From the Deloitte Center for the Edge

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Coherency in contradiction

Report 5 of the 2013 Shift Index series

About the Shift Index

We developed the Shift Index to help executives understand and take advantage of the long-term forces of change shaping the US economy. The Shift Index tracks 25 metrics across more than 40 years. These metrics fall into three areas: 1) the developments in the technological and political foundations underlying market changes, 2) the flows of capital, information, and talent changing the business landscape, and 3) the impacts of these changes on competition, volatility, and performance across industries. Combined, these factors reflect what we call the Big Shift in the global business environment.

For more information, please go to www.deloitte.com/us/shiftindex.

About the authors

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Contents

Executive summary

THIS report examines life in the Big Shift by exploring some of the tensions and intrinsic contradictions arising from the accelerated pace of technology and information flows. We'll examine the conditions that are amplifying these contradictions and suggest ways to find opportunity within them. By reframing contradictions as complementary, rather than mutually exclusive, leaders may discover a greater ability to adapt and innovate in a complex, dynamic world.

Although each contradiction impacts systems of all sizes, we'll constrain our examination to three distinct levels: people, organizations, and ecosystems. For example, we explore the cooperation and competition between humans and machines as a people-centered tension, but organizations and ecosystems are also affected. Similarly, we consider only a subset of meaningful contradictions while overlooking many others, such as the growing divide between prosperous Americans and the 49.7 million living in poverty.[1]

Intrinsic contradictions

"If you're not confused, you're not paying attention," wrote Tom Peters in his 1991 book *Thriving on Chaos: Handbook for a Management Revolution*. Twenty-two years later, the confusion is still an everyday condition. Life has always been full of contradictions. Some are transitional, ebbing and flowing with the trends or politics of the day. Others are deeply intrinsic but may be moderated or intensified by circumstances. In times of stability, governing institutions—such as central banks, legislatures, and employers—exercise greater oversight to dampen the effects of deeper, intrinsic contradictions. But in a fast-changing world, such institutions—often under duress themselves—may prove unable to provide the stabilizing effects expected of them. In the absence of stabilizing institutions, the intrinsic tensions of life take on sharper definition and are amplified by information technologies and globalization.

It is human nature to simplify things, to evaluate new situations against the models and experiences we already hold. This deeply programmed behavior helps us quickly sort our environment into threats, allies, food, family, etc. It is also problematic; by quickly cataloging the world into buckets that conform to what we know, we limit our understanding of the inherent nuance and complexity of contemporary life. Mainframe computer companies, for example, underestimated the importance of personal computers when they were introduced, categorizing PCs as a gadget or toy, and as a result most did not take the competitive threat seriously. Simplifying makes it easier to weigh one thing against another. The world, however, is not so simple.

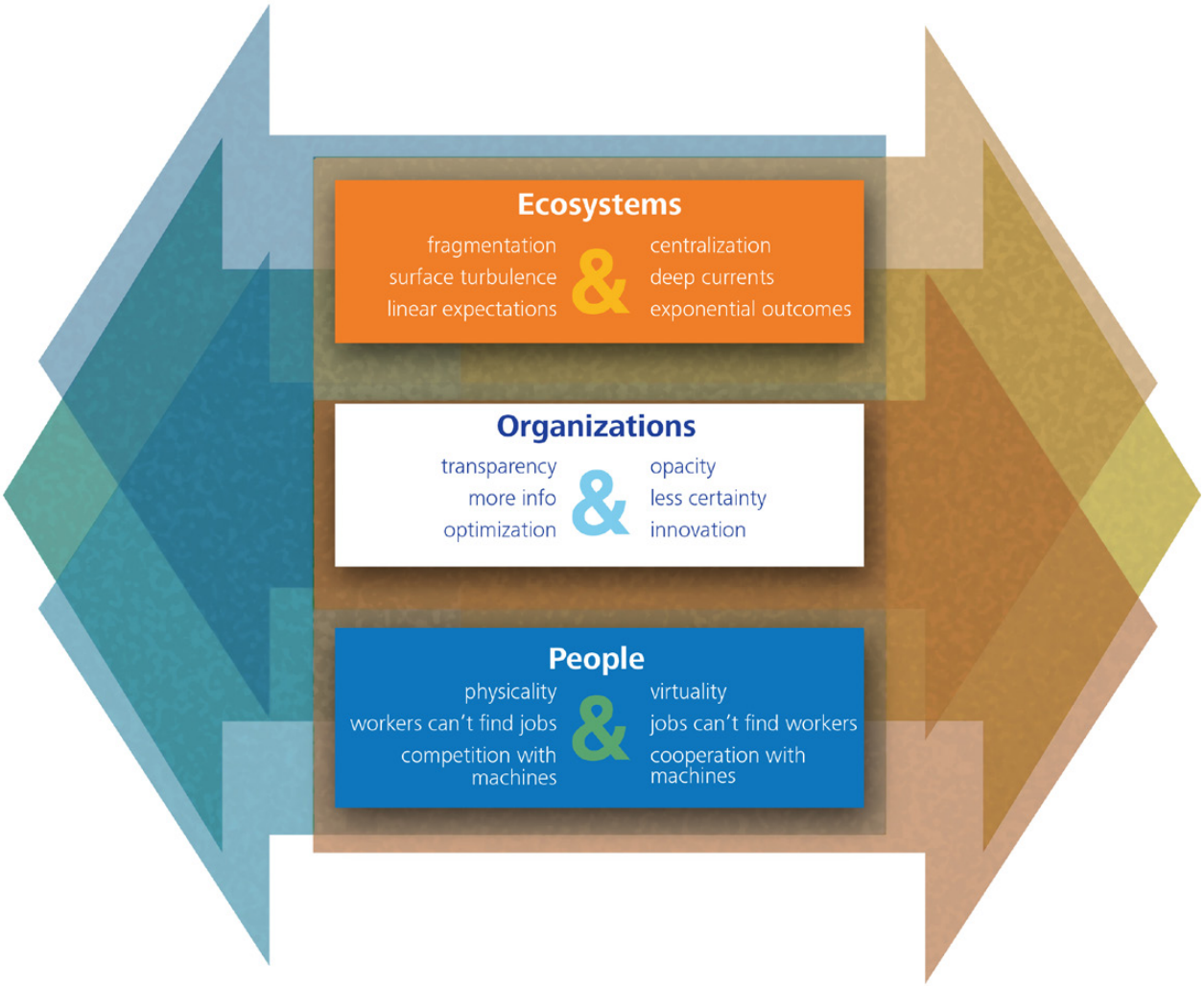
The urge to resolve contradictions is also human nature. Yet in the face of deep, persistent contradictions, developing the potential of our organizations and improving performance may require embracing seeming contradictions rather than resolving them. Contradictions can be seen to represent opportunities to simultaneously explore two paths in ways that complement each other and capitalize on the advantages of each. This concept of dynamic tension is an uncomfortable art for organizations married to predictability. Those that embrace it will benefit, continuously drawing new insights for performance, innovation, and resilience. "It's okay to have two opposing ideas," says Brian David Johnson, Intel's strategic futurist, "because that's what the future looks like."[2]

