

# BATTELLE

Battelle is an international technology company that invests in the scientific and engineering base to support key areas of national security. These areas include chemical and biological defense, munitions and ordnance, intelligence, arms control and nonproliferation technology, defense systems engineering, and information systems engineering. Using its scientific and engineering expertise, Battelle supports intelligence community missions with a range of product and services, including:

- state-of-the-art analyses
- weapons systems/technology assessments
- trend studies and forecasts
- simulation modeling, conceptual design
- software development, analysis tools
- hardware development and exploitation

In the area of foreign scientific and technical information, Battelle has provided the intelligence community with support for more than 40 years. Battelle's multi-disciplinary staff of scientists, engineers, country experts, data management personnel, and open source information specialists apply expertise and technology in identification and acquisition; processing and storage; search, retrieval, and manipulation; and enabling technologies R&D.

In the area of finding sources, Battelle has worked to refine open source identification methodologies to identify and exploit new sources containing information relevant to intelligence. Open source material also includes foreign gray literature -- hard to identify/obtain items such as conference papers, preprints, and technical reports. Battelle has identified many collections of foreign gray literature, work that has been done for the Community Open Source Program Office (COSPO), Foreign BroadC.ast Information Service (FBIS), and the National Air Intelligence Center (NAIC).

As part of its open source database building and maintenance activities, Battelle processes all open source information for the CIRC (Central Information Reference and Control) system, a predominantly S&T database supporting Government analysts. Over the past 15 years, Battelle staff, fluent in 24 languages and knowledgeable in many scientific subjects, have selected, indexed, translated, and quality-assured an average of 250,000 documents a year for CIRC, from publications of 40 countries. Battelle also created a user-friendly, alternative graphical user interface for CIRC. This effort is intended to allow intelligence analysts and information specialists to spend less time learning the database command structure and more time analyzing documents.

Recognizing similarities in scope between CIRC and other Government S&T databases such as NASA's RECON (REmote CONsole) database, Battelle, National Air Intelligence Center (NAIC), and National Aeronautics and Space Administration (NASA) have investigated arrangements to perform database tasks more cooperatively, including jointly exploiting Library of Congress foreign technical reports. In another application, a specialized technical database is under development to provide value-added information to analyst. The data set will consist of critical foreign technical information that has been

partially analyzed. Battelle supported the project through the original system design phase, and by identifying, collecting, and processing data.

Battelle has helped design or implement software tools available on the NAIC node of the COSPO-sponsored Open Source Information System (OSIS). One such tool is the Data Base Recommendation System (DBRS) which recommends databases and other sources of information to use for particular research topics or regions of interest.

In the R&D arena, Battelle conducts research on methods to facilitate technological improvements and to allow open source material to be better exploited in the future. This research includes investigating applications of scanning, optical character recognition, machine indexing, and machine translation to improve input processing systems. Battelle's work with the CIRC input program provides an ideal laboratory from which to test the operational efficiency of these technologies. In the broader context of R&D, the Pacific Northwest National Laboratory (PNNL), run by Battelle for the Department of Energy, helped to revolutionize computer multimedia through its involvement in the development of CD-ROM technology. PNNL also is working closely with the National Ground Intelligence Center (NGIC) and CIA/ORD to implement visualization technologies in analyst tool chests. These technologies will help analysts more easily identify and extract patterns and processes from large volumes of open source material.

Battelle has pursued efforts to improve the post-processing of open source information by filtering database output before it reaches the analyst. As an example, when confronted with large volumes of database output, an analyst first separates records on a target person from other people who have the same name. Battelle has developed algorithms to address this "Same Name/Different Person" problem.

Battelle's major technology centers are located in the United States and Europe. Other facilities, offices, and representatives are strategically placed in more than 50 cities worldwide. Battelle has a variety of contract vehicles to accommodate a client's requirements and needs. At any time, there are several contracts in place that can be used for the establishment of special and ad hoc tasks.

