SEVEN POWER TOOLS FOR GLOBAL SOLUTION NETWORKS

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Global solution networks (GSNs) are pioneering new approaches to technology design and delivery that provide access to the ideas, capital and skills required to bring critical innovations to market. Based on their experiences, we have identified seven power tools to fast-track the development and deployment of technologies for global problem solving. These tools include patent pools, "hackathons," incentive challenges, incubators and accelerators, impact investing, crowdfunding and advanced market commitments.

GLOBAL SOLUTION NETWORKS

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Idea in Brief

New technologies and networks are multiplying the opportunities to develop and deploy innovative approaches to solving global problems. Historically, organizations seeking to advance technology-based solutions have faced a series of obstacles that can derail the innovation process, including insufficient access to the capital, intellectual property, skills and capabilities required to bring promising innovations to fruition. As a result, game-changing technologies have been deployed ineffectively or, as in the case of life-saving vaccines for diseases prevalent in the developing world, are deployed only after unduly long delays.

Fortunately, global solution networks (GSNs) are pioneering new approaches to technology design and delivery that provide access to the ideas, capital and skills required to bring critical innovations to market. Based on their experiences, we have identified seven power tools to fast-track the development and deployment of technologies for global problem solving. These tools include patent pools, "hackathons," incentive challenges, incubators and accelerators, impact investing, crowdfunding, and advanced market commitments.

Igniting Innovation to Solve Global Challenges

In 2012, a small team of passionate journalists and development professionals hatched a new idea for empowering isolated and disadvantaged communities in Africa and Asia to send out urgent news alerts to the global media. After serving as independent reporters in some of the world's toughest environments, Alice Klein and Libby Powell conceded that even the most principled and persistent journalists could not make up for the fact that the voices of women, minority groups and people without access to the Internet or computers are largely excluded from mainstream news reporting. In the search for solutions, the pair realized that the growing ubiquity of mobile phones offered new opportunities for direct engagement and could empower individuals and communities to share their own news and perspectives via SMS. But these individuals would need access to tools and training, so together they founded Radar (onourradar.org), a global solution network dedicated to advancing citizen journalism in communities that are too often overlooked by global media conglomerates.

Radar broke ground in rural Kenya, delivering workshops that offered fundamental journalistic skills, geared toward mobile reporting. Trainees learned the basic principles of sourcing and verifying information, and producing balanced, impartial news. The workshops soon spread to Sierra

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Leone and India. In its first six months, Radar covered two African elections and supported more than 250 citizen mobile reporters to share more than 2,000 reports via social media sites.

As the network grew, so too did the scope of Radar's reporting. But with increasingly sensitive subject matter—including corruption, gender violence and slavery—security became a priority, both for their data and for their reporters. Klein and Powell wanted to develop a new digital platform that could connect their reporters to Radar's central news hub as swiftly and securely as possible. Doing so would protect their data and allow Radar to work with a greater pool of reporters simultaneously. But building a platform required money and expertise that neither Klein nor Powell possessed.

onourradar.org Radar information flow[1]

In August 2013, the Radar citizen journalism organization launched a campaign to raise the funds they required. And here's where the story takes an interesting turn: rather than turn to the UK's Department for International Development, the World Bank or the UN, Radar launched its fundraising campaign on Indiegogo, a crowdfunding platform used by capital-seeking start-ups around the world. "Just like mobile citizen reporting, crowdfunding is a new and innovative way to raise funds swiftly," says Klein. In fact, the Indiegogo campaign raised £1,000 in 24 hours and over £5,000 by the end of the campaign; just enough to complete development of a prototype and initiate testing. Klein says that when the new platform is launched it will enable Radar to "set up new networks and ensure those we've trained elsewhere have the tools they need to continue their great work. It will also allow us to receive, verify and edit stories on the go via a bespoke web app."

Radar is just one of hundreds of Global Solution Networks that are launching new innovations and leveraging technology to deliver vital remedies to the world's most pressing problems. Indeed, while GSNs are addressing an incredible diversity of issues, one thing they typically share in common is the use of technological innovation to support the design and delivery of effective solutions to global problems. Radar is attacking the need to amplify the voices of disenfranchised communities in the media by using one of the most accessible and affordable tools available—the mobile phone. Other GSN research has demonstrated how non-government organizations (NGOs) and civic networks can use satellite monitoring to, for example, track illegal

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logging operations around the world and how large international institutions can use social media and crowdsourcing to engage people and organizations that were previously excluded from global decision-making. Regardless of the specific applications, well-designed technological interventions can power impactful solutions that are efficient, scalable and sustainable.

However, fostering the emergence and growth of technology-based solutions is no easy feat and those advocating for technology-enabled solutions to global problems often overlook the associated challenges that could include a lack of understanding of the capabilities required to foster technological innovation for global problem solving, and the real as well as the perceived costs. As a result, even readily-available technology is frequently not deployed—or is deployed ineffectively—because of a lack of skills and capacity on the ground, or because there is no lucrative end-market to convince commercial interests to invest in producing the technology at scale. At the same time, major foundations and donors that could conceivably step in when the market fails have largely proven unwilling to fund substantial investments in developing applications of technology to serve the public good because tech-related investments are considered "organizational overhead" rather than an integral aspect of solution design and delivery.

Fortunately, new tools are emerging to empower GSNs to take technological innovation into their own hands. This report identifies seven "power tools" that networks can use to fast-track the development, application and deployment of technology for global problem solving. These power tools include: patent pools, "hackathons," incentive challenges, incubators and accelerators, impact investing, crowdfunding and advanced market commitments. Using a series of brief case studies, this report provides GSNs with a practical toolbox of approaches and related lessons gathered from using, supporting or observing these emerging tactics in practice.

The research undertaken for this report reveals that GSNs are already widely using several of these power tools to address these challenges and advance technological innovation for the public good. Buoyed by the digital revolution, GSNs themselves represent an innovation in the way society organizes to address global problems. As nodes that bring together knowledge and stakeholders across sectors and geographies, GSNs are ideally positioned to enable innovation in their field. Additionally, GSNs are also more likely to have organizational values that encourage experimentation, accept risk and learn from failure. Because they are self-organized, GSNs are freer than their traditional state-based counterparts to rethink market design and regulatory frameworks in support of technological innovation.

