

2007-2008 SUSTAINABILITY OUTLOOK: SCENARIOS AND SIGNALS OF INNOVATION

Sustainability has become a hot topic in all types of companies, posing strategic challenges and opportunities for innovation and market leadership. From C-suites to marketing organizations to supply chain partners, people are asking what sustainability really means and how it will change the future of brands, operations, and corporate strategy.

This year's Sustainability Outlook project, conducted jointly by Business for Social Responsibility (BSR) and Institute for the Future (ITF), helps answer these questions.



Sustainability goes beyond the capacity to maintain business as usual, whether we're talking about companies, governments, or human society as a whole. Sustainability is the ability to ensure the health and well-being of individuals, our collective society, and the ecosystem. For without these, the world of business cannot prosper for long.

Sustainability strategies, likewise, go beyond innovations in the marketplace. In fact, this year's Outlook focuses on four approaches to sustainability strategies: new kinds of commons, new marketplace strategies, potential policy frameworks, and new technological platforms. For each of these, we depict a horizon of "signals"—innovations that, taken together, can help us anticipate four very different future worlds.

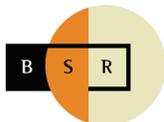
To help you make sense of these worlds, the 2007-2008 Sustainability Outlook toolkit includes the following:

- A strategic map of the uncertain sustainability horizon, including the four strategies, plus signals, wildcards, and specific sustainability issues
- Four strategic scenarios that bring the map to life with insights into the near-, mid-, and long-term possibilities of these four very different approaches to sustainability
- A set of industry analysis cards that interpret the risks and opportunities for seven key industry sectors.

You can use these tools to get familiar with the signals of sustainability innovation, to interpret the implications of the four scenarios for your organization, and to build strategies that anticipate both sustainability risks and opportunities in the coming decade.

Look inside for details.

Sustainability strategies create opportunities for innovation and new value creation by aligning business practices with the well-being of individuals, society, and ecosystems.

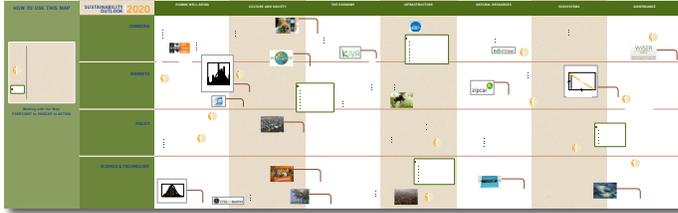


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2020 Sustainability Outlook: A Strategic Map of an Uncertain Future

The 2020 Sustainability Outlook Map is a visual guide to sustainability strategies over the next decade. It asks—and answers—the question: How will sustainability practices differ if society focuses on one of four key strategies: commons, markets, policy, or technology? It provides signals of innovations in each of these strategies, using seven different lenses on sustainability. The four strategies (rows) and the seven lenses (columns) form an innovation grid.

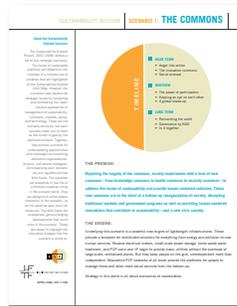


Use the map to explore signals of innovation over the next decade—and to map additional innovations you foresee.

Sustainability Outlook Scenarios

Four Sustainability Outlook scenarios take a deep dive into the alternative worlds that our four different societal strategies suggest. They weave the signals from the map into four complete stories about how the future might unfold. Each scenario has a day-in-the-life vignette to make it more tangible, as well as a couple wildcard stories that depict what would happen if the strategy went awry.

Use the scenarios to immerse yourself in alternative scenarios for a sustainable future—and envision the implications of your strategic choices.



Industry-by-Industry Analysis

Sustainability will pose different risks and distinctive opportunities for each industry sector. The industry analysis cards summarize the significance of each scenario for seven key industries: consumer products, extractives, food and beverage, high-tech, professional services, retail, and transportation. They also analyze selected signals of innovation for risks and opportunities.

Use the industry analysis cards to focus your view of the sustainable future—and anticipate risks and opportunities for your own company.



Explore the Signals of Innovations

Tour the map to get familiar with the signals

The Sustainability Outlook Map is made up of dozens of signals—wavy banners that describe the territory of the map.

Distribute copies of the map and allow 15 minutes for participants to explore the signals. In small groups, discuss

- What is the most surprising signal?
- What is the most threatening signal?
- Which signal is most relevant to your group?
- What are some examples of these signals in today's world?

Connect the dots among signals

Ask each participant to choose a signal from the map and write it on a name tag. Participants then find a partner and spend 5-7 minutes discussing:

- What each signal means and an example of the signal
- What happens when these two signals intersect

Rotate partners two or three times and then discuss the insights in the full group. (Variation: start in pairs and then expand to groups of three and four.)



Get Immersed in the Scenarios

Perform the scenarios

To immerse participants in the worlds described by the scenarios, divide into four groups—one for each scenario. Take 15-20 minutes for the groups to read their scenarios and note key signals on the map.

Then ask each group to develop a performance. It can be a news report, a debate, a skit, or some other performance form. The goal is to convey the scenario as completely as possible to the other groups. The groups may need about an hour to do this.

Each group then delivers a 5- to 7-minute performance. Follow each performance with a Q&A session, so the other groups can ask clarifying questions.

Create new scenarios

The real future will likely include elements of all the scenarios. Divide participants into groups of three or more people. Give them 10-15 minutes to choose a half dozen signals from across the rows of the map.

Then, using the scenarios and the industry analysis cards as a reference, ask the groups develop their own timeline of the future. Instruct them to create bullet-point “events” for the near term, the midterm and the long term. To begin to bring the scenarios home to your company, ask them to include a few key corporate events on their timeline. Aim for 5-7 bullet points for each timeframe.

Ask each group to present its timeline, allowing 10 minutes for each presentation. Then invite other groups to ask questions and comment.



Building Strategy

Prepare a mock strategy presentation

To prepare individuals to talk in the organization about areas of the map and their relevance to your company, ask them to develop a mock presentation of one intersection on the map.

Invite each participant to choose an intersection that is compelling for your company. Using the signals in that intersection, give the participant about 10 minutes to prepare a presentation to a mock audience. The presentation should explain the following:

- What is compelling about this area of the map
- Implications for your business
- Key risks associated with the signals
- Key opportunities associated with the signals
- Suggestions for tangible next steps to explore

Analyze the strategic implications of key signals

Identify 4-5 priority signals for your company, based on their relevance to a key issue (such as climate change), your operations (such as supply chain management), and/or your strategic objective. Using the industry analysis cards as a guide, discuss the following for each priority signal:

- What are the implications of this signal for your current and planned activities?
- What risks does this signal pose for you work?
- What opportunities may this signal present?

Once you've analyzed all the priority signals, discuss the key risks and opportunities your strategy needs to address.

Create a strategy wind tunnel

To test a new product or strategy for resilience and relevance in the future, provide the group with information about the rationale, objectives, and other important details of the product or strategy.

In small groups, select and read a scenario, making note of the relevant signals. Assume a date in the future when the product or strategy is launching. Discuss the following question: “What are the strengths and weaknesses of our new product or strategy in this scenario?”

Share insights with the full group.

■ **BUSINESS FOR SOCIAL RESPONSIBILITY**

Business for Social Responsibility (BSR) provides responsible business solutions to many of the world’s leading corporations. Headquartered in San Francisco and with offices in Europe and China, BSR is a nonprofit business association that serves its 250 member companies and other Global 1000 enterprises. Through advisory services, convenings, and research, BSR works with corporations and concerned stakeholders of all types to create a more just and sustainable global economy.

■ **INSTITUTE FOR THE FUTURE**

The Institute for the Future (ITF) is an independent, nonprofit strategic research group with 40 years of forecasting experience. The core of its work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. ITF provides its members with insights into business strategy, design process, innovation, and social dilemmas. Its research generates the foresight needed to create insights that lead to action. The Institute for the Future is based in Palo Alto, California.

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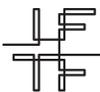
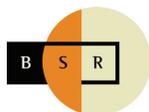
Sustainability Outlook is an ongoing project of BSR and IFTF. For more information, please contact **Stacey Smith** (ssmith@bsr.org) at BSR or **Bob Johansen** (bjohansen@iftf.org) at IFTF.

About the Sustainability Outlook Scenarios

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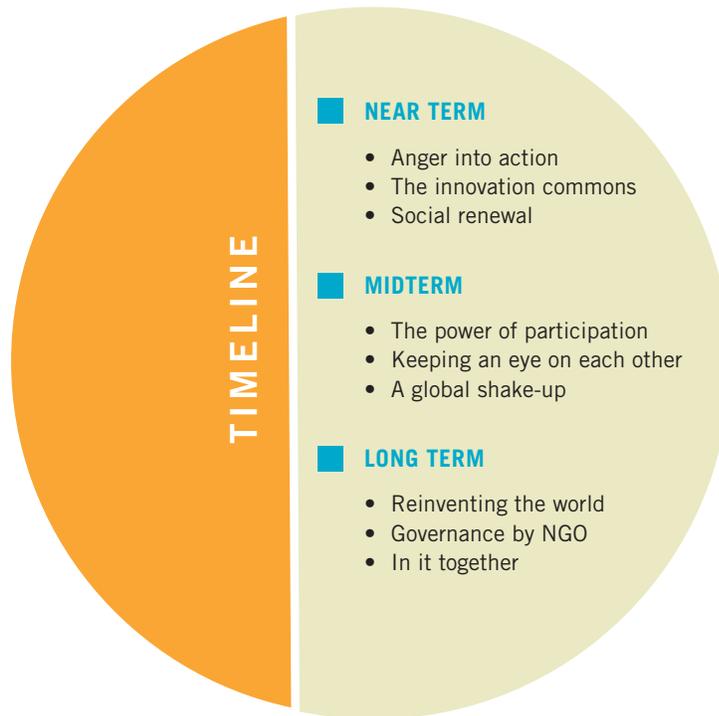
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THE PREMISE:

Rejecting the tragedy of the commons, society experiments with a host of new commons—from knowledge commons to health commons to security commons—to address the issues of sustainability and provide human-centered solutions. These new commons are at the heart of a bottom-up reorganization of society, disrupting traditional markets and government programs as well as providing human-centered innovations that contribute to sustainability—and a new civic society.