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# THE CRITICAL TECHNOLOGIES INSTITUTE

The Critical Technologies Institute (CTI) was established in 1992 by an Act of Congress and is a Federally-Funded Research and Development Center (FFRD.C.) operated by RAND, a private, nonprofit research institute that also operates three FFRD.C.s engaged in national security research. The CTI provides analytical support to the White House Office of Science and Technology Policy by identifying near-term and long-term objectives for research and development; analyzing the production capability and economic viability of technologies; and providing options for achieving R&D objectives. The Institute also facilitates collaboration between industry, universities, and government agencies and sponsors technology workshops, seminars, research fellowships, and internships.

The Institutes work ranges from developing key information tools to investigating policy questions. Research centers on four topics:

## 1. Federal R&D Portfolio

The CTI is constructing a comprehensive, real-time accounting of federal R&D activities and spending. It identifies the various existing federal data sources, developed an organizational framework that allowed these data to be merged into a common, relational database, and then develops an easily searchable online database for federal R&D spending and activities. This database, called “Radius” (“for research and development in the United States”), allows users to track federal R&D activity from cabinet and agency level budgets down to the program and project levels.

The CTI has been studying the issue of metrics for investment in science that offers options for evaluating returns on investment in science based on prior empirical work and feedback from practitioners, stockholders, and the policy community. Program evaluation, aggregate estimates of the returns to R&D, and development of goals and milestones, are some of the issues being studied.

Another effort has involved CTI assisting the Committee on Environment and Natural Resources (CENR) of the National Science and Technology Council in formulating performance milestones for environmental and natural resources research in order to strengthen links between science and policy. The CTI has developed a template for constructing performance milestones that can be used to ensure that research strategies are meeting criteria for a well-balanced environmental R&D program.

## 2. Space Policy

The CTI provides research into the evolution and applications of the Global Positioning System (GPS) in order to assist OSTP and the National Science and Technology Council assess alternative national policy objectives, opportunities, and vulnerabilities in the exploitation of GPS as a national resource. The project has been undertaking three tasks:

- assessing GPS policy issues-related to national security, foreign policy, economic competition, and technology, and making recommendations on how diverse elements may be integrated for national benefits
- assessing alternative policies
- providing policy recommendations and supporting rationale

Another effort involves the analysis of aeronautics and space policy issues of interest to OSTP in conjunction with space-related programs, technologies, and national policies. The effort involves analysis of space-related matters coming before OSTP and the NSTC which include:

- the enhancement of the contribution of NASA programs to economic growth
- the development of less costly, more competitive space launch systems
- the convergence of U.S. civil and military polar-orbiting weather satellite systems
- commercial remote sensing
- the future of the Landsat program

### **3. Education and Training**

In support of the NSTC, CTI has been conducting a study to help create a national strategy for promoting the effective use of technology in education and training and outline the elements of a federal strategy for overcoming them. The study has identified four major barriers:

- difficulties financing acquisition of equipment
- few examples and limited evidence concerning effectiveness of computer technology in the classroom
- inadequate supply of and market for high-quality software
- limited computer skills of teachers and school administrators

### **4. Environment and Health**

#### Environment Technology

CTI has provided analytic support for a series of technical workshops and policy symposia designed to improve understanding of industry views on environmental technology issues. Activities have included

- developing a Geographic Information System (GIS), a database for managing very large set of geographical information
- soliciting and integrating industry views

#### Earthquake Hazard Reduction

The National Earthquake Loss Reduction Program has been addressing two fundamental goals:

- understanding the earthquake threat
- using that understanding to limit earthquake losses.

The CTI's role has been to provide analytic support for the formulation of a national strategy for addressing the two basic goals.

## **Seminars and Workshops Program**

The CTI support an active program of workshops and seminars to facilitate industry and academic input on specific technologies and to help foster collaboration among government, industry, and universities.

