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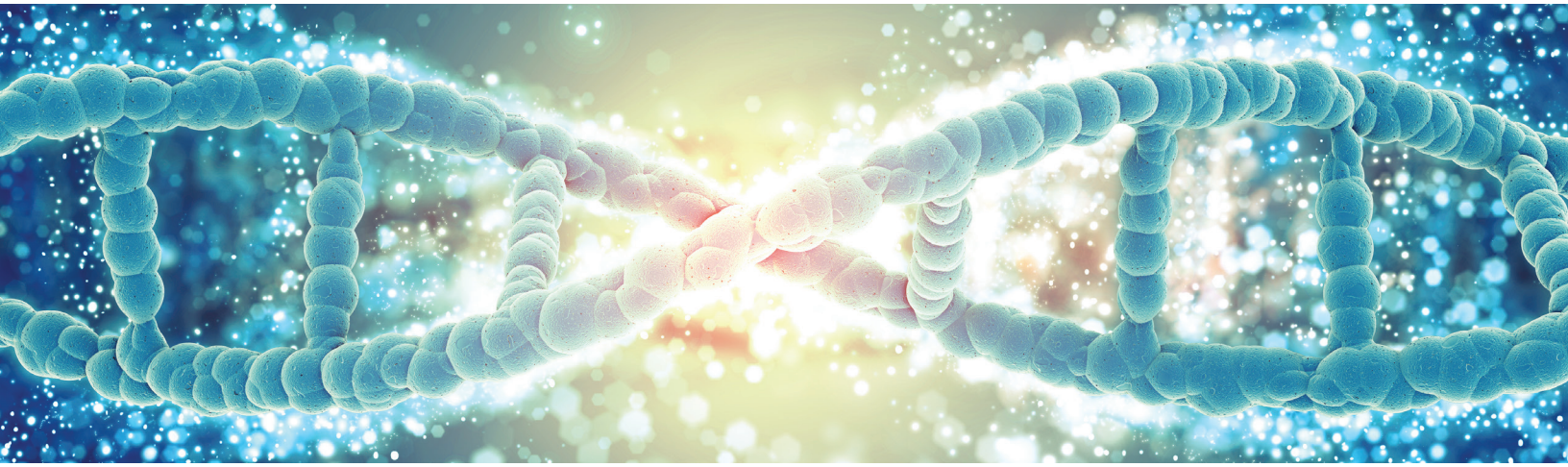

DIGITAL MCKINSEY

Healthcare giant shares prescription for digital reinvention

Stuart McGuigan, the CIO of Johnson & Johnson, describes how the life-sciences company has remade itself into a health-technology innovator.

Sastry Chilukuri and Steve Van Kuiken

Several years ago, leadership at the more than 125-year-old global healthcare company Johnson & Johnson decided to double down on the use of technology. Its legacy systems and ways of working were at odds with its desire to be a leader in the emerging digital health landscape—in which companies across the healthcare service chain have access to troves of patient and process data and are exploring ways to provide products and services faster. Stuart M. McGuigan, vice president and chief information officer at the company, has been leading the IT organization's transformation from "a back-office function to a true innovation engine." In this conversation with McKinsey's Sastry Chilukuri and Steve Van Kuiken, he describes how J&J is building a flexible but secure digital IT organization to support faster development of smart healthcare products and to improve customer and patient experiences with the company.

McKinsey: *What prompted Johnson & Johnson to consider transforming the IT organization?*

Stuart McGuigan: Within a few months of my arrival in 2012, it became clear to me we had a very cost-centered view of IT. We had this legacy IT architecture and application infrastructure, and we felt like we weren't going to be able to move as fast as we needed to move to keep up with the broader trends and rapidly emerging innovations happening in our industry.

