

**NIST Technology Innovation Program (TIP)  
Advisory Board Meeting  
November 2, 2010**

**Executive Summary (Full Minutes Follow)**

TIP Advisory Board Chair Mr. Jeffrey Andrews began by welcoming new Board member Dr. Ray Johnson.

TIP Acting Director, Dr. Lorel Wisniewski, reviewed the program's status. TIP's third competition is currently underway, with approximately \$25 million available for awards. TIP received 110 proposals as of the July 15 deadline. After subtracting administrative expenses and the \$25 million set aside for new awards, the remainder of the \$69.9 million in FY 2010 funding will be used to support ongoing projects. In the FY 2011 budget process the House has agreed to the President's budget of \$79.9 million. The Senate mark is \$69.9 million. Because there are "mortgages" to pay in FY 2011 for a number of previously funded projects that are on-going, there is unlikely to be much funding for new awards in FY 2011.

The Small Business Jobs Act of 2010 directs TIP to ". . . *enhance the competitiveness of small and medium-sized businesses in the United States in the global marketplace.*" TIP's existing charter is fully consistent with that directive. TIP encourages small and medium-sized businesses and joint ventures to undertake high risk R&D, which enhances their competitiveness. TIP proposers must demonstrate that the project is in the best interests of the United States. Usually that means that the technology is intended primarily for use in the United States. But even if a U.S. company develops a new technology that predominantly is sold overseas, if it creates wealth here, then that is beneficial to the United States.

Mr. Thomas Wiggins, Director of TIP's Selection Management Office, reviewed the methodology used by TIP to solicit the views of stakeholders and to define critical national needs. His charts described TIP's "White Paper" process. TIP projects are typically three- to five-year projects.

At TIP Advisory Board meetings, a subject area that has been determined to be a critical national need, or an area that is under consideration as a possible critical national need, is usually featured. At this meeting, the topic was the "Smart Grid." NIST is playing a key role in standards-related issues associated with the Smart Grid, as explained by Mr. Dean Prochaska, NIST's National Coordinator for Smart Grid Conformance. He was followed by Dr. Jeffrey Mazer (formerly at the Department of Energy (DOE) now a Physical Scientist at TIP). Dr. Mazer is collecting input from industry and other agencies and exploring whether the Smart Grid might qualify as a critical national need. It was clear from the discussion that the Advisory Board considers the Smart Grid to be a good candidate.

The Board stated that better and cheaper dispersed storage for electrical energy deserves more attention. Non-constant power sources such as solar and wind are major contributors to this growing need. Better technology for electrical energy storage is also an enabler for the smart grid and for electric vehicles. Along with DOE, NIST/TIP is an appropriate organization to address this need. Through TIP, battery manufacturers (as well as champions of other storage approaches) can learn about needs and opportunities arising from adoption of the Smart Grid, and how breakthroughs in new technology might impact their business. By fostering this kind of

dialogue, and by helping to support high-risk new technologies, TIP helps to create a competitive advantage for U.S. companies. There are information technology challenges associated with the Smart Grid, too. The Smart Grid will be characterized by ubiquitous sophisticated sensors coupled to autonomous computers capable of making real time decisions to optimize bi-directional power flows, enhance reliability of the overall system, and permit the use of more complex billing schemes. With increases in dispersed generation not under the control of the utilities, utility companies will have an increasingly difficult time matching the time-varying grid-connected generating capacity to the changing load.

Up to now, TIP has waited until funding has actually been available before announcing a competition. After proposals are received, TIP must allow sufficient time to permit careful review. Congress rarely approves agency budgets prior to the beginning of a new fiscal year. TIP funds are “no-year” money, so in principle, money can be carried over into a subsequent year. However, because so many Federal programs are chronically short of funds, if TIP does not allocate its funds before the end of the fiscal year, there is a high probability that they will be reallocated to some other program. Given this situation, TIP’s mode of operation has been to obligate all funds before the fiscal year ends. The result of these constraints is that TIP proposers typically have only 90 days to prepare and submit proposals. The Board’s conclusion was that it is in the interest of TIP to lengthen the effective “reaction time” for proposers.