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# **INTERNATIONAL TECHNOLOGY RESEARCH INSTITUTE**

## **Japanese Technology Evaluation Center**

## **World Technology Evaluation Center**

## **Transportation Technology Evaluation Center**

### **International Technology Research Institute**

The International Technology Research Institute (ITRI) is at Loyola College in Baltimore, Maryland, and is the umbrella organization that houses three centers for assessment of foreign technology. The Japanese Technology Evaluation Center (JTEC) and the World Technology Evaluation Center (WTEC) are supported by the National Science Foundation under a cooperative agreement. Over the 12 year history of the program, 15 separate branches in six agencies of the Federal Government (including NSF) have supported JTEC and WTEC studies.

The Transportation Technology Evaluation Center (TTEC) has the mission of assessing foreign technology in vehicles, transportation, and construction methodology and highway systems and is supported by the Federal Highway Administration. The TTEC is reviewed in a separate section.

### **Mission**

The JTEC program was initiated in 1983 by the U.S. Department of Commerce and the National Science Foundation (NSF) which assumed leadership of the program in 1984. The purpose and goal of JTEC was to inform policy makers, strategic planners and managers from government and private industry about the status of selected high technologies in Japan in comparison to those in the U.S. The WTEC program was established subsequently to provide similar studies of countries other than Japan.

The JTEC/WTEC program has the twin missions of helping the United States better understand the international competition it faces in science and technology and helping to identify opportunities for international collaboration in pre-competitive research. It does this by establishing a world-class benchmark for each technology studied and comparing the different approaches being taken in research programs around the world. This international perspective can offer new insights on the direction of U.S. research programs.

Each JTEC or WTEC study provides a current view of the status of research, development and/or applications of a particular technology in one or more foreign countries. It also provides a snapshot of a particular technology and its relationship to a possible range of products and, in most cases, includes a review of mechanisms for R&D support in the subject country(ies).

### **Japanese Technology Evaluation Center**

In the first few years of the program, most of the studies focused on Japan, reflecting concern over Japan's growing economic prowess. Studies were largely defined by a few federal mission agencies that contributed most of the funding, such as the Department of Commerce, the Department of Defense, and the Department of Energy.

The early JTEC methodology involved assembling a team of U.S. experts (usually six people from universities, industry, and government), reviewing the extant literature, and writing a final report. Within a few years, the

program began to evolve. First, there were site visits, with panels traveling to Japan for a week, visiting 20-30 industrial and research sites. As interest in Japan increased, a larger number of agencies became involved as co-sponsors of studies. Over the 10 year history of the program, 15 separate branches in six agencies of the Federal Government (including NSF) have supported JTEC studies.

The JTEC studies have contributed significantly to U.S. benchmarking of Japan's technological enterprise. Some have estimated that JTEC has been responsible for over half of the major Japanese technology benchmarking studies conducted in the United States in the past decade. The reports have also been widely cited in various competitiveness studies. The JTEC studies have been valuable sources of information for both U.S. and foreign researchers, suggesting potential new research topics and approaches, as well as opportunities for international cooperation.

### **World Technology Evaluation Center**

In recent years there has been an increasing awareness among the sponsors of the JTEC program that the technological challenge facing the United States comes not only from Japan but also from Europe and, potentially, from many other parts of the world. This inspired the formation of the World Technology Evaluation Center. The WTEC completed its initial assessment, on European nuclear instrumentation and controls (I&C) technology, in late 1991. The detailed review of the world's major nuclear I&C technology suppliers was completed in 1993 with the publication of the WTEC Monograph on "Instrumentation, Control, and Safety Systems of Canadian Nuclear Facilities". The second international assessment, completed in 1993, examined satellite telecommunications technology in Europe, Japan, and Russia.

