



THE BIONIC COMPANY

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Bionic: having normal biological capability or performance enhanced by or as if by electronic or electromechanical devices (Merriam-Webster)

TECHNOLOGY HAS USHERED IN the age of the bionic company. Organizations that combine the capabilities of humans and machines will develop superior customer experiences and relationships, more productive operations, and dramatically increased rates of innovation.

Customers are demanding the relationships and innovation, while competitors are driving the push for productivity through automation. Companies across industries are embracing artificial intelligence (AI) and machine learning. The combination of these capabilities—along with low-cost data sensors, computing power, storage, mobile connectivity, and robotics—means that customer relationships and business processes will become radically augmented, if not fully automated, in the next few years.

The primary barrier to progress today is no longer technology itself. Rather, it is finding the right design for a company so that it can unleash the power of technology. Business leaders need to ask two questions: What does the bionic company look like? And what is the practical path for traditional companies to take when converting their organizations to the new model?

Not all of the answers are known, but the organizations, business models, and processes of so-called digital natives—such as Alibaba, Amazon, Google, Netflix, Salesforce, Tencent, and Tesla—offer a clear sense of direction. So, too, do older companies in the midst of bold transformations, including Inspire Brands, L'Oréal, Recruit, and Renault.

What the company of the future will look like is becoming clear. At the center is its purpose and strategy: the reasons it is in business and how it brings those reasons to life. Four enablers allow companies to operate as bionic organizations: two have to do with technology and data, while the oth-

er two address talent and organization. Three outcomes about how these companies do business are the result. (See the exhibit.) We explore all this below.

Purpose and Humanity

For all that machines will change us, humans will remain the essence of companies. In fact, the real power of a bionic company lies in further unleashing the power of human creativity. Machines are only enablers.

As companies move toward more bionic operations, purpose and strategy become more important than ever. They are the essential elements that inspire and align rapidly moving autonomous teams. Bionic companies will be very effective at establishing “an unbroken chain of why” that links business outcomes with the work that individual teams are charged with delivering.

As people shift from operating processes to designing them, companies need to pay huge attention to how they reskill their managers and employees and motivate

them during a time of such major disruption. Attracting talent will be, in part, a function of whether companies are able to deliver on purpose and strategy in such a way as to create high levels of employee engagement. We can also expect society—meaning customers and shareholders—to demand more than ever from business. The company of the future will want to meet their expectations because companies that play a positive role in society deliver superior shareholder returns.

