MAPPING THE VISION 2

The Vision 2030 Project has been a "real-options" planning effort undertaken to strengthen the competitiveness of North Carolina's workforce and industry through taking advantage of science and technology-driven economic development opportunities.

Mapping the Vision 2 *is the final report submitted by the North Carolina Board of Science and Technology to the Governor, the North Carolina Senate and House of Representatives Technology committees and to the North Carolina Department of Commerce.*

www.governor.state.nc.us/govoffice/vision2030

VISION 2030
MAPPING THE VISION 2

Mapping the Vision 2 contains the final recommendations of the Vision 2030 project. It notes for each recommendation; a short background statement, the implementation action, the description of the action, the recommended funding source and the costs or identification of how to develop the costs.

Mapping the Vision (or Mapping the Vision 1) is inserted in the back of this document. Mapping the Vision 1 is a compilation of the first 10 recommendations made by the Vision 2030 Project. These recommendations were released in June of 2000. Mapping the Vision 1 has more text that describes why more investment by North Carolina in science and technology are important. The Board of Science and Technology hopes that this format can be easily understood by all North Carolinians interested in an ever-growing technology based economy that can impact all the regions of North Carolina.

We encourage you to review both documents to gather the total perspective of the Vision 2030 project recommendations.

On December 8, 2000, the report was presented to the chair of the NC Board of Science and Technology, Governor Jim Hunt. On that same date, these documents were transmitted to Representative Joe Tolson for delivery to the Technology Committees of the House and Senate for their action. The Board of Science and Technology wishes to thank Governor Jim Hunt, Secretary Rick Carlisle of the North Carolina Department of Commerce, the North Carolina Department of Commerce Economic Development Partnerships and the General Assembly Committees, chaired by Representative Joe Tolson and Senator Eric Reeves, for their support and looks forward to action being taken on the recommendations, either by legislative or executive action. The report was also submitted to the transition team of Governor-elect Michael Easley.

Jane Smith Patterson, Executive Director
North Carolina Board of Science and Technology
December 31, 2000

Advancements in science and technology will drive future economic growth and prosperity for all North Carolinians. Creating a climate where such innovations will flourish is a critical task for the State. The North Carolina Vision 2030 Project was designed to educate and challenge leaders and citizens across North Carolina to identify those scientific innovations that will lead to economic growth for the State and to build the platforms throughout North Carolina to support these innovations.

The Vision 2030 Project was initiated by Governor James B. Hunt Jr. and executed by the North Carolina Board of Science and Technology. Over 18-months, almost 1000 North Carolinians representing 83 of the State's 100 counties met in focus group meetings and conferences around the State to develop a set of options that could drive North Carolina's future science and technology-based growth.

Five Vision 2030 Task Forces were established to generate policy proposals to create a vibrant climate in North Carolina for growth and innovation. These Task Forces--Innovation Climate, Knowledge and Technical Infrastructure, Science and Technology Workforce, Global Competitiveness, and Social and Ethical Issues--identified more than 100 proposals for policy change and new investment. In June, the Vision 2030 Project released its first 10 priority recommendations, Mapping the Vision (referred to now as Mapping the Vision 1), to Members of the North Carolina General Assembly and leaders from around the State. Mapping the Vision 2 serves as an addendum to Mapping the Vision 1 and outlines all of the recommendations of the Vision 2030 Task Forces to provide a broader blueprint for affecting strong science and technology-based economic growth in North Carolina.

The North Carolina Board of Science and Technology and the Vision 2030 Project are grateful for the strong leadership received from the chairs and professional staffs of the Vision 2030 Task Forces. We would like to thank these individuals for the time, energy, and insight they provided to creating these recommendations.

- *Innovation Climate*
  Chair: Dr. Robert Sullivan, Dean, Kenan-Flagler Business School, UNC-Chapel Hill
  Staff: Deborah Watts, Partner, Technology Development Group
- *Knowledge and Technical Infrastructure*
  Chair: Dr. Ruben Carbonell, Director, Kenan Institute for Engineering, Technology and Science, NC State University
  Staff: Raj Narayan, Assistant Director and Mark Benson, Associate Director, Kenan Institute for Engineering, Technology and Science, NC State University
- *Science and Technology Workforce*
  Chairs: Dr. Martin Lancaster, President, N.C. Community College System
  Dr. Joan Michael, Dean, College of Education and Psychology, NC State University
  Staff: Malissa Bailey, Research Assistant, NC State University
- *Global Competitiveness*
  Chairs: Mary U. Musacchia, Counsel to the President, SAS Institute
  Gordon Smith, Partner, Solomon Smith Barney
  Staff: Ruth Turner Camp, President, N.C. World Trade Center

- *Social and Ethical Issues*
  Chairs: Betty McCain, Secretary, N.C. Department of Cultural Resources
  Karen Hoffman, President, N.C. Association for Biomedical Research
  Staff: Mark Moore, N.C. Department of Cultural Resources

Table of Contents

INNOVATION CLIMATE
Innovation Climate Taskforce

Today's economy is driven by knowledge and powered by innovation. In this new economy, the key to wealth and job creation depends largely upon which ideas, innovations, and technologies are embedded in services, manufactured products, government, education, and tax policies and practices.

The Vision 2030 Innovation Climate Task Force identified those areas available to public policy intervention that could be changed to minimize existing impediments to innovation and to encourage and support innovative efforts occurring within the private and public sectors of North Carolina.

Innovation and entrepreneurship are inextricably linked. The Innovation Task Force members placed particular emphasis on efforts that will encourage entrepreneurship throughout North Carolina.

Innovation will flourish in an environment characterized by a strong Innovation Triangle--an interconnected network of universities, private companies, and governmental and non-profit agencies that reinforce and support one another. The Innovation Triangle is enhanced through human linkage such as research partnerships and electronic linkages facilitated through advanced telecommunications capabilities throughout the State.

The Innovation Climate Task Force reviewed previous studies on the use of public policy to encourage innovation. This research yielded a number of lessons-learned in which context these innovation recommendations are presented.

- Top-down imposition of programs and initiatives does not work.
- Self-initiated creative partnering among elements of the Innovation Triangle has been successful.
- Leadership and a visible champion are critical to success.
- Educational and governmental bureaucracies can represent the most formidable barriers to a successful innovation climate.
- Innovations flourish in areas proximate to research universities or research facilities.
- Practices and programs promoting innovation are weakest in the rural areas.
- Likewise, with respect to industry-specific efforts, traditional industries are under-served.
- Demonstrable resource leveraging and attention to accountability and return on investment factor increasingly in funding decisions at the state and federal level.

Innovation, at its base, is about change--incremental or radical. Likewise, these recommendations consist of two types of initiatives:

1) Incremental changes or additions to existing efforts that can be adopted in a relatively short time frame and at a modest or no incremental cost; and,
2) Radical changes that will require significant additional planning and development efforts and a more significant investment of time and financial resources.

INNOVATION CLIMATE

Recommendation 1: ***Expand and enhance the North Carolina Research & Development Tax Credit***

Background/Justification:
Scientific and technological research is critical for a state's economic growth. Most states recognize the role of research and development as an economic engine for current and future prosperity. As a result, they have expanded and enhanced their direct investment in R&D and revised their R&D tax laws to serve as competitive tools for economic development. North Carolina lags behind many other states in the tax treatment of qualified research and development expenditures by companies. States such as California, Connecticut, Pennsylvania, Georgia, and Massachusetts have R&D tax credits that are at least twice as beneficial as those in North Carolina.

North Carolina needs an updated tax structure that encourages research and development for it to be on the competitive edge in science and technology-based economic development.

Implementation Action:
__X__ Legislative

Description of Action:

- Make the North Carolina R&D tax credit permanent and increase it from 5% to at least 10%. Apply the credit to all companies engaged in qualified R&D regardless of their industry classification. Permit companies to conduct an alternative flat-rate credit calculation to simplify the credit process for small and mid-size companies.
- Allow the R&D tax credit to accommodate the long-term lack of profitability that many young, high-growth companies experience initially when they are investing heavily in research and development activities. Lengthen the carry-forward period for this tax credit from 5 years to at least 15 years. Allow a company the right to sell its tax credits back to the state at 70 cents on the dollar when it has insufficient North Carolina tax liability to use its entitled tax credit in any taxable year.
- Permit companies that sponsor qualified research activities at North Carolina's universities to take an annual tax credit of 40% of the total amount of funds spent in these sponsored research activities.
- Require the North Carolina Department of Revenue to draft a fiscal note for this expanded R&D tax credit that utilizes dynamic modeling to determine the benefit of this credit to North Carolina's economy in addition to its cost.