A WTEC panel completed a global assessment in the area of research submersibles and related undersea technologies in Russia, Ukraine, Finland, France, Germany, and the United Kingdom. WTEC has also completed an assessment of advanced display technologies with a panel that visited Russia, Ukraine, and Belarus in October of 1993, and has collaborated with the Civil Engineering Research Foundation in an assessment of civil engineering technologies in Western Europe. Current study topics include metal casting and rapid prototyping technologies (in W. Europe and Japan), and submarine technologies (E. Russia).

### **Methodology**

The objective of ITRI, through JTEC, WTEC, and TTEC studies, is to produce an up-to-date report on the outcomes of current R&D efforts in a specific field for a specific geographic area. The report is a rendering of the judgments of the leading U.S. experts as to the value -- scientific, technical, and industrial -- of the technologies they have observed abroad. A study answers the following questions:

- What is the world-class benchmark?
- What is the competitive environment?
- What are the opportunities for cooperative ventures?
- Are there different approaches being taken abroad?
- Is our research emphasis correct?

A panel for a study nominally has six members, but often seven or more, who travel to a host country for site visits and discussions with researchers to reach conclusions about the state of the observed technology. Panelists are chosen for their own special expertise in and knowledge of the technology under study, both domestically and abroad. Thus they are able to compare this R&D to that in the United States. The results are

initially presented in workshops attended by representatives from the public and private sectors who critique the preliminary findings. The panels' written reports are distributed by the National Technical Information Service (NTIS), where they have become best-sellers with leading U.S. and Japanese firms, universities, and the science counselors of the embassies in Washington.

Thousands have received gratis copies because of workshop attendance, hosting of panels, etc. The results are also presented in books and articles by the panelists. Studies are usually the subject of national press accounts; a sample of these publications is listed in the bibliography. Although ITRI is planning to try out a number of revisions to this methodology in the coming year, this approach has yielded successful results in over 30 studies conducted to date involving a dozen countries and over 200 panelists and other participants.

### **Scope of Coverage and Dissemination**

Beginning in 1990, as mentioned above, ITRI began to broaden the geographic focus of the studies, which has been accomplished through WTEC. As interest in the European Community (now the European Union) grew, Europe was added as an area of study. With the breakup of the former Soviet Union, visits to previously restricted research sites opening up there were organized. These most recent WTEC studies have focused on identifying opportunities for cooperation with researchers and institutes in Russia, Ukraine, and Belarus, rather than on assessing them from a competitive viewpoint.

Attendance at JTEC/WTEC workshops (in which panels present preliminary findings) has increased, especially industry participation. Representatives of U.S. industry now routinely number 50 percent or more of total attendance, with a broad cross section of government and academic representatives making up the remainder. The JTEC and WTEC studies have also started to generate increased interest beyond the science and technology community, with more workshop participation by policymakers and better exposure in the general press (e.g., *Wall Street Journal*, *New York Times*). Publications by JTEC and WTEC panel members based on the studies have increased, as has the number of presentations by panelists at professional society meetings.

### **Objectives**

The JTEC/WTEC continues to evolve in response to changing conditions. New initiatives are aimed at the following objectives:

- Expanded opportunities for the larger science and technology community to help define and organize studies. Under a program designated as CISAR (Community Initiated State of the Art Reviews), universities and industry (preferably working together) may originate concepts and become partners in JTEC and WTEC studies. As of early 1996, two university-industry groups are conducting studies under this arrangement.
- Increased industry sponsorship of JTEC and WTEC studies. For example, NSF recently funded a team organized by the Polymer Science & Engineering Department at the University of Massachusetts (Amherst) to visit Japan for two weeks studying biodegradable plastics and polymers R&D there. Twelve industrial firms put up over half the funds.

Through the Japanese Technology Evaluation Center (JTEC), World Technology Center (WTEC), and Transportation Technology Evaluation Center (TTEC) program, ITRI seeks to provide a better understanding of cutting edge research that is being conducted outside the U.S. and improve the awareness of international developments that can significantly enhance the scope and effectiveness of international collaboration.

