Information Technology Indicators for a Healthy Community

CITY OF SEATTLE
Department of Information Technology
Community Technology Program

The Information Technology Indicators were developed as a Community Technology Program of the City of Seattle Department of Information Technology and its Citizens Telecommunications and Technology Advisory Board (CTTAB).

This report and more information about this project is available at:

http://www.cityofseattle.net/tech/indicators

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City of Seattle

Gregory J. Nickels, Mayor

May 8, 2002

Dear Friends:

Over the last few years, we have all witnessed the impact that information technology is having on our region. Access to computers and the Internet, the influence of the IT industry on our local economy, and the role that technology plays in building and connecting our communities are all important issues that Seattle must grapple with everyday.

Seattle is in a unique position among cities to not just react to technology changes, but to shape those changes. We have an opportunity not just to envision the future, but to create that future. In order to do this, we need to be clear about what our goals are as a city, and we need data that tells us how we are doing in meeting those goals.

It is with that in mind, that I am pleased to introduce the *2000 – 2001 Information Technology Indicators for a Healthy Community*. This report marks the first-ever effort to measure the impact of information technology on the health of our city. Through an extensive public process, we have created a measurement tool that reflects the joint vision of citizens, businesses, and government for a technologically healthy community.

I hope those in all sectors will join me in using this report to reflect on our use of information technology. By working together, we can ensure that Seattle forges ahead as a technologically innovative city with vibrant, sustainable digital opportunities for all.

Sincerely,

GREG NICKELS
Mayor of Seattle

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Executive Summary

This Information Technology Indicators Report presents for the first time a set of measurements intended to reflect the state of information technology as it impacts the social, economic and cultural health of Seattle. The importance of this project is not to place focus on specific information technologies (IT or ICT[1]), it is to capture whether we are utilizing IT effectively and appropriately and in a manner which grows the capacity of our citizenry and institutions. There have been other IT surveys; these IT Indicators attempt to bring together a range of arenas that we believe will allow reflection and motivate healthy and sustainable IT use.

These measurements present a snapshot at the time they were gathered. The IT indicators are intended to be longitudinal, with measurements retaken at later dates to track change. The data for this report was gathered via original research conducted for the City of Seattle, including a one-thousand household residential survey, and material available through government, industry and other sources.

The measures we chose were drawn from values developed through a rich community dialogue with diverse participants. The project would not have been possible without generous contributions from education, government, business, technology, social service and community leaders. This exchange of ideas and concerns was itself a very positive community action, and we hope this report encourages more conversation about how we as individuals and as community choose to use and guide the tools of technology.

Our community developed five key goals for a technology healthy city. The City and people of Seattle want to build a technology healthy community where information technology:

- Enhances our local economy;

- Is applied to solving social issues;

- Is used to foster civic participation;

- Promotes relationship building and community development;

- Supports the sustainability of our quality of life; and

- Access to technology tools is equitable and affordable.

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*In many countries Information and Communication Technology (ICT) is used rather than IT.

We hope other communities undertake a similar process to verbalize their own values and develop their own indicators. Taken a step further we see a need for common indicators across communities, states and nations.

Access

Seattle residents overall have a very high degree of access compared to national data. Three-fourths have an email address. Seventy-six (76%) have access to a computer at home and almost that number can access the Internet (72%). Seattle also has a high percentage of residents with high-speed Internet service. Many of the computers in homes are recent purchases. Of those who own computers in Seattle, most are less than two years old.

However there are some very critical gaps. Access is significantly higher for those with more education or higher income and lags for senior citizens. Income is the most significant factor. Access at home is affected by ethnicity, regardless of income, age, or education. African Americans are more than three times less likely to have a computer or Internet in the home than all other ethnic groups combined. Hispanics are also less likely than others to have access.

Many residents access computers outside the home, at places like work, school, the library, and community centers. More than half the residents surveyed access a computer at work, though only a small portion rely on this as their only computer. For those who do not have a computer or are seeking training or online information outside home or work, Seattle has quite a few public access points (libraries, community technology centers and Internet terminals). These are located within a reasonable distance of most residents, though some of the sites are underutilized.

People with disabilities experience more barriers to access than those without. The cost of computers with adaptive equipment is considerably higher than for those without any special needs, and many local civic web sites are not meeting basic accessibility standards.

Literacy

On average, residents with computer access spend 28 hours a week on the computer and about one-fourth of this on the Internet. Those who use a computer at home spend more than half of their home computer time on the Internet. Seattle residents find computers to be very useful for a wide-range of communication, work, and research-related tasks. Email or instant messaging was most popular, followed by work related tasks.

Overall, Seattle residents have a high degree of comfort with computers and the Internet, though there are a number of differences in degree. Access at work or home has significant impact on comfort level. Those with access at work were most skilled. Residents 65 and older are significantly less comfortable with both basic and advanced computer tasks than any other age group. Caucasians and, to a lesser extent, Asian-Americans are more likely than African-Americans and Hispanics to say they are comfortable with basic computing tasks. We found no gender gap for basic tasks, but men were more likely than women to be comfortable with advanced tasks.

63% of residents can be considered fluent, a measure of their likelihood to learn new programs or help others learn. Asian-Americans, African-Americans and Hispanics are all more likely than Caucasians to have above-average computer fluency. This may suggest that given access to a

computer, these groups make a greater effort to learn and help others. Men were significantly more fluent than women, and we found that fluency decreases with age.

The Seattle School District is slightly lower than the state average for computers per student but is aggressively implementing new technology and has established student technology standards.

Business & Economic Development

Although the IT industry represents a small portion of the overall industry and workforce in Seattle and King County, its growth has been a strong contributor to overall employment growth in our region. In 1999, prior to the economic slowdown of the past couple years, the IT industry's rate of employment growth was three times that of total employment growth in King County.

The number of IT professionals employed by companies located in King County also enjoyed incredible growth and those professionals are benefiting from significantly higher salaries than the average employee. The growth rate in IT-specific jobs between 1998 and 2000 was more than five times the overall job growth rate for King County. On average in King County, IT professionals' hourly wages are almost 50% higher than that of the average worker.

The number of high school students in Washington identifying Computer and Information Sciences as their main academic interest has more than doubled in the last decade. However it still represents only a small percentage (6%) of high school students.

Despite growth in the number of students pursuing information science degrees, Washington colleges and universities are still not graduating enough students in this area to meet projected local workforce needs. One solution to meeting IT workforce needs is employing foreign workers through the H-1B visa program. In 2000, Seattle jobs made up almost half of the 15,000 openings certified in Washington State for H-1B visa workers.

The majority of residents (55%) have looked for local business information online, though satisfaction with content is mixed. A very small number of residents (8%) use the Internet to sell goods and services out of their home.

Community Building

Seattle residents are very involved in their community and using email and the web to further their activity. More than half (62%) participate in a wide range of community organizations. Almost half of those participating in a group use email or the Internet to communicate with others in the organization. Local business associations (75%), cultural organizations (67%), and school associations (65%) were the most likely to report having web pages, while senior centers and neighborhood associations were the least likely.

Neighborhood organizations are using the web and email to communicate and grow their organizations. Email is now the most common way that group leaders are contacting other group members. More attention is being paid to web sites and a number said they were going to come online in the next year. Almost half of the organizations surveyed currently have a web site; an additional 24% think they will have a web site within a year. However, there are mixed feelings about the effectiveness of their sites.

Non-profit organizations are increasingly dependent on information technology to accomplish their work, but often face limited resources. Our survey found that 63% have an adequate degree of IT infrastructure for their needs, which shows there are numerous gaps. Forty percent of organizations surveyed have technology plans.

Civic Participation

Our residents have mixed feelings about the Internet as a tool for civic participation. Almost half (49%) of our residents feel the that the Internet and email are effective ways to communicate about issues that affect them and their communities, but less (36%) felt that these are effective tools to communicate with elected officials.

More than half (55%) of Seattle residents have used the Internet in the past year to find information from a city, county, state or federal government site. There are significant differences in who uses the sites. The highest percentages of those who have sought information from a government agency on the web are between 36 and 50 years old, have a college education, and have upper / high upper household incomes. People of color are less likely to use these sites. Whereas two-thirds (66 percent) of Caucasians surveyed have sought information from a government agency on the Internet, only 38 percent of African-Americans, 38 percent of Asian-Americans, and 30 percent of Hispanics respond similarly.

Use of the City's web site has increased dramatically. About 30 percent of all residents have visited the City's website, whereas only 18 percent of residents had accessed www.cityofseattle.net according to our 1999 Citywide Residential Survey

Human Relationships

Overall, Seattle residents feel good about the impact that information technology has had on their lives and on the city. About three-quarters of residents feel it has had a positive impact on their quality of life and about four in five feel that IT has had a positive impact on the quality of life in Seattle.

Seattle residents are divided in their opinions about security on the Internet. When asked about the security of financial transactions on the web, online companies use of personal information, and the ability of children to access the web safely, residents are almost evenly split between those who feel good Internet security and those who do not. Feeling secure when using the Internet is related to gender, age, and experience with computers.

A large majority were satisfied with the content on the World Wide Web, though there are some important distinctions in how satisfied and who. Satisfaction with the web increased with income and was lower for families with children. Among ethnic groups, Asian-Americans were the least satisfied with the content of the Internet and Caucasians were the most satisfied.

Partnerships And Resource Mobilization

The IT industry and IT professionals provide a great deal of community assistance, but there is no comprehensive measure of their contribution. For this report, we were able to identify a

starting measure of almost 500 volunteer hours contributed per year per community technology center by a range of residents. Many efforts, including work on the digital divide and job skills development, rely on partnerships. Strategic tracking of these partnerships could enable more effective placement of resources and better acknowledge leveraging of resources.

Conclusions & Challenges

Overall we found that Seattle is a very wired city and one where use of information technology is being developed and applied in a wide range of arenas. IT is a growing sector of our economy, although we face a hurdle in growing a local diverse workforce to meet the need. IT has also become an important tool for community and non-profit organizations despite the fact that the applications and infrastructure for these organizations are still emerging. We were surprised at the degree to which our residents are already connected and using IT for local business, civic and personal activity. This shows that there is a large population available electronically, which has already impacted our City government outreach strategies and should impact marketing strategies for all sectors. However, the research confirmed that we need to stay very aware and continue to move to address the significant disparities in levels of opportunity for different populations.

Users of the information presented here should take into account we didn't reach everyone. We were not able to survey non-English speaking residents, though we believe from experience in our community technology centers, and assuming income correlations, that our immigrant population is also an important slice of the digitally disadvantaged community.

There is still much work to be done to measure the impact of technology on our community that we were not able to cover at all or only partially in this effort. As described in the introductory section, there are areas where defining the indicator is extremely difficult or where there remain significant barriers to collecting reliable and valid. For instance, there is a need to improve evaluation of the impact of community technology centers (CTC's) in the city. Business license and other industry data do not reflect the current IT industry profile. Industry and employment data is a particularly acute example of where data lags.

Statistical data doesn't always tell the whole story. There are qualitative measures that could be included or refined. For example, measuring culturally relevant content continues to be a challenge. Some issues and benefits are most relevant when told in stories and that's why we've tried to share a few of them in this report.

Despite the lure of using technology, it is our ability to decide how to apply the tools appropriately and when not to use them that will make the difference in achieving other social and economic goals.

This report takes a large leap towards fostering a vision of a technology healthy community created by the community. The data presented here tells us which way we're stepping. The City of Seattle, our residents and others have already taken action as a result of this indicators project. Over the long haul, the value of these IT impact indicators will be decided by users of the data and actions taken to apply these findings.

Introduction

When I first started working in the technology industry, physical infrastructure used to be all that we worried about. Today we need to also address the social, political, ethical, and environmental impacts of technology on us as individuals and on us as a community.

—Marty Chakoian, Chief Technology Officer, City of Seattle

This Information Technology Indicators Report presents for the first time a set of measurements describing the state of information technology[1] as it impacts the social, economic and cultural health of Seattle. This ambitious project was initiated in 1999 by the City of Seattle Department of Information Technology and the City's Citizens Telecommunication and Technology Advisory Board (CTTAB) as a way to frame the deep reach of information technology and collect reliable information to guide future actions and investments. It was made possible by significant participation from a wide range of interested residents, technology, education, government, social service, business, activist and community leaders. It is our hope that these indicators and the process to create them will inform the development of national, international and other local technology impact indicators. Moreover we intend these as a tool to encourage communities and individuals to make informed and conscious choices about the role information technologies play in our lives.

These indicators differ from previous research by bringing together data about our relationship to information technology in a range of arenas. This report also provides valuable information about our own local community. It should enable readers to consider whether we utilize IT effectively, appropriately and in a manner which grows the capacity of our citizenry and institutions. The data collected for this project is already enabling more informed decision making; we hope that it continues to be actively used and will assist in efforts for positive and sustainable community development.

The measurements present a snapshot of the time they were gathered. The indicators project is to be longitudinal, with measurements retaken at later dates to track change. It is the City's intention to update these measurements every two to three years in order to effectively track the impact of information technology on the region over time. It is also a living, breathing work. The selection

and measurement of these indicators will mature as they are applied and modified by others. While seeking as much consistency as possible, they will also be revised in later generations to reflect changing technology and respond to community needs.

Technology Healthy Communities

Television, phones, and now computers and the Internet have changed the way we live, work, learn, participate and play. Previous research has also shown that digital opportunities are not equally available to all. Some residents and organizations do not have sufficient access, knowledge or the resources necessary to fully participate in the information age. The scope of the issue continues to evolve, but the gap between information rich and poor has generally been termed the "digital divide." Communities around the country and the world have developed initiatives with the goal of closing this gap.

Seattle has long had a commitment to closing the digital divide and ensuring that all citizens have access to Internet-based government services and the education sufficient to enable them to use these services. In the course of the indicators project, we have come to link our work on the digital divide with a more integrated and positive concept of developing a **technology healthy community**.

Early in the IT impact indicators project we chose five important themes to help guide our discussions. We found that these themes: **access, literacy, content, diversity, and infrastructure,** wove through all areas of the indicators. Certainly they overlap as well. They were used by community participants to help formulate the categories for our indicators.

The participants in the project helped articulate the following set of values to guide work on information technology development.

The City and people of Seattle want to build a technology healthy community where information technology:

- Enhances our local economy;
- Is applied to solving social issues;
- Is used to foster civic participation;
- Promotes relationship building and community development;
- Supports the sustainability of our quality of life; and
- Access to technology tools is equitable and affordable.

We believe the residents of Seattle can work together to guide the direction of information and community technologies towards these goals. To do so also requires public understanding of IT's capabili-

Like nature, communities are held together by a web of relationships, some of which extend beyond the community. The more communities understand these relationships, the better informed their choices will be.
—Communities by Choice, An Introduction to Sustainable Community Development[2]

ties, applications, and impacts.

Using the Indicators

The indicators are signposts to measure our progress in meeting these community goals. We hope that these indicators become a working tool for those who plan, fund and implement programs as well as those who develop products and services. It is our intent that they will inform, spark public dialogue, educate, encourage strategic planning and partnerships, focus programs and encourage effective resource allocation. If truly successful, the use of the data will further equitable and sustainable use of IT in the community, encourage IT to be used for civic good and better equip us to make personal choices about our use of information and communication technologies.

Some of the groups that we see using the indicators are:

- **Businesses,** as they seek to survive and thrive in the information economy, develop and deploy services and foster workforce development;

- **Organizations**, including neighborhood associations, non-profits and funders, as they connect to constituents and clients, plan and implement programs, and seek or provide technology resources to increase community and organizational capacity;

- **Schools and the Education Community,** as they work to ensure an education system that applies IT to learning goals, foster information technology fluency and create new opportunities for youth and lifelong learners;

- **Government,** as it develops e-services, encourages civic participation, fosters community development, and addresses social priorities; and

- **Residents**, trying to understand and manage the impact of IT on their personal lives, concerned with helping those in need, or seeking to take advantage of the new opportunities enabled by the use of information technology.

Breaking New Ground

This project poses a new model for evaluating the impact, both positive and negative, that information and communication technology is having on our region. Over time, we will be able to track changes and progress within the community using this baseline. In this report, we interpret and draw conclusions on some of the results of our research. For some data, the results will only be meaningful when compared over time. Some of the measures are new and may need to evolve to best capture our intent.

Our indicator formulation process drew much from the values and experiences of Sustainable Seattle as well as the King County Social and Health Indicators Project. The indicator categories and values they represent are based on public input. The linkage of categories is unique, but intentional. It recognizes that there is a wide set of interactions which foster or impede the development and sustainability of a technology healthy community. This approach also takes the analysis of the digital divide a step further towards encompassing gaps in the economic and social fabric of our community.

Devising this specific set of indicators was very challenging. We have assumed in the project that there are positive benefits of IT, but very consciously tried to forge a balance in the indicators construction, allowing for negative impacts and trends. Unfortunately many possible indicators also had to be left aside because they were too narrow, too costly or too difficult to measure. For instance one of these was measuring "technology greenspace," the amount of public space and bandwidth on the information highway reserved for non-commercial use. We recognize that there are other aspects of information technology to measure. This is a start to an evolving process.

Background and Process: Engaging the Public and Selecting Indicators

The idea for creating this set of indicators was presented to the City by members of the City of Seattle's Citizens Telecommunications and Technology Advisory Board (CTTAB). This was in response to our need to plan and evaluate the role of Seattle's Community Technology Programs.

To develop the indicators, we first turned to the community to construct a set of values and concerns for a technology healthy community. Extensive and diverse outreach resulted in more than 130 people attending a public forum to talk about the role that technology could and should play in a healthy community. The public concerns and values developed at the forum and subsequent online discourse became the backbone of the indicators presented here.[3]

A Technical Advisory Group[4] was formed, made up of community technology planners, evaluation experts, business leaders, economic development experts, technology developers and social service providers. They worked with us to take the public concerns and values from the forum and develop working indicators and identify potential data sources.

We then took a list of more than sixty indicators from the Technical Advisory Group and narrowed it down to a more manageable set. The indicators were evaluated according to a set of criteria that includes measurability, reliability, validity, and relevance to the identified public values. This set was returned to the Technical Advisory Group and to the public forum participants for review and comments.

The data collected for those indicators is presented here. As we collected data there was some revisions to the indicators, based on obtainable information.

Data Sources

Much of the data presented here comes from new original research conducted by the City. Other sources include educational institutions, state and federal governmental agencies, other City departments, and a range of other interest group and association reports. A list of reports that were consulted and other data sources are included at the end of this report.

In collecting this first set of data, the City created and conducted the following surveys:

- **The Information Technology Residential Survey**: A random-sample telephone survey was conducted of residents in 1,011 Seattle homes. Data was weighted for age, ethnicity, location, and gender based on 2000 Census data in order to reflect the demographics of the Seattle population as a whole.[5]

- **Technology Usage in Non-Profit Organizations**: A mail and e-mail survey was distributed to a list of approximately 700 non-profit organizations with offices in Seattle. The list of non-profits was developed in conjunction with United Way, King County Community Services Division, the City of Seattle Human Services Department, and NPower. Responses were received from 238 non-profits with offices in Seattle.[6]

- **Technology Usage by Community and Neighborhood Groups**: A mail and e-mail survey was distributed to a list of about 300 community and neighborhood groups, based on a list maintained by the Department of Neighborhoods. Responses were received from 91 neighborhood groups.[7]

- **Community Technology Center Services**: Surveys and analysis were conducted to ascertain distribution, services and capacity use.

- **Small Businesses**: A survey of small businesses is currently being conducted in conjunction with Community Capital Development, a business assistance and lending organization. The results of this survey will be published separately when completed.

We need to expand access, we need to expand our vision, and we also need to know how we're doing. Unless we have some knowledge of what we want to accomplish with technology in our community, we are not going to know whether we're being successful and where the gaps are we need to focus on.
—Richard Conlin, Seattle City Council Member

Shifting Ground

These first set of measurements are starting signposts. Over time we will and must be able to refine the methodology and selection of data used.

Already over the three year course of this indicators project, our world has changed greatly. On top of world political events and economic fluctuations, use of the Internet and home ownership of computers continues to grow at some rate. The technologies also have changed. Cell phones and personal computing devices, such as Visors, Palm Pilots or Windows CE devices, are now commonplace in many communities. When we began, the information technology industry was growing at breakneck speed. The economy has slowed, and Seattle, like the rest of the country, has seen a decrease in new businesses and new jobs. Some of that slowdown is reflected in this research, and some is not. Over time, we will better be able to understand what realistic growth is and what is not.

Conversations have also progressed. As use of email and the web have grown, people are talking more about balancing the desire for information with the challenge of info overload. Attention is starting to focus more on quality of content and how to organize it. Tougher questions are being asked about cost versus benefit and how technology is really changing people's lives. Despite the lure of using technology, it is our ability to decide how to apply the tools appropriately and when not to use them that will make the difference in achieving other social and economic goals.

A vision of a technology healthy community created by the community is an important step and the data presented here tells us whether we're stepping in the right direction. It is the action taken after reading the data that will determine where we end up.

Notes

1 For the purpose of these indicators, information technology is defined as information and communication tools, including personal computers, computer applications software, Internet and web-based communications, and devices for the storage and retrieval of information.

2 Jeanne Gage and Don Harker, Mountain Association for Community Economic Development, www.communitiesbychoice.org, 1997

3 The materials and result of the forum are available online at www.cityofseattle.net/tech/indicators/data_collection.htm

4 For a full list of Technical Advisory Group members, see www.cityofseattle.net/tech/indicators/advisors.htm.

5 The full methodology, survey instrument, and results of this survey can be found at www.cityofseattle.net/tech/indicators/data_collection.htm or through the Seattle Public Library.

6 The full methodology, survey instrument, and results of this survey can be found at www.cityofseattle.net/tech/indicators/data_collection.htm

7 The full methodology, survey instrument, and results of this survey can be found at www.cityofseattle.net/tech/indicators/data_collection.htm

Definitions: Icons and Indicators

Early in the IT impact indicators project we chose five important themes to help guide our discussions. We found that these themes, *access, literacy, content, diversity*, and *infrastructure*, wove through all areas of the indicators. In this final report we have tagged some of the items with icons representing these themes. We have not attempted to tag all the indicators; we hope the icons will help remind readers of these themes and illustrate the continuity of issues across our measurement categories.

Access

All residents need to have access to information technology (IT) tools and training in order to find employment, access information, and participate in civic and cultural life.

Literacy

All residents should receive the training needed to reach a basic technology literacy benchmark. Beyond that we should strive for information technology fluency, where residents become self-learners, teach others and are more able to apply their skills and contribute to the direction of IT development.

Content

Internet delivered content should reflect the diversity of our population, offering information that is important to all residents. We also need to encourage responsibility for content and the ability for families to make choices about their use of the Internet.

Diversity

The design and availability of technology tools should support the interests and serve the needs of our diverse community. We should strive to train a diverse IT workforce.

Infrastructure

Sufficient infrastructure needs to be provided to enable all areas of our community (geographic and organizational) to participate fully in the information age.

What is an Indicator?

An indicator is a measure that summarizes information about a particular subject and may point to particular problems. It provides a reasonable response to specific needs and questions asked by decision and policy makers. Indicators show trends, provide quantitative and qualitative information, but they can be more than pieces of information if designed in response to well defined policy objectives. Policy-oriented indicators help prioritise and define targets.

Source: United Nations Centre for Human Settlements—UNCHS (Habitat), Global Urban Observatory—Urban Indicators Programme, *http://www.unhabitat.org/guo/index.html*

1

Access to Information Technology
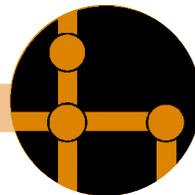
Access   Content   Diversity   Infrastructure   Literacy

Direct Access to computers, the Internet and other information technologies starts the access pathway. Key questions follow, revealing the depth of access issues. Which technologies are essential? Who owns equipment and how convenient is the access? What bandwidth capacity is available and what is the impact of the cost of access? What are the barriers to access?

This section examines who has access to a range of information technology tools, from computers and the Internet to cable television. It also looks at who does not have access. Other measurements in this section cover quality of IT access in the home, barriers, and the capacity of libraries and other public computing centers (community technology centers or CTC's) to meet the needs of the have-nots. Finally, this section looks at information technology as a tool for breaking down barriers, with a focus on the quality and cost of access available to people with disabilities.

