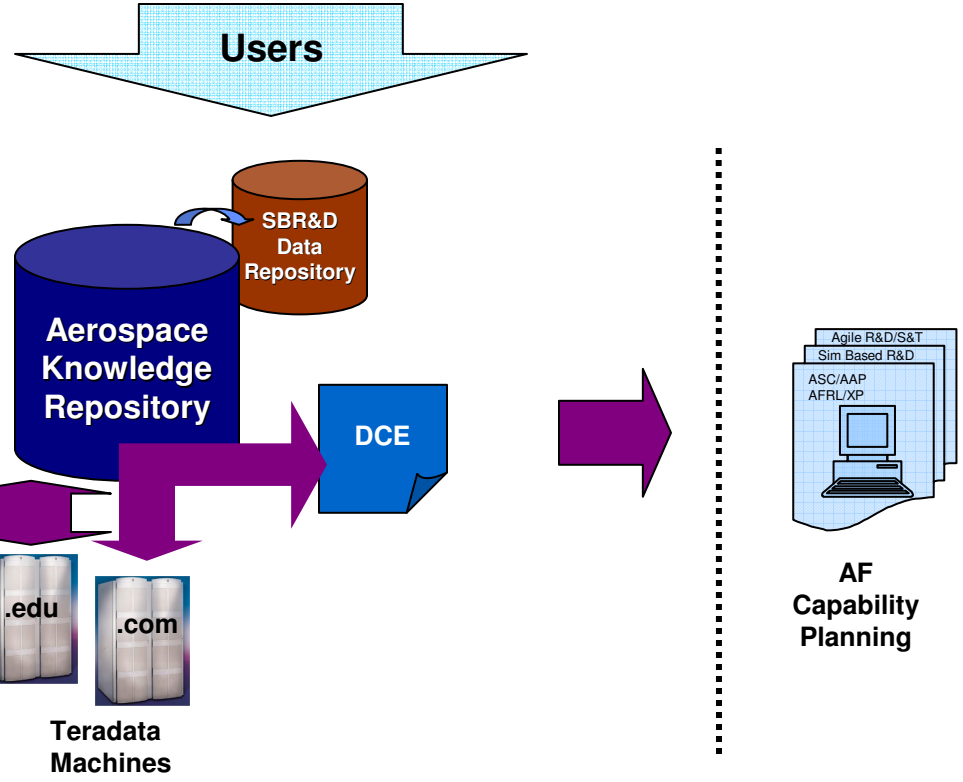
Mapping University Basic Research To Warfighter Capability Needs



WCI Secure Knowledge Management

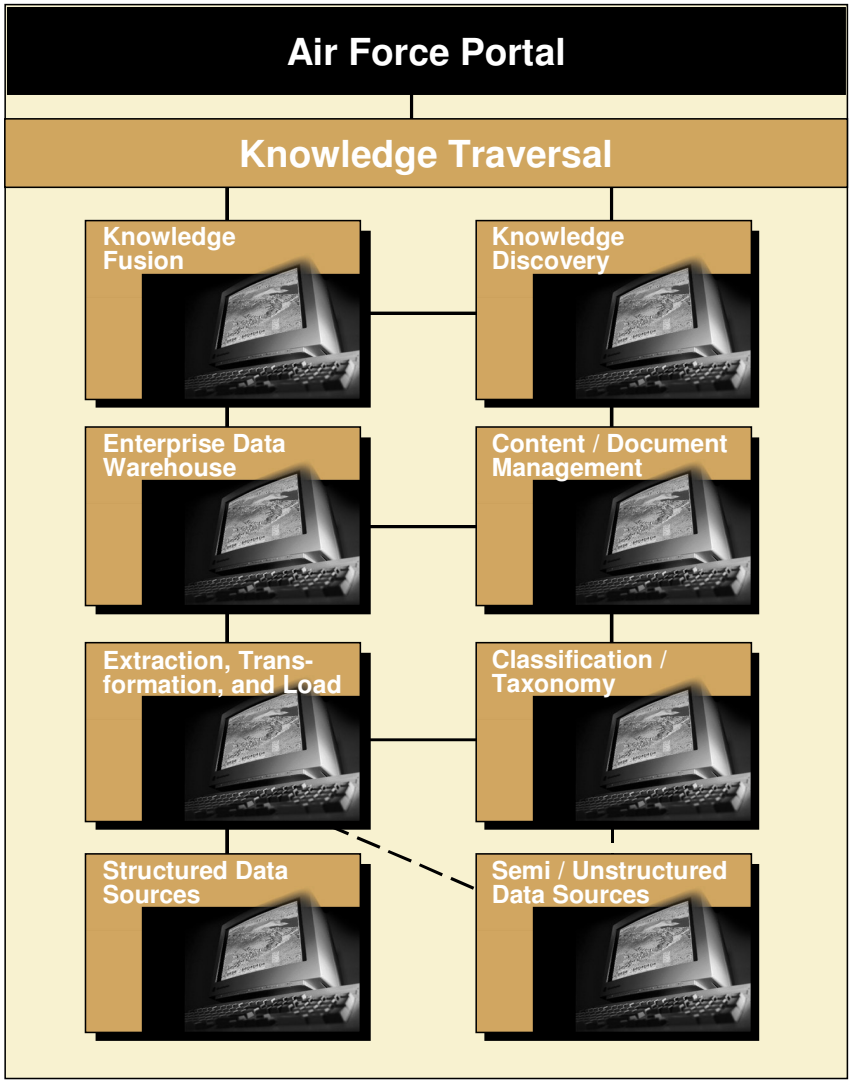
Prototype Aerospace Knowledge Repository

