19 key essays on
how Internet is
changing our lives

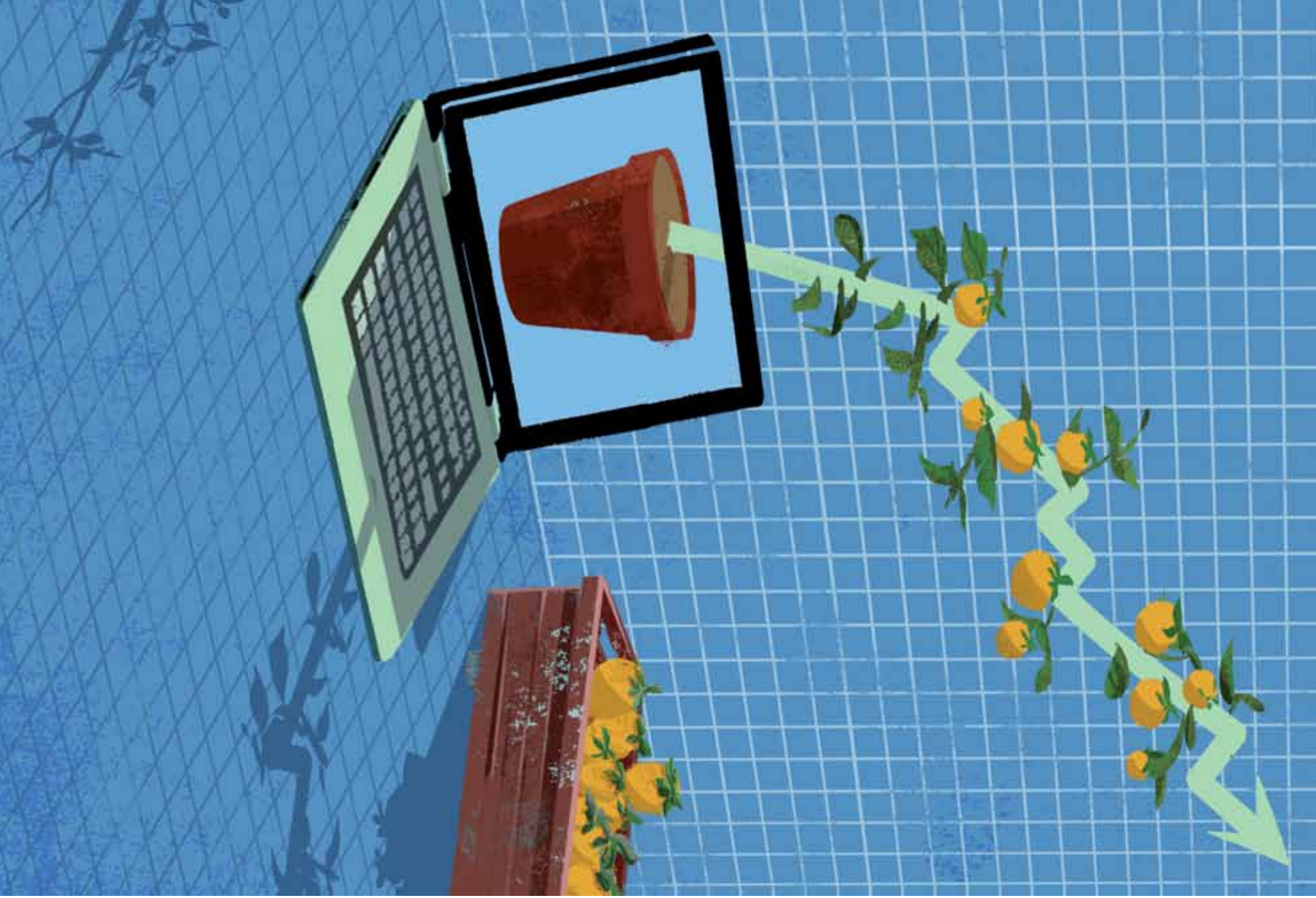
CH@NGE

OpenMind

BBVA

Knowledge Banking for a Hyperconnected Society

Francisco González
Chairman and CEO, BBVA



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Francisco González

Chairman and CEO, BBVA

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Knowledge Banking for a Hyperconnected Society

> *The Web as I envisaged it, we have not seen it yet. The future is still so much bigger than the past.*
>
> Tim Berners-Lee

This book, *Ch@nge: 19 Key Essays on How the Internet Is Changing Our Lives*, is the sixth installment in BBVA's annual series devoted to the exploration of the most important issues of our time. We seek out the world's leading experts and ask them to use a straightforward approach and language accessible to laypeople to explore the best and most current knowledge on topics that matter to us all. Over these past few years, we have been incredibly fortunate to have presented the work of more than 130 authors at the forefront of their fields, authors who have enriched us with their contributions; they are the very essence of our project. I would like at this point to acknowledge all of our contributors and, in particular, those authors who in this year's issue are new to our community.

