



2009 Annual Report of the  
**Technology Innovation Program  
Advisory Board**



# **2009 Annual Report of the Technology Innovation Program Advisory Board**



**U.S. Department of Commerce  
National Institute of Standards and Technology  
Technology Innovation Program**

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**For Information regarding the Technology Innovation Program Advisory Board, contact:**

Lorel Wisniewski  
Deputy Director  
Technology Innovation Program  
National Institute of Standards and Technology  
100 Bureau Drive, Mail Stop 4700  
Gaithersburg, MD 20899-4700

Tel: 301-975-2162  
Email: [tip@nist.gov](mailto:tip@nist.gov)

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# TIP Advisory Board Members

**Jeffrey P. Andrews, (Committee Chair)**  
SVP of Strategy and Business Development  
Advanced Electron Beams  
Wilmington, MA  
(Term expires 12/31/2011)

**Dr. Vinton G. Cerf**  
VP and Chief Internet Evangelist  
Google, Inc.  
Reston, VA.  
(Term expires 12/31/2012)

**Dr. Charles L. Cooney**  
Professor of Chemical Engineering  
Massachusetts Institute of Technology  
Cambridge, MA  
(Term expires 6/18/2011)

**Dr. Mauro Ferrari**  
Professor of Internal Medicine  
University of Texas  
Houston, TX  
(Term expires 6/18/2012)

**Dr. Martin Izzard**  
Vice President, Texas Instruments  
Dallas, TX  
(Term expires 6/18/2011)

**Dr. Ray O. Johnson**  
Senior Vice President and Chief Technology Officer  
Lockheed Martin Corporation  
Bethesda, MD  
(Term expires 12/31/2012)

**Dr. Radia Perlman**  
Sun Microsystems  
Sammamish, WA  
(Term expires 12/31/2011)

**Dr. Luis Proenza**  
President, the University of Akron, OH  
Akron, OH  
(Term expires 6/18/2012)

**James E. Reeb**  
Director of Manufacturing R&D  
Caterpillar, Inc.  
Mossville, IL.  
(Term expires 6/11/2012)

**Dr. William Peter Teagan**  
Independent Consultant  
Acton, MA  
(Term expires 01/30/2013)



# Introduction

The Technology Innovation Program (TIP) Advisory Board is a distinguished body of experts in the field of technology innovation, including representatives from high-tech companies, the venture capital community, and universities. Its charter can be found on TIP's website ([www.nist.gov/tip/](http://www.nist.gov/tip/)). TIP promotes and accelerates innovation in the United States by offering competitive opportunities for cost-shared funding for high-risk, high-reward research that has the potential to yield transformational results.

TIP funds projects only in areas of critical national need. A critical national need is defined in the TIP Rule (15 CFR Part 296) as "an area that justifies government attention because the magnitude of the problem is large, and the societal challenges that need to be overcome are not being addressed, but could be addressed through high-risk, high-reward research." A societal challenge is defined in the Rule as "a problem or issue confronted by society that when not addressed could negatively affect the overall function and quality of life of the nation, and as such justifies government attention, and can be addressed through high-risk, high-reward research." American competitiveness is an issue that has received considerable attention in recent years. The creation of TIP was a response to concerns about the need to foster technological innovation in the U.S. to help ensure future economic growth.

This annual report includes two calendar year 2009 TIP Advisory Board meetings:

- July 7
- December 8

During the Advisory Board meetings TIP and National Institute of Standards and Technology (NIST) staff briefed the committee on plans, recent events, and accomplishments. TIP's management raised special issues and concerns for which Board input was sought. Sometimes outside experts on technology policy briefed the Board to provide additional points of view regarding the current state of the nation with regard to technology development. The meetings included open-ended discussion sessions during which the Board provided feedback to TIP.

Following each meeting, minutes were prepared, circulated to the Board members, and posted on the TIP website.

Because TIP is a relatively new program, this Advisory Board has an opportunity to shape the future course of the program, and the Board takes that responsibility seriously. TIP staff have welcomed advice from the Board and take it into account as plans are revised.

