Leveraging Technology in Human Services

An Environmental Scan for the
21st Century Model to Address Poverty Project

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1 Background

1.1 The Changing Face of Technology

Developments in IT over the next five years will significantly change how individuals, governments and societies deal with information. There will be new and better ways of presenting, analyzing and using information. There will be improved mobile devices for end users, much-improved middleware, better-conceptualized standards, wider connectivity, new collaboration tools, and new and better models for doing business. Many upcoming technological innovations will change how people, teams, enterprises, governments and even whole societies interact with and share data. Imagine a world where objects can sense, reason, communicate and act. The explosion of smaller, cheaper sensors, continuously connected through wireless communications, will create a sensory web where we will see the physical world online – *this will change everything*. The main drivers are standards for improved interoperability, improved understanding of information supply chains, wider connectivity and some key technologies like micro-payments, digital rights management, extensible markup language and ontologies. Many of the implications are beyond providing better IT infrastructure. They are more about doing business completely differently.

If we consider the state of the world technologically as it was in 1994 - just 10 years ago, we would be without email, without a cell phone, without instant messaging. We would not be browsing the Internet nor would we be transacting business via e-commerce. We would not have Personal Digital Assistant's (PDAs) or web kiosks. We would be technologically immature. In year 2014, we will look back to 2004 and we will appear to have been technologically immature. Instead of carrying a computer around, computing environments will be available everywhere for personalized access to anytime/anywhere information via modified TV, electronic kiosks, or airplane display monitors. Voice activated applications will have substantially reduced the need for keyboard typing. Physical hardware computing machines and "boxes" as we know them will have been replaced by virtual networks. All relevant information will be connected and accessible to anyone granted permission to access it - at any time. Electronic devices will integrate and communicate wherever we are, giving us any information that we need. The network will be the heart of it all — personal and pervasive. Emerging technology and trends will transform the ability of businesses and people to control their work and personal environments. The Human Services infrastructure must successfully face the business and human challenges that will arise in the always-on, always-connected world of 2014.

Experts maintain that a new US and world economy has emerged – a new stage of global capitalism. This new stage is referred to by some as post industrialism or informationalism. Informationalism represents a third industrial revolution (table 1.1). The first followed the invention of the steam engine in the eighteenth century and was

characterized by the replacement of hand tools by machines. The second followed the harnessing of electricity in the nineteenth century and was characterized by the development of large scale factory productions. The third revolution came to fruition in the 1970s with the diffusion of the transistor, the personal computer and telecommunications. In other words, what we have is not an Internet economy but an information economy in which computers and the Internet play and essential and enabling role. Experts have identified four features that distinguish informationalism from the prior industrial stage: the driving role of science and technology for economic growth; a shift from material production to information processing; the emergence and expansion of new forms of networked industrial organization and the rise of socioeconomic globalization.[1]

Table 1.1 – The Three Industrial Revolutions

	First Industrial Revolution	Second Industrial Revolution	Third Industrial Revolution
Beginning	Late 18th century	Late 19th century	Mid to late 20th century
Key Technologies	Printing press, steam engine, machinery	Electricity, internal combustion, telegraph, telephone	Transistor, personal computers, telecommunications, Internet
Archetypical Workplace	Workshop	Factory	Office
Organization	Master-apprentice-serf	Large vertical hierarchies	Horizontal Networks

The changes to date in the world's economy (as noted above) as well as emerging technologies that are changing business practices as we know them, create the need for all industries to reevaluate their use of technology to achieve goals and objectives.

1.2 Technology in Human Services Delivery Infrastructure

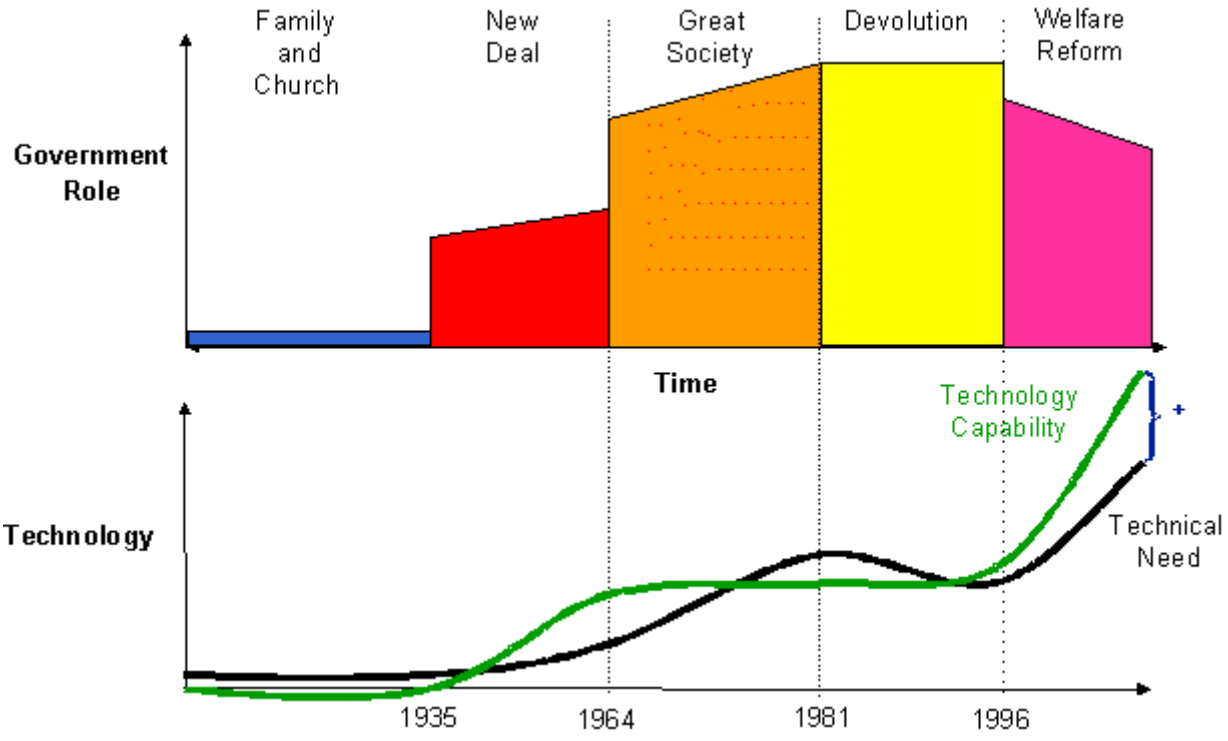
Human services programs have evolved dramatically during the past several generations, often experiencing tectonic shifts as political perceptions evolve regarding their need and value.[2] Prior to the Great Depression, most human services needs were addressed by the families or religious institutions of those in need. However, because the Great Depression generally overwhelmed the ability of families and charities to care for all of those in need, government programs were created. In the mid-1960s, the number and complexity of government programs grew dramatically as part of the "war on poverty." As political

[1] Mark Warschauer, Technology and Social Inclusion. 2003
[2] John Kost, New Solutions for Government Human Services. 2003

leadership challenged the effectiveness of these programs in the 1980s, their growth was slowed and more flexibility was shifted back to lower units of government. Since the mid-1990s, even more flexibility has been granted to noncentral governments and private agencies to offer new or more-flexible services (see Figure 1). (Gartner Group)

Figure 1

The Evolution of Human Services Delivery



Source: Gartner Research (August 2003)

The upper portion of Figure 1 graphically depicts the relative role of government in the delivery of human services during these eras. The lower portion of Figure 1 depicts how the role of technology has evolved. Early on, IT was nonexistent. With the development of mainframes and large-scale payroll systems, technology began to play a more-prominent role in human services during the 1960s as agencies moved management of cash assistance programs onto computers. However, until the late 1990s, little of this technology development was specifically designed for or targeted at human services agencies. Other than financial management, technology played little or no role in far-more-qualitative activities, such as case management, until very recently.[3]

[3] John Kost, New Solutions for Government Human Services. 2003

When human services were primarily the responsibility of the family and charities, the beneficiaries of those services were given only those things that were perceived to be necessary in the short term (such as money, clothing, food, spiritual guidance and job tools). Through the 1970s, as the government's role grew, services became more homogeneous (for better or worse). With welfare reforms beginning in the early 1980s and continuing into the mid-1990s, more programs have become available to meet the unique and highly varying needs of each case. Yet, because of the complexity of administering all of these programs, few government jurisdictions or policies have adapted to better apply these programs to the needs of their constituents.

Human services agencies work to support complex financial and social needs of qualifying individuals and families. By their very nature, these needs may vary from one individual or case to another. Human services programs provide income to people or families in need, provide assistance to enable self-sufficiency from these programs, or which help support or protect children, the disabled, and the elderly in situations where they are dependent on others. Because societal needs are so diverse, a wide variety of programs has been, and continues to be, created to address varying conditions. Each of these programs may have different eligibility criteria and administrative distinctions. Resources to support eligible clients exist in federal, state and local governments, community action agencies, faith institutions and other not-for profit entities.

As important as efficient client management is to reducing poverty, the Human Services community does not have a single system capable of fully integrating program and resource information holistically to empower those most in need. Most of the problems that the low-income people face in seeking remedies can be ascribed to the nature of human services programs and the lack of timely, accurate information needed to make sound and rapid decisions. This lack of timely accurate information (which should be available on demand) forces the system into a generally reactive mode. Neither case managers nor clients are able to see opportunities or obstacles in advance.

While there are a few exceptions, for the most part, the Human Services infrastructure is limited by stove-piped systems that are independently operated and managed throughout the various layers of the infrastructure. Data currently resides in redundant, stovepipe applications that reflect decades-old business processes. System functionality limitations, lack of integration, and operating difficulties result in extensive manual efforts and inefficient business processes. These conditions require field staff to focus an inordinate amount of time and effort collecting data and shuffling paperwork. This does not allow sufficient time for analysis and service intervention.

The most significant administrative challenge human services agencies will continue to face will be marrying the specific needs of each client with the most appropriate solution or program. This is, first and foremost, a problem of case management for employees of human services agencies and the technology infrastructure intended to support them.

In the future, human services must “invert the paradigm”. The Human Services infrastructure must consider that the system should operate from the perspective of meeting the individual need of the client rather than supporting organizations and

programs. The process must begin with the individual by providing tools and resources to allow the person in need to design a navigation strategy. Governmental resources could then be used to support service delivery issues which are more complex and not easily solved by technology. Technology is in place to support the inversion of the paradigm. Technology allows for self-service strategies to empower individuals and communities to address their own unique needs.

1.3 Technology for Communities and Individuals

There have been mixed reviews in terms of how technology has been leveraged to date by communities and individuals to deal with issues of poverty. As of August 2001 an estimated 513 million people around the world had Internet access. This represents 8.4% of the world's population[4]. Even though Internet access has been increasing rapidly in some countries, access remains highly stratified by region. The number of people with Internet access ranges from 57.2% in North America to .5% in Africa. The reasons for the disparity in Internet access rates are multiple and involve issues of economics, infrastructure, politics, education and culture.

Although access is an issue, a computer and the Internet are not much use without content and applications that serve people's needs. According to Warschauer in *Technology and Social Inclusion,* the United States which leads the world in Web site production suffers from significant content gaps that affect underserved communities. In other words, the applications or service interventions that technology affords are not available to meet the needs of individuals and communities to the degree needed. Additionally, an in-depth study of Internet content and diversity was carried out by the Children's Partnership[5]. They identified four main content-related barriers that affected large numbers of Americans. The greatest barrier was the lack of locally relevant technology applications and information to address the needs of at-risk populations. According to the study, low income users seek practical, relevant information that affects their daily lives. Information of this nature is not consistently available at the local level to empower communities and individuals.[6] Locally relevant applications and information must be available as follows:

- Education – Adult high school degree programs, adult literacy programs, financial aid, homework assistance, telementoring
- Family – Low-cost child care, low cost enrichment activities for children, public assistance programs for families
- Finances – Public benefits news, consumer information, credit information
- Government advocacy – Immigration assistance, legal services, tax filing support

[4] Mark Warschauer, Technology and Social Inclusion. 2003
[5] Children's Partnership
[6] Mark Warschauer, Technology and Social Inclusion. 2003

- Health – Easy to understand health encyclopedias, local clinics, low cost insurance resources
- Housing – low cost housing, low cost utilities, neighborhood crime rates
- Personal enrichment – foreign language newspapers and search engines, communities of interest for youth and adults
- Vocational – Low cost career counseling programs, job training programs, job readiness programs, job listings

The author of Spanning the Digital Divide summarized some key questions/issues that must be addressed if technology is to be leveraged to successfully impact individuals and communities in the 21st century. The questions/issues are as follows[7]:

Physical Access	Is there physical access to technology? People will only use technology if it is available within a reasonable distance from their home or work. A computer that lacks adequate power supply, connection (internet capabilities), and software will not be effective in helping people see the relevance of technology to their lives.
Capacity	Do people understand how to use technology and its potential use? People must be able to effectively use the technology. Further, it is essential that people understand the broader potential for technology applications, so users can be empowered to creatively apply the technology to other parts of their life.
Affordability	Is technology affordable enough for people to use? The cost of hardware, phone lines, electricity, internet connection, software, and maintenance must not be so expensive it excludes many people and organizations from using technology.
Trust	Do people have confidence in and understand the implications of the technology they use, for instance in terms of privacy, security, or cybercrime?
Relevant Content	Is there locally relevant content in the local languages? Content is only relevant when its substance is interesting to users given their culture background, and accessible given their reading, writing, and language skills.
Integration	Does the technology further burden people's lives or does it integrate into daily routines?
Socio-cultural Factors	Are people limited in their use of technology based on gender, race, or other socio-cultural factors? People are often excluded from using technology based on ethnic, gender, or other socio-culturally-based inequalities. These factors must be considered and addressed.
Appropriate Technology	What is the appropriate technology that meets the needs and desires of people? A wide variety of technologies are available. Policy makers and users must be able to critically assess which kind of technology is appropriate for the intended use.
Local Economic Environment	Is there a local economy that can sustain its use? The local economic situation will determine the level and frequency of technology use. Technology that can be used to foster economic growth will foster use in the community.

[7] Teresa Peters - Bridges.org, Spanning the Digital Divide.

Legal and Regulatory Framework	Do laws and policies foster technology use? What changes are needed to create an environment that does?
Macro-economic environment	Is national economic policy conducive to widespread technology use, for example in terms of transparency, deregulation, investment, and labour issues?
Political Will	Is there political will in the government to do what is needed to enable the integration of technology throughout society?

Having more-robust technology accessible at the individual and community levels coupled with the potential to optimize the organizational silos that make programs and service delivery so ineffective and inefficient to administer, is the impetus for a new 21st century approach. This research explores the current state of technology in human services as well as technological advances that may empower transformation of the Human services industry.

This research is not intended to be an exhaustive analysis of "what works" in applying information and communications technology to poverty reduction. Despite a proliferation or reports and initiatives, and pilot projects (some of which we highlight in the research), we still have little knowledge about the effectiveness of these projects in lowering the incidences of poverty. There are abundant success stories, but few have been subjected to detailed evaluation to measure their effectiveness toward poverty reduction outcomes. The goal of this report, then, is not to outline specifically what works and why but to provide a framework for thinking about how technology could influence poverty. As such, technology is viewed as a means to an end – a tool that may help to enable a desired end.

This report is organized as follows:

- Current State Analysis
  - Individuals
  - Communities
  - Human Services Infrastructure
- Advances in Technology
- Technology as a leverage mechanism in Human Service

2 Current State Analysis

2.1 Individuals and Technology

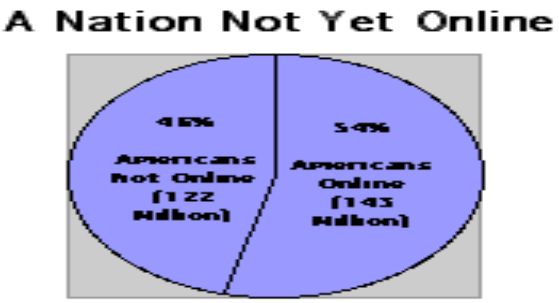
2.1.1 Computer and Internet Usage

When access to jobs and services is delivered electronically, those who have good network connections will have an advantage, whereas those with poor service or no service will be disadvantaged and marginalized.[8]

Americans are increasingly going online and using the Internet for social, economic, civic and educational purposes. The power and benefits of information technology are increasingly evident.
"Many sociologists argue that the ability to use computers and the Internet is fast becoming a prerequisite for a broad array of jobs. Half of the new jobs that employ workers without college degrees require daily use of computers, often including use of the Internet, and the income gap between those who use computers on the job and those who don't continues to widen." -
--Wall Street Journal, (Yochi J. Dreazen, February 4, 2002)

However, while overall Internet access and use increased, millions of Americans who could benefit from the educational and job opportunities offered by the Internet are the least likely to be online.

- 46% of individuals do not use the Internet (122 million Americans).
- 50% of households do not use the Internet.



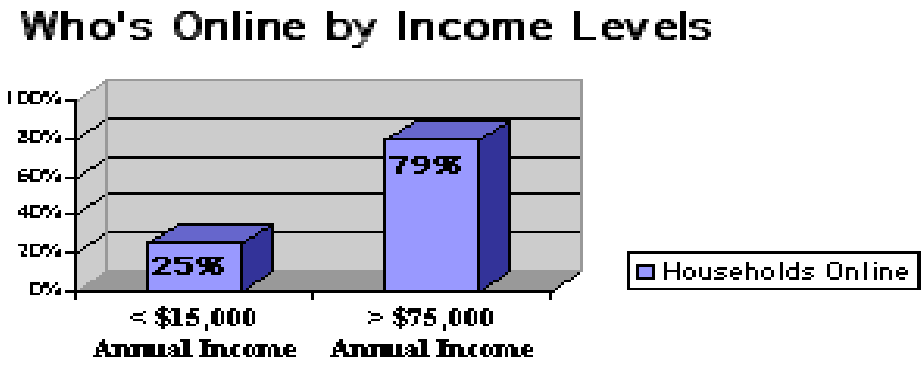
Almost half of Americans do not have access to the Internet.

Source: U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA). A Nation Online: How Americans Are Expanding Their Use of the Internet, February 2002.

[8] **Donald A. Schön, Bish Sanyal, and William J. Mitchell,** High Technology and Low Income Communities

With many people losing their jobs or unable to find work in these difficult economic times, it is particularly important to have access to the employment, education and resources found online. In fact:

- When low-income users do connect, they are more likely to use the Internet to complete school assignments and search for jobs than higher income Internet users.



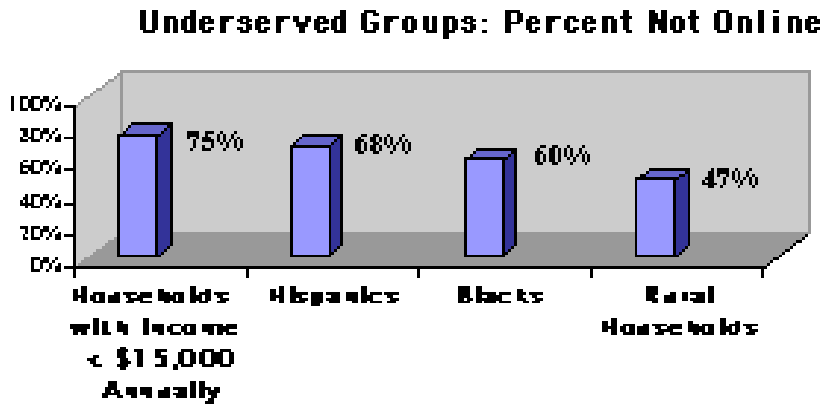
- People in households with low family incomes — 75% of people who live in households where annual income is less than $15,000, and 67% of those in households with incomes between $15,000 and $35,000. [9]

Higher-income Americans are more than three times as likely to be online as those with lower incomes.