THE ENGINE:

Underlying this scenario is a powerful new engine of lightweight infrastructures. These provide a template for distributed solutions for everything from energy and pollution to new human services. Reverse electrical meters, small-scale power storage, home waste water treatment, and P2P voice over IP begin to provide basic utilities without the overhead of large-scale, centralized plants. But they keep people on the grid, interdependent more than independent. Meanwhile P2P networks of all kinds provide the platforms for people to manage these and other more social services from the bottom-up.

Strategy in this world is all about economies of coordination.

Lee Wen, 32, Vancouver Canada (citizen of People's Republic of China)

Lee Wen went about his day as he had for nearly two years, but this time, he was thousands of miles from home, walking through the streets of Toronto rather than Dongguan. Outdoors during the warmer-than-usual autumn, he watched the flows of data from the remaining nodes of his environmental sensor network, feeding the data to the United Nation's Comprehensive Climate Response model. His hopes for a message from Beijing, telling him that the national government had finally been able to make the local governor see reason, grew dimmer every day. Just last night, he'd slipped and called his current temporary residence "home."

The sound of chanting pulled Wen away from his web tablet. Another protest, this one outside the Indian consulate, about the barring of Ecosystemes Sans Frontieres from helping with the Kashmir recovery. Wen had no particular problems with India, although the old rivalry between Beijing and New Delhi would sometimes make things awkward when he had to interact with Indian Desi here in Vancouver. He couldn't understand why India was so adamant about this, though.

Wen's reverie was interrupted by a slight vibration and "ding" from his web tablet: new message received. Flipping to his email, he saw that the message claimed to be from Canada's Department of Climate Management. Just as he was about to open it, his mobile vibrated and signaled again. There, in softly-glowing Chinese characters, was his long-awaited mail from Beijing.

Walking quickly towards his flat while scanning the message, Wen sighed. The Dongguan council would only drop the trespassing charge (and refrain from making further charges) if Wen would sign over all rights to his sensor grid, and sign a contract agreeing never to disclose the grid's contents. Probably due to the influence of nearby Hong Kong's traditional businessmen, Dongguan had dragged its feet getting set up for closer environmental scrutiny; by taking over Wen's network, the city would be able to meet next year's national standards without spending any money. More importantly, for Wen, the city would close down public access to the data. If Wen said no, he'd remain in exile, but the sensor data would remain part of the world's commons.

Wen closed the message from Beijing, opening the mail from the DCM. He had to reread it twice to believe what he saw: the Canadian government was offering to fund a project to deploy one of his sensor grids throughout the Inuit territories; moreover, the data coming from the sensor grid would be made freely available, in accordance with Canadian law.

He stopped abruptly, nearly being hit by a car (one of those new Indian hybrids, Wen noted absently). He could head back home and rejoin his family, knowing that his work would be slowed or stopped (and that he'd be under constant scrutiny from the local government and suspicious neighbors alike), or he could accept Canada's offer and roll out a far larger, and far better funded, version of that network. His head screamed for Canada and its open support; his heart screamed for China and his family and friends. Wen stood there at the corner, not moving, wondering if he really could ever think of Canada as "home."

Anger into Action

As the 21st century's first decade draws to a close, the mismatch between the public interest and the ambitions of political and commercial leaders could scarcely be more profound, with frustrations and anger erupting from Seattle to Soweto. Long-term thinking and a willingness to compromise are in short supply among global political leaders. The ongoing economic downturn puts even greater pressure on corporations to show short-term returns, putting a freeze on myriad strategic and sustainability plans many of the developed world's most forward-looking companies have had put into practice. Throughout it all, the cries of environmental scientists and climatologists keep getting more insistent and desperate—and the global citizenry, ever more attuned to the increasing fragility of the global environment, wonders who will step up to lead us out of this mess.

While majorities wait for leaders, a small but passionate set of citizens realizes that their time has come. Collaborative, commons-based solutions that took advantage of networked technologies began to appear in the 1990s as responses to complex problems, and the variety of these solutions multiplied in the early part of the 2000s. But while many observers argue for cooperative, bottom-up responses to sustainability concerns, there remains a great deal of caution about just how far these ideas can go. The dominant position, as 2010 approaches, is that open, peer-to-peer models are interesting showcases and tests for what the “important” actors—government and business—will need to do.

The Innovation Commons

As more people become conversant with the technologies and practices of open, collaborative projects, it starts to dawn on many of the participants that they might be able to do more than just test out ideas. In this first decade, the commons-“literate” part of the population remains still quite small, but it's increasingly influential; niche practices such as open-source graphic and architectural design, so-called “micro” models of finance and energy, and peer production of media and information

demonstrate the ability of the commons-based approach to be economically important. Without any explicit intent, the “open economy” becomes a major (if widely unacknowledged) source of innovation and economic growth in many advanced nations, and an emerging catalyst for “leapfrog” development in the global South.

One key driver of this approach is the rapid expansion of so-called “lightweight infrastructures”—micro-scale and peer-to-peer technologies allowing much more flexible and efficient use of resources and information. By the end of the decade, a growing number of households in the United States, Europe, and Japan have some degree of “smart” infrastructure, whether reverse energy meters, home wastewater treatment, or wireless networks. In places like China, dependent more on mobile, wireless networks than on high-speed grids, the development and deployment of “lightweight” networks follows a path of empowering communities rather than individual homes.

While these practices have a clear economic value, their first true flowering comes in the realm of civil society: human rights, sustainability, and support for development. Experts describe the ongoing phenomena as increasing both the “density” and “sensitivity” of interconnections: people have a growing variety of links to each other, connecting them in richer and more immersive ways, allowing them greater awareness of the needs of and pressures on their families, colleagues, and fellow citizens.

Social Renewal

Over the course of the decade, collaborative systems continue to expand into—and eventually come to dominate—issues that had once been considered the realm of governments and businesses, such as health care and human rights, building on skeletal efforts underway for years. During this period of growth, few beyond those participating in these projects truly appreciate their scale. Finally, in 2012, *TIME Magazine* features a cover story on the “New Volunteers,” giving this rapidly growing movement mainstream attention.

The Power of Participation

With official attention inevitably comes official control. But much to the surprise of both corporate/government officials and many global “commoners,” the participatory, collaborative culture seems unmoved by the sudden appearance of traditional power-brokers. This appears, in part, to be because mainstream leaders aren’t offering anything new and are largely viewed as a potential hindrance; it also seems to be an accidental result of the lack of clear overall leadership in the Commons. All of the projects have leaders, but there’s no one figure or team to oversee the movement as a whole. Connections to businesses and government agencies happen in piecemeal, and the bottom-up, collaborative flavor of the movement remains.

Moreover, the continuing degradation of the global environment overshadows debates about relationships with traditional power-centers. Sustainability was a watch-word for many of the early commons projects, but was just one among many. By 2014, however, ecological crises are so profound that, while other participatory efforts remain in effect, sustainability and the global environment concerns weave through nearly all commons-based projects, from health care to human rights.

Keeping an Eye on Each Other

The result is an explosion of new ideas. Technologies of mobile observation and sensing, promoted as social networking and personal memory devices, become fundamental tools for environmental management. In a play off the “Big Brother” fears of omnipresent monitoring, advocates of this new model call themselves “Little Sisters.” The records and data gathered by these Little Sisters contribute to an emerging ecological reputation system, making it easy for citizens to determine whether individuals, companies, and governments are living up to their own sustainability claims. Although this process has a visible technological component, its real engine is the changing sense of responsibility felt by global citizens.

The various collaborative efforts offer more than just passive information gathering and access. By the mid-point of the decade, “commons action networks” become a leading mechanism of response to the growing number of environmental and

social crises. In 2016, People’s Health, an offshoot of Doctors Without Borders, provides a trustable peer-to-peer mechanism for health care; a parallel project, the Famine Network, builds on the proliferation of local food providers to offer a new model for famine relief. An open-access science group calling itself the Biotrust serves as a watchdog against biopiracy.

All of these projects happen in parallel to, not in replacement of, official efforts. In most cases, the traditional models remain the dominant response to global needs, due to better-established relationships and deeper pockets. Increasingly, however, community and global leaders alike look at the commons-based approaches as showcases of innovative practices and ideas. Some of the mainstream governments and businesses take this even further, offering financial, infrastructure, and political support for new commons-based solutions.

A Global Shake-Up

Unsurprisingly, there’s quite a bit of tension between the commons-driven efforts and traditional power centers, particularly in societies and cultures that treat deference to centralized power as a normative good. Many entrenched political institutions see the commons action networks as insurgents or rivals, and some try to outlaw citizen networks. It soon becomes clear, however, that such crackdowns are counter-productive, in part because they drive away the most innovative members of society.

One counterpoint to the crackdowns is the rise of what is colloquially known as “SMS democracy” in the more forward-looking parts of the developing world, where voting, polling, and numerous economic and social transactions take place by secure mobile phones. Kenya pioneers this model in 2016, and nations as diverse as India, Thailand, and Brazil soon follow suit.

Reinventing the World

As the decade draws to a close, pundits and observers of all stripes compete to describe just how surreal the world has become, at least to conventional eyes. To some, this decade has seen the most significant shift in the global political structure in centuries; to others, the revolution underway has more to do with reinventing commerce and the global economy. Most agree, however, that the trigger for this transformation was the accelerating course of environmental collapse—and the apparent unwillingness of traditional leaders to respond in time.