Section 1 documents the Board's findings and recommendations. Section 2 summarizes events that transpired at the two 2009 meetings. The appendices provide additional information about progress within the program.



# Findings and Recommendations

## Findings

1. While TIP is a very young program, the Board believes that the program is already playing a valuable role in stimulating the development of new technology to address critical national needs, thus creating new jobs and fostering economic growth. TIP encourages teaming between industry and universities which will pay dividends not only during the duration of particular projects, but as lines of communication are opened and broader trust developed between industry and academia, such networking is likely to create long-term benefits. The Board members are sympathetic with the views of Dr. Robert Atkinson (President of the Information Technology and Innovation Foundation) who made a presentation during the December meeting. Dr. Atkinson believes that if the nation had invested more of its collective resources in high-tech R&D over the past decade instead of speculating in real estate and financial instruments of little intrinsic value, the current severe recession might not have occurred, or might have been less severe.
2. TIP has been successful in engaging the technical community in the process of identifying critical national needs where new technology can help solve important problems affecting our lives and simultaneously lead to economic growth. Not only does the identification of these critical national needs allow TIP to determine and justify the highest priorities for new R&D funding, it also helps industry recognize areas of opportunity and have a stronger justification for pursuing them.
3. TIP has put into place a robust and comprehensive evaluation system. Each project is assessed (not just those that succeed). Lessons learned can be utilized for continuous improvement. Benefits arising from successful projects are quantified to the extent possible. This systematic evaluation is responsive to the Government Performance and Results Act (GPRA), but TIP's evaluation process goes well beyond the minimum required by GPRA, and that deserves praise. TIP has already been asked to share its expertise in evaluation methods and practices with other programs and agencies.
4. The funding model used for TIP, the selection process adopted, and the project management approach ensures that tax dollars are invested wisely. The project selection process helps to ensure that projects selected meet the TIP criteria and that they are based on sound science. Because all projects are cost-shared, both the R&D performers and the Federal government have an incentive to succeed, and both have an incentive to terminate projects that do not appear likely to work out as planned.
5. TIP has reached out to state and regional economic development groups. For example, at the December Advisory Board meeting, the President and CEO of Northeastern Ohio Technology Coalition (Nortech) addressed the group. By coordinating with state and regional organizations, TIP and these organizations are able to leverage each other's expertise and knowledge. There is currently no infrastructure or mechanism to ensure the alignment of state and Federal policies and investments in science and technology.
6. TIP has teamed with NIST's Manufacturing Extension Partnership (MEP). This collaboration has enabled TIP to reach out to thousands of small manufacturing firms that might not otherwise be aware of opportunities through TIP.
7. TIP has expended considerable effort to reach out and engage other Federal agencies (such as the National Institutes of Health, the Federal Highway Administration, the Department of Energy and others) in the process of developing critical national need topics. These collaborations enable TIP to leverage the scientific and technical expertise that exists across government to best address the nation's critical needs.
8. The Board has studied the "white papers" defining the critical national needs areas and has provided its collective wisdom to TIP. There is no doubt that areas identified to date such as civilian infrastructure, healthcare, energy, and manufacturing are critical national needs. The recommendations section and the

meeting minutes document some of the specific advice given to TIP.