Recommended Funding Source:
__X__ State funds

Cost:
Calculation of tax credit will come from the North Carolina Department of Revenue.

INNOVATION CLIMATE

Recommendation 2: ***Enhance Technology Transfer and Commercialization through creation of a gap-fund and by enhancing availability of seed and venture capital***

Background/Justification:
Innovation is fueled by the infusion of capital at critical points during the development cycle of a technology or a business. Providing incentives such as grants or matching funds to further develop internal and collaborative research will attract more companies, enhance innovation, and expand the economy of North Carolina. Similarly, funds provided to universities will enable them to develop technologies that are not yet marketable leading to increased technology licensing revenue. It will also encourage the formation of companies from university research projects, thereby creating jobs and returning to the university an equity stake in the companies it helped create.

Implementation Action:
__X__ Legislative

Description of Action:
- Create a "gap-fund" for technology development for university and community college technology development organizations to eliminate institution-specific "gaps" in research and development activities. These competitive funds could go directly to universities and community colleges or be distributed via a third party (e.g. NC Technological Development Authority, NC Small Business and Technology Development Center, or NC Biotechnology Center). These funds might be used to further develop technology invented in the university, file patent applications, or hire consultants to help with marketing and licensing.
- Provide matching funds and seed money to enhance partnerships and collaborative research. The goal of this is to attract more early-stage venture capital and to provide matching funds for researchers seeking federal support.
- Encourage the General Assembly, in collaboration with North Carolina's technology research and development organizations, to assure appropriate venture capital for entrepreneurial companies seeking early-stage investments.
- Provide tax incentives for the private sector to participate in collaborative ventures in research, teacher training, K-16 curriculum development, etc.

Recommended Funding Source:
__X__ State funds __X__ Federal Funds
__X__ Create a public-private partnership

Cost:
Gap fund of $550,000 annually
Matching/Seed Funds of $2,000,000 annually

INNOVATION CLIMATE

Recommendation 3: ***Enhance the innovation environment throughout North Carolina in conjunction with the drive to provide broad band internet access. This would be accomplished through the establishment of Regional Technology centers.***

Background/Justification:
Regions vary widely in the degree to which science and technology-based innovations play a role in their economy. This reflects significant differences in the focus of regional educational institutions, technology-supporting infrastructure, types and amounts of investment capital, industry mix, synergies between educational assets and industry needs, and public understanding and appreciation of innovation. To even the playing field across North Carolina, Regional Technology Centers should be established. These Centers would be created in conjunction with the regional economic development partnerships and would serve as the hub of enhanced innovation efforts in each region.

Implementation Action:

X	Legislative		Administrative
	Statutory	X	Executive Order
	Other		

Description of Action:

- Prototype efforts could be implemented in two regions of the state in an initial phased implementation. For example, a Center could be established in one eastern and one western economic development region as Phase I of this effort.
- Initial responsibility for creating the Centers will reside in the regional partnership with seed funding by the NC Board of Science and Technology and the North Carolina General Assembly. The North Carolina Small Business Technology Development Center (SBTDC) and other partner organizations will provide administrative and planning assistance as determined by regional-specific analysis.
- Other partner organizations will contribute real or in-kind investments that leverage their commitment and participation. Potential partners include: the North Carolina Center for Entrepreneurship and Technology (CET), the North Carolina Technological Development Authority (TDA), the SBTDC, the Regional Economic Development Partnerships, the Rural SBIC, NIST/Manufacturing Extension Partnerships, the UNC-General Administration, the North Carolina Community Partnership, the North Carolina Cooperative Extension Service Regional Partnerships, and their constituent industry and community partners.

Recommended Funding Source:

X	State funds	X	Create a public-private partnership

Cost:
$350,000 would be an initial figure to provide for a technology resource center if all the economic development efforts in a region would work together on this initiative. Seven centers for the seven economic development regions would cost $2.4 million.

INNOVATION CLIMATE

Recommendation 4: ***Teach, Celebrate, and Reward Innovative Thinking in K-16. Elevate and Promote Innovation in Education, Business, and Government.***

Background/Justification:
At the grassroots level, there is a strong need to increase the recognition and value of innovation as the prime engine of future economic growth for both individual regions and the State as a whole. Teaching concepts and methods to accelerate the generation of innovative ideas, products, and processes will be essential to grow North Carolina's economy.

The breadth of this innovation education will span the geographic and industrial sectors of the State, touching all educational and income levels. Publicly rewarding innovative activities will encourage others to innovate.

Implementation Action:

X	Legislative	X	Administrative
	Statutory		Executive Order
	Other		

Description of Action (if applicable):

- Study, test, and incorporate into the State Curriculum effective models that enhance innovation in K-16.
- Through models such as the Baldridge Quality Awards, publicly recognize innovators in all areas and sectors of the State for their accomplishments. Honor innovators through new categories in the North Carolina Awards.

Recommended Funding Source:

X	State funds	X	Federal funds

Cost:
Curriculum development could be funded through a National Science Foundation Grant and through the ongoing curriculum development funds of our educational institutions.

KNOWLEDGE AND TECHNICAL INFRASTRUCTURE

Knowledge and Technical Infrastructure Taskforce

A solid technical foundation under girds a successful science and technology-based economy and permits innovation to flourish. The Vision 2030 Knowledge and Technical Infrastructure Task Force examined infrastructure issues and made recommendations for critical investments that will strengthen North Carolina's knowledge and technical resources.

The Infrastructure Task Force members framed their recommendations around three goals:

1) Increase the availability and affordability of North Carolina's science and technology-based resources through building out affordable advanced telecommunications capabilities across the State;
2) Enhance the usability of North Carolina's science and technology-based resources by creating a clearinghouse of these resources that would be available to all citizens and by encouraging citizens and businesses to take advantage of these opportunities; and,
3) Increase the value of North Carolina's science and technology-based resources and insure the State's economic sustainability through innovative collaborative initiatives and better knowledge management practices among educational sectors, industry, governmental agencies, and not-for-profit corporations.

The Task Force members feel that it is imperative that the North Carolina General Assembly makes significant infrastructure investments over the next few years to achieve these goals. These investments are necessary to build up the infrastructure of the universities, to help connect all of its citizens to the information highway, to provide resources to K-12, community colleges and universities to ensure an educated workforce, and to provide incentives for collaboration and investments with the private sector. It is only through these investments that North Carolina will maintain its position on the leading edge of economic growth based on high technology.

In the last few years, North Carolina has been reaping the benefits of the creative leadership of its past. The nurturing of an outstanding university system, the enlightened vision of the Research Triangle Park, the development of the Centennial Campus at NC State University, and the establishment of information superhighway links (the NCIH backbone) to most of our larger cities and towns have all contributed to the recent growth of North Carolina's economy. Most of this growth has occurred in new sectors such as biotechnology, and information and communication technologies.

As other states recognize the importance of the development of new technologies for economic growth, they have been making significant investments to develop their technology infrastructure, to foster industry-university collaborations, to attract and retain top technology faculty in their universities, and to enhance science education at all levels. In addition, many states have established agencies to coordinate efforts in technology and to administer programs that enhance state competitiveness in the technology arena.

Our citizens' futures depend on the State's ability to focus support into infrastructure development that is the most effective in leading to economic growth. The Knowledge and

Technical Infrastructure Task Force makes the following recommendation to encourage innovation and bring opportunities to citizens across North Carolina.

KNOWLEDGE AND TECHNICAL INFRASTRUCTURE

Recommendation 1: ***Develop a state level infrastructure organization, external from state government enabled by an executive order, that would encourage manufacturing extension partnerships, economic development partnerships, community colleges, universities, and public schools to cooperate in a collaborative statewide effort resulting in "Smart Communities."***

Background/Justification:
The mission of the newly established Rural Internet Access Authority (RIAA) should be expanded to include developing the demand side of networks by working with North Carolina's citizens to explain why technology matters. "VirginiaLink" is a similar model. The expanded duties of the RIAA might include:

- Public relations campaign to citizens about the importance of connectedness;
- Negotiation of telecom rates for purchasing alliances of employers;
- Outreach and technical assistance to communities in developing connectivity plans to become Smart Communities;
- Competitive, criteria-based funding for Smart Communities to build out state networks; and,
- Incentives to Internet Service Providers and other employers that connect up under-served areas and populations.

