

A light blue map of the United States is centered on the slide. Overlaid on the map are various images related to technology and manufacturing, including a person working at a computer, a gear, a microscope, and a person in a lab coat. The text is overlaid on this map.

# **Expanding U.S. Innovation in Areas of Critical National Need: TIP Interests and Funding in Nanomanufacturing**

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# The Technology Innovation Program

## Funding Transformational Research for Critical National Needs

### TIP's Mission

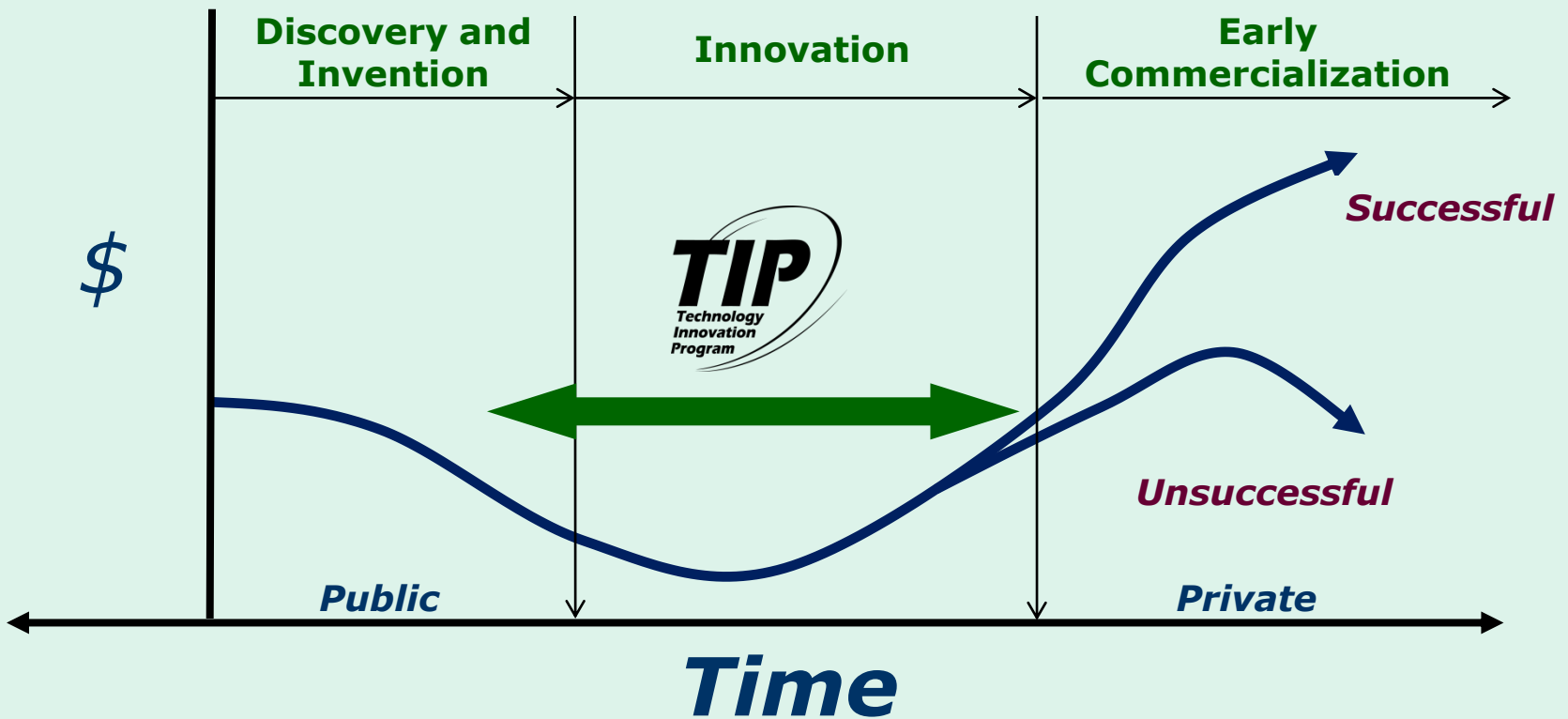
- Assist United States businesses and institutions of higher education or other organizations, such as national laboratories and nonprofit research institutions
- Support, promote, and accelerate innovation in the United States through high-risk, high-reward research
- In areas of critical national need



