



Technology Innovation Program

*Innovating for
Critical National Needs*

2008 TIP Proposers' Conference

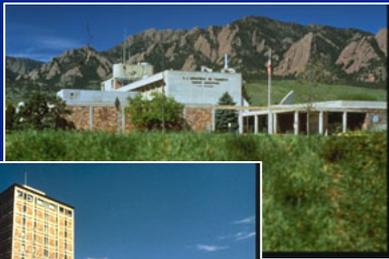
**National Institute of
Standards and Technology**
U.S. Department of Commerce



National Institute of Standards and Technology • U.S. Department of Commerce



Gaithersburg, MD



Boulder, CO

To promote U.S. innovation and industrial competitiveness by advancing

**measurement science,
standards,
and technology**

in ways that enhance economic security and improve the quality of life for all Americans.

NIST Infrastructure Paves the Way to Innovation

The equivalent of research “roads and bridges” the industrial and scientific communities need to develop and commercialize new technologies



- Groundbreaking research tools that foster new fields — quantum information, nanotechnology, bioscience
- Better measurement methods to ensure quality
- Performance measures for accurate technology comparisons
- Standards to assure fairness in trade

TIP is Part of NIST

Funding

- \$70 million FY 2008 including management of ongoing Advanced Technology Program awards

TIP draws upon NIST scientific and technical expertise

- Identifying and selecting critical national need areas for TIP funding
- Peer review of proposals

NIST benefits from collaborating with TIP

- Learning about critical national needs as applied to NIST research
- Enhancing knowledge through proposal review





TIP Purpose ...

“Assisting United States businesses and institutions of higher education or other organizations, such as national laboratories and nonprofit research institutions, to support, promote, and accelerate innovation in the United States through high-risk, high-reward research in areas of **critical national need.**”

*America COMPETES Act
(PL 110-69)
August 9, 2007*



Key Features of TIP

- **Novel Purpose:** address societal challenges not being addressed in areas of Critical National Need (CNN) with benefits that extend significantly beyond proposers
- **Rich Teaming:** businesses, academia, national labs, nonprofit research institutions and other organizations
- **Scientific & Technical Merit:** high-risk, high-reward research
- **Transformational Results:** strong potential for advancing state-of-the-art and contributing to U.S. science and technology base
- **Societal Challenges:** justifies government attention
- **Clear Government Need:** no other funding sources are reasonably available



Key Features of TIP (cont'd)

- **Funding**
 - Single company projects up to \$3M over a maximum of three years
 - Joint Venture (JV) projects may be funded up to \$9M over a maximum of five years
 - Note: TIP funds direct project costs only
- **Cost share**
 - At least 50% of the yearly total project costs – direct plus indirect
 - Composed of both cash and in-kind
- **Allows institutions of higher education to lead a joint venture R&D project**
- **Intellectual property**
 - Reside with U.S. company or any joint venture member (including a university joint venture member)
- **Opportunities for state involvement with R&D planning**
- **Program assessment and annual reports from Program and Advisory Board to Congress required**



The TIP Critical National Need Framework

- TIP uses a *Critical National Need* identification & selection process to shape its competitions and collaborative programs
- *What is a Critical National Need?*
 - *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*



TIP Societal Challenges

- **What is a TIP Societal Challenge?**
 - 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 justify government attention
- **A Societal Challenge**
 - Represents a problem or issue, not a solution or answer
 - Requires a technical solution
 - Is sufficiently difficult to overcome that advancements across a multitude of areas is warranted

Competition topic areas are based on the needs, not technologies, for meeting societal challenges



A Pipeline of Critical National Need Topics

- Leverage nationally recognized science and technology reports and know-how
- Evaluate a large field of areas where transformative research could be expected to have large societal impact
- Use a TIP evaluation framework to assess a diversity of areas and challenges
 - Mapping to Administration Guidance
 - Justifies Government Attention
 - Essentials for TIP Funding
- Identify interest areas



A Pipeline of Critical National Need

Topics (cont'd)

- **TIP seeks input from a host of external stakeholders and organizations**
 - Government agencies and advisory bodies (such as the National Research Council, the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine)
 - Science and Technology Policy Institute
 - Industry organizations, leading researchers from academic institutions, and others
- **TIP confirms analysis of federal funding to determine unique role within a Critical National Need and Societal Challenge**



- Poor road conditions cost U.S. motorists \$54 billion a year in repairs and operating costs.
- More than 33% of the nation's 600,000 bridges are rated structurally deficient or functionally obsolete.