Organizations such as MCNC and the North Carolina Networking Initiative (which is now working on Internet2), the Rural Internet Access Authority, and the Information Technology Services Division may be consulted to help propose standards for the establishment of such a state of the art, forward-looking, and flexible statewide system.

Implementation Action:

X	Legislative	X	Executive Order
X	Other		

Description of Action:
The RIAA would be responsible for the following activities:

- Developing a data-based outreach effort to educate North Carolinians about the importance of technology infrastructure investments and the opportunities the technology offers for greater business competitiveness and citizen quality of life. The messages should be developed from available data on best practices showing "why technology matters" as well as on demonstrated returns on investments to educational performance or business competitiveness;
- Serving as an information broker and technology-neutral negotiator on behalf of purchasing alliances of employers to get cost-effective telecommunication services from providers;
- Managing and disbursing funds from a "Smart Communities Fund" for the build out of the networks. Provide funds to public-private partnerships in communities and regions that meet desired connectivity criteria (including equity, outreach, and business partnerships). These Smart Communities would then get broadly publicized as models for replication;

- Revising funding guidelines for existing state programs to emphasize the Smart Communities principles;
- Developing programs to assist families to obtain information network access devices and to pay the monthly network charges;
- Offering tax credits or other incentives to businesses that develop some of the needed infrastructure, including those that offer household Internet access to their employees;
- Tracking the network build-out effort via GIS-based spatial data;
- Advising the State regarding ways to assist rural regions in attracting high-tech companies by helping to assure water and utility services, strong school systems, educated and technology capable workforce, and start-up tax breaks;
- Facilitating better collaboration among universities, community colleges, and K-12 toward knowledge development and sharing between these entities;
- Transitioning government users to a seamless web-based process; and,
- Setting target deadlines for implementation of initiatives.

Recommended Funding Source:

X	State funds	X	Foundation Funds
X	Create a public-private partnership		

Sources of funding for this expanded RIAA initiative may include:

- A state-run universal services fund that collects from all telecommunications businesses and disburses to firms that invest in low-income areas;
- Membership fees from businesses that want to participate in purchasing alliances; and,
- Community foundations.

Cost:

At least $1 million added to the budget of the RIAA. The RIAA is scheduled to sunset after 3 years but may need to continue as a 501(c)(3) to continue these initiatives that enable ubiquitous connectivity of North Carolina homes and businesses.

KNOWLEDGE AND TECHNICAL INFRASTRUCTURE

Recommendation 2: ***Provide tax incentives for collaboration***

Background/Justification:
Tax credits would provide an excellent incentive for the private sector to participate in collaborative ventures in, for example: research, teacher training, and K-12 curriculum development. This type of support will encourage companies to provide funds for research to universities or to permit their employees to take paid time off to address many pressing societal issues.

Implementation Action:
__X__ Legislative

Description of Action:
Provide tax incentives for:

- ***Developing the high-bandwidth network infrastructure*** - Businesses in the telecommunications and e-arena should be granted tax incentives to build a telecommunications infrastructure that services all areas of the State and provides internet/electronic access to government services to all citizens at a reasonable cost.
- ***Collaborative efforts for worker training*** – Tax incentives could be used to encourage businesses to allow worker training on-site utilizing e-education opportunities provided by the state's community college and university systems. In doing so the state will be able to support the training and re-training of the state's workforce.
- ***Providing grants for educational technology*** - Providing grants to schools, universities, and community colleges for educational technology will enable the use of technology for teacher training and will empower teachers to utilize technology in their classrooms.
- ***Development of tools and user-friendly infrastructure*** - Government web sites must be designed to reduce literacy, educational and knowledge barriers. Sites must be easy to use and understandable at, for example, the eighth grade reading level. Technical tools should be made useful for business development.
- ***Promoting knowledge sharing*** - Development of shared knowledge databases and processes for knowledge sharing will enhance collaborative research.
- ***Collaborations among businesses and universities to bring technology to rural communities and households*** - The State and local governments should provide economic incentives to industry or academic institutions for novel or innovative solutions to the rural connectivity and Internet service delivery problems.

Recommended Funding Source:
Foundations, Corporations, NC General Assembly

Cost:
We have no specific data on cost/opportunity cost of this initiative. The General Assembly should request its fiscal research division to develop fiscal notes on the above-recommended actions.

KNOWLEDGE AND TECHNICAL INFRASTRUCTURE

Recommendation 3: ***Funding Initiatives to Promote E-Government***

Background/Justification:
Seed funds should be made available to provide incentives and support for individuals or organizations wishing to forge partnerships to achieve knowledge and technical infrastructure enhancement goals. Pulling together joint proposals to deal with complex issues is a significant enterprise that merits investment by State government. Collaborative efforts are much more difficult to put in place if these types of funds are not available.

Matching contributions are also necessary to make the State competitive in seeking federal support for many worthwhile efforts involving multi-institutional and multi-agency efforts. For example, many states have a pool of funds available to help provide matching contributions to universities wishing to submit Center or Institute proposals to the National Science Foundation (NSF). North Carolina researchers are at a competitive disadvantage because such a funding source does not exist.

Implementation Action:
__X__ Legislative

Description of Action:
Specific funding initiatives for the State:

- ***State Budget Process*** - The State must provide the leadership to make electronic operations in government, education and health a reality. State run institutions and agencies cannot react quickly enough to satisfy the public's demand for electronic services due to a budget process that does not respond to the changes and possibilities made possible by rapid technological development in the e-arena. State institutions operating on a biannual budget cannot target funds quickly enough to deliver electronic systems that meet public demand and utilize the latest technological advancements. The State must deliver a budget process/methodology to react in the short-term tactical timeframe rather than in the long-term strategic timeframe. The State should develop a task force combining appropriations and budgeting officials with academics to develop a more rapid budgeting process.
- ***E-Government Fund*** -A special E-Government Fund should be used to finance the rapid development of e-projects in government/education/health agencies and institutions. The Fund would be used to encourage multi-agency and individual projects to reduce the time to market delivery of electronic business projects allowing government to deliver services more effectively. Citizens could, for example, pay fines, file court documents, renew registrations and licenses, and gain access to a myriad of information via the Internet and other means of electronic access to government files.
- ***Public Technology Center*** - Fund the proposed Public Technology Center at the UNC Institute of Government to assist local governments in leveraging the best use of information technology and the Internet to serve the citizens of the State. The Public Technology Center would supply the leadership in marshalling available resources to meet these pressing local government needs and deliver direct educational and technical assistance services. The UNC

Institute of Government has determined that $850,000 of the annual budget of the Public Technology Center would need to be funded by State appropriations.

- ***Government Fees*** - The State should recognize the cost differential of doing e-business and reduce fees to companies/citizens utilizing e-transactions. The cost per transaction for an e-transaction is cheaper than a transaction processed in a traditional office setting requiring staff and office space. Reduced costs for government services when transacted on-line will encourage more citizens to use on-line services. The State should create a task force to streamline access to government services. It should develop a fee reduction process for citizens and businesses transacting business on-line. For example, airline companies in the United States have just announced that there are more e-tickets now than paper ones due to their charging lower fees for e-tickets.
- ***Credit Barriers*** - The State must provide a means for citizens unable to possess traditional checking/credit card accounts to participate in the e-government process and to pay for services. The State must ensure that it does not create or expand a class of citizens who are disadvantaged because of their lack of access to electronic government, education, commerce or health related services.

Recommended Funding Source:

__X__ State funds

Cost:

Budget Task Force – This should be able to be developed within the budget of the Office of State Budget.

E-Government Fund - $3,000,000 seed fund to be replaced with 50% of departmental savings from moving to online transactions.

Public Technology Center - $850,000 annually to the Institute of Government at UNC-Chapel Hill.

KNOWLEDGE AND TECHNICAL INFRASTRUCTURE

Recommendation 4: ***Regulatory Measures--1) Removal/Exemption from the Umstead Act and 2) Standardize Licensing/Certification of Teachers Regarding IT***

Background/Justification:
Regulatory exemption from the State's Umstead Act might be required so that the State may, on a temporary basis, deploy affordable advanced telecommunications services in areas of North Carolina that are not cost-effective for the private sector to serve. Additionally, State regulations may need to be modified to enhance efforts at teacher preparation and licensing and to provide merit pay increases to improve teacher retention.