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

**FUNDING:** \$69.9 million for FY 2010, including management of ongoing TIP and Advanced Technology Program awards

## Funding for Transformative Research





# Key Features of TIP

- **Novel Purpose:** address societal challenges not being addressed in areas of Critical National Need with benefits that extend significantly beyond the 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 the state-of-the-art and contributing to the U.S. science and technology base
- **Societal Challenges:** justifies government attention
- **Clear Government Need:** no other funding sources are reasonably available



# TIP Project Types

- **Funding**
  - Single company projects can receive 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.
- **Proposers' cost share**
  - At least 50% of the yearly total project costs – direct plus indirect
  - Composed of both cash and in-kind
- **Structure**
  - Single company projects led by a small or medium-sized U.S. company
  - Joint venture projects of either:
    - 1) at least **two** for-profit U.S. companies with the project lead being a small or medium-sized company, or
    - 2) at least **one** small or medium-sized company and **one** institute of higher education or other eligible organization with the lead being either the small or medium-sized company or the institute of higher education



# Current TIP Critical National Need and Interest Areas

## Critical National Need Areas

- Civil Infrastructure\*
- Manufacturing\*

## Other Interest Areas

- Robotics\*
- Complex Networks
- Energy\*
- Healthcare\*
- Sustainability
- Water\*

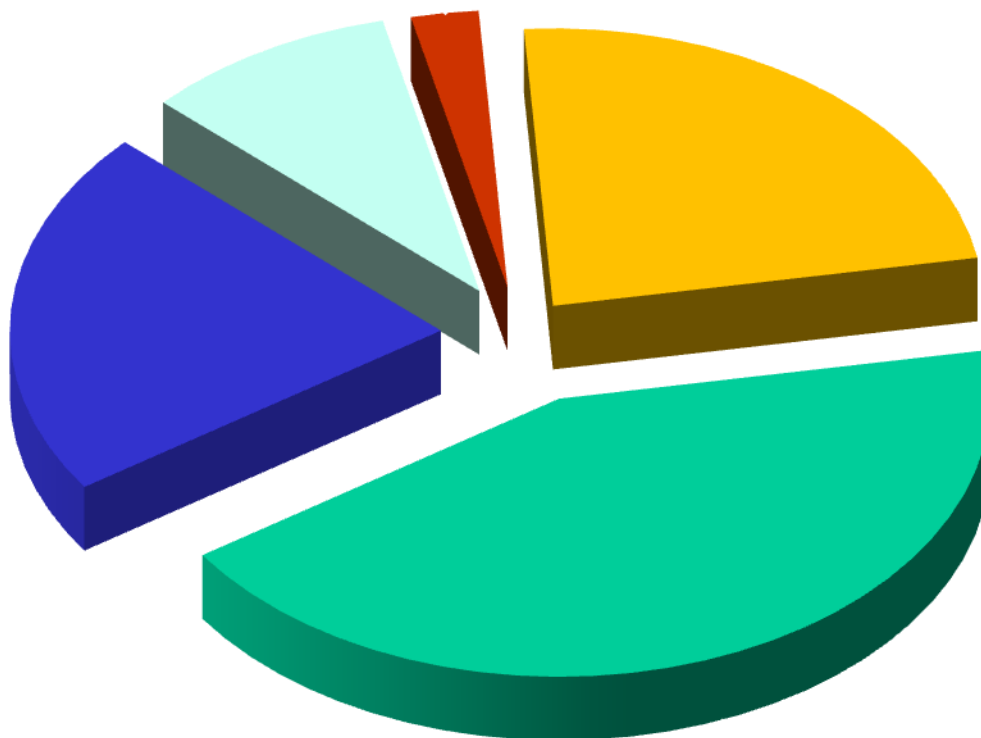
Interest Areas subject to change as TIP focuses on the Nation's most pressing priorities!

How might nanotechnology address the Nation's critical national needs?

