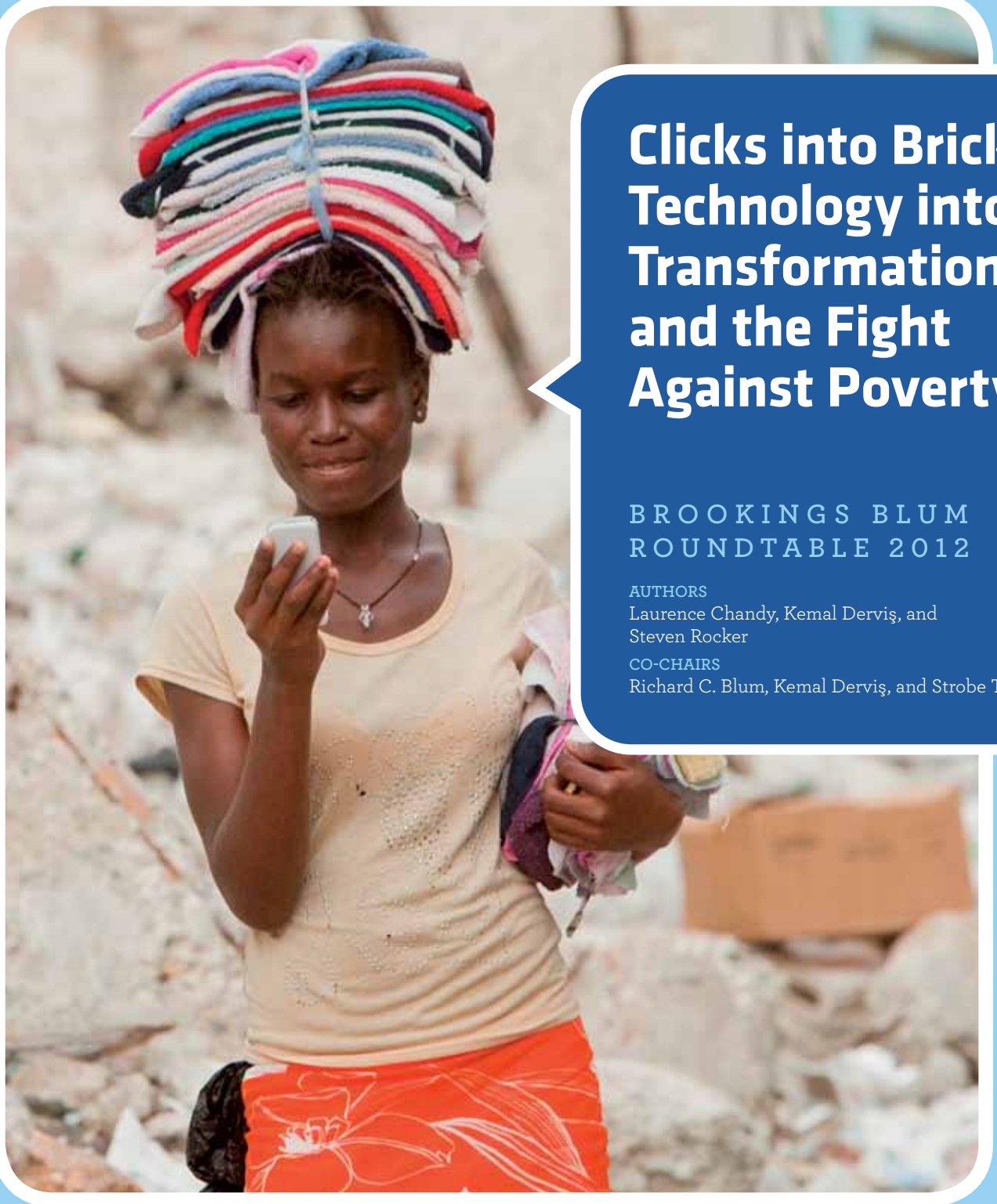

Clicks into Bricks, Technology into Transformation, and the Fight Against Poverty

BROOKINGS BLUM ROUNDTABLE 2012

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Global Economy and Development at BROOKINGS

Global Economy and Development at Brookings examines the opportunities and challenges presented by globalization, and recommends solutions to help shape the policy debate. Recognizing that the forces of globalization transcend disciplinary boundaries, the program draws on scholars from the fields of economics, development, and political science, building on Brookings' worldwide reputation for high-quality, independent research. To address new challenges in development assistance, the Global Economy and Development program established the **Development Assistance and Governance Initiative (DAGI)**. Through targeted areas of research on aid effectiveness, governance and anti-corruption, and reform of U.S. global development efforts, as well as undertaking key convening activities like the signature Brookings Blum Roundtable, DAGI offers policy recommendations on how to improve the lives of millions around the world.

Propelled by the energy and talent of faculty and students committed to helping the nearly 3 billion people who live on less than $2 a day, the **Blum Center for Developing Economies** is focused on finding solutions to the most pressing needs of the poor. Spanning the University of California, Berkeley, Davis, and San Francisco, and the Lawrence Berkeley National Laboratory, Blum Center innovation teams are working to deliver safe water and sanitation solutions in eight countries, life-saving mobile services throughout Africa and Asia, and new energy-efficient technologies throughout the developing world. The center's Global Poverty & Practice concentration is the fastest-growing undergraduate minor on the UC Berkeley campus, giving students the knowledge and real-world experience to become dynamic participants in the fight against poverty. In addition to choosing from a wide variety of new courses, students participate directly in poverty alleviation efforts in more than fifty developing countries.

The mission of the **Aspen Institute** is twofold: to foster values-based leadership, encouraging individuals to reflect on the ideals and ideas that define a good society; and to provide a neutral and balanced venue for discussing and acting on critical issues. The institute does this primarily in four ways: seminars, young-leader fellowships around the globe, policy programs, and public conferences and events. The institute is based in Washington; in Aspen, Colorado; and on the Wye River on Maryland's Eastern Shore. It also has an international network of partners.

The **Mary Robinson Foundation–Climate Justice** is a center for thought leadership, education, and advocacy on the struggle to secure global justice for those many victims of climate change who are usually forgotten—the poor, the disempowered, and the marginalized around the world. It is a platform for solidarity, partnership, and shared engagement for all who care about global justice, whether as individuals and communities suffering injustice or as advocates for fairness in resource-rich societies. In particular, it provides a space for facilitating action on climate justice to empower the poorest people and countries in their efforts to achieve sustainable and people-centered development.

Photo by Alex Irvin

Foreword

From August 1 to 3, 2012, around 60 preeminent development practitioners and thought leaders from the public, private, and nonprofit sectors convened for the ninth annual Brookings Blum Roundtable in Aspen, Colorado. Participants from around the globe exchanged ideas and solutions for promoting technology and innovation for global development. This report highlights ten issues raised at the roundtable where either particular proposals were advanced and debated, or new perspectives and analysis were shared. In each case, we summarize the Roundtable discussion or explore the issues raised.

The roundtable was hosted by Richard C. Blum and the Global Economy and Development program at Brookings, with the support of honorary co-chairs Walter Isaacson of the Aspen Institute and Mary Robinson, president of the Mary Robinson Foundation–Climate Justice. Previous Brookings Blum roundtables have focused on challenges to global development cooperation (2011); development assistance reform for the 21st century (2010); tackling climate change in the midst of a global economic downturn (2009); building climate change resilience in the developing world (2008); the expanding role of philanthropy and social enterprises in international development (2007); the complex ties between poverty, insecurity, and conflict (2006); the private sector's role in development (2005); and America's role in the fight against global poverty (2004). Reports from these gatherings are available at www.brookings.edu/bbr, along with this year's companion set of policy briefs (for more information, see page 53).

Acknowledgments

The roundtable was made possible through a generous grant from Richard C. Blum, chairman of Blum Capital Partners and founder of the Blum Center for Developing Economies at the University of California, Berkeley, with additional support from the Bill & Melinda Gates Foundation. The roundtable's organizers extend special thanks to Steven Rocker and Stephen Magneson for superb event planning and coordination, and to Kirsten Gilbert, Kevin McNulty, Kristina Server and Mao-Lin Shen for ensuring the meeting's success. We also extend our appreciation to the William and Flora Hewlett Foundation, AusAID's Office of Development Effectiveness, and other donors for the broad support they have provided to the Brookings Institution's work on foreign assistance reform and aid effectiveness.

Photo: © Solar Electric Light Fund (SELF)

Follow #Blum2012 for tweets from 2012 Brookings Blum Roundtable on innovation & technology for development: www.brookings.edu/bbr

Introduction

The last century has witnessed dramatic global improvements in the quality of life. Many of these improvements can be attributed to the discovery and spread of new technologies and ideas, ranging from vaccines and antibiotics, to improved hygiene, to the agricultural reforms of the Green Revolution. The United States has played an important role in each of these advances, from spreading the seeds of the Green Revolution to inventing and donating the vaccines and drugs that have dramatically improved global health.[1]

Today there is growing excitement about a new set of technologies that could further improve the lives of poor people around the world. For instance, mobile technology is giving poor people the capacity to use their cell phones to send, receive and store money. Connection technologies such as open source software have allowed people in Haiti and Pakistan to collect and analyze information about, and then respond to, violence, corruption and natural disasters. Myriad "green growth" technological innovations around the globe are expanding access to electricity and increasing agricultural yields while also reducing harmful emissions.

The United States appears poised, once again, to support these changes. The Obama administration has advocated an increased focus on technology within its global development policy, a position that enjoys bipartisan support. Silicon Valley inventors, scientists and researchers from leading universities, and a new breed of impact investors from the financial sector are shifting their attention toward these same goals and are potential partners to advance government efforts.

If only it were this straightforward.

Despite an endless supply of creative technologies to support the world's poorest people, only a tiny fraction can expect to be brought to a scale where they will benefit millions. Most succumb to the "valley of death" that characterizes the transition between early-stage discovery and a proven, rolled-out business model. The odds of failure, which are high in any innovation process, are heightened when tackling the challenges of the developing world. Even where a technology proves successful in one setting, such as mobile money in Kenya, the assumption that it can be seamlessly replicated elsewhere—the external validity principle—does not withstand scrutiny. Bad institutions, regulations and policies have been stumbling blocks to adopting many innovations and may require innovations of their own. Citizen connectivity and information sharing through Web and cell phone applications have helped the poor become more self-sufficient and their own change agents, but have rarely succeeded in building the better institutions that are needed to deliver systemic change.

Supporting technology and innovation through partnerships between business, government and civil society may appear to offer the best chance of success. Yet experience shows that such partnerships are easier to conceive than to negotiate, implement and sustain. So-called cultural differences associated with different institutions affect goals, time horizons, decisionmaking processes and risk tolerances, which can feed mistrust and undermine collaborations. Furthermore, there remains little clarity as to government's rightful role in this area. The presence of market failures suggests a case for public intervention, but this is tempered by a fear of overreach and the introduction of distortions. It remains to be seen whether government has the appetite for risk that innovation demands or for subsidizing profitable businesses that may be best placed to deliver innovative goods and services at the base of the pyramid.

The 2012 Brookings Blum Roundtable was convened to uncover new solutions for promoting technology and innovation for global development. This report highlights 10 issues raised at the roundtable where either particular proposals were advanced and debated or new perspectives and analyses were shared. In each case, we summarize the roundtable discussion or explore the issues raised.

Photo: © World LPG Association

1 Partnerships for reaching scale

The global development community is teeming with promising technological solutions to improve the lives of the world's poorest people. Examples include clean-energy, portable fuel cells powered by sodium silicide to bring power to off-grid homes; a cell phone fingerprint recognition app to improve health worker attendance; a special pen to self-test for pre-eclampsia to prevent maternal mortality; a low-cost psychometric-based test to screen credit applications from small business owners; and cyanobacterial fertilizer to improve soil fertility. These particular examples are among several currently being sponsored by the U.S. government as part of its renewed focus on supporting transformative technologies for development.

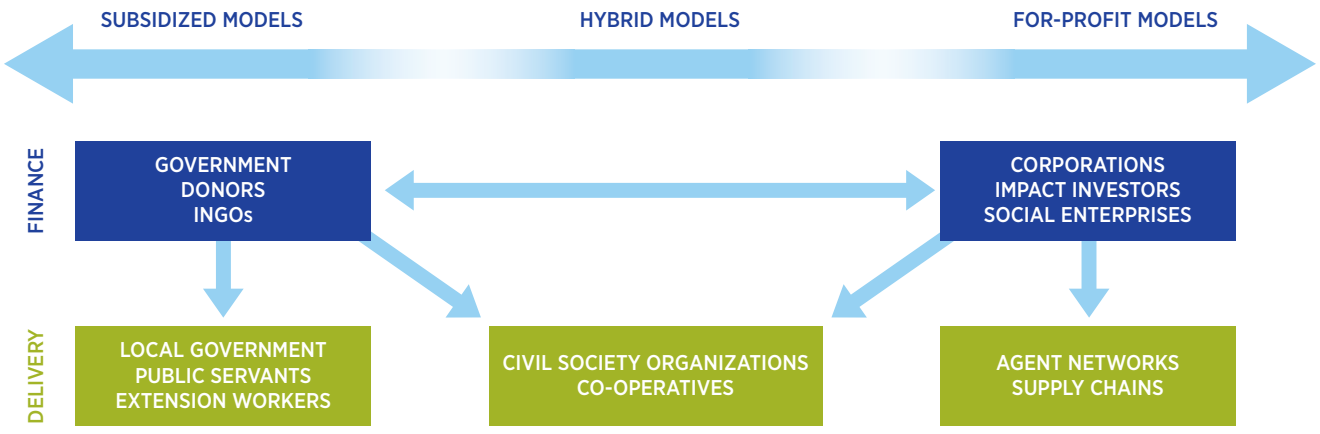
Whether these or any other technologies succeed in having a transformative impact depends not just on their individual brilliance and creativity but also on whether they can be brought to a scale where they can reach millions of poor people. Participants in the Brookings Blum Roundtable examined what it takes to propagate technological solutions for development so that their reach can be maximized.

