

Are We on the Verge of a New Golden Age?

Carlota Perez, Leo Johnson, and Art Kleiner, *strategy+business*, August 28, 2017

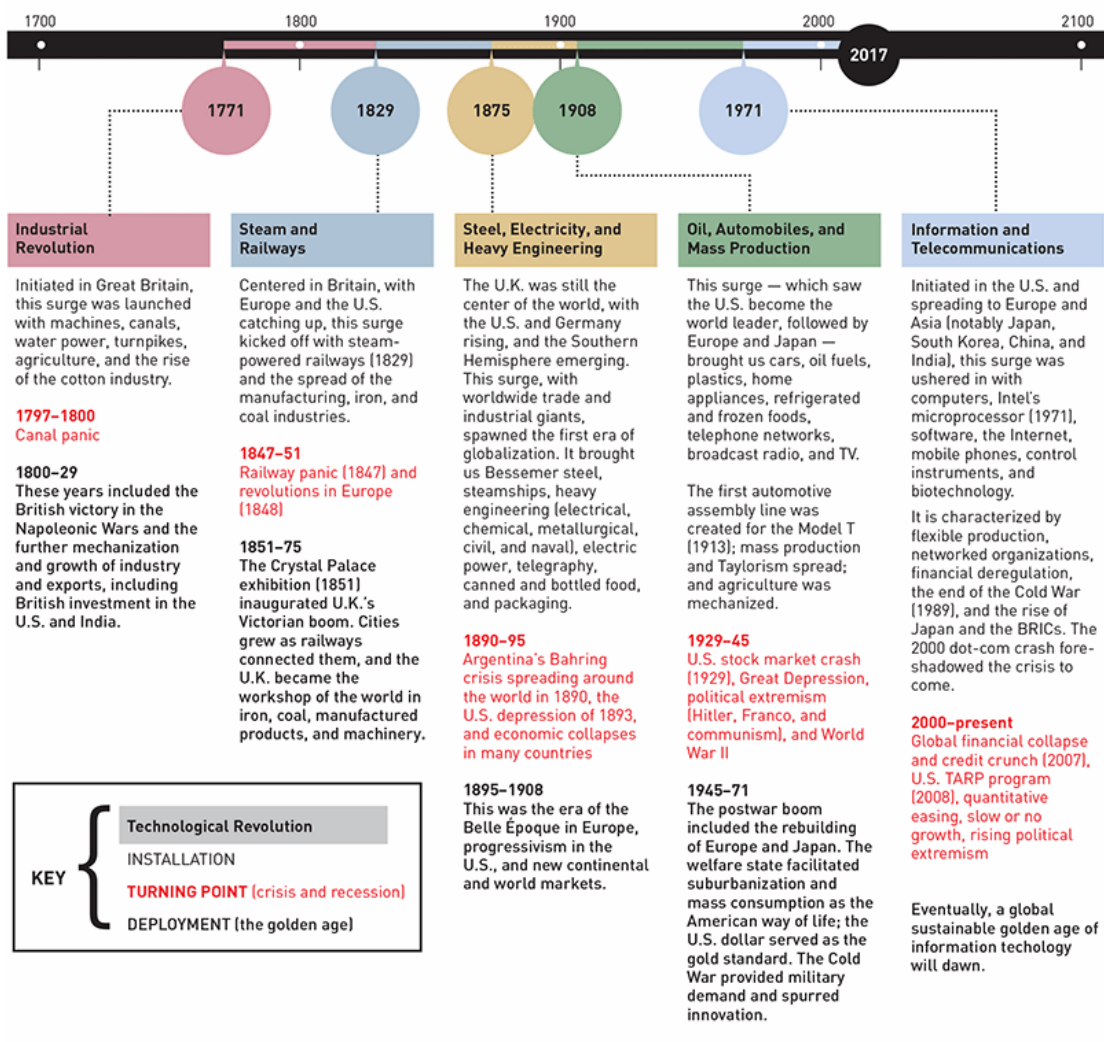
A long-wave theory of technological and economic change suggests the financial malaise that began in 2007 may be about to end

History doesn't exactly repeat itself, but it does run in cycles. One of the most robust theories of such cycles was articulated by economic historian Carlota Perez, in her influential book *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages* (Edward Elgar, 2002). It suggests that humanity can get through the current period of upheaval and economic malaise and enter a new "golden age" of broad economic growth, if the world's key decision makers act in concert to help foster one.