Source: U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA). A Nation Online: How Americans Are Expanding Their Use of the Internet, February 2002.

[9] U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA). A Nation Online: How Americans Are Expanding Their Use of the Internet, February 2002

[10] Note: The report utilizes data from the Department of Commerce's U.S. Census Bureau, taken from the Census Bureau's September 2001 Current Population Survey (CPS) of approximately 57,000 sample households.



- Adults with low levels of overall education — 87% of adults (age 25+) with less than a high school education, and 60% of adults with only a high school degree.
- Hispanics — 68% of all Hispanics, and 86% of Hispanic households where Spanish is the only language spoken.
- Blacks — 60% of Blacks.
- Rural households – 47% of rural households.

High percentages of Americans with very low incomes, Hispanics, Blacks, and rural households still lack access to the Internet. Source: U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA). A Nation Online: How Americans Are Expanding Their Use of the Internet, February 2002.

In the report "A Nation Online: How Americans Are Expanding Their Use of the Internet" dated February 2002[10], we find that disparities *still* lie in access to computers and the Internet:

- Approximately 46% of the population (roughly 122 million Americans) were not accessing the Internet, as of September 2001.
- 34% of the population did not use computers.

I. Americans' Computer And Internet Use

By Income

There are **more than 50 percentage points** between Americans who have access to computers and the Internet and those who do not:

Annual Income	Computer	Internet
Less than $15,000	37%	25%
$15,000 - $24,999	46%	33%
Greater than $75,000	88%	79%

Family income remains an indicator of whether a person uses a computer or the Internet. Individuals who live in high-income households are more likely to be computer and Internet users than those who live in low-income households. This relationship has held true in each successive survey of computer oand Internet use.[6]

Nonetheless, both computer and Internet use have increased steadily across all income categories over time (Figure 2-2). While notable differences remain in Internet use across income categories, Internet use has grown considerably among people who live in lower income households. Among people living in the lowest income households (less than $15,000 annually), Internet use had increased from 9.2 percent in October 1997 to 25.0 percent in September 2001.

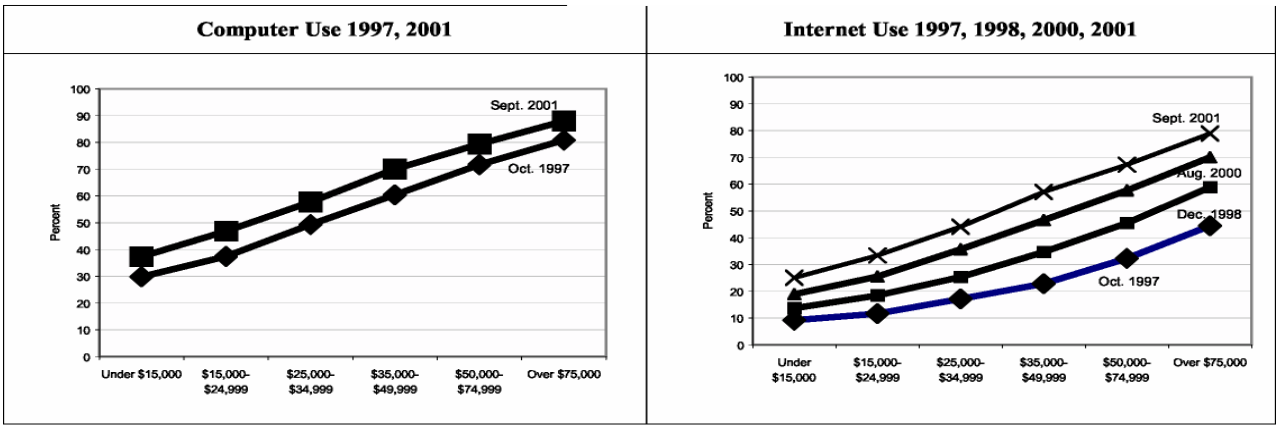


Figure 2-2: Computer and Internet Use From Any Location by Family Income,

By Employment

- 59% of people not employed were not computer users.
- 63% of people not employed were not Internet users.

By Education

Individuals who have a bachelor's degree are **five times more likely** to use computers and the Internet as those who have not received a high school diploma.

	Computer	Internet
Less than High School Diploma	17%	13%
High School Diploma	47%	40%
Bachelor's Degree	85%	81%

By Race

- Whites, Asians and Pacific Islanders are **one and a half times as likely** to use computers and **six times more likely** to use the Internet as Blacks and Hispanics.

	Computer	**Internet**
Blacks	56%	40%
Hispanics	49%	32%
Whites	70%	60%
Asian/Pacific Islander	71%	60%

II. The Unconnected

- 46% of individuals do not use the Internet.
- 50% of households do not use the Internet.

The Offline Population

- People in households with low family incomes — 75% of people who live in households where income is less than $15,000 annually, and 67% of those in households with incomes between $15,000 and $35,000.
- Adults with low levels of overall education — 87% of adults (age 25+) with less than a high school education, and 60% of adults with only a high school degree.
- Hispanics — 68% of all Hispanics, and 86% of Hispanic households where Spanish is the only language spoken.
- Blacks — 60% of Blacks.
- Rural households – 47% of rural households.

What is the main reason Americans are not connected to the Internet?
It is too expensive (stated by 35% of households with annual incomes of less than $15,000).

III. How And Where America Goes Online

Connection Types

- 80% of individuals connect to the Internet via a dial-up connection.

Dial-Up	80%
Cable Modem	13%
DSL	7%

- High-speed subscribers were present in 97% of the most densely populated zip codes at the end of December 2000 as compared to 45% of zip codes with the lowest population densities.

Higher-Speed Internet Connection by Geographic Area

- Central and urban cities are nearly **twice as likely** to have higher-speed Internet connections as rural areas.

	2000	**2001**
U.S,	19%	11%
Central Cities	22%	12%
Urban (Not central cities)	21%	12%
Rural	12%	7%

Location of Use

- At the end of 1998, only 7% of the population used the Internet both at home and from another location. In just under three years, that figure has risen to 25% (an increase of over 300%).

Internet Use by Specific Location

- Internet access at public libraries is more often used by those with lower incomes than those with higher incomes.

  Specifically:

  - 10% of individuals with household incomes of less than $25,000 rely on public libraries to use the Internet compared with .02% of individuals in households earning over $75,000.

- 14% of Internet users do not access the Internet at home, school, or work; alternate access locations: public libraries-- 5%, community center-- .06%, someone else's home-- 6%.
- 43% access the Internet from home.

Primary Uses of the Internet

E-Mail	84%
Product/Service Information Search	67%
News, Weather, Information	62%
Playing Games	42%
Product/Service Purchases	39%

- When low-income users do connect, they are more likely to use the Internet to complete school assignments and search for jobs than higher income Internet users.
    - **Complete school assignments:** 37% of individuals with annual incomes less than $15,000 compared to 25% with incomes over $75,000.
    - **Search for jobs:** 23% of individuals with annual incomes less than $15,000 and 21% of individuals with incomes between $15,000 - $24,999 compared to 15% with incomes over $75,000.

IV. The Digital Generation: How Young People Have Embraced Computers And The Internet

Computer and Internet Use

- 90% of school-aged children (5-17) use computers.
- 59% of school-aged children (5-17) use the Internet.
- Family households with children under age 18 are much more likely to have computers than families without children (70% compared to 59%). They also are more likely to have Internet subscriptions (62% vs. 53%).

Computer Use Among 10 to 17 Year Olds By Income and Location

- Almost **60 percentage points** divide youth who use computers in households in the lowest income category compared to the highest income category.

Computer Use at Home by Income

Annual Income	
Less than $15,000	33%
More than $75,000	92%

- **Four times** as many children (ages 10-17) go online only at school if they live in a household in the lowest income category (21%) compared to those in the highest income level (5%).

Computer Use Among 10 to 17 Year Olds By Race/Ethnicity and Location

- A far higher percentage of Hispanic (39%) and Black (45%) children rely solely on schools to use computers than do Asian and Pacific Islanders (11%) and White children (15%).

Computer Use Among 10 to 17 Year Olds By Household Type and Location

- More than twice as many children from single-parent families use computers only at schools as do children in two-parent families: 41% of children in female-headed households, 32% in male-headed households, and 17% in households with two parents.

Internet Use Among 10 to 17 Year Olds By Income and Household Type

Internet Use at Home by Income	
Less than $15,000	21%
More than $75,000	83%

- **60 percentage points** divide youth who use the Internet in households in the lowest income category compared to the highest income category.
- Children in single-parent families are **less likely** to use the Internet at home (37% in female-headed households and 45% in male-headed households) than are children in two-parent families (64%).

How Young People Use the Internet
#1 Use: **Schoolwork**:
Over 1/2 of children over age 10
3/4 of young adults (18-24)
Nearly 1/5 of elementary students

#2 Use: **E-mail**: close second

Concerns About Children's Online Use

- 68% of parents with children said that, compared with television material, they were more concerned about their children's exposure to material on the Internet (though this would not prompt them to discontinue using the Internet).

V. Computer And Internet Use Among People With Disabilities

- People with disabilities tend to use computers and the Internet **at rates below** the national average.

Internet Use at Home Among 25-60 year old Disabled Americans

Deaf or Severe Hearing Impairment	68%
Blind or Severe Vision Impairment	62%
Multiple Disabilities	56%
None of these Disabilities	75%

Table 2-1: Computer Use From Any Location by Individuals Age 3 and Older, October 1997 and September 2001

Table 2-1: Computer Use From Any Location by Individuals Age 3 and Older, October 1997 and September 2001

	Oct. 1997		Sept. 2001		Percent of People Who Are Computer Users		Growth in Use Rate (annual rate)
	Computer Users (thousands)	Total (thousands)	Computer Users (thousands)	Total (thousands)	Oct. 1997	Sept. 2001	Oct. 1997 to Sept. 2001
Total Population	136,900	255,689	174,051	265,180	53.5	65.6	5.3
Gender							
Male	66,978	124,590	84,539	129,152	53.8	65.5	5.2
Female	69,921	131,099	89,512	136,028	53.3	65.8	5.5
Race/ Origin							
White	105,957	184,295	130,848	186,793	57.5	70.0	5.2
Black	13,854	31,786	18,544	33,305	43.6	55.7	6.5
Asian Amer. & Pac. Isl.	5,306	9,225	7,600	10,674	57.5	71.2	5.6
Hispanic	10,729	28,233	15,690	32,146	38.0	48.8	6.6
Employment Status							
Employed a	80,687	130,857	98,819	135,089	61.7	73.2	4.5
Not Employed a, b	18,074	72,911	31,487	77,268	24.8	40.8	13.5
Family Income							
Less than $15,000	13,182	44,284	11,681	31,354	29.8	37.3	5.9
$15,000 - $24,999	12,115	32,423	12,464	26,649	37.4	46.8	5.9
$25,000 - $34,999	16,360	33,178	16,495	28,571	49.3	57.7	4.1
$35,000 - $49,999	23,440	38,776	25,233	36,044	60.4	70.0	3.8
$50,000 - $74,999	30,043	41,910	35,465	44,692	71.7	79.4	2.6
$75,000 & above	29,542	36,572	49,672	56,446	80.8	88.0	2.2
Educational Attainment							
Less Than High School c	2,331	29,114	4,672	27,484	7.9	17.0	21.5
High School Diploma / GED c	19,256	57,487	27,118	57,386	33.5	47.3	9.2
Some College c	24,595	42,544	31,551	45,420	57.8	69.5	4.8
Bachelors Degree c	20,640	27,795	25,965	30,588	74.3	84.9	3.5
Beyond Bachelors Degree c	10,970	13,863	14,151	16,283	79.1	86.9	2.4
Age Group							
Age 3 – 8	14,412	24,445	16,877	23,763	59.0	71.0	4.9
Age 9 – 17	30,188	35,469	34,356	37,118	85.1	92.6	2.2
Age 18 – 24	14,528	24,973	19,361	27,137	58.2	71.3	5.3
Age 25 – 49	58,745	101,853	71,491	101,890	57.7	70.2	5.1
Male	27,577	50,177	33,647	50,020	55.0	67.3	5.3
Female	31,168	51,676	37,844	51,871	60.3	73.0	5.0
Age 50 +	19,026	68,949	31,965	75,272	27.6	42.5	11.6
Male	9,654	31,252	15,547	34,438	30.9	45.1	10.2
Female	9,372	37,697	16,418	40,834	24.9	40.2	13.1
Household Type In Which the Individual Lives d							
Married Couple w/Children <18 Years Old	68,855	103,791	81,897	104,337	66.3	78.5	4.4

Table 2-2: Internet Use From Any Location by Individuals Age 3 and Older, October 1997, December 1998, August 2000, and September 2001

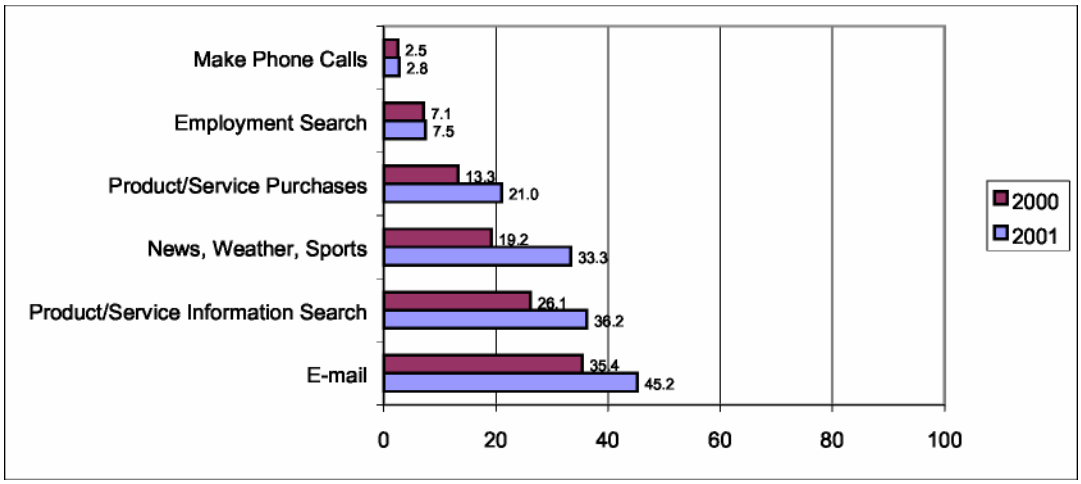
	Oct. 1997 (thousands)		Dec. 1998 (thousands)		Aug. 2000 (thousands)		Sept. 2001 (thousands)		Internet Use (percent)			
	Internet Users	Total	Internet Users	Total	Internet Users	Total	Internet Users	Total	Oct. 1997	Dec. 1998	Aug. 2000	Sept. 2001
Total Population	56,774	255,689	84,587	258,453	116,480	262,620	142,823	265,180	22.2	32.7	44.4	53.9
Gender												
Male	30,311	124,590	43,033	125,932	56,962	127,844	69,580	129,152	24.3	34.2	44.6	53.9
Female	26,464	131,099	41,555	132,521	59,518	134,776	73,243	136,028	20.2	31.4	44.2	53.8
Race/ Origin												
White	46,678	184,295	69,470	184,980	93,714	186,439	111,942	186,793	25.3	37.6	50.3	59.9
Black	4,197	31,786	6,111	32,123	9,624	32,850	13,237	33,305	13.2	19.0	29.3	39.8
Asian Amer. & Pac. Isl.	2,432	9,225	3,467	9,688	5,095	10,324	6,452	10,674	26.4	35.8	49.4	60.4
Hispanic	3,101	28,233	4,897	29,452	7,325	30,918	10,141	32,146	11.0	16.6	23.7	31.6
Employment Status												
Employed [b]	37,254	130,857	56,539	133,119	76,971	136,044	88,396	135,089	28.5	42.5	56.6	65.4
Not Employed [b, d]	9,012	72,911	14,261	73,891	21,321	73,891	28,531	77,268	12.4	19.5	28.9	36.9
Family Income												
Less than $15,000	4,069	44,284	5,170	37,864	6,057	32,096	7,848	31,354	9.2	13.7	18.9	25.0
$15,000 - $24,999	3,760	32,423	5,623	30,581	7,063	27,727	8,893	26,650	11.6	18.4	25.5	33.4
$25,000 - $34,999	5,666	33,178	8,050	31,836	11,054	31,001	12,591	28,571	17.1	25.3	35.7	44.1
$35,000 - $49,999	8,824	38,776	13,528	39,026	16,690	35,867	20,587	36,044	22.8	34.7	46.5	57.1
$50,000 - $74,999	13,552	41,910	19,902	43,776	25,059	43,451	30,071	44,692	32.3	45.5	57.7	67.3
$75,000 & above	16,276	36,572	24,861	42,221	36,564	52,189	44,547	56,446	44.5	58.9	70.1	78.9
Educational Attainment												
Less Than High School [a]	516	29,114	1,228	29,039	2,482	28,254	3,506	27,484	1.8	4.2	8.8	12.8
High School Diploma/GED [a]	5,589	57,487	10,961	57,103	17,425	56,889	22,847	57,386	9.7	19.2	30.6	39.8
Some College [a]	10,548	42,544	16,603	43,038	24,201	44,628	28,321	45,420	24.8	38.6	54.2	62.4
Bachelors Degree [a]	11,503	27,795	16,937	28,990	21,978	30,329	24,726	30,588	41.4	58.4	72.5	80.8
Beyond Bachelors Degree [a]	7,195	13,863	9,635	14,518	12,104	15,426	13,633	16,283	51.9	66.4	78.5	83.7
Age Group (and Labor Force)												
Age 3 – 8	1,748	24,445	2,680	24,282	3,671	23,962	6,637	23,763	7.2	11.0	15.3	27.9
Age 9 – 17	11,791	35,469	15,396	35,821	19,579	36,673	25,480	37,118	33.2	43.0	53.4	68.6
Age 18 – 24	7,884	24,973	11,356	25,662	15,039	26,458	17,673	27,137	31.6	44.3	56.8	65.0
Age 25 – 49	27,639	101,853	41,694	101,836	56,433	101,946	65,138	101,890	27.1	40.9	55.4	63.9
Male	14,679	50,177	20,889	50,054	27,078	50,034	30,891	50,020	29.3	41.7	54.1	61.8
Female	12,960	51,676	20,806	51,781	29,356	51,913	34,247	51,871	25.1	40.2	56.5	66.0
Age 50 +	7,712	68,949	13,669	70,852	21,758	73,580	27,895	75,272	11.2	19.3	29.6	37.1
Male	4,560	31,252	7,356	32,248	10,989	33,561	13,757	34,438	14.6	22.8	32.7	39.9
Female	3,152	37,697	6,313	38,604	10,769	40,019	14,138	40,834	8.4	16.4	26.9	34.6
Geographic Location of Household In Which the Individual Lives												
Rural	n/a	n/a	19,274	65,828	28,889	67,980	35,751	67,642	n/a	29.3	42.5	52.9
Urban	n/a	n/a	65,313	192,625	87,591	194,640	107,072	197,537	n/a	33.9	45.0	54.2
Urban Not Central City	n/a	n/a	41,881	116,091	56,773	118,641	69,342	120,724	n/a	36.1	47.9	57.4
Urban Central City	n/a	n/a	23,432	76,534	30,818	75,999	37,730	76,813	n/a	30.6	40.6	49.1

Primary Uses by the U.S. Population

The chief uses of the Internet remained the same in September 2001 as in August 2000, but occurred at much higher levels (Figure 3-1). The predominant use continued to be e-mail or instant messaging. In September 2001, nearly half of the population used e-mail (45.2 percent, up from 35.4 percent in 2000). Searching for information also ranked high: approximately onethird of Americans used the Internet to search for product and service information (36.2 percent, up from 26.1 percent in 2000), and to search for news, weather, and sports information (33.3 percent, up from 19.2 percent in 2000).