BBVA began this series in 2008 in conjunction with the launch of the Frontiers of Knowledge prizes awarded by the BBVA Foundation. In response to the outstanding reception to the first few books, in 2011 we created OpenMind, an online community dedicated to the dissemination of knowledge. OpenMind—which contains all our books to date—is a space for discovery, discussion, and the sharing of ideas in a multidisciplinary environment. Over the past few years, our community has expanded the content and broadened its audience in keeping with what has been its overriding objective from the outset: the sharing of knowledge to build a better future.

If I had to identify a single guiding principle for our book series, it would be the desire to understand the major forces that are shaping our world. In the course of this quest, we have published five successive essay collections

that address the present frontiers of science, globalization, innovation, the ethical challenges of our time, and our vision of the future.

The Internet: The Engine of Change

This year, our chosen theme is the Internet, the single most powerful agent of change in recent history. In the words of Arthur C. Clarke, "Any sufficiently advanced technology is indistinguishable from magic." The rapid pace and reach of the changes wrought by the Internet indeed have a touch of magic about them.

As a tool available to a fairly wide public, the Internet is only twenty years old, but it is already the key catalyst of the most extensive and fastest technological revolution in history. It is the most extensive because over the past two decades its effects have touched practically every citizen in the world. And it is the fastest because its large-scale adoption is quicker than that of any earlier technology. To put this into perspective—it was 70 years after the invention of the airplane that 100 million people had traveled by air; it took 50 years after the invention of the telephone for 100 million people to use this form of communication. The 100-million user mark was achieved by PCs in 14 years, the Internet in 7. The cycles of adoption of Internet-related technologies are even shorter—Facebook reached 100 million users in 2 years.

It is impossible today to imagine the world without the Internet: it enables us to do things that only a few years ago would have been unthinkable, and reaches every facet of our lives.

Yet what makes the Internet even more amazing is that it is such a young technology—still developing, still rapidly changing. Everything we have seen so far is just the beginning. First, because Moore's Law still holds: processing power doubles every 18 months. Any iPhone today has approximately the same capacity as the largest supercomputer of the 1970s. The key difference is that a supercomputer cost $5 million in 1975 dollars, occupied a very large

room, was completely disconnected from other devices, and its use was restricted to very few people for very limited purposes. In contrast, an iPhone costs less than $400 in today's money, we can carry it in our pocket, and we can connect it to millions of other devices for any number of purposes.

The increasing capacity of devices will continue, along with an exponential increase in the speed of data transfer. The global average data transfer speed is about 2 megabytes (MB) per second. But speeds of 100 petabytes (in other words, 100 billion MB per second) have already been achieved.

This means that 400 DVDs-worth of data could be transmitted every second. Over time, the cost of creating ultra-fast data transfer networks will gradually decrease. Soon any consumer will be able to download a high-definition movie within the space of a second. In parallel to this, technologies enabling mobile wireless Internet access at speeds comparable to broadband continue to advance.

This ties in with the second multiplier effect of the Internet's influence—increasing connectivity. Internet access has moved from personal computers to mobile phones, on the path toward what has been called *the Internet of Things*, in which myriad everyday objects will become capable of receiving, generating, and sending information. It is estimated that by 2015 there will be more than 200 billion devices connected to the Internet—four times more than in 2010. In only a few years, this will be the most complex structure ever created by humankind. There will be billions of nodes able to measure anything measurable, extracting and communicating any form of information; and this information will be used to monitor every aspect of the *real* world.

This entails the generation of an almost unimaginable volume of data, growing at an exponential rate. Just for us to get an idea, it is estimated that by 2003 humankind had generated 5 exabytes (5 trillion bytes) of information. Today, however, that figure is reached every two days, such that 90 percent of all available data has been generated in the past two years. And the volume of information generated is growing at a rate of 50 percent a year.

This vast wealth of data is potentially highly valuable, but only if the right systems are available to handle it—to capture, store, transfer, analyze, and

visualize the information. This is the field of information and communications technology known as *Big Data*, which is fast becoming the vital key for the generation of useful knowledge. Big Data holds immense potential to raise productivity, enhance innovation, and, ultimately, improve the way we live.