Many of these observers cite the “solar rights” movement as a leading example. In 2018, activists, scholars, and community leaders on every continent start to demand that access to renewable energy be considered a human right, in parallel to the right to access to clean water. Traditional leaders and the mainstream press initially dismiss this as a joke, but as more people take up the cause, the harder it becomes for governments to deny. By 2020, what had started as a fringe argument has become a major platform issue for political campaigns across the democratic world.

Governance by NGO

More and more of the leading solutions for the pressing problems of the day cut across traditional notions of sovereignty and citizenship. Online unions, spun off from reputation and social networks, engage in labor negotiations without regard for borders. Commons-based organizations such as “Ecosystemes Sans Frontieres” gather and redistribute sustainability innovations around the world, blatantly ignoring intellectual property and trade restrictions set by “obsolete” institutions. Governments push back—hard—against many of these developments, but with diminishing public support. And once one administration agrees to abide by the new rules, it becomes harder for other nations to continue to hold out. Critics call this “governance by NGO.” Soon, its supporters start calling it that, too.

Some scholars argue that this is little different from the system of international treaties and trade regimes earlier in the century—other than the presence of millions of citizen participants. And despite the transformation of global politics, day-to-day life has changed little for most in the industrialized and post-industrial nations. The greatest impact from environmental transparency and community networks tends to be in realms where the broad consensus had already turned away from business-as-usual, such as with energy.

In it Together

Few of the citizens of post-industrial nations recognize their role in helping to understand the world. Various “Little Sister” ecological monitoring technologies have evolved, in the intervening years, into a planetary sensing and analysis network. Most residents of developed nations have environmental sensors built into their mobile devices as a matter of course, and the ecological action communities make monitoring the planet a constant activity, soon becoming a leading source of real-time scientific data.

In the developing world, however, the commons-driven shift is more profound: empowered by “SMS democracy,” informed by collaborative information-gathering systems, and connected by a ubiquitous communication infrastructure, citizen movements in 2020 appear on the brink of giving the developing world the potential for a positive future.

Citizens around the world, however, recognize that ecological risks threaten to derail such positive outcomes. Despite the efforts of the global commoners, climate and environmental disruption remain major threats, and even the most optimistic models show decades more of problems before the planet begins to stabilize. For many of the leading citizen action networks, creating a truly sustainable world will be the predominant issue facing the world’s nations for years to come.

BOTTOM-UP GREEN GOVERNANCE TURNS INTO GREEN FASCISM

Desperate times lead to desperate measures. By 2020, the growing impacts of climate disruption on the United States, combined with what is now seen as a tragically delayed response, trigger economic and social disruptions on a par with (and, arguably, exceeding) those of the 1930s depression and dustbowl. There's abundant blame to go around, but the first response is a good one: a unified call to action and innovation.

Unfortunately, that sense of unity and purpose is soon undermined by people and companies trying to game the system—emitting more greenhouse gases than they should, relying on tenuous (and all-too-often phony) offsets to allow them to out-compete the law-abiding. The backlash is swift, but there's now a mood of suspicion and resentment building against those who helped create this mess. And while there's plenty of discussion of “thermal inertia” and “climate lag,” the continued worsening of conditions despite the nation's efforts simply makes matters worse.

As controls on emissions grow tighter, informal information markets spring up, relating both advice on how to improve one's footprint and tips pointing to people or companies that don't seem to be doing their fair share. Conditions and behavior-monitoring technologies spread, all in the name of a desperate effort to cut carbon emissions by 80% by 2025. Citizen “carbon militias” shoot protestors; harsh footprint restrictions limit travel. And the people wait, hoping that these sacrifices manage to head off an even greater disaster.

FOOD ISSUES ARE GROUND ZERO FOR CONFLICT

Tortillas were just the beginning. Whatever the actual details, by the late 2010s the story of how the corn biofuel rush in the United States caused a multifold hike in the price of tortillas in Mexico has taken on a mythic quality. For some who tell the story, its moral is clear: the agricultural industries end up hurting the planet and taking food from the people's mouths. More objective observers argue that what the story tells us is that the global food network is all too brittle and is increasingly a catalyst for social conflict.

This theme shows up again and again: over-fishing destroys fisheries and triggers bitter (and sometimes violent) fights between nations over fishing rights and between fishermen and government over how much fish can be caught; fruit shipped thousands of miles rots in port as protestors and politicians argue over whether introduced drought-resistant genes should count against GMO restrictions; people eating hamburgers start to receive the same kind of treatment as people wearing fur.

Few of the solutions appeal: clearing more forestland to grow crops simply makes climate problems worse; aggressively modifying crop genomes to make them hardier or grow faster is risky and controversial; simply eliminating the meat industry and turning over the feedstock land to human food production faces massive resistance. Biofuels, once seen as a climate savior, are now being phased out as quickly as possible, simply due to the food impact—a small victory.

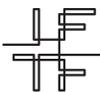
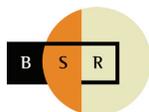
And throughout the industrialized nations, climate-related crop failures and drought trigger social unrest and the return of a concept that had long been relegated to the parts of the world that only show up in telethons: famine.

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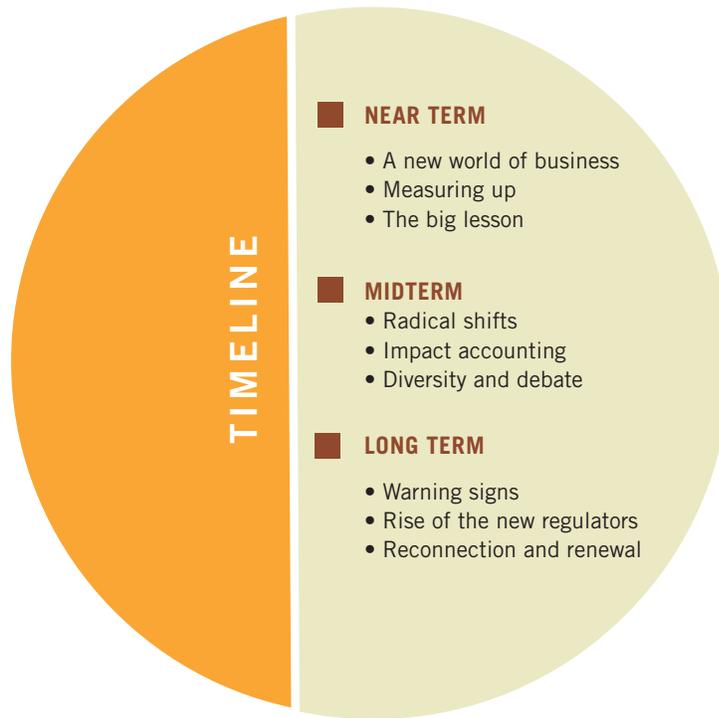
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THE PREMISE:

Market-led sustainability leverages market strategies to manage the ecosystems and improve social conditions at all levels—from households to farms, factories, cities, and the planet. Market incentives drive consumer and corporate behavior alike, aligning work and play, public and private life with changing environmental realities and human needs.

THE ENGINE:

Underlying this scenario is a trust in the transformative power of numbers and numeration. Markets require capital, and this scenario involves sweeping capitalization—the valuation of goods and services into capital, and the emergence of markets and market dynamics around that capital. Cap-n-trade markets, triple-bottom-line calculations, ecosystem services markets, and emission credits manifest these principles. Meanwhile, the philosophy of metrics and valuation extends to footprinting strategies, sustainability labeling, real-time feedback dashboards, health credits, even global development goals. Not all metrics are comparable, but most dimensions of society are measurable in some way and these measurements drive innovation.

Marta Enriquez, 52, Mexico City

Ask Marta Enriquez if she's a "green health consumer," and she'll laugh. "Oh my, no, I'm not political. I mean, I'm very aware of the impacts of the groceries I purchase for my family, but that's just common sense." Still more than half of the products in her shopping basket are organic, and most of the rest offer some kind of footprint reduction when compared to similar items.

Marta reads the labels, too. She looks for carbon info—then again, who doesn't?—and for any indications that the box of vegetables or bottle of juice might have come into contact with hazardous materials. Mexico has been pushing to get the North American trade zone to adopt a European-style reduction of hazardous substances (ROHS) law, but one of Mexico's northern neighbors has been dragging its feet. As it turns out, it's Canada, not the United States, that's been the hold-up. A rapidly-growing number of Canadian residents are also part-time Chinese residents, and China has been pushing back hard against a global ROHS; the newsblogs say that the Canadian government is stuck, but Marta just wants them to grow a backbone.

Marta follows both formal data services and informal info-feeds to keep track of what's happening to her (and her nation's) health, and of course her friends, co-workers, and former students all provide links and comments on the social network. She reads the news and chatter on her phone, and on her television; her daughter, the doctor, helped her set it up, but adding new sources turned out to be very easy. Marta pays unusually close attention to this information—she has to, after that health scare last year.

Marta also looks at the bigger picture. She worries about how global trends like "food miles" and "environmental goods and services rules" will affect poor farmers, but she also understands that it's a complex problem. Mexico has seen more than its share of impacts from global warming, from wildfires to famine to that flu that came up from Guatemala last year. (Marta's not entirely clear on how a flu is a result of global warming, but her daughter insists that it's so.) One definite benefit from this crisis is that, for the first time in decades, Mexico City is seeing more smog-free days than not as people stop driving gasoline cars.

It's a good thing, too, since Marta has to go into Mexico City every month for a checkup. The tumor was small and easily removed, but she knows that she can't let that happen again. Her network of friends keep coming up with more information on the kind of cancer she had, and who's doing the best research on it.