Based on the discussion at this meeting, there was a consensus of the Board on the following major points:

- TIP should seek ways to announce potential competitions as far in advance as possible with appropriate caveats about funding uncertainties. Six months notice is a recommended goal.
- Descriptions of critical national need technical areas should be written as broadly as possible to encourage innovation.
- TIP should continue to aggressively market the program to ensure that all those with a potential interest in proposing are aware of it.
- Just because another Federal agency is providing funding in a given area does not mean that all good proposals in that area will be funded. (In the case of the development of the Internet, R&D funding came from several agencies, and this helped to achieve the critical mass needed to make rapid progress.) If a need is truly a critical national need, then TIP should not hesitate to sponsor R&D even if other agencies are funding that area.
- Companies should not have to demonstrate herculean efforts to find other funding before becoming eligible for an award as this can create an “adverse selection” issue where high quality programs choose not to apply.

The Advisory Board’s Annual Report is due to Congress thirty days after the President’s budget is announced, or approximately, by March 1. As noted in the full minutes, the Board made a number of recommendations about points that should be emphasized in the annual report.

## Minutes

### Attendees:

#### Board Members

Jeffrey Andrews, Advanced Electron Beams  
Vinton Cerf, Google, Inc.  
Ray Johnson, Lockheed Martin Corp.  
Radia Perlman, Intel Lab.  
Jim Reeb, Caterpillar  
Peter Teagan, Consultant

#### NIST

Clare Allocca  
Brian Belanger, Advisory Board Liaison  
Herbert Bennett  
Jason Boehm  
Steve Campbell, TIP  
Mrunal Chapekar, TIP  
Miral Dizdar  
Ed Garboczi  
Paul Julienne  
Jeffrey Mazer, TIP  
Kathleen McTigue, TIP  
Emil Simiu  
Mark Stiles  
Marc Stanley  
Joseph Stroschio  
Marlon Walker, TIP  
Mike Walsh, TIP  
Tom Wiggins, TIP  
Lorel Wisniewski, TIP

#### Public

Gary Henson, Washington CORE  
Brittany Westlake, American Chemical Society

### **Mr. Jeffrey Andrews, Advisory Board Chair - *Call to Order and Welcome***

Mr. Andrews called the meeting to order at 8:35 a.m. He welcomed new Board member Dr. Ray Johnson. Mr. Andrews reviewed the agenda, mentioning two important discussion items:

1. The timing of competition announcements
2. The Board's annual report to Congress, due around March 1.

**Dr. Lorel Wisniewski, Acting Director, TIP – Program Update**

*[Note: The PowerPoint presentations by the speakers will be posted on the TIP website along with these minutes. Those postings provide details about the content of the formal presentations; hence these minutes focus on the ensuing discussion by the board. In these minutes, “Q” refers to a question from the Board, “C” is a comment, and “A” is the response to the question or comment.]*

Dr. Wisniewski reminded the Board of the purpose of TIP and what makes it unique among Federal programs. She summarized its current status and shared findings from the Customer Satisfaction Survey from the 2009 competition. The third competition is currently underway with approximately \$25 million available for awards. As of the July 15 deadline, TIP received 110 proposals in the area of *Manufacturing and Biomanufacturing: Materials: Advances and Critical Processes*.

**Q:** Innovation is more than just science. New technology must be adopted and disseminated to be useful. To what extent does TIP get involved in fostering implementation?

**A:** To receive an award, a proposal must include a credible plan to deploy the technology if the research funded by TIP is successful.

**Q:** The \$25 million in available funding—is that for the life of the projects, or just for the first year?

**A:** That is up to TIP to decide. Awards are multi-year, but awardees draw down funds from an account that is set up for them, and must demonstrate steady progress for funding to continue. Most, but not all projects continue to completion, and when a project is suspended or terminated, that frees up funds for other projects. Given the modest funding in recent years relative to the large number of proposals received, typically TIP uses the available funds to fund the first year of the new projects. The risk of having insufficient funds for ongoing projects in out-years is low. In tight budget years, the Congress may decide not to appropriate funds for new projects, but historically, the Congress has provided funding to complete ongoing projects that are making good progress towards their goals.