While most of our consumer and life-science business was still being done in bricks and mortar, we knew it was going to become predominantly e-commerce at some point. It's also clear that healthcare is moving slowly but surely toward precision medicine, in which massive amounts

of data and analytics drive individualized treatment and outcomes. Through advanced tools like machine learning, we can understand which individualized therapies will be the most effective for improving quality of life, reducing follow-on healthcare costs, and preventing relapse and remission in specific segments of the population—all the way down to individualized care. All of this has to be powered by technology. I started my technical career in artificial intelligence and machine learning, so I find the applications of these technologies in healthcare to be very exciting, even if it is a couple of decades later.

McKinsey: *Many companies have taken their digital experiments outside the core, using lab or incubator models. Why did J&J decide to tackle the core IT organization?*

Stuart McGuigan: True digital transformation touches every part of the organization—from core IT all the way back into the supply chain. So, in our view, it has to be an integrated effort rather than a separate one. You're going to run into trouble at some point, for instance, if you're implementing user-centered development and design thinking on the front end, but you haven't digitized your business processes on the back end. We brought everyone together and said we're going to take an end-to-end view of digitization—from the way we consume electricity in the data center to the way we interact with customers. And we invited everyone in the company to look at what we were doing—at any point—to see what sort of progress we were making.

McKinsey: *How did you get buy-in for change on such a broad scale?*

Stuart McGuigan: It was a bit counterintuitive. I proposed a leapfrog strategy to our leadership team. Instead of repairing the technology we had on the floor—incrementally upgrading servers and storage—we would bypass all that and move our workflow to a hybrid cloud environment. Of course, in 2012 that was much more of a bold statement than it is now. The company needed to understand that moving to the cloud didn't mean losing control and just giving people credit cards and allowing them to buy capacity with cloud-service providers. It meant rethinking our overall computing model. It meant taking advantage of cloud technology and agile development to shift from long product-planning cycles and a capital-intensive IT infrastructure to a highly variable infrastructure and cost structure. The goal was to improve reliability and flexibility, so we could respond quickly to increases in supply and demand, and not burden the business units with a big capital balance sheet and long-term depreciation costs. In fact, one of the things that resonated with our financial leaders was the idea that if we needed capacity tomorrow, we could dial it up in the cloud today, and get it. And if we didn't need as much capacity the week after that, we could take it down and we wouldn't have any residual cost. Not having capital costs to deal with encourages innovation since the financial risk is essentially eliminated.

The other part of this flexible infrastructure was moving from large, multiyear waterfall projects that sometimes didn't deliver business value, to shorter projects with many iterations and agile development processes. We used an ongoing enterprise-resource-planning (ERP)-implementation project as a test case for agile development. We created integrated teams of business owners, testers, and regulatory-compliance folks. In fairly rapid sequence, these agile teams were able to roll out new ERP systems for Canada, Japan, Latin America, and the United States. And they have done these ERP implementations with zero business disruption, which is something I never thought I would see in my career. The results gave our business leaders confidence in our ability to transform our technology. Those pilots helped shift the conversation from, "How are we going to survive and thrive using this legacy IT environment?" to "What other technologies and approaches can we use to serve our customers better?"

Stuart M. McGuigan

Education
Holds a master's of science and a master's of philosophy in cognitive science from Yale University, as well as a bachelor's degree in psychology from Fairfield University

Career highlights
Johnson & Johnson
(2012–present)
Vice president and chief information officer

CVS Caremark
(2008–12)
Chief information officer and senior vice president

Liberty Mutual Group
(2004–08)
Senior vice president and chief information officer

Medco Health Solutions
(1993–2004)
Senior vice president for information services

Fast facts
Serves on Johnson & Johnson's Corporate Group Operating Committee

Previously was a member of the Science and Technology Advisory Council for the state of Rhode Island

Serves on the advisory board for Golden Gate University's new Masters in Business Analytics program

Senior business leaders from across the company saw more speed, less complexity, and lower costs—all very transparent measures of performance. In 2013, we made a good-enough case to receive funding over a three-year period to move 85 percent of our computing workloads to a hybrid cloud environment.[1] We've passed the 60th percentile now, with that project, so we're largely in the hybrid cloud, and that's allowed us to consider all kinds of new capabilities.

