

TLC - RFP

PHOTOCOPY
PRESERVATION

Technology and Learning Challenge Grant Program
A very preliminary draft of an RFP

1. A Challenge to American Communities

Investing in lifelong learning has been a central, and consistent part of the Administration's commitment to *putting people first*. We have an obligation to make effective use of all available tools in meeting this commitment. Computers and advanced communication technologies are revolutionizing finance, entertainment, and many other information-rich businesses and helping them tailor services to individual customers. But these technologies have had little impact on learning productivity. The **Technology and Learning Challenge Program** challenges America's Communities to change this.

There is no area where productivity and sensitivity to individual needs is more important to America than the business of learning. Efficient life-long learning is essential for the health of the whole economy in a fast-paced world where success often hinges on competition in the mastery of new tools and new markets. And efficient learning tools tailored to the interests and needs of each individual are essential if each of us is to enjoy the benefits of a growing economy. The imagination, determination, and resources needed to capture the potential of new technology in boosting learning productivity must come from creative individuals and communities around the nation.

The **Technology and Learning Challenge Grants program** is a part of a broad set of federal programs coordinated as the **Technology and Learning Challenge** built around four key elements:

1. an aggressive, interagency program of research, development, and demonstration
2. ensuring that the federal government exercises leadership in the use of productive learning technologies for its own civilian and military employees
3. effective management of the National Information Infrastructure to create the private investment needed to capture the potential of information technology in education
4. integration of cost-effective learning technologies into all federal programs aimed at enhancing education and lifelong learning.

These are described in greater detail in the section of this paper titled "Federal Partnerships in Technology and Learning".

2. Invitation

The Technology and Learning Challenge Program is designed to encourage Communities to form new partnerships between schools, communication and other businesses, universities, and subject-matter experts to create the tools needed to build learner-centered, interactive learning tools the community requires. Like the Empowerment Zones and Enterprise Communities programs, the program is designed to be flexible in responding to creative notions from many different kinds of communities in the country and their notions of what is important.

The rules will be simple and paperwork will be kept to a minimum. Each application will be judged both on the merits of the plan proposed by the community and by the extent of participation by key community members -- both private and public.

The Federal government will designate [n] groups as TLC Communities. These Communities will receive federal grants up to [\$] to develop and introduce new, technology-based learning-productivity tools into their Communities. Funding for the program would be used to design high-quality, affordable learning tools and learning environments that are sensitive to the unique needs of individuals and permit explorations, games, and other highly interactive experiences. Activities qualifying for support would include such things as development of innovative curricula and pedagogy using the capabilities of new technology, design and dissemination of software (simulated environments, simulated equipment, context-sensitive help and tutorials); teacher and instructor training and professional development; testing and evaluation; capture, communication, and use of digital information, and; new models of assessing progress in learning. The program would not be designed to purchase communications equipment or other hardware for communities.

The grants would be judged by [individual Department(s), TRP-like consortia, Committee of the President's Community Enterprise Board, ETR, ??]

In addition to the grants, designated communities would have access to planning and research assistance from a variety of federal research facilities and [...priority in choice of objects for entry into federal digital archives,??].

In the end, however, we expect that the greatest benefit of participating in the program will not be the financial or other rewards provided by federal programs, but the community partnerships encouraged and strengthened by participation in the program. It is these partnerships that will achieve the nation's goals.

3. Key Objectives

The central objective of the program is to design programs that reflect a new consensus emerging about the dynamics of learning:

The first is a recognition that the primary work of learning is done by the learner not the instructor. All students are different, they learn at their own pace, often in different styles. The work of learning is more engaging for the student if it involves active interaction and occurs in a meaningful context, rather than through passive listening or watching in the abstract. In this new perspective, the role of the teacher is no longer that of a talking head standing in front of a class of 25 students: the teacher becomes a coach of teams of learners, and students of all ages (including peers, parents, and easily accessible experts and tutors) are the active participants in a community of learning. Students taught by individual tutors do better than 98% of students taught in standard "mass production" class room settings. Emerging technology makes it possible to provide learner-centered contexts for learning tailored to individuals without a prohibitive investment in new materials or increases in instructional staff. America's teachers -- and their union leaders -- are demanding that schools not be left out of this revolution.

Second, technological advances in computers, multi-media, data-storage, and communication are creating dramatic new ways to communicate complex ideas and experiences. The potential for creating a new generation of interactive learning tools is upon us. The technology can create interactive learning environments that invite exploration and approximate the experience of working with individual tutors. We can realize this potential, however, only if we can bring the creators of the new technologies together with the makers of essential learning

content to transform games, information, and entertainment into engaging curricula for all ages, interests, needs and styles of learners.

Learning Productivity for Different Communities

- ***All children arriving at school prepared to learn*** For better or for worse, children's television programming has changed the learning experiences of pre-children during the past 25 years. New technology allows us to move from a passive experience to engaging games and adventures that permit -- indeed require -- active participation on the part of children. The challenge is to combine the experts on early childhood development, producers of for children, and technology experts to develop a new generation of children's programming that will combine exploration, adventure, games, and learning.
- ***U.S. high-school graduates will be first in the world in science and math.*** New information technologies make it possible to create learning environments that simulate experiences ranging from walking through adventures set in synthetic representations of the historic discoveries in science, to exploring the biology of synthetic ponds to learning math through vivid confrontation with real-world problems. They permit instant access to state-of-the-art data and expertise around the globe. Capturing this potential requires new consortia between teachers, subject matter specialists, entertainment industries, software designers, and business partners across the country.
- ***School-to-Work*** Only a quarter of high-school graduates complete four years of college. School systems around the nation are being challenged by the new program to design innovative programs (e.g. apprenticeships) to help all students learn in the context of work and to make a transition from learning in school to learning on the job, to higher education, and to learning for next jobs. Emerging technology can make experiences simulating a variety of training on-the-job available in schools and student homes during the next few years. These systems will help students demonstrate that they have the practical skills and problem-solving ability needed by employers. Interactive programming capable of exploiting this potential require coalitions between local businesses, schools, training institutions, and communication businesses.
- ***Lifelong Learning*** Simulated environment now possible with new technologies allow operators of all types of equipment to learn new levels of competence or quickly re-learn seldom used skills. But developing the interactive learning systems to realize this potential will require combining subject-matter experts, experienced trainers, and software developers -- a task that is well beyond the means of a typical small business or community college.

Third, diverse means of transmission and telecommunication are being developed that will enable learners of all ages to connect with these learning tools -- and with other learners, experts, and tutors -- in schools, workplaces, and homes. Virtual learning communities can thereby be created between coaches, tutors, peers, parents and children, and learners of all ages to use these new learning tools at all hours of the night or day, on weekends, throughout the year. The extent

of learning and the effectiveness of teaching no longer need be a prisoner of the amount of seat time in a classroom.

While the themes remain the same, strategies for applying them to specific learning communities will obviously differ.

4. Application

a. Eligibility

The definition of communities eligible for the grant would be broad. Communities could be geographic or they could be linked by a common interest or purpose (e.g. disabled groups, businesses with similar training requirements, physics or history instructors). All proposal teams would, however, be expected to include the following members: teaching institutions (schools, universities, colleges, training centers), local businesses, communication firms, software developers (broadly defined), and content specialists (e.g. historians, scientists, business specialists)

b. The plan

The core of the application will be a plan for developing and introducing innovative learning technologies into a specific community. The program proposed should represent a clean innovation in using technology to enhance learning productivity in the community, not a simple repackaging of existing assets. The plan should consider the following elements

How is the Community Defined

- Describe the specific groups whose learning productivity would be enhanced given success of the proposed project
- Describe the specific schools, businesses, individuals, and other organizations participating in the development of the plan and their previous experiences in learning productivity acting alone or as a part of the community
- Describe how the members of the community will work together to achieve the objectives of the plan
- Describe how the members of the community worked together to create the plan
- Explain the management structure that will be used to implement the plan if a grant is available.

What is the vision of the program defined; which of the Administration's lifelong learning goals does the program support

- Describe the ways technology can enhance the learning productivity of the targeted community and the specific kinds of benefits that can be achieved.

- Explain how accomplishing the goals of the program will enhance other goals of the community in areas such as youth employment, linking businesses to schools, linking parents to teachers and schools, bringing individuals with disabilities into mainstream employment opportunities, or helping small businesses and their employees keep pace with technical innovation.
- Describe the principles underlying the instructional program proposed: how well will it approximate the kinds of instruction available from an individual tutor, will it permit team as well as individual training, how will it be sensitive to the needs of minority groups?

What private resources are committed to the plan

- What kinds of financial or other commitments will be made by local communication companies (phone, cable, new entrants), and by other local to cover the cost of the hardware, software, maintenance and training needed to make the plan succeed?
- What voluntary contributions will individuals and businesses in the community make to installing and operating the needed equipment and to providing training.
- What evidence can be provided of the nature, kind, and magnitude of these contributions?

What government resources will be used to support your plan

- Identify how the community will make use of state and local education and training resources to support the program
- Identify how state and other regulatory authorities will work to create incentives for communication providers to connect the schools, companies, and other institutions participating in the program.
- Identify federal program funding or cooperative research programs already committed to tasks relevant to the plan and programs that would become available if the community is designated.
- Identify military or federal civilian training programs in the community that can participate in the plan.

What key problem will the federal resources available under the grant resolve

- Given the public and private resources available to support the plan, precisely what missing element will be covered by the federal program resources requested.
- Why would it be difficult for the community to fill this gap using alternative means?

What evidence is there that the proposed program will succeed and how will success be evaluated?

- What are the specific tasks and timetables that will be needed to implement the plan
- explain how progress toward the goals will be evaluated and what benchmarks will be established
- explain how the management of the plan will change in response to information available.

5. Selection Criteria

- How effectively will the programs help the community achieve the goals set out in the Goals 2000 and School-to-Work Act?
- Do the proposals suggest unique strategies for using technology to increase learning productivity? Will they encourage innovative strategies in pedagogy, accelerate the introduction of learner-centered, experience-based learning environments, and result in a measurably improved learning?
- Is the proposal an effective part of a larger community program to encourage learning productivity and programmatic changes in the communities education and training programs?
- Will the programs proposed have benefits to the nation outside the immediate community involved? Can the learning tools produced be readily transferred, replicated, or marketed to other national or international communities.
- Will the products of the proposal be widely available in the community?
- Does the proposal promise significant cost-sharing from the participants?

6. Federal Partnership in Technology and Learning

The federal government is reinventing the way it does business. Managers of a diverse set of federal programs are working together to make efficient use of available resources. The participating programs have a broad set of objectives -- including national security, business development and trade, scientific advances -- and the coordination efforts have found many ways to achieve programs that serve to promote these clear programmatic goals while contributing to activities that advance learning productivity in a broad set of American communities. The programs are built around the following four key areas.

a. Research, Development, and Demonstration

The research challenges associated with using technology to increase learning productivity are as important as any the nation faces today. The President's National Science and Technology Council has crafted an integrated plan for research and development activities in technology for learning based on resources available in the National Science Foundation, the Department of Education, the Advanced Research Projects Agency and other DOD research programs, the Department of Energy, NASA, and several other research agencies.

b. Military and Civilian Training

Efficient operation of the federal government depends on maintaining the skills of its workers. The Nation's security has always depended on the quality of the training programs available for the uniformed and civilian personnel in the Department of Defense -- including maintenance of skills in the reserves. The challenge has become greater as new technologies constantly redefine the skill requirements of federal civilian and military employees. Defense Training programs, the Office of Personnel Management, and other federal agencies responsible for federal training are coordinating their work to (a) ensure that federal training makes efficient use of cost-effective training technology available on the market and, (b) procures training products and services in ways that stimulate innovations in instructional technology. All federal procurement will be designed to stimulate innovative private firms capable of selling innovative, technology-based training systems to civilian as well as to government training organizations. Federal training programs will get more for the public money they spend, and federal employees will receive better training in less time, if innovative private businesses competing to provide efficient, low-cost training systems.

c. The National Information Infrastructure (NII)

Promoting quality education and life-long learning are central objectives of the Administration's programs in the National Information Infrastructure. An advanced information infrastructure is essential for ensuring that easy-to-use, interactive educational tools and instructional resources are available to meet the needs of learners and educators throughout America. And it is essential to ensure free or inexpensive electronic information to extensive collections of information are available to all Americans.

The NII Task Force, chaired by Secretary of Commerce Ron Brown, is designed to encourage private investment in the information infrastructure, promote competition, create a flexible regulatory framework to keep pace with technological and market changes, provide open access to the network for all information providers, and ensure universal service. Each of these is essential to encourage a actively supporting national goals in learning productivity.

Specifically, the NII Task force will:

- ensure that telecommunications regulation provides adequate incentives for communication firms to provide schools, businesses, and other groups with the broadband communication systems required for use of advanced NII services in schools
- ensure that all American households have access to advanced communication services
- provide funds for planning and demonstration projects that promote the development and widespread availability of advanced telecommunication technologies in educational applications through the Telecommunications and Information Infrastructure Assistance Program, and
- support the conversion of federal archival information to a digital form and make this information broadly available. Resources included in this project include scientific and technical information available from the NIH, NASA, DoE, NOAA, USGS, and other research agencies, as well as cultural and other information available from the Smithsonian Institution, the National Park Service, the National Archives, and the Library of Congress.

d. Management of Federal Programs

Head Start

Job Corps

School-to-Work

Chapter 1

Eisenhower

Manufacturing Extension Program

OPEN ISSUES:

- How much will a fully-functioning, interactive, individual-based, learning environment cost to develop and introduce in each of the areas listed in the Vision statement?
- Should the offering attempt to get proposals in specific areas (e.g. preschool, incumbent workers, etc.) or should grants be made entirely on the basis of merit running the risk that some key areas will not be represented
- Should planning grants be given to help communities assemble proposals
- How much private cost-sharing could be expected from the software developers? From other partners?
- What kinds of intellectual property rights would developers expect if they participated with a community in the development and introduction of one of these tools?
- How many challenge grants should be awarded?
- Should there be a small number of large grants (how large) and a large number of small grants (how small) or only one category of grant?
- Will the challenge encourage the kinds of innovative software designers we want to participate?
- The systems require continuing maintenance funding and operational support after the initial development award (help desks, teams of experts available on-line, bug elimination, expansion and updating etc.). Who will pay for this.
- How will the program be managed?
 - funding to 1-2 agencies with a TRP-like board
 - combining programs in many agencies under a coordinating body
 - others?

