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NCHRP 20-75 – Implementing Transportation Knowledge Networks

Leni Oman, Chair, NCHRP 20-75 Panel, Amanda J. Wilson, National Transportation Library, Frances Harrison, NCHRP 20-75 Principal Investigator

NCHRP 20-75 – Implementing Transportation Knowledge Networks

Briefing for Transportation Librarians Roundtable

December 2009

Leni Oman, Chair, NCHRP 20-75 Panel

Amanda J. Wilson, National Transportation Library

Frances D. Harrison, NCHRP 20-75 Principal Investigator





Topics

- The information problem
- What is needed?
- Key strategies:
 - Knowledge Mapping
 - Communities of Practice
 - Findability
 - Transportation Knowledge Networks
- What you can do



The Information Problem

- 80% of an organization's information content is unmanaged
- 15-35% of employees' time spent searching for information
- Agencies losing brain trust
 - 40-50% of the transportation workforce will be eligible to retire within 10 years.
 - Reduction in Force
- Work trends
 - More specialization and less cross-training/mentoring
 - "Just in time" information consumption
 - Demographic changes/changing information expectations
- Explosion of information available – especially digital
 - 135% growth in Internet Usage in North American 2000-2008
 - Impossible to keep up – even for niche areas
 - Relevance is critical – and needs improvement
- Even so only 16-19% of Internet content is searchable
 - Not all agencies make their information accessible



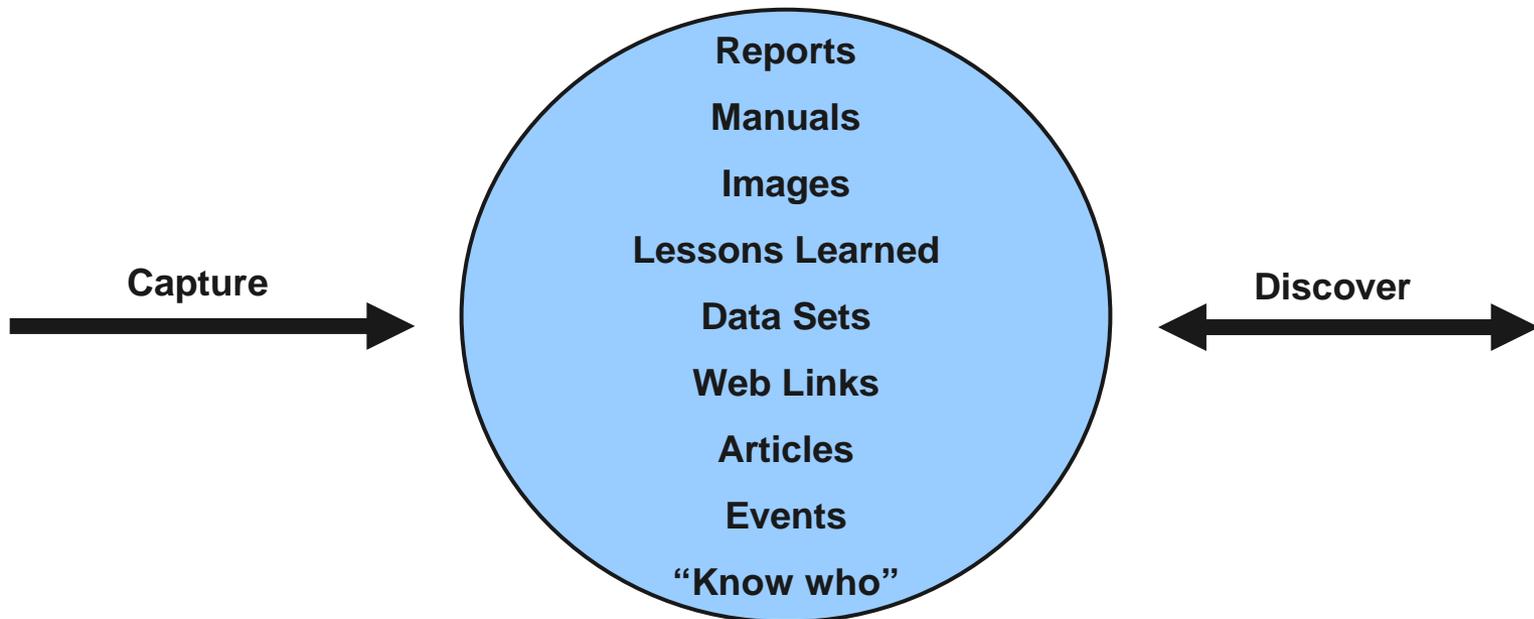
Current Information Management

- Fishing in a Bucket
 - Ask a colleague
 - Scan a few familiar resources (e.g. NCHRP Synthesis reports, recent conference proceedings)
 - Google search
- Agencies paying for the same information multiple times
- Staff and consultants spending valuable time searching for information and often missing what is of most value
- New research not benefiting from what is already known
- Practitioners reinventing approaches when they could piggyback on existing ones
- Responsibility for transportation knowledge capture *not* shared throughout industry

There is a better way

What is Needed?

1. Make it easier for transportation agencies to *identify, capture and preserve* information of value
2. Make it easier for people to *find* information when they need it – from their peers, catalogs, digital and physical collections.
3. Minimize the time it takes to *access* information that helps us operate more efficiently and effectively
4. Mitigate loss of institutional knowledge resulting from employee departures