This may seem far-fetched, but it's happened four times before. We are in the midst of the fifth great surge (as Perez calls them) of technological and economic change since the Industrial Revolution. The last one, the age of oil, automobiles, and mass production, lasted most of the 20th century and still shapes many people's attitudes. Our current surge started around 1970 and has rolled out information and communications technology around the world: It is the age of the computer and the Internet (see *Exhibit 1*).

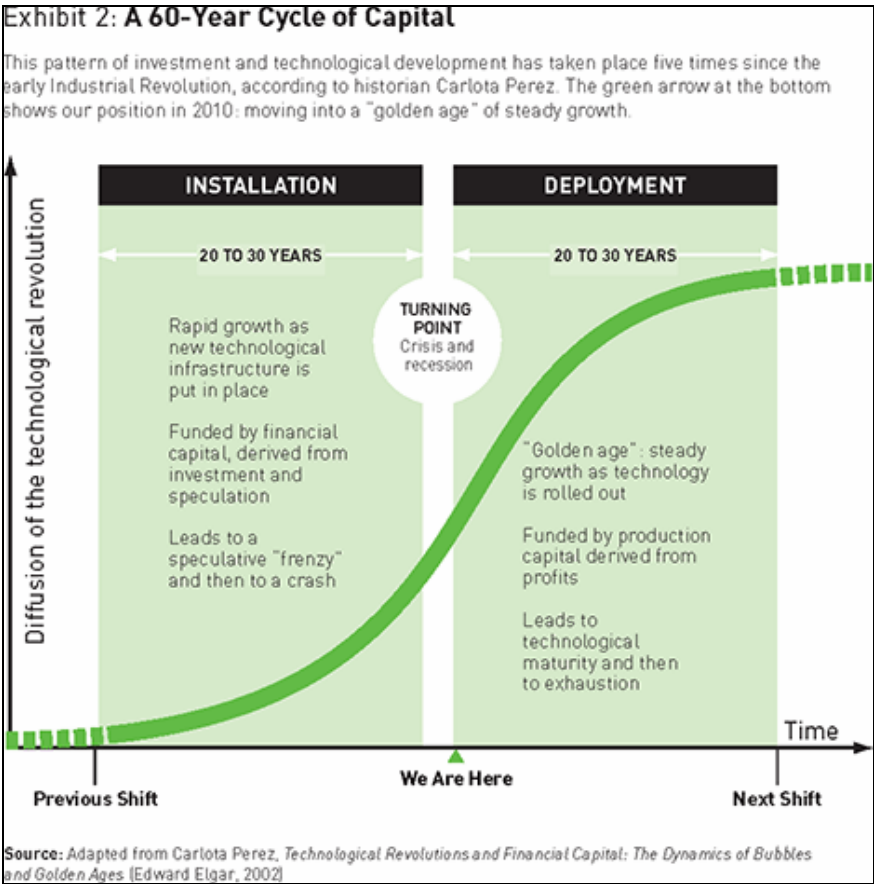
Exhibit 1: Five Great Surges of Capital and Technology, 1771–2017

Key moments in each stage of the five transformations the world has experienced since the 18th century. Each begins with a revolution in technology installed with financial speculation until a panic ends in economic recession, which brings policies that foster a golden age in which business and society prosper.



Source: Adapted from Carlota Perez, *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages* [Edward Elgar, 2002]

Each of these surges follows the same broad pattern. First, there is a wave of major new technologies, leading to dramatic changes in industrial production and daily life. For about 20 to 30 years, in a period that Perez calls installation, these technologies are funded largely by speculative investment chasing rapid returns. This age of widening wealth disparity leads to a bubble, which bursts in spectacular fashion, and is followed by a crisis period that Perez calls the turning point. This phase of economic and social turbulence has varied in length from two years to 17. Many efforts to get back to normal are made, usually involving the regulation of financial excesses or the stimulation of production and employment. When the crisis ends, the third part of the cycle begins; it consists of 30 years or so of stable economic growth, with a high level of genuine return on investment, and an economy funded by production capital, not speculation. Perez calls this period deployment. It is experienced as a golden age: a wave of prosperity, lifting everyone's fortunes, including those who felt left behind just a few years before. Eventually, the technological opportunities reach exhaustion, markets become saturated, and the cycle starts all over again (see Exhibit 2).