Implementation Action:
__X__ Legislative __X__ Administrative

Description of Action:
- The North Carolina General Assembly should amend the Umstead Act to allow public-private consortia to use the NCIH for purposes related to telecommunications, such as video-based worker training.
- The North Carolina General Assembly should establish a system of worker training centers across the state, utilizing distance education technologies. Regulations may be required to enhance connectivity, provide for the maintenance of Internet resources, and mandate that programs supported through State funds be organized through joint efforts of the various sectors.
- North Carolina should require businesses under contract with the State to provide their services equally and economically to all areas of the State where they may have a contract. In addition, the State should relax authority at the local level to allow towns and cities to raise revenue to address region-specific information technology and infrastructure issues.

Recommended Funding Source:
Companies would pay a set fee for using NCIH sites. These funds would pay local use costs and then the residual would be placed in the ITS connectivity reserve. The Community Colleges, public and private universities could work together on this initiative.

Cost:
No specific data on cost/opportunity cost of this initiative.

KNOWLEDGE AND TECHNICAL INFRASTRUCTURE

Recommendation 5: ***Specific Financial Allocations***

Background/Justification:
Additional budget allocations are necessary to spur collaboration and technological solutions for creating a more competitive workforce in North Carolina.

Implementation Action:
__X__ Legislative

Description of Action (if applicable):
- The State should pick up the "long haul" or inter-exchange carrier (IXC) cost that public and educational institutions pay for the NCIH, leaving only the cost that each pays to the point of presence (POP).
- North Carolina should establish a budget line item to fund inter-institutional collaborations that produce knowledge exchange toward economic development and help state institutions or residential companies to win more federal grant awards.
- North Carolina should fund the development of knowledge access, search, and guidance tools for knowledge flow throughout the State to support science and technology creativity and innovation. This could be accomplished by supporting the development of a North Carolina Knowledge Management Center.

Recommended Funding Source:
__X__ State funds

Cost:
- Pick up of IXC cost on the NCIH is identified as approximately $4 million. There is no other specific data on cost/opportunity cost of this initiative.
- Fund the North Carolina Knowledge Management Center $250,000 per year.
- Fund for matching funds to the NC Board of Science and Technology $1 million

SCIENCE AND TECHNOLOGY WORKFORCE

Science and Technology Workforce Taskforce

North Carolina faces incredible challenges in providing enough qualified science and technology personnel for business, industry, and public sector positions. Science and technology-oriented jobs are often higher paying and permit greater advancement. Moreover, jobs not traditionally considered "technical or scientific" increasingly have technical and scientific components. The Science and Technology Workforce Taskforce examined this crucial issue for North Carolina's future economic prosperity: What do we need to do to develop a highly proficient science and technology-based workforce in all parts of our State?

The Workforce Task Force made recommendations in five key areas to improve science and technology workforce development in North Carolina:

1. Professional Development and Quality Training for Teachers and Instructors;
2. Recruitment to Careers in Science and Technology;
3. Curriculum Development;
4. Collaboration among Educational Sectors; and
5. Financial Investments.

North Carolina's future economic competitiveness is predicated on having a world-class workforce that is trained in state of the art technology. In an economy where businesses are less capital intensive and capital is increasingly mobile, companies relocate to where trained talent exists. Companies will set up operations in North Carolina if they can count on a well-trained work force. Moreover, highly trained scientific and technological people innovate: creating new businesses and new jobs. This can be a virtuous circle of quality job creation for North Carolina, but only if we make the investments necessary to develop a scientific and technologically proficient workforce.

Far too few young people understand how studying math, science and technology in junior high school can lead to rewarding careers. Many of the fastest growing and highest paying jobs in the future will be in science, technology and engineering, but students opt out of the math and science courses that will prepare them for these careers because of negative stereotypes and a lack of role models and career information.

As the numbers of students in our educational system steadily rise, North Carolina will experience increased competition among educational agencies and other agencies of state government for ever-diminishing financial resources. The citizens of North Carolina and their elected representatives must be willing to commit financial resources to meet necessary funding toward this educational challenge. While science and technology become more important in the new information age, if this financial challenge is not met, representatives will consign our state to a much less promising economic future. Further, an on-going commitment that is dedicated to continual funding of the current and future technology infrastructure for public schools, community colleges, and four-year institutions is crucial to our educational system.

SCIENCE AND TECHNOLOGY WORKFORCE

Recommendation 1: ***Hire and retain quality instructors in scientific and technological fields. Commit to continual training and professional development in science and technology for instructors in all educational sectors in North Carolina. Provide better incentives to find and retain technologically or scientifically proficient instructors.***

Background/Justification:
There currently exist unheard of shortages of instructors in mathematics, science, and technology and greater shortages loom in the future. The current inability to attract and retain qualified instructional personnel in these technical fields is largely due to the substandard salaries and benefits offered. As, lateral entry into teaching will be a critical component of addressing that shortage, North Carolina will need to develop innovative strategies to attract highly technologically proficient people into teaching and retain them. Without a commitment to significantly higher salaries, many of our best instructors will continue to leave the field of education for the more lucrative private sector.

Although public school teachers must take a minimal number of hours of courses in information technology, there is great variability in the technical training of instructors at all levels. We recommend instructors at all levels receive professional development courses in technology. Since resources for professional development are inadequate already, more resources will have to be made available especially for community college and university instructors.

In serving this need of teacher shortage and recruitment, another challenge for the college system that has a special mission of life-long learning and adult learning is teacher retainment and mid-career training. Many persons, who seek a career change, also seek additional education in how to use and incorporate technology required by a new job or career opportunity. Special strategies must be employed to meet these needs through short-term and long-term courses. This will include curricular programs leading to degrees; increasingly it will mean shorter programs leading to certification of competency in a particular technology.

Teacher training, development, and retention will require a large initial investment and on-going funding in technology and course development to keep pace with advances.

Implementation Action:
__X__ Legislative

Description of Action (if applicable):
- Require instructors at all levels (K-16) to receive training and professional development courses in technology. Likewise, put the same technology in place in the teaching environment.
- Mandate that schools and departments of education must require proficiency in information technology in their lateral-entry criteria.
- Provide appropriate financial incentives to instructors in areas of educator shortage.

- Use assessment techniques such as electronic multimedia teaching portfolios to demonstrate the technical expertise teachers have and also ensure that they are competent and up to date in their knowledge of technological advancements in instruction.
- Make professional development curricula more comprehensive in respect to science and technology using curricula and instructional technology that addresses analysis, discovery, and innovation as future problem solving tools.
- Require better inter- and intra-institutional collaboration to facilitate the sharing of advances in instructional technology. Encourage collaboration with industry representatives to leverage State training resources and provide state-of-the-art technology training.

Recommended Funding Source:

__X__ State funds __X__ Create a public private partnership

Cost:

- $400 a year for training per each faculty member in science, technology, engineering, and related areas.
- Additional financial payments above standard salary schedules should be developed to pay persons who are in the science and technology fields who stay in teaching.

SCIENCE AND TECHNOLOGY WORKFORCE

Recommendation 2: ***Recruit students to scientific and technological career fields and prepare them to excel in these fields.***

Background/Justification:
A number of graduating high school and college students lack the prerequisite skills needed to make the transition into science and technology programs and careers. Many of the fastest growing and highest paying jobs in the future will be in science, manufacturing and technology, but students opt out of the math and science courses that will prepare them for these careers because of negative stereotypes and a lack of role models and career information.

Few young people understand how studying math, science and technology in junior high school can lead to rewarding careers. More steps should be taken to encourage students to become active with Pathways or involved with Job Ready to begin preparing for career pathways in science and technology while in middle school. Waiting until high school is too late for most students. Information should be directed also to parents who are often the primary resources for career planning information and encouragement for students.

Students should be required to acquire a broad foundation of skills in science and technology fields. An emphasis must also be placed on helping students apply the knowledge and concepts they acquire from these courses, as opposed to meeting specified assessment criteria. Students must be better prepared prior to entry into college in order to view career clusters broadly and be able to focus on appropriate experiences, seek relevance, and apply knowledge across multiple disciplines and domains. Careers in science and technology must be well presented as options if North Carolina is to have a workforce that is competitive in the global marketplace.

Implementation Action:
__X__ Legislative

Description of Action:
- Require students to take more courses with a science, math, and technology component at the middle school level.
- Provide a technology supplement for each middle and high school child enrolled in a science class and an equivalent amount for every middle and high school child enrolled in a technical (Workforce Development Education) class. These monies will supplement those applied locally. The purpose of this fund would be to provide all students and teachers with the tools necessary for the teaching of contemporary science and technology concepts and principles.
- Require students to take courses in a broad range of basic skills that form the foundation of almost any technical field: at least four courses in mathematics (e.g., through Algebra II and one other higher level math) plus four courses in science (two with laboratory components).
- School counseling programs should cooperate with business and industry and welcome students into the work place for career exploration and job shadowing. More formal partnerships should be put into place between education and the news media to encourage students to choose careers in science and technology and to educate parents about the value

of these careers. The Job Ready and Pathways programs, are successful examples of such a partnership and offer career information to students.