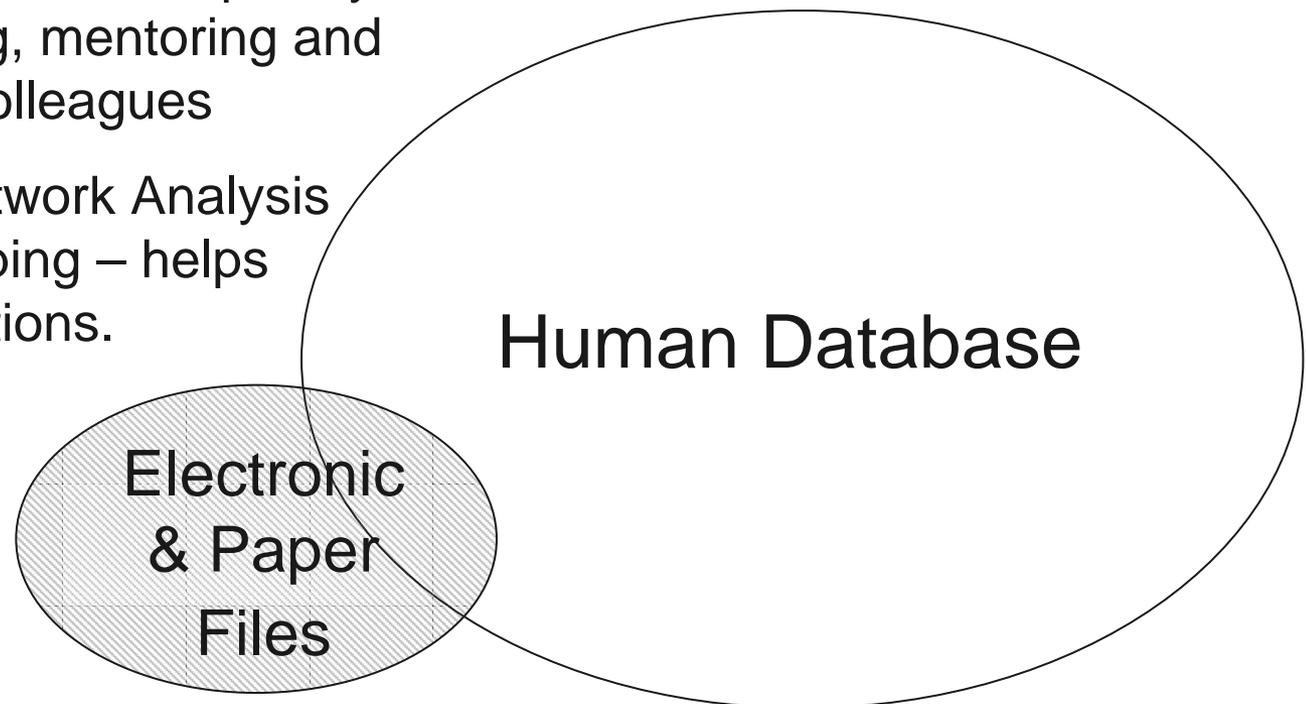


Key Strategies

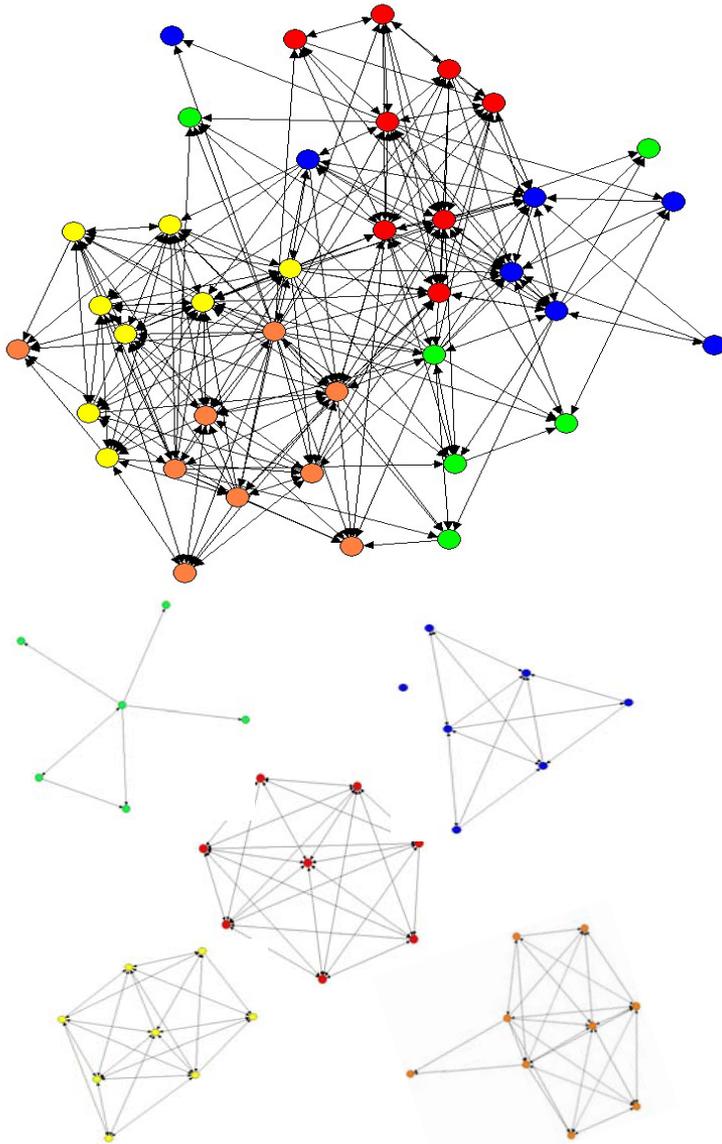
1. Facilitate person to person knowledge sharing within and across organizations –
 - Diagnose current state with **Knowledge Mapping Techniques**
 - Support knowledge sharing and creation within **Communities of Practice** - groups of professionals with common interests and goals.
2. Improve **Findability** – implement tools and techniques for information discovery
3. Strengthen **Knowledge Networks** - build and support an information sharing infrastructure across organizations to:
 - Ensure that valuable information is captured, collected and stored so that it can be easily discovered
 - Improve availability of filtered, synthesized and compiled information that can be rapidly absorbed

The Human Knowledge Base

- Some knowledge is explicit and can be captured in electronic or paper files.
- Some knowledge is tacit, resides within our way of knowing and doing our work. It can be difficult to capture and highly context specific.
- This information is most frequently shared through networking, mentoring and discussions with colleagues
- Organizational Network Analysis
– knowledge mapping – helps identify priority actions.



Example from Virginia DOT



- A knowledge map allows you to identify connections and creates opportunities for questions, like:
 - Are certain people over-subscribed with questions or requests for information?
 - Are there opportunities for individuals to be paired so as to distribute information or responsibilities more evenly?
 - Are some groups or individuals not connected at all?
 - Where are people getting their information?
 - Who are the strong communicators?
What can you do to mimic that pattern?

Communities of Practice and Communities of Interest

| Dimensions | communities of practice (CoPs) | communities of interest (Cols) |
|-----------------------|---|---|
| nature of problems | different tasks in the same domain | common task across multiple domains |
| knowledge development | refinement of one knowledge system; new ideas coming from within the practice | synthesis and mutual learning through the integration of multiple knowledge systems |
| major objectives | codified knowledge, domain coverage | shared understanding; making all voices heard |
| weaknesses | group think | lack of shared understanding |
| strengths | shared ontologies | social creativity; diversity; making all voices heard |
| people | beginners and experts; apprentices and masters | stakeholders (owners of problems) from different perspectives |
| learning | legitimate peripheral participation | informed participation |



Finding Transportation Communities

Cols Example : RITA

- <http://www.transportationresearch.gov>

CoPs Example : FHWA

- <http://knowledge.fhwa.dot.gov/cops/FHWAKnowExt.nsf/pages/index.html>

CoPs in Research Example : Pavement Interactive

- http://pavementinteractive.org/index.php?title=Main_Page

CoPs in TRB Example :

- Ning: <http://transportationresearch.ning.com/>

Solution: Improve *Findability* of High Quality Transportation Information

- The quality of being able to locate or navigate.
- The degree to which a particular object is easy to discover or locate.
- The degree to which a physical or digital environment supports navigation and search (retrieval).