## Recommendations

1. TIP is a program that is working as designed—one that the nation's high-tech community needs. It deserves bipartisan support to be able to address national needs with the sense of urgency they deserve.
2. TIP should engage the technical community in defining and refining national needs on a continuing basis. National needs and potential solutions are a moving target as technology evolves, and so the definition of needs requires updating.
3. TIP should continue to share its successful evaluation process with other Federal and state agencies whose processes may be less robust. TIP should study best practices in government and the private sector to further refine its process. Some state and regional programs could benefit from the lessons learned by TIP.
4. Some TIP projects will inevitably fail, because high-risk (but high pay-off) projects are what TIP seeks. It is commendable that TIP terminates projects deemed unlikely to succeed. It is important to study terminated projects to see if there were warning signs that might have been flagged even earlier. Presumably as time goes on, TIP staff can become even more adept at detecting early signs of project difficulty and taking appropriate action.
5. TIP should continue to work with MEP and other NIST operating units to take advantage of their skills, knowledge, and outside contacts. NIST is a logical place for TIP to be housed because of the wide and deep technical knowledge throughout the Institute.
6. TIP should continue to build and expand its network of collaborations across the Federal sector and the states. Such collaborations can leverage the potential impact of Federal investments in science and technology, and also serve as a starting point for the alignment of Federal and state policies on research and development.
7. TIP must continue to monitor trends and decisions by policy makers that affect technology choices, and thus affect critical national needs. Interrelationships between technology choices can be complex. As just one example discussed by the committee, as the nation moves more towards renewable energy sources such as solar and wind, which seems to be happening, energy experts generally agree that there is a pressing need for cheaper dispersed electrical energy storage. If the nation also moves towards increased use of electric autos, and if the nation moves towards the "smart grid" for electrical energy distribution, this could mean that the installed base of electric vehicles might constitute a form of disbursed energy storage. Whether that materializes or not and whether it could constitute a useful form of energy storage is partially a technology issue and partially a policy and regulatory issue. Accordingly, TIP must monitor regulatory and other policy changes that impact technology choices.

# Summary of Board Meetings in 2009

Because the complete Advisory Board meeting minutes are posted on the TIP website, only the most important points are summarized in this report.

## 1. July 7, 2009 Meeting

Jeffrey Andrews received thanks from TIP and NIST management for agreeing to chair the TIP Advisory Board.

TIP Director Marc Stanley reviewed TIP's mission and the Board's charter. The emphasis at this first meeting was to seek advice from the Board on program direction and to discuss critical national needs. Areas of critical national needs discussed by the Board included energy, healthcare, manufacturing, software, and green technology.

The Board feels that respect for NIST within the technical community and NIST's reputation as "an honest broker" will serve the program well. Knowledge of how to run a successful government-industry R&D partnership program gained through NIST's former Advanced Technology Program (ATP), as well as program assessment techniques honed within ATP should help TIP succeed. TIP is already involving the NIST laboratories, and that will help to ensure that measurements and standards needed to support new innovations will be developed.

Interdisciplinary technical areas and interfaces between agency programs represent promising areas of opportunity for TIP. To be successful, a program like TIP must demonstrate knowledge of what other agencies are doing and be able to show that the programs are complementary. TIP can leverage programs of other Federal agencies.

Nine (\$9) million dollars was appropriated for TIP's first year, and approximately \$25 M for new awards is available this year. TIP uses cooperative agreements as its financial assistance funding mechanism, although TIP is actually authorized to enter into grants, cooperative agreements, and contracts.

Access to business mentors can be important to TIP small company awardees. TIP should consider the

relationship between new business models and technical innovation.

Global warming and related energy concerns (e.g., the nation's strong dependence on imported fossil fuels) were mentioned several times by Board members as critical national needs that TIP might help to address. A related topic is technology and standards for a "smart" national electrical grid that would manage and distribute energy more efficiently and cost-effectively. The venture capital community is unlikely to fund large-scale energy projects because of high capital costs, reluctance of that industry to accept high technical risk, and the complex nature of this regulated industry.

Renewable energy sources such as wind turbines and photovoltaics, improved vehicle battery technology, and the smart grid could all combine to make possible new approaches to energy usage, distribution, and conservation. Alternatives to today's ubiquitous low-voltage DC power supplies in homes and offices could be explored.

Opportunities abound for new technology in the healthcare sector, e.g., shortening supply chains, standardizing and digitizing information, and streamlining information flow among hospitals, doctors, insurance companies, drug companies, and patients.

Manufacturing also has opportunities for technological innovation, such as enabling production machines to communicate with each other and non-destructive evaluation techniques for recycling products.

Other critical national needs noted by the Board include better tools for software quality control, identity verification, and green technology.

One Board member summarized the discussion thusly:

1. The role of TIP in supporting, promoting, and accelerating innovation through high-risk, high reward research in areas of critical national need is rather unique, and important to the economy.

