xentity corporation

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Knowledge Information and Data Strategy

KID

Cross Domain Knowledge for Interdependent Organizations and Systems

Workshop 111, TRB 96th Annual Meeting

xentity corporation

Jim Barrett , Xentity – January 8, 2017

Briefing Objectives

- Describe the KID model that fuses Data, Information and Knowledge practices and governance
- Explore its' benefits and possibilities for transportation / resiliency
  - Planning, policy
  - Investments – cost benefits
  - Risk Management
  - Complex and adaptive systems.

NCHRP 20-59(14C)

"[T]he ability to prepare and plan for, absorb, recover from, or more successfully adapt to adverse events" *

Transportation Resiliency is a complex knowledge challenge!

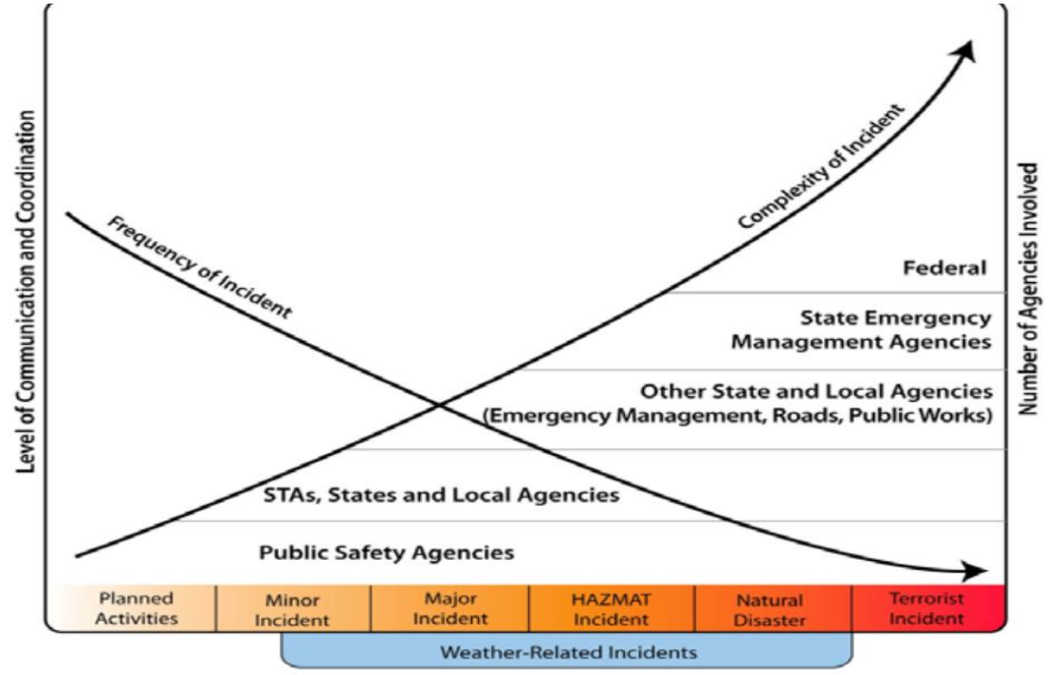
- Resiliency Findings & Recommendations
  - **Systemic risks causing system disruptions**
  - **Incorporating resilience into operational practice.**
  - **Investing in resilient infrastructure.**
  - **The importance of conducting a quadrennial review of transportation infrastructure.**
  - **Developing tools, models and standards to mitigate risks**
  - **Operationalizing resilience**

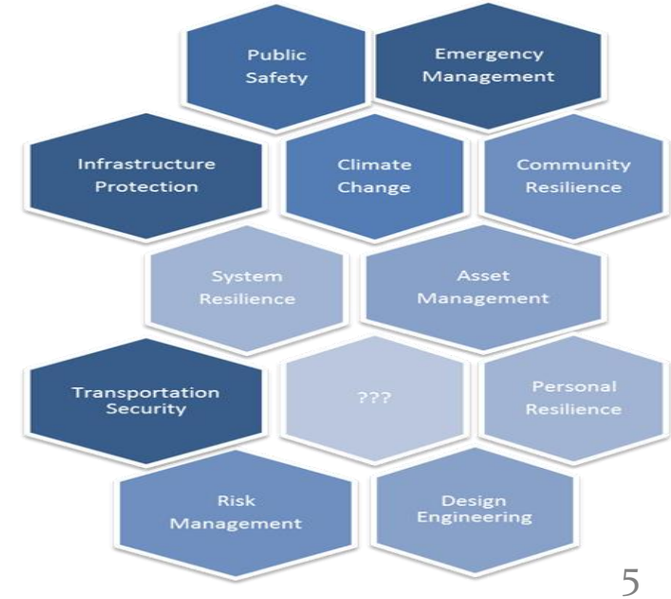
* American Association of State Highway and Transportation Officials (AASHTO), Special Committee on Transportation Security and Emergency Management (SCOTSEM)

