Networking the World for Global Opportunity

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Land was the raw material of the agricultural age. Iron was the raw material of the industrial age. Data is the raw material of the information age. Recent advancements in communications technology have created a dynamic global economy that is increasingly driven by new products, services, and businesses reliant on data-rich environments.

And unlike land or iron, data isn't a limited resource. It is infinitely reproducible and immediately accessible to everyone, everywhere through an Internet connection. That Internet connection is still only accessed by approximately 40 percent of the world's population. Billions of people have never done so much as a single Google search, let alone searched for a job, taken a course or found medical information online.

Studies have shown that the Internet is an essential driver of reducing economic isolation and enabling economic progress for billions of people all over the world.

According to a 2014 Deloitte report, expanding access to the more than 4 billion people who are disconnected from the Internet would add $2.2 trillion in additional global GDP, add more than 140 million new jobs, and lift 160 million people out of extreme poverty. By increasing the information density of a given environment, the report concludes, Internet access spurs innovation, creates new business, expands access to markets, improves job efficiencies, and increases access to capital, all of which drives GDP and in turn increases access even more.

Which is why, whenever we talk about the challenge of ending global poverty, we need to talk about the challenge of global connectivity.

There is additional evidence that Internet connectivity significantly reduces social and political isolation, enabling a level of engagement in society for previously disenfranchised individuals and communities that was not previously possible.

The effort to connect

The first 3 billion people connected to the Internet were connected because of reasonably well-functioning markets. In many societies, a combination of government and philanthropic efforts were necessary to provide an onramp to the Internet, but once connected, people stay connected at ever-increasing levels and do so by accessing hardware and telecommunications services through mainstream marketplace offerings. Market-based efforts will continue apace as more communities become investment-worthy for network deployments and low-cost, high quality hardware becomes increasingly available and affordable.

These efforts may connect the next billion or two, but there is a growing consensus that innovative public-private efforts are necessary to help bring billions of people online who will not otherwise be able to access the Internet over the near term. Prominent among these are separate efforts by Google and Facebook.

Google has announced Project Loon, an effort to provide high-speed wireless Internet access through helium balloons carrying antennae enabling 4G (fourth generation) connections. The effort is being tested with carriers including Telefonica in South Africa and Vodafone in New Zealand. Google's goal is to be able to reach 4 to 5 billion people by 2020.

Facebook has launched Internet.org, which it advertises as a "free onramp to the Internet." Internet.org provides a package of content (including Facebook) that it optimizes for low-bandwidth environments. To date, an estimated 9 million people have been connected to the Internet for the first time in 15 low-income countries through Internet.org. As with Google's Project Loon, Internet.org has substantial ambitions, with the stated goal of "making affordable Internet access available to the two-thirds of the world who are not yet connected and to bring the same opportunities to everyone that the connected third of the world has today."

One interesting non-factor in the increased utilization of networks is digital literacy. During the 1990s, there was a presumption that access to the Internet needed to be accompanied by digital literacy training, particularly for people with low incomes and limited literacy. This proved to be a less necessary than the consensus view at the time. New users of the Internet proved to demonstrate high levels of acuity and quick adoption of Internet-based tools irrespective of socio-economic disadvantage. Age proved to be a larger factor in determining ease of use than household income or literacy level. This has continued to be true as networks and tools have deployed into the developing world.

Reducing economic isolation

The more than 4 billion people who remain disconnected from the Internet are overwhelmingly concentrated in developing world economies where poverty rates remain high and a large percentage of workers are engaged in manual labor in agricultural and industrial workforces as opposed to knowledge-based workforces.

Internet access has had a demonstrable impact on the reduction of the relative isolation of these workers and their migration into more productive, higher-wage employment.

The link between Internet access and macroeconomic growth is well-known. The most frequently cited study is a World Bank one that measured the causal impact of fixed telephony, mobile telephony, Internet use, and broadband use on gross domestic product growth over 26 years, which demonstrated that a 10 percent increase in fixed broadband penetration results in a 1.35 percent increase in GDP growth in developing countries and a 1.19 percent increase in developed economies. A Deloitte study highlights the benefit to increases in productivity, estimating that connecting disconnected regions of the developing would increase productivity in those areas by as much as 25 percent.

At the community and individual level, a principal byproduct of this connectivity has been reduced economic isolation, accelerating the integration into regional and global marketplaces.