Seven Power Tools for Global Solution Networks
Patent Pools are consortiums of at least two organizations agreeing to license patents related to a particular technology to one another or to a third party. Patent pools permit access to technologies that would otherwise be available only in instances of economic value-creation for the owner. By extending the availability of proprietary patents, patent pools accelerate technology development and adoption.
Hackathons are multi-disciplinary events in which a large number of technologically capable people meet to engage in collaborative problem-solving and technology development over a short, intensive period of time. Hackathons are akin to highly productive brainstorming exercise with the end-result being a new technology product.
Incentive Challenges are open competitions, contests or challenges that invite participants to contribute the best idea or technology to solve a specific problem by offering a reward, either financial or in-kind. Because they can be fully coordinated online, incentive challenges are particularly effective at tapping into the creative potential and expertise of individuals around the globe.
Incubators and Accelerators are programs designed to support the successful development of entrepreneurial companies—or innovations within companies—through an array of business support resources and services, including mentoring and access to capital. Participants in an incubator or accelerator typically take up residence in a co-working environment provided by the program.
Impact Investing refers to risk-capital investments made in organizations to generate measurable social and environmental impact as well as a financial return in exchange for an equity stake in the business. In other words, impact investing is venture capital adapted to the needs and realities of the social enterprise.
Crowdfunding is the process of raising small amounts of money from large numbers of people to fund a project or venture. Successful projects offer a range of novel goods or experiences—ranging from exclusive access to the technology before it is commercial to dinner with the project leaders—in exchange for a financial contribution.
Advanced Market Commitments (AMCs) provide legally binding incentives for technology development by guaranteeing a viable market for a technology if it is successfully developed. AMCs are designed to encourage investment in R&D by the private sector as well as ensure self-sustaining deployment.

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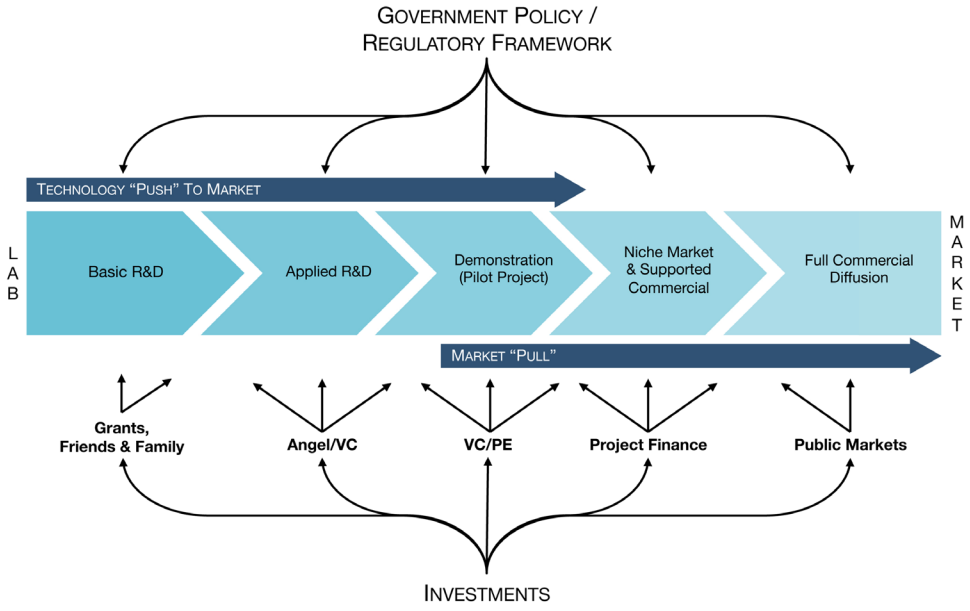
Challenges of Technological Innovation

Facilitating technological innovation is often a complex undertaking, but can be especially difficult when the technology is addressing or supplying a public good. In the private sector, the innovation process takes places within a dynamic ecosystem that has at its core an entrepreneur (lead innovator) moving a technology along from the idea stage to the market. This process can be loosely summarized into the following stages:



INNOVATION PROCESS:
It is important to note that this is a non-linear process, with knowledge flowing in both directions between all steps of the process.

For GSNs, the innovation process can look quite similar, with ideas progressing to pilot projects, and pilots maturing into full diffusion of an innovative new solution. But a variety of challenges often complicate this process. The first innovation challenge is to identify a "right fit" technology solution that accurately addresses the problem while considering the availability of internal and external resources. Failure to accurately define the problem being solved or a lack of sensitivity to the surrounding context (including socio-cultural values and norms, political and regulatory constraints, and the availability of infrastructure) can result in the wrong technology being applied. This means that technological innovation for global problem solving is not necessarily about applying the most advanced technological solution but rather is about a right-sized approach.

A second innovation challenge is that established regulatory regimes, organizational cultures and business processes may encumber new innovations. For example, many of the key actors involved in global problem solving are risk-averse and lack the capacity to facilitate experimentation or the know-how to make wise investments in new technology. In other cases, intellectual property (IP) regimes can prevent researchers from exploring public interest applications of commercial innovations, thereby delaying distribution of potentially world-changing technologies to the public domain.

Another key challenge is that markets related to global problems are often underdeveloped and not lucrative enough to attract the investments necessary to move a technology to market. For example, innovators concerned with making a return—or at least covering the costs of their R&D—may not make necessary investments to push a technology forward to serve the needs of the world's poorest populations.

These are challenging obstacles, but not insurmountable thanks to the innovation power tools we have identified. Advanced market commitments, for example, can provide innovators with assurances that they can recoup their investments in risky projects and technologies. Patent pools can make valuable IP available for non-commercial applications. A combination of crowdfunding and business accelerators can provide entrepreneurs with access to sufficient capital and mentorship to run a series of low-cost tests in which they engage in an iterative process of design and development, deployment, feedback and improvement as a way of refining solutions through real-time learning. Or a diverse network of stakeholders can come together through a hackathon or an incentive challenge to catalyze new ideas in situations where incumbent organizations are unable to muster sufficient innovation capacity internally.

The next section reviews each of the seven power tools in detail, including each tool's main purpose, the gaps it addresses and the success factors related to its use. GSN leaders should remember, however, that each power tool, or combination of power tools, is not an end in itself. GSNs must use these tools as part of a broader strategy to address the world's most pressing challenges.

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Power Tools for Global Problem Solving

Tool #1: Patent Pools

PATENT POOLS: Consortia of at least two organizations agreeing to license patents related to a particular technology to one another or to a third party.

Whether accidental or deliberate, innovations build on existing ideas and innovations—either by transferring the application of knowledge from one industry to another, putting together ideas or technology in a new way, or inventing something that builds on or complements someone else's technique or technology. Similar to the open data movement, the spirit of a patent pool is to provide enhanced access to the building-blocks of knowledge that are essential to drive innovation forward. By pooling patents, companies can accelerate technological breakthroughs, lower the cost of research and make "intellectual raw materials" available to a broader network of innovators, thereby enlarging the talent pool addressing a particular problem. In doing so, patent pools create powerful opportunities for GSNs to forge new partnerships with the private sector and to leverage leading edge technologies in their solutions with less capital investment than would be required to develop these technologies internally.

