Remarks by Henry Kelly, White House Office of Science and Technology Policy to the Kickoff Meeting of the Advanced Distributed Learning Initiative

November 3, 1997

I want to thank all of you for coming here today on what we in the administration feel is one of the most critical ventures of our time: finding a way to provide Americans the intellectual tools they will need to prevail, indeed to survive in the 21st century.

An ability to learn, and learn quickly must be at the center of any strategy for capturing the extraordinary opportunities provided technologies, for prospering in a highly competitive world economy, and for maintaining the nation's security. Businesses now clearly recognize that investing in the skills of their people is if anything more important than the investments they are making in new products and production systems. Investment in training is central to government strategies for sustaining military superiority and providing civilian services quickly and efficiently.

The future of our economy is perhaps seen most vividly in the exploding new industries of the information age. It's been 26 years since the invention of the semiconductor, the density of components on a unit area of a computer chip has doubled every 18 months during this entire period. Nothing comparable in the history of technology. It's as if we went directly from Newcomb's first experiment with steam engines to high-bypass jet engines in 25 years instead of 250. What's even more impressive is that the doubling rate hasn't slowed and we're likely to continue on this roller coaster for at least another dozen years.

Many major firms report that more than half their sales come from products that didn't exist 18 months. This means marketers, maintenance, designers, production workers all working on product lines and services which they didn't know about two years earlier. Increasing international trade and domestic deregulation have exposed virtually every business in America to intense competition and created intense pressures to innovate and change..

Similar problems are faced by our Armed Forces. New, complex equipment is appearing throughout our defense systems. The capabilities of these new systems, and new strategies built around these capabilities, must be mastered quickly. The end of the Cold War has also meant that the objectives of the military have become much more complex and uncertain. Our forces find themselves forced to cope with actions in any part of the world, often with little notice. And the nature of these operations can range from major combat conditions in the gulf to peacekeeping in Bosnia to humanitarian missions in Haiti.

What this means, of course, is that the skills of people throughout our economy must be continuously upgraded. Kelly's law is that as soon as something starts working right, as soon as you figured out how to work it,

the system is upgraded.

Virtually no one is exempt. People who formerly were in "backroom office" jobs are now working on networked computers taking orders and dealing with problems directly affecting the performance of the firm. People on the production line are forced to cope with constant upgrades of products and manufacturing processes. Nurses, vehicle operators, soldiers, sailors, and advertisers are as likely to have a computer at their side as traditional tools of the trade.

It's no exaggeration to say that both economic and military advantage now goes to the companies and the nations best able to convert new ideas into business and military opportunities. The rewards will go to those who learn the fastest -- as institutions and as individuals -- and to those who learn most effectively.

But there are clear signs that we have a problem. There is a widening gap between the skills Americans need to participate in an economy which depends increasingly on new technology and the ability of our education and training system to deliver the services required. For example"

- Between 1992 and 2000 89 percent of the new jobs created in the US will require more than high school levels of literacy and math skills. But only half the people entering the work force are prepared for these high-paying jobs, even though about 80 percent of them are high school graduates. Fully 40% of Americans can't read independently when they enter 4th grade.

- The Stanford Computer Industry Project just published a survey saying that there were 190,000 software positions unfilled in the United States today. Our military is forced to compete in exactly the same markets for exactly the same skills.

Americans have clearly gotten the message about the need for continuing education.

- Three quarters of Americans between 18 and 49 think that additional education or training is important for success in their

- The desire for more education is nearly independent of income or employment level. Even half of the employed people over 65 thought that more training was important.

- More than a third of all Americans were asked by their employers to get more work-related training or education last year and nearly half the workers aged 40-49 were encouraged to do so.

- But training has traditionally been limited to people who have a sound educational backgrounds and people fortunate enough to work for large organizations. People with BAs were 50% more likely to have participated than people lacking a high-school degree. 70 percent of establishments with fewer than 50 employees provided

formal training in 1993, while nearly all larger firms provided training.

- Even when programs are available, they're often not tailored to the real needs of the market. Cost was the greatest barrier cited by younger Americans but a lack of time was listed by about 60% of people aged 30-50. Driving across town after work can be a major barrier to a parent, particularly a single parent.

There is, however, overwhelming evidence that instructional technology can be an important part the. Technology can make learning much more productive, more accessible, and less expensive. Everywhere else in the economy we've seen that innovations which improve product quality can actually reduce costs. There is no reason why this can't happen in education**.**

There is a special irony that the nation's largest information enterprise -- the $600 billion business of education and training -- is surprisingly untouched by the revolution in technology that is reshaping every other information industry -- the technology that is revolutionizing the demand for the product of education. The potential for improvement, however, is enormous.