Such huge volumes of data call for equally vast processing power. *Cloud computing* essentially consists of services involving a large number of computers connected over a network, such as the Internet, to provide the capacity for cheap, flexible access to powerful data storage, processing, and analysis capabilities.

As a result of the very speed at which the Internet has developed and the rapid pace of the changes it has brought about, we quite possibly still do not understand the most important and far-reaching implications, nor can we possibly anticipate the transformations the future has in store for us.

Eric Schmidt's famous quote—"The Internet is the first thing that humanity has built that humanity doesn't understand, the largest experiment in anarchy that we have ever had"—remains as true today as ever.

The perception of the immense potential of the Internet to change our lives, the difficulty of predicting how it will evolve, and its free, *anarchic*, barely controllable character, combine to produce both great hope and profound apprehension.

This hope and apprehension are visible in all spheres of human activity—society, politics, culture, and the economy. And changes at the aggregate (macro) level simply mirror the changes taking place at a far more granular and profound stratum. Preferences are shifting, as are people's daily habits—the way we work, relate to one another, learn, have fun... in short, the Internet is changing the way we live.

The Internet may even be changing the way our brains work, modifying the substrate of our memories and thoughts. In recent years, Nicholas Carr

(2008, 2010) has argued that the Internet impairs our cognitive abilities, particularly of concentration and abstraction. These claims have been hotly debated in academia. For instance, Steven Pinker (2010), the distinguished experimental psychologist and cognitive scientist, sharply disagrees with Carr. A survey conducted by the Pew Research Center (2010) found that close to 80 percent of experts thought the Internet had in fact increased human intelligence, against 15 percent believing the opposite. Since the human brain is a malleable organ, it may be the case that the Internet enhances certain faculties at the expense of others. It is indisputably true, however, that the Internet helps us store, manage, and retrieve knowledge—and this, whatever the effect may be on each individual mind, collectively makes us far more intelligent as a society, as a species.

Authors in various fields have pointed to the risks, both real and imagined, associated with the Internet. In the economic arena, there are fears that a *digital divide* will lead to increasing inequality between different industries and geographic regions, with some proving capable of taking advantage of the Internet's potential while others are left behind.

Socially, there is an increasing concern about, among other issues, the loss of direct human contact as a result of the overexposure to virtual relationships, with the potential consequence of the impoverishment of people's emotional lives as well as the loss of social cohesion. Moreover, the privacy of the individual will be at the mercy of political and economic groups capable of exercising some degree of control over the Internet.

In the political sphere, some are apprehensive that the issue of control over the network and the data it supports will harm the very fabric of democracy by giving a powerful few the ability to manipulate public opinion; there is also concern that a proper balance be kept between protecting the public against cybercrime and cyber terrorism and respecting individual rights and liberties.

Yet it is perhaps in the field of culture where we hear the most voices alerting us to the dangers of the Internet, probably because culture and communications are the industries that have most been affected by the advent of the online world that has revolutionized paradigms entrenched for centuries—in many respects, since the invention of the printing press.

Over the past two decades, opinion leaders around the globe have heralded the *end of culture*. In the Spanish-speaking world, the ideas of the Nobel prize-winning author Mario Vargas Llosa (2012) have had a particular influence.

Of course, on the other hand there are any number of highly optimistic opinions of how the Internet is affecting us. I already mentioned Steven Pinker and the work being done by the Pew Research Center on the effects of Internet use on human intelligence. And many economists have pointed out the positive effects the Internet has on productivity, as well as its potential to stimulate the development of disadvantaged individuals and geographic regions. Examples include Brynjolfsson and McAfee (2011), Choi and Hoon Yi (2009), and Barro (2003). Yochai Benkler (2006)—a contributor to this book—points out the ways in which the Internet enables us to work together to improve the well-being of society at large. At any rate, the empirical evidence is overwhelming that the strong growth of many of the world's underdeveloped regions has been supported by the paradigm shifts brought about by the Internet's development. In the social and political realm, authorities such as Manuel Castells (2009)—also a contributor to this book—emphasize the opportunities provided by the Internet that allow us to become better informed, and to cooperate and coordinate with one another; in his view, these are factors that help raise the quality of democracy and strengthen bonds across society. And, in the cultural field, there are those—such as Lipovetsky and Serroy (2008)—who argue that we are moving toward a "world culture," which is more democratic, and less elitist, academic, and exclusive.

To form an opinion on these issues we should look at what the Internet can and cannot do for us.