Failure to reverse a trend of increasing highway infrastructure deterioration will lead to reductions in national and economic security, lower worker productivity, and an overall reduction in the quality of life.



2008 TIP Competition Important Dates

- The Competition is **currently open**
- **The deadline is:**
 - Thursday, September 4, 2008
 - All proposals must be received by TIP by 3:00 PM Eastern time (regardless of submission method) **WITHOUT EXCEPTION**

***To ensure timely receipt,
don't wait to submit until deadline day!***



For Info on TIP ..

- **Visit TIP's website**
 - *www.nist.gov/tip*
- **Register for the TIP mailing list**
 - *http://tipmailing.nist.gov/forms/mailing_list.cfm*
- **Upcoming TIP webcasts**
 - *Proposing for TIP Using Grants.gov: Thursday, July 24, 2PM ET*
 - *Human and Animal Subjects Requirements for TIP Proposals: Wednesday, July 30, 2PM ET*



Competition Overview: Civil Infrastructure Structural Integrity



2008 TIP Competition

- **Critical National Need**
 - Civil Infrastructure
- **Societal Challenge**
 - Civil Infrastructure Structural Integrity
 - Absence of cost-effective means for establishing accurate assessments of the integrity and condition of civil infrastructure elements
- **TIP Response**
 - Advanced Sensing Technologies For The Infrastructure: Roads, Highways, Bridges and Water Systems
 - Two elements:
 - Inspection
 - Monitoring



2008 TIP Competition: Scope

What TIP is Seeking

- Advancements beyond the state-of-the-art of sensing technologies that will assess the structural integrity and/or deterioration processes of bridges, roads, water mains, and wastewater collection systems
 - More accurate
 - Easier to use
 - More economically feasible



2008 TIP Competition: Scope (cont'd)

Innovations are being sought

- Create and validate new advanced, robust, network capable, nondestructive evaluation and test sensing systems, or system components
 - Cost effectively and quantitatively inspect and evaluate the structural integrity of the civil infrastructure
- Targeted system should be capable of (but not limited to)
 - Detection of corrosion, cracking, and delamination or failure of critical infrastructure elements and the materials of which they are made

Innovations are being sought (cont'd)

- **Solutions are needed for improved inspection systems**
 - Roads, highways, bridges, drinking and wastewater systems
 - Provide real-time understanding of the integrity and service life through the use of portable, mobile or remote sensing capability
- **All aspects of the system can be considered**
 - Advanced, cost effective
 - Networked , either fixed or mobile
 - Easily deployable, self powered, and self monitoring
 - All system components, hardware and software



2008 TIP Competition: Scope (cont'd)

Also within scope

- Systems that provide new and advanced methodologies for the detection of fluid leaks from water piping systems
- Single components of a system solution that include a demonstration of the component in a system setting

Proposals that include validation by potential end users will be considered as having strong potential



2008 TIP Competition: Scope (cont'd)

Ineligible projects under this competition

- Advancements in a system component without a prototype demonstrating that the component is functional within a system solution
- Integration projects using only existing state-of-the-art components