**Q:** Will some of the \$69.9 million in FY 2010 appropriations be used for old awards?

**A:** Yes, after administrative expenses are subtracted, and the \$25 million is set aside for new awards, the remainder will be used to support ongoing projects. In the current FY 2011 budget debate the House has agreed to the President’s budget of \$79.9 million. The Senate mark is \$69.9 million. Because there are “mortgages” to pay in FY 2011 for a number of previously funded projects that are winding down, there is unlikely to be much funding for new awards in FY 2011.

**C:** Uncertainty over future year appropriations complicates long range planning. Continuing resolutions can be disruptive. And, the outlook for future budget increases is dim.

**A:** Yes, knowing what future year funding will be would make managing the program much easier. A continuing resolution for the remainder of this fiscal year is one possible outcome.

**Q:** Describe how TIP coordinates with other Federal agencies.

**A:** TIP puts much effort into ensuring that there is no inappropriate duplication, but rather that TIP complements what other agencies are doing. We survey their plans and we also work with groups such as the Science and Technology Policy Institute. For instance in the case of bio-manufacturing, TIP staff engaged in in-depth discussions with agencies such as FDA and NIH. While both agencies carry out biological research, they typically do not fund R&D on improving industrial bio-manufacturing processes.

**C:** U.S. manufacturing represents the 8<sup>th</sup> largest economy in the world. Competing in world markets is challenging, yet no Federal agency is specifically focused on improving U.S. manufacturing. That is why TIP is so important.

**C:** High-level science policy reviews of the nation's R&D on information technology have been carried out. Perhaps a similar review should be done for manufacturing. The Commerce Department is a logical place. Perhaps this issue also needs to be addressed by the PCAST.

**C:** There is value in TIP making connections with industry. For example, the Smart Grid that will be discussed later presents opportunities for component manufacturers to introduce new products. But to seize those opportunities, companies need to understand the new standards and interfaces associated with the Smart Grid. NIST and TIP can help in that regard. TIP white papers provide valuable information to industry about what the future may hold as new technologies such as the Smart Grid are implemented.

**C:** Non-constant power sources such as solar and wind, when connected to the Smart Grid, increase the demand for more robust and cheap energy storage. Along with DOE, NIST/TIP is an appropriate organization to call attention this need. Through TIP, battery manufacturers (as well as companies researching other storage technologies) can learn about needs and opportunities arising from adoption of the Smart Grid, and how breakthroughs in storage technology might impact the larger picture. By fostering this kind of dialogue, and by helping to support high-risk new technologies, TIP can help to create a competitive advantage for U.S. companies. Information technology aspects of the Smart Grid also present opportunities for innovation.

**C:** The Chinese now control about 97 percent of rare earth materials that are critical for so many high-tech products. TIP might encourage innovation to find substitutes for these materials.

**Q:** What is the typical size of a TIP award?

**A:** There are two types of awards: single company awards, and joint venture awards. A single applicant can receive up to \$3 million, a joint venture up to \$9 million. Both must cost share. We can provide the Board with the exact figures for the average award for each category.

Dr. Wisniewski called attention to the Small Business Jobs Act of 2010, which directs TIP to “...enhance the competitiveness of small and medium-sized businesses in the United States in the global marketplace.”

**Q:** How does TIP propose to respond to this Act?

**A:** The wording of the Act is fully consistent with TIP's existing charter. TIP funds small and medium-sized businesses, and by helping them develop innovative new technologies, their competitiveness in global markets is enhanced.

**Q:** I presume that TIP's emphasis is on technology development for the U.S. even though today the global marketplace is on everyone's mind.

**A:** TIP proposers must demonstrate that the project is in the best interest of the United States. Other nations may have national needs that differ from those in the U.S.

**C:** But exports are important, so even if a U.S. company comes up with a new technology that predominantly is sold overseas, if it creates wealth and jobs here, that benefits the United States.

