

SUSAN NESS
2010 L'Hommedieu Visiting Lecturer

**MAKING THE CONNECTIONS: IS TECHNOLOGY AN OPPORTUNITY OR
OBSTACLE TO WOMEN'S GLOBAL ADVANCEMENT?**

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INTRODUCTION

Thank you, Dean Harriet Davidson. And thank you, Paige and Nicky L'Hommedieu, for sponsoring this lecture series.

It is a pleasure to be back at Douglass College, where I received my undergraduate degree forty years ago. It was then – and continues to be now – at the forefront of training women leaders.

Reminiscing on my four years at Douglass, it was a time of transition -- from the more socially refined role of young women in the early '60's to the more social activist role of young women in the late '60's. We had an 11:00 pm curfew at Douglass, which was enforced. And we had to wear a skirt to dinner. So -- we left our ugliest skirt on the porch of Cooper Dining Hall. And every evening, we threw it over our jeans as we entered for dinner.

And then there was my last semester at Douglass...1970 was a tumultuous time. University campuses across the country were in an uproar over the U.S. invasion of Cambodia, expanding the Vietnam War. Douglass held peaceful teach-ins, organized by a committee of faculty, the Administration and students. Classes were cancelled for the remainder of the school year.

We had a military draft back then, and our Rutgers brethren – and back then they were *all* brethren on the New Brunswick campus -- were sweating out which draft numbers would pop up on the lottery ping pong balls.

Much has changed since then. Our colleges have changed. The military has changed. And women's role in society has changed.

But throughout America and across the globe, we are witnessing right now the greatest transformation *ever* of our economic, social, and political worlds -- all triggered by the revolution in technology. It embraces everything.

Women and technology are inexorably connected – as users and as innovators -- here at home and in the developing world. What are the connections between women and technology and how has each transformed the other? And has technology helped or hindered women's advancement?

That is what I want to explore with you this evening. Let me set the stage.

I. HOW HAS THE ROLE OF WOMEN CHANGED?

New York Times columnist Nicholas Kristof recently observed that in the 19th century the great moral imperative was the fight against slavery. And in the 20th century, it was the fight against totalitarianism. In the 21st century, it is the fight for women's equality.

The outlook for women today is vastly different from 1970, when I was graduated from Douglass, and even from the women's rights decade that followed.

In 1981, I remember testifying before Congress on behalf of the National Women's Political Caucus at the confirmation hearing of William French Smith, the nominee for U.S. Attorney General. I was on a panel of women's organizations testifying against his membership in two powerful clubs that excluded women. At the end of our testimony, Senate Judiciary Committee Chairman Strom Thurmond, smiled at us and said, "You are the prettiest witnesses to appear before me in a long time. Are you married? If not, you could be if you wanted to be."

I doubt that would happen today.

Over the past forty years, we have seen progress for women in terms of college enrollment and university leadership. There have been great strides for women in the workforce and on the judiciary, but only lackluster progress in the number of women at the helm of corporations or in statehouses or in Congress.

In education, women now comprise 57% of students graduating from US colleges, thanks in part to Title IX. In the fields of law and medicine, women often are the majority of their graduating class. But women are only 20% of the graduates in computer science and engineering.

In 1970, few women headed universities. Today, women preside over top tier institutions such as Brown, Harvard, MIT, Penn, Princeton, and the University of Virginia.

Globally, women's access to education has improved significantly. According to the World Economic Forum's annual study on The Gender Gap, for many nations, the percentage of women with college or advanced degrees now *exceeds* that of men. The literacy rates for young women historically trailed men by 30% -- today, they are within single digits in many countries -- although we have a long way to go in many others.

Women are also gaining traction in the workforce. According to the *Center for American Progress*, women are now 50% of the U.S. labor force, up from 38% in 1970. And 40% of mothers (including single moms) are primary breadwinners in their families. The Center notes, however, that our workplace and social systems have not kept pace with these economic shifts in the status of women.