- Give additional support to the Tech-Prep program and support other programs that emphasize technical certification instead of four-year degree programs. The Tech-Prep curriculum brings added rigor to the high school curriculum for those students who choose to pursue a technical track instead of a traditional academic track or pathway to college.
- Establish a seamless transition in the North Carolina public education system from high school through the community college to the university building. Building on the North Carolina High School-to-Community College Articulation Agreement can facilitate this transition. The next step is to create a similar agreement for students achieving an Associate in Applied Science Degree so that they can articulate smoothly into a Bachelor's of Science program at a four-year institution.
- Educational institutions must more aggressively pursue private industry contributions in equipment and software, and dollar contributions to purchase equipment and software. The educational institutions, for example, do not serve their students by training them for tomorrow's jobs on yesterday's equipment. Business and industry must be educated concerning their self-interest in this challenge.
- Community colleges should prioritize the development of shorter programs leading to certifications of competency in a particular technology to facilitate skill building and career changes.

Recommended Funding Source:

X	State funds	X	Create a public private partnership

Cost:

State technology supplement of $100/child enrolled in a science or technical class. In addition to the technology monies, $1000/year for each science and technical class for supplies.

SCIENCE AND TECHNOLOGY WORKFORCE

Recommendation 3: ***Provide quality science and technology education ubiquitously across North Carolina.***

Background/Justification:
Geographic location should not pose a barrier to equality in education. There is currently in North Carolina great economic disparity between the rural and metropolitan areas with regard to high technology classrooms and availability of high-level science and technology courses.

With instructors facing the ongoing challenge of mastering the impact of technology on both their subject matter and methods of instruction, responsibility for technology maintenance should not fall on them by default. As classrooms become more sophisticated, provisions need to be made to relieve instructional personnel from the responsibilities of installing, maintaining, and supporting the technological infrastructure and tools. Consideration of total cost of ownership when purchasing, outsourcing, provisioning sufficient technical support resources, employing more technical staff, and other measures, are essential to maximizing the benefit of the planning and installation of technology in classrooms and continual staff development of instructional personnel.

Implementation Action:
__X__ Legislative

Description of Action:
- North Carolina should guarantee continual funding for a ubiquitous high-speed educational technology network.
- Distance learning programs should receive more state funding.
- Schools should have on staff technical personnel who are responsible for maintaining networks, equipment, and distance-learning facilities.
- Technology budgets must be sufficient to account for acquiring, installing, maintaining, and training to use advanced technologies. Academic institutions may want to consider the option of leasing necessary technical equipment to provide a readily available support and repair staff, as well as future updates. Such an arrangement is already in place in the community college system.
- Create a technology fund to finance the current and future technology infrastructure for public schools, community colleges, and four-year institutions in North Carolina. Georgia has a successful model for such a program.

Recommended Funding Source:
__X__ State funds __X__ Create a public private partnership

Cost:
- $400-500 per student in the community colleges and institutes of higher education.
- $300 per student in K-12.

GLOBAL COMPETETIVENESS
Global Competitiveness Taskforce

> New technologies are creating a global economy that is slowly supplanting existing national economies. Thirty years from now, few of us will think of ourselves as working in the American economy. Global economies are different from national economies. The big difference is that national governments cannot control them. So governments will have to start to think of themselves as platform builders. Can they build the platforms based on education, infrastructure, and research that will allow their citizens to successfully compete in the new global economy? Lester C. Thurow, 2000

North Carolina's companies, educational institutions, and workforce are not competing only with similar entities in other areas of North Carolina or in other states but with providers of goods and services from all around the world.

The Vision 2030 Global Competitiveness Task Force took as its mission to formulate specific recommendations essential for North Carolina to be competitive in the global economy. The Task Force examined ways in which North Carolina could position itself to be the "preferred provider" globally in key areas where we would like to be most competitive. These areas could include: manufactured and agricultural goods; high-tech goods including fiber-optics, telecommunications equipment, pharmaceuticals and genomics; services including software, consulting, and education. These areas also included the workforce from the perspective of attracting businesses to locate in North Carolina.

Task Force recommendations on making North Carolina's workforce, institutions, and companies competitive globally came under five broad categories:

- Image
- Infrastructure in terms of Transportation
- Infrastructure in terms of Education
- Legislative
- Administrative

GLOBAL COMPETETIVENESS

Recommendation 1: ***Create a Department of Science and Technology headed by a Secretary for Science and Technology.***

Background/Justification:
Scientific and technological innovations will drive North Carolina's future economic growth. To harness the power of these innovations and distribute them across North Carolina, the state should establish a cabinet level position focused specifically on Science and Technology. Neighboring states that are identifying their future with technology and innovation have taken this step. In order for North Carolina to maintain and increase the global competitiveness of its industries, institutions and workforce, legislation and administrative actions should be viewed beyond their county, regional, or state impact.

Implementation Action:

X	Legislative	X	Administrative
X	Executive Order		

Description of Action:
Create a Department of Science and Technology headed by a Secretary for Science and Technology. This position will oversee the current statewide activities and operations relating to science, technology and communications. The department would restructure the governance of science, technology and communications in North Carolina by extracting all of the various pieces that are located throughout the state system and organizing them into one body. Globally focused strategies such as benchmarking against successful competitors of North Carolina worldwide will be undertaken by this new department. The current Office of Information Technology would have its CIO report to the Governor yet the CIO would have a dotted-line responsibility to this Secretary.

Recommended Funding Source:

X	State funds

Cost:
A department staff would cost about $600,000 and could be accomplished by pulling appropriate science and technology functions under this department.

___X___ State funds

Cost:
Start-up funds of $350,000 could be gradually decreased after five years.

GLOBAL COMPETETIVENESS

Recommendation 2: ***Establish a central resource center for the collection, analysis, and dissemination of data on North Carolina's Economy.***

Background/Justification:
To compete globally, steps must be taken to establish an administrative infrastructure within the North Carolina state government. A 21st century competitive growth strategy for North Carolina must focus on creating the framework to broaden its knowledge worker base, expand research and development assets and build an infrastructure to support North Carolina's global market competitive position. This structure must include access to data and information relevant to competing in a world economy.

Information and data defining North Carolina's current inventory of assets, employment strengths, foreign investments, employment migrations and demographics are scattered in multiple institutions and organizations. Current economic data about North Carolina is difficult to locate, but even if located may be of limited usefulness due to the lack of standard formats and nomenclatures and unclear and quality control measures in the collection process. When North Carolina's data is compared to the data of other states and regions, even attempting to use the federal codes, can be cumbersome and difficult to interpret. We must know what we have before we can embrace a "New Economy". Once North Carolina's position in the current global marketplace is ascertained and its assets inventoried, the next phase requires a global competitiveness plan with defined objectives and yearly measurements to advance North Carolina into the "New Economy".

Implementation Action:

X	Legislative	X	Administrative
X	Executive Order		

Description of Action:

- Establish one point of entry for collection of data and information affecting current and future economic growth and establish a single web portal repository of global competitive information for North Carolina citizens and enterprises.
- Update annually a publication that assembles all available information on the technology sector and knowledge infrastructure and make these data available to policy makers and the general public through a website.
- Identify a core set of technology issues facing the state and collect the information from relevant primary and secondary sources.
- Establish standard definitions for data elements used to track North Carolina businesses' global investments (i.e., exports, financial vendor partnerships, imports, and strategic alliances).
- Develop baseline criteria and model application for assessing North Carolina global competitive market position.
- Identify and implement measurable strategies that elevate its global market position.

Recommended Funding Source:

GLOBAL COMPETETIVENESS

Recommendation 3: ***Require the North Carolina General Assembly to utilize Dynamic Revenue Modeling when considering legislation that will affect current tax or fiscal policies.***

Background/Justification:
Dynamic Revenue Modeling would allow state policy makers and staff to evaluate both the cost and the return-on-investment of new initiatives and tax policy. Just as the private sector makes investment decisions based on marketplace dynamics and net return in both the short and long term, state policymakers should have similar tools that account for longer-term impact of new jobs created, development of industry clusters, impact on marketplace competition, and future tax revenue growth when evaluating tax and fiscal policy.

