



took on new levels of authority, as did regional systems like the Association of Southeast Asian Nations (ASEAN), the New Partnership for Africa's Development (NEPAD), and the Asian Development Bank (ADB). The worldwide spirit

“WHAT IS OFTEN SURPRISING ABOUT NEW TECHNOLOGIES IS COLLATERAL DAMAGE: THE EXTENT OF THE PROBLEM THAT YOU CAN CREATE BY SOLVING ANOTHER PROBLEM IS ALWAYS A BIT OF A SURPRISE.”

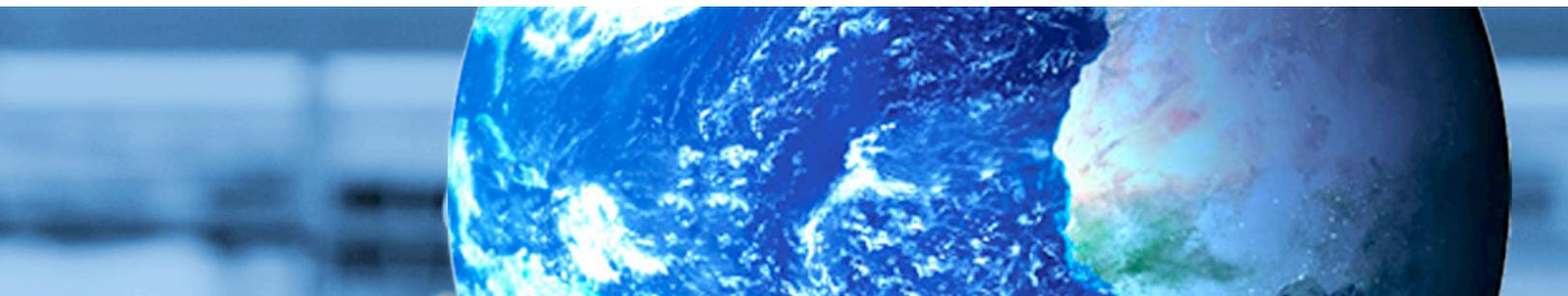
– Michael Free, Program for Appropriate Technology in Health (PATH)

of collaboration also fostered new alliances and alignments among corporations, NGOs, and communities.

These strong alliances laid the groundwork for more global and participatory attempts to solve big problems and raise the standard of living of everyone. Coordinated efforts to tackle long-entrenched problems like hunger, disease, and access to basic needs took hold. New inexpensive technologies like better medical diagnostics and more effective vaccines improved healthcare

delivery and health outcomes. Companies, NGOs, and governments – often acting together – launched pilot programs and learning labs to figure out how to best meet the needs of particular communities, increasing the knowledge base of what worked and what didn't. Pharmaceuticals giants released thousands of drug compounds shown to be effective against diseases like malaria into the public domain as part of an “open innovation” agenda; they also opened their archives of R&D on neglected diseases deemed not commercially viable, offering seed funding to scientists who wanted to carry the research forward.

There was a push for major innovations in energy and water for the developing world, as those areas were thought to be the key to improving equity. Better food distribution was also high on the agenda, and more open markets and south-south trade helped make this a reality. In 2022, a consortium of nations, NGOs, and companies established the Global Technology Assessment Office, providing easily accessible, real-time information about the costs and benefits of various technology applications to developing and developed countries alike. All of these efforts translated into real progress on real problems, opening up new opportunities





to address the needs of the bottom billion – and enabling developing countries to become engines of growth in their own right.

In many parts of the developing world, economic growth rates increased due to a host of factors. Improved infrastructure accelerated the greater mobility of both people and goods, and urban and rural areas got better connected. In Africa, growth that started on the coasts spread inward along new transportation corridors. Increased trade drove the specialization of individual firms and the overall diversification of economies. In many places, traditional social barriers to overcoming poverty grew less relevant as more people gained access to a spectrum of useful technologies – from disposable computers to do-it-yourself (DIY) windmills.

Given the circumstances that forced these new heights of global cooperation and responsibility, it was no surprise that much of the growth in the developing world was achieved more cleanly and more “greenly.” In Africa, there was a big push for solar energy, as the physical geography and low population density of much of the continent enabled the proliferation of solar farms. The Desertec initiative to create massive thermal electricity plants to supply both North Africa and, via undersea cable lines, Southern Europe was a huge success. By 2025, a majority of electricity in the Maghreb was coming from solar, with exports of that power earning valuable foreign currency. The switch

