TR News July-August 2007 Partnerships Advancing European Research: Achievements and Goals of Two International Initiatives

DETAILS

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COVER: Traffic near the iconic Arc de Triomphe, Paris. European nations are establishing international cooperative research programs and alliances to solve transportation problems and create unified standards. (Photo: John Foxx/Getty Images)

TR NEWS

features articles on innovative and timely research and development activities in all modes of transportation. Brief news items of interest to the transportation community are also included, along with profiles of transportation professionals, meeting announcements, summaries of new publications, and news of Transportation Research Board activities.

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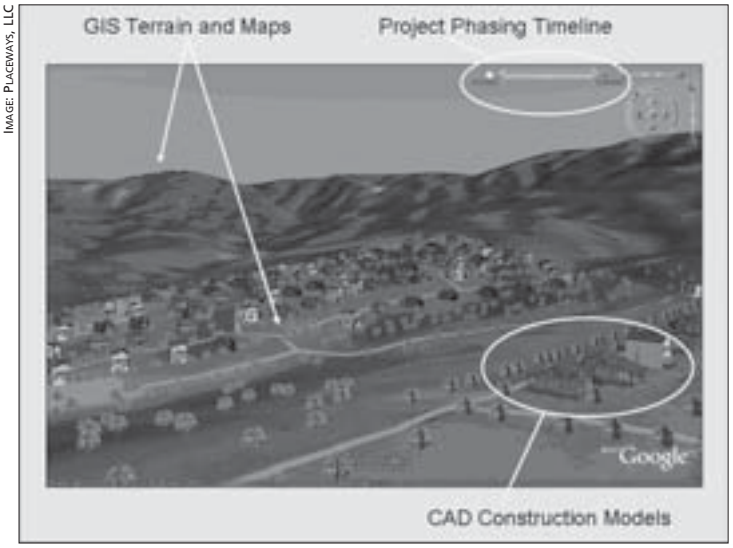
ALSO IN THIS ISSUE:

COMING NEXT ISSUE

The September–October issue of *TR News* ventures into the high-technology frontier of visualization in transportation research and practice, current and future. Articles examine ways that visualization can improve the comprehension and management of transportation-related data sets for decision making; visualization's role in education—for example, enhancing the learning process for engineers and planners—but also in training and educating the transportation work force; the remaining mysteries and new frontiers; developments in other fields that can have an impact on transportation applications; and success stories, evolving phenomena, and continuing barriers; plus a look at the approaches and effects of history-making visualizations past.

IMAGE: PLACEWAYS, LLC



Demonstration of CommunityViz software combining computer-assisted design, geographic information systems, and project scheduling technology into a single visual model, displayed in Google Earth.

Developing an International Interface for Innovation

A Profile of the European Conference of Transport Research Institutes

GEORGE GIANNOPOULOS AND JEAN-PIERRE MÉDEVIELLE

Giannopoulos is Head, Hellenic Institute of Transport, and Professor, Aristotle University of Thessaloniki, Greece, and is Immediate Past Chair of the European Conference of Transport Research Institutes (ECTRI). Médevielle is Deputy General Director of INRETS (French National Institute for Transport and Safety Research), founder and Immediate Past Secretary-General of ECTRI, and a member of the TRB International Activities Committee and the International Trade and Transport Committee.

January 2006 marked a major milestone for the Transportation Research Board (TRB) and the European Conference of Transport Research Institutes (ECTRI). The two organizations signed a memorandum of understanding to develop research partnerships extending across geographic borders. The document sets forth a 10-point action plan to foster information and technical exchanges, the professional development of young researchers, and collaboration and coordination of research efforts between the two organizations (see box, page 5).

Shaping the Mission

ECTRI was created in April 2003 as an international nonprofit association governed under French law. A key influence was the Lisbon Strategy, an initiative of the European Council, which consists of the European Union heads of state and government and the president of the European Commission. Drafted in 2000, the agenda set a goal of making Europe a cutting-edge knowledge society and called for the establishment of an international interfaced European Research and Innovation Area.[1] ECTRI is pursuing this initiative in surface transportation research.

ECTRI members include 20 national transport research institutes, technical universities, and national research platforms in 17 countries from the European Union, the Acceding Countries awaiting full membership in the European Commission, and the Western Balkan nations (see box, page 6). All together, member organizations employ more than 5,000 researchers and research staff working with a variety of transportation stakeholders.

[1] http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/00100-r1.en0.htm.

Jean-Pierre Médevielle, ECTRI's original Secretary-General, and ECTRI President Guy Bourgeois, both of INRETS, the French National Institute for Transport and Safety Research, participate in the International Research Roundtable during the 2007 TRB Annual Meeting in Washington, D.C.

ECTRI Working Group 4 meets to consider initiatives involving "soft research infrastructures"—such as libraries, databases, data sets, communication networks, and discussion forums—in the international exchange and transfer of knowledge on transport topics.

Pursuing the Mission

ECTRI's mission is to

- Facilitate the integration of transport research activities within the European Union;
- Foster cooperation with international counterparts;
- Provide independent, science- and technology-based advice to European Union institutions or state members on policy issues, on request;
- Promote and coordinate the technology transfer of European transportation expertise; and
- Provide a platform of exchange for the establishment and development of additional research networks.

The mission is being carried out through six strategic efforts:

- Identifying common priorities and programs of work and fostering opportunities for researchers' professional development and mobility—that is, the opportunity to move between nations and institutions;
- Promoting high-quality, coordinated, and focused transportation research in Europe, through cooperation, networking, promotion, and support of excellence in transportation research;
- Offering independent advice on research to European funding agencies, the European Commission, member states, regional councils, and

A June 2006 workshop on research management issues, conducted by ECTRI's NET-TRACK program, which works to "network transport research resources, competencies, and knowledge within the new boundaries of the European Research Area," was attended by 22 organizational executives from 12 countries, in Budapest, Hungary.

Action Plan for Cooperation Between ECTRI and TRB

1. Arrange a scanning tour of leading research institutes in Europe for U.S. research managers and a similar tour in the United States for European research managers.
2. Encourage participation by TRB-selected researchers in the Young Researchers Seminar organized by ECTRI, the Forum of European Road Safety Institutes, and the Forum of European Highway Research Laboratories.
3. Publish an informative article on ECTRI in *TR News* and an article on TRB activities in the ECTRI newsletter.
4. Encourage the active participation of ECTRI members in TRB committees.
5. Encourage the active participation of ECTRI in TRB Annual Meetings, through session presentations and an exhibit booth.
6. Regularly exchange information about strategic documents in transport research and about key research events in the United States and Europe.
7. Strengthen U.S. participation in COST (European Cooperation in Scientific and Technological Research) projects through the exchange of information about COST activities.
8. Build up possibilities for cooperation between U.S. and European research bodies through the European Union Framework Programmes and the corresponding U.S. research programs—such as the National Science Foundation and the TRB Cooperative Research Programs.
9. Include a special session on Europe or a keynote speaker from Europe in TRB Annual Meeting programs.
10. Create a joint committee or working group on the topic of future transport research needs.

The 10-point memorandum of understanding between ECTRI and TRB is displayed by signers Giannopoulos (*center*), then President of ECTRI, and TRB Executive Director Robert E. Skinner, Jr., in January 2006. Médevielle (*left*), then Secretary-General of ECTRI, and Michael D. Meyer (*not pictured*), then Vice Chair of the TRB Executive Committee, played key roles in developing the historic agreement.

European and national official agencies—such as safety agencies; ECTRI has established and strives to maintain permanent links and liaisons with the three European Union Directorates General that have jurisdiction over transportation issues—Research, Transport and Energy, and Information Society and Media;

- Promoting and coordinating high-quality training opportunities and technology transfer throughout Europe in the field of transportation—especially for young researchers, but also to enable researchers to increase their professional mobility;
- Encouraging an open and free exchange of information, as well as the dissemination of research results, at the national and international levels through state-of-the-art reports and through organizing other appropriate events and activities; and
- Creating a cooperative research network in Europe, in coordination with the European Union, and with selected organizations in the United States, Japan, and other countries, such as Korea, China, India, and Australia.

Goals and Accomplishments

Operating on a three-year cycle under a Joint Programme of Activities, ECTRI relies on the efforts of working groups, task forces, and nonexclusive research project groups. The groups address content- or process-oriented activities adapted to the Joint Programme and to any major development or breakthrough in surface transport research at the European or international level.

Médevielle and then-President of ECTRI, George Giannopoulos, Hellenic Institute of Transport, prepare to greet visitors at the organization's exhibit booth at the 2006 TRB Annual Meeting.

In cooperation with transportation stakeholders from academia, industry, public agencies, and other areas, ECTRI is developing a new electronic scientific journal for European transportation researchers, encompassing a multidisciplinary, interdisciplinary, and systematic approach to transportation science. The journal will be launched soon. Papers will receive a high-level peer review appropriate to a scientific journal such as the *Transportation Research Record: Journal of the Transportation Research Board.*

Among ECTRI's early accomplishments is the establishment and implementation of a Young Researchers Seminar every year and a half, in conjunction with two other transportation organizations—the Forum of European Road Safety Institutes and the Forum of European Highway Research Laboratories. The seminar already has provided a venue for approximately 50 young researchers to present their research and to build collegial relationships and exchanges.

Supporting Policy

In addition, during the past three years, ECTRI has supported the European Union's policies and is working toward the creation of the European Research Area, which will engage in the following activities:

- Networking Europe's centers of excellence and creating virtual centers through new interactive communication tools;
- Developing a common approach to financing large-scale research activities—examining both the needs and the means—and building closer relations between the various organizations working to

ECTRI Members

AVV: Adviesdienst Verkeer en Vervoer (Transport Research Centre), Netherlands

CDV: Centrum Dopravního Výzkumu, Czech Republic

CEDEX: Centro de Estudios y Experimentación de Obras Publica, Spain

DLR: Deutsches Zentrum für Luft und Raumfahrt (German Aerospace Center), Germany

DTF: Danmarks TransportForskning (Danish Transport Research Institute)

FHG-FVV: Fraunhofer-Verbund Verkehr (Fraunhofer Transport and Traffic Alliance), Germany

HIT: Hellenic Institute of Transport, Greece

INRETS: Institut National de Recherche sur les Transports et leur Sécurité, France

ITS: Instytut Transportu Samochodowego and CNTK: Centrum Naukowo-Techniczne Kolejnictwa, Poland

KTI: Közlekedéstudományi Intézet (Insitute for Transport Sciences), Hungary

POLITO: Politecnico di Torino, Department of Hydraulics, Transports, and Civil Infrastructures, Italy

TNO: Netherlands Organisation for Applied Scientific Research

TØI: Transportøkonomisk Institutt, Norway

TRL: Transport Research Laboratory Limited, United Kingdom

TTEF: Transport and Traffic Engineering Faculty, University of Belgrade, Serbia and Montenegro

UPM: Universidad Politecnica de Madrid, Spain

VGTU-TMI: Vilniaus Gedimino Technikos Universitetas–Transporto Mokslo Institutas, Lithuania

VTI: Statens Väg-och Transportforskningsinstitut (Swedish National Road and Research Institute), Sweden

VTT: Valtion Teknillinen Tutkimuskeskus, Finland

VÚD: Výskumný Ústav Dopravný (Transport Research Institute), Slovak Republic

Participants at the May 2007 Young Researchers Seminar in Brno, Czech Republic, considered such topics as transportation economics and travel behavior, intelligent transportation systems, sustainability and the environment, safety, and road engineering.

achieve scientific and technological cooperation in Europe;

- Improving the instruments and resources that encourage investment in research and innovation, such as indirect aid in compliance with the European Commission rules on state aid, as well as patents and risk capital;
- Establishing a common system of scientific and technical reference for the implementation of policies;
- Encouraging more abundant and more mobile human resources, to achieve such goals as
  - Greater mobility of researchers from nation to nation;
  - The introduction of a European focus to scientific careers;
  - Increased prominence and opportunities for women in research; and
  - Stimulating the interest of young people in research and careers in science;
- Enhancing the cohesiveness of European research through best practices in knowledge transfer at the regional and local levels and through promoting the role that regions can play in European research efforts;
- Bringing together the scientific communities, companies, and researchers of Western and Eastern Europe;
- Improving Europe's attractiveness to researchers from other continents; and
- Promoting common social and ethical values in scientific and technological matters.

Other activities under way include the development of cooperative programs for research to guide scientific databases, libraries, and communication networks; a strategic agenda for urban mobility; and research management. ECTRI has kept its members informed about requests for proposals from the European Union and other international projects and has provided assistance and advice as needed.

ECTRI has submitted comments to the European Union and other organizations on the frameworks for research and development programs and on draft policy documents. The organization's representatives participate in all of the major European transportation-related technology platforms, including rail, road and automotive, logistics, and the e-Safety Forum and Intelligent Car Initiative. ECTRI is assisting transportation research projects in the Eastern and Western Balkan nations.

Long-Range Vision

ECTRI's long-range vision is to create a virtual transport research institute for Europe with an international interface, combining the strengths and potentials of all its members and using members' expertise and infrastructure. In effect, the vision is for a 21st century, supply-side research institute harnessing the synergies, the coordinated activities, and the involvement of research managers, senior scientists, and young scientists in the member organizations in the pursuit of innovation and research in transportation.

The ECTRI endeavor is proceeding step by step, bringing together a large part of the European scientific community in transport research, seeking excellence and relevance at the international level, and taking an open-minded and pragmatic approach to a new paradigm of competition and cooperation. The international interface that ECTRI provides is essential for each step forward.

Transport Research Cooperation in Europe

The COST Success Story

JØRGEN CHRISTENSEN

PHOTO: COST

The author recently completed a three-year term as President of the Association of European Highway Research Laboratories (FEHRL) and chairs the Organization for Economic Cooperation and Development–International Transport Forum Working Group on the Economic and Technical Viability of Long-Life Wearing Courses. He served as director of the Danish Road Institute from 1992 to 2005 and is now Chief Counselor of the Danish Road Directorate. He is a Fellow of the Danish Academy for the Technical Sciences.

(*Photo, upper right:*) Roads in Brussels, Belgium, after a winter storm. COST Action 353 produced findings for winter service strategies to increase European road safety.

International cooperation in scientific research has contributed to the integration of the European Union. Science is inherently international and easily overcomes the barriers of culture and language. The Lisbon Strategy[1] and the Barcelona Declarations[2] established ambitious targets for European research and development by 2010 and created additional incentives for European cooperation in research. The European Parliament has allocated 50 billion € for 2007 to 2013 for the 7th Framework Programme for Research and Technological Development, confirming a political commitment to cooperation in research.

Supplementing the Framework Programmes are two other platforms for research cooperation: EUREKA, a network for market-oriented industrial research and development; and COST, which stands for cooperation in scientific and technological research. Both have identified transport as a field for research cooperation.

EUREKA is committed to enhancing the competitiveness of European industry by promoting cross-border, market-oriented innovation that involves cooperation with research institutes. Funding comes from participants and national sources. Launched in 1985, EUREKA has completed approximately 1,000 projects valued at approximately 24 billion €.

COST works parallel to EUREKA in nonindustry research cooperation. Launched in 1971 as the result of a ministerial initiative, COST predates the introduction of the Framework Programmes by 12 years. COST underwent a major overhaul in 2005 and resumed operations early in 2006 after adjustments to the definitions of the domains—or thematic fields for research—and to its financial structure; the fundamental principles and the organization of its functions, however, remain unchanged.

What Is COST?

