

INFOSYS INSIGHTS

TRENDS. PERSPECTIVES. IDEAS.

Volume 2, 2016

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RENEW THE OLD. BUILD THE NEW.



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IT'S ALL JUST SERVICES

by *Dr. Vishal Sikka*

Nearly two decades ago, when I was doing my graduate studies in artificial intelligence (AI), one of my professors at Stanford, Nils Nilsson, used to say that whenever a technology became interesting, it disassociated itself from AI. We called the time “the winter of AI.” At that time, it was so precisely true. AI was on the outskirts; it was considered an extreme point of view.

Now AI is everywhere around us. It's at the heart of our discussions on innovation. Before we concerned ourselves with the fear of robots taking over the world. Today we talk about driverless cars; machines – everything from turbines to airplanes to trucks – that predict their own maintenance needs; and store shelves that trigger their own restocking.

We are now focused on using AI for broad societal good. As you may have heard, Infosys has partnered with Y Combinator, Elon Musk, Peter Thiel, Amazon Web Services, and many others, to launch OpenAI. This non-profit will conduct unfettered research in the most important and most relevant dimensions of AI, to create ideas and inventions that amplify our humanity. This will help us learn more, see/perceive and understand more, and be more.

Moreover, AI systems provide the backbone for thinking beyond software and platforms, a reconsideration of the very objects around us — how software and technology can amplify our uniquely human endeavors. We are only at the beginning. Homes, books, groceries, and more have become services,

but truly, if we think deeply about it, this great servicification can extend to anything. Objects materialize themselves temporarily, transitorily to us. They appear as just a snapshot of an ongoing activity.

For Infosys, this is truly exciting, as we can think about services in a way that brings an extreme focus on the end user, bringing intelligence to the end points, such as bringing consumers closer to the producers and blending our physical and digital worlds in a more complete way. Already, we're seeing businesses disrupted by the disintermediation of companies that separated an end user from a producer. Today's technology has created a true-value pricing system and an immediate feedback loop. And companies have responded by constructing an integrated experience within the digital and physical worlds. For example, anyone with a mobile device can make a reservation, hail a taxi to the restaurant, and pay the bill, all through their applications.

In addressing these forces, we put together a simple strategy of 'Renew-New'. We must non-disruptively renew existing landscapes while discovering new opportunities, update current systems while exploring what we previously couldn't imagine. Pravin goes into greater depth on this in the next article; rather, I want to focus on how we bring the strategy to life in 'Aikido' –our three complementary services, Ai, Ki, and Do.

Our open-source automation

platforms and platforms as services comprise 'Ai'. Here we harness the power of machine learning and AI. Through our Ai platforms, we have used automation on routine tasks and maintenance, to free resources. We have also optimized big data insights in real-time. For a mining company, we put our Infosys Information Platform on Amazon Web Services. Now it runs more than one million records and provides real-time reporting on the company's operations. And by using open source software and AWS, we significantly reduced the cost.

To enable non-disruptive IT landscape renewal, we are focusing on knowledge-based IT, and capturing the know-how and the spirit of an organization, which is the focus of 'Ki'. This is crucial in today's shifting landscape. By moving the know-how of a company from its people to its systems, we can make businesses impervious to change. Rather than a scramble with each shift, a company will be ready for the next 20 transitions, workforce retirements, and uncertainty in vendor landscapes.

Already, we engage in this kind of knowledge transfer. When we migrate servers, shift infrastructure to the cloud, move off mainframes, and optimize existing landscapes, we have to capture the knowledge inherent in the company. Now the Ki service allows us to embed this know-how explicitly into software with modern AI technology. From there, we can build new experiences and new consumption models, on top of the system.

We have already done this to great effect across industries — everything from manufacturing to IT. For example, with GE, we used our Panaya offering to reduce the time it took to develop IT solutions and see their benefits from 16 months to 4–6 months. By embedding the company's knowledge into software, we could reduce the most time-consuming aspects of the job, the required development, application design, and build out and testing, from 11 months to 60 days.

Finally, to find the way forward, we turn to 'Do' which relies on design thinking and a change in perspective. Arthur Koestler asked us to think in terms of blue and pink planes of context. While we typically live in a pink plane, with limited understanding, Arthur described 'blue plane' moments — when a scientist shouts "Eureka!" (Stefan Simenon discusses this later in the issue); when a comedian makes us laugh; or when an artist achieves catharsis. In each circumstance, these blue plane moments expose us to a context outside of our own. Through design thinking, we train our minds to make discoveries quickly — to find what is not there and to solve problems that we ordinarily wouldn't consider. Already, we have had more than 150 design thinking engagements. We helped employees at one IT company rapidly design, prototype, and enable user-centric solutions in rapid cycles. At an IT systems provider, we transformed the rollout experience of supply chain capability changes. And more.

We have put these three service offerings together with our deep culture of learning and training, and our 'Zero Distance' program — a reflection of our focus on driving innovation every day, in every project, for our clients. We have Zero Distance innovations in almost all of our projects, and in turn we project that our customers will save more than US\$1 billion dollars annually. Ravi will elucidate this later in his article.

