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Perspectives on the National Information Infrastructure: CSPP's Vision & Recommendations for Action

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Executive Summary

As the 21st century approaches, our nation's challenge is to find ways to rekindle economic growth, remain competitive abroad, and create the kinds of jobs that will enable Americans to raise their standard of living. This will require that we be more productive and innovative than our competition abroad, and that we act more quickly and more efficiently.

Across a range of industries, Americans are increasingly turning to information technology to do just that. Our ability to generate and exchange information, technology, and ideas is helping us to increase output, decrease costs, improve quality, and bring new products to market. The United States has a unique opportunity to capitalize on this increasing reliance on information technology and the benefits it can bring.

We are currently the world leader in computing and communications technologies, yet we have not taken steps that will allow us to make the most of our potential. This report calls for concerted efforts by the U.S. public and private sectors to develop and deploy an advanced information infrastructure that will put our information technology advantage to work for all Americans.

Throughout history, the United States has been successful, in part, because we have taken bold steps to make our national resources available to individual Americans by creating a variety of underlying foundations or infrastructures. Our transportation, telephone, electric power, and water systems are all solid examples of this tradition. By developing the infrastructures to make these resources readily accessible to individual Americans and easy to use, we have experienced an economic prosperity, quality of life, and global competitiveness virtually unmatched by any nation. We need to build on this tradition to carry us into the 21st century.

A national information infrastructure, which will be as accessible and easy to use as our existing national infrastructures, will revolutionize our ability to communicate and collaborate by erasing geographical boundaries. It will enable us to tap into our existing resources of creativity and knowledge. It will lead to the development of products and services today unimagined. It will create new jobs and economic strength for individual Americans. It will accelerate the development of critical technologies. And finally, it will enable us to address more effectively many societal problems, including challenges in the areas of health care, education, and manufacturing.

The call for a national information infrastructure builds upon the High Performance Computing and Communications (HPCC) Program. The HPCC Program is an excellent first step. It provides an initial research foundation to create a more extensive information infrastructure that will be broadly accessible to the public and capable of meeting a wide variety of information needs. Nevertheless, it alone is not enough. CSPP believes the United States must make a national commitment to create a new national information infrastructure that complements, builds upon, and delivers the advantages of the research being performed in the HPCC Program, enabling the private sector to create new services that will benefit individuals in all walks of life. This will require improving upon and linking together current

communications, computing, information, and human resource capabilities. More importantly, it will require developing new capabilities to enable broad access to a variety of public and private information resources. Finally, it will require the integration of a range of computing and communications technologies to enable transmission of text, images, audio, and video to anyone, anywhere, at any time.

CSPP believes the first step is to develop a consensus vision - across industries and with the government - of what the Information infrastructure should be. It will also require building a widespread understanding of the benefits this infrastructure could bring to Individual Americans. On the following pages, CSPP presents its vision of the national information infrastructure (NII). In addition, CSPP recommends the following actions be taken by the new Administration, Congress, and U.S. industry:

Summary of Recommendations
Administration Agenda

1. Make the NII a National Technology Challenge
2. Establish a National Information Infrastructure Council
3. Establish an NII Implementation Entity
4. Invest in Research for an NII
5. Fund Pilot Projects to Demonstrate Technologies
6. Develop a Public Education Program
7. Make Government Information Easily Accessible

Legislative Agenda
1. Authorize a National Information Infrastructure Council and Appropriate Funds for its Operation
2. Authorize and Appropriate Funds for Research and Technology Demonstrations

Industry Agenda
1. Continue Investments to Develop and Deploy an NII
2. Continue to Invest in Research and Development of Applications
3. Reach Out to Other Industries
4. Promote NII Efforts
5. Develop and Participate in Pilot Projects
6. Develop NII Goals and Milestones

Finally, CSPP believes the public policy principles outlined at the end of this report must be addressed jointly by the private sector and government before the information infrastructure of the future can become a reality

Background
In December 1990, the CEOs of CSPP met with Administration officials to discuss their public policy positions on technology issues. At that meeting, CSPP was asked to assess the High Performance Computing and Communications (HPCC) Program and provide recommendations to increase industry's involvement and interest.