2. TIP projects should fill such gaps, especially at interdisciplinary boundaries.
3. TIP's convening power means that TIP's modest resources can leverage funding by other agencies.
4. Business models must change to accommodate new technologies. A new technology will not succeed unless a suitable business model accompanies it.
5. In the healthcare area, information technology focused on the patient is where many opportunities lie—making information available where and when it is needed.
6. TIP should focus on technical problems that, if solved, would have major impact. The private sector should lead in identifying technical problems in areas of critical national need.

## 2. December 8 Meeting

Two recent Technology Innovation Program competitions were about to be announced at this meeting. TIP reviewed 138 proposals, involving 244 participants. More than 200 white papers were received, suggesting additional technology areas that TIP might pursue.

Dr. Patrick Gallagher, Director, NIST, announced recently that Marc Stanley is to be Acting Deputy Director of NIST pending a more extensive reorganization, and Mr. Stanley has asked Dr. Lorel Wisniewski to function as TIP Director during this period.

Dr. Robert Atkinson, President of the Information Technology and Innovation Foundation, spoke on the topic of innovation economics. Dr. Atkinson believes that long term investments in innovation would likely have led to a more stable and prosperous economy for the nation than investments in real estate and financial instruments, which led to the severe recession. Dr. Atkinson's conclusion is that the United States faces significant challenges with regard to innovation. The Board members generally agreed with Dr. Atkinson's conclusions (although several questioned the appropriateness of his aggregating diverse metrics into an overall score used to compare countries). The Board

was sympathetic with his admonition that policy makers should give innovation a higher priority than it has had in recent years. They also noted that educating the U.S. workforce is a requirement for success. The Board supports increased Federal funding for basic research and for TIP. The Board agreed that better alignment of Federal and state technology-based economic development (TBED) programs is needed.

Rebecca Bagley, President and CEO of the Northeast Ohio Technology Coalition (Nortech), spoke on fostering regional high-tech economic development. TIP is exploring ways to work more closely with state TBED programs. Beginning in 2002, Ohio funded a 10-year "Third Frontier" program (\$1.6 billion) that is now beginning to create jobs. Ms. Bagley's data show that the decline in employment in traditional Ohio industries is being at least partially offset by recent growth in high-tech industries. Coordination of activities among the concerned parties is probably the most valuable Nortech function. The Board concurred that TIP should interface effectively with regional clusters, but that TIP would be spread too thin if it tried to help in the creation of new regional clusters.

Dr. Lorel Wisniewski (Deputy Director, TIP) reported that about a year ago, TIP and NIST's Hollings Manufacturing Extension Partnership (MEP) began collaboration. (MEP's mission is "to act as a strategic advisor to promote business growth and connect manufacturers to public and private resources essential for increased competitiveness and profitability.") To date, MEP and TIP have held four joint regional workshops around the country, reaching 260 attendees, which has helped publicize TIP to small and medium sized manufacturers with a potential interest in proposing to TIP. To ensure that truly innovative projects are conceived and proposed, TIP must engage in outreach. The reaction of the Board to TIP/MEP collaboration was positive. Information on critical national needs that TIP gathers can help align the states and the Federal government on issues of technology development.

Stephen Campbell (Group Leader, TIP Impact Analysis Group) discussed TIP's evaluation strategy. TIP is committed to analyzing objectively the impact of its projects as well as the effectiveness of the overall

program. TIP carries out systematic evaluation for several reasons:

1. It is required by law.
2. Congress, the Administration, and program participants will inevitably ask how well the program is working.
3. Impact evaluation data can be used as a management tool to improve operations.
4. It leads to a better understanding of the innovation process and how TIP contributes to it.

In addition to studying individual projects as well as the overall impact of the program, TIP must evaluate operational aspects of the program, including the selection process, project management, and overall customer satisfaction. A survey was completed recently for the 2008 competition. Responses were solicited from those on the TIP mailing list, those who submitted proposals but did not receive funding, and those who received funding. TIP reviewed 701 responses and the data were analyzed carefully. The Board considers it appropriate that TIP is devoting significant effort to evaluation.

