The Digital Divide – are we ready to breach the chasm?

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Friedman in his 2005 epic book "The World is Flat" argues that convergence of personal computer with fiber-optic micro cable, along with the rise of work flow software, will have a flattening effect on world commerce and trade. It will create a level playing field, where developing economies will be able to compete with developed economies on even terms, leveraging converged Information & Communication Technology (ICT). However critic of Friedman, including noble prize winning economist Joseph Stiglitz were critical of Friedman's book. In "Making Globalization Work" Stiglitz writes: "Friedman is right that there have been dramatic changes in the global economy and global landscape; in some directions, the world is much flatter than it has ever been, with those in various parts of the world being more connected than they have ever been, but the world is not flat. Not only is the world not flat: in many ways it has been getting less flat." The reason for this is the worldwide "Digital Divide" that is being manifested by the rapid deployment of ICT. The digital divide is an inequality or gap between groups, broadly construed, in terms of access, use and knowledge of ICT. Not only is this divide widening between developed and developing economies, but is also manifest within a developed economy like US. This divide is visible within the US population when one analyses usage of ICT against factors such as education and income levels, age, sex and race.

Digital Divide- What are we talking about?

Access to technology is access to knowledge. No nation can prosper with inadequate access and familiarity about it, by its citizen. An inequitable distribution of digital resources is a mammoth hindrance to a nation's inclusive growth plans. The US Department of Commerce in all its wisdom recognized this early and started as far back as 1995 to take a closer look at the disparities in access to telephone and computer use by its citizens."Falling through the Net: A survey of the "Have Nots" in Rural and Urban America", a report produced by the National Telecommunications and Information Administration (NTIA) gained new insights about the "information disadvantaged", with a view to empower them in the future. One of their observations was the most enthusiastic users of on-line services were from the most disadvantaged groups. Low income, minority, young and less educated computer households engaged actively in searching for employment, taking educational classes and accessing government reports, online. The concept of digital divide started off by being defined as this disparity in internet access between rural and urban areas of the United States of America.

Broadly, there are three types of digital divides that are not necessarily between those with access and those without because of economic reasons. They include those that can be active creators and distributors of information and those that can only be consumers. This new distinction points to the varying degrees of skills within the same group and is completely independent of access. It gives rise to a digitally literate group of technically savvy elite with better problem solving skills and a superior ability to deal with information. Sixty Six million Americans are without these basic digital literacy skills of effectively and critically navigating, evaluating and creating information using a range of digital technologies.

Digital Divide- What is the current status in US?

Since June 1995, internet adoption amongst American adults has grown from 14% to 74% as of August 2011. But its usage, as in the past, still remains strongly correlated to age, education and household income.

- 86% of groups earning $75K and above prefer to go online wirelessly as compared to 50% from groups earning less than $30K. The broadband penetration at home for the same income groups show a wider gulf, 89% to 41%.

- 45% of all Americans own a smart phone. As of April 2012, 55 percent of adult cell phone owners accessed the Internet from their phones. Half (51%) of African-American cell internet users do most of their online browsing on their phone, double the proportion for whites (24%). Two in five Latino cell internet users (42%) also fall into the "cell-mostly" category

- 82% of people having a college education have online access as compared to 36% with no high school diploma.

- 94% of people aged under 30 use the internet while only 41% of those above 65 use the internet.

- Currently one-third of Americans do not subscribe to broadband services at home and more than 60 million Americans lack digital literacy skills, which are the basic skills needed to use a computer and the Internet.

Economic Divide: Due to people being unable to afford ICT investments

Usability Divide: Far worse than the economic divide is the fact that technology in its simplest form remains so complicated that many people cannot even use the available technology. Literacy levels pose the biggest challenge to ICT access. Nearly 40% of population has lower literacy rate.

Empowerment Divide: Participation inequality exists. In social networks 90% of the community, do not contribute, 9% contribute sporadically and a tiny minority of 1% account for most contribution.

Types of Divide

These are extremely significant statistical data strongly underlining the deep digital chasm prevalent in American society today. Over the last decade, traditionally weaker sections of society like the Hispanics (28% jump) & African Americans (36% jump) are embracing the internet as quickly as the white (31% jump) populace, but their final percentage still remains much below desired levels. The digital divide today is less about who has access to the hardware and more about who has access to information and can leverage it for knowledge creation and problem solving.