**C:** Technologies that are insufficiently sophisticated for application in the U.S. may still be valuable in other countries. Affordable solutions to common problems can have a big impact in the global marketplace.

**C:** For many new technologies, the issue of whether they can be scaled up to meet industrial needs is important.

**C:** Sometimes the need is for technologies than can scale *downward* rather than upward. Pollution control technology that might be applied successfully to a large chemical plant can be much too expensive for a neighborhood dry cleaner. Inexpensive but effective new technology for the latter application could be important not only in the U.S. but in world markets.

**Q:** Small U.S. businesses may be unaware of opportunities overseas. Can TIP and NIST help?

**A:** The Department of Commerce already has programs in place to address that need. DOC has representatives in other countries to provide information to U.S. companies seeking to do business abroad.

**Q:** TIP requires that companies show that they have made exhaustive efforts to find funding elsewhere and have been unsuccessful. But if a company has been turned down repeatedly elsewhere, doesn't that raise a red flag about the viability of the project?

**A:** Not necessarily, when the risk aspect is considered. Banks will not lend money for risky R&D. A venture capital firm may conclude that the project is too early-stage for it to provide funding. The project may not fit with other Federal agency missions. This TIP requirement is often a stumbling block. About 50 percent of proposers fail to convince TIP that they have made a good-faith effort to find funding elsewhere.

**Q:** Is ownership of intellectual property an issue? Is IP in any way diminished when a company seeks TIP funding?

**A:** Companies retain title to intellectual property. The Bayh-Dole Act applies to single applicants. In the case of joint ventures, it is up to the joint venture to negotiate IP rights among the participants. The government retains a royalty-free license to use the technology for

government purposes, but this has not been a stumbling block. The government also has “march-in rights,” which means that if an awardee develops and patents some great new technology, but for whatever reason, chooses not to pursue it, after a reasonable period of time, the government can insist that the technology be licensed to some other company that will make use of it so the taxpayer’s dollars will not go to waste. It is unlikely that this provision would ever be exercised because if a company did develop a great new technology, it would be unusual for the company not to exploit it.

**C:** TIP should not be overly strict about requiring rigorous proof that no stone has been left unturned in seeking funding elsewhere. A company could use up so much time pursuing funding, that by the time sufficient evidence had been gathered, the window of opportunity had passed, and a foreign company might have taken the lead.

Former TIP Director Marc Stanley was present, and explained the reason for the provision that requires TIP applicants to demonstrate that funding is unavailable elsewhere. The Advanced Technology Program (ATP, which Mr. Stanley also headed for a time) had some similarities to TIP but failed to achieve sustained bipartisan support. ATP was abolished, and TIP was designed to eliminate the elements of ATP that had been controversial while retaining the elements that were generally looked upon favorably by both parties in Congress. The intellectual property provisions and selection criteria for TIP were chosen carefully so as to achieve the broadest possible consensus about the program. To achieve that consensus, it was also necessary to include among the criteria that an applicant had to have been unable to fund the project from other sources, and that the project addressed a critical national need.

**Q:** In an agency such as DARPA, potential applicants are encouraged to discuss their projects in some detail with the program managers before submitting a proposal. Does TIP encourage that?

**A:** TIP’s solicitations for proposals in critical national needs areas are somewhat akin to broad area announcements by other agencies. But, TIP is different. In the case of DARPA, the program manager typically identifies a specific requirement of the Department of Defense that the project should address, and proposers need to understand that requirement. In the case of TIP, the company or joint venture determines what project to pursue (as long as it falls within the scope of a critical national need as announced by TIP). TIP staff members are very willing to discuss the application process and selection criteria with potential applicants, but they do not discuss the merits of specific project ideas prior to proposal submission.

**Mr. Thomas Wiggins, Director, TIP Selection Management Office – *The Identification of Critical National Needs***

Mr. Wiggins reviewed the methodology used by TIP to solicit the views of stakeholders and to define critical national needs. His charts described TIP’s “White Paper” process.