COST is an intergovernmental framework coordinating nationally funded research in Europe. Membership includes 34 countries.[3] Research institutions from non-COST countries may participate in individual projects—called actions—for mutual benefit.

Aims of COST

COST actions aim at establishing European networks of nationally financed research on issues that are inherently international, so that

- The cooperation benefits many countries;
- Regulations and policy making can be harmonized;

[1] At a special meeting in Lisbon, Portugal, in March 2000, the European Council set a strategic goal: "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion."

[2] Meeting in Barcelona, Spain, in March 2002, the European Council noted that closing the gap between the European Union and major competitors required a boost in research and development and innovation. The Council agreed that "overall spending [in these areas] … should be increased [by approximately] 3 percent of [the gross domestic product] by 2010. Two-thirds of this new investment should come from the private sector."

[3] The 27 European Union member states plus Croatia, Iceland, Norway, Serbia and Montenegro, Macedonia, Switzerland, and Turkey. Israel is a cooperating state.

- Public concerns and the interests of society are served; and
- Emerging or multidisciplinary scientific topics are addressed cooperatively.

Flexible and à la Carte

The following principles govern a COST action:

- The action must involve flexible arrangements—that is, it must be capable of accommodating additional partners while in progress.
- The action may be initiated by individual scientists from COST member countries or by the European Commission.
- Participation is voluntary and *à la carte*—only interested countries sign on.
- The COST budget covers coordination and related expenses, but the research activities receive national funding.
- Researchers from all COST member countries have equal access to the actions.

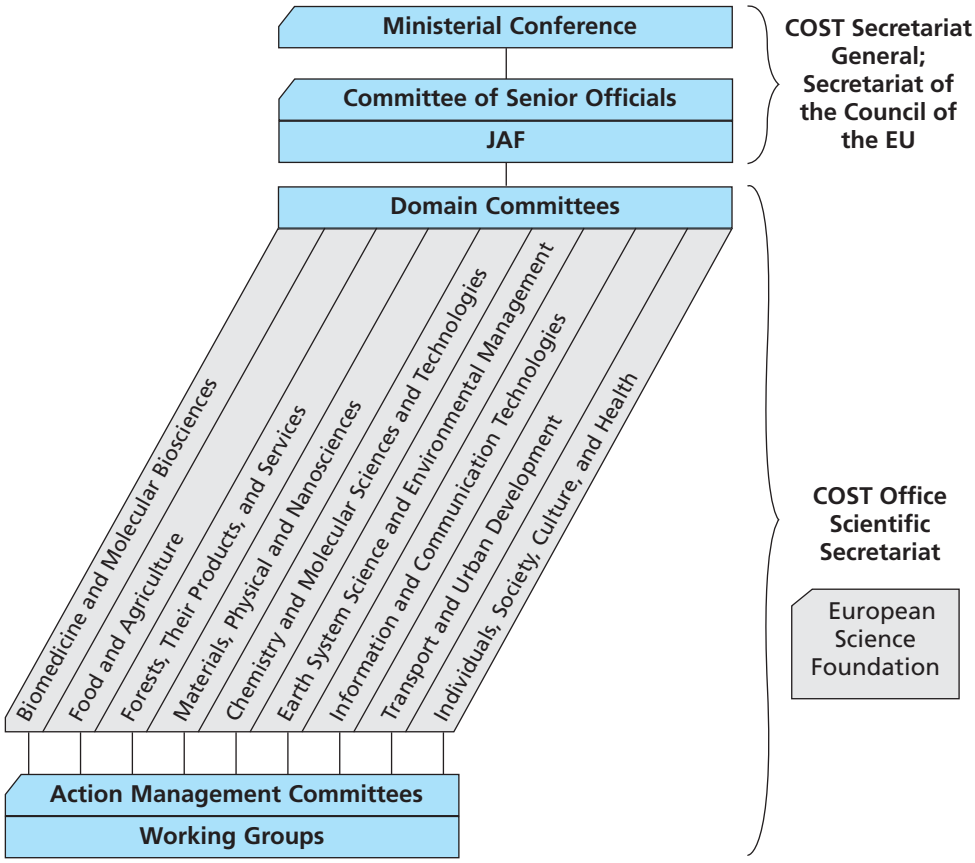


FIGURE 1 Organization of COST
(EU = European Union; JAF = Juridical, Administrative, and Financial Committee.
Source: www.cost.esf.org)

Scientific Domains

COST actions are subdivided into several domains or subject areas, including biomedicine and molecular biosciences; food and agriculture; information and communication technologies; and others (Figure 1). Transport previously constituted a single domain and was a strong candidate for funds, initiating many successful actions. After the recent reorganization of COST, transport shares a domain with urban development. As a result, research on urban matters will receive more opportunities for funding in consonance and in competition with transport.

Action Networks

Memorandum of Understanding

A memorandum of understanding defines the goal, the type of activity to be pursued, and the terms of participation for every action. The memorandum proper summarizes the main features of the action, and a technical annex describes the action in detail.

The COST countries that decide to participate in the action sign the memorandum through their diplomatic representatives to the European Union. The European Commission also may join an action and sign the memorandum. A minimum of five COST countries must sign before the memorandum can take effect and the activities can begin. Other COST countries may join the action at any time during the first year after the official launch.

PHOTO COURTESY OF FHWA

Multimodal dynamic message sign assists traffic in Munich, Germany; COST actions have addressed a variety of multimodal transport issues.

Drainage construction along Highway E29 near Sandweiler, Luxembourg, which connects to German Autobahn A1. A current COST action aims to improve highway performance related to water drainage and to minimize the leaching of contaminants from roadways and traffic.

Participant Contributions

Participants may contribute to an action in the following ways:

- Carrying out studies and research;
- Contracting for research with organizations;
- Contributing to the secretariat or coordinating other services or activities required for the action;
- Making available to other signatories any information about relevant research, including any necessary basic data; and
- Arranging for short-term scientific missions, training schools, or high-level scientific meetings.

These various means of participation highlight the networking characteristics of COST actions and effectively allow new partners to join an action at any time.

Governance

Senior Officials and Secretariat

Governing COST is a Committee of Senior Officials (CSO), which consists of two representatives from each of the member countries and the one cooperating country, Israel. Supporting the CSO is the COST Secretariat, provided by the General Secretariat for the European Council, the highest executive body of the European Union.

The CSO members elect a president and vice-president for a three-year term. The CSO also appoints an executive group of its members to prepare the work of the CSO and to carry out assignments. Ministerial conferences are convened to approve major strategic decisions for COST, such as extending membership to new states or changing the organizational structure.

Domain Committees

Domain committees—previously called technical committees—are the principal scientific bodies of the organization and are responsible for the quality control of COST action proposals and for the monitoring and final evaluation of each action. Each committee has one expert representative, appointed for a four-year period, from each COST country. Because of the scope of each committee, each country also may nominate one or two additional experts with complementary expertise, who can serve as resources when necessary.

The COST Office is responsible for operation and administration, serving the domain committees and approximately 200 actions (Figure 2). Organized by the European Science Foundation on behalf of the European Council, the office is based in Brussels and

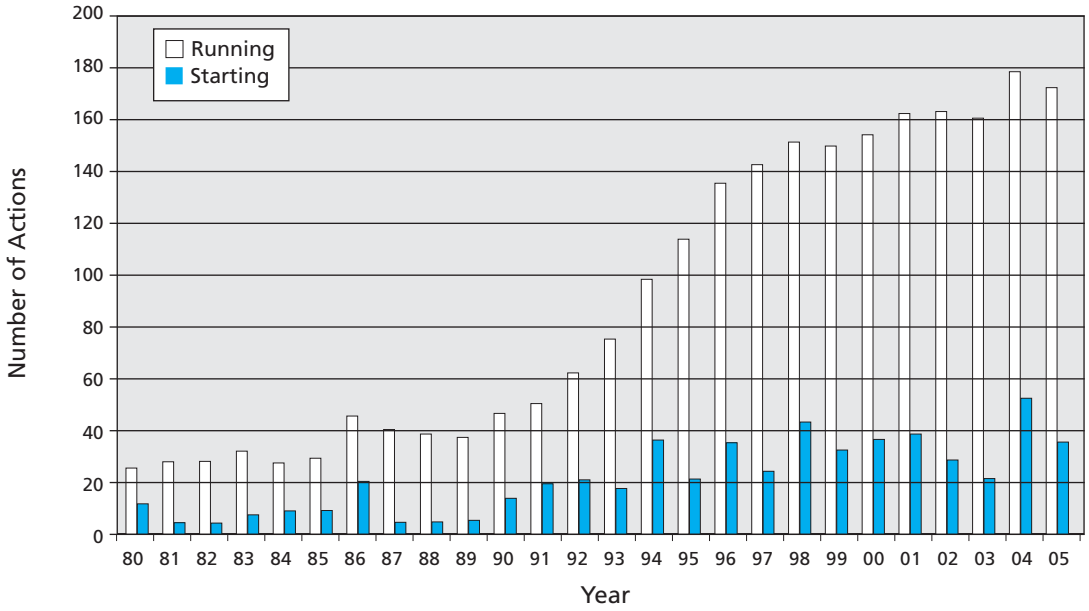


FIGURE 2 COST Actions Started and in Progress, 1980–2005

has a staff of approximately 40, including 15 scientific officers, each associated with a domain. The COST Office administers approximately 15 million € per year from the European Union, to reimburse the travel and per diem expenses of participants in meetings and to fund training courses, short-term missions by researchers to participating institutions, and the dissemination of final reports from conferences and workshops.

Past Achievements

Transport was among the five technical and scientific fields opened for actions when COST was launched, and the many achievements have contributed to the development of a European consensus on key transport topics. COST brought together young and experienced transport researchers and created networks that have benefited cooperation in related fields, for example on projects under the European Framework Programmes, the working groups of the European Standardization Committee, and many bilateral and multilateral research activities.

In an address to the 2006 Transportation Research Arena Conference in Gothenburg, Sweden, Josef Mikulík, the former chair of the COST Technical Committee on Transport, summarized past achievements:

> The focus [has been] the Europewide exchange of best national practices, the improvement of existing methods, and recommendations for harmonization at a European level. The results from many actions have been implemented in [international] legislation or other forms of standardization in … infrastructure design, materials and management, accessibility of public transport for disabled users, and transport and environment. Since the end of the 1990s, almost half of the actions relate to research on materials and methods in infrastructure design, construction, and maintenance; the [rest] focus on transport policy and environmental issues. COST covers and solves problems [that] have an impact [on] the majority of the European population.

Several recently completed actions are highlighted in the box on pages 12–13.

COST's Renaissance

An independent evaluation in 2002 prepared the way for the changes in COST. After consultations with ministers in 2003, a modified *modus operandi*, including the new definitions of domains, went into effect on January 1, 2006.

The difficult task of developing a proposal to restructure the domains was assigned to a group of technical committee chairs, headed by the chief executive of the European Science Foundation, Bertil Andersson. Their success in reaching consensus is viewed as miraculous and often is likened to a Copernican revolution.

New Opportunities

Under the reformed structure, the transport and urban development domain covers basic and applied research activities and technical developments in transport, urban, and civil engineering issues. To prepare for the work of the new domain committee, an independent panel of experts reviewed COST's past achievements in transport and in urban civil engineering, compiling peer reviews, interviewing key participants, and surveying the opinions and experiences of technical and management committee members.

In a December 2005 report, the panel noted that the redefined domain committee should "provide greater strategic direction and therefore coherence to the portfolio of actions without losing COST's … ability to respond to the changing needs and concerns of the research community." The panel emphasized that COST actions in these areas are not science but provide important types of support to the research community—the actions may have little effect on basic research but are policy-oriented and influence norms and standards, particularly through improved dissemination.

According to the panel, the actions also influence and are influenced by other European research programs, but more concerted coordination could increase the mutual benefits. More participation from outside Europe is desirable and would have benefited several previous actions.

New Themes

The following examples illustrate themes of research in the new domain:

Josef Mikulík, Director of the Transport Research Center in the Czech Republic and former chair of the COST Technical Committee on Transport, addresses the International Research Roundtable at the 2007 TRB Annual Meeting in Washington, D.C.

PHOTO COURTESY OF FHWA

Traffic information center in Barcelona, Spain; European nations are relying on COST actions to accelerate and standardize technology transfer.

- Sustainable transport and urban planning policy;
- Design of transport systems and development of urban infrastructure;
- Urban architecture and civil works construction, planning, and design; and
- The management of transport systems, infrastructure, and urban structures.

The domain spans sectors and is multidisciplinary, encompassing a range of scientific expertise, with special emphasis on related policy and on sustainable development. The domain activities are innovative but are designed to complement other European programs.

Interdisciplinary Emphasis

The interdisciplinary makeup of the transport and urban development domain is characteristic of the reformed COST and is a strategic choice of the governing body. The ability to operate across disciplines is linked to the drive to achieve a knowledge-based society as envisioned in the 2002 Barcelona declaration.

COST reinforces this goal through strategic workshops on interdisciplinary subjects that also cross the domains. In 2005 one workshop examined cultural heritage, and another considered issues in environ-

Recently Completed COST Transport Actions

Action 347: Improvements in Pavement Research with Accelerated Load Testing (2000–2004) developed a European code of good practice to optimize the use of accelerated load testing (ALT) facilities and to improve the application of the results.

Many of the ALT facilities in Europe are owned by the member organizations of the Forum of European Highway Research Laboratories. COST 347 successfully developed a common code of good practice, which can improve the efficiency and quality of ALT work and harmonize the results for application. Experts defined new applications for ALT in pavement research.

The main form of dissemination of results was a biannual newsletter, posted on the Internet (http://www.pave-test.org/public.htm). The project established links to the Transportation Research Board, and the action experts participated in the TRB Full-Scale and Accelerated Pavement Testing Committee. The COST results were presented at several TRB Annual Meetings.

Pavement test facility at Transport Research Laboratory, United Kingdom, is used to test and evaluate the durability of materials under roadway loading conditions. COST has developed a code of good practice for testing facilities to improve the application of results.

Action 340: Toward a Trans-European Intermodal Transport Network: Lessons from History (2000–2005) provided an analysis framework to assist in decision making on transport policies. In addition, a set of recommendations has helped in establishing priorities for projects involving trans-European connections and intermodal transport. The action brought together experts from different geographical and political regions of Europe to identify the many barriers to creating efficient intermodal transport networks.

COST 340 convened a final conference with keynote addresses by transport policy experts from the European Commission and several national ministries of transport. Papers focused on the interaction between transport and economic development and the impact of transport policy and infrastructure on development in different regions. The conference underscored the need for a history-conscious approach to European transport and European transport policy.

The action established a European network of specialists and led to the creation of the T2M Association of scholars and practitioners in Europe and the United States, dedicated to the history of transport and economics.

Action 346: Emissions and Fuel Consumption from Heavy-Duty Vehicles (1999–2005) developed an improved methodology for estimating pollutant emissions and fuel consumption from commercial heavy-duty vehicles in Europe. Before this action, the database on emissions from heavy-duty vehicles was poor.

Results were presented at the 14th Transport and Air Pollution conference in Graz, Austria, in 2005. With 175 participants representing research and scientific institutions in 27 countries, as well as industry and governments, the conference provided opportunities for information exchange at a high scientific level.

COST 346 produced emission models for calculating emission and fuel consumption indicators for vehicle fleets, as well for individual vehicles, with adjustments for driving performance, conditions, vehicle age, and other factors. The findings also

ment and health. Strategic workshops in 2006 focused on food and health and then on nanosciences and technologies.

