JCOTS Working Group Recommendations for Discussion November 16, 2006

Research Recommendation 1: Found the Virginia Institute for Nanotechnology, with an initial investment of $50 million and a continuing investment of $5 million annually to accelerate advances in the key fields indicated in our research document. The Institute will be a distributed entity, spanning all major nanotechnology research laboratories in the Commonwealth. Institute support will be applied to strengthening (inter)nationally competitive research activities that should ultimately achieve the status of a major funded Center through one of the federal agencies. Example activities to be supported would include start up costs for new faculty hires, equipping of critical laboratories, support of inter-university and university-industry initiatives, matching funds for major grants, and provision of postdoctoral and graduate student fellowships for critical seed research efforts. The decision as to how to disburse funds would be partially be an Institute Board comprising representatives from all major participating entities, and partially by a competitive review process.

Research Recommendation 2: We propose the establishment of a *"Virginia Nanotechnology User's Network"*, that will provide access to state-of-the-art fabrication, computational, and characterization facilities for all nanotechnology researchers across the state. The network will comprise: i) Multiple instruments already installed at Virginia universities, by mutual agreement with the current owners of those instruments, ii) An initial investment of $10-15 million to "fill the gaps" in the existing instrument base, iii) An annual investment of order $4 million for operations, upgrading and extension of this instrument base, iv) Agreement by the hosting institutions to provide appropriate level of technical support, service contracts, and other maintenance (which cost can substantially be offset by user fees), and v) Partnership between the Network, the Virginia Institute for Nanotechnology, and participating institutions to support the personnel (faculty, postdocs and students) and infrastructure to enable development of key advances in nanoscale instrumentation in support of the major research thrusts identified by the Institute. Another key component of this approach will be to provide an administrative and technical structure to make equipment in one location seamlessly available to researchers from other locations.

Manufacturing Recommendation 1: Legislation should be introduced in the 2007 session of the Virginia General Assembly which addresses the adverse impact of the machinery and tools tax on Virginia's manufacturing sector. This legislation should address exemptions for technology-based investment, efforts to implement advanced manufacturing techniques and processes, and hence to stabilize the economic climate for technology lead manufacturing within the Commonwealth. This legislation should also address local authority over machinery and tools taxation, in that the Commonwealth should insure a higher level of consistency in tax policy among its political sub-divisions, and should call upon the Virginia Department of Taxation to develop a standard schedule for machinery and tools depreciation that shall be adopted by each political sub-division of the Commonwealth.

Manufacturing Recommendation 2: The Manufacturing Extension Partnership should be charged with the task, by request from the General Assembly, to survey in collaboration with the

Virginia Manufacturers Association and other interested parties, the existing manufacturers of the Commonwealth to determine the potential applications of nanotechnology to their production processes. Such an assessment should entail developing a cost estimate for needed transition tasks, and discussions on how nanotechnology can enhance the overall competitiveness of that given industry.

Manufacturing Recommendation 3: 1) Establish the "Virginia Nanotechnology Manufacturing Partnership Act" which was would be initially capitalized by $25 million from the Commonwealth, which by legislative budget language would have to be matched by $25 million from the federal government, or other non-state resources. To access these funds from the Virginia Nanotechnology Manufacturing Partnership Act, a Virginia based research institution MUST be teamed with a private sector employer from within the Commonwealth to address new product development or applications of nanotechnology to research needs within that given industry; 2) Add nanotechnology to the list of eligible uses for financing from the Virginia Small Business Financing Authority; 3) Consider adjusting the eligibility requirements for accessing the Governor's Economic Opportunity Fund for nanotechnology enterprises that may not meet current employment and investment criteria; 4) Create the Virginia Nanotechnology Supply Chain Network, through the Virginia Department of Business Assistance, that would work to expose existing and prospective Virginia manufacturers to the capabilities of Virginia nanotechnology businesses, and means by which they can address applications of their technologies to enhance manufacturing competitiveness.

Business Development Recommendation 1: Provide capital for seed and bridge funding. This funding can include Phase 0 funding to stimulate SBIR/STTR proposal development, matching of angel investments in nanotechnology start-ups, and staged grants to support product development and investments in manufacturing infrastructure.

Business Development Recommendation 2: Enact H.B. 935, creating a Commonwealth non-stock corporation that encourages private sector research collaboration with state universities. The legislation is summarized as follows:
State Council of Higher Education for Virginia; creation of nonstock corporation to support academic research. Requires the State Council of Higher Education for Virginia to establish a nonprofit, nonstock corporation under Chapter 10 (§ 13.1-801 et seq.) of Title 13.1 as a public instrumentality exercising public and essential governmental functions, to assist the Council in (i) supporting academic research in Virginia; (ii) encouraging research initiatives, with an emphasis on biological systems and nanotechnology, to support Virginia industry; and (iii) conducting or undertaking other activities useful in carrying out the provisions of this section. The Council shall require such corporation to report to it at least annually on its activities. The bill sets out the composition of the board of directors for such corporation.