Overall Information Technology Access

Household access is an indication of the opportunity that residents have to utilize basic and more advanced information technology. For this indicator we define baseline tools as telephones, televisions, computers and the Internet. Advanced tools include cable and satellite TV, high speed Internet access, and wireless phones. We combined responses on access to each tool to create a measurement reflecting overall access for Seattle households.

Overall, Seattle residents have high levels of access to information technology.

Almost all respondents (95%) have televisions at home, and three out of five (60%) subscribe to cable TV.

Five percent subscribe to satellite TV. Almost half (46%) have a wireless phone.

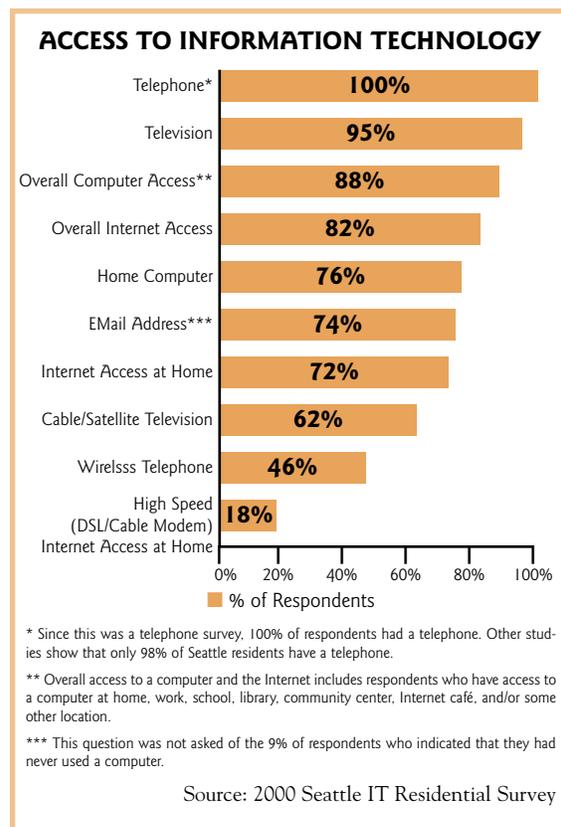More than one-third (35%) of those surveyed have access to nine or more of the technologies mentioned in the survey (see graph). An additional 39 percent fall into the average category, and have access to seven or eight of the technologies.

Twenty-five percent, however, classified themselves as having "limited" or "below-average" access to IT. These reported having access to

fewer than seven of the technologies, with some having as few as one in the list.

ACCESS TO INFORMATION TECHNOLOGY

Technology	% of Respondents
Telephone*	100%
Television	95%
Overall Computer Access**	88%
Overall Internet Access	82%
Home Computer	76%
EMail Address***	74%
Internet Access at Home	72%
Cable/Satellite Television	62%
Wirelsss Telephone	46%
High Speed (DSL/Cable Modem) Internet Access at Home	18%

■ % of Respondents

* Since this was a telephone survey, 100% of respondents had a telephone. Other studies show that only 98% of Seattle residents have a telephone.

** Overall access to a computer and the Internet includes respondents who have access to a computer at home, work, school, library, community center, Internet café, and/or some other location.

*** This question was not asked of the 9% of respondents who indicated that they had never used a computer.

Source: 2000 Seattle IT Residential Survey

Measurements

Percent of Residents with High Access to Information Technology	**35%**
Percent of Residents with Average Access to Information Technology	**39%**

Access Values

In the course of developing the access indicators, community members identified these values:

● Access to basic information technology should be equitable and affordable, and all individuals should have the opportunity to use current, updated equipment.

● Information technology access should allow users to produce content, and not just consume information.

● Access must include training opportunities for building literacy and fluency.

● Public access points are useful only if we ensure that people are aware of their availability.

Computer and Internet Access in the Home

Our research showed that home users are likely to have higher computer and Internet literacy compared to those who connect only at public access sites, such as libraries, school and community centers.[1] Home access increases opportunities to explore the tools and potential uses. With home access, residents have no restrictions on time and content. Home users can attend school or complete school work, apply for services, do research, and telecommute. Public access users are limited by hours of operation, the capacity, and location of computer labs. Measuring home access also gives some insight into affordability of computers and the priority residents place on having them in their homes.

Measurements

|	
Percent of Seattle Residents with Home Access to a Computer	**76%**
Percent of Seattle Residents with Home Access to the Internet	**72%**

Most Seattle residents (91%) have used a computer, and the majority of residents (76%) have a computer in the home.

This is significantly higher than the national average. It is estimated that only about half (51%) of US households have a computer.

**Among Seattle residents with computer access, nearly all (93%) have Internet access.**

Almost three quarters (72%) of Seattle residents have Internet access at home. Again, this is significantly higher than the national average, which suggests that approximately two in five American households (42%) have Internet access.

HOME COMPUTER AND INTERNET ACCESS BY AGE

Source: 2000 Seattle IT Residential Survey

AVERAGE SEATTLE COMPUTER AND INTERNET ACCESS COMPARED TO NATIONAL AVERAGES
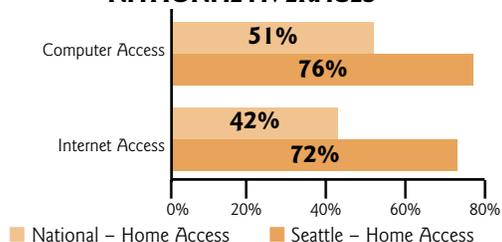
Sources: 2000 Seattle IT Residential Survey and *Falling Through the Net: Towards Digital Inclusion* (2000)
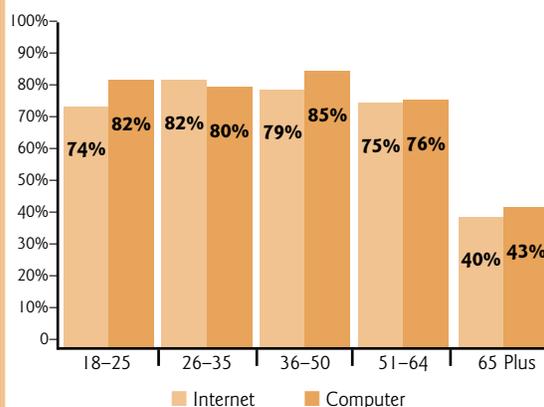
Despite the generally high accessibility to computers and the Internet in Seattle, the numbers change when age, ethnicity, education and income enter the picture.

In-depth analysis was done to see which of the demographic factors has the most significant effect on access. The results of this analysis show that each of these factors affects the occurrence of home computer and Internet access, other factors notwithstanding.

The largest gap in home computer and Internet access is seen in Seattle's senior population.

Those over the age of 65 are less likely to have computer and Internet access at home, but this is less of a factor than seen with income, education and ethnicity. After correcting for the other factors, those over the age of 65 are just

under three (2.8) times less likely to have computers at home. For the Internet, the odds decrease a bit more, with those over 65 being 2.9 times less likely to have net access at home. The results shown here are consistent with other studies that show that seniors are the least likely to have access to computers and the Internet.

There are many factors that may contribute to the lack of access in this age group, including lack of exposure to the potential benefits of computers, living on a fixed income, and distrust of or unease with technology. We predict that more seniors will continue to get connected, as today's retirees have been exposed to computers and the Internet at work and may already be connected.

Access to computers and the Internet at home increases with income, with the largest jump in access found between those in the moderate to middle income brackets.

Of all the demographic factors, income has the greatest influence on home access to computers. After correcting for age, education, and ethnicity, those in the middle income bracket or higher are five times more likely to have a computer at home than those in the lower income brackets.

Income has a slightly lesser effect on home Internet access. Those in the middle income

HOME COMPUTER AND INTERNET ACCESS BY EDUCATION

Source: 2000 Seattle IT Residential Survey
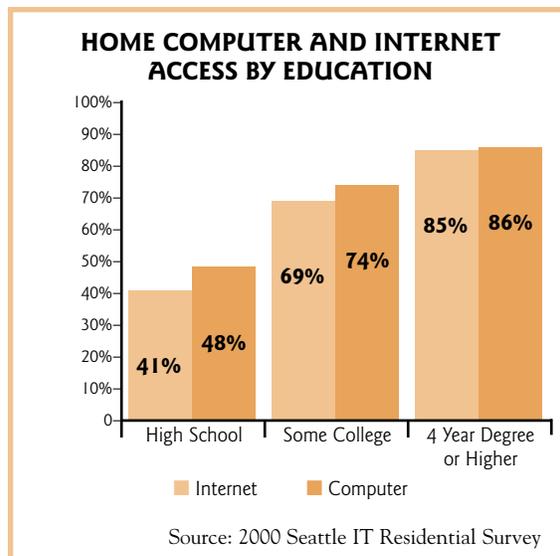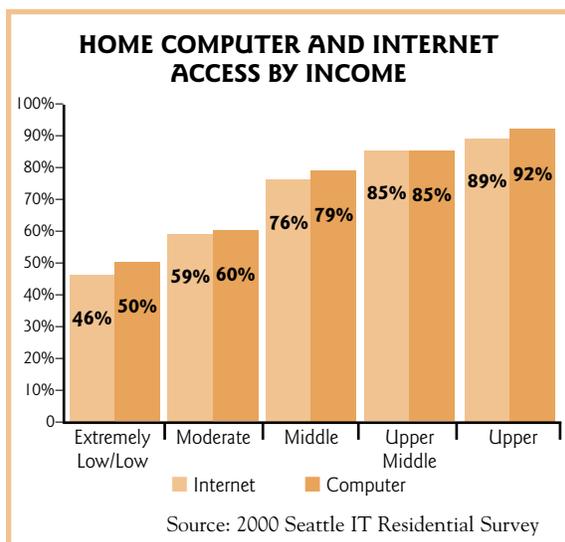
brackets or higher are 4.5 times more likely to have Internet at home than those with lower incomes.

As education increases, so does home access to computers and the Internet.

After correcting the data set for age, income, and ethnicity, we found that those with education beyond high school are four times more likely to have home computer access than those with a high school degree or less.

For Internet access, the odds ratio is even higher. Those with education beyond high school are almost five (4.7) times more likely to have Internet at home than those with a high school degree or less.

HOME COMPUTER AND INTERNET ACCESS BY INCOME

Source: 2000 Seattle IT Residential Survey

Computer and Internet Access in the Home, *continued*

Access at home is also affected by ethnicity, regardless of income, age, or education.

Asian Americans are the most likely to have access to computers and the Internet, regardless of income. After correcting for income, age, and education, Asian Americans are just over twice (2.2) as likely to have a computer in the home than all other ethnic groups combined.

For African Americans and caucasians, access to computers and the Internet increases with income. However, for all income levels, African Americans have lower access to technology than do caucasians, and are more reliant on access outside the home. After correcting for income, age, and education, African Americans are more than three (3.2) times less likely to have a computer in the home than all other ethnic groups combined.

When looking at Internet access, African Americans are almost four (3.9) times less likely to have Internet access at home than all other ethnic groups combined.

HOME COMPUTER AND INTERNET ACCESS BY ETHNICITY

Ethnicity	Internet	Computer
African American	45%	52%
Asian	74%	80%
White	76%	79%
Hispanic	55%	58%
Other	71%	71%

Source: 2000 Seattle IT Residential Survey
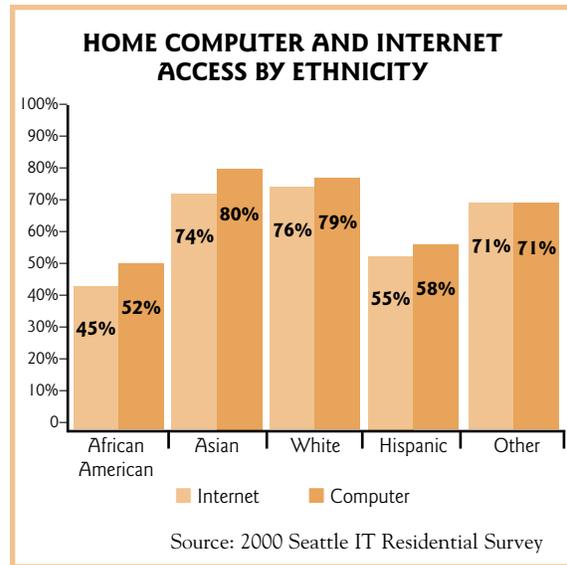
Seniors Training Seniors

In 1999, the City of Seattle Department of Information Technology commissioned a study on how to best train senior citizens in computer and Internet usage. Studies have consistently shown that those over the age of 65 are significantly less likely to have access to computers and the Internet.

The City's study recommended that training of seniors be done by other seniors. With this in mind, the Seniors Training Seniors program was developed. In the first year of the program, 32 senior trainers trained more than 300 of their peers, and the program continues to grow.

Jim, 57, Senior Training Seniors Volunteer Instructor

On teaching

I get a lot of pleasure out of teaching people. Probably the absolute gift one person can give to another is to teach them something. I'm not a computer wiz but I can teach. I'm nowhere near what someone would call a hacker. I just go out there and use computers as much as I can.

On age and learning

As one gets older, there's less and less opportunity to be in the mainstream. And because many of the things we do now are using computers with the Internet, that even puts them further out of the loop unless they get into it at some point.

It's difficult for me to learn these things so I can understand how difficult it is for somebody coming in at some of these ages learning something entirely different. It's incredible that they're willing to take that risk.

On challenges

It's just so easy to get lost. Especially the way things are coming at people now. The way pages are being pushed at people more and more. So that it's real easy to click on a page and have five more spring up at you. The difference between a senior and a 14 year old getting lost is that the 14 year old probably thinks it's a challenge. The senior probably thinks that it's something they've done wrong.

Mitzi, 82, Student

Mitzi is a Nisei, born in 1918 to immigrant parents from Japan. She was sent to an internment camp during WWII and later worked with U.S. intelligence operations until she retired in the mid-1980's.

I approach my friends, and they seem to stay away from this sophisticated tech. I think they're afraid. They don't care. I said well, you know, it's kind of nice to stay up to date with the new tech. But, "I'm too old for that sort of thing is the line I get. And I'm not about to jump into something like that." I kind of feel sorry for them because they don't know what they're missing.

Literacy with a purpose

I don't want to be computer illiterate. And I wanted to converse with my grandchildren on this subject. Another thing, I needed to learn how to use a computer in conjunction with a large reunion I organized about six years ago. I had to write certain material for a booklet so that gave me a start.

Success

I've taken quite a few classes. And one I enjoyed lately is emailing in Japanese. You have to know the language in order to do that...So I went ahead and typed a message for Jim [the instructor], and he couldn't read it. [Laughs.]

Quality of Home Access

Equity in home access is a moving target. Processor speeds continue to double every 18–24 months. Computer applications have grown more sophisticated and complicated, fueling a market for more powerful and portable devices. Deployment of higher bandwidth services like DSL and cable broadband enable delivery of new and faster services on the World Wide Web. Those with higher bandwidth and more powerful equipment have advantages; they can save time online, making it easier to work or study from home, utilize multimedia materials and web-based application services.
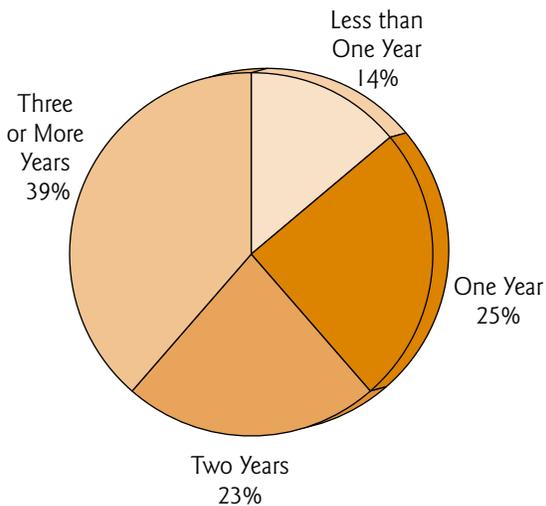
Measurements

Average age of computer in the home	**2.42** yrs
Percent of residents with high-speed Internet access in the home	**27**%

The majority of computers in the homes of Seattle residents are less than two years old.

More than three out of five (62%) home computers are two years old or less, with the average age of a computer in a Seattle home at 2.42 years. Residents living in moderate and middle income households are the most likely to have a computer in the home that is one year old or less (49% and 52% respectively).

SPEED OF INTERNET CONNECTION AT HOME
(Base: Those with Internet at home)

High-speed Access*	**27%**
56K Dialup	**32%**
Slower than 56K	**8%**
Don't Know	**25%**
Other	**9%**

■ % of Respondents
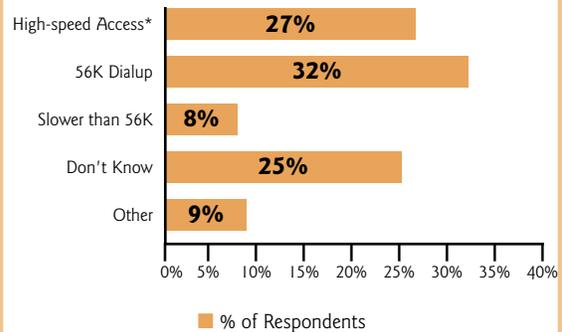
* High Speed access is defined as DSL, ISDN, or cable modem service.

Source: 2000 Seattle IT Residential Survey

Only 34 percent of upper income households and 31 percent of upper middle income households have a computer that is one year old or less. This may be due to the decreasing price of computers over the last few years leading to an increased number of moderate and middle income families buying their first home personal computer.

Seattle has an extremely high penetration rate of high speed Internet access among residents with Internet at home.

One in four (27%) residents with Internet access have a high-speed connection using DSL or a cable modem, compared with only 10.7% of online households nationwide.[2]

A large number of respondents did not know the speed of their connection, giving instead the name of their service provider.

AGE OF COMPUTER IN THE HOME
(BASE: Those with home computers)

Less than One Year 14%

Three or More Years 39%

One Year 25%

Two Years 23%

Source: 2000 Seattle IT Residential Survey

Barriers to Ownership of Computers and Internet

In order to track how well Seattle residents are meeting their home computing needs, we asked residents who do not have computers and/or Internet access in the home to tell us why. For some, issues of cost, space or distrust hinder ownership. A lack of ownership may be a values choice, a lack of interest, or dissatisfaction with content. As the data below suggests, seeking universal home access is a challenging and perhaps unrealistic goal. However understanding the barriers is a first step to appropriate action.

Measurements

Significant Barriers to Home Computer Access:

Don't Want One	**38%**
Cost	**30%**

Significant Barriers to Internet Access at Home (Computer Owners):

Don't Want	**31%**
Problems with Computer	**16%**
Cost	**15%**

BARRIERS TO COMPUTER OWNERSHIP

(Base: Those who do not have a computer in the home)

Don't Want One	**38%**
Cost/Too Expensive	**30%**
Don't Know How to Use	**11%**
Access Elsewhere	**9%**
Too Old/Retired	**6%**
Haven't Gotten Around to It	**3%**
Computer Broken	**2%**
No Time	**1%**
Safety/Security Concerns	**1%**
Other	**6%**

■ % of Respondents

Source: 2000 Seattle IT Residential Survey

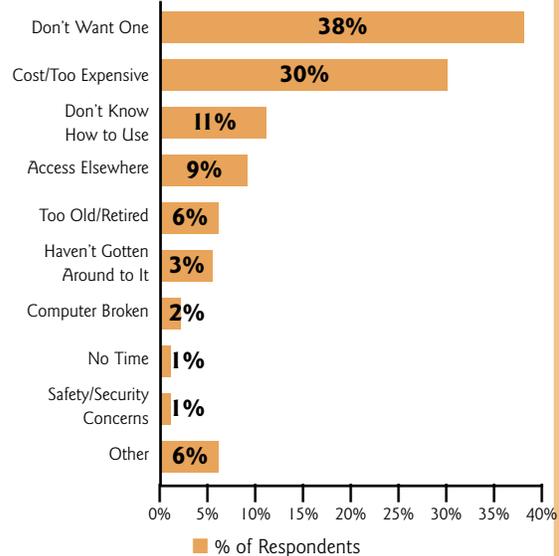**In the case of both computers and the Internet, Seattle residents who do not have access at home were most likely to reply that it was because they did not want it.** This is consistent with other national studies looking at barriers to access.[3, 4] Often, lack of desire to own computers or have Internet access comes from distrust of the technology itself or not being able to see how it would add any value to one's life.

The largest percent of respondents (38%) without a computer at home state that the reason they do not have a computer is because they do not want one. An additional 30 percent name cost as a barrier.

Men are more likely than women (47% compared to 30%, respectively) to indicate the reason they do not have a computer at home is because they do not want one, as are respondents over the age of 65 when compared to those age 35 and under.

Women cite cost (35%) and no need (30%) as the major barriers to having a computer at home. While women are more likely than men to cite cost as a factor—35 percent compared with 24 percent, respectively—this difference is not statistically significant.

Cost is the greatest barrier to younger respondents—those 35 and younger.

Cost is still a barrier for low to moderate-income respondents. This group is more than three times more likely to state cost as a barrier than those without computers at home in the upper income bracket.
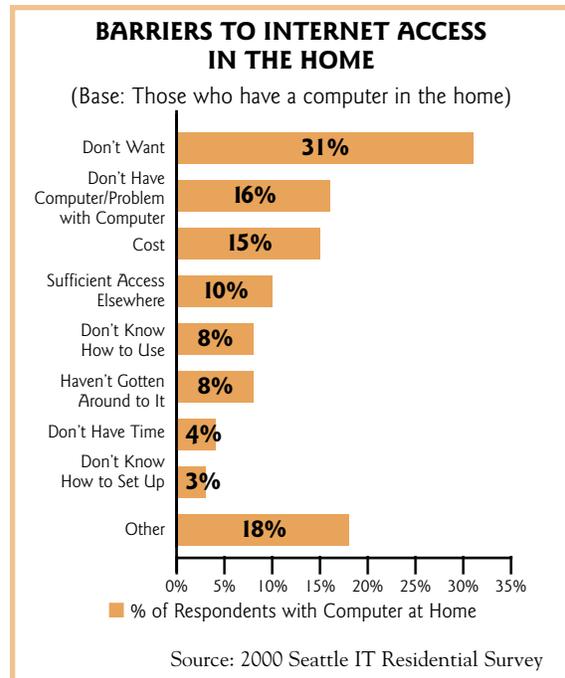
The most common reason that residents identified for not having Internet access at home was also because they do not want it.

This is consistent with other studies that have shown that the most common reason that individuals are not going online is lack of interest.[5, 6]

The next level of reasoning cites cost (15%), and problems with a home computer (i.e., not working, not powerful enough, not available for personal use) (16%).

Lack of knowledge—both in terms of configuring a computer for Internet access (3%) and Internet literacy (8%)—are other identified problems.

Those who do not have a computer at home (51%) cite that fact as the most significant reason for doing without Internet access.

BARRIERS TO INTERNET ACCESS IN THE HOME

(Base: Those who have a computer in the home)

Barrier	%
Don't Want	31%
Don't Have Computer/Problem with Computer	16%
Cost	15%
Sufficient Access Elsewhere	10%
Don't Know How to Use	8%
Haven't Gotten Around to It	8%
Don't Have Time	4%
Don't Know How to Set Up	3%
Other	18%

■ % of Respondents with Computer at Home

Source: 2000 Seattle IT Residential Survey

Relevance is critical to overcoming interest barriers

While not clarified in the data, experience tells us that two different types of people are represented in the group that rejects use of computers and the Internet. For some, it is a lifestyle and values choice. For others, it is a lack of exposure to the usefulness of computers and the Internet.

Seniors are a good example of the latter. Our experience in working with seniors shows that even the most cynical types enjoy computers and the Internet when shown how technology is relevant to their interests. Jim Sproull, volunteer senior computer instructor, shared this story:

"There is a palpable change in these seniors as they learn. Most learners are excited about getting into the technology, but they don't even have a clue about how much is out there.