TALKING POINTS FOR CHALLENGE GRANT

Improving America's School Act of 1994 (Reauthorization of Elementary and Secondary Schools Act) Title III - Technology for Education Act

National Challenge Grants for Technology in Education

HOW MUCH MONEY IS THERE?

- There is \$27 million in Federal funds in 1995 to initiate the program plus Federal funds will be used to leverage a substantial investment from private sector partners. In addition, there will be increases in Federal funds in 1996 and in the following years of this legislation.

HOW WILL IT BE DISTRIBUTED?

- The Department of Education will conduct a competitive grant program

HOW LONG WILL IT LAST?

- Grants will be awarded for up to 5 years

WHO IS ELIGIBLE?

- Awards will be made to consortia. these consortia must include a local educational agency with a high percentage of children living below the poverty line and may include other local educational agencies, State educational agencies, institutions of higher education, businesses, telecommunications industries, academic content experts, software designers, museums, libraries, or other appropriate entities. - These consortia can be geographical or virtual, linked by interest.

WHAT IS THE PURPOSE?

- The Challenge Grant program is a major initiative of the Administration aimed at using technology to improve learning for all students in this country. We have already witnessed a technological revolution in business and entertainment; now the Challenge Grant challenges all of us to bring this revolution into classrooms so that all students can learn to high standards. It will enable communities to develop and use interactive technologies to help achieve the National Education Goals and so that students can reach the high standards envisioned by Goals 2000.

WHAT DOES THIS MEAN?

- The Challenge Grant is a way to change the nature of teaching and learning by promoting the development of compelling applications that will help students achieve high content standards.

- The Challenge Grants can stimulate the business community to form partnerships that will support their "investment" in schools rather than their "donations" to schools as charities.

- Challenge Grant communities will build applications of technology that can ultimately create a viable market for many more such applications for many years to come.

WHAT SHOULD YOU DO?

- Find partners - As President Clinton said last week in New York, "We're going to challenge communities around the country to come together around their own innovative plans to put technology in the service of learning." -- Ask: Who in your community (geographical or virtual) are the best partners to help you achieve your goals and help your students achieve the National Education Goals? (What is their contribution - financial and other?)

- Find a compelling idea. (Think about how applications have changed the nature of our world. --- Eg. spreadsheets, wordprocessors, desktop publishing, presentation packages, Mario Brothers --- What will similarly change the nature of learning?)

HOW DO YOU FIND OUT MORE?

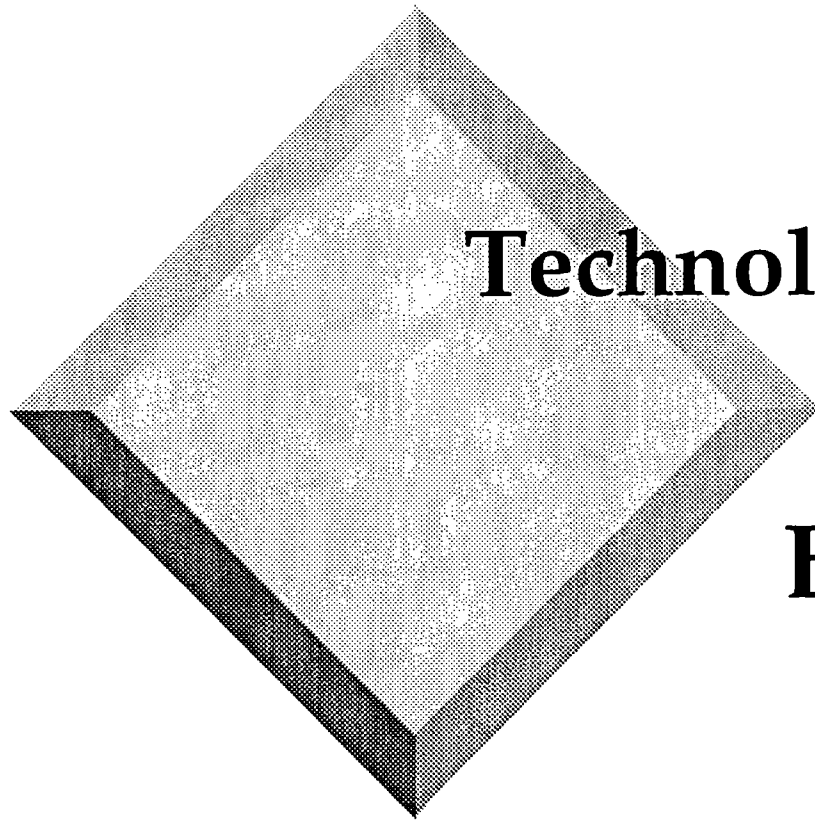
- Expect an official announcement in January.

WHEN IS THE APPLICATION DUE?

- Most Federal applications are due back approximately 3 months after they are issued.

WHEN WILL AWARDS BE MADE?

- Announcements of grant recipients will be made in September, 1995.



Technology Learning Challenge Status Report Briefing to ETR

18 August 1994

Technology Learning Challenge Vision

To ensure all Americans access
--anytime and anyplace--
to quality education and training
tailored to their individual learning
and workplace needs

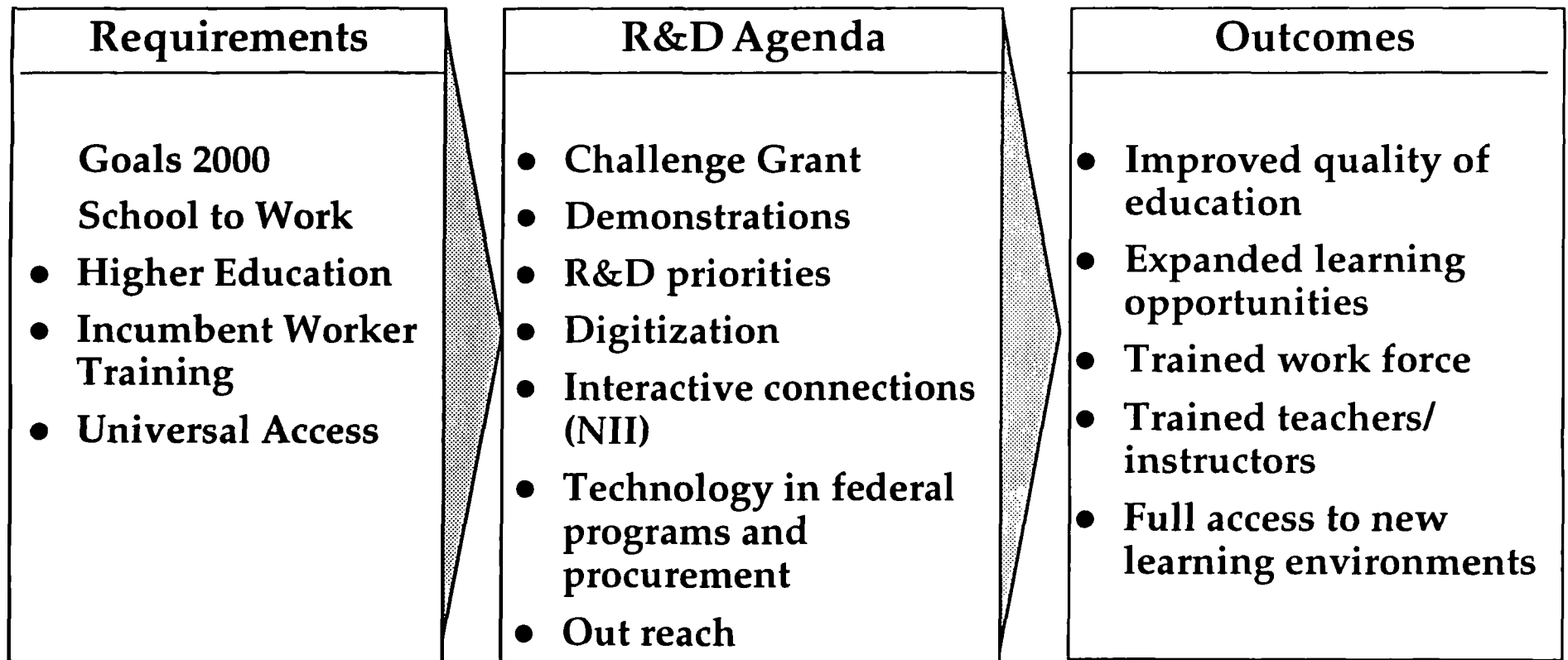
*" The television, the set-top-box, the personal
computer, and the telephone won't exist any more;
their descendants will ."*

Fortune Magazine, August 22, 1994

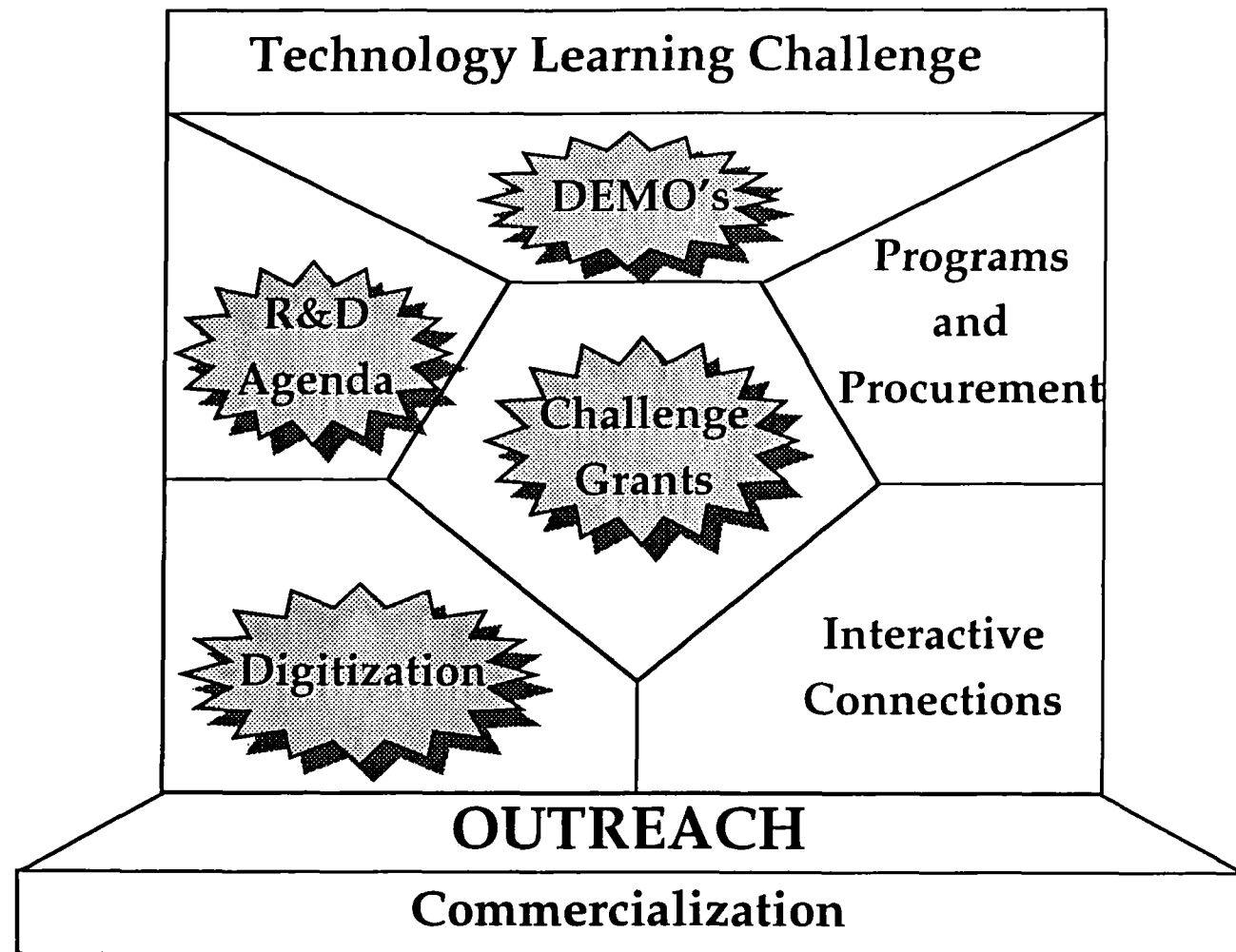
Technology Learning Challenge Goals

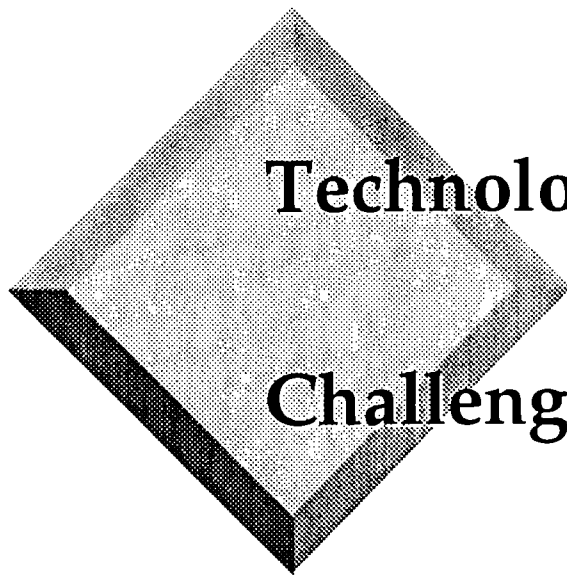
- **Challenge Grant: design, develop and implement new community-based interactive learning environments**
- **Leverage federal research and development to produce scalable demonstrations of advanced learning technologies**
- **Focus and coordinate federal procurement and education and training programs to invigorate learning in schools, workplaces and houses with powerful, interactive learning tools**

Technology Learning Challenge



Task Force on Learning and Technology Components





Technology Learning Challenge

Task 1

Challenge Grant

Challenge Grant Program

Mission:

- To create a nation-wide initiative that will stimulate communities to improve life long learning through the development and use of powerful, interactive learning technologies
- Through a community-based grant program, design and implement creative new uses of technology to advance:
 - ✓ Goals 2000
 - ✓ School to Work
 - ✓ Higher education
 - ✓ Workforce competitiveness objectives

Why is it needed:

- Major under-investment in content
- Markets for learning technology are fragmented and hard to reach--particularly in schools and small businesses
- Requirements for developers are poorly defined
- Products are limited in scope and successful concepts seldom move to large markets

Challenge Grant Program (continued)

Proposal elements:

- Challenge complete learning communities to bring together successful technology applications that help schools, businesses, communities and learners at school, at work and at home
- Modeled after successful elements of Empowerment Zone project
- Covers content--not hardware

Types of communities:

- Communities linked geographically
- Virtual communities linked by common interests

Who could propose:

- Complete learning communities
 - ✓ School systems
 - ✓ Colleges and universities
 - ✓ Local businesses
 - ✓ Content experts
 - ✓ Software designers
 - ✓ Telecommunications firms
 - ✓ Others

Challenge Grant Program (continued)

Proposal Criteria:

- Does it offer a creative new strategic vision for using technology to advance life long learning goals: School-to-Work, Goals 2000, higher education, incumbent worker training?
- Is concept applicable to other communities?
- Are there plans to market the concept more widely?
- Is it part of a comprehensive community plan for education and training; will it continue to be supported by the community as an integral part of its instructional programs?
- What is the extent of investment offered by the partners?
- What benchmarks for measuring success?