In addition, many more Internet users reported making online purchases or conducting online banking. The August 2000 survey combined these two categories and found that 13.3 percent of online users were engaged in both activities. The September 2001 survey, however, asked about these activities separately and found that 21.0 percent made online purchases and 8.1 percent conducted banking online.

Figure 3-1: Online Activities, 2000 and 2001
as a Percentage of Total U.S. Population, Persons Age 3 +

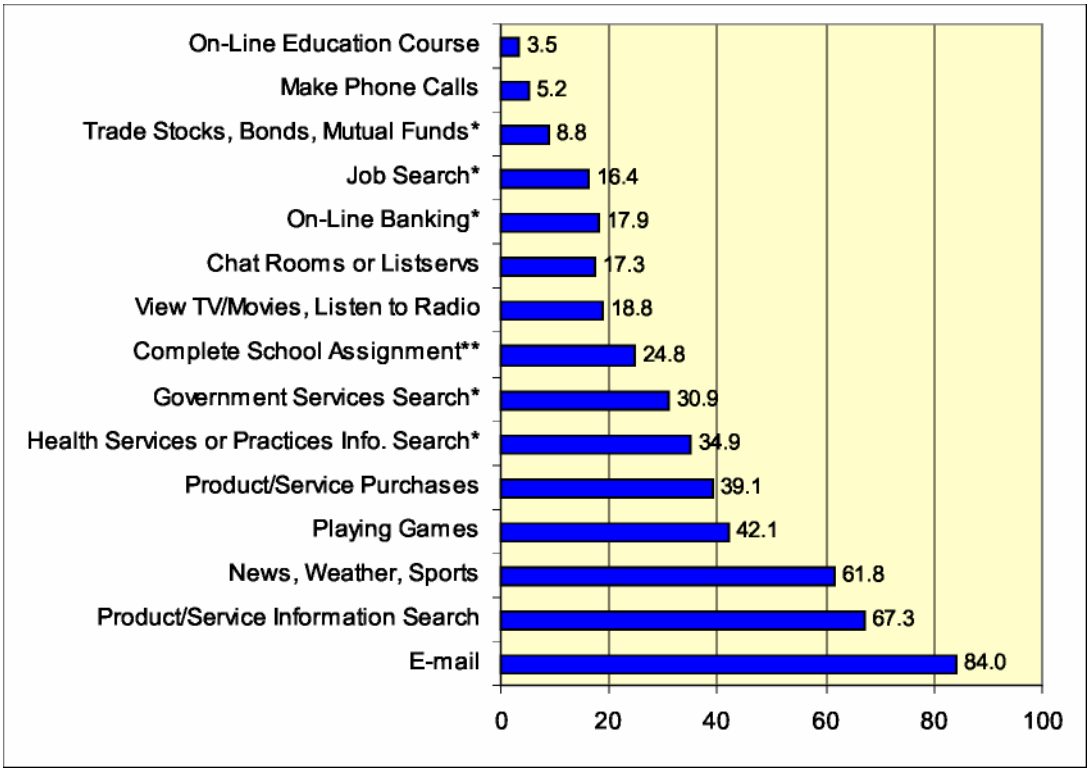


Source: NTIA and ESA, U.S. Department of Commerce, using U.S. Census Bureau Current Population Survey Supplements

Activities Among Those Individuals Online

Looking more specifically at *Internet users,* e-mail easily outdistances all other online activity (Figure 3-2). Online users are also connecting to the Internet in large numbers to search for information, whether it is product/services, health, or government services. The Internet is also a source for news and sports for many online users. To the extent that product/service purchases, online trading, and online banking represent consumers engaged in e-commerce, that activity is fairly strong and growing.

Figure 3-2: Activities of Individuals Online, 2001 As a Percentage of Internet Users, Persons Age 3 +



*These online activities surveyed individuals age 15 and over only. **This activity was asked of all respondents. If the response was restricted to individuals enrolled in school, the percentage of Internet users completing school assignments would increase to 77.5 percent.

Source: NTIA and ESA, U.S. Department of Commerce, using U.S. Census Bureau Current Population Survey Supplements

Whether an Internet user engages in a certain activity varies by some, but not all, demographic factors. For example, geography has little impact on the selection of activity. The proportions of Internet users engaged in specific online activities varies little across regions, and was similar regardless of whether the Internet user lived in a rural, urban, or central city area. Household type also showed little, if any, differences. Gender, age, race, and income, however, do have some relationship with Internet users' selection of online activities, as discussed below.

Summary

More low-income Americans are going online

Notwithstanding the fact that a significant gap still remains between the "haves" and "have-nots," it is true that every day greater numbers of low-income Americans are getting access to computers and beginning to use the Internet. In other words, more "potential" users of online content for underserved communities are online today, making the demand for content that meets the unique needs of low-income individuals greater than ever before.

- In the four years between 1997 and 2001 (the latest available data), the number of Americans with family incomes of less than $25,000 who used the Internet more than doubled (an increase from 7.8 million to 16.7 million).

- Among people in very low-income families (less than $15,000 annually), there was a 90% increase in those

online (increase from 4.1 million to 7.8 million)

Large numbers of low income individuals have limited literacy skills or disabilities

An estimated 44 million American adults do not have the reading and writing skills necessary for functioning in everyday life.5 They are served inadequately by today's Internet content, most of which is developed for intermediate or advanced readers. Appropriate online content for limited literacy Americans has the potential to raise literacy levels as well as employment levels.

New data, which for the first time includes information about people with disabilities, shows that approximately 8.5% of the population has at least one significant disability.6 For older Americans (aged 65 and older) the figure is nearly 30%.7 This data also shows, for the first time, that people who have one or more disability are much less likely to be Internet users than those without any disability.8 Yet, having access to, and the ability to use, online information (presented in ways that are accessible to the disabled) could open up valuable new ways for people with physical or mental difficulties to learn, work, or communicate with others.

More Americans from Other Cultures or Countries Are Using the Internet

For many of the 26 million Americans who are foreign-born, the lack of culturally diverse Internet content limited what they could find that was relevant and valuable to their lives, such as advice for dealing with a health problem tailored to their unique cultural beliefs or practices. According to more recent figures, that number has grown. There are now 28.4 million Americans living in the United States who are foreign-born.9 This larger group experiences first-hand the shortage of content organized around their unique cultural interests and practices.

Technology Access Outside the Home Is on the Rise

- Internet access from a location outside of the home more than doubled between 1998 and 2001, up from 17% to 4.8%.
- At the end of 1998, only 6.5% of the population used the Internet both at home and from another location. Three years later, the figure had nearly quadrupled to 24.5%.

The Internet is rapidly Becoming Essential for Basic Needs

- At present, over half (57%) of people over the age of 25 who are employed use a computer at work.15 In fact, blue-collar occupations are moving online faster than any other occupational group, with factory operators and laborers, for example, showing a 52% increase in one year alone in the number using the Internet.16
- According to a recent national survey, when looking for work-related information, 48% of respondents chose the Internet. Sixty percent chose the Internet for personal and special interest information needs, compared to 18% who chose magazines
- Health information is a top use of the Internet today; low-income individuals place a high value on it as well. In national survey conducted in March 2002, the Pew Internet Project found that 73 million Americans (62% of Internet users) have gone online in search of health information. On a typical day, six million Americans turn

to the Internet for health information. Most report that the information is helpful as they make decisions about themselves or a loved one.

- Three quarters of all individuals enrolled in school use the Internet to complete school assignments.19 Twenty-one percent of adults nationwide say their children's grades have improved since beginning to use the Internet.
- In 2001, 55% of Americans visited a government Web site, with 21% actually conducting business online with a government entity.21 Ensuring Internet access for underserved communities is important since, increasingly, families are expected to receive government benefits for which they qualify via the Internet – whether it is Medicaid or Medicare information, Food Stamps, or Social Security.

2.1.2 Impacts

There is no easy way to measure the impact of the current inequitable distribution of information technologies, but it clearly is becoming an increasingly important contributor to inequality in America according to the Office of Technology Assessment (OTA).[11] OTA described the effect as "the concentration of poverty and the deconcentration of opportunity." Email, video conferencing, fax machines, and computer networks are making it easier for jobs to migrate from city centers to suburbs and beyond, the OTA explained in a 1995 report. These technologies are enabling industries that once had to be close to customers and related businesses to operate at greater distances. Similarly, they are allowing distributors and financial institutions like banks and insurance companies to consolidate operations and locate "back room" facilities farther from their customers, eliminating many downtown jobs. At the same time, new technologies have led to sweeping changes in manufacturing processes, making old factories in urban centers obsolete. The OTA estimated that the 28 largest counties in the Northeast and Midwest lost one million jobs in the 1980s. The city of Chicago alone has more than 2,000 unused manufacturing sites, according to Krieg. As employers take advantage of technological advances to relocate to suburbs, the labor market in many cities has become fractured. Many highly skilled managerial and professional jobs remain downtown because they require a great deal of face-to-face contact and networking. But increasingly, the only work for unskilled people consists of low-paying, service sector jobs. Such jobs offer little hope of advancement, and intermediate jobs that would help less skilled workers climb career ladders are hard to find.

"We are witnessing the wholesale disappearance of work accessible to the urban poor," concludes Milton J. Little, Jr., executive vice president and chief operating officer of the National Urban League. His view was confirmed in 1996 by Harvard sociologist William Julius Wilson in When Work Disappears:The World of the New Urban Poor.

But the cities' loss has not been the rural areas' gain. "Without intervention, unemployment, poverty, and out-migration will likely increase, exacerbating the structural problems typical of rural areas," the OTA warned in an earlier report, Rural

[11] Office of Technology Assessment, OTA

America at the Crossroads: Networking for the Future. “Unlike routine manufacturing industries that migrated to rural areas in search of lower production costs, today's high-technology industries are attracted by a highly skilled workforce and communications networks to other economic markets and information centers. These are precisely what rural areas lack.”

“Poor, rural communities are already isolated,” observes Amy Borgstrom, executive director of ACENet, an organization dedicated to using networking technologies to open new markets for citizens in Appalachian Ohio. “There is low access to infrastructures.” Borgstrom argues that information technologies could enable isolated communities—rural and inner-city—to compete economically with other regions. “But without infrastructure, training, and access, information technology and these opportunities will pass these communities by,” she says.

2.1.3 Leveraging Technology for Individuals

There are some key questions/issues that must be addressed to ensure that technology is leveraged in a manner to support persons susceptible to poverty.[12] Access to technology must mean more than just computers and connections according to Bridges. “Providing access to technology is critical, but it must be about more than just physical access. Computers and connections are insufficient if the technology is not used effectively because it is not affordable; people do not understand how to put it to use, or they are discouraged from using it; or the local economy cannot sustain its use. The following issues are the determining factors in whether or not people have "real access" to technology; i.e. access that goes beyond just physical access and makes it possible for people to use technology effectively to improve their lives.

- *Physical access.* What can we do to make technology available and physically accessible to our citizens in their communities and workplaces?
- *Appropriate technology*. What can we do to ensure that the available technology is appropriate to how our citizens need and want to put technology to use, and that it fits within the reality of their daily lives?
- *Affordability*. What can we do to make technology access and use affordable for our citizens?
- *Capacity*. What can we do to help our citizens understand how they can use technology in their lives, and what can we do to ensure they receive the training they need?
- *Relevant content*. What can we do to ensure that content is developed that is locally relevant to our citizens, especially in terms of language?
- *Integration*. What can we do to ensure that technology is not just a further burden to the lives of our citizens, and how can we help them integrate technology into their daily routines?

[12] * Bridges.org, www.bridges.org/digitaldivide/realaccess.html.

- *Sociocultural factors*. What can we do to ensure that our citizens are not discouraged from using technology or limited in their use because of their gender, race, or other sociocultural factors?

- *Trust*. What can we do to help our citizens trust technology and how can we help them understand what happens "behind the screen" so that they will feel confident and be informed about things like electronic privacy, data security, and cyber -crime?

- *Legal and regulatory framework*. What can we do to determine how our laws and regulations affect technology use and what changes can we make to create an environment that fosters its use?

- *Local economic environment.* What can we do to foster local economic development that can and will sustain technology use?

- *Macro-economic environment.* What can we do to determine whether our national economic policies are conducive to widespread technology use, for example, in terms of transparency, deregulation, investment, and labor issues, and what changes can we make to create a more conducive environment?
- *Political will.* What can we do to gain public support for our e-strategies—and to fortify our government's political will so that we can make tough decisions and drive the change needed for our country to achieve its goals?

* Bridges.org, www.bridges.org/digitaldivide/realaccess.html.

Numerous on-the-ground initiatives are working to provide technology access and help put technology to use in underserved populations. There are an enormous number of efforts, ranging from telecentres to training to innovative business applications, Many initiatives address specific aspects of the range of issues, but too often they neglect related factors that limit their success. For example, too many telecentres providing computers and connections in rural locations do not become self-sustaining because local people do not use their services – often they have failed to address the role of the centre in the local economy or the need for locally relevant content. There is a need for a holistic approach to cover the range of issues to create effective and sustainable uses for technology that are integrated into communities

Providing access to technology is critical, but it must be about more than just physical access. Computers and connections are insufficient if the technology is not used effectively because it is not affordable; people do not understand how to put it to use, or they are discouraged from using it; or the local economy cannot sustain its use. *Real access* requires training, relevant content in local language, a supportive political environment, and a sustainable local economy.

Overall, a pooling of resources and experiences is needed. Dealing with the technology gap is beyond the scope of any single initiative. While it is important for organizations doing community technology projects to meet the needs of their clients as comprehensively as possible, the issues at stake require full collaboration.

Private sector programs are vital.

Many local initiatives have been executed to support or bring technology to low income individuals. Some examples of these programs are as follows:

DATA BUSTERS
NORTHEAST FLORIDA COMMUNITY ACTION AGENCY, INC.; JACKSONVILLE, FLORIDA
The Northeast Florida Community Action Agency operates a six-week competency-based summer program called "data busters." that introduces youth to hardware and software. The program receives federal funding through the Community Services Block Grant. Youth ages 15 to 16 participate in the program. Students use desktop computers and educational content software. Youth are introduced to a competency-based approach to pre-employment and work maturity skills. To demonstrate mastery of the work maturity skills, the youth work on schoolwork detail for which they are paid the minimum wage.

YOUTH TECHNOLOGY
MADISON COUNTY COMMUNITY DEVELOPMENT; EDWARDSVILLE, ILLINOIS
Madison County Community Development works in partnership with the Black Butterfly Youth Foundation to operate a computer technology center. The center primarily focuses on youth between the ages of 9 and 19; however, the center is open to adults as well. Funding for the center comes from CSBG, United Way, U.S. Department of Education, and the Catholic Diocese.

FRESH START PROGRAM
WESTERN DAIRYLAND COMMUNITY ACTION AGENCY; INDEPENDENCE, WISCONSIN
Western Dairyland's Fresh Start Program provides technology education to at-risk youth. The Fresh Start Program, with projects in both Eau Claire County and Jackson County, has received funding primarily from the Wisconsin Division of Housing and Intergovernmental Relations Bureau of Housing, as well as the Eau Claire County Housing Authority, the Department of Corrections (for those participants on probation or parole), the Wisconsin Conservation Corporation (WCC), the Wisconsin Department of Health and Family Services (DHFS) Title IV(e) (for those participants from group homes or foster care), and the Wisconsin Housing and Economic Development Administration. The Fresh Start Program has combined classroom instruction and house construction to provide education, employment skills training, and career direction to high-risk youth between the ages of 17 to 24. On a daily basis, participants are given instruction to develop skills in the areas of academics, employment, independent living, health and nutrition, and interpersonal relations. During the Program, youth participants acquire typing skills and competence in word processing software and Internet research. Additionally, Fresh Start youth have the opportunity to receive training in web page design and development and Internet applications at Western Dairyland's Women's Business Center.

At the Fresh Start Program work site, participants gain skills in home-building technology, while acquiring the motivation and attitudes necessary to succeed in the workplace and participating in a worthwhile community project. The youth learn home building skills, including how to draw and read blueprints and how to convert and scale measurements. The participants have the opportunity to use 3-D Home Architect computer software to design their own "dream" home and build scale models based on

those designs. The program coordinator teaches the youth the uses of Auto CAD 2000 LT, which gives the youth the opportunity to see a detailed picture of what the house will look like when finished. Using the blueprints and designs, the youth learn how to estimate materials and costs and how to prepare for and conduct the bid and permit processes. Upon the completion of the excavation and concrete work, the youth perform all construction activities, from the basic framing of the house to the very detailed work of installing cabinetry and trim. During this process, the youth learn how to use manual tools, such as tape measures, speed squares, architect rulers, and carpenters squares, as well as various power tools. Through technology education, the youth learn how to apply systematic knowledge to the homebuilding craft, which provides these at-risk youth with an improved education and refined work skills that lead to enhanced self-confidence and, for the first time in many of their lives, the feeling of accomplishment and success. Homes built by the Fresh Start Program are sold to low-income families.

The BeeHive (beehive.org)

The Beehive provides information and resources to individuals on areas such as: money, health, jobs, school and family. This past tax season, the Beehive launched a pilot project to help families use an online tool to file for the Federal Earned Income Credit (EIC), a program that helps low-income individuals and families get tax reductions and wage supplements of up to $4,204 a year. This program helps bring more children out of poverty than any other government program. The Beehive is a part of one-economy – a non-profit organization.

2.2 Community and Technology

The ability of communities to access, adapt, and create new knowledge using information and communication technologies is critical to the reduction of poverty. A number of studies have been commissioned to look at how technology has been leveraged at the community level to address issues of poverty. Some studies focus on technology in the community in general. Other studies focus specifically on how technology has been leveraged in low income communities to bring about positive results. In their book *High Technology and Low-Income Communities - Prospects for the Positive Use of Advanced Information Technology,* the authors outline five initiatives for using computers and electronic communications to benefit low-income urban communities:

- to provide access to the new technologies in ways that enable low-income people to become active producers rather than passive users;

- to use the new technologies to improve the dialogue between public agencies and low-income neighborhoods;

  "With the cooperation of Parent-Teacher associations, schools should be converted in the evening into community centers, open to the society at large, making them less vulnerable to gangs and more in touch with the community's real problems.

- to help low-income youth to exploit the entrepreneurial potential of information technologies;

  "Entrepreneurial immigrants are quickly becoming the driving economic force in many poor communities in New York and Los Angeles. Online selling, advertising and contacting over the Net could ease the difficulty of locating these start-up businesses in the invisible, dangerous areas of the city."

- to develop approaches to education that take advantage of the educational capabilities of the computer;

  "It is well know that a significant proportion of poor males, particularly among ethnic minorities, spend considerable amounts of time in jails. Prison becomes an extension to the community. To cut another vicious circle between poverty , racism, discrimination, and jails, information technology could be used to educate and train the prison population to provide opportunities for teleworking and to interact with prospective employers while in prison so that the link with education and jobs is not lost.

- to promote the community computer: applications of computers and communications technology that foster community development.

An article from the Wall Street journal described the issue this way[13].