Resiliency - Complex adaptive systems

- Dynamic Risk – inconsistent change
- Greater unpredictability/long time frames
- System of Systems (SoS)- interdependencies
- Multiple Domains
- Multiple organizational interdependencies
- Semantics and standards – inconsistencies

Resiliency Plans & Strategies need to be dynamic!





Resiliency + ongoing Ops complexity

- The challenges DOTs face*:
  - aging infrastructure,
  - evolving customer expectations,
  - availability of new sources of data,
  - rapid technology/innovation advances,
  - outdated information technology (IT) strategies

**** TURNING DATA INTO INFORMATION FOR TRANSPORT DECISION MAKING (Cambridge Systematics)***

Knowledge Inflection Point?

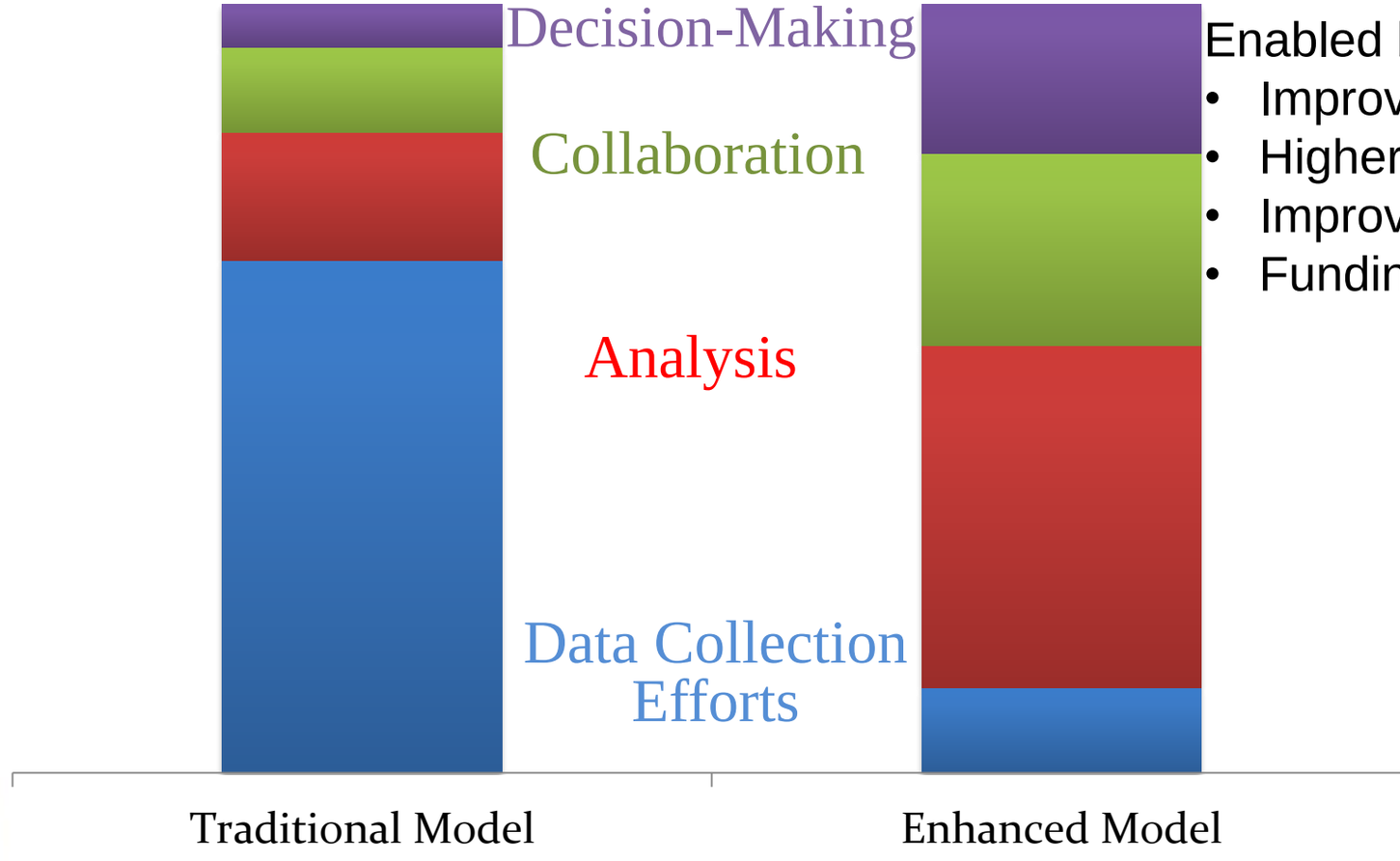
Are we at a time when industry, needs to think differently about knowledge challenges like transportation resiliency?