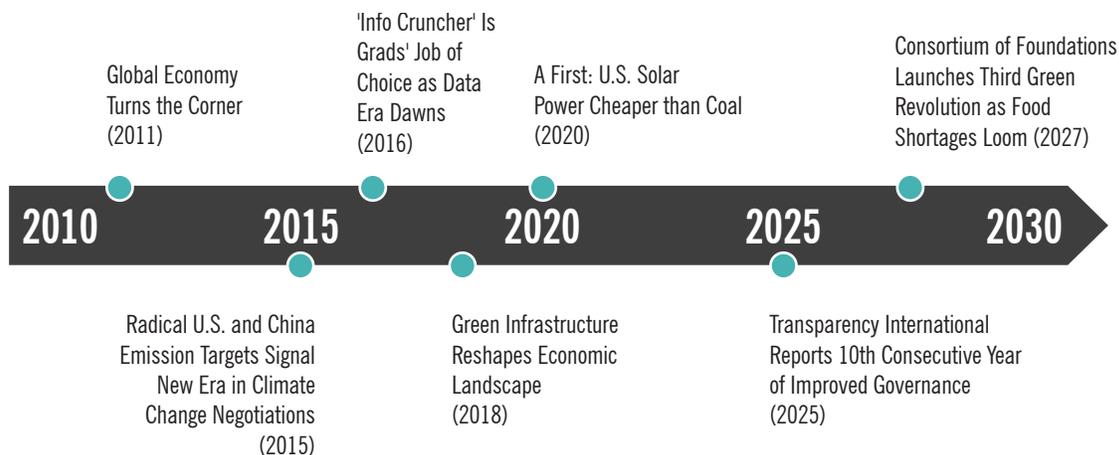
to solar created new “sun” jobs, drastically cut CO<sub>2</sub> emissions, and earned governments billions annually. India exploited its geography to create similar “solar valleys” while decentralized solar-powered drip irrigation systems became popular in sub-Saharan Africa.

Reduced energy dependency enabled all of these countries and regions to better control and manage their own resources. In Africa, political architecture above the nation-state level, like the African Union, strengthened and contributed to a “good governance” drive. Regional integration through COMESA (the Common Market for Eastern and Southern Africa) and other institutions allowed member nations to better organize to meet their collective needs as consumers and increasingly as producers.

Over the course of two decades, enormous strides were made to make the world less wasteful, more efficient, and more inclusive. But the world was far from perfect. There were still failed states and places with few resources. Moreover, such rapid progress had created new problems. Rising consumption standards unexpectedly ushered in a new set of pressures: the improved food distribution system, for example, generated a food production crisis due to greater demand. Indeed, demand for everything was growing exponentially. By 2028, despite ongoing efforts to guide “smart growth,” it was becoming clear that the world could not support such rapid growth forever. •



## HEADLINES IN CLEVER TOGETHER



### ROLE OF PHILANTHROPY IN CLEVER TOGETHER

In this world, philanthropic organizations focus their attention on the needs of the bottom billion, collaborating with governments, businesses, and local NGOs to improve standards of living around the globe. Operationally, this is a “virtual model” world in which philanthropies use all of the tools at their disposal to reinforce and bolster their work. With partnerships and networks increasingly key, philanthropies work in a more virtual way, characterized by lots of wikis, blogs, workspaces, video conferences, and virtual convenings. Smaller philanthropies proliferate, with a growing number of major donors emerging from the developing world.

Systems thinking and knowledge management prove to be critical skills, as philanthropic organizations seek to share and spread best practices, identify leapfrog opportunities, and better spot problems in failed or weak states. There are considerable flows of talent between the for-profit and nonprofit sectors, and the lines between these types of organizations become increasingly blurred.



## TECHNOLOGY IN CLEVER TOGETHER

In “Clever Together,” strong global cooperation on a range of issues drives technological breakthroughs that combat disease, climate change, and energy shortages. Trade and foreign direct investment spread technologies in all directions and make products cheaper for people in the developing world, thereby widening access to a range of technologies. The atmosphere of cooperation and transparency allows states and regions to glean insights from massive datasets to vastly improve the management and allocation of financial and environmental resources.

*Technology trends and applications we might see:*

- The cost of capturing data through nanosensors and smart networks falls precipitously. In many developing countries, this leads to a proliferation of new and useful services, including “sousveillance” mechanisms that improve governance and enable more efficient use of government resources.
- Intelligent electricity, water distribution, and transportation systems develop in urban areas. In these “smart cities,” internet access is seen as a basic right by the late 2010s.
- A malaria vaccine is developed and deployed broadly – saving millions of lives in the developing world.
- Advances in low-cost mind-controlled prosthetics aid the 80 percent of global amputees who live in developing countries.
- Solar power is made vastly more efficient through advances in materials, including polymers and nanoparticles. An effective combination of government subsidies and microfinance means solar is used for everything from desalination for agriculture to wi-fi networks.
- Flexible and rapid mobile payment systems drive dynamic economic growth in the developing world, while the developed world is hampered by entrenched banking interests and regulation.



## LIFE IN CLEVER TOGETHER

Standing next to his desk at the World Meat Science Lab in Zurich, **Alec** took another bite of the steak that his lab assistants had just presented to him and chewed it rather thoughtfully. This wasn't just any steak. It was research. Alec and his research team had been working for months to fabricate a new meat product—one that tasted just like beef yet actually contained only 50 percent meat; the remaining half was a combination of synthetic meat, fortified grains, and nano-flavoring. Finding the “right” formula for that combo had kept the lab's employees working around the clock in recent weeks. And judging from the look on Alec's face, their work wasn't over. “The flavor is still a few degrees off,” he told them. “And Kofi and Alana—see what we can do about enhancing this texture.”

As Alec watched his team scramble back to their lab benches, he felt confident that it wouldn't be long before they would announce the invention of an exciting new meat product that would be served at dinner tables everywhere. And, in truth, Alec's confidence was very well founded. For one, he had the world's best and brightest minds in food science from all over the world working together right here in his lab. He also had access to seemingly infinite amounts of data and information on everything from global taste preferences to meat distribution patterns—and just a few touches on his lab's research screens (so much easier than the clunky computers and keyboards of the old days) gave him instant access to every piece of research ever done in meat science or related fields from the 1800s up through the present (literally the present—access to posted scientific research was nearly instantaneous, delayed by a mere 1.3 seconds).