## **List of JTEC/WTEC Studies and Panel Chair Person(s), 1992-95**

JTEC/WTEC has initiated over 40 foreign technology studies over the past 12 years. The following JTEC and WTEC studies were done from 1992 through March of 1995.

### **JTEC Panel Report on Machine Translation in Japan**

Jaime Carbonell, Carnegie Mellon University (Co-Chair)  
Elaine Rich, MCC (Co-Chair)

### **JTEC Panel Report on Database Use and Technology in Japan**

Gio Wiederhold, Stanford University (Chair)

### **JTEC Panel Report on Bioprocess Engineering in Japan**

Daniel Wang, MIT (Chair)

### **JTEC Panel Report on Display Technologies in Japan**

Lawrence E. Tannas, Jr., Tannas Electronics (Co-Chair)  
William E. Glenn, Florida Atlantic University (Co-Chair)

### **JTEC Panel Report on Material Handling in Japan**

Edward H. Frazelle, Georgia Institute of Technology (Co-Chair)  
Dick Ward, Material Handling Industry (Co-Chair)

### **JTEC Panel Report on Separation Technologies in Japan**

C. Judson King, University of California at Berkeley (Chair)

### **JTEC Panel Report on Knowledge-Based Systems in Japan**

Professor Edward Feigenbaum, Stanford University (Chair)

### **NASA/NSF Panel Report on Satellite Communications Systems and Technology**

Joseph N. Pelton, University of Colorado (Co-Chair)  
Burton I. Edelson, George Washington University (Co-Chair)

### **WTEC Study on Instrumentation, Control, and Safety Systems of Canadian Nuclear Facilities**

Robert E. Uhrig, Oak Ridge National Laboratory & the University of Tennessee  
Richard J. Carter, Oak Ridge National Laboratory

### **JTEC Panel Report on Advanced Manufacturing Technology for Polymer Composite Structures in Japan**

Dick J. Wilkins, University of Delaware (Chair)

### **WTEC Panel Report on Research Submersibles and Undersea Technologies in Finland, France, Russia, Ukraine, and the United Kingdom**

Richard J. Seymour, Texas A&M University (Chair)

### **Civil Engineering Research Foundation (CERF) Task Force on European**

**Constructed Civil Infrastructure Systems and R&D (WTEC Panelists Only)**

Richard L. Tucker, Construction Industry Institute (WTEC Chair)

**JTEC Panel Report on Micro-electro-mechanical Systems in Japan**

Kensall Wise, University of Michigan (Chair)

**JTEC Panel Report on Electronic Packaging in Japan**

Michael J. Kelly, Georgia Institute of Technology (Chair)

**WTEC Panel Report on Advanced Display Technologies in Belarus, Russia, and Ukraine**

William Doane, Kent State University (Chair)

**JTEC Panel Report on Optoelectronics in the United States and Japan**

Stephen Forrest, Princeton University (Chair)

**ITRI Monograph on Benchmark Technologies Abroad: Findings From 40 Assessments, 1984-94**

Dr. R. D. Shelton, Director ITRI

**JTEC Panel Report on Biodegradable Polymers and Plastics in Japan**

Robert W. Lenz, University of Massachusetts

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## **TRANSPORTATION TECHNOLOGY EVALUATION CENTER**

The Transportation Technology Evaluation Center (TTEC) of Loyola College in Baltimore, Maryland, was established in April 1993 under contract with the Federal Highway Administration (FHWA), U.S. Department of Transportation. As a division of Loyola's International Technology Research Institute (ITRI), TTEC

assesses foreign transportation technology for possible implementation in the United States. More specifically, TTEC obtains innovative technological information from abroad that could improve efficiency and effectiveness of the domestic highway program. Delegations of U.S. experts are sent to the developed countries in Europe and the Pacific Rim to research and gather information about technological innovations and research advancements for dissemination to the domestic highway community.