Aerospace Knowledge Repository



- On-line Repository of Technology, Research, & Researchers
- Aerospace Meta-Knowledge Base for Other WBI Research
- Knowledge Management Electronic Clearinghouse
- Supports Continuous Technology Gap Analysis

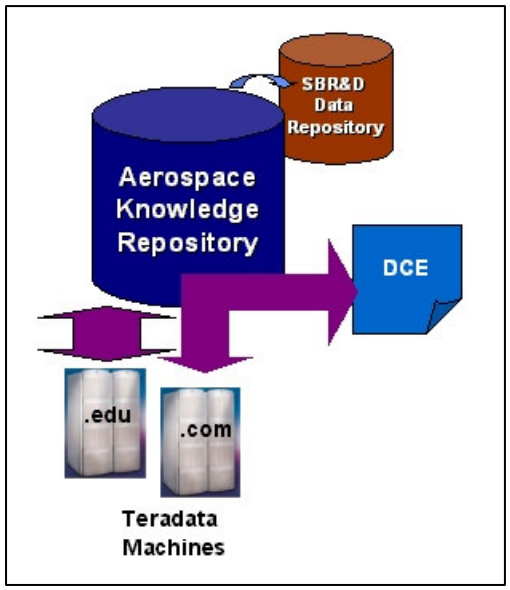
AKR Concept

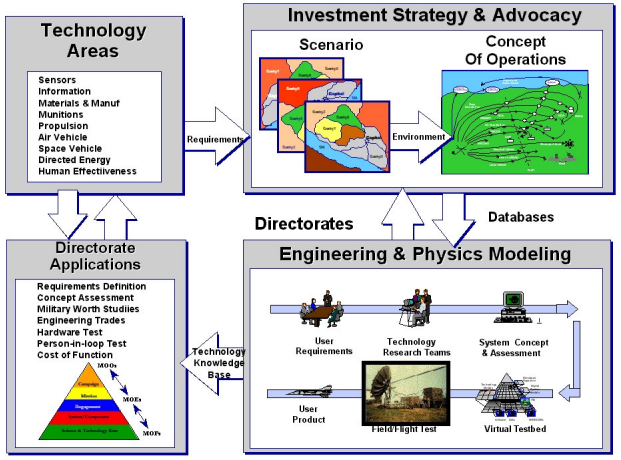


- Focus on Knowledge Discovery
- Structured Data
  - Rows and columns
  - Retrieved by indexes or keys
- Unstructured Data
  - Makes up >70% of information needs
  - Recognized as one of the major unresolved information technology issues
  - Full-text documents, Word files, PDF files, HTML or web files, etc.

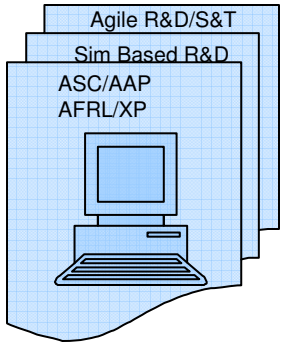
WCI Secure Knowledge Management

Decision Support for Planning





AF Capability Planning



- **Decision support for capability planning**
- **Technology Trends Data base**
- **Technology Assessment Events to evaluate technology maturation & impact of new technology using M&S assets**