Major factors contributing to the Divide

Broadband affordability and access a key cause for Digital Divide. The U.S. Census Bureau reported that 43.6 million (14.3%) Americans were living in absolute poverty in 2009. The national poverty rate rose to 15.1% in 2010. A wired high-speed internet plan providing multimedia services like video-on-demand, internet classrooms and business meetings cost close to $100 a month. This is economically unviable for millions of Americans. Most dial-up internet user find the cost of switching to broadband at current costs, unjustified. Cable companies providing high-speed broadband have to bear the cost of infrastructure and have very little incentive to venture into rural areas or poor neighborhoods, where economies of scale would be inapplicable. The relative high cost of technological services is prohibitive for residents of these communities and the service provider's complicate plans, long-term contracts, further add to their woes. The above results in significantly lower than 60% of rural households having broadband, lagging urban households by close to 10%.

Apart from affordability, the most prominent reasons behind usage of home broadband revolve around age, household income, disability, ethnicity and level of education attainment. Adoption levels of 22% for adults who have not completed high school, 30% for seniors aged 65 and older, and 41% for those who live in households making less than $30K per year. This is compared with 85% of college graduates, 76% of adults aged under 30, and 89% of those making at least $75K per year.

One in 4 adults in the United States live with disability and 54% of adults living with a disability use the internet as compared to 81% of adults without a disability. 62% of all Americans have high-speed internet access at home, including 66% of whites, 49% of African Americans and 51%of Hispanics.

Home broadband demographics

% of American adults age 18+ who have a high-speed broadband connection at home, as of August 2011.

	% who access the internet via broadband at home
All adults (age 18+)	**62%**
Men	65
Women	59
Race/ethnicity	
White, Non-Hispanic	66
Black, Non-Hispanic	49*
Hispanic (English- and Spanish-speaking)	51*
Age	
18-29	76
30-49	70
50-64	60
65+	30
Household income	
Less than $30,000/yr	41
$30,000-$49,999	66
$50,000-$74,999	81
$75,000+	89
Educational attainment	
No high school diploma	22
High school grad	52
Some College	73
College +	85

* All differences are statistically significant except for those between the rows designated with an asterisk.

Source: The Pew Research Center's Internet & American Life Project's August Tracking Survey conducted July 25-August 26, 2011. N=2,260 adults age 18 and older, including 916 interviews conducted by cell phone. Interviews were conducted in both English and Spanish.

Paucity of STEM education is another major cause of the Digital Divide. The Information Technology & Innovation Foundation (ITIF) Atlantic Century II report, published in July 2011, ranked the United States fourth in innovation-based competitiveness. Manufacturing jobs continue to decrease, while science, technology, engineering, and math (STEM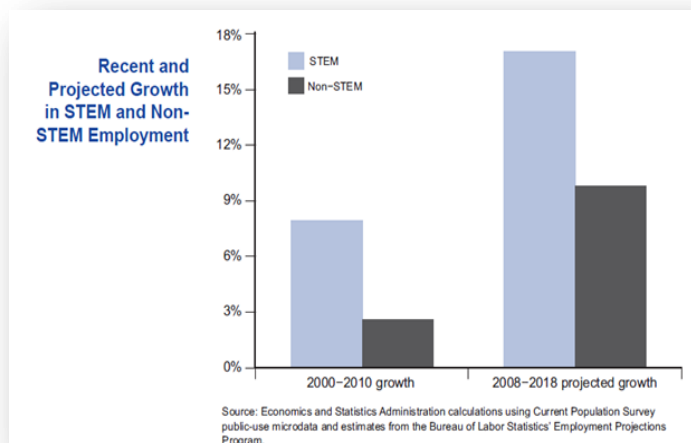) jobs grow at a faster and faster rate. According to a recent U.S. Department of Commerce report, employers increasingly seek employees with "knowledge of mathematics, computers, and electronics." It has also been established that people with STEM education are in the majority, creating content and knowledge on internet. STEM education as such is the other key factor that can go a long way to bridge the digital divide.

Reasons people do not have broadband at home

In April of 2009, 7% of American adults age 18+ used dial-up internet at home. (As of August 2011, this number is 3%.) These are the reasons they gave for not switching to broadband.

What would it take to get you to switch to broadband?	% of dial-up users
Price must fall	35%
Nothing would get me to switch	20
Don't know	16
It would have to become available where I live	17
Other	13

Source: Pew Internet & American Life Project Survey, April 2009.
More: http://pewinternet.org/Reports/2009/10-Home-Broadband-Adoption-2009.aspx

Increasing the engagement of underrepresented minorities and females in science, technology, engineering, and math (STEM) fields is currently a critical challenge facing the US education sector. Recent analysis found that young women and young people from lower socio-economic backgrounds are less likely to pursue studies in STEM fields. The section of society, which is not favorably disposed towards STEM education, must be motivated to pursue the stream. They should see the benefit of STEM education and develop ownership. To make the program user friendly, it should be project based and provide hands-on experience. In recent years, many technological interventions have surfaced, such as virtual worlds, games, and digital labs that aspire to link young people's interest in media technology and social networks to enhance learning about STEM areas.