Cost--How much?:

- 10-15 grants for \$4-6 M/yr for 4 years
- 100 grants for \$500 K/yr for 4 years

Total: \$100 M/yr

Challenge Grant Program (continued)

Interagency coordination funding:

- DoED, DoL, DoD, DoC, DoE, NSF, NEH, NASA, OSTP, OVP, DPC-NEC, OMB

Federal assistance other than direct challenge grant funding:

- Help set priorities for digitization
- Access to federal resources at labs, NASA and other facilities
- Access to funding for connectivity through DoC/NTIA programs
- Access to NEH program funding by combining application with an NEH application
- Access to state funding for hardware by combining federal and state decision reviews

Management/Funding Options

Option (1) Direct all funding to ARPA in DoD

Pro:

- Comparative ease of adding funding in an agency
- Strong program management abilities
- Proven track record in technology for learning

Con:

- Education not central to DoD mission
- Not consistent with shift to civilian R&D
- Unclear links to ESEA, Goals 2000, School to Work

Management/Funding Options (continued)

Option (2) Direct all funding to DoED

Pro:

- Mission covers most relevant learning communities
- DoED needs an R&D program to support its mission
- Builds on ESEA funding available in FY95

Con:

- Administrative difficulties in getting education programs through appropriations committees
- Little R&D management experience

Management/Funding Options (continued)

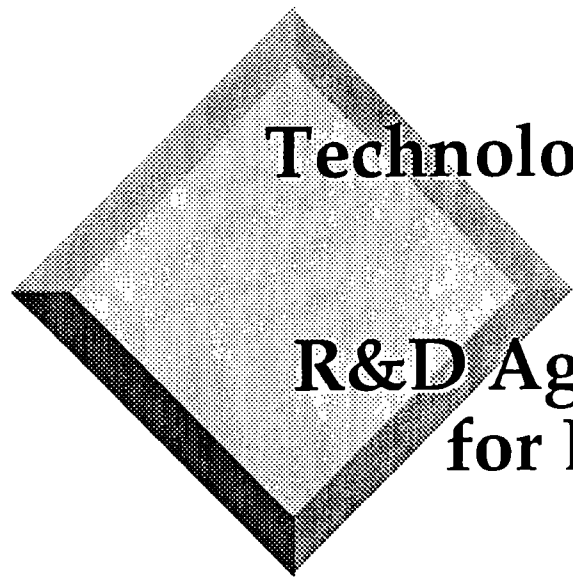
Option (3) Combined programs for children and youth (pre-school through school to work and college) funded through DoED and programs for adults funded through DoD/ARPA

Pro:

- Most likely to achieve total funding needed
- Follows successful model of Empowerment Zones using HUD and USDA funding

Con:

- More complex management
- Funding would require dealing with more Congressional committees
- Could discourage proposals combining programs for children and adults



Technology Learning Challenge

Task 2 & 3

R&D Agenda and Demonstrations for Education and Training Technology

Technology Learning Challenge

R&D Agenda Focus Areas

- Undertake basic research on learning and cognitive processes
- Develop new models to evaluate learning productivity
- Develop high-quality, affordable learning tools
- Demonstrate innovative technology and networking applications

Technology Learning Challenge

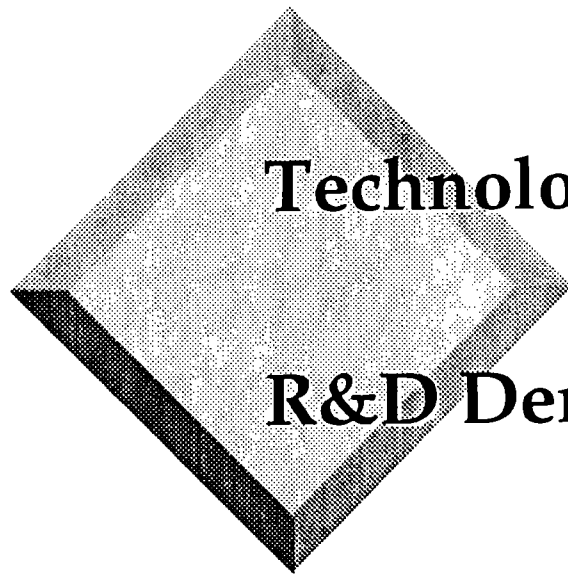
R&D Agenda Focus Areas (continued)

Background:

- Rivlin/Gibbons memo (Aug 5) states that the IITF and ETR reviews will incorporate relevant NSTC assessments in their analyses
- While much work is being done in some of the agencies (i.e., DoD, NASA, DoE), insufficient R&D is focused on interactive learning technologies
- CET and agencies have major responsibility to:
 - ✓ Promote technology transfer to DoL, DoED, DoC and others
 - ✓ Coordinate, supplement and focus community R&D efforts

Recommendations:

- CET should provide the management resources to craft a detailed R&D plan
- CET should define a set of ambitious interactive demonstration projects that can become the focus of interagency collaboration



Technology Learning Challenge

R&D Demonstrations

Demonstration Features

Attributes:

- Scalable
- Sustainable
- Adaptable
- Distributed
- Accessible and ubiquitous
- Commercializable

Management/participation :

- Public/private supported
- Fully funded
- Supported by interagency collaboration

Menu of Demonstrations to Choose From

Administration Program

Goals 2000
School to Work
Incumbent Worker
Training
Re-employment Act
NII Goals
Military Readiness

Target Population

Pre-school
K-8
8-12
School to Work
Higher Education
Incumbent Worker
Training
Disadvantaged/Disabled
Military Personnel

Discipline

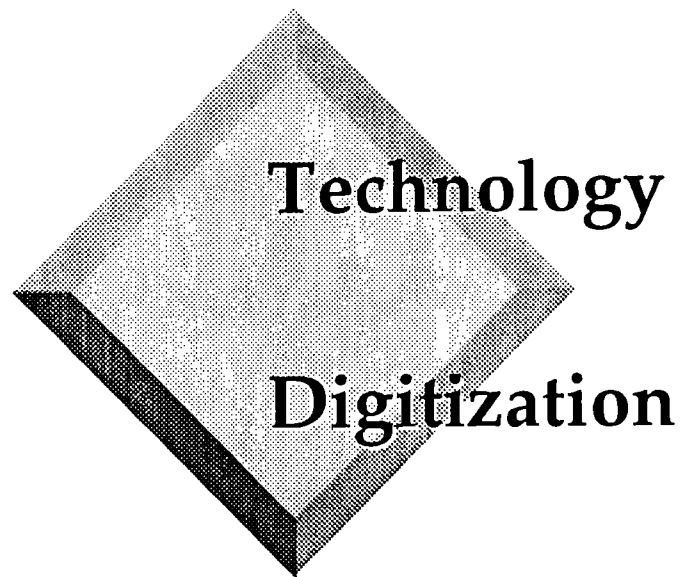
Math
Physical Sciences
Social Sciences
Arts & Humanities
Trades
Business
Behavioral Sciences

Technology Basket

Integrated Courseware
Distance Learning
Re-engineering School
Team Training
Just-in-time Learning
Synthetic Environments

Candidate Demonstrations

Target Groups	Goal	Key Features	Lead Agencies
Pre-School	All students start school ready to learn	An evaluation of the effectiveness of "edutainment" software to teach fundamental skills	DoED
Grades K-8	All student leave grades 4 and 8 having demonstrated competency over challenging subject matter	A cost-effectiveness assessment of interactive courseware and distance learning to improve core skills	DoED
Grades 8-12	Every school in America will ensure that all students learn to use their minds well so they may be prepared for responsible citizenship	A study of the ability of interactive multimedia and synthetic environments to enhance learning across knowledge domains and reform traditional education	DoED
Vocational Ed	All U.S. high school graduates obtain meaningful employment	An evaluation of the benefits of using interactive courseware and distance learning to improve job entry skills	DoED/ DoL
Higher Education	All graduates are equipped for success in the 21st century	A cost-benefit study of the use of models and simulation to advance the quality of higher education and research	DoED
Incumbent Workers	All workers acquire new skills needed in the 21st century	A cost-benefit study of the use of distance learning and just-in-time training technologies	DoL/ DoD
Military Personnel	The U.S. military is the best equipped, trained, and led fighting force in the world	An evaluation of the capabilities and limitations of advanced simulation and distance training to transform the traditional training infrastructure	DoD



Technology Learning Challenge Task 4

Digitization

Task:

- Define options to make federal assets available in digital form and at the lowest possible cost

Status: A systems perspective was adopted to structure the task

- Research & development
- Building collections
- Dissemination
- Grants

For each area

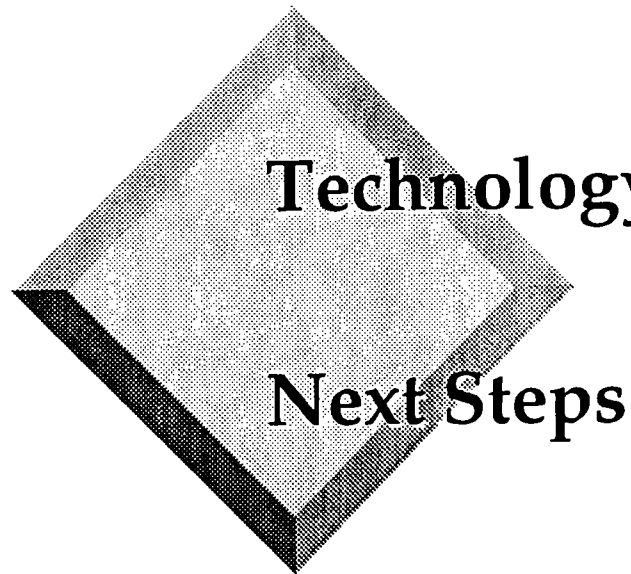
- Current status was established
- A preliminary assessment was made of key needs

Efforts are underway to refine

- Characterization of status
- Key needs

Recommendations

- Redirect Library Services and Construction Act funding to digitization
- Support FY96 funding requests for NEH and Smithsonian
- Provide \$4 million in FY96 to fund digitization of cultural resources for SI, NARA, LoC consortium



Technology Learning Challenge

Next Steps

Technology Learning Challenge

Next Steps

Date	Task	Instrument	Responsibility
18 Aug	- Decision memo to ETR principals on Challenge Grant - R&D agenda and demonstrations recommendation to CET - Digitization recommendations to CET	- Decision memo - White paper - White paper	- ETR (Schmidt) - R&D Subcommittee (Robinson/Finch) - Task Force (Lytel)
9 Sept	Agency budget submissions to OMB	Standard format	Agencies
29 Sept	FY96 priorities on R&D agenda and demonstrations to NSTC	Strategic plan (5-10 page summary)	CET (Kunin/Glynn)
4 Nov	- Federal programs and procurement plans - Formulate Outreach program	- Planning package - Action plan	- Task Force (Portman/Schmidt) - Task Force (Kohlenberger)
TBD	Interactive connections	Planning package	NII Task Force (Sallett/Kalil)
TBD	Public announcements and roll-out	Communication, event, roll-out	OVP with designated agencies

The Federal Workforce:
Surviving or Thriving in the 21st Century?

A White Paper on the Federal Government's Use of
Learning Technologies in Education and Training
for the Federal Workforce

Submitted by the
Human Resources Development Council

November 4, 1994

The White Paper on the Use of Learning Technology in Education and Training for the Federal Workforce was submitted by the Human Resources Development Council.

Executive Committee, Co-chairs
Carson Eoyang, NASA
Renelle Rae, EPA

White Paper Advisory Committee
Richard Indelicato, OPM
Eileen Mason, NRC
Don Mizaur, OPM
Donna Oriana, DLA
Stephen Ramp, DoD
Carol Townsend, GSA
Roy Tucker, HHS

This paper was prepared by Anna Doroshaw, EPA

November 4, 1994

LEARNING TECHNOLOGY IN THE FEDERAL WORKFORCE

"While traditional organizations require management systems that control people's behavior, learning organizations invest in improving the quality of thinking, the capacity for reflection and team learning, and the ability to develop shared visions and shared understandings of complex business issues."

Peter Senge
The Fifth Discipline

The Human Resources Development Council is a recently constituted body that serves as the principal advisory board on federal training and development policy and practices. It is composed of the chief training officers of the major federal departments and agencies and provides guidance and direction to OPM's Human Resources Development Group on human resource development matters. In addition, it serves as a coordinating mechanism across federal agencies as well as a forum for the consideration and approval of new initiatives in training and development for the federal civil service.

This White Paper focuses on the relationship of learning and the use of educational technology on workforce performance in the Federal government. It looks at how learning technologies are being utilized, including factors that support success and others that create barriers. The Council makes recommendations for actions that will support federal training and learning through improved applications of technology.