The landscape of change

For better or worse, the stability we have come to expect—a world of reasonable predictability, linear graphs, and dependable s-curves—is unlikely to return. Rather, we should expect continuous change, turbulence, non-linearity, and spiky graphs of outliers and disruptors, in part as a result of improving cost performance of core digital technology: computing, storage, and bandwidth. As technology gets better and becomes more and more available to individuals and companies, it unleashes knowledge flows that transmit and amplify events across the business landscape. In such a world, contradictions are the constant condition within which we operate. How, then, can organizations and businesses be configured to thrive in such conditions? Embracing the contradictions and apparent incoherency of our present condition may induce institutional change that better enables learning, innovation, and sustained performance improvement.

A world of contradictions: People, organizations, and ecosystems

Our exploration begins with a consideration of individuals. Individual people experience and engage with life's tensions and contradictions. People aggregate around shared goals, eventually forming organizations to have greater scale and impact. In a hyper-connected landscape, organizations are inevitably drawn into interdependent ecosystems that emerge as the connective tissue of collaboration, innovation, and performance.



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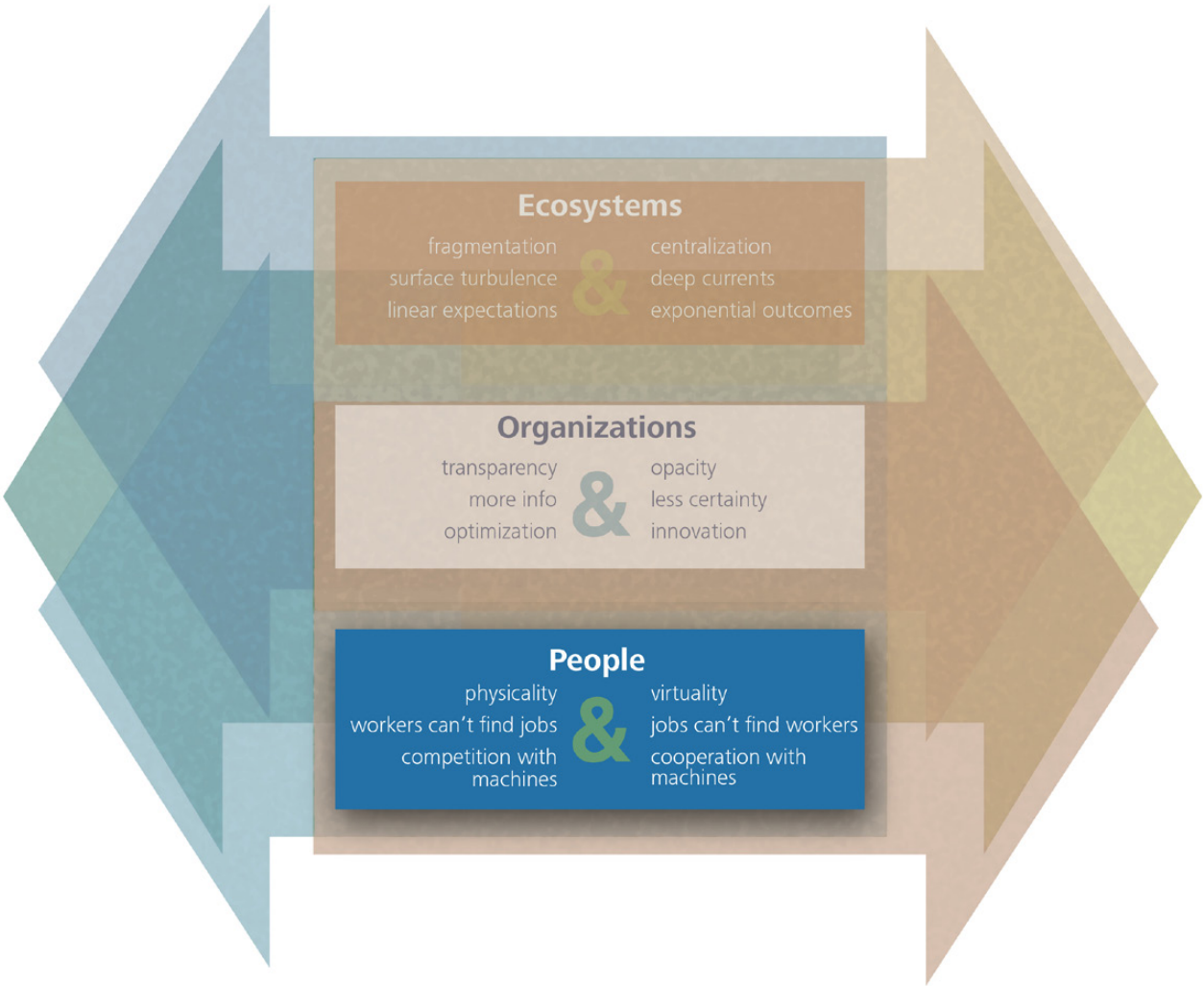
People

The Big Shift is lived by people.[3] As leaders of organizations and business ecosystems, people are often tasked with understanding and adapting to an increasingly complex world, but our mental maps struggle to match the terrain. We habitually frame the world in terms we can relate back to the models we carry in our heads, based on our experiences, perceptions, and cognitive dispositions. When events and conditions don't fit a pre-existing model, people compensate for the apparent contradiction by creating stories about the world that are more impressionistic, and attempt to apply logic and order that doesn't exist in reality.

We'll explore how the desire to resolve contradictory pressures creates false dichotomies for individuals as they navigate expansive virtual platforms that still fall short of physical presence, seek relevant employment that meets their developmental and lifestyle demands, and persist amid the surge in machine capability that can seem to negate labor.

As the virtual world expands, we seek more personal connections

The coupling of computational power and network connectivity has made it possible for people to instantaneously interact and collaborate with each other from almost anywhere around the globe. Businesses extend their operations across continents and seas, innovations emerge from unexpected corners, and



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revolutionaries wielding cell phones mobilize social networks to topple dictators.

Contradiction: Global connectivity allows for immediate communication and collaboration, but travel volume continues to grow.[4]

Virtuality: Virtual connections enable fast and continuous touch-points and are well-suited for the exchange of explicit knowledge—things you know and can speak of. Social media designs are increasingly moving into the workplace—witness Salesforce.com's $33 billion market capitalization for cloud-based social CRM. As social moves into the workplace, enterprises gain capabilities for one-to-many broadcasting of ideas and queries; quick identification of relevant internal specialists; and greater coherency between the workplace and clients, partners, and the crowd. Virtual channels like short message service (SMS), social networks, and immersive collaboration spaces allow for fluid interactions that economize information sharing while creating a rich data record for business intelligence efforts.