"A good example is Archie. Archie was pretty frustrated until we got him onto the baseball page. And baseball is many things, but if it's anything at all, it's counting the numbers, the stats. Who's batting at what? How many pitchers have pitched 20 games? And the Internet provides all of that—far more than one could ever get out of a newspaper. You can compare this team's batting percentage playing night games away against that teams batting percentage playing home games during the day. If you want to do those things.

"And he said, 'this is incredible!'

"And his frustration level dropped away because he was now seeing that there is something very real that he could latch onto and get off of this, rather than just learning it. There're things he can get that will provide him enjoyment."

Cost of Access

As stated in the previous indicator, cost is not identified as the greatest barrier to access. However, it does remain the most significant barrier to those who want the technology but cannot afford it. One way to measure cost as a potential barrier to home computing and Internet access is to define basic access and track its cost over time. The chart below presents a baseline for this tracking.
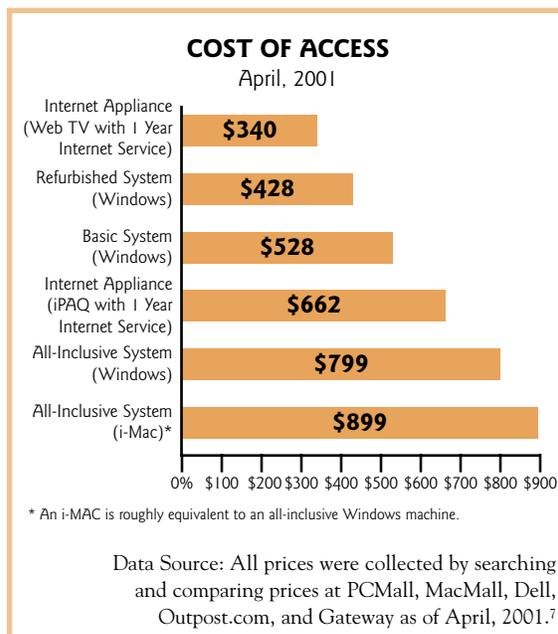
Measurements	
Basic Systems	$428–$528
All-Inclusive Systems	$799–$899

Our scan of current pricing still finds that prices are likely prohibitive for low income families, although the cost of computers has dropped.

Even a refurbished system costs just over $400, and does not include technical support or any maintenance costs that may arise. Many major computer retailers do offer payment plans for very low monthly rates or reduced pc cost with Internet subscriptions. This may encourage some families to make computer purchases, although it discriminates against low-income residents by costing purchasers more than if bought outright.

COST OF ACCESS
April, 2001

	Cost
Internet Appliance (Web TV with 1 Year Internet Service)	$340
Refurbished System (Windows)	$428
Basic System (Windows)	$528
Internet Appliance (iPAQ with 1 Year Internet Service)	$662
All-Inclusive System (Windows)	$799
All-Inclusive System (i-Mac)*	$899

0% $100 $200 $300 $400 $500 $600 $700 $800 $900

* An i-MAC is roughly equivalent to an all-inclusive Windows machine.

Data Source: All prices were collected by searching and comparing prices at PCMall, MacMall, Dell, Outpost.com, and Gateway as of April, 2001.[7]

Access Outside the Home

This indicator tracks residents' use of computer outside the home, by measuring the usage of computers at work, school, and public computing locations. Work, school, and public computing locations, such as libraries, community centers, and Internet cafes provide classes and access to the Internet, whether residents have a computer at home or not. These are important electronic watering holes; they provide skill building opportunities and bring community together. Access centers may also provide higher quality, state of the art technology to those with older systems at home.

Measurements

Residents who use computers at work	**56%**
Residents who use computers at a place in addition to work or home	**56%**

Many residents access computers outside the home, at places like work, school, the library, and community centers.
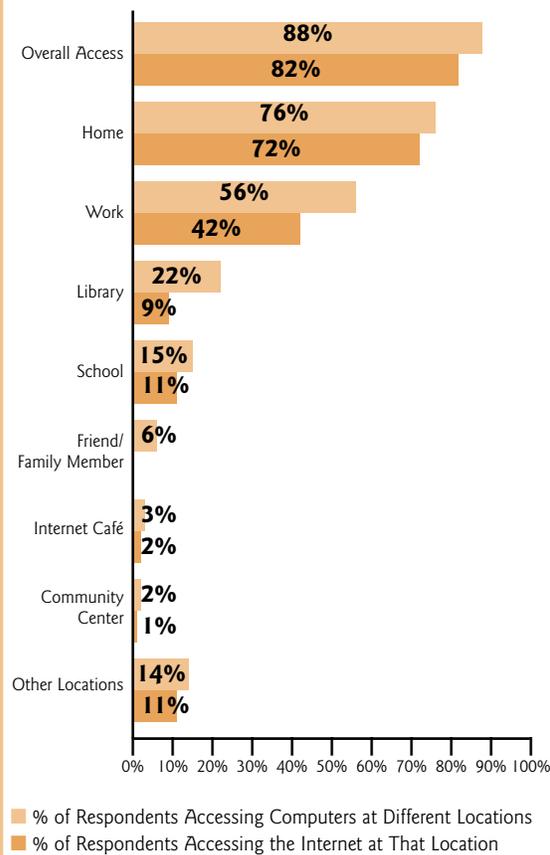
After home access, the largest number of residents (56%) access a computer at work. Of those who access a computer at work, only nine percent identified this as their only access point.

More than half (56%) of residents use a computer at some place in addition to home or work. Twenty-two percent indicated using a computer at a public library and 15 percent at school. Only eight percent of those using a computer at a public library and three percent of those using a computer at school cite this as their only computer access. While this was not originally included in the questionnaire as a separate location, six percent of those surveyed mentioned that they used a friend's or family member's computer. Thirty-one percent (31%) of those who said they use a friend's or family member's computer said this is their only computing location.

Similarly, many residents also access the Internet outside the home. Of those who use a computer at work, 76 percent use it to access the Internet. The same percent (76%) of those who use a computer at school use it to access

PERCENTAGE WHO ACCESS THE COMPUTER AND INTERNET BY LOCATION
(Base: All Respondents)

Location	% Computers	% Internet
Overall Access	88%	82%
Home	76%	72%
Work	56%	42%
Library	22%	9%
School	15%	11%
Friend/Family Member	6%	
Internet Café	3%	2%
Community Center	2%	1%
Other Locations	14%	11%

■ % of Respondents Accessing Computers at Different Locations
■ % of Respondents Accessing the Internet at That Location

Source: 2000 Seattle IT Residential Survey

the Internet. For those who use a computer at Internet cafés, 66 percent use the Internet. For those who use computers at a community center, 59 percent access the Internet. Those who use computers at a library are least likely to go online at that location, with only 39 percent stating that they use the Internet.

Public Access Points: Proximity to Public Access

This indicator gauges how close residents are to centers providing public access to IT tools. These locations where the community can gain free or low-cost access to technology are often called community technology centers (CTC's). They are one solution to the gap that still exists between those with home access to computers and those without. Studies have shown the benefits of CTC's extend beyond access. These labs are often linked to community centers or non-profit organizations and provide both technology training and community resource connections. Increased job skills, improved outlook on learning, increased civic participation, and new social and community connections are all reported impacts of community technology centers.[8] While all residents, regardless of home access, could benefit from the access and training at these centers, they are most critical where home access is low, and particularly for low-income residents.

Measurements

The average household is about $\frac{1}{2}$ (.56) of one mile from a public computer

The average low-income household is about $\frac{1}{3}$ (.33) of one mile from a public computer

(Note limitations below)

In Seattle, residents are, on average, just over half a mile from a public computer access site. For low-income households, this distance decreases to about a third of a mile.

Some of the public access sites offer training opportunities and some do not. When those that do not offer training opportunities are removed from the list, Seattle residents are just over three-quarters of a mile from a public computer. For low-income households the distance to a public computer center with training opportunities decreases to about half a mile.

The research that led to these findings is useful, but it's important to also understand its limitations. For instance, there is no distinction made between public access sites with just a single computer (i.e., a neighborhood service center or coffee shop) and those with many computers. This analysis also does not take into account the fact that some access sites are targeted towards specific populations or interest groups, and that the center closest to a resident may

not be the one that they feel most comfortable attending. More information on other limitations to this research can be found in the appendix.

Despite the limitations, this research is still useful in that it illustrates the concentration of public computer access sites in the Seattle area. On average, all residents are roughly within walking distance (about $\frac{1}{2}$ mile) of a public computer. However, there are still some areas in the north end of the City and in West Seattle that are below the average distance of just over half a mile to a center.

DISTANCE TO PUBLIC ACCESS SITES IN SEATTLE

Legend: ■ Miles to CTC with Training ■ Miles to Public Computer
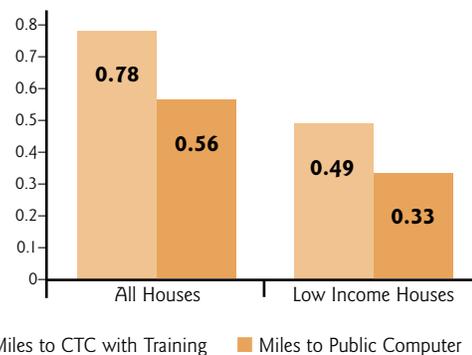
Source: Drew, Jason and James Werle, "Low income, technology access & training: Are the local CTCs helping to close the gap?" November, 2000.[9]

Capacity of Public Access Points

As seen in the previous indicator, public computers in Seattle are relatively well distributed, with lower income neighborhoods containing a higher penetration of access points. However, counting computers and measuring distances do not indicate the overall capacity of these centers to meet the needs of their communities. This indicator below attempts to capture how well used the existing resources are.

Measurements

Capacity Index for
Seattle Public Access Centers   **23**

Although more than 400 individual users were reported at the 18 sites that participated in our Public Computer Usage Assessment Day, there are still many computers open to the public that are going unused.

This data is based on a one-day assessment of public computer usage at 18 locations across the city. These centers ranged in size from one to 31 computers. In total, the centers represented 124 computers across the city. A total of 427 users were documented at these centers on the assessment day. More than half of these were users of the public access computers at the Central Library,[11] which is the largest site with a total of 31 computers. Operating capacity ranged from an average of 76% at one center to 0% at some of the single computer access points. In general, centers with larger numbers of computers had relatively higher usage than those sites with only one or two computers.

CURRENT OPERATING CAPACITY OF SEATTLE COMMUNITY TECHNOLOGY CENTERS

Current Operating Capacity 23%
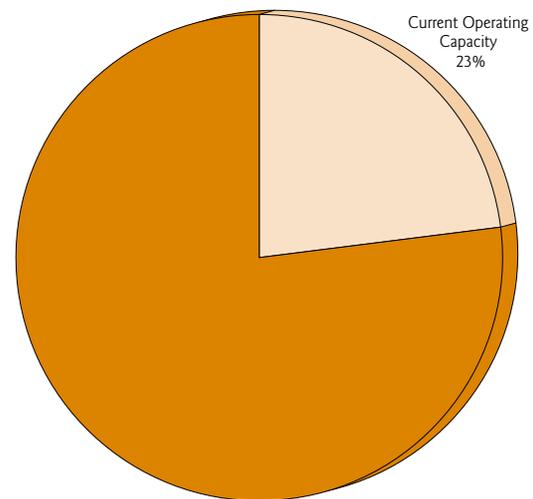
Source: City of Seattle—Public Computer Usage Assessment Day, April 11th, 2001[10]

Most of our students come from different ethnic backgrounds. And they have problems back home. When they come here on the first day orientation, I tell them, "You guys are coming from different areas. We have different issues in our politics. But this is not the place."

The first day, they don't talk to each other. After that, there is no problem at all. No matter what politics is going on over there [in Africa]. So, I see in many ways that this lab is not only for technology. It's for stronger relationships between the communities.

—Tsegaye Gebru, Horn of Africa Instructor

Information Technology as a Tool for Breaking Down Barriers

Information technology holds great potential for serving people with disabilities, people who are homebound (including seniors), and non-English speaking people. Information technology can open doors to employment, education, communication with family and friends and community participation opportunities that otherwise may not be available. However, these groups also face unique and very challenging barriers to access.

People with Disabilities

This indicator charts the cost of information technology access for those with disabilities compared to others. National research shows that people with disabilities are less likely to have computer and Internet access than those without disabilities. The U.S. Department of Commerce found that those who identify themselves as having a disability were only half as likely as those without a disability to live in homes with Internet access. About 60 percent of those who have at least one type of disability have never used a computer, compared to just under 25 percent of those who do not have a disability.[12]

ESTIMATED COST OF COMPUTER SYSTEMS WITH ADAPTIVE EQUIPMENT

* Basic system includes an ink-jet printer.

Source: Equipment list was provided by the University of Washington's DOIT Program. Prices were found on specific product web pages as of May, 2001.

Measurement

Percent increase in cost of adaptive systems compared to basic systems

40% to 332%

The cost of computers for people with disabilities is considerably higher than for those without any special accessibility needs.

Recent strides in equalizing computer and Internet access have produced technologies like screen readers, Braille printers, specialized keyboards, and alternatives to the mouse. These technologies, however, are not inexpensive. Their major cost is often a problem for those who are unable to work or living on a fixed income.
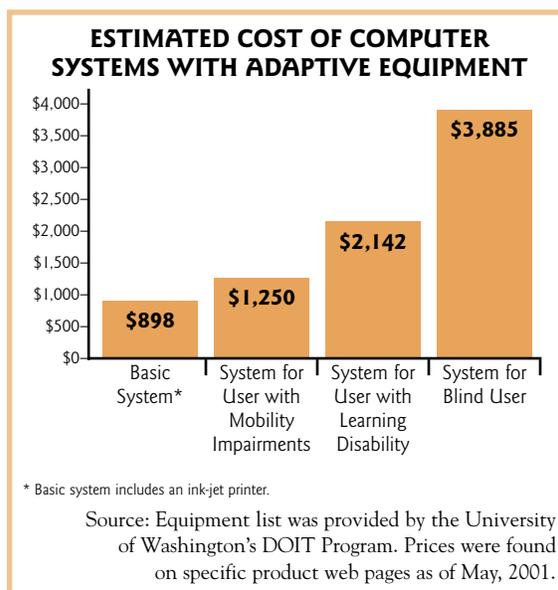
There are an unlimited number of disabilities that require adaptive equipment for computer use. And there is a range of adaptive solutions for each individual problem. For the purposes of this study, we chose a few sample packages that are often used with certain disabilities.[13] These packages were priced out and compared to the cost of a basic system.

Civic Information Web Sites with Accessibility Standards

Access to the tools is only one element of addressing access for those with disabilities. Access also requires providing online content that can be read, navigated, and processed by these tools. In this interest, the World Wide Web Consortium's Web Accessibility Initiative has developed basic accessibility standards for web pages.

The standards aim to guarantee that all people will be able to access information, notwithstanding their disabilities or the sophistication of the technology in use. The goal is that eventually all web sites will be created with accessibility standards in mind. To begin to gauge our local content accessibility, we tested some

PERCENTAGE OF PAGES THAT MET ACCESSIBILITY STANDARDS

Site	Percentage
Seattle P-I	0%
Seattle Times	8%
Seattle Public Library	19%
City of Seattle	43%
Metro Transit	66%
Public Health	71%
WA State	90%
Crisis Clinic	95%
Seattle Community Network	95%

Source: Tests conducted with the Bobby accessibility testing tool from the Center for Applied Special Technology between April 24–26, 2001.

Measurement

Community Web Page Accessibility Index **54%**

important local civic sites to see how well accessibility standards are being met.

None of the civic information sites tested completely met accessibility standards.

In total, just over half of all the tested pages from nine important community sites were accessible to individuals with disabilities.

For this indicator, a sampling of nine "civic information" sites were tested using Bobby, a web site accessibility testing tool created by the Center for Applied Special Technology.[14] Sites were rated by the number of pages tested that met accessibility standards, meaning that no "priority one" errors were found by Bobby on that page.[15] A higher number on the graph indicates that the site is closer to meeting accessibility standards. The Community Web
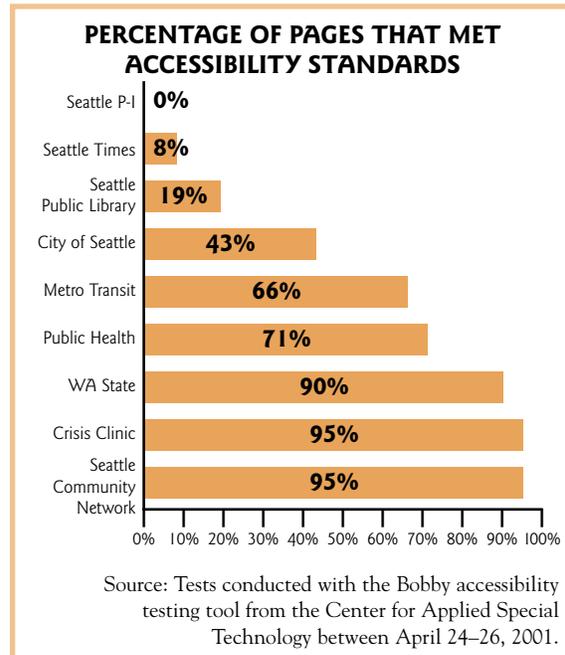
Page Accessibility Index was determined by taking an average of all the nine sites tested.

Some of these errors can be easily fixed. The lack of compliance with accessibility standards indicates that there continues to be a need for educating the public and web developers on the importance of web accessibility.

Homeless Population

The homeless are another community that the City is concerned with assisting and not leaving out of the information age. This is also a very difficult population for which to gather data. Although there are free access sites and training resources available, many of those who are homeless may not know where to go to get access or may not feel comfortable visiting some of the locations. Community Voicemail, providing telephone voice mail accounts for the homeless, provides a great example of enabling the underserved with information technology tools. Just as voicemail has enabled those in our community to stay in touch with family or potential employers, computers, Internet and email can provide these critical connections and encourage personal development and increased self-sufficiency.

There is currently no statistical information available on the level and quality of access that the homeless population has to computers. There is, however, some focus group and anecdotal information about homelessness and technology access and training. Staff at the Seattle Public Libraries and a couple of our Neighborhood Service Centers report that homeless residents use computers there, and a few homeless assistance agencies have set up small labs in their offices. A center at Real Change, a service agency and newspaper production studio for the homeless, is well used and expanding. Despite this information, overall access is believed to be low.

The information that we do have indicates that knowledge about computers and access is low in the homeless population, but many homeless residents are interested in learning more. In October and November of 2000, United Way, the City of Seattle and King County held a series of focus groups with homeless residents to discuss general homelessness planning efforts and to gather input on upcoming proposed projects. Nine focus groups were held, with more than 60 people including single adults, families, and youth recruited through homeless assistance organizations. The focus group participants were asked to talk about their experience with computers and whether or not they would be interested in learning more about them. In general, most of the participants did not currently use computers, but they had a strong interest in learning and expressed a sense of being left behind. Almost none of the participants recalled ever using a computer to access services, and most were very interested to learn how they might do that. Many of the participants were interested in receiving training, but they wanted to be sure someone was on hand to help. When asked where they would like to access computers, responses included places where they already often have to wait (such as Harborview Medical Center or Department of Social and Health Services) or within the social service agencies that provide services to the homeless.[16]

The Internet is important for jobs and being comfortable with computers. There're certain things that people like to do, like being able to communicate with friends and family. Or being able to find out information about things that they're interested in. Or being able to play a fun game. It doesn't matter if you're rich or poor, home-full or homeless, you still want to do those things. And the Internet is the most popular way.

—Lily North, VISTA Volunteer, Real Change

Notes

1 City of Seattle Department of Information Technology, *2000 Seattle Information Technology Residential Survey*, 2001 pp 56, 65.
2 U.S. Department of Commerce, *Falling Through the Net: Toward Digital Inclusion,* October 2000, p 23.
3 Amanda Lenhart, *Who's not Online: 57% of those without Internet access say they do not plan to log on*, Pew Internet and American Life Project, September 2000.
4 U.S. Department of Commerce, p 26.
5 Lenhart, p 2.
6 U.S. Department of Commerce, p 26.
7 This data comes from searching and comparing prices at various computer retailers such as PCMall, MacMall, Outpost.com, and directly through retailers like Dell and Gateway. Prices can fluctuate greatly, and these prices do not include any sales or rebates. In some cases, residents may be able to get better deals on equipment through close-out sales, local distributors or quality second-hand equipment through friends or relatives. In general though, the prices reflected here were relatively consistent across the various sites selling computer equipment. The prices shown in this section are from April 2001. For this indicator, we defined a basic system as one that is currently on the market and allows residents to run current applications, access the Internet, load new software, and run a current operating system. For more detail on the sample systems used in this indicator, please see www.cityofseattle.net/tech/indicators/add_info.htm.
8 June Mark, Janet Cornebise, and Ellen Wahl. *Community Technology Centers: Impact on Individual Participants and Their Communities,* April 1997. Research conducted for CTCnet by the Education Development Center.
9 This research, conducted by graduate students in the University of Washington's Information School and the Daniel J. Evan's School of Public Affairs, was based on a number of assumptions that may limit the reliability of this data. A presentation of this research, including information on the limitations, can be found at www.cityofseattle.net/tech/indicators/UWpresentation.
10 For more information on the specific results of the Public Computer Usage Assessment Day and the limitations of this assessment, please see www.cityofseattle.net/tech/indicators/add_info.htm.
11 Computers at the libraries were only counted in this study if they could be used for functions other than searching the card catalog i.e. Internet access, word processing, etc.
12 U. S. Department of Commerce, 61.
13 These sample packages were suggested to us by the Disabilities, Opportunities, Internetworking, and Technology (DOIT) program at the University of Washington based on systems that they buy for their programs.
14 See http://www.cast.org/bobby
15 For detailed results of the tests run on each page and the types of errors found, please see www.cityofseattle.net/tech/indicators/add_info.htm.
16 United Way of King County, City of Seattle, and King County. *Highlights from the Seattle-King County Focus Groups with Homeless People*. Unpublished.

2
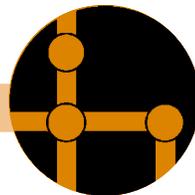
Literacy

Access   Content   Diversity   Infrastructure   Literacy

Just as the ability to read is integral to basic survival and achievement, the ability to use computers and the Internet is becoming fundamental to participating and working in society.

Information technology literacy relies on exposure to use and how time with the tools is spent. This set of indicators measures residents' comfort with computing and Internet tasks, then goes beyond that to look at fluency. It also considers the nature and importance of tasks performed during time spent with the tools. Are people able to apply technology to complete desired tasks? How important are computers and the Internet for accomplishing these? These are reflections of applied literacy as well as quality of life indicators.

The public school system may be the most critical stage for developing a technology healthy future. The education system indicators included here present a snapshot of the Seattle Public Schools system as it works to achieve its goals of building the infrastructure and implementing the planning, training and programming necessary to enable a technology sound education system. Additional data on education, including academic interest in IT careers and higher education, is included in the Business and Economic Development section of this report. A significant amount of information technology education occurs on the job or in other training programs outside traditional educational institutions. Adult education and lifelong learning programs also provide valuable information technology literacy opportunities. However we were not able to capture a measure for these.

Information Technology Patterns of Use

Having a computer to use is not enough to create healthy access—residents need to have regular opportunities to use computers and the Internet to build their skills and meet their personal and professional needs. Regular computer usage improves skills and literacy levels and creates opportunities for residents to find new applications for computers and the Internet that support their day to day activities. However, time spent on the computer may be time that otherwise would be spent with friends, family, or in the community. The balance between sufficient access and excessive access can be measured by looking at satisfaction with the amount of time spent on computers and the Internet. Healthy usage means that residents feel they are meeting their computer and Internet needs by not spending too much or too little time logged on.

Measurements

Hours spent on the computer per week	**28**
Percent of that time spent on the Internet	**25%**
Percent of residents who would like to use the computer more than they currently do	**28%**
Percent of residents who would like to use the Internet more than they currently do	**33%**

**On average[1], residents with computer access spend 28 hours a week on the computer.** This amount of time is a combination of all locations where computers are used, including work, school, home and other locations. Those who access the computer at work spend far more time on that computer than those who access at home, school or other locations.