## **Background**

The FHWA developed the International Technology Scanning Program in response to Section 6003 of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. As indicated, "The Secretary is authorized to engage in activities to inform the domestic highway community of technological innovations abroad." As applied in this program, the term "scanning" refers to the approach of study generally known as benchmarking.

The success of ITRI's JTEC/WTEC benchmarking studies was recognized by FHWA research and development experts who solicited the assistance of Loyola College to facilitate their scanning program.

## **Scope and Method**

The TTEC has the following responsibilities of assembling the delegations of U.S. professionals, composed of representatives from Federal, State, and city planning levels, from academia, and from the private sector; identifying foreign transportation experts in governments, universities, and the private sector; establishing contact; coordinating meetings; and providing logistical arrangements.

Upon completion of the scanning sessions, a member of the delegation, designated as report facilitator, collaborates with TTEC to compile the information collected into a report of results. The TTEC also disseminates the results to the highway community through workshops and technical presentations. In addition, individual delegates disseminate findings to colleagues and professional societies.

## **Scanning Reviews Undertaken in 1993**

### **1. European Intermodal Programs: Planning, Policy, and Technology**

Four representatives visited Belgium, the Netherlands, and Germany to discuss and report on European experiences with intermodal freight transportation policies and systems. The objective was to observe and document information on European Union methods and experiences in the planning and administration, system development, environmental compliance, financing, marketing, and operation of increasingly complex and capital-intensive intermodal freight systems and facilities. Report published September 1994.

### **2. Pedestrian and Bicyclist Safety:**

Seven representatives visited England, the Netherlands, Germany and Switzerland to learn practices and policies for improving pedestrian and bicyclist safety and promoting use of these modes. Topics covered included roadway facilities, educational and promotional programs, traffic enforcement issues, and other relevant pedestrian and bicyclist research. Report published December 1994.

### 3. Contract Administration Techniques for Quality Enhancement Study Tour:

Fifteen representatives traveled to Germany, France, Austria, and Spain to evaluate European contract administration procedures. The primary objective was to link innovative contract administration practices with high quality levels of highways construction in Europe and, if such linkage could be verified, determine whether practices were potentially adaptable for use in the United States. Topic included bidding/award procedures, design issues, quality control, environmental impact, and acceptance of materials and products. Report published June 1994.

### 4. National Personal Travel Surveys:

Six representatives traveled to the United Kingdom, Denmark, the Netherlands, Sweden, France, and Germany. The purposes of the visits were to seek out innovative methodological approaches to transportation survey design and operations, review European experiences with different kinds of institutional arrangements, and investigate new ideas in survey content and data collection methods. Report published September, 1994.

### 5. Advanced Transportation Technology:

Seven representatives visited Denmark, Germany, France, and the Netherlands to survey European technology and to observe and document developments in evolving computer-based technologies such as artificial intelligence, expert systems, neural networks, computer enhanced inspection, modeling and test methodologies. In addition to assessing the state of ongoing research in evolving computer-based technologies, the delegation was to determine how European countries test innovations and put them into practice. Report published December, 1994.

## **Scanning Reviews Undertaken in 1994**

### 1. Highway Safety Management Systems:

Six representatives traveled to Japan to examine safety management offices and research centers for information about cutting-edge technology concepts. They visited Australia and New Zealand to examine broad-based safety management systems initiatives and implementations, conducting interviews with those responsible for maintenance at all levels.

### 2. Issues and Options in Highway/Commercial Vehicle Interaction -- Phase I, North America:

This study was designed in two parts: Phase I, benchmarking in North America; Phase II, Europe. The team of experts visited Canada, Mexico, and the United States, focusing on both current practices in truck components/pavement design and on new and emerging technologies that have potential for long-range application for extending pavement life and at the same time allow for increased productivity in terms of the amount of good transported. Specific vehicle, vehicle component, and pavement designs having a negative impact on highway infrastructure were also evaluated. The primary objective is to determine relationships between trucks and pavement damage to support decisions for a national policy on truck size and weight, axle-tire-suspension characteristics, cost allocation, and alternative pavement design and rehabilitation strategies.

