Retrospective (and Some Prospective) on NNI RSL Initiatives

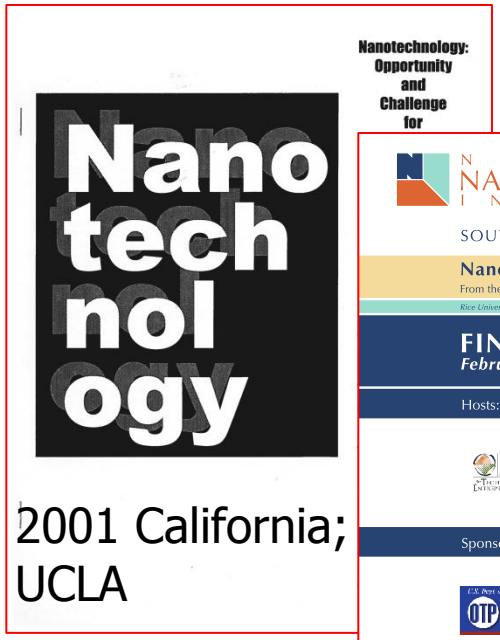
E. Clayton Teague

Member of Pixelligent Technologies Advisory Board

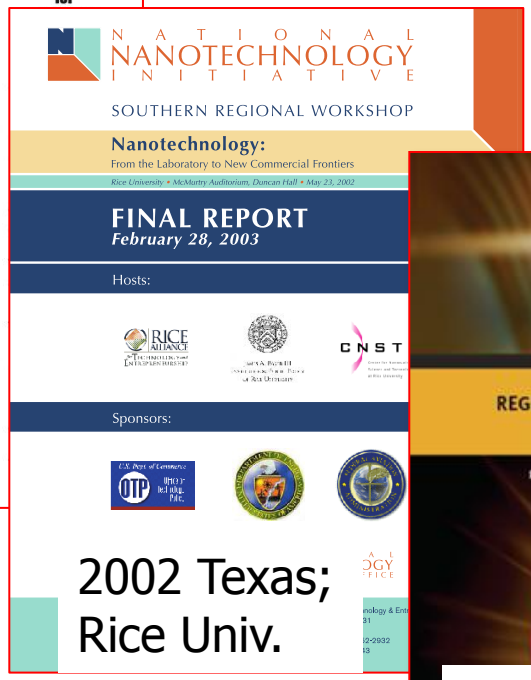
Member of TAPPI Board of Directors