Women are making a difference inside corporate America. Several studies have underscored that companies that consistently promote women to leadership positions throughout their operations exhibit greater financial success over time.

According to the *National Center for Women in Technology*, a study of 100 work teams at 21 companies found that teams with equal numbers of women and men were more likely to experiment, more likely to be creative, more likely to share knowledge, and more likely to complete tasks than teams of any other composition.

A *Catalyst* study found that Fortune 500 companies with more female board members were more profitable than those with fewer or no women. Sadly, however, the percentage of women in the corporate executive suites and in the boardrooms has barely budged.

Even the popular press is heralding women's economic power: Reporting on a study by the Boston Consulting Group, *Newsweek* observed that women are the "real emerging market" in the world. Although a huge gap in total income persists between the genders, the BCG study showed that women's incomes are rising more rapidly than men's, and are poised to fuel the post-recession world economy.

So...Global leaders are finally recognizing how important the less visible half of the population of our planet is to the economic security of the world. They recognize that an investment in women is the *best* investment, because women – more so than men – plow their funds back into their families and their communities. This is especially reflected in the field of micro lending, where 80% of the loans are now going to women.

At long last, women are the focus of major policy initiatives – at the World Economic Forum, at the Clinton Global Initiative, at the Center for American Progress, at the UN Foundation and at the GSMA World Conference.

A "consensus" has formed – and, hallelujah, not just among women, but also among men -- that women's economic empowerment really matters.

II. HOW HAS TECHNOLOGY CHANGED?

While the last four decades brought monumental changes in the role of women, the pace of change in technology was even faster.

Back in the late 1960's, technology was uncomplicated. We listened to the Beatles on our portable record players and audio cassette recorders. Our other technology tools included portable typewriters and one pay phone on every dorm floor. It wasn't until after the '60's had ended that we had calculators. And we were oblivious to the fact that the Internet was launched in 1969, when ARPANET, a joint project between the federal government and research universities, linked two computers at UCLA and Stanford.

Fast forward 25 years to 1994, as the dot.com revolution was emerging, and I was sworn in as a commissioner of the Federal Communications Commission. The World Wide Web had just launched and the Internet went from a government and university network to a commercial network. Only two cellular phone companies were licensed in each market. Those clunky phones were mostly installed in cars and weighed around four or five pounds.

When I took office in 1994, there were seven regional Baby Bells that had been created by the 1980's breakup of AT&T. Telephone and cable service were regulated as natural monopolies; DirectTV was about to launch. Television and radio were broadcasting with an analog signal. Cable modems were beginning to connect a handful of subscribers to the Internet. America On Line was a fledgling dial-up service. And the FCC dusted off the old military draft ping pong ball lottery machine and used it to award mobile phone licenses.

During my seven years on the FCC, we ushered in the transition from analog to digital for most forms of communication. We authorized digital cell phone service, the digital TV standard, and satellite and digital radio. And we introduced local market competition for cable and telephones. Our E-Rate program provided subsidies to connect school classrooms and libraries to the Internet. We proclaimed that we would keep our regulatory hands off of the Internet... And we established auctions to replace the ping pong ball lottery for awarding wireless licenses.

We had found the entry ramp onto the information superhighway. But we were driving in first gear compared with what was about to happen.

We began to see the manifestations of Moore's law – that the processing power of a computer chip – relative to its price -- doubles every two years. Technology also has chipped away at the size of chips, has driven down data storage cost, and has boosted battery life.

A 1.3 megapixel camera that cost \$13,000 in 1991 is standard on today's mobile phones and is given away for free. Hard drive storage per gigabyte went from \$9,000 in 1990 -- to \$15.00 in 2000 -- to 9 cents in 2010.