A keystone of the roundtable discussion was recognizing the importance of the business model—the specific combination and design of product, distribution, supply chain, financing, pricing, payment and sales—through which a solution is propagated. This is equally applicable whether the solution is delivered commercially or as a public good or service. Most business models employed in administering development interventions are not viable at scale, which explains their limited reach and impact. Identifying the appropriate business model to use for a given product or intervention is therefore a critical challenge.

This challenge can be divided into two parts. First, there is the issue of *finance*. Poor people can rarely afford to pay the full cost for a good or service, and these costs can be especially high when new markets or products, like solar power, are being introduced. The second issue is managing delivery to large numbers of beneficiaries. Marketing and distributing goods and services efficiently to poor people spread out throughout a country or the world hinges on effective logistics, systems, staffing and training.

Devising and implementing a scalable business model is hard for any single organization to do alone. Roundtable participants noted the potential for partnerships to expand the scope for achieving scale both by pooling the resources and expertise of different parties to enable larger and more ambitious interventions, and by dividing up tasks according to an appropriate division of labor.

Below we describe three technology-infused development solutions and how they are organized to pursue impact at scale. (These examples either were cited during the roundtable discussion or have been analyzed by roundtable participants.) In each case, a unique partnership of actors is formed to tackle the twin challenges of finance and delivery. Moreover, these partnerships employ hybrid models combining public and private actors and thus do not conform to a traditional division of subsidized versus for-profit approaches—see the figure below.[2] These examples demonstrate that the role of innovation in development does not stop with the design and harnessing of new technologies but extends to the business models and partnerships through which they are propagated.



"When you undertake something which represents a paradigm shift, you have to understand the organizational cost involved. Map Maker would not have happened had the right people not backed it and had a couple of individuals not taken on enormous personal costs to see it all the way through. When you look around the world for innovations that really transform, they have at their heart this one core team or this one core person who makes that happen."

— Lalitesh Katragadda @KLalitesh
Co-Founder, Google India

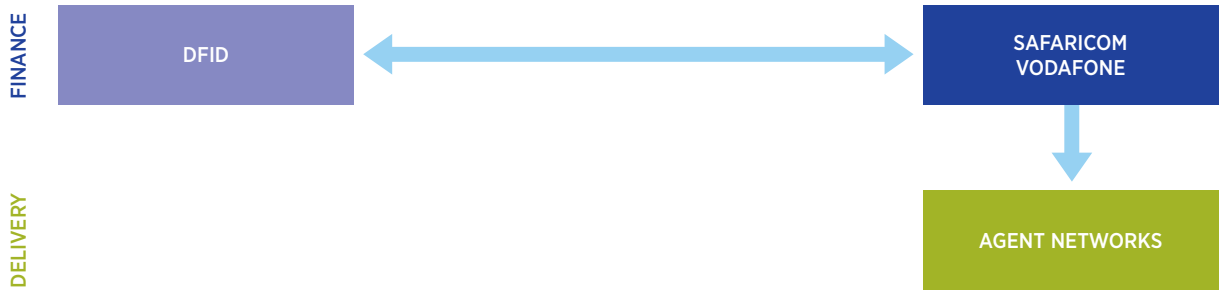
Photo by Alex Irvin

Case 1: M-Pesa

The mobile money service M-Pesa enables cell phone users to transfer money and utilize other simple financial services at a minimal cost and without requiring a formal bank account.[3] M-Pesa has reached scale in Kenya and has been rolled out in other countries alongside other mobile money systems from rival operators, many of which employ a similar business model.

While M-Pesa is profitable in Kenya—it is currently responsible for 18 percent of the revenue of the mobile operator Safaricom—it benefited from some "soft money" in its early development to help pilot the initiative. A total of £1 million was made available through a challenge fund from the U.K. Department for International Development. This was matched by approximately £9 million in investment between Safaricom and its parent company, Vodafone, with the latter being responsible for developing and hosting the technology.

Safaricom reaches its customers through its network of agents. Agents are the most visible element of the service, and were responsible in the early years for gaining the trust of customers to encourage the adoption of a new product. Rather than creating an agent network from scratch, M-Pesa identified existing networks of competent intermediaries in the Kenyan economy which they could readily employ. These included their own airtime dealers, the fuel retailer Caltex, Group 4 Securicor courier services, supermarket chains and other retailers, dry-cleaners and the Pesa Point ATM network. At present, Safaricom has over 45,000 agents, or nearly 1 for every 500 adult Kenyans. Regular interactions between M-Pesa and its agents provide an opportunity for training (to ensure a high quality of service), information gathering (to inform improvements to the service) and instilling loyalty (to retain agents and avoid rehiring costs).



Global poverty data has major lags. We don't really know what's happened due to global financial crises over past 4 yrs. No data! #blum2012

Photo by Alex Irvin

"The biggest constraints to public-private partnerships are culture and experience. In our firm, we are used to taking risks and we know sometimes we're going to lose. We also think, rightly or wrongly, that we're smart enough that we will do well over the long run. From the time we were selling lemonade, we wanted to be entrepreneurs. Those in government sometimes have a whole different way of thinking. We need to create shared experience where the risk takers and those less likely to take risks can work together."

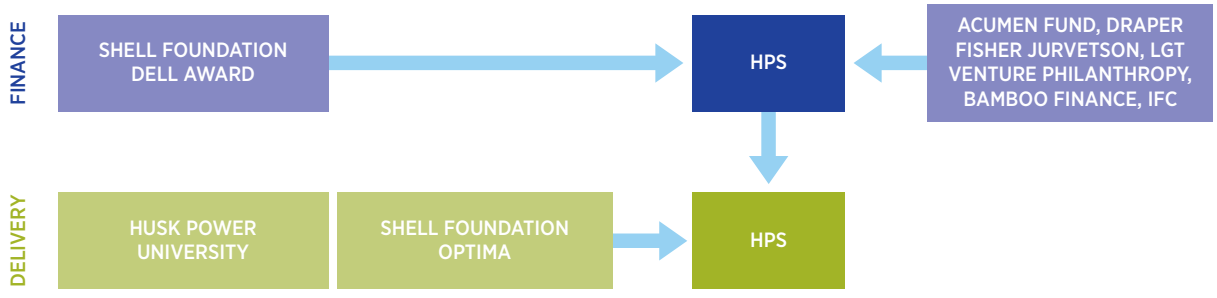
— Richard Blum
Chairman and Chief Executive Officer, Blum Capital Partners, LP

Case 2: Husk Power

Husk Power Systems (HPS) has developed a profitable approach to biomass energy generation and distribution that is loaded with innovation across the value chain.[4] This includes the generation of gas from rice husks, distribution of power to homes via low-cost bamboo poles, a sophisticated system to prevent power theft, specially designed smart meters and a tariff model tailored to the low-income customer segment. Starting in 2007, HPS has developed 75 mini–power plants serving 25,000 Bihari households and is now planning to replicate its business model in Tanzania and Uganda.

As with M-Pesa, HPS benefited initially from grant funding to test and refine its business model. This included an award from the Dell Social Innovation Challenge and, more significantly, a $2.3 million multiyear commitment from the Shell Foundation. The latter helped to finance a range of sunk costs including research and development, capital expenditures, human resources, training, and health and safety and was complemented with extensive on-the-ground technical assistance from the Shell Foundation team. Once HPS was ready to scale, it was able to draw in impact investors, including the Acumen Fund, Draper Fisher Jurvetson, LGT Venture Philanthropy, Bamboo Finance and the International Finance Corporation.

Operating in poor, rural and remote locations presents obvious challenges in hiring qualified personnel. To overcome this challenge, HPS has established a dedicated training center called Husk Power University, which is being run as a separate philanthropic project through the owners' foundation, Samta Samriddhi, with support from the Shell Foundation and the business training group Optima. A partner organization, the Rural Power University, is sponsored by HSBC and the Indian philanthropic foundation, Dasra.



"When talking about innovation and technology, it's very important to define the specific impact you're trying to have. Discussing innovation and technology in general terms is sometimes one of the barriers to getting to specific best practices and figuring out which actors—government, the private sector, etc.—are best at what in this space."

— Sylvia Mathews Burwell
President, Walmart Foundation

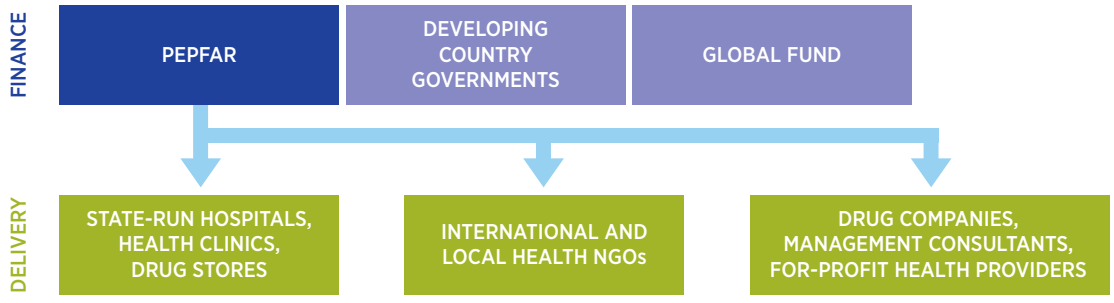
Photo by Alex Irvin

Case 3: PEPFAR

The U.S. President's Emergency Plan for AIDS Relief (PEPFAR) is one of the world's largest foreign aid programs. Here we focus on one aspect of the program: its provision of life-saving antiretroviral treatment (ART) to 3.9 million people, or nearly half the total number of ART patients worldwide.

PEPFAR is fully funded by the U.S. government, but it is better understood as part of a bigger picture of global ART financing, in which there is a de facto division of labor between PEPFAR, the Global Fund to Fight AIDS, Tuberculosis and Malaria (for which the U.S. government is the lead funder) and developing country governments. As PEPFAR's scale and reach have increased, so has its budget, despite a steep reduction in per capita treatment costs. Its annual expenditures are currently over $6 billion, of which more than a third is devoted to treatment. The goal of universal provision of ART for all 34 million people living with HIV/AIDS—a number that is rising by 2.5 million a year—demands additional resources, with growing reliance on developing country governments.

The delivery component of PEPFAR is complex and involves a multitude of players and partnerships that vary from country to country. This adaptable approach has been driven by a focus bringing treatment to scale as quickly as possible through whatever means are feasible. ART drugs are procured from pharmaceutical companies, including more than a dozen in developing countries, thanks to the ground-breaking initiative by the U.S. Food and Drug Administration to approve generic ARTs for use in PEPFAR-supported countries. Many organizations are involved in the transporting, storage and inventory management of drugs to ensure their ready supply in the hardest-to-reach areas and at a reasonable cost. In several PEPFAR partner countries, this process has been managed under the Supply-Chain Management System, administered by a consortium of private sector, nongovernmental and faith-based organizations. Drugs are then administered to patients through a range of hospitals and health clinics run by government, nongovernmental organizations and the private sector, with various organizations often subcontracted under larger management authorities. Under recent reforms, efforts are under way to integrate PEPFAR's delivery modalities with government systems to enable longer-term sustainability.



First step in moving toward a green future: cut the $650 billion in annual global fossil fuel subsidies. **#Blum2012**

Photo: © spirit of america /Shutterstock.com

Photo: © Bill & Melinda Gates Foundation/Lionel Healing

A man enters his finger for identification at a mobile banking vehicle in Michinji village, approximately 120km west of the capital Lilongwe, Malawi.

Great observation from **#Blum2012**: The more coal we use, the more expensive it becomes. With solar, the more we use, the cheaper it becomes.

2 How replicable is M-Pesa?

Mobile money—the ability to store and transfer money using cell phones—arguably represents the most talked-about technology in global development today. Expectations are high that in as little as a decade, the service can be rolled out across the developing world, bringing basic financial services to the 2.5 billion people currently without a bank account.

Of particular interest is the possibility of serving the world's poorest people, who have historically been denied access to financial services by a combination of distance and cost. Mobile money offers a commercially viable business model for serving these potential customers, overcoming the constraint of distance by substituting cell phone ownership and networks of agents for physical banks, and mitigating the cost constraint by facilitating a shift from cash to electronic money where transaction costs are lower, thus permitting small-value transfers and minimal fees.