Physicality: The need for actual presence persists. Physicality helps people establish trust, bond, and collaborate in ways that remain cumbersome in virtual channels. Physical settings allow more serendipitous interactions—those unexpected meetings and collisions of ideas around a water cooler or buffet line. Perhaps most importantly, physical presence enables the exchange of tacit knowledge derived from practical experience: the shortcuts, hacks, and tricks that imbue a person or team with true expertise while frequently defying documentation. There is a risk, however, in requiring too much co-location: The workforce can homogenize around the local talent pool, neglecting valuable individuals who choose to live elsewhere.

Reconciliation: Individuals will likely continue to intuitively blend physical and virtual environments to suit their personal and professional needs. Organizations have yet to find an easy balance. Modern work environments are inherently continuous across virtual and physical channels, but many businesses do not explicitly acknowledge this, and they do not intentionally establish processes to optimize performance in a blended environment. For many businesses, virtual channels are an afterthought or a localized experiment. More often, employees create ad hoc solutions based on their own familiarity with tools outside of work.

Rather than make blanket policies about co-location, organizations can try to better understand which functional groups perform best locally and which can be more distributed, and also recognize that this balance changes over time. Cloud collaboration tools are beginning to better approximate the ways people naturally apply social structures, identity, and communication to their work and can facilitate collaboration across local and remote domains. As these tools integrate with mobile devices, an organization's interface is extended to meet employees, stakeholders, customers, and the crowd—wherever they are.

In the blended virtual/physical world, businesses can gain from integrating benefits from each channel into the other. For example, creating communities of practice and giving employees incentives to share videos may help codify tacit knowledge that might otherwise be lost without physical presence. Establishing presence and deep relationships in locations essential to your industries and ecosystems (e.g., Silicon Valley for tech companies, New York and LA for fashion companies) helps your organization plug into relevant knowledge flows. At the same time, digital tools can be further refined to better facilitate trust and bonding.

Workers can't find jobs, and jobs can't find workers

There have always been difficulties in matching the supply of talent to the evolving needs of employers, but the pace of technological change heightens the challenge. The technological foundations of work are outpacing the ability of workers to adapt and integrate the necessary skills[5]—a situation aggravated by the slowness of higher education to adapt to the needs of modern labor.

Contradiction: While workers struggle to find jobs, employers struggle to fill positions with the appropriate talent.

Workers: With few bright exceptions, unemployment remains stagnant and is even rising in some regions. Put simply, many workers are not keeping up with the changing demands of the workplace. In a 2013 report, economists at the UCLA Anderson Forecast said that one of the fundamental challenges to economic recovery is that too many workers lack the skills to compete in the modern economy.[6] Given the pace of technological change, many workers will need to develop new skill sets at some point in their careers. The jobs themselves are changing, and the fluidity of the global labor marketplace means that domestic workers compete with people from across the globe, often able to work for lower wages.

Employers: "Companies all over are having a difficult time recruiting the kind of people they're looking for," says Robert Funk, chairman and chief executive of Express Employment Professionals, a national staffing firm. For example, manufacturing companies that invested in robotics to better compete are struggling to find the right talent to help maintain these machines. "[The machines] sit dormant 70 hours a week when they could be working," says Drew Greenblatt of Marlin Steel Wire Products.[7] The companies themselves are partly to blame for their talent shortages. Structured for efficiency, many companies hire workers who have the skills that are needed today, but when the skill becomes obsolete, so does the person. These businesses are also slow to adopt the tools to help people be more effective and adapt to their changing environments.

Reconciliation: When skills become obsolete so quickly, companies need workers who can adopt new tools and adapt to new challenges. Potential and passion are more valuable than specific skills. Rather than pursue efficiency and systemized routines, companies can construct work environments that cultivate creativity, imagination, and an intrinsic desire to solve problems.[8] Leading technology companies such as Google are adopting flatter, more autonomous organizational structures that allow business units and individual workers to better direct their efforts without bureaucratic drag. Organizations have an opportunity to redesign work environments to motivate and enhance the ability of employees to continuously and more rapidly develop and retool in-house, preserving institutional knowledge while keeping up with the pace of change.

Emerging employment ecosystems offer workers and employers other options. In its 2012 Independent Work Preview, MBO Partners estimated that 70 million US workers will be independent by 2020.[9] Services like oDesk.com and eLance.com match independent workers with the specific needs of employers, making contingent hiring easy by providing transactional assurances and automatically (and publicly) documenting feedback and reviews.[10] These employment services allow savvy workers to use technology to create the kind of work they want. Just as social media is redefining how organizations manage internal flows, digital freelance platforms may offer guidance for how organizations and talent can organize around projects.

In many ways, workers have greater access to their own development than ever before. Open courseware—free, remote access to core

curriculum classes at such prestigious universities as Stanford[11] and MIT—and online services like Khan Academy and YouTube provide workers tremendous ability to update their skills.

Humans compete against, or cooperate with, the machines

Over the last century, during times of fairly stable economic and sociopolitical systems, US businesses configured for scalability and growth. Highly mechanized production capacity drove the domestic consumer market, elevating the assembly line to an icon of Western growth. American prosperity was directly coupled to machine automation, from the factory floor to the kitchen, giving the consumer lower costs and greater leisure. Since that time, the capabilities of machines and their algorithmic counterparts have expanded rapidly into areas once thought to be the sole domain of humans.

Contradiction: Humans create the machines and work practices that negate the need for some human labor.

Humans: Human capabilities and creativity are vital to innovative problem solving. Our ability to conceive, create, and use tools is a defining trait of the human species. We're so good at it, in fact, that we can barely keep up, often realizing the impact of our creations only after they've been released into the world. Through the twentieth century, we developed machines, such as the automobile, that reconfigured the landscape and enabled Western prosperity. We created new ways of work that removed humans from some of the more dangerous labor practices and developed medicine that increased longevity and with it, our population and resource requirements. And yet, it is our ability to map a problem space and come up with a novel solution that keeps the whole human drama moving along.

Machines: Clearly, the gains afforded by technology have been tremendous. Machines have been displacing labor for some time, but the pace and breadth of displacement today is greater than ever before as exponential improvements in technology fuel the rapid expansion of machine capabilities. Businesses have reconfigured work to be exactly the kind of tightly specified, standardized, repeatable, and predictable tasks that machines do so well. A recent report from the Oxford Martin Programme on the Impacts of Technology concludes that 45 percent of American jobs risk being replaced by automation in the next 20 years unless workers differentiate their skills from those of machines.[12] These numbers suggest that productivity may come at the expense of employment.