\* TIP White Paper available for public comment



# Total TIP Funding of Manufacturing Projects Awarded in 2009 – 2010



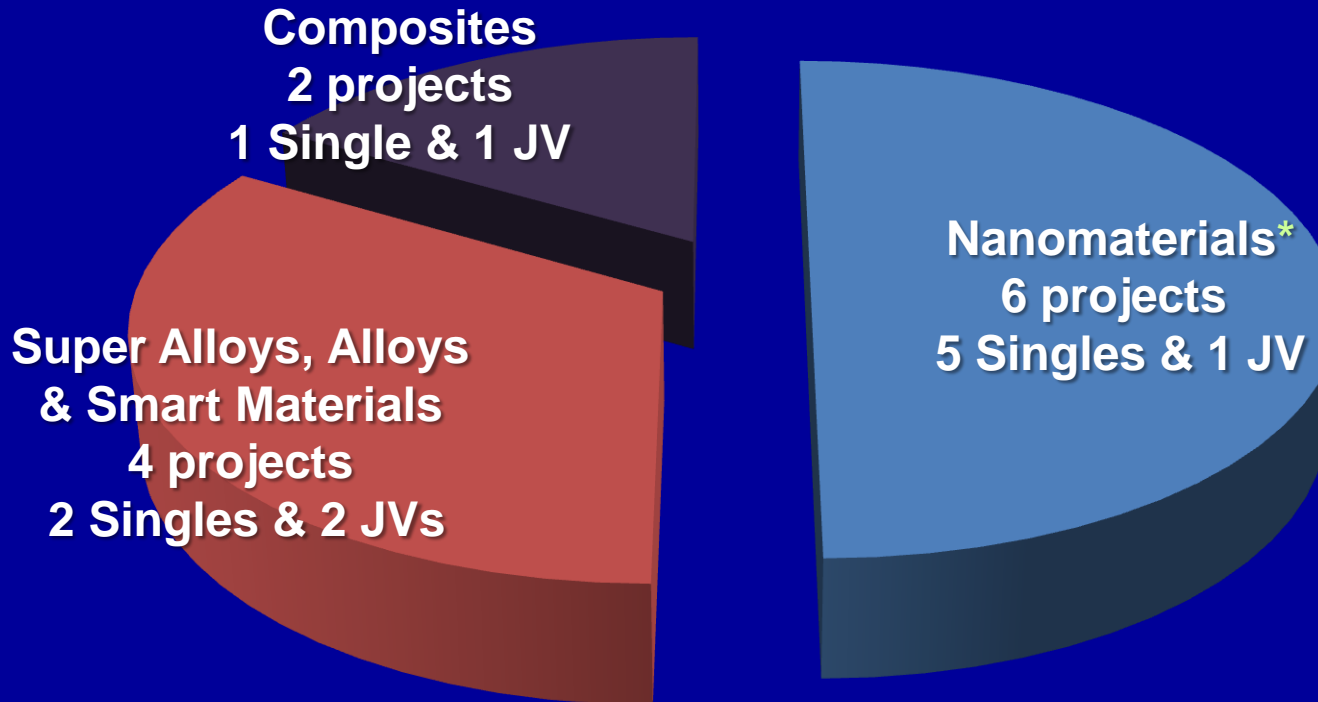
Total Funding      \$129.8 M  
Federal Share      \$ 63.1 M





# TIP Investment in Manufacturing: 2009 Competition Awards

## Accelerating the Incorporation of Materials Advances into Manufacturing Processes



### Funded:

12 awards

\$84 M R&D

Federal share \$41 M

\* Classification against TIP solicitation materials scope





# TIP's Current Project Portfolio

## 2008 – 2010

### Civil Infrastructure

- 2008 and 2009
- 17 awards
  - 12 joint venture, 5 single
- \$149.9 M
  - \$72.6 M Federal share

### Manufacturing

- 2009 and 2010
- 21 awards
  - 4 joint venture, 17 single
- \$129.8 M
  - \$63.1 M Federal share

### ➤ Total high-risk, high-reward R&D initiated:

- ✓ 38 projects with 132 participants
  - 89 small/medium companies, 2 large companies, 32 universities, 5 federal/state/local, 4 not-for-profit
- ✓ \$279.7 M total
  - \$135.7 M Federal share



# TIP Funded Nanotechnology Research: Current Portfolio

## Nanomanufacturing

- 2010 & 2009 Competition
- 13 awards
  - 3 Joint Venture, 10 Single
- \$76.6 M (est.)
  - \$37.2 M Federal share (est.)