McKinsey: *You've mentioned cloud computing and agile development. What other technologies and approaches have been central to J&J's IT transformation?*

Stuart McGuigan: J&J comprises more than 200 separate operating companies, so one of our biggest requirements is accessing and managing information that cuts across different parts of the organization. There's a tremendous amount of clinical knowledge, customer insights, and know-how in a global healthcare company like ours.

For the past three years, we've been implementing data-lake and data-grid technologies that have helped us free critical information from legacy systems where it's been trapped, in some cases for years, and made it accessible across the globe. This is where we have really benefitted from the leapfrog approach to addressing our technology deficit: if we had just built up and replaced Unix servers instead of moving things to a hybrid cloud, we wouldn't have been able to take advantage of these newer tools and technologies. So, for instance, our consumer marketing and commercial organizations can now look at global product performance using one tool. They can search our data by geography, franchise, or product category, and make business decisions in real time. In the past couple years, we've made all of our clinical trial data available (completely de-identified) through Yale Medical School. Now researchers can use all the information that we had gathered over the years to understand how best to treat patients.

When we free up the data in the healthcare system, we take out a lot of cost and waste, and we increase our ability to positively impact patients and customers. In the future, there won't be a debate about what value a new product creates; it will be demonstrated by definitive evidence of its performance in the population.

McKinsey: *There is a certain amount of risk built into deploying new technologies and undertaking transformation. How have you managed it?*

Stuart McGuigan: I think one of the biggest fallacies of cloud and agile is that in your push for speed, you can apply less thought and rigor than with legacy models. The reality is you need to impose a greater level of discipline than you would have applied to a mainframe implementation 25 years ago. Our objective is that every cloud or agile project results in higher compliance, better security, and higher reliability. We can do this because of the levels of transparency and automation these approaches enable. We were one of the first companies to move a GxP-compliant instance of SAP to the hybrid cloud to support our pharmaceutical business in Asia–Pacific. Our on-premise cloud needed to work mechanically and financially the same as the public cloud. We needed to line up all the different layers of software, the technology providers, and the hosting companies to have it be truly cloud based. We over-managed the first implementations of cloud and agile. We made sure we had tested our fallback plans. You can never have zero risk, but we felt like this was as close as we could get. And if things weren't working for some reason, we were prepared to dial it back to the old infrastructure. Transparency can engender trust. Once you can demonstrate what's possible, you can draft a lot of support.

McKinsey: *How have you changed the way you manage your IT infrastructure?*

Stuart McGuigan: In the past we would extract the data from our source systems, we would spend a lot of time modeling the data to define, say, what's a customer, what's a product, and how are they related. We would then load the data warehouse with this information, and we were good to go. Now with cloud technology and in-memory grid technology, we're loading the data in its original state but transforming it on the fly for the specific purposes in which it's needed.

This is agile data, and we're using it in all kinds of interesting ways. One of my favorite examples is we've loaded engineering blueprints into a data lake for our orthopedic devices business, and some smart technologist on the project found open source OCR (optical character recognition) software and customized it to read blueprints. So now, without having to spend a tremendous amount of time restructuring data from the blueprints so they can be stored in a relational database, we load the blueprints themselves. They can now be searched in their raw form. Within the first two months of the launch of this program, our engineers identified existing products we'd built over the last ten years that could meet customers' emerging needs. So instead of designing, developing, tooling, and testing a new product, we can simply select an appropriate product from our repository, from thousands of SKUs. This discovery has more than paid for the development of the infrastructure.