We went from mainframe computers to PC's to laptops to netbooks, and now iPads and smart phones. These evening bag-sized devices are voice and texting vehicles, watches, alarm clocks, online search centers, keyboards, MP3 players, calendars, address-books, cameras and video recorders, GPS navigators with turn by turn directions, dictionaries, foreign language translators, video game players, televisions, newspapers, and entertainment centers – all rolled into one. Just about the only thing they can't do is make coffee – and Starbucks is working on that app.

A cornucopia of independent websites and applications sprang up to meet the insatiable global demand for information – and connection. And for the first time, companies competed to connect the world's population to the Web and to each other.

III. TECHNOLOGY HAS TRANSFORMED BUSINESS, SOCIAL INTERACTION, AND POLITICS

What has resulted from all of this technological change?

Technology has transformed the commercial world: The new economy has spawned new business models that have opened up global markets to businesses and consumers alike. Many

net based businesses deal directly with consumers, eliminating the middlemen. Or they provide free services to amass a gargantuan base of users, whom they then entice with premium services or flood with banner ads.

For example:

- **E-Bay** enables consumers and businesses alike to sell their new and used treasures directly to a global public. The company provides the technology and collects a small fee per transaction. Over 25 million businesses have established outposts on E-Bay, and one million people actually make their living off of the service.
- **Craigslist** was founded in 1995 by a mild-mannered computer programmer who wanted to give his Bay Area friends a listing of upcoming events. Craigslist offers free classified ads and community forums in 700 cities in 70 countries. With just 31 employees, Craigslist posts 50 million new classifieds per month and has over 20 billion page views a month.
- And, **Google** – the 800 pound gorilla of the new economy – It’s only 12 years old. Google now runs over one million servers in data centers worldwide, processing over one billion search requests and twenty petabytes of user-generated data -- every day. What is a petabyte? Suffice to say it is a really big number!

Most of Google’s services – search, G-Mail for 175 million users, Google Maps and YouTube -- are free. Its profits flow from online advertising products.

Google’s awesome power comes from its ability to instantaneously sift through humongous amounts of information across the web. For example, its massive data base and algorithms enable it to translate voice and text instantaneously into 52 languages -- with surprising accuracy.

As you can see, technology is connecting the world. Today, a quarter of the world’s population accesses the Internet. That access increasingly is through their mobile phones.

Today, 4.6 *billion* people have mobile phones – that’s two thirds of the world’s population. The growth rate of mobile phone users is staggering. In just the last eight months alone, subscriptions rose by half a billion people. Remember, digital mobile phones have only been around for about fifteen years! This is the most rapidly and widely adopted technology -- ever.

And Technology is a key driver of the global economy. A study by the London School of Economics concluded that just a 10% increase in mobile phone penetration results in a half percent growth in a nation’s GDP.

Cloud computing is another innovation that is accelerating the pace of change. The “cloud” is the geek word for the Net. With cloud computing, your computer programs and data reside on the net, rather than physically installed on your computer. A company can access the most sophisticated programs for its operations for a fraction of the cost of ownership, and do so from anywhere with an Internet connection. It reduces barriers to entry for smaller firms – often

female owned – so that they can compete with established players. We have only just begun to see the impact of cloud computing.

Technology also has transformed social interaction. Social networks – founded only five to seven years ago -- connect millions of people around the world and have transformed how we work, play, and are governed.

- Launched just six years ago, **Facebook** has over 400 million users – that’s one and a half times the entire population of the United States. 70% of Facebook users live outside the US. Women are the majority of its users -- but there are no women on Facebook’s board.
- And then there is **Twitter**. Who ever knew that 140 characters could be so powerful? Twitter was launched in 2006, and today is the 3rd most popular social networking site in the world. Women comprise 57% of Twitter users.
- **YouTube** was launched five years ago. Remember the Britain’s Got Talent singer, Susan Boyle? The video of her performance was watched a whopping 89 million times.
- And, **Skype**, which was launched in 2003, does what AT&T failed to do years ago – deliver a ubiquitous and clear video phone connection. And, unlike AT&T, Skype offers its service for free if you are connecting to another of its 521 million users.