Summary of 2009 competition statistics: Approximately twenty awards were announced (versus nine in 2008). There were 138 applicants. This year proposals were limited to two critical national needs areas: civil infrastructure and manufacturing. Winning proposals were in areas such as sensors for assessing the structural integrity of bridges, water and waste water piping, and manufacturing for nanomaterials, super alloys, and composites. Funding of approximately \$25 million has been allocated for new awards in 2009. Over the life of the projects, the total TIP investment plus matching

funds will amount to about \$146 million if all projects continue on to completion. Projects are funded through a financial assistance award called a cooperative agreement. Awardees must submit quarterly technical and impact progress reports as well as quarterly financial reports. Milestones and decision points are officially part of the awards and based on the R&D plans in the original proposals. Awards can be terminated early for a variety of situations including at the request of the award recipient, or for material non-compliance with the award terms and conditions.

The Board feels that some of the most important things TIP can do to advance the Administration's innovation strategy include allocating funding to the areas of greatest need, addressing disconnects (e.g., lack of coordination between state and Federal programs), and emphasizing new areas of technology rather than well-established technologies.

The Board believes that TIP can help to keep healthcare costs down by encouraging the adoption of smart technology such as electronic medical records. But the Board believes that healthcare R&D resources should not all go into healthcare IT. There are other important healthcare technology opportunities, e.g., cheaper diagnostics. The comment was made that if healthcare costs can be reduced, manufacturing firms may be more likely to keep factories in the U.S. rather than move them offshore. (Providing new sources of cheap energy can also keep factories here.) Personalized medicine is a promising area. A clear standards role for NIST in the healthcare area was also mentioned.

The Board stated that cheaper energy storage is critical to utilities, and the energy white paper should stress that storage technology other than batteries or other electrochemical devices should be explored. More attention could be paid to renewable energy.

# Appendix 1

## TIP Projects Funded to Date

### TIP Project Awards, FY 2009 Competitive Funding Opportunity

#### Critical National Need: Manufacturing

#### “Accelerating the Incorporation of Materials Advances into Manufacturing Processes”

**Production of Low-Cost, High-Quality Metallic and Semiconducting Single-Walled Carbon Nanotube Inks;** Brewer Science, Inc. (Rolla, MO), joint venture lead, with SouthWest NanoTechnologies (SWeNT), Norman, OK)

Project Duration: 3 years  
Projected TIP Contribution: \$6,527,000  
Total Project Cost (est.): \$13,910,000

#### Functionalized Nanographene for Next-Generation Nano-Enhanced Products

Angstrom Materials, LLC (Dayton, OH)

Project Duration: 3 years  
Projected TIP Contribution: \$1,494,000  
Total Project Cost (est.): \$2,988,000

**Transformational Casting Technology for Fabrication of Ultra-High-Performance Lightweight Aluminum and Magnesium Nanocomposites;** University of Wisconsin-Madison (Madison, WI), joint venture lead; with Eck Industries, Inc. (Manitowoc, WI), Nanostructured & Amorphous Materials, Inc. (Houston, TX), the Oshkosh Corporation (Oshkosh, WI), and Wisconsin Alumni Research Foundation (Madison, WI)

Project Duration: 5 years  
Projected TIP Contribution: \$4,863,000  
Total Project Cost (est.): \$10,092,000

**High-Speed, Continuous Manufacturing of Nano-Doped Magnesium Diboride Superconductors for Next-Generation MRI Systems;** Hyper Tech Research, Inc. (Columbus, OH)

Project Duration: 3 years  
Projected TIP Contribution: \$3,000,000  
Total Project Cost (est.): \$6,050,000

**PRINT® Nanomanufacturing: Enabling Rationally Designed Nanoparticles for Next-Generation Therapeutics;** Liquidia Technologies, Inc. (Durham, NC)

Project Duration: 3 years  
Projected TIP Contribution: \$2,971,000  
Total Project Cost (est.): \$5,942,000

**Silicon Nanowire Production for Advanced Lithium-Ion Batteries;** Amprius, Inc. (Menlo Park, CA)

Project Duration: 2 years  
Projected TIP Contribution: \$3,000,000  
Total Project Cost (est.): \$6,000,000

**Integrated Multiscale Modeling for Development of Machinable Advanced Alloys and Corresponding Component Machining Processes;** Third Wave Systems, Inc. (Minneapolis, MN)