We've also undertaken an enterprise project where we are loading all of our detailed transaction data in their raw form into an in-memory data grid. So rather than pulling data out of an ERP system, our employees can go to a purpose-built data repository, and get the information they need more quickly. With this virtual-data layer, we've really decoupled the speed with which we can support our businesses from the speed with which we can change out ERP systems. This is a perfect example of two-speed IT. We can put our core transaction systems on one life-cycle management time frame, but all of our business processes—for instance, order management, e-commerce, or billing—can be done using a platform designed from the get-go to handle massive amounts of data churn.

McKinsey: *How have you changed your approach to managing talent?*

Stuart McGuigan: I spent the first few months of my tenure at J&J analyzing the talent we had and any gaps we needed to fill across the major IT disciplines. I decided to enhance the strong team I inherited by bringing in a few new leaders from the outside, with a proven track record of transformation—our chief technology officer had been a stand-alone CIO before, and our head of application development was a process- and service-oriented senior executive. The bulk of the IT transformation has been executed by colleagues who have been here a while, who want to continue to be part of the mission to help millions of people live longer, happier, healthier lives. We believe that mission, combined with incredible management support for innovation and technology, will inevitably attract top technology talent.

Another aspect of our talent strategy is opening up to our ecosystem of technology partners and providers. We'll share with a pool of prequalified partners a problem that we can't solve—using a crowdsourcing model and dedicated online tools—and we often get the best and brightest answers in response. This approach has really accelerated our innovation, and it has opened us up to a world of talent, including millennials. It has helped us establish the reputation among technology companies that we are an innovative company and that J&J IT is a cool place to work.

McKinsey: *How are patients and providers interacting differently with J&J as a result of the transformation?*

Stuart McGuigan: It's interesting because what we hear more and more is that many leaders of hospital systems and large insurance companies are interested in working with us not just because we make knees, hips, sutures, and drugs. They are also interested in working with us because of our consumer-marketing expertise. They see that more and more of their success depends on how they connect with patients and help them through a journey of care.

So we're using our clinical knowledge—about things like orthopedic procedures, bariatrics, and mental health—along with our consumer-marketing expertise to create digital tools that help guide people on their healthcare journeys, and not just as patients but as people. If someone is beginning to experience knee pain, for instance, we can give them an online tool that will guide them in doing the things that could reduce their pain or improve their mobility. If the patient ultimately needs knee-replacement surgery, this tool will supplement providers' guidance on pre-surgical preparations and post-surgical recovery. The tool will allow them to connect with peers who've already had the same surgery, both intellectually and emotionally.

This model is scalable. We can use data lakes, analytics, machine learning, and other emerging technologies to understand what type of patient in what type of condition responds best to which messages and care protocols. We can compare treatment plans and outcomes, and we can measure treatment efficacy. More and more providers, hospital systems, and governments are looking closely at outcomes as part of their reimbursement formulas—which is why there is more pressure for them to understand the patient journey at a more detailed level. We think we're in a better position to help them because we've made these investments in technology.

McKinsey: *What advice do you have for others who are embarking on a digital IT transformation?*

Stuart McGuigan: I'd say don't hedge your bets at the beginning. Set out a clear, bold goal, and see how far you can push it. For example, instead of trying to determine how many applications we could reasonably move to the hybrid cloud, we started with a different question: "What would we have to do if we moved every application to the hybrid cloud?" We walked backward from there. We disqualified some applications, but unless we proved we couldn't do it, we assumed we could.

It was the same thing with agile: our assumption is that every project that can be agile will be agile this year, and we only walk back from that when it clearly doesn't make sense. In one of our businesses, we flipped that idea on its head. Instead of saying we'll do agile in those cases where we can identify a product owner, we said we won't do a project unless it has a product owner. Being bold out of the gate can help create more focus, better prioritization, and faster delivery. ■

[1] A cloud-computing environment that comprises a mix of on-premise, private cloud services and third-party, public cloud services with orchestration between the two platforms.

Sastry Chilukuri is a partner in McKinsey's New Jersey office, where **Steve Van Kuiken** is a senior partner.