## **Scanning Reviews Undertaken in 1995**

## 1. Issues and Options in Highway/Commercial Vehicle Interaction -- Phase II, Europe:

The delegation that visited North America in 1994 traveled to France, the United Kingdom, Germany, the Netherlands, and Sweden. See above description of objectives.

## 2. Speed Management and Enforcement Technology:

Twelve representatives visited the Netherlands, Germany, Sweden, and Australia to focus on the comprehensive development and implementation of speed management programs. Emphasis was placed on techniques to identify speed problems, efforts to establish speed limits, methods to inform the community of the dangers of speeding, techniques to involve the community, the judiciary, and the police in program development, and evaluation techniques and results. Application of automated enforcement technologies in comprehensive speed management programs were also reviewed.

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# MICROELECTRONICS AND COMPUTER TECHNOLOGY CORPORATION

## Global Technology Services

The mission of the Microelectronics and Computer Technology Corporation's (MCC) Global Technology Services (GTS) is to track high-technology research and development abroad and inform the MCC member companies of important trends and developments. The GTS staff, consisting of research analysts and information specialists, monitors the technical areas where MCC conducts consortial research projects: semiconductor packaging and interconnect for low-cost portable electronics, interface technology, network architectures, and system design and integration. The Global Technology Services group primarily monitors R&D activities in Asia and Western Europe.

Global Technology Services delivers information to MCC members in a variety of ways, including a detailed bi-monthly technical report on foreign technology called the "MCC Global Technology Monitor". Other vehicles include in-depth technical reports on leading-edge research activity, briefings at member sites, frequent translations of research reports and technical articles, member consultations with GTS analysts, and a major electronic database (175,000 records and full text reports) that covers R&D in Japan and Europe. An additional benefit to MCC members is participation in a GTS Strategic Technology Tour to Europe or Asia. These tours, of seven to ten days duration, focus on technology topics of immediate interest to member companies. In addition, GTS staff members regularly respond to queries from MCC members for in-depth information on particular projects, firms, or topics.

The information offerings of Global Technology Services are designed not only to keep MCC members abreast of developments abroad in microelectronics, computing, and software, but to support the strategic decisions that North American firms must take to position themselves in the fast-moving world of global R&D. We know that to succeed in the next decade, MCC members must understand their competitors in Europe and Asia as well as understand the domestic competition, monitor technology policy and research activity around the world and choose the foreign partners that best match their needs. The role of GTS is to help MCC members meet these challenges in a rapidly changing world.

### MCC Global Technology Services Member Benefits and Programs

- **Global Technology Monitor:** GTS' bi-monthly technical report, the Global Technology Monitor, covers the most advanced overseas technology trends for an audience of several thousand researchers, managers, and strategic planners in MCC member organizations. The Global Technology Monitor is also distributed electronically via e-mail to subscribers.
- **Detailed Technical Reports:** Periodically, GTS prepares in-depth technical reports on fields of current importance to MCC members. Past topics include computer architecture in Japan, low-voltage device technology, advanced R&D in battery technology, and copper-polyimide packaging technology.
- **Briefings:** The GTS research analysts use the knowledge they acquire in tracking the technical literature and through visits and contacts made during visits abroad to prepare presentations and briefings for delivery at MCC member companies' sites.

