

Acknowledgements

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Introduction

“The information technology revolution provides an opportunity...to organize and deliver transportation information in new ways. Networks are the organizing structure [of] the information age,” write the authors of the 2006 Transportation Research (TRB) Special Report 284 (SR-284), *Transportation Knowledge Networks: A Management Strategy for the 21st Century*. “We [believe] that the model that best fits the decentralized transportation sector is a distributed network of customer-driven, managed TKNs [transportation knowledge networks] linking information providers and users wherever they are located.” [\[1\]](#)

Information and data needs and delivery continue to evolve, as do transportation organizations, libraries, and researchers. When SR-284 was published, the then five-year old Midwest Transportation Knowledge Network (MTKN) was the sole transportation knowledge network (TKN). Subsequently, the founding of the Eastern Transportation Knowledge Network (ETKN), Western Transportation Knowledge Network (WTKN), and National Transportation Knowledge Network (NTKN) have enabled the first steps toward building the distributed network of information, data, and knowledge delivery envisioned by the Committee for a Future Strategy for Transportation Information Management.

Transportation librarians play important roles by supporting transportation research, facilitating technology transfer, and preserving research outputs, such as reports and data sets. Organizing and delivering high-quality data and information are vital to current and future decision making. Yet, transportation information professionals find themselves squeezed, like transportation researchers and staffs everywhere, by shrinking resources. Transportation librarians must join with other transportation information creators and professionals to address these shortcomings, preserve transportation information in its various forms, and take advantage of institutional knowledge and practices. Only in this way can we realize the full vision of knowledge networks, leveraging what we know today to enable new knowledge creation in the future.

What is a Transportation Knowledge Network?

While it is common to think of the phrase *knowledge network* as newly-minted and relating exclusively to knowledge management, knowledge networks are much older and more interdisciplinary. Wallace notes the intellectual origins of knowledge management can be found in “philosophy, economics, education, psychology, information and communication theory, and library and information studies.” [\[2\]](#)

The first modern reference to a knowledge network was likely the Becker and Hayes 1970 report *A Plan for a Wisconsin Library and Information Network: Knowledge Network of Wisconsin*. The report examined the potential to increase interlibrary cooperation in Wisconsin by “investigating various ways of linking the state’s library systems with other information centers into a network.” [\[3\]](#)

A knowledge network is created by the desire to gather, organize, and share information, whether explicit (documents, etc.) or implicit (personal experiences, organizational workflows, etc.). The goals of a knowledge network include preserving, expanding, analyzing, and implementing the gathered knowledge to benefit the network, its members, as well as the target audience (customers, researchers, patrons, etc.).

A mature, functional TKN would capture and organize knowledge from diverse transportation modes and economic sectors. This knowledge would be made readily accessible to policy makers, researchers, and students as well as information professionals working in transportation and related disciplines. Collectively, transportation librarians have decades of training and practice in organizing, retrieving, and sharing information regardless of subject and format. These

best practices for information management can be applied to preserve newly developing knowledge, such as research data sets and information about their creation, as required by new federal funding mandates.

Because knowledge networks are interdisciplinary endeavors, it is vital that transportation librarians establish a community that includes information providers, research managers, and subject-matter experts. Transportation librarians took steps in this direction beginning in 2001, with the creation of the Midwest Transportation Library Consortium and the August 2002 follow-up meeting “Midwest Conference on Library & Information Services for Transportation.” The conference, with funding from the National Transportation Library (NTL), included representatives from the Transportation Research Board (TRB), Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials (AASHTO), State Departments of Transportation (DOTs), University Transportation Centers (UTCs), Local Technical Assistance Program (LTAPs), county engineers, contractors, and libraries. The idea of a transportation knowledge network, reflecting the endeavor’s interdisciplinarity, was first raised during this meeting and adopted in December 2002 as the Consortium became the Midwest Transportation Knowledge Network.

In a press release, the MTKN laid out initial goals: “[C]reate a single point of access for the bibliographic catalog records of all member libraries, with cooperative lending of these resources among members. ...[G]ather and develop training products that members can use to educate their customers on topics such as finding transportation information on the Internet and how to use transportation information databases.” [\[4\]](#) These modest first steps were analyzed for SR-284.