The Obama administration also has paid significant attention to the troubling signs of American students' performance in mathematics and science, especially in response to the Program for International Student Assessment (PISA), whereby American students ranked significantly lower in science and math literacy compared to their counterpart students in other developed countries. The most recent PISA results showed that American students ranked seventeenth out of thirty-three in science literacy and ranked twenty-fifth out of thirty-three in math literacy among students in developed countries.

Recent and Projected Growth in STEM and Non-STEM Employment

Source: Economics and Statistics Administration calculations using Current Population Survey public-use microdata and estimates from the Bureau of Labor Statistics' Employment Projections Program.

It is estimated that more than 4 million jobs are available in US for people having STEM education. At a personal level, familiarity with computers and technology has a big impact on a student's future. Half of today's jobs require technology skills, and that is expected to increase to 77 percent in the next 10 years. Students without home access to computers and the Internet are 6–8 percent less likely to graduate, have a lower academic performance, and have a lower lifetime earning potential.

Bridging the Digital Divide

The *Global Information Technology Report 2013* presents a country/economy profile summarizing an economy's performance in the various dimensions of the Networked Readiness Index (NRI). NRI can also be construed as an index of effective ICT deployment. The index is measured on ten dimensions on a 1-7 scale. Most of the ten dimensions have a positive correlation with effective ICT deployment for inclusive growth. This in turn is a direct contribution towards bridging the digital divide within the country.

Finland is ranked 1 on the NRI index while USA comes in at number 9. It is evident that US needs to play catch up primarily on the political and regulatory environment, infrastructure building and skill sets enhancement. The policy makers in US have a significant role to play to improve performance on most of the dimensions and bridging the divide.
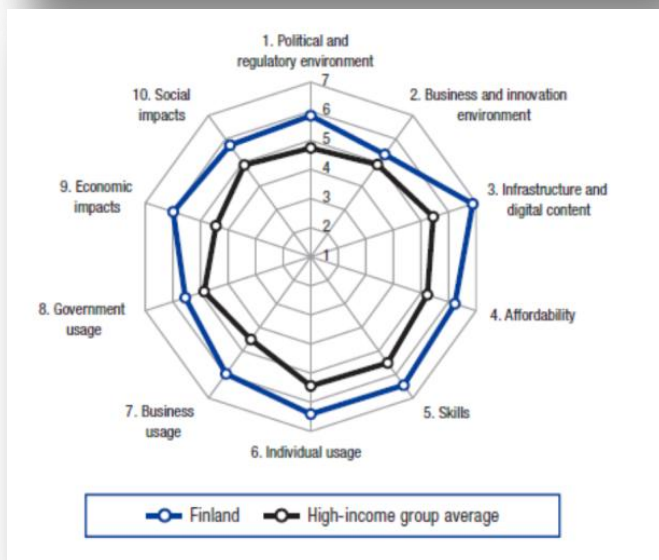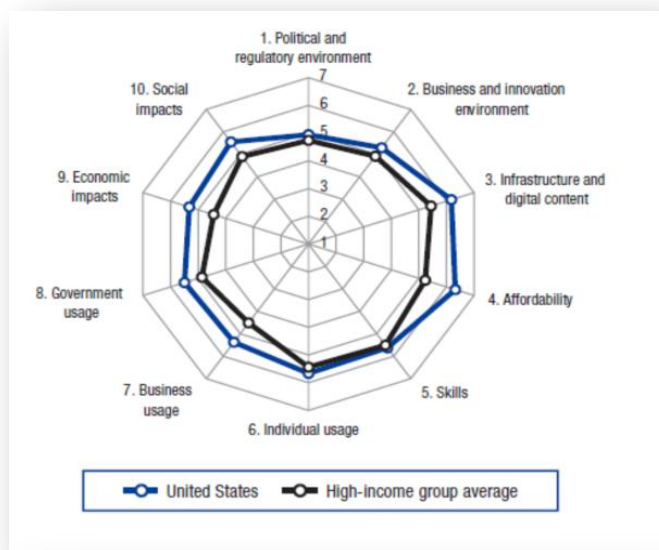
Formulate Effective Broadband Policy

Broadband networks are a part of national infrastructure that plays a vital role in bridging the digital divide and increasing a nation's competitiveness. The government plays a pivotal role in the rollout and deployment of telecommunication services. Frequency allocation is a scarce natural resource and its allocation, deployment and pricing should be guided with the sole objective of meeting the public needs. The government policy plans in US have changed focus over time. Plans produced between 2002 and 2006 generally tended to focus on ICT's. Policies after 2006 focus on universal access and services explicitly through broadband. The policies must address all dimensions that enhance digital divide.