Former Director of NNCO

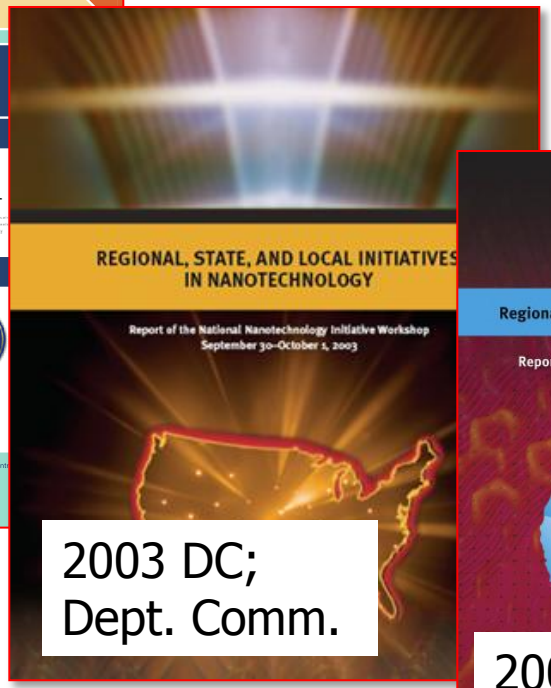
Five Previous RSL Workshops



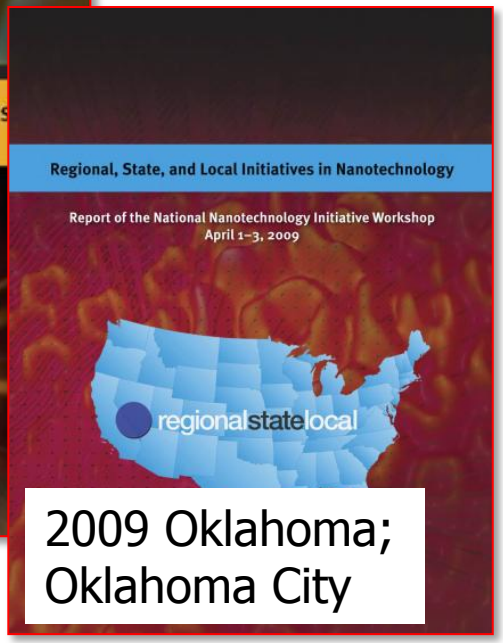
2001 California; UCLA



2002 Texas; Rice Univ.



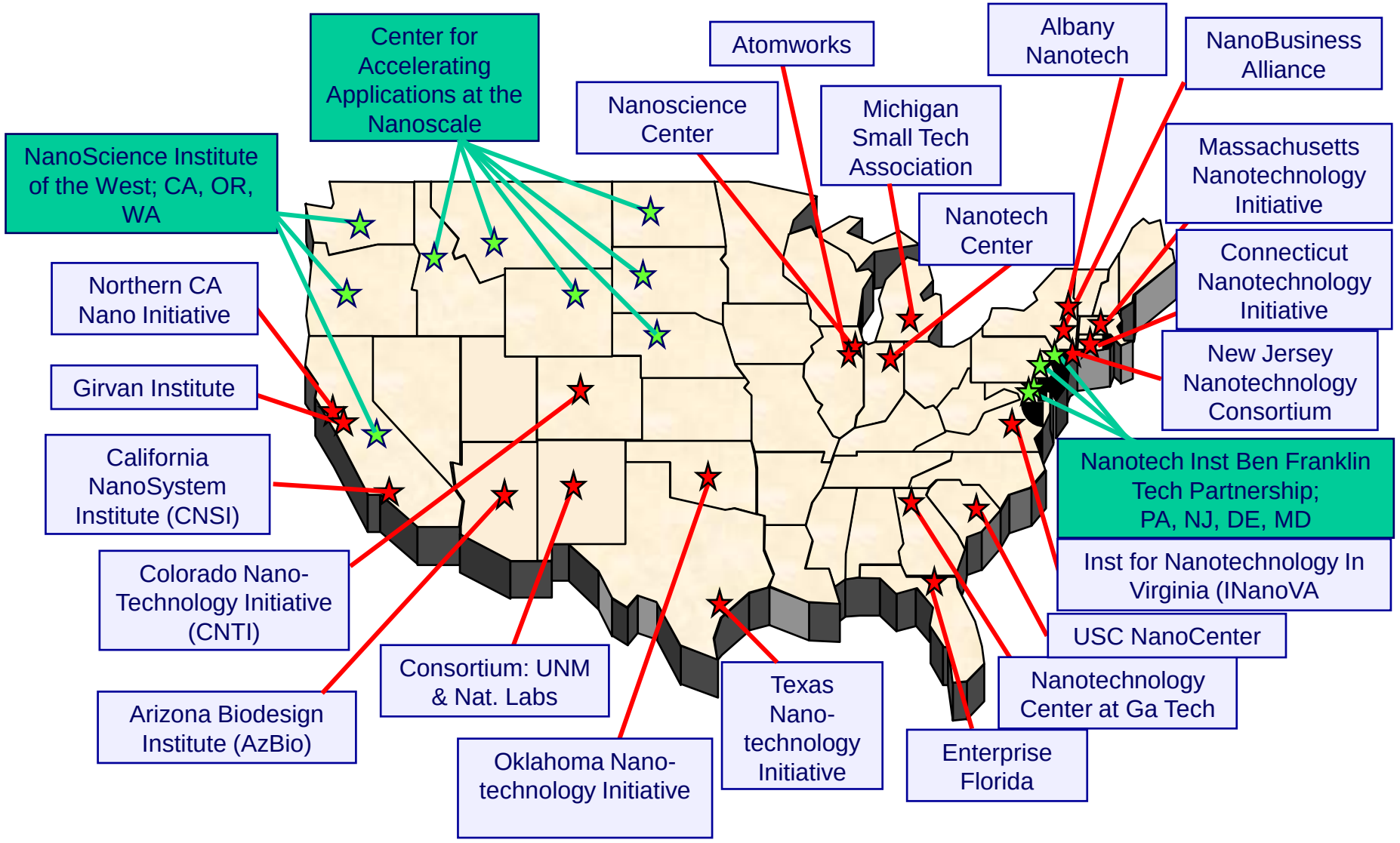
2003 DC; Dept. Comm.