Reconciliation: It is our ability to creatively identify and frame new questions and to develop a deep and nuanced understanding of the rich context for our actions and relationships that sets us apart from machines. It is the capacity of machines (in the modern computational sense) to rapidly process tremendous amounts of data and to execute millions of calculations per second to identify the best move forward that sets machines apart from us. Each side supports the other.

In 2005, Playchess.com held a competition allowing a human player to pair with a computer against an opponent. The human-computer pairs were always victorious over either human or computer opponents alone. Long-time chess grandmaster Gary Kasparov noted that for weaker players, "human strategic guidance combined with the tactical acuity of a computer was overwhelming." Interestingly, stronger players performed worse when paired with computers because they often second-guessed the recommendation of the algorithms.[13] This suggests that both the tool and the mindset of the individual matter. As recent computer-human pairings have demonstrated,

however, we cannot afford to be complacent, and must continue to seek new ways to learn and improve our use of machines.

By designing better tools that help people become more effective problem solvers, and training individuals to better use tools, organizations can reap the rewards of algorithmic efficiency while continuing to develop valuable talent. Creative problem solving, emotional intelligence, long-term design thinking, human-centered development, rapid adaptation, and sense-making of complex systems are among the skills that humans offer. Yet the gap in productivity between humans and machines suggests that institutions are not preparing the workforce or building the practices to deploy humans aided by machines. Of course, businesses will have to find ways to evaluate workers for their uniquely human traits rather than on the performance of their machine counterparts. Capable people paired with capable machines will likely achieve greater performance, but this will require profound rethinking of our work environments and work practices if we are to truly harness the full potential of humans and machines.

Palantir Technologies, a software company that builds next-generation Unified Data Access platforms, got its start addressing some of the analytic needs of the intelligence community. Its powerful data integration platforms and efficient graphical user interface enable analysts to sort through enormous volumes of private data with speed, accuracy, and relevance to the problems at hand. Palantir's field engineers design custom ontologies[14] to structure and constrain data for customers such as banks that need to ferret out signs of fraud. By making it easier for analysts to focus on surfacing meaningful connections, the algorithms reinforce and extend the human operators. "Our really sweet spot is anytime there's an adaptive adversary because this is the place where automation always fails," says Ari Gesher, Palantir engineer and evangelist. "Humans do a good job of figuring out what's going on if you give them a way to understand the data in their own language."[15] This type of intentional design augments the unique abilities of humans with those of algorithms so that the duo can be more productive than either one alone.

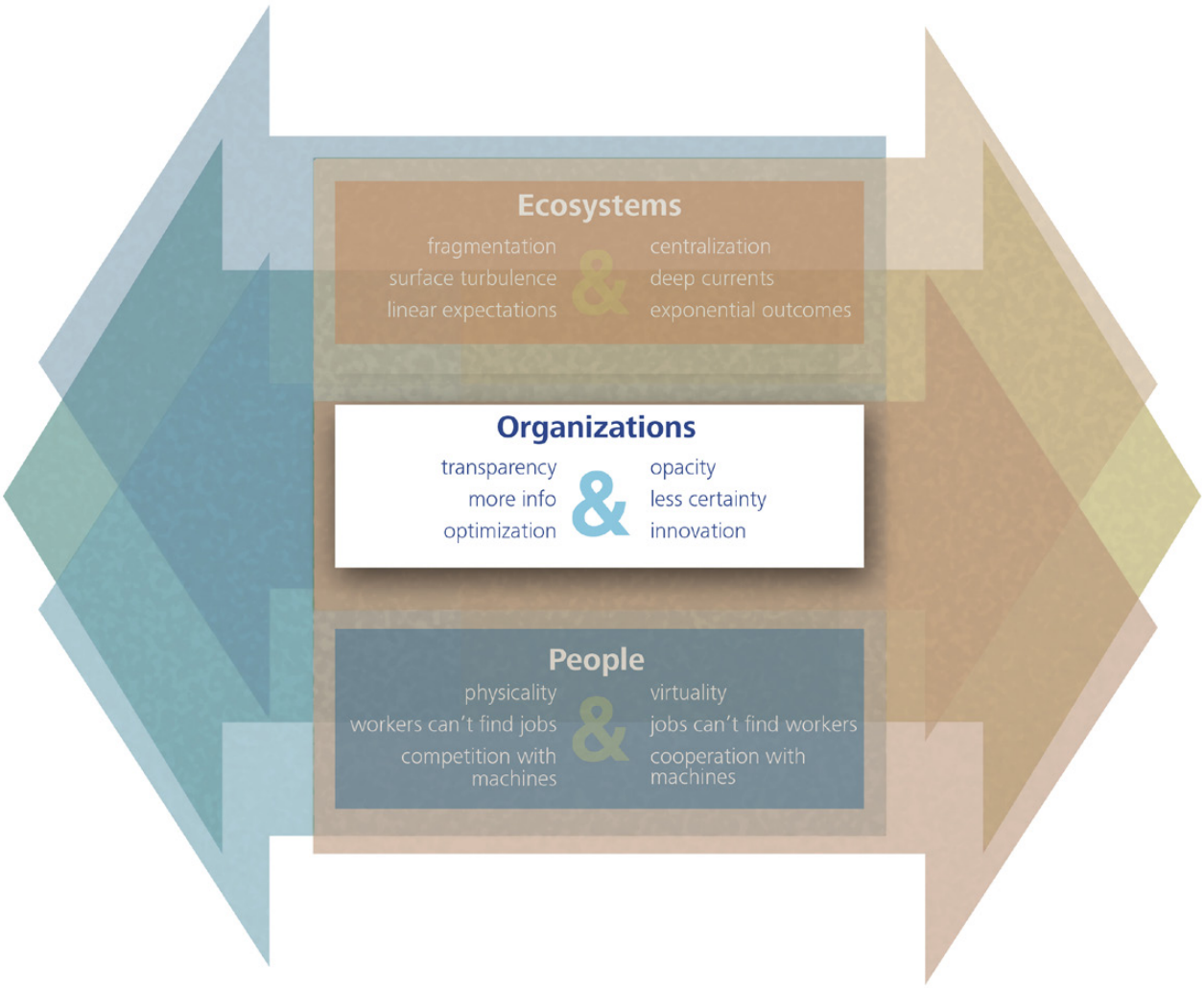
Organizations

As people come together around shared goals, organizations emerge to capture and coordinate their work. The larger scale of operations dictates new types of choices. Some organizational contradictions are merely the amplified version of the contradictions affecting individuals; hiring and the automation of roles are also relevant to managing human resources, for example. Other contradictions are characteristic of the increased complexity of organizational scale.