Technology also has transformed political and civic participation at home and abroad. Technology has become *the weapon of mass communication*.

The internet and the mobile phone are powerful tools for organizing, for fundraising, and for disseminating messages.

The Obama presidential campaign illustrates the effectiveness of the new age technology. By collecting small contributions from millions of people online, the Obama campaign raised enough money to enable it to opt out of federal funding for the general election. And its online community organizing is now the gold standard for campaigns on both sides of the aisle.

But the impact of technology is, perhaps, even greater abroad.

Take Haiti. Information technology has played a crucial role in the rescue efforts in the aftermath of the earthquake. Within hours, the State Department helped private sector partners set up a “text HAITI” campaign. In just one week, the Red Cross raised over \$22 million for recovery efforts from millions of people, each texting \$10 on their cell phones. The tech community also set up interactive maps to target resources where they were most needed.

And a week after the quake hit, a seven year old girl and two women were pulled from the rubble of a collapsed supermarket by a search and rescue team responding to their text message for

help. There is now talk of replacing Haiti's destroyed wired telephone system with a completely wireless one.

In politically oppressed countries, texting, tweeting, and Facebook, have been the weapons of choice for grassroots organizers -- with astounding results:

Take Moldova. Last spring, a group of young adults began talking among themselves about the recent election that they viewed as fraudulent. Then, through texting, Facebook, blogs, and using a Twitter tag to pinpoint the main square in the capital, a group of 10,000 protesters suddenly appeared from nowhere to force a recount. Cell phone videos were uploaded to YouTube and streamed by a Romanian TV station. When the authorities turned off the cell phone coverage, the protesters used Twitter to get their message out to the world.

Take Iran. Who can forget the shocking video of a young woman gunned down by the police – a video taken on a cell phone – a video uploaded to YouTube that instantly became a rallying cry of the Green movement?

Twitter had become such a critical tool during the Iranian election protests, the State Department persuaded the company not to shut down for its regularly scheduled maintenance. The U.S. government is now revising its prohibition on information technology exports to Iran so that progressive Iranians will have the ability to circumvent government censorship.

Take Kosovo. In the days after Kosovo declared its independence in 2008, the nation's leaders created a public forum for input into the new constitution. The forum included very few women, and rural women were left out entirely. Hamide Latifi of *Women for Women* fought to expand the forum. The authorities finally relented, but gave her less than 48 hours to mobilize women in rural areas and transport them to the forum site. Hamide and her team used their mobile phones to contact rural women across the country; 250 appeared. Because of their participation, a gender equality provision was included in the new constitution.

From these examples it is clear that repressive governments have less to fear from citizen access to censored information than they do from technology that enables a citizen to send a message instantaneously to thousands of other citizens.

These are the connections that make social networking and technology so powerful.

IV. THE CONNECTIONS BETWEEN TECHNOLOGY AND WOMEN

So what are the connections between women and technology? And how has each transformed the other?

Women are major consumers of technology in the United States. During the mid-90's, there were significant gender differences in computer and Internet usage, but those disparities have disappeared.

Globally, surveys show that most social networking sites have more female than male users -- except, of course, for tech sites, such as *Slashdot*, which are overwhelmingly populated by men.

Women play online video games as much as men do, although the choice of games is different. Not surprisingly, men frequent more violent game sites, while women flock to social games like *FarmVille*.

FarmVille is a farm simulation game on *Facebook* that attracts 80 million players a month (the equivalent of the population of Germany). Sixty percent are women. Players plant, grow and harvest crops and raise livestock. The virtual world mirrors reality. In the *real* world, most of the earth's food is grown, harvested, stored, and prepared by women, often under backbreaking conditions. And by the way, they don't get to own the land – their husbands and sons do.

In the developing world, mobile phones have become a vital tool for women. These basic devices: (1) help women to obtain work; (2) help women to negotiate better prices for their products; (3) help women to improve literacy; (4) help women to access lifesaving health and safety information; and (5) help women feel more independent and secure.