2008 TIP Competition: Scope (cont'd)

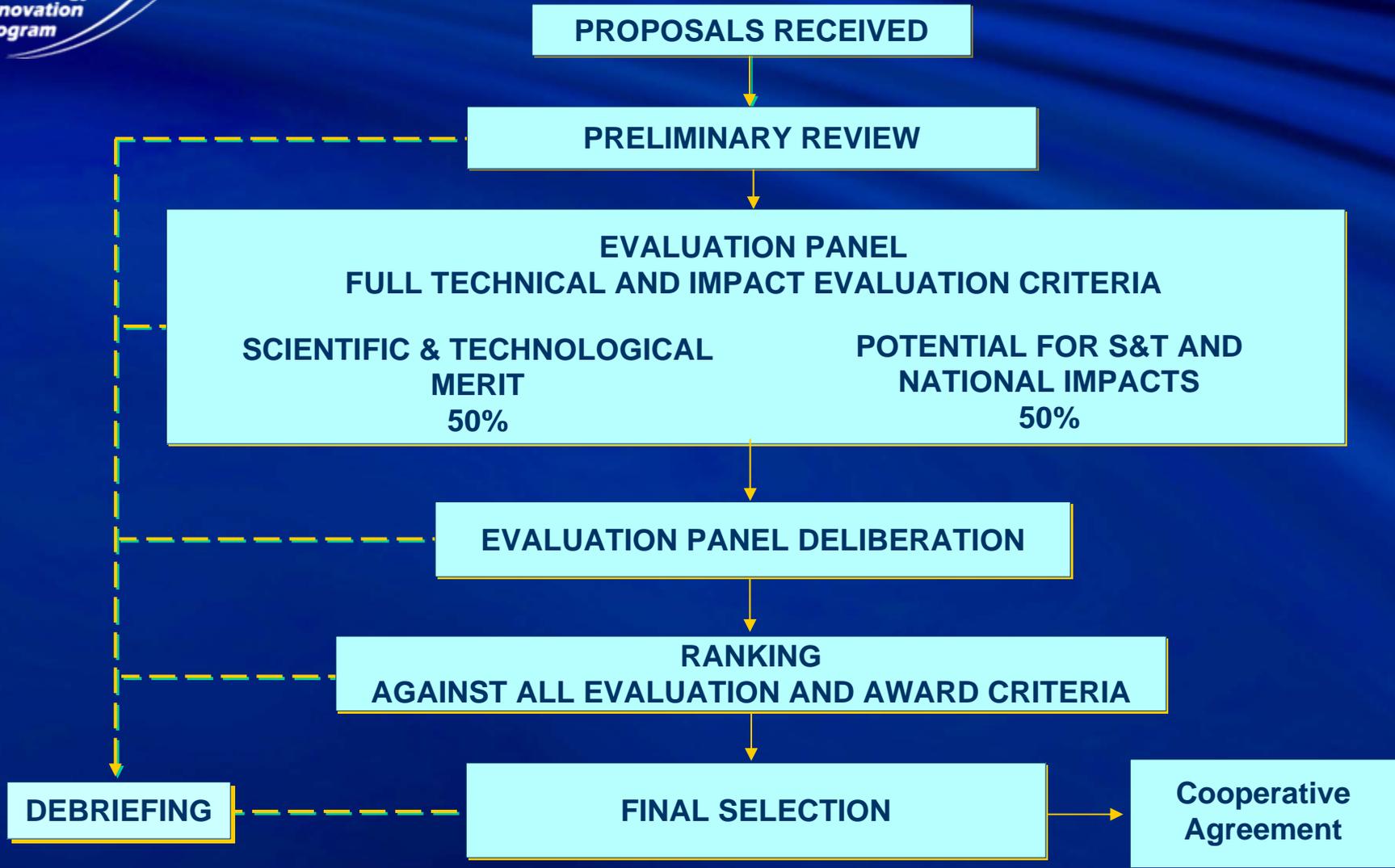
Ineligible projects under this competition (cont'd)

- Straightforward improvements to existing components without the potential for a transformational increase in performance to the technical requirements
- Software development that is predominantly straightforward, routine data gathering using applications of standard software development practices
- Other ineligible projects, as described in Sec. D.1. in the TIP Proposal Preparation Kit.