Business Development Recommendation 3: Evaluate use of the Virginia Small Business Development Center and Business Incubator networks to address business support services for start-up nanotechnology enterprises. The Virginia General Assembly should request in the 2007 session for a report from the Virginia Department of Business Assistance and the Virginia Center for Innovative Technology on what resources would be needed to accomplish this task.

Education and Workforce Development Recommendation 1: Fund House Bill HB 1244, the Virginia Mathematics, Science, and Technology Education Grant Program, which provides for grants for students who are pursuing engineering degrees at Virginia universities and who work in Virginia high technology companies upon graduation.

Education and Workforce Development Recommendation 2: Complete HJR25, the study of how to systematically enhance STEM education in Virginia with a set of comprehensive actions that reach into the curriculum that is delivered every day into the classroom. Provide for the continued creation and education of enough Science, Math and Technology teachers to support the actions and ensure that the actions align with the actions being implemented at a National level in support of the study, Rising Above the Gathering Storm. The actions need to include the immediate education of the leadership of the public school system as well as an advertising campaign that educates the citizens across the Commonwealth.

Education and Workforce Development Recommendation 3: Convene a workshop with participation from the key stakeholders from universities, industry and the school system, who are interested and actively pursuing K-12 outreach activities in order to identify best known methods, pursue collaborative activities, and define a set of actions which can impact the overall Commonwealth.

Education and Workforce Development Recommendation 4: Fund the creation of educational programs to provide for the following: 1) a comprehensive Manufacturing Technician certificate from the VCCS, and 2) true asynchronous engineering degree programs for undergraduate and graduate degrees to support the continuing education needs of people employed in the high technology industry who work shift schedules and need non-traditional education programs. The initial degree programs should be oriented towards those degrees which support the further development of skills in nanotechnology, such as electrical, chemical and mechanical engineering and materials science.

Finance Recommendation 1 - Creation of and funding for 'Nano-Enterprise' business accelerator (made jointly with Business Development Subcommittee)
Virginia Nano Business Accelerator
To address critical needs as outlined, it is proposed to develop a 'Nano-Enterprise' Business Accelerator Range of Services. The Virginia Nano Business Accelerator would provide companies a full range of services to support the development and growth of their nanotechnology businesses:

- Management support
- Research and Clinical Collaborations
- Investment Capital and Other Start-up Funding
- Business Development
- Resource Network

Finance Recommendation 2 - Funding of Business Grants

- Direct Business Grants (Estimate: $10MM annually)
- Proof of concept grants (Estimate: $3.0MM annually)

- Non-Matching Grants for seed and bridge funding (Estimate: $2.0MM annually)
- Matching gifts, grants (Estimate: $15MM annually)
- Forgivable loans (Year 1 Estimate: $50MM, $20MM thereafter)

- Tax incentives (Estimated budget impact TBD)

Tax incentives may also be offered for more mature companies and for companies that exceed certain annual revenues or income levels. Generally speaking, tax credits could take the form of:

  - Nanotechnology investment tax credits
  - Income tax credits
  - Income tax deferrals

- Regulatory Relief and Economic Development Assistance in attracting other nanotech companies.
  - Elimination of state incorporation and annual filing fees could be eliminated or credited for nanotechnology firms working with the Virginia Nano-Enterprise business accelerator.
  - Review of securities laws to enable rapid approval of any Virginia securities law filings.

Attracting other companies or potential startups to Virginia will require dedicated assistance by Virginia EDA and VEC to identify and target nano technology startup companies. Further, Virginia will need to market itself to venture capital firms with nanotech investments in order to demonstrate how relocation to Virginia will enhance their returns.

Finance Recommendation 3: - Generating Private Funding

Capital funding by the private sector will still need to attracted and exceed public funding and grant funding by a wide margin (estimates range from 2 – 6x) in order for be sustainable and successful. Some local entities, such as Carlyle and NEA may look at local nanotech companies today. For Virginia to be successful, large East Coast, West Coast, corporate VC and International firms will need to be aware of the technology, business and financial opportunities available in Virginia. Efforts to create enough capital flows could be generated by:

- Recruiting and developing an active stable of domestic and international angel investor community and venture capital network as sources of early stage investment capital.
- By lowering the ‘economic searching costs’ of finding viable nano-tech investments, Virginia will differentiate itself by providing this ‘service’
- Tracking the amount of capital raised as a performance metric of the Nano-Enterprise would be critical to establishing the accelerators’ effectiveness.
- Incentives for assist technology transfer from state universities into the marketplace, either to entrepreneurs or to corporate development groups.