John Kenneth Galbraith described technology as "... the systematic application of scientific or other organized knowledge to practical tasks."¹ Technology is also defined as "... the tools, process, material resources, and creative human intelligence applied to the solution of practical problems."² Technology is used to describe "*both the tools and the processes that facilitate the establishment of learning systems*", rather than just the tools (microcomputers, videodisc players, hypermedia, expert systems, etc.). The process of technology is a systems approach, using a dynamic, iterative process to forge the tools into technologies for addressing the challenges of training and learning, and finding the solutions to practical problems.

¹Galbraith, John Kenneth, *The New Industrial State*, Boston: Houghton Mifflin, 1967.

²Barbee, David and Gabriel Ofiesh, *A Report on the Nationwide 'State of the Art' of Instructional Technology*, Washington D.C.: Institute for Technological Solutions, 1990.

The HRDC is looking at how learning technologies are being used to improve federal workforce performance. We want to ensure that we are not merely creating more technology, but are creating the "tools, processes, material resources and creative human intelligence" to enable the federal worker to grow into the Agile Learner³ capable of meeting the challenges of the 21st century.

Increasing the role of educational technology in federal training, even if it results in improved training, is not an end in itself. As Vice-president Al Gore wrote in Earth in the Balance:

"We now face a crisis entirely of our own making: we are drowning in information. We have generated more data, statistics, words, formulas, images, documents and declarations than we can possibly absorb. And rather than create new ways to understand and assimilate the information we already have, we simply create more, at an increasingly rapid pace."⁴

Educational technology will not bring overall changes and desired long term improvements if we do not make the transformation from a culture focused on teaching (training) to one that is focused on learning. The move toward competency-based training and outcomes is reflected in the work of many organizations within government, industry and academia. Throughout industry and government, there is a growing recognition that "a workforce with superior skills is the only sustainable source of competitive advantage." Training and development systems are being viewed as critical to creating readiness and flexibility for change across all levels of the organization.⁵ Learning technologies are playing increasingly important roles in the changing the direction of training and development systems.

³ The agile learner is a concept developed by the National Learning Foundation, Paul Messier, Ph.D., President. According to Messier, the agile learner is a strong individual in a self-governing system -- one who is not a sponge for information, but, rather one who has sovereignty over information and is capable of reflection and choice.

⁴ Gore, Albert, Boston: Houghton Mifflin, 1992.

⁵ "Designing Training and Development for Competitive Advantage: Lessons from the Best" by Judy D. Olian, Cathy C. Durham, Amy L. Kristof (Maryland Business School, University of Maryland), Kenneth G. Brown (Department of Psychology, Michigan State University), and Richard M. Pierce (Human Technology, Inc.).

THE CURRENT STATE OF TRAINING AND LEARNING

The most common category of training incorporating computer or other non-classroom/lecture delivery is computer and systems training. Almost across the board, agencies have turned to some form of computer-based training (CBT)⁶ delivery to teach workers to use the computers and software systems required on the job. Much of the computer training is still delivered as hands-on training in formal classrooms with an instructor. More self-paced learning alternatives are being introduced, ranging from video tapes and video disc courseware to online systems with huge libraries of courses that are fully managed electronically. (See the examples described in Appendix D for the U.S. Customs Service.) Computer-based training, in use since the early 60's, continues to have a major role in federal training delivery.

In the mid-80's, information centers--technology support organizations frequently operated by the Information Resource Management (IRM)/Information Technology (IT) organizations--were widely established throughout the federal government. Focus here was on supporting the use of computers, however, not on computer technology as a tool for learning regardless of the content or programmatic area. Since the late 80's, the growth of multimedia (computer plus graphics, audio, and video in an interactive mode) has continued to fuel the movement toward more and better use of educational technology applications, especially for education. Today the use of various technologies is widespread across the government in both types of technology employed and types of applications. (See table in Appendix B for a sample of applications across the Federal government.)

Technological advances are transforming the workplace, and demographic trends are changing the nature of work. The HRDC focus is on identifying and supporting actions that will enable the Federal Government to develop the workforce learning necessary to meet the demands of a rapidly changing workplace. Adding more technology is not going to bring the desired outcomes by itself. The use of appropriate technology appropriately used is the key.



Courtesy of Rich Tennant
and Federal Computer Week

⁶ See Glossary in Appendix A for definitions and related terms.

BARRIERS TO IMPLEMENTING EDUCATIONAL TECHNOLOGY SOLUTIONS

The four biggest barriers to the effective application of technology in training are:

- 1) the technology itself,
 - 2) the people who use or might use it,
 - 3) budget,
- and
- 4) procurement.

Technology:

Technology is often complicated, incompatible, costly, and subject to constant change. Some level of technological knowledge is required if technology is to be used effectively. Human resource developers, managers and trainers need to learn:

Technical Feasibility

- Compatibility of systems
- Evaluating the competition
- Potential problems

Planning, Design and Development

- Role of various technologies
- Applications
- Interest among various departments and agencies
- Means of introducing or producing products
- Availability
- Off-the-shelf, adapted courseware (developed by another Agency), or custom courseware
- Timetable for introducing
- Justification
- Cost Analysis (economic analysis)
 - Traditional cost/benefit analysis does not measure outcomes

Implementation issues and strategies

- Adequate support (contractor or in-house)
- Maintenance and obsolescence (life cycle planning)

People:

Government personnel often lack basic information about the potentials of technology as well as the how-to skills to begin incorporating new approaches for human resource development, training and learning into the existing framework. Our predominant experience as educators, trainers and human resource developers is in the classroom and follows the old pattern of

teacher as lecturer, student as listener. We estimate that 90 percent of training still occurs using traditional methods. When the fear of the uninitiated (or technophobic) meets the sometimes mindless enthusiasm of the "techno-guru", common sense may be one of the casualties. Whether enthusiast or technophobe, human resource professionals all need to acquire new knowledge and expand their skills:

Human Resource Management Needs

- work in multidisciplinary teams
- navigate complex multimedia databases
- create real-life scenarios for teaching skills

Overcoming fear

- Perceived threats to job security
- Fear of technology and the unknown

Evaluation

- Evaluation of methodologies, determining best methods
- Evaluation of outcomes

Management/Administration Issues

- Integrating technologies into the existing technological, social, and political infrastructure
- Competing human and capital investment issues
- Decentralized training functions within Agencies

Accountability

- Training is often delivered without being linked to competencies or outcomes.
- Technology gatekeepers do not understand training and learning needs and are often unresponsive when asked for help in planning and implementing technology solutions for training and learning, especially for non-systems (computer) related training.
- Lack of baseline information on traditional training prevents development of realistic comparisons or standards to help evaluate alternative methods.

Budget:

After the idea of incorporating technology has been accepted and the management decisions have been made, another major barrier often impedes the progress--**budget issues:**

Financial

- Tight budgets
- Funding constraints

(e.g.: restrictions on purchase of computers and/or software because they are not seen as learning systems and educational materials)

Procurement:

Even when all other barriers have been overcome, another major source of trouble includes the ever-looming procurement issues:

Procurement

- How, where, how much, etc.
- Restrictions
- RFP process
- Lag-time for procurement (RFP process can take months to years to complete, making the purchase obsolete before the award is even made)

The most frequently cited problem outside of the technology, people, budget and procurement is **communication**--having access to information. We don't know what's being done, who's doing it, where to go for help, how to share what we have and/or know, or how to sort out what we're getting. We become victims of information overload as much as lack of access.

SUCCESS FACTORS

People and planning are key. Most successful applications of technology have been spawned by creative, courageous, and thoughtful risk takers who match the applications of technology to genuine needs and who have accounted for the context in which the technology has to operate. They have had to think about audience, access, affordability, affordances, accommodation, anticipated obsolescence, advocacy and education. These factors affect successful application of all technology-based education and training efforts, not just those for the federal workforce.

Technological advances are transforming the workplace, and demographic trends are changing the nature of work. Today's technologies provide many keys to unlock future productivity. Their appropriate application can serve to extend the opportunities for learning in real-world situations, expand our abilities to think and learn, improve accountability, and establish and manage learning environments where people work.

RECOMMENDATIONS

The Human Resource Development Council focus is on identifying and supporting actions that will support Federal workforce learning requirements to meet the demands of a rapidly changing workplace. The following recommendations are designed to provide incentives, access to resources including capital and expertise, rewards and protection to the human resource learning entrepreneurs and innovators in our agencies.

The HRDC offers recommendations on several levels:

- Incentives for individual and organizational entrepreneurs to develop innovative solutions to workforce performance issues and the institutional structure to support lifelong learning.
 - Clearer vision of the role of technology to support learning, workforce competency and productivity improvements in the Federal workplace.
 - Learning opportunities for management and human resource personnel to acquire the understanding and skills to make the transformations in their own agencies and departments.
 - Relationships between federal government, private industry, universities and others to allow the government to leverage its people, knowledge and resources most effectively.
1. **Create a Learning Fund** -- a working capital fund or revolving fund -- to support innovative learning ventures within the federal sector from single program offices up to entire agencies. The fund would support efforts similar to the reinvention labs developed out of the NPR.
- Operate the Learning Fund through an existing lead agency or organization capable of coordinating a national program.
 - The National Demonstration Laboratory for Interactive Information Technologies has operated a learning and demonstration center with public and private sector support. It is currently housed with the Academy for Educational Development, a private association supporting educational development.
 - Other possible agencies include the Office of Personnel Management, National Science Foundation, National

Technical Information Service (Dept. of Commerce) and Naval Research Lab among others.

- Use the Federal Technology Transfer Act as a model to encourage collaboration among public, private and academic sectors. Research parks dot the US where Technology Transfer Act efforts have been successful. (See Appendix C)
- Allow "profits" from ventures to accrue to the government (back to the Learning Fund) to support additional projects, research and educational activities.
- Facilitate joint ventures for new development and research projects.

The HRDC will help to establish criteria for distributing learning funds.

The HRDC will assist with continuing research to develop a Learning Fund program.

2. **Utilize existing magnet learning centers** that provide working environments for learning, experimenting, innovation, and change. Examples include: CD-ROM Information Resources Center (CIRC); the National Demonstration Lab (Academy for Educational Development); US Geological Survey Centers for Learning; General Accounting Office Training Institute.
 - Operate these magnet facilities as centers of excellence for education and learning (Excellence Center for Education and Learning--EXCEL). Results from research and development efforts would be shared through the EXCEL network.
 - Use existing centers as models for transforming training operations into learning centers within other federal agencies.
 - For example, the National Library of Medicine operates a Learning Center for Interactive Technology that has been functioning as a "magnet center" for over ten years. It also houses the National Coordination Office for High Performance Computing and Communication (HPCC) that coordinates the efforts of several agencies with contracts in these areas to avoid duplication and leverage resources.

The HRDC will ask each agency to nominate centers of excellence and will coordinate improving access to information-sharing through existing Bulletin Board Systems (BBS) and/or Internet access.

The HRDC will explore the feasibility of operating a listserv for Internet access through the National Technical Information Service (NTIS) and National Audiovisual Center.

3. **Develop incentives** for people to take risks, trying innovative and new approaches to meet learning and training requirements.

- Create a Vice Presidential award for significant accomplishments in learning and the innovative application of technology to improve workforce training. Recognize individuals and organizations for best practices and innovation in learning.

The HRDC will work to develop criteria similar to Quality awards for outstanding accomplishments.

The Council will work with other Agencies to identify best practices across the federal government.

- Agencies will submit nominees to the OPM and/or the HRDC annually, with the finalists being forwarded to the Vice President's office for an annual recognition and award ceremony.
- Encourage the use of existing mechanisms to reward human resource entrepreneurs with money, recognition, academic or other exchange time, and other career enhancing and developmental opportunities (e.g., Intergovernmental Personnel Assignment (IPA) process, developmental details and rotational assignments, and sabbaticals for academic and research work).

4. **Include planning for workforce learning** as key component in all Reinvention efforts such as Business Process Re-engineering (BPR), Work Process Reengineering, and TQM. Plans should include evaluating role of educational technology and incorporating alternatives to traditional classroom training.

5. **Include the federal workforce in the Administration's vision for learning.** Sponsorship should be shared by lead agencies such as the Office of Personnel Management, Departments of Labor, Health and Human Services, Education, and Commerce.

"In moving toward the 21st Century, we must, above all, become an 'education nation' -- and support public sector leaders at all levels who will make training and education their unmistakable top priority (policy and dollars).

Tom Peters
Liberation Management

- Set **Learning** as a national priority
- Sponsor a research initiative by the White House Domestic Policy Council and/or Office of Science and Technology Policy to bring new learning theories and learning technologies into the mainstream for workforce development, productivity and quality improvement, and achieving national and international competitiveness in government and business.

Research findings would apply to issues of competitiveness, education reform, school-to-work transition, and related areas.

- Annual recognition of best practices (see Recommendation 2) will continue to reinforce the vision and commitment to this national priority.
- The Federal Government should place more emphasis on technology transfer and training as an integral part of human resource development and management.
 - Technology transfer will be facilitated through the joint efforts of the participants in the EXCEL network and projects sponsored through the Learning Fund.

6. **Identify best practices in performance measurements** for the transfer of learning and training to the workplace. Focus on evaluation of learning technologies and transfer of learning to job performance.

- Focus on how to demonstrate the impact of human resource, organizational development, and learning programs on business performance.
 - Utilize research and findings of the Dept. of Labor Office of the American Workplace.
- Identify tools, models and metrics necessary to design, implement, and evaluate impacts of training and organizational development efforts.

- Host a conference on evaluation and performance measurements which brings together participants from government, academia, educational associations, and business to share knowledge and experience. Findings should be published and distributed (electronically) by OPM through the Human Resource Development Group.

7. **Leave delivery decisions about training to the discretion of the learning experts** rather than mandate delivery details in the training provisions of Legislation and Executive Orders.