Her network friends also convinced her that she should report on the company that gave her cancer. At least, her friends say that the toxins in the make-up did it, and while Marta's daughter worried about "blind trials," she eventually said "yes, probably so." When Marta joined a related "responsibility smart-mob" (she hated that name, it sounded so violent, even though it was only online), she found that she wasn't the only one to be hurt by this company.

Marta takes a moment to think again about what she's been asked. "Well, maybe I am a green health consumer," she admits. "But we all are, today."

A New World of Business

As 2010 draws near, feelings of dissatisfaction and unease abound throughout the West. An increasingly creaky global economy staggers under a relentless financial crisis and recession. Few people even pretend to ignore accelerating climate and environmental dangers. Political turmoil continues apace, flaring up in the usual spots, but with no signs of improvement on the horizon. And across disparate cultures and societies, citizens are re-evaluating their lives, wondering if lives defined by consumption really matter. It's a hard time to be in business, at least for those companies that had assumed that good times would never go away.

At the same time, there are emerging niches that hold the promise of an eventual turn-around. Savvy designers start to look at these communities as sources of inspiration and innovation, trying to find the next untapped market. Lifestyles across the cultural spectrum are changing, with a combination of economic pressure, age, and evolving environmental and health norms pushing away from heavy consumption behaviors. The aging baby boomer population in the United States asserts itself yet again—for example, putting pressure on global producers to meet new demands. Around the world, cross-culture immigrants seek a greater voice in the market; the so-called “empowered disabled” populations start using treatments for physical limitations as jumping off points for better-than-normal augmentations; and “sustainable business” is rapidly becoming not just a consumer requirement, but an assumption. “Consumer downsizing” alters the relationship between suppliers and users, emphasizing product-service systems and lifecycle sustainability, becoming the major economic theme of the early 2010s.

Measuring Up

In order to meet these evolving demands, many businesses find they need top-to-bottom changes in not just how they work, but what they know about how they work. Sustainability dashboards offer a popular solution, providing standardized measures and models of business sustainability; these dovetail nicely with studies of compliance

with new pollution and energy regulations. Controversies erupt over a lack of transparency in many industries, threatening both nascent carbon markets and the growing market dependence on environmental goods and services. Now more so than ever, consumers are willing to say “no” to markets that don't meet their standards.

These standards, in turn, increasingly rely on the latest in eco-science. Not just in the study of environmental impacts—although that remains important—but also the explosion of research and development of cutting-edge eco-friendly goods and services. Innovation in this arena proves a key driver of global economic recovery, and both informed consumers and fierce competition push that innovation forward. A top-rated product of 2009 would find itself abandoned by the market of 2013 without continuing to evolve to meet the latest goals. In an echo of the first Internet boom, major corporations have found their profits under siege by faster, smarter start-ups; in turn, big companies pounce on smaller ones in the search for ideas.

The Big Lesson

As the mid-point of the second decade approaches, that search gets even broader. Fields like synthetic biology, once considered well off the mainstream, suddenly become market darlings as industries seek out the newest sources of solutions. With this pace of innovation and experimentation comes risks: 2014 finishes by being called “the year of the big lesson,” as several bioscience and biochem firms go under due to lawsuits over unsafe practices.

Radical Shifts

That “big lesson” isn’t lost on Wall Street. Prodded by insurance companies, government, and citizens alike, new sustainability-focused stock exchanges offer a home for companies and financial instruments willing to endure deep, ongoing evaluation of practices and services. As much as these changes seem prompted by fear of lawsuits and bad publicity, many participating companies see this as an opportunity to make significant changes to their practices. New corporate models flourish, with social entrepreneurs and b-corps leading to even more radical business hybrids. At the mid-point of the decade, social responsibility, environmental sustainability, and overall profitability show signs of working hand-in-hand.

This resurgence of success masks a deeper structural problem: the gap between rich and poor nations (and between rich and poor communities within nations) continues to grow, threatening to make the early-mid 2010s recovery a brief one. The reasons aren’t hard to see: few of the long-standing structural inequities have been resolved, and quite a few of the environmental demands coming from the post-industrial world come with significant financial or social costs. The “food miles” concept exemplifies this problem: attempts to penalize food coming in from long distances by leveling additional carbon taxes make some environmental sense, but at the expense of developing world exporters.

Impact Accounting

One effort to better understand—and, hopefully, rectify—this problem also offers a new way to measure profits. The “impact accounting” movement, which looks not just at current externalities but also at carefully discounted future generations and effects, takes advantage of sophisticated new enviro-economic modeling software to give businesses a clearer look at medium and long-term results. Impact accounting is highly controversial, and is by no means widely accepted, but it irreversibly alters the “conversation” between businesses, consumers, and society.

The broad adoption of a standardized method of measuring and reporting the “footprint”—both environmental and social—of a variety of products offers a more mainstream development, starting with food. Emphasizing transparency as inherent to sustainability, the standards see rapid adoption in much of the world. As with a growing number of environmental policy changes, this code is developed and pushed through by corporate actors, cooperating with citizen groups, and merely formalized by government policy. Increasingly, this model of business-community cooperation takes the lead in developing new guidelines and markets.

Diversity and Debate

Not all of the new guidelines are as widely accepted, however. Agricultural markets boil over with arguments about food vs. biofuels, organic vs. engineered crops, synthetic species, carbon sequestration—topics that have been sore points for years, made worse by both new perspectives on impacts and the new power of green biotechnologies. Few of these issues can be easily resolved, and Europe, the United States, and China each follow divergent pathways, emphasizing and restricting different sets of agricultural practices. This apparent diversity, however, pales in comparison to the experimentation in the global South, with nations like South Africa, Brazil, and India showing far greater eagerness to try new and potentially risky approaches.

The strength of these nations in this realm serves as a jumping-off point for a new South-South trade partnership, increasingly cutting out Western markets. In particular, South Africa’s emphasis on biotechnology, Brazil’s position as the “Saudi Arabia of biofuels,” and India’s investment in low-cost, low-impact transportation make the three a formidable combination. This development alarms many Western government and corporate leaders, who immediately focus on keeping China in the developed world fold. Beijing masterfully plays the South and the West against each other, at least at first; internal squabbling prevents China from resolving this economic dilemma before both the South Africa-Brazil-India partnership and the Western nations adapt to a lesser Chinese role. By 2017, the European Union/United States, China, and the SAbRIn coalition have all suffered.

Warning Signs

At the end of the 2010s, what had seemed a new boom is now threatened by an international trade conflict. Some of the companies that had been playing by the new rules when times were good find abiding by those rules harder during a downturn. They learn quickly, however, that citizens around the world are not forgiving of backpedaling, especially with large-scale environmental problems continuing to unfold.

Well-functioning markets require well-informed consumers, and the consumers of 2018 have more knowledge at their fingertips than ever before. A camera phone snapshot of a product in Boston connects to a social responsibility database in Madrid that pulls in comments and real-time data from producers in Indonesia. One of the early signs of a business in trouble is when consumers know more about the history and footprint of their products than does management.

Rise of the New Regulators

Businesses see pressure from the top down, too—not from governments, but from pseudo-regulators like insurers. Since the 1990s, reinsurance companies had pressured their insurance industry customers to take emerging environmental impacts into account when writing new policies; by the late 2010s, this pressure has become overwhelming, and insurance firms have become the leading practitioners of impact accounting. In many industries, businesses trying to reduce sustainability efforts face the very real prospect of losing all insurance coverage.

The companies too wealthy or too entrenched to care about citizen or insurance pressure face a final hurdle: carbon and biodiversity trials. First tried in Europe in 2016, hearings on corporate responsibility for carbon emissions and habitat destruction take off, globally, in 2018. While most companies facing such trials end up paying financial penalties, three transnational corporations—so far—actually face the so-called “corporate death penalty” by 2020, having their charters revoked, permanently.

Reconnection and Renewal

Despite these headline events, however, new markets and industries built to take advantage of the late-2010s conditions thrive. The most visible success story is the rise of micropower markets, where individual consumers and producers of energy buy and sell on real-time, networked exchanges. With the explosion of home and vehicle energy production (from photovoltaic materials to wind micro-turbines), the transition away from fossil fuels is happening far faster than expected—and local energy trading is now one of the fastest-growing professions. Similar markets have emerged for the newly-enacted “eco-credit” system, which enables individual households to trade in environmental footprint credits. While most of these markets operate regionally or nationally, several U.S. states are experimenting with allowing transnational trades with the European Union and Japan.

The more forward-looking pundits envision expanding this market to include the New South—nations like Brazil, India, and South Africa. As the trade hostility of the mid-decade fades, envoys from governments, businesses, and communities alike have begun careful discussion about economic re-engagement. The emerging biodiversity trading system looks likely to be the first beneficiary of this modern detente, offering a clear environmental services-based approach to valuing complex ecosystems.

It’s too early to say just how much impact these changes have had on the environment; we’re still a decade or more away from seeing clear results in the best of scenarios. Nonetheless, the combination of new markets and models with ongoing environmental stress emphasizes the need for an improved capacity to estimate outcomes and foresee risks. By 2020, the most radical sustainability experimentation happens in virtual worlds, which have become testing grounds for new social, economic, and environmental scenarios—and some of what’s being tested looks more radical than anything we’ve ever seen. As complex as today’s world can be, scientists, policy-makers, consumers, and producers alike see plenty of signs that it’s just the beginning.

MERCENARY FORCES ARE ENGAGED IN ECO-PROTECTION

In 2012, a group going by the name Environmental Protection Services, Incorporated (EPSI) quietly starts operations out of Havana, in a Cuba still wracked by the end of the Castro family regime. Comprising former mercenaries, deep ecologist radicals, and a surprisingly large number of young people right out of global militaries, EPSI ostensibly offers security and enforcement services for environmentally sensitive areas. Their first high-profile contract, defending a wildlife preserve against poachers, garners them considerable notoriety, including talk of a movie deal and a *TIME Magazine* cover entitled “Greenwater, Inc.”