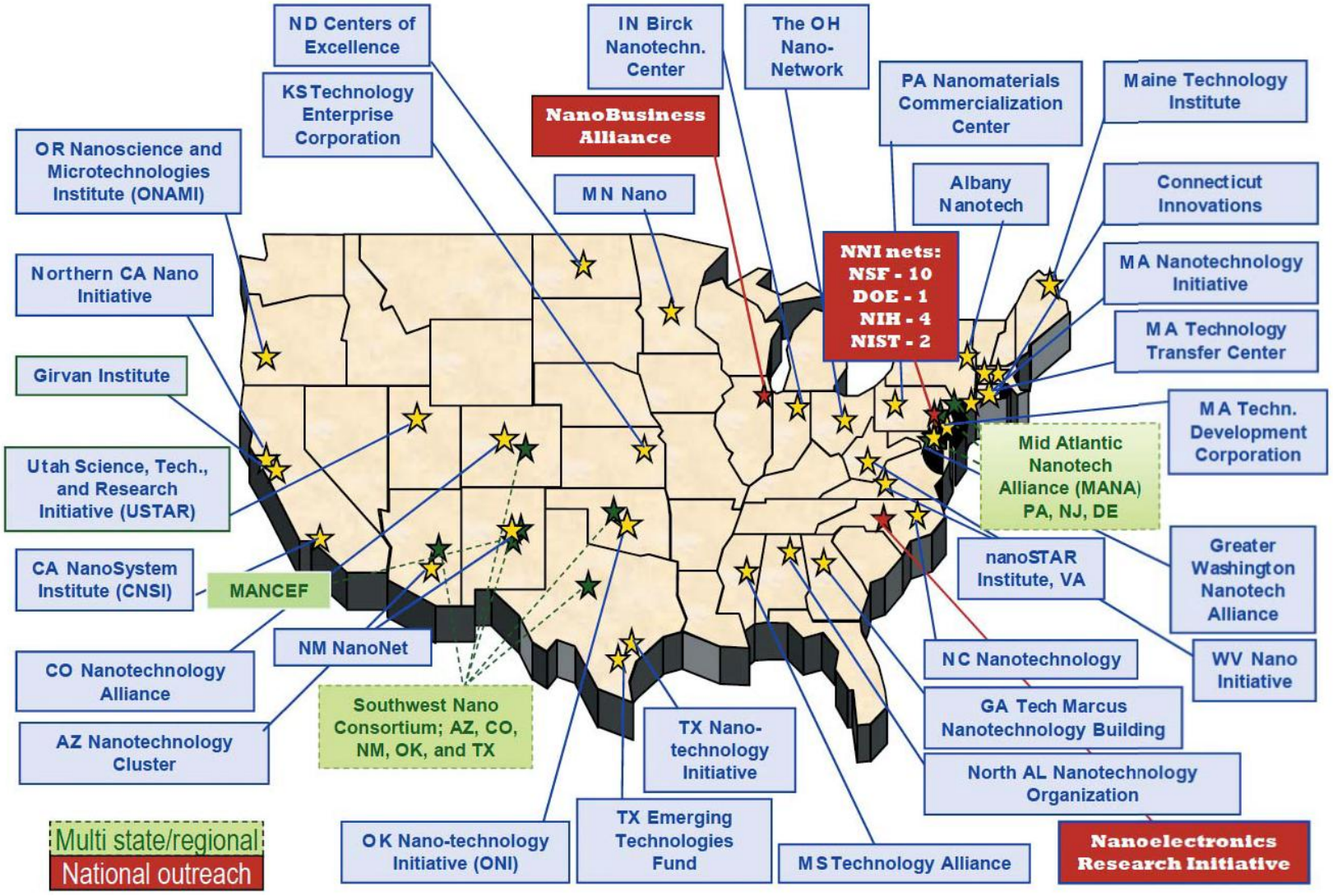
2009 Oklahoma; Oklahoma City

Workshop Convened in 2005 Illinois; Chicago