The following two recommendations address the need to focus on the planners and implementers, to help them acquire a strategic view of learning and training for the organization while also learning how to adapt learning programs and integrate technologies appropriately:

8. **Incorporate technology into the basics** for training, especially for senior management (SES and political managers). E.g.: give managers a laptop at check-in for their four week stint at the Federal Executive Institute, along with help to learn to use the software, email, etc. Set up programs for paperless (almost) work with the products delivered by the Institute participants coming out in electronic form. Set up node on Internet for FEI and perhaps a listserv to promote continued collaboration and sharing of learning, etc.

- SES executives need programs that will help them to understand the role of learning as a strategic part of mission
- Non-Technical SES career officials need training and learning opportunities about information and learning technology.

The HRDC can provide guidance and subject matter expertise in helping to develop a learning program through the FEI and other federal training institutes and programs which incorporates strategic planning and learning with technology.

8. **Create a Federal Human Resource Learning Institute** to help human resource professionals develop learning skills and competencies.
- Develop a "virtual" university environment drawing upon the existing resources, best practices and model programs across the country.

-
- Establish opportunities for employees to become members of learning teams, teaching and learning simultaneously, with their roles as facilitator and learner interchangeable.

The HRDC will inventory the existing models such as the Federal Executive Institute, Federal Quality Institute, Staff College on Learning and Technology (Center for Substance Abuse Prevention) and other government and non-government organizations.

The HRDC will assist in developing curriculum designed to help federal trainers and HR professionals acquire the skills to move federal training to a learning culture which measures competency and develops training based on learning outcomes, applies best practices and continuous learning to methodologies.

APPENDICES

- Appendix A. Technology Definitions and Descriptions
- Appendix B. Table of Typical Educational Technology Applications by Agency and Technology
- Appendix C. Technology Transfer Act
- Appendix D. Demonstration Center, Laboratories and Resource Centers
- Appendix E. EPA NPR Initiative: 3% for Training
- Appendix F. Interagency Resource Sharing Panel - Federal Government Bulletin Board Systems
- Appendix G. Contributors to White Paper

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APPENDIX A: TECHNOLOGY DEFINITIONS AND DESCRIPTIONS

The following descriptions of the tools available for human resource development include machines, software, and complete systems. The categories are arbitrary, but the tools they represent are real; they hold substantial promise for providing solutions to practical problems.

THE TOOLS AND PROCESSES

Microcomputer At the heart of the new technologies lies the microcomputer. It has made possible the creation, delivery, and management of learning environments that provide textual, audio, video, and graphical stimuli, as well as control, to the learner. Simulation, tutorials, practice, sophisticated branching, manipulation of data and information are available in highly interactive modes.

The computer is more than just another tool. It can program and manage a CD-ROM, videodisc player, expert system, or other tool, functioning as part of a *learning technology*. When used in this way, computer-based systems not only deliver training, but also act as *tools of learning* that can help humans gather and manipulate relevant information, and even create intelligence. Computer systems hold the promise of creating more ideal instructional systems. (Barbee and Ofiesh, 1990)

Artificial Intelligence (AI) AI computer programs have the ability to think in response to user input and to provide information based on user queries or responses. The programs may emphasize problem-solving applied to specific tasks or may be used as training programs. AI is related to Expert Systems, which organize and apply the knowledge of human experts for specific problems.

Intelligent Computer-Assisted Instruction (ICAI), also known as Intelligent Tutoring Systems (ITS), is an intelligent computerized instructional system that makes use of artificial intelligence programming techniques to enhance instructional effectiveness. It is used to organize a comprehensive knowledge base into a clearly defined instructional model which can interact with the learner tailored to the learner's performance and needs.

Authoring Systems In the past the cost of programming the computer for instructional use was very high. Authoring systems were developed to enable instructional developers,

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without the knowledge of a programming language, to generate text and graphic lessons on the computer. They can call upon the still frame, motion and audio sequences of a random access videotape or videodisc player, or they can call other peripherals driven by the computer for sound, visuals, text, graphics, or other electronically stored material.

Compact Disc Technologies There is an entire family of compact disc technologies growing out of the CD audio so familiar to the consumer electronics market.

Compact Disc-Read Only Memory (CD-ROM) The 12 cm. CD-ROM disc can store 550 megabytes or more of digital data (the equivalent of about 250,000 pages of text, 500 1.2 MB floppy disks, or a 20' high stack of paper). The data on the disc is in digital form, allowing the computer to read and manipulate it. For education and training purposes, pictures, text, graphics, sound, and even color video sequences can be stored. However, it does not provide full-motion video sequences as a videodisc or videotape does.

Compact-Disc Interactive (CD-I) This system combines a microcomputer and a CD-ROM player in a stand-alone unit, providing random access to graphics, sound, and both still and full motion video. The data format, however, is proprietary, requiring CD-I discs to be played only on CD-I players. This technology, under development by Philips and Sony, was originally targeted for the home market; the developers are now marketing to the business environment as well. Few applications exist at present.

Digital Video Interactive (DVI) DVI allows real-time presentation of up to 72 minutes of full motion, full screen digital video, audio and graphics from a CD-ROM or other large storage device. The technology employs a set of algorithms to compress and decompress digital signals through a chip set on a PC board. Because all the signals are digital, every screen pixel, and every second of sound may be adjusted by the user, providing a highly interactive tool.

Computer Based Training (CBT) CBT can incorporate a wide range of concepts, techniques, media, and technologies. Computers can bring many specific capabilities to training delivery systems, however, with a high degree of interactivity unavailable with other instructional approaches, except, perhaps, for a direct dialogue between a student and instructor. A current definition of CBT from Gloria Gery is

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"an interactive learning experience between a learner and a computer in which the computer provides the majority of stimulus, the learner must respond, and the computer analyzes the response and provides feedback to the learner." This new definition moves CBT away from many of the traditional limitations such as little learner control and criticism that it is primarily an electronic page-turner.

CBT is a versatile medium, available from mainframe, mini, and PC networks or on stand-alone units from a hard drive or floppy disk. Some of the distinct capabilities of CBT training include:

- Creation of files for storing information
- Organization of text, video, and numerical data
- Random access to data and programs
- Manipulation of variables and the calculation of outcomes
- Creation of linear, conditionally branched, or non-linear interactions
- Evaluation of student responses and decision-making based on performance assessments

Interactivity and learner control are the primary factors separating CBT from other more traditional instructional media. The wide range of learner control options and levels of interactivity permit a higher degree of individualized learning and add teaching value beyond that achieved with other media. (See also *Artificial Intelligence*, which is an important related topic area.)

Variations of CBT include computer-aided instruction (CAI), computer-based instruction (CBI), computer-based education (CBE), computer-based tutorials (CBI), and interactive tutorials.

Computer Conferencing Using the computer as a delivery system, conferencing sets up an *electronic classroom* combining computers and telecommunications. It is commonly used for student-teacher and student-student communication. Students meet with the instructor online; course information can be presented, along with questions, tests, assignments, and individual responses to questions or discussion items. The

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role of the instructor is similar to teaching in a classroom but the contact is electronic rather than face to face. This format may be referred to as *asynchronous computer conferencing*. Virtually any computer terminal can be used with telecommunications.

Courseware The term is used to describe courses developed for educational technology applications. It indicates a learning or training tool for delivered through a computer.

Distance Learning Human resources (learners, experts, teachers, others) come together with material resources (text, audio, and visual databases; predesigned packaged learning environments) to learn. It is more than simply the physical or electronic delivery of local training to another location. It is an interactive phenomena. Examples of distance learning delivery methods include television and satellite, computer, and video conferencing technologies.

Electronic Bulletin Board Systems (BBS) A computer system is used to allow users to leave, read, and exchange messages with other users. Electronic bulletin boards provide access to data files, and permit on-line, real-time conferences between two or more users. The three major functions of a BBS are messaging, data access, and conferencing. The system can be used for support and teaching purposes.

Some of the advantages of using bulletin boards include:

- Wide and almost immediate access to a broad base of expertise
- Timely notices regarding system changes, new services, important announcements
- User involvement and user-to-user support
- Customization of on-line help with the combined immediacy and individuality of phone support and the convenience of on-line help
- Efficiency for support providers who gain a degree of control over their time, eliminate telephone tag, and provide public responses to common questions and problems

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Disadvantages include:

- Security problems with dial-in access to internal networks
- Limited appeal to some users who are uncomfortable with electronic communications and want face to face support
- Lack of enforcement to get users to read messages when policy or procedure changes are broadcast
- Costs and/or access for connect time from long-distance participants and for appropriate hardware

Electronic Performance Support (Also referred to as Performance Support Systems or PSS) An electronic performance support system provides a worker with immediate guidance, advice, assistance, and tools to perform a job with a minimum of support from other people. The concept incorporates old as well as new tools, combining them to create powerful new systems to support jobs rather than individual tasks. The technologies being combined in creative ways include mass storage, increased desktop power, on-board video and audio, artificial intelligence, relational database management, networking, dynamic data linking, and uniform interfaces.

Embedded Training When training is delivered by the same computer a person uses for work as the work is performed, it is referred to as embedded training. The training material is located within the application software, or as a shell around it to provide immediate guidance as the individual works. When the training material resides in its own program which parallels the application software, it is called *concurrent training*. Embedded training can range from simple help functions to full blown tutorials, simulations, or context-sensitive help on a specific topic. It can be used to walk a user through the actual use of the software, providing the appropriate level of support to enable the user to perform tasks while simultaneously learning how to use the tools.

Expert Systems An expert system is an advice giving system used to help make decisions or solve problems. It uses techniques developed in the field of artificial intelligence to represent knowledge and make inferences. It consists of a knowledge base (a set of rules and decisions that make up the expert's knowledge), an inference engine (the method used to access and apply the knowledge), and an interface

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with the user (usually the keyboard and program which makes it easy to interact with the expert as naturally as possible).

Hypertext/Hypermedia Hypertext is a way of organizing, storing and retrieving textual information using a series of cross references referred to as nodes and links. Hypermedia extends the hypertext concept to include pictures, graphics, sound, and/or motion video in addition to text.

Hypertext A common definition of hypertext is a database that has active cross references and that allows the user to jump to other parts of the database as desired, making the reading (and writing) process non-sequential. The requirement for active cross references makes a computer necessary to implement hypertext. The database can be conceptualized as a network of nodes (documents) and links (cross references). Articles or documents can be shared across multiple locations/machines and allow collaboration in both reading and writing.

Hypermedia When documents are multimedia in nature, the term hypermedia is often used. Multimedia links can be made not only among text documents, but also among pictures, audio, video sequences, or whatever media are available in the machine environment being used. Videodisc and CD-ROM are commonly used media devices.

Learning Stations The interactive learning station can combine a number of tools to provide *embedded training* (training material or assistance is delivered as the person at the workstation works). Training is integrated with the work itself to allow the person to move freely from work to training, then back to work. The training material may be an actual part of the applications software (embedded training) or may be running in a separate program at the same time (concurrent training).

Multimedia The addition of graphic, sound, and motion video (multiple media) is used to create computer-based applications. Multimedia is commonly delivered via video disc (analog) and CD-ROM (digital); new video graphics and sound boards in computers, along with high speed modems are making it possible to transmit multimedia available over the Internet and other data communication systems.

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Videodisc A videodisc player employs a laser to access video images stored on the 54,000 frames available on a single side of the disc. Two independent sound tracks may be recorded, with additional audio storage available by using some of the video frame space (referred to as the disc's real estate).

Most videodiscs used in the more sophisticated instructional applications are controlled by a computer (referred to as a *Level III* videodisc application). Level III applications use the computer to access frames, motion sequences and audio, while overlaying computer-generated text and graphics for maximum instructional utility. The user interface can be touch screen, light pen, mouse, keyboard, voice recognition, or any or all of the these methods, or some other device that represents, for example, a control panel, welding station, or simply the top of a table or desk.

The data on a videodisc is not stored in a digital format as it is on a hard disk or CD-ROM disc; it is stored in analog form. The image or sound itself cannot be altered since it is not in a form the computer can recognize.

Videoconferencing Similar to computer conferencing, videoconferencing, or **video-teleconferencing**, uses broadcast-quality video with a voice link. The analog signal provides one-way video with two-way audio bridges similar to a conference call. For wide distribution, the signal is usually broadcast via satellite. Video networks are evolving to deliver prepackaged programming to business sites equipped with downlinks for capturing satellite transmissions. Subject matter experts and instructors can be made available to a large audience while reducing travel-related costs. The technology serves to extend the traditional classroom more than replace it.

APPENDIX B. TABLE OF TYPICAL EDUCATIONAL TECHNOLOGY APPLICATIONS BY AGENCY AND TECHNOLOGY

AGENCY/DEPT	TECHNOLOGY	APPLICATIONS
General Accounting Office Training Institute	Video Conferencing CBT IVD	
General Services Administration		
Environmental Protection Agency	Video IVD CD-ROM (under development) CBT Satellite	computer-related courses, management, literacy, health and safety training, technical training (subject matter for scientific, technical, administrative, legal & support staffs)
Customs Service	CBT - mainframe and PC systems	
Internal Revenue Service	CBT	
U.S. Postal Service		
Federal Aviation Administration	EPSS	
USDA Soil Conservation Service		
Social Security Administration		
Office of Personnel Management		
Dept of Education Horace Mann Skill Center	IVD, CBT	
DoD Army Navy Air Force Marines	CBT Satellite Simulation (including computer simulation) IVD Audio conferencing Teletraining	

AGENCY/DEPT	TECHNOLOGY	APPLICATIONS
Federal Language Training Lab (Federal Laboratory Consortium for Technology Transfer)	Multimedia workstations, Teletraining	Foreign language learning; computer testing
Dept of Energy (Sandia Lab)		
National Library of Medicine - Lister Hill Center	CBT IVD	
USDA Extension Service	Satellite CD-ROM IVD CBT Teletraining	
National Security Agency National Cryptologic School	Simulations (including computer simulation)	Executive and project manager learning
Department of Justice	IVD Computer gaming	Attorney trial advocacy skills Ethics training

Audio Audio Tapes
 AudioCon Audio Conference
 CBT Computer-Based Training (see glossary
 for related terms)
 CD-ROM Compact Disc-Read Only Memory
 Comcon Computer Conference
 EPSS Electronic Performance Support System

IVD Interactive Video Disc
 TeleTr Teletraining
 Video Video Tapes
 VideoCon Video Conference

Appendix C. Technology Transfer Act

Public Law 99-502
99th Congress

An Act

To amend the Stevenson-Wydler Technology Innovation Act of 1980 to promote technology transfer by authorizing Government-operated laboratories to enter into cooperative research agreements and by establishing a Federal Laboratory Consortium for Technology Transfer within the National Bureau of Standards, and for other purposes.