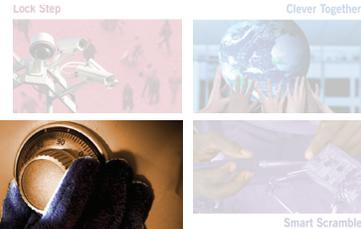
Alec also had strong motivation. There was no doubt that meat science—indeed, all science—was much more exciting, challenging, and rewarding in 2023 than it was a few decades ago. The shift from “lone wolf” science to globally coordinated and open-platform research had greatly accelerated the speed and spread of breakthrough ideas and developments in all fields. As a result, scientists were



making real progress in addressing planet-wide problems that had previously seemed so intractable: people were no longer dying as frequently from preventable diseases, for example, and alternative fuels were now mainstream.

But other trends were troubling—especially to a scientist who had spent his whole career researching food. In cities and villages around the world where children used to be hungry, access to higher-calorie meals had produced alarming increases in the incidence of obesity and diabetes. The demand for meat, in particular, was rising, but adding more animals to the planet created its own set of problems, such as more methane and spiking water demand. And that’s where Alec saw both need and opportunity: why not make the planet’s meat supply go further by creating a healthier alternative that contained less real meat?

“Alec, we have a new version for you to try,” yelled Kofi from across the lab. That was fast, thought Alec, as he searched around his desk for the fork.



Hack Attack

# HACK ATTACK

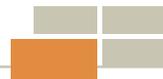
An economically unstable and shock-prone world in which governments weaken, criminals thrive, and dangerous innovations emerge

Devastating shocks like September 11, the Southeast Asian tsunami of 2004, and the 2010 Haiti earthquake had certainly primed the world for sudden disasters. But no one was prepared for a world in which large-scale catastrophes would occur with such breathtaking frequency. The years 2010 to 2020 were dubbed the “doom decade” for good reason: the 2012 Olympic bombing, which killed 13,000, was followed closely by an earthquake in Indonesia killing 40,000, a tsunami that almost wiped out Nicaragua, and the onset of the West China Famine, caused by a once-in-a-millennium drought linked to climate change.

Not surprisingly, this opening series of deadly asynchronous catastrophes (there were more) put enormous pressure on an already overstressed global economy that had entered the decade still in recession. Massive humanitarian relief

efforts cost vast sums of money, but the primary sources—from aid agencies to developed-world governments—had run out of funds to offer. Most nation-states could no longer afford their locked-in costs, let alone respond to increased citizen demands for more security, more healthcare coverage, more social programs and services, and more infrastructure repair. In 2014, when mudslides in Lima buried thousands, only minimal help trickled in, prompting the *Economist* headline: “Is the Planet Finally Bankrupt?”

These dire circumstances forced tough tradeoffs. In 2015, the U.S. reallocated a large share of its defense spending to domestic concerns, pulling out of Afghanistan—where the resurgent Taliban seized power once again. In Europe, Asia, South America, and Africa, more and more nation-states lost control of their public finances, along



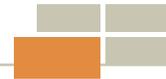
with the capacity to help their citizens and retain stability and order. Resource scarcities and trade disputes, together with severe economic and climate stresses, pushed many alliances and partnerships to the breaking point; they also sparked proxy wars and low-level conflict in resource-rich parts of the developing world. Nations raised trade barriers in order to protect their domestic sectors against imports and—in the face of global food and resource shortages—to reduce exports of agricultural produce and other commodities. By 2016, the global coordination and interconnectedness that had marked the post-Berlin Wall world was tenuous at best.

With government power weakened, order rapidly disintegrating, and safety nets evaporating, violence and crime grew more rampant. Countries with ethnic, religious, or class divisions saw especially sharp spikes in hostility: Naxalite separatists dramatically expanded their guerrilla campaign in East India; Israeli-Palestinian bloodshed escalated; and across Africa, fights over resources erupted along ethnic or tribal lines. Meanwhile, overtaxed militaries and police forces could do little to stop growing communities of criminals and terrorists from gaining power. Technology-enabled gangs

and networked criminal enterprises exploited both the weakness of states and the desperation of individuals. With increasing ease, these “global guerillas” moved illicit products through underground channels from poor producer countries to markets in the developed world. Using retired 727s and other rogue aircraft, they crisscrossed the Atlantic, from South America to Africa, transporting cocaine, weapons, and operatives. Drug and gun money became a common recruiting tool for the desperately poor.

Criminal networks also grew highly skilled at counterfeiting licit goods through reverse engineering. Many of these “rip-offs” and copycats were of poor quality or downright dangerous. In the context of weak health systems, corruption, and inattention to standards—either within countries or from global bodies like the World Health Organization—tainted vaccines entered the public health systems of several African countries. In 2021, 600 children in Cote d’Ivoire died from a bogus Hepatitis B vaccine, which paled in comparison to the scandal sparked by mass deaths from a tainted anti-malarial drug years later. The deaths and resulting scandals sharply affected public confidence in vaccine delivery; parents not just in Africa but elsewhere





“WE HAVE THIS LOVE AFFAIR WITH STRONG CENTRAL STATES, BUT THAT’S NOT THE ONLY POSSIBILITY. TECHNOLOGY IS GOING TO MAKE THIS EVEN MORE REAL FOR AFRICA. THERE IS THE SAME CELLPHONE PENETRATION RATE IN SOMALIA AS IN RWANDA. IN THAT RESPECT, SOMALIA WORKS.”