> *"Silicon Valley," it said, "is in the midst of an epic boom, opulent even for this glittering edge of America." But such riches haven't reached many low-income communities— even ones like East Palo Alto, which is right in the middle of Silicon Valley's technological abundance. "Anywhere else in Silicon Valley, your parents use computers, there is a shop down the street to sell you a computer, another to fix your computer, another to give you computer classes, (and) there are Kinko's everywhere," notes Bart Decrem, director of a California youth technology initiative called Plugged In. "In East Palo Alto, there's none of that." The contrast between affluent and low-income communities may be particularly sharp in places like Silicon Valley, but it exists almost everywhere. The simple fact is that poor communities are entering the Information Age far behind their wealthier neighbors. "While [middle-class communities] are rapidly approaching the 'next cycle,' the technology of the previous cycle has already bypassed the inner city," says Richard Krieg, executive director of the Institute for Metropolitan Affairs, a public interest organization in Chicago committed to seeking practical answers to problems involving education, health care, and crime. Krieg notes that while families in affluent areas are rapidly acquiring home computers, people in many low-income neighborhoods have little exposure even to earlier generation tools such as laser scanners at supermarkets and bank automatic tellers. "Despite limited empirical study of technology diffusion…, it is clear that computerization, telecommunications, and mass media applications are dramatically underrepresented in distressed urban areas."*
>
> *As Krieg suggests, the technology gap is not simply a reflection of the choices made by individual households. The deeper problem is that many poor neighborhoods lack the infrastructure available in affluent areas. Groups such as the United Church of Christ that have studied patterns of telecommunications investment have found that, all too often, telephone and cable companies have moved quickly to wire wealthier suburbs with advanced systems, while poor, inner-city neighborhoods aren't upgraded. While public attention is often focused on whether individuals can get a service, the equally important problem is that lack of adequate telecommunications facilities makes an area less attractive for businesses. This can feed a spiral where the lack of investment at the community level leads to fewer economic opportunities for people who live there. As a result, the poverty in the neighborhood makes it a less inviting target for investment, further aggravating the problem.*
> *The same neighborhoods that lack infrastructure are comprised of households that are far less likely to have the tools of the Information Age.*

[13] *In an October 8, 1996, article describing one of California's technology corridors, the Wall Street Journal*

Among the services that are currently being provided through Technology in communities are

- Information
- Education and Training
- Mentoring and Consultation
- Self-diagnosis/self-monitoring
- Transaction processing

2.2.1 Leveraging Technology for Communities

Three key issues that communities are facing in leveraging technology: access, infrastructure and capacity.

Access

There are differing levels of access in communities to various forms of technology. There are differences in access in sustained and affordable form to landline phones, radio and TV, Internet, mobile phones, satellites services, etc. Although full access to information and communication technology requires more than the presence of devices and conduits, there remains pressing issues about physical access to computers and the Internet.

> *Access to technology, Upton, Owens and Hickok agreed, is no longer a privilege; rather, it is a requisite. After eight years of investments by school boards, the federal government, state governors and the private sector, more than 95 percent of schools are connected to the Internet; the average school has one computer for every five students. It's About Outcomes. The ratio of computers to children only tells us so much. The real challenge for public and private sector players alike is to move beyond the issue of access and ensure that technologies are used in meaningful ways to truly improve and encourage learning. Larry Irving told TTR participants, "but it's not just about access, it's got to be about outcomes. If all [a teenager] does with that technology are the things he or she can do with a newspaper or a television, if he or she is not getting new skills [or] … contributing to the community, then what's the point of this technology?"*

Andrew Clement and Leslie Shade present a seven layer conceptual model of access for communities. They discuss three main questions 1) access for what purposes, 2) access for whom and 3) access for what.

Infrastructure

There are differing levels of infrastructure relevant in communities. There are different levels of development of the underlying *infrastructure* that enables access to, and networking of technologies. Communities must (1) extend the telecommunications

infrastructure throughout the community and (2) make telecommunications more affordable. High-speed Internet access through cable modem and DSL lines is generally most available in urban and suburban areas, with limited availability in rural communities

Capacity

There are different levels of capacity to develop and use meaningful applications enabled by technology. In some instances the capacity of existing technologies to address poverty is not sufficient (i.e. applications not culturally relevant, don't consider language barriers, are not comprehensive)

Below are some technology initiatives currently underway in America to address issues facing communities.

Using technology to support community-based industry: ACENet

Citizens in Appalachia are using interactive technologies to tie their communities into the new world economy. The Appalachian Community Economic Network, or ACENet, was started in 1985 to help small businesses in the impoverished rural area find new markets. With ACENet's help, more than 20 entrepreneurs have found customers through the Public WebMarket, a project orchestrated by the Center for Civic Networking. To help small businesses get started, ACENet has developed a computer loan program. Beneficiaries include the Runges, owners of a mom-and-pop machine shop operation with three employees, who were able to increase their profitability with a computer leased from ACENet and purchase their own, more sophisticated computer system. Similarly, three women living in rural West Virginia used a computer leased from ACENet to coordinate shipping and distribution for a network of 40 home-based knitters. The network, in partnership with a larger company, uses the Internet to receive orders for custom knitwear from all over the world. Another entrepreneur, a mother with four children, receives email orders from around the world for herbs she grows.

Beginning in the fall of 1997, ACENet set out to train 18 students in the use of technology, entrepreneurship, basic workplace skills, and how to be a consultant. At the end of the year, the students will either own or work at a technology consulting and training facility, or they may decide to move on to higher education in order to further their technology skills.

Training 20th-century citizens for 21st-century jobs: The South Bristol Learning Network

People are not "disadvantaged," argues John O'Hara. They are "dislocated from the creation of wealth." What's more, he adds, "if they do not become involved in the creation of digital wealth, they will become even more dislocated."

O'Hara, who believes that "digital wealth" will be the most valued commodity in the global economy, secured a $1 million challenge grant from the British government in 1993 to establish the South Bristol Learning Network (SBLN) as a private nonprofit organization dedicated to creating an advanced information infrastructure. Dislocation was readily apparent in South Bristol, which had lost more than 40,000 jobs in the 1980s.

SBLN began by training 50 long-term unemployed South Bristol residents in information technologies, including email, database creation, web page development, CD-ROMs, business marketing, and the Internet. Once trained, the staff went into the community and evaluated 300 local education groups, community centers, and businesses to assess their information needs and better understand how to create a local information society. From these assessments, SBLN developed a plan to raise the community's awareness of information technologies, provide training, and build partnerships. In the process, they created a market for the trainers' new skills. SBLN staff went on to run skill workshops, provide technical services for local businesses, and give presentations about the Internet and information technologies. Of the 50 staffers originally hired, only seven have returned to the unemployment rolls.

O'Hara now heads the CyberSkills Workshops, dedicated to replicating the design and success of SBLN elsewhere in England, Europe, and the United States. More than 10,000 people representing 1,200 organizations have participated in the workshops. The South Bristol Learning Network model is being applied in Burlington, Vermont, at the Old North End Community/Technology Center, a project of Chittenden Community Television (CCTV) headed by CCTV's executive director Lauren-Glenn Davitian. CCTV and the city of Burlington started ONE C/TC to serve as a community media center and a local center for technology training. Like the South Bristol Learning Network, ONE C/TC recruits disenfranchised community members to serve as trainers and staff. More recently, it began focusing more on providing job training and information on how to develop small businesses.

A trusted service provider incorporates technology into its programs: United Neighborhood Houses of New York

Settlement houses provide Head Start programs, health education, job training, teen counseling, music, drama, language classes, and much more to at least half a million of New York City's residents. So it was a safe bet that if the settlement houses made the Internet available, people would show up and they have.

The United Neighborhood Houses of New York (UNH), an umbrella organization formed to help the settlement movement participate in social reform efforts, launched its Information Technology Initiative in 1991 with two overarching goals: to consolidate recordkeeping among settlement house programs so that caseworkers could spend more time meeting with their clients and coordinating services with other nearby organizations, and to provide safe, supportive, friendly telecommunications-based resources for community use. According to technology training coordinator Michael Roberts, UNH has helped nine settlement houses establish computer networks and get Internet access. Each

of these houses has created "neighborhood-based family rooms" as spaces for community members to use computers.

The settlement houses introduce community members to technology by incorporating computers into other programs. After-school tutors for children now use educational software, for example, and job training workshops use computer databases. More than 29 settlement house programs have integrated computers into their services.

Maxine Rockoff, who launched the program, recalls one group of 10 parents of children who were enrolled in Head Start programs at UNH. Six did not speak English, and none had ever used a computer before. Ten minutes after starting their first computer class, they were working in pairs and surfing the World Wide Web. One pair found an Ecuadorian website in Spanish that posted local newspapers and scores from regional soccer games. Another woman was so inspired by the session she signed up for a course in English as a second language.

Community demand for computer time has been heavy. Melissa Nieves, the librarian at a settlement house known as the University Settlement, says there is a long waiting list to use the 10 multimedia stations in the computer lab.

UNH currently is concentrating on training staff in business, email, and Internet applications so that the settlement houses can be sure that their clients are getting the most out of the resources provided to them. UNH family rooms are understaffed, but that is a problem that increased funding can easily solve. The big question, according to Roberts, is not simply "how do you weave technology into existing programs, but once you have, how do you assess if it's working?"

Rockoff, meanwhile, now advises the city of New York on how it can streamline its administrative requirements of service providers. In a recent interview, Rockoff reported that "the Settlement created great places for the community to learn about technology, but we didn't succeed as much as we wanted in reducing the paperwork load on the settlement houses."

Public institutions increasing access: Union City Schools and Libraries Online!

Many schools and libraries are using their technology facilities and their expertise in teaching to help communities gain skill with information technologies. Examples of this include the Union City School District in New Jersey and the libraries participating in the Libraries Online! initiative, which became the basis of the Gates Library Foundation.

Union City's school reform effort, supported by Bell Atlantic's donations of technology and technical support, has been one of the most successful and widely reported public-private educational technology partnerships. In 1989, Union City schools were about to be taken over by the state because of students' poor academic performance. Then the school district adopted several reforms, including revision of its curriculum. The district formed a partnership with Bell Atlantic so that the Christopher Columbus Intermediate

School, formed in 1993 to reduce overcrowding in other schools, would receive multimedia-on-demand interactive applications. All Christopher Columbus students and teachers were provided with computers to use at home.

According to a 1994 report prepared by the Education Development Center, a nonprofit research organization, student scores on achievement tests increased dramatically throughout the district after the school reform plans were implemented, with scores at Christopher Columbus topping the district average.

Parents as well as students have benefited. Union City has been running a Parent University in which students and their parents sign up for classes on such topics as family math and family science. Parents can take English as a second language and computer classes. Adriana Burke, the Parent University coordinator, reports that these programs have been an overwhelming success. "The parents see how we are doing a good job with their children," she says. "They see how much the children use computers, and they want to get involved." She says the program has inspired many parents to go back to school to improve their workplace skills.

Libraries Online!, a joint project of Microsoft Corporation, the American Library Association, and the Center for Technology in the Public Library, was created to increase Internet access to underserved communities through local libraries. Initially, nine library systems in the United States received staff training, computer hardware, and cash grants worth $3 million. Participants included Charlotte-Mecklenberg County, North Carolina; Baltimore County, Maryland; the Mississippi Library Commission; the State Library of South Dakota; Brooklyn, New York; Tucson-Pima County, Arizona; Los Angeles, California; and Seattle and Pend Oreille County, Washington. Each of these library systems offered training and support to small businesses, families, and students who were not likely to have access.

According to an outside evaluation, the time and money invested in the program had been put to good use. Of all respondents, 98 percent stated that they would return to the library to use the computers again, 83 percent said that they "had accomplished the task they had set out to do," and 62 percent said that they would "take advantage of learning more about computers now that they have access in the library." Fully 87 percent of users surveyed stated that they did not have Internet access at home.

The success of the Libraries Online! program prompted Microsoft chair Bill Gates and his wife, Melinda French Gates, to create The Gates Library Foundation in June 1997. The new foundation will spend $200 million over five years to help public libraries, primarily those in low-income areas, gain Internet access. Microsoft will supply an additional $200 million of software for the foundation to give away. The foundation also will provide training and support for library staff. It hopes to work with half of the 17,000 libraries in the United States and Canada. Gates stated that his vision is that "people will take for granted that you can walk into your local library, get the latest book, and sit down at a computer." The first round of grants, announced in early 1998, will benefit

more than 1,000 libraries, including 95 percent of the public libraries in Alabama, the foundation's first state partner.

Providing support and information for community technology centers: CTCNet

Community Technology Centers' Network (CTCNet) grew out of the Playing to Win storefront access centers founded by Toni Stone, a high school math teacher. CTCNet is composed of more than 250 computer access centers throughout the United States and Europe. All are committed to work toward a society where each member is "equitably empowered by technology skills and usage." CTCNet sponsors an annual conference, and six times a year it publishes a news update describing activities at member organizations, analyses of relevant policy developments, and discussions of funding, software, and partnership possibilities. Members also receive a start-up manual to help them work through the challenges of starting and maintaining a technology center. Regional CTCNet coordinators provide technical assistance to local centers. CTCNet has been working closely with the Department of Housing and Urban Development on the Neighborhood Networks initiative, and many neighborhood networks will become members of CTCNet. Also in the works are sites sponsored by the National Urban League and Bell Atlantic. Many of the initiatives discussed in this report are CTCNet members.

Using technology to strengthen neighborhood communications: The AFN-Neighborhood Network and MUSIC/LUV

The AFN-Neighborhood Network is a joint project of the Austin Free-Net (AFN), the Austin Learning Academy (ALA), and the 21st Century Project at the University of Texas' Lyndon B. Johnson (LBJ) Graduate Program in Public Policy. Together, the partners are studying the theoretical and the practical side of increasing access in Austin. A grant from the National Science Foundation supports eight graduate students and two faculty members who are studying how best to implement a community access project. Their findings have led to the Austin Access Model, a plan in which researchers and community members will develop community computer networks in six areas of Austin. Each network will offer training, neighborhood public access sites, and links to the AFN.

The 21st Century Project and the ALA received a $248,000 TIIAP matching grant to create the first community network in a roughly five-block section of East Austin known as the 11th and 12th Street Corridor. Most of East Austin's 70,000 resident are poor, and many are non-English-speaking.

Families participating in ALA classes on technology, English as a second language, or parenting are working with students in the LBJ program to design the AFN-Neighborhood Network. The development of the network will take place in conjunction with the implementation of a $9 million redevelopment grant for the areas from HUD. The content will be developed specifically for and by the region by local nonprofits, organizations, and businesses.

Linking Up Villages (LUV) is a Boston-based project designed to reinvigorate communities through local electronic bulletin boards and software called Multi-User Sessions in Community (MUSIC). "The LUV motto is, rather than focusing on National Information Infrastructure, to us, NII is really about Neighborhood Information Infrastructure," says Alan Shaw, president of MUSIC, Inc., the for-profit counterpart to LUV.

Shaw designed the MUSIC software a few years ago at the Massachusetts Institute of Technology's Media Lab. It enables participants to create an online version of their communities, complete with "buildings" and, within the buildings, "rooms." Subject to rules adopted by individual communities, individuals can "stroll" through this graphical "virtual neighborhood," obtain information on community services and activities, make their own contributions to the database, participate in live "chat" groups, or engage in sustained discussions through various community forums. All that's needed is a computer and a modem.

In Dorchester, a working-class Boston neighborhood, neighbors who got together online formed a food co-op, a neighborhood watch, and a community newsletter. In Newark, New Jersey, where a TIIAP grant helped LUV install a more extensive system, neighbors have put together a database on adult education programs, an employment hotline, a "political action" room, and discussion groups on everything from AIDS to recipes. Some local doctors have come online to answer health questions.

Although LUV primarily operates in Newark, its sphere of influence has been expanding. LUV's programs in Boston include a TIIAP grant to collaborate with the Boston Public Schools for a project, called Networking for Student Success, which will connect six Boston high schools and five community-based organizations and business partners, as well as the establishment of a web-based community safety network, called Citizens For Safety. In San Francisco, LUV is working with AT&T and the Greenlining Institute on The Signature Learning Project, which will connect parents whose children are in elementary school with the school's teachers and administrators. The families involved in The Signature Learning Project will receive MUSIC software in addition to the home computers needed to run it. In its Cincinnati project, LUV is teaming up with the Urban League of Greater Cincinnati and MYCOM in order to establish community network access centers, called Cybervillages, in the Cincinnati area.

LUV gives away its software to needy communities, and provides technical and start-up consultations for about $2,500. The big cost for a community wanting to develop a system is the computers. An $8,000 grant from the Wood Foundation helped put computers into a dozen neighborhoods in Boston. TIIAP provided $106,000 to help the Newark community purchase 35 computers and pay other start-up costs. LUV encourages communities to put computers in libraries and other public access locations and to ask businesses to donate their used computers. In the last two years, LUV has made great strides to ensure that all communities could reap the benefits of their MUSIC software. Originally designed to run on Macintosh systems, MUSIC is now available in PC format,

can be accessed through LUV Internet connections, and will soon be accessible through an NT server.

Providing underserved youth with enrichment and training for the jobs of the future: Break Away Technologies, Plugged In, and National Urban League Youth Achievement Initiatives

Youth initiatives address a special need in low-income communities. Children and young adults in neighborhoods struggling with persistent poverty have few opportunities for enrichment and positive growth within their immediate neighborhoods, and their opportunities to explore the world outside those boundaries are limited because they lack transportation, money, and trustworthy guides. Just as adults in these communities are isolated from jobs, kids are isolated from opportunities to grow and develop. Interactive technologies and the resources available on the World Wide Web can offer them new learning experiences. Kids who have been shut out can use online services to visit sites that show museums, cities, and wildlife preserves they otherwise would not get to see, and they can communicate with people who live far beyond neighborhood boundaries.

After-school access programs provide enrichment opportunities and training for the jobs and schools of the future. And, just as importantly, they help teenagers constructively fill the otherwise unstructured period between 3 p.m. and 6 p.m. (Research done at the request of the California State Legislature, for example, has revealed that the majority of teen pregnancies are conceived in this time period.)

In most communities, crime committed by youth is growing faster than most other types of crime, according to Steve Snow, director of Charlotte's Web, the community access network in Charlotte, North Carolina. "Young people see less and less reason to play by the rules," he argues. "If young people are not engaged in society (and electronic technology is part of a matrix of key interventions needed), then we won't be able to build the walls in the nation's suburbs high enough."

Break Away Technologies proves the value of youth initiatives. Break Away has about 100 computers primarily Pentiums, many of which were donated by Microsoft. The center is open from 9 a.m. to 8 p.m. Monday through Friday. Each day, about 400 elementary school students from the West Los Angeles Christian Academy come to the center for workshops. Each afternoon, about 50 teens wander in to take classes and surf the Internet. On Fridays and Saturdays, classes and services are available for adult learners.

Break Away also works with groups in the community. A teen development group, Rites of Passage, comes in for classes, as do various kids living in group homes. Break Away leads young people through a series of technology courses, each emphasizing character development and personal responsibility, as well as technology. As students advance through computer classes, they take on more responsibility, working first as study partners and then as mentors.

CIOF Community Technology Centers

Computers in Our Future is a four year $7.5 million demonstration project designed to increase access to technology and training opportunities for young people in low-income communities across California. Operating in and across eleven sites spread throughout the state, the project has also provided linkages to job training and employment, served as a community resource for technology, and established a statewide community voice to advocate for public polices that strengthen and support local communities. Initial funding for the project was provided through a grant from The California Wellness Foundation. Management and technical assistance for the CIOF project has been provided by Community Partners, CompuMentor and The Children's Partnership

The 11 Computers In Our Future sites have established community technology access and training centers in low-income neighborhoods across California. Their locations range from Siskiyou County in the north to San Ysidro at the southern border. With grants of $525,000 over four years from The California Wellness Foundation, sites are developing and supporting community technology centers that increase access to computer technology, teach marketable skills and enhance job placement opportunities. Each site will also serve as a community technology resource and promote a public discussion about technology issues. For more information, visit www.ciof.org.