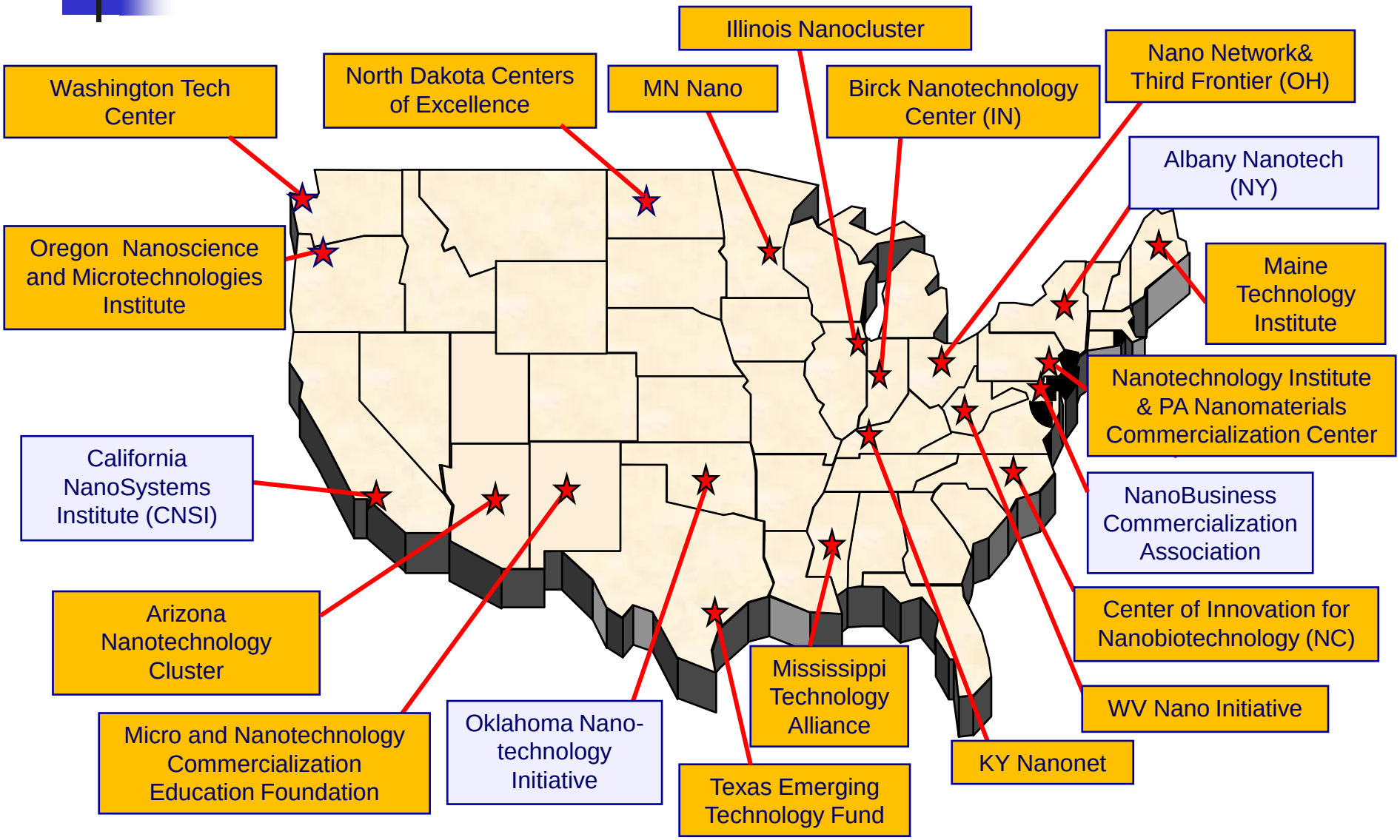
Sampling of Regional, State, & Local Initiatives in Nanotechnology in 2003-2004