## Nanoscale Devices & Systems

- 2009 Competition
- 1 Joint Venture award
- \$13.9 M (est.)
  - \$6.5 M Federal share (est.)

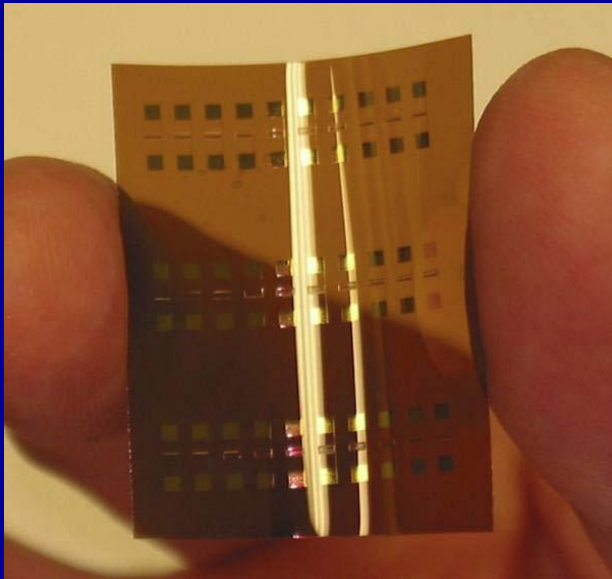
- **Total high-risk, high-reward R&D initiated:**
  - ✓ **14 projects**
    - 18 small/medium companies, 1 university, 3 other
  - ✓ **\$90.5 M total (est.)**
    - \$43.8 M Federal (est.)

# Manufacturing: Process Scale-Up (Nanomaterials)

## Production of Low-Cost, High-Quality Metallic and Semiconducting Single-Walled Carbon Nanotube Inks

Brewer Science, Inc., Rolla, MO

Other Joint Venture Participant: SouthWest NanoTechnologies, Inc., Norman, OK



February 1, 2010 to January 31, 2013

Total Project Budget: \$13,910k

TIP Cost Share: \$6,527k

### Project

Develop technologies for the cost-effective production of high-purity, high-quality metallic and semiconducting carbon nanotube 'inks' to enable commercial production of a wide variety of high-performing electronic devices for energy, flexible electronic, and sensor applications

### Potential Impacts

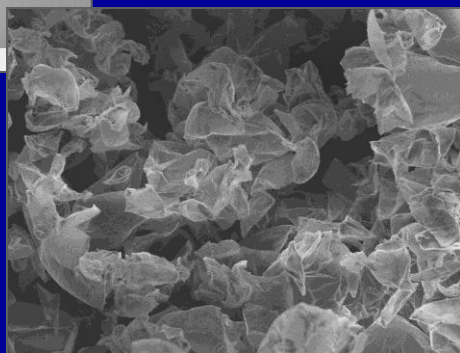
- Deliver affordable high-purity, high-quality single-walled carbon nanotube inks
- Enable domestic leadership in a wide variety of applications, including photovoltaics, supercapacitors, solid-state lighting, energy storage, printed electronics, and sensors

•9/27/2010

# Manufacturing: Process Scale-Up (Nanomaterials)

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

Angstrom Materials, Inc., Dayton, OH



### Project

Development and scale-up of cost-effective processes for producing functionalized nano graphene platelet for energy storage and composite applications

### Potential Impacts

- Significant reduction in cost and enhanced performance of supercapacitors, Li-ion batteries, and fuel cells over current composite materials or other classes of materials
- Other potential markets include electrostatic painting, eliminating the use of volatile organic compounds, and thermal interface materials. Both markets are already or are likely to be in the billions of dollars in the near future