The current portfolio consists of actions continuing from several of the former technical committees (see box, page 15). The CSO approved the actions at the recommendation of the technical committee for transport.

Proposing and Selecting Actions

Open Calls for Initiatives

The procedures for proposing, evaluating, and approving new COST actions are designed to be inclusive. In principle, the call for proposals is always open, although deadlines must be met for handling and evaluation in accordance with the meeting schedules of the COST bodies. A proposal typically is an initiative of a group of researchers in one or more COST countries; one member of the group serves as coordinator for the proposal.

Preliminary Proposals

The proposal procedure is simple, but demanding, and has two stages. The first stage is the submission and assessment of a preliminary proposal. At this stage the proposal receives a title or a name, often an easy-to-remember acronym. Submission of a first-stage pro-

Sustainable transport is a major policy concern, including the availability of alternative modes, such as the Strassenbahn tramway in Cologne, Germany.

Trucks traverse a German Autobahn. A COST action has produced emissions and fuel consumption models for commercial heavy-duty vehicles in Europe.

were compared with and incorporated into deliverables from other European Union research projects on transport emissions.

Action 349: Accessibility of Coaches and Long-Distance Buses for People with Reduced Mobility (2001–2005) produced guidance on the construction and design of interurban and international coach and bus systems to accommodate people with reduced mobility and to assist operators, passengers, and authorities in planning for accessible and high-quality transport systems.

Results addressed all aspects of the accessibility of public transport for disabled users and are relevant to the development of European Union legislation and regulations. Findings were presented to the professional public at the COST 349 final seminar during the Busworld Exhibition in Kortrijk, Belgium. The seminar was attended by 120 experts from the operating and manufacturing sectors of the bus industry and by representatives of organizations of disabled people and by the media.

Action 348: Reinforcement of Pavements with Steel Meshes and Geosynthetics (2002–2006) analyzed models, methods, and materials for the structural design of pavements with reinforcements in the bound or unbound layers. All types of reinforcement were considered, along with the most effective methods for assessing pavement performance.

The designs, calibrated for specific countries and projects, had performed well under normal conditions and with conventional materials, but a generally accepted model for routine use is lacking, and the reliability of current approaches has not been established. Knowledge gaps were found in current practice, testing, and design methods, limiting the applications of the technology.

Nevertheless, using geosythetics and steel meshes in new construction and maintenance of roadway pavements has benefited road administrations, road users, and the environment. The action confirmed the benefits of pavement reinforcement.

Action 350: Integrated Assessment of Environmental Impact of Traffic and Transport Infrastructure (2001–2006) worked to establish an approach for integrating on a regional scale all the environmental aspects of traffic and surface transport infrastructure, so that policy makers can address these issues earlier in the decision-making process.

The action developed a methodology to support Strategic Environmental Assessment (SEA) through transport infrastructure planning scenarios and options, the classification of environmental impacts and indicators, the assessment and aggregation of impacts, and transport planning parameters, assessments, and monitoring.

The results and recommendations applied to the national, regional, local, and corridor levels. Case studies of SEA compliance were evaluated, along with a synthesis of current approaches and lessons learned. Guidance documents and methods were reviewed, and examples of best practices were explored. The action brought together available guidance on the environmental impacts of transportation for the participating member states.

PHOTO: COST

The recently completed COST Action 349 recommended improvements in the accessibility of coaches and long-distance buses for people with reduced mobility.

posal must be online. The maximum length is 1,500 words—in English, French, or German—and the proposal must be carefully formulated to present a clear case for the need and value of the activities and the objectives. Because the competition is keen and the capacity for supporting concurrent actions is limited, the first hurdle is not easy.

The COST office and the COST national coordinator—one of the two national representatives on the CSO—receive the preliminary proposal. The domain committee then evaluates the proposal; if it is accepted, the proposer will be invited to submit a full proposal.

Full Proposals

The full proposal comprises two parts. The first is a comprehensive expansion of the preliminary proposal, including a dissemination plan that identifies the target audiences and the ways for presenting and delivering the results. Part 2, in an open format, assembles additional information, such as the history of the proposal, the preliminary work plans, a list of interested experts, and a bibliography. If approved, Part 1 becomes part of the memorandum of understanding and must comply with the formal requirements for the international document.

Assessment and Approval

The relevant domain committee assesses the full proposal. The committee normally delegates the task to a member who acts as rapporteur with support from a COST science officer.

The next step proceeds either to a committee panel or to a written review; in either case, at least two external experts and, if appropriate, a European Commission representative participate. The assessment follows criteria established by the CSO and is recorded and reported in a standard format. If only minor adjustments are required for approval, the science officer will advise the proposer and identify the elements to be changed.

The committee receives the findings and recommendations from the assessment and decides whether or not to endorse the proposal. If the proposal is endorsed, the COST Office drafts a memorandum of understanding, which will be forwarded to the CSO, with Part 1 of the full proposal now serving as a technical annex.

The CSO makes the final decision to approve the proposal with or without modifications or to reject it. The process from acceptance of the preliminary proposal to the decision on the full proposal takes approximately four months.

Funding and Financing

COST actions involve research activities in member countries; the funding typically comes from national sources. COST funding therefore does not support the research for the action but supports the activities necessary for the network of the action to function. Experience has shown that this concept works well—the approach has created cooperating networks of researchers in many fields of science in Europe, and many of the networks have lasted beyond the formal conclusion of the action.

The COST office has several flexible economic tools to facilitate the joint activities of an action or of a domain committee:

- With certain limits, COST covers the travel and per diem expenses of action participants in meetings, workshops, and conferences that are part of the work plan.
- An action-related workshop, conference, or meeting open to the entire scientific community and effectively showcasing the action may receive financial support for most of the expenses.
- Short-term scientific missions and interlaboratory exchange visits—from one week to three months—may receive support for travel and per diem expenses. Preference is given to young researchers.
- Support is also granted for several-day training programs for young scientists working on an action, to gain acquaintance with new subjects or with unique equipment.
- Dissemination and publication are also eligible for support from the COST Office, which may make a variety of publication channels available, such as scientific journals, special publications, books, and proceedings, as well as informational leaflets and brochures.
- Domain committees and action management committees can request subsidies to review, coordinate, evaluate, or summarize results; execute studies; or prepare documents for the scientific community.

To accommodate the heavier trucks allowed by European Union standards, some nations, such as Poland, are examining policy alternatives to finance and manage roadway rehabilitation.

Current COST Actions in Transport Research

Action 351: Water Movement in Road Pavements and Embankments (2003–2006) aims to improve highway performance related to water drainage and to minimize the leaching of contaminants from roads and traffic. Improved performance will lead to fewer road closures, better use of the road network, longer service life, and more effective transportation of goods and people.

Action 352: Influence of Modern In-Vehicle Information Systems on Road Safety Requirements (2004–2008) is creating a scientific base for legislation on in-vehicle equipment, as well as for the safety evaluation of in-vehicle information systems and rules for driver education and training in their use.

Action 353: Winter Service Strategies for Increased European Road Safety (2004–2008) is developing a framework for managing winter traffic to maximize road safety.

Action 354: Performance Indicators for Road Pavements (2004–2008) is taking into account the needs of road users and road operators in developing uniform performance indicators and indexes for road pavements.

Action 355: Changing Behavior Towards a More Sustainable Transport System (2004–2008) is analyzing conditions that could reverse the growth in unsustainable transport demand by changing the behaviors of travelers, shippers, and carriers.

Action 356: Toward the Definition of a Measurable, Environmentally Sustainable Transport (2006–2010) is designing methods to harmonize and improve environmental indicators using current European indices and is developing approaches that contribute to a system view of environmental and transportation issues among decision makers in the different countries of Europe.

Helmeted motorcyclists on a highway in Spain.

Action 357: Accident Prevention Options with Motorcycle Helmets (2005–2009) is examining the effect of helmet design on the cognitive abilities of drivers of powered two-wheeled vehicles. The study will attempt to establish parameters that make measurements possible. This is the first effort involving researchers from the range of backgrounds needed to address the complex issues; the action also benefits from a wide geographic participation.

Action 358: Pedestrians' Quality Needs (2006–2010) aims to identify what is needed for the safe and agreeable mobility of pedestrians in public spaces and to demonstrate the value of a systems approach compared with a sectoral approach. The objective is to determine pedestrians' quality needs and how those needs relate to structural and functional elements, policy making, and regulation to support conditions conducive to walking.

PHOTO: DANISH ROAD INSTITUTE

PHOTO: TRANSPORT RESEARCH LABORATORY, UK

PHOTO: TRANSPORT RESEARCH LABORATORY, UK

PHOTO: DANISH ROAD INSTITUTE

A current COST action is looking at performance indicators for road pavements. The Danish Road Institute has developed a profilograph (above, left)*, which uses laser-based equipment for longitudinal and transverse road surface measurements; and ROAR* (below, left)*, for measurements of skid resistance. In the United Kingdom, the Transport Research Laboratory employs HARRIS2* (above, center)*, equipped with high-resolution systems for measuring road shape and visual condition, and is developing the Traffic Speed Deflectometer* (above, right) *to monitor the structural strength of roadways at traffic speed.*

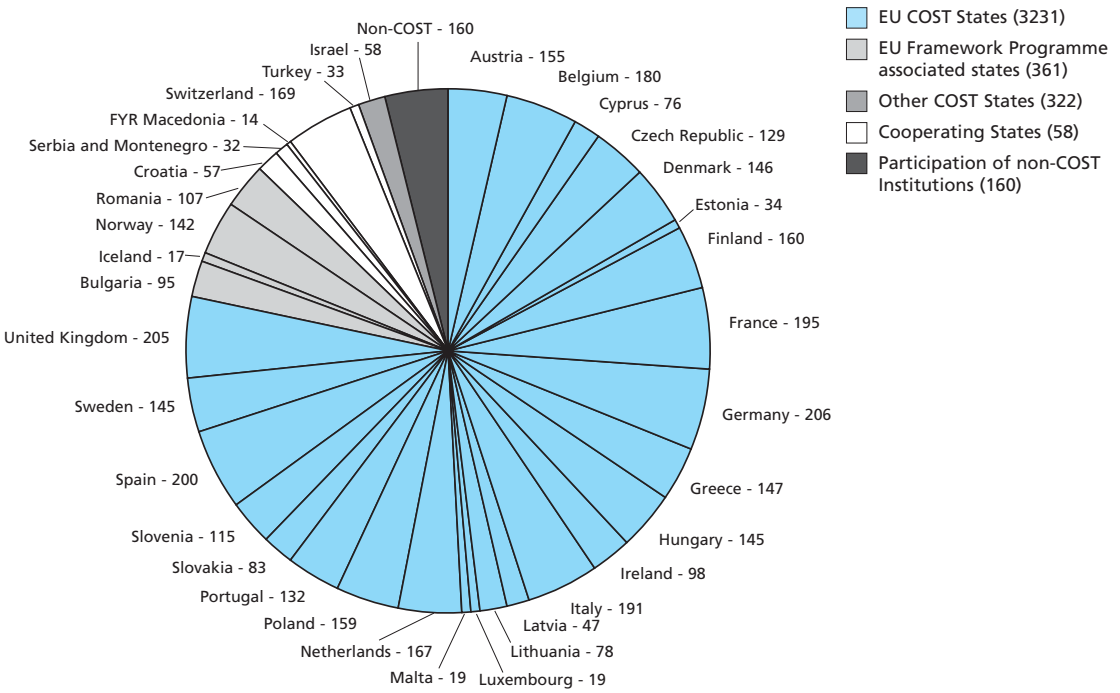


FIGURE 3 COST Action Participation by Country, 2005 (total number of action signatories = 4,132)

Outside Participation

An open-door policy allows any COST country up to one year to sign on to a memorandum of understanding for an action without any conditions (Figure 3). Joining later than that is possible with the approval of the action's management committee. Similarly, the participation of non-COST countries is welcome if the action's management committee considers it in the mutual interest. Participation is on the same terms as for COST member countries, except that the participants do not have voting rights on the management committee.

In addition, a special policy seeks to stimulate the participation of researchers from what are called the "near neighbor" non-COST countries: Albania and Bosnia and Herzegovina in the Balkans; Algeria, Egypt, Lebanon, Libya, Morocco, the Palestinian Authority, Syria, and Tunisia in the Mediterranean; and Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia, and Ukraine among the European New Independent States. One researcher from each of these countries each year may attend COST action meetings and working groups with funding from the COST Office.

Shaping the Future

COST is well established as a pragmatic, visionary, low-cost, user-friendly tool for the development of the European Research Area. A common comment from the thousands of researchers who have benefited from COST is that "if it did not exist, we would have to invent it."

COST has played an important role in introducing accession countries awaiting membership in the European Union to the European research community, providing valuable opportunities for international cooperation. These contacts often have evolved into the formation of joint project consortia under the more favorable funding conditions of the European Framework Programmes for research and technological development.

In the field of transport research, COST has had a long history of successful actions, often with valuable participation from non-COST countries. The opportunities for cooperation in transport research will continue under the revised domain structure and will be pursued when mutual benefit is expected.

An objective is to increase the interaction of COST with the Framework Programme, particularly to promote international cooperation through participation by countries outside the European Union. This can strengthen the worldwide network of researchers in the increasingly global disciplines of transport research.

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Talk Is Cheap, Communication Priceless

Practical Tips for Engineers and Their Colleagues

PATRICIA L. LEES AND JAMES E. NICHOLS

Lees is Director of Work-Based Learning for the Kansas City, Missouri, School District. Nichols is retired from Nichols Consulting Engineers, Reno, Nevada.

- Sarah said that they knew how to fix the road but didn't know how to convince the community that the fix would work.
- Bob said his unit had a 14-month backlog and that if there was a way to change what they do, he'd be the first in line.
- Paul said his 26-mile project included farms, a ski resort, a bear habitat, a nuclear waste site, and an Indian reservation, and he wondered whose advocates he should listen to first.
- Steve had 930 slides for a three-day course and knew that all of them had to be presented.

No formula or checklist is available for solving communication problems like these. People who work with engineers know that a checklist would be a good start—but talking about such problems is still necessary, whether the setting is a state department of transportation (DOT), a national agency like the Federal Highway Administration (FHWA), or a private engineering firm.

The type of training that engineers have completed, the kinds of work assignments they have had, and the assumptions they make about the world and about themselves are relevant in communication. The jokes about engineers, which circulate every few years, probably were written by engineers—they know they have issues with their social skills and that they tend to see things more as problems to solve than as relationships to cultivate.

Engineers generally are logical, methodical, and problem-solving and tend to assume that everyone else is too. Because engineers are smart, they accept new data that can help solve a puzzle. Therefore the key to converting an engineer to a successful communication style is to provide the reasons for changing, to offer examples and coaching in a nonthreatening environment, and to create and share a positive learning experience.

To improve communication with colleagues and with nonengineers, an engineer should know

- The audience;
- Something about how adults learn, as well as his or her own preferred style of learning;
- The specialized knowledge and skills required for effective communication; and
- That going outside the comfort zone may be necessary.

Engineers encounter four main trouble spots for communication:

- Making presentations,
- Designing training programs,
- Engaging public involvement, and
- Becoming managers.

Because of their respect for procedures, engineers listen, test, assess, and adjust in their communication experiences, just as in the technical

The model for many presentations may include formal papers presented by a panel of speakers, projected PowerPoint slides, and an engaged audience.

aspects of their jobs. Although engineers may respond to suggestions or requirements with initial resistance, data and experimentation win out.