Sampling of Regional, State, & Local Initiatives in Nanotechnology in 2009



Sampling of Regional, State, & Local Initiatives in Nanotechnology in 2011-2012

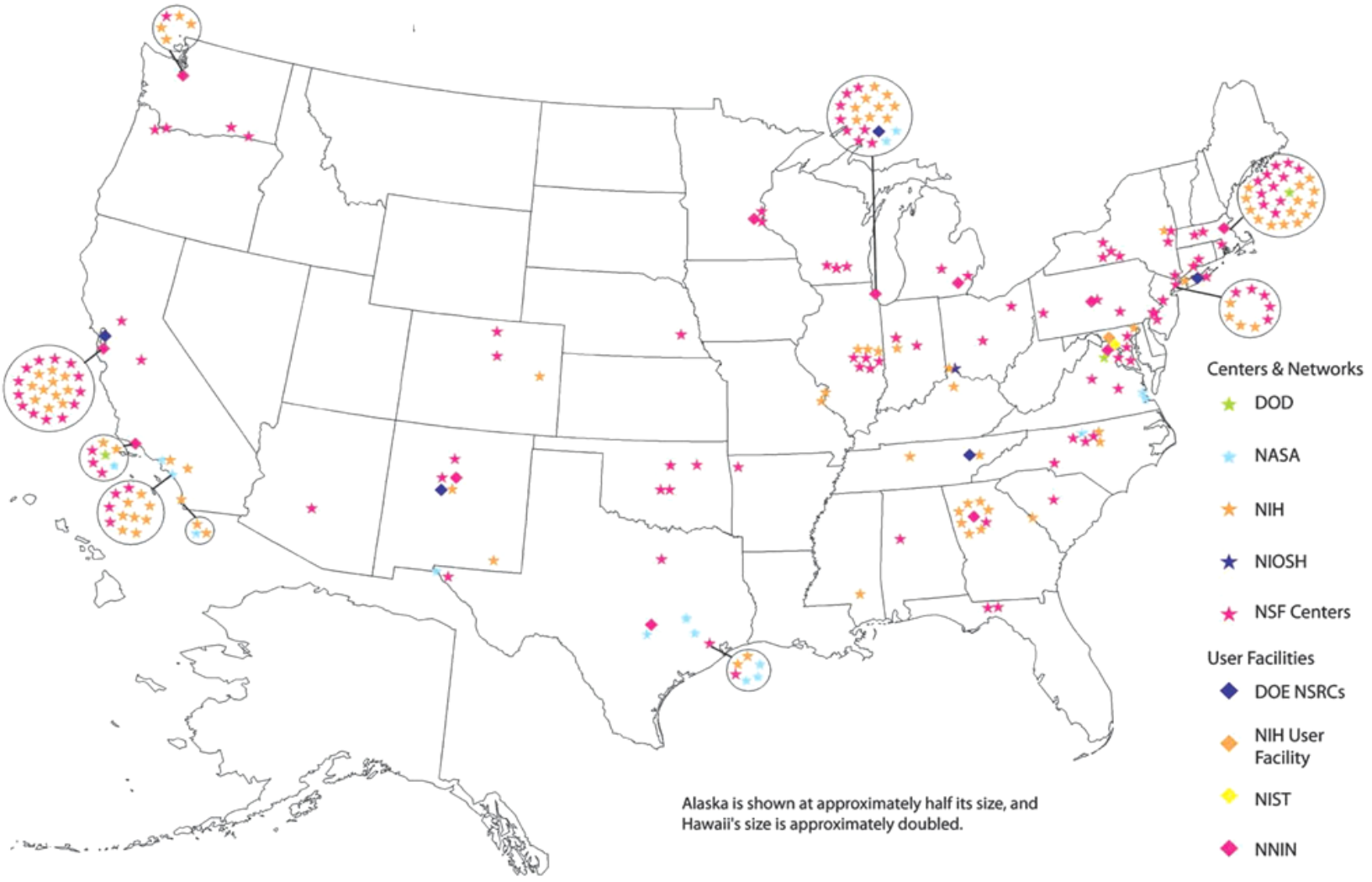


Recognition of Enduring Leaders of RSL Initiatives and Nanotech Commercialization!