Computers in Our Future program sites include:

Career Resources Development Center
Career Resources Development Center is a private, nonprofit organization with a 33-year history of providing educational programs to immigrants, refugees and other disadvantaged populations in San Francisco. Located in San Francisco's Tenderloin district, CRDC partners with homeless and runaway youth services agencies. CRDC primarily serves Chinese, African American, Latino, and Southeast Asian youth and young adults.

Center for Virtual Research, University of California, Riverside
The University of California, Riverside, Community Digital Initiative (CDI) has established a computer and educational center in the Caesar Chavez Community Center in Riverside. The Center for Virtual Research and the Center for Social and Behavioral Science Research in the College of Humanities, Arts and Social Sciences at U.C. Riverside are directing the initiative in partnership with community based organizations in Riverside.

Central Union High School District
The Central Union High School District is located in El Centro, a city of 39,000 in the Imperial Valley in the southeast corner of California near the U.S.- Mexico border. The Central Union High School District has established a community technology center at Desert Oasis High School, a school that provides an alternative education program for high school students and serves as the site for the District's adult education program.

C.T. Learning, Inc.
C.T. Learning, Inc. is a Fresno-based nonprofit organization working to empower residents of low-income communities through literacy and citizenship programs. It is the lead agency in a collaborative of faith-based institutions including Catholic, Episcopal and Baptist churches and the Fresno Interfaith Sponsoring Committee. It primarily serves African American, Latino, and Southeast Asian youth and young adults.

Karuk Tribe of California
The Karuk Tribe is a federally recognized Indian Tribe located in the remote Siskiyou County, near the Oregon border. The economy of the area has been adversely impacted by the decline of the timber industry, and 85 percent of its 4,000 residents are considered low-income by Federal standards. Through the Karuk Community Development Corporation, the Karuk Tribe and a broad spectrum of community organizations and representatives are working together to develop and implement economic revitalization strategies.

Plumas County Health Services
The Computers In Our Future program, administered by Plumas County Health Services, established four community technology centers in this rural northeastern county that is bordered on the east by the Sierra Nevadas. Collaborative partners include Plumas Children's Network, Almanor Basin Community Center, Portola Healthy Start, Roundhouse Council, and the Alliance for Workforce Development, Inc. From January 1998 through November 1999, Plumas CIOF had 1,627 free access participants and reached 22% of the 14-23 year old age group in the four local communities.

Santa Barbara City College
The Continuing Education Division of Santa Barbara City College is Santa Barbara's primary public sector provider of computer and technology-related instruction and delivers both English language and bilingual instruction in computer applications and vocational education. The Division has used its knowledge of starting up computer centers to convert two additional City College labs into open access centers based on the CIOF model.

San Diego Housing Commission/Casa Familiar
The San Diego Housing Commission is the public housing authority for the city of San Diego. The Commission has teamed with Casa Familiar, a local community-based organization, to increase access to computers, training and jobs for youth in San Ysidro, a low-income community of 34,000 with no high school or major employers. The computer center is located with an existing teen center and a fitness facility.

Women's Economic Agenda Project
The Women's Economic Agenda Project (WEAP) in Oakland is a not-for-profit organization founded in 1982 working to help women develop leadership skills and become economically self-sufficient. WEAP is using the Computers In Our Future funding to help lift women out of poverty by helping them develop computer and technology-related skills.

COMPUTER LEARNING CENTER

COMMUNITY ACTION PROGRAM OF EVANSVILLE AND VANDERBURGH COUNTY, INC.;
The Community Action Program of Evansville and Vanderburgh provides computer training at its learning center, which is funded by Health and Human Services/Head Start. Clients of any age can work on computers for assistance with math, reading, or GED study. Computers are also used for keyboarding classes and for use of the Internet.

The Texas Computer Education Association

The Texas Computer Education Association is the largest state organization devoted to the use of technology in education. Founded in 1980, the organization has been very active throughout Texas supporting instructional technology. Our primary focus is on integrating technology into the K-12 environment and providing our members with state-of-the-art information through conferences, workshops, newsletters, the Internet, and collaborations with higher education and business. TCEA is affiliated with the International Society for Technology in Education (ISTE) which provides a two-way channel of information throughout the world.

TCEA is divided into twenty areas across Texas so that the needs of our members can be more easily met. These twenty areas are defined by the Regional Education Service Centers. We encourage our members to stay in touch with the area directors so that everyone will be an active member. There are numerous area conferences and activities in which educators and students can participate, as well as our large annual state conference. The conferences and contests will link you with other professionals in your geographic area as well as across the state.

2.3 Technology in Human Services Delivery Infrastructure

Organizational silos and independently conceived and operated programs have led to a complex technological environment in Human Services. Many technology solutions are large-scale, complex, based on outdated technology, and designed to support single programs and as a result reinforce the "stove-piping" of program administration. The technology needs of Human Services agencies have been met via extensive customizations, commercial technology or "in-house" projects within the context of organizational and program silos. In many instances, the technology is antiquated and requires a huge expense for maintenance, while offering little flexibility. Further, systems have not been historically built to serve or empower communities or individuals. Rather systems have been built to meet program objectives.

Funding and administration for most human services programs are tightly confined to specific types of needs. A large number of programs, each with unique eligibility and business rules, provide a wide variety of solutions for many societal ills. However, for citizens to take advantage of these programs, they must figure out which agency to contact (a challenging task, given the excessive number of programs) or rely on a single point of contact within government for help to sort through these services. Unfortunately, human services agencies have struggled to create one-stop shops that empower case managers with the ability to simultaneously assess eligibility for multiple programs and provide coordinated service interventions.

While public policy makers are beginning to recognize that government programs can be more effective if they are individualized to the unique needs of each family situation, the one size fits all approach is ingrained into the infrastructure due to the monolithic programs and information systems. For several years, the U.S. government provided funding for state and local government for new systems, only if they transferred operational systems from other jurisdictions. However, because the business rules vary so much from state to state, even these so-called "transfer systems" required massive investment and time for customization, with little reduction in risk. Further, government procurement processes demanding "turn-key" projects compounded the risk and have discouraged many jurisdictions from attempting new systems to take advantage of the flexibility granted by the 1996 welfare reforms.

The primary entities currently addressing issues of poverty and their associated technology use include the federal government, state government, local governments, private and not-for profit agencies, and faith based organizations.

2.4 Characteristics of Technology in Human Services Organizations

Characteristics of the current Human Services environment technologically are as follows

Legacy Systems

Human Services agencies (HSA's) have a variety of legacy automation systems. These systems are generally mainframe systems that have been in existence for more than a few years. HSAs invested valuable resources to develop mainframe systems that were once on the leading edge of technology. However, technology continued to move forward at an incredible rate of speed, and mainframe systems developed only a short time before became the "legacy" mainframe system of today. Problems associated with legacy systems are

- Lack of adequate documentation.
- Programming styles and standards.
- Enhancements to customize a system to meet the needs of one organization reduced the potential for sharing technology among the HSAs.

Silos of Data

Organizational structures and independently conceived and operated programs have led to silos of data throughout government and non-government entities. Barriers such as large data volumes, quality and consistency of data, and complex, stovepipe legacy systems plague Government enterprises as they attempt to implement strategic initiatives that support data sharing. In an increasingly information-centric, collaboration-dependent world, agency performance depends on the ability to integrate, move and use data confidently and securely.

Costly Systems /complex Interfaces

Complex interfaces among multiple generations of hardware and operating systems are commonplace. The interfaces and limited in their reach and serve the silo rather than the client. Additionally, many of the system currently in operation are costly.

> California's current eligibility costs average $337 per eligible person across all three programs. Pennsylvania's eligibility costs for the three programs average $68 per eligible person. Pennsylvania has adopted an Internet-based eligibility system. Michigan's eligibility costs average $79 per eligible person. Florida's eligibility costs average $144 per eligible person. Florida is going through an eligibility vendor procurement process from which Florida estimates that it will reduce eligibility costs by 15–25 percent. New York state eligibility costs average $171 per eligible person across the three programs. Texas is in the process of developing of an integrated eligibility system using Internet-based applications with significant savings to its current system.

Fragmented Data Management

Historically, it was not considered necessary for disparate systems in a heterogeneous environment to inter-communicate, or if it was, expediency came first. Now there is an ever increasing requirement to ensure that data sources can talk to one another so that a complete "picture" is available.

Duplicate Processes - Service Provision
Processes are duplicated across different systems and have the potential to generate large volumes of inconsistent data.

Access Issues
Access to existing information technology systems is governed by the 'silo" that owns the system. For the most part, information is limited to the organization or individual managing the silo. Access to the Internet varies by community and individual.

Lack of Standards
There are few common standards within the human services infrastructure. There are no common data structures, no geographic wide data, and access issues throughout.

Infrastructure Issues
Infrastructure is not in place to allow all components of the Human services enterprise to participate in the process. Many organizations have a huge investment in proprietary server designs which require a lot of care and feeding at a great cost.

2.5 Technology Actions – Government

2.5.1 Leveraging the Internet

Internet Technology has been used by Government to provide or publish information that may benefit individuals, communities and society

Governments generate huge volumes of information, much of it potentially useful to individuals and businesses. The Internet and other advanced communications technologies are being used to bring this information quickly and more directly to citizens. "Publish" implementations of e-government enable citizens and businesses to readily access government information without having to travel to government offices, stand in long lines or wait for government service workers. Publish sites seek to disseminate information *about* government and information compiled *by* government to as wide an audience as possible.

Internet Technology has been used by Government to broaden interactivity
Internet sites that Publish information, however rich in content, are just a first step. E-government has the potential to involve citizens in the governance process by engaging them in interaction with policymakers throughout the policy cycle and at all levels of government. Strengthening civic engagement contributes to building public trust in government. Interactive e-government involves two-way communications, starting with basic functions like email contact information for government officials or feedback forms that allow users to submit comments on legislative or policy proposals.

Internet Technology has been used by Government to transact government services available online

Governments can go further, by creating websites that allow users to conduct transactions online. Just as the private sector using the Internet to offer e-commerce services, governments can do the same with their services. Potential cost savings, accountability through information logs and productivity improvements will be important drivers. A transact website offers a direct link to government services, available at any time. In the past, government services such as renewal of drivers licenses required long waits. Innovations such as citizen service kiosks and home-based internet access bring e-government directly to citizens.

Achieving E-Government for All provides the latest results on how governments are responding to the serious challenge of making their online services accessible and relevant to all people, regardless of their abilities, skills or economic situation. The study concluded that information on most government websites is skewed to the needs and abilities of highly educated English speakers. For low-literate populations, the Web remains an untapped resource. People with disabilities, such as those with visual impairments, continue to struggle with government websites that don't address their needs. And the emerging practice of fee-based online services penalizes the poor, who would reasonably expect essential information and services to be available at no cost. Tens of millions of Americans cannot avail themselves of essential services, since government information and services are not offered appropriately to accommodate their needs:

- 112 million Americans were not online in early 2002, according to the U.S. Department of Commerce's *A Nation Online* report;

- 90 million adult Americans are defined as low literate, based on the findings from the National Assessment of Adult Literacy (1992);

- 53 million Americans have some level of disability, says the U.S. Census Bureau (1997); many of whom (e.g., people with visual impairments) have trouble interfacing with most websites;

- 25 million adult residents speak a non-English language in the home, data also from the U.S. Census.

"As government officials transfer day-to-day responsibility of their websites to technicians and webmasters, there is often benign neglect of underserved citizens whose needs may be outside the realm of the experience of well-educated, high-tech professionals. This reality reflects less on the webmaster and more on higher-level decision-makers who fail to give priority to social inclusion as a primary duty of government of, by and for the people."

City, state and national governments in the United States have made considerable progress at getting services online. According to recently released Brown University studies, 68 percent of federal sites, 44 percent of state ones and 48 percent of city government websites offer online services. These numbers are up over recent years and demonstrate the success officials have achieved in bringing the advantages of technology to businesses and slices of the general public.

Despite the extensive progress made in upgrading government offerings, several pressing policy issues remain for government officials. For example, not all Americans are sharing in the fruits of technology: there remain well-documented differences in access and digital literacy, with poorer people and communities of color being less likely to have Internet access or to make use of electronic information and services. Reports such as the Benton Foundation's *Bringing a Nation Online* and the Pew Internet and American Life project's *The Ever-Shifting Internet Population* demonstrate that there is still much work to be done when it comes to bridging the digital divide.

In addition, there are challenges concerning the accessibility of digital government for people with disabilities. Individuals who have a visual disability, a hearing impairment or who face other physical challenges do not have the same access to online content as the non-disabled. Many government agencies are not designing their pages in accessible ways or are not taking advantage of technologies that facilitate usage. With the U.S. Department of Education's National Adult Literacy Survey revealing that half of Americans are reading at the eighth-grade level or lower, many websites are also inaccessible because they are written at too high a level for many visitors to comprehend. Complex words and sentences limit the utility of digital government and deny the advantages of e-government to large populations of American society.

Data presented in the Brown University e-government studies of city, state and national government highlight six policy issues facing the public sector. In particular, (1) disability access, (2) readability, (3) non-English language accessibility, (4) interactivity, (5) equity of access across agencies and (6) user fees and premium sites.

1. Disability Access

In this year's study, 47 percent of federal sites satisfied the W3C standard of accessibility, 33 percent of state sites did and 20 percent of city government sites met the test. With the stricter Section 508 guidelines, 22 percent of federal sites were in compliance, compared to 24 percent of state sites and 13 percent of city websites.

The wide variance in compliance across levels of governments suggests the need for education and stronger enforcement action in e-government. City governments run considerably behind state and federal sites in making their sites compliant with disability standards. The federal government needs to provide resources for this policy area so that all levels of government can provide disability access. There has been a federal push in recent decades to improve accessibility for

traditional "bricks and mortar" government, but not the same kind of effort for digital government. This interferes with the ability of the disabled to take full advantage of the e-government progress that has been made in recent years.

Beyond the governmental area, nonprofit groups can play a constructive role by publicizing “best practices” in terms of website accessibility, such as the CPB/WGBH National Center for Accessible Media. Agencies that do an exemplary job should be officially recognized for their accomplishments. They deserve financial incentives that encourage them to keep working hard in this area and give lower-performing sites incentives to do better at providing disability access. Indeed, in these trying fiscal times for government at all levels, the need for direct, categorical support for making e-government accessible to all is highly apparent and underscored by the findings of this study.

2. Readability

Literacy is defined by the U.S. Department of Education as “using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.” As noted earlier, about half of the American population reads at the eighth-grade level or lower. A number of writers have evaluated text from health warning labels to government documents to see if they are written at a level that can be understood by citizens. The fear, of course, is that too many government documents and information sources are written at too high a level for citizens to comprehend.

Since government websites are text based, clearly readability is a basic consideration if users are to comprehend what’s online. To see how government websites fare, we used the Flesch-Kincaid test of the grade-level readability of the front page of each government website that we studied. The Flesch-Kincaid test is a standard reading tool evaluator and is the one used by the U.S. Department of Defense. It is computed by dividing the average sentence length (number of words divided by number of sentences) by the average number of syllables per word (number of syllables divided by the number of words).

The average grade readability level of American government websites is at the eleventh grade, which is well above the comprehension of many Americans. Sixty-three percent of federal sites read at the twelfth-grade level, while 68 percent of state sites are at that level, and 70 percent of city sites are legible at the twelfth-grade level. Only 12 percent of state and federal sites and eight percent of municipal sites fell at the eighth-grade level or below, which is the reading level of a major segment of the American public.

Inattention to readability limits the usefulness of government websites for visitors who cannot comprehend online information. In particular, reports, databases and online services need a level of readability that matches the skills of the target audience. Officials must recognize the importance of communicating with a broad

range of visitors with different levels of educational attainment and literacy. Those who are responsible for authoring and editing government documents must integrate content readability into their editorial processes. It will require a program of training, skill building and incentives to equip and encourage agency staff to write and edit in a simple and readable style. Agencies must realize that achieving readability will not come without financial cost.

In our research, we found little correlation between agency type and readability level. Agencies that served individuals who were generally less educated paradoxically often had higher grade-level readability than those whose content might attract more highly educated users. So clearly much more attention needs to be paid to readability as an important accessibility barrier for government websites. Much like disability access, readability should be considered an integral aspect of website accessibility and not an add-on.

3. Non-English Language Accessibility

Some people who visit government websites do not speak or read English or speak/read it poorly -- over 25 million people in the U.S., for example, prefer to speak a language other than English at home. The Brown report indicated that governments in the United States are making slow progress in providing foreign-language accessibility. In 2003, 40 percent of federal sites, 12 percent of state sites and 16 percent of city sites offered some type of foreign-language translation. These numbers are up from previous years for state and federal sites. In 2000, only four percent of these sites featured foreign-language translation. This rose to six percent in 2001, seven percent in 2002 and 13 percent in 2003.

4. Interactivity

One of the most promising aspects of e-government is its ability to bring citizens closer to their governments. In our examination of government websites, we looked for several key features that would facilitate this connection between government and citizen: email contact information, comment or feedback sections, automatic email updates and the ability to personalize websites to the visitor's particular area of interest.

We found mixed results, depending on the particular kind of outreach. Most sites provide email contact information (93 percent of federal sites, 90 percent of state sites and 71 percent of city sites). These numbers are up over preceding years. In terms of areas to post comments or provide feedback through surveys or chat rooms (other than through email), 52 percent of federal sites, 23 percent of state sites and 35 percent of city sites provide some means for visitors to offer reactions, suggestions or criticisms.

Automatic updates and website personalization still are relatively infrequent. Only 32 percent of federal sites, 11 percent of state sites and eight percent of city sites

have a means to send automatic updates on specific issues. This information can be in the form of a monthly e-newsletter highlighting new information or email alerts notifying citizens when something relevant to their area of interest has become available. Some states allow visitors to designate themselves as students, tourists or businesses and customize the website to their particular interest. This gives visitors more power over website content and allows them to use the technology in a nonlinear manner. They can search and manipulate information in a manner that serves their particular needs. However, very few sites -- five percent of federal sites, two percent of state sites, and four percent of city sites -- offer any type of personalization feature, whereby website visitors can register preferences that allow them to customize the site to their particular interests. This may not be a deficiency on the part of government websites, as the technology behind personalization of websites is highly controversial. Often, personalization is accomplished through "cookies," which are used to identify users and store information about them. Many privacy advocates, though, view cookies as an unwarranted intrusion into civil liberties.

Feedback mechanisms are important for websites because most agencies do not have budget resources to conduct surveys or focus groups. Some government officials have told us their only feedback mechanism is their telephone complaint line. When complaints rise, they know they have a problem, and they seek to address it.

Unfortunately, this puts government in a reactive mode. Officials cannot respond to problems until specific issues have been highlighted. Rather than merely reacting to complaints, it would be more useful to be proactive and develop feedback devices such as online surveys and satisfaction forms that provide regular, ongoing, and systematic feedback on website materials. Volunteer citizen advisory boards could be formed to solicit participation and feedback from concerned stakeholders. Such efforts serve to put government officials in a stronger position to direct future e-government efforts.

5. Access Across Agencies

Accessibility varies considerably by agency type. At the state and federal levels, there are interesting differences across agencies in terms of disability, data, online services and readability. Economic development sites were the least likely to be accessible to people with disabilities. Health and housing agencies were the most likely to offer non-English language translation. Health departments were the most likely to have databases, while budget departments were the least likely. Economic development sites were the most likely to offer online services, while budget departments were the least likely.

Readability also varied by the type of agency. For example, corrections departments had the highest percentage (83 percent) of websites written at the

twelfth-grade level. Other agencies that have a high percentage of sites written at the twelfth-grade level are budget (81 percent), economic development (79 percent), elementary education (74 percent), housing (69 percent), health (69 percent), human services (67 percent) and taxation (46 percent). For more details, see the full e-government report at www.insidepolitics.org/egovt03us.pdf (Adobe Acrobat version) or www.insidepolitics.org/egovt03us.html (accessible HTML version).