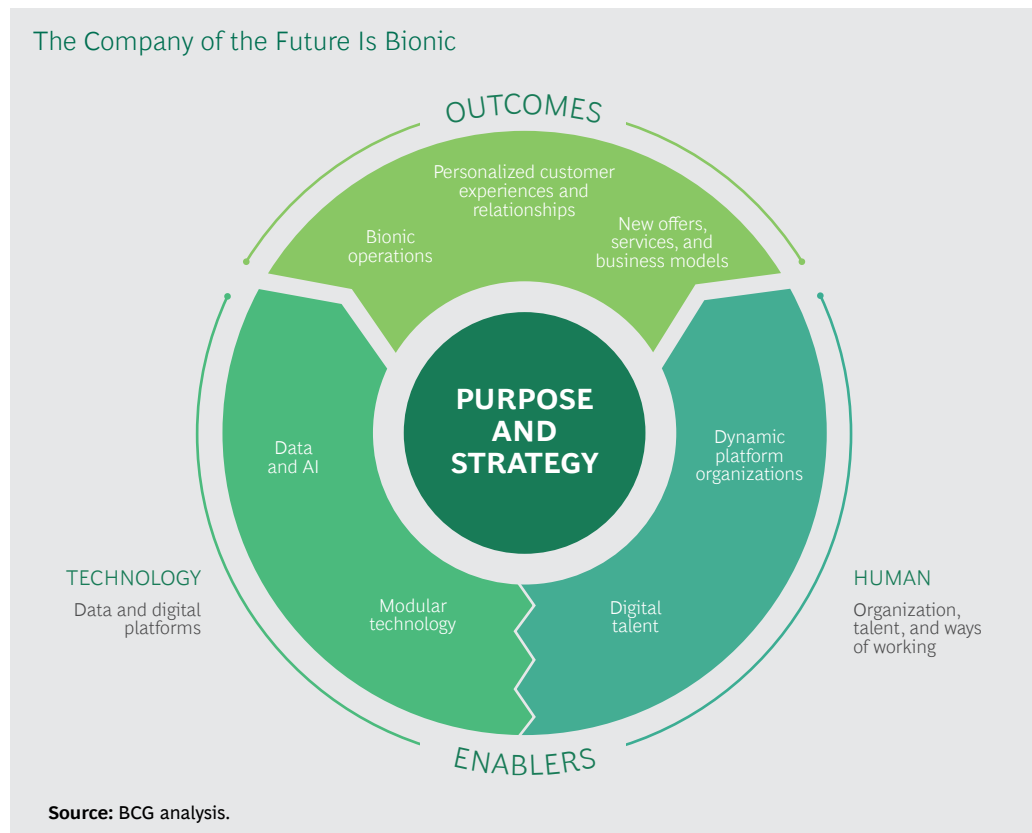
Outcomes

Three types of outcome will shape bionic companies.

PERSONALIZED CUSTOMER EXPERIENCES AND RELATIONSHIPS

Digital technologies are already profoundly changing how both B2B and B2C companies relate to their customers—and we’re just getting started.

To date, the most obvious changes have been in customer channels and experiences. Thanks to technologies such as the in-



ternet, e-commerce, and mobile devices—powered by increasingly personalized analytics—customers today expect companies to understand them and know their preferences. They look for seamless, 24-7, personalized service across physical and digital channels.

At the same time, search engines, recommendation features, and social media have transformed marketing from outreach to dialogue. A heretofore unknown level of transparency for customers requires that companies be authentic, deliver great products and services, and engage with customers on their preferred social media sites. The ones that do it best build loyalists who amplify the organizations' brand reputations.

Still, customer experience is in its adolescence, and the state of the art will continue to evolve. Increased connectivity and bandwidth, voice recognition, and augmented, virtual, and mixed reality will lead to further changes in preferred communication modes. We are also seeing customer experience blur across digital and human lines. Digitally supported in-store staff are providing customers with superior service and assisting them in the virtual world. Companies in China, for example, ask retail staff to engage local customers continually through social media—and have increased revenues by 10% to 30% as a result. Over time, the human and digital distinctions of channels will recede, becoming bionic.

The most important shift, though, goes deeper. Business models in many industries are undergoing a metamorphosis as companies move from a focus on product or service sales to a business model built on cultivating customer relationships—the ultimate manifestation of customer centrality. It was not possible a few years ago for a consumer goods company to know very much, beyond broad-based geographic and demographic facts, about the people who purchased its products. Nor was it feasible for a B2B company to know all of its small- and midsize-business customers. Today, a tire distributor can accurately predict the demand for tires in major cities block by

block, which allows the company to optimize its entire supply chain and never miss a sale.

With digital engagement and 24-7 connectivity, personalized “segment of one” relationships at scale are not only practical but imperative. Businesses that simply used to sell products are now building databases that house information about every customer who could possibly want their products. Companies engage customers in context—at the right time and in the best location. For example, the financial-services arm of an equipment manufacturer knows every piece of equipment coming off lease among its own customers and those of its competitors, and it is learning to predict which customers to target to convert to its brand. Companies are thinking about customers throughout each customer's lifetime—from attraction and engagement to providing maximum value to building long-term loyalty and advocacy. What's more, pursuing a relationship business model doesn't change only customer engagement. It also shifts such fundamentals as pricing, metrics (for instance, lifetime value and cost of acquisition), product strategy, and the profit model for the business.

Industries are at very different points on this journey. Some companies, such as those that provide software as a service, have substantially completed this shift. But many more, such as consumer and industrial-goods companies, and even businesses in finance and telecommunications, have a long way to go.

BIONIC OPERATIONS

The vast majority of business processes today are operated by human beings. In the not-very-distant future, almost all business processes and operations will be heavily augmented, or even operated, by machines, many of which will be running AI algorithms.