Peter Morville (2005)--Ambient Findability: What we find changes who we become

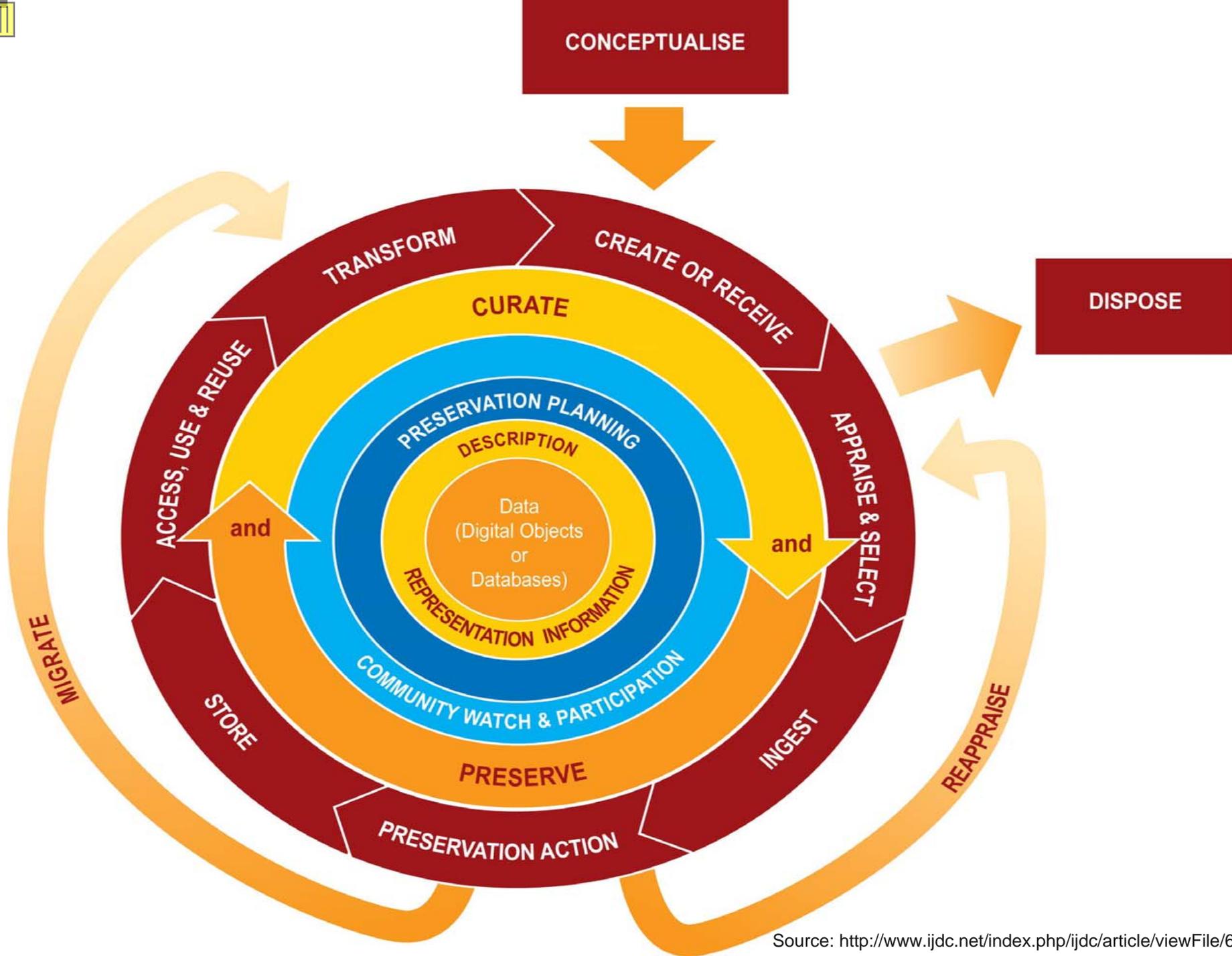
Information Professionals



&/or



Source: www.cobbcatt.org

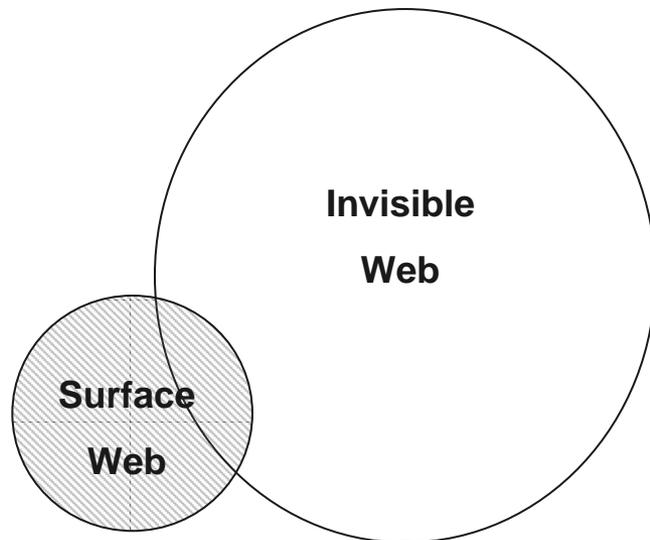


Framing the Findability Problem: Are you finding what you think you're finding?

The WWW & Invisible Web

- World Wide Web consists of “surface web” and “invisible web”
 - Search engines index the surface web (Google, Yahoo, Clusty.com)
- Invisible web is not accessible by web crawlers
 - 550 times larger than surface web**
 - (more) high quality information
 - excluded by search engine policy

**number varies



The Invisible Web

- Dynamic content: database-driven
- Unlinked content: pages not linked to by others
- Private web: sites requiring login or registration
- Contextual web: content governed by access controls
- Limited access content: sites blocking web crawlers



Tips on How to Improve Findability of Your Digital Information

*Information that is [Created/Received](#)

- Full-text searchable PDF documents (OCR)*
- Add metadata
 - “Properties” in most Microsoft applications
 - include Transportation Research Thesaurus terms for topical description
 - Use of HTML <meta> & <alt> tags for web pages
- Consistent file & URL naming
- Use of open standards
 - example: Sitemaps.xml protocol
- Ensure your research is getting to your library ***and*** TRIS

*often solved when resources are made Accessible and compliant with Section 508 of the ADA

*Information for [Access/Use/Reuse](#)

- Resources available in open formats
 - PDF
 - HTML
 - XML/RDF
- Resources available in multiple formats
 - PDF, native format (e.g., Word, .PPT), and HTML
 - .CSV and native format (ARCGIS, SAS) for data
- Digitize and index your resources
 - High quality digital master images
 - Metadata covering topic, date, attribution
- Publish local standards and guidelines
 - Codebooks for datasets
 - Metadata profiles for databases

What Info Professionals are Doing about Findability

- Semantic Web
 - Applying meaning to web for search engines and other web applications
 - Requires knowledge representation (information professionals)
 - Requires machine-processable, repurposable data (entire community)

- What needs meaning?