While more sophisticated financial services are beginning to be deployed through mobile money initiatives (see section 3), even basic offerings provide users with a rudimentary tool to support savings and more balanced spending (consumption smoothing), which themselves are associated with significant welfare benefits. For instance, a study in western Kenya found that women entrepreneurs who had access to a deposit account invested 45 percent more in their businesses.[5] Another study in Malawi showed that access to simple financial tools resulted in a 17 percent rise in household consumption.[6]

The preeminent example of mobile money success is M-Pesa. Launched in Kenya in March 2007, M-Pesa signed up 20,000 customers in its first month, 2 million by the end of its first year, and almost 10 million within three years, representing 50 percent of the country's adult population. In a country where two-thirds of the population lives below $2 a day, M-Pesa has clearly demonstrated its ability to serve the needs of low-income customers. Indeed, its penetration rates for 2011 are indistinguishable for customers living on $1.25 to $2 a day as those living on above $2. For people living on less than $1.25, penetration rates are lower, but still reached 72 percent in 2011 and are continuing to rise.

Today, mobile money systems are sprouting up almost everywhere. GSMA's mobile money tracker counts 150 live systems and a further 110 in the pipeline across 72 developing countries. These offerings are predicated on the assumption that the success achieved by M-Pesa in Kenya can be emulated by others elsewhere. To date, however, few other systems have come close to matching M-Pesa's achievements.

This is puzzling. Conventional wisdom dictates that crafting a viable business model and bringing it to scale can take several years, possibly even generations, and that this time frame can be especially long when the product or service involves the creation of a new market.[7] However, once a model is proven financially viable, it should be possible to replicate it considerably more quickly, reflecting a powerful demonstration effect.

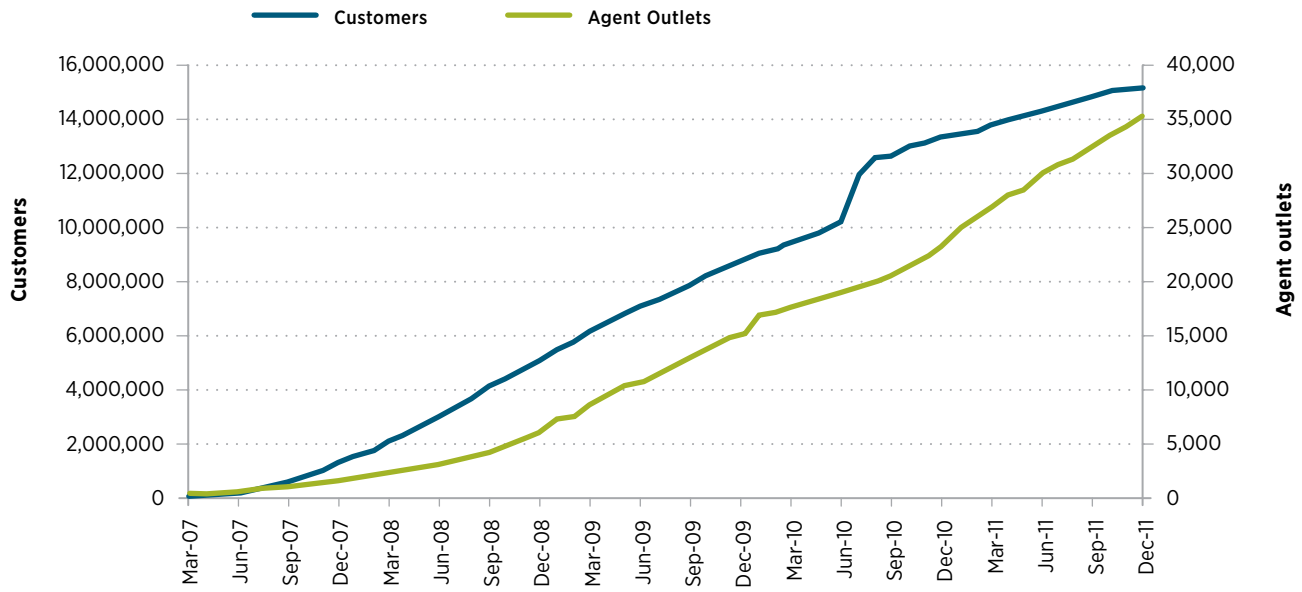
The case of mobile money does not seem to respect these rules. M-Pesa evolved from a concept to a country-wide launch in four years and achieved scale less than three years later. But replication in many cases has proven harder and slower.

Photo by Alex Irvin

"We, at MasterCard, estimate that out of the more than 130 mobile money deployments there are roughly 50 million accounts—and that half of these 50 million accounts come from only two countries—Kenya and the Philippines."

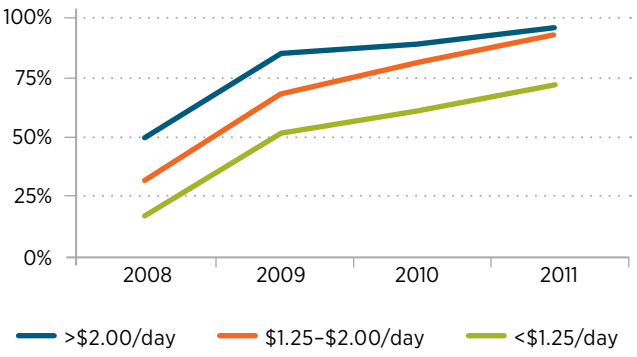
— **Mung Ki Woo** @MungKiatMC
Group Executive, Mobile, MasterCard Worldwide

Number of M-Pesa Customers and Agent Outlets, 2007-2011



Source: Safaricom/M-PESA Key Performance Statistics, May 2011

M-Pesa Use by Daily Per Capita Consumption
(non-Nairobi sample)



Source: Tavneet Suri and Billy Jack, "Reaching the Poor: Mobile Banking and Financial Inclusion," *Slate*, February 27, 2012.

Participants in the Brookings Blum Roundtable explored what lies behind this paradox. This was hardly the first attempt to address this issue; the mixed performance of mobile money systems worldwide has motivated many attempts to identify one or more distinguishing factors that separate successes and failures. Regularly cited factors include aspects of the offerings themselves (the product design, pricing, and terms of use) and the environment in which they are deployed (access to existing financial services, the competitiveness of the mobile industry, and country geography). A 2011 study by the International Finance Corporation identified no fewer than 50 parameters that determine the potential for mobile money's successful development in a given country.[8]

2.5 billion ppl in the world still unbanked. Mobile money is critical 2 get them access 2 **#financial services #Blum2012** http://t.co/AUuzRcwg

Source: http://www.mobileworldlive.com/mobile-money-tracker, as of 12/2012

It is self-evident that the technology used in mobile money can be employed virtually anywhere. However, as is the case in most innovative global development solutions, technology is only one part of a bigger story.

The roundtable discussion identified three critical issues that explain M-Pesa's success and the challenge of replication. First, the most successful mobile money offerings around the world have crafted their product design and marketing strategies with the goal of meeting a specific customer need and fulfilling a compelling value proposition. For M-Pesa, the "killer application" was to facilitate domestic remittances. In Japan, NTT DOCOMO's mobile money system, the most successful in the developed world, drew customers by enabling fast, convenient payment for train tickets for metropolitan Tokyo commuters. Such applications are context specific and so cannot simply be copied from a successful system elsewhere. Furthermore, the most salient application is not always readily apparent; for instance, M-Pesa's pilot was aimed at supporting the receipt and payment of microfinance loans.

The table on page 14 illustrates the International Finance Corporation's analysis of the segments of the mobile money industry that present the greatest opportunity for growth in four emerging economies (Brazil, Nigeria, Sri Lanka and Thailand), and thus the potential focal points of successful future offerings in these markets. Two aspects stand out: First, the most promising segments vary from country to country; and second, M-Pesa's killer application (domestic remittances) is not identified as a strong opportunity in any of the four countries.

Second, roundtable participants noted the role played by industry regulators in M-Pesa's winning formula. In particular, the limited regulation of M-Pesa's network of agents was critical to the viability of its business model. This was permitted by Kenya's regulators, who correctly identified these agents as intermediaries rather than providers of banking services. A broader philosophy of allowing "regulation to follow innovation" meant that the authorities could uphold prudential controls and consumer protection without stifling M-Pesa's growth. In other countries where Safaricom has launched M-Pesa, notably India and South Africa, overzealous regulation

"Mobile technology has the power to bring about a dramatic revolution in the way that banking is done by providing consumers around the world with more agency than ever before and ensuring that consumers and businesses can directly deal with each other. Linking people around the world and allowing them to make payments and have access to capital gives people a chance to disintermediate not just banks but many other powerful institutions."

— Gillian Tett
U.S. Managing Editor, Financial Times

Photo by Alex Irvin

has been cited as a constraint on growth and forced changes to the business model.[9]

Although acknowledgment of Kenya's regulators is surely deserved, some caution here is warranted. Kenya is rarely held up as a model of good governance for good reason; the Worldwide Governance Indicators rate its regulatory quality as a little below average. Two factors may help to explain this incongruity. First, supportive regulation of M-Pesa can likely be attributed as much to individual leaders as to the regulatory institutions with which they are affiliated. This is a reminder of the role specific champions can play in supporting innovation and bringing innovations to scale. Second, it is possible that Kenyan regulators and policymakers may have played a less supportive role in the emergence of mobile money if they had known what a tremendous success it would turn out to be and the subsequent opportunities that would be created for rent-seeking. Officials in other countries are better prepared to seize such opportunities when mobile money systems are launched, or to protect vested interests in the banking sector. This suggests that the demonstration effect associated with the successful launch of an innovative product or service can have a more insidious side.

Finally, one important factor in the modestly paced scaling up of mobile money worldwide, which was noted at the roundtable, is that much of the early-stage work performed in anticipation of M-Pesa's original launch has to be repeated in the preparation for launching similar systems in new countries. This includes establishing a network of agents, conducting experiential communications to teach consumers how to use the service and building customer trust. This places an onus on effective execution, challenging the assumption that replication is a straightforward, mechanized process involving little adaptation or experimentation. Moreover, these early-stage activities take time, money and patience. This is at odds with the contestable market spirit associated with mobile operators, whereby new promotions and products have a short turnover and their viability—measured narrowly in terms of their contribution to revenue—is tested over a short time frame.

Opportunity Analysis Summary

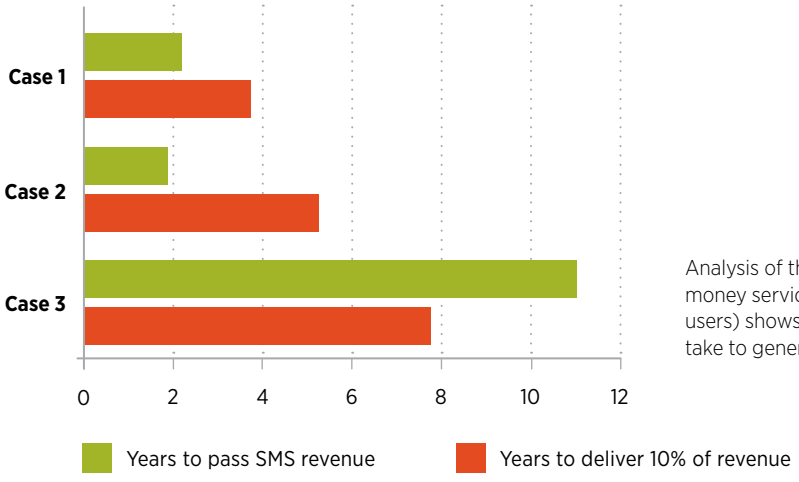
POTENTIAL MARKET	BRAZIL	NIGERIA	SRI LANKA	THAILAND
Bill payments (utilities)	■	●	▲	▲
P2P transfers	▲	▲	▲	▲
G2P payments	▲	■	●	■
Payroll (informal sector)	▲	▲	●	▲
Public Transport	▲	■	▲	▲
B2B payments	▲	▲	●	▲
International Remittances	■	▲	●	■
Credit and Microfinance	●	▲	●	■

Source: IFC Mobile Money Study 2011

Note: ● = significant and unrealized opportunity for m-money; many of the pre-conditions for m-money exist, such as demand, supportive regulation, and an identifiable group of customers; ▲ = potential opportunity but there are substantial challenges; ■ = unlikely to be any m-money opportunity due to lack of economies of scale or other constraints.

Photo: © Bill & Melinda Gates Foundation /David Evans

Guillermia Diaz Diaz utilizes the DiConsa store in her community to obtain Oportunidades (an innovative Mexican social assistance program) payments and participate in a savings program.



Analysis of the top 3 African mobile money services (as measured by active users) shows the length of time it can take to generate significant revenue.

Source: CGAP analysis, company financial statements 2009 and 2010.

Photo: © Bill & Melinda Gates Foundation

Bill & Melinda Gates Foundation team's advance visit to the EKO site at Uttam Nagar in New Delhi, India.

3 A survey of financial services through mobile phones

Mobile money represents a stunning breakthrough in the goal of expanding financial inclusion across the developing world (see section 2). However, as of now, most mobile money offerings are limited to simple money transfer functions, falling far short of the menu of personal financial services enjoyed by formal bank customers.