Machines can do much of what humans do, although they are best suited to singular tasks rather than multifunction jobs, and they can often perform faster and

more efficiently. Machines can sense (with cheap data sensors), remember (with cloud servers and data lakes), make decisions (with AI and advanced analytics, as well as mobile connectivity), and take action (using robots and autonomous vehicles). More and more of these functions can be accomplished at reasonable cost; and when machine- and AI-automated or augmented processes are well developed, they have lower marginal costs and are robust.

Most important, machines learn steadily. Once machine-assisted performance passes human capability, these processes climb learning and experience curves, giving the organizations that adopt machine-augmented operations first-mover and powerful, long-term competitive advantages. (There is a tradeoff: because machines do not adjust well to unforeseen or changing circumstances, companies need to decide where and how they can best be applied.)

We are already seeing this evolution play out in simple processes (back-office robotic process automation, for example) as well as in higher-value, more complex processes. The latter include both internal operations—such as sales force optimization, production forecasting, maintenance optimization, and manufacturing automation—and customer engagement, such as e-commerce offer selection and dynamic pricing and promotions.

As machines and AI take over more of any given company's operations, the role of humans inevitably will change. Many new jobs will be created for people to design augmented and automated processes and improve them over time. Indeed, over the medium to longer term, we expect to see a fundamental shift in the nature of work—from processes operated by humans to processes designed and audited by humans. Capturing value from this shift will require a massive redesigning of legacy business processes to enable humans and machines to work together. This is where many traditional businesses struggle, while digital natives can design for this sort of collaboration from the get-go.

It is critical to understand that building and managing bionic processes requires a fundamentally new way of working. These processes are most rapidly created and built by multidisciplinary teams that are tasked with a goal or an outcome and are empowered to find the best way to achieve it. These teams have a product owner and a clear mission, and they work with an agile methodology. As we will see later, the economics and ways of working used by these teams and processes will cascade throughout the full organizational structure.

NEW OFFERS, SERVICES, AND BUSINESS MODELS

Continuous innovation will be a hallmark of the company of the future. The combination of data, technology (including AI), and talent will enable bionic companies to develop and bring to market an ongoing stream of new products and services, many of which will also involve new models for business and customer interaction. Consider recent history. Over a few decades, Amazon evolved from an online book retailer to an online marketplace to a cloud computing leader to a home entertainment force to a feared disruptor in health care and a major investor in industries as disparate as automotive and food delivery.

But perhaps no company illustrates the potential for growth and expansion through innovative new offerings better than Alibaba, which in 20 years has launched the Taobao online marketplace, Tmall, Alibaba Cloud, AliExpress (online retail aimed at international buyers), the Cainiao logistics network, Ant Financial Services Group, and Credit Sesame (a credit scoring agency).

Over the next decade or two, we expect many more companies to transform their new offerings capabilities, from:

- Centrally driven R&D functions to hundreds of innovative, empowered product-building teams
- Top-down direction of ideas to a directed portfolio of rapid experimentation, where senior executives can see and rapidly scale winning propositions

- Deliberate, paced sequencing of new offerings to a more rapid pace of change

The most successful companies will not shy away from going outside of their traditional core markets or product offerings. They will leverage their corporate assets—including customer access, distribution channels, brand, and capital—to arm their new ventures with formidable advantages.

Technology Enablers

Technology used by the company of the future will look very different from today's in two critical ways.

DATA AND AI

The blood of bionic companies is data: it brings machines and AI to life. As companies move from a system in which decisions are made by humans to one in which decisions are made jointly by humans and AI, they will have to build up their ability to collect, manage, and use data from multiple sources as an input and feedstock for their advanced analytics. This means being able to:

- Create data on almost every aspect of customer experiences and operations
- Construct data lakes, which hold data from all sources in a ready-to-use condition
- Embed data science skills and technology throughout the organization
- Track outcomes in order to train algorithms
- Build ongoing learning and innovation into machine-AI operations

Critically, companies will need to identify the use cases for which data can create the most value. There's no shortage of potential examples: they include predictive maintenance or machine control in manufacturing; advanced production flows or inventory management or transportation in supply chains; and next-best-offer, pricing, promotions, and marketing messages in

commercial functions. Success starts with picking the top use cases, accessing the data, leveraging AI and advanced analytics, adapting the organization and process, turning insight into business actions, tracking outcomes, and creating learning loops.