Project Duration: 3 years  
Projected TIP Contribution: \$1,564,000  
Total Project Cost (est.): \$3,170,000

**High-Volume Production of Nanocomposite Electrode Materials for Lithium-Ion Batteries;** A123Systems, Inc. (Ann Arbor, MI)

Project Duration: 3 years  
 Projected TIP Contribution: \$2,864,000  
 Total Project Cost (est.): \$6,000,000

**Building U.S. Strategic Metals Competitiveness through Integration of Advanced Sensor Technologies**

wTe Corporation (Bedford, MA), joint venture lead, with National Recovery Technologies, Inc. (Staten Island, NY) and Energy Research Co. (Nashville, TN)

Project Duration: 4 years  
 Projected TIP Contribution: \$5,670,000  
 Total Project Cost (est.): \$11,532,000

**Homogeneous Three-Dimensional Pultruded Processing of PEEK, PEI, and PPS High-Temperature Thermoplastic Composite Profiles;** Ebert Composites Corporation (Chula Vista, CA)

Project Duration: 2 years  
 Projected TIP Contribution: \$1,866,000  
 Total Project Cost (est.): \$4,018,000

**High-Risk, Low-Cost Carbon Nanofiber Manufacturing Process Scale-Up;** eSpin Technologies, Inc. (Chattanooga, TN)

Project Duration: 3 years  
 Total project (est.): \$6,006,000  
 Requested TIP funds: \$3,000,000

**Development and Scale-Up of Nanocomposites with Sub-10 nanometer Particles**

Pixelligent Technologies LLC (College Park, MD), joint venture lead, with Brewer Science, Inc. (Rolla, MO)

Project Duration: 3 years  
 Projected TIP contribution: \$4,089,000  
 Total project cost (est.): \$8,178,000

**Critical National Need:  
 Civil Infrastructure**

**“Advanced Sensing Technologies and Advanced Repair Materials for the Infrastructure: Water Systems, Dams, Levees, Bridges, Roads, and Highways”**

**Civil Infrastructure Inspection and Monitoring Using Unmanned Air Vehicles;** The Droid Works, Inc. (Framingham, MA), with the Georgia Institute of Technology Research Corporation

Project Duration: 3 years  
 Projected TIP Contribution: \$2,453,000  
 Total Project Cost (est.): \$4,996,000

**Automated Nondestructive Evaluation and Rehabilitation System (ANDERS) for Bridge Decks**

Rutgers, The State University of New Jersey (Piscataway, NJ), joint venture lead, with Drexel University (Philadelphia, PA), PD-LD, Inc. (Pennington, NJ), Mala GeoSciences USA, Inc. (Charleston, SC), and Pennoni Associates, Inc. (Philadelphia, PA).

Project Duration: 5 years  
 Projected TIP Contribution: \$8,810,000  
 Total Project Cost (est.): \$17,923,000

**Distributed Fiber-Optic Sensing Technology for Civil Infrastructure Management;** Optellios, Inc. (Newtown, PA)

Project Duration: 3 years  
 Projected TIP Contribution: \$1,930,000  
 Total Project Cost (est.): \$3,917,000

**Robotic Rehabilitation of Aging Water Pipelines;**

FibrwrapConstruction, Inc. (Ontario, CA; joint venture lead, with Fyfe Company (San Diego, CA) and the University of California, Irvine

Project Duration: 5 years  
 Projected TIP Contribution: \$8,462,000  
 Total Project Cost (est.): \$17,582,000

**A Rapid Underground Pipe Rehabilitation Technology;**  
LMK Enterprises, Inc. (Ottawa, IL)

Project Duration: 2 years  
 Projected TIP Contribution: \$1,701,000  
 Total Project Cost (est.): \$3,411,000

**Development of a Multiscale Monitoring and Health Assessment Framework for Effective Management of Levees and Flood-Control Infrastructure Systems;**  
Rensselaer Polytechnic Institute (Troy, NY), joint venture lead, with Geocomp Corporation (Boxborough, MA)