Making Presentations

Whenever a professional from a DOT thinks about presenting a paper, the presentations at the annual meetings of the Transportation Research Board (TRB) serve as the likely models, even when the audience is local and nontechnical. Historically, the TRB model has resembled academic presentations, with the speaker reading a formal paper aloud. The presenter may use PowerPoint for visual aids. The audience listens carefully and then joins in the question-and-answer period, as time permits—but invariably the material exceeds the time.

Most people in audiences, however, have an 8- to 12-minute attention span—and then expect a commercial break. Add the urge for multitasking, the presence of portable wireless communications devices, and a few people with attention deficit–hyperactivity disorder, and an audience's attention span can contract even more. An effective presenter therefore develops strategies to keep the audience engaged.

Today all parties to a project want to be involved, to learn about what is happening, and then contribute to the discussion. This includes the project management team with subject matter experts from many disciplines, as well as the community gathered to learn about potential projects in their neighborhood. In the past, when organizations emulated top-down, military systems, the lead engineer would be in charge, and many believed that the efficiency of that approach outweighed outside participation or shared decision making.

Times have changed—project teams include water and air specialists, archaeologists and historians, and demographers and economists. Communities want to do more than comment on proposals—they want to influence and perhaps control decisions that affect their quality of life. This represents a big change not only for veteran engineers, but also for recent graduates, who may not have experienced public involvement during their academic work. Understanding this shift of roles and the disruption it may cause is important.

Audience Characteristics

The first need is to know something about the audience—who they are, why they are involved, and what issues they bring. The audience shares some of the characteristics of adult learners and some of the characteristics of the professionals engaged in the project. The presentation should be designed accordingly.

Malcolm Knowles, one of the pioneers in the field of adult learning, identified the following characteristics of adult learners (*1*):

- *Adults are autonomous and self-directed.* They need to be free to direct themselves. Teachers there-

fore must involve adult participants actively in the learning process.

◆ *Adults have accumulated a foundation of life experiences and knowledge* that may include work-related activities, family responsibilities, and previous education. They need to connect learning to this base of knowledge and experience.

◆ *Adults are goal-oriented.* They know their goal when enrolling in a course. Therefore they appreciate an educational program that is organized and has clearly defined elements.

◆ *Adults are relevancy-oriented.* They must see a reason for learning. Learning has to be applicable to their work or to other valued responsibilities.

◆ *Adults are practical*, focusing on the aspects of a lesson most useful to their work. They may not be interested in knowledge for its own sake.

◆ *Like all learners, adults need to be shown respect.* Instructors must acknowledge the wealth of experiences that adult participants bring to the classroom.

This information may seem more relevant to training than to presentations, but in both cases, the audience is there to learn. These learning characteristics provide guidance for a presentation:

◆ State the purpose or the goal up front. Give the audience a reason to pay attention.

◆ Organize the presentation to keep the audience engaged. Telling a story helps people remember.

◆ Link the material to the experiences of the audience. Adults are tuned into radio station WIIFM, "What's in it for me?"

◆ Guide the audience to opportunities for application. End with a call to action that keeps the audience thinking about the message.

Audience Interaction

Presentations may appear to be a one-way communication but can be made interactive. The presenter can trigger more than one sense—for example, have the audience complete a diagram, draw conclusions from a chart, solve a problem as a group or by conferring with the next person, call out answers or comments, or stand up and sort themselves according to a relevant category such as urban, suburban, ultra-urban, or rural setting; or maintenance, design, or construction; or numbers of years of experience. The presenter will not lose respect or cause chaos but will provide a way for the audience members to remember and apply the information. As one engineer experienced in presentations has observed, "Corny works."

PowerPoint Strategies

Many articles and books describe how to use PowerPoint. The tips from Microsoft are a good start:

◆ The screen orientation is landscape, like TV and the movies.

◆ Elements should be visible from the back of the room. Never say, "I know you can't see this"—fix it beforehand. A page from a book, or a table from a report, or a software screen rarely work as images. Parcel the information to gain a clear, uncluttered image. The rule of thumb is no more than seven lines and no more than seven words per line.

◆ Background and foreground colors should show up in the room—consider the room's conditions. An image that works on a computer screen may not work blown up 10 feet wide in a ballroom.

◆ Fancy slides are ineffective if content is missing.

◆ Animate the audience, not the slides.

A recent survey revealed audiences' annoyances with many PowerPoint presentations:

◆ The speaker read the slides aloud;

◆ The text was too small to read;

◆ The slides were hard to see because of the color choices;

◆ Full sentences were displayed instead of bullet points;

◆ The text and graphics were moving around too much; and

◆ The diagrams or charts were too complex.

Additional Tips

Other tips can add impact to a presentation. For example, in preparing for a panel discussion, a panelist should talk to the other presenters to find overlaps and synergies in the presentations. The session moderator may handle this task, but if not, the speakers should take the initiative to coordinate material, find opportunities to engage the audience in dialogue, and perform more analysis and synthesis.

The question-and-answer period also requires preparation. A frequent presenter may know what questions often surface and may already have modified the presentation accordingly. A first-time presenter should prepare by considering what people may ask.

A big fear in public speaking is embarrassment, particularly at being caught without an answer. If this occurs, "I don't know" is an acceptable response; the speaker also may thank the partici-

Many presenters overload, overdo, and weaken PowerPoint slides, obscuring instead of clarifying their key points.

pant for pointing out other areas for consideration.

A speaker should have what may be called a separator phrase in case a member of the audience continues arguing or wants to put the speaker on the spot. The separator phrase should get the speaker off of the defensive and back in control—for example, "It's reassuring that we don't all have to agree," or "Well, you can't tell which way the train goes by looking at the tracks."

Repeating each question before responding is always welcome to an audience because the acoustics in large rooms are usually poor. People tune out if the question-and-answer period turns into a dialogue between the speaker and one audience member.

If no questions arise, and time permits, the speaker might say, "I know it is hard to ask a question in a big room. In other conversations and presentations about this topic, people have asked…." In this way, the speaker can reveal concerns that others may have had about the topic and may prompt questions from the group.

Training Design

Consider the Learner

The biggest challenge for an engineer or other technical specialist who is involved in designing a training program is to think about the learner, not just the content. The excuse usually is that there is "so much material to cover." The trainer's job, however, is not to cover material. If the learners do not know what to do with the information, what has been gained?

The goal in designing a training program is to define what needs to be different at the end of the training:

- Can the trainees apply new techniques?
- Can they solve more complex problems?
- Can they prevent problems?

To develop new training, instructional design practitioners use the ADDIE model: analyze, develop, design, implement, and evaluate. No engineer would design a road without proper analysis.

Integrating Communications into the Curriculum
A Pioneering Program at Georgia Tech

LISA ROSENSTEIN

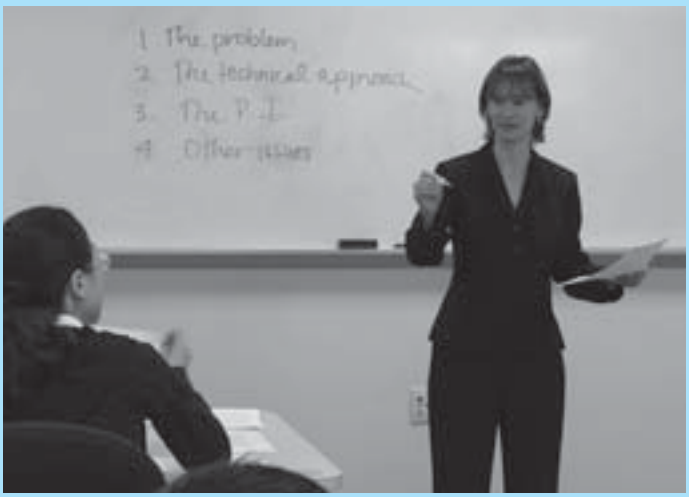
Teaching engineering students to communicate effectively was not a new concept in 1998; teaching them through an in-house program was. That was the innovative approach taken by the School of Civil and Environmental Engineering (CEE) at Georgia Tech. The prevailing method of teaching communications skills to engineers at the time consisted of one or two courses taught in the English department, with content often unrelated to students' engineering disciplines. The results were disappointing.

To improve the way engineers are taught to communicate, the CEE chair proposed an in-house program that would place the instruction in an engineering context. A generous endowment from the Joseph Mundy family made the program possible. The Charles E. Gearing Program in Technical Communications—named in honor of one of Mundy's most influential professors at Georgia Tech—ushered in a new era in communications instruction in the College of Engineering; today other schools within the college also house similar programs.

The goal of the CEE Engineering Communications Program is straightforward—to teach engineering students the written, visual, and oral communications skills they need to compete and succeed in the workplace. The program addresses these three forms of communication at the undergraduate and graduate levels to teach the fundamental and advanced skills students need as they progress through the degree programs.

Basic Principles

On the undergraduate level, the program integrates communications instruction into some of the sequenced core courses. For example, in the sophomore-level Civil Engineering Systems course,



Communications Specialist Lisa Rosenstein helps engineering students link written, visual, and oral communication skills directly to their course content; she has been the mainstay of the innovative program at Georgia Tech's School of Civil and Environmental Engineering and School of Materials Science and Engineering since 1998.

Without a model that structures thought, people often say, "I think I know what the problem is," and then, "I think I know what the answer is." Figure out first what the learner will do with the information—this will help in selecting outcomes, content, delivery methods, and evaluation tools.

Styles of Learning

The design of a training program for a group requires the accommodation of all learning styles. Learning is a complex process, and each person has a learning style that changes with the environment, the content, or the tasks. Most people have a dominant style that defines the best way for them to learn new information. A presentation or a training course often starts out tailored to the designer's preferred style of learning.

Consider the following statements by learners:

- I take lots of notes and I like to doodle.
- If I had to explain a new procedure or technique, I would prefer to write it out.
- I like to talk to myself when solving a problem or writing.
- If my boss has a message for me, I am most comfortable when she talks to me in person.
- I am not good at reading or listening to directions. I would prefer to start working on the task or project at hand.

PHOTO: IOWA STATE UNIVERSITY

A group trainer must be able to accommodate a variety of learning styles and must work to impart new skills.

students learn how to structure engineering reports, integrate visual elements, and deliver oral technical presentations about their work. These skills are enhanced in the senior year in the Capstone Design Course. Students learn how to write project proposals and design reports, as well as to deliver technical presentations not only to the instructors, but also to project sponsors, who often may include local government officials, members of regional agencies, or engineers from high-profile firms.

The graduate-level program incorporates a stand-alone course, Engineering Communication, in which students use content from their own studies to improve their skills in written, visual, and oral communication. The course is conducted as a workshop, with equal time devoted to lectures, in-class individual and group work, and evaluation and critique sessions.

The course first covers the basic principles of clarity. Students then apply these principles as they learn to create well-written and effectively designed technical documents. The emphasis is on editing and revision. Second, students learn not only how to create visually effective figures, graphs, and charts, but how to write and talk effectively about them. Third, students learn how to create and deliver professional-quality technical presentations. The presentations are delivered through electronic media, and equal emphasis is placed on achieving excellence in content, delivery, and slide design. All presentations are recorded so that the students can evaluate their own efforts and assess their progress.

In addition, the communications specialist often guest lectures and provides teaching materials for other CEE courses. Individual students and teams can receive assistance, and the communications specialist often conducts workshops on such topics as fellowship application essays, thesis proposals, and résumé writing. Doctoral students also may seek consultation during the dissertation process, and faculty members periodically receive assistance with papers, proposals, and technical reports.

Many Forms, One Goal

The program has worked well for CEE, but successful in-house communications programs can take many forms. At Georgia Tech, for example, several schools in the College of Engineering have excellent in-house programs and each one is unique, designed to meet the specific needs of the school while working within specific constraints, such as the number of students, financial resources, and preferred pedagogical models. Some schools have writing labs that help students with papers and presentations; some have train-the-trainer programs that enlist graduate students to help with instruction; and others have communications specialists who help engineering colleagues design assignments for their classes. All of these in-house programs are committed to the same goal of improving the communications skills of a new generation of engineers.

Nearly a decade after its inauguration, CEE's in-house Engineering Communications Program has become an integral part of the school's mission and curriculum. The program addresses the needs of undergraduates, graduate students, and faculty. Feedback from current students and alumni, as well as from local employers and an advisory board, confirms that the program is accomplishing its goals.

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◆ If I had to explain a new procedure or technique, I would prefer to demonstrate it.

The first two statements indicate a visual learner; the second two characterize an auditory learner; and the third pair, a kinesthetic learner.[1]

A trainer or presenter who has not considered his or her own learning style or the range of styles in a training group may have missed opportunities to make an impact. One trainer described his classes as interactive because he told jokes and the audience laughed. Clearly he needs to change his definition of interactive and engage the individual learning styles of his class.

Public Involvement

Most public- and private-sector engineers and technical specialists react to an assignment to the public involvement part of a project with emotions similar to the fear of death or snakes. The main communication challenges, however, are fairly common. First is the general fear of public speaking—even those who are experienced speakers encounter unknowns such as the mood of the audience, the difficulty of their questions, or the presence of the media.

Anticipating an unfavorable experience, some project engineers may design the event to retain complete control. They display charts and graphs, present highly technical explanations, and draw a conclusion about the alignment or project schedule. Not surprisingly, the community stakeholders are not satisfied.

Changes in regulations, however, have assigned new value to community input and have altered the process. The community group should be viewed as trainable—they want to know what is at stake, what are the variables, and how decisions are made among competing projects. If someone asks, "How many people have to die before you fix this intersection?" the engineer should answer. The audience may be angry, but they would find out that the decision is not random. Historical relationships apply, as well as the new relationships being developed, and the project team may not know how many times in the past the community had been misled.

Princeton University professor and psychologist George Miller stated, "To understand what another person is saying, you must assume that it is true and try to imagine what it could be true of" (2). Speakers who are focused on getting a message across may judge and interpret what other people say and as a result may respond too quickly, often without understanding the other person. Miller's Law, instead of denying a challenge and arguing a position, advocates starting from a different place in the conversation.

Engineers and other specialists need to believe that each group deserves the best presentation. Fear of confrontations, hecklers, misinterpretations, or of hearing the same questions again and again interferes with seeing a meeting as the first time for that particular audience and an opportunity for all to learn together.

Engineers into Managers

How do nonengineer managers communicate with engineers, and how do engineers learn to be managers? These questions must date back to the building of the pyramids.

For effective communication with an engineer, a manager should understand the engineer's thought process when faced with a problem. The process is usually a circular, iterative technique:

1. Identify the problem.
2. Gather information.
3. Brainstorm solutions.
4. Analyze and select a solution.
5. Test and implement the solution.
6. Communicate the solution to others.

The engineer uses Steps 1 through 5 to come up with the best solution possible. The pitfall is that Steps 1 through 5 can become a continuous loop, because the engineer may believe each time that there is a better answer and that more data are needed. Management therefore must be engaged in the first five steps to offer guidance and to set boundaries; then in the sixth step, the manager must provide a convincing argument for the solution selected.

[1] An instrument for assessing learning styles is available at http://www.nwlink.com/~donclark/hrd/vak.html.

The best approach to conducting a public involvement meeting is to see it as a learning opportunity for all.

PHOTO: FITZGERALD & HALLIDAY, INC.

In Step 1, the manager must establish the boundaries of the problem. The engineer may not think of the social, economic, political, or environmental dimensions of a problem—the manager must identify these. The engineer, however, may identify certain constraints to construction. Step 1 therefore is a dialogue.