On December 3, 1991, after almost a year of review and analysis, CSPP issued its report and video, "Expanding the Vision of High Performance Computing and Communications: Linking America for the Future," concluding that the HPCC Program is a significant and critical undertaking. It would, CSPP determined, advance research in high performance computing and networking technologies as well as increase the use of high performance computers to solve important science and engineering problems. At the same time, CSPP observed that the HPCC Program could provide a foundation for something more. If properly designed, HPCC research could advance the development of technologies to help solve a wide range of social and economic problems and improve the competitiveness of U.S. industry by providing the foundation for a national communications and information infrastructure.

CSPP continues to support the HPCC Program and believes it should remain a

national research priority. CSPP applauds the recent creation of a new, improved management structure for the Program, which will provide a clear mechanism to coordinate, manage, and govern the implementation of the Program and a central point for private sector interaction. In addition, CSPP commends Senator Al Gore and Representative George Brown for introducing the Information Infrastructure Technology Act in the summer of 1992 to move the HPCC effort to a new level.

The research and technology advancements supported by the HPCC Program remain a high priority for CSPP. In October 1992, in the CSPP Agenda for the 103rd Congress, we recommended enhancing and expanding the HPCC research agenda to: 1) provide the foundation for an information and communications infrastructure of the future; 2) bring the benefits of HPCC technology to individual Americans in areas such as health care, education, and manufacturing; and 3) develop technology demonstration projects.

In addition to supporting the HPCC Program, CSPP believes the nation must focus on creating the information infrastructure for the future. Together, the HPCC Program and the NII will provide the means to address the difficult challenges the nation now faces. HPCC research advancements will pave the way for the applications a national information infrastructure will make possible, and the infrastructure will provide a vehicle to deliver the benefits of HPCC research. The following report describes our vision for the infrastructure and recommendations for action that will help to make the vision a reality.

Part I: CSPP's Vision

Introduction
Information in the 21st Century

In the future, the United States' primary resource for generating economic prosperity, improved quality of life, and global competitive will be our ability to quickly and efficiently generate and exchange information, technology, and ideas.

Increasingly, across a range of industries from banking and retail to automotive and aerospace, information technology has become instrumental in product development, manufacturing, marketing, sales, and service. The flow of information has become the foundation for improving productivity and increasing innovation in most every business enterprise. U.S. industry is not, however, the only beneficiary. Information technology continues to become an increasingly integral part of the every day lives of individual Americans.

The information infrastructure of the future will revolutionize the way individuals relate with one another by, enabling, us to work together, collaborate, and access and generate information without regard to geographical boundaries.

Automated tellers, airline reservation systems, anti-lock brakes, and personal computers are just a few examples.

As we face the 21st century, we have an advantage over our foreign competitors. We currently lead the world in computing and communications technologies. But to make the most of the increasing reliance on information technology and our current strengths, we, as a nation, need to take the bold step of developing and deploying an advanced information infrastructure that will help us remain more productive and more innovative than our competitors abroad.

The National Information Infrastructure: What is it? Why is it Important

What Is It?

The infrastructure of the future is a nationwide system that will allow all Americans

to take advantage of our rich resources in information, communication, and computing technologies. It will link together a range of institutions and resources, from schools and businesses to libraries and laboratories. More importantly, it will link together individuals, from senior citizens and students, to health care professionals, manufacturing managers, and business people from all fields.

The information infrastructure of the future will revolutionize the way individuals relate with one another by enabling us to work together, collaborate, and access and generate information without regard to geographical boundaries. It will enable fundamental changes in the way we educate our children, train and retrain our workers, earn a living, manufacture products, deliver services of all kinds, and interact with family and friends.

Throughout its history, the United States has followed a tradition of creating underlying national foundations - infrastructures - that have fostered a quality of life in America unmatched by any nation. Our transportation, electric power, and water systems are all solid examples of this tradition. As we move into the 21st century, these existing infrastructures will continue to be important, but they, alone, will no longer be sufficient to meet our national needs.