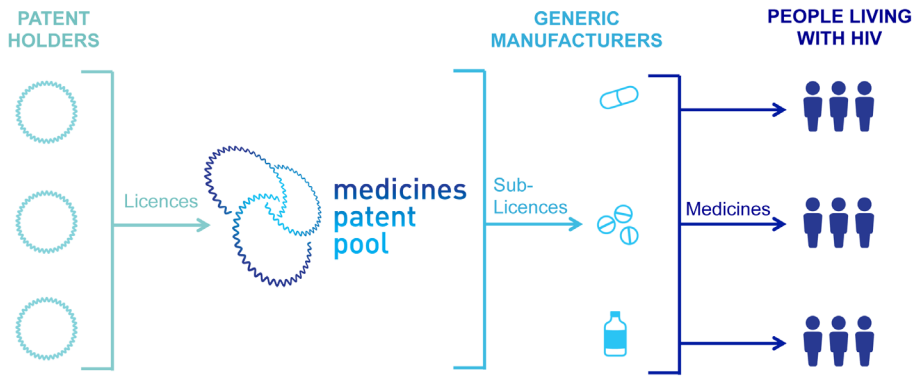
Of course, conventional wisdom suggests that organizations should control and protect all proprietary resources and innovations—especially intellectual property—through patents, copyrights, and trademarks. The various tools of IP protection were conceived to promote innovation and stimulate R&D. They seek to give owners a period of time to exclusively market a product or invention, rewarding them for the time and capital investment required to generate the innovation. This is not without its challenges. Patent holders are incentivized to set high prices for the use of their inventions. This can make the application of new technology cost-prohibitive for organizations that serve the public good. Furthermore, patents lead to the fragmentation of knowledge where the IP required to deliver a solution is protected under multiple patents, often belonging to multiple organizations.

Patent pools relieve some of these tensions and ultimately spur innovation by integrating complementary technologies and reducing transaction costs. The first known use of a patent pool occurred in 1856 when sewing machine manufacturers I. M. Singer Co., Wheeler & Wilson Co. and the Grover & Baker Co. chose to pool their patents, rather than sue one another into bankruptcy. Following this, manufacturers began to mass-produce sewing machines as never before. In addition, manufacturers could design and market sewing machines for home use for the first time because of improvements resulting

“Without the collaboration facilitated by the Golden Rice Pool, the thicket of patents created by multiple owners each holding a separate piece of the puzzle would have prevented farmers in poor countries from producing this essential grain.”

from the incorporation of all the patented technologies into a single machine.[2] Although the objective was to avoid costs of litigation, the result was increased innovation and higher profits for the industry as a whole. In other words, it was a classic example of a rising tide lifting all boats.

Collaborative patent pools have yielded some impressive results. For example, launched in 2010, the Medicines Patent Pool acts as a “one-stop shop” for patent holders, manufacturers of generic drugs and other organizations interested in engaging in R&D related to HIV/AIDS. Patent holders voluntarily license their technology to the Medicines Patent Pool, which subsequently licenses out to organizations focused on delivering life-saving medications to poor populations that cannot afford to pay market prices. The pooling allows for versions of patented drugs to be more easily produced as generics, long before their 20-year patent term runs out, thus reducing the time-to-market for life-saving drugs in the developing world.



MPP pooling process[2]

The Golden Rice Pool was formed in 2000 to provide access to the patents needed to grow and distribute a strain of rice which aims at combating vitamin-A deficiency, a leading cause of blindness in developing countries. The patented key technology for Golden Rice production required access to a package of ancillary technologies. The package contained proprietary technologies belonging to Syngenta, Bayer AG, Monsanto Co, Orynova BV and Zeneca Mogen BV. These companies formed a partnership to provide access to the required technologies free of charge, for humanitarian purposes. The process took less than six months to negotiate and provides an example of an effective pool with a targeted purpose. Without the collaboration facilitated by the Golden Rice Pool, the thicket of patents created by multiple owners each holding a separate piece of the puzzle would have prevented farmers in poor countries from producing this essential grain.

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Patent pools can also help free technology for alternative uses as in the case of the GreenXchange, which was founded by Nike and includes the participation of a range of corporate partners including BestBuy and Mountain Equipment Co-op. This pool recognizes that companies in vastly different fields may benefit from the very same research. As long as the research is applied to products that are non-competitive, the patent holder can share knowledge without posing a threat to their core business. If a company like Nike, for example, has performed extensive research on maximizing the efficiency of air pressure in sneaker design, a company that manufactures truck tires may apply the patent in a way that saves materials and money, creates a more eco-friendly product, and has no impact on Nike's market. Similarly, companies in the apparel industry may benefit from sharing research on creating a more eco-friendly shoebox, cutting unnecessary costs and achieving results more quickly.

In summary, patent pools are a useful tool to accelerate applications of commercial technologies and innovations for the public good. They can be used in a range of sectors and are most helpful when IP related to a solution is spread across several players. There is also an opportunity to use patent pools as a way of encouraging IP sharing to explore applications across business lines, for example from retail to sustainability. GSNs are ideally placed to stimulate the formation of patent pools by working across several organizations to facilitate mutually beneficial outcomes. GSNs directly involved in R&D can also look to patent pools as places to share and license technology for global public good at low or no cost.

Tool #2: Hackathons

HACKATHONS: A multi-disciplinary event in which a large number of people meet to engage in collaborative problem-solving and technology development over a short, intensive period of time.

Hackathons are great ways for organizations to raise awareness of a problem they are trying to solve and seek solutions from a broader cross section of talented individuals, from technologists to designers. In a typical hackathon, a host organization might convene a large number of participants over 48 hours to "hack" a software solution to a predefined problem. A growing number of such events are dedicated to building physical prototypes thanks to the rise of low-cost 3D printing and open source electronic prototyping platforms like Arduino. Regardless of the specific objective or mandate, GSNs should see hackathons as a way to unleash a quick burst of creative collaboration by drawing talent and expertise from across disciplines and focusing their energies on coming up with solutions that traditional organizations would otherwise be unable to generate in a short amount of time.

Although hackathons can be organized as "one off" events, they are most powerful when they help bring together and catalyze the creative potential of an existing community that shares a common purpose and is committed to boosting the results of its efforts. For example, Random Hacks of Kindness (RHoK) is a community of over 5,500 innovators in over 30 countries that has as its mission "making the world a better place" by developing practical, open source technology solutions that respond to some of the most complex challenges facing humanity. They do this by defining problems and organizing hackathons. They go a step further after the hackathon by helping to ensure that projects or solutions are effectively deployed. To date, RHoK has held 177 hackathons in 37 different countries producing thousands of solutions. Projects include CHASM, Open Street Map Tasking Manager, Risk-in-a-Box (now InaSAFE), First Responder and Caritas Disaster Mapping. RHoK—a GSN in its own right—is a joint initiative of Microsoft, Google, Yahoo!, NASA and the World Bank.