About seven hours per week are spent on the Internet, which is equivalent to one-quarter of the time spent on the computer. Home computer usage has the largest influence on the amount of time spent on the Internet. Those who use a computer at home spend more than half of their home computer time on the Internet. In comparison, those who use a computer at work spend only about 10 percent of their work computer time on the Internet.

Despite heavy usage of the Internet, many Seattleites are not getting to spend as much time online as they would like.

One-third (33%) of all respondents would like to use the Internet more. Those with access to

### TIME SPENT ON THE COMPUTER AND INTERNET PER WEEK

Legend: ■ Median Hrs/Week on Computer ■ Median Hrs/Week on Internet
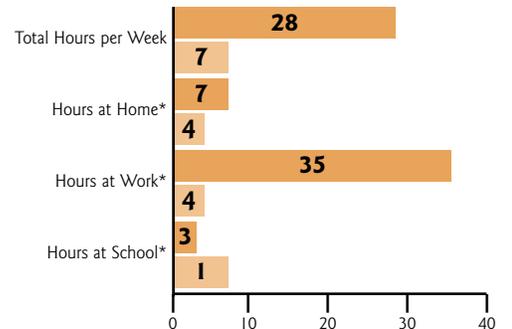
Hours at home, work, and school are based only on those respondents who use computers or the Internet in these respective locations—i.e., hours at home is based on those with a computer/Internet at home, hours at work is based on those who use a computer/Internet at work, and hours at school is based on those who use a computer/Internet at school.

Source: 2000 Seattle IT Residential Survey

the Net only outside the home are the most likely to want to spend more time online, with almost three out of five (57%) saying they would like to use the Internet more. Half of those who have access to the Internet but don't use it say that they would like to use it more.

WHO WOULD LIKE TO SPEND MORE TIME ONLINE?

Legend: ■ % Who Would Like to Use Interent More
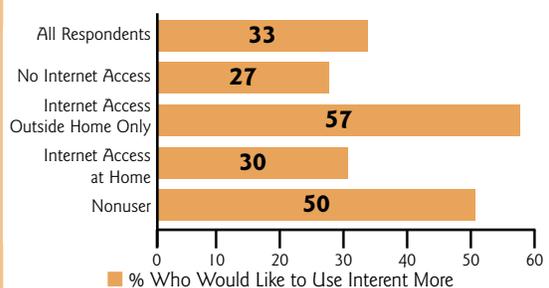
Source: 2000 Seattle IT Residential Survey

Use of Computers and Internet for Personal Tasks

Technology will change over time, so it is important to understand how these tools are being utilized and what value they hold for individual's personal needs. The importance of computers and the Internet for completing daily tasks is indicative of the role that computers currently play in residents' lives. Changes in usage over time helps to track changing influences on the development of computers and the Internet.
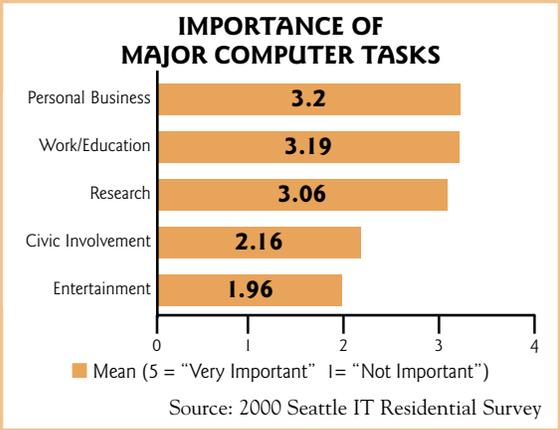
Seattle residents find computers to be very useful for a wide-range of communication, work, and research-related tasks.

Analysis from the Seattle Information Technology Survey shows that computers and the Internet are most important to residents for personal business (e-mail, travel research and planning, managing finances, and researching products and services) and work/education related tasks (work tasks, homework, and starting or maintaining a business). Research tasks such as learning about current events, researching hobbies, and looking for health information are rated almost equally as important.

Computers and the Internet are least important to residents for entertainment related tasks, such as playing games, researching entertainment or sports, and visiting chat rooms.

In general, the ten most popular uses of computers and the Internet for Seattle residents are very similar to what has been found in national studies. In all national studies, the Internet is found to be extremely popular for personal communication and research tasks (e-mail, instant messaging, hobby information, travel information, medical information).[2]

IMPORTANCE OF MAJOR COMPUTER TASKS

Task	Mean
Personal Business	3.2
Work/Education	3.19
Research	3.06
Civic Involvement	2.16
Entertainment	1.96

Mean (5 = "Very Important" 1= "Not Important")

Source: 2000 Seattle IT Residential Survey

TOP TEN MOST POPULAR USES OF COMPUTERS AND THE INTERNET

1 E-mail or instant messaging

2 Work-related tasks

3 Research or gathering information about hobbies

4 Educational purposes or homework

5 Find news about travel or make travel arrangements

6 Gather information about products or services you might wish to purchase

7 Learn about current events

8 Manage finances

9 Get health or medical information

10 Search for jobs

Source: 2000 Seattle IT Residential Survey

Information Technology Literacy

In order to ensure participation in community, work and civic life, there is an increasing need for all residents to meet a basic standard of computer and Internet literacy. Defining and measuring basic technology literacy for residents is an important step in shifting the conversation from the subject of technology access towards the subject of technology skills and knowledge. There is currently no universally accepted definition of the basic set of computer and Internet skills that residents should master in order to be considered computer literate. There are varying levels of technological expertise, so the challenge is to recognize all these levels and pull from them the basic standard for competency.

Measurements

Comfort with basic computer tasks **4.59**
(Scale of 1–5 where 5 is very comfortable)

Comfort with more advanced computer tasks **3.59**

Comfort with basic Internet tasks **4.28**

Comfort with more advanced Internet tasks **3.19**

Computer Tasks	Mean Score
BASIC TASKS—OVERALL SCORE	**4.59**
Navigating using a mouse	4.58
Saving a file	4.47
Opening a saved file	4.47
Typing, editing and printing a document	4.38
ADVANCED TASKS—OVERALL SCORE	**3.59**
Installing new software	3.67
Creating a simple budget using a spreadsheet program	3.63
Adding or changing a peripheral	3.56
Creating a flyer	3.41
Setting up a new computer	3.29
Scanning and editing images	3.24

Internet Tasks	Mean Score
BASIC TASKS—OVERALL MEAN	**4.28**
Replying to an e-mail message	4.57
Creating and sending an e-mail message	4.54
Sending and opening e-mail attachments	4.17
Finding and retrieving information on the web	4.09
Downloading files from the Internet	3.90
ADVANCED TASKS—OVERALL MEAN	**3.19**
Signing up or removing oneself from a distribution list	3.84
Setting up a new Internet connection	3.36
Creating a website	2.49

Source: 2000 Seattle IT Residential Survey

Overall, residents are very comfortable with both basic and more advanced computer tasks.

There is no significant difference in comfort with basic tasks between men and women. However, men are significantly more comfortable with advanced computer tasks than are women.

- Those residents 65 and older are significantly less comfortable with both basic and advanced computer tasks than any other age group.

- Those with four-year college degrees are more likely to be comfortable with both basic and advanced computer tasks than those without college degrees.

- Caucasians and, to a lesser extent, Asian-Americans are more likely than African-Americans and Hispanics to say they are comfortable with basic computing tasks. Hispanics are the least comfortable with using the computer for advanced computing tasks.

- Using a computer at work has the greatest influence on comfort with both basic and advanced computer tasks, followed by those who have access at home.

Residents are very comfortable with basic Internet skills and less comfortable with more advanced skills, although the average user still rated their comfort above a three on all tasks except creating a web site.

- Comfort with basic and advanced Internet tasks breaks down along the same demographics as comfort with computer basic and advanced computer tasks.

- Those who have access to the Internet at work were most likely to score highest on comfort with advanced Internet tasks.

Fluency

In 1999, the Computer Science and Telecommunications Board of the National Research Council commissioned a study to define the technology skills that citizens need to participate in the Information Age. This study found that in order to use technology effectively today and in the future, citizens must move beyond basic computer literacy and be able to acquire new skills independently after formal education is complete. "Fluency" refers to this ability to continually apply knowledge about technology to adapt to change and acquire more knowledge to effectively apply information technology to work and personal needs.[3] Fluency with information technology is a proxy for residents' ability to effectively participate in the information age, even as technologies and personal needs change over time.
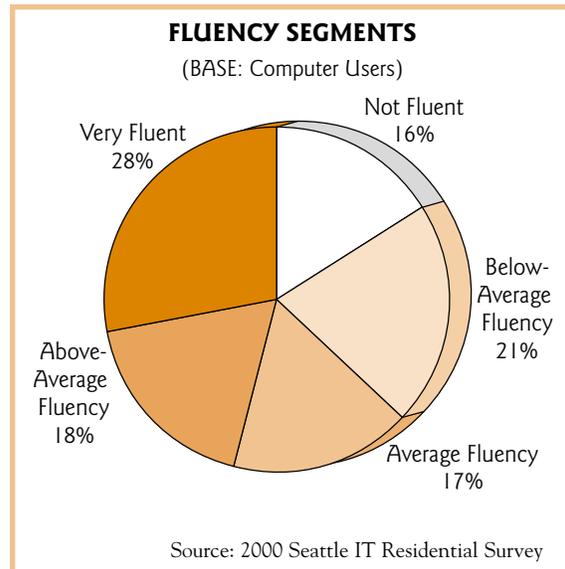
Measurements

Percentage of Seattle residents who can be considered fluent	**63%**
Fluency index for all computer-users	**5**

In consultation with Dr. Lawrence Snyder, University of Washington professor and chair of the Committee on Information Technology Literacy of the Computer Science and Telecommunications Board of the National Research Council, three questions were developed for surveying residents on their level of information technology fluency. Residents surveyed were asked to indicate the number of times in the past year that they had (1) personally learned a new program or computer application, (2) helped someone else get started using computers or the Internet, and (3) helped someone else learn a new program or computer application. These three measures were combined and averaged to create a fluency index. Responses to these three questions give us an indication of residents' ability to apply knowledge of information technology in a new situation or to acquire a new technological skill. According to Dr. Snyder, any computer user who is learning and helping others an average of more than three times a year should be considered "fluent" with information technology.

Almost two-thirds (63%) of computer users can be considered fluent on the computer.

- Those that are Very Fluent have personally learned a new program or application or

FLUENCY SEGMENTS
(BASE: Computer Users)

Very Fluent 28%
Not Fluent 16%
Below-Average Fluency 21%
Above-Average Fluency 18%
Average Fluency 17%

Source: 2000 Seattle IT Residential Survey

helped others from as few as 12 times in the past year to nearly 300 times. The average (as measured by the median) is 23.

- Those that are Above-Average Fluency have learned or helped others an average of eight times.

- Those that are Average Fluency have learned or helped others an average of five times, while those that are Below-Average Fluency have only learned or helped others an average of two times.

There are some divides in fluency based on demographics.

- Men are significantly more likely than women to be very fluent or above-average in fluency—49 percent compared with 36

percent, respectively. On the other hand, more than two out of five (42%) women are not fluent or below-average in fluency.

- Fluency decreases with age with those between the ages of 18 and 25 being the most fluent.

- Asian-Americans, African-Americans and Hispanics are all more likely than Caucasians to have above-average computer fluency. This may suggest that given access to a computer, these groups make a greater effort to learn and help others.

Rainier Vista Jobs Plus
Building Computer Literacy in a Diverse Community

No matter how you pronounce it, "Good Luck" means encouragement. And that is the message conveyed as you walk through the door of the Rainier Vista Jobs Plus computer lab. Glance up, and you'll see that sentiment in at least 20 languages, plastered across the walls of the lab. The signs were created by lab users to make all who enter feel welcome, valued and respected.

Amy Voung works on the Promoting Assets Across Cultures (PAAC) newsletter at the Rainier Vista Jobs Plus Computer Lab.

The Jobs Plus center serves a diverse, low-income community composed, mostly, of ESL refugees and immigrants, ages 10 to 84. Native languages include, among others, Amharic, Tigrinya, Oromo, Somali, Arabic, Kiswahili, Vietnamese, Khmer, Hmong, Thai and Chinese. The lab is part of Rainier Vista, a 496-unit garden community housing project with approximately 1200 residents. Of these, about 216 households speak no English. Their average yearly income, $10,898.

The Rainier Vista Jobs Plus computer lab was opened in 1998 by the Rainier Vista Leadership Team (RVLT), a non-profit residents' council. The lab is open five days a week and has matched more than 200 jobs with resident job hunters. First matched to entry level jobs, workers are next encouraged to focus on landing career path jobs with increased pay and benefits through the Job Upgrades program. The inclusion of the lab in their job program recognizes that computer skills are critical to a career pathway.

A Unique Community

Getting residents to take advantage of the Jobs Plus resources is not always easy. Because of this resistance, residents are offered a two-year rent freeze or rent reduction for enrolling at Jobs Plus. Seventy-five percent of the participants are women, because computing is equated with clerical work in many countries represented at the center. Clerical work is seen as "women's work." "The few adult men who show up are likely to want to learn accounting software," said Job counselor and technology coordinator Rhonda Allison.

Youth are very prevalent lab users. During this writer's visit, several Southeast Asian teens were at the site, working on a very professional looking newsletter. They are part of Kids Promoting Assets Across Cultures (PAAC). A Cambodian youth group is working on oral history. They're acting out stories which they hope to produce for public access television. A Vietnamese group has the same idea, and is working on the boat people experience. Because youth are such eager users, special hours have been set aside at the center to balance their enthusiasm with the need to provide adult access and training.

Often, learners are illiterate. Most must begin with English as a Second Language (ESL). Because language and culture are significant barriers, teaching computer skills can require a kinetic approach. To illustrate the idea that striking a key will produce a letter on the screen, Rhonda literally guides their hands with her own for the first hour of training. Once they get the idea, mouse technique is demonstrated, then real keyboarding. Later, 30 minutes of keyboarding practice is required at each sitting.

"It's this one-on-one approach that makes the program so successful," according to Rhonda. "Tutorial-based training can be relatively useless in such a diverse atmosphere."

The center's approach is unique and encourages building of relationships as well as computer skills. Learners "graduate" when they are able to teach others what they've learned.

Education

The role that computers and the Internet should play in K–12 education remains a controversial issue. Building the computer and Internet literacy of youth is important to their ability to participate in future professional and civic endeavors, just as it is important for adults. However, many are not sure that computers should be introduced into the classroom without a better understanding of the usefulness and effectiveness of computer and the Internet as learning tools. A recent Associated Press poll found that American adults were about evenly split on the importance of Internet skills for students, with about half feeling they are very important and the other half saying they are somewhat or not at all important.[4]

Computers and the Internet in schools should be an aid to the educational process, integrated into the curriculum and used to advance academic standards, not a substitution for personalized instruction. The old approach of a computer lab where classes go to learn computers is being replaced by computers in the classroom, with the intention of creating a seamless integration of technology into lesson plans and classroom activities. Although this creates opportunities for more creative uses of technology, it also creates new challenges for teachers, who may not be trained in how to use computers and the Internet effectively.

This indicator seeks to measure the rate at which the Seattle Public Schools are reaching their goal of providing teachers with the tools they need to integrate technology into the classroom.

As a part of an approved technology levy, Seattle Public Schools has an aggressive technology plan in place to address the integration of computers into the classroom: By January 1, 2003, 100% of the classrooms will have Internet access and 100% of the computers in the school will be connected to the Internet. Each school in the District is required to develop a technology plan defining how technology will fit in with the school's own goals for scholastic achievement. These plans help the schools to think about how technology can be used to advance academic goals. In an attempt to give

STATISTICS FOR THE SEATTLE SCHOOL DISTRICT AS OF DECEMBER 2000			
Measure	As of August 2000	As of December 2000	District Goal
Ratio of computers that meet district standards to students	1:19	1:9	1:5 by the end of 2004
Percent of schools that are fully wired for high speed Internet access	60%	60%	100%
Percent of classrooms with Internet access	no data	63% of classrooms with at least one Internet connection	100%
Percent of computers connected to Internet	60%	76%	100%
Percent of schools with completed and approved technology plans	9.3%	27% (26 of 97)	100%
Percent of schools that offer industry certification courses	80% of high schools offer at least one (8 of 10)	80% of high schools offer at least one (8 of 10)	
Percent of principals that have been through SmartTools Training (as a proxy for technology leadership in schools)	80% (78 of 97 principals)	91% (88 of 97 principals)	100%

Source: Seattle Public Schools

Seattle Public Schools Technology Standards

1. Basic Operations and Concepts

1.1 Students demonstrate a sound understanding of the nature and operation of technology systems.

1.2 Students are proficient in the use of technology.

2. Social, ethical, and human issues

2.1 Students understand the ethical, cultural, and societal issues related to technology.

2.2 Students practice responsible use of technology systems, information, and software.

2.3 Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

3. Technology productivity tools

3.1 Students use technology tools to enhance learning, increase productivity, and promote creativity.

3.2 Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.

4. Technology communications tools

4.1 Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.

4.2 Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

5. Technology research tools

5.1 Students use technology to locate, evaluate, and collect information from a variety of sources.

5.2 Students use technology tools to process data and report results.

5.3 Students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks.

6. Technology problem-solving and decision-making tools

6.1 Students use technology resources for solving problems and making informed decisions.

6.2 Students employ technology in the development of strategies for solving problems in the real world.

students the opportunity to pursue higher level technology skills, some schools are offering industry certification classes. Principals are encouraged to attend SmartTools, training to help learn how to incorporate technology into the school's curriculum. This type of commitment at the leadership level indicates a commitment to smart and effective technology integration.

By measuring the school district's progress in relation to the goal defined by the technology levy we can track the progress as well as anticipate some of the upcoming needs of the district.

Overall Washington State schools are about average compared to other states for students per instructional computer (4.7) and students per Internet-connected computer (7.5) as of

the year 2000.[5] In 1999, the state completed the K-20 Educational Network, a $60 million network that links most of the state's 296 districts to the Internet, one another, and two- and four-year colleges with T1 lines. This has created opportunities for all students, regardless of the wealth of their district, to connect to distance learning and online Advanced Placement courses, and also allowed students to access the Internet from about 95% of the state's classrooms.[6] This has helped to solve some of the technology inequities experienced by lower-income districts in other states.

However, according to Technology Counts 2001, published by *Education Week*,

Washington schools still have some important gaps to fill. For example, Washington is one of 24 states that do not have any technology requirements in place for teachers.[7] Washington is also one of only 15 states that have not incorporated technology standards for students into their list of other core academic standards.[8] Dennis Small from the Washington State Office of the Superintendent of Public Instruction comments that this is in part because individual school districts are encouraged to develop their own standards instead of using State-created standards.[9]

It is up to the educational pundits to come up with ways to infuse tech into their curriculums. Some will say "but it has not been proven that technology improves test scores and learning." I say that argument is now irrelevant. Here's why; the world these kids will work in will and is increasingly dependant on the many various uses of technology. This has nothing to do with scores, it is the way the competitive world our kids will compete in operates now.

—Currie Morrison, Retired Technology Instructor, Seattle Public Schools

Notes

1 Because of the range of times reported by residents, the median is actually used as the more reliable "average" in this section.

2 A number of reports on the use of computers and the Internet have come up with similar lists of most common uses. Some of those reports include The UCLA Internet Report: "Surveying the Digital Future," published by the UCLA Center for Communication Policy, *Falling Through the Net: Towards Digital Inclusion* published by the U.S. Department of Commerce, *The Pew Internet and American Life Project* (Internet Activities Chart, see http://www.pewinternet.org/reports/chart.asp?img=6_internet_activities.jpg), and *The Internet and Society Report* published by the Stanford Institute for the Quantitative Study of Society.

3 National Research Council, Computer Science and Telecommunications Board, *Being Fluent with Information Technology* (Washington, D.C.: National Academy Press, 1999) 2.

4 "Poll: USA split on use of Net in School," *USA Today*, August 20, 2001. Accessed at http://www.usatoday.com/life/cyber/tech/2001-08-20-internet-schools-poll.htm.

5 "Technology Counts 2001: The New Divides," *Education Week*, Volume XX, Number 35, 10 May 2001, 56-57.

6 Ibid., 103.

7 Ibid., 52.

8 Ibid., 55.

9 Dennis Small in private conversation with Emily Bancroft on July 12, 2001.

Business & Economic Development

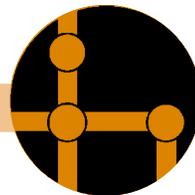**Access**   **Content**   **Diversity**   **Infrastructure**   **Literacy**

Nowhere is the impact of information technology on our region clearer than in the growth of the IT industry over the past decade. As one of the strongest economic sectors in our region, software, computer, and telecommunications services have contributed greatly to a generally healthy economy. Even taking into account the slow-downs in this sector from the end of 2000 into 2002, these industries still enjoyed major growth throughout the course of the last decade.

The IT industry's impact on community quality is very broad. Wage data from the state shows that jobs in information technology occupations pay, even in the lowest quartile, much higher than what is considered a living wage. The information technology industry employs a wide variety of types of positions, including manufacturing, administrative, technical, and professional workers. The incredible growth and profit of this sector has also positively impacted non-profit and community organizations, who have benefited from the generosity of both companies and individuals.

A healthy economy is fundamental to maintaining Seattle's quality of life, and the information technology industry continues to play a large role in the strength of our economy locally, regionally, and nationally. This section examines the impact that information technology is having in the following business and economic development areas:

1. Industry: What is the state of the information technology industry in our area and what is the extent of information technology jobs in all industries?

2. Workforce: Are we sufficiently developing a local workforce for employers to draw from and are they hiring locally? Are we developing IT innovators and leaders as well as technicians? How is the workforce changing?

3. Supporting small local business. To what extent is the Internet used to support local business? Are small businesses adopting computers and the Internet effectively to support their sustainability and growth?

Defining the Information Technology Industry and Information Technology Occupations

Defining the Information Technology Industry and those who work as "Information Technology Professionals" within the confines of the current Federal and State industry and occupational classification systems poses a challenge for anyone hoping to present an accurate picture of the economic impact that IT is having on our region. There are significant limitations in both the industry and the occupational data available.

INDUSTRY

All companies in the United States are categorized into industries using a system of Standard Industrial Classification Codes (SIC Codes).[1] These codes are used to group similar companies together based on the type of work that they do, and most federal and state data on employment is reported using these codes. This system is updated infrequently and therefore does not necessarily reflect changes in the industry, however using this system in creating definitions does insure that consistent federal and state data will be available over time.

In creating the definition of the Information Technology industry used in this report, we consulted high-tech industry definitions and talked with economic development experts at the City and State level, as well as with staff at the Puget Sound Regional Council, the WSA (formerly the Washington Software Alliance), and the Northwest Policy Center at the University of Washington. For the purpose of this report, the information technology industry in our region is defined as firms in the industry sectors listed at right.

The limitation of any list based on SIC codes is that many of the "new economy" companies that we think of as being part of the information technology industry are classified under the service they provide (such as consulting) or as retail industries, and therefore are not included in this industry grouping. Without looking at all companies on a case-by-case basis, grouping all of the information technology industries within the confines of the current classification system is impossible.

Communication Services

4812	Radiotelephone Communications
4813	Telephone Communications
4822	Telegraph and Other Message Communications
4832	Radio Broadcasting Stations
4833	Television Broadcasting Stations
4841	Cable and Other Pay Television Services
4899	Other Communication Services

Software and Computer Related Services

7371	Computer Programming Services
7372	Prepackaged Software
7373	Computer Integrated Systems Design
7374	Computer Processing and Data Preparation
7375	Information Retrieval Services
7376	Computer Facilities Management Services
7378	Computer Maintenance and Repair
7379	Computer-Related Services, NEC (not elsewhere classified)

OCCUPATIONS

There are similar challenges in classifying Information Technology Occupations. On a Federal and State level, occupations are categorized using occupational titles.[2] Jobs are changing faster than the Federal and State government are able to alter the classifications, causing estimates of IT professionals based on this type of data to be lower than the actual number working in IT jobs.