We'll explore how scale and complexity complicate the balance between the need to protect information and the need for transparency with partners, how access to too much data without context can overwhelm the benefits of information, and how the constant pressure to optimize and reduce costs can seem at odds with the loosely defined imperative to innovate.

Transparency highlights the need for opacity

In the modern globalized and hyperconnected economy, networks of computation and storage have eliminated much of the friction that previously impeded the flow of information. Not only is it easier to get access to valuable information, public or private, but customers and stakeholders are increasingly expecting—and demanding—openness from institutions.



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Contradiction: Security and privacy are important for firms, but innovation and performance increasingly require openness.

Opacity: With the shift to digital storage and networks, companies must defend against remote intrusions as well as unintentional leaks. Every employee with a smart phone constitutes a pore in a company's firewall. Even casual social media updates have the potential to affect messaging, hiring, product releases, and vulnerabilities. This ease of copying intellectual property, across networks and devices, befuddles attempts to preserve knowledge stocks and intellectual property. Recently, desktop software company Adobe Systems, Inc. suffered a security breach that released source code for Acrobat and Photoshop—two of its most valuable applications—as well as an estimated 130 million user passwords.[16] For many companies, cyber intrusion is not a matter of "if" but "when."

Ultimately, opacity is privacy—something individuals negotiate daily. Organizations' activities around opacity will continue to be under scrutiny, especially as they collect more and more information about the public while punishing those who violate institutional opacity.

Transparency: Efforts to lock down knowledge flows often inspire distrust among

participants, and restrictions on connectivity and sharing alienate the talent that companies need to innovate. Millennials and digital natives entering the workforce will likely expect continuous connectivity with public networks. Furthermore, effective ecosystems require a greater degree of transparency. Opening development flanks to third-parties allows them to create their own intellectual property on the platform. As a result, the many participants in the ecosystem, even potential competitors, are invested in making the core business succeed. Such platform ecosystems demand better flow of information and visibility into the operations, finances, and outlook of the companies that orchestrate them. Openness and regular communication with the ecosystem inspires trust among participants, reinforcing the social capital of the brand, and generating returns in innovation and durability.

Reconciliation: In choosing what information should be public and what should be cloistered, leaders must balance between empowering the ecosystem and protecting their crown jewels, complying with local regulations and staying attuned to customer sentiment. Secure information flows can feed internal and external performance. An intentional synthesis of transparency and opacity will likely engage the ecosystem to build trust and commitment to the platform, establish a more robust value chain, and facilitate an environment of reciprocity. At the same time, the organization retains the ability to guard those elements that make it competitive and to continue defending the ecosystem against disruptors.

The increasing volumes of data that businesses gather present a technical and philosophical challenge. Trust takes years to build, but can be lost in an instant. Businesses should develop protocols or data structures that enable rapid, seamless access to data for authorized users while still safeguarding these ever richer and more connected troves from unauthorized access.

"How do you build systems that can let data analysts effectively do their work and follow the law?" asks Ari Gesher, engineering evangelist at Palantir Technologies.[17] "With sensitive information you don't want other people getting access to information they shouldn't have access to." To mediate between analysts and data stocks, Palantir has implemented a regulatory and auditing component that manages access based on the user's identity, the age of the record, and the degree of secondary signatories and writs necessary to legally view the information, while recording every action in an offsite audit trail. This protocol attempts to offset the tremendous power of Palantir's tools by embedding governance directly into the software. This creates support for the civil liberties challenged by big data, and it gives organizations better ability to deal with the scale of their data.

More information, less certainty

An important signature of the Big Shift is the tremendous flow of information unleashed by globally connected technologies. The growth of Internet bandwidth and digital storage capacity both enables and is driven by the volume of new information being created. The embedded computation, sensors, and algorithms constantly gathering and generating data, as well as the volumes of content

generated by individuals and organizations, further feed the swelling flows of information.

Contradiction: Big data can offer tremendous insights, but information overload may decrease certainty.

Information: Organizations, supply chains, and ecosystems—previously contained in tidy organizational charts—are teeming with details, many of which directly impact performance, costs, and downstream social and environmental impacts. Leaders have ready access to filtering and analytic tools, business intelligence suites, semantic clustering, and machine learning algorithms to gain insight into their operations and their customers in a way that was previously impossible. As we employ increasingly sophisticated sensors throughout the environment, our models can become more precise, enabling fine-tuning and more efficient management.

Uncertainty: Big data is not a panacea. Simply gathering more of it does not make a company more effective at comprehending and acting on it. Data may become overwhelming without investments in analysts, domain experts, and social scientists capable of surfacing the human needs hidden within the noise. "We're creating all of this information about ourselves," says Intel's Brian David Johnson, "but that data is completely meaningless until it comes back and touches the lives of people."[18] Fragmentation in data standards and the often-opaque compartmentalization of business units and institutions makes it even harder to get the right results. With the rising volume of data, too much noise threatens to drown out the relevant signals and overwhelm the decision-making processes of institutions. Indeed, the sheer degree of visibility into the world exposes tremendous complexity in human and natural systems.

Reconciliation: Organizations should take advantage of the enhanced capabilities being developed to capture information about their operations and their domains. The trick is to sort through the data and convert it to actionable insights. Data solutions can narrow the volume of information and deliver the most relevant results to analysts. Human intelligence makes data meaningful. A trained analyst acting on experience and hunches can ferret out subtle patterns invisible to algorithms. Rich data visualization tools make it easier to analyze results and to surface meaningful patterns and insights.

To ensure that insights become immediately actionable and drive higher performance, organizations should enable their own internal information flows. Data and insights should be put in the hands of frontline workers to support their ability to learn and iterate in real time. The sales channel, for example, should be a conduit for insights and information. Andrew Ridley, the manager of Intel's Australian and New Zealand Financial Services Industry, advocates the SMAC Stack—social, mobile, analytics, and cloud. Using content synchronization capabilities on enterprise tools, the group can securely share large files, and expert finder capabilities make it easy to connect to content experts across the corporation. Says Ridley, "It is truly changing the way we work as an organization."[19]

Effective management of this contradiction will ultimately require two parallel streams of implementation. First, organizations should be thoughtful about building richer and more timely feedback flows to the people who are in a poised position to act. Second, it will be

important to avoid coupling information flows too tightly. Feedback flows can rapidly spin out of control without a mechanism that allows a user to reflect on the meaning of the data and the lessons it provides before acting. Financial bubbles and crashes, for example, offer a timely reminder of the risks of acting on data without adequate reflection.

Optimization at the expense of innovation

Sensing, communication, and computational capabilities that span the globe intensify the experience of continuous change. The world is high-resolution and immediate. With the insecurity and fear that came of 9/11 and the 2008 banking collapse, the natural response has been to batten down the hatches and retrench into security. For many businesses, strategy collapsed into tactics, planning horizons were shortened, and priorities shifted to cutting costs and optimizing existing products and structures. Forward-looking innovation took on a greater risk of failure.