Step 2 is primarily the engineer's bailiwick, gleaning information from a variety of sources and sifting through it. This makes Step 1 critical—the problem has been well defined and sources of data are broad enough to address all dimensions of the problem.

Step 3 is a joint effort, because a nonengineer manager usually can develop solutions that may not be apparent to an engineer with limited exposure to qualitative aspects of the project. Without involvement in public meetings on the project, the engineer may have little appreciation of stakeholder concerns and of options that would be viable and acceptable.

If possible, Step 4 is accomplished quantitatively by assigning numerical values to selections, but this can be deceptive and can result in erroneous choices without qualitative judgment. Management therefore should provide the qualitative input for the process.

Step 5 involves identifying suitable testing procedures to implement a solution. For example, the primary test for a selected highway project is whether it meets the needs for which it was planned—to reduce congestion, to provide greater safety, or to serve durably. Ancillary tests will be required to show the effects on stakeholders, the economic ramifications, or other aspects. Management must set up focus groups or other qualitative assessment instruments to evaluate the project.

The process is iterative. As the solution is tested, other problems are identified and the process begins again, proving the adage, "the chief cause of problems is solutions." Management needs to know when this process has reached a point of diminishing returns and the solution is acceptable.

The final step entails communicating the solution to others—perhaps the biggest challenge to management. Managers know how to identify the audience, but knowing how much detail to include in the presentation while keeping the audience engaged is an art and comes with experience. Presentations that drill down into the minutiae of Steps 1 through 5 will lose an audience, and all the hard work will be in vain if the solution is rejected because it is not understood. In contrast, an audience of engineers would want to understand the details of Steps 1 through 5, making it critical to present enough detail to impart credibility to the solution and to the team. The speaker must know the audience.

PHOTO: IOWA STATE UNIVERSITY

Management offers guidance, establishes the boundaries, and applies a larger perspective for project problem solving.

To help an engineer become a manager requires a synthesis of all the communication advice already presented. Most people also learn by watching others who are skilled at their tasks. Managers must master the technical aspects of their jobs, including the subtleties of public speaking, of supervision and training, of shared decision making, and of listening. Good communication requires paying attention to all of the clues that an audience provides.

Problem Solving

Metaphors or farming analogies may not be effective in communicating with engineers, and a designer may be hard to convince that listening to the community may generate good ideas that had not been considered—but engineers are problem solvers. Appealing to that characteristic can motivate a pavement expert to try something new and uncomfortable and discover that it works.

Many years ago at a DOT headquarters, the training room during the week was dark and crowded, with everyone focused on the front of the room. When the course ended, one of the participants was asked about the lecture delivery method and if it was effective. He said, "It's just like engineering school, so we have low expectations." The challenge is to change those expectations.

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Engineers and Scholarly Journals

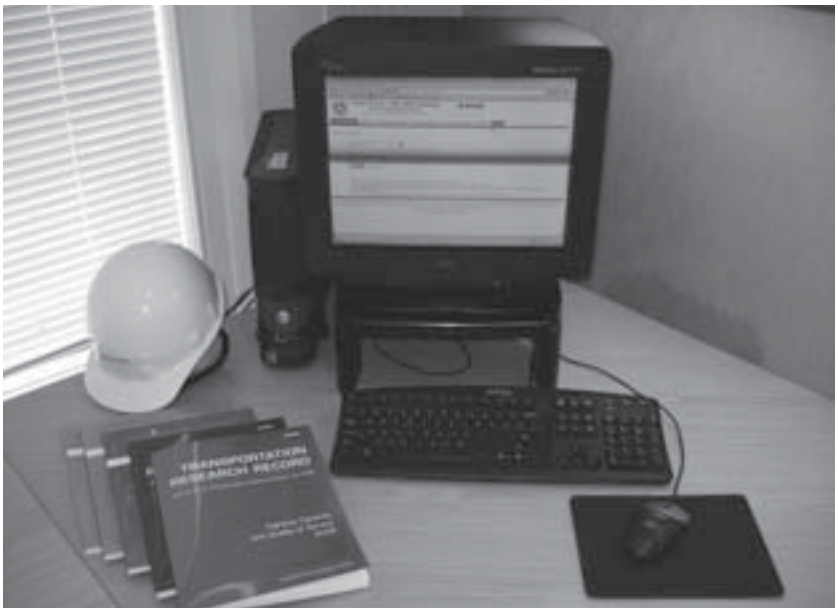
Reading Patterns in the Electronic Era

CAROL TENOPIR AND DONALD W. KING

Tenopir is Professor of Information Sciences, College of Communication and Information, University of Tennessee, Knoxville, and King is Distinguished Research Professor, School of Information and Library Science, University of North Carolina–Chapel Hill. They coauthored Communication Patterns of Engineers *(Wiley, 2004).*

Scholarly journals are an important source of trusted information, although the engineering professional reads fewer journal articles on average than do members of the scientific and engineering academic communities. Studies have shown that engineers spend a smaller proportion of work time reading from scholarly journals and that they read fewer articles than scientists and physicians. Nonetheless journals are useful and valuable to engineers, who also read many types of information resources, including standards, technical reports, books, and articles.

When engineers read articles, they rate the importance to their job as very high. Other information sources—particularly oral reports and oral communications—are more important for engineers than for scientists or medical professionals. Recent studies confirm these trends, which have been observed for decades, although a growing percentage of reading is now from electronic sources.



Comparing Patterns

The reading patterns of engineers have been studied extensively for nearly 50 years. Studies in the 1960s, for example, found that engineers use technical reports frequently (*1*–*3*). Several studies have compared the use and importance of scholarly journals for several fields, including medicine, sciences, social sciences, and engineering (*4*–*5*).

Most of the data presented here were collected in readership surveys from 2000 to 2005 at five universities and the Oak Ridge National Laboratory (ORNL), a Department of Energy science and energy research facility in Tennessee. Responses by engineers were compared with those by scientists and members of other professions.

The surveys focused on the most recent reading—a variation of the critical incident technique. After the respondent estimated an amount of reading, the questions turned to the last article read. Questions covered details about the last reading, including the time spent, how the article was identified, where it was obtained, the purpose and value of the reading, and the form and format of the reading. In addition, a limited number of questions required recall—such as the amount of reading in the past month—and demographic questions aimed at such information as the respondent's subject discipline, age, gender, and degree.

Reading Journals

A 1977 national survey sponsored by the National Science Foundation showed that engineers read an average of 80 scholarly articles per year and spent about 60 hours reading these articles, or an average of 45 minutes per reading (*6*). Approximately 30 percent of all readings were by engineers in universities and the remainder by engineers in other locations. The university engineers averaged 150 readings and other engineers about 60 readings per year.

A series of 32 surveys in the 1980s and 1990s

revealed that engineers in industry, government, and federal laboratory settings averaged about 83 annual readings and spent 72 hours per year reading these articles (7). Engineers averaged an additional 210 hours reading materials such as trade journals or bulletins (47 readings per year); books of all kinds (40 readings); technical reports, mostly internal (81 readings); and other work-related documents. In 2001 a survey at ORNL showed that engineers averaged 98 annual readings of scholarly articles and 88 hours reading these articles, an indication that nonuniversity engineers had increased their reading of articles and their time spent reading.

A similar pattern was observed for university engineers. The amount of reading and time spent reading by university engineers increased from 150 readings in 1977 to 250 by 2005 and from 110 to 170 hours spent reading per year.

Some increased reading of scholarly articles is attributable to broadened access to articles through bibliographic and full-text article databases and e-journal systems. More time spent reading articles, however, may detract from reading other materials. Regardless, engineers' willingness to devote time to reading articles indicates the value they place on the information.

Amount of Reading

In surveys by Tenopir and King, respondents were asked, "In the past month (30 days), approximately how many scholarly articles have you read?" A scholarly article was defined as one "found in journal issues, author websites, or separate copies such as preprints, reprints, and other electronic or paper copies." A reading was defined as "going beyond the table of contents, title, and abstract to the body of the article."

The survey focused on readings, not on the specific articles read. Almost 16 percent of readings by university engineering faculty in 2005 and 30 percent of readings by nonuniversity engineers in 2001 were rereadings. The distribution of readings tends to be highly skewed, with only a few engineers reading many articles in the preceding month.

Figure 1 shows the average amount of reading per month by university faculty and staff by subject disciplines. The amount of reading by engineering faculty is less than that by science and medical faculty.

Time Spent Reading

The average time spent reading an article has decreased from an average of 48 minutes per article across all subject disciplines in 1977 to an average of 34 minutes per article in 2005. Because the average number of article readings has increased dramatically at the same time, the total time spent reading articles has increased, but by less than would have been projected. On average, the decrease in the amount of time engineers spent per article was less than that for scientists or medical faculty.

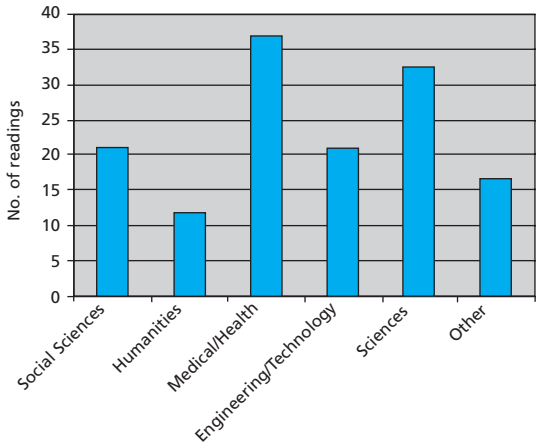


FIGURE 1 Average Readings per Month by Subject Discipline: Faculty in U.S. Research Universities, 2005 (n = 941)

Engineering faculty read fewer articles on average than colleagues did in several other disciplines but spent more time per article (Figure 2). In 2005 university engineers reported spending an average of 41 minutes per article or 172 hours per year—this included only reading, not searching, retrieving, and citing the articles. ORNL engineers reported spending an average of 54 minutes per article in 2001 or about 88 hours reading journal articles annually.

Sources and Format

As journal prices have increased, engineers have subscribed to fewer journals and have sought articles from other sources, such as libraries and separate copies. The availability of electronic journals also has changed information-seeking and reading patterns. The average number of subscriptions per university engineer was 2.56 during 2000 to 2003; 16 percent of university engineers, however, reported

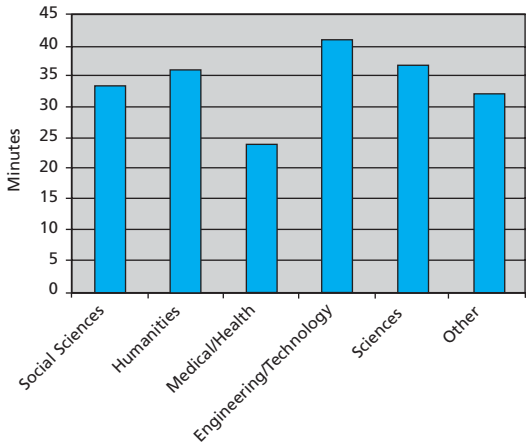


FIGURE 2 Average Time Spent per Article by Subject Discipline: Faculty in U.S. Research Universities, 2005 (n = 937)

receiving no personal subscriptions. The average number of personal subscriptions per ORNL engineer was 1.16. These numbers are down from an average of 2.93 subscriptions per engineer in 1977.

The main sources for access to print or electronic journal articles were personal subscriptions, library collections, and separate copies. University readers obtained 57 percent and ORNL engineers 50 percent of readings from library collections. Nearly two-thirds of university engineers' readings from library collections were in electronic journals, up from one-third during 2000 to 2003. Most of the electronic article readings were printed out—few were read online.

In addition, researchers often obtained articles as separate copies from interlibrary loan requests, author websites, colleagues, subject repositories such as arXiv.org, and other sources. University and ORNL engineers reported using similar numbers of article copies—22 percent and 18 percent, respectively. The most frequent source of separate copies was another person, such as a colleague or an author.

Most of engineers' article readings came from recent journals; however, an appreciable amount of reading consisted of articles published more than 10 years ago. The university engineers read older articles more frequently than the ORNL engineers did. The library collection was the principal source, especially as the age of the articles increased. The age distribution of articles read from electronic journals is almost the same as for those read from print journals. Some articles were identified by one means and then obtained from the library's electronic collection. Newer articles were mostly found through browsing, and older articles through searches.

Gauging Value

The value of an article is defined by the consequences of reading and by what engineers are willing to pay for the information or by how much time they are willing to spend to obtain and read the articles.

One way to measure the consequences of reading journals is to determine the purpose for which the article is read. Engineers were asked to indicate the principal purpose for which they have used or plan to use the information obtained from the most recently read article. For university and ORNL engineers, the most frequent principal purpose was research. Among ORNL engineers, one-quarter of the readings was for current awareness or keeping up with the literature; only 6.5 percent of university engineering faculty gave this reason.

In the university surveys, the engineers were asked, "In what ways did the reading of the article affect the principal purpose?" When primary research was the principal purpose, the most frequent response was that the reading "improved the result," followed by "it inspired new thinking or ideas," and "it narrowed, broadened, or changed the focus of the research." Reasons mentioned less frequently were "Resolved technological problems," "Saved time or other resources," "Resulted in collaboration or joint research," and "Resulted in faster completion."

Other Influences

Engineers whose research or other professional contributions have been acknowledged through awards or special recognitions tended to read more and to spend more time reading than those whose work had not been acknowledged. In the survey, engineers who had received recognitions averaged nearly twice as many readings as those who had not.

Scientific and technical information is communicated via many other channels, such as informal reporting, technical reports, and conference presentations and proceedings. Engineers therefore have many opportunities to be exposed beforehand to the information found in articles that they may read. The surveys asked: "Prior to your first reading of this article, did you know about the information reported or discussed?" About one-half stated that they were aware of the information, although they read the article anyway, sometimes at great length.

Online Versus Print

Ease of use is important for journal-related services and advanced features. The time required to identify, locate, and obtain articles affects use. For example, electronic journals in library collections are more extensively used than the available print collections.

Approximately 80 percent of engineers who have personal subscriptions continue to read the articles in print, although electronic versions are available. Earlier surveys indicated that browsing print journals took less time than browsing electronic versions, but more recent and refined data suggest that this may no longer be true. Readers still consider personal print subscriptions to a few core journals to be more convenient for current awareness reading.

Another consideration is whether electronic articles are read online or printed out. Less than one-quarter of the readings of electronic articles were online. Online readings tended to be shorter in duration than readings of printed versions. How the electronic articles were read—online or printed out—was consistent with survey results from other disciplines, suggesting that ease of use influences the choice. The decision to print an article out may be dictated by the need to keep a copy available.

Journal Quality and Services

Certain attributes affect in varying degrees the use of journals and related services—such as the quality of the content, the number of articles and pages, the number of issues, the format, the archive availability, and the price (*8*). Important attributes for article sources, such as library collections, include the comprehensiveness and the age of the journal collections, the location, the hours of availability, the accessibility, the format of the collection, and the collection-related services, such as reference support. Search service attributes include price, recall and precision of results, and display features.

Convenience and Value

Scholarly journals are an important source of high-quality and convenient information for engineers in their work. Engineers read fewer journal articles on average and spend more time per article than do scientists and social scientists, but scholarly articles from a variety of sources serve an important role in research, current awareness, and teaching for engineers. Engineers read a combination of print and electronic articles and the average number of articles read is increasing.

The continuing value of article readings is demonstrated by the time that engineers spend on reading and their observations that the articles contribute to their work. Engineers use many sources of readings, with library electronic collections gaining in use. Readings from library journal collections are considered of higher value, are more likely to be electronic, are often older articles, and are more likely to be for research.