This report focuses on the core information technology workforce as defined by the U.S. Department of Commerce Office of Technology Policy.[3]

Using the Dictionary of Occupational Titles, the core IT professions are found in the following occupations:

22127	Computer Engineers
25102	Systems Analysts
25103	Database Administrators
25104	Computer Support Specialists
25105	Computer Programmers
25108	Computer Programmer Aides
25199	Computer Scientists, NEC
34005	Technical Writers[4]

Workforce Needs: Computer Literacy and Employment

In order to maintain a healthy economy, business and individual workers need computer skills. For many businesses, computers are already an integral part of their work environment, and employees are expected to be able to use computers for internal and external communication and for completing their own work-related tasks. Although some on-the-job training may be provided, an increasing number of new employees are expected to arrive on day one with some level of basic technology literacy. In a 1998 Benton Foundation Report, the then Assistant Secretary of Commerce for Communications and Information stated that by the year 2000, 60 percent of all jobs would require some skills with technology.[5]
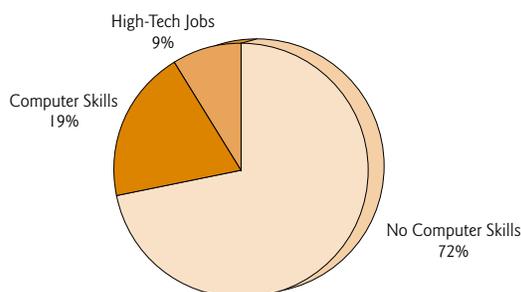
Globalization has created new opportunities for companies and businesses to employ workers at much lower rates outside of the U.S. Technology, and the productivity that it has brought, has rendered some other jobs obsolete. In order to secure a job that will pay a wage sufficient to support a family, workers need to come to the table with more skills. Measuring the number of jobs that require basic computer literacy helps to define the importance of providing training and life-long learning opportunities for all residents.

Measurement

Percentage of *Seattle Times/P-I* Classified Ads that mention computer skills as a pre-requisite for employment

28%

PERCENTAGE OF EMPLOYMENT CLASSIFIED ADS THAT SPECIFY COMPUTERS SKILLS AS A PRE-REQUISITE FOR EMPLOYMENT

High-Tech Jobs 9%
Computer Skills 19%
No Computer Skills 72%

April 30th, 2000

High-Tech Jobs 6%
Computer Skills 22%
No Computer Skills 72%
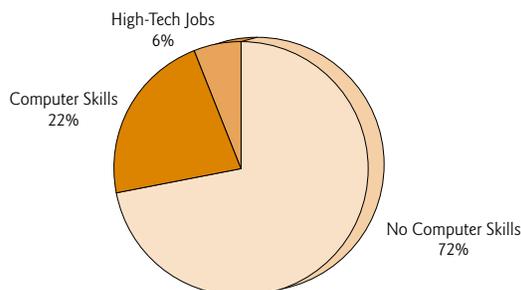
December 3, 2000

Source: *Seattle Times/Post-Intelligencer* Classified Ads

More than three-quarters of the classified ads made no mention of computer skills or specific computer programs as a requirement for the advertised job, though it is difficult to gauge non-advertised skill expectations. In some cases, jobs may not require those skills. In other cases, companies may not have mentioned computer skills in their ads, but may still expect serious applicants to have computer skills. In order to get a better picture of employers' expectations, some follow-up would be necessary.

- In general, the number of classified ads that specify computer skills as a prerequisite for employment was consistent in the April 2000 classifieds and in the December 2000 classifieds.

- Overall, there were far fewer classified ads in the December 2000 sample than there were in April 2000, although the percentages requiring computer skills remained virtually the same.

- There was a noticeable decrease (35%) in the number of high tech jobs advertised in December 2000, as compared to those advertised in April 2000. This may be a result of the slowing of the technology sector seen in late 2000.

Workforce Needs: Education

A healthy local economy creates jobs and growth opportunities for the community, while the community provides the workforce needed to meet the growth of the economy. Both pieces need to be in place—the local industry providing jobs, and the community providing the people to fill those jobs. There are concerns about how well the region is meeting its workforce needs locally. Many of the new jobs created by the growth in the software and computer industry need specialized skills training. If successful, the community and technical colleges, university system and other training centers offer needed certificate programs, and undergraduate and advanced degrees in computer science and related IT fields. Focusing on how well our universities and colleges are doing to meet workforce demand and the interest in technology related careers by graduating high school students provides some measure of the region's ability to sustain the growth of the economy using local resources and local people.

Measurement

Percentage of Washington high school students identifying computer or information science as their primary academic interest when taking the SAT

6%

ACADEMIC INTERESTS OF WASHINGTON STUDENTS TAKING THE SAT'S
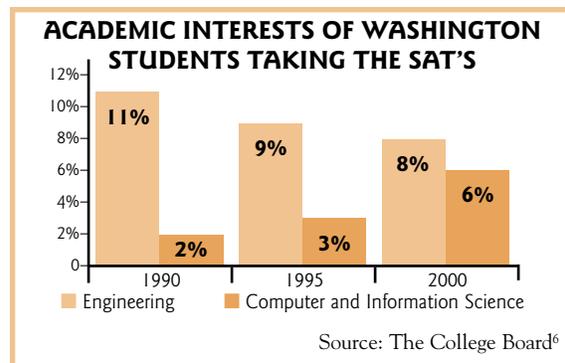

Source: The College Board[6]

When 11th and 12th grade students take the SAT in preparation for college, they are asked to identify their academic interests and possible future course of study. This data is collected by the College Board, the organization that creates and oversees the SAT and Advanced Placement tests, as an indication of the academic interests of college bound students.

The number of high school students in Washington identifying computer and information sciences as their main academic interest has more than doubled in the last decade. Despite this growth in interest, it still represents only a small percentage of high school students.

Interest in engineering is decreasing, while interest in computer and information sciences is increasing. Although the total number of students identifying these two high technology fields as their main academic interest increased between 1990 and 2000, the overall increase was only one percent (13% to 14%).

Washington universities and colleges are not graduating enough students in technology related fields to fill the current or projected demand for technology workers within the state, According to the Washington State 2000–2001 Workforce Study released by a local trade association, the WSA (formerly the Washington Software Alliance).[7] These two indicators look at the number of students graduating from Washington schools with degrees in information technology related fields, and the

We should have a sense of urgency when it comes to our youth. All of our programs are built on the idea that all students will either be users of technology, producers of technology, or inventors of technology.

—Trish Millines-Dziko, Technology Access Foundation (TAF)

Measurement

Projected new technical positions due to software and Internet industry employment expansion between 2000 and 2002

12,000

Number of 2000 graduates from Washington state universities and colleges with IT related degrees or certificates

2,700

EMPLOYMENT, VACANCIES AND PROJECTED HIRES FOR TECHNICAL POSITIONS IN THE WASHINGTON STATE SOFTWARE AND COMPUTER INDUSTRY [11, 12]

Year	Current Employees	Current Vacant Positions	Planned New Positions
1998	27,147	4,893	36,763 (over 3 years)
2000	30,471	5,928	12,126 (over 2 years)

Source: Washington State Software Industry Challenges (1998)—Paul Sommers for the WSA *Findings of the 2000–2001 Workforce Study*—WSA

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projected openings in the information technology industry over the next two years.

Even with the slowing economy at the end of 2000, overall workforce in the software and Internet industry still shows a 12% increase in technical employment over 2 years.

The decrease in planned new positions from the 1998 survey to the 2000 survey is an indication of the slowing of the technology sector. However, even with this slowing, the sector continues to predict moderate growth and a shortage of qualified workers.

The largest predicted vacancies for technical positions in the 2000–2001 survey are for programming/software engineer positions. Over the next two years, an estimated 5,199 new programming/software engineering positions will be added in Washington state software and Internet companies.[8, 9]

A major limitation of these technical employment estimates from the WSA workforce studies is that they are not indicative of the technical employment of all industries in Washington state, but instead just in the software and

More and more, the ability of our people to find and keep jobs in this high tech society—or for that matter, to function in daily life—depends on their ability to access and analyze information.
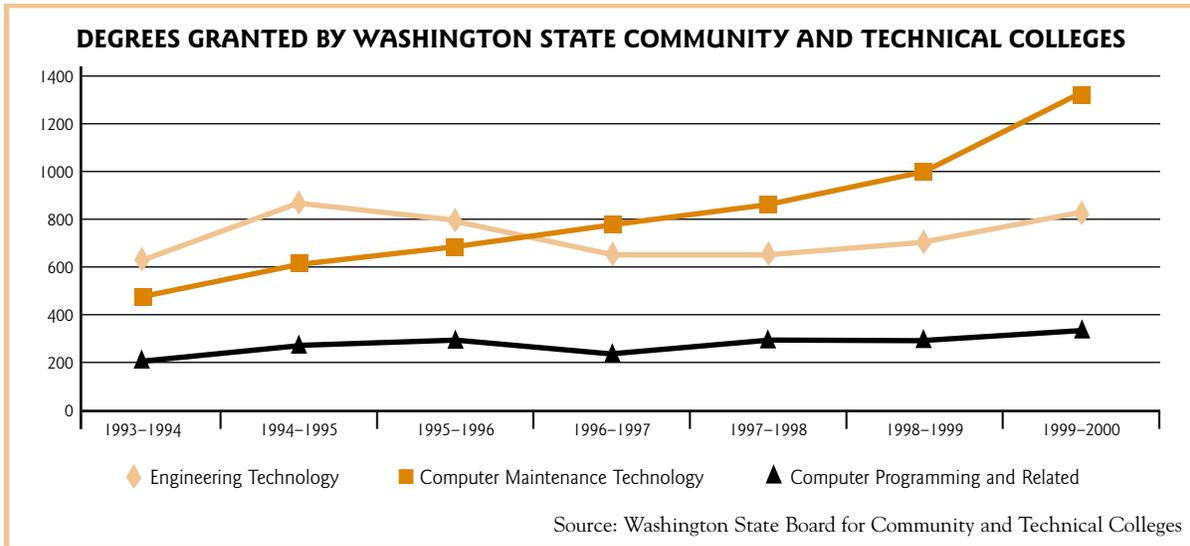*—Former Seattle Mayor Norm Rice, 1995*[10]

Internet industries. Those working in technical IT positions outside of the industry (i.e., the computer engineers for a bank, or the programmers for a business that is an online retail store) are not included in these employment estimates. For that reason, these numbers cannot be seen as an indication of the number of IT professionals currently working in Washington or the overall number of new IT positions that will be added in Washington over the next two years.

Between 1993 and 2000, community and technical colleges in Washington saw a steady increase in computer programming and maintenance degrees.

- Over the past seven academic years, there has been a 183 percent increase in the number of students graduating with computer programming and related degrees and certificates.

- There has been a 64 percent increase in students graduating with computer maintenance technology degrees and certificates.

The numbers shown here do not include those students who completed more than 45 credits but did not stay long enough to earn a degree. Follow-up with these students in the past has shown that many of them are re-entering the workforce without completing an actual degree. Therefore, they are often considered

Workforce Needs: Education, *continued*

DEGREES GRANTED BY WASHINGTON STATE COMMUNITY AND TECHNICAL COLLEGES

Legend:
◆ Engineering Technology ■ Computer Maintenance Technology ▲ Computer Programming and Related

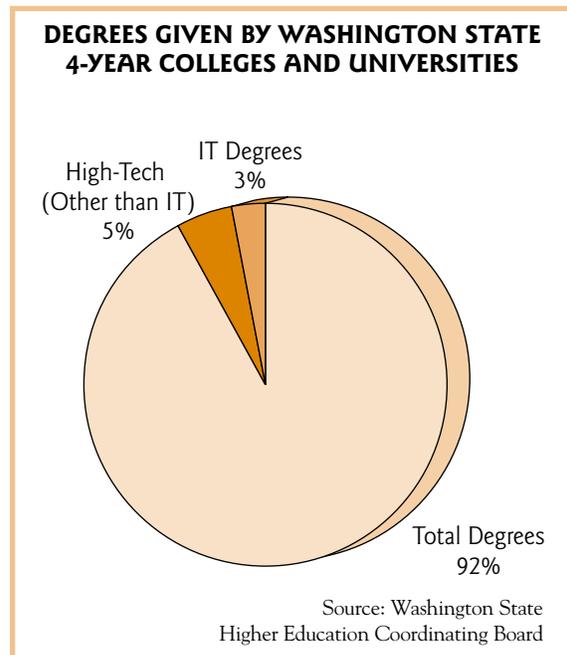Source: Washington State Board for Community and Technical Colleges

"completers" by the community college system and in workforce studies. In the 1998-1999 school year, this added about 1,700 students to the total number completing degrees and certificates at the community colleges in the state.

Washington State 4-year institutions gave a total of only 1038 IT-related degrees in the 1999-2000 school year. Individuals with these advanced degrees are the ones likely to drive technology development and management.

- Seventy-seven percent of these were bachelor's degrees

- Twenty percent were master's degrees.

- Just over one percent were doctorate degrees.

- Another two percent were "other" degrees, in this case post-baccalaureate certificates in information sciences and systems.

Of these degrees, 342 of them were business-related IT degrees, which are bachelors and master's degrees that focus on IT management and business issues.

DEGREES GIVEN BY WASHINGTON STATE 4-YEAR COLLEGES AND UNIVERSITIES

High-Tech (Other than IT) 5%
IT Degrees 3%
Total Degrees 92%

Source: Washington State Higher Education Coordinating Board

Growing the IT Industry

A healthy industry is creative and profitable, supported by and responsible to local communities. The following indicators look at local IT infrastructure for businesses and the economic impacts of IT on the local economy. In order to maintain healthy growth of the information technology sector, Seattle must create an environment that is conducive to the development of new businesses by providing the necessary infrastructure, incentives, and quality of life to encourage businesses to locate within the city.

Measurement	
New Information Technology City Business Licenses in 2000	**544**
Percentages of New Licenses that are for Information Technology Businesses	**7%**

Measurement	
Number of IPO's filed by companies located in Seattle	
in 1998	**1**
in 1999	**12**
in 2000	**4**

The City business license classifications are limited, but in the year 2000, IT business licenses made up about seven percent of all new business licenses submitted to the City of Seattle.

The total number of new business licenses decreased by just over three percent between 1999 and 2000, but the percentage of new licenses that were for Information Technology only decreased by about 2/10 of a percent.

Year	Total New Licenses	New IT Licenses	Percentage
1999	7,969	580	7.28%
2000	7,699	544	7.07%
Source: City of Seattle Department of Finance— License Enforcement Unit			

In the past few years, the country has seen a growth in the number of companies becoming publicly owned through initial public offerings (IPO's). The IPO market is extremely sensitive to the strength of overall industries, especially to the strength of the tech sector, making it a good proxy for measuring for the business climate in a region.

There was a drastic increase in the number of companies filing initial public offerings between 1998 and 1999. This increase can be seen very clearly in Seattle.

In 1998, 1999 and 2000, Seattle companies made up more than half of those filing for IPO's in King County between January 1 and December 31. In 2000, Seattle companies dropped down to one quarter of those filing for IPO's in King County. However, if you subtract the five firms that withdrew before actually going public, Seattle firms continued to make up over a third of the firms filing in the county in 2000. Overall, the number of firms withdrawing their IPO's almost tripled in 2000, indicating the slowing economy and changing business climate nationwide. In Seattle, far fewer firms filed in 2000 than in 1999, but none of those filings had been withdrawn at the time of printing. Only one of the four had been priced by May of 2001.

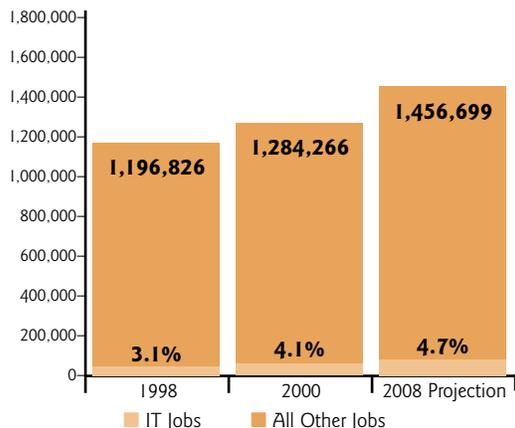| Year	Total IPO's Filed	Total in WA State	Total in King County	Total in Seattle
1998	477 (73*)	12	9 (3*)	1 (0*)
1999	718 (107*)	23	20 (0*)	12 (0*)
2000	713 (279*)	17	16 (5*)	4 (0*)
* indicates number that had been postponed or withdrawn as of May 14, 2001.				
Source: http://www.ipo.com, as of May 14, 2001				

WorkForce: Local Employment

Information technology jobs and the IT industry both play a much larger role in the nation's economy than they did a decade ago. Despite the slowing in the technology sector in late 2000 and into 2001 the industry still continues to grow, albeit more moderately, and IT jobs remain in high demand.

Measurement

In 2000, IT jobs make up 4.1% of all jobs in King County.

In 1999, the IT industry provides 5.5% of jobs in King County and 3.6% of jobs in Seattle.

IT JOBS AS A PERCENTAGE OF TOTAL EMPLOYMENT IN KING COUNTY

	1998	2000	2008 Projection
Total	1,196,826	1,284,266	1,456,699
IT Jobs	3.1%	4.1%	4.7%

■ IT Jobs ■ All Other Jobs

Source: Washington Employment Security Department, Labor Market and Economic Analysis (LMEA) 1998–2008 Occupational Projections and Job Openings and 2000–2008 Occupational Projections and Job Openings[13]

There have been increases in information technology jobs as a portion of total jobs, though it remains a relatively low percentage overall.

In 1998, information technology professionals account for just over three percent of the total jobs in King County. By 2000, IT professionals increased to four percent of total jobs.

• There was an 8% increase in all jobs between 1998 and 2000.

• For IT professionals, there was a 42% increase during this time period.

Due to the way that the Washington Employment Security Department makes occupational estimates, there is no accurate information on information technology occupations in Seattle alone that is collected by the State. Organizations and trade associations within the industry have done their own estimates of the IT workforce, but these cannot be compared directly with state data.
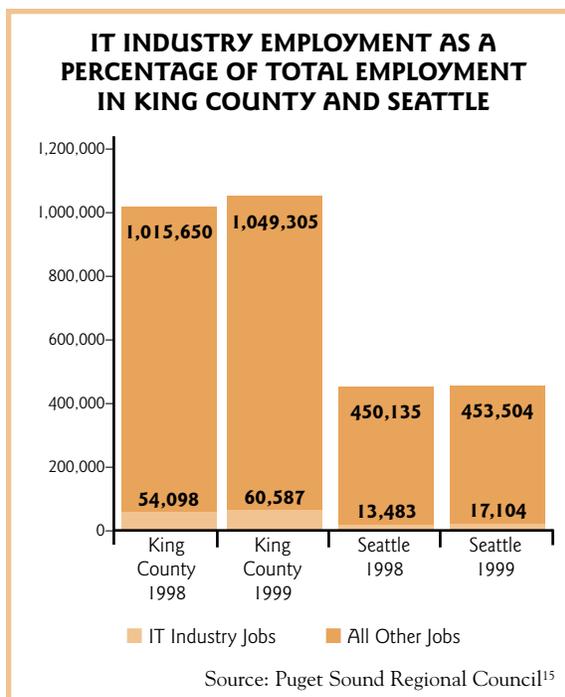
What attracts high tech business?

A study of location decisions of high tech companies in metropolitan Seattle included these findings:

• The top three location factors for high tech companies are:

1. urban vs. suburban preference of founder and employees for amenities, workforce and housing;

2. telecommunications infrastructure; and

3. presence of top research institutions.

• Cities need to have the fundamental education and infrastructure in place to support the start-up and expansion of high tech industries.

—Source: The New Economy in Metropolitan Seattle: High Tech Firm Locations Within the Metropolitan Landscape[14]

Workforce: Local Employment, *continued*

IT INDUSTRY EMPLOYMENT AS A PERCENTAGE OF TOTAL EMPLOYMENT IN KING COUNTY AND SEATTLE

Source: Puget Sound Regional Council[15]

MEDIAN HOURLY WAGE FOR KING COUNTY JOB SECTORS

Source: Washington State Employment Security Department, Labor Market and Economic Analysis Branch. Occupational Employment Statistics (OES) Wage Survey Data, representing wages for the 4th quarter of 1999[16]

Employment in the Information Technology industry grew rapidly both in Seattle and in King County between 1998 and 1999.

In 1998, jobs within the Information Technology industry made up just over five percent of the total jobs in King County. In 1999, this increased to about five and a half percent.

- Overall, jobs in King County increased by slightly less than four percent between 1998 and 1999. Jobs in the information technology industry in King County increased by 12 percent.

In 1998, jobs in the information technology industry accounted for just under three percent of the total jobs in Seattle. By 1999, this increased to just over three and a half percent. **The growth in the information technology**

Measurement

On average in King County, IT professionals' hourly wages are almost 50% higher than that of the average worker.
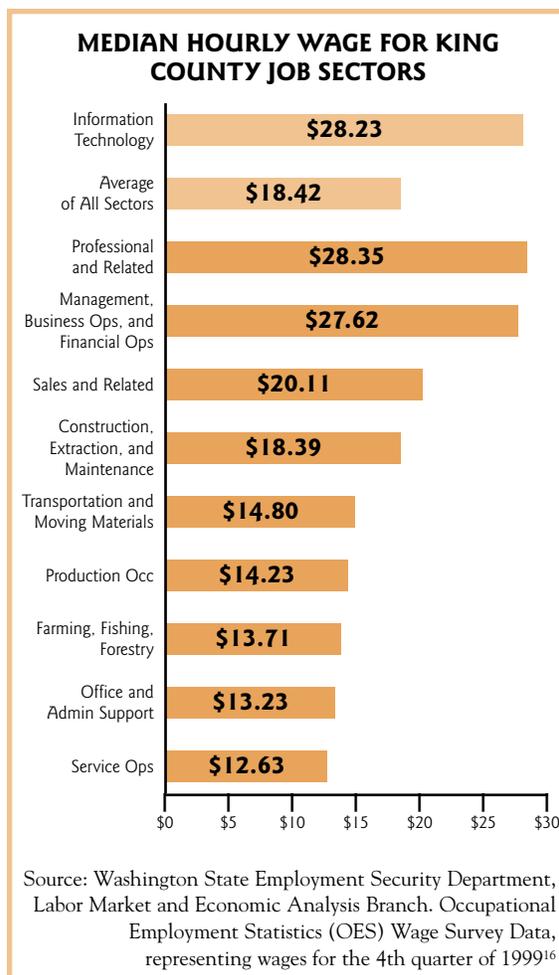
industry in Seattle was more than twice that of the growth in the industry in King County.

- Overall, Seattle jobs increased by only 1.5 percent between 1998 and 1999, while jobs in the IT industry in Seattle increased by about 27 percent.

In June of 2001, the Northwest Policy Center released a study entitled *Searching for Work that Pays*, a report that explores the gap between the number of living wage jobs being created in Washington and the number of people needing living wage jobs. According to this study, a *living wage* is a wage that allows family to meet their basic needs without resorting to public assistance and provides them some ability to deal with emergencies and plan ahead. In

Workforce: Local Employment, *continued*

Washington state, a living wage job in 1998 ranged from $10.65 an hour for a single adult to $17.52 an hour for a single adult with two children. In 2000, these numbers were $11.25 and $18.51.[17]

The mean hourly wages in 1999 reported for information technology occupations in King County range from $18.58 to $38.40. Only one IT position, computer support specialists, reports a mean hourly wage of less than $24.00 an hour. According to the definition of a living wage, all of the IT positions pay mean wages that are above the living wage for a single adult with two children. As shown in previous indicators, there is also a continued increase in new IT jobs, making this a desirable focus for job training and employment programs.

Another indication of whether our local workforce is meeting the needs of local companies is the number of foreign IT workers employed by Washington companies through the H-1B visa program. In 2000, Congress increased the number of H-1B visas available to companies across the U.S. There is strong debate about whether the use of foreign workers is necessary and appropriate for U.S. companies and a global marketplace or whether it restricts development and support for the local labor market and local community reinvestment.[18] Regardless of the debate, H-1B visas numbers contribute to two profiles: 1) overall workforce numbers and 2) reliance on labor outside the United States and potential loss to the local market.