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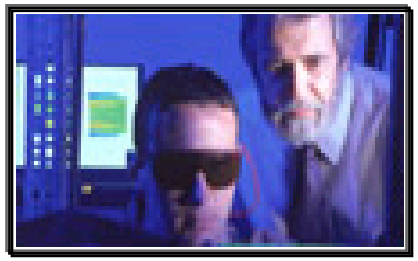
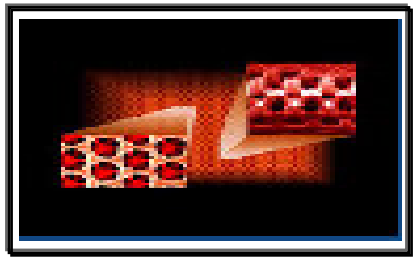
AKR Knowledge Mining



Researcher / Technologist

Research



Technology

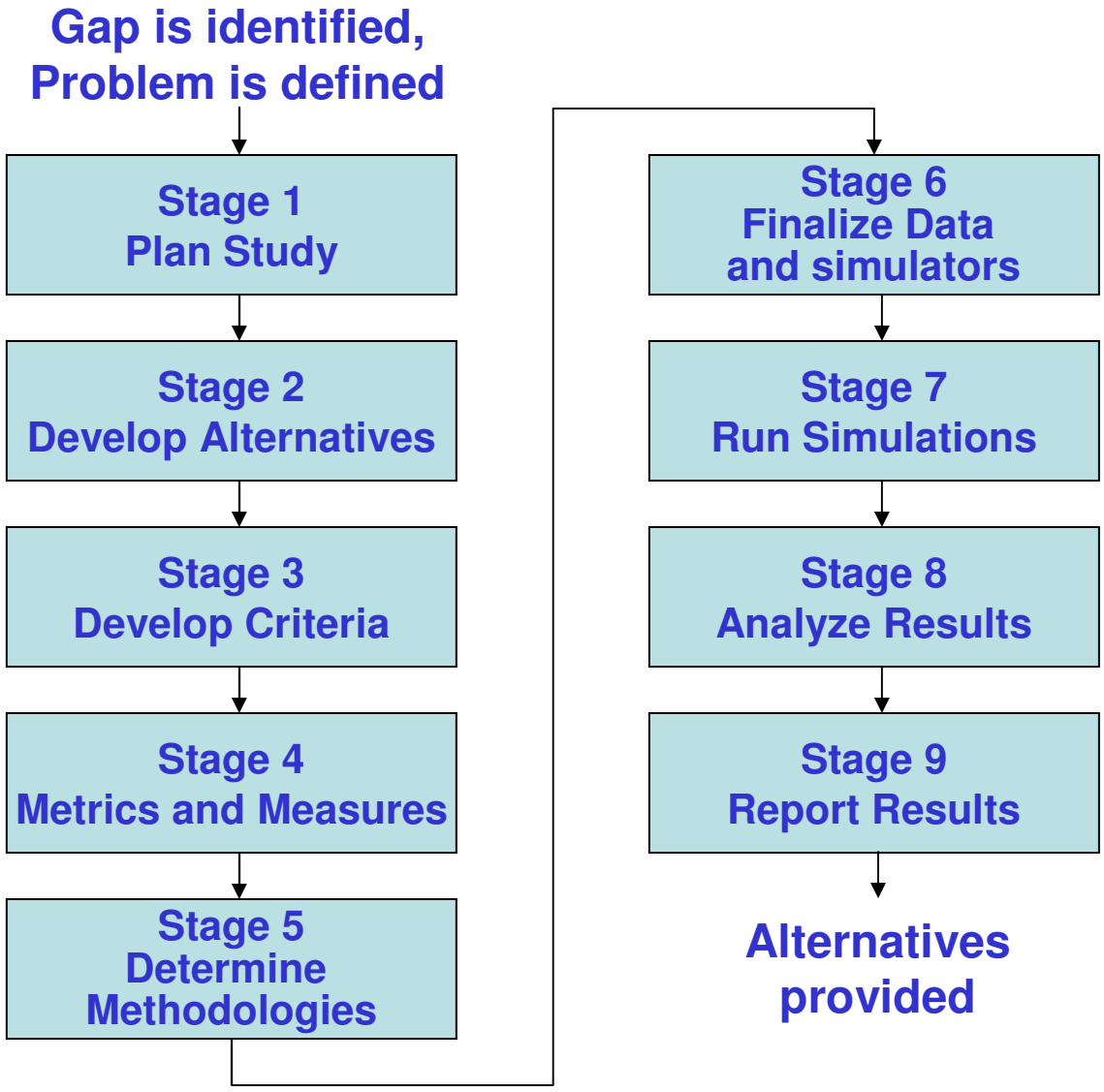
Academia

Industry