– Aidan Eyakuze, Society for International Development, Tanzania

began to avoid vaccinating their children, and it wasn’t long before infant and child mortality rates rose to levels not seen since the 1970s.

Technology hackers were also hard at work. Internet scams and pyramid schemes plagued inboxes. Meanwhile, more sophisticated hackers attempted to take down corporations, government systems, and banks via phishing scams and database information heists, and their many successes generated billions of dollars in losses. Desperate to protect themselves and their intellectual property, the few multinationals

still thriving enacted strong, increasingly complex defensive measures. Patent applications skyrocketed and patent thickets proliferated, as companies fought to claim and control even the tiniest innovations. Security measures and screenings tightened.

This “wild west” environment had a profound impact on innovation. The threat of being hacked and the presence of so many thefts and fakes lowered the incentives to create “me first” rather than “me too” technologies. And so many patent thickets made the cross-pollination of ideas and research difficult at best. Blockbuster pharmaceuticals quickly became artifacts of the past, replaced by increased production of generics. Breakthrough innovations still happened in various industries, but they were focused more on technologies that could not be easily replicated or re-engineered. And once created, they were vigorously guarded by their inventors—or even by their nations. In 2022, a biofuel breakthrough in Brazil was protected as a national treasure and used as a bargaining chip in trade with other countries.

Verifying the authenticity of anything was increasingly difficult. The heroic efforts of several companies and NGOs to create





recognized seals of safety and approval proved ineffective when even those seals were hacked. The positive effects of the mobile and internet revolutions were tempered by their increasing fragility as scamming and viruses proliferated, preventing these networks from achieving the reliability required to become the backbone of developing economies—or a source of trustworthy information for anybody.

Interestingly, not all of the “hacking” was bad. Genetically modified crops (GMOs) and do-it-yourself (DIY) biotech became backyard and garage activities, producing important advances. In 2017, a network of renegade African scientists who had returned to their home countries after working in Western multinationals unveiled the first of a range of new GMOs that boosted agricultural productivity on the continent.

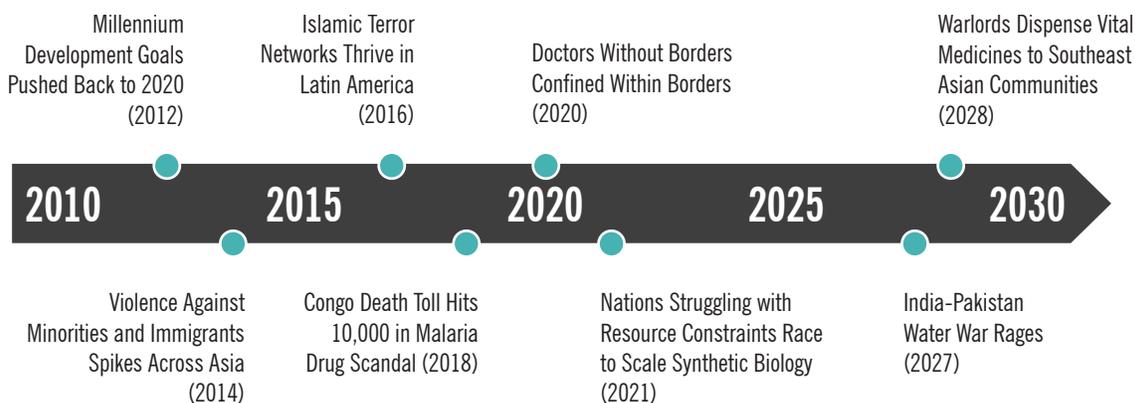
But despite such efforts, the global have/have-not gap grew wider than ever. The very rich still had the financial means to protect themselves; gated communities sprung up from New York to Lagos, providing safe havens surrounded by slums. In 2025, it was de rigueur to build not a house but a high-walled fortress, guarded by armed personnel. The wealthy also capitalized on the loose regulatory environment to experiment

with advanced medical treatments and other under-the-radar activities.

Those who couldn't buy their way out of chaos—which was most people—retreated to whatever “safety” they could find. With opportunity frozen and global mobility at a near standstill—no place wanted more people, especially more poor people—it was often a retreat to the familiar: family ties, religious beliefs, or even national allegiance. Trust was afforded to those who guaranteed safety and survival—whether it was a warlord, an evangelical preacher, or a mother. In some places, the collapse of state capacity led to a resurgence of feudalism. In other areas, people managed to create more resilient communities operating as isolated micro versions of formerly large-scale systems. The weakening of national governments also enabled grassroots movements to form and grow, creating rays of hope amid the bleakness. By 2030, the distinction between “developed” and “developing” nations no longer seemed particularly descriptive or relevant. •



## HEADLINES IN HACK ATTACK



### ROLE OF PHILANTHROPY IN HACK ATTACK

Philanthropy is less about affecting change than about promoting stability and addressing basic survival needs. Philanthropic organizations move to support urgent humanitarian efforts at the grassroots level, doing “guerrilla philanthropy” by identifying the “hackers” and innovators who are catalysts of change in local settings. Yet identifying pro-social entrepreneurs is a challenge, because verification is difficult amid so much scamming and deception.