A striking example can be seen in Kenya with "iCow," a text message and voice-based mobile app being used by more than 11,000 small-scale dairy farmers. For hundreds of years, subsistence-level dairy farmers in Kenya lived lives of isolated poverty. With the introduction of mobile Internet connectivity into Kenya and the availability of low-cost handsets and access plans, it became possible to develop locally-relevant applications that could increase the economic integration and well-being of historically isolated populations. iCow was founded by a woman named Su Kahumbu to provide information for three stages of dairy farming: menstruation, milking, and marketplace. In practice, this means that the app texts farmers on days of the cows' gestation periods, collects the farmers' milk and breeding records and sends texts about best practices that the farmer should take advantage of depending on the specific conditions of the herd and individual cattle. One farmer joked to Kahumbu that, "iCow tells me when to give my cow maternity leave."

iCow also alerts farmers to the days of highest demand for milk, veterinary information, and market price information. This last part basically means that instead of a farmer walking for half a day with his cow to the market and selling it to whoever is standing in the town square at whatever he is willing to pay, the farmer is now connecting to hundreds of possible buyers in the region

through a mobile-enabled marketplace. If a farmer needs a veterinarian, she or he sends a text message to iCow's short code with the word "VET" and iCow responds with the phone numbers of nearby veterinarians.

The average farmer using iCow owns just three cows. After 7 months using iCow, the increased production is the equivalent of owning a fourth cow. For every dollar spent on iCow, the average farmer made an additional $77. With this data applying to 11,000 dairy farmers and growing, the impact is not trivial—and it is representative of what happens when applications are developed that respond to local needs leveraging 21st-century telecommunications infrastructure.

Similar case studies are abundant across other market segments with high concentrations in the developing world, from agriculture to fisheries to artisanal work. In recent years, however, we have also seen the benefit of years of connectivity begin to accelerate the integration of local economic actors into global, knowledge-based industries. The combination of well-developed human capital and high-speed networks connecting continents is enabling the integration of young, developing world technology talent into prominent, well-paying workforces in the developed world.

An example of this can be seen with the work of Andela, a company founded in 2014 by successful technology entrepreneurs to "integrate full-time genius level software engineers" into American workforces. Its mission is to transform the global technology landscape by connecting top employers with untapped talent around the world. The premise of its thinking is that in regions of high population density where connectivity has been in place for some time, that there are technology-adept young people who, if given training and access to employers, will flourish. So long as there is access to the Internet, there will not be just a few genius technologists that can break out, there are thousands, maybe tens of thousands.

The first site for Andela's work was Nigeria, where just 10 years ago there were only 100,000 phone lines, mostly landlines, for what was then a population of 140 million. Today these old phone lines are nonexistent, and have been replaced by more than 167 million mobile phones—Africa's largest telecom market.

In the company's first six months of operation, 9,597 Nigerian young professionals—averaging age 25—competed to enter Andela's bootcamps. Andela then selected and trained the most promising of these applicants. Every Andela developer has at least 1,000 hours of coding experience. Of the first 12 companies that hired Andela Fellows, there was 100 percent retention and nine of the companies almost immediately asked for more.

Andela then expanded into Kenya and has now received more than 16,000 applications from African technologists, and has developed partnerships with American companies searching for the

best engineers—including Google and Microsoft, where average annual compensation for engineers is $167,042 and $117,586 respectively according to Glassdoor. The idea that large numbers of Nigerians and Kenyans could work inside workforces from Microsoft and Google without an American or European university degree and without physically locating to the U.S. or Europe would have been difficult to imagine just five years ago. Andela's success demonstrates just how powerfully economic isolation can be reduced by connectivity.

Reducing social and political isolation

There is also substantial evidence that Internet connectivity reduces social and political isolation. By providing access to information, there are material advances in civic and political engagement and reduced social isolation. While Internet connectivity is insufficient to serve as a substitute for primary necessities (access to clean water, nutrition, shelter, and safety) the evidence shows that it accelerates progress in the social development objectives of the U.N. Millennium Development Goals, including in health and education.

The effect on political and civic engagement has been profound. Media and information environments, political agendas, social movements, and governmental decision-making processes have all been disrupted by citizens using what are now billions of devices and billions of Internet connections. Information no longer flows exclusively from mainstream media and government out to society. It flows in a vast network of citizens and consumers interacting with once-dominant information sources. This network of people is constantly reading, writing, and evaluating everything, shaping the ideas that guide society and politics.

It would be a mistake to take a politically-deterministic view of how technology shapes political and civic engagement. These tools tend to amplify the existing sociologies on the ground, and can be used to promote the political goals of open democracies and closed autocracies alike. Having said that, there are three early conclusions we can draw about how Internet connectivity and the platforms and tools that leverage that connectivity shape civic and political engagement.

First, connectivity accelerates the growth of social and political movements. In a connected environment, distance and time no longer limit access to real-time information. Movements that would have once taken years to develop and relied on strong ties between people well-known to each other now can be built in days or weeks, leveraging the relatively open platforms that social media provide. This phenomenon is plain to see in world events as diverse as the Arab Spring, political protests in Russia, disaster response in Japan, and the populist political movements that started online in Europe and the United States.