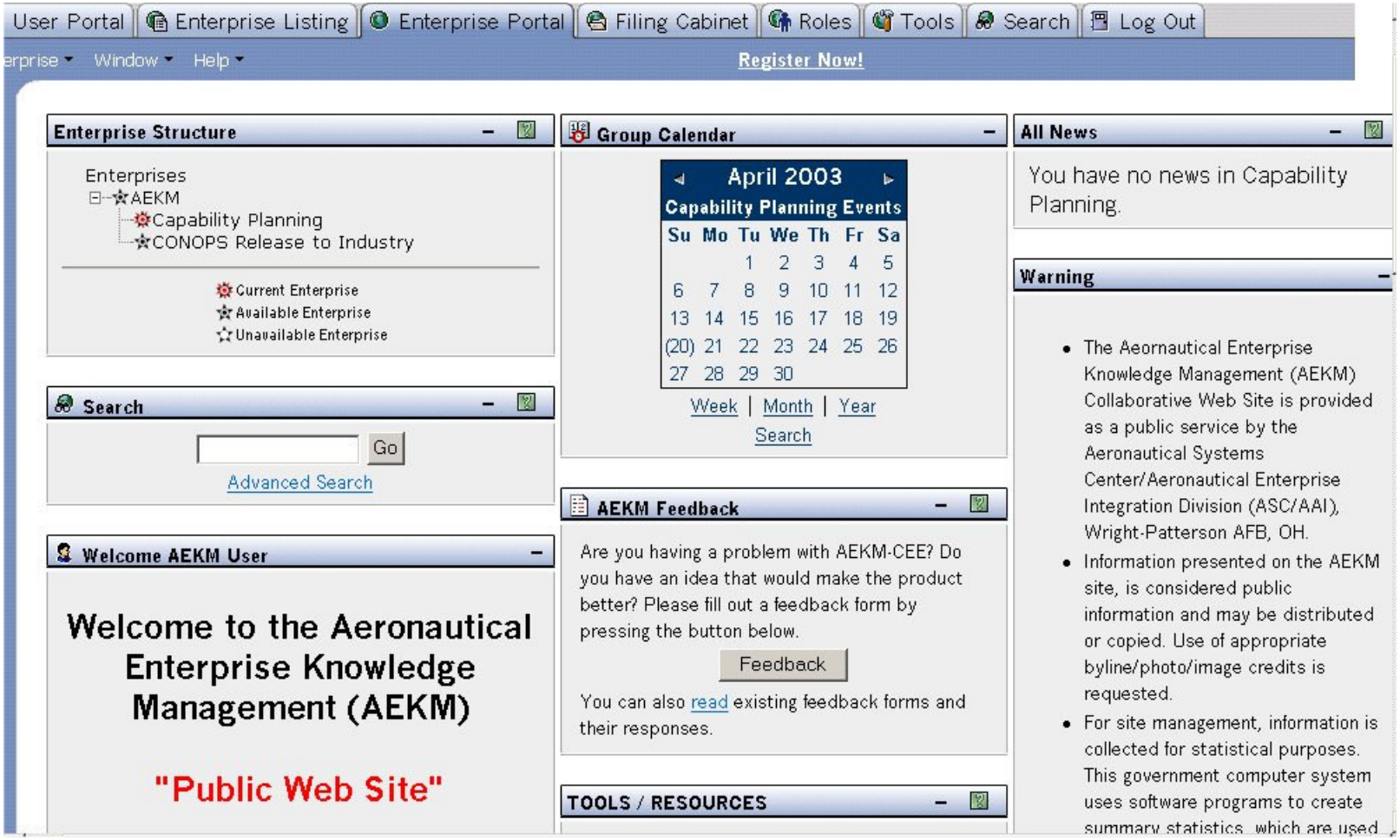
Government

Capability Planning Process Flow

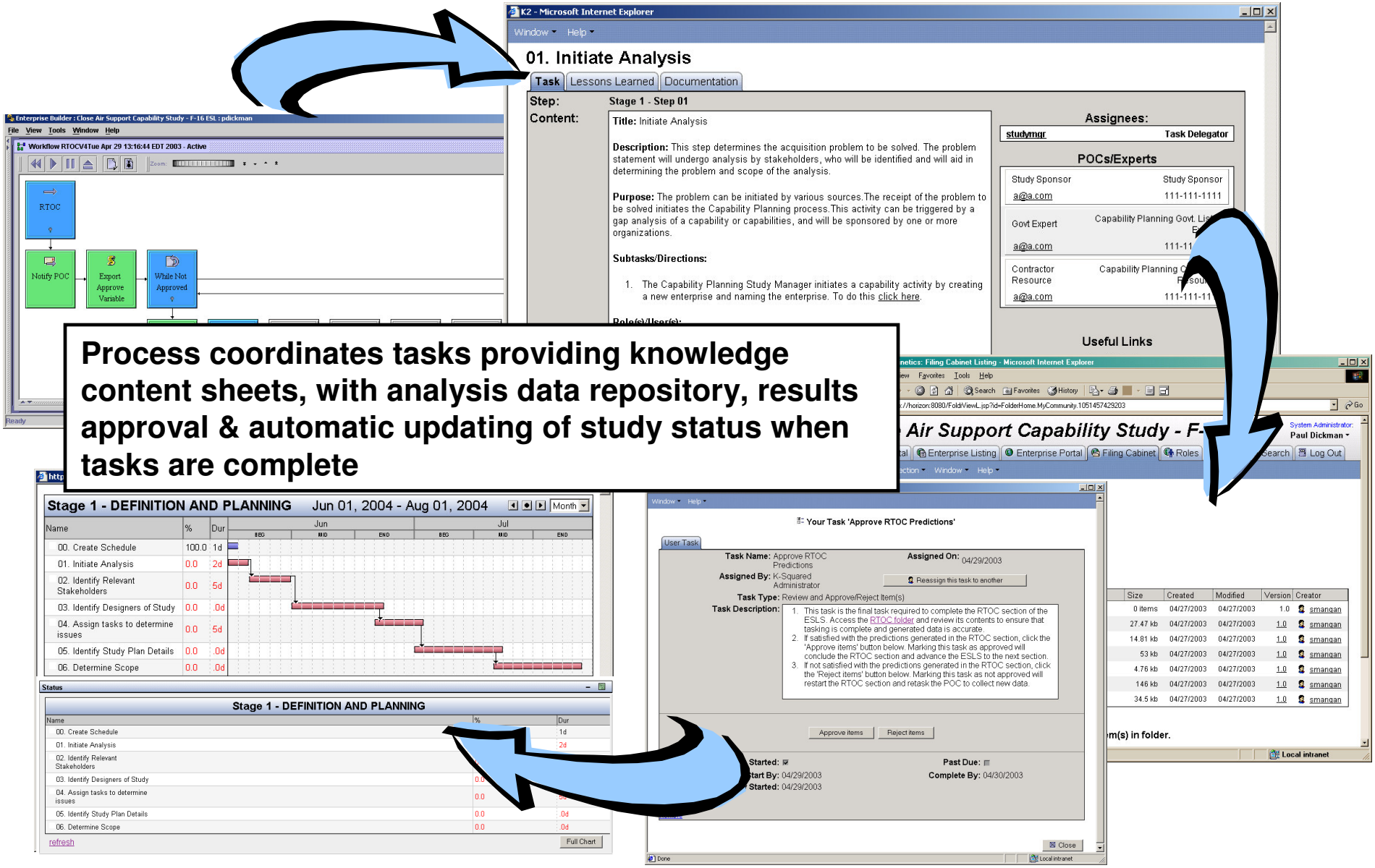
Each stage represents a sequence of steps, and is performed in order



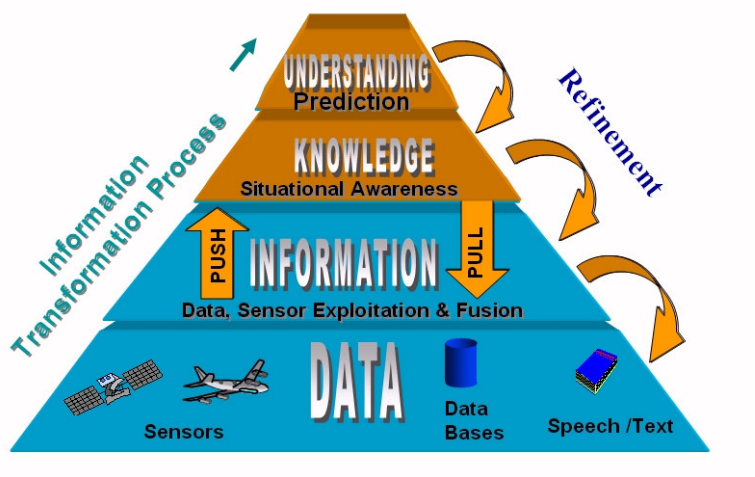
Virtual Capability Planning Portal



Process Execution/Knowledge Capture



Summary



Opportunity to provide decision-quality knowledge for planning including

- examining proposed capabilities
- cost of alternative approaches
- the impact of technologies
- identification of primary risk drivers
- creation of executable acquisition strategies