- Technology-based learning can mimic many of the best features of tutorial and apprentice based learning. One-on-one tutorials are a much different learning experience than the passive, mass-production model of learning we've learned to accept. Studies have demonstrated that tutor-based instruction can not only lead to a sharp gain in student performance but also narrow the distribution of performance. Unlike standard classrooms, the tutor doesn't have to move on until every student has mastered every topic.

- With access to the net, instructional material can be constantly fresh and up-to-date while still being affordable.

- Technology can permit tests to examine more complex and subtle skills and provide information that is much more helpful to students, employers, and teachers. It permits testing the performance of teams as well as individuals. If you crash your flight simulator there's no reason to grade the test.

- Technology makes learning much more convenient to the practical needs of individuals and the businesses that employ them. There are many fewer limits on when a class much start or where learning can occur.

- The lack of constraints on where instruction can be delivered makes new learning methods much compatible with the real needs of workers with harried schedules. It is a real hardship for a person with a family to travel across town to attend a community college after work.

- The technology reduces the need to ship people across the country

to take courses. This is costly and can be a burden on people forced to be away from their families

- Technology makes it possible to imbed training into operational equipment – whether this is a CAD system, a word processor, or a machine tool. Such systems can also provide "just in time training".

Unfortunately we're a long way from capturing the potential of learning technology. We need technical ingenuity but even more we need ideas on how to create the openness and institutional flexibility essential to capture the benefits of dramatically different approaches to teaching and learning.

It's clear that markets for improved instructional products are not operating efficiently. Training tools are inherently capital intensive and costs must be spread across a wide market. But it is extremely difficult for developers to reach a large market.

Our hope for this conference is that we can work together to create more efficient markets for education and training materials work better. If you're interested in finding the best training solutions, efficient markets are the only certain way to ensure that you've got the best people in the country are focused on delivering a high-quality, timely product. But you must be able to articulate what you want in terms software vendors can understand. You've also got to rethink what is possible – how you really want to go about conveying information.

If you're a developer, markets can ensure that you can make an investment in a product that can be sold to the largest possible customer base. But software developers need to learn to sell products in education and training markets.

We feel that the government has several key responsibilities in helping this new market to mature:

1. We must continue to support progress in K-12 education generally, and use of technology in these school systems.

1. We should develop and fund a balanced program of research and development in advanced instructional techniques and methods for evaluating their impact. We must do this in close partnerships with universities, school systems, and private organizations.

1. We should eliminate regulatory and other barriers that block expanded use of technology-based instruction wherever they exist. We've got to ensure that internal regulations, federal education funding, and other programs take full advantage of emerging technologies.

1. We can work with universities, and private firms to develop the technical and business vocabulary needed for an efficient market in technology-based educational materials to work efficiently. Effective markets allow buyers know what they are getting and that components will work effectively together. They allow vendors to

ensure that their intellectual property is protected and that competition is open and fair.

1. We can ensure that the federal agencies are exemplary users of education and training technology wherever it makes economic sense and use the power of federal procurement in ways that build on, and therefore encourage, "best commercial practice".

1. We can help facilitate the flow of information about products and training opportunities. The Department of Labor has developed an extremely efficient web-based tool for helping employers find people with the skills they need and people looking for better jobs to market themselves. They will soon be adding a service that will provide a national source of information for education and training services both conventional and technology-based.

Making all of this work will require bringing together communities that have not worked together before. It will require trainers, educators, software specialists, subject-matter experts, and many other professions to form teams. It will require overcoming old prejudices about the boundaries separating education and training, military and private business practices. It will require all of us to be open to the incredible process of invention spawned by the invention of powerful, inexpensive computers and the world wide web.

The steps we take should be able to encourage the development and use of protocols for ensuring interoperability and reuse as well as standards that can provide protection for intellectual property and facilitate electric commerce. Such standards must be voluntary not proscriptive. They must provide enough predictability that markets can work but not be so prescriptive that they present barriers to the creativity that constantly surprises us in this field. One concrete model for what is possible can be seen in the invention of the internet standards themselves. The TCP/IP and HTTP protocols created a vocabulary that launched an explosion of creativity because people could put their material in a common, accessible format.

There is probably nothing more important to this nation's military or economic security in the coming century than the way we manage the tools of learning throughout a person's career. We can only capture these opportunities by building markets that can unleash the creative powers that have served America so well in the past. As we face the 21st century, we've never needed them more.

That is why I am so grateful to those of you who have taken the time and trouble to work with us to seize the opportunity presented by learning technology. We need to move fast and effectively. If any group of people can do it, you can. I wish you the best of luck and pledge you the full support of the Clinton administration.