120 technologists from across Bangalore gathered to code on open source platforms at the Grace Hopper hackathon.[4]

Hackathons have traditionally been a favorite tool of the software development community. However, with the emergence of "hardware" communities this is likely to change. For example, Open Source Ecology is a network of farmers, engineers, and supporters that, for the last two years, has been creating the Global Village Construction Set. This is an open source, low-cost, high-performance technology platform that allows for the easy, DIY fabrication of the 50 different Industrial Machines required to build a sustainable habitat with modern comforts. As a logical extension of their work, this network is now hosting hardware hackathons.

> *...the objective of a hackathon is as much about building community as it is about generating new solutions.*

There are several ways in which hackathons can help GSNs advance their technology development goals. GSNs can host or partner with hackathons in which they define a problem for the community to tackle and provide subject-matter expertise to help guide the collaborative effort. This will multiply the capacity of the GSN to tap into creative thinking of multi-disciplinary teams, while raising awareness and interest in solving the problem at hand. It is important to keep in mind that the objective of a hackathon is as much about building community as it is about generating new solutions. Therefore, GSNs are best advised to articulate a theme or problem that is not organization specific and will have broader impact.

The success of a hackathon depends greatly on the quality of the participants. Organizers should consider the ways in which to engage with and attract developers and designers by interfacing early with the local start-up community. Partnerships can be especially useful in this regard. Often, friendly competition amongst participants is encouraged, offering teams the opportunity to demo their product in front of a panel of judges. As an alternative to organizing a hackathon, GSNs can participate in the process by providing data and open source software, as well as an application-programming interface (API). As demonstrated by Ushahidi's Crowdmap, making platform technologies available to collaborators during hackathons, or on an ongoing basis, can be akin to crowdsourcing information and expertise in a fraction of the time it would take to do it alone.

Beyond hackathons, GSNs will want to consider how they can best enable experts to contribute to a technology project sustainably. Initial models include "reverse hackathons" where technologists approach organizations with their expertise and together they identify a problem set needing work. An example of this is DataKind, which matches leading data scientists with high impact social organizations to help leverage data for public good. Another example is Code for America's Fellows initiative, which deploys technologists within government to develop applications and release data sets in order to tackle specific challenges.

Tool #3: Incentive Challenge

INCENTIVE CHALLENGE: A competition, contest or challenge that invites participants to contribute the best technology to solve a specific problem by offering a reward—either financial or in-kind.

Incentive challenges are quite versatile in their structure and can be used to stimulate basic and applied R&D as well as demonstration and niche market commercialization. In a departure from grant-making, incentive challenges allow sponsors to define the problem to be addressed without prescribing a solution and then pay only for the results. This invites creativity on the part of the entrepreneur or innovator pursuing a course of action to achieve the desired result. Incentive challenges also tend to attract more diverse groups

"Incentive challenges also tend to attract more diverse groups of innovators that may not otherwise participate in more traditional grant-making or procurement processes."

of innovators that may not otherwise participate in more traditional grant-making or procurement processes[4], allowing the sponsor to benefit from a larger pool of potential solutions that taps into a broader range of skills, experience and knowledge. In addition, prizes are only disbursed for results, that is, when a solution meets the pre-set goal.

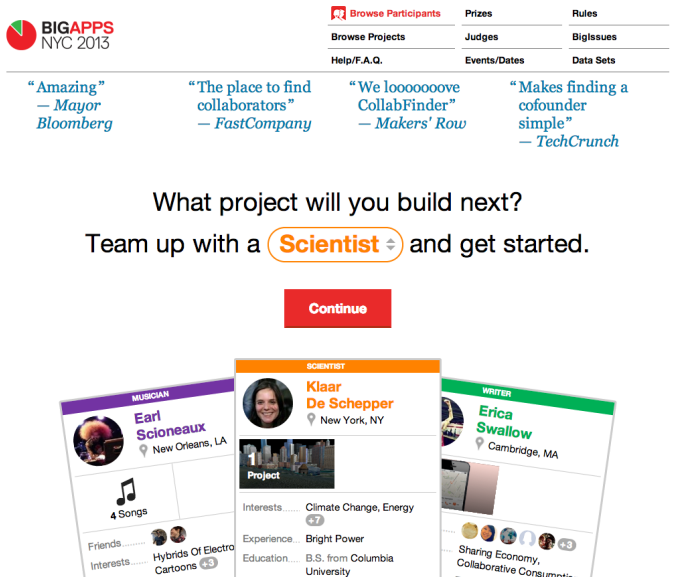
Often, the real value of incentive challenges goes beyond the investment made by the sponsor towards the dollar-value of the prize and includes the impact made in increasing the number of entrepreneurs and stakeholders engaged in the innovation ecosystem. In fact, the value of the prize rarely covers the cost of the R&D assumed by respondents. High profile prizes have actually stimulated R&D investments 5-10 times larger than the prize itself.[5] In addition, prizes stimulate a number of media-friendly attributes that enable the sponsor to raise awareness for a technology need in the market.

Incentive challenges have enabled the spread of technology to difficult markets. The Haiti Mobile Money Initiative (HMMI)[6] was launched by the Bill & Melinda Gates Foundation and USAID in June 2010 to bring mobile money services to Haiti after similar services such as M-Pesa in Kenya and M-Paisa in Afghanistan were widely recognized as successful. HMMI set out to further the diffusion of this technology by offering a $10,000 incentive prize to the first two providers of mobile money services in Haiti. The prize was broken down into two awards to compensate for the risk involved in deploying the technology: a first-to-market award providing an incentive to see the technology deployed as quickly as possible and a scaling award that was allocated only when specific milestones related to technology deployment were achieved. The competition resulted in the emergence of two providers—TchoTcho Mobile and T-Cash—that now continue to grow well beyond the milestones that were set.