Most of EPSI’s work comprises small-scale protection of corporate-sponsored environmental remediation projects, with the occasional contract for governments needing specialized assistance. In 2015, the United Nations hires EPSI to defend Burma’s coastal mangroves as a “no-go” zone for all combatants during the post-war insurgency.

In 2017, EPSI’s reputation becomes somewhat murkier, as they are implicated (but never charged) in the attack on the *Hokkaido Maru*, a Japanese “scientific research” vessel suspected of violating the recently enacted global ban on whaling. The *Hokkaido Maru* sinks, with all hands lost; EPSI issues a terse and desultory denial. Later in the year, one of EPSI’s founders is quoted as saying that he wishes that they had been there to help.

Subsequent investigations into EPSI reveal that, throughout the 2010s, EPSI personnel had provided logistic and strategic support for a number of sabotage and terrorist attacks on environmental “bad actors.” These included the destruction of a new coal-fired power plant in Romania (built without key environmental safeguards), a direct assault on a rainforest logging operation in Malaysia, and most controversially, the attack on the experimental ocean iron fertilization facility in Melbourne—an attack that set the project back three years.

EPSI’s board of directors remain at large.

FRAGMENTATION OF METRICS, OPTIONS, AND MARKETPLACE REWARDS CREATES SUSTAINABILITY FATIGUE

As is often the case, the backlash against eco-measurements and markets is well underway before it seeps into the public consciousness. A throw-away skit on an otherwise-dull episode of *Saturday Night Live* in 2014 becomes an overnight meme-storm in the United States, and soon takes off in most of the YouTube-capable world. People making the “meep meep” sound of the skit’s overly intrusive carbon detector become almost inescapable.

Suddenly, derisive bumper-stickers and web animations pop up everywhere, ridiculing the idea of monitoring every little aspect of sustainability. Eco-advocates mutter darkly about oil companies and former government officials, but as far as anyone can discover, this is a purely spontaneous outpouring of frustration. The proliferation of competing (and all-too-often seemingly contradictory) metrics of sustainable behavior has left citizens around the world exhausted. Scientists and activists lobbied for an endless variety of tactical choices, and governments—afraid of being accused of “eco-fascism”—happily encouraged this trend; now, that diversity of options looks more overwhelming than attractive.

The widespread recognition that so much must be done to avoid a sustainability catastrophe initially made people reluctant to complain; now that this barrier is breached, the litany of complaints doesn’t stop. It’s not the information itself, or even the need to pay attention to it—it’s the overly granular detail, the disagreements between competing metrics, the sheer complexity of measuring footprints and impacts for every little action.

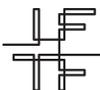
The movement is summed up in one phrase: “Please, make the invisible invisible again.”

About the Sustainability Outlook Scenarios

The Sustainability Outlook Project, 2007-2008, defines a set of four strategic scenarios.

The future of sustainable practices will depend on the interplay of a complex set of variables that are highlighted on the *Sustainability Outlook 2020 Map*. However, the scenarios help explore the strategic issues by comparing and contrasting four basic societal approaches to management of sustainability: commons, markets, policy, and technology. These are not mutually exclusive, but each scenario takes one of them as the center of gravity, the preferred solution. Together, they provide a context for understanding opportunities and challenges and exploring alternative organizational, product, and service strategies.

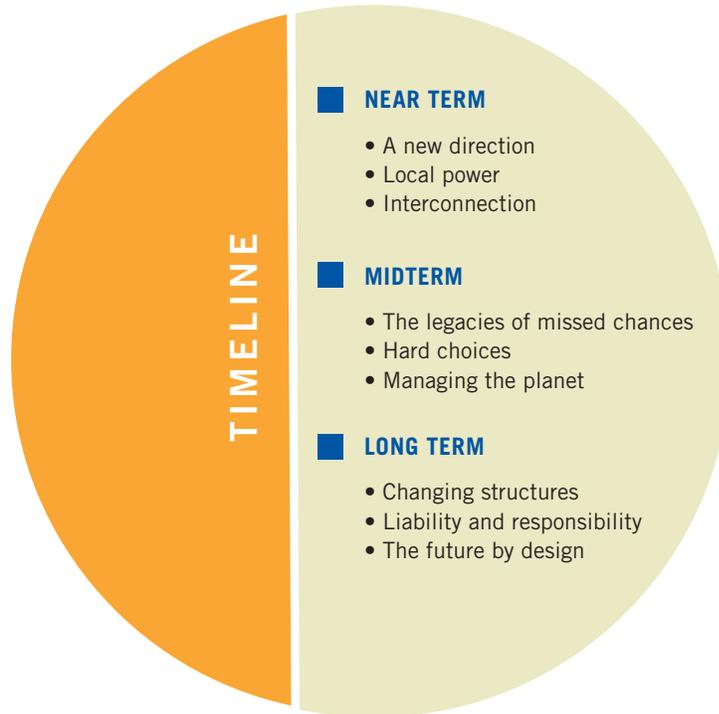
Accompanying each scenario are one vignette and two Wild Cards. The vignettes are snapshots in the life of a fictional character living in the scenario world. They are designed to allow deeper immersion in the scenario—to let the world be seen from the inside out. The Wild Cards are unexpected, game-changing developments that could arise in the scenario. These are meant to highlight the disruptive changes that the scenario is prone to.



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THE PREMISE:

In the face of rapid deterioration of the environment and the global human condition—and recognizing the slowness of the markets to drive fundamental behavioral changes—governments intervene with regulation and funding of programs aimed at control and remediation.

THE ENGINE:

Underlying this scenario is the philosophy of top-down design—sustainability challenges are addressed through carefully engineered, comprehensive processes. Everything must be managed: ecosystems, local and global resources, food webs, demographics, labor distribution, eco-science and R&D, and economic growth. Few things are left to erratic market behavior, techno-fixes, or bottom-up responses—coordination from the top helps facilitate progress across all fronts. The top lays infrastructure, establishes norms, plans out development, and builds buffers against disruption. It's not necessarily about control; rather, centralized power can simply create the most comprehensive systems to help deal with pervasive challenges.

Jacob Stein, 44, Washington DC

Jacob looks at his latest batch of business cards (smart-chipped, wow) and sighs. “Regulator”—that’s such a 20th-century term. Makes it sound like what he’s doing is slowing things down, putting a brake on action. It should be obvious to anyone by now that his job is all about enabling, not regulating. But titles are titles, and he’s gotta go with what’s on the business card.

What frustrates Jacob most about being called a regulator is that it sounds like his job is to slow things down, hold back change. He didn’t hold things back, he pushed them forward! He knows that not everyone agrees, but Jacob truly believes that his work enables change. Take health care. Jacob consulted for the Department of Health and Human Services back when they were rolling out the universal coverage initiative about a decade ago. They’d gotten past the scare stories about people losing coverage, losing their doctors, all that, but even among the folks working on the initiative there was a sense that this would slow down growth, put a brake on the economy, that sort of thing.

Jacob was adamant: what’s going to happen is that all of those industries that had been bogged down with health care costs, all of those entrepreneurs afraid of trying out something new because they didn’t want to give up insurance, all of those folks would be unleashed, and the economy would jump, not slow down. He wanted to yell at them, shake them and tell them not to buy into dated stereotypes. And look. Directly as a result of the new health care regs, industries long seen as on the verge of collapse (like auto-making) saw rapid re-invigoration. New industries emerged, trying to combine new technologies like wireless health monitors, and social movements like organic consumption with a universal health care model.

Jacob did well enough with this project that he got headhunted out of HHS. He’s now discovered that figuring out how to avoid environmental disaster without wrecking things in the process makes health care look easy. Still, the same underlying model applies: certainty, stability, and consistency offer a better world for business (and society) in otherwise risky times.

He’s been reading a lot, trying to immerse himself in the literature of the field, trying to get a sense of what the right model could be for long-term management. Because that’s what has been abundantly clear to Jacob from the outset: the big problem has been the lack of long-term thinking. That conceptual shift started in the first decade of the 2000s and is finally starting to take firm root.

One of the authors that Jacob found most provocative was an ecologist from the turn of the century, Daniel Janzen. Back in ‘03, Janzen argued that we’ve entered the “gardenification” era—that there are no more wilds and our best goals should be careful maintenance and management. Even today, that perspective is a bit shocking, but it makes real sense. Simply leaving parts of the planet to fend for themselves, even absent other human interventions, increasingly appears not just irresponsible, but dangerous. We’ve let things go too far to for “hands off” to work in anything close to the time frame we need.

Jacob plays with ideas about “gardenification” and “undevelopment,” looking at the implications of intentionally returning previously inhabited areas to “natural” conditions. Could undevelopment guide an over-stressed ecosystem towards eventual stability? Jacob knows one thing: it would be better than what we’re facing today.

A New Direction

By the turn of the decade, the political pendulum finally begins to swing away from rampant privatization.

In multiple polls taken in 2010, the public (in both the industrialized West and the global South) offer broad agreement that privatization has veered too far into cronyism and corrupt inefficiency and that we simply can no longer put life-or-death decisions—about our selves or our planet—into the hands of people who see nothing but the bottom line. Government is quick to respond: at the local and regional levels, policy-makers reassert themselves; at the national level, regulation takes its first tentative steps at a return; internationally, we see vigorous new drives for standardization.

To the surprise of some, the corporate world—by and large—welcomes this step with enthusiasm. While a few business leaders noisily continue to oppose regulation, far more offer sighs of relief. Uncertainty can be far more threatening to corporate well-being than regulation, especially in times when everyone knows that the rules will change, but nobody knows quite when. By making clear the scope and timing of environmental regulation, national governments let businesses focus on more pressing concerns.