These low end phones cost \$15 to \$20, and prepaid metered service costs a few dollars per month.

- ***In India***, the Self Employed Women's Association members get valuable commodity pricing and harvesting data on their mobile phones. That empowers them to get better prices for their goods. Without the phones, women were at the mercy of a single buyer or had to travel long distances to sell their products. SEWA is adding an interactive voice response to the cell phone service to help women who are illiterate.
- ***In Uganda***, female entrepreneurs are getting microloans for a Business in a Box – a kit that includes a phone and solar panels for a mobile phone charger. In villages where there is no reliable electricity, women offer battery charging as well as phone service.
- ***In Kenya***, Vodafone offers M-Pesa, which is a mobile banking system. Most people have mobile phones, but very few have bank accounts. Women use their mobile phones to safely send money back to their family or to collect payments for their produce. When the service was launched, Vodafone aimed for 200,000 mobile banking customers by the end of its first year; it reached 200,000 customers by the end of its first month.
- ***In Senegal***, a wonderful organization called Tostan uses texting on mobile phones to teach literacy and math to young women.
- ***In Zambia***, a cell phone enables a mother to check if the doctor is in before she carries her sick child for three hours to the doctor's village; and
- ***In Malawi***, organizations are using SMS to train midwives to give pregnant women the health information they need.

A simple mobile phone can make an extraordinary difference in a woman's sense of self-worth and security. A recent *GSMA Foundation* survey of mobile phone use by women in low and middle income countries found that 85% of the female mobile phone owners felt more independent because of their mobile phone. And nine in ten felt safer and more connected.

It is not just mobile phones that are helping to change the status quo. In rural India, cable TV has helped both men and women to become more open to the idea of women's autonomy and female participation in household decision making.

So -- the good news is that technology is helping women in developing countries to advance. The bad news is that there is another gap -- a global gender gap -- in access to mobile phones.

The *GSMA Foundation* found that in low and middle income countries, a woman is 23% less likely than a man to own a mobile phone. Just closing that gap would bring the benefits of mobile phones to an additional 300 million women.

We should not ignore the dark side of technology. Mobile phones permit stalkers to more easily trail their target -- just as they enable women to get help. Mobile phones contribute to violence against women -- just as they allow women to document the abuse. And mobile phones make it easier for repressive regimes to identify, locate and punish those in the opposition -- just as they help sow the seeds of protest.

Women as Developers of Technology

We've talked about how women's economic participation is a key driver of the global economy. And we've discussed how technology is rapidly transforming the world. It stands to reason, therefore, that women are front and center in the high tech revolution. Right?

Not so. More bad news: There is yet another gap.

In the United States,

- Women are not at the engineering or computer science table;
- Women are not at the drafting table in the design of products; and
- Women are not at the tech firm conference table or the boardroom table.

While women hold 57% of professional jobs in the United States, they hold only 25% of the professional IT related jobs. Only one in 10 corporate officers at *Fortune 500* tech companies is a female.

The pipeline is also bleak. The percentage of female engineering and computer science students is actually *declining*.

Although women were 57% of graduating college students in 2008, they earned only 18% of the degrees in computer science. That's 51% *fewer* than the female undergrads receiving computer science degrees in 1998 -- a decade *earlier*.

And, between 2000 and 2008, the number of incoming undergraduate women interested in majoring in computer science *declined* by 79%.

It gets worse. According to a study in the *Harvard Business Review*, 52% of female scientists and engineers are abandoning their jobs in mid-career --more so than in any other field. Why?

The top reason cited was the hostility of the workplace culture. Second was the sense of isolation when a woman is the only female in the room. Third, was a disconnect between the work rhythms of most women and the behavior that is rewarded in fields dominated by men. Finally, the requirement to work 70 hours per week caused some women to resign, since they were also doing the lion's share of the work at home.