Implementation Action:
__X__ Legislative __X__ Administrative

Description of Action:
- Form a study commission to examine and report the findings of a Dynamic Revenue Model process and steps needed to implement in North Carolina.
- Require Dynamic Revenue Modeling processes to be implemented by the Fiscal Staff of the North Carolina General Assembly so that the opportunity for revenue benefits as well as initial costs of various tax and fiscal proposals are examined during the legislative process.

Recommended Funding Source:
__X__ State funds

Cost:
- Task Force operations would be about $100,000 over 18 months.
- The cost for developing the dynamic model could run from $150,000 to 200,000 dollars.

GLOBAL COMPETETIVENESS

Recommendation 4: ***Brand and market North Carolina globally as a high-tech state.***

Background/Justification:
If North Carolina markets itself as a state where science and technology are recognized and rewarded, economic benefits will include an increase in trade, more grant funding, and a greater likelihood of high-tech industries relocating or expanding here. Global branding leads to more foreign direct investment including R&D investments, more trade, and more international scholars choosing to study here. Other states are applying resources toward global branding whereas, North Carolina has had to overcome its recent negative publicity from the natural disasters that have affected the State.

North Carolina has global brand recognition for certain products such as furniture and tobacco but these industries are on the decline. If North Carolina wants to brand itself as a high-tech state, it must extend this global recognition to high-tech industries such as biotechnology, communications, information technology, and value-added service industries such as banking.

Implementation Action:
__X__ Administrative __X__ Executive Order

Description of Action:
Create a public/private partnership to heighten the image of North Carolina through:

- A strategic, coordinated and integrated public relations, marketing, and communications campaign promoting North Carolina as a high-tech state that values, encourages, and invests in science and technology.
- Trade shows in industries where we would like to have global brand recognition such as optical switching or environmental technologies that attract industry representatives from around the globe. This successful model, used by the North Carolina Biotechnology Center and the Council for Entrepreneurial Development at their annual Biotech Conference, should be expanded to other industry sectors.

Recommended Funding Source:
__X__ State funds __X__ Create a public/private partnership

Cost:
The public/private partnership would be funded through a combination of funding from the state, private industry, universities, and non-profit organizations. We anticipate the budget could be close to $2,000,000 a year.

GLOBAL COMPETETIVENESS

Recommendation 5: ***Erase the boundaries: Teach North Carolina's citizens to think, learn, and work in a borderless world.***

Background/Justification:
All North Carolinians must be prepared to understand and deal with an increasingly global environment. This includes an understanding of foreign cultures, languages, and economic, political, and educational systems. The American workforce of the future no longer will be able to expect or demand that business, politics, or any other global interaction will be done the "American Way". Consolidated economies in Western Europe and Asia will constitute major economic challenges.

Other states have taken a lead in creating a "global generation" ready to succeed in an increasingly cosmopolitan and global working environment. For example, in May of 1998, Wisconsin's Governor Tommy Thompson issued a plan developed by a public/private task force to internationalize the Wisconsin workforce.

Implementation Action:

X	Legislative	X	Administrative

Description of Action:

- Establish a public/private partnership to create a globally-minded workforce in North Carolina. This Partnership will integrate all educational sectors, beginning in elementary school and continuing throughout a citizen's life through life-long learning opportunities.
- Programs, systems, and services must be put in place to assure that instructional personnel in North Carolina are trained to integrate international concepts into their instructional designs wherever appropriate.
- Give support to projects, programs, and curricula that encourage internationalization such as: NC/Japan Centers, NC Global Partnership, NC World Trade Center, the NC Global Center, NC Center for International Understanding, study abroad programs, Sister City and Sister State partnerships, and foreign language instruction.

Recommended Funding Source:

X	State funds	X	Create a public/private partnership
X	Federal funds	X	Foundation funds

Cost:
$150,000

GLOBAL COMPETETIVENESS

Recommendation 6: ***Expand and enhance the North Carolina Research & Development Tax Credit***

Background/Justification:
Scientific and technological research is critical for a state's economic growth. Most states recognize the role of research and development as an economic engine for current and future prosperity. As a result, they have expanded and enhanced their direct investment in R&D and revised their R&D tax laws to serve as competitive tools for economic development. North Carolina lags behind many other states in the tax treatment of qualified research and development expenditures by companies. States such as California, Connecticut, Pennsylvania, Georgia, and Massachusetts have R&D tax credits that are at least twice as beneficial as those in North Carolina.

North Carolina needs an updated tax structure that encourages research and development for it to be on the competitive edge in science and technology-based economic development.

Implementation Action:
__X__ Legislative

Description of Action:
- Make the North Carolina R&D tax credit permanent and increase it from 5% to at least 10%. Apply the credit to all companies engaged in qualified R&D regardless of their industry classification. Permit companies to conduct an alternative flat-rate credit calculation to simplify the credit process for small and mid-size companies.
- Allow the R&D tax credit to accommodate the long-term lack of profitability that many young, high-growth companies experience initially when they are investing heavily in research and development activities. Lengthen the carry-forward period for this tax credit from 5 years to at least 15 years. Allow a company the right to sell its tax credits back to the state at 70 cents on the dollar when it has insufficient North Carolina tax liability to use its entitled tax credit in any taxable year.
- Permit companies that sponsor qualified research activities at North Carolina's universities to take an annual tax credit of 40% of the total amount of funds spent in these sponsored research activities.
- Require the North Carolina Department of Revenue to draft a fiscal note for this expanded R&D tax credit that utilizes dynamic modeling to determine the benefit of this credit to North Carolina's economy in addition to its cost.

Recommended Funding Source:
__X__ State funds

Cost:
Calculation of tax credit will come from the North Carolina Department of Revenue.

GLOBAL COMPETETIVENESS

Recommendation 7: ***Reorganize the planning process for transportation to include rail, roads, sea ports, and air.***

Background/Justification:
In order to market our state globally we must enable visitors to have access to our vital areas of commerce, research, and development. Connectivity of all sections of the state is essential to provide access to all citizens of the state and to enable the development of new markets, e.g. tourism, in a global economy.

The Global Transpark might need to be seen as focusing on the eastern part of North Carolina. It is easier for North Carolina citizens to see the middle and Western areas of the State as being served by the proposed Fed-Ex facility in Greensboro and by ports in Southeastern North Carolina and South Carolina.

Major international corporations with divisions located in smaller metropolitan areas use corporate aircraft to fly customers into corporate offices sometimes exceeding the number of flights of commuter aircraft. Support regional airports in developing safe air traffic control and runway systems for secondary air travel through commuter systems to relieve the major airports serving primary markets.

Implementation Action:

X	Legislative	X	Administrative
X	Executive Order		

Description of Action:

- Examine "Best Practices" of other states to improve North Carolina's transportation process from planning to delivery.
- The existing state structure is inadequate to meet present, much less future needs. A state infrastructure bank is needed to assure funds for future transportation growth.
- As part of the statewide plan for transportation, North Carolina must include the highest and best use of regional airports to accommodate the corporate traffic that is developing through international trade.

Recommended Funding Source:

X State funds

Cost:
Minimal costs to reorganize the planning function for transportation would be expected.

GLOBAL COMPETETIVENESS

Recommendation 8: ***Integrate the educational plans for K-12 schools, community colleges, and state universities in North Carolina.***

Background/Justification:
The potential economic benefits to North Carolina by becoming a major world provider of education/workforce development services could turn an essentially domestic system into one of the state's largest and most profitable export products. The rapidly growing global need for access to educational resources must be filled by someone. There are a variety of new models involving both onsite and E-education modes, both public and private. With an integrated educational plan, North Carolina should be able to compete for a share of this evolving and growing world market.

Implementation Action:
__X__ Administrative __X__ Create a Public/Private Partnership

Description of Action:
Pursue the process of integrating the educational plans for K-12 schools, community colleges, and state universities in North Carolina. By so doing, we produce an educational system that can be viewed as constituting a major revenue-generating source for the state of North Carolina.

Recommended Funding Source:
Develop a public/private partnership model that would become the e-learning effort for North Carolina institutions to compete worldwide.

Cost:
Cost would be determined on the decision of the Taskforce by the parameters it would set for going after this worldwide educational market.

GLOBAL COMPETETIVENESS

Recommendation 9: ***Establish a Network Access Point (NAP) in North Carolina to improve access to and reduce cost of Internet connectivity.***

Background/Justification:
A NAP is a point where Internet traffic is exchanged among Internet Service Providers. Currently, most Internet traffic is routed to NAP's in Washington, DC, Atlanta or other dispersed locations. The distance that data must travel to reach the Internet backbone results in higher cost of connectivity and higher probability of network congestion. The high demand for bandwidth in North Carolina by major industry sectors like information technology, health care, financial services, education, manufacturing, and governmental units, merit the establishment of a direct public access Internet backbone connection in North Carolina.