Oct. 20, 1986
(H.R. 3770)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Federal Technology Transfer Act of 1986".

SEC. 2. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

The Stevenson-Wydler Technology Innovation Act of 1980 is amended by redesignating sections 12 through 15 as sections 16 through 19, and by inserting immediately after section 11 the following:

"SEC. 12. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

"(a) GENERAL AUTHORITY.—Each Federal agency may permit the director of any of its Government-operated Federal laboratories—

"(1) to enter into cooperative research and development agreements on behalf of such agency (subject to subsection (c) of this section) with other Federal agencies; units of State or local government; industrial organizations (including corporations, partnerships, and limited partnerships, and industrial development organizations); public and private foundations; nonprofit organizations (including universities); or other persons (including licensees of inventions owned by the Federal agency); and

"(2) to negotiate licensing agreements under section 207 of title 35, United States Code, or under other authorities for Government-owned inventions made at the laboratory and other inventions of Federal employees that may be voluntarily assigned to the Government.

"(b) ENUMERATED AUTHORITY.—Under agreements entered into pursuant to subsection (a)(1), a Government-operated Federal laboratory may (subject to subsection (c) of this section)—

"(1) accept, retain, and use funds, personnel, services, and property from collaborating parties and provide personnel, services, and property to collaborating parties;

"(2) grant or agree to grant in advance, to a collaborating party, patent licenses or assignments, or options thereto, in any invention made in whole or in part by a Federal employee under the agreement, retaining a nonexclusive, nontransferrable, irrevocable, paid-up license to practice the invention or have the invention practiced throughout the world by or on behalf of the Government and such other rights as the Federal laboratory deems appropriate; and

Federal
Technology
Transfer Act of
1986
Commerce and
trade
Government
organization and
employees
15 USC 3701
note
15 USC 3701
note
15 USC
3701-3704
15 USC 3703a

State and local
governmental
Business and
industry
Schools and
colleges

Patents and
trademarks

Appendix D. Demonstration Centers, Laboratories and Resource Centers

National Demonstration Laboratory for Interactive Information Technologies - Academy for Educational Development

National Technical Information Service - Department of Commerce
National AudioVisual Center - Department of Commerce

Technology Resources Center - Department of Education, Office of Educational Research and Improvement

Pentagon Skill Assessment Center

Horace Mann Skill Center - Department of Education

CD-ROM Information Resources Center (CIRC) and Special Interest Group on CD-ROM Applications and Technology (SIGCAT)

US Department of Education OERI
Technology Resources Center

What is the Technology Resources Center?

- The Center is a demonstration site for the application of technology to all levels of Education.
- Introduction to new technology. Examination of new programs and new products.
- Lectures and demonstrations designed for specific needs.

Demonstrations of:

- Satellite downlink and US ED "Star Schools" programs.
- Interactive videodisks on: AIDS, Art Galleries, Geography, History, Math, Music, Science, Social Studies, and World Affairs.
- CD ROM discs including: Compton's, Grolier, Encarta and World Book encyclopedias, Art, Books in print, Children's stories, Current events, Federal grants locator, Foreign languages, Graphics, History, Medical data, and Reference tools.
- Philips CD I and Kodak Photo CD
- IBM EduQuest MultiMedia system, DOS 5.0 and Windows 3.1
- Macintosh System 7, HyperCard, Quick Time, and Video capture board. Apple IIE and Apple II GS.
- Software on display is made available by vendors and/or is chosen from programs listed by ASCD's, "Only the Best" and EPIE, "The Educational Software Selector Guide."

Visitors To The Technology Resources Center

- Classroom teachers use our software library to see what is new, or to research how various programs teach the same subject. The Center is a convenient and immediate source of demonstration for a wide variety of primary and secondary school subjects.
- Education administrators, supervisors, and national leaders visit the Center. We are able to provide them with a personalized demonstration of computers, videodisk, and CD ROM. While many are aware of some of this technology, few have had a chance to have hands-on contact with specific products.
- Foreign visitors from over 75 different countries have come to see the Center. Visitors have come individually or as class size groups. Many have unique and specialized problems, and all are concerned with teacher training.
- Program developers and hardware vendors demonstrate their new products and materials. The Center, through regular meetings and demonstrations, has become a place for developers and educators to meet each other and exchange ideas.
- Directors of educational institutions use the facility to look at various configurations of hardware so that they may make their own decisions on equipment.
- Other Government Agencies come to see specific software and new technologies. The Center has a large collection of CD ROM discs produced by or for government agencies.

Equipment demonstrated in the Center is on loan from vendors. The Technology Resources Center does not recommend, evaluate, endorse, or loan products. The Center is open daily from 9:00 AM to 4:00 PM. Appointments are requested. Phone 202 219 1699 or fax 202 219 1696. Presentations can be customized to individual or group needs. The Center is located within the Education Research Library, at Capitol Place, 80 F Street, NW., two blocks from Metro at Union Station. The mailing address is: Technology Resources Center 555 New Jersey Ave N. W., Washington, D.C. 20208 -5725

CD-ROM INFORMATION RESOURCES CENTER (CIRC) QUESTIONNAIRE

SIGCAT is in the process of establishing a CD-ROM Information Resources Center (CIRC). This facility, which will be co-located in Reston with the SIGCAT Technical Educational Center, will provide members of the CIRC with the opportunity to evaluate hardware and software products. The concept of the CIRC emerged from the apparent need for a single, organized environment in which the many CD-ROM products now available could be assessed.

Our initial focus will be on authoring software. Those who join the CIRC as users will have the opportunity to access these products on a network. In addition, the CIRC will contain a wide variety of CD-ROM reference discs produced by the federal government and private publishers, which users can evaluate. Members would visit the CIRC by appointment. An **Individual Membership** would provide 10 hours on the network; a **Group Membership**, appropriate for government and private organizations, would provide 125 hours of network time; and a **Consulting Membership** would provide 600 hours of network time. Each level of membership would include additional time on a standalone machine to use the evaluation discs and unlimited time using such resources as trade publications and other reference materials.

Please return the questionnaire to Jerry McFaul during one of our breaks, or, if more convenient, mail to SIGCAT, P.O. Box 3706, Reston, VA 22090. We appreciate your taking the time to provide your response to the CIRC, and we welcome your suggestions.

I would be interested in (please check one):

- ☐ Individual Membership (\$75)
- ☐ Group Membership (\$500)
- ☐ Consulting Membership (\$1200)

Name _____ Title _____

Address _____

City _____ State _____ Zip _____ Phone _____

Comments _____

Appendix E. EPA NPR Initiative: 3% for Training

**NPR
INITIATIVE:**

3% FOR TRAINING



SUBMITTED SEPTEMBER, 1994

by:

**Julie Bartenstein
Patty Bettencourt
Lori Inglis
Julius Jimeno
Zandra Kern
Judy King
Delia Scott
Dwight Welch
Barbara White
Richard White
Steve Vineski, Facilitator**

NPR INITIATIVE: 3% FOR TRAINING

Introduction -- The NPR Recommendation

In December of 1993, the EPA National Performance Review Steering Committee issued its report with 52 recommendations. Recommendation #10 called for the Agency to devote the equivalent of 3% of PC&B to training and professional development. The Steering Committee directed OARM, and OHRM in turn, to develop recommendations for implementation. A workgroup was formed which is composed of representatives from the regions, AFGE, NFFE, program offices, and OARM, with expertise in budget and finance, workforce development, and learning systems. This report represents the findings and recommendations of the workgroup.

The 3% goal for training was referred to in two different NPR reports: explicitly recommended in the Management and Executive Development Report, and implicitly in the Workforce Capacity Report. The intent of the NPR workgroups was to increase, from a static base, the amount of money spent on training and development, not to raise the base by changing the accounting mechanism. The goal refers only to in-service employee training and development, not to the training and education we do for the States, for industry, or community outreach via contracts and grants.

The SLC accepted the recommendation of the Management and Executive Development Workgroup for implementation, but broadened it to include training and development for all employees, not only managers and supervisors.

Background and History of "3%"

What does "3% for training" mean?

A standard industry measure for employee training investment is stated as percentage of payroll. A goal of "3%" is calculated by totaling organizational costs for personnel compensation and benefits and multiplying by three percent. Common corporate practice measures progress towards this goal by accounting for only direct training costs. Indirect costs, such as employee salaries while taking training, are not normally included. If salaries are included, the goal doubles.

Three percent of actual expenditures on employee training is considered a corporate minimum for workforce capacity investment. For example, Texas Instruments spends 3.5%; General Motors spends 5%; Xerox and IBM spend up to 10% of their payroll equivalent.

History of Three Percent at EPA

The EPA Institute has been tracking Agency-wide expenditures for training since FY 1990, using the IFMS and ten training-related object classes.

The FY 1992 budget call letter, issued in 1990, required each AA and RA to address the "Agency-wide goal of 3% of PC&B costs for training and development." The goal applied to "...T&D expenses for all supervisory and non-supervisory EPA staff and includes, but is not limited to, in-house training, mandatory training, commercial and University training, participation in professional organizations, developmental programs and details, and travel related thereto."

The "3% for training" language in the budget call letter made no significant difference in the rate of expenditures, using the same object class measures in FY's 91, 92, and 93. The Agency consistently spends about 1% of PC&B for training and development. This amounts to a little over \$10 million across all AA's and Regions. Based on the FY 1994 budget, a three-percent goal means \$30 million spent on EPA workforce development and training.

Current State of Training Investment at EPA

Management of Training Process

Our culture views training as a cost rather than an investment, and that is manifested in the way we spend our money. Currently, our training and development budgets are an afterthought and are dependent on what was budgeted in the prior year, or what is "left over" at the end of the fiscal year. Virtually all training expenditures are top-down (not cross-organizational), with accountability residing with immediate supervisors. Systems are not in place to fund Agency priorities or cross-organizational needs. Workforce development costs are neither strategically planned, nor are there any accountability systems in place to ensure effective spending. Even statutorily mandated training, such as Health and Safety, is not fully supported. Agency requirements for training in contracts or supervisory/management are not completely met.

Delivery of Training

Virtually all training which we develop or attend in this Agency is for the classroom. We have over-used the Train-the-trainer model to the point of exhausting the system, and diminishing the quality. We send people out to training vendors for cost- and time-intensive classroom experience, but do not measure or reinforce behavioral change. Though according to the literature, return on training investment is both possible and

practical to calculate accurately, we do not have any systems in place to examine long-range effectiveness.

Training data

Very little training data is available or collected. There is no central data collection system, other than IFMS, which can only collect cost data by training object class codes. There is no current system which can collect data about what training money is spent on and how effective that training is. Headquarters programs and Regions collect different data differently, using dissimilar definitions and a variety of tracking software.

ORD Case Study

Our study of ORD's training expenditures is a clear example of the current state of training data at EPA. In order to capture training expense data, a central call letter, including a format for data collection, went out from the program management office to all ORD program operations offices. It took close to 6 months to get all responses back and data aggregated. All information had to be collected manually. Depending upon definitions of "training expense", ORD spends either 1% (IFMS data); 2% (including travel and training-related contracts, interagency and cooperative agreements); 3% (including salaries for in-house or internal training initiatives) or 5% (including employee salaries while engaged in training activities). The report provided ORD with a better picture of their development expenses.

Obstacles to Implementation

Currently, we view the following as obstacles to full implementation of the 3% recommendations:

Administrative ceiling and conflicting mandates -- training locations must compete against a myriad of other expense needs; existing commitments (e.g. OIRM) predetermine some expenditures and reduce spending discretion.

The Agency sends a mixed message about the value and support for training and development. For example, each new initiative is accompanied by a training requirement, but unaccompanied by resources needed to ensure adequate learning.

The budgetary distinction between "administrative" and "programmatic", as applied to training, works against building the competencies required by reinvention (e.g. team skills, engineering, customer service skills, etc.)

Continually changing priorities diminish the likelihood of long term commitment to competency building.

Sired State for Training Investment at EPA

Our vision for the future is that organizations, groups, and self-directed individuals are responsible for meeting both organizational and individual development needs within a strategic framework. Whatever the amount of money spent (e.g., 3%, 10%), it is important that it is focused and targeted to build the capacity of our workforce to carry out the strategic mission of the Agency. Our recommendations focus on better management of the training planning process, better delivery of a training product, and better data to account for our efforts.

Better Management--Align Training with Strategic Direction

We need to develop a system to translate our strategic plans and program budgets into developing the capacity of our workforce--the only means through which our work is done. When budgets are formulated for programs and Regions two years in advance, workforce development needs must be reflected in the planning. In order to better focus our diminishing financial and human resources, we need to invest in the future skills of our workforce. Senior executives must routinely link workforce capacity with organizational goals; they must continually assess development needs, and reflect this in their planning and budgeting processes.

The National Human Resources Council has endorsed a "Framework for Workforce Training and Career Development". It is a comprehensive model, addressing virtually all of the 3% Workgroup's general suggestions, in far greater detail, for more targeted spending (addressing a more inclusive IDP process, organizational as well as individual needs, national as well as local needs, and mandatory training requirements).

Better Delivery--Focus on Results

We need a transformation in training delivery. Effective delivery of our 3% requires reengineering our training development and delivery to produce better, more effective, learning programs for the workforce; lower the overall cost to the Agency; and better meet our customer's learning needs. We need to look to technology-based delivery to lower cost, speed delivery, and improve access. We need to create an easy and effective mechanism for feedback on, and evaluation of, learning experiences and develop longer term evaluation systems which link investment to behavioral change.