The mismatch between agency type and accessibility and readability suggests the need for government officials to recognize their mission and tailor their e-government activities to the nature of their clientele. Readability levels should match the bulk of the visitors who make use of the agency's website. Disability access should be part and parcel of universal design, and should be unvarying by agency type. Government offices should seek to be comprehensive in posting information, reports and data online; however, this should not preclude other means of accessing information, such as printed materials and automated telephone systems.

6. User Fees and Premium Sections

The final aspect of equity and accessibility concerns financial barriers to e-government use. With governments at all levels facing fiscal difficulties, we have been charting the extent to which public-sector websites have started to move toward user fees or premium sections requiring payment for entry. A user fee is an extra fee tacked on to the ordering of an electronic report or service, while a premium section fee is a payment or subscription required for entry into particular areas of a website, such as business services, access to databases or viewing up-to-the-minute information.

In general, we have not found that American governments at any level are relying very much on user fees or premium section charges. None of the federal sites, three percent of state sites and seven percent of city sites employed user fees. Less than one percent of the national, state or city sites had premium sections requiring payment for entry or access to a portion of the website. This is encouraging because user fees and premium sections create the possibility of a two-tier society based on those who can afford information and those who cannot. E-government should not contain barriers to usage based on the ability to pay. Bricks-and-mortar agencies have developed a variety of ways to serve different members of the population. Libraries provide books to diffuse knowledge through public access. Public areas in agencies allow access by those who do not have computers.

It should be noted that online financial transactions, whether government-related or not, may pose challenges to low-income people who do not possess a credit card or those who more generally may not feel comfortable providing financial information online. It is known that comfort levels with electronic transactions is

a function of the length of time a user has been online, such that new Internet users are less likely to reveal personal information than those for whom the Internet is now second nature. Alternative methods of payment and face-to-face transactions are still paramount for a large segment of the population.

> User fees and premium sites compromise the principles of equal access to government by making it more difficult for the poor and needy to use public resources. Government agencies should continue their general avoidance of these fees. In an era of fiscal tightness, it is tempting to expand user fees and premium sites as a way to finance e-government. This temptation should be resisted because it undermines equity of access and the ability of governments to attract new users to their websites. Anything that constrains public access compromises the ultimate goals of e-government.

The Internet is a tool with the potential to help all Americans become more efficient, effective, and productive members of society. Officials should redouble their efforts to make sure e-government is open to all and that vulnerable populations are not further marginalized from the benefits of technology.

2.5.2 Legislative actions in 2003 to address the digital divide

Despite record state budget shortfalls throughout the country, there was still notable progress in increasing technology access and training opportunities. Probably the most ambitious policy development occurred in California, where community technology advocates pushed through a bill that created a Digital Divide Grant Program with a sustainable source of funding. In addition, other states made strides to address technology access by creating committees or task forces to study the issue, make recommendations, and report back to the legislature. In Cleveland, public agencies and community groups connected to existing but unused high-speed bandwidth to serve their broadband needs. Following is a snapshot of policies—both legislation or regulatory actions—that took place in 2003[14].

Create a Statewide Digital Divide Grant Program
In California, community technology advocates and wireless companies succeeded in their two-year effort to create a Digital Divide Grant Program. This program was created through legislation, AB 855 (http://info. sen.ca.gov/pub/bill/asm/ab_0851-0900/ab_855_bill_20031011_chaptered.html), which centralized the process through which wireless companies lease state-owned property where they can place cellular towers to increase wireless coverage. In exchange for using state property,

[14] 2004 The Children's Partnership.

wireless companies pay the state a fee. A portion of this fee, 15%, goes into a fund that supports community technology programs engaged in Digital Divide projects, such as creating online content, providing access to computers and the Internet, and offering technology training to youth. The revenue generated for this fund has been projected to range between $3 million and $6 million per year.

Establish a commission or task force to study the advanced elecommunications needs of the state and make recommendations to address these needs

The Louisiana Legislature passed SCR 91 (http://www.legis.state.la.us/leg_docs/03RS/CVT7/OUT/0000KS91.PDF), which created a joint committee of the House Committee on Agriculture, Forestry, Aquaculture, and Rural Development and the Senate Committee on Agriculture, Forestry, Aquaculture, and Rural Development. This joint committee will identify the availability of Internet access in Louisiana's rural communities and to study issues and make recommendations related to solving problems encountered with providing reliable Internet access to Louisiana's rural communities.

Similarly, in North Carolina, H.B. 1194 (http://www.ncga. state.nc.us/html2003/bills/AllVersions/House/H 1194vf.html) was signed into law. This bill creates the e-NC Authority for purposes of managing, overseeing, promoting, and monitoring efforts to provide rural counties and distressed urban areas with high-speed broadband Internet access. The Authority also serves as the central Internet access policy planning body for rural and urban distressed areas of the State. The Authority is also charged with communicating and coordinating with state, regional, and local agencies and private entities in order to continue the development of a coordinated Internet access policy for the citizens of North Carolina.

Oklahoma passed a similar law, SB 556 (http://www2.lsb.state.ok.us/2003-04SB/sb556_enr.rtf). This bill commissions the Task Force on Oklahoma's Communications Infrastructure and charges it with conducting a study of the communications infrastructure in Oklahoma. The study is supposed to include, but not be limited to, the following: 1) An overview of the existing communications infrastructure, including both public and private components, with particular emphasis on Internet access; 2) Assessment of the strengths and weaknesses of the existing infrastructure, including issues such as interoperability, efficiency and impact on economic development; and 3) Development of recommendations for creating a communications infrastructure which will provide a seamless delivery system for voice, data and video capacity and for Internet access throughout all areas of the state.

Provide advanced telecommunications discounts for Community Based Organizations (CBOs)

The California Public Utilities Commission approved T-16742 (http://www.cpuc.ca.gov/PUBLISHED/FINAL_RESOLUTION/26074.htm), a resolution that affirmed SB 1863's (http://www.leginfo.ca.gov/pub/01-

02/bill/sen/sb_1851-1900/sb_1863_bill_20020828_chaptered.html) intent of increasing advanced telecommunications discounts for CBOs to 50%. In addition, it streamlined the process through which CBOs apply for discounts, included DSL as a discounted service, and removed the limit on the number of services that qualify for the discount. As a result, this resolution expanded the scope of SB 1863 so that more CBOs can take advantage of this program to save overhead costs.

In addition, the California Legislature passed into law SB 720 (http://www.leginfo.ca.gov/pub/bill/sen/sb_0701-0750/sb_720_bill_20030925_chaptered.html), which allows CBOs to apply for a one-time discount of 90% for installation costs and connection to advanced communications infrastructure (so-called Internet 2). The intent of this bill is to allow CBOs access to highspeed and reliable Internet access, and, as a result, access to the rich after-school curriculum that requires a high-speed connection and is used by schools.

Include community technology needs as part of statewide or regional development plans

To create economic opportunities in Illinois (http://www.commerce.state.il.us/), the governor facilitated the creation of regional development plans. By dividing the state into ten distinctive regions that share similar economic traits, the state hopes to track more effectively economic conditions and trends, rapidly respond to opportunities and challenges, and customize regional development initiatives with greater precision. These plans recognized and included the development of a broadband infrastructure and investment in workforce training programs in 21st Century Skills.

Provide wireless Internet access

In Central Los Angeles, the Bresee Foundation (http://www.bresee.org/pages/techoverview.html) began offering free wireless Internet access in its recently-opened park. Situated in a region of Los Angeles with very few green spaces, the park offers residents not only a place to congregate, but also a place to access the Internet. The Bresee Foundation received funding from both the city of Los Angeles and the state of California to develop this park, but absorbed the cost of Internet access by purchasing several Apple Airports to extend Internet access to outside the building.

Similarly, The Wireless Community Project of the Center for Neighborhood Technology (http://www.cnt.org/) aims to demonstrate how wireless Internet access can work in two underserved areas of Chicago. Recently funded by the federal Technology Opportunities Program (http://www.ntia.doc.gov/top/), this project will provide wireless Internet in Chicago's ring-city, Elgin, and in downstate West Frankfurt.

Develop resource and referral networks
Illinois passed the 211 Human Services Collaboration Act (http://www.legis.state.il.us/legislation/publicacts/fulltext.asp?name=093-0613), which will coordinate efforts of eight state agency boards to create 211 Plans in ten Illinois telephone area code areas. 211 is a statewide non-emergency phone number that provides information about government and nonprofit services and referrals to human services agencies. This network will allow community technology programs to promote their services, such as afterschool programs or workforce training.

Utilize dark fiber
Nonprofit organizations and public entities (universities, city, schools, public TV network, etc.) in Cleveland created a consortium, called "One Cleveland" (http://onecleveland.org), to acquire and utilize several rings of dark fiber—fiber that has been laid in the ground but not used—through which they will offer affordable gigabit network access throughout the county. Members of this consortium will use the network to deliver advanced information technology capabilities to achieve community priorities for learning, job training, research, economic development, and community access to culture, healthcare and e-government.

Offer tax credits
In Michigan, Grand Rapids Community Media Center (http://digitizethis.grcmc.org), a community media center that offers access to TV, computers, and the Internet, received a boost in their fundraising efforts by utilizing a favorable determination on a state tax credit question. The state attorney general's office determined that financial contributions to community television could be considered a tax credit. In other words, by treating a financial contribution as a tax credit, the donor could reduce his or her tax liability, or taxable income, thus allowing the donation to be subtracted from the donor's pre-tax income. This tax credit was used by GRCMC as an incentive for donors to contribute to the organization during their year-end fundraising drive.

The research that resulted in "How Cities and States Are Bridging the Technology Gap" was conducted by The Children's Partnership between May and November 2001. It included a review of available analyses on the subject, extensive Web research, and dozens of interviews with informants in the public and private

2.5.3 Nationwide trends in addressing the digital divide

This analysis looks at the level of activity and the nationwide trends in city and state attempts to address the Digital Divide. The Digital Divide has narrowed in some cities and states, but remains a critical problem for many low-income communities across the country (http://search.ntia.doc.gov/pdf/fttn00.pdf). It also provides a sampling of the

varied approaches, involving the public and private sectors, to achieve widespread technology access and competence.

1. **A New Emphasis on Protecting Our Rights in Cyberspace**. While many states are focused on harnessing the benefits of technology (through e-government, e-trade and commerce, and tax policies that are supportive), there is even greater activity around protecting consumers and businesses from the misuses of technology.

2. **From E-government to Privacy and Public Safety.** In 2000, the vast majority of bills signed into law by states grappled with e-government; in 2001, attention to Internet privacy issues dominated the action. Notably more legislative attention was focused on privacy (including financial, Internet, medical, identity theft, consumer credit, and unsolicited commercial e-mail) than on the second-most active subject-- public safety (including computer crimes, harming minors, and content accessible in schools and libraries).

3. **Energetic Responses at the Local Level**. Cities and counties are proving to be an active and fertile testing ground for leadership on Digital Divide issues. With so many residents in central cities now on the wrong side of the Digital Divide, the problem is very immediate. National leadership groups representing cities, counties, and mayors have made this area a priority, devoted time at national conferences to it, and established policy to support city-led efforts (http://usmayors.org/uscm/resolutions/69th_conference/). Efforts by local communities often have the benefit of being carried out on a manageable scale, while testing ideas that can be applied on a statewide basis.

4. **Promising but Isolated Responses**. While there is a growing awareness of the Digital Divide among city and state decisionmakers, there are only isolated efforts to solve the problem. Many are analyzed in "Examples of Cities and States." They run a wide gamut from authorizing studies or task forces to establishing grant programs or a state authority to build the infrastructure for high-speed Internet access. Ironically, there seemed to be an underlying assumption that all residents would have access to the benefits e-government sought to offer. Yet, 75% of Americans with annual incomes less than $15,000 lack access to the Internet, as do 67% of individuals with annual incomes between $15,000 - $24,999 (http://www.ntia.doc.gov/ntiahome/dn/anationonline2.pdf).

5. **Community-based Solutions Neglected**. Where the Digital Divide is being addressed by cities and states, much of the focus is on bridging the gap in schools, with decisionmakers viewing the subject as a school technology issue rather than an equity issue. Attention to access through other community institutions is very rare, although a few beacon cities and states are starting to point the way. Interestingly, where schools have made particular progress in technology, leaders are beginning to understand that technology use by youth has to extend beyond the schools and into the communities (http://www.edweek.org/sreports/).

6. **Wide-Ranging Goals Prompt Action**. Where city and state leaders are promoting Digital Divide initiatives, they are prompted by a variety of goals. These include workforce development, e-government or e-commerce, building city or state infrastructures, reducing crime or gang activity, welfare to work, increasing school achievement, youth development, and civic participation.

7. **Digital Divide Leaders in Search of Allies**. Although a core cadre is starting to build of city and state leaders working across states to help one another or seek technical assistance jointly, this network is still fledgling. Leaders report feeling isolated, a situation that is particularly worrisome to them because most lack expertise in this uncharted and highly technical area. Now seems to be the time when a learning community can be forged among public and private sector leaders working on a similar mission.

8. **Ingenuity in Redeploying Resources**. The fiscal constraints, which few states experienced in 2000, forced many states in 2001 to find new ways to respond to the Digital Divide. Those cities and states that exercised leadership usually did so by redeploying existing personnel or facilities, redirecting existing funding sources toward this new challenge, and creating partnerships with business, philanthropy, and the nonprofit sector.

Below are some other examples of current technology used in Human Services. These examples are intended to represent the range of technological solutions currently deployed in Human services.

2.6 Current Applications of Technology in Human Services

Although the majority of technological solutions in place in local agencies are legacy-based silos, there are examples of innovations taking place currently to leverage emerging technologies. This listing is not an exhaustive listing

E-Government

Many local, state and federal governments are currently experimenting with "e-government," meaning the ability to access government services and get government information electronically. E-government can become more productive and cost-effective by increasing the opportunities for citizens to access information, fill out forms, pay bills, and sign-up for services from any computer, at any hour of the day. E-government is also seen as a new way to engage citizens in civic participation and encourage a more "user-friendly" image of the democratic (and bureaucratic) process. Along with ensuring that no one is left out, the goal for effective e-government is to design web sites that encourage using online services, market those sites to be sure that people are aware of what is available, and to respond quickly to improve and expand on e-government services.

Nebraska's N-FOCUS System

N-FOCUS is a fully computerized eligibility determination and case management system that joins together twenty-seven programs. This system has integrated child welfare, case management functions and built in a client/server environment. "The system makes use of rules-based artificial intelligence to determine eligibility for multiple programs, including:

Income Support Programs (TANF, Food Stamps, Medicaid); Employment First and Food Stamp Employment and Training, Child Care, Emergency Assistance, Adult Protective Services intake, Developmental Disabilities case management, Children and Family Services (Child Welfare programs), Social Services for the Aged and Disabled and for Children and Families, Refugee Resettlement, Medicaid Waiver Programs"[3]

The structure provides intensive case management, includes resources and services, and utilizes the system to make payments to clients and their providers. N-FOCUS automatically interfaces with other state and national systems, such as the: "State Bureau of Motor Vehicles, Unemployment Compensation, the Internal Revenue Service, and the Social Security Administration."[3]

Louisiana's Department of Health and Hospitals

Recently Louisiana's Department of Health and Hospitals faced two major challenges. The first was to design and develop a Medicaid eligibility system that would meet the requirements of the eligibility determination process, not just for today but the future. The second was to achieve this in a short period of time, in this case 19 months--an extremely aggressive timeframe for such a project.

Either of these challenges alone would have been daunting. Addressing both was a substantial undertaking. Yet, the Medicaid Eligibility Data System (MEDS) was implemented in July, and is now being used statewide in all eligibility offices.

Prior to implementing the new MEDS system, changes to a welfare program that affected Medicaid would result in computer programmers having to modify the system. Modifications to the system required testing, frequently a complicated and costly task. Louisiana wanted a system that could be more easily and effectively modified, to respond to change, without lags in service delivery to the public. The key to Louisiana's concern was designing a flexible computer system.

San Mateo Case Management and Consumer Follow through systemj

San Mateo County, California has industrialized and put into practice a common case management and consumer follow through system (SMART) accessible to all staff. The system is connected to a data warehouse that offers information for executive decision-making.[3]

Community Human Service Agency – Camfield Estates

Community agencies often report that access to technology is key to helping adults with children to end dependency and operate successfully in the regular labor market of the community. Antipoverty efforts have proven futile for some, and many want them replaced with faith-based initiatives. Regardless, the underlining issue of access remains unchanged.[15]

One community success story of access explains the turn around of Camfield Estates, a rebuilt 102-unit public housing development. Since 2001 Camfield has been the site of a project aiming to span the "digital divide" between the impoverished and those with access to the web technology. It is the *Creating Community Connections Project*; it gives residents free computer systems to connect on the Web using high-speed cable. Every home in this project has access to the service.[16]

The funding was provided by a $200,000 grant from the Kellogg Foundation and sustained by corporations like Hewlett-Packard and Microsoft as well as public and nonprofit entities.[6] Residents who have decided to go wireless have also benefited from that option. The residents can buy wireless cards for 60 dollars and the elderly resident receives the cards free of charge. O'Bryant, the gentleman who helped to establish this program, hopes the project will be replicated throughout other disenfranchised communities.

A resident poll established that next to all members used the computers to read news, learn about healthiness and housing, and to shop online. Many residents are now training to become professional IT personnel.[6]

While the federal government says the divide is narrowing, consumer and public interest advocates say it remains a problem.

[15] Nathan, 2003

[6] Retrieved from: http://www.cnn.com/2003/TECH/internet/02/24/housing.hotspot.ap/

3 Advances in Technology

3.1 Before and After the Internet

"The Internet changes everything" was Larry Ellison's most common answer to questions about the future of Oracle Corporation. He was right and we are just beginning to see how profound the changes really are.

Prior to the explosive growth of the Intranet many view the advent of the personal computer as revolutionary and in some respects it was. Personal computers introduced some Americans to a new way of communicating - email, a new form of entertainment – computer games, education without walls – computer based training, but most use of the computer was still restricted to businesses for spreadsheets, presentations, and word processing.

The sales of personal computers for home use have been driven by the growth and availability of the intranet. Many home computers are purchase solely to give user access to the Internet. The growth rate of home Internet access is paralleling that of the telephone access in the home which today is about XX%.

To help understand why the impact of the internet is so significant we need to look at how computer communication took place before the internet and how they are taking place today.

Starting with the first mainframe computers, communication between the user and the computer was point-to-point. All information between the user, usually sitting at a terminal, and the computer, off in some secure air-conditioned room somewhere, was from one point to another. Any information sent by the user in the form of a command or data entered on the keyboard, was sent over a wire directly connected to the computer. Over time that wire running between rooms and building was replaced with telephone lines, usually leaded from the telephone company. By the late 1970's and throughout the 1980's modems were commonly used to turn any ordinary telephone line into the physical point-to-point connection needed between the user and computer.

Even with the introduction of personal computers, which replaced the "dumb" terminal, communications between the user and "mainframe" computer was point-to-point. Users who needed access to another computer to perform a task needed to know how to make the physical connection.

The Internet introduced to users a kind of "generic" connection. It was still a physical connection, via a modem and telephone line, but it was to no specific computer and for no single purpose. With the one session connected to the Internet users could make travel reservations, pay a bill, get the latest headlines and use email. For the first time in the

modern history of information technology users could perform multiple tasks without know much about the computer they were connection to or where that computer was located. Scott McNeally's prediction that "the computer was the network" had ultimately come true. User connected to the Internet – the network – could not distinguish it from the many thousands of computers – web servers – providing content and services via web pages.

To understand how profound this change was we can look at the comparison of human interactions with computers BI (Before the Internet) and AI (After the Internet).