Implementation Action:
__X__ Administrative

Description of Action:
A request has been made to the Secretary of Commerce to fund an independent study to validate the need for a NAP in North Carolina. A neutral party is preferred to conduct this study. Some of the traffic data may be considered proprietary by the telecommunications providers who will be asked to supply this information.

Recommended Funding Source:
Implementation costs of the NAP are borne by the private sector.

Cost:
The type of and size of the NAP would determine cost.

GLOBAL COMPETETIVENESS

Recommendation 10: ***Consolidate the administration and administrative functions of appropriately located Community Colleges to create regional administrations.***

Background/Justification:
The location of community colleges in the various counties was established to provide easy access to all potential college students. The measure was drive time. With the advent of the Internet and the Virtual Campus the fundamental rational for college location is changing. As more and more students select the virtual learning environment, drive time or proximity to the physical location of the educational institution becomes less and less meaningful. Students are now "growing up digital". Every projection for the future indicates that the volume of virtual learning will greatly exceed learning on-site. There are sufficient models of digital delivery of educational products and services to suggest that the process is not only viable but in very many cases preferable.

Implementation Action:

X	Legislative	X	Administrative
X	Executive Order		

Description of Action:
Consolidate the administration and administrative functions of appropriately located Community Colleges to create regional administrations and save state resources on administrative duplication. The duplication costs of facilities, staff, and administration is unacceptable overhead. Create a task force of North Carolina educators comprised of "educational futurists" representing the Department of Public Instruction, the Community College System, and the University System immediately to create design the best way to consolidate these functions.

Recommended Funding Source:
A taskforce should explore and develop the pros and cons of this recommendation. It would also develop future funding options.

Cost:
$15,000 would be assigned to the Task Force for its work.

SOCIAL AND ETHICAL ISSUES

Social and Ethical Issues Taskforce

The goal of the Vision 2030 Social and Ethical Issues Task Force was to anticipate social and ethical questions that may arise due to scientific and technological innovations in North Carolina over the next three decades. The Task Force proposed ways to deal with these issues in a proactive manner that enhances the understanding, inclusion, cooperation, and competitiveness of the State's citizenry.

Within this context, the Task Force focused on the implications of technological innovations on issues of personal privacy. Increased access to public records and health and biological information databases raises important ethical questions that affect citizen privacy, employment, and the expansion of digital information systems. As technology increases the volume of available personal information, and the speed at which it can be shared, there is strong potential for discrimination and other abuses of this information.

Personal information privacy, the ability of an individual to control the use and dissemination of information that relates to himself or herself and to make an informed judgement about the dissemination of that information, is a concern to many people. The increasing pervasiveness of information technology is producing a rise in privacy concerns because of people's perceptions that personally-identifiable information is more readily available. Concern about privacy extends to all relationships involving the individual, but particularly to those relationships involving large entities that are perceived as non personal, specifically government and large businesses and private organizations. Any entity that requires personal information as a cost for service in particular opens itself to worries about a loss of privacy.

In analyzing these issues, a central consideration involved determining the optimum balance between progress in healthcare and scientific research, and protection of personal privacy. Legislators, other decision-makers, and the general public will be called upon to decide what constitutes appropriate and inappropriate use of information, under increasingly complex scenarios.

Actions to safeguard personal privacy will increase public confidence in government, corporations, and organizations--and will lead to an increased willingness to engage in relationships that require the exchange of personal information. This new confidence will inspire commerce and enhance the ability of governments and other organizations to provide services to the public.

SOCIAL AND ETHICAL ISSUES

Recommendation 1: ***Develop public awareness and education programs to address social and ethical issues related to progress in science and technology***

Background/Justification:
Innovations in science and technology are already challenging our social and ethical norms. Biological advances in areas such as cloning, genetic engineering, and stem cell research coupled with exponential growth in the ability to electronically acquire, process, and access personally-identifiable information will have unanticipated effects on our citizens. North Carolina's citizenry and leadership must be educated about the legal and ethical issues surrounding advances in science and technology. Our leadership needs to participate in an informed dialogue on these issues to assure that the benefits of technological advance are realized in a way that does not compromise our fundamental principles.

Implementation Action:
__X__ Legislative __X__ Other

Description of Action:
- Enhance science education significantly throughout K-12 with special emphasis at the elementary school level.
- Educate the public, media, and the Legislature using individuals in scientific and technological fields that can articulate the social relevance of their work.
- Integrate social, ethical, and legal issues into the science and technology curriculum of the K-12, community college, and university systems.
- Develop a K-12 teacher curriculum on health and biological information technology, and incorporate this curriculum into current professional development programs.
- Hold ongoing public forums about health, biological, and information technology issues that will include updates on new technologies and regulatory issues.
- Educate medical professionals through their professional societies how to self-regulate regarding the release of personally-identifiable information.

Recommended Funding Source:
__X__ State funds __X__ Create a public/private partnership

Cost:
$250,000 annually in public funding is needed to be matched by $250,000 a year from private sources.

SOCIAL AND ETHICAL ISSUES

Recommendation 2: ***Establish a study commission or a joint select committee on personal information privacy to investigate necessary protections.***

Background/Justification:
Exponential growth in the ability to electronically acquire, process, and access medical and biological information presents complex social and ethical challenges for North Carolina. Government should play a leadership role in identifying the most appropriate ways to protect personal information privacy. One way to do this would be to establish a study commission or joint select committee on personal information privacy. Any such body should include leaders of the legislative, executive, and judicial branches of State government, local government, of news media and information technology, of private industry and organizations, and recognized authorities on the issue. By establishing such a Commission, North Carolina will enhance confidence in government and private enterprise and pave the way for popular support of an electronic information economy and government. Increased public confidence in government, businesses, and organizations leads to an increased willingness to engage in a relationship which requires the exchange of personal information; which leads to an enhanced ability of government or organizations to provide services and businesses to increase commerce; which leads to increased benefits for all.

Implementation Action:
__X__ Legislative __X__ Executive Order

Description of Action:
Issues to be studied:

- The development of an Office of State Personnel regulation that defines the privacy expectations of State employees with respect to their use of electronic mail, the telephone, and the Internet; to filtering and monitoring their use of telecommunications; and to access to personal information about them.
- The enactment of a statute that requires employers to define the privacy expectations of their employees with respect to their use of electronic mail, the telephone, and the Internet; to filtering and monitoring their use of telecommunications; and to access to personal information about them.
- The enactment of a statute that requires governmental agencies, private corporations, organizations, etc., to withhold the release of personally identifiable information if the information is to be reused commercially, unless the individual who is the subject of the information authorizes the release.
- The enactment of a statute that allows individuals to gain access to any and all personal information held about themselves by the employer, governmental agency, corporation, organization, etc.; to challenge the accuracy of that information; and to get errors corrected; all in a timely fashion.
- The impact on civil liberties of offender registries, which force public policy decisions on whether public information may be used to punish rather than inform people.
- A case by case review of governmental records in order to determine whether such records should be open to public inspection in light of privacy concerns.

- Amend the North Carolina General Statutes to make the language referring to government records consistent and clear with respect to their openness or confidentiality.
- Bring together and harmonize in one section of the North Carolina General Statutes all relevant laws governing health care and biological information.
- Develop an ongoing process for analyzing and mapping North Carolina statutes and regulations against federal, regional, and international laws and regulations that impact on the operations of enterprises operating in North Carolina.
- Identify changes in North Carolina statutes and regulations to cover any gaps resulting from change external to North Carolina, or shifts in technology that render then-current statutes or regulations obsolete.
- Amendment to statute to require the North Carolina Central Cancer Registry and any other such registries to provide information on privacy protections to each patient before the patient's data is entered into the registry and to ask the patient to indicate, on a brief consent form, whether he or she is willing to be contacted by researchers. This would address consent to be contacted directly for personal involvement in research (which is voluntary), but not consent to be included in the registry itself (which remains obligatory, under state statute).
- The enactment of a statute, as with racial, sexual, and religious discrimination, to ensure that employers and insurers do not discriminate based upon information gained through genetic fingerprinting.
- The enactment of a statute that mirrors Federal policy providing for a "Certificate of Confidentiality" that provides an added shield of protection over sensitive or potentially incriminating data obtained by researchers.
- The enactment of a statute that insures that law enforcement access to personal medical information occurs only as permitted by and pursuant to specific statutory authority—or with a judicial order issued by a court or administrative tribunal having jurisdiction—upon determining that the need for information outweighs individual and public policy risks to confidentiality; and that once the information has been disclosed, law enforcement officials are required to keep it confidential, and should be able to use it only for the limited purpose authorized by the enabling statute or by the court order.
- The establishment of a public forum for examining the protection of personally-identifiable genetic information (e.g., its release to third parties and its applications in biomedical research).
- Amend statutes to limit access to public records that inhibit the ability of researchers at public universities to conduct research on a par with those at private universities.
- Encourage public education and discourse on appropriate and inappropriate uses of information. This is an important prerequisite to developing a public policy framework. While this might be led by our academic institutions, we must have the involvement of our publicly elected officials and demographically balanced representatives from the general population.
- Provide a mechanism for the convening of expert panels on a periodic basis to review current state-of-the-art security practices, policies, and mechanisms in order to promote best practices across State government and to inform the public regarding new developments that might assist them in staying abreast of new threats and opportunities in preserving the privacy of personally identifiable information.