The Internet was first conceived of—and primarily used—as a vast repository of information. But it has proved to be much more than this. It is a collaborative tool within everybody's grasp; and it is collaboration that has breathed life into the Internet's immense potential as a generator of knowledge and a driver of innovation. As Eric Schmidt has said, "None of us is as smart as all of us." The Internet has broadened the horizon of opportunity for billions of people, particularly in the least developed regions of the world, and has become vital to global prosperity and stability.

The Internet involves risks. Like any other powerful tool, it can be misused. And the truth is that the Internet is enormously powerful—we still don't even know what it can do, or how it will evolve. We don't know how to control it. We need to address the tough challenges the Internet poses, particularly in terms of governance, *ownership*, control, and allocation of *responsibilities*. In the words of Clay Shirky, one of the most influential thinkers working in the field of the Internet and social media:

> *The whole, "Is the Internet a good thing or a bad thing?" We're done with that. It's just a thing. How to maximize its civic value, its public good that's the really big challenge.*
>
> (Aitkenhead 2010)

Given the rise of all manner of literature about the Internet and its impact on every last corner of human life, we thought it would be useful to gain some perspective on these issues and the dizzyingly fast changes we are seeing by bringing together a collection of essays by undisputed experts, each in their field and each with their own particular approach.

In truth, the Internet has always had a presence in our books, simply because the Internet is ubiquitous in our times. Contemporary science, economics, society, politics, and culture cannot be understood without the Internet. I would, however, like to expressly cite three key essays—from our earlier books—that specifically concerned the Internet. Having stood the test of time, all three would perfectly complement the articles presented this year: Janet Abbate's "The Internet: Global Evolution and Challenges" (2008), Robert Schultz's "Ethics and the Internet" (2011), and Brian Kahin's "Knowledge Markets in Cyberspace?" (2009).

In this year's book—as in past editions—we are very fortunate to have with us some of the finest minds in their respective fields, to present to us in an accessible manner their thoughts on a wide spectrum of issues raised or prompted by the Internet. With the purpose of somehow ordering such diverse, interlocking, and interrelated contributions, we have classified the essays into four sections:

- The Future of the Internet
- Society, Community, Individuals

– The Economy, Business, and Work
– Culture and Communication

The first section seeks to predict where the Internet is going—or, what is almost the same thing, where it is taking us. In the first essay included in this section, *David Gelernter* argues that, since humans are better at handling information when it is arranged in a time-sequenced narrative, it is plausible that the Internet will evolve toward a system that organizes information not—as so far—on a spatial basis, but over time. This will cause the web as we know it to be replaced by a new form of "Cybersphere," a single data narrative flowing through time ("Worldstream").

The *Internet of Things* has for a long time been a buzzword without much of a real-world correlate. In his essay, *Juan Ignacio Vázquez* explains how hyperconnectivity is finally making the Internet of Things a reality; coupled with Big Data and computing, it will enable everyday objects to improve our lives.

One of the ongoing themes of this book is that Big Data is one of the central nodes in any discussion about the Internet—some have described it as "the database of human purpose." *Michael Nielsen* argues for the critical importance of powerful infrastructure providing freely accessible data, built and managed by nonprofits, as platforms for experiment, discovery, and the creation of new and better ways of life.

One of the crucial aspects of the future of the Internet is security. *Mikko Hypponen* explores scenarios for an increasingly sophisticated Internet that is open to attack; effective oversight by governments is accordingly becoming an urgent and vital need.

The Internet has become an indispensable practical tool that we use for widely diverse purposes in our everyday lives. The second section looks at the ways in which the Internet is influencing society as a whole, different communities and social groups, as well as individuals.

A long-standing authority in this field, *Manuel Castells*, highlights how the Internet is expanding the freedom of and empowering users, and how it is nurturing the creation of online communities that are becoming increasingly influential and playing a significant role in many areas of the *real world*.

In his essay, *Eugeny Morozov* shows how difficult it is to evaluate the meaning and magnitude of the Internet's impact on politics. Internet-centrism is in fact confounding the debate; because the Internet is only a tool and the truly critical question is how the same networks and protocols are being used in different countries and from different positions toward conflicting objectives.

Federico Casalegno points out that one of the main problems with online connectivity is that it may discourage direct human contact. He accordingly presents a number of projects initiated by MIT in which technology is used to transfer knowledge, culture, history, and memory; by linking individuals to a wider community, the Internet becomes a tool that supports—rather than replaces—human interaction.

The next essay discusses the role of the Internet in education. *Neil Selwyn* explains how new learning tools, such as wiki tools, MOOCs, and School in the Cloud initiatives, are revolutionizing the field and testing the boundaries between teacher and student. Many of the difficulties in contemporary education have social and cultural roots, and technological solutions are ineffectual in the short term; however, the Internet is fostering a new *bottom-up* education culture that helps people break free from physical limitations.