**Q:** Timing is important. What is the time frame for TIP projects?

**A:** TIP projects are typically three- to five-year projects. If, at the end of the project, the technical goals have been met, and feasibility has been established, it may still take considerable additional time to bring the new technology to market, particularly if the technology involves major scale-up.

**Q:** Can the Advisory Board have access to the raw material that forms the basis for the recommendations to the TIP Director for critical national need areas?

**A:** Yes, that material can be made available.

Mr. Wiggins pointed out that TIP is aggressive in seeking input from concerned agencies during the white paper development process—studying planning materials put out by those agencies and meeting with key managers.

**Q:** Are the NIST Fellows involved in the white paper process?

**A:** They are invited to participate but not required to do so. The degree of participation is up to the individual Fellow. Some play an active role. At least one draft recommendation was rejected because a Fellow called attention to a deficiency in it.

**Mr. Dean Prochaska, NIST National Coordinator for Smart Grid Conformance – *NIST and the Smart Grid***

NIST is playing a key role in the standards-related issues associated with the Smart Grid, and Mr. Prochaska explained that role.

**Q:** How are Federal agency efforts related to the Smart Grid coordinated?

**A:** There is a Smart Grid Task Force led by DOE. In addition, a National Science and Technology Council subcommittee was established this summer to create a Smart Grid Policy Framework and also to coordinate Federal agency Smart Grid efforts.

**Q:** To what extent have the technical needs of the Smart Grid been identified?

**A:** Many challenges have been identified. Storage is a definite need, so better battery technology is an obvious challenge. Distributed generation, especially with renewable energy sources, presents many challenges.

**C:** Metering can largely be done with existing technology, but there are cost issues.

**Q:** Implementation is likely to be difficult. There are many regulatory bodies and a plethora of different utility companies that all need to agree. How can these diverse groups be brought together to implement the Smart Grid?

**A:** There must be suitable economic incentives if this is to be achieved. Non-technical policy issues abound, particularly with regard to variable pricing. Having said this, on a case-by-case basis, there are drivers for utilities to deploy Smart Grid technology today.

**C:** The Smart Grid may have the potential for job creation associated with new consumer products. Appliance makers are considering the next generation of appliances. For example, a communication link might inform a refrigerator that a load peak is occurring and that it should wait before cycling on.

**Q:** One must consider the difference between the needs of residential users and industrial users. Has the Smart Grid Task Force considered this?

**A:** Industry already looks for ways to lower its utility bills by managing demand better. Whether a customer is industry or a residence, if the user has detailed information about how much power is actually costing at every instant of time, the user can then take appropriate steps.

**C:** Storage is certainly important. It may well be a critical national need. Industrial energy efficiency is important, too, but tends to fall in the cracks and too often receives inadequate attention.

**C:** Most large industries today monitor and devote attention to power management. Some purchase generators to provide in-house power at times of peak loads. Whether to generate your own power or buy it off the grid is a cost tradeoff that must be made based on hard data. Companies today are seeking ways to utilize waste heat, e.g., from heat treating furnaces. In some cases waste heat can be used to generate power to sell to the utility company. Wal-Mart is installing solar panels on the roofs of its stores.

**C:** With increases in dispersed generation not under the control of the utilities, utility companies will have an increasingly difficult time matching the generating capacity connected to the grid at any given time to the load.

**Q:** Will U.S. standards for things like the Smart Grid be accepted overseas?

**A:** U.S. standards are already widely accepted overseas. Most standards committees include representatives from other nations, given the extent to which markets have become global. The NIST Framework 1.0 identified close to 80 percent of its standards that are considered international standards. We are working closely with other countries to ensure harmonization of Smart Grid standards.

**Q:** Current kilowatt-hour meters are highly “reliable and have long lives. Will new “smart” meters be as reliable?

**A:** Utility companies want to purchase meters that will not have to be replaced often. But right now, interoperability is receiving the most attention. To support future interoperability capabilities, NIST is working with industry to identify needs for smart meter upgradability standards that will ensure long life for smart meters and to ensure that they can be upgraded as new smart meter standards evolve. This standard was developed in fewer than 90 days by NEMA.