The operational model in this world is a “fortress model” in which philanthropic organizations coalesce into a strong, single unit to combat fraud and lack of trust. Philanthropies’ biggest assets are their reputation, brand, and legal/financial capacity to ward off threats and attempts at destabilization. They also pursue a less global approach, retreating to doing work in their home countries or a few countries that they know well and perceive as being safe.

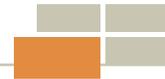


## TECHNOLOGY IN HACK ATTACK

Mounting obstacles to market access and to knowledge creation and sharing slow the pace of technological innovation. Creative repurposing of existing technologies—for good and bad—is widespread, as counterfeiting and IP theft lower incentives for original innovation. In a world of trade disputes and resource scarcities, much effort focuses on finding replacements for what is no longer available. Pervasive insecurity means that tools of aggression and protection—virtual as well as corporeal—are in high demand, as are technologies that will allow hedonistic escapes from the stresses of life.

*Technology trends and applications we might see:*

- Echoing the rise of synthetic chemicals in the nineteenth century, synthetic biology, often state-funded, is used to “grow” resources and foodstuffs that have become scarce.
- New threats like weaponized biological pathogens and destructive botnets dominate public attention, but enduring technologies, like the AK-47, also remain weapons of choice for global guerrillas.
- The internet is overrun with spam and security threats and becomes strongly associated with illicit activity—especially on “dark webs” where no government can monitor, identify, or restrict activities.
- Identity-verification technologies become a staple of daily life, with some hitches—a database of retina recordings stolen by hackers in 2017 is used to create numerous false identities still “at large” in the mid-2020s.
- With the cost of cosmetic surgery dropping, procedures like the lunchtime facelift become routine among emerging middle classes.

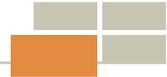


## LIFE IN HACK ATTACK

**Trent** never thought that his past experience as a government intelligence officer would convert into something...philanthropic. But in a world full of deceit and scamming, his skills at discerning fact from fiction and developing quick yet deep local knowledge were highly prized. For three months now he had been working for a development organization, hired to find out what was happening in the “grey” areas in Botswana—a country that was once praised for its good governance but whose laws and institutions had begun to falter in the last few years, with corruption on the rise. His instructions were simple: focus not on the dysfunctional (which, Trent could see, was everywhere) but rather look through the chaos to see what was actually working. Find local innovations and practices that were smart and good and might be adopted or implemented elsewhere. “Guerrilla philanthropy” was what they called it, a turn of phrase that he liked quite a bit.

His trip into Botswana had been eventful—to put it mildly. On-time flights were rare these days, and the plane got diverted three times because of landing authorization snafus. At the Gaborone airport, it took Trent six hours to clear customs and immigration. The airport was bereft of personnel, and those on duty took their time scrutinizing and re-scrutinizing his visa. Botswana had none of the high-tech biometric scanning checkpoints—technology that could literally see right through you—that most developed nations had in abundance in their airports, along their borders, and in government buildings. Once out of the airport Trent was shocked by how many guns he saw—not just slung on the shoulders of police, but carried by regular people. He even saw a mother with a baby in one arm and an AK-47 in the other. This wasn’t the Botswana he remembered way back when he was stationed here 20 years ago as an embassy employee.

The organization that hired him was probably more right than it realized in calling it guerrilla philanthropy. After many weeks spent chasing down leads in Gaborone, then an unfortunate stint that had him hiking for miles alone through the Kalahari



Desert, Trent found himself traveling deep into the Chobe Forest (a nice reprieve, he thought, from inhaling all that sand). One of his informants had told him about a group of smart youngsters who had set up their own biotechnology lab on the banks of the Chobe River, which ran along the forest's northern boundary. He'd been outfitted with ample funds for grant-making, not the forest bribes he had heard so much about; regardless of what was taking place in the world around him, he was under strict orders to behave ethically. Trent was also careful to cover his tracks to avoid being kidnapped by international crime syndicates—including the Russian mafia and the Chinese triads—that had become very active and influential in Botswana. But he'd made it through, finally, to the lab, which he later learned was under the protection of the local gun lord. As expected, counterfeit vaccines were being manufactured. But so were GMO seeds. And synthetic proteins. And a host of other innovations that the people who hired him would love to know about.

Lock Step



Clever Together



Hack Attack



Smart Scramble

# SMART SCRAMBLE

An economically depressed world in which individuals and communities develop localized, makeshift solutions to a growing set of problems

The global recession that started in 2008 did not trail off in 2010 but dragged onward. Vigorous attempts to jumpstart markets and economies didn't work, or at least not fast enough to reverse the steady downward pull. The combined private and public debt burden hanging over the developed world continued to depress economic activity, both there and in developing countries with economies dependent on exporting to (formerly) rich markets. Without the ability to boost economic activity, many countries saw their debts deepen and civil unrest and crime rates climb. The United States, too, lost much of its presence and credibility on the international stage due to deepening debt, debilitated markets, and a distracted government. This, in turn, led to the fracturing or decoupling of many

international collaborations started by or reliant on the U.S.'s continued strength.