Second, Internet connectivity has enriched the information environment. Many people know the story of Mohamed Bouazizi, a fruit vendor from the small town of Sidi Bouzid in Tunisia whose self-immolation on December 17, 2010, catalyzed what became the Arab Spring. On December 18, his mother and other family members began a protest that spread to the rest of Tunisia. What most people don't know, though, is that just two years earlier there were protests in Tunisia that started off far larger, but failed to spread beyond the confines of the Gafsa mining basin where they began.

What changed in those two years? During the initial protests in Sidi Bouzid, acts of protest were documented on video-enabled mobile phones and posted to social media sites. Activists in the Tunisian diaspora curated and distributed this content, leading to it being picked up by pan-Arab satellite television networks including Al-Jazeera. This allowed students with a few dozen friends and followers on social media to become eyewitness sources for satellite TV networks that broadcast their stories to hundreds of millions of viewers. The Tunisian government of President Zine el-Abidine Ben Ali was unable to contain this flow of media and information as it was just two years prior. This combination of new and traditional media can amplify the voices of citizen-centered movements into potent political forces and demonstrates how governments lose control over their information environments.

Third, Internet connectivity affects leadership structures. Internet-enabled movements tend to lack the traditional single charismatic leader, inspiring and organizing the masses from on high. Rather, movements that rely heavily on the Internet tend to have a leadership structure that looks like the Internet itself—a distributed web of nodes and connections, rather than a pyramidal, top-down structure. This enables a decentralized form of organization bringing together unlikely combinations of people into rapidly formed movements. While this has the virtue of making movements more citizen-centered and less bound to the cults of personality one often finds in and around protest movements, it also makes these movements more ephemeral and less sustainable. A lack of real structure and widely-accepted leaders has limited the sustainability of many movements, both political and issue-oriented.

Internet freedom

As private sector actors have taken action to try to connect the remaining 4 billion disconnected citizens, a debate has emerged about whether those solutions should embrace the principles of net neutrality, which prescribe that Internet service providers should enable access to all content and applications regardless of the source, and without advantaging particular products or websites.

In India, more than 800,000 people have started using Internet.org since its launch in February,

2015. Still, certain Indian stakeholders objected and others outright refused to participate because the platform provided access to just a few dozen web services, including Facebook's network and messaging services. An examination of those 800,000 new Internet users, though, shows that more than 90 percent of the data they have consumed is outside of the Internet.org platform, suggesting that Internet.org is indeed a legitimate onramp to the larger Internet and that objections are largely mercantile.

The more fundamental question for connecting the next 4 billion people goes to Internet freedom: the freedom to connect to the Internet, to the website's of one's choosing, and to each other. As Internet access has accelerated globally, the Internet has become contested ground in the fight for human rights. Article 19 of the United Nations Universal Declaration of Human Rights holds that "everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers."

On the Internet, the freedom of expression, the freedom of association and assembly, and a free press are in decline. Freedom House's report *Freedom on the Net 2014*—the fifth annual comprehensive study of Internet freedom around the globe, covering developments in 65 countries—finds that Internet freedom around the world is in decline for the fourth consecutive year, with 36 out of 65 countries assessed experiencing a negative trajectory.

To return to the example of India, the question of human rights on the Internet has produced a contest between the judiciary, which tends to support the exercise of universal rights on the Internet, and legislative, law enforcement, and executive officers, who regularly draft and implement restrictions on free expression and a free press online.

In dozens of other developing world countries, the kind of competition across branches of government that exists in India would not have existed. In an increasing number of autocracies, controlling access to the Internet is at the core of its strategy for maintaining control over its citizens. In these societies, the kind of economic, social, and political empowerment that the Internet enables is constrained, and those societies will not realize the full potential of the Internet's power.