**Q:** Are other countries ahead of the U.S. in the Smart Grid?

**A:** Needs and interests differ widely from country to country. For example, in China, the focus is on long distance high-voltage transmission from remote power plants. In Denmark and the Netherlands, the emphasis is on incorporating wind turbines into the grid. Australia has said it will look closely to the U.S. with regard to Smart Grid standards. In Japan, the “smart community” concept is receiving attention, in which the focus is on building efficiency, so HVAC and automatic lighting systems are receiving attention.

A member of the audience from ASHRAE commented that his organization will happily share information about ASHRAE's efforts related to the Smart Grid.

**C:** Within the U.S., standards for meters are the concern of NEMA. Overseas, IEC standards are usually adopted, and there are some important differences.

**Dr. Jeffrey Mazer, TIP Physical Scientist – *Smart Grid: A Potential Critical National Need***

Dr. Mazer is a photovoltaic (PV) technology expert formerly with the Department of Energy. At TIP he is collecting input from industry and other agencies and exploring whether the Smart Grid might qualify as a critical national need. There is a growing body of evidence to suggest that it might. The widespread integration of renewables plays an important role in Smart Grid scenarios.

The worldwide photovoltaic industry has exhibited an average annual growth rate (in terms of megawatts of modules shipped) of 44 percent during the last ten years. Meanwhile, the average price per watt has declined markedly.

**Q:** If sensors that determine the state of the grid are powered by the grid, then what happens during a power failure?

**A:** Critical sensors obviously must have an independent power source as well as robust communications links. Recently, there have been papers in the archival literature exploring prototype self-powered MEMS (microelectromechanical systems), piezoelectric sensors that might be coupled to wireless communication, and printed energy storage (capacitor or battery). However, much work remains to be done in this field.

**Q:** An issue for the grid is recharging of electric vehicles (EVs). If a vehicle must be recharged quickly, that requires high amperage. How will this be dealt with?

**A:** Most scenarios for EV use are based on the assumption that most such vehicles would be charged only intermittently during the day, if at all, with the principal recharging taking place at night during off-peak hours. Japan has a battery exchange program for EVs, but the difficulty there is designing vehicles that can provide easy access for swapping batteries quickly.

**Q:** With the proliferation of personal electronic devices, homes today are filled with “wall warts” to provide 12-volt DC to power TV sets, computers, cell phone chargers, etc. Would it make sense to consider wiring homes with 12-volt DC circuits?

**A:** Not anytime soon. The cost of rewiring homes for direct current would likely be prohibitive. However, if one had photovoltaic panels providing power for homes not connected to the grid, one could imagine a future day when appliances in such homes could be powered by low voltage DC from the solar installation. Alternating current has the great advantage that transformers can provide convenient voltages for homes and businesses. (The voltage can then be rectified and conditioned for DC applications.) The present trend in photovoltaic deployment in the developed world is for battery-free, grid-tied systems. Note that off-grid PV-powered homes will require battery storage. There are two reasons for this added infrastructure: 1) provision for uniform voltage for appliances, and, 2) supply of electric power during night time and inclement weather.

**Q:** Low voltage LED (light-emitting diode) lighting may take over someday. Where does the gallium-nitride come from to make white LEDs?

**A:** Electronic-grade gallium nitride for semiconductor devices comes from crystals grown by standard processes. The sources for gallium feedstock are zinc and bauxite ores, which are found in many places around the world. The United States has essentially no primary production of gallium. Thus, at present, gallium feedstock must be imported.

**C:** Energy systems of the future may employ superconducting devices. Better ways to manufacture superconducting wire might be an R&D opportunity for TIP.

**C:** Most battery R&D in recent years has been for small batteries for portable electronic devices. However, distributed energy storage for the grid and high capacity batteries for electric vehicles are sorely needed. The same kinds of batteries needed for electric vehicles could be used for distributed energy storage. An automobile needs to store a tremendous amount of energy. R&D for high-capacity, less costly and lighter weight batteries therefore seems like a natural area for TIP to pursue.