- People/Organizations
- Topics
- Location
- Relationships

- Creation of Linked Data

- Id.loc.gov

TRANSPORTATION: Transportation Research Thesaurus, other thesauri, taxonomies, and ontologies

- Virtual International Authority File

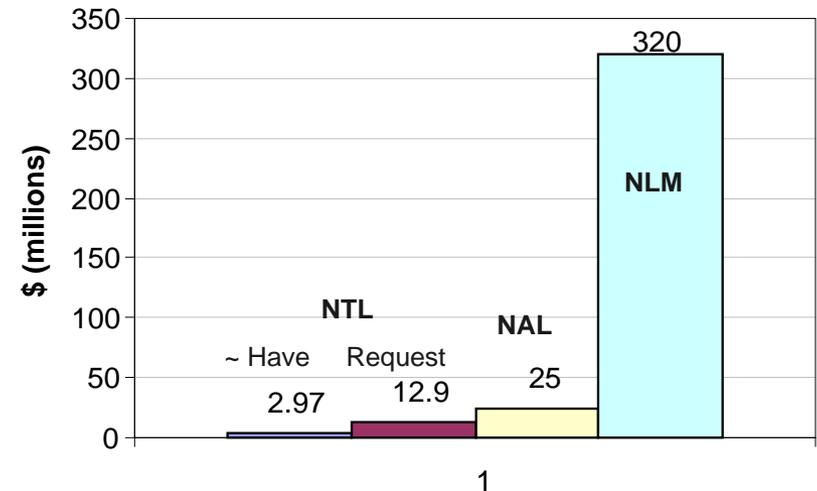
TRANSPORTATION: TRIS, COPs, TRB Committees



How Do We Compare?

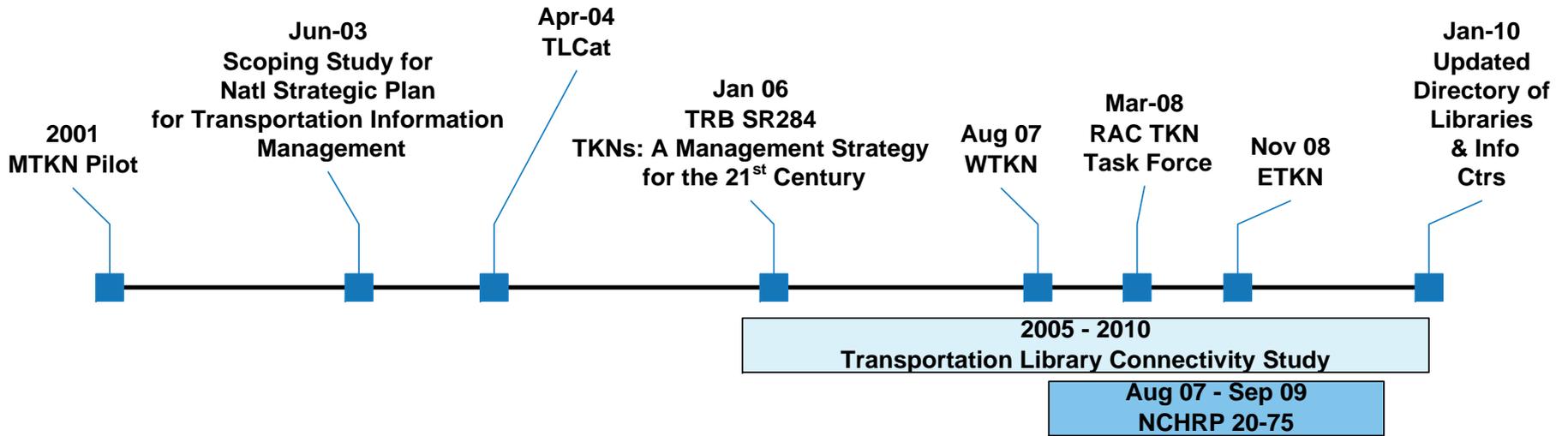
- National Library of Medicine
 - MeSH 23,000 terms,
 - >150K supplementary records, thousands of cross references
 - 11 staff managing the thesaurus
 - Index over 4800 professional journals
 - User interfaces: PubMed and MedLinePlus
- National Agricultural Library
 - NALT >68,500 terms
 - 7 staff managing the thesaurus
 - Have indexed over 4 million records
 - Custom user interfaces
- National Transportation Library
 - TRT <10,000 terms
 - Indexing is a part time duty between 4 FTE
 - 700,000 records in TRB's TRIS Online
 - Very limited custom user interfaces