Understanding the TIP Criteria

Project Selection Process





TIP Award and Evaluation Criteria

- **Proposals are selected for funding based on:**
 - TIP Award Criteria (15 C.F.R. §296.22), and
 - TIP Evaluation Criteria (15 C.F.R. § 296.21)
- **No proposal will be funded unless TIP determines:**
 - It has scientific and technical merit
 - The proposed research has strong potential for addressing a societal challenge within the TIP-identified area(s) of Critical National Need

***Peer Review is the Foundation
for all Proposal Evaluations and Decisions***



TIP Award Criteria: The First Three

Three Award Criteria explain the need for TIP financial support

- Why is TIP support needed?
- Efforts to secure alternative funding
- Novelty of the proposed research (technology)



Award Criteria: Why is TIP Support Needed?

- How will the Nation benefit?
- How will the specific project address the competition's societal challenges?
- Without TIP funding, what will be the consequences?
- What will be the potential impact with and without TIP funding on the potential solution?



Award Criteria: Efforts to Secure Alternative Funding?

- Each proposer, single or each JV member, must have adequately sought alternative funds but such funds are not available or not available in a reasonable time period
 - **Internal funding?**
 - Specifically, why is it not available?
 - **External private sources?**
 - Why was the effort unsuccessful?
 - **Other government sources?**
 - What efforts were made and the status of submissions?
 - Have all other sources of government funds been contacted? If not, why?
- Include documentation



Award Criteria: Novelty of Proposed Results

Research (Technology) RESULTS from TIP-funded research must be novel!

- How is your proposed research (technology) novel relative to similar research results others have developed, commercialized, marketed, distributed, or sold?
- Why does your project have the potential to more fully address the societal challenge(s)?
- Science-based and performance-based detail (metrics) are critical to making a competitive case

Novelty of Proposed Results (cont'd)

Proposed Solution: The New State-of-the-Art

Project's objectives?

Quantified targets?

How the project may more fully address the challenge?

Comparison to competing solutions?



TIP
Innovation

Baseline: Today's State-of-the-Art

Within the industry at large?

What others are currently developing?

Within the team?



TIP Award Criteria: The Remaining Three

The remaining three Award Criteria

- Scientific and technical merit and may result in intellectual property vesting in a U.S. entity
- Strong potential to advance the state-of-the-art and contribute to the U.S. science and technology knowledge base
- Strong potential to address areas of critical national need
 - Transforming the Nation's capacity to deal with major societal challenges
 - Generate substantial benefits to the Nation that extend significantly beyond the proposer

***These are expanded upon as part of the
TIP Evaluation Criteria***



TIP Evaluation Criteria

- **Two Evaluation Criteria**
 - 1) Scientific and Technical (S&T) Merit (50%)
 - 2) Potential for S&T and National Impacts (50%)
- **Subject to multidisciplinary peer review**



Evaluation Criterion

1) Scientific and Technical Merit (50%)

The proposer(s) adequately addresses the scientific and technical merit and how the research may result in intellectual property vesting in a United States entity ...

1) Scientific and Technical (S&T) Merit (50%)

(cont'd)

Specifically ...

- The research is novel
- Results have the potential to address the technical needs associated with a major societal challenge
- The research is high-risk, high reward
- The project has the key expertise and resources (e.g., data, equipment & facilities) necessary to accomplish the project
- The research plan is scientifically sound with tasks, milestones, timeline, decision points and alternate strategies

Societal Challenge as the Driver of Technical Planning

What is Needed to Overcome
the Societal Challenge?



What is Needed for Technical Success?

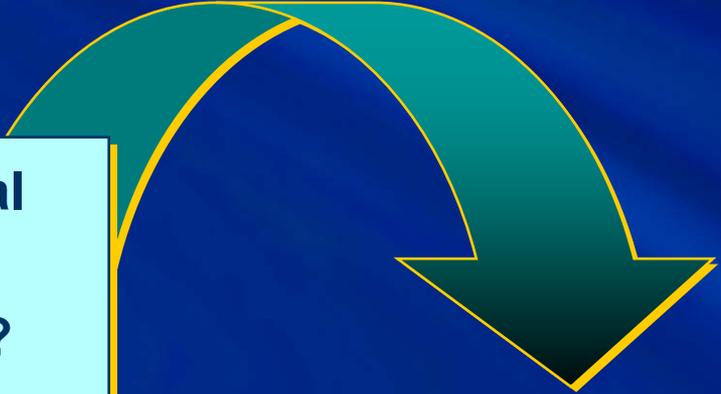
The proposed research must be novel!