Project Duration: 4 years  
 Projected TIP Contribution: \$3,462,000  
 Total Project Cost (est.): \$6,928,000

**Development of High-Toughness, Low-Viscosity Resin for Reinforcing Pothole Patching Materials;** University of California, Los Angeles, joint venture lead, with Materia, Inc. (Pasadena, CA)

Project Duration: 3 years  
 Projected TIP Contribution: \$1,499,000  
 Total project cost (est.): \$3,051,000

**Advanced Coating Technology for Infrastructure;** MesoCoat, Inc. (Euclid, OH), joint venture lead, with The Edison Materials Technology Center (Dayton, OH) and Polythermics, LLC (Kirkland, WA)

Project Duration: 3 years  
 Projected TIP Contribution: \$1,792,000  
 Total project cost (est.): \$3,956,000

## TIP Project Awards, FY 2008 Competitive Funding Opportunity

**Critical National Need:  
Civil Infrastructure****“Advanced Sensing Technologies for the Infrastructure: Roads, Highways, Bridges and Water Systems”****Development of SCANSn for Advanced Health Management of Civil Infrastructures;** Acellent Technologies, Inc. (Sunnyvale, CA)

Project duration: 3 years  
 Projected TIP contribution: \$2,995,000  
 Project cost-share contribution: \$2,995,000

**Fiber Sensing System for Civil Infrastructure Health Monitoring;** Distributed Sensor Technologies, Inc. (Santa Clara, Calif., joint venture lead, with Optiphase, Inc., (Van Nuys, CA), Redfern Integrated Optics, Inc., (Santa Clara, CA) and the University of Illinois at Chicago

Project duration: 3 years

Projected TIP contribution: \$4,030,000  
 Project cost-share contribution: \$4,518,000

**Infrastructure Defect Recognition, Visualization and Failure Prediction System Utilizing Ultrawideband Pulse Radar Profilometry;** ELXSI Corporation (Orlando, FL), joint venture lead, with UltraScan, LLC. (Ruston, LA) and Louisiana Tech University (Ruston, LA)

Project duration: 3 years  
 Projected TIP contribution: \$3,119,000  
 Project cost-share contribution: \$3,629,000

**Microwave Thermoelectric Imager for Corrosion Detection and Monitoring in Reinforced Concrete;** Newport Sensors, Inc. (Irvine, CA)

Project duration: 3 years  
 Projected TIP contribution: \$1,249,000  
 Project cost-share contribution: \$1,249,000

**VOTERS: Versatile Onboard Traffic Embedded Roaming Sensors;** Northeastern University (Boston, MA), joint



venture lead, with the University of Massachusetts at Lowell, the University of Vermont and State Agricultural College (Burlington, VT) and Witten Technologies, Inc., (Somerville, MA)

Project duration: 5 years  
Projected TIP contribution: \$9,000,000  
Project cost-share contribution: \$9,802,000

**Self-Powered Wireless Sensor Network for Structural Bridge Health Prognosis;** Physical Acoustics Corporation (Princeton Junction, NJ), joint venture lead, with Virginia Tech (Blacksburg, VA), the University of South Carolina (Columbia, SC) and the University of Miami (Coral Gables, FL)

Project duration: 5 years  
Projected TIP contribution: \$6,930,000  
Project cost-share contribution: \$6,969,000

**Next Generation SCADA for Prevention and Mitigation of Water System Infrastructure Disaster;** University of California at Irvine (Irvine, CA), joint venture lead, with Earth Mechanics, Inc. (Fountain Valley, CA), the Irvine Ranch Water District (Irvine, CA), the Orange County Sanitation District (Fountain Valley, CA), and the Santa Ana Watershed Project Authority (Riverside, CA)

Project duration: 3 years  
Projected TIP contribution: \$2,800,000  
Project cost-share contribution: \$2,885,000

**Cyber-Enabled Wireless Monitoring Systems for the Protection of Deteriorating National Infrastructure Systems;** University of Michigan (Ann Arbor, MI), joint venture lead, with Weidlinger Associates (New York, NY), SC Solutions (Santa Clara, CA), LFL Associates (Ann Arbor, MI), Monarch Antenna (Ann Arbor, MI), and Prospect Solutions (Albany, NY)