Of course, these are broad observations, and nothing guarantees that the pattern will continue. But its overall logic is compelling. To Perez, the dramatically powerful technologies of Wall Street, Silicon Valley, and Industry 4.0 have provoked, in effect, a worldwide economic revolution, starting in the 1970s, challenging the equally powerful technologies of the fourth surge: oil, automobiles, and mass production. To turn the corner from crisis to golden age would require a major economic and political consensus: an intelligent global policy framework giving a convergent direction to investment and innovation, ensuring the growth of profitability and jobs around the world, including most major national economies. Not an easy task!

The participants in this roundtable were three longtime observers of the Perez hypothesis — including Carlota Perez. We met recently to consider this question: Given today's political turbulence, after at least 10 years of being in the crisis phase, what would have to happen for a new golden age to begin?

Art Kleiner

Causes of the Current Crisis

KLEINER: Carlota, according to your theory, we're now about 45 years into a surge that began in the early 1970s. That's the longest such cycle we've seen — and the longest period of crisis.

PEREZ: It's probably also the deepest transformation of everyday life, and the one that has gone the furthest globally. Also, given our longer life span, the older generation has taken longer to hand over power — in this case, to younger digital natives. Even after 40 years, the information and communications technology (ICT) revolution is far from complete. It hasn't fully changed our way of life, as previous technological revolutions had done. And it has brought a dangerous political shift, the separation of the interests of major global corporations from interests of the national societies where they are based.

During the golden age of mass production, in the 1950s and early 1960s, the interests of business and society converged. With the welfare state and suburbanization, working-class people in many Western countries could become homeowners and consumers. Therefore, when companies paid high salaries and high taxes, it all contributed to increasing domestic demand. Government support for education and health services freed up discretionary cash for people to spend on consumer products. High demand for these products created conditions for growth and profit. It was a robust positive-sum game, a super win-win between business and the majority of the population, resulting in good profits and decent livelihoods.

Then, in the 1970s, the mass production revolution hit a maturity ceiling. New products were less viable; productivity fell; markets were saturated. The welfare state became unsustainable, and national solidarity broke down. Since then, many businesses have seen their cost advantage and their customer demand migrate abroad, away from their home countries. Low salaries no longer harm business as in the past, so living standards have been declining for decades. This, together with unemployment from offshoring, goes far in explaining the Brexit referendum and the fervor of the U.S. elections in 2016.

JOHNSON: A factor that may intensify those tensions is the nature of today's technology. We have an amazing arsenal of innovations on the threshold of realization: synthetic biology, quantum computing, blockchain, drones, autonomous vehicles, and private-citizen space travel. Potential breakthroughs are dangled before us.

But as Kentaro Toyama, the former Microsoft research director, [says](#): "Technology is not the answer.... In project after project...information technology amplified the intent and capacity of human and institutional stakeholders, but it didn't substitute for their deficiencies."

The key question is the intent with which we deploy this new arsenal of technologies. And in a capitalist economy, there are two critical issues. Does an endeavor aim to increase productivity, and thus create wealth? And does it then aim to distribute that wealth among the many, rather than concentrate it among the few?

PEREZ: Those two things — wealth creation and distribution — must be combined. The new technology giants, like Google, Facebook, and Apple, along with others developing robotics and similar technologies, will comprise the highest-productivity sectors. That's understood. But they won't lead us to a more decent society unless they encourage distribution. Otherwise, they are unacceptable monopolies. It's not just redistributing income that's needed, but also fostering multiple novel job-creating activities, which historically have been associated with changes in lifestyles. (In the fourth surge, suburban living led to new jobs in retail and many other services.)

JOHNSON: I think the choice facing society is between closed economies, highly concentrated and unequal, and open economies, with decentralized ownership. But how willing are governments and large commercial institutions to break through their institutional lock-in to address these problems?

The Internet was originally seen as a vehicle for decentralizing ownership and control. Instead, we've moved to the era of Google and Facebook, where the algorithm becomes the means of production. Those who own the algorithm capture the value. You thus see a much greater concentration emerging among a very limited number of platform companies.