At the Brookings Blum Roundtable, participants agreed that the potential impact of mobile money on poverty reduction and economic development could be further enhanced by expanding the range of financial services available through mobile phones. Progress is expected to occur as the mobile money sector matures and continues to innovate, supported by the spread of improved technologies such as smartphones, near-field communication and biometric identification. Here we take stock of progress in the application of mobile money to the provision of four financial services: savings, credit, insurance and international remittances.

Savings

Mobile money systems provide customers with the means for safely storing money in a cashless form. Given that most low-income customers lack access to formal savings products, mobile money accounts have been harnessed as an informal substitute. However, operators are typically precluded from offering interest on mobile money deposits by financial regulations, which limit this activity to the formal banking sector. The formation of interest-bearing mobile savings accounts instead requires a partnership between one or more mobile operators and banks. For instance, M-Kesho, a mobile-based interest-bearing account created through a partnership between Safaricom and Equity Bank in Kenya, has established 700,000 personal accounts with $8 million in deposits. Such partnerships, in theory, could provide a mechanism for bringing mobile money customers into the formal banking system and enabling greater inoperability between the mobile money system and the broader non–cash economy. However, this depends on new business models emerging from the banking sector and its willingness to serve the base of the pyramid.

One of the advantages of building mobile-based savings products is the possibility of using technology to induce saving behavior through customer-driven design and the application of simple nudges. Experian MicroAnalytics, a firm with experience developing mobile money tools, found that the most effective savings products supported clients in meeting their own specified savings goals.[10]

Credit

A lack of access to affordable credit is perceived as one of the most significant constraints to escaping poverty. Informal credit services for the poor usually come with exorbitant interest charges. These reflect the personal interaction required, and thus the high transaction cost, of effective debtor monitoring that is necessary to maintain low rates of default.

Photo: © Bill & Melinda Gates Foundation

A mother and child stand near a mobile banking vehicle in Michinji village, approximately 120km west of the capital Lilongwe, Malawi.

Mobile money has many potential ways of reducing the transaction costs incurred in credit services for the poor (cashless payments and repayments, SMS reminders) but it faces a significant challenge in replicating the personal aspect of credit services. Future options could include using mobile money agents as collection agents or employing new technologies such as biometric identification tools; but for now, these business models remain unproven. An experiment from the Philippines found that SMS reminders boosted repayments by microborrowers only when the loan officer's name was identified in the text, providing further evidence of the significance to debtor psychology of knowing their creditor.[11]

One fruitful development is the possibility of using mobile phone activity records as a basis for issuing credit scores. In a precommercial pilot developed by Cignifi, the Inter-American Development Bank and the mobile operator Oi Telecom in Brazil, it was shown that a single month of activity records from prepay mobile customers provided sufficient information to discriminate both the risk of credit default and customers' interest in credit services.[12]

Insurance

As is the case with savings, mobile money provides an informal, albeit incomplete, mechanism for allowing customers to insure themselves against shocks by enabling reciprocal transfers among interpersonal networks of customers. This has been vividly demonstrated by the flows of transfers entering the western Lake Kivu region of Rwanda following the 2008 earthquake,[13] and into Nairobi following the postelection violence in 2007–8.[14] Research has demonstrated that M-Pesa customers are better able to absorb shocks and smooth consumption than households that do not use the service.[15]

More recently, a number of promising formal insurance

Cash is a constraint to development-esp for millions who are not near a bank. Mobile money remove that barrier. #blum2012

Photo by Alex Irvin

"I think the power of this device and of mobile technology to accelerate development goals and gains is as powerful and has as much potential as a tool as anything I've seen in my lifetime maybe next to vaccines."

— **Neal Keny Guyer** @nealkg
Chief Executive Officer, Mercy Corps

services have been launched through mobile money. Indeed, mobile money is at the vanguard of the expansion of micro-insurance in Sub-Saharan Africa. Successful offerings have been able to harness mobile customer activity records, both to assess customer risk and to tailor products to customers' needs. They have also taken advantage of the reduced transaction costs made possible through mobile-based sales and the trust bestowed on mobile operators by customers, which is a critical factor in driving demand for insurance at the base of the pyramid.

Among the most notable examples of mobile money insurance are Kilimo Slama crop insurance in Kenya, which employs weather stations to monitor rainfall and determine when payouts are to be made; and Tigo Family Care life insurance in Ghana, which is enabling households to protect themselves against the exceptionally high funeral costs unique to that country.

An interesting development among mobile money insurance providers in Tanzania, Pakistan, the Philippines and Ghana is the launch of promotions that reward high-activity mobile customers with free insurance over a given period. These promotions are predicated on the intuition that these same customers are low risk and important to operators' bottom line.

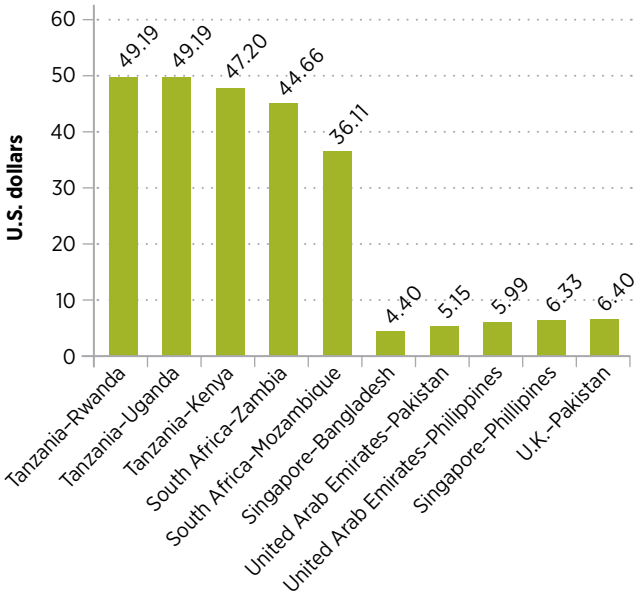
International Remittances

Mobile money has the potential to significantly reduce the cost of international remittances, as well as to increase access. The goal of reducing the cost of international remittances has been identified by both the Group of 8 and Group of 20, demonstrating its importance to global development objectives. Average global costs today are 8.96 percent (of the transfer value) and 12.4 percent for remittances to Africa. The cost of sending money across the Tanzania-Kenya border was nearly 10 times the price of sending money from the United Kingdom to Pakistan in 2011.

About one in five mobile money operators around the world offers international remittance services, in some cases in partnership with traditional money transfer operators such as Western Union. However, most of these services remain limited and have yet to drive down costs significantly.

A number of obstacles stand in the way of the development of this service. Chief among these is the prevalence of cumbersome regulations of international remittances in most countries. As with the payment of interest, the right to transact international remittances is typically limited to banks. Furthermore, remittances are subject to stringent rules to prevent money laundering and the financing of terrorism.

The Most and Least Expensive Remittance Corridors



Source: World Bank (http://remittanceprices.worldbank.org).
Note: Data is for Q3 2011.

Photo: © Miguel Samper for Mercy Corps

Photo by Alex Irvin

"A key question is whether or not digital networks are inherently so distributed and decentralized that they cannot form centralized leadership the way that physically organizing does. Digital revolutions or Twitter revolutions can have a lot of impact but people need to know how to organize and have hierarchies on the ground in order to translate their efforts into real change."

— Walter Isaacson @WalterIsaacson
President and Chief Executive Officer, The Aspen Institute

4 Translating information into power

Technology can serve as a powerful vehicle for connecting citizens and generating and sharing information. Countless new Web and cell phone applications are sprouting up across the developing world that combine communication, digitalization and data processing technologies in innovative ways in pursuit of humanitarian and development goals. A key objective is to narrow or eliminate the "information asymmetry" between the world's poorest people and better-off individuals, corporations or the state. A pursuant and arguably more ambitious objective is to translate information gains into greater accountability and performance from the institutions that serve the poor. The Brookings Blum Roundtable's discussion assessed the challenges for meeting these two goals.

Technology can reduce barriers to information flows in at least seven ways. First, it can provide convenient, low- or zero-cost platforms for search and exchange. Second, it can help overcome geographical constraints by bringing information to populations in remote areas. Third, it can anonymize individuals seeking information, thereby reducing the scope for discrimination. Fourth, it can expand the volume of information that can be transferred, allowing more frequent information exchanges and the sharing of more detailed information. Fifth, it can facilitate common information solutions—such as gap-filling, aggregation and analysis—whether through social networking, crowdsourcing or the processing of Big Data. Sixth, it can generate information systems and platforms (often open source) that can be easily replicated and brought to scale, such as the Janaagraha's I Paid A Bribe portal. And seventh, it can enable information to move more quickly, increasing the scope for real-time analysis and feedback.

Participants in the roundtable noted that simply unleashing more information into the public domain or within poor communities provides little guarantee that information will be consumed and put to use. In this respect, technology-driven information solutions face many of the same problems as do traditional solutions. A critical, and often ignored, criterion for success is the presence of sufficient demand for information among members of the target group. Factors such as literacy rates and the capacity to organize for collective action are important determinants of the uptake of information. On the other hand, the supply of information can vary in important ways that affect whether information is utilized. The quality, relevance, digestibility and complexity of information all matter, as does the form in which it is presented.

This can be illustrated by the experience of Kenya's Open Data Initiative. In July 2011, the Kenyan government released 160 data sets on a publicly accessible online portal. Despite much fanfare from the international press, the initiative found only modest resonance among Kenyan citizens. After an initial flurry of traffic, the number of Web visitors slowed to fewer than 120 page views a day. The sheet volume and complexity of data were seen as a constraint on the portal's usability. Another was the readiness of its audience; only a third of Kenyans have access to the Internet, and more than a third of the country's adults are illiterate.[16]

Even where market forces for information operate well, there is no guarantee that better information will be acted upon without recognition of the broader environment in

"It seems that we are in between eras, using 20th century tools to respond to 21st century development challenges. One of the things that we're seeing is a lack of faith in institutions where people ask for something and the right institution is not there to respond to them."

— Madeleine Albright
Chair, The Albright Stonebridge Group; U.S. Secretary of State, 1997–2001

Photo by Alex Irvin

Photo by Alex Irvin

"Technology can be terrific, and there are many examples we have where technology is working. But in this case we learnt that technology does not trump politics. If you have an accountability chain underpinned by expectations and decades of experience that tells you that certain types of accountability work and others don't, simply introducing technology will not change that dynamic."

— Rakesh Rajani @rakeshrajani
Head, Twaweza

Photo by Alex Irvin

"Governments are only beginning to figure out how to fully engage their citizens through these new communications technologies in a way that creates a reciprocal dialogue. At the moment, we're more in receivership mode than we are in participatory mode, but that will continue to change."

— Michael Froman
Deputy National Security Adviser for International Economic Affairs, National Security Council and National Economic Council

which that information is introduced. This includes factors such as the responsiveness and cooperation of the state and freedom of the press. For example, in September 2008 four Jordanian technologists developed the Web site Ishki.com to serve as a complaint brokerage to collect and organize citizen complaints about their country's public and private sectors. After a year of growing activity, the site's number of new users and submitted complaints began to drop off. The site's developers attribute this to the hesitancy of Jordanians to publicly complain about powerful institutions and individuals, and the fear that their IP addresses would be tracked by the authorities.[17]

This example serves as a reminder that information does not guarantee accountability. Bringing to light an institution's failings or corruption does not, by itself, imply any penalties or consequences. The roundtable's discussion highlighted the tension this poses for those seeking to use connectivity and information to deliver systemic change in a poor institutional environment: Should technology be used to demand change from institutions or to help the poor become more self-sufficient and their own change agents? In other words, are information solutions best employed as a substitute, as a complement, or as a catalyst for good institutions?

Technology provides a tool for citizens to both disintermediate and mediate vis-à-vis institutions. Participants in the roundtable hypothesized that institutional failings may be most effectively addressed by a combination of the two: disintermediation where institutions are not crucial or are beyond repair; and mediation where institutions play a pivotal role and respond constructively to public pressure. Without the right balance, information solutions may do more harm than good. For instance, amplifying people's demands without a clear grasp of choices or without the institutions to channel those demands may lead to worse policy decisions.

Best use of tech for dev will not be created by us but by people on the ground who are closer to the problem; able to id solutions **#blum2012**

Photo by Alex Irvin

"Mass networks, by definition, start with scale, so getting big is not the challenge. But to make them maximally effective you have to go from big back down to small by forging convergence and coalescence around a smaller number of nodes that then feed into regular channels of communication and accountability."

— **Anne Marie Slaughter** @SlaughterAM
Bert G. Kerstetter '66 University Professor of Politics and International Affairs, Princeton University

An example of this tension is provided by the use of social media tools to support the transition to democracy in Guinea following the Bloody Monday massacre in September 2009. The civil society group Alliance Guinea set up the Ushahidi open source mapping software to support citizens' reporting during the 2010 presidential election. This initiative was carried out in partnership with the African Elections Project (an independent elections monitoring and information group), the National Independent Election Committee and a number of mobile phone operators.