- *To address the increasing volume, speed and sources of data*
- *Our approach to creating, acquiring and sustaining organizational knowledge?*
- *How we architect and design for an organization to be knowledge:*
  - *centric?*
  - *driven*
  - *knowledge workers – front and center?*

Knowledge, Information and Data Drivers

- Knowledge economy
- Volume of data
- Velocity of data
- Veracity of data
- Hidden data
- Multiplicity of sources
  - Productization
  - Specialization
- Technology Opportunities
  - Brokers
  - Geospatial
  - Mediators
  - Lakes, Puddles, Big Data, Warehouses etc.…
  - Semantics, ontologies, controlled vocabularies

New Operating Models suggest behavior shifts



Enabled by value of :

- Improved Data Supply
- Higher Quality
- Improve Availability
- Funding Gap Expansion

Credit: Armand Ciccarelli – Appian Strategic Advisors

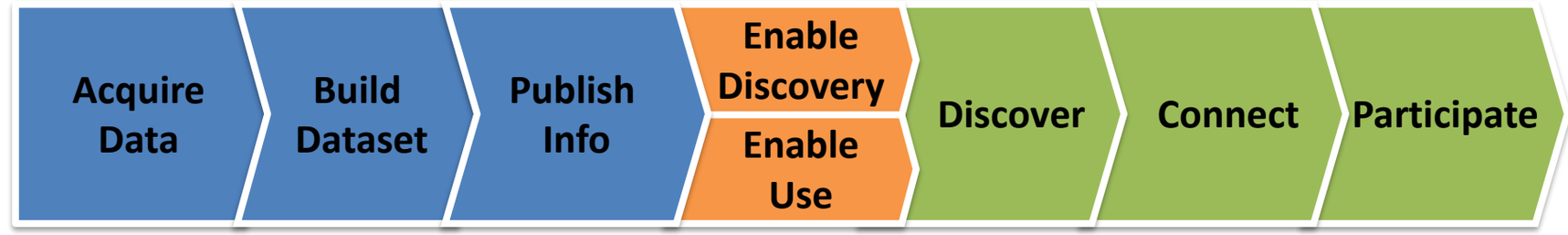
Data Value Network Model

NOT Self-Organizing

Self-Organizing

Community of Suppliers

Community of Users