Also in trouble was China, where social stability grew more precarious. Depressed economic activity, combined with the ecological consequences of China's rapid growth, started to take their toll, causing the shaky balance that had held since 1989 to finally break down. With their focus trained on managing the serious political and economic instability at home, the Chinese sharply curtailed their investments in Africa and other parts of the developing world. Indeed, nearly all foreign investment in Africa—as well as formal, institutional flows of aid and other support for the poorest countries—was cut back except in the gravest humanitarian emergencies. Overall, economic



stability felt so shaky that the occurrence of a sudden climate shock or other disaster would likely send the world into a tailspin. Luckily, those big shocks didn't occur, though there was a lingering concern that they could in the future.

Not that anyone had time to think about the future—present challenges were too pressing. In the developed world, unemployment rates skyrocketed. So did xenophobia, as companies and industries gave the few available jobs to native-born citizens, shunning foreign-born applicants. Great numbers of immigrants who had resettled in the developed world suddenly found that the economic opportunities that had drawn them were now paltry at best. By 2018, London had been drained of immigrants, as they headed back to their home countries, taking their education and skills with them. Reverse migration left holes in the communities of departure—both socially and literally—as stores formerly owned by immigrants stood empty.

And their homelands needed them. Across the developing world and especially in Africa, economic survival was now firmly in local hands. With little help or aid coming through “official” and organized channels—and in the absence of strong trade and foreign currency earnings—most people and communities had no

choice but to help themselves and, increasingly, one another. Yet “survival” and “success” varied greatly by location—not just by country, but by city and by community. Communities inside failed states suffered the most, their poor growing still poorer. In many places, the failures of political leadership and the stresses of economic weakness and social conflict stifled the ability of people to rise above their dire circumstances.

Not surprisingly, across much of the developing world the rural-urban divide gaped wider, as more limited availability and access to resources like IT and trade made survival and self-sufficiency much more challenging for non-urban dwellers. Communications and interactions that formerly served to bridge one family or one village or one student with their counterparts in other places—from emailing to phone calls to web postings—became less reliable. Internet access had not progressed far beyond its 2010 status, in part because the investment dollars needed to build out the necessary infrastructure simply weren't there. When cellphone towers or fiber optic cables broke down, repairs were often delayed by months or even years. As a result, only people in certain geographies had access to the latest





“THE SPREADING OF IDEAS DEPENDS ON ACCESS TO COMMUNICATION, PEER GROUPS, AND COMMUNITIES OF PRACTICE. EVEN IF SOMEONE HAS BLUEPRINTS TO MAKE SOMETHING, THEY MAY NOT HAVE THE MATERIALS OR KNOW-HOW. IN A WORLD SUCH AS THIS, HOW DO YOU CREATE AN ECOSYSTEM OF RESEARCH AMONG THESE COMMUNITIES?”

– Jose Gomez-Marquez, Program Director for the Innovations in International Health initiative (IIH), MIT

communication and internet gadgets, while others became more isolated for lack of such connections.

But there were silver linings. Government capacity improved in more advanced parts of the developing world where economies had already begun to generate a self-sustaining dynamic before the 2008-2010 crisis, such as Indonesia, Rwanda, Turkey, and Vietnam. Areas with good access to natural resources, diverse skill sets,

and a stronger set of overlapping institutions did far better than others; so did cities and communities where large numbers of “returnees” helped drive change and improvement. Most innovation in these better-off places involved modifying existing devices and technologies to be more adaptive to a specific context. But people also found or invented new ways—technological and non-technological—to improve their capacity to survive and, in some cases, to raise their overall living standards. In Accra, a returning Ghanaian MIT professor, working with resettled pharma researchers, helped invent a cheap edible vaccine against tuberculosis that dramatically reduced childhood mortality across the continent. In Nairobi, returnees launched a local “vocational education for all” project that proved wildly successful and was soon replicated in other parts of sub-Saharan Africa.

Makeshift, “good enough” technology solutions—addressing everything from water purification and harnessing energy to improved crop yield and disease control—emerged to fill the gaps. Communities grew tighter. Micro-manufacturing, communal gardens, and patchwork energy grids were created at the local level for local purposes. Many communities took on the aura of co-ops, some even launching





currencies designed to boost local trade and bring communities closer together. Nowhere was this more true than in India, where localized experiments proliferated, and succeeded or failed, with little connection to or impact on other parts of the country – or the world.

These developments were encouraging, but also frustrating. In the absence of enduring trade and FDI channels, local experiments and innovations could neither scale nor boost overall growth. For those looking, it was difficult to find or access creative solutions. Scaling was further inhibited by the lack of compatible technology standards, making innovations difficult to replicate. Apps developed in rural China simply didn't work in urban India.