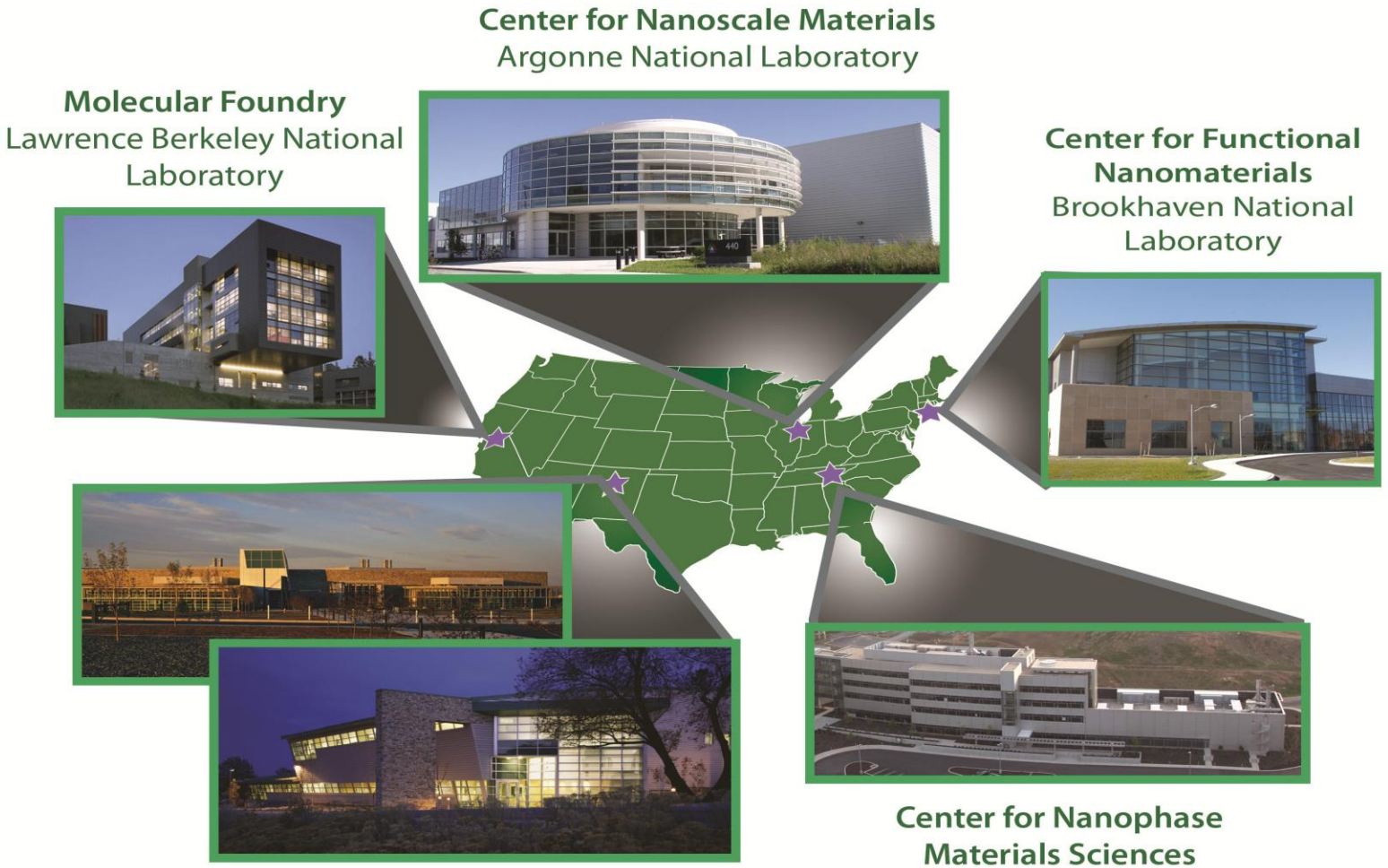
- Mike Roco – National Science Foundation
- Jim Mason – Oklahoma Nanotechnology Initiative (ONI)
- Skip Rung – Oregon Nanoscience and Microtechnologies Institute (ONAMI)
- Griff Kundahl – Colorado Nanotechnology Initiative & Center of Innovation for Nanobiotech (COIN in NC)
- Tony Green – The Nanotechnology Institute (PA)
- Jeff Morse – National Nanomanufacturing Network (MA)
- Vince Caprio – NanoBusiness Commercialization Association
  Sean Murdock – NanoBusiness Alliance