February 1, 2010 to January 31, 2013

Total Project Budget: \$2,988k

TIP Cost Share: \$1,494k

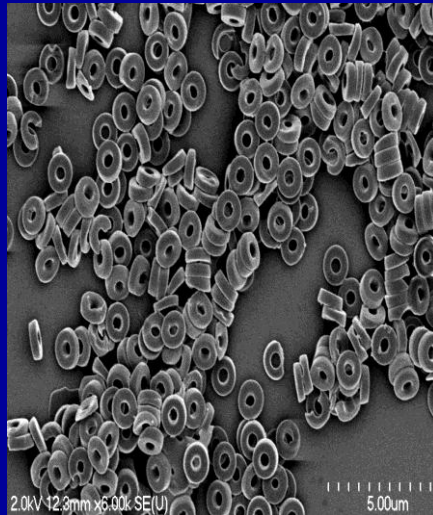
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# Manufacturing: Process Scale-Up (Nanomaterials)

**Development of a Manufacturing Process for a Scale Up of Nanoparticles of Specific Sizes, Shapes and Materials for Therapeutic Applications**

**Liquidia Technologies, Inc., Durham, NC**



February 1, 2010 to January 31, 2013

Total Project Budget: \$5,942 K

TIP Cost Share: \$2,971 K

## Project

Develop a process that results in a 1000-fold scale-up for fabricating nanoparticles using the Particle Replication in Non-Wetting Templates (PRINT) technology

## Potential Impacts

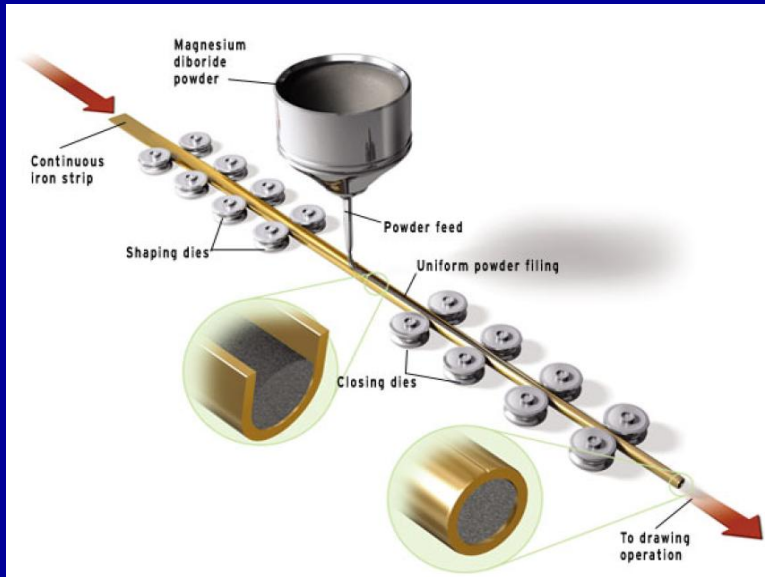
- Provide new manufacturing capabilities to create precisely engineered nanoparticles in clinically relevant quantities
- Enable safer and more efficient delivery of vaccines and therapeutics to address unmet medical needs

•9/24/2010

# Manufacturing: Process Scale-Up (Alloys)

## High Speed, Continuous Manufacturing of Nano-doped Magnesium Diboride Superconductors for Next Generation MRI Systems

Hyper Tech Research, Inc., Columbus, OH



### Project

Revolutionize the way nano-doped, alloyed superconductor MgB<sub>2</sub> wires are manufactured using a continuous tube forming and filling process to enable next generation, higher temperature MRI magnets and advanced welding wire

### Potential Impacts

- Enable a 500-1000 times increase in manufacturing productivity for high-volume nano-doped MgB<sub>2</sub> superconductors to lower the cost of MRI systems
- Revolutionize the manufacture of flux cored and metal cored wire for welding industry