> *If we are really going to find a way to make technology and society work, we have to bring together technological expertise and community concerns.*
>
> *—Richard Conlin, Seattle City Council member*

Workforce: Local Employment, *continued*

Measurement	
Number of IT-related H-1B visas applied for by Washington Companies	**14,889**

In fiscal year 2000, 15,000 H-1B visas openings were certified for computer-related occupations in Washington, with 13,642 of those in King County. About 50 percent of the King County openings were for Seattle companies. H-1B visas of this type are allotted on a first-come, first-served basis. The effect that these visas have on the availability of professional jobs for U.S. workers is unclear, but the implication is that it must have some effect. As a paper by the Benton Foundation on meeting workforce demands in the Year 2000 stated, "A recent Immigration and Naturalization Service (INS) survey found that 60% of H-1B petitioners are IT workers. Applying the INS estimate to the current H-1B visa limit of 115,000 suggests that the H-1B visa program currently fills over 70,000 IT jobs, equivalent to 28% of the average annual demand for IT workers with at least a bachelors degree during 1996–1998."[19]
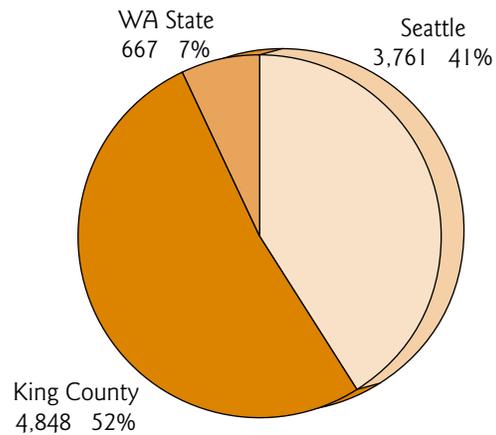
There was a sharp rise in the number of information technology related H-1B visa openings certified for companies in Washington between 1999 and 2000. Since H-1B visas are distributed annually on a first-come, first-served basis until the allotted number is reached, many companies rush to submit applications early. In fiscal year 2000, the annual cap of 115,000 visas was reached in five months. It can be assumed that more companies would have submitted applications for H-1B visas had they been available.

- Overall, computer-related occupations account for nearly 54 percent of the total H-1B petitions.

- More than 47 percent of all approved petitions are for foreign workers in System Analyst or Programmer positions.
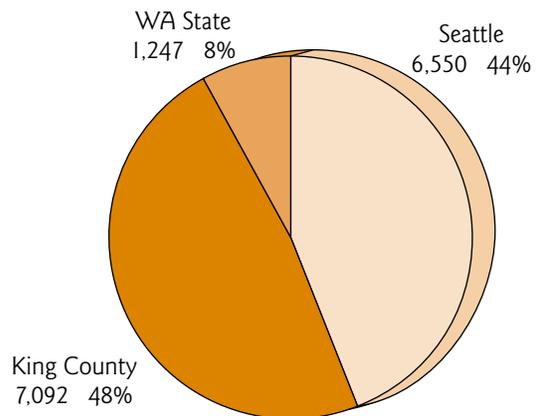
- In Washington, 77 percent of all approved H-1B visa applications in fiscal year 2000 were for information technology related positions (14,889 out of 19,395).

Preliminary reports from the Immigration and Naturalization Service in March, 2001 state that the number of H-1B visas approved during the first six months of fiscal year 2001 was down nearly 30 percent compared with the first six months of the previous year.[20]

H-1B VISA OPENINGS CERTIFIED[21] FOR INFORMATION TECHNOLOGY JOBS BY WASHINGTON STATE, KING COUNTY, AND SEATTLE COMPANIES

WA State
667   7%

Seattle
3,761   41%

King County
4,848   52%

FY 1999

WA State
1,247   8%

Seattle
6,550   44%

King County
7,092   48%

FY 2000

Source: U.S. Department of Labor, Office of Workforce Security—Employment and Training Administration

Use of the Internet for Local Business

Local small businesses are the core of our city's trade of goods, infrastructure and information. In the information age economy it is critical to consider what impact the Internet has on local business and whether they are able to stay competitive. We have used two measures to help track this issue. The results of our small business and technology survey will be added later. The first indicator here, whether residents have looked for local businesses online and what they found, provides a measure of the interest in supporting local business and the quality of the market. The second measure is concerned with using home Internet access to sell goods and services. This provides a look into entrepreneurial activities and new lifestyles.

Measurement

Percent of Seattle residents with Internet access who have looked for information about local businesses online **55%**

More than half (55%) of respondents have sought information regarding local businesses online in the past year.

Most residents are indifferent about the information available on local businesses online—45 percent of those who have looked for information say they are neither satisfied nor dissatisfied with what they found.

- Only one-third (38%) of respondents who have sought information on local businesses are satisfied with the information that they found.

- Almost one in five residents (17%) are dissatisfied with the information available on local businesses on the Internet.

EXTENT OF USE OF THE INTERNET TO FIND INFORMATION ON LOCAL BUSINESSES

Have Sought
55%

Have Not
Sought
45%
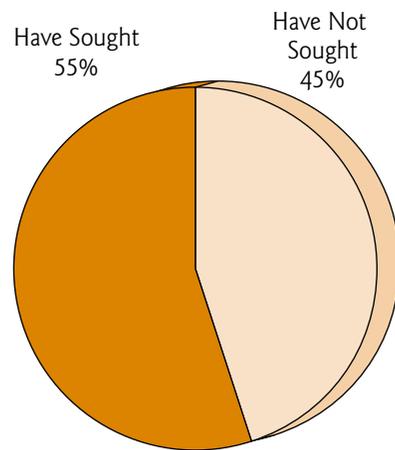
Source: 2000 Seattle IT Residential Survey

Use of the Internet for Local Business, *continued*

Measurement

Percent of Seattle residents with Internet access at home who have used the Internet to sell goods or services
8%

The Internet has fueled telecommuting, auction opportunities, day-trading, web development and hosting services—and increasingly businesses that people are running from their homes for primary or supplementary income. The opportunity to conduct business from home has many possible ramifications. It may enable parents to be available for their kids. It saves transportation and overhead costs, but could shift cost burdens to an employee. There are other social implications as well. For instance, working from home may decrease interaction with professional peers but increase neighbor time.
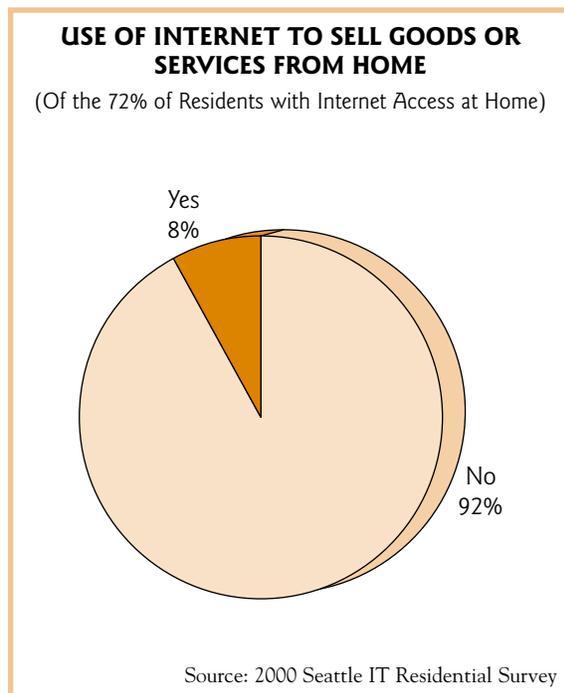
As a way to explore the expansion of micro-businesses on the Internet, residents with Internet access at home were asked if they have used the Internet to sell good or services from their homes. Although this is not an

accurate indication of all residents who have used the Internet to start home-based businesses, it does give a sampling of the way that the Internet is creating new entrepreneurial opportunities for Seattle residents.

Overall, only a small percentage of residents are using the Internet to sell goods or services from their homes. However even this small percentage indicates that more than 40,000 residents have used the Internet to start some sort of micro-business from their home.

There are few differences in demographics between those who have used the Internet for this purpose and those who have not.

- Men are twice as likely as women to have used the Internet to sell goods or services from their homes.

- Those between 18 and 35 are more likely to have used the Internet in this way than those over 35.

- Those without any college education who have an Internet connection at home are more than twice as likely to have used the Internet to sell goods and services as those with a college education.

USE OF INTERNET TO SELL GOODS OR SERVICES FROM HOME

(Of the 72% of Residents with Internet Access at Home)

Yes
8%

No
92%

Source: 2000 Seattle IT Residential Survey

Notes

1 For a full listing of SIC codes and their definitions, see http://www.osha.gov/cgi-bin/sic/sicser5.

2 For the Dictionary of Occupational Titles, see http://www.wave.net/upg/immigration/dot_index.html.

3 C. A. Meares and J. Sargent, *The Digital Workforce: Building Infotech Skills at the Speed of Innovation* (U.S. Department of Commerce, Office of Technology Policy: June, 1999).

4 Technical Writers are not included in the DOC Office of Technology Policy definition.

5 The Benton Foundation, *Losing Ground Bit by Bit: Low-Income Communities in the Information Age* (June 1998), 4.

6 College Board as reported through e-mail correspondence with Tim Washburn, Executive Director of Admissions and Records, University of Washington, December 26th, 2000.

7 Washington Software Alliance, *Findings of the 2000-2001 Workforce Study,* 2001, 14.

8 Washington Software Alliance, 10.

9 This data is from the Washington Software Alliance which uses a narrower definition of the IT industry than used in other sections of this report (see Defining IT Industry and Occupations section). The numbers on technical employment/technical positions referred to in this indicator were collected through private interviews with companies, and therefore were not confined to the State occupational classifications. These Technical Positions are Programming/Software Engineers, Database Development/Administration, Quality Assurance, Network Design and Administration, Enterprise Systems Analysis/Integration, Technical Support, Web Development and Administration, Digital Media, and Technical Writing.

10 Mayor Norm Rice, "Global Connections, Local Impacts," remarks to Puget Sound Regional Conference on Telecommunities, January 6, 1995.

11 Paul Sommers, *Washington State Software Industry Challenges*, (Seattle, WA: Northwest Policy Center, October, 1998) 18.

12 Washington Software Alliance, 9.

13 Projections from the Washington Employment Security Department are based on information gathered from employers in the Occupational Employment Statistics Survey conducted cooperatively by the Washington State Employment Security Department and the U.S. Department of Labor, Bureau of Labor Statistics. Some limitations of this method include:

 • The occupational projections are based on survey data and industry employment estimates. As a result, some degree of error is inherent in all numbers. The smaller the base year number the larger the possible error range.

 • Only the occupations with ten or more workers in the base year are included in this listing.

 • In instances where state and the sum-of-the-area projections differed, the area projections were adjusted to the state totals.

14 Paul Sommers and Dan Carlson, *The New Economy in Metropolitan Seattle: High Tech Firm Locations Within the Metropolitan Landscape,* 2000. Report published by the Daniel J. Evans School of Public Affairs, University of Washington for The Brookings Institution on Urban and Metropolitan Affairs and City of Seattle Office of Economic Development.

15 Some limitations of this data include:
 • Covered employment typically represents around 85% of all jobs in the region.

 • All employment for a business record is reported under a single SIC code. So, for example, if a business making wood products also employs janitors, and accountants, they would all likely be included in the job totals reported for the wood products manufacturing SIC code, unless the company reports them separately.

 • Some totals for multiple sites are still reported at a single location.

16 Wages reported include base rate, cost of living allowances, guaranteed pay, hazardous-duty and incentive pay (includes commissions and production bonuses), on-call pay and tips. Wage data does not include back pay, stock and options bonuses, jury duty pay, vacation pay, overtime pay, severance pay, shift differentials, nonproduction bonuses and tuition reimbursements.

17 Northwest Policy Center, Northwest Federation of Community Organizations, and Washington Citizen Action, *Searching for Work that Pays, 2001: Washington*, Northwest Job Gap Study, June 2001.

18 There have been many commentaries written on the H-1B visa program. A lead voice against increases in the H-1B visa program is the Washington Alliance of Technology Workers, a part of the Communication Workers of America (see www.washtech.org). On the other side of the debate is the Information Technology Association of America, which has supported past increases (see www.itaa.org/itserv/immipolicy.htm).

19 Benton Foundation, "Meeting Workforce Demands in the Digital Economy," from the Digital Divide Network, 2001 (http://www.digitaldividenetwork.org/content/stories/index.cfm?key=6).

20 Carrie Johnson, "High-Tech Visa Approvals Down From Last Year," *Washington Post,* 21 March 2001, sec. E, p. 1.

21 Openings certified only indicate the number of H-1B openings that were certified for work and does not mean that this many H-1B workers were actually employed. Each year the Department of Labor certifies more openings than are actually used by employers.
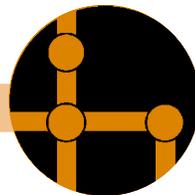
Community Building

Email and the Web have quickly spun into our lives, but what effects have they had on our ability to build community? Has technology connected people to communities or isolated them? Are we spending more time with our computers or with each other?

The Internet has certainly changed the way that we think about communication and community building. In this age of mobility, our communities are not only formed around a physical location; they cut across borders and/or exist entirely online in "virtual communities." Information and communication technologies, when applied to community, can foster dialogue and reinforce connectedness. Used to their greatest potential, these technologies can:

- build relationships and community unity
- encourage face-to-face interaction
- enable sharing of resources
- support and promote community assets
- promote community development
- be applied to building neighborhood area networks inclusive of residents, schools, organizations and businesses
- Build networks of interest and promote commonality across geographic boundaries.

This set of community building indicators covers participation in community groups and electronic participation via web and email. The Internet is certainly stretching our thinking about community building and communications. Those who take advantage of the web and email may be at an advantage for delivering services, recruiting members, fundraising, marketing and advocacy. Still, the web and email are another in a long line of tools. From drums to telephone trees, information technologies have long been used to rally community groups together. The challenge lies in effective applications: how to use the tools and, perhaps more importantly, making choices about when not to use them.

When developing these indicators, we found that sense of place continues to be very important to Seattle residents. Seattle has strong and caring residents working hard to improve their neighborhoods. Local institutions and businesses often rely on local support. The City of Seattle also places a high priority on promoting residents' sense of ownership and responsibility for their community. For that reason, these indicators focus on measuring local communities and information technology rather than trying to assess virtual communities.

As individuals, government, and the private sector all get wired, nonprofits, small businesses and neighborhood associations must follow suit. Information technology has become an essential part of the toolbox for community builders and human service providers. Since their success is critical to the well-being of our city, this indicators project also took a measure of the IT health of local nonprofits (non-government organizations). Additional research is being conducted on small businesses.

Electronic Participation in Local Community Groups

Healthy communities are active. Residents get to know each other and work together on common goals. The interests that bring our communities together cover a broad spectrum; they may include neighborhood associations, school and parent groups, sports clubs, and arts, religious or cultural organizations. Together they weave the fabric of our communities and our quality of life. Involvement in these community groups provides a measure of the extent to which residents are engaged. Their use of email and the web provides a measure of the reliance on these tools. These numbers should also be applied to considering the risk of alienating those with less access. As email and the web are relied upon as the dominant communication medium, those with less technology access and literacy may be left out of the loop.

Measurements

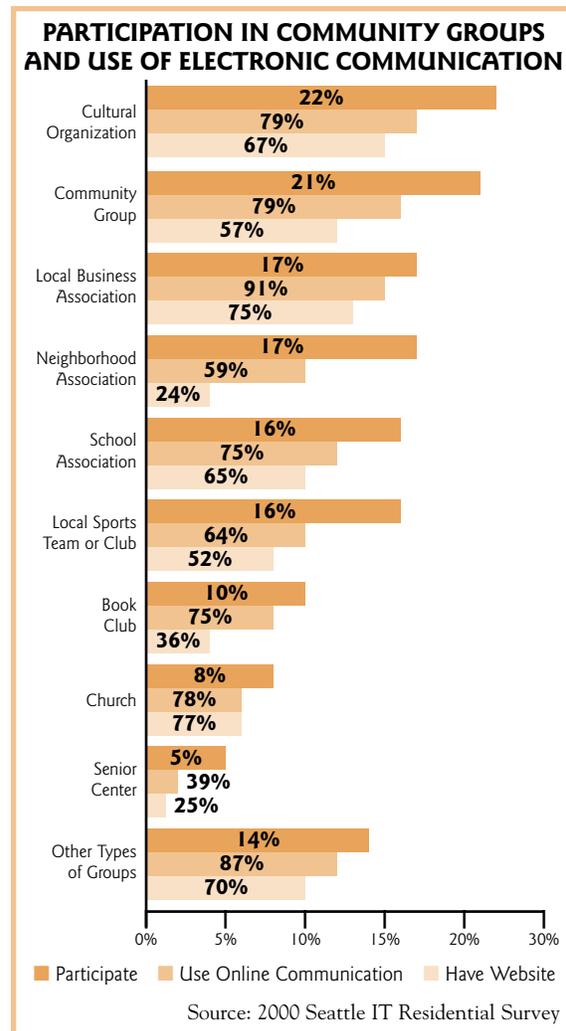|	
Seattle Residents Participating in Community Groups	**62%**
Groups that Participants Identified as Using Email to Communicate	**73%**
Groups that Participants Identified as Having a Web Site	**55%**

Many Seattle residents are active in community groups, and many of those groups incorporate electronic participation into their work.

More than three in five (62%) residents participate in at least one neighborhood or community organization.

Those who participate in community groups were asked if that group has a web page or uses email to communicate with members. Almost half (48%) of those surveyed indicated that at least one of the groups they participate in uses email or the Internet to communicate with members. Those who participate in local business associations were the most likely to report that their group uses email or the Internet to communicate, followed closely by those who participate in cultural organizations and those who participate in churches. Only 39 percent of those who participate in senior centers indicate that the group uses email or the Internet to communicate with members.

Fewer respondents (39%) indicated that the community group(s) in which they participate

have a web page. Members of local business associations (75%), local cultural organizations (67%), and school associations (65%) were the most likely to report having web pages, while senior centers and neighborhood associations were the least likely.

PARTICIPATION IN COMMUNITY GROUPS AND USE OF ELECTRONIC COMMUNICATION

Group	Participate	Use Online Communication	Have Website
Cultural Organization	22%	79%	67%
Community Group	21%	79%	57%
Local Business Association	17%	91%	75%
Neighborhood Association	17%	59%	24%
School Association	16%	75%	65%
Local Sports Team or Club	16%	64%	52%
Book Club	10%	75%	36%
Church	8%	78%	77%
Senior Center	5%	39%	25%
Other Types of Groups	14%	87%	70%

Source: 2000 Seattle IT Residential Survey

Use of Technology by Community Groups

Although surveying random residents about their participation in community groups is a good way to get an accurate sample or overall involvement, it is not the best way to learn about how technology is currently being used by community groups. By speaking directly with neighborhood and business group leaders, we can better measure the percentage of neighborhood organizations over time that are using email, listservs, and web sites as communication tools for their organizations. Learning about how communication methods change over time also provides important information about the way that newer technologies are, or are not, being adopted by community groups.

Measurements

Last contact with community group was by email (most common)	**48%**
Groups that use email to communicate	**85%**
Groups that use a listserv	**11%**
Groups that have a web site	**42%**

USE OF EMAIL, WEB SITES, AND LISTSERVS BY COMMUNITY GROUPS

Source: City of Seattle Department of Information Technology, 2001 Community Groups Survey

Computers and the Internet are being used to build and strengthen community and neighborhood groups in Seattle.

Email and web technology allow neighborhood leaders to communicate with members. They are also used to contact and mobilize large numbers of people while using minimal resources, organize events, increase exposure, raise the profile of a group, and bring in new members.

Many Seattle neighborhood groups use email as a primary communication method. Almost all of the neighborhood leaders that responded to our survey have a personal email address and 85% said they use email to communicate with members. A majority feels that email is very effective for that purpose.
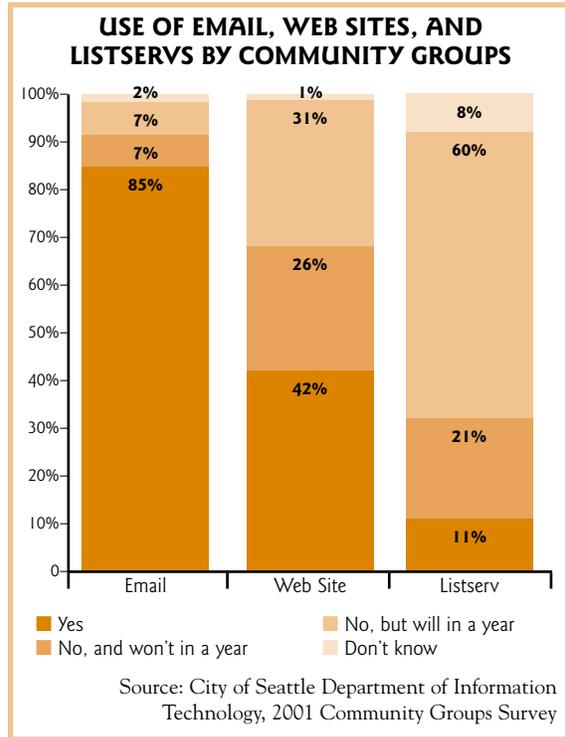
Many groups have created web sites but would like to use them more effectively.

Almost half of the organizations surveyed currently have a web site; an additional 24% think they will have a web site within a year. However, there are mixed feelings about the effectiveness of their sites. Only one-quarter of

Instead of the information superhighway, I'm interested in the information bike path. I want to see the links that can be made at the local level from household to household, school to school, neighborhood to neighborhood.
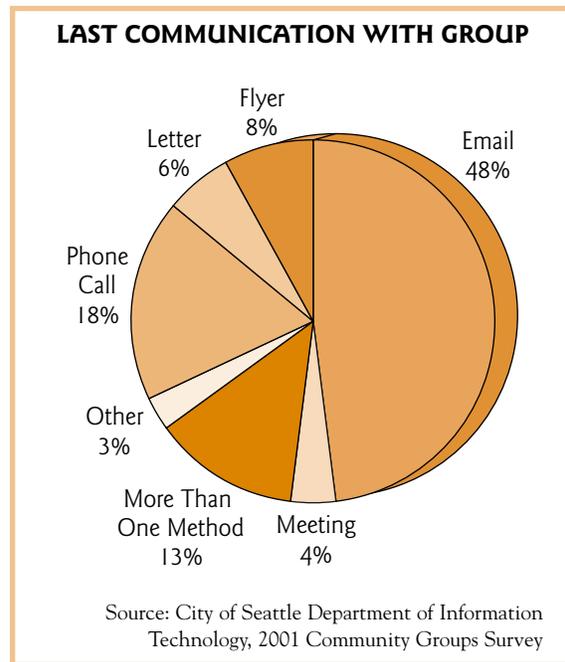*—Richard Conlin, Seattle City Council Member*

those with web sites feel that their site is effective, while more than one-third feel that their site is not very or not at all effective. Resources, skills, and cost, including those related to updating content, are the greatest barriers to building effective sites.

Email is the most common way that group leaders are contacting other group members.

When asked how the last contact with group members was made, almost half (48%) of respondents stated that it was through email. Many of those that listed more than one method, included email as one of those methods as well. The next most popular method of contacting groups was phone calls at 18 percent.

LAST COMMUNICATION WITH GROUP

Source: City of Seattle Department of Information Technology, 2001 Community Groups Survey

The Internet—Breaking Down or Building Community?

Information Technology has an effect on the developments of communities, both geographic and non-geographic. With increasing use of the Internet, communities can easily transcend geographic boundaries. With the growth of these new communities, many are concerned about what the effect is going to be on the communities in which we live and work. Concerns about increased isolation as a result of technology usage are at the forefront, yet many argue that technology has allowed them to communicate and connect with more people than ever before. National and local research has struggled with this question, and reports have been released that support both views.