Today, we think nothing about turning on a faucet and immediately getting hot water for a shower, flipping a switch and getting electricity to make coffee, and another switch to get a weather report. We pick up the telephone without a second thought. We must create an advanced information infrastructure for the future that will provide Americans with the same easy access to all sorts of information and people.

The information infrastructure, used in conjunction with a collection of "information appliances" - tools that will combine computing, communications, and video technologies, for example - will give people in rural areas ready access to libraries, museum exhibits, job information, and medical care now only available to those who live near those resources. People all over the country will be able to work and interact with others, without even knowing their collaborators' locations. By making information resources readily available and easy to use, the information infrastructure of the future will revolutionize our ability to access the information we need and our ability to collaborate and cooperate with others.

This infrastructure will integrate four essential elements - communications networks, computers, information, and people - to create a whole new way of learning, working, and interacting with others. A more detailed description of the elements of the infrastructure includes the following:

Communications Networks

• a network of interconnected and interoperable public and private communications networks ("public" networks refer to those networks, such as the public switched telephone network, that are open to use by anyone; "private" networks refer to those that are limited to use by a specific group of people meeting certain criteria, such as corporate networks), providing services ranging from high to low speed, allowing a range of uses anytime, anywhere;
• agreed-upon technical standards for piecing together the network, having all its pieces work together, and plugging into it;
• the capacity to transmit information, at both high and low speeds, in a variety of data formats, including image, voice, and video; and
• multiple mechanisms, perhaps including digital signatures, to support the electronic transfer of funds in exchange for services received.
Computers
• high-performance computers resident on the communications networks to provide intelligent switching and enhanced network services;
• powerful personal computers and work stations - including machines that respond to handwritten or spoken commands and portable, wireless devices that are easy to use and mask the complexity of the underlying system so people can tap into it as

easily as they dial a phone; and
• distributed computer applications that are widely accessible over the network (which acts like a lending library) and that help people perform a wide variety of tasks quickly and easily.
Information
• public and private databases and digital libraries that include material in video, image, and audio formats; and
• information services and network directories that assist users in locating, synthesizing, and updating information.
People
• people of all ages and backgrounds who are easily able to use the rich and varied resources available through the infrastructure to improve how they learn, live, and work; and
• people who create, package, communicate, and sell information in the many new ways made possible by the existence of the information infrastructure.

Why Is It Important?

The investments the nation has made over the years to develop our existing transportation, communications, and energy distribution infrastructures were instrumental in making the United States an economic and political world leader. They were also instrumental in improving the quality of life for individual Americans. To remain an economic power in the 21st century, the United States must have in place an infrastructure that allows us to compete in the Information Age by providing a tool to be continually more productive and innovative.

An information infrastructure will enable the U.S. to tap into the vast resources of knowledge and creativity that already exist in this country. As the volume and complexity of our information resources has increased, it has become almost impossible for any individual or business to take full advantage of what is available. An information infrastructure will make the benefits of information technology as available to individual Americans as the transportation infrastructure made available the benefits of automotive technology and the communications infrastructure made available the benefits of telephone technology. It will create new opportunities for the development of products and services we cannot even begin to imagine today, creating new jobs and economic

It will create new opportunities- the development of products and services we cannot even begin to imagine today, creating new jobs and economic strength for Americans and providing a resource for our current workers to continuously improve their-job skills.

Strength for Americans and providing a resource for our current workers to continuously improve and upgrade their job skills.

In addition, an information infrastructure will accelerate the development of critical U.S. technologies. A strong consensus exists as to what technologies bolster the competitiveness of our economy and where we stand in those technologies relative to the rest of the world. Initiatives to develop, deploy, and use an information infrastructure will create a market demand for many of these technologies, spurring an increase in private sector investment. Moreover, these technologies would be put to work in the real world, a testing ground more powerful than the laboratory and with the potential to directly benefit individual Americans by generating advancements in commercially relevant technologies and creating an infrastructure they can use.