The same technology could still lead to an open economy, where the means of production are more distributed. We would then see, for example, decentralization in energy, with micro-production of power, maybe blockchain-based micro-transactions for energy trades, crowdsourced finance, 3D printing, and more innovative means of local food production.

In which direction are we headed? It looks to me as though we're headed toward increasingly closed economies at the moment, toward concentration. Would you agree?

PEREZ: In the 1920s, wealth distribution looked the same as it does today. The top 1 percent received 25 percent of society's total income. By the 1950s it was down to 10 percent. Every installation period brings inequality until the state comes back actively to reverse it and relieve social unrest. In the Belle Époque of the third surge, at the turn of the 20th century, poverty was rife and most European countries followed the example set by Bismarck in the 1880s with some form of welfare state. This was also the time of the Progressive era in the United States.

Handicapping the Transition

KLEINER: What would have to happen to turn the corner this time?

PEREZ: The last time a period of crisis ended, after World War II, there was a concerted effort by many government and business leaders to create a unified, prosperous, long-lasting recovery. The Marshall Plan, the Bretton Woods Agreement, the conversion of wartime industries to peace, and the rebuilding of Europe and Japan all played a role. Unfortunately, today's leaders haven't yet taken on the role they played at this point in past surges. Their stepping up last time was a catalyst for ending the crisis.

To get there, perhaps we need to have a crisis that is truly felt as a crisis. That seems to be the self-correction mechanism of capitalism; things need to get so bad that stability gets threatened seriously. Even at the worst part of the financial crisis in 2008, the threats weren't felt sufficiently strongly by enough decision makers.

But now the people are angry. They are ready to follow demagogues. Leaders around the world should know that they ignore popular unrest at their peril.

Much of the unrest can be traced back to the austerity policies in Europe and the U.S., which were based on the premise of letting the market operate on its own. Markets do well on their own during the installation period, when a technological revolution is beginning and there is a lot of experimentation. But that period is already over in this surge. It led to two major bubbles: the Nasdaq one in the late 1990s, and the easy-credit one of the mid-2000s.

After the collapse in 2008, financial institutions stopped funding business, because they saw business as risky, and took refuge in pure speculation with bonds, debts, and derivatives. Only the new ICT giants, which live in their own bountiful world doing what they please with abundant cash, are investing. Except for some venture capital for tech startups, new potential projects and innovations across the economy cannot find credit. The market is not working and won't take us out of feeble, jobless economic growth. The austerity policies are keeping the world from recovery. If a company had as high a failure rate as these policies have had, the CEO would have been replaced long ago.

Even now, the decision makers are still waiting. They don't understand that, as in every previous technological revolution, the public sector has to lead the way back after the major bubble collapses. Only with intelligent government policies providing clear directions for profitability will markets work again. And only with effective policies to restore jobs and incomes will social unrest wane.

KLEINER: Doesn't business have a role to play in this?

PEREZ: Of course! Business needs to modernize itself and to work *with* government, not against it, in getting us out of this mess. But, as in the 1930s, business leaders tend to oppose government intervention on principle. Last time, it took the experience of World War II for them to discover the advantages of working together with government. After the war, even business leaders supported high taxes (as high as the 90 percent top rate under Eisenhower) and a generous welfare state. These policies spurred dynamic demand. The support for austerity and minimal government today shows that those lessons have been forgotten.

KLEINER: There has been some movement toward consensus. The 2016 Paris Agreement encouraged collaboration among government and business leaders (particularly tech leaders such as Bill Gates and Mark Zuckerberg) around climate change. Some technological platforms, such as Industry 4.0, are bringing disparate operations together. The populists are forcing some governments to streamline their internal bureaucracies and raise their productivity. Some recent elections — for example, those in France and the Netherlands — showed a clear appetite for consensus solutions. Commentators, including some in our own firm, PwC, are underscoring the urgent need to reframe the current system so that the economy once again delivers for society. (See "[Common Purpose: Realigning Business, Economies, and Society](#)," by Colm Kelly and Blair Sheppard.) Don't elements like these help?

PEREZ: They may. But things could also get much worse before they get better. I think there are several possible catastrophes that could finally wake up the world's leadership. One would be the takeover of power in more countries by demagogues and populists, along with growing social unrest and violence everywhere. Another could be a third financial crash, which in my view is plausible, starting either in the West or in China. The bailout would not be harder this time. And we should not rule out a climatic catastrophe, such as a devastating hurricane hitting a city like New York.