Ongoing Support Through Three Administrations

64 Major NNI Centers, Networks, User Facilities



DOE Nanoscale Science Research Centers



NIH Infrastructure Summary

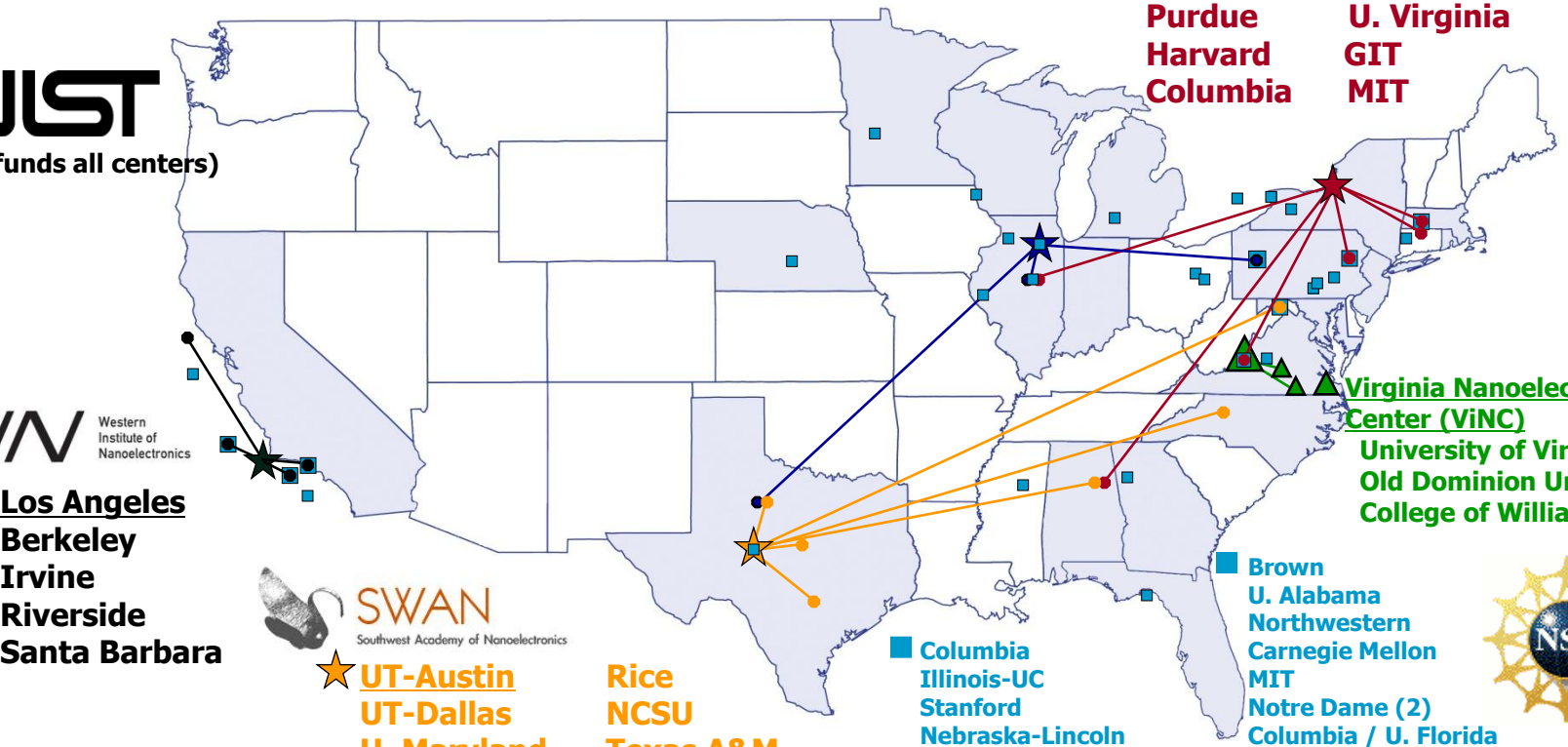
- NIH Nanomedicine Development Centers
  (8 centers originally; now down-selecting to top 4)
- NCI Centers of Cancer Nanotechnology Excellence
  (8 centers)
- NCI Cancer Nanotechnology Platform Partnerships
  (12)
- NCI Nanotechnology Characterization Lab
  - *comprehensive assay portfolio for the assessment of the safety of nanoparticles in* in vivo *applications*
- NHLBI Program of Excellence in Nanotechnology
  - *four interdisciplinary research centers*

NSF Infrastructure Summary

- Nanoscale Science and Engineering Centers (NSECs)
  - *17 interdisciplinary research centers*
- Materials Science and Engineering Research Centers (MRSECs)
  - *4 are fully dedicated to nanotechnology research; many others include nanotechnology components*
- Several other related centers and networks
  - *Nanoscale Informal Science Education Network*
  - *Centers for Learning and Teaching in Nanoscale Science & Engineering*
  - *Engineering Research Centers and Science and Technology Centers*
- Network for Computational Nanotechnology
  - *7 nodes, Led by Purdue University*
- National Nanotechnology Infrastructure Network (NNIN)
  - *integrated partnership of fourteen user facilities*
  - *extensive support in nanoscale fabrication, synthesis, characterization, modeling, design, computation and hands-on training*
  - *over 5300 unique users in 2009-2010, 800 from industry*

NRI Funded Universities

Finding the Next Switch



Nanoelectronics • Architectures MIND
MIDWEST INSTITUTE FOR NANOELECTRONICS DISCOVERY

★ Notre Dame
Penn State
Purdue
UT-Dallas

INDEX
INSTITUTE FOR NANOELECTRONICS DISCOVERY AND EXPLORATION

★ SUNY-Albany
Purdue
Harvard
Columbia
U. Virginia
GIT
MIT

NIST
(co-funds all centers)

Virginia Nanoelectronics Center (ViNC)
University of Virginia
Old Dominion University
College of William & Mary