Lucien Engelen uses real-life examples to explore the sweeping changes that the Internet is bringing about in healthcare. Patients are playing a far more active role in looking after their health, while Big Data is set to revolutionize clinical research.

The section ends with an article by *Zaryn Dentzel*, who focuses on social communication and underscores how the Internet and social media are changing both the way in which we interact with one another and the very structure of society.

The Internet has completely changed the rules for the whole economy, for industries, and for individual businesses. And the process of change is far from over. In fact, it is just getting started: having sparked a chain of innovations that overlap, combine, and feed off each other to bring about still more change, every time there is an alteration in the rules and the general environment, a fresh wave of innovations washes over us.

Dan Schiller opens the section on the Internet and the economy with an essay exploring how businesses in the United States have contributed to give the Internet its current form and the macroeconomic consequences of this reality. The U.S. captures more than 30 percent of the revenue and more than 40 percent of the net earnings generated by the Internet around the world. The U.S.'s privileged position in cyberspace is becoming a source of intergovernmental conflict centered on the structure and politics of the Internet.

According to *Yochai Benkler*, the Internet has given rise to new forms of production—he calls it "social production"—based on the free and open flow of information over social media. These new models regard innovation and creativity as assets held in common, and stimulate economic and social change alike.

In his essay, *Thomas Malone* claims we are witnessing the first stages of a revolution in the way we organize our work. He thinks that we are moving toward decentralized organizations in which large numbers of individuals take important decisions based upon a wide range of information. This reorganization will demand a radical change in the way that businesses manage their human resources, with a shift from "command and control" to "coordinate and cultivate."

The final section of the book concerns communication and culture, where the Internet has had an especially powerful impact.

David Crystal terms the language we use on the Internet "electronically mediated communication"—an entirely new form of communication unlike both writing and speaking that features innovative possibilities such as "interfering" at any time with the text, giving rise to "panchronic" communication. Crystal predicts the emergence of a new revolution in step with the development of Voice over Internet Protocols (VoIP).

Paul DiMaggio presents a broad perspective on how the Internet has affected the media and cultural industries. In his view, the Internet has brought more culture to more people, and that the magnitude of disruption varies greatly depending upon the cultural industry or sector: music has witnessed the rise of new opportunities, while print media is being driven out of the market.

Peter Hirshberg focuses on how the Internet has revolutionized the ways in which we watch TV and listen to music. No longer is the audience a passive recipient; each individual has become his or her own content producer and distributor. Television used to be a family activity, but now it comes within the autonomous sphere of the individual—although it can later be shared and discussed in social media.

Patrik Wikström analyzes the profound changes in the music industry over the past 15 years. People are listening to more recorded music than ever before in history, yet revenue has collapsed. On the other hand, music licensing and live music have taken on great importance. A growing number of artists are involving the audience in the creative process, thus changing the artist/listener relationship and modifying the audience's interaction with music.

In the closing essay, *Edward Castronova* speaks of the rise of Internet-based games. He maintains that games lie at the core of our society, our economy, and our culture. These complex phenomena are in fact structured as vast tissues of interrelated games whose rules mold our behavior. So the emergence and growing influence of Internet-based games creates subtle, gradual, yet, in the long run, profound in our culture.

Banking, Information, and Technology: Toward Knowledge Banking

Several of the essays in this book explain how the Internet is transforming the economy, industrial sectors, and business life. Practically every single business in every part of the world must cope with these changes. They are unavoidable, because the technological underpinnings of the production and distribution of goods and services have shifted. What's more, society and the people it is made up of have themselves changed. They are more informed and more demanding; they have new consumption habits, and in virtually every domain imaginable their decision-making criteria have shifted.

So even large companies that formerly made huge profits and enjoyed universal brand recognition now fade away or are driven out by other, far newer businesses that form part of the online explosion.

The S&P 500 clearly reflects this situation. Kodak and the *New York Times* have dropped off the index; Kodak replaced by a cloud computing firm, and the *New York Times* pushed out by Netflix, a company that rents movies and TV series over the Internet.

This is a chiefly information-driven revolution. Thus the industries undergoing the fastest and most far-reaching changes are those where the informational component is largest: the service sector industry in general, and, more specifically, media, culture, and entertainment.

Banking and the wider financial services industry also carry a very high information load. Their *raw materials* might in fact be said to be money and information. Money is readily dematerialized (converted into electronic form) by being turned into accounting entries; in other words, information.

