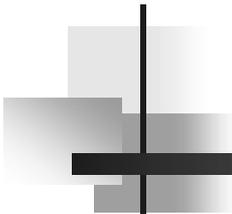


Nanotech Accelerated Development Center



A presentation to

The Joint Commission on Technology and
Science Nanotechnology Advisory Committee

By

The Northern Virginia Technology Council

Introduction

- Proposing a Nanotechnology Accelerated (Prototype) Development Center (NADC)
- Establish one of the three pillars of Virginia nanotechnology ecosystem (Research, **Commercialization**, Manufacturing)
- 4 Functional Areas
 - Physical Lab & Office facility
 - Virtual (network connectivity and relationships)
 - Workforce
 - Demonstrations

Topics

- **21st Century Nanotechnology Research and Development Act (S189)**
- **Obstacles in transitioning Nanotechnology to Commercial Markets**
- **Accelerated Development Center**
 - **Goals**
 - **Benefits**
 - **Concept of Operations**
- **Example of Candidate Project**
- **Summary**

Nanotechnology Research and Development Act (S189)

- Authorizes ~ \$3.7B in funding over 4 years for nanotech research and development (R&D)
- Goals:
 - Ensuring United States global leadership in the development and application of nanotechnology
 - Accelerating the deployment and application in the private sector, including startup companies.
- Methods:
 - First Stage - *Research* is heavily emphasized in S189
 - Development and commercialization of nanotechnology are crucial next steps.

US Nanotech Centers

- **21 states have 48 Nanoscience or Nanotechnology Initiatives or Centers planned or underway**
 - 33 are university based
 - 5 in national laboratories
 - 10 state or city organizations
 - Some states – New York, Oregon, Texas – have robust initiatives
- **DoD initiatives are underway at the service, laboratory, and program levels.**
 - For example, the Institute for Nanoscience at NRL
 - Strong emphasis on fundamental research
 - Weak emphasis on transition to commercialization
 - Relatively little focus on customer needs, program requirements and possible nanotechnology solutions
- **Point: Involvement of industry typically *indirect* - through partnership with specific research centers or area initiatives**

Transition to Market

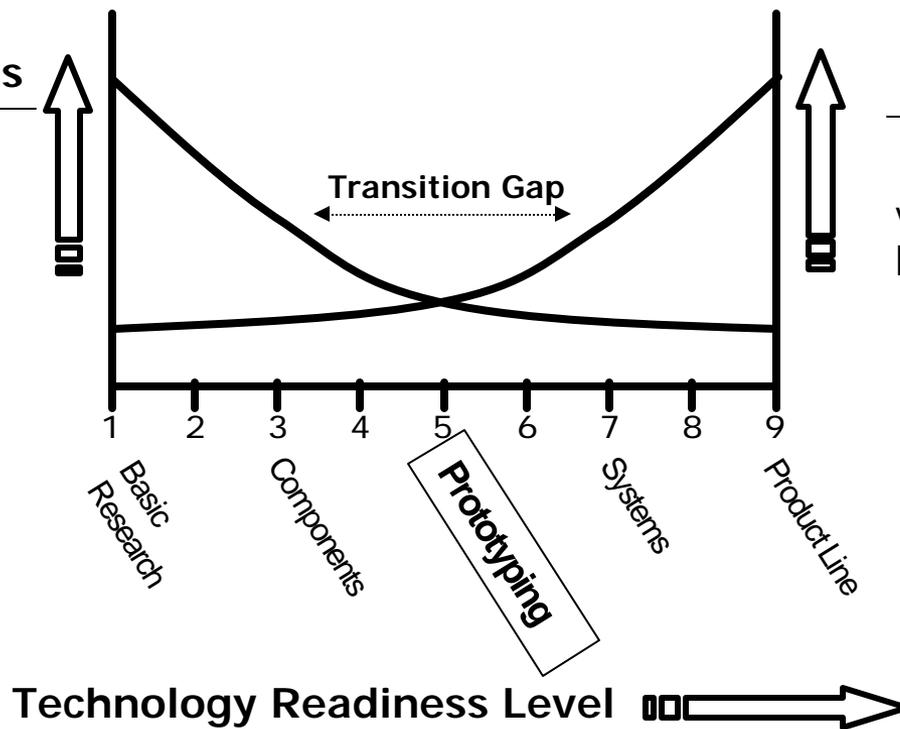
Expertise & Resources

Start-up Nanotech Firm/Small Business

Nanotech small businesses often lack expertise and resources to transition basic research to commercial markets