An Overview of SR-284: Lessons from the First TKN and Other Sectors

The creation of a robust, accessible network of information resources and services for transportation professionals, coordinated at the national level with stable financial support, has been a persistent vision of transportation professionals for many years. Recently, we have begun to see this network come together. Factors leading to the development of a robust national network were (1) the provision of access to tools, such as TRB’s Transportation Research Information Services (TRIS), the Transportation Research Thesaurus (TRT) and the Online Computer Library Center’s (OCLC) bibliographic database to organize and provide access to transportation research; (2) the establishment of NTL and MTKN; and (3) the utilization of pooled funds to support transportation library connectivity. In this rapidly changing technological environment of the turn of the century, an interdisciplinary committee of transportation professionals was charged with identifying necessary core information services, outlining their provision, and suggesting funding options.

The Committee for a Future Strategy for Transportation Information Management’s policy study, SR-284, made these findings and recommendations for effective and sustainable management of a national transportation information system:

1. Transportation knowledge networks (TKNs) should be established in every region of the United States and at the federal level.
2. A national-level coordinating structure should be established to manage and coordinate the TKN’s activities, possibly within the USDOT, reporting to Congress,
3. External peer reviews of the activities of the coordinating structure and the TKNs should be conducted.
4. Sustained and regular funding should be provided for the TKNs.

From their examination of the MTKN, the Committee determined that the provision of transportation information is best accomplished through managed but decentralized, regional networks. The Committee also recommended a federal-level TKN headed by the National Transportation Library. Functions and services of the federal and regional TKNs should

include sharing of information, catalogs and services (including reference); coordination of collections; professional capacity building for information professionals; and the identification of key information providers and users.

SR-284 modeled many of its recommendations on the National Library of Medicine (NLM) and its 6,700-member network which serves as NLM's field force to provide health information access across the United States. Since 1965, NLM has funded its network as the core of its outreach program for NLM's broad areas of expertise, including computers and communications, specialized information services, extramural programs, public and technical services, and biomedical communications and technology. This commitment at the national level allowed NLM to embrace the Information Age with trillions of bytes of electronic health data delivered daily. Transportation librarians, research managers, and others have worked for decades to create a similar structure for transportation information stakeholders. When the NTL was established in 1998 by the Transportation Equity Act for the 21st Century, this brought a hope for a true national library: a coordinating body with resources and the expertise needed to proactively take a leadership role in the management of transportation information for the nation.

The major finding of SR-284 revealed that despite the progress achieved in creating specific components of a national system, two critical elements for a successful knowledge network—a sustainable coordinating mechanism and stable financial support—did not exist for transportation. These crucial elements were present in the comparative sectors of health and agriculture and their successful knowledge networks. The Committee recognized that transportation information providers continued to operate on ad hoc institutional and funding arrangements which led to the observation that transportation libraries and information services were comparatively undervalued versus those in health and agriculture. Lack of sustained funding had been a critical problem hindering the development of a national coordinating structure, as well as the ability of TKNs to meet the full range of transportation information needs.

The future strategy outlined in SR-284 was the development of a business plan to implement the report recommendations. This step was taken in NCHRP Report 643, *Implementing Transportation Knowledge Networks*. [5] The Committee closed the report by reiterating that stable funding, active coordination, and strong leadership are the prime factors for successful transportation knowledge networks. [6]

TKN Development and Current Activities

TKN activities since SR-284 have shown varying levels of progress in each of the functional areas outlined in the policy report: (1) information, catalog,



Website: <http://wtkn.org/>

Year Founded: 2007

AASHTO Region: 4

Member Organizations:

- Alaska Department of Transportation Library
- American Honda Motor Co., Inc. Library & Information Services
- Arizona Transportation Research Center Library
- Bell Helicopter, a Textron Company Engineering Library
- California Transportation Library and History Center
- Center for Transportation Research Library, University of Texas at Austin
- Idaho Transportation Department Resource Library
- Institute of Transportation Studies Library, University of California at Berkeley
- Lester Wire Library, Utah Department of Transportation
- Los Angeles County Metropolitan Transit Authority Library
- Montana Department of Transportation Library
- Nevada Department of Transportation Library
- New Mexico Department of Transportation Library
- Oklahoma Transportation Library, Oklahoma Department of Transportation
- Oregon Library Information Resource Center, Oregon Department of Transportation
- PACCAR Technical Library
- Puget Sound Regional Council Information Center
- Sound Transit Library & Information Center
- Texas A&M Transportation Institute Library
- Washington State Department of Transportation Library
- Wyoming Department of Transportation Research Center Library

and service sharing (including reference); (2) collection coordination; (3) professional capacity building for information professionals; and (4) identifying key information providers and users.