Finally, the information infrastructure will lead to the development of a range of new "information appliances" that will allow Americans to tap into the resources of the infrastructure in ways beyond our understanding today. Some of these tools for the infrastructure could include interactive learning devices, wireless computers capable of simulating design and engineering plans onsite, and pocket size devices

allowing doctors access to medical resources from remote locations. The only thing that will limit the shape, form, and use of these appliances is our imagination.

Why Should The United States Act Now?

Today, many of the changes taking place in our economy and influencing our competitive position are driven by the advent of the information age and the new set of economic ground rules this has created. In the information age, the value of the products and services we exchange is increasingly a function of their information content and the knowledge used to create them rather than the raw materials used to produce them. Because of this shift, the ability to easily access and share information and stimulate the creation

A coordinated, focused drive for a national information infrastructure will enable us to more effectively and efficiently devote our collective talents to developing the competitive edge against other nations.

Of new ideas is essential to maintaining a strong economy, developing world class industries, and enhancing the quality of life for every citizen. America now has the opportunity to create the information infrastructure required to achieve this.

Other nations, including Japan, Germany, France, and Singapore are taking significant steps to upgrade their own infrastructures and have long-term plans in place to continue doing so. With U.S. industry and government working together as partners, we can build on our already strong lead in information technology to maintain our current lead, help us compete abroad, and improve our quality of life at home.

A coordinated, focused drive for a national information infrastructure will enable us to more effectively and efficiently devote our collective talents to developing the competitive edge against other nations. Working together toward a common goal, America will realize the benefits of an information infrastructure sooner - we will establish the standards the world will need to follow and we will be the first to market with important new products, services, and applications for the infrastructure. More importantly, we will be able to dramatically change the way Americans learn, care for the sick and elderly, and manufacture products.

The following descriptions provide a glimpse of the important benefits an information infrastructure could make possible.

The Potential Benefits

Health Care

Americans spend more on health care than on any other industry, but they are getting less in return for their expenditures than is possible. For many people, health care is too expensive and often unavailable. CSPP believes that computing and communications technologies can provide solutions to both of these shortcomings.

Health care is a large, high growth, recession resistant industry, with spending rising about 2 1 times faster than GNP. In 1991, health care spending totaled $738 billion, or 13% of GNP, up from 7.3% of GNP in 1970. The Health Care Financing Administration projects that the nation's health outlays will reach $1.6 trillion by the year 2000. The soaring cost of health care has triggered concern about the ability of the nation to continue providing quality health and medical care as well as the ability of individual Americans to afford it.

Health care is extremely information intensive. Each year, Americans make approximately 636 million visits to doctors' offices for ambulatory care. In addition,

23 million surgical procedures are performed annually. Each visit and procedure generates large amounts of medical and financial data. There is presently no means to preserve or track that information for use in future or related health care situations. In fact, the cost of managing health care information is one of the prime causes of the increasing cost of health care.

Improving the management of this information through a health care information infrastructure will enable efficiency gains and cost savings throughout the entire health care process. First, roughly 20% of annual health care expenditures go to administrative costs, including processing an estimated five million health care claims per day. Computing and communications technologies offer new opportunities to improve the management of and access to health care-related information and to reduce costs for processing insurance claims through electronic payment and reimbursement. Second, better access to medical data and patient medical histories will help improve doctors' diagnoses by providing fast and easy access to accurate, complete, and up-to-date information. Third, high speed networks will enable residents of rural areas and inner cities to enjoy the benefits of the latest medical technologies and expert opinions without leaving their home towns. Finally, easy access to information by individuals in their homes on self-care and healthy lifestyle practices will enable people to better manage their own health, reducing the number of visits to doctors' offices and hospitals, and increasing the likelihood that medical problems will be identified earlier.