The Ushahidi platform had a strong response from citizens, but was handicapped by its limited authority: citizens' reports could not be verified and were vulnerable to deliberate false reporting; Alliance Guinea lacked the capacity and authority to respond to reports of malpractice; and during postelection violence, the government temporarily blocked access to the text services upon which the platform depended. Citizens' reporting may well have succeeded at deterring fraud at the margin, but it was no substitute for formal election monitoring. The integration of election monitoring and informal citizen monitoring, as has been attempted in other countries, would appear to offer the potential for better results. This could include uploading reports from election monitors on the mapping software alongside crowdsourced information and using independent election monitors to inform the design of Alliance Guinea's interventions and advocacy campaigns.[18]

Photo by Alex Irvin

"We're swimming in an ocean of real-time digital data being generated for free, everyday, by populations around the world. The data out there are immense. There were more data created in 2011 than in all of the rest of human history combined back to the invention of the Phoenician alphabet."

— **Robert Kirkpatrick** @rgkirkpatrick
Director, UN Global Pulse, Executive Office of the Secretary-General

Electrical Student Jean Louis Thomas writes a text message to a friend while in downtown Port-au-Prince, Haiti.

Photo: © Bill & Melinda Gates Foundation/Natasha Fillion

Photo: Solar Electric Light Fund (SELF)

5 Can social protection deliver green energy access?

One of the few beliefs shared by climate advocates and climate skeptics is the critical role that innovation can play in supporting green growth. Brookings Blum Roundtable participants discussed this role with particular reference to the challenge of expanding energy access to the world's poorest people.

The scale of this challenge is daunting. A quarter of the world's population (1.5 billion people) lives without electricity, and almost twice that number lack clean fuels for cooking. The UN secretary general has set a goal of reaching universal access to energy by 2030, alongside simultaneous goals to double reliance on renewable energy sources from 15 to 30 percent and to double rates of energy efficiency so that global energy consumption declines.

As is the case in other sectors, innovation in green growth is typically associated with technological breakthroughs and the development of new products. And over recent years, we have seen unprecedented innovation in this field: see section 6. However, innovation is equally important in enabling these products to be brought to scale, whether by identifying a viable business model, forming supportive partnerships or establishing policies and regulation that create the right incentives.

One innovative approach to expanding access to energy was put forward at the roundtable: the possibility of employing existing social protection systems to propagate green energy products to those without electricity or clean fuel. This could take one or both of two forms:

- First, social protection systems provide an "infrastructure" for managing the delivery of cash, vouchers or goods in kind to large numbers of people across a region or country. This infrastructure includes tried-and-tested systems for record-keeping, logistics, overseeing personnel, interfacing with beneficiaries, and other back-office functions involved in running large-scale operations.
- Second, many social protection systems have a mechanism for identifying target beneficiaries among a broader population. Target beneficiaries may be identified through one of various methods: community selection, self-selection, geography or proxy means testing. Records of those beneficiaries are then made in registries. The recording of biometric information can greatly enhance the accuracy and reduce the cost of records and identity verification.

The potential for piggy-backing on either the infrastructure or identification tools of social protection systems to deliver green energy access is driven by the recent proliferation of these systems in the developing world and their increasing levels of sophistication. The New America Foundation's Global Savings and Social Protection Initiative tracks 105 social protection programs that use cash transfers alone. The World Bank was involved in the formation of 19 social protection initiatives during the 2008–9 financial crisis, mostly in low-income countries. Although this growth in social protection coverage is significant, its effect should not be overstated. Few low-income countries have existing social protection systems operating at a national scale. Indeed, social protection of any sort reaches less than a quarter of the poorest quintile of households in Africa.

Green **#energy** is as much about business model #innovation as #tech innovation **#Blum2012**

"Here we are in 2012 and we are still getting routinely linear lowball estimates of what the potential for these green energy technologies is. And I will refrain from saying why we need to move faster—you can connect the dots. Every night on the news is like a nature hike through the Book of Revelation."

— **Al Gore** @algore
Chairman, The Climate Reality Project;
Former Vice President of the United States

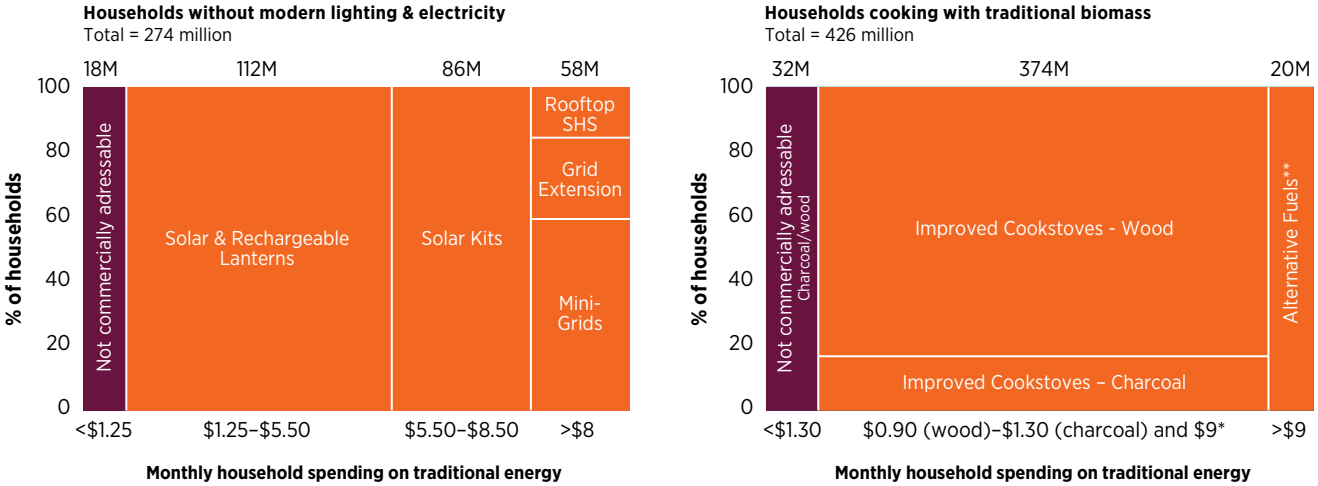
Photo by Alex Irvin

About half a billion people in the developing world have had their biometric identification (using fingerprinting or iris or facial recognition) recorded in a government database—a number that is currently rising at an astounding rate of 25 percent a year. This information has been used in at least 15 countries to verify the recipients of cash transfer programs and in many others for in-kind transfers. AADHAAR, the world's largest identification project in India, is able to record an individual's biometric information at a cost of only $0.79. It is estimated that savings generated by the incorporation of biometric identification into a typical cash transfer program can cover the sunk costs of information collection in only 15 months and save an additional $60 million after five years. Cash transfer programs that have implemented biometric systems have reported savings as high as 10 to 20 percent from fraud reduction.[19]

An added incentive for serving green energy access goals through social protection systems is to replace expensive and inefficient fuel subsidies that tend to favor the rich. Fuel subsidies in Sub-Saharan Africa cost more than 2 percent of the continent's gross domestic product.

The World Bank is currently exploring the feasibility of

Potential Market for "Lighting Plus" and Improved Cooking in 2010



* The lower bound for monthly spending on wood (~0.9) is below the charcoal limit (~1.3) because the efficiency gains from wood-fired improved cookstoves (~40%) are higher than the efficiency gains from charcoal cookstoves (~30%).

** Alternative fuels include pellets, LPG.

Source: IFC analysis.

Note: The segmentation of improved energy alternatives is indicative, reflecting current estimates of technology costs and pricing and how much households spend at the global level. This should not be interpreted as a fixed market size for specific products or services, which is best determined on a country level using local technology costs and pricing and willingness and ability to pay.

Photo by Alex Irvin

"Initiatives aimed at access to sustainable energy must consider the largest but poorest socioeconomic group, the so-called bottom of the economic pyramid. This is an issue of climate justice because these are the people who are most vulnerable to the impacts of climate change but who have done least to cause it. Identifying specific measures to reach those least able to pay for energy and low-carbon technologies must be a priority."

— Mary Robinson
President, Mary Robinson Foundation–Climate Justice; Former President of Ireland

this concept with partner countries. However, a key challenge in the design of any program will be to determine how generous—or how narrowly targeted—it should be. That judgment depends on the scope for solving green energy access through market-based solutions, and the speed with which policymakers expect to see scaled-up access.

Until recently, debates about energy access have been dominated by a public sector mindset. But that is changing as the economics of green energy alters and a growing cadre of entrepreneurs demonstrates the ability to turn a profit serving low-income customers. It is estimated that 90 percent of those households without electricity and clean fuel spend more today on kerosene lamps, disposable batteries, firewood and other traditional fuels than the retail price of cleaner commercial products such as solar lamps and efficient cookstoves.[20] Yet we will not see a switch to these products until commercial markets for green products become accessible themselves, and consumers are better informed, both of which will take time.

A well-designed social protection system could meet the energy needs of those at the very base of the pyramid where commercial opportunities are not expected to emerge in the near future, while catalyzing business interest higher up the pyramid by nudging consumers toward green energy products. By contrast, a poorly designed system could undermine commercial solutions and compel the clean energy market to a future that relies on permanent subsidies and that is ultimately less efficient and sustainable.

A cautionary tale is provided by the scaling up of access to insecticide-treated bednets in Tanzania over the past decade.[21] In 2004, the Tanzania National Voucher Scheme (TNVS) was launched, through which the government, in partnership with various actors including the Global Fund and the President's Malaria Initiative, subsidized the cost of bednets for the most vulnerable members of the population. Under this system, a voucher was given to each pregnant woman on her first visit to a health clinic to reduce the cost of a bednet, priced at between $3 and $10, by $2.50. The system also served as a social marketing program to disseminate knowledge about malaria and the importance of bednet use.

The TNVS was initially attributed with expanding access to bednets while spurring competition from suppliers through to retailers. However, the publication of research demonstrating that partial subsidies failed to remove the affordability constraint for the poorest households, combined with a desire to accelerate progress toward universal access, led to reforms in 2009 that expanded the TNVS, with far-reaching consequences. Though access to bednets increased further, as had been envisaged, domestic competition for the production of bednets was hurt due to a revised TNVS design. The government tender to source the bednets created a monopoly in the supplier market, while the creation of a barcode system to ensure a maximum price for beneficiaries handed responsibility for distribution to the supplier, effectively eliminating the wholesale market. Simultaneous campaigns to distribute bednets freely among other target groups further eroded the retail market. This undermined much of the work to foster a commercial, competitive market for nets in Tanzania that had been done by organizations such as Population Services International.

This is not to say that the decision to expand the TNVS and to distribute bednets freely was wrong. Rather, this case study highlights the difficulty of balancing the speed with which results can be achieved with their cost and sustainability; and the potential for public interventions to create a range of market incentives depending on their design and scope.

Photo: China Alliance for Clean Stoves

6 A survey of energy access solutions

The participants in the Brookings Blum Roundtable noted that the prospects for expanding access to clean energy among the world's poor are improving rapidly as a result of new technologies available at affordable costs. Here we profile six innovative energy access products and services identified in the International Finance Corporation's 2012 report *From Gap to Opportunity: Business Models for Scaling Up Energy Access*. The IFC estimates that the propagation of these solutions could annually prevent 800,000 premature deaths related to indoor air pollution and 300 million metric tons of carbon dioxide emissions.

- **Improved cookstoves:** Thanks to sustained engagement from business, researchers and governments, there now exists a range of competitively priced and customer-driven well-designed cookstoves that achieve improved efficiency (with between 30 and 50 percent savings in fuel) and reduced emissions. Competitors include both local small and medium-sized enterprises, such as the Ghana-based Toyola Energy, and international players, such as U.S.-based Envirofit. Commercial costs for improved cookstoves now start at as little as $5, or 40 cents per month over the life cycle of the product.
- **Solar and rechargeable lanterns:** Solar and rechargeable lanterns, which combine small photovoltaic panels, non-disposable batteries and an LED lightbulb, are recording large decreases in price thanks to economies of scale. With prices as low as $10, these products are gaining popularity with both the rural poor and urban slum dwellers as a cost-effective and durable alternative to less safe and clean kerosene lamps. Many of these lanterns are now being fitted to allow for mobile phone charging, such as those produced by the India-based for-profit social enterprise d.light, whose products have reached more than 10 million people.
- **Solar kits:** Solar kits typically include a portable solar panel, nondisposable batteries, multiple lights and sockets for mobile phones and small appliances such as a black-and-white television. These have higher energy storage capacity than the more simple solar and rechargeable lanterns, are efficient, can be bought off-the-shelf, and do not require installation or much maintenance. Retailing at $100–$150, solar kits are considered an aspirational purchase by the poorest households. San Francisco-based Fenix International has created a partnership for distributing its solar kits with the Uganda mobile phone operator MTN, whereby MTN imports, warehouses, distributes and assists in servicing devices, in return for increased revenue made possible by its customers' access to electricity.
- **Solar home systems:** Solar home systems are a comprehensive energy solution for poor households and come equipped with a permanent photovoltaic panel installed on a roof or attached to a pole. These start in the $300–$500 range and have the capability to power large appliances. They require professional installation and regular maintenance but can last from 15 to 30 years with no operating costs. Solar home systems have taken off in Bangladesh, spurred by major producers such as Grameen Shakti. From 2000 to 2010,

What's the barrier to more innovation in development, more scaling up? Don't think fundamental problem has been identified yet **#blum2012**

Photo: © Jenny Bussey Vaughan/Mercy Corps

solar home systems' penetration of Bangladesh's unserved population grew from less than 1 percent to 40 percent.