Several tools have been developed to share information and services. The first of these is the Transportation Libraries Catalog (TLCat), the result of NTL funding and partnership with MTKN. TLCat was an initial step toward MTKN's founding idea of a single portal to improve search outcomes for transportation researchers. Participation in TLCat required that MTKN members become OCLC subscribers (providing access to the global catalog of library collections), which brought many libraries into standard practice for information description. TLCat essentially increased the size of each library to the combined holdings of all participating libraries. By May 2013, TLCat included nearly one million items from 37 participating libraries. While TLCat provided unique functionality in 2004, by 2013 holdings of all OCLC libraries were searchable on the open web through WorldCat.org, and TLCat's usage was waning. Funding for TLCat was pulled to be applied to more pressing needs.

Another tool useful in responding to a frequently encountered transportation library request—comparing policies and procedures across state agencies—is the ETKN's "Extreme Event Preparedness & Response for Operations (EEPRO) LibGuide." [7] The EEPRO LibGuide compiles best practices, evacuation plans, and agency contacts related to emergency operations, across all modes, in one location freely accessible on the Web. WTKN members have put together a robust "US State DOT Wildlife Crossing Structures" LibGuide [8] covering U.S. and international structures. Because authorship and maintenance are distributed across TKN members, if any one agency changes its practices, the guide is easily edited to maintain currency.

Other TKN tools effective in improving transportation knowledge and data-management practices include an ETKN member's "NYSDOT Knowledge Management" LibGuide [9] and the "Transportation Data Management Wiki," [10] developed by members of the MTKN, WTKN, and NTL to prepare transportation organizations for a new directive from the White House Office of Science and Technology Policy on public access to research publications and data. Additionally, the NTL created a DOT Public Access site [11] to answer questions about the directive and provide guidance for creating a data-management plan. TRB's standing committee on Library and Information Science for Transportation (LIST) cosponsored a workshop, with the standing committee on Conduct of Research, about data management during TRB's 95th Annual Meeting in January 2016. This workshop was an example of how TKN members work with partner groups to educate research departments about changes in transportation information. Accumulating, promoting, and preserving knowledge in such tools are important goals of knowledge networks.



**MIDWEST TRANSPORTATION
KNOWLEDGE NETWORK**

Website: <http://www.mtkn.org/>

Year Founded: 2001

AASHTO Region: 3

Member Organizations:

- Center for Transportation Studies Library, University of Minnesota
- Hanson Professional Services Inc. Library
- Illinois Department of Transportation
- Iowa Department of Transportation Library
- Kansas Department of Transportation Library
- Michigan Department of Transportation Research Administration, Bureau of Field Services
- Minnesota Department of Transportation, MnDOT Library
- Missouri Department of Transportation Library
- Northwestern University Transportation Library
- Ohio Department of Transportation Library
- Portland Cement Association Library
- U.S. Army Corps of Engineers Technical Library, Rock Island District
- Wisconsin Department of Transportation (WisDOT) Library
- Wisconsin Transportation Center National Center for Freight & Infrastructure Research & Education (CFIRE)
- Wiss, Janney, Elstner Associates, Inc. Library

Several efforts to coordinate collections across TKN members have been initiated. One current activity is focused on digitizing federal, state, and local transportation reports and data. Members of the regional TKNs, TRB LIST, and NTL staff are combining efforts to reduce redundancy in digitizing reports and identifying digitization solutions to enable wider access and provide additional full-text links to TRB's TRID database.