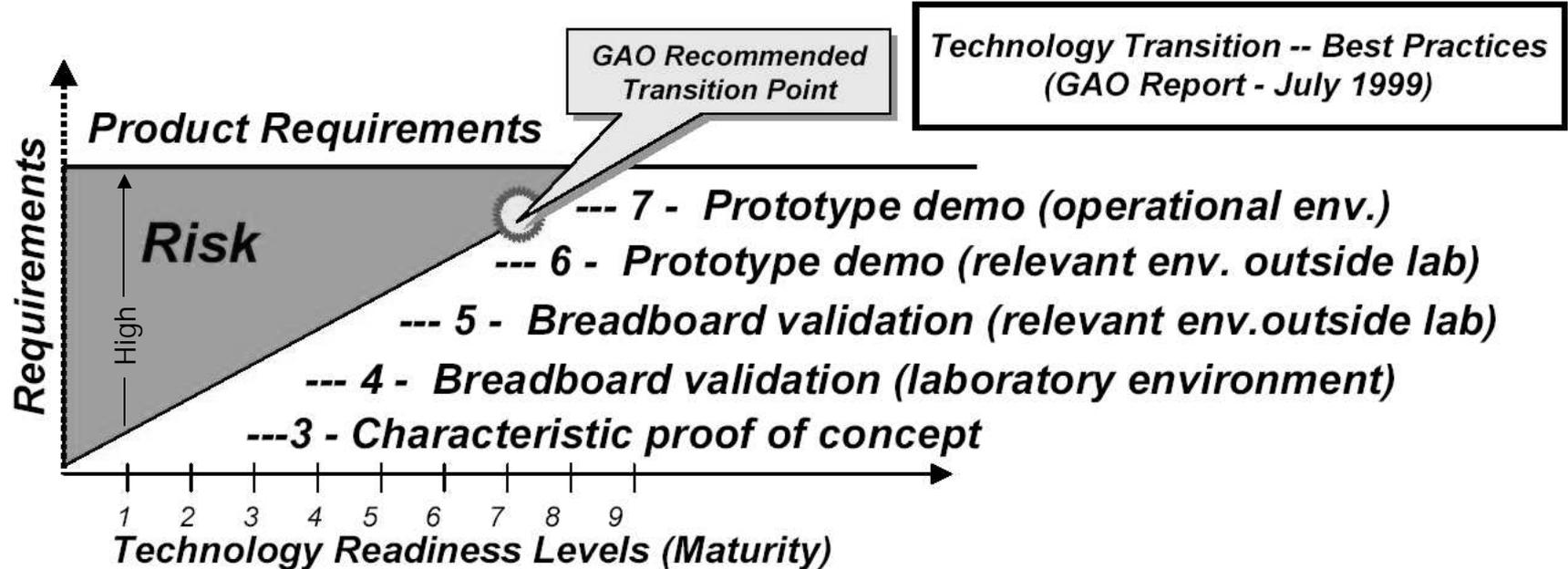
Large Business

Large businesses view nanotech as high risk



There is presently a gap in transitioning nanotechnology from basic research to a commercial market, complicating the development of Nanotech products