Local Power

Since the beginning of the century, on issues of health and (especially) the environment, local communities and regional governments around the world have been able to push beyond more cautious national policymakers; now, this push becomes more forceful. Building codes, pollution regulations, and tax codes increasingly reflect a growing ambition among these policies to be seen as national, even global, leaders. By 2011, some of the most innovative new approaches to sustainable living can be found in small towns and villages across the United States, Europe, and, much to everyone's surprise, China.

Such innovations see their first big impact in the world of education. By the early part of the 2010s, so-called “eco-education” has become a standard part in many primary and secondary school curricula. The “Sustainable Children” mantra (initially derided by critics as the “children’s crusade”) becomes unavoidable during election year campaigning.

Interconnection and Transparency

Equally ambitious, if not quite as high-profile, are new utility concepts. Internet access as a public good receives the most attention, but the “devolution” model for energy generation—taking advantage of the increasing use of microgeneration and (in the West) the widespread adoption of “smart grids” putting the control into the hands of municipalities—has the greatest long-term impact. In the more cutting-edge communities, waste and recycling utilities are replaced by “upcycling” utilities, turning waste into a product stream.

What had started as an alphabet soup of sustainability certification and labels has evolved into broader international agreements over resource management and food “footprints.” The standardization of the footprint concept in particular is a welcome move, as the lack of broad guidelines has made cross-industry and cross-national comparisons impossible. The validity of “food miles” and “locavore culture” finally becomes the focus of debate, with many developing-world groups arguing that the larger impact of depriving African and South American nations of food export markets would far outstrip any “food footprint” concerns. This dovetails with the emergence of the International Resource Management Board (IRMB), which seeks not to place top-down controls on resource access and use, but to require information transparency, confident that wiser use will emerge as a result. Its mixed record of success becomes, by 2014, an argument for a somewhat stronger government hand in the process.

The Legacies of Missed Chances

As provocative as the government initiatives of the first part of the 2010s could be, however, they pale in comparison to decades of unsustainable economic and social practices. New policies can't alter the impact of long-term carbon commitment, thermal inertia, and the legacies of missed chances. Ongoing research makes clear just how bad the climate and sustainability crisis has become, and as the first wave of serious global warming problems starts to hit, the public debate about how to handle climate change takes on a more desperate tenor.

Health care systems see their greatest challenge yet in 2015, as a new series of diseases erupts from shattered ecosystems. While traditional and cutting-edge treatments are able to prevent a pandemic, it falls on the shoulders of local and regional governments to enforce prevention, building on what they'd learned during the avian flu outbreak of the turn of the decade. Health screening becomes mandatory, and while the Centers for Disease Control and the American Civil Liberties Union battle in U.S. courts over just how much personal information can be stored with the test results, at least two potential local epidemics get stopped early in China by aggressive screening. Proponents of "local value policies" (from local agriculture to local production) see a boost from the pandemic scare, as well; economic arguments about free trade and political arguments about global development find fewer advocates with each successive health threat.

Hard Choices

National governments start to take on more proactive postures, as well, with regards to natural resources. The "Resource Nationalism" movement spreads quickly, serving as a trigger to both increased global tension and a greater emphasis on the development of local alternatives, especially in the energy realm. Petroleum peaks at over \$300/barrel before returning to around \$190/barrel, with some OPEC countries briefly offering discounts to customers willing to scale back alternative energy development. The opposite happens—some countries embrace top-down "crash" programs for renewable energy, while others rely on less assertive mandates to accelerate a transition, such as the "Renewable Portfolio Standards" that start to appear in the United States and the European Union.

Such standards, while initially aimed at for-profit enterprises, increasingly start to show up in philanthropic realms as the decade goes on, and not just in the realm of energy. As governments use all of the tools at hand to enforce policies, from mandates and regulations to taxes and even aggressive law enforcement, the public—even in the more libertarian nations—pushes for more. The flurry of redistributive carbon taxes in 2017 offers a clear demonstration: Proposals to replace income taxes in developed nations with carbon taxes have been on the table for more than a decade, but the combination of a growing sense of crisis across the globe and a relaxation of corporate opposition finally make such a change in tax systems possible.

Managing the Planet

This desire for management and regulation unleashed by the pandemic threat and the resource crisis manifests internationally, as well. Cross-border flows of people, goods, and especially agricultural products face far stricter controls than ever before. The United Nations takes on a more prominent role as a clearinghouse of transnational social and environmental standards. A "managed migration" program seeks out communities under migratory pressure (due to economic or, increasingly, climate-related threats), setting up relocation strategies before the need for illegal border crossing emerges, including health screening.

The latter half of the decade sees the parallel development of international regulation and management of environmental conditions, from carbon sequestration to agricultural and biodiversity management. Such policies are far less popular among business and academic leaders than other regulations, as they undermine decades of carefully built globalized trade regimes. Nonetheless, a strong public commitment to doing what is necessary keeps the policies going. The argument that "this is a global problem, it demands a global response" carries the day.

Changing Structures

By 2020, the remaining uproar from people opposed to overweening government power has begun to die down, as the continued rush of environmental threats heightens the demands for an even greater governmental role in taking responsibility for the planet. Globalization advocates even step back into favor, as a variety of “Sustainable Globalism” models emerge from think tanks around the world. Traditional political scientists aren’t quite sure what to make of the current international structure: although individual nations retain full sovereignty, the degree of policy coordination far exceeds previous conditions. With the climate threats so abundant and evident, no major nation is willing to take the chance of being blamed for stalling on sustainability.

Liability and Responsibility

Blame is one fear; liability is another. The first wave of global warming liability lawsuits, earlier in the decade, went after major corporations with both a clear link to greenhouse gas emissions and a well-documented pattern of undermining efforts at early action against global warming. But as national governments move past the easy solutions and adopt less certain (but far more critical) policies, the question of what happens if the policies are wrong—or even make matters worse—becomes a policymaker’s nightmare.

Despite the profound ongoing environmental and legal risks, it remains difficult to translate national and transnational responsibility into individual accountability. Carbon taxes go part of the way, but since their first introduction, fiddling with the details to ensure both behavioral pressure at the top end and behavioral support at the bottom has proven challenging. The U.K.’s program of “Tradable Emissions Quotas” initially appeared to be an unwieldy alternative, but by 2020, the system is working well-enough—and has sufficient enthusiasm from its users—that several dozen other nations are considering its adoption. A concept of “infrastructure taxes”—fees paid by users of core energy, water, and transportation networks—also has support, largely from regions still beset by corruption and people trying to “game” the system.

The Future by Design

“Managed migration” specialists increasingly find themselves thrust into the role of being guardians of the long-term interests of the planet’s people. Preservation of no-longer-local languages moves onto their agendas, as does a long-term planning program referred to as “Demographics by Design,” an effort to preserve cultural and biological diversity among transient communities, while also maintaining a healthy population balance globally. While critics deride these efforts as a “full-employment act for sociologists,” advocates call the effort one of the key tools for surviving the century with our civilizations intact.

The most profound aspect of the world of 2020, however, is the degree to which national leaders have been willing to adopt transnational policies. One observer called the behavior “cooperative fear,” and the shock expressed by once-recalcitrant states after incontrovertible evidence of environmental collapse—increasingly-deadly climate chaos, sudden mass extinctions, near-pandemic outbreaks, and the waves of refugees from around the world—underscores that description. Even the previously unspeakable notion of armed forces used to enforce environmental treaties is now on the policy agenda; most leaders hope that the threat of military force will be enough to rein in rogue states.

The irony is that this global cooperation, focused on dealing with the ongoing dilemmas posed by climate and sustainability threats, would have seemed impossible just a decade or two earlier. Other challenges loomed larger, and few citizens would have been willing to cede to policymakers this level of control over the market and society. As of today, however, few citizens can see how it could have turned out any other way.

SOCIETY GIVES UP PRIVACY IN THE NAME OF HEALTH, SECURITY, ENVIRONMENT

In the cities, we're seen by nearly a thousand security cameras per day, at least a quarter of which will have active behavior monitoring engaged. Biosensors in everything from restrooms to escalator handrails keep watch for dangerous pathogens, protecting both public health and personal well-being. Emissions records keep track of the carbon footprint of everything we buy or use. It's not Big Brother, it's Business As Usual.

The pundits argue: privacy is nice, but secrecy can kill. Going after dangerous secrets unfortunately means giving up some (or a lot of) privacy. And in today's world, what constitutes "dangerous secrets" encompasses more than a bomb in a backpack. Pandemic diseases spread far too quickly for us to let people who don't think they're that sick, or just want to see a family doctor, or don't believe in science to wander through crowds. And with every day bringing us closer to climate disaster, people who try to hide carbon emissions or keep "off the books" aren't just trying to slip something past the tax collector. For a growing number of citizens passionate about this issue, carbon cheats are trying to kill our children.

Other citizens are equally passionate about the idea that this ubiquitous transparency should be two-way. They want to know precisely who gets to see the results, what happens to the data, how well the monitoring agencies are living up to their own standards. Academics and activists alike call for making the data analysis software open source, so that everyone can see what's being done with our information. Mutual assured transparency is the absolute opposite of privacy—but it also might be the next best thing.

URBANIZATION AS ECO-IMPERATIVE OR PATH TO "PLANET OF SLUMS"

Early in the 21st century, Earth became a "city planet"—more than 50% of the world's population lived in cities. By 2020, the proportion had surged to nearly 60%; demographers project that we'll see 75% by 2040. Today, although almost two-thirds of the populace can be categorized as "urban," there remains a stark divergence in what urbanization means.

Global city-states like London, New York, Paris—and, increasingly, Shanghai—form the cultural and economic hubs of the world, and have taken on greater political stature as the modern localism movement has taken firm hold.