- **Minigrids:** Minigrids are small-scale and decentralized power systems that provide electricity to poor communities that are not connected to a central grid. Customers for one minigrid can range in number from as few as 10 to several thousand. Minigrids can be operated using a range of sources, including diesel, hydropower, biomass, photovoltaics and wind. Cambodia's Vihearsur Electrify Enterprise, for example, supplies power profitably to 1,760 customers 24 hours a day in a district outside Phnom Penh for about $8.44 per month each.
- **Grid extension:** Efforts to expand access to centralized electricity grids for poor households in urban, peri-urban and rural areas usually depend on reshaping the service to serve low-income customers. This may include the installation of prepay meters, allowing flexible payment, and offering consumer finance. Efficiency gains and theft prevention can improve the financial viability of these initiatives. However, purely commercial models remain rare, and the most prominent examples benefit from strong public support and smart subsidies. For instance, in Brazil, CEMAR, the private utility serving the State of Maranhão, succeeded in extending access by 50 percent to the poor with help from a public program called Luz para Todos, which supported approaches to increasing access that had the lowest cost per capita.

Photo by Alex Irvin

"The good news is that in 2011 global investment in renewable energy was $187 billion and for the first time in global history, it exceeded investment in traditional sources of energy by 20 percent."

— **Viswanathan Shankar**
Group Executive Director and CEO, Europe, Middle East, Africa and Americas, Standard Chartered Bank

Photo by Alex Irvin

"Developing countries are far from hostile to greening their economies. The questions they're asking are: How? What are the means of implementation? And specifically, how do we fund this transformation? How do we develop the capacities for it? How do we access the technologies that we're talking about, which make transformation possible? And I think having convincing answers to these questions really lies very much at the heart of 21st century development."

— Helen Clark @HelenClarkUNDP
Administrator, United Nations Development Programme

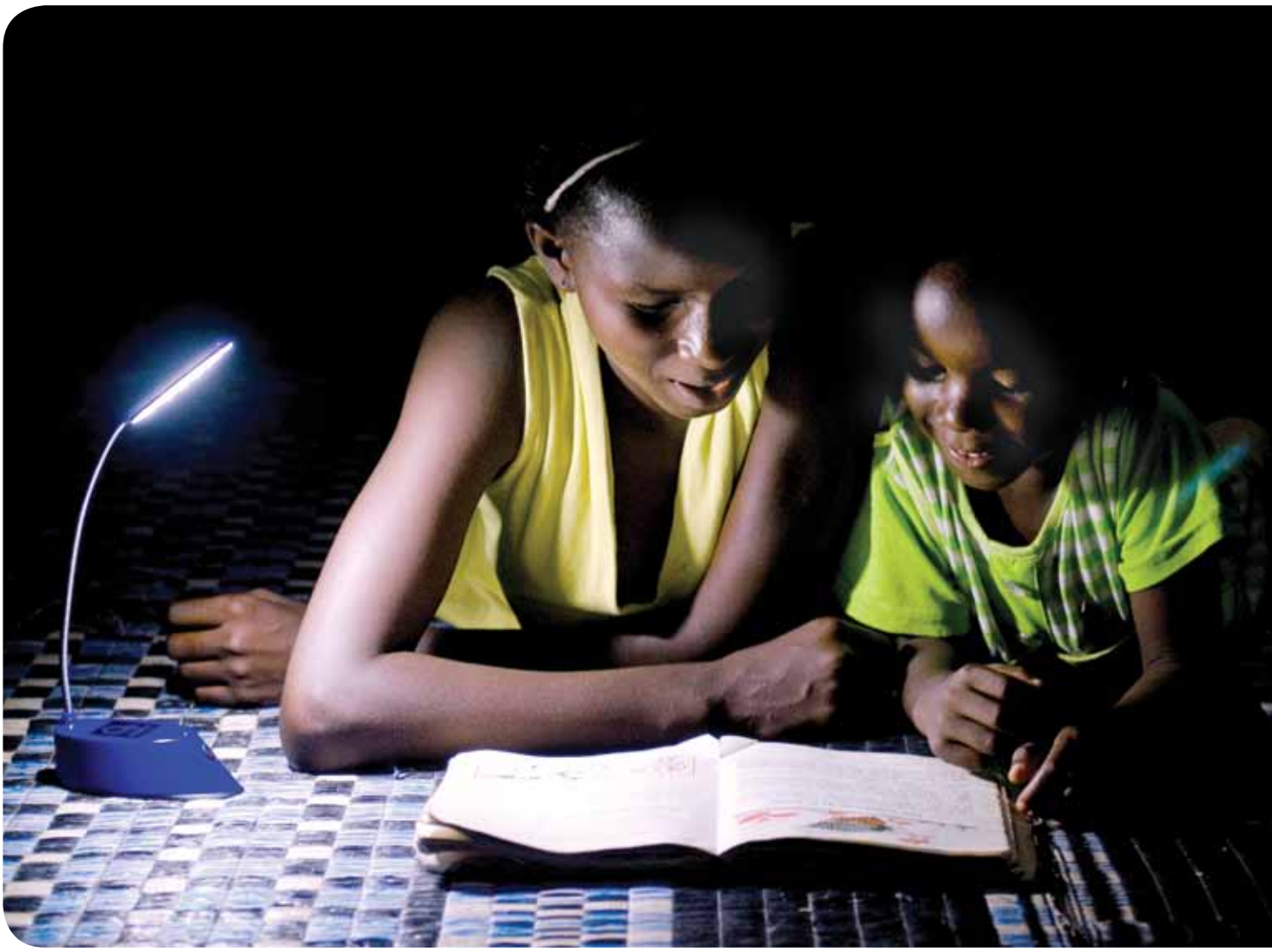
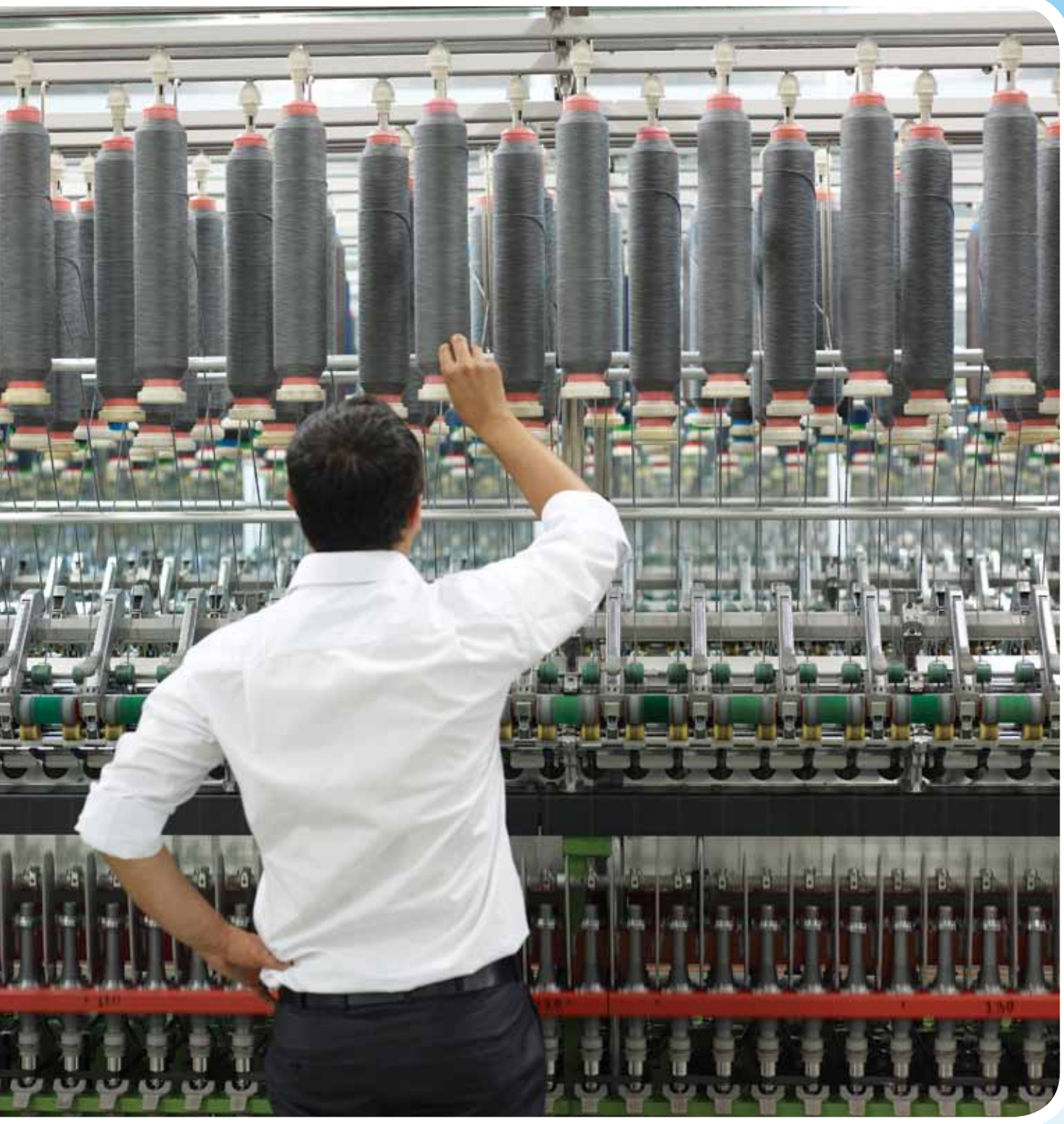


Photo: International Finance Corporation



7 What impact does technology have on jobs?

In keeping with the mood of economic despondency, there has been lots of pessimistic talk in the U.S. and the rest of the industrial world about innovation in today's economy, or the lack thereof. For instance, Tyler Cowen's best-selling e-book *The Great Stagnation* argues that innovation is occurring at a slowing rate and that the innovation that is taking place, such as through the application of the Internet, has had a relatively limited impact on living standards and job creation. In a similar vein, the economist Bob Gordon hypothesizes in a recent paper that the presumption of continuous growth can no longer be taken for granted when today's innovations do not generate sustained improvements in labor productivity. One area where everyone agrees that technological change is making a difference is in driving a wedge between high- and low-skilled wages, leading to widening inequality and a stagnant median income since the 1990s.

One of the questions posed at the Brookings Blum Roundtable was to what degree these concerns have salience in the developing world, especially in low-income countries. Because developing countries stand some distance from the global productivity frontier, a speculative slowdown in technological development or a decline in the impact of these technologies should not concern them. They can continue to raise their prosperity by harnessing the existing technologies employed in the West. However, that still leaves the question of the impact of technology on jobs.

There is a growing recognition that jobs are an economic and political priority in developed and developing countries alike. Given demographic trends, merely sustaining current rates of employment around the world during the next 15 years will require the creation of 600 million new jobs worldwide. Jobs are not just a by-product of growth but are also central to improving living standards and social cohesion. For instance, supporting job creation has been identified as one of the first priorities for fragile states, especially those emerging from conflict.

How, then, does innovation affect jobs in the developing world? The participants in the Brookings Blum Roundtable noted the complex relationship between innovation and employment. There is an important distinction to be made between *process* innovation, whose direct effects are most associated with job losses as productivity gains eliminate the need for labor, and *product* innovation, which is typically associated with job gains to serve new markets. Low levels of research and development from domestic firms and public investment mean that most technical change in developing countries is reliant on trade and foreign direct investment and engendered in the capital goods imported from rich countries. However, the ultimate effect on employment of these technologies depends on the net impact of labor productivity gains and the output growth these technologies propel. Whether countries are able to fully develop the growth and employment potential of imported technologies depends on the absorptive capacity of domestic firms—a daunting challenge for many businesses in low-income countries.

The impact of innovation on the quality of jobs in developing countries is similarly hard to unpack. As in the developed world, many new technologies shift the demand for labor in

favor of more skilled workers—an effect known as skill-biased technical change. However, this is counterbalanced by the expectation that trade in global markets, especially in the presence of new technologies at the frontier, will lead developing countries to specialize in the production of labor-intensive goods that capitalize on their comparative advantage, creating opportunities for the unskilled.

The latter effect could create new opportunities for Africa's workforce in the imminent future. As its wages rise, China is expected to graduate from its focus on low-skilled manufacturing in the coming years, freeing up an estimated 85 million jobs. This is more than four times the number of industrial jobs in Africa, where there remains an abundant supply of unskilled labor. Whether this could spark a broader take-off in Africa's development is a much larger question and is threatened by the spread of skill-biased technological change. The model of labor-intensive manufacturing growth that singularly drove the development of South Korea, Singapore, Taiwan and China is difficult to emulate as technology transforms industry to become more dependent on skills and capital. Technology is more readily transferred in manufacturing than in other sectors, but today's poor countries can no longer rely on this to drive their economies, and so must try to foster the skills and institutions necessary to support other sectors.[22]

The impact of skill-biased technological change in developing countries is therefore a legitimate concern. So far at least, the trend toward widening income distributions remains limited to the West and a few large emerging economies. Within most developing countries, the evidence suggests that inequality has likely moderated over the last decade, despite assumptions to the contrary. Nevertheless, roundtable participants concluded that today's low-income countries face a daunting challenge in identifying a sustainable development path that utilizes their abundant unskilled labor, given today's technology and the competitiveness of global markets.