Annual Library Budget



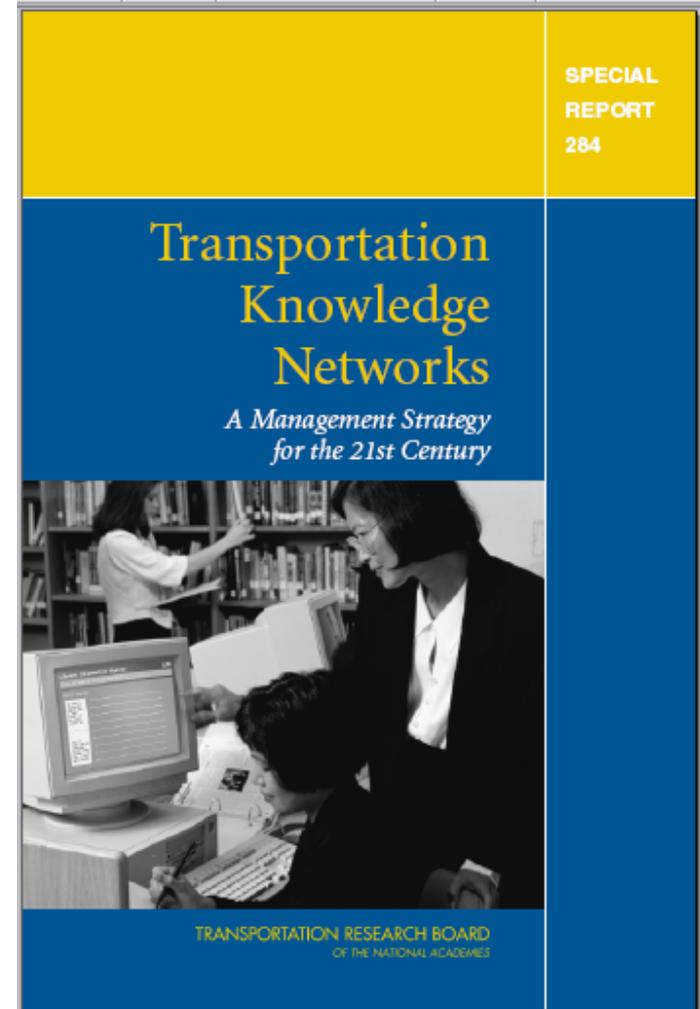


Timeline



Recommendations

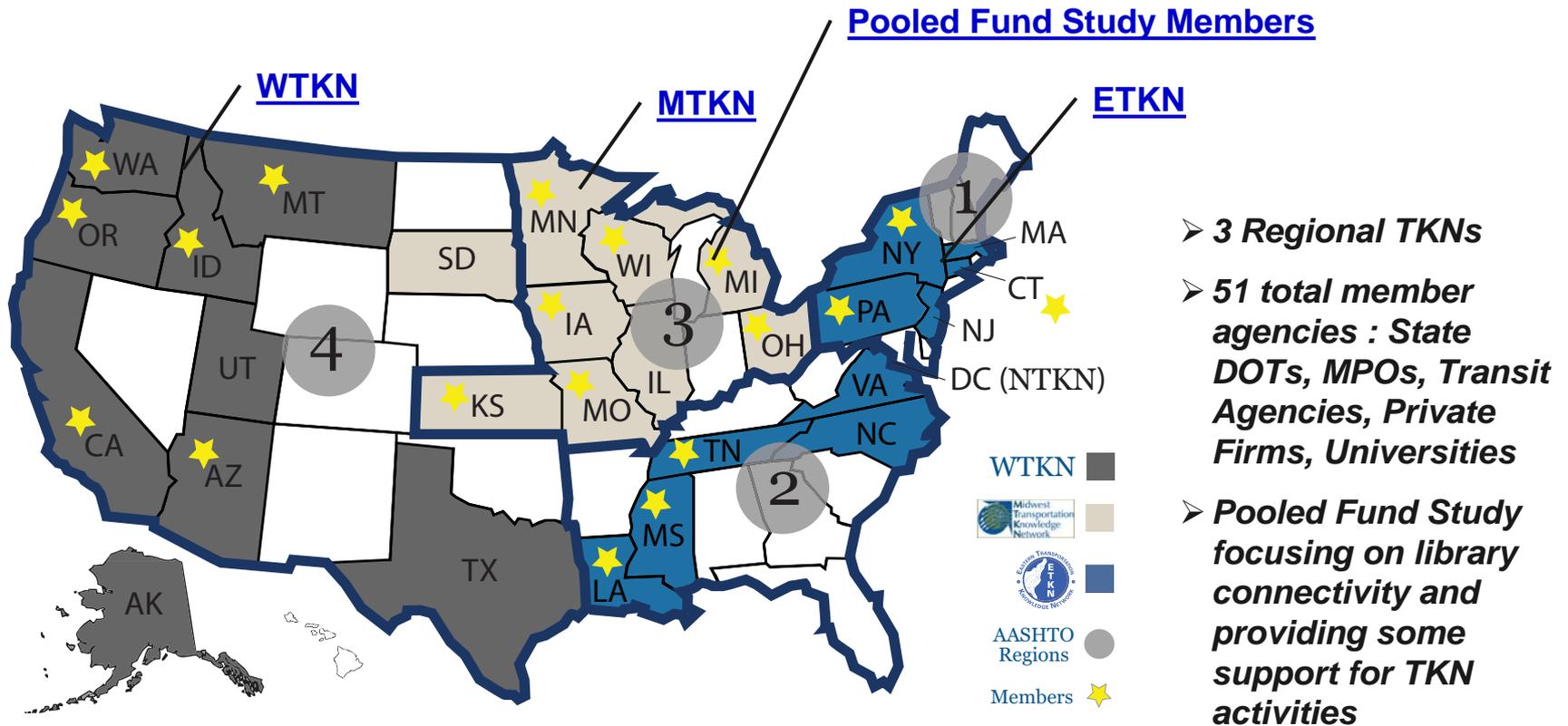
- Proposed a network of Transportation Knowledge Networks with a National Coordinating Structure
- Need for a strong governing body to provide policy, oversight, and to act as a champion for transportation information and Transportation Knowledge Networks
- Seek broad-based funding support from multiple sources to sustain operations.
 - Provide federal grants for start up
 - Grow federal funds
 - Develop local match
- NCHRP project to develop a business plan



Transportation Research Board of the National Academies 2006

Transportation Knowledge Networks - 2009

A TKN is a network of transportation organizations that collaborate to share their information



Map courtesy of the Transportation Library Connectivity Pooled Fund Study - TPF-5(105)

Transportation Knowledge Networks - 2009

WTKN

- Alaska Department of Transportation
- Arizona Transportation Research Center
- California Department of Transportation
- Idaho Transportation Department
- Montana Department of Transportation
- Oregon DOT
- Utah State DOT
- Washington State DOT
- University of California, Institute of Transportation Studies
- Texas A&M University
- University of Texas at Austin/Texas Center for Transportation Research
- Los Angeles County Metropolitan Transit Authority
- Puget Sound Regional Council
- Sound Transit
- PACCAR, Inc.
- American Honda Motor Co., Inc.

MTKN

- Illinois DOT Policy and Research Center
- Iowa DOT
- Kansas DOT
- Michigan DOT
- Minnesota DOT
- Missouri DOT
- Ohio DOT
- South Dakota DOT
- Wisconsin DOT
- University of Michigan Transportation Research Institute
- Northwestern University
- University of Minnesota Center for Transportation Studies
- Wisconsin Transportation Center
- Mid-Ohio Regional Planning Commission
- Hanson Professional Services
- Portland Cement Association
- Wiss, Janney, Elstner Associates, Inc.

ETKN

- Connecticut DOT
- Georgia DOT
- Massachusetts State Transportation Library
- Mississippi DOT
- New Jersey DOT
- New York State DOT
- North Carolina DOT
- PennDOT
- Tennessee DOT
- Virginia DOT
- Louisiana Transportation Research Center
- University of North Carolina Highway Safety Research Center
- Delaware Valley Regional Planning Commission
- Transportation Research Board Library
- AASHTO Information Center
- FHWA Research Library
- Volpe Technical Reference Center
- Community Transportation Association of America
- GRA, Inc.



Transportation Knowledge Networks - 2009

Example Mission (Western TKN):

Connect transportation resources and information from (member) organizations to facilitate research and implementation

Example Membership Criteria (Eastern TKN):

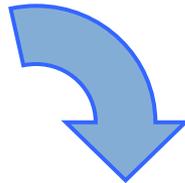
- *Be involved in transportation research and/or practice*
- *Have library or information services, or a related department with an accessible collection of transportation information resources available to TKN members*
- *Have cataloged or systematically organized collections*
- *Be willing and able to provide access to local collections and services*
- *Designate a representative responsible for communicating with other TKN members.*

Example TKN Activities:

- *Contribution of topical material to central information portals*
- *Posting of member research links to common web page*
- *Cataloging of information into a “union” catalog for transportation*
- *Digitization of state DOT high-use, high-value materials*
- *Networking & capacity building among membership*

Example: Climate Change Clearinghouse

TKN Members



State Climate Change Portals
White Papers
Regional Initiatives

U.S. Department of Transportation

Clearinghouse Home :: About the Clearinghouse :: About the Center :: Calendar of Events :: Hot Topics :: Climate Exchange :: Glossary :: Site Map

Transportation and Climate Change
CLEARINGHOUSE

Change text size RSS Feeds

Google search this site: Search

[Home](#) >> State/Local Actions & Policies

State/Local Actions & Policies

Many states and local government are setting greenhouse gas (GHG) reduction goals through legislation, regulation, and other policies. States and regional coalitions are developing climate action plans to identify and evaluate feasible policies to reduce their greenhouse gas emissions through a combination of public and private sector policies and programs. With growing interest in climate change, transportation decision makers are facing increased public emphasis on the relationship between transportation and climate change. In response, transportation agencies and planning organizations are increasingly integrating climate change impacts into transportation decision making.