Contradiction: Business leaders face constant pressure to optimize operations, but they cannot achieve growth without innovating new services and product lines.

Optimization: When macro-events threaten stability and the future seems even less certain, businesses often rely on squeezing cash cows and optimizing them around the needs of larger customers to generate dependable revenue streams. Cutting costs, trimming human resources, and streamlining business units offer a degree of control and can seem like the safest way to mitigate risk and ensure agility. Public companies, in particular, have incentives to lower their overhead to meet the earnings expectations of shareholders. Digital management systems provide additional improvement opportunities by revealing inefficiencies and redundancies.

Innovation: To meet the needs of current and future customers, businesses should innovate their services and product lines. Incremental innovations address the evolving needs of customers while novel research and development differentiates a company and helps position it ahead of the market. Innovation also signals vitality to the marketplace and the will to change and grow. Ironically, signaling a commitment to change is often most critical when uncertainty is greatest. By establishing a roadmap through the chaos, organizations offer structure and security to their ecosystem partners.

Reconciliation: Many organizations instinctively know they need to innovate as well as optimize. Some try to embrace both by creating organizations where one part of a company is charged with driving new product and service innovation and the other with maximizing efficiency of the core, and each part has different metrics, objectives, and cultures.[20] However, this type of organizational structure can have the unintended consequence of further isolating business units and increasing internal communication challenges and culture clashes. This dichotomy derives from a common misperception that innovation is an outward effort while optimization is strictly inward. By recognizing that innovation is critical for both products and operations and is not constrained to 6- or 12-month cycles, it is possible to create more coherent organizations that can optimize and innovate.

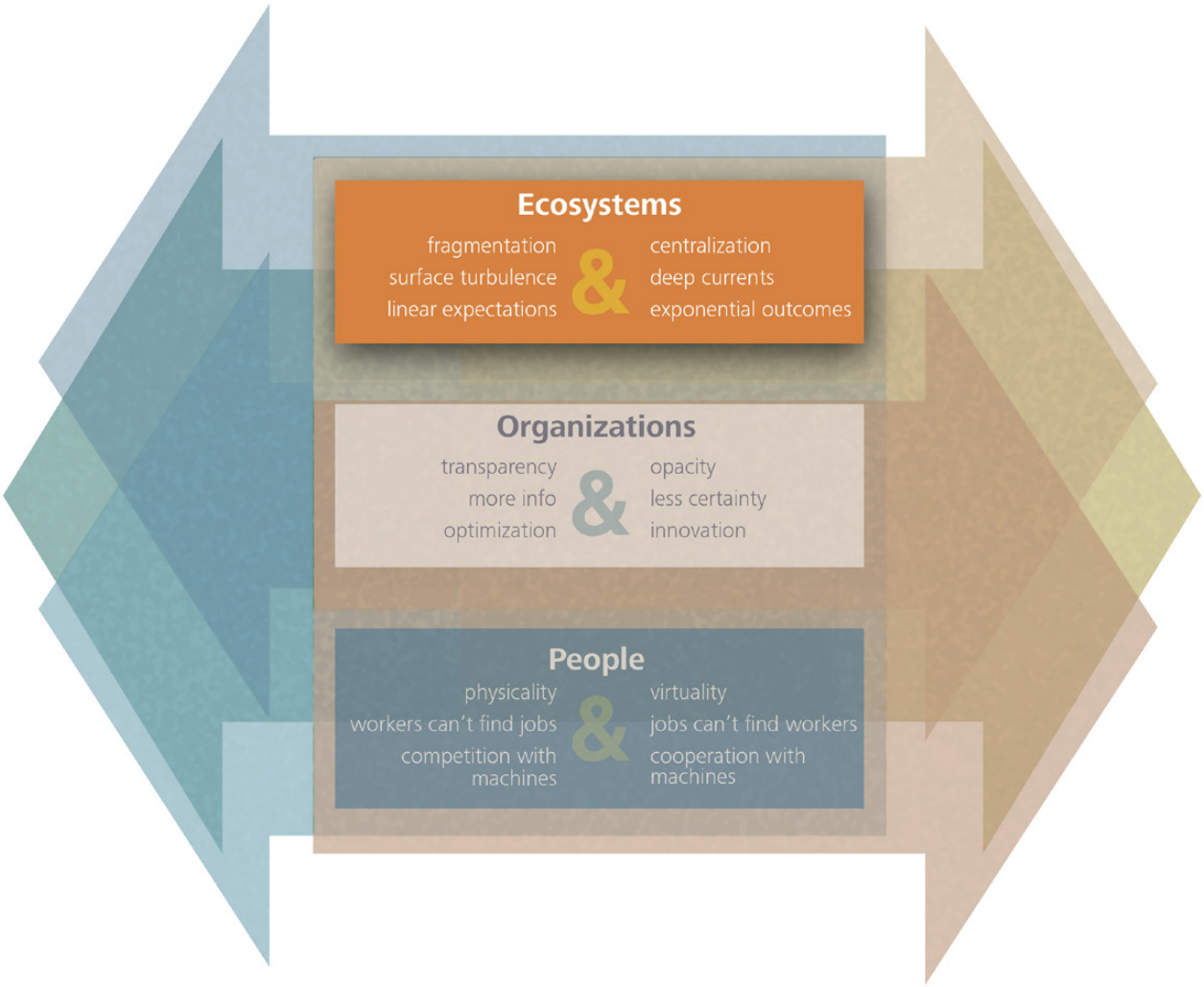
Innovating at the institutional level, rather than at the product or service level, allows companies to take a broader perspective that encompasses the full range of operations and practices required to sustain success in rapidly changing and unpredictable environments. Institutional innovation shifts an organization's focus away from efficiency improvement or the number of new products introduced to creating an environment where everyone—from the front line to the executive tier—is learning and experimenting to improve performance. A deeply embedded process of continuous, rapid

learning allows an organization to quickly explore opportunities and gain new insight from the results. In effect, it is a laboratory for evolutionary fitness, within both a company and its marketplace. The commitment to continuous innovation of processes and practices can drive optimization. Optimization efforts, in turn, can be used to refine innovation through data analytics and lean and agile methodologies, and by simply realigning the organizational capacity to better support new projects. Optimization also drives out costs and friction that might distract time and resources from efforts to innovate.[21]

Organizations bent on optimization don't change overnight. They can start developing innovative capacity with small initiatives and invest in resources that improve their external sensing capabilities to hone in on those promising innovations. In order to avoid marginalizing these efforts, however, companies should find ways to rapidly scale these initiatives so that the practices become the "new normal" for the entire enterprise.