Photo by Alex Irvin

"Over the last decade or so you have many countries where the share of labor in low productivity activities is actually increasing because technology is displacing labor. It's worth thinking about what kind of transformational technologies are increasing employment versus other types of technological developments which may in themselves be very powerful and make some people much more productive and healthy and so on, but overall may have an employment-shrinking effect."

— Kemal Dervis

Vice President and Director, Global Economy and Development, The Brookings Institution

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Photo: © Shehzad Noorani/World Bank

Photo by Alex Irvin

"There is an absolute dearth of untied, unfettered, generous, patient capital ready to take risks on business models that haven't yet been proven. The microfinance industry benefitted from what some people estimate was $20 billion of that kind of money, experimenting with business models until we got it right, until it took not 10 years but three years for a new institution to break even."

— **Elizabeth Littlefield** @elittlefield
President and Chief Executive Officer,
Overseas Private Investment Corporation

Unblocking dealflow in impact investment opportunities

The past decade has witnessed growing optimism for finding commercially viable market-based solutions to global development challenges. Such solutions are attractive from a development perspective because they promise to expand the resources and skills deployed in development efforts, propagate innovative products and business models, and provide a proven sustainable route—market forces—to take these to scale. Clean cookstoves, community water, microfinance and mobile money are examples that vividly demonstrate this potential.

While private firms and social enterprises are busy developing these solutions, a cadre of enlightened investors is playing an important catalytic role. These impact investors include development financial institutions such as the U.S. Overseas Private Investment Corporation, investment banks such as J.P. Morgan, retirement funds such as TIAA-CREF, foundations such as the Skoll Foundation and investment funds such as Root Capital. Today, impact investing is emerging as a standalone asset class, with an estimated value of $50 billion. The participants in the Brookings Blum Roundtable discussed the growing pains associated with this asset class, which provide some useful insights on the broader challenges confronting market-based development solutions.

A central problem cited by roundtable participants was "deal flow": a shortage in the supply and range of high-quality investing opportunities. This is corroborated by a recent survey of impact investors (see table). The roundtable discussion explored the factors that lie behind this problem.

A first step in understanding this constraint is to distinguish between different stages of investment. Most impact capital is focused on the later stages, when business models are already proven and ready to be brought to scale. By contrast, only a handful of investors support the early stages when business models are still being developed and tested. A review of 90 funds by the Monitor Group in 2011 found that only 10 percent provide angel or seed capital to support new start-ups and

Industry survey of the most critical challenges to the growth of impact investing today
Number of respondents = 99; Respondents ranked their top three

RANK	SCORE	AVAILABLE ANSWER CHOICES
1	143	Lack of appropriate capital across the risk/return spectrum
2	140	Shortage of high quality investment opportunities with track record
3	76	Difficulty exiting investments
4	58	Lack of common way to talk about impact investing
5	53	Lack of innovative deal/fund structures to accommodate portfolio companies' needs
6	48	Inadequate impact measurement practice
7	44	Lack of research and data on products and performance
8	32	Lack of investment professionals with relevant skill sets

Source: GIIN, J.P. Morgan, 2013

Need a global first loss fund for early stage, riskier investments -- grant money before investments. #Blum2012

"Identifying local investors is key for building an entrepreneurial ecosystem in poor countries. Often, it's not about market entry so much as market creating. Therefore, you need people who know the local systems, the local networks, the local connections. In Silicon Valley, many investors won't invest outside a 10 to 15 mile radius, because they know the human capital they bring is just as important, if not more, than the financial capital they bring."

— **Amy Klement** @amyklement
Vice President, Investments, Omidyar Network

Photo by Alex Irvin

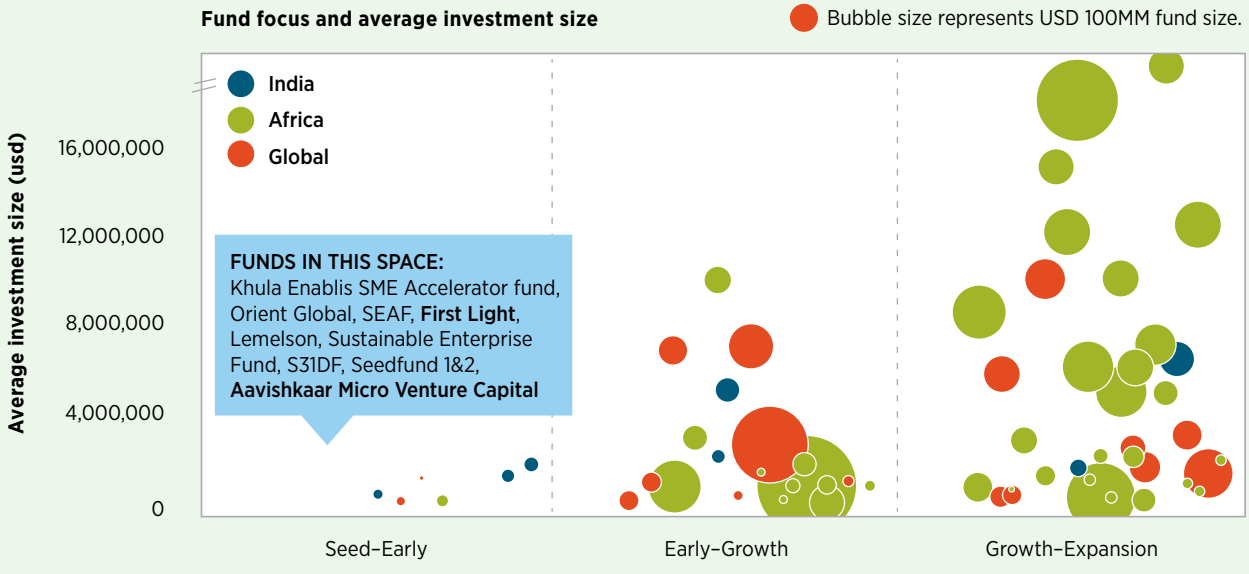
product innovations. The Omidyar Network estimates that of the $50 billion in capital devoted to impact investment, the amount available each year for early-stage investments is in the low hundreds of millions of dollars.[23]

The paucity of early-stage investment in market-based development solutions is easy to explain. Such investments are inherently risky with long, undefined maturities and high rates of failure, but without the upside of occasional outsized returns which venture capitalists can achieve in other markets. Furthermore, investments are typically small in size and complex, implying high transaction costs. This combination of low margins, small size and indeterminate timescale are anathema to investors' bottom line.

With little capital invested in the early stage of the business

Focus of Impact Investment Capital Industry (90 Funds), Mid–2011

Most impact funders currently play primarily in the growth/expansion phases, but with some focus on early phases. There is little capital available at seed stage.



% Total Investors	**13%**	**22%**	**65%**
% Total Investment	**19%**	**29%**	**52%**

Illustrative—Fund landscape not exhaustive.
Analysis by the Monitor Group.

Photo by Alex Irvin

"Getting business models right takes time and requires a lot of trial and error. Our analysis of 50 high performing social enterprises found profit margins of between 3 and 15 percent if they're doing really well, but it takes 10 years or more for most social enterprises to reach any kind of meaningful scale, which means there's almost no return in the early stage financing of these enterprises. And unlike conventional venture capital, you're not going to get your return back from hitting it big on one investment to cover the cost of the others. None of these are making extraordinary margins, extraordinary returns to give you that portfolio effect."

— Mike Kubzansky
Partner, Monitor Group

lifecycle, few validated business models successfully emerge whose expansion subsequent investors could then support. Hence, when investors complain of weak deal flow, they are specifically referring to the later stages of investment in which most impact investors specialize. The demand-supply imbalance indicated by a weak deal flow reflects the inverse problem at an early investment stage when there are a multitude of capital-constrained firms but scant demand for investment opportunities from the very same set of investors.

Supporting the early stage of business development is not just a matter of providing money. An integral part of Silicon Valley's success is the hands-on involvement of investors in the ventures they support, imparting expertise, forging market linkages, and informing recruitment. The same is true for impact investors where the imputed cost of human capital combined with transaction costs can easily exceed the size of financial investments. However, replicating the Silicon Valley model is a challenge for impact investors. Few have a presence in target countries to allow regular contact with firms, or sufficient local knowledge and networks to draw upon. A 2011 study of impact investors supporting small and growing businesses by Santa Clara University found that investors who practiced "high-touch" portfolio management (defined as "monthly contact or greater" with firms) reported significantly higher return expectations than those who employed less frequent contact, but this comes with the trade-off of larger overheads.[24]

The problem of deal flow is exacerbated by the fragmented nature of the impact investment sector in which investors operate and deals are struck largely independently of each other. This increases the transaction and search costs incurred with individual investments. In theory, these costs could be mitigated by increased coordination and information sharing between investors, creating a transparent and efficient pipeline of investment opportunities as businesses transition through different investment stages. However, many impact investors prefer to operate independently and perceive this as integral to their ability to generate profits in challenging markets. Such investors are unlikely to readily disclose information regarding their investments or to rely on information picked up secondhand from rival investors. This is a reminder that impact investors are a diverse group; while they all share an interest in both commercial success and social impact, they vary in terms of the weight applied to these two goals.

A related constraint is the limited enabling infrastructure in the impact investing industry. Compared to mature asset classes, impact investing has few dedicated institutions and services to grease the wheels of investment deals. Most transactions take place without the benefit of market exchanges, rating agencies, investment banks, brokers, or specialist lawyers, making potential deals harder to identify and value, as well as to close.

As the industry grows, this infrastructure is likely to develop. Indeed, there are signs that such changes are already afoot. Open Capital is a deal-broker service based out of Nairobi that prepares businesses for capital raises and helps structure and negotiate investments. The African Enterprise Challenge Fund, hosted by the Alliance for a Green Revolution in Africa, is helping to identify the best new ventures for investment through a competitive mechanism. Industry associations such as the Global Impact Investing Network and the Aspen Network of Development Entrepreneurs are taking various steps to improve the functioning of the market.

These developments are undoubtedly positive but the deal flow problem continues to loom large. An unresolved question posed at the roundtable is whether ultimately more purely philanthropic funding is needed in early stage investment if the potential of market-based development solutions is to be unleashed and if so, how it might be mobilized.

Photo: © *iHub/Johathan Kalan

9 Localizing innovation

President Obama's September 2010 Presidential Policy Directive on Global Development identifies innovation and technology as a key component of the government's efforts to alleviate global poverty. This focus makes sense, given that it draws on the comparative advantage of the U.S. economy.

Of course, the U.S. does not have a monopoly on good ideas. There is a growing recognition that some of the best recent innovations for development have emerged from within the developing world. Innovators there use their proximity to development challenges as an advantage, ensuring that their inventions respond precisely to local needs and are compatible with local behavior, culture and the environment.

In his Madeleine K. Albright Global Development Lecture, U.S. Agency for International Development (USAID) administrator Rajiv Shah articulated his vision for "open source development," in which USAID would serve as a platform connecting the "world's biggest development challenges to development problem solvers all around the world."[25] He noted the vast and expanding expertise that exists outside formal development institutions and the need to leverage these grassroots skills and resources. In addition, he expressed a bold and laudable commitment to finding, supporting and building strong institutions in developing countries, including through much-needed procurement reform. These institutions ultimately guarantee their countries' path to sustainable development and prosperity and thus represent an exit strategy for foreign assistance.

Here we look at two promising attempts to locate and foster innovation in the developing world through the formation of dedicated entities in developing country capitals, both of which were cited at the Brookings Blum Roundtable: Nairobi's iHub and Jakarta's Pulse Lab.

Nairobi's iHub

Nairobi's iHub is a collaborative space designed to nurture and facilitate innovation by young information technology entrepreneurs, Web and mobile phone programmers, designers and researchers. Part open community workspace, part vector for investors and venture capitalists, and part business incubator, the organization has set itself the ambitious mission of spurring "a revolution in the technology, products and services space" in the Kenyan business scene.

Erik Hersman, cofounder of the crowdsourcing Web site Ushahidi, started the iHub in 2010 with financial support from the Omidyar Network and equipment and high-speed Internet service from Nokia, Google and the East African home entertainment operator Wananchi.

The iHub is designed to support a set of activities that it calls the five "Penta Principles": innovation, community, entrepreneurship, business mentorship and research. For example, the iHub allows its members access to conference room space for meetings with venture capitalists, potential seed funders and local businesses; hosts informational technology events, workshops on high-performance computers, hackathons and international video teleconferences for local developers and information technology entrepreneurs; and

"In India, Ajay Kumar set up a platform to crowdsource information about when power cuts are happening, where. That's a fantastic example of the community teaching us that the best use of technology for development will not be created by us, it will be created by the networks of people who are on the ground and are close to the problem, and therefore, the solution."

— **Juliana Rotich** @afromusing
Executive Director, Ushahidi

Photo by Alex Irvin

Photo: © Warren Goldswain / Shutterstock.com

holds prize competitions for the most innovative business ideas. The iHub has its own dedicated research arm to build local research capacity and to conduct its own quantitative and qualitative research in the field of information and communications technologies and development.