Activities in the TKN areas of professional capacity building and identifying key stakeholders have resulted in the formation of several long-term groups. Building on initial success, MTKN members helped launch the Transportation Library Connectivity Pooled Fund Study TPF-5(105) in 2005 with the goal of continuing and expanding MTKN's work. TPF-5(105) spans all four AASHTO regions. The Transportation Librarian's Toolkit, Second Edition, [12] a TPF-5(105) product capturing the accumulated knowledge of current transportation librarians, serves as an orientation tool for incoming librarians. The Toolkit is vital because many transportation librarians are solo librarians; accordingly, when they retire, the loss of institutional knowledge approaches 100 percent.

The founding of two new regional TKNs in 2007, WTKN and ETKN, further demonstrated the benefits of networking to organize and preserve transportation information held by libraries. However, librarians are not the only information providers within transportation agencies, as the WTKN "Guiding Principles" recognize: information, and ultimately knowledge, is created and held by librarians, data providers, researchers, website and records managers, among others. [13] For a TKN to become truly entrenched, it needs to spread beyond libraries. In 2008, with TPF-5(105) assistance, the AASHTO RAC TKN Task Force was formed to serve as an advocate for TKNs within the broader transportation community and as an avenue to collect information needs from TKN stakeholders. The TKN Task Force includes research managers, policy makers, data managers, and librarians. Current membership represents more than 40 organizations within the four AASHTO regions. Participants work together to improve the networking of transportation knowledge through the creation and improvement of tools and the adoption of standards and best practices.

Despite ambitious plans and broad interest, the TKNs face a number of challenges, including static, volunteer membership, a lack of funding, and the need for national coordination. By the 2004 and 2005 MTKN annual meetings, most attendees were transportation librarians. With limited volunteer time, membership growth has been difficult to achieve. Even though SR-284 called for modest, but regular, budgeting for TKNs, these funds have not been federally appropriated. Finally, NTL's own constricted budget and resources rendered the library unable to provide regular, dedicated support or coordination. Ten years on, the TKNs have shown a portion of the promise envisioned by SR-284 through continued successful



Website: <http://etkn.org/>

Year Founded: 2007

AASHTO Region: 1 & 2

Member Organizations:

- AASHTO Information Center
- Arkansas Highway & Transportation Department
- Community Transportation Association of America
- Connecticut DOT Library
- Delaware Valley Regional Planning Commission
- Federal Highway Administration Research Library
- Georgia Department of Transportation – Roy A. Flynt Memorial Library
- GRA Research Library
- Kentucky Transportation Center, University of Kentucky
- Louisiana Transportation Research Center Library
- LTK Engineering Services
- Maine DOT Library
- Massachusetts DOT Library
- Mississippi Department of Transportation Library
- National RTAP (Rural Transit Assistance Program)
- National Transportation Library
- New Jersey DOT Research Library
- New York State DOT Research Library
- North Carolina DOT Library
- Pennsylvania DOT Library
- Tennessee Department of Transportation Library
- Transportation Research Board Library
- University of Arkansas Libraries
- University of North Carolina Highway Safety Research Center
- Vermont Agency of Transportation
- Virginia DOT Research Library
- Volpe Technical Reference Center

collaborations across and within regional TKNs, yet they have a long way to go to realize their full potential.

The State of NTKN



Website:

<http://ntl.bts.gov/networking/index.html>

Year Founded: 2009

AASHTO Regions: All

In USDOT’s response to publication of SR-284, NTL was designated as the federal coordinating body for TKNs. NTL’s mission is to maintain a collection of and facilitate access to statistical and other information needed for transportation decision making, as well as to coordinate with public and private transportation libraries and information providers to improve information sharing. This mission aligned well with the goals of SR-284.

The publication of SR-284 made clear that the successes of MTKN were worth emulating. As the WTKN and ETKN gained a foothold, the regional TKNs began working in concert with NTL to build an entity to address nationally those issues that the TKNs faced regionally. When NCHRP Report 643 was published in 2009, the AASHTO RAC TKN Task Force, members of TPF-5(105), regional TKNs, and NTL were already coordinating outreach and information-sharing activities. NTL sponsored the first joint TKN meeting in

2009 with the goal of forming the National Transportation Knowledge Network (NTKN) and developing a plan for strengthening the transportation-information infrastructure.