Project duration: 5 years  
Projected TIP contribution: \$8,998,000  
Project cost-share contribution: \$10,164,000

**Development of Rapid, Reliable, and Economic Methods for Inspection and Monitoring of Highway Bridges;** The University of Texas at Austin (Austin, TX), joint venture lead, with National Instruments Corporation (Austin, TX) and Wiss, Janney, Elstner Associates, Inc., (Northbrook, IL)

Project duration: 5 years  
Projected TIP contribution: \$3,421,000  
Project cost-share contribution: \$3,421,000

## Appendix 2

# Summary of TIP White Paper Submissions

TIP began soliciting white papers from the public on December 16, 2008<sup>1</sup>. In this call for white papers, TIP is seeking information in all areas of critical national need, including information to assist TIP in further defining several topic areas under development. By December 31, 2009, TIP received white papers as follows:

Total number of white papers received:	235
Number of authors and contributors:	527
Organizational affiliation of author/contributor:	314
University	183
Small/medium company	221
Large company	32
Non-profit organization	50
Government/national laboratory	16
Foreign entity	11
Individual/no organizational affiliation	14
Number of states represented:	41 <sup>2</sup>

The technologies discussed in the submitted white papers were often cross-disciplinary. A categorization of the technologies by major topic area follows:

Civil Infrastructure	17
Complex Systems and Networks	16
Electronics/Photonics	18
Energy	64
Healthcare	41
Manufacturing	53
Security	23
Sustainability	12
Water	10
Other	15 <sup>3</sup>

<sup>1</sup> *Federal Register*, 73, no. 242, Tuesday, December 16, 2008, p. 76339.

<sup>2</sup> The District of Columbia was also represented.

<sup>3</sup> "Other" includes aircraft, agriculture, aquaculture, software development, education and social science.



# About the Technology Innovation Program

The Technology Innovation Program (TIP) assists U.S. businesses, institutions of higher education, and other organizations—such as national laboratories and nonprofit research institutes—to support, promote and accelerate innovation in the United States through high-risk, high-reward research in areas of critical national need. TIP aims to speed the development of high-risk, transformative research targeted to key societal challenges that are not being addressed elsewhere. Program funds support research that has scientific and technical merit, as well as strong potential for advancing the state of the art and contributing to the U.S. science and technology knowledge base.

TIP was created on August 9, 2007, through the America COMPETES Act (P.L. 110-69), a comprehensive strategy to keep the United States the most innovative nation in the world by strengthening scientific education and research, improving technological enterprise, attracting the world's best and brightest workers, and providing 21st century job training. TIP is part of the National Institute of Standards and Technology (NIST) in Gaithersburg, Md.

- TIP has a novel purpose. TIP has the agility to make targeted investments that are within NIST's areas of technical competence and are not possible by other mission-oriented agencies or programs.
- TIP supports rich teaming. Projects may be proposed by individual for-profit companies or by joint ventures

that may include for-profit companies, institutions of higher education, national laboratories, or nonprofit research institutes, so long as the lead partner is either a small or medium-sized business or an institution of higher education. Large businesses may participate in a TIP-funded project, but they may not receive TIP funding.

- TIP is a public-private partnership. TIP makes cost-shared awards of up to 50 percent of total project costs. TIP may award a total of \$3 million in direct costs over 3 years for a single-company project or up to \$9 million over 5 years for a joint venture.
- TIP complements—but does not duplicate—existing R&D efforts. TIP funds R&D that is not already being addressed, for which other funding (public or private) is not available, and for which government support is justified.
- TIP awards funding in response to publicly announced competitions. All proposals are subject to peer review.

Contact TIP for further information:

- On the internet: <http://www.nist.gov/tip>
- By e-mail: [tip@nist.gov](mailto:tip@nist.gov)
- By phone: 1-888-TIP-NIST (1-888-847-6478)
- By writing: Technology Innovation Program, National Institute of Standards and Technology, 100 Bureau Drive, Mail Stop 4701, Gaithersburg, MD 20899-4701