Technology based delivery is an important part of both reducing our cost and more effectively helping our employees learn. People generally underestimate the cost of classroom training (as pointed out by ORD data). Only "known" costs are accounted for, not hidden costs. IFMS reports known costs: development, instructors, classrooms, supplies and materials,

equipment, instructor's travel and per diem. Indirect or hidden costs include learners' travel and per diem, learners' time away from job, costs of lost productivity when training is delayed. Hidden costs, especially for a large, geographically dispersed audience or a training with a long lifecycle, are frequently an order of magnitude above the known cost.

The benefits of technology-based training are manifold: on-demand, on demand; responsive to a variety of learning styles; reduced training time -- typically by 40%; higher retention rates typically 25% greater.

Better Data--Information Helps Decisionmaking

Cost of training is a significant dimension in assessing training and development investment, but it is not by itself a measure of training effectiveness. There are several other key indicators which, when viewed holistically, reflect on the state of "health" in an organization: time spent in training, whether at or no-cost; people trained, by series and job type; type of training, an appropriate mix of technical and general; mission competencies, the skills our workforce needs to accomplish Agency goals. Our current data systems do not collect this kind of information, nor even complete training cost information in a useful way.

RECOMMENDATIONS for IMPLEMENTATION

DEFINITION OF INVESTMENTS INCLUDED IN 3%

All direct costs for training and development should be included in calculations towards the 3% goal, for example, tuition, books, travel, technology-based courseware, training videos, etc. Indirect costs, such as salaries and administrative overhead, are not to be included.

MANAGEMENT OF THE PROCESS

Conduct workforce strategic planning beginning with the FY97 budget process -- senior executives must strategically link workforce capacity with organizational goals by assessing competency requirements and development needs, and reflecting this in their planning and budgeting processes.

The required March 1995 streamlining plans from all AA's and SAs should include a 3% spending proposal for workforce and organization development.

All new initiatives, programs, or priorities must include a human resources impact plan and the budgeted resources to meet the competency development needs of the workforce.

The Comptroller should include training and development and associated travel targets in the budget process for each budget cycle and include this as a requirement in the Agency's technical budget letter.

We endorse the National Human Resources Council's "Framework for Workforce Training and Career Development" as a model for more targeted spending.

We recommend specific training and development "set-asides" in some or all of the following areas:

- Set-asides at the AA and RA level for all four quadrants of the Framework (mentioned above).
- Set-asides at the AA/RA level with accountability for expending dollars solely with the organization's line managers.
- Set-asides (other than top-down) for "recognized" cross-cutting or special focus Agency groups for specialized career development (e.g., Secretarial and Administrative Support Advisory Council, Women in Science and Engineering, unions, special Presidential or Administrator initiatives).

Increase the Agency's Professional Training Fund by 300% to be used for building an Agency-wide learning "infrastructure" (e.g., learning, information, and performance support systems; development of computer-based learning programs; competency-based models for learning; etc.).

AFTER DELIVERY OF THE PRODUCT

Reengineer our training development and delivery to produce more effective learning programs for EPA's workforce.

Emphasize technology-based delivery for learning which lowers cost, speeds delivery, improves access, and increases retention.

Minimize the focus on the classroom for training design and delivery, as the costs are enormous, and generally underestimated.

Create an easy and effective mechanism for feedback on, and evaluation of, learning experiences. Also, longer term evaluation systems which link investment to behavioral change.

AFTER DATA COLLECTION

Establish a data base system to better aggregate training data, with agreed upon standards, definitions, and reporting methods.

Expand budget sub-object classes to better capture "type" of training.

Revise Agency forms to better collect data (e.g., travel for training, simpler or automated training forms, etc.)

Compare actual training expenditures, by AA and RA, with strategic budget plan for training.

Conduct pilot study to obtain clear data and a better picture of how and where development dollars are spent.

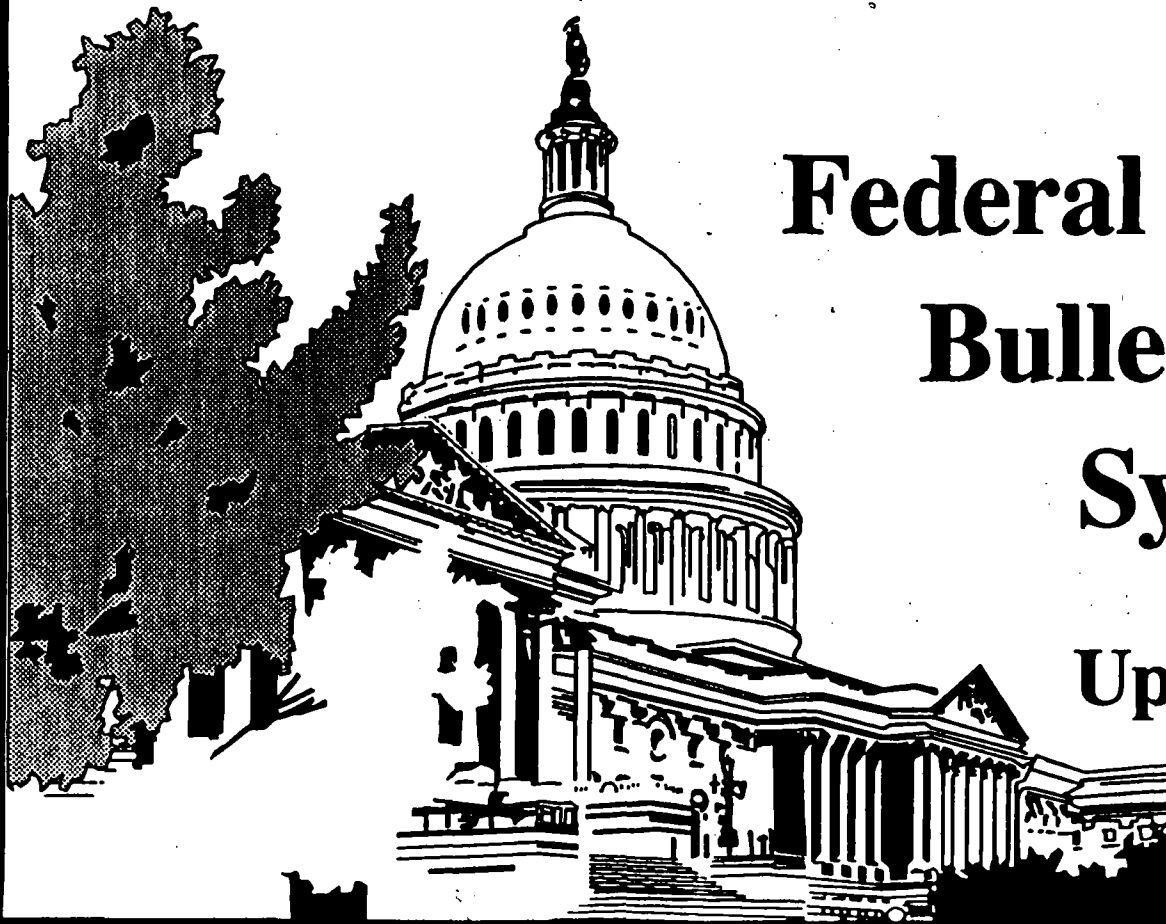
Appendix F. Interagency Resource Sharing Panel - Federal
Government Bulletin Board Systems

Interagency Resource Sharing Panel



Federal Government Bulletin Board Systems

Updated: October 1994



Agricultural Library	Agricultural Library Forum	301-504-6510; 301-504-	9,600; 2,400	301-504-5113	Public	Public
Agriculture Department	Biological Assessment	703-1-624-2723	2,400; 2,400	703-231-3747	Public	Public
Agriculture Department	Commercial Information Delivery Service	Must subscribe	9,600; 2,400	202-720-5505	Public	Public
Agriculture Department	Economic Research Service	800-821-8229	9,600	202-219-304	Public	Public
Agriculture Department	Human Nutrition Information Service	301-436-5076	2,400	301-436-8491	Public	Public
Air Force	Air Force Small Business BBS	800-636-8369 type SIGNUP	2,400	800-636-9636	Contractors (fee)	Contractors (fee)
Air Force	Small Computer Support Center	406-731-2503	9,600	406-731-4612	Public	Public
Air Force Engineering Installation	ULANA BBS	405-736-0926	2,400	405-734-9926	Air Force, DLA	Air Force, DLA
Air Force Engineering Installation	ULANA II	405-741-0824	9,600	405-734-9926	Contractors	Contractors
Air Force Space Command	Competition Advocate	Call voice first	2,400	719-554-5325	Public	Public
Air Force Standard Systems Center	Standard Systems Center	205-416-5651	9,600	205-416-5771	Public	Public
Argonne National Laboratory	Newton	708-252-8241	9,600	708-252-6941	Public	Public
Army	Integration & Analysis Center (IMA)	703-285-6400; 6401	9,600	703-285-6105	Public	Public
Army Corps of Engineers	Automated Specification Criteria	916-557-7997; 800-445-8844	9,600; 2,400	916-557-7870	Public	Public
Army Engineering and Housing Support Center	Data Distribution System	703-355-2185	9,600	703-355-0073	Army	Army
Army District of Washington	Morale, Welfare and Recreation	202-475-7543	2,400	202-475-2513	Public	Public
Army Software Center	Software Engineering Support BBS	703-285-8637	2,400	703-285-9654	Public	Public
Bureau of Mines	Mines-Data	202-501-0373	9,600	202-501-0406	Public	Public
Bureau of Prisons	Office of Information Systems	202-514-6102	9,600	202-307-3104	Federal employees	Federal employees
Census Bureau	Census BEA Electronic Forum	301-763-7554	9,600	301-763-1580	Public	Public
Census Bureau	Census Personnel BBS	301-763-4574	2,400	301-763-4951	Public	Public
Coast Guard	Coast Guard On-Line Magazine & News	202-267-3644	9,600	202-267-0926	Public	Public
Coast Guard	Global Positioning System BBS	703-666-3894; 703-313-5910	9,600; 2,400	703-313-5900	Public	Public
Commerce Dept. - NTIA	NTIA/NII BBS	202-482-1199	14,400	202-482-3999	Public	Public
Commerce Dept. - Office of Business Analysis	Economic Bulletin Board	202-482-3870; 202-482-2584	2,400; 9,600	202-482-1986	Public (fee)	Public (fee)
Commerce Dept. - Office of Planning & Budget	Planning and Budget BBS	202-482-1423	2,400	202-482-2949	Public	Public
Customs Service	Customs Electronic BBS	703-440-6155	9,600	703-440-6236	Public	Public
DC Government	DC Government Information	202-727-6668	2,400			
Defense Department	Ada Information Clearinghouse	703-614-0215	2,400	703-665-1427	Public	Public
Defense Department	Export License I	703-697-6109	2,400	703-693-1097	Public	Public
Defense Information Systems Agency	DISA Acquisition BBS	618-256-9200	9,600	618-256-9380	Public	Public
Defense Information Systems Agency	Information Technology Acquisition	618-744-8767	9,600	618-256-9691	Public	Public
Defense Logistics Agency	DASC-ZE BBS	703-274-5863	2,400	703-617-0452	Public	Public
Defense Mapping Agency	Navifonet	301-227-4424	9,600	301-227-3296	Public	Public
Defense Technology Security Administration	Eisa I	703-697-6109	2,400	703-693-1096	Exporters	Exporters
Department of State	Passport Info/Travel Alerts	202-647-9225	9,600			
Education Department	ED Board	202-260-9950	2,400; 9,600	202-706-6775	Public	Public
Education Department	Educational Research and Improvement	202-219-2011	2,400	202-219-2012		
Education Department	Able Inform	301-589-3563	2,400	301-589-3563	Public	Public
Education Office of Research and Improvement	National Education BBS	800-222-4922; 202-219-1511	2,400; 2,400	202-219-1526	Public	Public
Energy Department	Megawatts	202-586-0739	9,600	Leave message on	Public	Public
Energy Department	Civilian Radioactive Waste Mgmt. Intolink	Call voice first	9,600	800-225-6972	Public	Public
Energy Information Administration	BA BBS	202-586-2557	2,400	202-586-8800	Public	Public
Energy Office of Fossil Energy	FE Telenews	202-586-6496	9,600	202-586-6503	Public	Public
Energy Office of Minority Economic Impact	Minority Impact BBS	800-543-2325; 202-586-1561	9,600	202-586-7696	Public	Public
Environmental Protection Agency	EPA Region 4	404-347-1767	2,400	404-347-3633	Public	Public
Environmental Protection Agency (ATTIC)	Alternative Treatment Tech Info Center	703-906-2136	9,600; 14,400	703-906-2137	Public	Public
Environmental Protection Agency	Wetlands, Oceans & Watersheds	301-589-0205	9,600	301-589-5318	Public	Public
Environmental Protection Agency	Pesticide Information Network	703-305-5919	2,400	703-305-7499	Public	Public
Environmental Protection Agency	Pollution Prevention BBS	703-506-1025	2,400; 2,400	703-821-4800	Public	Public
Environmental Protection Agency	Research and Development BBS	513-569-7610; 800-256-6805	9,600	513-569-7272	Public	Public
Environmental Protection Agency	Technology Transfer Network	919-541-1447; 919-541-5742	9,600; 2,400	919-541-5384	Public	Public
Environmental Protection Agency	Cleanup Information	301-589-8366	2,400	301-589-8366	Public	Public
Environmental Protection Agency and SWANA	Solid Waste Management	800-544-1936	2,400	800-624-8301	Public	Public
Environmental Protection Agency and NOAA	Gulfline	800-235-4662; 601-668-2677	9,600; 9,600	601-668-1065	Public	Public
EPA Ocean & Coastal Protection Division	CoastNet	202-260-8462	2,400	202-260-9082	Call for user ID	Call for user ID
Export-Import Bank	Eximbank BBS	202-566-4699	9,600	202-566-4490	Public (fee)	Public (fee)
Federal Aviation Administration	Air Traffic Operations Service	202-267-5331	2,400	202-267-9229	Public	Public
Federal Aviation Administration	Air Transport Division	202-267-5231	2,400	202-267-3764	Public	Public
Federal Aviation Administration	FAA Airports	202-267-5205	14,400 (2 nodes)	202-267-7699	Public	Public
Federal Aviation Administration	FAA Headquarters BBS	202-267-5097	9,600	202-267-3332	Public	Public
Federal Aviation Administration	Navigation and Landing	202-627-6547	2,400	202-267-6543	Public	Public
Federal Aviation Administration	FAA Office of Environment & Energy	202-267-9847	9,600	202-267-3359	Public	Public
Federal Aviation Administration	FAA Safety Exchange	800-426-3814	2,400	816-426-3560	Public	Public
Federal Aviation Administration	Orlando Flight Service District Office	407-648-6309	9,600	407-648-6640	Public	Public
Federal Aviation Administration	Pilot Examiner	405-684-4530; 405-664-4630	2,400	405-664-4753	Public	Public