Banking and finance have of course changed to some extent, but the magnitude of the change has been far less than in other sectors. There are several possible reasons for this: the industry is tightly regulated; users' average age is comparatively high; and the financial sector grew at an amazing rate in the decades leading up to the downturn, which allowed for the sustaining of relatively high levels of inefficiency.

But all this is on the way out. In the aftermath of the financial crisis, we are moving toward an industry guided by far more stringent requirements with respect to transparency and good practice, solvency and control. Margins will inevitably be thinner and profits smaller.

Banks need to restore their reputations while continuing to operate profitably in a far more demanding environment in terms of principles, quality, and service pricing.

In addition, a whole generation of customers has grown up with the Internet—they use social media and have an *online life*. They have never been to a bricks-and-mortar branch office, and never will. Various estimates suggest that by 2016 retail customers will contact their bank once or twice

a year at a physical branch office, as against 20 or 30 times a month using their cell phones (see King 2013).

Moreover, a whole new league of competitors is emerging, mostly but not exclusively from the online world. These new players are free of legacies, the structures inherited by the banks: obsolete and inefficient IT systems and costly physical distribution networks.

Today, the use of online payment mechanisms, the execution of money transfers using e-mail, automatic personal finance management with various software apps, or the use of the cell phone as an e-wallet is increasingly possible and widespread. There are even several online currencies.

So far, most of the companies developing these capabilities—such as Paypal, Square, iZettle, SumUp, TransferWise—are niche players targeting a single segment of the financial industry's value chain.

But there increasingly more sectors coming under attack. Even lending, the key area where it is hardest to cut out the middleman, is no longer the exclusive preserve of banks: in the United Kingdom, supermarket chains like Tesco are selling mortgages. You can get a loan on Amazon. Peer-to-peer lending is growing exponentially.

And the emerging competition is increasingly strong. Some bankers and analysts believe that the *Internet giants*—Google, Facebook, and Amazon—are unlikely to fully commit to a business like banking, which is heavily regulated and offers only thin, declining margins. Yet it is unlikely that these companies, with their incredibly strong and well-known brands and billions of users, will stay on the sidelines of a business that generates a large number of recurring contacts and transactions—and thus a wealth of information—and which also facilitates additional sales opportunities.

The good news for banks is that they enjoy a crucial competitive advantage—the huge store of information they already have about their customers. The challenge is to convert this information into knowledge, and use this knowledge to offer customers what they want.

And What Is It That Customers Want?

First, they want a quick, sensibly priced real-time service under transparent terms and conditions, tailored to their own conditions and needs.

Secondly, they want the ability to carry out transactions anywhere, anytime, using mobile devices. This has significant implications. On one hand, the need for a large branch network is fading away; on the other, the potential market is far greater.

Today, there are 4.7 billion cell phone users on the planet, as compared to only 1.2 billion bank customers. Mobile telephony furnishes a powerful infrastructure to access billions of people who have never been bank customers, largely as a result of conventional banking's inability to develop an efficient model capable of catering to low-income individuals, many of them living in geographically remote or dispersed locations. To give one example, in Kenya M-Pesa started to provide basic cell phone banking services in 2007; today, it has almost 20 million users.

Thirdly, customers want a genuine multichannel experience. They expect the same value proposition, the same service, anytime, anywhere, using any channel—a branch office, ATMs, a desktop or laptop, a landline or cell phone, etc.

They also need the ability to switch from one channel to another instantly, seamlessly, without any discontinuity. This seamless experience still lies far beyond the current *multichannel* approaches offered by most banks.

Finally, customers are increasingly looking to their banks for new forms of value—goods and services that meet their needs.

To satisfy all these requirements, banks must develop a new, knowledge-based business model adapted to the online world.

How can we develop this model? According to Peter Weill (see Weill and Vitale 2001; Weill and Ross 2009), every online business model comprises three critical components. First, the content; in other words, whatever is being sold. Second, the customer experience; that is, how the product is presented and consumed. And third, the technology platform, which determines how the product is produced and distributed.

It is probably this third element—the platform—that poses the toughest challenge, because most banking platforms were designed and built in the 1960s and 1970s. It is upon this base that the later retouches, patches, and add-ons are layered, giving rise to what Professor Weill calls "spaghetti" platforms, evoking the complexity that results from the connections among the various applications. Inevitably, these platforms are rigid and inefficient, overly complex, and expensive to maintain. And they certainly do not provide tools capable of competing with the new players in the industry—who are far more agile and flexible—or of creating the experience that today's customers demand.