About Transportation & Climate Change
GHG Inventories, Forecasts, & Transportation Data
Methodologies for Analyzing GHG Emissions from Transportation
Greenhouse Gas Emissions Reduction Strategies
Climate Change Impacts & Adaptation



NCHRP 20-75 Outreach Findings

What is Needed?

- One stop shopping for transportation information
- Improved search tools
- Value-added services to filter & annotate information
- Peer-to-peer sharing of best practices
- Capture of “missing” information resources
- Greater access to digital documents
- Cataloging to enable sharing of documents across organizations
- Preservation of information resources to ensure continuing availability

Comments on the Value of TKNs



“The issue of workforce retention, workforce turnover, and *loss of knowledge* as a result of that turnover of experienced staff [is] the number one issue of concern to me. To the extent that knowledge networks can be an effective tool in trying to address that issue, it becomes a tool that’s addressing my *number one priority*”

- Neil Pedersen, Administrator, Maryland SHA



“Having the *capability to access what’s going on, whether it’s in research or whether it’s in best practices*, is tremendously important for [innovators] to help create their own approaches in their own organizations. Transportation Knowledge Networks are very important to provide information to be able to learn what others are doing to grapple with these questions.”

- Bob Johns, Director, Volpe National Transportation Systems Center

Comments on the Value of TKNs



[The medical sector] invested in the deposits and repositories for information. If you go to the National Library of Medicine, you can see what the human genome looks like and you can find out every chromosome that's on there, and that information is helpful to the person working on the next cure for cancer as well as the cancer patient.

[The medical sector has] really benefited from this concept of building distributed knowledge networks, and I think *when we look at transportation, it's just ripe for an innovator to come in and talk about how information can radically change the way that we move people, goods, and services around this country.*

This vision of building a cooperative information network is different from the Internet itself. In other words, it's not just enough to take all the digital data that we have and give it a URL and pop it on the Net and say 'good luck.' There is *work that needs to go into prioritizing that information and finding that information.* Just putting it online and searching *Google isn't good enough.*

- R. David Lankes, Associate Professor, Syracuse University, School of Information Studies

AASHTO Standing Committee on Highways

A survey of SCOH members was conducted in May of 2008. **85% of the respondents thought a TKN would add value for transportation agencies.**

Transportation Knowledge Networks - A Vision
Your trusted source for transportation information

A service of the National Transportation Library

About | Contact Search

Transportation Topics
Start here with up-to-date resources on over 1000 topics

Search Tools
Find specific information using customized search tools

News
Search and subscribe to news stories

Events
Find upcoming events and training

Directories
Find contacts in DOTs, Universities, and Firms

Acronyms & Glossary
Look up the meanings of common and uncommon acronyms and terms

Communities of Practice
Connect with colleagues who share your interests

CURRENT NEWS
[Check out the new alerts services from TKNs](#)
[New Resource: NTL Integrated Search](#)
[Search over 19,000 citations for Environmental Impact Statements, provided to TRB by Northwestern University](#)
[More news](#)

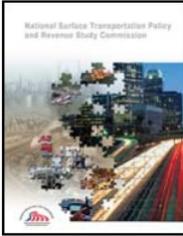
ASK A QUESTION
Get expert help

FIND AN EXPERT
Use our directory information to find people with specialized knowledge or skills

SUBMIT RESOURCES
Share your reports, best practices, tips, stories, and more

FEATURES

New Report: Transportation for Tomorrow
The National Surface Transportation and Revenue Study Commission has released its Report to Congress.
[View the Report](#)



UPCOMING EVENTS
May 4 - May 8, 2008
[AASHTO Spring Meeting](#)

| Do you think that a transportation knowledge network/information portal would add value for transportation agencies? | | |
|--|-------|----|
| Yes | 85.2% | 23 |
| No | 0.0% | 0 |
| Don't Know | 14.8% | 4 |
| If you answered No or Don't Know, please explain: | | 4 |

| Which arguments for transportation knowledge networks did you find to be compelling? | Response % | Response Count |
|--|------------|----------------|
| One stop shopping capability would make searching for transportation information easier and more efficient | 78.6% | 22 |
| Opportunities to reuse/adapt analysis tools and reports developed at peer agencies | 75.0% | 21 |
| All agencies will benefit from a national investment in information sharing | 75.0% | 21 |
| Improved ability to keep up with what peer agencies are doing | 71.4% | 20 |
| The opportunity to deliver clear and concise information about transportation issues to the public. | 50.0% | 14 |
| Improved ability to get new staff and consultants up to speed | 46.4% | 13 |
| Providing new services for the next generation "born digital" workforce in transportation | 42.9% | 12 |
| The need and ability to capture institutional knowledge before employees leave or retire. | 32.1% | 9 |
| Current investment in transportation information services is very low relative to other fields | 14.3% | 4 |



NCHRP 20-75 Outreach Findings

What Should the Business Plan Contain?

- Mix of technology, coordination/collaboration, and programs
- Mix of centralized and decentralized elements
- Clear roles for national coordinator and regional TKNs
- Focus on “hot topics” and innovation to demonstrate value
- Emphasis on how TKNs can increase efficiencies
- Clear accountability

| If a national transportation information portal were created, what types of content would be useful for the scope of responsibilities you manage? | Response % | Response Count |
|---|------------|----------------|
| Key transportation facts (gas tax by state, which states are using variable pricing...) | 96.4% | 27 |
| State of the practice/Lessons Learned resources | 89.3% | 25 |
| Current Policies and Procedures | 82.1% | 23 |
| Research reports | 75.0% | 21 |
| Industry Standards and Guidelines | 60.7% | 17 |
| Directory of transportation professionals across the nation | 60.7% | 17 |
| Data sources | 50.0% | 14 |
| Event data (national and regional meetings and conferences) | 35.7% | 10 |
| Other (please specify) | | 1 |
| <i>There should be a blog for recent retirees. One of their issues to adjust is that they have a career of knowledge to share but unless they consult they have no voice or venue to mentor and advise.</i> | | |