February 1, 2010 to January 31, 2013

Total Project Budget: \$6,050k

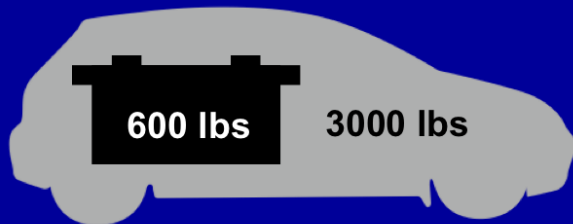
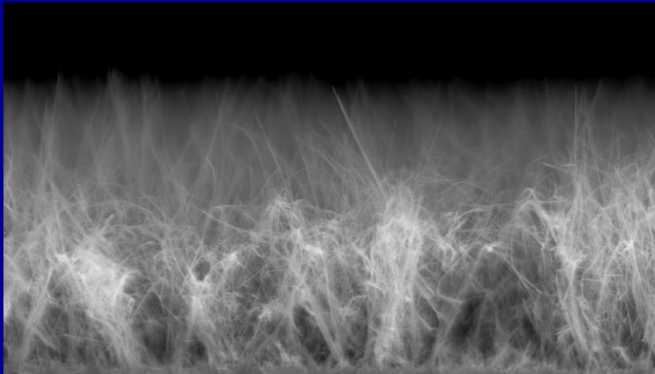
TIP Cost Share: \$3,000k

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# Manufacturing: Process Scale-Up (Nanomaterials)

## Silicon Nanowires for Advanced Lithium-ion Batteries

Amprius, Inc, Menlo Park, CA



February 1, 2010 to January 31, 2012

Total Project Budget: \$6,000k

TIP Cost Share: \$3,000k

### Project

- Create high-capacity lithium-ion battery anode from Silicon-based nanomaterials
- Develop high-volume, low-cost manufacturing capability to grow the U.S. advanced battery industry
- Integrate an advanced anode into high-capacity batteries for electric vehicles
- Extend developments in manufacturing to accelerate growth of the nanomaterials industry in the U.S.

### Potential Impacts

- Reduce greenhouse gas emissions and dependence on foreign oil by accelerating the adoption of electric vehicles
- Enable the U.S. electric vehicle industry to become more competitive
- Extend impacts to industries that benefit from nanomaterials e.g. solar, storage, and LED lighting



**New!**

Critical National Need Area	Societal Challenge Topic	FY 2011	FY 2012	FY 2013	FY 2014
Civil Infrastructure (#1)	Inspection, Monitoring, Repair	Advanced sensing technologies			
		Advanced repair materials			
Manufacturing	Manufacturing Processes for Advanced Materials (#2)	Advanced materials			
	Critical Processes	Biomanufacturing			
		Manufacturing			
	Intelligent Automation	Robotics & intelligent automation (#3)			
Energy	Smart Grid	Technologies to enable a smart grid (#4)			
Healthcare	Proteomics, Data Integration & Analysis, and Biomanufacturing for Personalized Medicine	Technologies for personalized medicine (#5)			
Water	Ensuring & managing water availability	Technologies for water availability (#6)			
Complex Networks		Complex networks			
Sustainability		Sustainability			

## Industry, non-proprietary White Papers

- Present stakeholder views specific for TIP!
  - What nanotechnology-related societal challenges TIP should consider and address
  - See “*A Guide for Preparing and Submitting White Papers on Areas of Critical National Need*” (October 2010), at <http://www.nist.gov/tip/wp/index.cfm>



# ***Expectations for 2011***

- TIP is actively seeking white papers
  - Rolling deadlines: May 10, July 12
- New/revised TIP Draft White Papers posted for public comment:
  - <http://www.nist.gov/tip/wp/index.cfm>
- 2011 Competition(s) – *TBD*
  - Announcements as early as March
  - Announced in Federal Register, Grants.gov, on TIP website (sign up for email alerts!)
  - Proposers' Conference – Gaithersburg, MD plus targeted groups/settings and webinars



# *Expectations for 2011 (cont'd)*

## What Might Your Actions Be? Prepare!

- Does my idea fit within any of the TIP white paper topics?
- What might my proposal address, and who would I wish to involve?
- Register for the TIP mailing list.



## *For More Information on TIP*

Visit TIP's website

– *[www.nist.gov/tip](http://www.nist.gov/tip)*

Register for the TIP mailing list

– *[http://tipmailing.nist.gov/forms/mailing\\_list.cfm](http://tipmailing.nist.gov/forms/mailing_list.cfm)*



*Thank you  
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