- Develop a citizens' and consumers' rights code, including the risks and benefits of information gathering and uses and defining who or what is protected or not protected.
- Establish a central information resource to respond to public concerns about information technologies and personal privacy.

Recommended Funding Source:

__X__ State funds __X__ Create a public/private partnership

Cost:

- $1,500,000 if done thoroughly with a professional staff.
- Implementation of recommendations based on the issues may also have substantial financial effect on public and private organizations; an assessment of the cost of implementation must be part of the study.

SOCIAL AND ETHICAL ISSUES

Recommendation 3: ***Ensure that public access to public information is available regardless of economic status or geographic situation.***

Background/Justification:
Access to public records should not be through private vendors who attain public records and then sell them. As taxpayers have already supported the creation of these records, they should not have to pay to access them. Access to information today should also be tempered with strategies for preservation in the distant future. Too often digital records are lost with changes in software and hardware.

Implementation Action:
__X__ Legislative

Description of Action:
- Provide funding to enable public agencies to put public information on the World Wide Web.
- Provide funding for the preservation of archival data over time.

Recommended Funding Source:
__X__ State funds

Cost:
As public records are distributed across all governmental entities, this cost could be substantial, but is currently undetermined. One possibility is creation of a recurring fund within the State Archives to underwrite such an effort. This fund could be capitalized at perhaps $2,000,000 and over time would increasingly make public records available over the Web. More money would speed up the implementation.

CONCLUSION

This year, Mikel Landabaso, principal administrator of the European Commission's Regional Policy Directorate-General, has been a visiting scholar in Chapel Hill. Landabaso used this time to develop his research on regional economic development policies in respect to their impact on developing the "new economy." One of his conclusions was that "some of the most interesting and inspiring lessons to be learned from the U.S. economic experience are not its de-regulated, low taxed economy and 'flexible' labor market but the role the public sector has played in economic development through the promotion of innovation." Landabaso notes that this enabling role played by the states and other regional institutions, even by semi-public or non-profit bodies, serve as "animators, catalysers and anchors for regional (state) economic development."[1]

The National Governors' Association Center for Best Practices in their 2000 "State Strategies for the New Economy" report noted that states could play a major role in the creation of a favorable business climate for the new economy. They pointed out that:

- Investing in systems that build workforce skills and promote lifelong learning to ensure a competitive workforce is important.
- Enhancing the infrastructure – communications and transportation – is needed to support the electronic commerce and the growing knowledge-based industries.
- State tax systems must be realigned to meet the twenty-first-century economy.
- Government must reengineer to deliver services more efficiently, using technology, privatization and private and nonprofit sector partnerships.
- Entrepreneurs must be supported by providing assistance to firms who seek venture capital, more timely decisions by government at all levels and the streamlining of business regulations and the process whereby entrepreneurs access state government decision makers and permitting procedures.
- The quality-of-life concerns must be addressed to attract and keep new knowledge workers and knowledge businesses.
- University policies need to be promoted that build the intellectual infrastructure—more encouragement of research and development and funding for these programs.[2]

Ross DeVol in his 1999 report for the Milken Institute commented on factors that attracted and sustained high-tech industries. He noted that high-tech companies like to go where there is an existing high-tech presence. High-Tech companies consider traditional costs of doing

---

[1] Reflections on US Economic Development Policies: Meeting the "New Economy" Challenge. 2000 (Mikel Landabaso). A publication of the EU Fellowship Visiting Scholar Program, draft paper.

[2] State Strategies for the New Economy. 2000 A publication of the National Governors Association.

business such as tax structure, capital, space and compensation costs. High-Tech industries consider the ease with which they can work with excellent research institutions to be very important. Access to an educated workforce and to venture capital is very important. Still, DeVol stresses that "quality of life" [3] is of great importance to these companies.

In Mapping the Vision 1, we titled one of our sections *Falling Behind in a Race We cannot Afford to Lose.* A quick review of the targeted science and technology investment initiatives of states that are our competitors in this new economy should make you pause and question why we in North Carolina are not moving forward in making these strategic investments. A couple of notes should be made here. Understandably, Governor Hunt has spent many dollars in his important effort to increase the performance of our schools and the readiness of our children to begin their education. We know that this is of paramount importance.

The recent Hurricanes Floyd and Fran that devastated eastern North Carolina were addressed financially by our state in 1999 and 2000. We note also that the tobacco settlement has catalyzed the infusion of funds in other states into science and technology programs where we in North Carolina must focus on a successful transition from our tobacco driven economy to a more economically viable entrepreneurial economy. The hurricanes, the demise of our tobacco industry, and the loss of jobs in our apparel sector have taken a heavy toll on our financial capacity, already depleted by tax cuts and legal settlements.

Recent announcements such as Duke University's new photonics initiative, the new genomics initiative lead by the NC Biotechnology Center and research universities, the new venture capital Long Leaf fund, the new proposed research campus at East Carolina University and the already announced new research campus in Charlotte to be excellent starts on the right road for state investments. All of these projects, including others not mentioned here, will require careful consideration by our General Assembly as it looks to invest the financial resources of our state. Private sector investment as well as the potential for investment by foundations, nonprofits and private sector venture capital firms will be important indicators of whether we become successful in the new economy.

Vision 2030 recommendations, in general, do not call for huge new program outlays of funds. Rather, they call for the beginning of some new programs, some redirection of others, some tinkering around the edges of already successful programs, and in every case, the involvement of the private, nonprofit and government sectors to work collaboratively together to transition to the New Economy. The Vision 2030 effort has always focused on diffusing throughout our state the benefits of science and technology based economic development.

The Board of Science and Technology has given seed grants to a number of our economic development regions to continue through 2001 with science and technology round tables. Already, the Asheville, Greenville and Fayetteville areas have held their first roundtable gathering. Winston-Salem has been holding a science and technology roundtable now for

---

[3] America's High-Tech Economy: Growth, Development and Risks for Metropolitan Areas. July 13, 1999 (Ross DeVol, et. al.). A publication of the Milken Institute.

about a year. Hopefully, the Northeastern area and the Wilmington community will soon follow with their roundtable development. These roundtables should make all of our communities more aware of the requirements and benefits of a science and technology driven economy.

North Carolina has a new opportunity to develop its economic base so that all areas of the state benefit from the investments in its educational institutions and research institutes. For North Carolina to be competitive in the twenty-first century as a fully participating member of the New Economy, North Carolina must rededicate itself to investing in science and technology-based economic development. It has never been more important!

Vision 2030 therefore, does provide a blueprint to begin the journey into an uncharted future. From a partnership built on the intellectual capital of our universities and community colleges, the market savvy of our established and new industries, the indomitable spirit of our people, our vigorous entrepreneurial nonprofit sector, the visionary leadership of our elected executive leaders and the political will of a far-sighted legislature, we can make Vision 2030 goals a reality for all North Carolinians. Let's get started!

North Carolina Board of Science and Technology Staff

Dyan Austin, Administrative Officer
Margie Boccieri, Associate Director
Trudy Guffey, Administrative Secretary
Sally Holloman, Receptionist
Michael Jones, Science and Mathematics Specialist
Barbara Levine, Director, ConnectNC
Parrish McIntyre, Graphic Designer
Elizabeth Murphy, Intern
Jane Smith Patterson, Senior Advisor to the Governor for Science and Technology

www.governor.state.nc.us/govoffice/vision203