- Ask yourself, “Why is it novel?”
 - Technical approach or goals?
 - Is it a novel approach or novel integration?
- Is the research transformational, not just incremental or predictable?
- How is the research innovative relative to alternative approaches being pursued?
 - By others inside or outside of the team
 - Domestic or foreign competitors
 - If others have tried and failed, why will you succeed?

S&T Merit: High-Risk, High-Reward Research

Does your idea...

- ✓ Have potential for transformational results?
- ✓ Far- or wide-ranging implications?
- ✓ Address the TIP competition critical national need?
- ✓ Perhaps too novel or spans too diverse a range of disciplines?



***High-Risk,
High-Reward
R&D***



S&T Merit: High-Risk, High-Reward Research

A few questions to ask ...

- What are the scientific risks or technical barriers?
- How will the results have the potential for far- or wide-ranging implications if successful?
- Will the work, if successful, dramatically transform the future direction and state-of-the-art?
- Does your proposal seek to overcome extremely difficult scientific or technical challenges?
- What are the leveraged technical and scientific benefits beyond the initial applications?

High-Risk High-Reward and Scientific Soundness

High-Risk High-Reward

- Extremely difficult scientific risks or technical challenges
- Potential for far- or wide-ranging implications
- Dramatic transformation
- Single innovations or integration of disparate technologies, or both
- Technical leverage

Sound

- Approach and metrics to manage project are based on
 - Sound scientific foundation
 - Sound engineering approach
 - Sound project expertise



Your TIP proposal should balance both!