These times are sometimes compared to the 1960s, but they are very different. The 1960s took place at the maturity phase of the last surge, when relatively affluent, innovative groups like the hippies could flourish, complaining about excess consumerism: "Stop the world; we want to get off." The followers of today's populist leaders are not interested in inventing something new. They are angry and resentful; they are victims of an enormous, super-unfair inequality. They want to go back to a better past.

Getting from our current fragmented world to some kind of golden age seems impossible right now. But at similar turning points in previous surges it also seemed impossible. In the 1930s Depression, it was hard to imagine those hungry, unemployed people, standing in line at the soup kitchens, as owners of a suburban home with a car at the door. And yet it happened, in an astonishingly short period.

New Forms of Productivity

KLEINER: How would the shift to a golden age affect jobs and unemployment?

PEREZ: Every technological revolution destroys old jobs. In solving the problems of the previous surge, it increases productivity, producing more goods and services with fewer people. The new productivity takes a different form each time, but it ultimately doesn't have to mean fewer jobs overall. It means a change in the way jobs are defined.

At the turn of the 20th century, mass production (the fourth surge) did the same thing to shop production that electronic production is doing to mass production now. It eliminated jobs — at first. Mass production could create many identical units at low cost. The ideal policy was thus to make energy and materials cheap and labor more expensive, thereby creating more mass-market consumers using cheap fuels and electricity. After World War II, governments in the industrialized world did just that, raising the cost of labor by supporting labor unions, establishing payroll taxes, and passing minimum-wage laws. Cheap raw materials and energy, in the form of fossil fuels, came from the developing world. Even though businesses chafed at high salaries, they benefited from the increases in productivity and in demand.

Today, it's energy and materials that are too expensive (or will become so if growth resumes strongly), and they need to be reduced to cut costs. Environmental threats reinforce this incentive. Thus businesses are redesigning products for smaller carbon footprints, fewer materials, and zero waste. Many products are also being turned into services — prerecorded music into streaming, for example.

The amount of labor needed is also being reduced, so there's a double gain in productivity coming. Robots and artificial intelligence are already replacing many jobs and are likely to replace more.

JOHNSON: If current trends hold, regular jobs look like they could be blitzed. Timesheet-billed jobs in major corporations are going. IPsoft has a chatbot called Amelia that can carry out 25,000 conversations at once. IBM is developing a bot that can interpret financial regulations.

PEREZ: How much of the economy do you think will be affected?

JOHNSON: There are various estimates. The Frey and Osborne study from the Oxford Martin School estimates 47 percent of today's white-collar jobs in the U.S. and U.K. could be automated by 2035. A recent World Bank study suggests that 69 percent of all Indian jobs are vulnerable to automation.

PEREZ: But there is always a counterbalance, and it is linked to a new vision of the good life, which becomes a prevailing theme of the golden age. In the second surge, it was urban living, as defined in the cities of Victorian Britain from the 1850s. In the third it was the cosmopolitan living of the Belle Époque. In the fourth, it was the American way of life from the 1950s, which compensated for the jobs lost to technology with massive employment in construction, retail, services, and government.

Something similar could happen this time. This next golden age will probably involve smaller carbon footprints, a collaborative economy, preventive healthcare, creativity, experiences, exercise, lean use of materials, and industrial ecology.

It would mean a general shift from products to services, from tangibles to intangibles, and from mass production to customization. Whereas mass production emphasized economies of scale — making cheaper identical goods — the new digital technologies thrive on diversity and adaptability. The higher the price premium, the better-paid the jobs are likely to be.

There may also be a further shift away from owning to renting or sharing products. Even today, when people use a credit card to buy an appliance, they are actually renting it until they have paid it off. If it breaks down, it's often cheaper to buy another one than to fix it — in effect, "renting" another one.

We could change to a higher-employment society simply by taking this model to the next logical step: Let credit cards evolve into rental portals with Amazon-like websites [for, say, appliances]. It would mean massive employment in maintenance and installation workers (using electronic diagnosis of breakdowns and 3D printing of parts), while products would change hands many times and help all those who have just entered the consumption ladder rent older — but still good — appliances for small sums.