In another example, the XPRIZE Foundation serves both as a platform for incentive challenges and a center of expertise focused on stimulating game-changing technological innovation in areas such as energy and the environment, exploration, global development, learning and life sciences. Over the years, the so-called XPRIZEs have catalyzed a number of ambitious breakthroughs. The $10 million Ansari XPRIZE, for example, is widely recognised as having initiated the creation of a market opportunity for private space travel.[7] The global development group at the XPRIZE Foundation is currently designing a prize to stimulate the development of tuberculosis diagnostics.[8]

Growing interest in incentive challenges has generated a burgeoning economy of prize platforms and centers of expertise in designing and orchestrating public innovation challenges. Platforms such as Ashoka's Changemakers and ChallengePost host competitions sponsored by partner organizations including governments, corporations and GSNs to drive innovation. Their value is in building a community of innovators that are actively engaged in searching for and responding to challenges. Changemakers provides a way for potential respondents to search for competitions according to sector, business model and stage of development as well as additional resources for individual competitions such as

comprehensive issue briefs; access to thought leaders and experts through social media; and a feedback dashboard for respondents to collaborate with each other. Since 2004, Changemakers has built a community of over 500,000 innovators from 125 countries, channeling over $600 million into social innovation. ChallengePost provides the infrastructure for US government entities to offer challenges through Challenge.gov, which has hosted challenges such as the NYC Big Apps Competition. By lightening the administrative burden, these platforms have shortened the time it takes to connect solutions to their partner sponsors from 48 months to less than 12.[9]



NYC Big Apps home page[10]

In summary, incentive challenges are a useful tool for driving technological innovation forward at a number of different points in the innovation process, whether to generate basic and applied R&D or to bring a technology to market. GSNs have opportunities to harness incentive challenges, both as hosts seeking innovations and as contributors of solutions. As hosts, GSNs can leverage incentive challenges to tap a larger talent pool and accelerate their efforts to bring new solutions or technologies to fruition. The hefty prize purses offered by groups like the XPRIZE Foundation should not deter more modestly funded GSNs from seeking to host challenges.

For many participants, the benefits of contributing to an incentive challenge go well beyond the cash prize and include plugging into a community of like-minded innovators, as well as securing media exposure and credibility. Some prizes offer rewards such as mentoring or access to resources that are not otherwise publicly available. And the fact that numerous organizations offer platforms to run incentive challenges (at all stages of development and across all sectors) means that the complexity and administrative burdens associated with hosting a challenge have been greatly reduced. As solution providers, GSNs should view incentive challenges as a vehicle for obtaining the funds required to scale their ideas or to receive public recognition for their work.

"GSNs have opportunities to harness incentive challenges, both as hosts seeking innovations and as contributors of solutions."

All GSNs should strive to become familiar with the organizations and platforms that publicize incentive challenges relevant to their area of focus and they should regularly evaluate opportunities to participate against desired outcomes, whether it be to get feedback from a like-minded community, to gain recognition and exposure or to win the prize itself.

Tool #4: Incubators and Accelerators

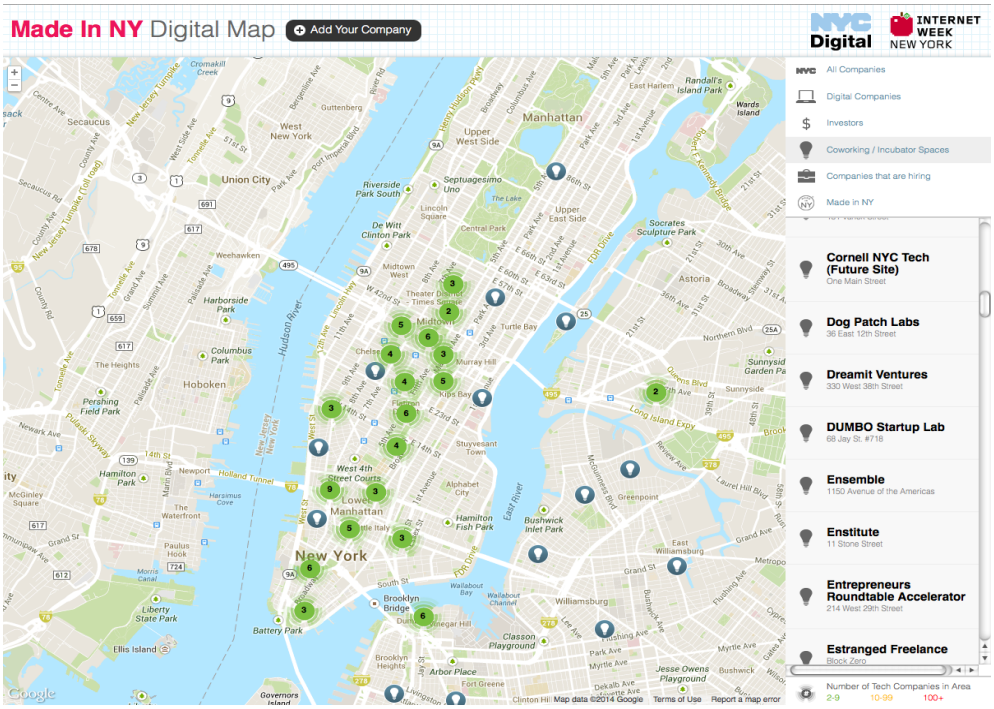
INCUBATORS AND ACCELERATORS: Programs designed to support the successful development of entrepreneurial companies—or innovations within companies—through an array of business support resources and services, including mentoring and access to captial.

There is increasing interest around the world in the role of entrepreneurship, and specifically social entrepreneurship, in providing solutions to global problems. A social entrepreneur is someone whose primary goal is "mission-related impact" and whose business value proposition targets an underserved, neglected or highly disadvantaged population that lacks the financial means or political clout to achieve the transformative benefit on its own.[11] The process of creating a viable, self-sustaining business that achieves scale while at the same time addressing its social mission is far from straightforward however, and entrepreneurs typically achieve results much more quickly when they are immersed in an environment where they can benefit from the resources, expertise and lessons-learned of a supportive ecosystem.

More than co-working space alone, technology incubators and business accelerators offer entrepreneurs the business resources and support to fast-track the development and growth of new technologies. A 2012 report from the Monitor Group highlights this paradox: "While thousands of early-stage innovators seeking impact launch companies worldwide, very few are able to build the teams, find the customer base, or raise the investment necessary to scale."[12] Incubators are "network integrators" that immerse a select group of entrepreneurs in a highly concentrated ecosystem that provides support and expertise in achieving these goals. Incubators bring together various business enablers to offer a network of support that includes investors, experts, mentors and peers. In some cases, programs (typically called "accelerators") offer financing as well as access to intensive coaching and mentoring in exchange for equity. In other words, they create a community, show people the realm of the possible and allow fast-paced sharing of ideas and best practices.

Corporations and venture capital firms have a long history of working with incubators and accelerators, and even launching their own, as a way to spur innovation and source merger and acquisition targets as well as talent. More recently, there has been an emerging trend towards organizations launching accelerators to support impact entrepreneurs. For example, Techstars has partnered with Kaplan to launch an EdTech Accelerator, an intensive, deep-

immersion program for educational start-ups. Another example is Google's partnership with Code for America to launch an accelerator as well as a separate incubator that will help capture the public service innovations generated by Code for America Fellows. Endeavor—financed by the Omidyar Network among others—selects, mentors, and accelerates high-impact entrepreneurs in emerging nations around the world. At the core of their program is a concerted approach to providing strategic advice to help entrepreneurs navigate business challenges.