The benefits of a decentralized model of knowledge networks with a national coordinating structure include improved user access to transportation information, new efficiencies in providing information services, and sharing information-management expertise. By 2013, NTKN was fully established with a supporting National Coordinating Committee (NCC) to perform the coordinating function collaboratively. The NCC’s defined role is to provide oversight and development of an information-management agenda for transportation, coordinate activities between regional TKNs and partner groups, conduct planning and needs assessments with the user and stakeholder community, and communicate and engage in outreach activities. After holding three annual NTKN meetings, NTL was faced with other competing demands, including resource and staffing constraints, which diverted attention away from the coordination of the NTKN for several years. Despite this challenge, continued successful collaborations across and within regional TKNs as described above demonstrate the advantages of national coordination. As identified in NCHRP Report 813, *A Guide to Agency-Wide Knowledge Management for State Departments of Transportation*, collaboration is a key activity in the knowledge life cycle: “Employees build knowledge through a learning process—informed by content that they discover and access and/or through collaboration or mentoring relationships with their peers.” [14]



Website:

<http://sp.research.transportation.org/Pages/TransportationKnowledgeNetworks.aspx>

Year Founded: 2008

AASHTO Regions: All

Looking to the future, the current NTKN structure may be adapted by leveraging its strengths—including full participation from TKN groups, successful intra-TKN coordination, communication, commitment to the mission—and shoring up areas for improvement—such as communication, visibility, and integration within the broader transportation community. These transformative actions would provide the NTKN with a more agile national coordinating structure. The NTKN needs achievable goals that are informed by NTL’s resources and legislative or federal mandates (such as the US DOT Public Access Plan). Initial success and current interest in cooperative digitization and preservation of our institutions’ collections demonstrate the urgent need to continue focusing on building a national collection. The efforts of the NTKN could be

shared among the various regional TKNs by assigning representatives (their chairs or designees) to form an operational committee. NTKN's goals and objectives could be altered to reflect this new coordinating mission, and not simply a larger version of the regional TKNs. NTKN could realize far greater effectiveness by focusing on strategic outreach, needs assessment, partnerships, and consensus building.

Some Conclusions & A Vision

The year 2016 marks ten years since the publication of SR-284, and seven years since the implementation plan outlined in NCHRP Report 643. The federal funding picture has dramatically changed. One of the four broad recommendations identified in SR-284 has been met: establishing TKNs in every region of the U.S. and at the federal level. The ETKN, MTKN, and WTKN meet regularly and choose projects that will most benefit their users.

Over the last 10 years, the TKN movement has incrementally furthered the cause of the NTL as a coordinating body. A fully successful NTKN needs to adapt to the current funding environment and find innovative ways to accomplish shared goals. One step in this direction is NTKN's reestablishment of monthly Coordinating Committee meetings and development of a new strategic plan.

The way forward also will require champions at all levels who share an understanding of the tremendous opportunities a fully functioning NTKN can provide. As the country and states address infrastructure challenges and the daily loss of institutional knowledge, transportation research and management of information and data have never been more critical. Transportation knowledge networks, as envisioned by SR-284 and NCHRP Report 643 and adjusted for today's current funding context, can mean the difference between the loss of existing knowledge and the creation of new knowledge.

Finding Transportation Information

Literature Searches and Literature Reviews for Transportation Research Projects. How to Search, Where to Search, and How to Put It All Together: Current Practices. Transportation Research E-Circular, Issue E-C194, 2015.

<http://www.trb.org/Main/Blurbs/172271.aspx>

Transportation Research International Documentation (TRID) <http://trid.trb.org/>

TRB's database of more than one million transportation reports, journal articles, conference proceedings, and research projects.

Transport Research Portal <http://www.intransport.eu/search/index.php>

International transportation search database funded by the European Union.

National Transportation Library

NTL's digital collections <http://ntl.bts.gov/>

ROSA P (Repository & Open Science Access Portal) <https://rosap.ntl.bts.gov/>

WorldCat <http://www.worldcat.org/>

OCLC's international catalog.

Library Connectivity & Development LibGuides <http://guides.libraryconnectivity.org/>

More LibGuides, sponsored by TPF-5(237).

Google Scholar <https://scholar.google.com/>

Google search tool focused on peer-reviewed and scholarly output rather than entire World Wide Web.

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Additional Resources

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