The challenge is to create a medical information infrastructure that will support the following types of applications that could help, in the near and longer term, to solve the health care problems the nation is experiencing:
• On-Line Patient Records - Hospitals, doctors' offices, and community clinics will be interconnected through high speed networks. Patient records, including medical and biological data, would be available to authorized health care professionals anytime, anywhere (with privacy assured) over these networks. This would enable health care providers to access immediately, from any location, the most up-to-date patient data, including medical images from tests, resulting in improved diagnoses and more informed treatment decisions.
• Medical Collaboration - Medical personnel will use interactive, multimedia telemedicine technologies to collaborate and consult with each other over distances. Doctors in hospitals or offices will consult on short notice with experts located anywhere in the nation; emergency room physicians will provide vital assistance to emergency medical personnel on the scene via wireless technologies. Patients and their doctors would have instant access - at affordable cost - to experts and specialists, no matter where the patient is located.
• Surgical Planning and Treatment Physicians and surgeons will use high speed computing technologies to simulate the function of human organs to facilitate medical diagnoses and treatment decisions, and to plan complex surgical procedures. Imaging and modeling techniques will be used to produce realistic and detailed 3D models of a patient's organ, to develop the most effective and safe surgical procedures, to demonstrate planned procedures to patients and medical students, and to develop alternate non-invasive treatments. With high speed networks, images could be transmitted instantly to experts located elsewhere for confirmation of diagnoses and treatment recommendations.

Education

To ensure a secure and prosperous future, Americans need to be able to think critically and to have access to the widest possible body of knowledge. The work force requirements of the future will increasingly require people to be able to learn new, skills to adapt to changing job requirements and new technologies and to use knowledge and information to make decisions. Changes must be made to the United States' education system to ensure that it will give individuals the skills they will need for lifelong learning in a high wage, information-based economy of the future.

Meeting these challenges will require extending America's edge in computing and

communications technologies to education services in schools, communities, work places, and homes. An information infrastructure for lifelong learning will offer unprecedented potential for improving lives by making knowledge readily available and usable by all Americans. Such an Infrastructure would provide a tool for addressing many of the learning needs the country is facing, including, for example, making additional resources available on-line for teachers who want to improve their skills and update their knowledge; providing a means for Americans to continually acquire the new knowledge to adapt to the multiple careers will likely undertake; providing seniors and disabled or homebound Americans direct access to information resources critical to their health and welfare; and providing better access to information that affects our quality of life and cultural awareness.

Effective deployment of a computing and communications infrastructure for education and lifelong learning requires well trained and technologically experienced teachers and administrators who can facilitate the use, installation, and management of new instructional technologies such as digital interactive video, local area networks, and gateways to national networks. Users and students will need new skills to help them retrieve, review, categorize, and analyze the information and knowledge they will be able to access. This will require investment in training for educators and students in the use of new technologies, development of model curricula and new instructional techniques, development of new information resources, improvement in the quality of existing resources, and extension of public access to electronic schools and libraries.

A national information infrastructure will create an enormous range of education and lifelong learning applications, such as:

• On-line Job Training Libraries - Interactive, multimedia, digital libraries will be Table on job sites to provide workers with task-oriented information that they could use, at their own convenience and pace, to improve and upgrade their job skills and performance. Workers in any job - assembly lines, retail outlets, sales, or offices - would be able to continuously upgrade their skills and learn new skills at any time through customized training libraries.
• Electronic Libraries - Students will use on-line electronic libraries in classrooms and at home to learn more about any topic. For example, if a student wanted to learn about the works of Shakespeare - or about a specific play - he or she will simply turn on a computer and, with the flick of a switch, be connected to the entire works of Shakespeare, complete with photographs, videos, and recordings. The electronic libraries will include software tools to help students find the information they need, identify relevant data, analyze, and present the information and will provide access to information and reference specialists to help users locate the material they need.
• Virtual Laboratories & Field Trips -Through virtual laboratories, students will perform science experiments using equipment and facilities located anywhere in the United States, including at the national laboratories, in collaboration with some of the nation's best laboratory scientists. Students will also take "field trips" to museums, observatories, science exhibits, and research centers without leaving the classroom.

Collaborative Learning -Students of all levels and ages, teachers, and experts will collaborate, in real time, via high speed networks, on a wide variety of learning projects. The collaborators will access information and high performance computing resources located throughout the country, such as images collected by NASA's Earth Observing System satellites, and would work together to develop research projects that focus on their own interests.