One of the most noteworthy and highly publicized findings was by the Stanford Institute for the Quantitative Study of Society. Their report on the Internet and society found that the Internet is increasing isolation. As the preliminary findings state, "the more time people spend using the Internet, the more they lose contact with their social environment."[1] However, just a few months later the Pew Internet and American Life Project released study findings that showed that email and the Internet has improved communication with friends and family members. Beyond just improving communication with family and friends, the Pew Study found that Internet users were actually more socially connected than non-users, and Internet users surveyed did not report any measurable decrease in their ties to their family and friends because of their involvement with the Internet.[2] On the local level, in a *Seattle Times* poll of Washington and Oregon residents conducted in September 2000, not a single respondent felt that the Internet was causing them to have less interaction with others. When asked, "On balance, would you say the Internet is expanding your interaction with other people? Or do you have less interaction with others than you used to?" 66 percent of respondents replied that the Internet is expanding their interaction with others.[3]

Technology Usage by Non-Profit Organizations

Non-profit and community based organizations play an important role in community building and sustainability. In order to effectively deliver services and develop the organization, it is becoming increasingly important for non-profits to have a sufficient level of information technology infrastructure. Funding challenges for non-profits often put them in a position of playing catch-up to industry standards and expectations. Varying types of service create varying technological needs for organizations. However, there is a basic technology infrastructure that should be in place for all organizations.

Measurement

IT Infrastructure Index Rating (between 0 and 100) for Seattle Organizations **63**

What is Basic Technology Infrastructure for a Non-profit?

For the purposes of this indicator, basic technology infrastructure is defined by the following five criteria:

Organizations have a technology plan in place.

According to NPower, a local technology assistance organization for non-profits, all organizations should have a 2- or 3-year written technology plan that is integrated into the organization's overall strategic plan and/or annual program plan. Many non-profits find themselves reacting to technological problems and developments on an *ad hoc* basis. A technology plan allows organizations to take a proactive approach to the use of computer technology.

All staff who need computers have them, and the computers are adequate for the needs of staff.

Technology should be assisting and facilitating the work of organizations, and not holding it up. Staff members who need to use computers in their work should have easy access. Just having access to computers isn't always enough—the computers at organizations should have the memory, software, and capabilities that staff need in order to complete their projects efficiently.

INFORMATION TECHNOLOGY INFRASTRUCTURE FOR NON-PROFIT ORGANIZATIONS

Overall Index Score	63%	
Technology Plan	40%	
Computers for all Staff who Need Them	68%	
Adequate Computers	63%	
Internet and Email for all Staff who Need Them	74%	
Adequate Internet and Email	66%	
Adequate Networking	59%	
Reliable Access to Tech Support	78%	
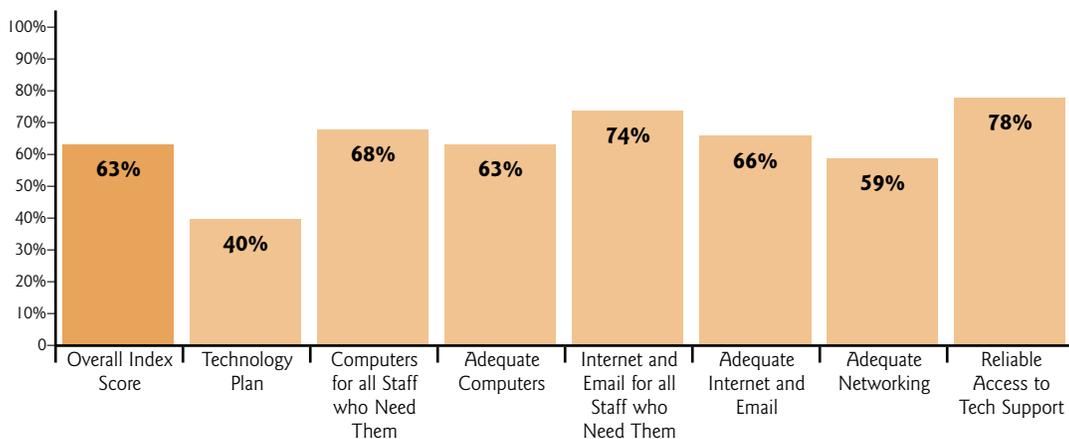
Source: City of Seattle Department of Information Technology, 2001 Non-Profits and Technology Survey

All staff who need access to the Internet and email have access, and the Internet and email systems are adequate for staff and organizational needs.

As with computers, Internet and email systems should be available to those staff who need them and adequate for organizational needs. One computer with Internet access in an office may be sufficient for some organizations, while others may need to have every computer connected.

A network adequate for the needs of the organization is in place.

Some organizations may not need a local area network, while others may need to be connected not only within the office, but also to a wider network of organizational sites. Organizations should define the level of networking that is suitable for their needs, and then work to have that in place.

The organization has reliable access to technology support.

Computer technology can drain an organization's resources if it is not functioning well. Work can be held up if computers that staff rely upon are not functioning. Organizations should have some form of reliable technology support, whether through a staff member, a consultant, or a volunteer.

The data here is part of a larger research project into technology usage within non-profits.[4] This survey considered a broader scope of resources necessary to use information technology effectively and considered barriers. One of the questions on the survey asked what type of training or assistance would help their organization use technology more effectively. The most frequent response was staff training, requested by thirty-five percent of respondents. If staff do not have the training and skills to use the hardware and software effectively, the technology potential goes untapped.

Notes

1 Nie, Norman H. and Lutz Erbring. *Internet and Society: A Preliminary Report* (Stanford Institute for the Quantitative Study of Society, February 17, 2000).

2 Pew Internet and American Life Project, *Tracking Online Life: How Women Use the Internet to Cultivate Relationships with Family and Friends.* 10 May 2000, p. 21.

3 From the raw data of the survey conducted by Elway Research for *The Seattle Times* and *Northwest Cable News*, in collaboration with the Daniel J. Evans School of Public Affairs at the University of Washington. Summary of survey results was published in *The Seattle Times* on 24 September 2000.

4 See www.cityofseattle.net/tech/indicators/ nporesults.htm
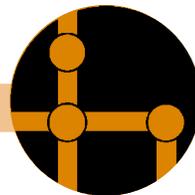
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Civic Participation

Access   Content   Diversity   Infrastructure   Literacy

The Internet has been hailed as the new town square of democracy. Unlike most information technologies that have come before, the Internet provides residents with a relatively low-cost opportunity to broadcast ideas, opinions, and political views to a mass audience. More importantly it provides powerful capacity for interaction and dialogue about community issues.

The Internet is still young. How well it serves as a tool for democracy and diversity is as yet an unanswered question, although many fear that it is already falling short. There are concerns about oversimplification of democracy with debate and dialogue being replaced by yes/no polls. The commercialization of the Internet has fostered intense competition for your online attention and threatens to leave smaller voices unheard. Despite these concerns, new voices are heard via the Internet and there are many working to promote the potential of the Internet as democratic medium, where a variety of content is supported and maintained.

The civic participation indicators presented here cover two aspects of electronic democracy. The first set of indicators captures the extent to which residents feel the Internet is an effective tool for dialogue about community issues and for reaching elected officials. Additional indicators measure use of electronic government services, also referred to as e-government.

The term e-government has been popularized in some circles, though its definition is still evolving. E-government is best considered in broad terms referring not just to online services but to all telecommunications media. For instance, telephones have long been a primary tool for reaching government officials. The advent of voicemail and push-button menus (technically called integrated voice response or IVR), revolutionized our contacts with government and business…sometimes for the better and sometimes not. In addition many communities have public and/or municipal cable television channels. Now the integration of television, telephone, and Internet services is simultaneously challenging and enabling governments to choose the most appropriate tool for reaching residents.

The City of Seattle strives to be a leader in applying information technologies to enhance access to services, increase public interaction with local government and enable effective input into policymaking.

Online payment and purchasing transactions are a major area of development for e-government. At this writing, the City of Seattle has a limited number of online transaction services. These include payment of parking tickets and other municipal court citations through the City's web site. For these indicators, we have used online payment of municipal court fines as a proxy to capture residents' use of electronic government for transactions.

On the City of Seattle's web site one may check the status of a building permit, register as a city vendor, and submit campaign finance reports. A large proportion of City forms may be downloaded and an increasing number of those forms are interactive, which means that they can be filled out and submitted online. While these services are important, we have not developed an indicator for them.

Information Technology as a Means for Civic Participation

Publication and delivery of government services and communications are increasingly delivered via the Internet. It is important to consider how this influences citizens' access to public officials and civic participation. The effectiveness of electronic participation and communication for civic means has not been evaluated before now. Email and web-based campaigns on political issues are becoming popular ways for special-interest groups to organize mass responses to legislation or to encourage action by elected officials. With the increased volume of email, are elected officials responding? Do people feel their voices are being heard?

Measurements

Residents who feel that the Internet and email are effective ways to communicate about issues that affect them and their community

49%

Residents who feel that email and the Internet are effective ways to communicate with elected officials

36%

Overall, survey respondents have mixed feelings about the Internet as a tool for civic participation. Residents are more positive about the Internet as a tool for communicating opinions about issues affecting the community than about the Internet as a way to communicate with elected officials.

- Women were significantly more likely than men to feel that the Internet is effective for communicating with elected officials.

- Young respondents, between 18 and 25, rated the Internet the lowest in terms of effectiveness in communicating with elected officials, while those between 51 and 64 rated the Internet the highest in both categories.

- Caucasians rate the Internet higher in terms of its effectiveness in communicating with elected officials than did other ethnic groups.

EFFECTIVENESS OF EMAIL AND INTERNET TO COMMUNICATE CIVIC ISSUES

(BASE: Computer and/or Internet Users)

	Email	Listserv
5 Very Effective	27%	18%
4	22%	18%
3	26%	27%
2	13%	16%
1 Not Effective	12%	20%
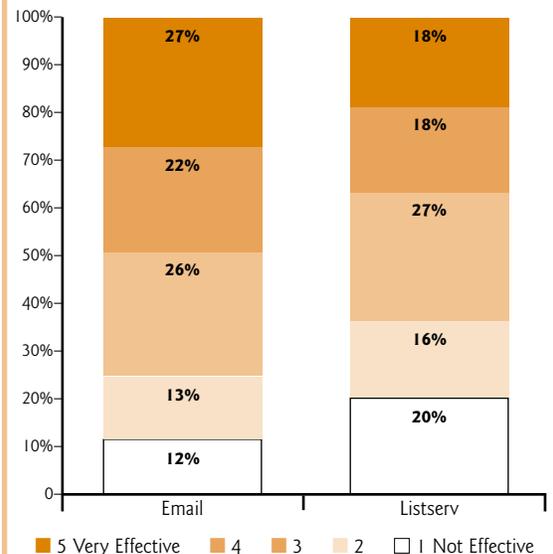
Source: 2000 Seattle IT Residential Survey

Civic Participation Up Close
The Search for Effective Strategies

Residents want to be heard and make a difference. So too, elected officials want meaningful input to help guide debate and decisions. Our new digital toolbox includes email, the web, cell phones and more. Residents and policymakers alike are challenged to select the right tool at the right time. Challenges abound. We run the risk of info glut where messages become needles in a proverbial haystack. If the best organized and most effective users of new tools of technology leave a diversity of voices unheard, the resulting digital divide in participation restricts democracy rather than enhancing it.

We are still learning and searching for the best tools and most effective information technology strategies to connect people with government and government with the people in a timely way to influence policy and positive change. Below are a few examples of how the City of Seattle has begun using IT tools and how citizens have as well.

On the government side…

The City of Seattle has a long history of work fostering electronic civic participation predating the Internet and World Wide Web presence. Its first project was a dial-up bulletin board. Named the Public Access Network or PAN, the City enabled citizen groups to establish discussion forums. In the late 1990's Seattle City Council member Nick Licata developed an email list for his constituents and then used this to seek comment on whether the City should make a bid for the Olympic games. In 1999, the City Council solicited email comments as part of its hearing on the City budget. As the City moved to the web, it also carried forth its commitment to participation by hosting web sites and listservs for community groups and supporting an innovative community technology initiative to further access and literacy.

Seattle was also one of the first cities to video stream its government access TV channel programming over the Internet. This began in 1998. By 2000, the City had added the capacity to stream live as well as taped programming. The public could now watch the city channel directly on the Internet, live. As an ongoing pilot project, meetings of the City Council Public Safety and Technology Committee have been broadcast on cable television and simultaneously streamed live; email comments may be sent during the meetings and are addressed during public comment time. This technology allows for a new method of engaging and informing citizens about government activities.

City hosted listservs have seen an increase in use as well. The City currently hosts neighborhood discussion lists to support community development work and provides announcement lists, on topics ranging from crime prevention to construction updates to neighborhood news.

Many elected officials will tell you they are excited by the web and overwhelmed by email, but are searching for ways to use it most effectively. The City is now embarking on a new "Democracy Portal" project, intended to more strategically integrate cable television, the Internet and traditional media outlets into an effective forum for public education and input. On another track, Judy Nicastro, a Seattle City Council member, began an attempt in March 2002 to raise funds to develop a live web camera project. The live camera would enable the public to follow her through her work for the electorate. Whether or not a "councilorcam" project becomes reality, it is an indication of the excitement and challenge of seeking effective ways to use information technology to engage residents in government.

On the citizens' side….

A number of community organizations and interest groups have been using email and web sites for public education, fundraising and organizing. Organizations such as ONE/Northwest assist community organizations in developing their IT capacity and using it effectively for education and advocacy. Following is an example of the use of information and communication technologies in a cam-

paign by *Yes For Seattle*, a group of environmental activists who organized to bring about changes in Seattle's water policy.

Yes For Seattle's goal was to pass I-63, a ballot initiative to conserve water for the benefit of salmon in fish-bearing creeks and rivers. In September 2001, as a direct result of the citizen-sponsored campaign to put I-63 on the November ballot, the City Council passed a substitute measure that agreed to increase conservation of water, retrofit low-income housing for conservation, and devote more water to preserving endangered salmon runs.

Information technology played a large role in allowing *Yes For Seattle* to organize a massive signature gathering campaign and distribute information quickly to supporters. According to Sacha Crittenden, campaign manager, "We had to set up our organization and campaign just a few weeks before signature gathering started. Everything happened really quickly.

"We gathered 26,000 signatures and qualified the initiative by July 26," Crittenden said. "After that, we were in constant lobbying negotiations, conversations or some other form of communication with city council, our board members, our constituents and volunteers.

"We used IT on four different levels. We have a web site, email, a database, and a listserv that goes out to all of our volunteers and supporters. A listserv newsletter kept people abreast of the campaign. And there was a progress report to our internal campaign committee, and that went out by email.

"Our database was crafted specifically for signature gathering, which means it has a lot of functions. You input the number of signatures somebody gathered, and where and when they were gathered. And you can do reports by location, county and date and all." These reports allowed *Yes for Seattle* to publish up-to-date figures on the signature gathering campaign in a weekly electronic newsletter. This turned out to be a great motivator for volunteers to achieve their signature-gathering goals.

"I think during the lobbying campaign, the listserv was critical to our success," Cirittenden continued. "We used it to send out action alerts. The speed of the listserv helped us win. Things were changing every day and we were sending action alerts every couple of days. People forwarded action alerts to other lists. The effect was like ever-expanding concentric circles. We reached a lot of people.

"The web site was used mostly to direct media or people who were looking for copies of the initiative. And we had a big FAQ there with our responses to all of the questions. The web site also had a volunteer sign-up form that produced a lot of volunteers."

In the end, I-63 never made it to the November ballot. Instead, the city council passed the substitute measure before the election, meeting the goals of the original initiative. Effective communication with their supporters, a well-organized campaign with strategic use of information technology, and many hours of hard work all contributed to *Yes For Seattle's* success.

Information Technology as a Means of Accessing Government Services

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.

Measurements

Percent of residents who have used the Internet to access information from government agencies in the past year **55%**

Percent of residents who have visited the City's web site **30%**

Percent of City Municipal Court payments that are made online **1.4%**

Seattle residents are using the Internet to obtain information on government agencies.

More than half (55%) of all residents and three out of five (60%) computer users indicate that they have used the Internet in the past year to find information from a city, county, state or federal government site.

The highest percentages of those who have sought information from a government agency on the web are between 36 and 50 years old, have a college education, and have upper/high upper household incomes. Whereas two-thirds (66%) of caucasians surveyed have sought information from a government agency on the
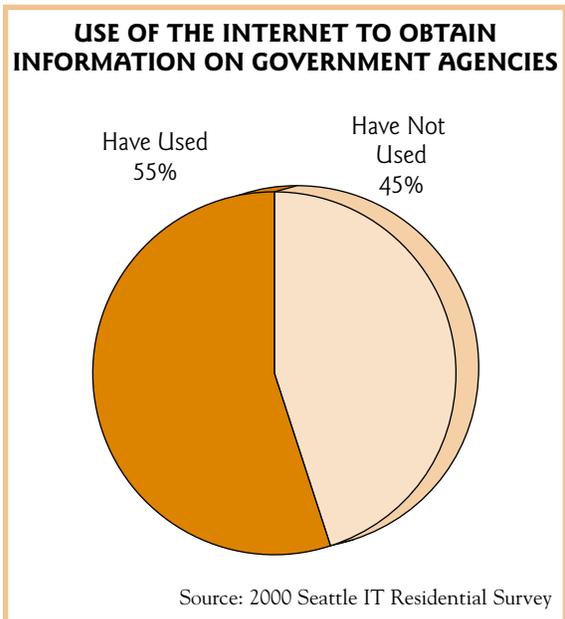
USE OF THE INTERNET TO OBTAIN INFORMATION ON GOVERNMENT AGENCIES

Have Used 55%

Have Not Used 45%

Source: 2000 Seattle IT Residential Survey

Internet, only 38 percent of African-Americans, 38 percent of Asian-Americans, and 30 percent of Hispanics respond similarly.

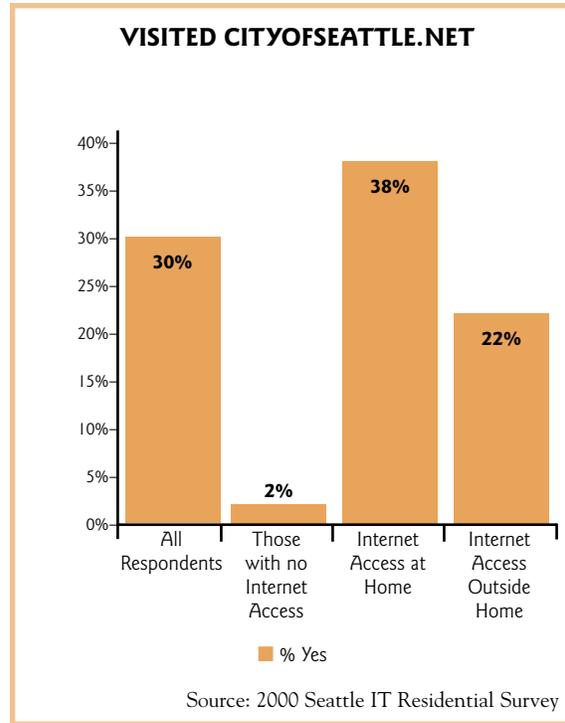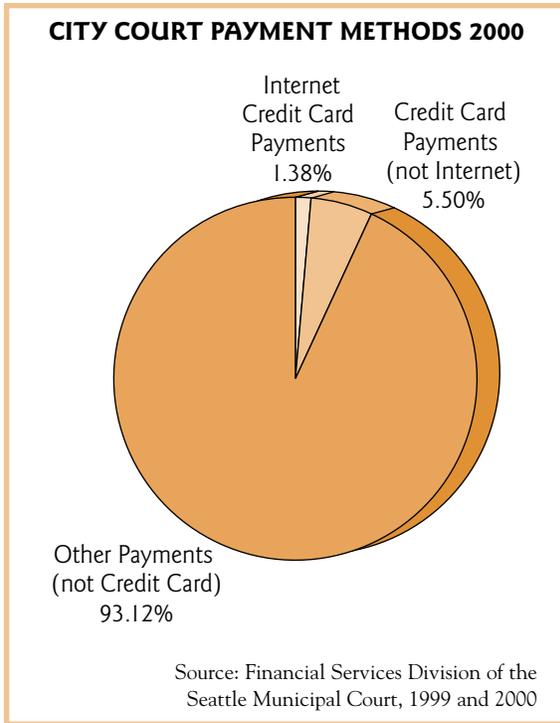**Many residents have visited the City's website, www.cityofseattle.net.**

About 30 percent of all residents have visited the City's website. This includes more than

Access, as it exists now, should not be all that we are striving for. We, as citizens of Seattle, should think larger about how we conceptualize an information and communication technology infrastructure that would really help us as a city.

—Doug Schuler, Author and educator

CITY COURT PAYMENT METHODS 2000

Internet Credit Card Payments 1.38%

Credit Card Payments (not Internet) 5.50%

Other Payments (not Credit Card) 93.12%

Source: Financial Services Division of the Seattle Municipal Court, 1999 and 2000

VISITED CITYOFSEATTLE.NET

All Respondents	30%
Those with no Internet Access	2%
Internet Access at Home	38%
Internet Access Outside Home	22%

■ % Yes

Source: 2000 Seattle IT Residential Survey

one-third (36%) of those with Internet access. This is an increase from the 1999 Citywide Residential survey when only 18 percent of residents had accessed cityofseattle.net.[1]

Who visits the City's Web Site?

- Residents between the ages of 26 and 50 are the most likely to have visited the city's web site.

- Those in the extremely low and low income brackets are significantly less likely to have visited the City's web site than those in all the higher income brackets. This is in part due to the lower level of computer and Internet usage in this population.

- Those with college degrees and higher are also more likely to visit the web site than those with less education.

The number of Municipal Court infractions paid online is increasing.

Currently, paying parking tickets and other Municipal Court infractions are the only financial transactions that can be completed on the City's web site. Only a very small portion of court payments are made online, but the number doubled between 1999 and 2000, and is on track to double again in 2001.

- Of the 554,923 payments made between January 1st and December 31st of 2000,

Seattle is in a unique position among cities to not just react to technology changes, but to shape those changes. We have an opportunity not just to envision the future, but to create that future.

—Gregory Nickels, Mayor, City of Seattle

38,158 (5.5% of total) payments were made by credit card, 20 percent of which were paid over the Internet.

- Internet payments accounted for only about 1.4 percent of the total court payments in 2000. However, this is more than double the number seen in 1999, when only 0.57% of Municipal Court payments were made through the Internet.

More than half (57%) of those with cable television have watched the City of Seattle's local government cable television channel. Cable television provides a vehicle for local, county and state government to provide programming. Live interactive programs provide viewers the opportunity to call or email elected officials and government employees or other issue experts with questions and receive immediate answers. With 60% of households subscribing to cable, this would mean that one out of three (33%) adults in the city has seen or watched the municipal channel. Almost half (44%) of those who have watched the channel report that they have watched City Council meetings.[2]

Notes

1   City of Seattle Executive Services Division. *1999 Citywide Residential Survey*. See www.cityofseattle.net/pan/survey99.htm.

2   City of Seattle Department of Information Technology, *2000 Seattle IT Residential Survey*, p 115.

6

Human Relationships to Information Technology
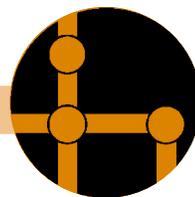
Access   Content   Diversity   Infrastructure   Literacy

"It's the personal touch."

"So and so knows them; you can trust them."

Personal and community relationships, personal and community safety—these are high values for all of us. The human relationship indicators presented here attempt to capture some of the quality of life and safety concerns that have risen to the top of the debate and development of our information technology age.

Participants in the development of these indicators felt a strong need to be able to capture and reflect on the current psyche of our city in concert with the other quantitative measures. Behind this lies a goal of ensuring that information technology is used to benefit and not harm our personal lives, our families, our relationships with each other and the society we live in.

Technology is a powerful magnet and in its allure we may lose track of how we're adjusting to the changes or whether we're heading in the right direction. We must simultaneously recognize both the benefits and problems associated with use of information and communication technologies. There are certainly a range of perspectives and ambivalence in our relationship with IT.

The measures in this section cover impact on personal time, privacy, security and quality of life. Also included in this section is a discussion of the content of the Internet and how well that content meets the needs of residents. If the Internet is to be truly a place of equality then the authors and content should be inclusive of our diverse community.

We have attempted to gather a selection of measures here that together reflect overall trends in our relationship with technology. This was a challenging set of indicators to develop. We hope their publication sparks further dialogue and critical thinking about how we put residents in the driver's seat and ensure that information technology is used to benefit and not harm our personal lives, our families and our relationships.