Aviation Administration	Portland	Minimum Equipment List	207-780-3267	9,600	207-780-3263	Public	Minimum equipment list
Jeral Communications Comn	15 Link	FCC daily digest & carrier stats/reports	202--1361	14,000	202-418-0940	Public	Carrier statistics, daily digest
Jeral Communications Commission		Public Access Link	301-725-1072	1,200	301-725-1	Vendors	FCC license applications
I Deficit Reduction		Report US Government waste fraud & abuse	202-225-5527				
Jeral Emergency Management Agency		Hazardous Materials	706-972-3275	2,400	800-752-6367	Public	Emergency response planning
I Emergency Management Agency		State/Local Emergency Mgmt.	202-646-2887	9,600	202-646-3158	Public	Emergency response
I Energy Regulatory Commission		Commission Issuance Posting System	202-208-1367	9,600; 2,400	202-208-2474	Public	Commission agenda, filings, findings
Jeral Government		Govt Printing Office & Files distribution	202-512-1367	9,600			
I Highway Administration		FEEBS	202-366-3764	9,600	202-366-9022	Public	FHWA programs, tech support
I Information Exchange		FEDIX	800-232-4878; 301-258-0953	2,400; 2,400	301-975-0103	Public	Research, educational opportunities
Jeral ve Bank of Dallas		Federal Reserve Economic Data	214-922-5199	9,600	214-922-5173	Public	Banking, regional economic data
I re Bank of Minneapolis		Electronic Database	612-340-2489	2,400	612-340-2443	Public	Banking, regional economic data
Jeral re Bank of St. Louis		Federal Reserve Economic Data	314-621-1824	2,400	314-444-8582	Public	Banking, interests rates
I Supply Service		Automated Product Listing Service	703-305-6570	9,600	703-305-6023	Public	Federal Supply Schedule products
h and) Service		National Ecology Research Center	303-226-9365	2,400	303-226-9335	Public	Habitat simulation programs
od and Drug Administration		PMA, IDE, 510K & guidance documents					
od and Drug Administration		Devices and Radiological Health	301-443-7466	2,400	301-443-7003	Public	Meetings, research
ological Survey		Quick Epicenter Determination	800-358-2663	1,200	303-236-1500	Public	Seismological and geomagnetic data
ological Survey		Geological Survey BBS/CD-ROM Info	703-648-4168	9,600	703-648-7300	Public	CD-ROM technology
overnment Printing Office		Federal Bulletin Board	202-812-1367	9,600	202-512-1530	Public (fee)	Government publications
S		Global positioning	703-866-3890	9,600			
A		Cooperative Administrative Support Program	202-653-7516	9,600	202-653-7000	Public	Administrative support
A		Consumer Information Center	202-206-7679	9,600	202-501-1794	Public	Consumer information catalog
A Federal Supply Service		Mititase File for Interagency News	202-205-3890	9,600	703-305-7200	Government	Surplus property, requisitions
A IRM Service		GSA Schedule BBS	202-601-7254	9,600	202-501-1404	Public	GSA schedule contracts
A Office of IRM		OFIRM	202-206-7484	9,600	202-501-4409	Public	Governmentwide contracts
ad Start Online-BBS		Head Start Online BBS (Region III)					
alth and Human Services		Health Care Financing ADM	410-597-3351	9,600	410-597-5215	Public	Medicare and Medicaid
alth and Human Services		Administration for Children and Families	202-401-5800	2,400	202-401-5682	Public	Administrative support
alth and Human Services		National Institute on Alcohol Abuse	202-289-4112	2,400	202-289-2992	Public	Alcohol use statistics
alth and Human Services		Office of the Assistant Secretary of Health	202-690-5423	2,400	202-690-6248	Public	AIDS-related reports
alth and Human Services		FDA Center for Radiological Health	301-443-7466		301-443-7004	Public	Procedures for medical devices
use of Representatives		Federal Deficit Reduction (Whistleblower)	202-225-5527	2,400	202-225-3471	Public	Federal waste, fraud and abuse
using Urban Development		HUD News & Events BB. Press Releases	202-706-3563	9,600			
Nutrition Information Service		Nutrient Data Bank	301-436-5078	2,400	301-436-6491	Public	Food composition
lian) Service		IHS Division of Environmental Health	301-443-9517	2,400	301-443-1046	Public	Environmental health
rior Department		Geological Survey	703-648-4168	9,600	703-648-7300	Public	Mapping & earth science information
rior Department		Office of Environmental Affairs	202-206-7119	2,400	202-206-6304	Public	Environmental reports
rior Di ment		Offshore Statistics & Information	703-787-1225	9,600	703-787-1043	Public	Offshore oil and gas data
rmal Revenue Service		ISM Support Information System	202-219-9977	9,600	202-501-5173	Public	Microcomputer support
rmal Revenue Service		Statistics of Income Division	202-874-9574	9,600	202-874-0408	Public	Tax return statistics
3 ineburg Computer Center		Information Reporting Project	304-263-2749	9,600	304-263-8700	Public	Electronic filing
stice Department		Amer. With Disabilities Act Info					
stice Office of Justice Programs		Criminal Justice Reference Service	301-736-8895	2,400	301-251-5269	Public	Civil rights enforcement
por Department		Board of Wage & Service Contract Appeal					
por Department		Labor News	202-219-4784	9,600	202-219-7343	Public	Consumer price index, earnings reports
por Office of Public Affairs		Labor News	202-523-4784	2,400	202-523-7343	Public	Consumer Price Index, earnings reports
rary of Congress		Library of Congress News Service	202-707-3854	2,400	703-385-8631	Public	Exhibit news, jobs
rary of Congress		Automated Library Information	202-707-4886	2,400	202-707-4800	Public	Federal agency libraries
PO		AIDS Information & Reports	202-690-5423	9,600			
SA/Goddard		The NASA NODIS Locator System					
SA Marshall Space Flight Center		NASA SpaceLink	205-895-0028	2,400	205-544-6360	Public	Scientific and educational programs
ional Archives (FREND #1)		Fed. Register Electronic News Delivery	202-275-0920	2,400	202-523-3447	Public	Federal register on line
ional Archives (FREND #2)		Fed. Register Electronic News Delivery					
ional Institute of Dental Research Online		National Institute of Dental Research					
ional Institute of Standards and Technology		Building Fire Research	301-990-2272	2,400	301-975-6662	Public	Fire simulation programs
ional Institute of Standards and Technology		Computer Security BBS	301-948-5140; 301-948-5717	9,600; 2,400	301-975-3359	Public	Emergency response team advisories
ional Institute of Standards and Technology		Data Management Information	301-948-2059; 301-948-2048	1,200; 1,200	301-975-3272	Public	Data standards reports
ional Institute of Standards and Technology		Automated Computer Time	303-494-4774	1,200	303-497-3261	Public	Synchronizes computer clocks
ional Institute of Standards and Technology		North American ISDN Users Forum	301-869-7261	2,400	301-975-2837	Public	ISDN activities
ional Institutes of Health		Information Center BBS	301-480-5144; 800-644-2271	14,400	301-486-6610	Public	Health information
ional Institutes of Health		National Institute of Health Grant Line					
ional Institutes of Health		PC Bull	301-480-8400	2,400	301-486-2262	Agency	Microcomputers
ional Oceanic and Atmosphenc Administration		Space Environment Lab	303-497-9299	2,400	303-497-3997	Public	Geomagnetic and solar forecasts
ional Oceanic and Atmosphenc Administration		Marine Data Computer	301-713-4673	9,600	301-713-2653	Public	Marine information
ional Oceanic and Atmosphenc Administration		Environmental Services Data Directory	703-606-4888	9,600	202-606-2012	Public	Environmental sciences
ional Oceanic and Atmosphenc Administration		NOAA Library	303-497-3848	2,400	303-497-3271	Public	Shareware, public-domain software

Agency	BBS	U	A	Speed	Voice	Ac	Note
ational Oceanic and Atmospheric Administration	Bibliographic Catalog	301-713-4544; 800-352-7281		9,600	301-713-2600	Public	Note User ID = ANSI
ational Science Foundation	National Science Foundation	202-634-1764		2,400			
ational Technical Information Service	FedWorld	Telenet fedworld.gov ; 703-321-8029		9,600	703-487-4608	Public	Gov't Info/Gateway
ational Tele. & Info Admin.	NTIA/NIJ	202-482-1199		14,400	202-482-3999	Public	Telecomm/NIJ
ational Weather Service	Climate Dial-Up Service	301-899-0827		2,400	301-763-4670	Public (fee)	Worldwide climate conditions
aval Computer and Telecommunications Station	Navy IRM College Recruitment BBS	804-445-2104; 804-643-4093		9,600; 38.4K	804-444-8487	Public	Entry-level IRM employment
aval Computer and Telecommunications Station	Online Automated System	804-445-1627		2,400	804-444-8487	Government	Micro contracts, DOD software
aval Computer and Telecommunications Station	ADA Technical Support BBS	804-444-7841		2,400	804-444-1231	Public	Ada technical assistance
aval Gun Weapon System BBS	Naval Gun Weapon System						
aval Research Force HQ	Naval Reserve Force BBS	504-254-7776		2,400	504-254-7947	Government	Reserve force training
avy Marine Corps Appellate Review	JAGnet	703-325-0748		2,400	202-325-2924	Public	Microcomputers
avy	NAVAIRES Alameda						
avy	Naval Health Sci Edu & Training Command						
avy	NAVCOMTELSTA Washington DC						
avy	Nav Computer & Telecom Station						
avy BUPERS Access	Navy Personnel Information						
ice of Government Ethics BBS	Office of Government Ethics	202-523-1186		9,600			
ice of Personnel Management - WASHNET	Government Groups and Organizations	202-606-1113; Call voice/password		2,400	202-606-1848	Government	SES openings, weekly job updates
ice of Personnel Management - WASHNET	Mainstreet	202-606-4800		2,400	202-376-3747	Public	Weekly federal job openings
ice of Personnel Management	Federal Quality Institute	301-937-0722		2,400	800-766-8737	Government	Total quality management
ice of Personnel Management	Policy Operations and Staffing BBS	912-757-3100		9,600; 2,400	202-606-0960	Government	Policies
ice of Personnel Management/Corpus Christi, TX	Federal Jobs	512-850-8255		9,600	512-850-8905	Public	Jobs
ice of Personnel Management/Dallas, TX	Federal Jobs	214-767-0565		9,600	214-767-0310	Public	Jobs
ice of Personnel Management/Detroit, MI	Midwest FederalJobs	313-226-4423		2,400	313-226-2095	Public	Jobs
ice of Personnel Management/Macon, GA	Midwest FederalJobs	912-757-3100		2,400	912-744-2139	Public	Jobs
iyPerNet #1	Fed. Pay & Performance Management BBS						
iyPerNet #2	Fed. Pay & Performance Management						
ess Release-Online	Some Cong. Committee Press Release						
ience & Technology Information System	Science & Technology Information System	202-357-0359		9,600			
nall Business Administration: SBA ONLINE	SBA BBS DC Metro Full Service	202-401-9800		9,600	202-205-6400	Public	Small Business Information
nall Business Administration: SBA ONLINE	SBA BBS 800 Limited Service	800-697-INFO		9,600	202-205-6400	Public	Small Bus. Info. (No Mail/Gateway)
nall Business Administration: SBA ONLINE	SBA BBS 800 Full Service	900-463-INFO		9,600	202-205-6400	Public	Small Business Information
nall Business Administration	Small Business Admin. Internal BBS	202-205-6269		9,600	202-205-6400	Government	Small Business Information
ate Department	Automated License Status System	703-875-7350			703-875-7391	Public	Monitoring of export license applications
ate Department	Consular Affairs	202-647-9225		1,200	202-647-1488	Public	Passport Info, Travel alerts
ate Department	Federal Bulletin Board	202-512-1387		2,400; 9,600	202-647-6681	Public	Foreign Affairs
ate Department	PerManNet	703-715-9806		9,600	703-715-8632	Public	International Affairs
asury Financial Management Service	FMS Inventory Line	202-287-0767		2,400	202-874-7115	Government	Financial rates
asury Financial Management Service	Surety Bond Circular 570	202-287-1295; 202-874-7214		2,400	202-874-6850	Government	Federal bond approvals
S. Courts/4th Circuit Court of Appeals	Access to Court Records	804-771-8084		2,400	202-633-6393	Public	Cases, court dockets
S. Courts/6th Circuit Court of Appeals	Appellate Court Electronic Services	513-684-2842		2,400	202-633-6393	Public	Opinions, oral argument calendars
S. Courts/7th Circuit Court of Appeals	Access to Court Records	312-435-5560		9,600	312-453-5584	Public	Cases, court documents
S. Courts/9th Circuit Court of Appeals	Electronic Opinions	415-744-9022		9,600	415-744-9530	Public	Court opinions
S. Department of Transportation	The MARlinespike BBS	202-366-8505		9,600; 14,400	202-366-5534	Public	Maritime Admin. U.S. - Flag Shipping
S. Department of Transportation	"IRMA" BBS	202-366-3373		9,600; 14,400	202-366-5534	Public	U.S. DOT, Office of the Sec., IRM
iterans Affairs Information Technology Center	Information Technology Center BBS	202-523-7339		9,600	202-535-8923	Government	Shareware
iterans Affairs Department/Regional Offices	Foreclosed Property	Call voice			202-233-2741	Public	Lists property foreclosures
iterans Affairs	Vendor BBS	1-800-735-5282		9,600	202-633-7320	Public	R.F.P.S.

for modifications or updates, please contact (202) 205-6400 or (202) 205-6241.

Appendix G. Contributors