Engineers will continue to read from article sources that are convenient and that bring value to their work. Along with technical reports, standards, specifications, and books, journal articles have a role to play in engineers' need for information.

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NEW COOPERATIVE RESEARCH PROGRAMS REPORT

Improving Pedestrian Safety at Unsignalized Crossings

KAY FITZPATRICK

The author is Research Engineer, Texas Transportation Institute, Texas A&M University System, College Station.

The effectiveness of the many varieties of pedestrian treatments at unsignalized crossings was the subject of a recent research project jointly sponsored by the Transit Cooperative Research Program (TCRP) and the National Cooperative Highway Research Program (NCHRP) and conducted by the Texas Transportation Institute of the Texas A&M University System. The objectives were to

PHOTOS COURTESY OF K. FITZPATRICK

- Recommend engineering treatments to improve safety for pedestrians crossing at unsignalized locations—particularly intersections served by public transportation—and
- Examine the pedestrian signal warrant in the *Manual on Uniform Traffic Control Devices* (MUTCD) (*1*).

Unsignalized pedestrian crossing treatments in Boulder, Colorado (*above*); Redmond, Washington (*right*); and Salt Lake City, Utah (*above, right*).

After reviewing previous studies, examining all traffic control signal warrants, and conducting workshops to gather engineering judgments on proposed revisions, the research team recommended changes to the pedestrian signal warrant. The Signal Technical Committee of the National Committee on Uniform Traffic Control Devices (NCUTCD) reviewed the recommended revisions to the warrant, and the full NCUTCD endorsed the proposed changes in June 2006.

Quantitative Procedures

To provide more than a menu of possible treatments, the research team developed quantitative guidelines to help engineers and transit agencies determine the recommended treatments that would be appropriate for different street environments and traffic conditions. The Guidelines for Pedestrian Crossing Treatments—included in the research report, *Improving Pedestrian Safety at Unsignalized Crossings* (2)—are the results of the research evaluations. The appendices to the report include details about the field studies and other research efforts (3).

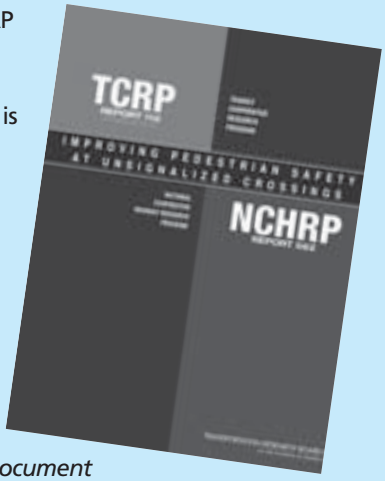
The quantitative procedures in the guidelines use key input variables—such as pedestrian volume, street crossing width, and traffic volume—to identify one of four possible crossing treatment categories:

- Marked crosswalk;
- Enhanced, high-visibility, or "active when present" traffic control device;
- Red signal or beacon device; and
- Conventional traffic control signal.

The guidelines include supporting information for each of the treatment categories, as well as examples of treatments. Worksheets are included with the guidelines to facilitate calculations.

The Transportation Achievement Award for Pedestrians cites the TCRP–NCHRP project for producing "a valuable tool to aid transportation professionals in selecting pedestrian treatments" and "a logical process" for making the selection.

TCRP Report 112–NCHRP Report 562, *Improving Pedestrian Safety at Unsignalized Crossings*, is available from the TRB Bookstore at http://www.trb.org/bookstore/ or can be downloaded at: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf. The appendices, *TCRP Web-Only Document 31/ NCHRP Web-Only Document 91*, can be downloaded at http://www4.trb.org/trb/onlinepubs.nsf/ web/tcrp_web_documents.



Supporting Information

In accomplishing the two main objectives of the study, the research team also developed useful supporting information on pedestrian walking speeds and on the yielding behavior of motorists. The NCUTCD has endorsed the recommended walking speeds for use in signal timing. The results from the study of motorist yielding showed that the crossing treatment, the number of lanes crossed, and the posted speed limit influence motorist compliance.

As a collaboration between TCRP and NCHRP, the project emphasized both roadway and transit considerations. The Institute of Transportation Engineers honored the project with the 2006 Transportation Achievement Award for Pedestrians. The award recognizes significant and outstanding transportation achievements that improve safety in transportation.

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RESEARCH PAYS OFF

Smart Parking Management to Boost Transit, Ease Congestion

Oakland, California, Field Test Shows Promise

SUSAN A. SHAHEEN AND CAROLINE RODIER

Shaheen is the Honda Distinguished Scholar in Transportation, Institute of Transportation Studies, University of California–Davis, and Program Leader, Partners for Advanced Transit and Highways (PATH), University of California–Berkeley, Richmond, California. Rodier is Project Manager, PATH.

Traffic congestion in the San Francisco Bay Area is notorious, and the projected addition of 1 million new residents by 2020 will intensify the conditions. Increasing ridership on regional mass transit can reduce commuting time, but the rising costs of land prohibit efforts to increase parking at transit facilities.

Problem

Peak-hour parking at most of the 31 suburban Bay Area Rapid Transit (BART) District stations has been at or near capacity. Heavy traffic congestion and high parking costs in the central city create the economic context for BART use. In suburban areas, where transit access is limited to a .25-mile walking radius and where feeder services are limited, most people drive to regional transit facilities. Roundtrip BART fares range from $6 to $8, and the cost of monthly parking passes ranges from $64 to $84.

Solution

Many European and Japanese cities have implemented smart parking management systems to use the parking capacity at transit stations more efficiently. The systems typically provide real-time information to motorists via changeable message signs (CMSs) that post the number of available parking spaces in park-and-ride lots, the departure time of the next train, and the downstream roadway traffic conditions, as well as guidance to open spaces in park-and-ride lots. Quick, convenient automobile access to park-and-ride lots is essential for transit to be competitive with the automobile, particularly in suburban areas.

The California Department of Transportation and BART requested California Partners for Advanced Transit and Highways (PATH) researchers to evaluate the feasibility of the smart parking concept for transit. Researchers implemented a field test at the Rockridge BART station in Oakland from December 8, 2004, to April 7, 2006. Other project partners included the California Center for Innovative Transit at the University of California–Berkeley, ParkingCarma Inc.'s ParkingCarma™ technology, Quixote Corporation, Intel, and Microsoft.

Attracting Users

Before the field test, exploratory surveys of BART commuters indicated that the lack of parking and the concern that space may not be available at the station limited BART use. The field test involved two real-time user interfaces:

- Two CMSs on Highway 24, which displayed parking availability information to motorists on an adjacent commuting corridor into downtown Oakland and San Francisco; and
- A centralized intelligent reservation system, which permitted commuters to check parking availability and to reserve a space via telephone, mobile phone, Internet, or PDA.

BART provided 50 of the 920 total parking spaces for the smart parking field test. Initially, 15 of the spaces were available for advance reservations, and the remaining spaces were available for same-day reservations by commuters who saw the CMSs on Highway 24 and decided to take BART.

The smart parking system integrated traffic count data from entrance and exit sensors at the BART station parking lot with an intelligent reservation system to provide accurate, up-to-the-minute counts of parking availability. Smart parking facilitated pretrip planning by permitting users to reserve a space up to two weeks in advance, but it also enabled en route decision making, providing real-time parking availability infor-

Sensors in the pavement at the parking lot entrance and exit provided a count of space availability.

mation to encourage motorists to use transit. A motorist who was confronted with congestion on Highway 24 could check parking availability on the CMS, exit from the freeway, and park in the smart parking area at the Rockridge BART station.

The project increased the number of parking spaces available to commuters during the peak period of 7:45 a.m. to 8:45 a.m. by converting parking that had been reserved for use after 10 a.m. (The smart parking service operated from 7:30 a.m. to 10:00 a.m., Monday through Friday.) Donations covered most of the capital costs and the operation and maintenance costs; such a project, however, typically would include initial capital costs of $150 to $250 per space and continuing operations and maintenance costs of $40 to $60 per space per year.

To maximize the number of participants in the project, one user was allowed only three parking reservations during a two-week period. Users who made en route reservations were charged $1.00 for the service, and those who made pretrip reservations were charged $4.50.

User Evaluations

Since the launch on December 8, 2004, the project accommodated more than 13,000 successful parking events. More than 400 participants completed an initial research survey, and 177 completed the final survey in February and March 2006, more than one year later. Participants were required to complete the survey after joining the project, and all participants were asked to complete the final survey. More than 30 percent of survey respondents indicated that smart parking encouraged them to use BART instead of driving alone to their place of work, and 55.9 percent stated the same for commuting to an off-site work location—for example, to attend meetings.

The before-and-after evaluation of the smart parking field test showed the following:

- The program attracted a new user population to BART—49 percent of respondents would not have used BART to commute if smart parking were not available. Many were encouraged to use BART more often because they could drive to the station.
- The program resulted in sizable increases in BART's modal share. On average, smart parking users increased their BART ridership by 5.5 trips per month for on-site work commutes and by 4 trips per month for off-site commutes.
- The program reduced total vehicle miles traveled by 9.7 fewer miles per participant per month on average.
- The program decreased average commuting time by 2.6 minutes.

Changeable message signs along Highway 24 encouraged commuters stuck in traffic to exit for smart parking service and complete their trips by transit.

Benefits

The smart parking project showed that more efficient management of a transit station parking lot can improve access to transit and therefore increase ridership. By dynamically managing BART parking, the project helped to manage parking capacity effectively without a new capital expenditure for construction. By enabling en route decision making through real-time parking information on a highway, the system encouraged a new group of commuters to take transit instead of driving the remainder of a trip, particularly when traffic congestion was significant.

The smart parking system that was tested is the first of its kind in the United States, and it enabled both pretrip and en route planning and billing. BART management was initially cautious about the field test but now has incorporated smart parking into the agency's strategy and plans to introduce the technology to other stations in the system.

For more information, contact Susan A. Shaheen, Policy and Behavioral Research Program Leader, Partners for Advanced Transit and Highways, University of California–Berkeley, 1357 South 46th Street, Building 452, Richmond, CA 94804-4648, telephone 510-665-3483, e-mail sashaheen@path.berkeley.edu.

EDITOR'S NOTE: Appreciation is expressed to Peter Shaw and G. P. Jayaprakash, Transportation Research Board, for their efforts in developing this article.

Suggestions for "Research Pays Off" topics are welcome. Contact G. P. Jayaprakash, Transportation Research Board, Keck 488, 500 Fifth Street, NW, Washington, DC 20001 (telephone 202-334-2952, e-mail gjayaprakash@nas.edu).

Arnim H. Meyburg

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Arnim Meyburg is a career academic, keen on making contributions to transportation progress. A professor of transportation engineering and planning in Cornell University's Department of Environmental Engineering, he has researched topics that include the development and use of models for planning passenger and freight movements; improvements in methods for surveying travel behavior, which contributed to the development of travel behavior models; and the economics of transportation regulations, infrastructure, and systems management.

Meyburg also has served as director and chairman of the Cornell School of Civil and Environmental Engineering; as a visiting professor and research fellow at the Technical University, Munich, Germany; as a visiting professor at the Polytechnic Institute, University of Sao Paulo, Brazil; and as a guest professor at the Technical University, Braunschweig, Germany.

"The university environment is conducive to asking questions and finding solutions to problems."

"The university environment is conducive to asking questions and finding solutions to problems," Meyburg explains. "This environment is both created and reinforced by the interactions of many generations of bright and inquisitive students questioning and exploring their world. Without such environments, progress in transportation research would not be possible."

In the mid-1970s, Meyburg participated in a project that remains a highlight of his transportation career, joining a multidisciplinary research team for a National Science Foundation–sponsored project, Communications for a Mobile Society—An Assessment of New Technology. Composed of researchers from the fields of civil engineering, economics, operations research, physics, law, city and regional planning, and sociology and psychology, the project team investigated and foresaw the social, behavioral, economic, and technological consequences of then-evolving communications technologies that would shape the future of society in the United States.

"I was part of a team of young and enthusiastic faculty," Meyburg recalls. "The intellectual exchanges that occurred between our multidisciplinary staff created an environment that was invigorating and challenging. The project was one of the first efforts in the United States that studied the future role of revolutionary communications devices, and, in retrospect, it is satisfying to realize that many of the project team's prognostications became a reality in the 30 years that followed."

A second personal and professional highlight for Meyburg occurred in 1995, when he set out to foster a cooperative working relationship between the New York State Department of Transportation (NYSDOT) and the transportation research community in New York State. The result was the creation of the Transportation Infrastructure Research Consortium (TIRC). As director of TIRC, Meyburg continues to ensure that the organization works to achieve the goals outlined in its mission statement: carrying out basic and applied research, technology transfer, and short-term consultations in the fields of engineering, operations, public transportation, management and finance, public policy, and human resources.

Since its establishment, TIRC has expanded and now includes 11 university members, as well as the U.S. Department of Energy's Brookhaven National Laboratory. Meyburg observes that the organization has "changed the character of transportation research cooperation between government and academia in the state of New York."

A member of many professional societies—including the American Society of Civil Engineers (ASCE), the International Association for Travel Behavior, the Alexander von Humboldt Association of America, the International Working Group on Information Technology and Transportation Interactions, and the Transportation Research Forum—Meyburg has served on TRB committees since 1978. He chaired the Urban Freight Transportation Committee and the National Research Council–appointed Committees on Freight Transportation Data: A Framework for Development; and the Future of the Federal Highway Administration's Freight Analysis Framework. He is a member of the Committee on Freight Demand Modeling: A Conference on Tools for Public-Sector Decision Making, and he is a regular TRB Annual Meeting participant.

Meyburg's teaching and work are highly regarded by his peers. He received the Cornell Professor-of-the-Year Award in 1984, 1994, and 1997; the U.S. Senior Scientist Award from the Alexander von Humboldt Foundation in 1984; a distinguished professor fellowship from the International Intermodal Exposition in 1994; and lifetime membership in ASCE in 2004.

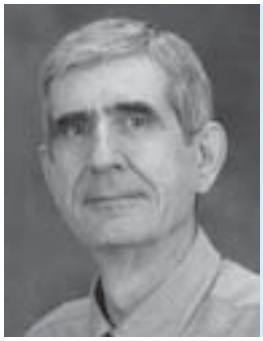
A native of Germany, Meyburg attended the University of Hamburg from 1960 to 1962, and earned a bachelor's degree equivalent from the Free University of (West) Berlin in 1965. He earned a master's degree in quantitative geography and a doctorate in civil engineering from Northwestern University in 1969 and 1971, respectively.

Celik Ozyildirim

Virginia Transportation Research Council

A principal research scientist for the Virginia Transportation Research Council (VTRC), the research arm of the Virginia Department of Transportation (VDOT) in partnership with the University of Virginia, Celik Ozyildirim is passionate about concrete. This passion drives Ozyildirim's research, teaching, and his work to improve the concretes used in public-sector transportation projects.

"Concrete is the most widely used construction material. It has served civilization well for many centuries—historic Roman concrete structures are still functioning today," Ozyildirim points out. "Today's environment, however, is harsh on concrete, and reinforcement is now widely used. Because of a lack of knowledge about concrete and frequent carelessness in its implementation, many modern concrete structures last only a few years, resulting in costly repairs and unhappy travelers. To ensure that concrete is used properly, a good understanding of the environmental effects on concrete and of the properties of concrete is necessary."