**Q:** Is there a way for a small area to be independent of the grid?

**A:** Yes. In particular, for grid-tied PV, it is possible for the PV system to be decoupled from the grid and work independently of the grid. However, this option requires extra hardware as opposed to a PV system intended only for grid-tied application. In any case, for grid-tied PV, provision must be made for the rapid disconnect of the system from the grid in the event that the grid goes down. Otherwise, repair personnel working on the grid could be injured by a PV system that was holding grid lines at high voltage (a phenomenon referred to as “islanding”). Protocols for preventing PV islanding are addressed in Article 690 of the National Electrical Code.

(The meeting broke for lunch at this point.)

### **Discussion: *Planning Scenarios for Future Funding Opportunities***

Dr. Wisniewski encouraged the Board members to provide feedback to her if additional thoughts on this topic occurred to them following the meeting.

Up to now, TIP has waited until funding has actually been available before announcing a competition. After proposals are received, TIP must allow sufficient time to permit careful review. Congress rarely approves agency budgets prior to the beginning of a new fiscal year. TIP funds are “no-year” money, so in principle, money can be carried over, and need not be allocated before the end of the fiscal year. However, because so many Federal programs are short of funds, if TIP does not allocate its funds before the end of the fiscal year, there is a high probability that they will be reallocated to some other program. Given this situation, TIP’s mode of operation has been to obligate all funds before the fiscal year ends. The result of these constraints is that TIP proposers typically have had only 90 days to prepare and submit proposals.

The Board concluded that 90 days is too short a window for proposal preparation.

**C:** Other industrialized nations tend to announce five-year R&D plans, but the U.S. Congress has a short time horizon which makes planning for future years difficult. Other Federal agencies sometimes announce their intent to hold a competition, stating an approximate level of funding and anticipated numbers of awards, so there is a precedent for making announcements prior to actually having the money in hand. Since the ground rules for applying do not change from year to year, the only uncertainty is how much funding will be available.

**C:** But some agencies issue very broad announcements that have little restriction on technical areas to be funded, whereas TIP can fund projects only in areas determined to be critical national needs. Proposers need to know with sufficient lead time which areas have been so designated.

**C:** The President's budget request for TIP is available well before the fiscal year begins, and often House and Senate marks are available months before the fiscal year budget is finalized. So by noting the highest and lowest of those three figures, TIP could provide potential proposers with a *range* of funding that might be available. TIP could publicize the fact that it *intends* to announce a competition, state the areas identified as critical national needs, and attach a caveat that the actual announcement is contingent on the final appropriation, and that one possible outcome is that the competition will be cancelled. That way, proposers would have more lead time to consider their proposals. Agencies such as DARPA sometimes put out a broad area announcement and then later decide not to fund that area, so there is a precedent for alerting potential proposers about an area of interest, but then not actually funding it.

**Q:** The Defense Department has categories of R&D funding ranging from 6.1 (basic research) to categories 6.3 and 6.4 (for implementation). Might TIP seek funds to allow it to move closer to tech transfer and implementation?

**A:** That would be up to Congress to decide.

**Q:** When TIP posts a White Paper for comment, does that imply that the area will be funded?

**A:** No, the White Paper is just to solicit comments from stakeholders. To rise to the level of a critical national need, the response to the draft white paper must be sufficiently compelling to convince TIP that the area achieves that threshold.

**Q:** Why not allow a proposer to submit a proposal in any area *it* considers a critical national need, rather than just the topical areas announced by TIP?

**A:** TIP sometimes does add new elements to critical national need topics in subsequent years. TIP legislation requires that NIST fund projects only in areas deemed to be critical national needs. Proposals may be rejected because TIP determines that they do not fall within scope of the defined critical national need area. TIP provides unsuccessful proposers with debriefings to explain why their proposals did not meet the criteria, and proposers may resubmit a revised proposal in the next competition.