Technology and innovation will play a critical role in every sector of the US and global economy. By 2016 there will be more than 1.5 million computer jobs available. BUT if current trends continue, the US industry will only be able to fill *half* of those positions.

The HBR study concluded that if we could reduce the attrition of mid-level women in science, engineering and tech by just 25%, we would add 220,000 workers to a labor market where the shortage of talent is draining our ability to compete globally.

The US is also falling woefully behind other countries in the total number of students it graduates in engineering, science and math. We already are seeing high tech businesses locate their state-of-the-art laboratories – not in the US -- but in China and India, where the future tech entrepreneurs are being trained.

Previously, the best and the brightest migrated to the US for its cutting-edge technology. We now are becoming the imitators – not the innovators – as we look to Europe and Asia for green technology.

So let's make the connection. If we were to achieve gender parity in young adults entering these fields – and -- if we focus on retaining women who have reached middle-management – we would help to reverse a slide in a critical component of U.S. competitiveness. And we would improve our national security. Yes, women matter.

V. RECOMMENDATIONS

What do we need to do? Here are a few ideas:

Here at home, we must make sure that both men *and* women are crafting solutions to the shortage of young women entering computer science and engineering. This is not a *women's* problem. This is a *national security* problem.

I encourage everyone to implement the recommendations of the *American Association of University Women* report (released today) and the study by the *National Center for Women in Technology*. We need to debunk the stereotypes that convince young girls that they are inferior

in math. And universities should hire more female professors so that there are role models for *all* students, and encourage mixed gender teams and study groups.

CEO's of high tech companies should undertake a campaign (1) to hire more women in technology, and (2) to reverse the exodus of mid-level women. This commitment should be instilled throughout the organization, from the board of directors on down. It requires a serious assessment of the corporate culture that contributes to an unhealthy work environment.

CEO's should do this, not just because it is good for *women*, but because it is good for the *bottom line*.

And companies should engage women in the design of tech products. They should do so – again - not just because it is good for *women*, but because it is good for the *bottom line*.

Globally, I am heartened by the focus at the highest levels on women's economic empowerment as an essential tool for world economic growth. We need to amplify that message and keep the pressure on to turn those words into deeds.

So much can be done with technology to improve the lives of women and girls. I gave you some examples of how basic mobile phones – not the \$500 model but the \$10 model – are ingeniously being deployed to advance women's economic security, education, health, and safety.

Let's encourage governments, organizations, manufacturers and service providers to work in partnership to expand women's access to technology. Whenever possible, let's base services on open source programming so that can be readily adapted from site to site. And let's make sure that *local* women are engaged in the design of the service. They know best how the technology will be used and how to win its acceptance within a traditional community.

To illustrate: A female run company called Solar Sista sells \$10 solar-powered lamps to women living in villages where there is no electricity. A woman bought two and brought them home. Her husband announced that one would go in their bedroom and the other on his desk. She replied no. One will go by the front door, because it is dark and unsafe when I return home at night from the market, and the other will go near the chickens, because hens won't lay eggs in the dark. With the extra eggs that the hens produced, the woman was able to buy a goat.

CONCLUSION

I recently attended an extraordinary conference, *Women in the World*, hosted by Tina Brown's *Daily Beast*. Queen Rania of Jordan spoke eloquently about using new technology to educate young girls, to improve maternal and child health, to end violence and to end the cycle of poverty. She said that young girls are a nation's best investment. That is as true here as it is in the developing world.

She said that social networks help solve social problems – phones and Facebook, blogs and widgets, Twitter and texting reach every corner of the globe. We must use them innovatively.

But we also need women to make connections, not just as users, but as the innovators -- spurring development in the high tech world at all levels.

Why? As we have seen, technology is transforming business, society and politics. And women are economically transforming society. It is a moral imperative, therefore, that women be front and center in guiding the technological transformation for the benefit of all.

Only then will the 21st century be not just about the *fight* for women's equality, as Nick Kristof said, but the *achievement* of women's equality.

Thank you.

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