Despite being only two years old, the iHub can already boast a number of successes. More than 90 start-up companies—including Kopo Kopo, the popular mobile payments platform for small and medium-sized businesses—have been launched from the iHub, and at least 10 have received seed funding from venture capitalists. Altogether, the iHub counts 9,000 members. Efforts are currently under way to built Africa's second supercomputer at the iHub, to support higher-level research.

Pulse Lab Jakarta

Indonesia is arguably the world's most rapacious consumer of social media. As of February 2012, a higher proportion of Indonesia's Netizens tweet than those in any other country. Indonesia is home to the world's third-largest number of Facebook users. Mobile phones are also ubiquitous, with as many phones in use—237 million—as the country has people.

Inspired by this record, the United Nations chose Jakarta as the location for the first "Pulse Lab" of the Global Pulse initiative, a program to harness Big Data to monitor development indicators in real time. The lab was opened in October 2012 with initial funding from the Indonesian ministry of national development planning (BAPPENAS), the Australian Agency for International Development and UNICEF.

The Pulse Lab will seek to bring together researchers from the Indonesian government, in-country UN agencies, nongovernmental organizations and the private sector to explore how Big Data can be used to help Indonesia's

Photo by Alex Irvin

"In harnessing innovation and technology to advance economic development, it's important to consider investing in existing programs at research centers around the world and, more importantly, funding investors that are already fairly sophisticated and operating in the local market. We don't always need to reinvent the wheel."

— Thomas Nides
Deputy Secretary of State for Management and Resources, U.S. Department of State

Photo: © Pulse Lab Jakarta/Ng Swan Ti

policymakers better understand and respond to the vulnerabilities of its population. Specifically, the lab will explore the use of social media and Twitter analytics, mobile phone data analysis, rapid mobile surveys and geospatial mapping to analyze changes in social welfare as it relates to food and fuel (both transportation and cooking) prices, employment and urban poverty.

The Pulse Lab's official launch featured findings from its first project, performed in collaboration with the business analytics group SAS and social media analyst Crimson-Hexagon. The project analyzed social media content (aggregated and anonymized to protect privacy) from the past two years to see whether it could identify populations and regions under stress from food and fuel price increases, based on comparisons with official Indonesian government statistics. The study's results indicated the potential for using real-time social media data to conduct rapid assessments of vulnerability and to speed up the government's response.

Photo: © USAID/Bobby Neptune

10

Building a DARPA for development

The U.S. government is considered a leader in the application of innovation and technology to address global development challenges. The Obama administration has built on that reputation with new resources, policies and initiatives over the past four years.

In just the latest example, the U.S. Agency of International Development (USAID) announced in December the launch of the Higher Education Solutions Network, a five-year, $130 million partnership with seven American and foreign universities to establish "development labs" that will apply science and technology to identify and address key global challenges in areas such as global health, food security and persistent conflict. This initiative has been described as the beginnings of a "DARPA for development," a reference to the U.S. Department of Defense's research and development organization, the Defense Advanced Research Projects Agency.[26]

DARPA is one model for the promotion of technology and innovation by government. Another is the National Institutes of Health (NIH), which has a very different mandate and structure. Both agencies were cited at the Brookings Blum Roundtable as possible archetypes for the design of a government entity dedicated to furthering an innovation agenda for global development.

Here we explore these two models, both held up as exemplars of good practice, to see what lessons and insights they provide to guide the U.S. government's evolving global development agenda. This analysis can help to answer two questions that were raised at the roundtable that are central to formulating the U.S. government's approach to technology and innovation as it applies to development:

First, what is an appropriate role for government in supporting innovation and technology for development? The case for government support for innovation and technology is justified by invoking several market failures that government intervention can help to overcome. However, poorly designed interventions can introduce distortions rather than appropriate incentives for researchers, entrepreneurs and investors, while overreach can crowd out other actors rather than catalyzing their engagement.

Second, what does a joined-up policy on technology and innovation for development look like? The U.S. government is engaged in many activities, from supporting the invention of scientific breakthroughs, to establishing competitive mechanisms to spur innovation through experimentation, to taking innovative solutions to scale or removing barriers to scaling up. These activities involve various parts of government, ranging from USAID and the State Department to the Energy, Health and Agriculture departments and the U.S. Patent and Trademark Office. As with other aspects of the government's global development policy, understanding and improving how these various moving parts relate to each other is a key criterion for effectiveness and coherent policymaking.

DARPA and NIH

DARPA was established in 1958 as part of the U.S. government's response to the launching of the Soviet Union's Sputnik satellite. Its core mission is to maintain the technological

"The U.S. government started investing in what became the Internet in 1969, and it wasn't until the mid-1990s that it really became a commercially viable and driven phenomenon. So even in very rich countries, the state still plays a very important role in supporting fundamental research and supporting long-term high risk research. The federal government has some models like DARPA that do a really phenomenal job of supporting breakthrough technologies and we have to figure out how we can create some of those models to support development as well."

— Tom Kalil
Deputy Director for Policy, White House Office of Science and Technology Policy

Photo by Alex Irvin

superiority of the U.S. military and to prevent technological surprise by America's adversaries by facilitating and sponsoring "revolutionary" research into advanced technologies and systems. DARPA is distinguished from other research and development offices in the Department of Defense by its independence from the military and its focus on high-risk, high-payoff projects that deviate from, rather than incrementally improve, the military's existing technology.[27] The agency is relatively small, with 240 employees contained within a flat, nonbureaucratic structure. Its research program is flexible and organized around a collection of typically three- to five-year projects each defined in terms of a specific technological challenge. It has a budget of approximately $2.8 billion, 98 percent of which is invested outside the organization, primarily in universities and in industry.

NIH, an agency within the U.S. Department of Health and Human Services, is responsible for conducting and supporting biomedical and behavioral research to prevent, detect, diagnose and treat disease and disability. With its origins tracing back to the late 19th century, today NIH consists of 27 quasi-independent institutes or centers, each with its own research agenda and budgets. These institutes and centers support research primarily through the provision of competitive grants to external researchers at universities, medical schools and other institutions around the world. NIH also has an in-house research program with over 10,000 government scientists, technical support staff, nonemployee trainees, and postdoctoral fellows focused on long-term and high-impact science. NIH has a budget of $30 billion, representing a quarter to a third of total biomedical research funding in the U.S.; 90 percent of this budget is spent externally.

A review of DARPA and NIH activities indicate seven key functions fulfilled by one or both agencies:

1. **Setting sector research priorities:** Through the development of goal-oriented projects, external competitions and the provision of grants to outside parties, both agencies signal which areas they consider research priorities. This can incentivize other actors to organize themselves around the same goals.

2. **Providing public financing where there are insufficient commercial opportunities:** Both DARPA and NIH focus their investments in areas where private returns are limited and that would therefore face limited or no finance in the absence of government funding. Limited commercial opportunities can be the result of various factors: The investments may be in public goods or basic research where the benefits of successful investments cannot be internalized but are enjoyed by others; financial returns may be limited by the price that can be charged to low-income customers; research gaps may necessitate longer-term investments that the market cannot provide; or investments may be high risk.

3. **Transitioning technologies:** Both agencies endeavor to have technological and research discoveries put to use. Though much of DARPA's research by definition has no immediate application, the agency nevertheless seeks to facilitate its adoption by having relevant members of the military oversee research projects with the expectation that this can help identify uses for the technology when they are brought to market. NIH's program project grants and center grants support multidisciplinary projects and programs that integrate basic research with applied research, and promote research on clinical applications.

4. **Facilitating collaboration:** Both DARPA and NIH seek to bring together different parts of their respective communities through the design of grants and projects. In

Photo: © International Finance Corporation

the case of DARPA, program managers are encouraged to instigate cooperation among grantees in order to spur more innovative thinking on a specific concept or technological approach. NIH's model is deliberately aimed at supporting the cross-fertilization of public and private biomedical research.

5. **Knowledge management and dissemination:** NIH and its Web site serve as a repository for the latest information, research, grant opportunities and statistics on health-related issues. NIH also organizes Consensus Development Conferences at which panels of experts appraise new modes of therapy or evaluate existing therapies about which questions have been raised. Since 1977, more than 100 of these conferences have rapidly channeled research findings on devices, drugs, and medical or surgical procedures to practicing physicians.
6. **Establishing research protocols/standards:** Through its Office of Extramural Research, NIH has established an extensive set of guidelines on health-related research integrity involving human and animal subjects, scientific peer review and intellectual property.
7. **Strengthening research capabilities:** NIH funds an array of training and research opportunities. Its internal post-doctoral fellowship program, for example, is 4,000-strong and allows recipients to pursue basic, applied or clinical research at one of more than 1,200 laboratories and/or research projects located in more than 10 cities, without having to obtain grants or fulfill teaching requirements.

Photo by Alex Irvin

"The U.S. government should consider how we might take these different invention investments, whether it's agricultural research, Development Innovation Ventures, Grand Challenges, the Higher Education Network, and all of the federal science partnerships and roll it into one national, scientific institute for development—helping American youth, in particular, but researchers across the board, see this as an area where they can apply their technical skill, and do so with government support."

— Rajiv Shah @rajshah
Administrator, U.S. Agency for International Development

Photo by Alex Irvin

"Since technological change and innovation are transforming so many aspects of our world, it's unsurprising that governments, NGOs and the private sector are thinking creatively about how to harness those tools in the cause of fighting global poverty. Detailed consideration and brainstorming about the most advantageous, and appropriate, ways to use technology to bolster global development is essential, which is why the discussions at the Brookings Blum Roundtable are so important and timely."

— Strobe Talbott @strobetalbott
President, The Brookings Institution

Mapping U.S. Development Efforts in Innovation and Technology

A cursory review of some of the government's recent initiatives to foster technology and innovation for development indicates considerable overlap with the seven functions outlined earlier:

- USAID's Grand Challenges for Development sets research priorities by bringing innovation and technology to bear on specifically enumerated problems such as reducing maternal mortality; improving global literacy rates; and fostering open government, transparency and accountability through Web and mobile technologies.

- USAID's Development Innovation Ventures (DIV) facilitates the adoption of innovative concepts or technologies by awarding competitive grants to identify and rigorously test potential high-impact development solutions from social entrepreneurs and then scale up those that prove to achieve results. Applicants for a DIV grant can propose a project at any of the three following stages: (1) up to $100,000 of seed funding over a year for research, design and prototyping; (2) up to $1 million to test the concept; and (3) up to $15 million over several years to scale up a proven development solution, often in multiple countries.

- USAID, the U.S. Department of State, the U.S. Department of Education and the Peace Corps are forming partnerships with a broad coalition of multilateral development banks, United Nations agencies, nongovernmental organizations, foundations and the private sector as part of the mEducation Alliance, to collaboratively explore and catalyze the use of mobile technology to improve educational outcomes.

- The Enterprise Development Network, which was initiated by the Overseas Private Investment Corporation , connects promising small- and medium-sized businesses

pursuing opportunities in developing countries with a network of financial institutions, business consultants, law firms and regional investment agencies to support the scaling up of innovative market-based solutions at the base of the pyramid.

- USAID's Center for Accelerating Innovation and Impact has been developed to improve market-based, scaled-up solutions at the base of the pyramid that promote global health technologies by brokering partnerships, strengthening business acumen among innovators and addressing other bottlenecks in the transition to scale.
- The U.S. Department of Agriculture has formed a partnership with CABI Plantwise to build a global knowledge bank to store information on diagnostic and treatment information for crop pests and diseases. The knowledge bank will serve farmers, researchers and regulators, allowing easier access to USDA research and support the work of CABI Plantwise extension agents at 180 plant clinics around the world.
- NIH and the Department of Energy have developed low-fee licensing agreements to facilitate the transfer and dissemination of government-owned technologies to promote global public health and clean energy consumption through not-for-profit institutions.

This list of initiatives is far from exhaustive, but it gives an indication both of the large number of activities with which the government is involved, and the range of functions it is attempting to perform to a greater or lesser extent. Mapping U.S. development efforts in innovation and technology in this way is thus a useful exercise in documenting the nature and level of U.S. government activity. However, it is a far cry from an overall strategy that defines the intended scope of government involvement and meaningfully links activities together. As noted at the roundtable, it is unclear to what extent these activities are related to each other, or to the core programming that makes up the bulk of U.S. development assistance. Furthermore, some of the most promising initiatives could easily be swept away under different leadership in the absence of a concerted effort to see them institutionalized.

A "DARPA for development" should aim to be more than the sum of its parts, reflecting a clear vision of the U.S. government's aims and a related set of activities that deliver on that vision. In addition to resolving the central questions surrounding the role and scope of government, a DARPA for development should also seek to provide clarity on issues of governance. The examples of DARPA and NIH demonstrate that the promotion of innovation and technology does not require a standard organizational structure; arguably, the most salient feature of an agency of this kind is how it relates to other government institutions and outside entities with which it hopes to form partnerships. A related challenge is to identify what oversight arrangements can uphold the highest standards of fiduciary and institutional risk while retaining the healthy risk appetite that is necessary to support work that is essentially experimental and uncertain, and where reducing the incidence of development failure is prioritized above the incidence of project failure.

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Note: The titles and affiliations of the participants are as of August 1–3, 2012.

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