KLEINER: What would happen to manufacturers?

PEREZ: The rental model could be good for them too. The mass production model was based on planned obsolescence, in which companies produced enormous quantities of shoddy goods. This created artificial demand in saturated markets by making people replace products that broke down or wore out. But if markets are growing around the world, as in a time of full global deployment, then companies could produce luxurious, expensive, top-tech, and durable goods that would last many years and be continually upgraded as technology evolved. There would be no more spare part inventories, only software to make them. And the new millions of people entering the middle class could be equipped with durable goods without materials becoming scarce and expensive, without harming the planet, and with increasing efficiency.

JOHNSON: I'd like to play devil's advocate. Once we fully enter the age of the algorithm, the age of zero marginal cost machine production, our skills become close to redundant. We're ornaments, complements to the machine. Another option is to stop prioritizing AI and the triumph of capital over labor. We could do the reverse: prioritize natural intelligence, harnessing the cognitive surplus that's still out there in abundance. Where I live in Kilburn, in North London, an old Italian man who lives two doors down from me has got about 200 neighbors involved in making local wine: crowd-picked, crowd-trampled and crowd-bottled. He's unlocking the natural and human assets that are there. Could this type of reskilling and community-based artisanship, augmented by technology, start to form part of a new cultural imagination?

PEREZ: I agree that local production can become an important and complementary part of the new economy. But people need a broad array of goods, including food, shelter, and transportation. Do you really think we could go back to making everything we consume through community artisans?

A Model of Social Growth

JOHNSON: And can we do the opposite? After the recent cybersecurity threats, I worry that the hyperconnected economy will be shown to be so hackable and non-resilient that we turn back to making our own stuff out of necessity.

And then what is the role of the large institutions that dominate today? Are they an anachronism? Would they continue to exist in an economy and society organized around very different, more organic principles? Are we looking, in other words, at the death of "big"?

PEREZ: We don't need the death of big. We only need the death of "mass." Instead of rendering giant companies obsolete, the capitalist system might complement them by opening other opportunities for wealth creation of another sort. Fintech startups are already forcing large banks to change the way they operate, and some startups might take over many of the banks' functions.

John Maynard Keynes was right. Someone needs to create demand before innovation and investment can come forward. The last time it was by building houses on suburban land. But how do you create demand now? For what products and services?

That's where emerging economies are important. The so-called developing countries were not included in the mass production surge of the 20th century, because the advanced world was more interested in their natural resources than in their consumer market. But that is changing now. As countries like China and India continue to grow like mad, they provide demand needed by business producers, including food and materials producers in other emerging economies. These new producers will take advantage of much greater global demand to fund their development, which in turn should increase global demand for capital and consumer goods. It's a new positive-sum game waiting to be set up.

Ultimately, when things get bad enough, we will need an equivalent of the Marshall Plan, to help develop all countries. There would be building projects for the tropical world: some for areas affected by rising sea levels, others for drought-ridden areas, all with large-scale engineering, using solar and other new forms of energy, and helping to develop those countries. This would be paid for as it has been in past surges, through new commitments that could include tax regimes that would have felt impossible to achieve just a few years before — but now everybody, including businesses, will end up recognizing how their fates all hang together.

KLEINER: How would that differ from what economic development groups such as the World Bank have done all these years?

PEREZ: It would be much more ambitious, and more attuned to the conditions and opportunities of the information age and of a globalized economy. The critical question is: Can a positive-sum game be established among all the world's nations? The need for full global development today is enormous, if only because of the growth in consumer demand that's needed. China and India alone cannot serve that purpose. This is also the only way to reduce migration from places like the Middle East and Latin America. Even if ISIS is defeated, you must establish enough jobs in the less-developed economies to bring back hope to their populations.

It's essential for every economy to specialize, so that it can participate competitively in global markets. But each piece of territory has to abandon the race to the bottom and define its identity, connected to its history or to strengths that it creates. Its businesses, universities, regulatory priorities, and tax regime must all favor the chosen direction for success, preferably defined by a consensus-building process. I think the advanced industrial countries will end up specializing in capital-intensive goods, high-level engineering, and luxury products. The lagging countries will have to build their own manufacturing bases. Some may specialize in raw materials-based industries, including those producing sophisticated food and chemical products. Some will have their own entrepreneurs, innovating in products and services that reflect their culture and identity. Diversity is in the nature of information technology just as much as homogeneity was natural to mass production.