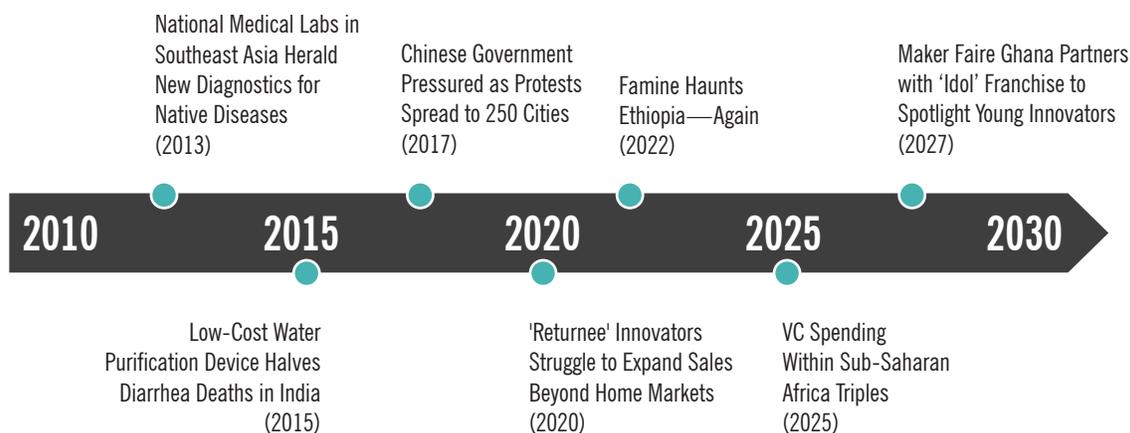
High-speed internet access – which gradually emerged in some areas despite weak government

or philanthropic support – did help, enabling students in isolated pockets in the developing world to access knowledge and instruction through the written word and other media like video. But the development of tangible devices, products, and innovations continued to lag in places where local manufacturing skills and capacities had not yet scaled. More complex engineering solutions proved even more difficult to develop and diffuse.

By 2025, collaboration was finally improving, with ecosystems of research and sharing – many of them “virtual” – beginning to emerge. Yet without major progress in global economic integration and collaboration, many worried that good ideas would stay isolated, and survival and success would remain a local – not a global or national – phenomenon. •



## HEADLINES IN SMART SCRAMBLE



### ROLE OF PHILANTHROPY IN SMART SCRAMBLE

Philanthropic organizations look to fund at the grassroots level, in order to reach people more quickly and solve short-term problems. The meta-goal in this world is to scale up: to identify and build capacity from the individual through the institutional, because without global coordination, innovation cannot scale on its own. Philanthropy requires a keen screening capacity to identify highly localized solutions, with specialized pockets of expertise that make partnerships more challenging and transitions between sectors and issues harder to achieve.

Philanthropy operations are decentralized; headquarters are less important, and the ability to quickly access different parts of the world and reconfigure teams on short notice is key. Office space is rented by the day or week, not the month or year, because more people are in the field—testing, evaluating, and reporting on myriad pilot projects.



## TECHNOLOGY IN SMART SCRAMBLE

Economic and political instability fracture societies in the developed world, resources for technology development diminish, and talented immigrants are forced to return to their countries of origin. As a result, capacity and knowledge are distributed more widely, allowing many small pockets of do-it-yourself innovation to emerge. Low-tech, “good enough” solutions abound, cobbled together with whatever materials and designs can be found. However, the transfer of cutting-edge technology through foreign direct investment is rare. Structural deficiencies in the broader innovation ecosystem – in accessing capital, markets, and a stable internet – and in the proliferation of local standards limit wider growth and development.

*Technology trends and applications we might see:*

- Energy technology improvements are geared more toward efficiency – getting more from existing sources of power – than new-generation technologies, though some local improvements in generating and distributing wind and geothermal energy do occur.
- Breakdowns in the global medicine supply chain accelerate the emergence of locally bioengineered super-strength homeopathic remedies, which replace antibiotics in the dispensaries of many developing-world hospitals.
- Widespread micro-manufacturing, using 3D printers, enables the fabrication of replacement components for engines and machines, allowing “perpetual maintenance” to compensate for broken trade links.
- Garden allotments proliferate in mega-cities as new urban-dwellers seek to supplement a scarce food supply and maintain their agricultural heritage.
- Technically advanced communities use mesh networks to ensure high-speed internet access, but most rural poor remain cut off from access.



## LIFE IN SMART SCRAMBLE

The beat-up six-seater plane in which **Lidi** was the lone passenger lurched suddenly. She groaned, grabbed the armrests, and held on as the plane dipped sharply before finally settling into a smooth flight path. Lidi hated small planes. But with very few commercial jets crisscrossing Africa these days, she didn't have much choice. Lidi—an Eritrean by birth—was a social entrepreneur on a mission that she deemed critical to the future of her home continent, and enduring these plane flights was an unfortunate but necessary sacrifice. Working together with a small team of technologists, Lidi's goal was to help the good ideas and innovations that were emerging across Africa to spread faster—or, really, spread at all.

In this, Lidi had her work cut out for her. Accelerating and scaling the impact of local solutions developed for very local markets was far from easy—especially given the patchiness of internet access across Africa and the myopic perspective that was now, in 2025, a widespread phenomenon. She used to worry about how to scale good ideas from continent to continent; these days she'd consider it a great success to extend them 20 miles. And the creative redundancy was shocking! Just last week, in Mali, Lidi had spent time with a farmer whose co-op was developing a drought-resistant cassava. They were extremely proud of their efforts, and for good reason. Lidi didn't have the heart to tell them that, while their work was indeed brilliant, it had already been done. Several times, in several different places.