Transition to Market - How and When

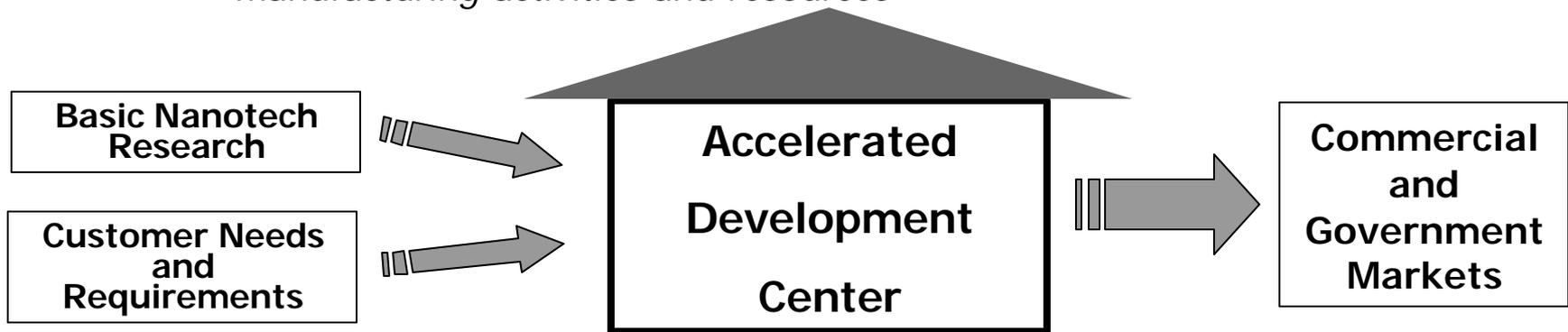


Proof of Concept and Prototype demonstrations

- Must ensure that the customer is a partner in product development
- Transition at TRLs less than 7 are high risk for sponsor/customer
- Bridge the "Valley of Death" for commercializing nanotechnology
- Provide credibility and accelerate transition to market

Nanotech Accelerated Development Center (NADC)

- A Federal and Commonwealth government-seeded prototyping center would bridge this commercialization gap.
 - “sunset clause”
- **Goals:**
 - Industry-run
 - Supports prototyping and accelerated development of nanotechnology
 - Transitions basic nano research to commercial markets
 - Focused on Industry/Government mission and needs (User pull)
 - *Integrates with and supports Virginia's nano research, development and manufacturing activities and resources*



Goals of Center

- **A collaboration between government and industry to accelerate the transition of nanotechnology to products having breakthrough functionality. The Center would:**
 - **Transition and integrate those technologies ready for prototyping**
 - Capability to meet customer requirements
 - Innovative “leap-ahead” technologies
 - Have partners willing to assume a portion of the project risk
 - *Provide a venue to showcase Virginia nanotech R&D and potential Applications*
 - **Support the prototyping phase of development for those products.**
 - Intent is to achieve “threshold of credibility”
 - Requirements driven, emphasis on ‘deliverables’
 - Reduces risk for industry/government sponsor
 - **Provide education, training, and jobs for next generation workforce**
 - Emphasis on nanotech business development
 - Internships, training with industry
 - Follow-on nanotech product lines create US and *Virginia* jobs

Benefits of Center

- **Maintains US lead and establishes Virginia's role across full life cycle of nanotechnology**
 - Research
 - Development
 - Rapid Prototyping
 - Manufacturing
 - Commercialization
 - Education and Training
 - Best Manufacturing Practices
 - *Workforce Development /Growth*
- **Leverages investments in basic R&D**
- **Makes prototyping and demonstration capability available to DHS, DoD, other government agencies, Industry and Academia**
- **Contributes to Workforce Training and Education**

Center's Concept of Operations

■ **Prototyping Facility:**

- Infrastructure provides instrumentation, staff, and space
- Characterization, visualization and manipulation of nanomaterials
- Manufacturing process development for materials, modules and systems
- Prototype computational design with NSF-funded code developers

■ **Location: Northern Virginia Area (NOVA)**

- Hub for Industry/Corporate Offices
- *Leverages NOVA's Proximity to Government Agencies and Markets*

Center's Concept of Operations (cont.)

- **Joint prototyping partnerships between government and business**
 - Ability to work virtually with other nanotech R&D centers
 - Serves as a model for future prototyping centers throughout the country
 - Integrates efforts with Southside Manufacturing Initiatives
 - Establishes *Virginia* as a leader in nanotechnology applications
- **System engineering and integration focus**
 - Linkage between technology and customer needs throughout prototyping projects
 - Ensures requirements are satisfied in operational environments
 - Lifecycle design addressed at prototyping stages

Center's Concept of Operations (cont.)