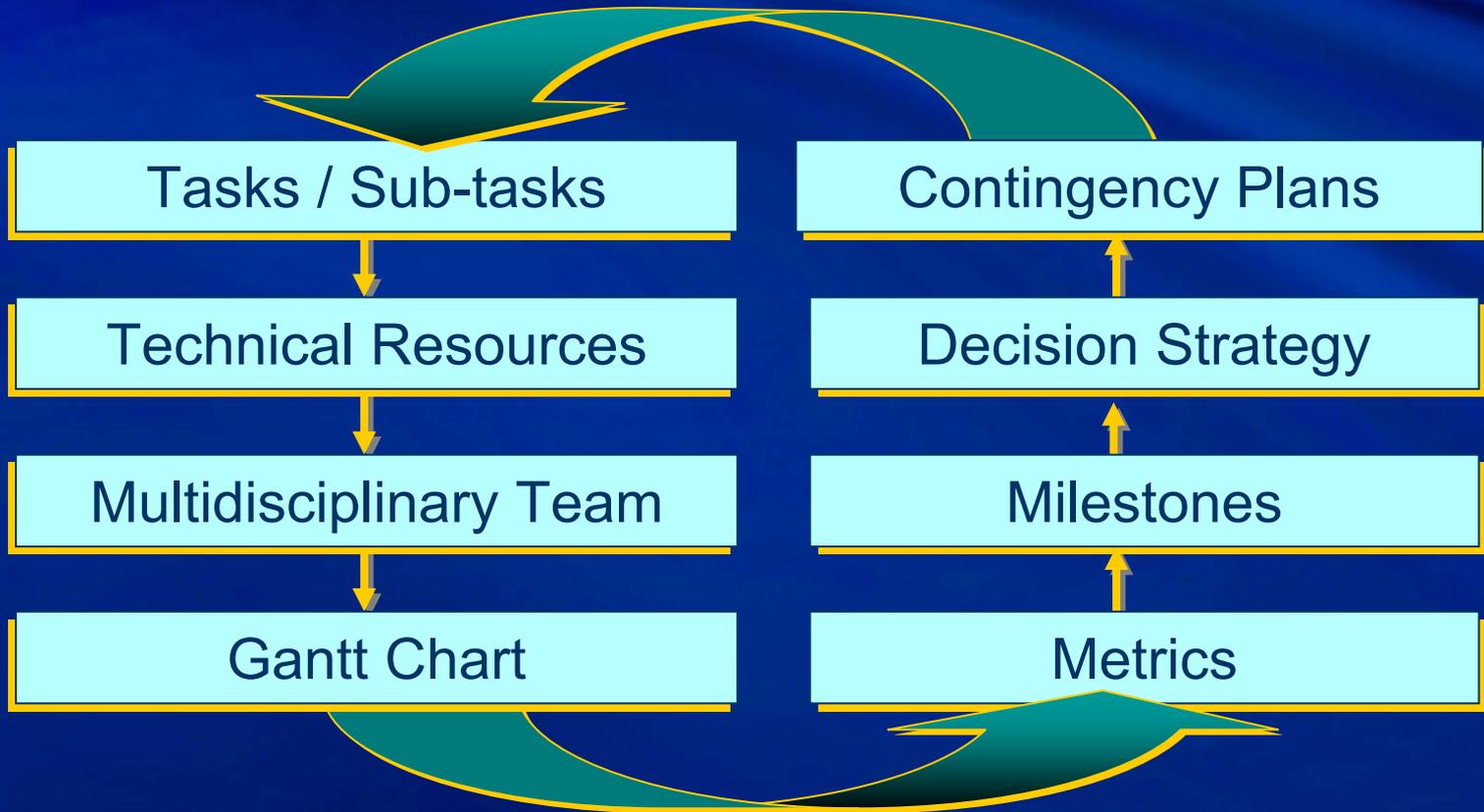


S&T Merit: Scientific and Technical Expertise

Technical experience, qualifications and location of all technical performers, key subcontractors, and informal collaborators

- Subcontractors and key suppliers
- Joint Venture partners
- Critical informal collaborators
- Describe any ownership or financial arrangements between performers with any of the proposer(s)
- Explain and justify if:
 - Foreign-owned company participation (NIST-1022G)
 - R&D at non-U.S. sites (NIST-1022H)

How will you achieve your goals?



Essential Elements of a Quality R&D Plan



S&T Merit: Facilities, Equipment and Resources

Adequacy of facilities, equipment and resources

- Existing vs. needed
- Timeline for meeting needs
- Link major purchases to the R&D plan
- Equipment or resources collaboration agreements
- Contractors for key expertise, facilities, goods or services

2) Potential for S&T and National Impacts (50%)

- **Establishes that the proposed research has strong potential**
 - For advancing the state-of-the-art and contributing significantly to the United States science and technology base, and
 - To address areas of Critical National Need through transforming the Nation's capacity to deal with a major societal challenge(s) that is not currently being addressed
 - To generate substantial benefits to the Nation that extend beyond the direct return to the proposer



Potential for Impact: Advancing the State of the Art

TIP Philosophy

*Successfully accomplishing the proposed research and surmounting the technical challenges should result in a **dramatic transformational** change in the future direction and state of the technology.*

This “path change” should be a major leap forward, advancing the state-of-the-art significantly.

Transformational Results

- Outcomes that enable disruptive change
- Have the potential to radically improve our understanding of systems and technologies
- Challenge the status quo of research approaches and applications



Potential for Impact: Advancing the State of the Art (cont'd)

Explain

- How can the research advance the state-of-the-art and contribute to the U.S. science and technology knowledge base?
 - Begin with a clear definition of current state of the art
 - Establish the difference(s) this project will make
 - What is learned if fully successful? Only partially successful?
- How may Intellectual Property result?
 - How will IP be vested in a U.S. entity?
- Your preferred strategy for disseminating the research results, and the level of commitment to that strategy for each research participant?



Potential for Impact: Transforming the Nation's Capacity

1) The potential magnitude of transformational results upon the Nation's capabilities

- How will the Nation's capabilities to address a societal challenge be different once the results of this research are applied?
- What is the magnitude or difference that the technology will make?
- Quantify!
- What are the specific differences TIP funding makes in realizing the societal benefits of the proposed project?