**C:** It is appropriate that TIP checks with other agencies to ensure that it is not duplicating what they are funding. But just because another agency is providing funding in a given area does not mean that all good proposals in that area will be funded. In the case of the development of the Internet, R&D funding came from several agencies, and this helped to achieve the critical mass

needed to make rapid progress. If a need is really a critical national need, then TIP should not hesitate to sponsor R&D even if other agencies are providing funding in that area.

**A:** The burden is on the proposer to show why funding from other sources is not adequate. There are broad areas where TIP is funding projects in areas also funded by other agencies, but often the difference is that TIP seeks more innovative higher risk projects, whereas other agencies may fund shorter term projects to meet specific agency needs.

**C:** Compared to agencies such as DARPA and NSF, the Department of Commerce does not have a long-standing reputation for funding high-risk R&D, so companies, especially small businesses that are not familiar with TIP, may not even think to inquire about funding opportunities with DOC. TIP needs to constantly strive to get the word out.

**A:** TIP has been striving to do that, and an increasing number of companies are aware of this opportunity. TIP is included in the Federal government's website for proposal solicitations ([www.grants.gov](http://www.grants.gov)). We target specific audiences. For example, when we announced that proposals in bio-manufacturing were being solicited, we contacted state bio groups to publicize it.

**C:** Of course TIP's goal should be to work for higher quality proposals rather than just a greater quantity of proposals.

**Discussion: *The Advisory Board 2010 Annual Report***

The report is due to Congress thirty days after the President's budget, or approximately March 1.

**C:** The report should note that while only about ten percent of the proposals submitted receive funding, the percentage of proposals that meet all criteria is higher. Therefore, additional funding could be put to good use.

**Q:** Does TIP have any way to respond to an excellent proposal outside the area of a critical national need topic?

**A:** TIP must follow its statute, regulations and established procedures as announced in the *Federal Register*, which require that proposals be funded only in announced areas. Of course in a subsequent competition, TIP can announce a new critical national need area *if* the case has been made that the area meets the criteria.

**C:** TIP should define critical national need areas broadly rather than narrowly so as to avoid missing out on excellent proposals that could be deemed outside the scope of narrowly defined critical national needs.

**Q:** Can TIP demonstrate success from completed projects by showing how the investment by TIP led to benefits that exceeded the investment?

**A:** TIP is systematically gathering such data. Now that project results are beginning to appear, TIP can collect both anecdotal information and hard data. Awardees are publishing papers on their accomplishments, patents are being filed, and additional investments are being made to further develop the technology. Those kinds of accomplishments are being tracked.

**C:** The annual report should include such information. Reporting on projects that were halted, and the reasons for the action, can also be instructive—whether the project was halted by TIP because of poor performance by the performer or halted by mutual agreement because the R&D task proved to be much more difficult than envisioned. It is important to capture lessons learned.

**A:** We agree, however, there can be issues of company proprietary information that sometimes limit how much detail can be provided about a project that did not go through to completion.

**C:** TIP should encourage awardees to provide letters or statements for the annual report about TIP's impact on advancing technology and creating benefits. Pictures that show accomplishments could also enhance the annual report.

**C:** Because the annual report will be read by non-technical people, technical jargon should be avoided.

Based on the discussion at this meeting, there was a consensus of the Board on the following major points:

- Given how challenging it is to write a winning TIP proposal, proposers should be given as much lead time as possible. TIP should seek ways to announce potential competitions as far in advance as possible, of course with caveats about funding uncertainties. Six months notice would be much better than 90 days notice.
- Descriptions of critical national need technical areas should be written as broadly as possible to encourage innovation.
- TIP should continue to aggressively market the program to ensure that all those with a potential interest in proposing are aware of it.
- Just because another Federal agency is providing funding in a given area does not mean that all good proposals in that area will be funded. (In the case of the development of the Internet, R&D funding came from several agencies, and this helped to achieve the critical mass needed to make rapid progress.) If a need is truly a critical national need, then TIP should not hesitate to sponsor R&D even if other agencies are funding that area.
- Companies should not have to exert herculean efforts to find other funding because this can be so time consuming that the window of opportunity can be lost.

The meeting was adjourned at 2:40 p.m.