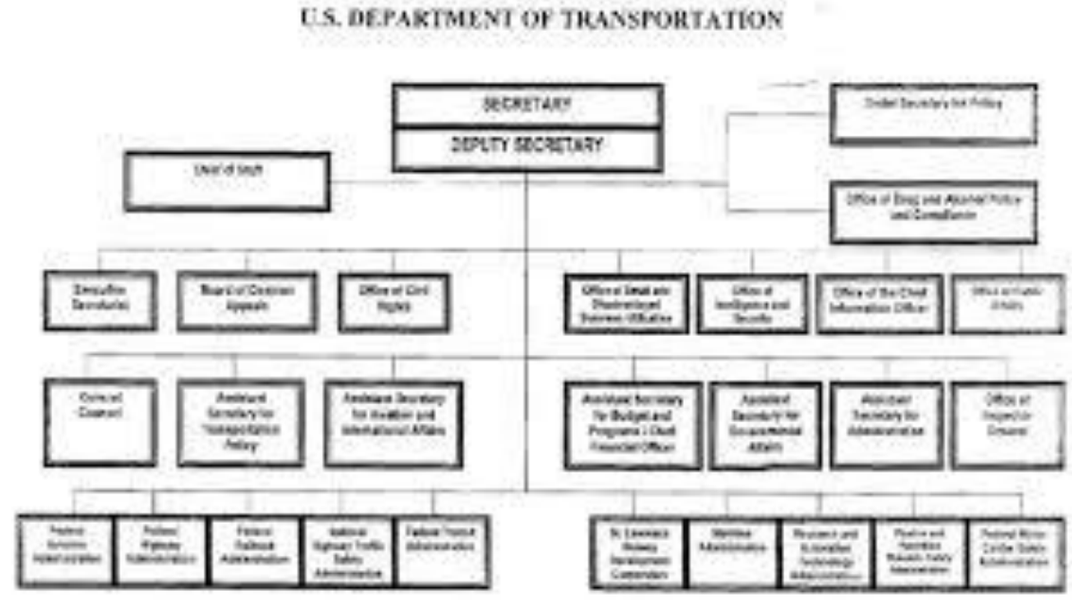
Efficiency Measures

Effectiveness Measures

Service Architecture:
Metadata Aggregation and Syndication
Infrastructure and Platform Services

Where will the innovation or complex issues be found?

Innovation is found within the "white" spaces of the organization – between units, domains and skill areas



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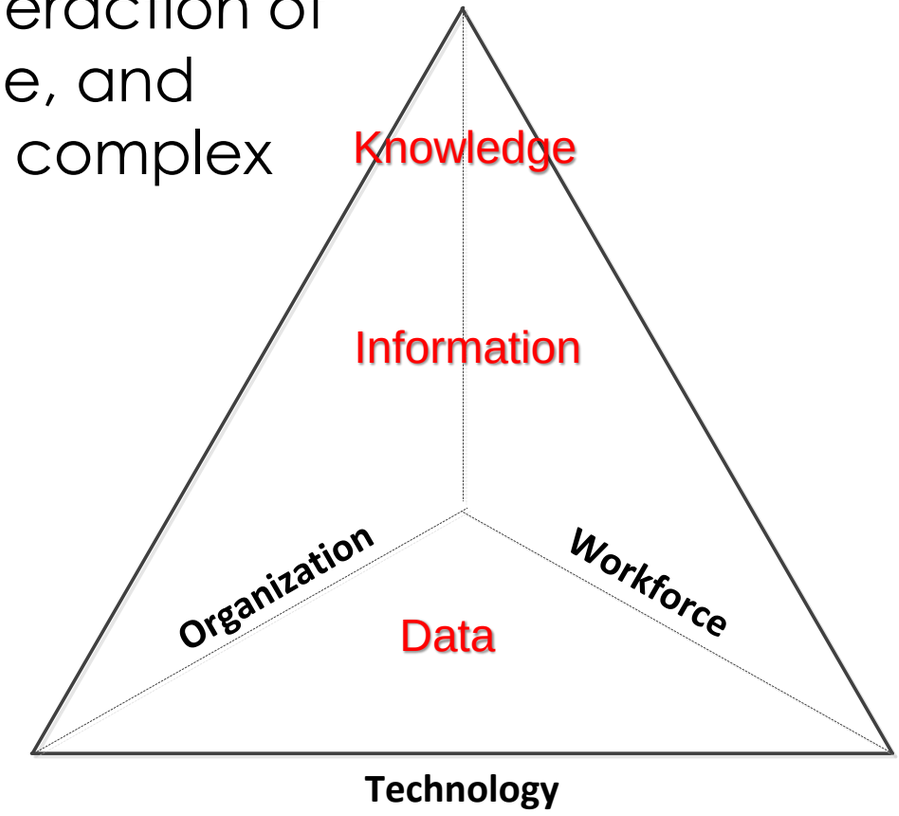
KM Approaches & Organizational Actualization

- Technology: with a focus on technology, ideally those that enhance knowledge sharing and creation
- Organizational: lead and design to facilitate knowledge processes best
- Workforce: focus on the interaction of people, identity, knowledge, and environmental factors as a complex adaptive system akin to a natural ecosystem.



KID and Social Engineering

- "Open source software is to Software engineers as Data and Information will be to Knowledge Workers"
  - Xentity
- "Data Use challenges are half technical and half social"