Map of coworking, incubators, accelerators in NYC[13]

Thanks to this trend, there are now a plethora of incubator and accelerator programs that support for-profit and not-for-profit ventures at different stages of development. Accelerator programs focussed on the earliest stages of technology innovation—from an initial idea to viable prototype, for example—usually require an intensive 3-6 month commitment, involve competitive enrollment, and are the costliest for participants as they take equity as part of the payment. Some business accelerators only accept companies with market-ready products and services that are already generating revenue with a view to preparing these start-ups for additional venture capital (VC) investment and the next stage of growth. Incubators have varying criteria for qualification that can involve stage of technology development, size of team, sector of focus, and location of business (in the cases of programs that are funded by local governments). Participation is usually month-to-month with the costs often being lower than market rate for office space and including the benefits of additional support.

> *There is a growing number of programs that specialize in social enterprise in which GSNs would not only find a community of like-minded peers, but also additional resources and guidance to help them build the skills and capacity to leverage technology and new innovation effectively.*

GSNs looking to bring a new technology or innovation to market or to mature a sparkling new application of an existing technology stand to benefit tremendously from participation in a technology incubator. There is a growing number of programs that specialize in social enterprise in which GSNs would not only find a community of like-minded peers, but also additional resources and guidance to help them build the skills and capacity to leverage technology and new innovation effectively. In choosing a program, it is important to consider not only the goods and services being offered but also the attention the incubator has dedicated to facilitating mentorship and networking opportunities with a high-caliber community of experts and peers. In fact, a key part of TechStars' business model is to monetize their mentor network, which underscores the fact that access to the mentor network is often as valuable as the financial investments that TechStars makes. Indeed, the value of peer networks and mentorship suggest that it should be attractive for GSNs to embed small teams into incubators on an ongoing basis to continue to participate in and contribute to the innovation ecosystem.

A decision to compete for a spot in an accelerator requires additional planning. Because programs take equity as a means of securing payment, a GSN must consider whether its business model is built for the high-growth expected by these programs and whether the cost of giving up equity is offset by access to the mentor network (and the investment capital that comes with it). In this case, it is even more important to complete due diligence on the mentor network. Beyond confirming that the mentors' areas of expertise are relevant to the technology development challenge, GSNs will want to favor programs that have mentor networks that are actively engaged and dedicate significant time to the entrepreneur and to the problem space they are tackling. One way of doing this will be to interview current and past program participants.

Tool #5: Impact Investment

IMPACT INVESTMENT: Risk-capital investments made to generate measurable social and envirommental impact as well as a financial return in exchange for an equity stake in a business.

Impact investment funds provide the capital that is an essential component of the innovation ecosystem. They also boost technology development from applied R&D through to demonstration. Investing in technological innovation led by entrepreneurs offers opportunities to sustainably solve global problems as the digital age has made it possible for start-ups to scale-up quickly. Like tech incubators, impact investment funds have been gaining traction, reflecting a growing appreciation for the fact that the creation of economic value and social welfare are not at odds. Omidyar Network, for example, changed its mandate to be able to invest in for-profit businesses as well as not-for-profit organizations.

> *...impact investors have an opportunity to stimulate an entire ecosystem of companies to address a challenge.*

Although impact investing could be—and at times is—undertaken by traditional VC funds, social entrepreneurs often struggle to attract the attention of these investors at the earliest stages as they are competing for funds against private sector companies that are not dealing with the challenges of the global problem solving market. For example, a technological innovation for global problem solving may not have sufficient early adopters to facilitate the transition from applied R&D to demonstration and beyond. This is especially true in cases where the main clients for the technology are governments or other institutions with long decision-making timelines, complex procurement procedures or low risk tolerance. Impact investing can serve what Acumen Fund has qualified as "patient capital" in the initial stages of a technology's development—providing a business with the critical time it needs to be able to demonstrate traction in the marketplace and therefore be of greater interest to VC funds looking for a more immediate return on their investment.

Since most funds are structured as portfolios consisting of multiple investments, impact investors have an opportunity to stimulate an entire ecosystem of companies to address a challenge. For example, the Omidyar Network recently set out to strengthen the microfinance industry in the developing world with a series of investments in organizations like Kiva, BlueOrchard, the Global Financial Microfinance Consortium, MFX Solutions, Catalyst Microfinance Investors, Elevar Equity, LeapFrog Investments, MicroVest and Solidus.

Angel networks are another potential class of impact investors. These groups of high-net-worth individuals collectively review deals and perform due diligence but retain the right to make individual decisions on how and when their capital will be spent. They typically make smaller investments than do VC funds and are therefore appropriate for very early-stage technological innovation. Investors' Circle is one of the few networks for angels interested in impact investing. Founded 20 years ago, its management was recently assumed by a not-for-profit arm of SJF Ventures. Other networks include Toniic and Intellecap's Impact Investment Network. There are, however, opportunities to expand the ranks of angel investors willing to support the activities and initiatives of global solution networks. For example, major donors, development agencies and foundations could partner with angel investors to influence investing in particular sectors. Or, diaspora networks could replace traditional remittances with organized angel networks that identify impact investments in their country of origin.

Impact investment is not for everyone. This capital is considered very expensive, with investors expecting returns that can amount to 10 times the initial investment over a period of 5 to 7 years. Despite the increase in numbers of venture and angel investors focused on social entrepreneurship, the probability of securing capital remains very low. According to David Rose, venture capitalists look at 400 companies for every one in which they make an investment whereas angels look at 40. GSNs interested in pursuing this route will want to ensure that their growth plans are aligned with the investment thesis and expectations of their investors. It is important to complete due diligence on the investor and treat the relationship like a

"...crowdfunding has become an appealing alternative to loans and risk capital because of its flexibility, its relatively low cost and its potential to reach a wide audience outside an organization's network."

partnership. In addition to capital, investors can become important allies by offering their expertise and by making introductions to other portfolio companies, potential clients and prospective hires.

Tool #6: Crowdfunding

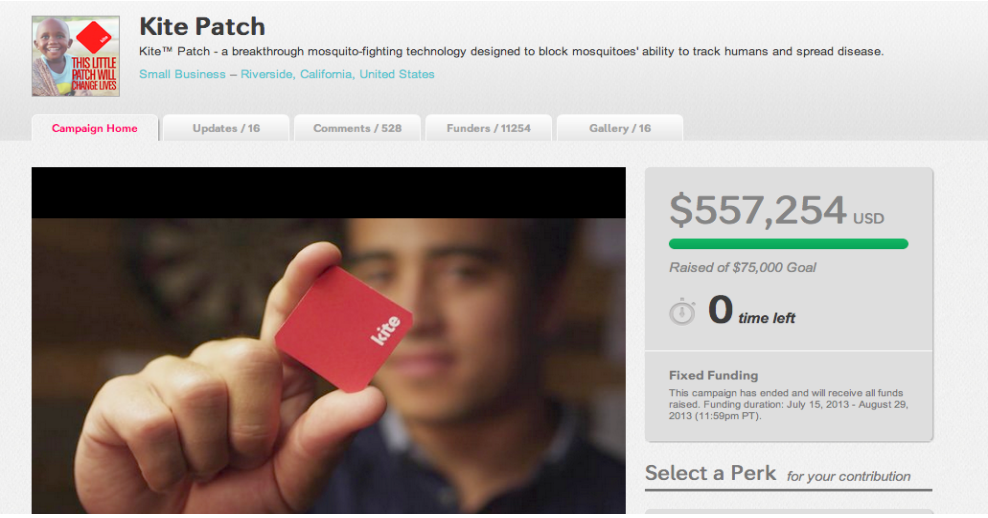
CROWDFUNDING: The process of raising small amounts of money from large numbers of people to fund a project or venture.