For the bionic company, two huge competitive benefits can result. First, those creating or accessing unique data will gain an advantage, at least in the near term. Digital natives are working tirelessly to create such advantages today—while many traditional companies haven't really started. But the companies that master the art of embedding advanced analytics into their most important processes and decisions will gain a second, even greater, advantage.

MODULAR TECHNOLOGY

Bionic companies must make two related shifts with regard to their technology. The first is from a mix of legacy technology systems across business units to a company-wide, common, next-generation technology stack. The second is from technology systems as a way to execute basic processes to fully modular, horizontally layered technology platforms (such as those used by digital natives) that enable rapid innovation and the customization of key processes and experiences.¹ Many will go through an interim step as well: transforming their core systems by gradually moving to digital-native, modular technology—including, for example, microservices, containers, cloud-based infrastructure, data and platform services, and APIs—to make data accessible and able to support key use cases. In this phase, companies will also deploy agile and DevOps at scale, if they haven't already.

Fully digital companies—such as Amazon, Salesforce, and Uber—have common, fully decoupled, next-generation technology platforms that allow access to standardized operating processes across their businesses. They also tend to include capabilities such as deep data, sophisticated analytics reporting, workflow management, and easy linkage to internal and external consumers of such processes and resources. These modular technology platforms are easily leveraged to create deliverables and out-

puts for both internal and external processes and experiences. As a result, innovation is fast. For example, HR teams at Salesforce were able to put out an onboarding app for new employees (which tracks when they are coming, who will greet them, where they will meet, the order for their computer, and so forth) in just a couple of weeks.

The challenge and cost of transforming the technology stack and function shouldn't be underestimated. Organizations will find that they can make greater, faster progress by moving away from a systematic, wholesale rejuvenation and toward a more flexible data- and transaction-driven approach, leveraging the advantages of full next-generation technology stacks from day one. This approach can create value quickly and early on, eventually developing an architecture that can support the desired rapid adaptation.

Human Enablers

As bionic companies organize around autonomous teams and learn to work in new agile ways, talent and organization will be more important than ever.

DIGITAL TALENT

Much of the discussion to date around bionic companies has centered on prospective job losses as machines take on more processes and operations. The transition will be disruptive, no doubt about that. But for managers, the first question—before tackling any transition—is, what kind of talent will their companies need in the future? Our view is that human talent will be more important than ever. As human capacity is deployed more for designing, auditing, and innovating processes (as opposed to operating them), the need for people with design and technical skills, already acute, will soar. Employees who are flexible, adaptable, and able to learn will also be at a premium.

Good product managers and designers of user experiences and interfaces (think customer journey mappers) will become table stakes requirements as the configuration of digital processes and products gains in im-

portance. All companies will need people who focus first on the frictions and pain points of customers and then work with technology engineers to find technical solutions to resolve the problems. Data scientists and engineers will be equally critical to deliver new data features and outcomes. Companies will see substantial talent shifts in key functions where new technologies are already having a big impact on necessary skill sets. Marketing, for example, is rapidly becoming a dramatically more analytical function, and traditional creative and brand-building skills, while still important, are now only one part of the mix.

Since many employees today do not have the required skills for a bionic future, the challenges of transition will be dramatic. Companies will need to employ multiple levers. The most important will be retraining current staff: a number of companies in traditional industries have already shown how retraining can be more effective than replacement. The main alternative will be letting current employees or contractors go and then rehiring or accessing capabilities from other sources for new needs.

DYNAMIC PLATFORM ORGANIZATIONS

Some of the most profound changes for bionic companies will involve organizational structure, new ways of working, and leadership.

Organizational Structure. Companies today are often designed around well-defined business units and practices: individual market profit and loss statements or manufacturing and operating facilities, for example. And despite the presence of central functions and centers of excellence, most processes are managed by business unit heads, national or regional executives, and plant managers.