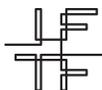
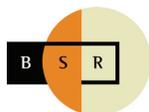
At the other end of the spectrum are the megacity slums. The developing world holds nearly all of the largest cities, and those cities in turn encompass the world's largest slums. Hundreds of millions of people, worldwide, live in these "shadow cities," building alternative economies, local security and political forces, and engaging in wild innovation—and also suffering from wildfire diseases, rampant violence, and a lack of legal standing. With many of these cities, it seems as if there's a race underway to discover just how large a megacity can get before utterly collapsing.

About the Sustainability Outlook Scenarios

The Sustainability Outlook Project, 2007-2008, defines a set of four strategic scenarios.

The future of sustainable practices will depend on the interplay of a complex set of variables that are highlighted on the *Sustainability Outlook 2020 Map*. However, the scenarios help explore the strategic issues by comparing and contrasting four basic societal approaches to management of sustainability: commons, markets, policy, and technology. These are not mutually exclusive, but each scenario takes one of them as the center of gravity, the preferred solution. Together, they provide a context for understanding opportunities and challenges and exploring alternative organizational, product, and service strategies.

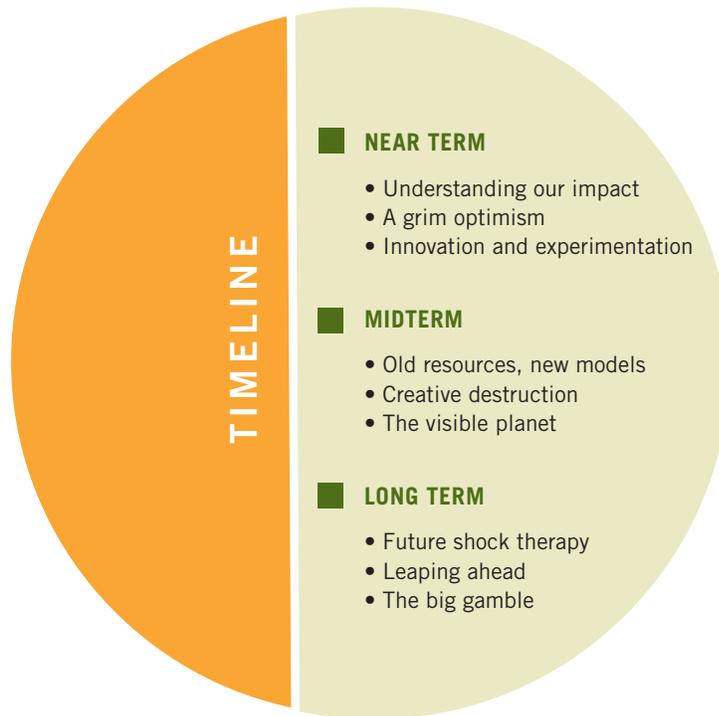
Accompanying each scenario are one vignette and two Wild Cards. The vignettes are snapshots in the life of a fictional character living in the scenario world. They are designed to allow deeper immersion in the scenario—to let the world be seen from the inside out. The Wild Cards are unexpected, game-changing developments that could arise in the scenario. These are meant to highlight the disruptive changes that the scenario is prone to.



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THE PREMISE:

Most of society's resources are mobilized to support scientific and technological solutions to sustainability dilemmas—creating new economic engines and stimulating a global drive to innovate ahead of ecological and social crises. The redirection of resources, though, may exacerbate social injustices.

THE ENGINE:

In this scenario, new technologies and social practices help make hidden processes—human and environmental—transparent. It is a world of ubiquitous data collection: embedded sensors, science satellites, distributed monitoring, and RFID. It's a world of constant data aggregation and display: tagging, mapping, dashboards, and simulations. And it's ultimately a world of rapid data response: smart walls, real-time feedback systems, and embedded biomedical devices. Making the invisible visible raises our level of understanding—and augments our ability to change it.

Strategy in this world is all about visibility—of ourselves, of others, and of processes in the world around us.

Nikki George, 25, Johannesburg, South Africa

Nikki's not quite sure what she can bring with her to her new office, but she knows one thing that she'll fight to hang onto: her autographed pic of Oscar Pistorius, her hero. The Blade Runner, the first man to win a Paralympics race at a time faster than the same year's Olympian winner. The first one, but not the last.

She was 13 when she lost a leg and an arm to a terrorist bomb. She'd been at the top of her class in sprinting before the blast; when the doctor told her that they'd had to remove her leg, she wanted to die. Funny to look back at that, she thinks, considering that now she knows that the bomb was the best thing that'd ever happened to her. Oh, not the bomb itself, of course, but the replacement limbs.

Once she'd gotten back into training, she found that she was faster than before, fast enough to qualify for the Paralympics. Oscar was the team's coach. She didn't win—she came in sixth—but she felt no disappointment.

The arm was another story, and was (in a roundabout way) why she's heading into the offices of the Earth Transparency Project (ETP) today. At first, she just wanted something that would let her keep her balance when she ran. It was only later that she discovered how much more she could do with the arm. It is, after all, a computer (smarter than anything she'd had at home, or at school) and made in one of those magic fabs. Carbon nanotubes, fiber optic network, electroactive polymer touch, she can cite the components by verse. And it's modular: she can add stuff to her arm, stuff like, say, environmental sensors.

In a way, she was surprised that the arm didn't already come with ecobugs. They're pretty much all over the place now, she thinks, and built into everything. The crazy weather—and the big projects the United Nations has been pushing through to fix the crazy weather—demand that we have a much better awareness of what's happening to our world.

ETP hired her as part of its intern program, giving her college credit, before discovering that she had an arty arm. When they found out, the first thing they asked is whether she'd be willing to travel. It turns out that many of the areas that the Project works in are without the smart environments and embedded networks of the post-industrial states. And some of the local businesses and governments aren't always as forthcoming with the environmental data as they're supposed to be. They're also really good at preventing crews with sensor kits from visiting critical areas. But an ETP bureaucrat and his intern sidekick? "I'm a freaking eco-spy," she laughs to herself.

She suspects that she won't really get to do much eco-spying, and that's fine. It's more the feeling of being part of something big, something important, that's so exciting. She saw the impact of the Pretoria tornados last year—the first ones, well, ever—and nobody can forget the wildfires that scoured southern France a few months ago. The most important thing that anyone her age can do is make sure that there's a planet to grow up on.

The commuter train passes under a forest of solar panels, one of the few hundred clusters installed this year. She can feel her artificial arm... itch... as she passes beneath them. Taking note of the grid, Nikki guesses. She's going to have to get used to having new senses.

Understanding Our Impact

For all the certainty surrounding climate disruption, the end of the first decade of the 21st century sees little agreement among scientists about the full extent of the impacts of global warming, and about which strategies for responding to the crisis would work best. When consensus does appear, it almost invariably tells a far more ominous story than had been the conventional wisdom of even a year earlier. With the rapidly growing anxiety over the onset of irreversible environmental damage, political, business, and community leaders plead for some kind of guidance, or some better way of understanding the options. Ecological simulation projects launched by Google, MIT, and Oxford (among others) attempt for the first time to integrate social, economic, and geophysical simulation systems, hoping to produce useful planning guidelines. In the initial wave of simulations, the results range from the entirely grim to the cautiously optimistic.

With the visibility of these planetary-scale projects, entrepreneurs and activists alike start to look for ways to bring these tools to the masses. By 2010, the appearance of regional, local, and even individual sustainability simulations echoes the wide adoption of global-scale models. Devices that help individuals measure their personal footprints in exacting detail—many associated with commercial and media endeavors—offer to bring sustainability thinking to the forefront of public attention; such tools take great advantage of the rapid proliferation of ecological sensor networks, many of which have a local or community focus. By the beginning of the new decade, online sustainability simulations and toolkits start to receive mainstream attention, with some pundits predicting that they'll eventually be as popular as online banking and shopping.

A Grim Optimism

These tools offer a compelling, if distressing, analysis: much of how we live our lives has to change if we're to make it through this disaster. It's not just how we commute and get our energy; it's how we design our cities, grow our food, entertain ourselves, raise our families. It's a re-examination of the impact of every choice we make.

It's hard, at first, to hear the voices arguing that this isn't a bad thing, that the world we'll get in return for these changes will be better than what we leave behind. In the industrialized world, many take this call for change to mean sacrificing comforts so that China and India can continue to pollute; in the developing world, nationalist groups claim that changes mean accepting economic stagnation because of the West's past bad behavior. Slowly, however, the "grim optimism" argument starts to take root. For communities willing to hear the message, experimentation becomes the order of the day, with the spread of innovative new models for how we live. That many of these innovations prove to be dead-ends is frustrating, but not fatal, as the successes offer real hope.

Innovation and Experimentation

The most visible improvements happen in the realm of urban planning, with innovations driven by projects around the world. In what is increasingly called the Green City Era, community redevelopment projects, operating largely from the bottom-up, combine with new top-down regulations and grants from national governments (and occasionally from major institutional donors, as with the 2011's X-Prize for Zero-Carbon Communities) to bring about much more rapid change than skeptics had predicted and analysts had feared. These urban experiments take their cues from ongoing innovations in city design, from Las Gaviotas in Colombia to China's "zero footprint" expansion of Shanghai to ongoing work in Vancouver, Canada.

Less visible, but ultimately more important, is the accelerated adoption of user-empowering technologies, especially in the developing world: peer-to-peer tools, collaboration networks, participatory content creation. Although intended to expand our ability to monitor the environment, such systems offer support for advocates of human rights and transparency as well. While analysts caution against looking for a "techno-fix" to the environmental crisis, it's soon evident that responding effectively to the pace at which ecological risks are growing demands both behavioral adjustments and system improvements.