Potential for Impact: Transforming the Nation's Capacity *(cont'd)*

2) How and when the ensuing transformational results will be useful to the Nation

- How will the research results (technology) be used?
- How will the research results (technology) move from the research team to those who will use it to address the societal challenge?
- How will the research (technology) be implemented to have the best opportunity to solve the stated areas of critical national need and societal challenges?



Potential for Impact: Transforming the Nation's Capacity ***(cont'd)***

3) The capacity and commitment of each award participant to enable or advance the transformation to the proposed research results (technology)

- Organizational Commitment
- Organizational Information
- Current and Past Federal Awards
- Financial, Employment and Ownership Information



Avoid These Proposal Weaknesses

- **Outside the TIP mission**
 - Low-risk (e.g., product development)
 - Lacks demonstrated need for TIP support
 - Reasonable and thorough efforts for other funding have not been adequately pursued
- **Lacks clear connection between technical goals and the TIP solicitation**
- **Lacks sufficient detail**
 - What is novel and why?
 - How is the R&D both “high-risk, high-reward”, and “transformational”?
 - How you will accomplish the objectives?
- **Unsupported assertions**



Eligibility, Administration and Additional Requirements



Discussion Points

- Eligibility
- Funding Limitations
- Cost Share Contributions
- Modes of Proposal Submission
- Page Limit
- Intellectual Property Provisions
- Budget Preparation
- Direct Costs
- Indirect/Overhead Costs
- Administrative Requirements and Cost Principles
- Information Requests During Proposal Review
- Accounting System Certification and Audits
- Human and Animal Subjects
- Key Contacts
- 2008 TIP Competition Important Dates

- **Single Company** – a small or medium-sized for-profit company doing a majority of its business in the US
- **Joint Venture** – A business arrangement that includes either
 - At least 2 separately owned small or medium-sized for-profit companies; or
 - At least 1 small or medium-sized for profit company and one institution of higher education or other organization such as a national laboratory , governmental laboratory (not NIST) or nonprofit research institute



Eligibility: Large Company Participation in TIP

- Large company: Fortune 1000 companies (total revenues in excess of \$1.63B)
- Large companies **MAY**
 - Participate and receive funding as a contractor (w/ certain requirements/limitations)
 - Participate as a JV member and provide cost share
- Large companies **MAY NOT**
 - Receive Federal funds as a JV member



Eligibility: *Foreign-Owned Company Participation*

- U.S.-incorporated company with a parent company incorporated in another country may participate
- Company's participation must be:
 - In the economic interest of the U.S.
- Home country of parent must afford U.S. companies:
 - Comparable opportunities to participate in government-funded programs similar to TIP
 - Comparable local investment opportunities
 - Adequate and effective protection of U.S.-owned intellectual property rights
- Submit NIST-1022G, Foreign-Owned Company Questionnaire (Exhibit 10 in the TIP Proposal Preparation Kit)



Funding Limitations

- **Single Company** - Up to \$3M Federal funds over 3 years
- **Joint Venture** – Up to \$9M Federal funds over 5 years



Cost Share Contributions

All awards require a 50% cost share contribution

- Cash contributions
 - Any nonfederal source (except contractors), e.g.
 - Proposer, state and local government, companies, nonprofits, etc.
- Third party in-kind contributions
 - Any nonfederal source (except contractors)
 - Equipment, research tools, software, supplies, etc.
 - Refer to 15 CFR Part 14.23
 - Use NIST-1022D



Modes of Proposal Submission

- Electronically (via Grants.gov)
 - General Instructions for Submitting TIP Proposals Electronically via Grants.gov (Chapter 5 in the TIP Proposal Preparation Kit)
 - Begin Grants.gov registration early!
 - Upcoming webcast on Grants.gov and TIP
July 24, 2008, 2PM ET
 - Log-in instructions can be found on the TIP website
 - Archive will be available for viewing after the webcast is conducted
- Paper