NCHRP 20-75 Business Plan

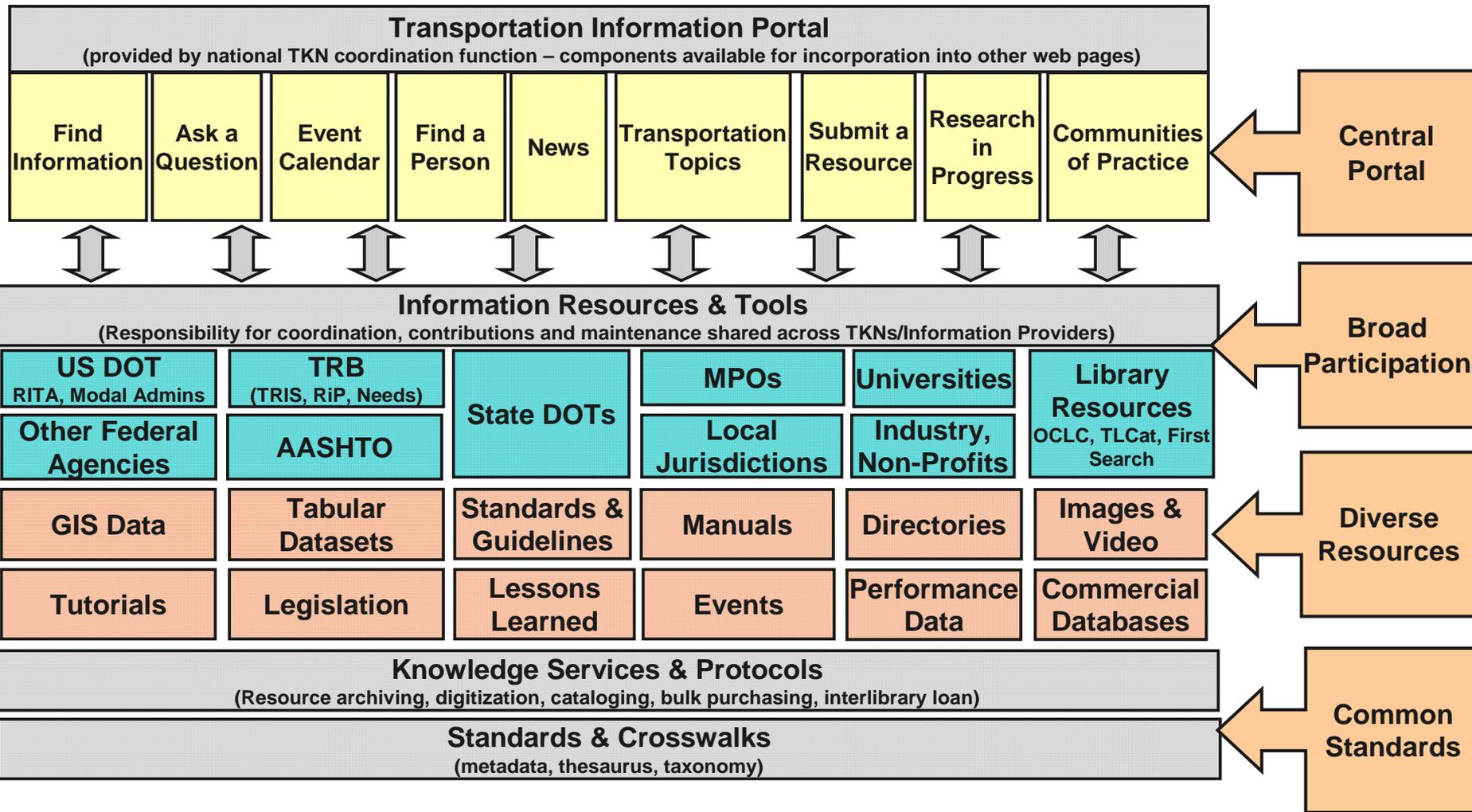
- **Context Section**
- **Background**
- **Mission, Goals and Objectives**
- **Market**
- **Products and Services**
- **Stewardship Model**
- **Estimated Costs** – \$13.5 million per year
 - \$7.9 mill for content
 - \$3.1 mill technical/administrative infrastructure
 - \$1.5 mill outreach/education
 - \$1 mill research/literature review services
- **Roughly 50% of funds to be distributed as grants to TKN member organizations for content development and services**



Future Vision: Information Sharing Infrastructure

- Technical & Administrative Infrastructure (\$3.1 million annually)
 - National Transportation Portal with Federated Search
 - National Information Repositories
 - Digital - documents & data
 - Print – archive copies for preservation
 - Standards Coordination + Thesaurus (improve findability through consistent tagging and semantic links)
- Content (\$7.9 million annually)
 - Information Modules (e.g. event calendars, directories, topical pages) – feed into national portal, available for other web sites/portals
 - Targeted Collection & Digitization Efforts
 - Group Subscriptions to Commercial Content
- Outreach, Coordination and Communication (\$1.5 million annually)
 - End-Users
 - Libraries
 - Non-Library Information Providers
- Research/ Literature Review Services (\$1 million annually)
 - Coordination for maximum coverage and availability

Future Vision: Information Sharing Infrastructure



Information Need Scenario

- A winter storm brings traffic to a standstill on a 20 mile section of an Interstate Highway. Motorists are stranded for hours. Following this incident, the state DOT Secretary requests a review of how to avoid this situation in the future.



Vision: Avoid Reinventing the Wheel

1. Find Similar Incident

READY THIS TIME
PennDOT hit roads earlier to drop salt
The Patriot - News. Harrisburg, Pa.
February 26, 2007

2. Find Close Match with Needs

Independent Report on the
Mid-February 2007
Winter Storm Response
for the Commonwealth of
Pennsylvania



March 27, 2007

Prepared by:
James Lee Witt Associates, a part of GlobalOptions Group, Inc.



3. Adapt & Share

The screenshot shows a website interface with a sidebar on the left containing navigation links like 'Search Tools', 'News', 'Events', 'Directories', 'Acronyms & Glossary', and 'Communities of Practice'. The main content area features a 'FEATURES' section with a 'New Report: Transportation for Tomorrow' highlighted. A red circle highlights a 'SUBMIT RESOURCES' button in the top right corner, with the text 'Share your reports, best practices, tips, stories, and more' below it.

The screenshot shows the homepage of the National Traffic Incident Management Community of Practice (CoP). The header includes the 'ntimc' logo and the text 'National Traffic Incident Management Community of Practice (CoP)'. Below the header are navigation icons for 'Exchange', 'Event Calendar', 'What's new', 'Related links', and 'e-Mail Notification'. The main content area features a 'Welcome to the Traffic Incident Management Community of Practice Website.' message, followed by a paragraph explaining the site's purpose: 'This site is intended for traffic incident responders to share their experiences and knowledge, collaborate, and advance the state-of-the-art in our field. The goal of the CoP is to transfer knowledge within the incident management community to promote better decision-making, spark innovation, and improve the quality of service for customers and partners.' Below this is another paragraph: 'We welcome your participation and know that all will benefit when contributors include transportation; law enforcement; emergency management services; emergency medical services; towing and recovery; and decision makers. Click on a Topic Area below to get started today!' At the bottom, there is a 'Topic Areas' section with a button for 'Traffic Incident Management/Planned Special' and a button for 'This Traffic Inc'.