WIN Western Institute of Nanoelectronics

★ UC Los Angeles
UC Berkeley
UC Irvine
UC Riverside
UC Santa Barbara

SWAN Southwest Academy of Nanoelectronics

★ UT-Austin
UT-Dallas
U. Maryland
GIT
Rice
NCSU
Texas A&M

■ Columbia
Illinois-UC
Stanford
Nebraska-Lincoln
Penn State
Princeton / UT-Austin
UC-Santa Barbara
UC-Riverside / Georgia

■ Brown
U. Alabama
Northwestern
Carnegie Mellon
MIT
Notre Dame (2)
Columbia / U. Florida
U. of Minnesota
Cornell / Princeton
Drexel University / UI-UC / U. Penn

NSF

Virginia Commonwealth / UC-R / Michigan / U. Virginia
UC-Riverside / UC-I / UC-SD / Rochester / SUNY-Buffalo
U. Pittsburgh / U. Wisconsin-Madison / Northwestern

Over 40 Universities in 19 States

Some Thoughts on Strategic Planning/Roadmapping

- WHO are the members of the planning/roadmapping team?
  - Representatives from all existing RSL initiatives? Agree on definition of RSL initiative
  - Representatives from corresponding state governments or one or more from National Conference of State Legislatures?
  - Representatives from what industries?
  - Representatives from what Federal agencies?
  - Who else?
- WHY
  - Achieving common agreement on Goals!
  - Achieving common agreement on Objectives toward Goals!

Three Important Concepts

Very simply put, planning is setting the direction for something -- some system -- and then working to ensure the system follows that direction. Systems have inputs, processes, outputs and outcomes. To explain,

- **Inputs** to the system include resources such as raw materials, money, technologies and people. These inputs go through a **process** where they're aligned, moved along and carefully coordinated, ultimately to achieve the goals set for the system.
- **Outputs** are tangible results produced by processes in the system, such as products or services for stakeholders.
- **Outcomes**, or benefits for stakeholders, e.g., jobs for workers, enhanced quality of life for customers, etc.

One Set of Definitions

- ***Goals (Results)***
  - Goals are specific accomplishments that must be accomplished in total, or in some combination, in order to achieve some larger, overall result preferred from the system, for example, the mission of an organization. (Going back to our reference to systems, goals are outputs from the system.)
- ***Strategies or Activities (Methods to achieve goals or objectives)***
  - These are the methods or processes required in total, or in some combination, to achieve the goals. (Going back to our reference to systems, strategies are processes in the system.)
- ***Objectives (Results)***
  - Objectives are specific accomplishments that must be accomplished in total, or in some combination, to achieve the goals in the plan. Objectives are usually "milestones" along the way when implementing the strategies.
- ***Tasks (Methods to achieve goals or objectives)***
  - Particularly in small organizations, people are assigned various tasks required to implement the plan. If the scope of the plan is very small, tasks and activities are often essentially the same.
- ***Resources (and Budgets)***
  - Resources include the people, materials, technologies, money, etc., required to implement the strategies or processes. The costs of these resources are often depicted in the form of a budget. (Going back to our reference to systems, resources are input to the system.)

"Smarter" Goals and Objectives

- ***Specific:***
  - For example, it's difficult to know what someone should be doing if they are to pursue the goal to "work harder". It's easier to recognize "Write a paper".
- ***Measurable:***
  - It's difficult to know what the scope of "Writing a paper" really is. It's easier to appreciate that effort if the goal is "Write a 30-page paper".
- ***Acceptable:***
  - If I'm to take responsibility for pursuit of a goal, the goal should be acceptable to me. For example, I'm not likely to follow the directions of someone telling me to write a 30-page paper when I also have five other papers to write. However, if you involve me in setting the goal so I can change my other commitments or modify the goal, I'm much more likely to accept pursuit of the goal as well.
- ***Realistic:***
  - Even if I do accept responsibility to pursue a goal that is specific and measurable, the goal won't be useful to me or others if, for example, the goal is to "Write a 30-page paper in the next 10 seconds".
- ***Time frame:***
  - It may mean more to others if I commit to a realistic goal to "Write a 30-page paper in one week". However, it'll mean more to others (particularly if they are planning to help me or guide me to reach the goal) if I specify that I will write one page a day for 30 days, rather than including the possibility that I will write all 30 pages in last day of the 30-day period.
- ***Extending:***
  - The goal should stretch the performer's capabilities. For example, I might be more interested in writing a 30-page paper if the topic of the paper or the way that I write it will extend my capabilities.
- ***Rewarding:***
  - I'm more inclined to write the paper if the paper will contribute to an effort in such a way that I might be rewarded for my effort.

Future Generations