The social web has turned crowdfunding into an essential business tool to fund and promote new ventures. Crowdfunding platforms such as Kickstarter and Indiegogo connect projects with a large audience of individuals from around the world that can invest in the project in return for a product or service. This differentiates it substantially from other types of fundraising, including sites that facilitate crowdsourcing donations such as CrowdRise or Fundly. However, to use these platforms, project heads have to agree to a fee that amounts to a set percentage of the total dollar value raised. Certain platforms have begun catering to social entrepreneurs. Indiegogo, for example, offers a discount on its fees for nonprofits and will allow contributions to be tax deductible. Catalyst, launched by the Center for Social Innovation, exclusively serves impact entrepreneurs. Overall, crowdfunding has become an appealing alternative to loans and risk capital because of its flexibility, its relatively low cost and its potential to reach a wide audience outside an organization's network.

BRCK page on Kickstarter[14]

There are already hundreds, if not thousands, of social enterprise technology projects such as Radar that have been crowdfunded. For example, Ushahidi leveraged the Kickstarter community to fund BRCK, a device that serves as a "backup generator for the Internet" and is designed to enable persistent connections to the web where there is intermittent access to power such as in remote and rural areas of Africa. In 30 days, the BRCK campaign raised a total of $172,107 from 1,078 backers. The contributions ranged from as little as $10 in exchange for a public thank you on the BRCK Crowdmap, to $150 to pre-order the first version of BRCK, and up to as much as $10,000 for a "Silicon Savannah BRCK Safari" in which the contributor was offered the opportunity to product-test BRCK in the field in Kenya with the Ushahidi team.

In another example, the Kite Mosquito Patch project—a product of ieCrowd Olfactor Laboratories, Inc.—raised an impressive $557,254 from 11,254 backers in 45 days (over 740% of their initial crowdfunding goal) for a small patch that can be worn to protect humans from mosquitoes.[15] The Kite Patch was developed to protect those who live in regions affected by malaria, but the product has generated consumer interest in other regions impacted by insect-vector diseases, including North America and Europe. The funds raised will be used by ieCrowd to advance field tests in Uganda and distribute close to 100,000 Kite Patches.



Kite page on Indiegogo[16]

Increasingly, crowdfunding a new technology venture is seen as an essential component of the funding model by technologists and investors alike. Not only does it enable cost-effective access to capital, it allows innovators to demonstrate that there is robust consumer demand for their products. Indeed, an initiative's ability to crowdfund successfully can send a powerful market signal to VCs and institutional investors that the product merits further investment. Furthermore, because crowdfunding requires the deployment of an attractive marketing campaign that will generate sufficient

> *"Crowdfunding campaigns have also proven helpful in connecting teams with early-adopters and stakeholders that can provide feedback and help refine a product or technology before it launches."*

interest, it has the added advantage of helping meet outreach goals in a very measurable way. Crowdfunding campaigns have also proven helpful in connecting teams with early-adopters and stakeholders that can provide feedback and help refine a product or technology before it launches. A number of crowdfunding sites play an active role in helping educate project heads about how to successfully pitch their products and generate interest from the audience.

GSNs that pursue crowdfunding should select a platform on which to promote a new venture based on alignment with the interests of the community that the platform has created. Kickstarter, for example, is known for its selective curating process that favors creative projects related to the arts as well as technology. Indiegogo, on the other hand, has earned the title of largest crowdfunding site worldwide—it has enabled the largest number of campaigns, and also allows anyone to post a project in any area. The growing number of crowdfunding platforms that cater to non-profit initiatives and development projects should make it easier to find one that provides a good fit and targets niche interests where this can be helpful.

Pulling off a successful crowfunding campaign requires a strong marketing effort. Once a platform is selected, low-cost marketing campaigns can be run on social media channels but most successful organizations produce a professional video that tells a compelling story. The video can become an asset that is reused on multiple channels. Only genuinely popular initiatives will secure funding, however, so GSNs should be willing to experiment. The first attempt at crowdfunding may not come off, but the second or third attempt could be a winner. Fortunately, it does not cost a lot to try. Finally, it is important to note that existing crowdfunding platforms may specify certain restrictions and be limited to projects originating in certain countries. For example, Kickstarter is currently only available in the US, UK, Canada, Australia and New Zealand, but the platform is expanding rapidly to other countries.

Tool #7: Advanced Market Commitment

ADVANCED MARKET COMMITMENT (AMC): A legally biding incentive for technology development that guarantees a viable market for a technology if it is successfuly developed.

An advanced market commitment (AMC) differentiates itself significantly from other financial tools such as impact investing and incentive challenges as the funds are used to overcome barriers to the formation of a lucrative end-market large enough to attract R&D investments. An advance market commitment (AMC) was proposed in 2005 by Michael Kremer to stimulate the production and distribution of vaccines to low-income countries by the private sector. His theory was ultimately put into practice in 2007 by five G8 member countries and the Bill & Melinda Gates Foundation. These partners funded a $1.5 billion AMC to speed the development and market diffusion

of a vaccine for pneumococcal disease. The vaccine is expected to have saved the lives of 7 million children by 2030. Although the concept of AMCs was developed to stimulate technological innovation at all stages, practical applications of the tool have so far only addressed proven technologies that are close to commercialization.

AMC vaccine delivery[17]

The market's failure to facilitate development and diffusion of vaccines for the poorest populations, even when the technology is available for other patient segments, illustrates that existing innovation ecosystems are typically not geared to supporting global problem solving. Governments want vaccine producers to invest heavily in R&D. They create incentives for this by offering tax incentives as well as upholding a favorable intellectual property regime that allows innovators to draw value from their inventions by offering them exclusivity. However, once a new medicine is available, governments then want to purchase the vaccine at the lowest possible price and are motivated to remove any limitations on access to the product guaranteed by IP regimes. This puts the innovator at risk of being pressured to release its IP into the public domain prematurely before it is able to recover the costs of the related R&D.