The Local Nation with Global Reach

KLEINER: You're describing a kind of local mercantilism in which every country has some geographic center of excellence, like Silicon Valley in the United States.

PEREZ: Yes, because globalization will force local and national economies to distinguish themselves through specialization, if they want to survive. Some of these specialized economies could be regional. For example, Europe has cultural traditions that favor environmental sustainability. The region is already beginning to build its economy around a "European way of life." The Scandinavian countries are showing the way. Germany declared an energy transition to renewables. Obviously, there will be cultural and climatic differences: Denmark would emphasize wind energy and Greece would favor solar. Some countries would innovate in healthcare, others in new materials. Each would have its specializations, but the identity of a cluster in the global economy would belong to Europe as a whole.

JOHNSON: But isn't the strength of Europe also its diversity? The fact that it is composed of units with immense ethnic, religious, linguistic, and cultural differences, that coexist and are part of a supranational grouping — doesn't that preclude thinking of Europe as having one way of life?

PEREZ: On the contrary, the advantage of ICT is that it thrives in variety. When I talk about a possible European way of life, I imagine multiple innovations that define different variants of the aspirational "good life" with lots of technology and human-based services, plus health and creativity. That is even easier for Europeans than adopting a standardized American way of life (which they happily did). But to say "smart green growth" should be the general direction, as I would suggest, opens all the space in the world for variety while fostering convergence in skills, suppliers, scientific and technological capabilities, services for business models, and so on.

KLEINER: Are you saying that a few leaders, in a few places, can begin creating the conditions for a new golden age?

PEREZ: Yes. That is how it always happens. A few pioneers start. Others imitate them. When it propagates further, there is massive change, involving a change of attitude in both business and government. We are talking about institutional innovation, new consensus-building mechanisms, and a huge revamping of the tax system, of education, and of the welfare state. They are all obsolete and not fit for purpose. How can current unemployment insurance work in the gig economy, where people are lifelong entrepreneurs, for example, conducting research on a piecework basis, or driving for ride-sharing companies, without the support or stability they need?

Ultimately, in my opinion, the most feasible solution — however difficult and complex it may seem — is probably universal basic income (proposed by, among others, Milton Friedman). Everyone, from childhood to old age, gets a minimal basic income that covers bare necessities, so that they can exist safely in the gig economy. That would truly grow the economy from the bottom up. We would get rid of dereliction and of the humiliating exercise of proving you need public assistance. Basic money would be there in an ATM for each person, deposited every month. The ones that earn enough (and the millionaires, of course) would quickly return the money in taxes. In the end, only those who really need it will be a cost to society, probably not much more

than is now spent in unemployment insurance, child support payments, the costs of dealing with dereliction and hunger-related crime and the salaries of the bureaucrats who do the means testing and make the decisions. They can go on to more creative jobs.

JOHNSON: One thing makes me feel pessimistic about this. The current state of politics seems to be moving in the opposite direction, with a fraying of the perceived link between taxation and representation. And technology is enabling even more authoritarianism, with algorithms determining our news feeds, social media data shaping elections, and sensors monitoring dissent by capturing video and sound.

But I can also think of reasons to be optimistic. The same trend toward decentralization in technology is showing up in politics. Already local entities are taking on more responsibility – most recently, the collective efforts of cities to tackle climate change. And even though we face severe social, economic, and environmental challenges, I think there are opportunities already emerging for technology, potentially backed by government, to promote the fuller global development that you refer to. Right now, as an example, subsistence farmers can lease the M-Kopa solar-powered light, equipped with a SIM card, for 50 cents per day, and use it to get a microloan of US\$36 for a hand pump. This reduces healthcare costs and triples the crops they can harvest; in one study, this type of technology raised annual incomes from \$180 to \$1,800 per person. There are 1.2 billion people around the world without power. That's an untapped market. If we can deploy capital to scale up these businesses, it's got to be in the interests of capitalism to deliver.

KLEINER: How does all this change begin?

PEREZ: We need to look at history. Leaders would have to understand their role in this crucial moment, move to open a consensus-building process, and be determined to take bold measures. Their efforts, hopefully supported by business and society, could be the basis for the global golden age of the information economy.

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