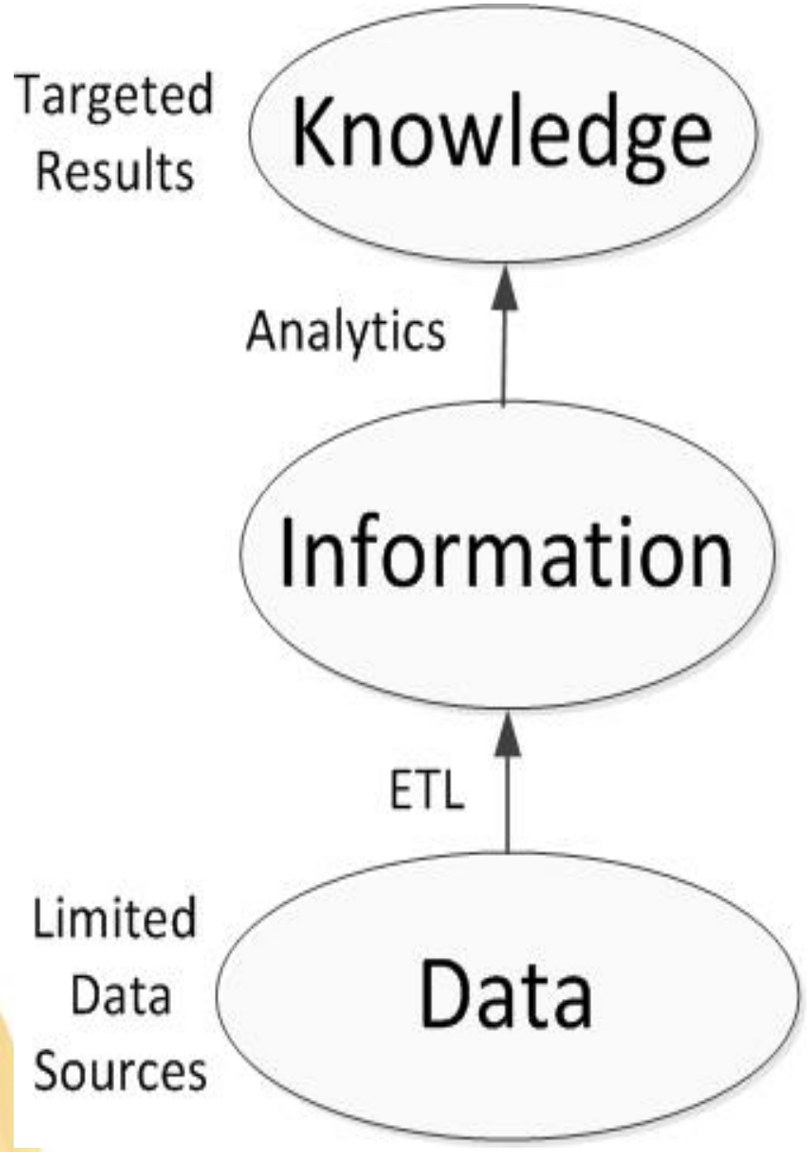
  NSF - Earth Cube Program

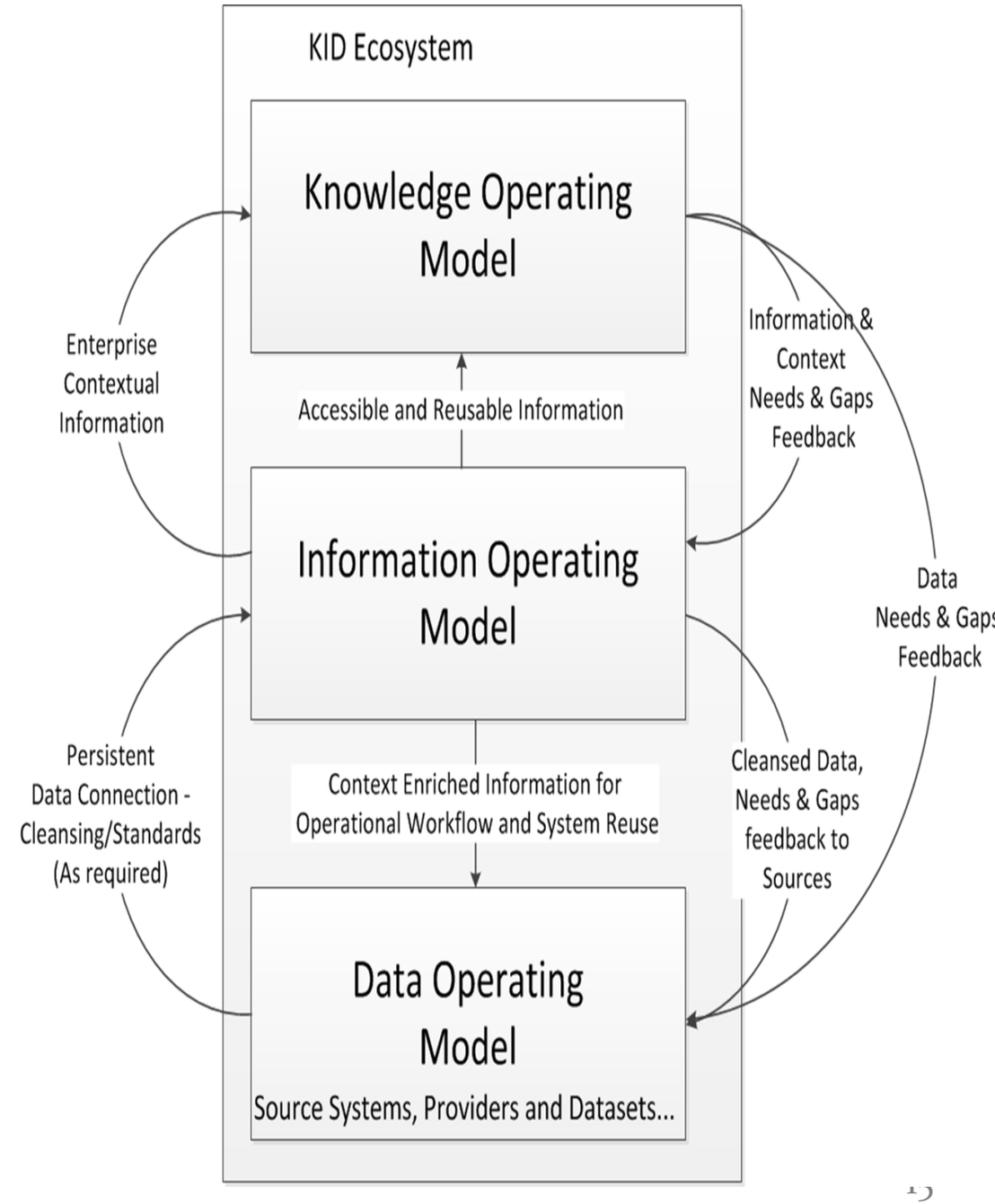
  Attributed to someone at every science meeting
- "At Xerox Corporation, knowledge management is 90 percent social process and 10 percent infrastructure, for instance. Knowledge management leverages and reuses the organization's existing resources to help people seek out best practices, not reinvent the wheel."

Data Management / IT Issues

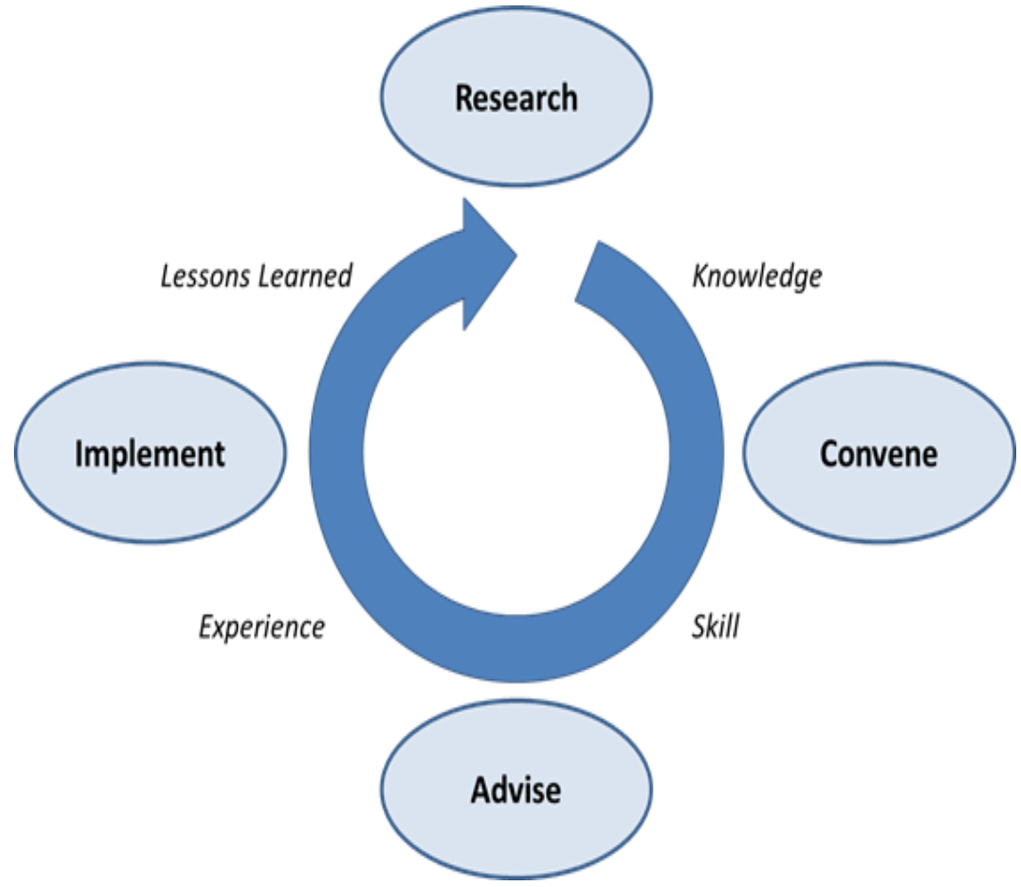
- Data stored in many, diverse locations across the enterprise: Inaccessible, many formats
- Need decision-quality data to support enhancements to planning and programming - improved allocation of limited resources
  - More objective programming and project selection
- How to make use of new sources of data
  - 3rd Party Probe-based data / Connected Data to support operations
  - Non-traditional data sources (e.g., Twitter) to support customer service needs
- Need for better predictions and forecasts
  - Costs-oriented – capital, operations, and maintenance
  - Performance-oriented (both output and outcome)
  - More effectively demonstrate the value of programs to policy makers