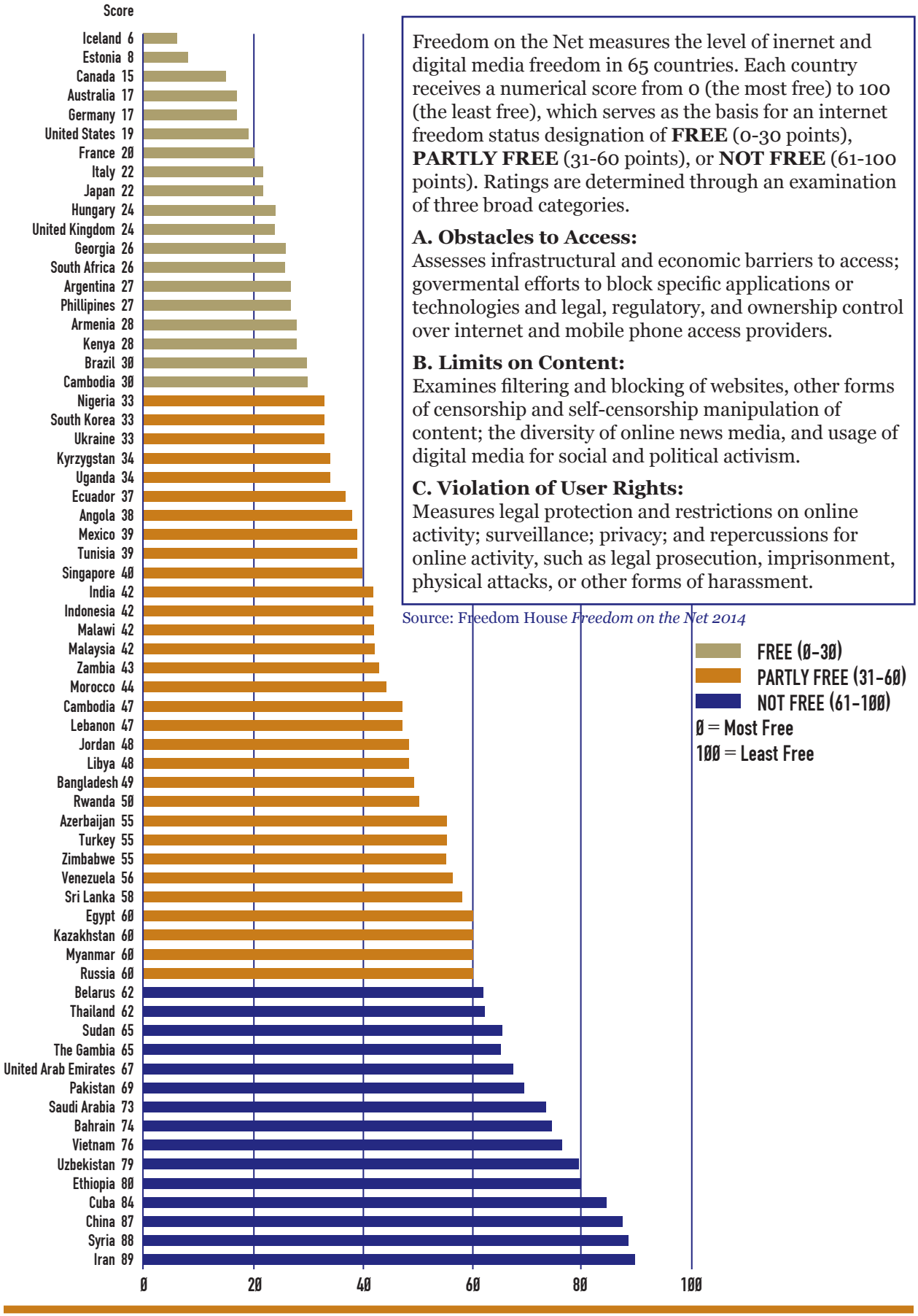
Going forward, three interesting unknowns about bringing the next 4 billion people online include:

1. To what degree does the macroeconomic growth spurred in part by connectivity produce *inclusive* economic growth? There is a raging debate among and between investors, entrepreneurs, academics, and government officials about the degree to which the increased wealth and bounty produced by connectivity is broadly shared.

2. Can countries with governments that restrict access to an open Internet produce non-derivative innovation? Will they be able to imagine, invent, and commercialize the future? Or will their industries be local knock-offs or adaptations of innovation that has taken place elsewhere?

3. What is the next generation of breakthrough innovation in hardware? The introduction of low-cost, high-capability mobile hardware has accelerated the rate of connectivity in a way that would never have been possible in a PC-only world. Further hardware innovation could spike connectivity outside of what is projected using today's hardware.

Figure 1. Freedom House scorings of internet freedom for 65 countries, 2014



Freedom on the Net measures the level of inernet and digital media freedom in 65 countries. Each country receives a numerical score from 0 (the most free) to 100 (the least free), which serves as the basis for an internet freedom status designation of **FREE** (0-30 points), **PARTLY FREE** (31-60 points), or **NOT FREE** (61-100 points). Ratings are determined through an examination of three broad categories.

A. Obstacles to Access:
Assesses infrastructural and economic barriers to access; govermental efforts to block specific applications or technologies and legal, regulatory, and ownership control over internet and mobile phone access providers.

B. Limits on Content:
Examines filtering and blocking of websites, other forms of censorship and self-censorship manipulation of content; the diversity of online news media, and usage of digital media for social and political activism.

C. Violation of User Rights:
Measures legal protection and restrictions on online activity; surveillance; privacy; and repercussions for online activity, such as legal prosecution, imprisonment, physical attacks, or other forms of harassment.

Source: Freedom House *Freedom on the Net 2014*