During her many flights, Lidi had spent hours looking out the window, gazing down on the villages and cities below. She wished there were an easier way to let the innovators in those places know that they might not be inventing, but rather independently reinventing, tools, goods, processes, and practices that were already in use. What Africa lacked wasn't great ideas and talent: both were abundant. The missing piece was finding a way to connect those dots. And that's why she was back on this rickety plane again and heading to Tunisia. She and her team were now concentrating on promoting mesh networks across Africa, so that places lacking internet access could share nodes, get connected, and maybe even share and scale their best innovations.

# Concluding Thoughts

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As you have seen, each of the scenarios, if it were to unfold, would call for different strategies and have different implications for how a range of organizations will work and relate to changes in technology. But no matter what world might emerge, there are real choices to be made about what areas and goals to address and how to drive success toward particular objectives.

We hope that reading the scenario narratives and their accompanying stories about philanthropy, technology, and people has sparked your imagination, provoking new thinking about these emergent themes and their possibilities. Three key insights stood out to us as we developed these scenarios.

First, the link between technology and governance is critical to consider in better understanding how technology could be developed and deployed. In some futures, the primacy of the nation-state as a unit of analysis in development was questioned as both supra- or sub-national structures proved more salient to the achievement of development goals. In other futures, the nation-state's power strengthened and it became an even more powerful actor both to the benefit and to the detriment of

the development process, depending on the quality of governance. Technologies will affect governance, and governance in turn will play a major role in determining what technologies are developed and who those technologies are intended, and able, to benefit.

A second recurring theme in the scenarios is that development work will require different levels of intervention, possibly simultaneously. In some scenarios, philanthropic organizations and other actors in development face a set of obstacles in working with large institutions, but may face a yet-unfolding set of opportunities to work with nontraditional partners—even individuals. The organization that is able to navigate between these levels and actors may be best positioned to drive success.

## Concluding Thoughts

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DEVELOPMENT-LED INTERVENTIONS ARE OFTEN NOT CAREFUL ENOUGH ABOUT WHAT THE TECHNOLOGY NEEDS IN ORDER TO WORK ON A THREE, FIVE, OR SEVEN YEAR CYCLE. WHAT SCALE IS REQUIRED FOR DEPLOYMENT TO BE SUCCESSFUL? WHAT LEVEL OF EDUCATION IS NEEDED TO BE SUSTAINABLE IN TERMS OF MAINTENANCE? HOW DO THESE REQUIREMENTS EVOLVE OVER TIME?

– Isha Ray, Professor, University of California-Berkeley School of Information, Energy, and Resources Group

The third theme highlights the potential value of scenarios as one critical element of strategy development. These narratives have served to kick-start the idea generation process, build the future-oriented mindset of participants, and provide a guide for ongoing trend monitoring and horizon scanning activities. They also offer a useful framework that can help in tracking and making sense of early indicators and milestones that might signal the way in which the world is actually transforming.

While these four scenarios vary significantly from one another, one theme is common to them all: new innovations and uses of technology will be an active and integral part of the international development story going forward. The changing nature of technologies could shape the characteristics of development and the kinds of development aid that are in demand. In a future in which technologies are effectively adopted and adapted by poor people on a broad scale, expectations about the provision of services could fundamentally shift. Developing a deeper understanding of the ways in which technology can impact development will better prepare everyone for the future, and help all of us drive it in new and positive directions.

# Appendix

## CRITICAL UNCERTAINTIES

The following is a list of the 15 critical uncertainties presented to participants during this project’s primary scenario creation workshop. These uncertainties were themselves selected from a significantly longer list generated during earlier phases of research and extensive interviewing. The uncertainties fall into three categories: technological, social and environmental, and economic and political. Each uncertainty is presented along with two polar endpoints, both representing a very different direction in which that uncertainty might develop.

### TECHNOLOGICAL UNCERTAINTIES

new technologies	◀	technologies with the most impact on development	▶	existing technologies
both developed and developing worlds	◀	origin of technology innovations critical to development	▶	developed world and some BRICs
slow the adoption of novel technologies	◀	social and cultural norms	▶	allow for rapid adoption of novel technologies
few	◀	new innovations that substantially reduce child and infant mortality (vaccines, treatments, cures)	▶	many

### SOCIAL & ENVIRONMENTAL UNCERTAINTIES

static, traditional	◀	community identity in the developing world	▶	dynamic, open to the novel and nontraditional
restricted	◀	educational and employment opportunities for women	▶	expanding
infrequent and manageable	◀	occurrence of “shocks” like disease, famine, and natural disasters	▶	frequent and highly disruptive
poor and worsening	◀	quality of the local environment in the developing world (air, water, sanitation, built environment, etc.)	▶	improved and improving
de-prioritized	◀	global climate change awareness and action	▶	prioritized

## ECONOMIC & POLITICAL UNCERTAINTIES

worse than expected	◀	global economic performance, 2010-2015	▶	improves significantly
inhibiting	◀	rules and norms around entrepreneurial activity	▶	supportive
static	◀	education and training opportunities in the developing world	▶	increasing
marginal and contained	◀	conflict in the developing world	▶	pervasive and widespread
weak, with barriers to cooperation	◀	international economic and strategic relationships	▶	strong, with more supranational cooperation
worse and more prone to disruptions	◀	food security in the developing world	▶	better and more secure

## LIST OF PARTICIPANTS

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