"The right concrete is crucial for ensuring a project's longevity in a particular environment."

A native of Turkey, Ozyildirim graduated from Robert College (now Bosphorus University), Istanbul, with bachelor's and master's degrees in civil engineering in 1967 and 1969, respectively. In 1968 Ozyildirim joined Tek-Ser Design Bureau, Turkey, working as an engineer specializing in route location and bridge analysis and design. In 1969, he left Tek-Ser to enroll in a doctoral program in civil engineering at the University of Virginia (UVA).

While studying at UVA, Ozyildirim participated in VTRC's graduate student program and met his mentor, Howard Newlon, head of the concrete section and former director of VTRC. Ozyildirim has followed in the footsteps of Newlon—training and educating others about concrete through presentations at meetings and workshops, published works, and as an adjunct professor of civil engineering at UVA.

After earning his doctorate in 1974, Ozyildirim returned to VTRC as a research scientist, studying the properties and performance characteristics of concrete in pavements and bridges, as well as bridge rating and analysis. His research has encompassed many areas of concrete technology, including ingredients, properties, testing, and specifications. Ozyildirim has worked to develop concretes and to establish construction practices to produce longer-lasting concrete products.

"The right concrete is crucial for ensuring a project's longevity in a particular environment," Ozyildirim explains. "There is currently a great emphasis on rapid construction and a 'get in, get out, and stay out' mentality. Staying out depends on durable structures constructed with a thorough understanding of the basics and a willingness to implement these principles."

In 2002, Ozyildirim and a colleague, the late Bryant Mather, completed an update of the *SP-1 Concrete Primer*, an American Concrete Institute (ACI) publication on the fundamentals of concrete technology. Ozyildirim also compiled many of Mather's published works into a special ACI publication with Shuaib Ahmad, and he worked with Nicholas Carino to update a chapter on concrete strength testing in the American Society for Testing and Materials (ASTM) publication, *Significance of Tests and Properties of Concrete-Making Materials*.

Ozyildirim is active in many professional societies, including ACI, ASTM, and the Transportation Research Board (TRB). He has chaired the TRB Concrete Materials and Placement Techniques Committee, as well as the Concrete Materials Section. He is an emeritus member of the Basic Research and Emerging Technologies Related to Concrete Committee, a member of the Task Force on Nanotechnology-Based Concrete Materials, and a member of the Design and Construction Group. For the National Cooperative Highway Research Program, he has contributed to panels on Silica Fume Concrete for Bridge Decks, Supplementary Cementitious Materials to Enhance Durability of Concrete Bridge Decks, and Guidelines for Reducing Premature Deterioration of Hydraulic Cement Concrete Pavements.

As evidenced by his relationships with transportation researchers and practitioners from industry, academia, and federal and state transportation agencies, Ozyildirim networks and collaborates closely with peers. He maintains that "peer interactions lead to exposure to new ideas and to a better understanding of material, which leads to implementation with good results."

For his work in the field of concrete Ozyildirim was awarded the VDOT Commissioner's Award for Excellence for personal achievement in 1998, and he was named an ACI fellow in 1993. He is a registered professional engineer in the Commonwealth of Virginia.

New NAE President Charles M. Vest received a National Medal of Technology for "outstanding contributions to the nation's economic, environmental, and social well-being," on July 27.

NAE Elects Vest; Reelects Bugliarello

Charles M. Vest, president emeritus of the Massachusetts Institute of Technology (MIT), has succeeded William A. Wulf as president of the National Academy of Engineering (NAE). Vest's six-year term as the new NAE President and Vice Chairman of the National Research Council (NRC) began July 1. A mechanical engineer, Vest served as president of MIT from 1990 to 2004, where he worked to make education and research programs more international in scope, to develop stronger relations with industry, and to foster racial and cultural diversity at the university. He was elected to NAE in 1993. Vest has participated in a number of National Academies studies, including the study that resulted in the 2007 report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, which focused on the key role of science and engineering in U.S. innovation and international competitiveness.

Vest chaired the U.S. President's Advisory Committee on the Redesign of the Space Station from 2002 to 2003. He has served on the bipartisan Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, and has been a member of the U.S. President's Committee of Advisors on Science and Technology, the Massachusetts Governor's Council on Economic Growth and Technology, and the NRC Board on Engineering Education.

Bugliarello

George Bugliarello, President Emeritus of Polytechnic University, New York, was reelected to serve as NAE foreign secretary. Bugliarello was President of Polytechnic University from 1973 to 1994 and has a background in biomedical engineering, fluid mechanics, sociotechnology, and science policy. From 1994 to 1997 he chaired the NRC's Board on Infrastructure and the Constructed Environment. Long active in the National Academies' international programs, he has a sustained interest in science and technology literacy, megacities, and technology in developing countries. As NAE foreign secretary, he serves as an *ex officio* member of the TRB Executive Committee.

COOPERATIVE RESEARCH PROGRAMS NEWS

Guidelines for Disparity–Availability Studies

The U.S. Department of Transportation (DOT) requires that states receiving U.S. DOT grants implement a Disadvantaged Business Enterprise (DBE) program that includes an annual goal-setting methodology. State DOTs must set DBE goals based on demonstrable evidence of the availability of DBE firms, and according to the regulations, can use a disparity study to demonstrate availability.

A recent 9th Circuit Court of Appeals ruling has made the use of a valid disparity–availability study a legal requirement for meeting the standards of the court. Recent court rulings demonstrate a trend requiring disparity studies to justify race-conscious elements of state DBE programs in response to constitutional challenges. State DOTs—especially western states located in the 9th Circuit—will be required to conduct disparity–availability studies at considerable departmental expense.

Presently, states do not have guidelines or standards for U.S. DOT disparity–availability studies. The lack of standards and the unique needs of each state demonstrate the need for a guide on the development and conduct of disparity–availability studies.

National Economic Research Associates, Inc., has been awarded a $280,000, one-year contract [National Cooperative Highway Research Program (NCHRP) 20-76, FY 2006] to provide guidelines to aid state DOTs in determining the need for disparity–availability studies; to develop a model scope of work to be included in requests for proposals of studies; and to develop a model for study design.

For further information, contact Chris Hedges, TRB, 202-334-1472, chedges@nas.edu.

TRANSIT IDEAS—Among the participants at the Transit IDEA panel meeting, July 17, in the National Academies' Keck Center, Washington, D.C., were (*clockwise from foreground*) Mike Flanigon, Henry Nejako, and Ron Hynes, Federal Transit Administration; presenter Peter Bartek, Victoria Consultants (*standing*); panel chair Fred Gilliam, Capital Metropolitan Transportation Authority, Austin, Texas; Harvey Berlin, TRB Senior Program Officer; and Paul Messina, New York City Transit.

The panel met to discuss an active Transit IDEA project to develop and test a system to warn rail rapid transit workers that a train is approaching. In addition to this and other presentations, the panel discussed the evaluation and selection of proposals for new project contracts.

Funded by the Federal Transit Administration as part of the Transit Cooperative Research Program, the Transit IDEA Program supports innovative approaches to improve the efficiency, safety, security, and ridership of transit systems through applied research and prototype testing. For further information, visit the IDEA web site at www.TRB.org/idea.

Bicycle Facilities Guide Revision

The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* is used by public agencies and consultants in the design of bikeways, highways, and streets. With an increase in the number of bikeway projects after the passage of the 1991 Intermodal Surface Transportation Efficiency Act, the AASHTO guide gained popularity.

Despite the utility of the guide, a 2004 NCHRP-sponsored study recommended adding new material—including chapters on planning, bicycle operation and safety, maintenance, bicycle parking, and bicycle linkage to transit, as well as revising chapters on shared roadways, bicycle lanes, and paths.

Toole Design Group has been awarded a $250,000, two-year contract (NCHRP 15-37, FY2006) to recommend revisions to the 1999 AASHTO *Guide for the Development of Bicycle Facilities*. Contractors, in consultation with stakeholders, will develop and implement a program to collect, compile, analyze, and synthesize information that will be used to develop new content for the guide.

For more information, contact Chris Hedges, TRB, 202-334-1472, chedges@nas.edu.

NEWS BRIEFS

PHOTO: PORT OF HOUSTON AUTHORITY

Ship traffic in the Port of Houston.

Port Management System Adds Economic Benefits

The Galveston Bay area receives an annual economic benefit of approximately $14.1 to $15.6 million in savings and income from the operation of the Physical Oceanographic Real-Time System (PORTS), a navigational decision support system, according to a recent NOAA report. The report details the economic benefits of the system, which operates in 13 major U.S. seaports and is scheduled to be integrated into four additional ports along the Gulf of Mexico.

Providing support for the safe and efficient movement of maritime commerce, the PORTS system creates economic benefits by reducing transit delays and the risk of ship groundings, improving ecological and environmental planning, expanding recreational opportunities, and increasing draft allowance.

In Houston–Galveston, PORTS data are used to enhance area weather and coastal marine forecasts, aiding in the prevention of storm and flood damage. The estimated annual benefit from improved weather forecasting is approximately $1.5 to $3 million. Water temperature and tidal data provided by the system also aid recreational boaters and fishermen.

The PORTS systems of New York–New Jersey are scheduled for NOAA evaluation in 2007. Other ports using the system include San Francisco Bay, California; Chesapeake Bay, serving Delaware, Maryland, and Virginia; Narragansett Bay, Rhode Island; Soo Locks, Michigan; Los Angeles–Long Beach, California; Delaware River and Bay; Tacoma, Washington; Port of Anchorage, Alaska; New Haven, Connecticut; and the lower Columbia River, bordering Oregon and Washington.

For more information, visit www.tidesandcurrents.noaa.gov.

Hydrogen-Powered Bus Now Boarding

The University of Delaware (UD) unveiled a hybrid hydrogen fuel cell–powered bus at an April ceremony, and service will soon begin on a regular passenger route around the university's Newark campus. The project was funded with a $1.7-million grant from the U.S. Department of Transportation's Federal Transit Administration and matching funds from private financing companies that partnered with UD.

Like all hydrogen fuel cell vehicles, the bus produces no harmful emissions. The fuel cell was created and tested for performance, longevity, and efficiency by researchers at UD's Fuel Cell Research Laboratory. The bus has an estimated range of 200 miles, and the project team built a safe and efficient hydrogen fueling station to serve the bus and future hydrogen-powered vehicles. UD researchers are confident that issues with the cost and availability of hydrogen fuel cells will be overcome, allowing for mass production. The UD team plans to build a second, larger bus.

Other, similar projects are in development in the United States, including a fuel–cell bus demonstration project at Georgetown University, Washington, D.C. Internationally, 5 buses will be tested in Rio de Janeiro, Brazil, in 2007, and 30 hydrogen fuel cell–powered buses are operating in European cities.

For more information, visit www.me.udel.edu/research_groups/prasad/index.html.

Exhibit Commemorates Survey of the Coast

A Smithsonian Institution traveling exhibit, "From Sea to Shining Sea: 200 Years of Charting America's Coasts," opened in June 2007. Created by the museum's Traveling Exhibit Service and the National Oceanic and Atmospheric Administration (NOAA), the exhibit celebrates the 200th anniversary of the establishment of the U.S. Coast and Geodetic Survey or Survey of the Coast.

In showings at approximately 200 venues nationwide, including maritime museums, ports, nature centers, schools, libraries, and lighthouses, NOAA's 200-year history is presented with 20 posters illustrated with photos, charts, and artwork and is complemented by a variety of educational materials and activities suitable for teachers, students, and parents.

An agency of the U.S. Commerce Department, NOAA works to improve economic security and national safety through weather and climate research and prediction, information service delivery for transportation, and stewardship of U.S. coastal and marine resources.

For more information, visit www.celebrating200years.noaa.gov/.

PHOTO: 111TH AERIAL PHOTOGRAPHY SQUADRON

A shipload of cranes passes under San Francisco's Golden Gate Bridge with the aid of real-time readings from a nearby tide gauge.

CALENDAR

TRB Meetings 2007

September

9–12 3rd National and 1st International Conference on Performance Measurement
Irvine, California

16–19 Smart Rivers 2007*
Louisville, Kentucky

19–21 1st International Conference on Recent Advances in Concrete Technology*
Washington, D.C.

20–21 Workshop on Advanced Research Needs for Geographic Information Technology for Transportation *(by invitation)*
Washington, D.C.
Thomas Palmerlee

25–27 8th International Symposium on Cold Region Development: ISCORD 2007*
Tampere, Finland

28 Technical Session on Draped Rockfall Protection Systems
Los Angeles, California
G. P. Jayaprakash

October

11 Seismic Accelerated Bridge Construction Workshop*
San Diego, California
Stephen Maher

15 Symposium on Differential Weathering of Rock Slopes
Pocono Manor, Pennsylvania
G. P. Jayaprakash

17–18 TRB–FAA Aircraft Fleet and Pilot Statistics Forecast Workshop
(by invitation)
Washington, D.C.

17–19 European Transport Conference*
Leiden, Netherlands

22–23 Research Issues in Freight Transportation: Congestion and System Performance
Washington, D.C.
Thomas Palmerlee

November

6–8 New Directions in Transportation Asset Management and Economic Analysis: 7th National Conference on Asset Management
New Orleans, Louisiana

6–8 Geographic Information Systems in Transit*
Tampa, Florida

7–9 Optimizing Paving Concrete Mixtures and Accelerated Concrete Pavement Construction and Rehabilitation*
Atlanta, Georgia

11 Bus Rapid Transit Forum*
Quebec, Canada
Peter Shaw

14–16 Road Safety on Four Continents*
Bangkok, Thailand

December

3–4 International Bridge Tunnel and Turnpike Association Transportation Finance Summit*
Washington, D.C.
Martine Micozzi

14 Workshop on Improving National Transportation Geospatial Information: Working Together for Better Decision Making
Washington, D.C.

2008

January

13–17 TRB 87th Annual Meeting
Washington, D.C.
Linda Karson

March

2–5 1st Pan American Geosynthetics Conference and Exhibition*
Cancun, Mexico

9–12 GeoCongress 2008: The Challenge of Stability in the Geoenvironment*
New Orleans, Louisiana
G. P. Jayaprakash

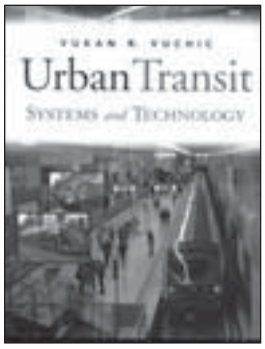
April

1–4 Innovative Instrumentation for Quality Control Assessments of Ground Improvement Projects*
Taipei, Taiwan
G. P. Jayaprakash

Additional information on TRB meetings, including calls for abstracts, meeting registration, and hotel reservations, is available at www.TRB.org/calendar. To reach the TRB staff contacts, telephone 202-334-2934, fax 202-334-2003, or e-mail lkarson@nas.edu. Meetings listed without a TRB staff contact have direct links from the TRB calendar web page.

*TRB is cosponsor of the meeting.

BOOK SHELF

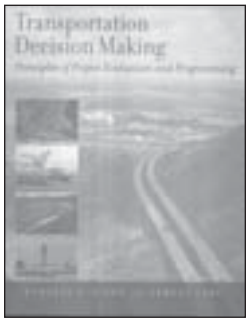


Urban Transit Systems and Technology
Vukan R. Vuchic. Wiley, 2007; 624 pp.; $125; 978-0-471-75823-5.
A revised and updated version of *Urban Public Transportation Systems and Technology*, this book presents fundamental classifications of transportation modes and descriptions of state-of-the-art transportation technologies. Chapter 1 presents information on the history of transportation and its impacts on society; Chapter 2 presents classifications and descriptions of transportation systems and modes; Chapter 3 covers the theory of traction, focusing on electric traction and the internal combustion engine; and Chapter 4 describes issues in transit system performance, including measures of capacity, efficiency, and utilization.