To compete in the twenty-first-century banking industry, we need a completely different platform concept developed from scratch under the aegis of far more advanced paradigms than those of 50 years ago, so that the system can integrate vast quantities of data with all possible points and channels of contact with all customers, without any cracks or discontinuities.

This new form of platform should consist of three levels. The core system is the platform engine, providing all the basic information-processing and data-analysis capabilities. The middleware level comprises the software that processes and packages the data and functionalities of the core system to make them available to the third level, the *front office* seen by customers, with fully interconnected channels, social media functionalities, high security standards, and the ability to capture all customer data and enable managers to react to it promptly.

With respect to the platform content and customer experience, banks need to completely revise their traditional concepts if they are to meet customers' true needs. Customers are people and businesses whose ultimate goal is to buy a new car, move house, travel, start up a business, build a manufacturing plant, and so forth. Getting a loan is not an end in itself, it is merely the means. Grasping this insight and taking action accordingly is vital to offering attractive content and a distinctive customer experience.

Technology enables us to build new content based on the knowledge generated from the available data. It also offers the customer an improved

experience. The bank no longer needs to wait for the customer to request a given service; it can anticipate the customer's decision-making process, offering what he or she needs at the right time and in the most convenient format. To achieve this banks must take their place at the forefront of Big Data analysis and make use of all the information they have amassed about their customers, as well as the wealth of available external data, particularly sourced from social media.

This, in turn, calls for vast data storage and processing capabilities. Cloud computing allows us to access capabilities of almost unlimited size, flexibly and efficiently, while improving the customer's experience.

These steps forward are necessary if a bank is to survive and successfully compete in the new knowledge-banking environment. And this represents a profound transformation of current business models. Not only must technology be radically upgraded but, in addition, operations and processes and organizational structures must all be comprehensively reinvented, and the manner of working and the capacities and skills required must also change. What is called for is a total transformation of the corporate culture.

And all these initiatives must be put to the service of an ongoing effort toward innovation. Open innovation models are critical to overcoming the existing limitations of an organization and attracting the best talent to work on better value propositions—employees, customers, shareholders, and other bank stakeholders can and should contribute to the design of better content.

The shift from offline to online, from analog to digital, "from place to space"—as expressed more than a decade ago by Peter Weill and Michael Vitale (2001)—is for conventional banks an inevitably long and complex process. It entails an *ongoing revolution* at every level of the organization, all while the bank is kept fully operational at all times.

At BBVA, we started work on this process six years ago. We made a conscious decision to start from scratch. We ruled out other options that on the face of it seemed easier, such as slotting in more middleware or enhancing channel applications without addressing the replacement of core systems. These options, which in one way or another have been the solutions of choice for many banks, smooth out intermediate difficulties, come at a lower cost, and

produce some results in the short term. But this approach multiplies patches and inefficient interconnections—*adding spaghetti to the plate*—and leads to a dead end when increasing data storage, and processing requirements outstrip the feeble power and flexibility of the core engine.

As a result, today at BBVA we have a state-of-the-art platform that allows us to speed up channels in the rest of our business divisions. What's more, even after achieving genuinely significant progress, after six years the transformation of our business model is still far from complete; it will continue to be our key priority in the coming years.

The fact is that the future of every bank depends on the decisions made about its operational platforms. We are moving toward an entirely new map of the financial services industry. Banks will be fiercely culled by rising competition, falling margins, and declining prices, in step with the shift of products and services to online media—as has already happened in other industries.

The new financial services industry will allow room for more than one viable model, chiefly depending on each company's degree of knowledge of its end customers and of its ability to access them.

There will always be niche players, of course, but most operators will be specialist suppliers: players with a reduced knowledge of and access to customers, and focusing on a strongly productive specialization. These suppliers will have to find their place within the value chain of larger and more powerful businesses, with better customer knowledge and access. The stronger operators will be far fewer in number—perhaps not more than a hundred worldwide—and will act as *knowledge distributors* while exerting control over the value chain. Their control will take the form of *ownership* of the open platform on which suppliers and customers interact, within the framework and under the rules created by the owner, who will in turn be able to integrate all the knowledge generated about the end customer.

This *ecosystem* model provides many small businesses—suppliers—with the opportunity of achieving global reach within their area of expertise. The platform owner can expand its range of products and services and improve the customer's experience. Moreover, cooperation among all players—businesses and customers—will stimulate innovation.

This model is already operational in the online domain. What Amazon is really doing is heading up an ecosystem by opening up its platform to a broad selection of suppliers who offer the customer base a growing range of products and services: books, of course, but also music, software, hardware, and so on.