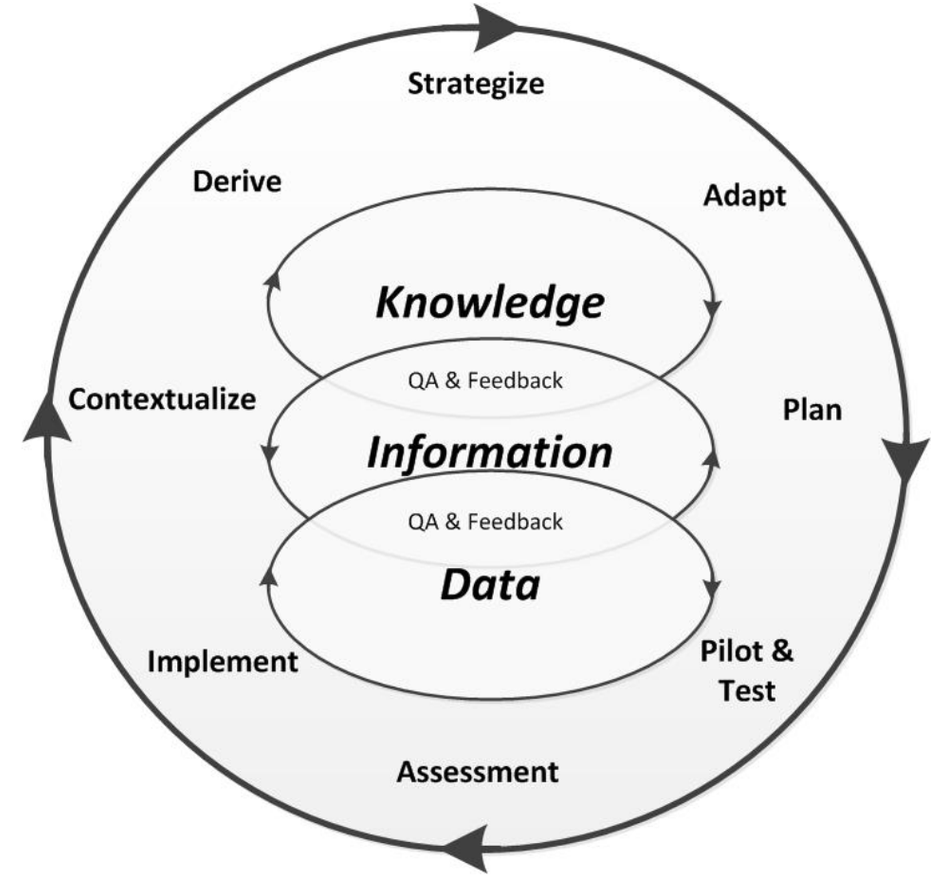
One of the current key models (DIK)