- **Project prioritization:**

- Transition manager required: industry or government*
- Must have capability to meet specific Industry/Gov requirements
- Assessed return on investment and jobs from follow-on product line
- Amount of co-funding by Partners
- Level of risk assumed by the government/industry team

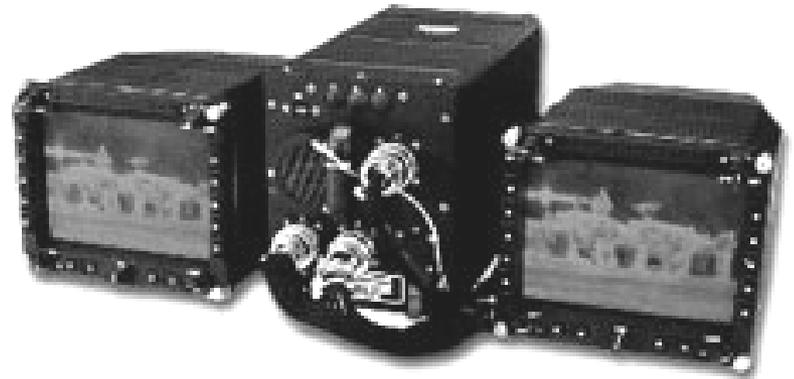
- **Estimated budget**

- \$20-30M in infrastructure
- \$25M in annual project support (<3% of funds authorized by S189)
- \$1-2M per project, two to three year funding per project

*** Goal of Nanotech Accelerated Development Center is to supplement costs for prototyping phase only, NOT full life-cycle of nano product.**

Example of candidate project

- **Product:** Down-converting screen for military CRTs
- **Concept:**
 - Pilots require eye protection to counter the laser threat, the goggles cut-off wavelength interferes with observation of CRTs/displays.
 - Nanocrystal film converts the screen's emission wavelength to one that is more compatible with goggles.
- **Prospective Customers**
 - Military Services and Homeland Security
- **Prospective Markets**
 - Thousands of CRT screens and NVD



Summary and Road Ahead

- **Nanotech Accelerated Development Center provides a mechanism to transition basic nanotechnology research to government and commercial markets**
- **Allows and encourages a more prominent role of industry in the development and commercialization of nanotechnology.**
- **Maintains US and establishes *Virginia* lead in full life-cycle of nanotechnology**
 - **Research**
 - **Development**
 - **Prototyping**
 - **Manufacturing**
 - **Commercialization**
- **Defines the essence of a “The Nano-Commonwealth”**

History of NADC

- June 2003 – Center Concept Proposed
 - While developing NVTC Nanotech Committee mission, Marty Fritts and Scott McNeil of SAIC proposed that NVTC facilitate formation of consortium to build “Nanotech Prototyping Center.”
- June 2003-Sept 2004 – Other Organizations Potentially Interested
 - Discovered a number of organizations interested in the prototyping center concept
- July 11, 2003 – NVTC Meeting with Sen. Allen & Sen. Warner’s staff to discuss concept
 - Support concept
 - Can’t provide funding for building center but can fund government projects that would be done there
- December 2, 2003 - NVTC Presentation to PCAST
- December 10, 2003 – NVTC President Bobbie meeting with SAIC management
- January 8, 2004 – Presentation to VA Commerce Secretary, Mike Schewel.

History (Cont'd)

- January 30, 2004 – Meeting with Commerce Undersecretary Phil Bond
- February 30, 2004 – Meeting with NVTC Legal Council to outline concept
- March 15, 2004 – Meeting with Danville EDA and VA Tobacco Commission
 - Interested in concept because a prototyping center in NOVA could drive manufacturing out to the rest of the state
- May 2004 – Discussions with Haye Group about doing feasibility study – \$50K + \$50K in kind
- May 4, 2004 – Presentation to Tobacco Commission in Richmond
- May 18, 2004 – Presentation to NVTC Board
- August 25, 2004 – Presentation to BAE

Discussion



Foreign Programs and Initiatives

- The **EU** is spending nearly double the US on nanotechnology R&D at the government level [Source: Nanobusiness Alliance]
- The **Japanese government** invested \$1.1B in their '03 nanotech R&D efforts. The nanotech budget is anticipated to increase by 20% in '04 [Asia Pacific Nanotech Weekly]
- **Matsushita Electrical Industrial Co.** (Panasonic) and Quantum Dot Corporation announced a long-term development agreement, where MEI licensed QDC's intellectual property. [Small Times, 8/6/03]
- Nanosphere announced the closing of a third round, which was led by Lurie Investment Fund LLC of Chicago and new investor **Takara Bio Inc. of Japan**. These proceeds will provide further capital to fund the commercialization of the company's first biomolecular detection system [Nanosphere press releases]
- Nanosys Inc announces the closing of its second round of financing for \$38M. Leading the round was **China Development Industrial Bank (CDIB)**. [Nanosys press release, 6/2/03]

Foreign entities are eager to capitalize on US nanotech research