AMCs are highly sophisticated tools that seek to address several market weaknesses at once, while ensuring the long-term sustainability of a given technology in a competitive private market. The objective is to place the business decision to invest in a product that has a low-margin market on equal footing with a product with an established lucrative market. Sponsors commit to paying a pre-determined price to the supplier for a specified volume with the goal of providing market returns to the developer. In the case of pharmaceuticals, once the total volume has been reached, the supplier is obligated to sell at an affordable price or to license the technology to a generic manufacturer.

> *AMCs are highly sophisticated tools that seek to address several market weaknesses at once, while ensuring the long-term sustainability of a given technology in a competitive private market.*

Applications for AMCs to promote technological innovation in other sectors are currently under consideration. Given their early success with the AMC for pneumococcal vaccines, the Bill & Melinda Gates Foundation and the World Bank, alongside members of the G20, identified AMCs as a viable model to be used in the context of AgResults, an initiative launched in 2012 which will focus on maize production and enhancement in Sub-Saharan Africa. The UK recently commissioned a study to explore whether AMCs could be used to stimulate investment in technologies to address climate change. However, initial reports have suggested that these sectors would benefit most from financing tools developed specifically to address the particularities and market failures inherent in their innovation ecosystem.[18]

Regardless of the application, several success factors come into play with AMCs. In particular, AMCs need to accurately tailor the size of the AMC to the market need. This is important in order to achieve the best balance between offering a reasonable incentive that mirrors that of a lucrative market and achieving cost effectiveness. Furthermore, because the sectoral knowledge and operational capacity is spread across several partners, AMCs require that legitimate and stable organizations enter into contractually binding agreements to ensure they fulfill their obligations over the life span of the AMC, which can be upwards of 10 years. In other words, AMCs are most likely to succeed when backed by a multi-stakeholder global solution network. Beyond the investment of the G8 and Bill & Melinda Gates Foundation, the AMC for pneumococcal vaccine, for example, required the active collaboration of the World Health Organization, the GAVI Alliance, the World Bank, UNICEF, the Independent Assessment Committee that was established specifically in support of this undertaking, countries purchasing the vaccines and vaccine manufacturers.

Given the complexity of the model, AMCs are not suited to driving innovation in all sectors, even where GSNs are willing and able to mobilize the significant resources and partnerships necessary to successfully implement an AMC. The significance of the relationships and expertise aligned to deploy the pneumococcal vaccine, however, should be leveraged to continue to develop further vaccine products for the developing world.

Implications for Network Leaders

The suite of seven power tools offers GSNs a variety of mechanisms to advance innovation in their fields of endeavor, whether those fields be alleviating poverty or promoting sustainable forestry. The following are some of the key implications that network leaders should consider as they seek to harness these tools and boost their ability to address global challenges.

The seven power tools have unique strengths—identify the innovation gaps in your global solution network and use the power tools to bolster your capability to innovate. Some tools, like incentive challenges, hackathons and technology incubators, address expertise and skills gaps by providing access to multi-disciplinary knowledge and capabilities that GSNs may lack. Tools such as crowdfunding and impact investing can address gaps in funding by providing access to the capital GSNs require to invest in new technologies or ideas. Patent pools provide access to valuable intellectual property that can be deployed to solve global challenges, while AMCs offer incentives to develop technologies in situations where the ultimate commercial potential would not otherwise justify the investment required to bring the technology to market. Even organizations that have the resources necessary to drive innovation internally can benefit greatly from the tools to tap into new opportunities and approaches, leveraging resources outside their reach.

Power tools won't work in a vacuum—they must be supported by a shared commitment to innovation by the organizations involved in the solution network. Regardless of the tool or tools deployed, GSN leaders who choose to be innovation catalysts in their fields must enable a culture of innovation within their organizations that allows for experimentation and rapid prototyping through a "fail, fail fast, fail cheap" approach. The iterative business design methods pioneered by start-ups in Silicon Valley and New York's Silicon Alley will enable right-fit solutions to emerge that can address global problems in an efficient and scalable manner. Leadership is key in this regard, as the head of an innovation organization must set the tone and ensure that an innovative mindset pervades every aspect of the business, including the choice of business models and external partnerships. It is also important to recruit team members with valuable skills such as data analytics, social media, design and software development.

Combining several power tools in sequence could offer GSNs the most complete approach to generating sustainable innovations. Whether harnessing the power of multidisciplinary problem-solving through hackathons or accessing capital through impact investor networks, GSNs may find that relying on one power tool alone may not be sufficient. For example, a new software application that emerges from a hackathon or incentive challenge may benefit from sustained time in an incubator before the technology is ready for impact investment. Alternatively, a new technology product may emerge from a patent pool that would benefit from crowdfunding before being further developed and produced as a pilot. The technology, in turn, may benefit from being the focus of a hackathon during which the product could be further refined before being deployed at scale.

Conversely, not all tools will be relevant to support all stages of technology innovation. For example, advanced market commitments (AMCs) are most relevant where a technology already exists and requires further R&D only to adapt the technology to a specific market (rather than develop a proof-of-concept). In essence, AMCs can be considered a business model innovation that enables the creation of a self-sustaining market where one does not exist.

Although power tools can accelerate and amplify innovation, generating good results still requires a great deal of effort. Many of the tools identified are relatively low-cost to deploy and thus attractive to networks with limited financial resources. However, in every case, the return a GSN can expect from the tool is commensurate with the level of time and resources that can be invested in maximizing the benefits. GSNs considering the use of these tools for the first time should choose the ones that respond to their highest priorities. Certain tools may appear to offer financial benefits (e.g. incentive challenges), though an alternative benefit (e.g. raising awareness and credibility) may in fact offer the greater pay-off.

Fully focus efforts on leveraging one tool before layering on another. Although it is entirely possible—and at times desirable—to use several tools at once, starting off with an incremental approach will help build confidence around the innovation process and insight into the results each approach will yield. Consider the suite of tools you will use as part of your overall business plan for bringing a technology to market.

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About the Author

A native of Montreal, Miriam Leia Bekkouche moved to New York City in 2010 to connect the city's exploding tech sector with Canadian start-ups. She founded the Canadian Technology Accelerator in New York City (CTA@NYC). An initiative of the Consulate General of Canada in New York, CTA@NYC provides a "soft-landing" for Canadian entrepreneurs, enabling them to accelerate their growth by offering space in a New York City-based incubator and access to targeted mentoring. In this capacity she has worked with hundreds of start-ups from across Canada, including 46 CTA graduates.

She also advises foreign governments on their programming to coach international entrepreneurs looking to develop networks in NYC, and has led the creation of a social media strategy for the Canadian Consulate which was a first for Canada globally. Prior to this, she spent five years with the Department of Foreign Affairs and International Trade where she held several roles including Science & Technology Officer working closely with partners in Brazil and Chile.

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Ten Types of Global Solution Networks

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