Know WHAT needed to be done before you start doing it is no longer essential.

> BI: Since computers are programmed to performed specific tasks, it was essential that users know exactly what need to be done before making the physical connection to the computer. If a users needed to calculate mortgage payment over a 30 years period they would have to know that up front so they could be sure to connect to the right computer to make the calculations.
>
> AI: A user may have connected to the Internet to search a local real estate brokers listings of homes available for sale. When they find one they like the broker offers the option via a simple click to calculate mortgage payments based on the selling price of the home and down payment. Given the hypertext capabilities of the web users can like from one item to the next with only a vague idea of what they are searching for. The more information the gather in their search the narrower the search becomes until the actually find what they need.

Computers don't necessarily need to know WHO the user is.

> BI: From the very beginning most computers required users to have some sort of a login ID and password. It not only was necessary to keep out malicious users but it was used as a way to keep the cost of computing under control. Computers, especially mainframes, were very expensive to run costing hundreds or even thousands of dollars to run every minute. Computer owners could not afford to open up the use of their assets to everyone. Before the Internet the major part of cost of the information and service you received was to due to computing costs.
>
> AI: With new low cost mass produced computer technology, cost is not an issue. Today there are over 50,000,000 servers (equivalent of the old mainframe computers in this context) on the Internet. When you connect to a web site via the Internet, you typically do not need to logon. Although there are many pay-for-services web sites the large majority are still free (in part due to advertising, government and/or private funding). When you pay for services today via the Internet the cost of computing is almost insignificant. Amazon.com is a great example with comparable pricing for books as any bookstore.

Knowing WHERE to go for information is not required.

BI: Similar to knowing what to look for, before you look, knowing where to look was essential before the Internet. If you needed to search the computer for a specific research topic you would have to make the trek to the library and suing one of the terminals connected to the library's card catalog system, you would make your search.

AI: Search engine like GOOGLE, has eliminated know where to look for something. Using the GOOGLE search engine any Internet user can find virtually any piece of information on any of the 50,000,000 computers on the web.

Know HOW to use a computer is (almost) a non-issue.

BI: Computer has always stymied all but the most technical users. Ever computer was different with difficult and often cryptic methods of communication. Graphical interface like those on the Macintosh and Windows based computer helped for operations performed on that specific computer. When users had to connect to other computers, even if using a Mac, they had to use the language of the computer they were connecting to.

AI: The web browser, such as Internet Explorer or Netscape, gives users a uniform interface for all computers on the Internet. Users have little difficulty accessing an application from the IRS or buying a book from Amazon.com. The look and feel of the browser is virtually identical on any device connecting to any computer. Even browsers on cell phone and Palm devices have the same feel.

WHEN you can use a computer is no longer a factor.

BI: Users were often restricted when they could use a computer. System had significant "down time" and little redundancy because of their high cost. Information was often out of date because of two factors: one, few information gatekeepers – the individuals that controlled the information stored on computers; and two, information was processed in batched with new updated information only available the next day, week or even month.

AI: Batch processing of information is declining, replaced with "real time" processing. This is possible due to new software technologies and the cost of computing power becoming almost insignificant. Also given the large number of servers on the web, the number of information gatekeepers is to the point where every user of the web has an opportunity to become a gatekeeper.

Perhaps the most revolutionary concept is knowing WHY users need a computer is not necessary fro users to use a computer..

BI: From the beginning of the computer age, system designers and programmers needed to know why users needed computers. They had to design the computers and software to perform specific tasks – calculate mortgage payments, forecast

economic growth, etc. If a programmer could not anticipate why a users need to do something on a computer, it generally could not be done.

AI: Although we are just at the beginning of the age where computer can do things that were not previously anticipated (e.g. Bayesian thinking from Technology Review's 10 top emerging technologies), remarkable things are taking place already. It can be a simple as one computer on the Internet needed information from another and getting without any human intervention that is done today with a technology called web services. Consider the more complex where a computer is asked to make a prediction without specifically being programmed to make that prediction. Emerging technologies combine with the ubiquitous of the Internet makes the unthinkable possible.

3.2 Industry Advances in leveraging emerging technology

As a part of the research, we considered how other industries are leveraging emerging technologies to streamline and improve business processes. Three fundamental transformations are present within companies and organizations taking advantage of emerging technologies.

Networks and interconnectivity – Devices, systems, machines, and processes are all getting connected – with or without wires. Technology's task is to get these items to talk to each other seamlessly. Processes that were carried out by humans can now be accomplished by devices talking to each other.

Sensors – Cheap miniature sensors are showing up everywhere. These devices can see, listen, count and pass messages wirelessly to each other and networks. How many people are in the airport terminal, where you drove the rental car, or when you need to reorder more supplies are now known to whomever or whatever needs to know.

Technology is birthing new industries – Industries encounter technology in a way that changes them. The movie industry encountered digitization and created a new special effects sub industry. Genetics encounter with digitization created genomics – a future of gene diagnostics and gene therapy.

The research surfaced many innovative and cutting edge approaches being adopted by industry and government. We have provided a few examples of the thinking taking place in industries other than Human Services.

Banking

ATM's

According to Technology Review magazine, the functions of ATM machines are advancing. ATM's can now perform functions such as selling movie tickets, cashing checks, adding minutes to your cell-phone account, and discharging cash. ATM's are no

longer dumb terminals but multi-use task enhancers. Since the 1980s, most ATMs have been built around simple, slow computers with low-bandwidth telephone connections back to the bank. But a new generation of ATMs have fast, updated processors, a Microsoft Windows operating system, and quicker network connections based on the same protocols used on the Internet. That means ATMs can handle complicated software for cashing checks, making money transfers, or displaying graphics as varied as any found on the Web. "One of the main advantages of the new ATMs is that their interfaces can be customized for each user, says Steve Grzymkowski, a product-marketing manager with Diebold. Once a customer has identified himself or herself to a machine using an ATM card, "the screen would appear like a personalized website with options showing your preferred transactions, or even have a ticker for your stocks or advertisements of your favorite accessories," Grzymkowski says. And because they run Windows, it's easy for software developers to write new programs for them. For example, NCR, a bank machine manufacturer headquartered in Dayton, OH, offers software that lets ATM users buy movie tickets or prepaid long-distance telephone minutes and even order flowers."

Technology advances mean better data, faster: innovative grid-based computing allows marketers to achieve more sophisticated data analysis and modeling at previously unachievable speed--and at a lower cost according to Charles D. Morgan, company leader of Acxiom, in Little Rock, Ark. Speaking at a recent symposium in Florida, Morgan said the new technology is allowing companies to obtain the intelligence needed to enhance customer relationships. "Today, I can tell you that the impractical is now practical, and what was unimaginable can be imagined," he says.[17]

Payment Processing in Banks

The routing of payment data through multiple systems slows down processing, increases costs, and hampers customer-facing functions within a bank. Establishing a single storage point for all data related to a payment eliminates the fragmenting that can make information inconsistent at different points during the day.

Historically, banks have built stand-alone systems to deliver each product or service. In the early days of data processing, this was because of reliability issues; by not having to rely on any other system to complete the processing, the system could be counted on to deliver consistent service. As a result, today's environment is a conglomeration of disparate hardware, software, and architecture that is only partially integrated. The check processing systems are one of the key silos of information not providing intraday data to other systems. A number of industry initiatives have been launched over the years to address the problem of checks, but none has gained critical mass. Paper checks continued to be flown around the country for clearing and settlement.

But following the terrorist attacks of 9/11, airports were closed and checks could not move from place to place for collection. It was at this moment when the government, along with banks, started to recognize that the country needed a more seamless and

[17] ***Bank Marketing***, May 2004 v36 i4 p5(1)

reliable way to collect check payments. The Check 21 Act, enacted by Congress and the Federal Reserve, begins the process of moving to a paperless environment. This new law, which goes into effect Oct. 28, authorizes the use of a substitute check (Image Replacement Document) for settlement. The decline in overall check volume, caused by industry consolidation and greater use of electronic products, has brought a rise in processing costs. As banks look for ways to reduce operating costs, reducing the handling points for each check, now at an average of 12, is a worthwhile goal. Check 21 offers the industry the opportunity to step back and reconsider the entire payment process. Rather than just replicating the paper process using images and electronic data, financial institutions can re-architect their systems to meet the needs of a multichannel-oriented customer base.

Check information can be captured one time and made available to all the product and service systems that need access to it. Day two adjustments can be made directly to the same data. The result is streamlined processing, the elimination of redundant data, and improved customer satisfaction both through customer service officers and through the self-service experience. Payment data is available more rapidly for use by other product systems.

Siloed payment structures require increased costs and provide little corresponding value to the customer and no revenue to the institution. For the years 2005-2007, banks will spend $13.5 billion to $16 billion reengineering their payment systems. Leading-edge banks will reorient their spending around enterprise systems.

The process will occur in two stages. First, banks will invest in products to meet the Check 21 requirements. This will offer an opportunity to move to a single storage point for payment information. Second, banks will invest in the strategic linkages that will lead to a common infrastructure for all payment-related applications. The attractiveness of this investment lies in its potential to directly reduce costs, generate revenue, and increase customer satisfaction. This evolution has already begun. The check image market is maturing; most of the top 20 banks have already built or are building enterprise image archives. By creating a single point of storage for the payment, the number of back-office touch points should be lessened. Interaction with the payment will occur on a single copy stored in one place. Furthermore, a centralized repository of electronic payment information creates other operational efficiencies.

Game Industry (PR Newswire, May 27, 2004 pNA)

Unrelenting progress in processing power, network bandwidth and storage capacity will enable the electronic game industry to become greater than five times more pervasive by 2010, with the installed base of electronic game devices (excluding PCs) growing from 415 million to 2.6 billion. "Moore's Law and Electronic Games," a new global report by Deloitte & Touche's Technology, Media and Telecommunications (TMT) Group and Deloitte Research, focuses on the industries -- outside of the electronic game and related industries -- that will be impacted by technological advances based on Moore's Law, as

well as the positive and negative disruptions that the advancements will create. Moore's Law states that the transistor density of a silicon chip will double every two years. "As technology continues to improve, new opportunities will arise for industries outside of the traditional electronic game arena, such as movie studios, record companies, advertisers, mobile phone producers, communications operators, toy manufacturers and electronics manufacturers," said Scott Singer, Managing Director of Deloitte's Media and Entertainment Corporate Finance Group. "As a matter of fact, the number and range of platforms on which paid-for electronic games can exist will expand significantly and will include mobile phones, MP3 players, PDAs, set-top boxes, children's toys and even exercise machines. The installed base of devices will escalate from 415 million in 2004 to 2.6 billion in 2010."

Moore's Law implies that there will be an eight-fold increase in processing power and memory capacity between now and 2010, greatly impacting the disruptiveness of the electronic game industry. It is expected that 450 million homes worldwide will have broadband connections by 2010, with one billion individuals having access to multimedia mobile phones that could support game downloads and some form of mobile game playing. Storage capacity will likely increase to 1,000 gigabytes of disk storage in a typical home PC by 2010, enabling games to be longer and more complex with enhanced visual detail, sound effects and music. These technological advances will create new revenue opportunities for sectors related to electronic games and will expand audience reach beyond the traditional electronic game markets.

* Advertising. Game publishers looking to recoup their spiraling development costs are more and more receptive to product advertising in games. In-game advertising is expected to become increasingly popular, particularly as technology improvements and shifting demographics make in-game product ads more appealing.

* Wireless communications. Mobile operators will be the predominant channel for selling and distributing phone-based games, with only a small number sold in retail stores. More advanced networks prevalent by 2010 will provide higher transfer rates, enabling downloaded games to be more complex and sophisticated.

* Entertainment. Electronic games represent an important new merchandising category, with cross-licensing between movies and electronic games providing a major source of revenue for movie studios. Music companies will recognize revenue opportunities, as music in electronic games becomes a more essential part of the game experience. Video games have inspired entire lines of toys and action figures, allowing toy manufacturers to capitalize on cross-licensing opportunities.

Health Care (Business Insurance, May 17, 2004 p14)

The bar will continue to be raised on the technology that health plans provide members and care providers, to the benefit of all participants in the health care system. Health plans and the vendors they work with are taking steps toward allowing members to use

online tools to exchange medical information with care providers and to receive disease management coaching. Eventually, health plans will enable members to help manage their own chronic conditions by transmitting vital data such as blood-sugar levels or blood pressure online to their care providers. "Electronic technology allows health plans to continue to do more for the consumer in a productive way," said Karen Ignagni, president and chief executive officer of America's Health Insurance Plans. Such efforts are important, Ms. Ignagni said, as employers and individuals look carefully at the costs and cost drivers of health care. "All of these tools enable our consumers to exercise their alternatives in a consumer-driven market," "Consumers are looking for assistance and information (that helps them) to be matched with the best professional in the right setting." As consumer-driven health plans grow, the demand for information and the technology to access it likely will increase. Other health plans also are using technology to deliver information to participants and providers wherever and whenever they need it. The company's IT system serves plan members, physicians, brokers and agents, and hospitals.

"There are four different constituents who need us, and they come to us from four different ways," Mr. Ponder said. "We have spent a lot of time internally to build our own information technology infrastructure to be accommodating." The program, which is linked with the company's drug formulary and includes the "Physicians' Desk Reference," alerts the provider to possible side effects and adverse interactions. The system also helps ensure that the pharmacist receives a clean, readable, correct prescription, Mr. Ponder said. The other program provides doctors with a computer, printer and the software to tap into health plan information to verify member eligibility, check claim status, review medical policies and submit paperless claims. The main purposes of this technology are to better connect patients and physicians, reduce doctors' administrative burden and enhance patient safety. Also important is meeting the varied needs of customers in its regional plans. "Medical insurance is a local product," said Mr. Ponder. "We have been able to put in place the (technology) that allows us to be local in terms of" regional plans' product offerings, he added. The objective of all of this technology is "to take the power of information and make it accessible to members, with the goal of making folks healthier and giving people control of their health destiny." Information should not only help people understand their health conditions but also guide them in using available resources.

"We want them to be able to be engaged and have access to the information to help them be better consumers and use their dollars wisely," Ms. Bierbower said.
Technology is the "conduit" for conveying information, Dr. Ho said, but health plans must work with consumers to make online information relevant and user-friendly. The programs are "an online laboratory of human interactive behavior," he said.
Among the online features the company provides members is the Health Dashboard, which provides an individual member's health statistics, health assessment results and personal information from another tool, Health Managers. That application provides information and recommended actions for chronic conditions.
The Web functions are a response to plan members' requests, Ms. Derman said.

Homeland Security

A visitor to the United States in the coming years might have to undergo a retinal scan at a consulate in his or her home country just to apply for a visa. Once here, the visitor would present a smart card, encoded with the digital eye print, to an immigration official and undergo a second scan to ensure a match. The data would be instantly cross-referenced against a database containing digital descriptors of known terrorists or other criminals. Upon departure, a final scan would tell officials if the person had overstayed the visa.

That's just one scenario that could play out under a megaproject the Department of Homeland Security to oversee the creation of a comprehensive border-control system, known as US-Visit (United States Visitor and Immigration Status Indicator Technology). Homeland Security is creating a "virtual border" that includes scenarios like the retinal scans, radio- frequency identification, voice- and facial-recognition, retinal- or iris-scanning, and digital-fingerprinting systems.

Emergency Workers

Wireless networking technologies being tested and deployed in U.S. communities will solve at least part of the problem that emergency workers face. The new networks are providing police and firefighters a way to pass vital data such as video, maps, and photos among themselves quickly and easily. Voice communications may take longer to modernize and integrate, but observers point to progress in an area called "software radio" that will let emergency workers from different agencies talk with each other more easily. Wireless laptops that display information such as drivers' records have been a common feature in police cars for at least a decade. But they have typically been connected via cellular networks that deliver data at dial-up-connection speeds or even slower, meaning that they are generally limited to receiving text. But now, faster data networks for police cars, fire trucks, and ambulances are giving officials access to more kinds of data and allowing them to share it with each other. Starting in May, for instance, fire, police, and ambulance workers in Garland, TX, will be able to use their existing laptops to send and receive mug shots, fingerprints, live video, medical data, and even floor plans at DSL-like speeds--while racing along at highway speeds.

A technology called mesh networking is used in which laptops instantly become nodes in a network simply by being on and within range of each other. Each laptop routes data to others nearby, so that data crosses the network by hopping along the most efficient path from one laptop to the next. By avoiding the tower-based, hub-and-spoke configuration typical in cellular networks, mesh networks can work around dead spots created by interference from buildings. They are also self-healing, meaning they simply reconfigure themselves if any node is lost. Consequently, no single node is indispensable, as a central tower is in a cell network. Mesh networks can also route data

around bottlenecks to ensure fast transmission, and their range of coverage can easily be extended by attaching additional routers to traffic lights and lamp posts.

"To the guy on the street, [high-speed data in vehicles] is going to make a huge difference," says Joe Hanna, a consultant in Dallas, TX, and a past president of the Association of Public Safety Communications Officials.

3.3 Emerging Trends in Technology

Below is a description of some of the key areas that entities and organizations are considering and planning for with regard to emerging technology.

- Software infrastructure,
- servers,
- mobile and wireless,
- information management
- and business applications.

There are quite significant changes ahead for **software infrastructure**. There are variations in creating composite applications, such as service-oriented business applications (SOBA), but there is also a new trend in relaxing even further the connectivity between software modules via complex event processing (CEP). Another trend that seems prevalent in the software, as well as the hardware community, is the virtualization of resources and its impact on increased utilization and real-time processing. Many of the innovations in this segment, will not so much address cost reduction, as enable new capabilities that are more dynamic and have better agility and flexibility.

This is in contrast to the **server** landscape where many of the upcoming innovations will spur cost savings. For example, to a certain extent, grid computing will start competing with supercomputers as a new, inexpensive platform for solving computationally intensive tasks. And the increasing server virtualization will provide much better utilization rates, again resulting in cost efficiencies.

In the **mobile and wireless** domains we will see much more attention given to user interfaces that are driven by the need for more product differentiation and diverse technological advancements. One of the big "killer applications" of wireless technologies will be the establishment of "plug and play" mesh networks, which provide optimized cost, benefit and reliability ratios. Another big factor will be how mobile infrastructure will start to merge with fixed computing infrastructure, mostly to use the micropayment facilities of the mobile providers.

Information management will benefit from renewed focus as enterprises find themselves needing to deal with high volumes and new types of data, with "lightly"

structured, document-oriented data playing a role in key business processes. Text mining will emerge as the "hot" area in customer relationship management, causing enterprises to redesign customer-facing business processes to take advantage of improved customer insight. Other innovations, like the Semantic Web, will have a hugely beneficial impact on businesses and society. Like data mining, it will actually remain niche from a software market and practitioners' perspective.

A number of these technological developments will make themselves felt in **business applications**. In particular, a service-oriented "ecosystem" will enable a new wave of business processes and application innovation. These will hit first among applications managing time-critical products or processes. The potential of services-oriented development of applications (SODA) in driving high reuse, rapid development and high mutability of business applications will support the evolution of a global trading grid — a single overlay of interconnected extranets and e-marketplaces that enables partners to electronically interact, collaborate and transact business. Radio frequency identification (RFID) will drive the innovation of in-store retail systems, warehouse management, transportation systems and after sales tracking of product use. Eventually, it will support full supply chain management and execution.

Other components or factors that may be considered subsets of the five key areas are described below.

- Web Services
- Communication Technologies
- Radio Frequency Identification Devices
- Business Intelligence Products
- Text Mining
- Micro-content and Micro-business
- Real-time infrastructures
- Event Management Technology
- Workflow
- Open Architecture

Web Services - *Web services gives ability to connect disparate systems in a secure and reliable way.*

Web portals are being used to unify the user experience across disparate applications and processes in a seamless manner. Pragmatic and increasingly sophisticated Web services will cause dramatic changes in the Web services market during 2006 according to Gartner. Standards and service-oriented applications will be the catalysts for this growth.