Intelligent Manufacturing

The U.S. manufacturing enterprise faces enormous challenges over the next decade just to keep up with new information and new technologies. The industrial world is rapidly moving to electronic commerce, in which suppliers and design collaborators will be on-line; factories will be highly programmable and staffed with highly skilled personnel product design and manufacturing will be fully integrated; and custom-

made, high-quality products will be manufactured rapidly in small quantities. Failure to keep-pace and maintain technological leadership will threaten our long-term competitive position in the world market.

Increasingly, to stay competitive, companies of all sizes must be able to respond rapidly to customer demands for high-quality products at low cost. This requires manufacturing and design processes that are highly efficient and flexible to enable the shortest possible design, development, and production times. Companies able to adapt and apply the latest information and communications technologies to their manufacturing processes will have an advantage over their less innovative competitors in the future. The challenge, therefore, is to develop, deploy and apply the technologies for a manufacturing infrastructure that incorporates computing and communications technologies to support integrated development, engineering, and manufacturing processes.

It is critical to ensure that small and medium manufacturers are stakeholders in this new infrastructure. Small and medium manufacturers are vital to the nation's economic development and growth, accounting for 40 percent of GNP, half of all employment, and more than half of job creation. Providing small and medium companies with access to computing, communications, and information resources will enable them to adopt new technologies and manufacturing techniques, reducing the cost of doing business and increasing efficiency and productivity.

Work is already underway in the private and public sectors to expand the use of advanced computing and communications technologies in the manufacturing process, but much more is needed. HPCC Program research in aerospace vehicle design and advanced materials are just a few examples of the application of high performance computing to benefit our industries. Computer-aided design (CAD) and computer-aided manufacturing (CAM) technologies are being incorporated into U.S. manufacturing enterprises at increasing rates. However, CAD/CAM technologies, which are further advanced than many other intelligent manufacturing innovations, still need improvement before they can be widely implemented and must be integrated into both the design and manufacturing processes to fully realize their benefits.

A national information infrastructure has the potential to significantly increase the productivity and quality of U.S. manufacturing by enabling applications such as:
• Concurrent and Distributed Design, Engineering, and Manufacturing - Manufacturers of products, from automobiles to airplanes, and from machine tools to televisions, will distribute scheduling and production across geographically dispersed facilities to reduce production delays, minimize manufacturing, transportation, and inventory costs, perform design, engineering, and manufacturing concurrently, and leverage unique skills and availability of skilled resources. Large amounts of information, such as engineering modeling data, product specifications, test specifications, and bills of materials, will be distributed and shared among dispersed facilities in real time. All of these techniques will significantly reduce the time to develop new products and bring them to market.
• Electronic Commerce for Manufacturing Enterprises - Companies of all sizes will increase their efficiency and productivity while reducing costs by incorporating electronic commerce into their operations. Through links with suppliers, customers and local, state and federal governments, companies will be able to conduct virtually all of their essential business opportunities electronically, including: locating the best suppliers to meet their needs, identifying potential customers for their products, placing and receiving orders, exchanging payments, and ascertaining the latest government regulations affecting their businesses and submitting required compliance reports electronically.
• Virtual Design and Manufacturing Project - Manufacturers of complex, expensive products will use virtual design facilities to model, simulate, and visualize product designs and manufacturing processes in advance, saving the costs of building prototypes. Eventually, virtual reality technologies will permit product designers to "walk through" new products before actually building the products and through manufacturing facilities before production begins.

Part II: CSPP's Recommedations for Action

By investing in the HPCC Program, the United States has already begun investing in the research for an infrastructure based on high speed networks, high performance computers, and on-line information. CSPP will continue to work with Congress and the new Administration to implement our recommendations to improve the structure of the HPCC Program. However, we must now make a national commitment to take the next step to develop a new national information infrastructure that will provide us with the best opportunity to compete in the global economy of the future.