- Single company: **30** pages maximum
- Joint venture: **40** pages maximum
- See Chapter 3 of the TIP Proposal Preparation Kit for:
 - documents excluded from page limit and for
 - a checklist of all items required for a complete proposal
- Font size no less than 12 point
- Figures and diagrams must be readable



Intellectual Property Provisions

- **Single Company awards**
 - Bayh-Dole Act applies, the entity that invents owns the invention (with some unique exceptions)
- **Joint Venture awards**
 - Ownership may vest in any JV participant as agreed by the JV members

Government reserves nonexclusive, nontransferable, irrevocable paid-up license for governmental use in all cases



Budget Preparation

- Detailed budget narrative (NIST-1022C)
- Third Party In-Kind Contributions (NIST-1022D)
- Estimated Multi-Year Budget
 - NIST-1022E (Single Companies)
 - NIST-1022F (Joint Ventures)

Costs that can be identified specifically with a particular cost objective, including ...

- Personnel
- Travel
- Equipment
- Materials/supplies
- Contracts
- Other



Indirect/Overhead Costs

Costs that cannot be readily identified with a single cost objective but identified with common or joint objectives, including ...

- General administration
 - Salaries / expenses of executive officers
 - Personnel administration
 - Accounting
 - Fringe benefits
 - Office rent
 - Maintenance
 - Library expenses
 - Office supplies
 - General purpose office equipment, computers, printers, copiers, etc.



Administrative Requirements and Cost Principles

- **Administrative Requirements**
 - 15 CFR Part 14
- **Cost Principles**
 - For-profit companies: 48 CFR Part 31
 - Universities: 2 CFR Subtitle A, Chapter II, Part 220 (OMB Circular A-21)
 - Non-profits: 2 CFR Subtitle A, Chapter II, Part 230 (OMB Circular A-122)
 - State and local governments: 2 CFR Subtitle A, Chapter II, Part 225 (OMB Circular A-87)
 - Hospitals: 45 CFR Part 74, Appendix E
- **See www.nist.gov/tip/helpful.html**



Information Requests During Proposal Review

***Information requests are at TIP's discretion
and may include ...***

- Site visits
- Oral reviews
- Corrections to forms



Accounting System Certification and Audits

- NIST may require some recipients to provide an accounting system certification
 - Cost of certification may be included in “other” cost category
- Recipients must undergo periodic financial compliance audits
 - Details will be provided as part of the award terms and conditions
 - Include audit costs in proposal budget

Proposal budget becomes the basis for project costs going forward



Human and Animal Subjects

- TIP can fund projects involving human and/or animal subjects in research activities
 - Must comply with applicable Federal rules
 - Not just biomedical research
 - You may be required to submit additional information
- Refer to Chapter 4 of the TIP Proposal Preparation Kit and “*Guidelines and Documentation Requirements for Research Involving Human and Animal Subjects*”
 - *www.nist.gov/tip/helpful.html*



Human and Animal Subjects

- Call Human & Animal Subjects Advisor for help
- Upcoming webcast on the details surrounding H&A Subjects:

Wednesday, July 30, 2008, 2:00 PM ET

- Log-in instructions can be found on the TIP website
- Archive will be available for viewing after the webcast is conducted



Key Contacts

- **Administrative, budget, cost-sharing, and eligibility**
 - Barbara Lambis, 301-975-4447, barbara.lambis@nist.gov
- **Project selection, evaluation and award criteria**
 - Thomas Wiggins, 301-975-5416, thomas.wiggins@nist.gov
- **Electronic proposal submission**
 - Chris Hunton, 301-975-5718, christopher.hunton@nist.gov
- **NIST 1022 and associated forms**
 - Deborah Dubeau, 301-975-3462, deborah.dubeau@nist.gov



Key Contacts (cont'd)

- **Human and/or animal subjects**
 - Lawrence Uhteg, 301-975-8779, lawrence.uhteg@nist.gov
- **Foreign-owned company participation**
 - Kathleen McTigue, 301-975-8530, kathleen.mctigue@nist.gov
- **Grants and cooperative agreement rules and regulations**
 - Grants and Agreements Management Division, 301-975-6328, grants@nist.gov



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