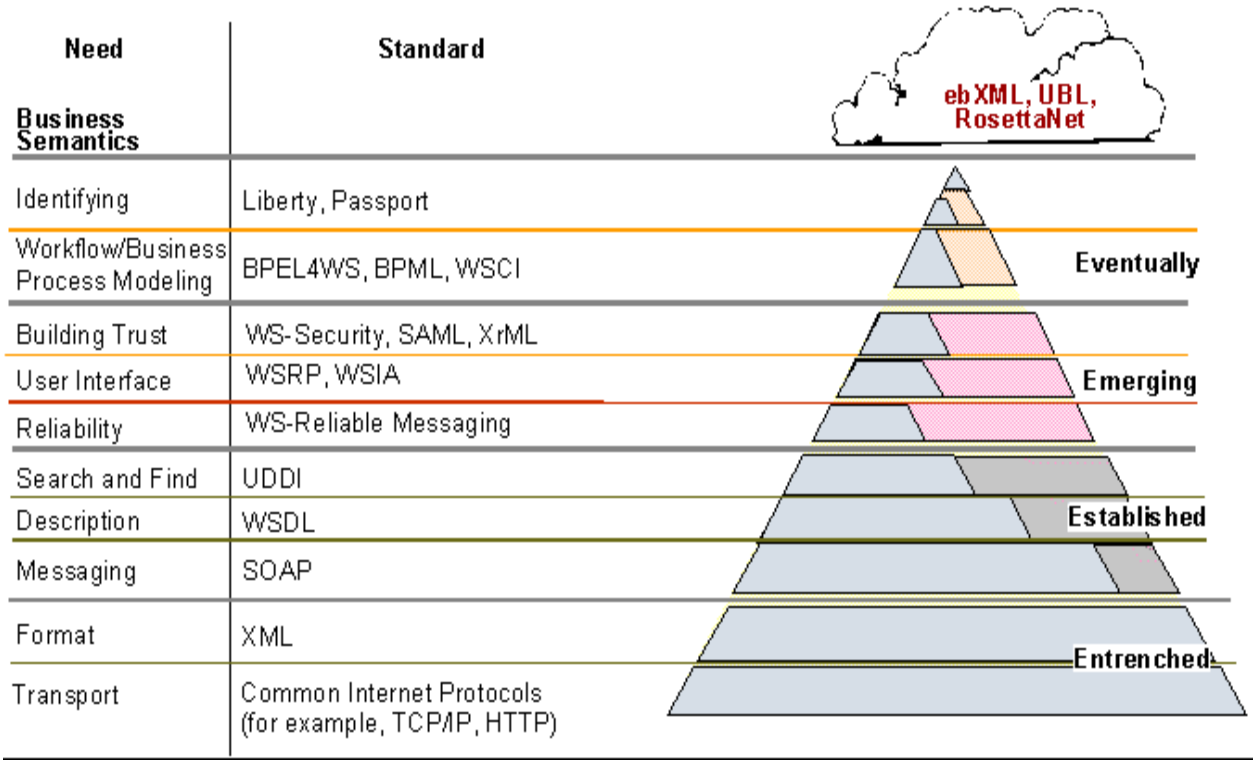
By 2006, Web services will take hold as a competitive differentiator in business relationships and product innovation. Enterprises that want to remain competitive will need to use Web services to provide commonly requested data to their partners. It is

imperative that enterprises develop a strategy for how to use Web services to develop products, including hard goods, digital goods and services.

In the healthcare industry, for example, Web services will become a critical tool for consolidating data from multiple sources. Technicians will be able to compile test results, or monitor results or patient care recommendations via separate but interoperable repository calls. Medical device manufacturers will employ Web services to improve patient monitoring, increase product reliability and establish a strong value proposition for healthcare providers.

Figure 1

Emerging Web Services Standards Stack



Source: Gartner Research (October 2003)

Attempts are being made to build a stack of Web services standards to satisfy every foreseeable enterprise requirement.

Communication Technologies

Devices will integrate and communicate anywhere. The power comes when they can self-assemble into sensor networks. Breakthroughs arise via two new communication technologies:

> *Ultra-wideband:* The biggest cost today in smart sensors is the communication module, whose parts can't get smaller. Moore's Law (the number of transistors per square inch on integrated circuits will double every 18 months) doesn't work for radio parts such as inductors. Ultra-wideband will eliminate the need for those parts, unleashing Moore's Law. With ultra-wideband, radios will become tiny, fast, low-power and inexpensive. They'll be so affordable that you can put ultra-wideband radios on every chip. Each chip will be able to communicate wirelessly with other chips, enabling sensor networks that are location-aware, self-configuring and self-managing.
>
> *WiMAX (Worldwide Interoperability for Microwave Access):* This new wireless technology (802.16a) is the next step beyond Wi-Fi (Wireless Fidelity; 802.11). WiMAX promises 70-megabit wireless connectivity over a range of 30 miles. It will link the Internet and connected objects such as sensor networks.

Information Technology will become increasingly ubiquitours with intelligence embedded in almost all objects. The gap between the physical and virtual world will shrink as the physical work is increasingly reflected online (Accenture). The growing standardization and commoditization in the technology industry will result in Web services becoming the dominant architecture for the delivery of interoperable business solutions

Radio Frequency Identification Devices

Large enterprises are refocusing on data management as a strategic discipline to cope with new types of data, explosive growth in data volumes, and the demand for higher levels of application integration and business intelligence. Upcoming technologies include radio frequency identification (RFID), easier data capture from mobile devices and automatic tagging technologies like information extraction and text categorization. Enterprises are looking to new data management approaches involving Web services, extensions to relational database management systems (DBMSs) using extensible markup language (XML), and the mapping together of XML dialects.

Enterprises that approach data management as a strategic function will reap the benefits of greater process transparency, interoperability and automation. This will provide tremendous benefit to areas such as supply chain management, enterprise application integration, customer management and the electronic workplace.

Business intelligence products are supporting a more networked view of the business

Collaborative business intelligence (BI) is emerging. The idea is not new. Adding annotations to reports and sharing analyses with others has been possible since the 1980s. Now, many vendors are adding workflow capabilities to their BI applications.

BI allows users to work on the same models simultaneously or have real-time communication between various BI applications. This lead to BI networks emerging for several reasons.

- Strategic sourcing requires non-hierarchical participation by many individuals, inside and outside the company
- Knowledge workers who are used to consulting their peers will gain influence in decision making
- Cycle times need to be reduced to achieve the goal of becoming a real-time enterprise

The concept of a hierarchy, which is the current BI focus, will be replaced by impact analysis to show cause-and-effect relationships between various BI users. Synchronization will not take place within extended and error-prone hierarchical organizations, but through peer consultation and alignment before sign-off.

Text mining is emerging as the "hot" area in customer relationship management

Text mining is the process of extracting information from textual data and using it for better business decisions. Text mining has existed for a long time, but mainly as a technology that was not well coupled with clearly recognized "pain points" in the organization. Customer service has been handled mainly in call centers, with an emphasis on transaction processing and short interaction times. As a result, most firms have been missing valuable input from customers on how to improve their business processes. This has led to low levels of customer satisfaction, little long-term loyalty and an expensive, albeit necessary, way of resolving customer complaints.

As text mining begins to be married with blended service-delivery models using the telephone and Web services, companies will begin to discover that the technology will allow them to identify not only what the customer said, but also what was meant. Companies will be able to spot and resolve problems earlier, and improve their ability to prevent problems recurring. In addition, customer satisfaction will be inferred more accurately than with today's flawed survey methodology. The result will be increased emphasis on greater customer interaction, encouragement of customer feedback and a reduction in simple transactional interactions.

Micro-content and micro-business will drive the knowledge economy

Business transactions costing less than $10 are becoming possible electronically thanks to evolving efficiencies and improved ease of use in micropayment technologies, digital rights management, increasing connectivity and various standards. These business transactions center around content (MP3 files, ring tones and consumer feedback),

location-based services ("find me a taxi") and various other future services (translation, transcoding of data and proofreading). So far, few of these have gained widespread adoption, but significant new examples have emerged, such as Apple's iTunes, Google's AdWords cost-per-click Web service, Zingo's taxi-hailing service in London, PayPal, and BT Group's click&buy.

The support foundation for software infrastructure is changing. Real-time infrastructure will reshape IT operations and infrastructure.

An *IT infrastructure* is a collection of client devices, servers, storage, networks, databases and middleware that supports the delivery of business applications and IT-enabled business processes. A *real-time infrastructure (RTI)* is an IT infrastructure shared across customers, business units or applications where business policies and service-level agreements *drive dynamic and automatic optimization of the IT infrastructure,* thus reducing costs while increasing agility and quality of service. RTI represents a 10-year vision and evolution for the distributed computing architecture and management environments, which will reduce capital and labor costs while increasing IT agility, responsiveness and quality of service.

Security considerations must be addressed by taking advantage of technologies such as Secure Sockets Layer (SSL) and Kerberos, because Web services may expose up to 70 percent of organizational firewalls to malicious-code attacks before WS-Security specifications reach deployment status beginning in 2005. End users should transform select applications to first-generation SOBA-based formats through integration with emerging Web services specifications, such as SOAP and Web Services Description Language (WSDL), and begin investigating more-advanced Web services standards, such as BPEL and Web Services Composite Application Framework (WS-CAF), for future composite formation. Push key application software providers — especially those that provide niche or industry-specific applications — to state if they plan to offer SOBAs and what migration path they propose. Providers that can't or won't give this information by the end of 2004 should be downgraded on your list of preferred vendors.

Real-Time Infrastructure

Nowhere is information technology more critical and important than in providing real-time information access. Developing a real-time infrastructure requires multiple underlying technologies, including all of the aforementioned technology enablers (e.g., workflow automation, integrated database, open architecture, B2B integration, and Internet technologies). For example, in the absence of real-time data, it is difficult to provide automated system alert/monitoring capabilities when real-time business events exceed some maximum threshold.

Event management technology will reshape the way businesses run by making applications expose the business events that they touch.

Enterprises will achieve new levels of flexibility and a deeper understanding of their business processes by applying the techniques of complex-event processing (CEP) to their daily work. Application systems and office productivity tools will emit a steady stream of event messages that report on hundreds of activities of business significance. CEP agents will analyze, correlate and summarize these low-level events into higher-level events suitable for notifying people in human terms or for triggering automated processes. Businesses will operate more efficiently, with early warning of potential opportunities and problems, and with better understanding of the root causes that change conditions.

We consider message-oriented middleware (MOM) to be an enabler of the simplest of four levels of event management. Simple events are widely used (although still underutilized). MOM has only the most basic "rules" — it will do publish and subscribe (pub-sub) on message headers, but that's all. The turning point is not simple events, however. The next big wave of event exploitation will be CEP. CEP is rare in business applications today, but it won't be in five years. The computer science for CEP is not entirely new — some aspects have been used in IT operations management software for a decade, and most operating systems are bastions of CEP. Although some CEP technology is still in the research labs, little CEP has been embedded in tools that are aimed at business applications. That's the big paradigm shift — applying CEP to a domain where it was hardly ever used before, which requires new development and middleware tools. For most people, "events" still mean IT operations management software and application management issues. The lack of standards is a serious limitation. The Web services movement has started to work on this, starting with guaranteed delivery and soon to address pub-sub. Official standards for CEP, however, will take several more years. However, CEP is emerging, with or without standards.

Workflow

Workflow is a term used to describe the tasks, procedural steps, organizations or people involved, required input and output information, and tools needed for each step in a business process. A workflow approach to analyzing and managing a business process can be combined with an object-oriented programming approach, which tends to focus on documents and data. In general, workflow management focuses on processes rather than documents. A number of companies make workflow automation products that allow a company to create a workflow model and components such as online forms and then use this product as a way to manage and enforce the consistent handling of work. A workflow engine is the component in a workflow automation program that knows all the procedures, steps in a procedure, and rules for each step. The workflow engine determines whether the process is ready to move to the next step. Proponents of the workflow approach believe that task analysis and workflow modeling is likely to improve business operations.

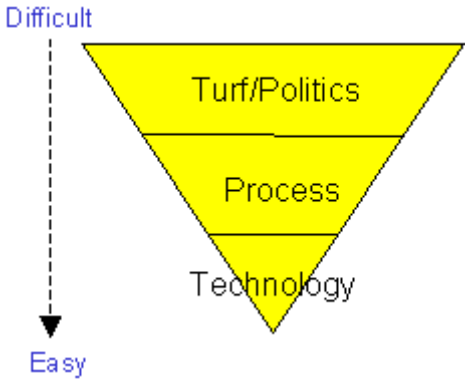
4 Technology in Human Services

Before we consider how technology might be leveraged to improve human services, it is important to recognize that technology alone is not capable of brining about organizational or systemic change. A common mistake in making organizational improvement is to assume that the biggest challenges are technical. Invariably, technology challenges pale in comparison with organizational and process difficulties. Many technical challenges are themselves manifestations of organizational and process problems. For example, the need to build and support multiple databases is often required because organizations refuse to share data with each other, rather than because of technical impediments. Further, even after multiple data centers are created in multiple agencies, building appropriate linkages for applications and data is hampered, not by technical issues, but by a lack of willingness to share information. This hurdle is raised even higher by funding processes that, in effect, require that assets acquired with funds from specific sources be used only for particular programs.

Breaking down bureaucratic silos is difficult, often requiring stakeholders and their program managers to surrender some authority and autonomy. Getting information systems to work together across these silos is not just a technology challenge, it is a threat to organizational independence (see Figure 1).

Figure 1

Hierarchy of Challenges in Government IT



Source: Gartner Research

It is important that human services decision makers assess and understand technology issues in the context of this hierarchy of challenges. Often, it is counterproductive to attempt to solve a technology problem that masks other, more-systemic issues.

4.1 Making Technology a Powerful Weapon

Understanding that technology can be an asset or a nemesis, how do we make it a powerful weapon in our arsenal to deal with the issues of poverty? We must avoid the

trap of thinking narrowly that technology is just a collection of devices and tools. We must look to the business world for best practices in applying technology. Charles Field and Donna Stoddard have identified three basic principles for executing technology effectively.

Develop a long-term technology plan – Most people see technology as a way to deliver quick and easy solution. Not so, technology requires a long-term disciplined plan and a strategic view that is linked to business objectives.

Create a unifying technology platform – A look at most technology initiative in an organization resembles independent countries, each with unique technologies, applications and data. These silos of information prevent sharing of information, consolidate view of data and cause costs to soar.

Cultivate a high functioning technology culture – Most organizations have treaded technology groups as an isolated entity that causes technologists to loose sight of the business strategy. Organization should cultivate a high-performing technology culture that is tightly integrated within the entire organization.

4.2 A Technology Primer

The traditional model of information technology in human services work can be characterized by:

- Monolithic systems that perform s single purpose, e.g. a system design to track grant applications
- System built on platforms that are difficult to update
- Systems that don not have any capability to communicate with other system
- Systems designed with specific outputs in mind, i.e. the system cannot handle a new situation or change in business process
- Multiple system with overlapping functionality
- Systems that are undocumented and are impractical to modify.

On the other hand systems should be designed to meet the following general requirements:

- web-based
- use database architecture
- scalable
- provide alerts
- robust reporting tool
- robust analytical tools
- support interfaces with third-party systems

- download to various formats
- secure and private

Web-based
A web-based solution must use a web browser as the primary means of interacting with the system. This means that remote users may access the system over the public Internet or secure Intranet by simply using a browser, either Microsoft Internet Explorer or Netscape Navigator. The delivery of information to the desktop is not necessarily restricted to using pure HTML.

Use database architecture
A database should be the primary means to store data information. The database will be used to store discrete data entities such as numeric and alphanumeric values, Word document, images, scanned documents or any other "binary" objects.

Scalable
The software applications, middleware, and database will be scalable to meet expanding and evolving needs. It is expected that all data will be maintained on - line indefinitely, which will require a database that can grow without performance issues. Also it is expected that requirements will change over time and in order to handle additional users and additional processing demands the application software will need to be scaleable as well. .

Provide alerts
The system should be able to alert users of events such as "A report requires your approval" via notifications when the user signs on the system and via email. Users should also be able to respond to an email "alert" with an approval or rejection.

Robust reporting tool
A robust set of reporting tools for both technology professionals and end users must be available. Technology users should have available reporting tools for developing complex reports. End users should have easy to use tools for developing quick, ad-hoc type reports for commonly requested data items.

Robust analytical tools
Robust analytical tools for multi-dimensional analysis should be available to sophisticated end users. These tools should perform as an Excel pivot table with the capability for processing large volumes of data in more dimensions than Excel can readily manipulate.

Support interfaces with third-party systems
Interfaces, both incoming and outgoing, must be available for linking to other vendor databases or proprietary systems. Application interfaces must offer data validation and error logging. Batch and real time interfaces should be supported including links to external databases

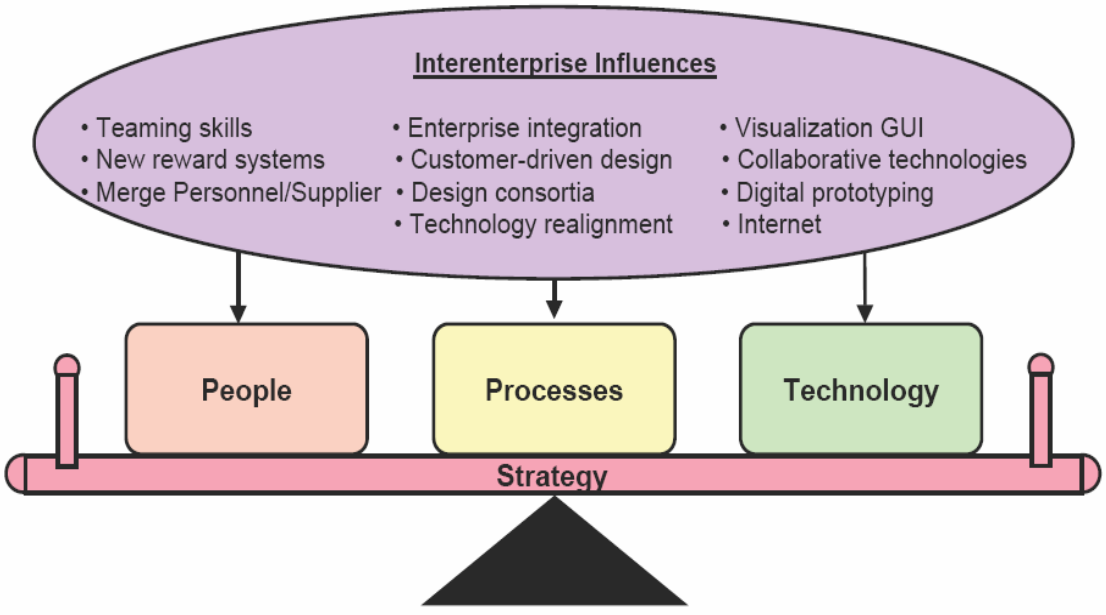
Download to various formats
Download to common file formats should include at a minimum: Excel, ASCII, HTML and XML.

Secure and Private
The system must support current standards for privacy and security. They include data encryption in transit, selective encryption, and a robust user security management.

4.3 Technology Framework to consider

- What technologies must be embraced to address poverty in the 21st century?
- What are the key technological drivers that may impact human services in the 21st century?
- What are the key benefits that may accrue as a result of modernizing and optimizing technological advances?
- What are some key obstacles that must be overcome to fully realize the advances that technology affords?

Effective implementation of this next generation will require that people, processes and technologies be bought into balance and alignment



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