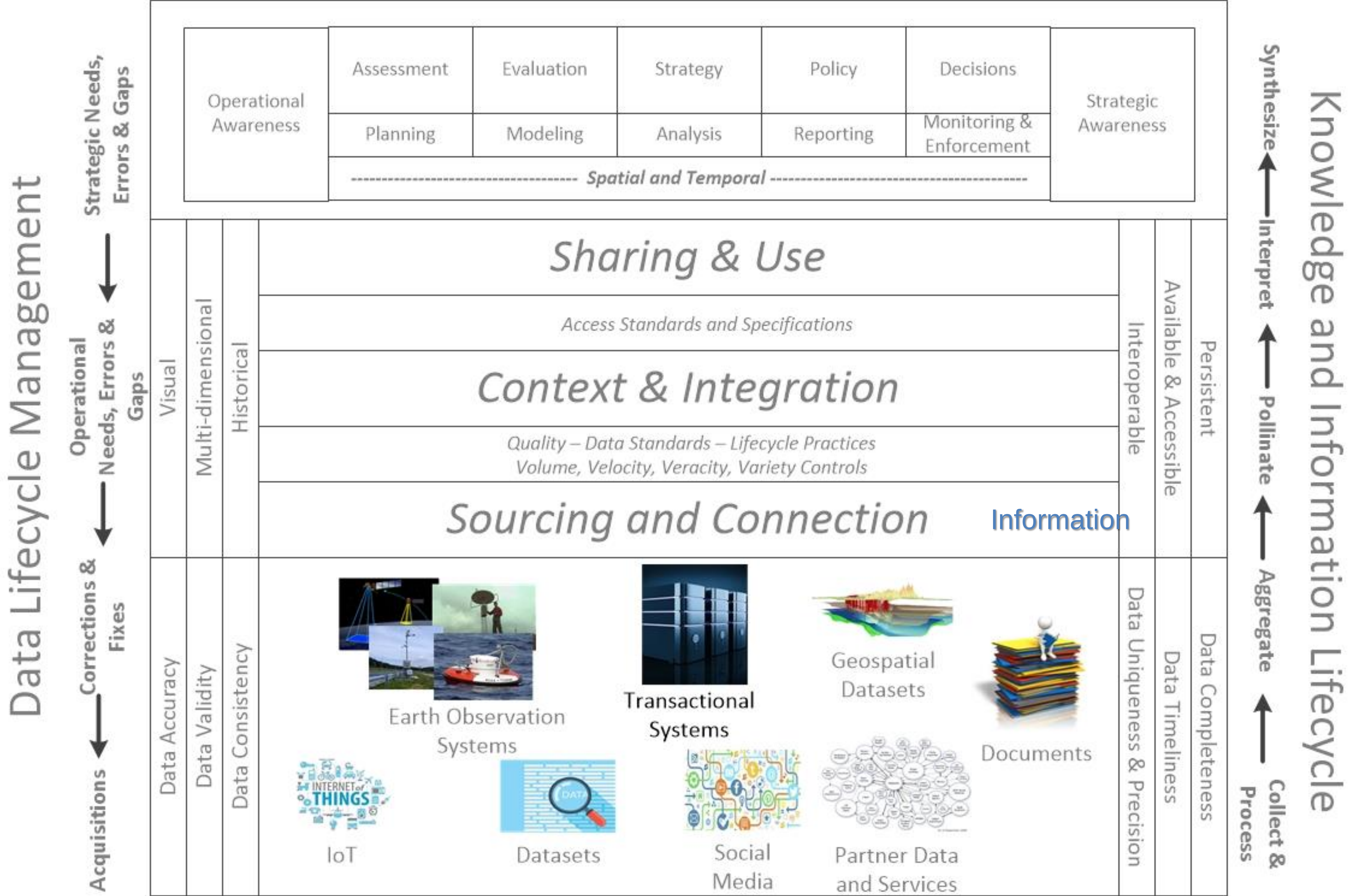




Adaptivity KID Conceptual Lifecycle






Data Lifecycle Management
Strategic Needs, Errors & Gaps
Operational Needs, Errors & Gaps
Corrections & Fixes
Acquisitions
Operational Awareness
Assessment
Evaluation
Strategy
Policy
Decisions
Planning
Modeling
Analysis
Reporting
Monitoring & Enforcement
Spatial and Temporal
Strategic Awareness
Visual
Multi-dimensional
Historical
Sharing & Use
Access Standards and Specifications
Context & Integration
Quality – Data Standards – Lifecycle Practices
Volume, Velocity, Veracity, Variety Controls
Sourcing and Connection
Information
Interoperable
Available & Accessible
Persistent
Data Accuracy
Data Validity
Data Consistency
Earth Observation Systems
Transactional Systems
Geospatial Datasets
Documents
IoT
Datasets
Social Media
Partner Data and Services
Data Uniqueness & Precision
Data Timeliness
Data Completeness
Knowledge and Information Lifecycle
Synthesize
Interpret
Pollinate
Aggregate
Collect & Process

Thanks