- **Strategic Technology Tours:** Using its international contacts, GTS coordinates seven- to ten-day tours in Europe and Asia consisting of visits to leading developers and users of a technology or set of related technologies. Joining GTS staff on these tours are small groups of researchers, research managers, and strategic planners from MCC member firms who have expertise in the technology domain in question. The goals of these tours are to evaluate the state-of-the-art in the organizations visited; to exchange views on technology trends with leading foreign research organizations; and to establish personal contacts abroad that may open possibilities for joint research projects or broader business relationships.
- **Consultation with GTS analysts:** The GTS staff includes specialists in both Asia and Europe and is available to MCC members for consultation on foreign research, projects and technology. GTS foreign contacts number more than 3000 researchers and government officials around the world.
- **MCC Database:** The GTS electronic database contains approximately 175,000 bibliographic, abstract, and full-text records of Asian and European technical literature, trade journals, newspapers and other publications. The database is used to support technology tracking activities and is available to the MCC membership via the Internet and a secure World Wide Web server. GTS also has access to a variety of commercial external databases, both international and domestic, as well subscriptions to major business and R&D newsfeeds.
- **Workshops and International Forums:** Several times a year, GTS conducts workshops on global technology and has recently begun a series of international forums conducted in conjunction with major international conferences and similar events.
- **Supplier Qualification and Partner Identification:** GTS receives requests from the MCC membership for assistance in assessing the capabilities of potential international suppliers, in identifying appropriate partner organizations abroad for joint projects and business activities, and in introducing potential licensees for technology.
- **Translations:** GTS translates a wide variety of foreign technical literature, with an emphasis on Japanese-to-English translation. GTS also offers translation services in Chinese, French, German, and Korean. These translations are available, wherever consistent with copyright restrictions, to the entire MCC community.

### Global Technology Services Customers

Global Technology Services benefits are available to all regular employees of MCC member organizations. GTS provides somewhat different sets of services to the various levels of MCC membership, with MCC shareholders enjoying the broadest set of services.

In its coverage of foreign technology, GTS provides technical information for the specialist, as well as strategic analysis for planners with more general responsibilities. Users of the MCC GTS in MCC member firms includes the following:

- Researchers who work in fields from semiconductor packaging, to optical communications, to computer-supported cooperative work environments, where groups in Asia and Europe are doing highly advanced work.
- Research managers who are responsible for maintaining an awareness of what the competition is doing worldwide in their technical areas.

- Strategic R&D planners who seek to design future R&D initiatives so their firms are positioned to compete effectively in the global economy.
  - Competitive analysts who must know as much about the activities of companies, laboratories, and government projects abroad as they do about domestic scene.
  - Senior managers who need timely, incisive coverage of general trends in technology abroad to help them set the right directions for their organization.
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# **SEMATECH**

## **Competitive Analysis Group**

The Competitive Analysis Group (CAG) of SEMATECH is within the Internal Technical Support Division, which reports to the Chief Operating Officer.

The CAG's mission is to understand the practices, strategies, developments, and trends of the world's leading edge producers (i.e., technical and manufacturing leaders) in order to provide competitive information and awareness to SEMATECH executive staff and technical programs/projects, as well as the member company community.

Currently, the group is made up of eight analysts, each of whom specializes in a specific area of semiconductor technology (process, equipment, design, modeling, packaging/assembly, etc.) or has a foreign language/regional industry expertise. Most analysts are two-year assignees from SEMATECH's member companies.

Projects include research and analysis activities for developing profiles of corporations and foreign countries; foreign semiconductor factory activity assessments; standard industry indicators and industry forecasts; assistance in developing the semiconductor industry's National Technology Roadmap; process modeling; foreign information translation/distribution activities; as well as foreign information gathering/assessment activities.

Sources include a broad network of individuals throughout the U.S. semiconductor industry as well as from overseas public literature sources, including domestic and foreign language publications and on-line services as well as industry-specific consultant reports/studies. In addition, members of the group, along with members from other SEMATECH or member company groups, routinely visit foreign industry/government organizations, leading edge producer facilities, and foreign equipment suppliers, as well as attend industry seminars, trade shows, and meetings.

The group meets routinely (face-to-face and by teleconference) with counterpart groups within each of the SEMATECH member companies and hosts two on-site meetings per year to present and discuss its project deliverables/status, determine action items, prioritize/plan new projects, and network.

Project deliverables are generally in the form of SEMATECH confidential or Member Company Confidential reports, meetings, and/or presentations.

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