Vision: TKNs Make it Happen

- **Find & Access Information**

- The National TKN Coordinating Body subscribes to information services such as Elsevier, ScienceDirect, Lexis-Nexis, ProQuest, and Dow Jones Factiva and makes these available to all TKN members.
- According to the TKN collection development policy, TKN members submit their organizations' research reports, manuals, consultant studies, and other publications to an identified information repository.
- TKN members tag the resources so that they can be found
- The National TKN Coordinating Body provides the technical infrastructure to maintain access to these resources.

- **Contacts**

- The National TKN Coordinating Body sets the structure, each TKN adds and updates own directory.

- **Submit Resources**

- Individuals may submit resources, which are then indexed and made accessible by the National TKN Coordinating Body or TKN member library.

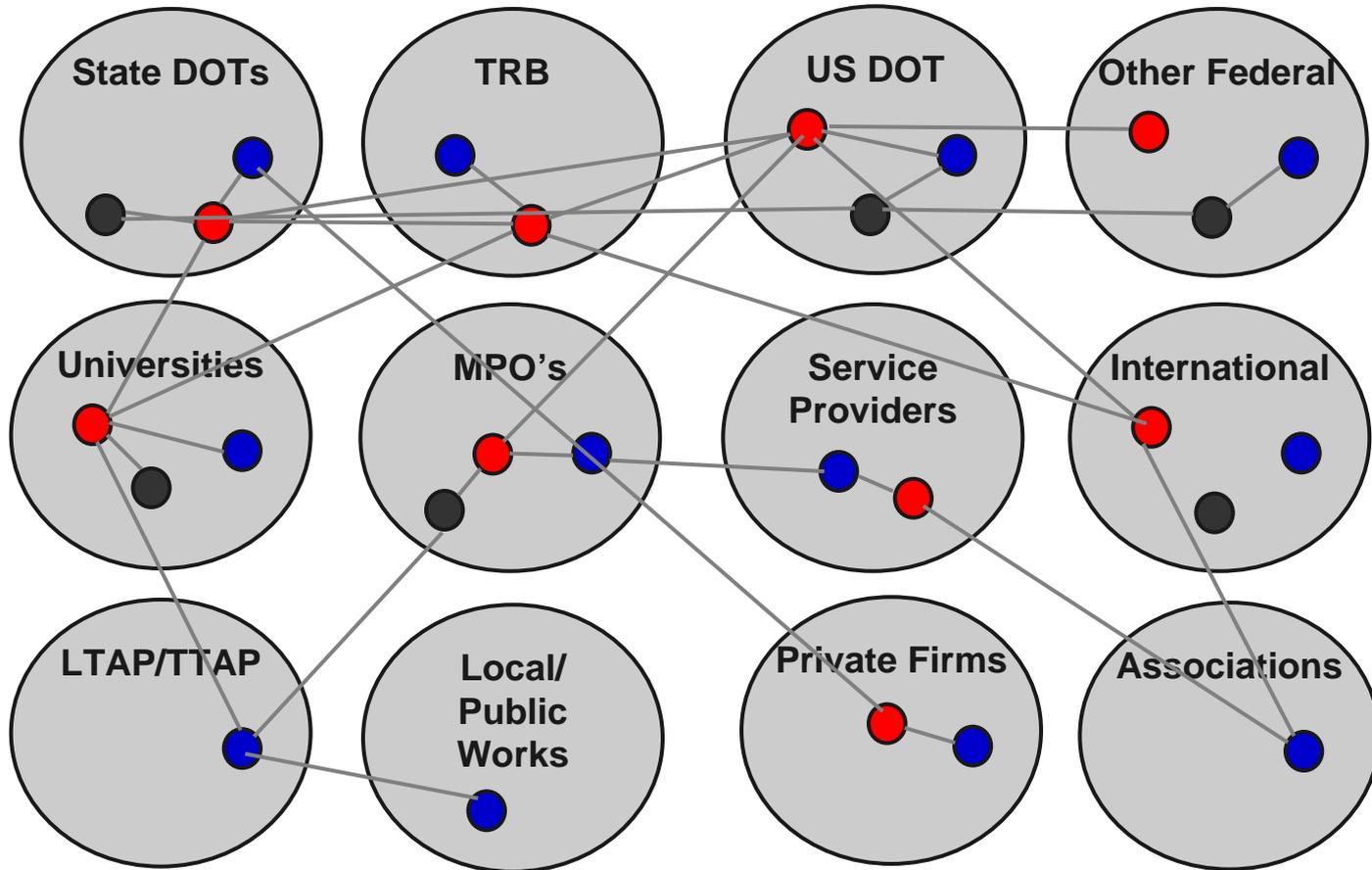
- **Ask a Question**

- TKN Members handle information requests

- **Communities of Practice**

- TKN topic leaders maintain the list of communities of practice.

Future Vision – TKN Members



- Libraries
- Data Providers
- Other (research centers, webmasters, publications, public affairs offices)



Directory of Libraries and Transportation Information Centers

- Purpose:
 - Develop an electronic, web-based directory of U.S. transportation librarians, libraries and information centers that could participate in any of a number of ways in TKNs and take responsibility for collecting and providing access to the reports, research, and technical information of their own organizations. This directory should support queries and reporting.
- Schedule: February 2009 - December 2009
- Participants: Collaborative effort of NTL, NCHRP 20-75A Team, SLA-TD, Regional TKNs and Pooled Fund Study Members
- Target Contents
 - Transportation Libraries
 - General Purpose Libraries with Significant Transportation Collections
 - State DOT, MPO, and larger (top 50) Transit Agency data and publications offices (where formal libraries do not exist)
 - USDOT Modal Administrations
 - LTAP Centers
 - Associations (updates for those in current NTL directory)
 - Private Firms
 - Local Transportation/Public Works Agencies
 - Major international transportation information sources



What You Can Do

- Meet with members of your agency management team and staff to answer the following questions
 - What kinds of information resources would members of my organization most like to have easy access to?
 - What additional help do we need to get our hands on timely and relevant information?
 - What information resources do we have that others would be interested in – consultant studies, policies & procedures, manuals, training materials, data sets, etc?
 - What would it take to make these available to other organizations? What help would we need to do this?
- Join/support your regional TKN: www.etkn.org, www.wtkn.org, www.mtkn.org
 - Identify areas of common interest and mutual benefit
 - Join/designate a contact person from your organization
 - Participate in an information sharing initiative
- Put your information sources on the map
 - Support cataloging of resources into OCLC
 - Adopt standard file naming and formatting conventions to facilitate discovery of your documents
 - Update your library's listing in the national directory of transportation libraries and information centers
 - If your organization has a data office, or publications office that is willing to make reports, data sets, maps, or other information resources available to the broader transportation community, add them to the national directory as well
 - Participate in community collaborative activities such as the Library Connectivity Pooled Fund Study, TRB LIST, SLA Transportation Division, TRB Data Section
- Help shape future TKN efforts
 - Communicate your ideas to the [AASHTO RAC TKN Task Force](#) and the [TRB LIST Committee](#)
- Build awareness of the [TKN Business Plan](#)
 - Connect with your agency AASHTO and CUTC representatives to share your perspective