Ecosystems

Just as people assemble into groups and then organizations, organizations become



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participants in ecosystems. The term "ecosystem" derives from the study of nature, but it has been adopted to refer to any population of independent but interdependent entities, including the extended networks of organizations and individuals. Business today is the result of numerous, often complex, interdependencies embedded within even more complex domains like economics and energy. Successfully engaging with ecosystems requires different behaviors, trade-offs, and ways of understanding.

We'll investigate how ecosystems facing contradictory pressures can use economic fragmentation and concentration to become stronger, differentiate between short-term turbulence and deeper trends, and manage the urge to find simplicity in a complex world.

Concentration amid fragmentation

Rapid advances in core digital technologies[22] are eroding boundaries, opening knowledge flows across domains and organizations, and shifting value toward ecosystems and the Long Tail—the innumerable niche markets built on specialized segments and empowered by the democratization of production tools. This rich array of small- and medium-scale businesses exist alongside centralized businesses that focus on refining operations and costs in their core competencies.

Contradiction: Parts of the economy fragment into a multitude of small competitors while others are increasingly consumed by a handful of giants.

Fragmentation: Access to production tools resulting from advances in digital technology is enabling innovation in every sector, bringing greater richness and diversity to the economy. With limited investment, inventors can create products and serve the needs of customers across the world. Small players can engage large networks of suppliers, partners, and customers to help test, market, and evolve solutions. For example, the Apache Software Foundation is a distributed collective of open source developers supporting the Apache HTTP Server, one of the most widely used pieces of software supporting the Internet. The economy as a whole seems to have room for a variety of such small players orchestrating larger networks. Indeed, this degree of diversity is the sign of a thriving ecosystem that continuously experiments with new ideas.

Concentration: Some large players may find they are only effective and profitable operating focused services at scale. Cloud infrastructure, manufacturing networks, and global shipping thrive by offering capabilities to smaller innovators who are unable to achieve the same scale of production and distribution. By accumulating capital and building out massive infrastructures, concentrated players add valuable services to the marketplace that are not easily replicated or supplanted by new entrants. In effect, they become organs of the economy. More concentrated players can work to shape ecosystems around their strategic goals, leveraging the efforts of ecosystem partners to secure and evolve their platform.

Reconciliation: The future is not a question of either a concentrated economy or a fragmented one. A healthy economy will have elements of both. Fragmentation brings diversity and demand for scaled access and capacity that can only be met by concentrated providers. The ability of a smaller innovator to bring a product to market with the help of a concentrated provider fuels further growth and innovation across the ecosystem. The success or failure of each fragmented endeavor provides information that may be acted upon by more concentrated players. These businesses create value by meeting the needs of the smaller participants while leveraging their ability to rapidly test innovations in the marketplace.

In segments like consumer products that are becoming more personalized, such

learning may help a company more effectively serve niche markets. The popular sports video camera, GoPro, was the idea of a single inventor, Nick Woodman, who used a Chinese computer-aided design (CAD) company to generate and manufacture his first batch of prototypes. Today, the company GoPro, valued at over $1 billion, has significantly disrupted the camcorder market and is used by almost every media company in film and sports.[23]

The evolving dynamic between large, concentrated players that organize ecosystems and provide infrastructure and the many fragmented participants that leverage the core services will likely continue to create new opportunities for value in the modern economy. Executives should ask themselves whether they are in a part of the economy that's fragmenting or concentrating and what capabilities that role will require.

Surface turbulence obscuring deep currents

The pace of technological change, the depth of its impact, and the connectedness it enables has created an environment of real disruption and heightened awareness of turmoil. The world of linear stability has turned into spiky graphs of cascading discontinuity. Some of this is perception. We are bombarded with increasingly more information about the world, yet we lack the cognitive and emotional tools to process such scope. This is the reality of life in a highly connected and interdependent world.

Contradiction: Short-term turbulence captures the attention of executives, but the long-term strategies needed to successfully manage change and shape the future are often overlooked.

Surface turbulence: Turbulence has become a general condition; even strategic planning must assume a future of continuous disruption. Leaders cannot ignore the pressing challenges at hand. Public companies, especially, must manage the present in order to satisfy the expectations of shareholders. In the near term, allocating resources to defend against upstarts, outmaneuver competitors, and reinforce existing product lines can help offset the impacts of turbulence. It is easy, however, to fall into an overly reactive posture, unable to distinguish between noise and legitimate threats.

Deep currents: The longer-term trends that persist beneath the churn warrant more attention because they are shaping the future. The incredible power and utility that computation brings to our everyday lives is a good example. In 60 years, mainframe computing moved to desktops and then into the cloud while mobile devices became the de facto means of computation and communication. Other persistent trends include personalization, the aging world, and the erosion of international borders. Ignoring such fundamental currents carries the risk of being displaced by those who do align with and shape the future. Retailer Borders missed the underlying trend that enterprise-scale bookselling was moving online. Some of its competitors aligned with the deeper trajectory of web-based retail and took advantage of longer-term opportunities that Borders missed.

Reconciliation: Chicago Mayor Rahm Emanuel suggested that crisis is an "opportunity to do things you think you could not do before."[24] Turbulence, therefore, is an opportunity to seize the high ground and establish new structures that support higher levels of performance and longevity. Navigating turbulence requires managing fear by better understanding and engaging with both the surface and the deeper currents. Rather than surrendering to the demands of near-term pressures and proliferating events, executives should renew their efforts to make sense of the longer-term forces that are re-shaping the business landscape and to help the entire organization

understand and maintain focus on the longer-term opportunities and challenges that these forces are spawning. One way that companies can gain perspective on longer-term trends is by expanding their ability to sense and understand the behaviors and goals of their customers through directed user research and ethnography. Regular scanning, scenario modeling, and primary research to understand the trajectories shaping the world can help organizations adapt to and shape the future.

If turbulence is a constant condition, leaders should consider how well their organizations are structured to understand and absorb change, to continuously learn and innovate, and to execute on long-term objectives more aligned with emerging futures. In this context, rapid experimentation is an important probe into the turbulence to see what works and what doesn't. Thomas Edison is quoted as saying, "I have not failed. I've just found 10,000 ways that won't work."[25] But Edison's success was ultimately driven by a tight focus on specific long-term opportunities enabled and shaped by evolving technology. In the absence of such a focus, experimentation may fragment into an expanding array of efforts that yield diminishing returns. Continuous experimentation provides the information for innovation. These short-term experiments can inform and refine a long-term vision and vice versa.

Complexity intensifies the urge for simplicity

Simple models are useful, but our expectations of simplicity can be catastrophic. "The key issue is that you can't really understand the whole system by simply looking at its individual parts," explains Michael J. Mauboussin, managing director and head of Global Financial Strategies at Credit Suisse. "Complexity doesn't lend itself to tidy mathematics in the way that some traditional, linear models do."[26] Complicated things, like watches and cars, can be understood and reverse-engineered, but complex things, like organisms and financial markets, have emergent characteristics that cannot be predicted or easily managed. For example, few economists expected the banking collapse of 2008. Those who did were ignored because their predictions ran counter to the expectations of past performance.