Through a public and private partnership to develop and deploy a national information infrastructure, we will not only lay the best foundation for remaining internationally competitive, we will also give ourselves the best chance to solve many of our domestic challenges - the declining quality of education, the skyrocketing cost and limited availability of high-quality health care, and the need for businesses of all sizes to increase quality and productivity - which increasingly require the ability to access and use large amounts of distributed information.

The time to act is now. Creating a national information infrastructure of the future will require improving upon and linking together current communications, computing, information, and human resource capabilities. More importantly, it will require developing new capabilities to enable broad access by millions of Americans to public and private information resources and to enable people to generate, transmit and receive text, images, and video anywhere, at any time.

Before the comprehensive information infrastructure of the future can be realized, a broad cross-section of American industries, academic and research institutions, and the federal government need to agree on a common vision for the effort. With a common vision in place, the private and public sectors can make a commitment to do what they need to do, independently or together, to make the vision a reality. While the private sector has primary responsibility for developing and making available the services, products, networks, and applications to make the infrastructure possible, the federal government has an important role as a catalyst in stimulating the effort and creating a regulatory environment that will encourage private sector investment and implementation.

To accelerate the development and deployment of a national information infrastructure, CSPP recommends that the Administration, Congress, and the private sector begin a joint effort to take the following actions:

The Administration Agenda

1. Make the NII a National Technology Challenge: The President should declare the national information infrastructure a new national technology challenge. The President should, in his State of the Union address and his FY94 budget submission, issue a challenge to Congress, industry, academic, and research institutions, and potential users to work with him to create a new information infrastructure.

2. Establish a National Information Infrastructure Council: The successful development and deployment of a national information infrastructure will be contingent upon the government adopting a vision and a strategy for its implementation. The best way to accomplish these objectives is to establish a National Information Infrastructure Council, chaired by the Vice President, to provide a management focus for the effort. Members of the Council should include the Secretary of Commerce, the Director of the Office of Science and Technology Policy, the Chairman of the Federal Communications Commission, and the heads of other federal departments, agencies, and White House Executive Offices who have roles or responsibilities in the information infrastructure, and private sector experts, including representatives of industry, user groups, and research institutions. The Council should have as its initial responsibilities:

• adopting a vision for an NII;
• working with the private sector to develop and adopt several concrete goals for the NII, with accomplishable milestones;
• coordinating the NII activities of the various government agencies and departments; and
• developing a strategy to address the information infrastructure policy principles listed following these recommendations.

3. Establish an NII Implementation Entity: Establish a federal entity to implement the National Information Infrastructure Council's vision, plans, strategies, recommendations, and other directions. The entity should have the responsibility and the authority to:
• manage and focus the NII research agenda, including research performed by the national labs;
• coordinate, in conjunction with other appropriate agencies and departments, the NII technology demonstrations; and
• develop strategies to overcome policy and regulatory barriers affecting the deployment by the private sector of a national communications network of interoperable, interworking networks.

4. Invest in Research for an NII: The FY94 budget request should include funds for precompetitive, generic research on enabling technologies for an NII, such as the following:
• research on the generic, enabling technologies needed to address challenges in health care, education and lifelong learning, and intelligent manufacturing;
• rresearch on the scalability problems associated with aggregating many high, medium, and low speed users;
• rtechnologies and architectures to ensure the security of information available in an NII and to guarantee privacy of information;
• rinteroperability;
• rintegrity and robustness of networks and databases;
• rhuman/computer interfaces, such as speech and handwriting recognition and machine intelligence; and
• rresearch on creating and managing distributed electronic databases and libraries, such as indexing databases, digitizing libraries, and organizing material.

5. Fund Pilot Projects to Demonstrate Technologies: In conjunction with industry, the federal government should fund pilot projects to demonstrate the application of high performance computing and communications technologies to health care, education and lifelong learning, and manufacturing. Such projects will help solve problems in scaling technologies and accelerate development of standards.

6. Develop a Public Education Program: Request the National Research Council of the National Academies of Science and Engineering to develop, in conjunction with the private sector, a program to educate the general public about the potential benefits of an NII and the impact it will have on their lives.