Telecommunication Reform 2012 listed out few salient features of broadband plans, with a view to narrow the digital divide:

- Plans should be cross-sectoral and specific to the needs and economic stature of the country.

- It should be developed in consultation with a broad range of stakeholders emphasizing an important role for public-private partnership.

- Due thought should be given to supporting development of human skills, literacy and demand among schools and small and medium sized enterprises.

Plans should look forward over a timescale of 5 to 10 years, as it is difficult to predict technological evolution over longer time horizons.

The US National Broadband Plan

The Federal Communications Commission (FCC) in March 2010 delivered the Broadband Plan to Congress to help Americans harness its potential. Since the release of the Broadband Plan, the FCC launched a number of programs towards its implementation. These programs are the Connect America Fund, which addresses universal service; a Mobility Fund for funding mobile coverage in unserved areas; the reformed Lifeline program for low-income Americans; and Connect 2Compete to connect low-income students. The FCC freed up additional spectrum for both licensed and unlicensed broadband. It also seeks to make 25 MHz of spectrum available and will launch the world's first incentive auctions to repurpose broadcast spectrum for mobile broadband.

Government Initiative to Spread Digital Awareness

A unique way of spreading digital awareness is to make the whole experience fun and engaging. Constituents interact with government in multiple ways. Some do it in person, others by attending meetings, others by telephone, email or on the Web. Some of the visionary cities and counties have initiated inclusive programs to help its stakeholders and citizens participate in decision related to various programs. Salt Lake City's Open City Hall(OCH) allows the public to participate in an online discussion of issues and topics which provide information to administrators and elected officials for consideration in the decision making process. SpeakOutSLC lets people post ideas. Due to the rampant use of smart phones and cell phones, Alex Yule on the team of Code for America developers came up with Textizen, which uses text messaging to bridge the digital divide and gets citizens engaged in the municipal planning process. Salt Lake City has adopted Textizen to help its planning process.

- **Service Availability**- Service available through the use of ICTs should be affordable and widely available to all who might wish to make use of them
- **Awareness** - Everyone must be made aware how they can leverage ICT for their own benefit
- **Opportunity –** All must have opportunity to attain computer literacy and use new media
- **Mastery of technologi**es- Everyone understands which tools are best suited for which tasks.
- **Experience** - Everyone is able to accumulate sufficient experience with the use of ICT to enable them to fully exploit their potential.
- **Skills-** Everyone has the right skills for performing ICT related tasks.
- **Support**- Everyone has access to appropriate assistance when they need it to help them make good use of ICTs.
- **Attitudes (motivation**)- Everyone is encouraged to participate in the sharing of benefits available from equal access to ICTs.
- **Content-** Sufficient content is available to enable everyone to gain benefits from ICTs.
- **Cultural**- Content delivery should be adapted to suit the cultures of all potential users.
- **Disability**- It should not be a hindrance to equal enjoyment of the benefits of ICTs.
- **Linguistic**- Language should not be a barrier to equal enjoyment of the benefits of ICTs.
- **Gende**r- Gender is not a barrier to equal enjoyment of the benefits of ICTs.
- **Empowerment of civil society-** Structural, political, and governance factors should not impede equal enjoyment of the benefits of ICTs.

Dimensions of Divide

Textizen

According to Code for America, more than 40 percent of Philly residents do not have access to high-speed internet at home. But the Centers for Disease Control research reveal that more than 90 percent of city households have cell phones with text-messaging capability. Textizen was Philadelphia's answer to narrowing the digital divide. Neighborhood-specific questions were posed via colorful posters in public places like bus shelters, along with instructions as to how citizens can make their voices heard. Since the program's launch in Philadelphia, multiple government agencies, nonprofit organizations and citizens, have adopted the platform in their respective communities.

Dutchess County, N.Y., posted its budget survey, after an extensive outreach effort using Twitter and Facebook, after receiving feedback from constituents and used them for budget deliberations. They have designed apps for feedback so constituents would know and be comfortable with its use year round and not just during budget season.

Give Us a Gig

Give Us a Gig, a community-driven initiative to maximize the impact of Google's 1-gigabit fiber build-out could have in and around Kansas City. It is a broad-base effort consisting of education, engagement and advocacy components, door-to-door outreach, neighborhood organizing and community events in the disadvantaged areas, driving up internet adoption. Give Us a Gig partnered with locally based crowd funding site Neighbor.ly, to help raise money for the effort.