Old Resources, New Models

As the new decade progresses, even “grim optimism” sometimes seems hard to maintain.

Resource debates come to dominate headlines, combining cultural clashes with environmental crises, and with research findings on biosphere sustainability and ecological diversity serving as the core of angry political diatribes. But scientific research also offers a way out of the disputes. Although the resources in question typically include traditional water, energy, mineral and agricultural products, it's the new resource concepts—rain forest services, biodiversity, carbon sequestration, even oxygen—that get the spotlight. Crash programs to increase the efficient use and availability of some resources, while creating alternatives to others, offer new solutions for long-standing development problems.

The results aren't always what people expect. The shift away from fossil fuels (still in its early days, but the writing is on the wall) sends the governments of petroleum-exporting nations into a panic. Some undertake crash programs to diversify their economies, while others focus on getting as much short-term benefit from oil shipments as possible. Verbal conflicts between increasingly antagonistic members renders OPEC, by 2015, all but dead. The resulting fluctuations of price and global perceptions of instability simply serve to accelerate moves away from fossil fuels and to boost the public support for doing so.

Creative Destruction

But as some coalitions fragment, others emerge. The World Biodiversity Organization (WBO), an intended parallel to the World Health Organization, serves as a clearinghouse of scientific information about ecosystem health and protection. While some activists see it as another way for the West to steal the developing world's riches, the work it sponsors quickly starts to make a real difference. By the latter half of the decade, WBO research provides new insights into the maintenance and revitalization of complex ecologies, offering hope for more sophisticated ecological management.

Innovation dominates. Game-changing new companies appear—some funded by the survivors of the Web 2.0 bubble, and some by the new Metaweb billionaires—offering revolutionary concepts and technologies. Jargon such as “SVVs” (Silicon Valley Vehicles), “upcycle production,” and “molecular manufacturing” starts to fill business journals. With industry after industry, incremental improvement proves insufficient. Many incumbent firms, including some recently considered at the top of their fields, begin to fall behind the increasingly vocal demands for change; alternative models appear, slowly, as catalysts for further disruption. The sense of crisis abates.

The Visible Planet

If the new eco-industrial model has its roots in Silicon Valley, its greatest proponents can be found in rising powers such as India and Brazil. Low-cost, Bangalore-made electric cars fill global streets by the late 2010s, and Chinese-designed near-zero-carbon building materials threaten to dominate construction markets. The U.S. presidential race in 2016 hinges on fears of falling behind, with ongoing claims that past administrations had done too little to push for green innovation.

The brightest spot of the mid-point of the decade is the “smart environment” movement, which seeks to build rich, dense information networks into local ecosystems, enabling both the documentation of environmental changes and a kind of immediate feedback for people trying to understand the impact of their actions. These networks build on similar programs underway in most urban settings. Eco-sensor systems proliferate, some supported by companies or local governments, but a startling number are built out by motivated activists and community members. Taking advantage of augmented reality and location-aware personal technologies, these networks become a common language for the growing number of people trying to understand what was happening to the planet and to their societies. For their adherents, “Socially Responsible Geomapping,” “Ecosystem & Economic Transparency,” and “The Visible Planet” are the touchstone concepts of the era.

SCENARIO 4: SCIENCE & TECHNOLOGY

LONG TERM

Future Shock Therapy

By 2020, the seeds planted earlier in the decade—the powerful simulations, the infrastructure experimentation, the focused research giving us a better understanding of the processes at work, and so forth—begin to bear fruit, as the pace of technological innovation continues to speed up. Many of these changes do improve lives, just as the “grim optimists” had predicted, but the daily crisis updates and reports on technological and social upheaval offers a stark reminder: we do this to avoid catastrophe. Some observers of the era refer to it as “future shock therapy.”

The changes are inescapable. The various biotechnologies and systems modeling methods that had proliferated over the 2010s in order to better understand disruption of ecosystems and avoid harmful policies, for example, parallel improvements to health care technologies. The same synthetic biology methods of improving agricultural resilience in an unstable environment have given us new tools to augment our own physiology. The same complexity analysis programs, able to simulate the planet, tell us with remarkable detail what’s happening in our bodies. The same mobile devices that analyze pollutants and carbon impacts can monitor diets and disease, offering advice based on real-time knowledge of the user.

Leaping Ahead

These connections between responding to global crises and transforming individual lives arise across industries and communities. Mobile robots based on military and industrial systems can now carry out many basic personal, household, and office tasks. “Smart environment” networks now serve as the backbone of emerging reputation and communication systems. First-generation molecular-scale manufacturing systems have begun to reduce production costs to below that of imports, suggesting that local production may soon have greater efficiency than carbon-intensive globalized industry. Moreover, these systems have the potential to eliminate material waste from the production process entirely. The social impact of all of these developments will surely become inescapable in the coming decade, but for now, they are improving lives globally, and not just in the West.

It’s hard to exaggerate just how profound these changes have been. By 2020, we’re now approaching, in terms of global carbon footprint, where we had hoped to be by 2030. It’s true that the various Ministries and Departments of Climate Impacts around the world tell us that we’re by no means out of the woods and will see at least another two decades of further warming. But we’re prepared. Efforts like the Earth Transparency Project should give us better warning of incipient disasters than we’ve had in the past, and the growing number of seed banks, DNA banks (“frozen zoos”), and ecosystem “snapshots” will help us eventually restore the ecosystems lost to climate disaster.

The Big Gamble

Some are starting to ask: can we fix the planet? Geoengineering—the direct manipulation of geophysical systems—is increasingly on the minds of scientists, policymakers and the citizenry. Officially, it remains a “last resort” technique; the results of small-scale tests of geoengineering techniques have been mixed, and significant questions remain. Is the knowledge that we’ve gathered over the last couple of decades thorough enough to tell us what we need to do? Are the simulations complex enough to warn us off the wrong pathways? Are the technologies we’ve developed powerful and subtle enough to perform climate “surgery?” It’s important that we don’t overreach—we’ve avoided eco-disaster, and we don’t want to undermine that success.

There are always those who don’t see these actions as a success, of course, and many of the angry, disconnected communities and movements that had proliferated in the mid-point of the decade persist at the decade’s end. Technological advances offer them new capacities, as well. Some have even threatened to attack fragile and critical ecosystems.

Nonetheless, the “grim optimists” still say that, in the end, we’ll make it through this century of crisis. The infrastructure, resource, and behavioral shifts underway will make an enormous difference in the long-term, even if the near-term forecast is mixed. It won’t be easy, and we’ll likely see setbacks along the way, but we know what needs to be done, and we’re doing it.

REGIONAL RESISTANCE TO NEW TECHNOLOGIES DISRUPT ECONOMIES AND POLITICAL BOUNDARIES

Since the latter part of the first decade, technology pundits had predicted that personal robotics would be the next big technology wave, and by 2015, that vision seems to be coming true. Household maintenance robots can be found in most “global city” homes, and offices and factories around the world are quickly adopting cheap, fast robots for in-building deliveries, restocking supplies and other basic (but necessary) tasks. Hollywood had its spasm of movies and TV shows showcasing absurd exaggerations of life with household and workplace robots, but that trend died as quickly as it arose. Across the post-industrial world, inexpensive, practical robots have become the next big thing.

In the developing world, the story is much more mixed. China seems to be taking to robots nearly as quickly as the United States, while India has almost completely rejected them. Brazil is tentative about their use, Venezuela denounces them, and in Indonesia and South Africa, they’re oddities—a topic of conversation but not a market-leading product.

It’s not a question of price; basic home/office robots are comparable in cost to a new mobile phone. Instead, the basic analysis holds that it’s a question of labor demographics. Regions with many unemployed young people, even if they’re not normally employed as household labor, end up steering clear of home and office robots. The labor issue is very real. Latin American countries have seen a measurable decline in direct transfers from citizens working in the United States, as robots gradually replace the use of low-wage housekeeping staff.

There are signs, however, that there’s a larger cultural question, beyond the labor issue. Some religious and political figures, in both the developing and post-industrial worlds, ask whether the reliance on robots is somehow dehumanizing, taking away the more humbling aspects of everyday life. Taking a different perspective, some philosophers and academics ask whether we need to come up with legal rights and responsibilities for robots. Email chain-letters denounce a secret United Nations/NAFTA/EU plan to “declare robots slave labor and demand that they be freed.”

These should sound absurd. Increasingly, they don’t.

SOCIAL AND ECONOMIC INEQUALITY DRIVEN BY UNEQUAL ACCESS TO HEROIC TECHNOLOGIES

The phrase “haves and have-nots” has never before been so appropriate. With the advent of molecular manufacturing devices, the haves—nearly anyone living in a state adhering to the World Trade Organization’s extended intellectual property guidelines—can have just about anything, at the push of a button. The have-nots—people living in states that haven’t signed the EIP agreement, or are unable to meet its requirements, or simply have a bad reputation—can have just about what they had before. A bit less, actually, since the demand for ultra-cheap labor by Western producers is rapidly declining.

It’s not even that the have-not nations don’t get the benefits of this new production technology. Nanofactory-produced solar power systems have eclipsed hydro and natural gas, and will soon outpace coal, transforming the world of energy. Building components, computers, machinery, material goods of all kinds are now far cheaper to make than ever before, and the aid from Western governments is that much more bountiful. But no nanofactories.

The reasons are either simple or ridiculous, depending upon who you talk to. Nanofactories come with two rules: they won’t make anything on a long list of prohibited goods; and they won’t accept any design that hasn’t been cleared by automated health, safety, and copyright/patent inspectors. Japan, the United States, and the European Union have the root inspector servers and require that anyone else using the nanofactories use those inspectors. Non-Western states are not eager to have their production capacities controlled by Tokyo, Washington, D.C. and Brussels.

As the rich get richer and more powerful, they face a choice: sovereignty or abundance?

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