Chapters 5 to 9 examine transportation modes and include material on bus systems; rail systems; low-floor vehicles; unconventional modes, such as automated guidance systems; specialized modes; and paratransit modes and their use in industrialized and developing countries. Chapter 10 reviews material from earlier chapters and compares transportation modes by category.

Exercises enhance reader understanding and facilitate real-world application of the information presented. Author Vukan Vuchic is a longtime TRB committee member.

Transportation Decision Making: Principles of Project Evaluation and Programming
Wiley, 2007; 544 pp.; $125; 978-0-471-74732-1.



This guide presents a holistic approach to transportation decision making for transportation project development and programming. Chapters 1 to 4 introduce material on transportation systems evaluation, including steps in the decision-making process at a typical agency, performance measures for evaluation, travel demand estimation, and cost determination for transportation projects. Chapters 5 to 8 examine the tangible impacts of transportation, including travel time, safety, and vehicle operating cost, as well as priceable impacts and economic efficiency evaluations.

Chapters 9 to 17 cover the developmental and environmental impacts of transportation, addressing such issues as business attraction, air quality, noise, ecology, water resources, aesthetics, energy, and land use. Chapter 18 provides information on multicriteria evaluation in decision making; Chapter 19 describes ways agencies can manage information to enhance decision making; and Chapter 20 relates techniques for programming transportation investments to achieve systemwide goals.

The New Orleans Hurricane Protection System: What Went Wrong and Why
ASCE, 2007; 84 pp.; $69.95; 0-7844-0893-9.
After an in-depth review of the work of the United States Army Corps of Engineers Interagency Performance Evaluation Task Force (IPET), the members of the American Society of Civil Engineers (ASCE) Hurricane Katrina external review panel have produced a report that examines the failures of the Gulf Coast hurricane protection system.

Authors maintain that emergency management agencies must reevaluate their policies and practices to ensure that public safety, health, and welfare are top priorities during disaster response and recovery. The report's findings indicate the need to establish and fund a mechanism for a nationwide levee safety and rehabilitation program, similar to programs already in place for major U.S. dams; to determine risk levels for communities in New Orleans and other hurricane- and natural disaster–prone areas through the use of public risk communications programs; to upgrade safety structure engineering and design procedures; and to consult with independent experts when reviewing safety structures and hurricane and flood protection systems.

Standard Specifications for Transportation and Methods of Sampling and Testing, 27th Edition, and AASHTO Provisional Standards 2007
AASHTO, 2007; 4,316 pp.; AASHTO member, $1,000; nonmember, $1,200; 1-56051-344-6.
This set contains the 27th edition of the American Association of State Highway and Transportation Officials (AASHTO) *Materials Book* and the 2007 *AASHTO Provisional Standards*. The *Materials Book* contains 415 materials specifications—developed and maintained by transportation departments working with AASHTO's Subcommittee on Materials—as well as test methods used in the construction of highway facilities.

The *Materials Book* consists of two volumes, Materials and Testing, and each volume is organized into two books. *AASHTO Provisional Standards* includes 37 provisional standards on an accompanying CD-ROM.

The books in this section are not TRB publications. To order, contact the publisher listed.

TRB PUBLICATIONS

Statistical Methods and Crash Prediction Modeling
Transportation Research Record 1950
Selected papers include an analysis of two types of regression techniques used to identify and rank accident-prone locations on arterial roads in Vancouver, Richmond, and British Columbia, Canada; a draft prototype chapter from TRB's forthcoming *Highway Safety Manual* (HSM), covering an analytical approach to accident-rate prediction on rural, two-lane highways; an evaluation of the application of the HSM draft chapter to data from rural roads in Louisiana; recently developed macrolevel prediction models in two road safety planning applications, with data from the city of Vancouver and the province of British Columbia, Canada; and more.

2006; 91 pp.; TRB affiliates, $35.25; nonaffiliates, $47. Subscriber category: safety and human performance (IVB).

Airlines, Airports, and Airspace
Transportation Research Record 1951
Studies in this volume include modeling the preferences of airline travelers for various attributes of domestic airline service; the effects of airline passenger itinerary choice and elapsed trip time on airline operating costs; the emergence of a secondary market for a carrier's frequent flyer awards; observations and statistics on aviation infrastructure-related taxes and fees; an examination of how legacy airlines and low-cost carriers coped with the changing economic environment, 1990 to 2003; the impact of competitive e-marketplaces on airline efficiency; an analytical model demonstrating the capacity of dual-dependent parallel runways; and more.

2006; 136 pp.; TRB affiliates, $39; nonaffiliates, $52. Subscriber category: aviation (V).

Geomaterials
Transportation Research Record 1952
Papers address such topics as the characterization of demolition and haul-back sources of recycled concrete for use as pavement base material in Utah; methods for determining permanent deformation of flexible pavement unbound base and subbase layers; the influence of aggregate angularity and size on rutting performance of siliceous river gravels used in hot-mix asphalt mixtures; development of a large-scale laboratory assessment test for granular materials for road foundations; identification of stabilizers usable with high-sulfate soils in Texas; and more.

2006; 143 pp.; TRB affiliates, $39; nonaffiliates, $52. Subscriber category: soils, geology, and foundations (IIIA).

Safety Data, Analysis, and Evaluation
Transportation Research Record 1953
Papers in this volume explore real-time traffic factors associated with sideswipe crashes on highways; a new approach for analyzing traffic accidents at hazardous road locations; the relationships between motor vehicle accidents and land use, population, employment, and economic activity; an in-vehicle data recorder to monitor and analyze driver behavior; a procedure for ranking the safety of intersections according to red-light crash frequency; factors that affect the severity of head-on crashes; and the effects of daylight savings time on the number of motor vehicle crashes that result in injury.

2006; 210 pp.; TRB affiliates, $45; nonaffiliates, $60. Subscriber category: safety and human performance (IVB).

Developing Countries
Transportation Research Record 1954
Financing and conserving road networks in developing countries; the transportation impact on changing workplace–residence relationships in Beijing; strengthening the case for policy and strategy changes in road transport and traffic operations in China and India; effectively addressing emissions from motorized two-wheeled vehicles and other automotive sources in India; and a market analysis of the bicycle delivery service systems in Beijing represent some of the topics covered in this volume.

2006; 60 pp.; TRB affiliates, $32.25; nonaffiliates, $43. Subscriber category: safety and human performance (IVB).

Transit: Intermodal Transfer Facilities and Ferry Transportation; Commuter Rail; Light Rail and Major Activity Center Circulation Systems; Capacity and Quality of Service
Transportation Research Record 1955
This four-part volume encompasses intermodal transfer facilities and ferry transportation; commuter rail; light rail and major activity center circulation systems; and capacity and quality of service. Specific subjects include security system designs for ferry transportation; an emissions comparison of light rail transit, electric commuter rail, and diesel multiple-unit railcars; issues and challenges in moving driverless transit into the mainstream; and developing measures and models that account for the effects of mass transit service reliability on wait-related user cost.

2006; 95 pp.; TRB affiliates, $35.25; nonaffiliates, $47. Subscriber category: public transit (VI).

BOOK SHELF

TRB PUBLICATIONS *(continued)*

Management and Public Policy 2006
Transportation Research Record 1956
Studies in this volume include the 2006 Charley V. Wootan Award–winning paper on the use of indicators for performance measurements in 16 local and regional authorities in the United Kingdom; the implementation of a web-based electronic data management system; flat-rate pricing for vanpool operations in Atlanta, Georgia; incentives to use public transit in Rome, Italy; an examination of sidewalk gradients and the travel resistance imposed on wheelchairs; and a nonemergency medical transportation cost–benefit analysis.

2006; 192 pp.; TRB affiliates, $43.50; nonaffiliates, $58. Subscriber category: planning and administration (1A).

National, State, and Freight Data Issues and Asset Management
Transportation Research Record 1957
This volume includes a report on a graduate-level infrastructure asset management class that applies active learning and engagement-based practices. Also examined are university-level classes in transportation asset management and their common elements; the structure, functionality, and content of the European Transport Information System; the need for, and benefits of, culvert asset management; and data collection devices for measuring the performance of freight mobility projects with trucks.

2006; 83 pp.; TRB affiliates, $33.75; nonaffiliates, $45. Subscriber category: planning and administration (1A).

Managing and Maintaining Highway Structures and Pavements
Transportation Research Record 1958
This two-part volume contains the D. Grant Mickle Award–winning paper on understanding and predicting hot-poured, bituminous-based crack sealants' constitutive behavior at low temperature. Part 1: Structures contains research on the development and implementation of an online data management system created to manage state- and locally maintained structures; the effect of stay-in-place metal forms on corrosion of steel reinforcement in concrete bridge decks; and more. Part 2: Pavements presents findings on the impact of enhancing residential street pavement design standards to accommodate greater vehicular and truck loads; correlating chip seal performance data from *NCHRP Synthesis of Highway Practice 342* with construction practices; an examination of the cooling rates of three bituminous hot-poured crack sealants; and more.

2006; 99 pp.; TRB affiliates, $35.25; nonaffiliates, $47. Subscriber category: maintenance (IIIC).

Freeway Operations and High-Occupancy Vehicle Systems 2006
Transportation Research Record 1959
Authors present findings on topics in freeway operations and high-occupancy vehicle systems. Subjects include an examination of obstacles to transportation and emergency services; a method to analyze components of freeway congestion; an assessment of environmental data to predict real-time freeway incidents; the development of dynamic message sign alerts according to driver information needs; the effects of single-occupant hybrid vehicles in high-occupancy vehicle lanes; and a feasibility analysis of a high-occupancy toll lane network in Dallas–Fort Worth, Texas.

2006; 177 pp.; TRB affiliates, $43.50; nonaffiliates, $58. Subscriber category: highway operations, capacity, and traffic control (IVA).

Finance, Economics, and Economic Development 2006
Transportation Research Record 1960
Authors examine the use of high-occupancy toll lanes instead of high-occupancy vehicle lanes to manage increased traffic demand; value pricing as a means of managing congestion in the Dallas–Fort Worth, Texas, region; a model for integrating the planning of transportation and economic development to revive disadvantaged communities; behavioral responses of car owners in the Netherlands to policy-related road-pricing measures; project management approaches to converting high-occupancy vehicle lanes into high-occupancy toll lanes; and more.

2006; 166 pp.; TRB affiliates, $41.25; nonaffiliates, $55. Subscriber category: planning and administration (IA).

Geometric Design and the Effects on Traffic Operations 2006
Transportation Research Record 1961
This volume contains a 2006 Fred Burggraf Award–winning paper that investigates the desirable length of spiral curves for two-lane, rural roads. Other papers present research findings on daytime high-speed passing maneuvers on rural two-lane, two-way highways; the use of a hierarchical, fuzzy-inference system to analyze expert opinions on median safety; the speed and crash rates of various right-turn lane designs; the design of safe roadsides in urban environments; and more.

2006; 103 pp.; TRB affiliates, $35.25; nonaffiliates, $47. Subscriber category: highway operations, capacity, and traffic control (IVA).

To order the TRB titles described in Bookshelf, visit the TRB online Bookstore, at www.TRB.org/bookstore/, or contact the Business Office at 202-334-3213.

INFORMATION FOR CONTRIBUTORS TO

TR NEWS

TR News welcomes the submission of manuscripts for possible publication in the categories listed below. All manuscripts submitted are subject to review by the Editorial Board and other reviewers to determine suitability for *TR News*; authors will be advised of acceptance of articles with or without revision. All manuscripts accepted for publication are subject to editing for conciseness and appropriate language and style. Authors receive a copy of the edited manuscript for review. Original artwork is returned only on request.

FEATURES are timely articles of interest to transportation professionals, including administrators, planners, researchers, and practitioners in government, academia, and industry. Articles are encouraged on innovations and state-of-the-art practices pertaining to transportation research and development in all modes (highways and bridges, public transit, aviation, rail, and others, such as pipelines, bicycles, pedestrians, etc.) and in all subject areas (planning and administration, design, materials and construction, facility maintenance, traffic control, safety, geology, law, environmental concerns, energy, etc.). Manuscripts should be no longer than 3,000 to 4,000 words (12 to 16 double-spaced, typed pages). Authors also should provide appropriate and professionally drawn line drawings, charts, or tables, and glossy, black-and-white, high-quality photographs with corresponding captions. Prospective authors are encouraged to submit a summary or outline of a proposed article for preliminary review.

RESEARCH PAYS OFF highlights research projects, studies, demonstrations, and improved methods or processes that provide innovative, cost-effective solutions to important transportation-related problems in all modes, whether they pertain to improved transport of people and goods or provision of better facilities and equipment that permits such transport. Articles should describe cases in which the application of project findings has resulted in benefits to transportation agencies or to the public, or in which substantial benefits are expected. Articles (approximately 750 to 1,000 words) should delineate the problem, research, and benefits, and be accompanied by one or two illustrations that may improve a reader's understanding of the article.

NEWS BRIEFS are short (100- to 750-word) items of interest and usually are not attributed to an author. They may be either text or photographs or a combination of both. Line drawings, charts, or tables may be used where appropriate. Articles may be related to construction, administration, planning, design, operations, maintenance, research, legal matters, or applications of special interest. Articles involving brand names or names of manufacturers may be determined to be inappropriate; however, no endorsement by TRB is implied when such information appears. Foreign news articles should describe projects or methods that have universal instead of local application.

POINT OF VIEW is an occasional series of authored opinions on current transportation issues. Articles (1,000 to 2,000 words) may be submitted with appropriate, high-quality illustrations, and are subject to review and editing. Readers are also invited to submit comments on published points of view.

CALENDAR covers (*a*) TRB-sponsored conferences, workshops, and symposia, and (*b*) functions sponsored by other agencies of interest to readers. Notices of meetings should be submitted at least 4 to 6 months before the event.

BOOKSHELF announces publications in the transportation field. Abstracts (100 to 200 words) should include title, author, publisher, address at which publication may be obtained, number of pages, price, and ISBN. Publishers are invited to submit copies of new publications for announcement.

LETTERS provide readers with the opportunity to comment on the information and views expressed in published articles, TRB activities, or transportation matters in general. All letters must be signed and contain constructive comments. Letters may be edited for style and space considerations.

SUBMISSION REQUIREMENTS: Manuscripts submitted for possible publication in *TR News* and any correspondence on editorial matters should be sent to the Director, Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, telephone 202-334-2972, or e-mail jawan@nas.edu.

- All manuscripts should be supplied in 12-point type, double-spaced, in Microsoft Word 6.0 or WordPerfect 6.1 or higher versions, on a diskette or as an e-mail attachment.
- Submit original artwork if possible. Glossy, high-quality black-and-white photographs, color photographs, and slides are acceptable. Digital continuous-tone images must be submitted as TIFF or JPEG files and must be at least 3 in. by 5 in. with a resolution of 300 dpi or greater. A caption should be supplied for each graphic element.
- Use the units of measurement from the research described and provide conversions in parentheses, as appropriate. The International System of Units (SI), the updated version of the metric system, is preferred. In the text, the SI units should be followed, when appropriate, by the U.S. customary equivalent units in parentheses. In figures and tables, the base unit conversions should be provided in a footnote.

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