Quality of Life

The City strives to improve and sustain a high quality of life for Seattle residents and for the City as a whole. The two measures here consider residents' view of information technology's impact on their own personal lives and the overall quality of life for the city.
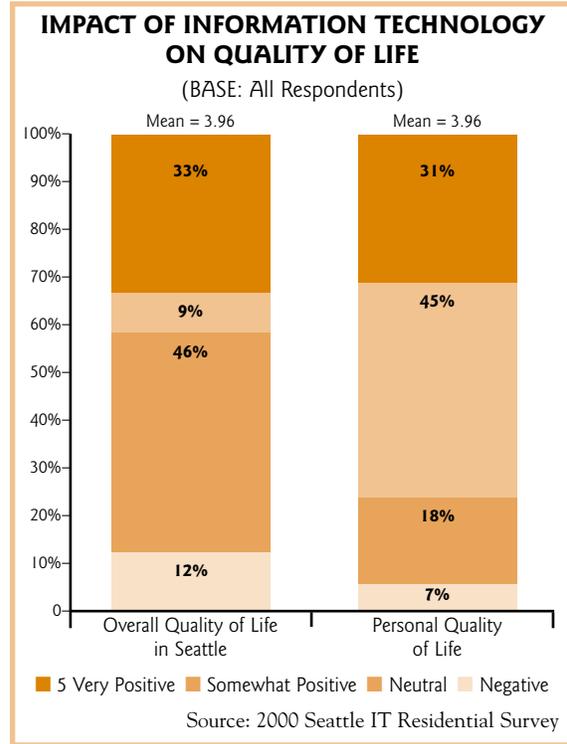
Measurements: Quality of Life

Percent of residents who feel IT has had a positive impact on their personal quality of life **76%**

Percent of residents who feel that IT has had a positive impact on the quality of life in Seattle **79%**

Overall, Seattle residents feel good about the impact that information technology has had on their lives and on the city.

About three-quarters of residents feel that information technology has had a positive impact on their quality of life. This includes computer users and non-computer users.

About four out of five residents feel that information technology has had a positive impact on the quality of life in Seattle.[1]

IMPACT OF INFORMATION TECHNOLOGY ON QUALITY OF LIFE
(BASE: All Respondents)

	Overall Quality of Life in Seattle	Personal Quality of Life
Mean	3.96	3.96
5 Very Positive	33%	31%
Somewhat Positive	9%	45%
Neutral	46%	18%
Negative	12%	7%

■ 5 Very Positive ■ Somewhat Positive ■ Neutral ■ Negative

Source: 2000 Seattle IT Residential Survey

Privacy, Security, and Safety Concerns

The power of electronic data lies in its ease of access, collection, analysis, modification and transference. Every new plateau requires a reapplication of community standards. Privacy, safety and trust are certainly major issues posed by the Internet and current evolution in data exchange. Having personal control over making choices may be as much an issue as what the choices are.

For example, companies may assume they can share your address and other data you give them; you are required to "opt-out" of information collection, as opposed to being asked to opt-in. Visiting websites may result in data being placed on your computer. Child safety, identity and source reliability are also areas that are of concern and evolving practice and policy. These issues are not exclusive to the Internet, but the Internet allows for the potential misuse of this information on a much larger scale than previously possible. The measures presented here look at acceptance of current practices and belief in the need for attention to security, child safety measures and privacy.

Measurement: Overall Security

Percent of residents who feel secure when using the Internet **51%**

This overall security measure is an index of three security measures—online companies' use of personal information, safe web access for children, and the security of online financial transactions.[2]

Overall, residents are almost evenly split between those who feel the Internet is secure and those who do not. Feeling secure when using the Internet is related to gender, age, and experience with computers.

Men were slightly more likely than women to feel very secure or secure with the Internet (54 percent to 49 percent respectively).

Older residents feel less secure with the web than do younger residents. Sixteen percent of those between 18 and 35 feel very secure with the Internet compared to only nine percent of those over 36. Those who are 65 and older feel the least confident about security and the Internet— more than one quarter (27%) feel that the Internet is not at all secure compared to only about one in 10 (12%) of those under the age of 65.

Those who do not have computer access are much more likely than those with computer

OVERALL SECURITY WHEN USING THE INTERNET
(BASE: All Respondents)

Not very Secure 35%

Not at all Secure 14%

Very Secure 11%

Somewhat Secure 40%
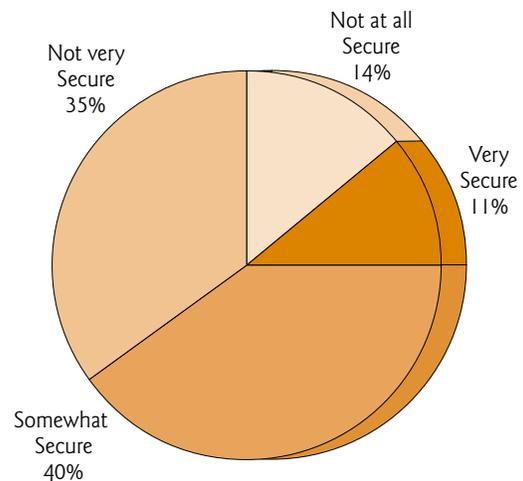
Source: 2000 Seattle IT Residential Survey

access to feel that the Internet is either not very secure or not at all secure (73 percent to 46 percent respectively).

Those who are "very comfortable" or "comfortable" using computers and the Internet are much more likely to feel that the Internet is secure than those who are "not very comfortable" or "not at all comfortable" with computers and the Internet (58 percent to 25 percent respectively).

Security of personal information is a concern, especially among non-computer users. Computer users are almost three times more likely to feel that companies on the Internet use personal information appropriately than non-computer users.

Computer and Internet users are much more confident in the security of financial transactions online, but overall confidence is still not very high. Fifty-seven percent of those with Internet access feel that financial transactions are secure, compared to only 18 percent of those without Internet access.

There is still a fair amount of uncertainty about whether or not children can access the web safely. Computer users are more confident than non-computer users. Forty-three percent of computer users felt that there are adequate precautions in place for children to access the web safely compared to only 28 percent of non-users. Those with children at home are also more likely to feel that kids can access the web safely than those without kids at home (47 percent to 39 percent respectively).

Is the Internet safe for kids?
Conversations with computer users at labs around the city

In order to learn more about how computer users feel about Internet safety for kids, we spoke to computer users at community labs around the city. Overall, the users we spoke to were conflicted about how to ensure safe access for children.

Everyone we spoke to agreed that children and youth, when online, should be monitored by adults. Many said that kids will find a way to go online without adult supervision, and should therefore be educated on how and why to protect themselves. Some felt that because of their lack of experience, children may believe that everything they see on the web is true, just because the material has been published. Many of them also stated that parents must discuss with children the physical and psychological dangers inherent in viewing potentially harmful sites and the personal consequences of giving out information to others online.

> Yes, the Internet can be dangerous for kids, but cutting off all access to anyone 18 and younger isn't going to work because they're going to find a way to get in somehow, some way. Parents should talk to their kids first. Tell them that these are the things we don't want you to do on the Internet for your own safety. We're not doing this to be mean or anything. We're doing this because we love you and want you to stay safe. Kids are more likely to respond to that than, "you just can't go here."
>
> *Azorhi, 22, Real Change MacLab User*

> If the parents want to guide the kids how to use it in good manner, yes it is safe. But if you just open the computer and give it to kids to surf the Internet, these kids don't know what to do. And it's dangerous.
>
> *Tsegaye, Horn of Africa Computer Lab Instructor*

> I think that you can train your children to evaluate things for themselves, and to look at a situation and say, "Is that really what I want to do? What are the consequences of that action?"
>
> *Lily North, VISTA Volunteer, Real Change MacLab*

> I don't think kids should just be getting on the Internet. It's very dangerous. It's easy to find sites that are not good for them. They can go to the library or some other place instead.
>
> *Sheldon, 25, Real Change MacLab User*

> Kids should not have absolute access to the Internet. That's actually the responsibility of the parents. There's so much out there. Kids will see things on the Net that they won't understand. And they'll think it's okay because they show it here, so it must be. My whole thing about security is where it's implemented. It's all about the responsibility of the parents and teachers and the kids' elders.
>
> *Kevin, 35, Lab Monitor at Real Change MacLab*

Satisfaction with Content of the World Wide Web

In 2000, the Children's Partnership released a study of the content available through the Internet and how well that content is meeting the needs of underserved Americans. This study, entitled Online Content for Low-Income and Underserved Americans: The Digital Divide's New Frontier[3], identifies four significant content-related barriers that affect large numbers of Americans. These barriers are lack of 1) local information, 2) literacy barriers, 3) language barriers, and 4) lack of cultural diversity. Through interviews, web searching and analysis, the Children's Partnership found underserved Americans (defined as those with lower-incomes, limited education, living in rural areas, and members of racial or ethnic minorities) are far less likely to find Internet content that is directly related to their needs. This study found that underserved Internet users want access to local job and housing listings, online learning materials with multimedia components, information at a basic literacy level that is appropriate to adults, more non-English web sites, online translation tools, and health and other vital information geared to particular racial and ethnic groups.

We were not able to conduct the same research for Seattle residents. Instead, as a representational look at equality, we asked residents who had used computers whether they were satisfied with Internet content. The results were analyzed for trends based on age, ethnicity, education, income, whether the household had children.

Measurement

Percent of residents who are satisfied with the content of the web **85%**

A large number of Seattle residents are satisfied with the content of the Internet for their personal needs.

- Only one tenth (11 percent) of respondents state that they are "dissatisfied" with the content of the World Wide Web for their personal needs.

- Of those residents who are satisfied with the content of the web (85 percent), slightly more were somewhat satisfied as opposed to very satisfied.

There were some differences in demographic groups and overall satisfaction with web content.

- Satisfaction with the web increased with income, with those in the upper and high upper income brackets rating their satisfaction significantly higher than those with lower incomes.

SATISFACTION WITH THE CONTENT OF THE INTERNET
(BASE: Respondents who have used a computer)

Neither Satisfied nor Dissatisfied 4%
Somewhat Satisfied 46%
Dissatisfied 11%
Very Satisfied 39%
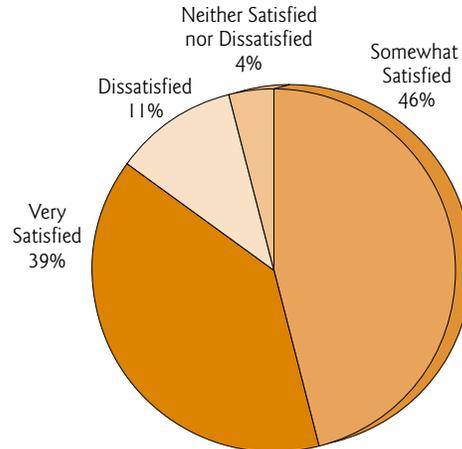
Source: 2000 Seattle IT Residential Survey

- Among ethnic groups, Asian-Americans were the least satisfied with the content of the Internet and Caucasians were the most satisfied (mean scores of 3.85 and 4.16 respectively).

- Those with children in the household were less satisfied with the content of the web than those without.

Impact of Information Technology on Personal Time

Personal time is when we invest our energy into family, friends and activities that enhance our relationships and quality of life. Have email and the web put you more in touch or out of touch? Can you get tasks done more effectively and spend more time on other personal activities? Maybe you're glued to a computer during your personal time. Do you feel you must stay connected to an office even during vacations or other "time off?"

The success of our relationship with information technology depends on our own needs and expectations, but is also influenced by others. You may be constantly wired to work or home through cell phones, pagers, PDA's[4], email, and the Internet…or wired as little as possible. How about your friends, family and co-workers? What do they expect of you? Through your own use or the use of those with whom you interact, your time has been influenced by information technology.

The measure of whether IT has impacted our residents' personal time provides a snapshot of whether the use of IT has been integrated into our lifestyle in a healthy manner or not.

Measurement

Percent of residents who feel that IT has decreased their personal time	**18%**
Percent of residents who feel that IT has increased their personal time	**22%**

The majority of residents (60 percent) feel that information technology has had no measurable impact on their personal time. The remaining 40 percent were split as to whether it increased or decreased personal time.

- Men are more likely than women to feel that IT has decreased their personal time, where as women were more likely to say it has made no difference.

- In general, young respondents (those between 18 and 25) feel that IT has increased their personal time. Those between 26 and 64 are the most likely to feel that it has decreased.

Other local studies have looked at whether or not people feel that information technology has made them more time-efficient. Results from a survey of Washington and Oregon residents done by the *Seattle Times* and Northwest Cable News found that 49 percent of respondents felt that they got more done in less time

IMPACT OF INFORMATION TECHNOLOGY ON PERSONAL TIME
(BASE: All Respondents)

Decreased 18%

Increased 22%

No Change 60%
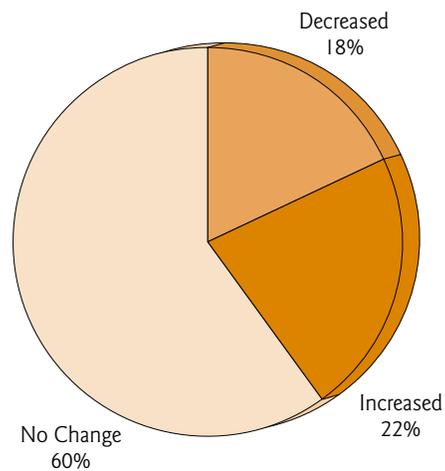
Source: 2000 Seattle IT Residential Survey

as a result of the Internet. However, 45 percent of respondents also reported that they work on office projects from their home computer at least once a week, with one third of those respondents saying they work on office projects from their home computer every day.[5, 6]

Notes

1   These results are consistent with other studies. A *Seattle Times* poll of Washington and Oregon residents conducted by Elway Research in September of 2000 found that 85 percent of respondents felt that the Internet has had a positive effect on their life. A quarter of respondents felt that it was a significant positive impact, while 60 percent said generally positive. Only four percent felt that the Internet had had a negative impact on their life. Source: Sharon Pian Chan "Internet Poll of Washington and Oregon Residents," *The Seattle Times,* 24 September 2000.

2   Overall security was calculated by taking an average of each individual's responses to the three security questions. Two of the questions were asked as yes/no questions, while the third was asked on a scale of 1 to 5. For the purposes of combining these questions into one security measure, the yes/no questions were put onto the 1 to 5 scale. Yes replies were given a 5, no replies a 1, and don't know replies a 3. Using this scale the three questions were added together. "Very secure" refers to those who answered yes or very secure to all three questions. "Not at all secure" refers those who answered no or not at all secure to all three of the questions. Those in between were split between "somewhat secure" and "secure." More detailed information about replies to the three individual security questions is available at www.cityof-seattle.net/tech/indicators/ data_collection.htm.

3   This report can be found at www.childrenspartner-ship.org/pub/low_income/index.html

4   Personal digital assistant, such as a Palm Pilot, Windows CE device or Handspring Visor.

5   Sharon Pian Chan "Internet Poll of Washington and Oregon Residents," *The Seattle Times,* 24 September 2000.

6   Our study did not measure the impact of the Internet allowing people to work at home, but other studies have begun to look at this. There has been other research done on Internet usage and its impact on personal time across the country. In analyzing the results of a survey of 4000 Internet users nationwide, researchers from the Stanford Institute for the Quantitative Study of Society were surprised by the degree to which people told them that they were working at home on the Internet for their employers, in addition to time spent at the office. Only 4 percent of Internet users working full or part-time said that they had cut back on their at work hours since gaining Internet access, while 16 percent said they were working more hours at home since gaining Internet access without cutting back at the office. An additional nine percent said that the Internet has increased both time at the office and time working at home Source: Norman H Nie and Lutz Erbring. *Internet and Society: A Preliminary Report.* (Stanford Institute for the Quantitative Study of Society) February 17, 2000. www.stanford.edu/group/siqss/ Press_Release/Preliminary_Report.pdf.

7

Partnerships and Resource Mobilization
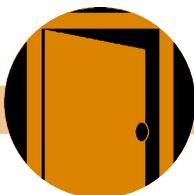
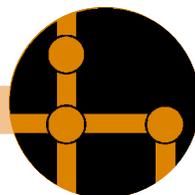**Access**   **Content**   **Diversity**   **Infrastructure**   **Literacy**

Problems are more likely to be solved when people work together, each contributing their unique expertise and unique set of resources to create a more powerful whole.

With this in mind, our community wanted to know how well segments of the city work together to develop a technology healthy community. To what degree have the private, public, educational and nonprofit sectors partnered? Are they strategically leveraging each others' resources towards closing the digital divide? What contribution does the information technology industry make to our city's community development? These questions led us to establish partnerships and resource mobilization indicators.

Unfortunately when we sought measures for these indicators, we were not able to collect sufficient data. However the concept is important and so merited some discussion and a placeholder for future data.

Private Sector Contributions

We know the private IT sector contributes time, materials and cash to community services, including activities which apply information technology to address social needs and help close the digital divide. In our initial project discussions, representatives of the Technology Alliance, WSA (Washington Software Alliance), educational institutions, community technology centers, the City of Seattle and others wanted to measure and recognize the tremendous value of these contributions by the information technology industry and individual IT professionals. Unfortunately, we found that while some individual companies could provide data on their corporate donations, there was no collective industry data available.

Measurement

Average number of volunteer hours contributed at each of six community technology centers in 2001[1]

496

Volunteers contribute a significant number of hours to community technology centers.

IT volunteers can bring needed skills and passion to an organization. For instance, Project Compute is a community technology center project at the Rainier Community Center that relies almost entirely on volunteers to teach basic and advanced computing projects to youth, adults and senior citizens. Black Data Processing Associates is a national organization of professional volunteers who provide mentorship and create exciting learning opportunities for youth. Days of service by Microsoft and others bring teams out into needy communities. Volunteers enable NPower to provide a tech check-up day for non-profits. Corporate volunteer projects and policies enabling paid release time create community capital and provide meaningful experiences for employees.

For these reasons, we sought to identify the number of IT companies that promote employee volunteerism and support it through paid release time. We found that this information has not been previously assembled and we were not able to reasonably gather the data for this report. However the question is going to be asked on future City of Seattle business surveys. Since our ability to collect this data is limited, we also strongly encourage the industry and professional associations to measure and publicize the value and impact of their contributions.

Every year a new study comes out about the digital divide, and every year it says it is getting worse. We all know it's there. It's getting worse because we keep talking about it, and very few people are doing anything about it. This doesn't mean that you all need to quit your jobs and start a non-profit. It does mean that you need to carve out a few hours a year of your time to give. If everyone does that we could make a real impact on our youth. If everyone put a drop in the bucket, we could fill the bucket.

—Trish Millines Dziko, Technology Access Foundation

Partnerships

Partnerships and strategic alliances contribute greatly to success in the corporate sector. The same benefits can be applied to developing the elements of a technology healthy community—fostering IT literacy and job training, attracting and retaining high tech business, ensuring access for all, and building a community IT infrastructure. Long-term partnerships and strategic alliances are especially critical for sustainability in tough economic times.

An index of partnerships would provide a measure of strategic use of resources. It could also provide a profile of our city's ability to attract federal funds and other investments in technology healthy development. However we found the same challenge here as we did trying to measure volunteerism; this is acknowledged

as important but has not previously tracked in any collective manner. Additional research that the City of Seattle is conducting on sustainable community technology centers will provide some data, but we are left to encourage future data gathering in this arena.

Government/Public Sector

Education

Private Sector

Community Based Organizations
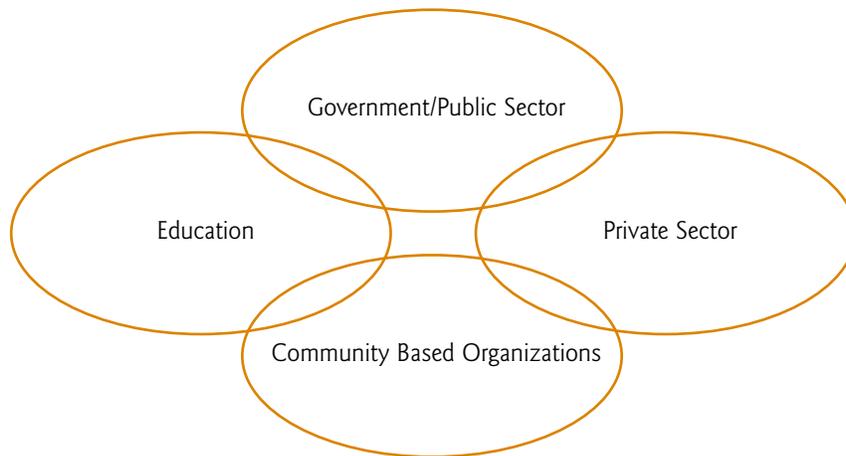
Partnership Profile: Seattle Jobs Initiative

The Seattle Jobs Initiative is a public private partnership formed to place low-income city residents in living wage jobs, support their retention and upward mobility and contribute to regional competitiveness by supplying employers with qualified workers and improving workforce development systems.[2] SJI initiated a high tech training program, starting with web content developers and designers, in 2001. The Seattle Jobs Initiative is made possible through a network of 31 partners. This includes 11 investing organizations, 6 training partners, 3 industry associations, and 11 community based organizations.

Partnership Profile: Seattle Community Technology Alliance

The Seattle Community Technology Alliance (SCTA) was created to link low-income and disadvantaged people to technology resources that increase their opportunities for lifelong learning, civic participation and access to cultural and community services.[3] The SCTA focused on development of community technology centers located in a variety of community centers, housing developments, schools and community based organizations. Seven sites were initially included. Each had great ideas and energy behind them, but did not have the leverage on their own to mobilize the resources needed to create sustainable programs. The project partners have included four diverse community based organizations, the Seattle Public Library and City of Seattle Department of Information Technology as well as the Parks and Recreation department, Seattle Public Schools, Seattle Housing Authority, the Seattle Community College District, University of Washington and five corporate partners, including Microsoft, Gateway, Millennium Digital Media, Cisco and AT&T Broadband. Together these partners committed $1.5 million dollars to match a $900,000 three-year grant received from the US Department of Education.

As a result of the resources brought together, SCTA community technology centers at seven sites were able to serve well over 3,000 users in 2001. The Seattle Community Technology Alliance and member community technology centers have also partnered with other organizations for job training services, youth tutoring, volunteer management training and other program activities. Each of these linkages supports the work of the partnering entity. The networking helps strengthen the capacity of participating community technology sites to be effective as individual business units and as a force for strategic and coordinated community technology and economic development. The SCTA has information measuring some of the impact of the work accomplished through these partnerships. Still, capturing the full impact of the partnership and benefits to future partners continues to be challenging for the organization.

The initial SCTA development project focused on a limited set of centers. In 2002, the partnerships and structure of the Alliance are being revisited as the Alliance moves past its initial funding commitments. Furthermore, other potential partners expressed interest in participating. The tracking of who participates over time and its impact could provide an indicator of the organization's effectiveness, community technology needs and the priorities of participating companies, organizations and government entities. This could be done in part by a measure of revenue generated by community technology centers (CTC's) through private donations, corporate donations, government funding, and earned income as determined by survey of CTC's.

Notes

1. Daria Cal, *Seattle Community Technology Alliance 2nd Year Performance Report*.

2. http://www.cityofseattle.net/oed/sji/

3. http://www.cityofseattle.net/tech/scta/

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City of Seattle Department of Finance—License Enforcement Unit

City of Seattle Department of Neighborhoods

City of Seattle Office of Economic Development

City of Seattle Personnel Department—Performance Resource Group

Disability, Opportunities, Networking, and Technology (DOIT) Program

King County Community Services Division

Municipal Court of Seattle

Northwest Policy Center

NPower

Puget Sound Regional Council

Seattle Community Technology Alliance

Seattle Public Schools

United States Department of Labor, Employment and Training Administration

United Way of King County

University of Washington Office of Educational Partnerships

University of Washington Admissions and Records Department

Washington Alliance of Technology Workers (WashTech)

Washington State Board of Regional and Technical Colleges

Washington State Employment Security Department, Labor Market and Economic Analysis Division

Washington State Higher Education Coordinating Board

WSA

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