Contradiction: We are biologically and cognitively conditioned to simplify, yet we are building an increasingly complex world.

Simplicity: Humans revert to simplistic structures, assessing and categorizing the world around us into manageable chunks, in order to understand and act on it. As Nobel laureate Daniel Kahneman notes, fast thinking draws on our experience of the past, using the associative memory to quickly map coherency onto the present. In essence, we make the world look like we remember it looked when we faced similar situations.[27] Within company boundaries, organization and operation can be forced into simple structures. These structures are supported by simple predictive models and short-term planning. Spreadsheets and linear projections help us understand a firm's operational metrics and make reasonably accurate predictions about the future—both of which drive daily actions and decisions. The challenge is to know that the territory described by simple maps isn't necessarily simple.

Complexity: "It's very clear that even at the most superficial qualitative level socioeconomic organizations have much in common with biology," says Geoffrey West, a distinguished professor and complex systems scientist at the Santa Fe Institute.[28] For people and organizations, complexity is not so much a choice as an inescapable condition of modern life. Weather systems and fuel prices converge with geopolitics and consumer confidence to make or break business models. Globalization, computation, and communication technologies

have radically connected the world, revealing all parts as interdependent members of one giant, complex, adaptive system.[29]

As companies are drawn into complex ecosystems, the classical models and linear projections used to anticipate the future lose fidelity. This is how linear expectations can unexpectedly yield non-linear outcomes, how financial experimentation can lead to economic collapse, how a protest in Tahrir Square can topple a 30-year dictator, and how a cat video can grab 4 million views on YouTube (and, conversely, how difficult it is to engineer those impacts when slight differences in initial conditions can lead to very different results). Like wildfires, cascading power outages, and Internet memes, complex systems are characterized by dense network connectivity and outcomes that are disproportionate to their inputs. The practical effect is that prediction only gets you so far when complexities and externalities can suddenly and aggressively price themselves back into the system.

Reconciliation: Jack Welch, the former CEO of General Electric, is often quoted as saying, "If the rate of change on the outside exceeds the rate of change on the inside, the end is near." To thrive in complexity is to release a degree of control, to become more nimble and adaptive, and to embrace challenges as opportunities to experiment and learn. Firms will evolve in ways that make them look and behave like complex ecosystems, mirroring the world that is evolving around them.

"The best resilient systems don't just bend and snap back," says author Joshua Cooper Ramo. "They manage to get stronger from the stress. They capture the good from avalanches of change without letting the bad wipe them out."[30] Organizations and ecosystems can deliberately engineer fail-safes, sophisticated sensing and mapping mechanisms, and the capacity to quickly adapt to build greater strength and learn from stressors. Rather than tightening their control, firms will likely need to drive decision-making out to the edges. "The great virtue of the Internet is that it erodes power," Esther Dyson noted. "It sucks power out of the center, and takes it to the periphery."[31] This is why it is critical to better integrate the practitioners on the front lines who are sensing change directly and developing new practices to adapt. It is also important to authentically engage ecosystems now that power has shifted beyond the walls of the company.

This effort is not about yielding to the chaos and trusting that everything will work out. But in order to better anticipate and shape their direction, we should become more adept at understanding the rapidly changing ecosystems that increasingly drive markets. More systematic use of complexity modeling tools and scenario planning will help reveal patterns and identify where new opportunities are likely to emerge. Instead of trying to suppress randomness, we should cultivate environments that increase the potential for serendipity so that we can build new ecosystems and discover new ideas and practices. In certain cases, we may even be able to shape how broad arenas evolve, materially altering the probability of certain outcomes, rather than simply waiting to react to events as they occur. Shaping, however, is very different from controlling and requires a deep understanding of the forces that drive the evolution of complex systems.

Ultimately, a leading response to growing complexity might be to abandon certain management techniques of the past. Through embracing the flow within complexity, it is possible to develop simple rules for greater performance, innovation, and—importantly—adaption and alignment with the defining structures of nature.

Implications

PART of the stress and deteriorating performance we are experiencing within companies stems from a desperate desire to hang on to the management techniques that served us so well in more stable times. The problem is that these management techniques are now contributing to the disruptions and instability. Rigid hierarchies, an over-reliance on efficiency, and homogenous management tiers all contribute to declining performance, rising topple rates,[32] and stagnation in economic recovery. These legacy management practices can also detract from building innovation and resilience directly into organizational structures.

Organizations should embrace the diversity and opportunity embedded in contradictions, reframing them to find the mutual value in seemingly opposed paths. In this way, the synthesis can be greater than the sum of its parts.

In a hyper-connected and globalized landscape, people and organizations are inevitably drawn into interdependent ecosystems that emerge as the connective tissue of collaboration, innovation, and performance. In such ecosystems classical models break down. Of course, we have always operated in complex environments, but the level of complexity has rapidly increased as a result of the increasing connectivity (volume, richness, and speed) created by digital technology infrastructures and a global trend toward economic liberalization.

Complexity gives rise to unexpected outcomes and exposure to more adjacencies and externalities. Impacts to the distant tendrils of a supply chain, for example, can have ramifications across an ecosystem, into many organizations, and down to the scale of individuals. Such a fast-moving and interdependent environment rewards nimbleness, agility, and the ability to quickly learn from friction to proactively define the future.

In a messy, complex world, it's not just possible to walk within paradoxes—it's necessary. We should resist the imperative of a linear world to settle and suppress paradox. Instead, we would do well to embrace it as a source of insight and learning as we seek to reconcile apparently contradictory elements. In complex ecosystems, the ability to act and quickly adapt to changing conditions is often more valuable than unwavering commitment. "The future is made every day by people, and the future is made every day by corporations and governments," says Intel's strategic futurist, Brian David Johnson. "You can't sit back and let the future happen to you. You have to have an opinion. If you give up your opinion, you've still made a decision that you're going to let the future happen to you."[33]

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Below the surface of current events, buried amid the latest headlines and competitive moves, executives are beginning to see the outlines of a new business landscape. Performance pressures are mounting. The old ways of doing things are generating diminishing returns. Companies are having harder time making money—and increasingly, their very survival is challenged. Executives must learn ways not only to do their jobs differently, but also to do them better. That, in part, requires understanding the broader changes to the operating environment:

- What is really driving intensifying competitive pressures?
- What long-term opportunities are available?
- What needs to be done today to change course?

Decoding the deep structure of this economic shift will allow executives to thrive in the face of intensifying competition and growing economic pressure. The good news is that the actions needed to address short-term economic conditions are also the best long-term measures to take advantage of the opportunities these challenges create.

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