Most leading-edge cities have launched a mobile app for access to city information and services. These include MetroCall 311 in Louisville, Boston's Citizen Connect and Riverside's 311 Riverside Resident Connect. Boston and the state of Massachusetts collaborated to expand the Boston app, now called Commonwealth Connect, to 138 other cities in the state. Washoe County Sheriff's Office state-of-the-art Web visitation solution iWeb-Visit allows families to visit an inmate from home using a computer with high-speed internet and a webcam. The sheriff's office charges $9 per video and saves money by reducing staffing to oversee the visitor's room.

JobScout

As a part of a digital literacy effort called iCALIFORNIA, the California State Library funded an $800,000 project called JobScout. The Web and mobile learning platform, which uses gamification elements, teaches Californians basic skills to help find a job in a virtual world. Users play the role of a "scout" on a digital literacy "trail." Through a partnership with the California State Library, the Link Americas Foundation and JobScout's parent company, TRAIL, the platform was developed and released in late 2011.

Embrace STEM education

Inability to integrate technology into the daily lives of students and to use it to further education and increase educational opportunities, has been one of the challenges to reduce the digital gap. It is important to embrace STEM education at the school level and motivate students to sign up for STEM by making the programs interesting and relevant.   There needs to be a comprehensive, organizational attempt at training teachers in order to successfully use technology to improve student learning. At present, in most schools, technology is not part of the way teachers and administrators work. When teacher's report cards, teacher evaluation   systems, and teaching tools are mainly paper-based, it is not surprising that computer and Internet are not the first tools that educators consider for teaching in the classroom. Making technology, a central and regular part of teachers and staffs' daily experience provides them with the technical knowledge and skills to use in the classroom. It gives teachers a familiarity and comfort level with technology that makes it a natural choice when evaluating teaching options. Schools and districts that have successfully integrated technology into their teaching and learning processes must hire trained staff to maintain their computers to allow teachers to focus on how computers can be used in teaching and learning, enhancing the existing curriculum, and preparing students for success in the digital age. Helping teachers move seeing the Internet as a research library towards its dynamic and integrative aspects is critically important to further STEM education.

At the national level, there are scalable initiatives that have begun taking shape in addressing the above-mentioned issue. The National Science Foundation (NSF) has been instrumental in spurring innovation of tools and capabilities that provide and maintain cyber infrastructure to enhance STEM educators' capabilities and productivity. In its Strategic Plan for Fiscal Years 2011–2016, NSF has clearly indicated its intention to invest in innovative learning tools that emerging technologies developed from partnerships among scientists, educators, and engineers. As a result, NSF has articulated many funding programs, such as Cyber learning, Transforming Education, Discovery Research K–12, Transforming STEM Learning, Informal Science Education, and others.

President Obama launched the Educate to Innovate campaign, which detailed some tangible initiatives to increase STEM literacy overall and expand STEM education to underrepresented groups. For example, Educate to Innovate promoted initiatives to create video games for science learning, community involvement in science teaching, and media campaigns to motivate students to pursue science.

At a micro level—for example, in schools, libraries, classrooms, and homes—research suggests that young people can engage in STEM via numerous pathways. Technology and media play a large role in the ways that young people can connect to STEM learning. For example, researchers are creating virtual worlds and games that leverage young people's interest to learn science concepts. Foundations are creating digital labs in public libraries to teach young people media literacy skills. Researchers are also beginning to find that young people engage with scientific practices via their participation in everyday digital media. It has been observed that "World of Warcraft" players exhibit numerous scientific practices, such as systems thinking, model-based reasoning, and social knowledge construction, as they collaboratively solve problems in the online game. These initiatives and research programs combine to suggest that media, technology, and social networks may help convert young people's everyday interests to meaningful STEM learning.

Conclusion

Tackling the digital divide needs to be a three-pronged coordinated approach led by private enterprises, non-profit local organizations and government agencies, both at the state and federal levels. The gap can be significantly narrowed by proactive participation of government machinery. An infrastructure impetus towards a rollout of broadband in rural communities with a renewed focus on making the most of the government services online and teaching fundamental STEM programs in school, using multimedia and through games would go a long way to narrow the divide. Migration of essential services like identity cards, passport applications, government subsidies and benefits online would be the greatest motivator for using the internet. At the local level strong ties with the church, Non Government Organizations and other religious organizations which work in close tandem with the economically challenged and the various ethnic communities would give a further boost to internet proliferation and usage, leading to closing of the digital chasm.

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