7. Make Government Information Easily Accessible: An information infrastructure could provide federal, state, and local governments with a system to better serve their citizens while reducing the cost of providing those services. Through a national information infrastructure, people would have ready access to the most up to date information about their entitlement to health, education, housing, and social security benefits. Citizens could, for example, use the infrastructure to register to vote, renew their drivers licenses, and pay their taxes. The National Research Council should assess federal information collection and dissemination policies and practices and make recommendations on how such policies and practices should be changed to make public information easily available and accessible to citizens through the NII. The NII implementation agency should be charged with developing a strategy to implement the recommendations across all affected departments and agencies.

Legislative Agenda

1. Authorize a National Information Infrastructure Council and Appropriate Funds for its Operation: Introduce legislation to authorize creation of a National Information Infrastructure Council to oversee development of the NII and appropriate funds for its operation.

2. Authorize and Appropriate Funds for Research and Technology Demonstrations: Introduce legislation, based on the Information Infrastructure and Technology Act of 1992, to authorize research on NII technologies and demonstration projects in health care, education, and manufacturing, and appropriate funds for-such projects.

Industry Agenda

1. Continue Investments to Develop and Deploy an NII: The U.S. computer industry is investing billions of dollars each year in research and development relevant to an NII. Industry must continue to work to develop and deploy the NII, including:

• deployment of interoperable communications networks;
• development of on-line databases and applications;
• development of easy to use computers and information appliances; and
• training people to design, develop, and use the various elements of the infrastructure.

2. Continue to Invest in Research and Development of Applications: Companies must continue independent and collaborative efforts to invest in research on NII technologies and development of new products and services.

3. Reach Out to Other Industries: CSPP will initiate a project to encourage other industries likely to benefit from the applications made possible through an NII to join the effort to achieve an NII.

4. Promote NII Efforts: A wide range of affected industries should form a non-profit group to work with the National Research Council to promote the NII.

5. Develop and Participate in Pilot Projects: Industry should undertake an effort to develop strategic plans and facilitate the formation of teams to design technology demonstration projects in health care, education and lifelong learning, and manufacturing.

6. Develop NII Goals and Milestones: The private sector will work with the Infrastructure Council to develop specific examples of accomplishable goals for an NII, with concrete milestones, such as, for example, a nationwide system of on-line patient records accessible by any authorized health care professional, anywhere; and all small and medium manufacturing companies networked with the manufacturing extension centers.

Policy Principles for a National Information Infrastructure

The public and private sectors have important roles in making the information infrastructure a reality. While the development and deployment of the infrastructure must be led by the private sector, guided by the forces of a free and open market, the federal government can accelerate its implementation by acting as a catalyst and a coordinator.

CSPP has identified the following important public policy principles that will have to be addressed jointly by the public and private sectors before the information infrastructure can become a reality. CSPP looks forward to working with the new

Administration, new Congress, and other industry groups to address these issues.

1. Access -- Because an informed citizenry is essential to the nation's growth, all individuals must have access to the NII.

2. First Amendment -- To ensure freedom of expression in an NII, First Amendment principles guaranteeing freedom of speech, as articulated by U.S. courts, should apply to electronically-transmitted communications.

3. Privacy -- Consumers of NII services have a right to privacy in their use of the NII.

4. Security -- Information available through the NII must be protected against unauthorized access, tampering, and misuse, consistent with the needs of the applications and the desires of the user.

5. Confidentiality -- NII users must be free to use effective, industry-developed encryption to ensure confidentiality of communications and data.

6. Affordability -- To promote maximum use, the NII must be affordable.

7. Intellectual Property -- The fundamental principles of copyright should apply to electronically-available information in the same manner as for other media.

8. New Technologies -- While it is impossible to anticipate all of the technologies that will eventually be part of the NII, the political and regulatory environment must encourage the development of new technologies and their incorporation in the NII.

9. Interoperability -- The NII must support maximum interoperability among networks in this country and internationally.

10. Competition -- Service providers must have fair and open access to the NII in order to assure competition among such providers.

11. Carrier Liability -- Information services carriers and distributors who have no editorial control over the contents of electronic information should not be liable for the content of the information transmitted over the NII.

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