This phenomenon has yet to reach the banking world—or has done so only in a very incomplete form. But the process is inexorable, driven by digitalization and increasing consumer needs. It is on this terrain that the newly digitized banks will meet the new entrants from the Internet. The banks will generate knowledge based on the financial information at their disposal—supplemented by other sources—to offer financial and, increasingly, non-financial services; and their rivals will in turn use general information about their users to offer them financial services.

For today's banks, the necessary transformation represents a great challenge, but also a wonderful opportunity. Those who fail to react quickly, decisively, and accurately will wither away, as their customers leave them behind and their revenues decline. Those who successfully adapt to the new environment, however, will discover a new field of possibilities. While the market will offer very low prices—digitalization necessarily entails a sharp drop in prices—costs will likewise be far lower. In the words of the economist Erik Brynjolfsson:

> *When goods are digital, they can be replicated with perfect quality at nearly zero cost, and they can be delivered almost instantaneously. Welcome to the economics of abundance.*

What's more, the market will be far larger in at least two ways. First, it will be genuinely universal, bringing in billions of people who currently have no access to financial services. Secondly, banks will be able to extend their offerings beyond the financial domain, embracing a potentially endless range of knowledge-based products and services.

The banks are equipped with a highly significant initial advantage—they have more and better data about their customers. But they need to turn this data into relevant knowledge.

In this new world, the banks have lost their monopoly over banking. Each bank is called upon to prove that it is capable of offering the (financial or non-financial) services that people really need, when they need them, in the way they need them.

Financial authorities, regulators, and supervisory bodies face perhaps even greater challenges. Their main goal should be to keep a level playing field between banks and new entrants to the business. This means that the regulatory and supervisory absence from what has so far been a practically unregulated online realm needs to be addressed, to ensure security, privacy, fair competition, and financial stability.

This is no easy task in the largely unexplored digital domain, which is continuously growing and becoming more complex, and where unfettered freedom is the norm. An even greater challenge will be in addressing these issues while also preserving a high degree of competition and sufficient incentive for innovation, the factors that ultimately benefit customers and drive growth.

The conventional financial services industry is becoming what I call the BIT (Banking, Information, and Technology) industry, a staging post on the road to its growing into Knowledge Banking: an industry able to provide us with far greater value, furnishing more and better solutions for our needs, and effectively supporting economic development at the global level. In this process, banks are merely accompanying the economy at large and the global society as they rapidly evolve toward knowledge-based forms of themselves.

BBVA is committed to collaborating in this effort in order to extract the highest possible benefit from the Internet for the well-being of individuals and for the global society, in keeping with the vision of our business group: “BBVA, working towards a better future for people.”

This vision provides the framework for our strategy, which rests on three pillars: principles, people, and innovation.

We first make our vision and our strategy a reality in our day-to-day work. BBVA is determined to offer our customers the best, most efficient, most agile, simplest, and most convenient solutions.

That is why BBVA aims to be one of the leaders in the transformation of the current financial services industry into a new knowledge-based banking establishment powerfully supported by technology.

Our business group has pioneered the creation of a cutting-edge technological platform, which is now practically complete. In addition, we are undertaking a sustained innovation drive that goes far beyond technology, extending into the organizational and cultural spheres.

Our approach to integration is founded on knowledge, because knowledge is our salient competitive advantage. We were among the first in the industry to conduct data mining and construct smart algorithms to anticipate and interpret our clients' needs. Similarly, BBVA has pioneered the use of the cloud to maximize the efficiency and flexibility of its processes.

For the past six years, at BBVA we have moved forward to bring about the change that I believe our industry must urgently address: turning an analog bank—highly efficient and profitable by twentieth-century standards—into an online venture focusing on knowledge services, thus rising to the far more elevated and demanding standards of the twenty-first century.

In addition, BBVA has a strong commitment to corporate responsibility, which we regard as another way of helping people to grow and to improve their lives in the communities where we operate. This work is focused on the areas we believe to be the most powerful levers for extending the horizon of opportunities for individuals: financial inclusion, social entrepreneurship, education—with a particular emphasis on financial education—and the creation and dissemination of knowledge.

Final implementation of these initiatives is chiefly the province of the BBVA Foundation. But the bank itself is also directly involved. One of the results of our participation is this collection of books and its parallel initiative, the OpenMind Knowledge Community, which aims to leverage the power of the Internet as a collaborative tool to create a space in which to share and discuss our knowledge of the key issues set to shape our future. I would like to thank all the authors and contributors, and to express the wish that our readers and visitors will enjoy this book and learn from it as much as we have.

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Francisco González

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