As a result, processes are customized by the organizational unit and its top management, and differences often outnumber commonalities. This structure has worked well for decades as companies put smart people close to the business mission and let them run those business units effectively.

In a bionic company, digital-human processes will, by necessity, have many more standardized elements. There are a few core economic drivers. First, AI needs mass data to train algorithms, and software needs standardized data to be broadly effective. Second, talent scarcity means that companies can't build dedicated technical capabilities in every market and business unit. And while costs have dropped, technology needs to be sufficiently standardized and modular for investments to be efficient. Put another way, you typically can't train a pricing algorithm using the sales data from a single sales unit alone. Nor does it make sense to invest in different systems that do the same thing in each unit of a company.

Because bionic processes require greater standardization and new ways of working, a platform organization structure will emerge. Our experience shows that companies can typically identify 30 to 50 major units of work or bionic processes. These can be customer-facing processes, frontline support, operations, or back-office processes.

Bionic processes will no longer be owned, either fully or partially, by business units. Rather, they will be built and managed by agile teams that have business missions and service commitments. Taken together, they form platforms that support the frontline and operations teams as well as customers. Done right, the go-to-market and operations teams are freed from much of their internal focus; they can be even more intensely committed to their core missions of sales, marketing, service, or operations.

In a more modular economy, bionic organization structures even extend beyond traditional employment walls. Companies will fill capability gaps by tapping into ecosystems (think Salesforce's customer relationship management or Amazon Web Services). More people will work atop a platform without joining the sponsoring company (as Uber and Lyft drivers do).

New Ways of Working. Bionic companies also need to work in new ways. We call this

model *agile at scale*. The teams that design and manage bionic processes will leverage agile methodologies. To staff agile teams, the hiring and development of people will be separated from the teams in charge of actually doing the work. This is a dramatic change from the traditional model, in which leaders hire people for specific roles and then manage their teams' operations directly. And, not surprisingly, a new operating system of processes to deploy teams, plan expenditures, manage strategy, determine incentives, and oversee modes of collaboration will be required to harmonize these new structures and ways of working.

Leadership. There are big implications for leadership. Gone are the days of traditional hierarchies where leaders directed managers who then distributed the direction. In bionic companies, middle management shrinks, and three modes of leadership emerge. First, and most obvious, are those who lead by doing—taking on product owner roles in the agile teams. These leaders act as player coaches. Second, the chapters (of capabilities) have leaders who are accountable for bringing in and developing the best talent—creating communities.

Finally, senior executives must adapt to a Silicon Valley leadership style—setting company goals, translating those goals into work to be done, deploying teams with the right capabilities, aligning the organization, and removing roadblocks. These leaders are much less involved in daily decisions. Rather, they step back to allow speed. They steer the organization by setting goals, adding resources for teams that are succeeding, and redeploying resources when teams finish work or initiatives fail.

TECHNOLOGY IS NO longer an impediment to huge leaps in customer engagement, growth, efficiency, and value creation. Rather, most companies face barriers in their legacy operating models, including human processes, old-school organizational models, fragmented systems, insufficient data and inability to access it, and lack of design and digital talent.

The transformation to a bionic operating model will be a massive challenge for most. CEOs need to start with a vision of the future as they design a new way of operating. We hope that this article provides a blueprint and key design principles for that vision.

The second critical issue CEOs face is how to undertake such a transformation. In our experience, the traditional companies that move the fastest do several things. They start by selecting a few big use cases at the heart of their businesses. Then, they pursue all of the capabilities and enablers described above to make a step change. They insist on three outcomes: real business val-

ue, increased customer benefit, and a truly changed organization. (L'Oréal took this approach in marketing; Tata Steel adopted it to digitize its supply chain.) When a company can fully see what a bionic organization looks like and what its benefits will be, then the road to broader scale becomes clear and necessary.

This article, originally published on May 31, 2019, has been updated to reflect the authors' ongoing work in this area.

NOTE

1. In some conglomerates or diversified companies, different systems will be needed for fundamentally different types of businesses.

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