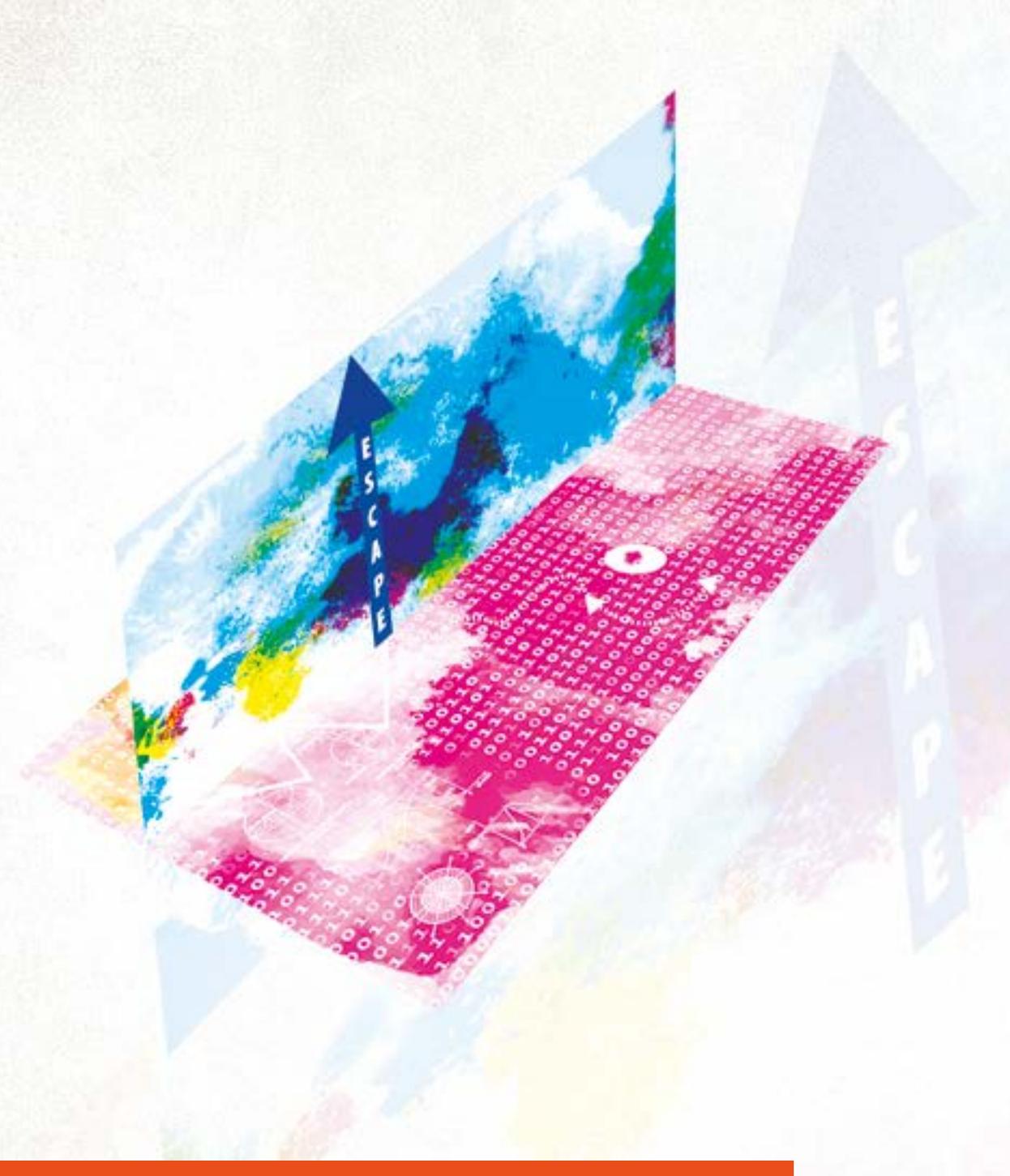
When viewed in totality, Aikido and Zero Distance ask for greater innovation, and then utilize that advanced technology, in AI, machine learning, the interconnectedness of things, and so much more, to unlock our humanity — our creativity, our ability to solve problems, and our capacity to reason with empathy.

I have every reason to be optimistic: humans have shown time and time again that we have a profound

capacity to take hold of powerfully shifting dynamics, to amplify our potential with the technology around us, and usher in a new era of unprecedented value creation. With this current wave of change, our only limit is our own imagination.

By opening ourselves up to the limitless possibilities that now surround us, we will master the forces that drive us, renew our existing landscapes while finding new possibilities, and forge a brilliant path into our futures. This is a new era of services, bringing the best of technology — artificial intelligence, automation, data-driven tools, and more — to bear.

Dr. Vishal Sikka



THE HEIGHTS ENTERPRISES CAN SCALE WITH 'RENEW-NEW'

Sir Arthur C. Clarke observed that, "Any sufficiently advanced technology is equivalent to magic." Technophilic overstatement? Perhaps. But as the articles in this issue evince, the pervasive hold of technology on present-day industry, commerce, and indeed on human life, is undeniable. So much so, that technology can provide a compelling competitive advantage to businesses that use it wisely. Enterprises have thrived or become obsolete based on their ability and agility to respond to shifts in technology.

There is an essential duality to enterprises evolving in and along with technology. The first is in relation to making changes to the existing construct of systems, processes, and infrastructures, to make them do a lot more and a lot better than they did before. The second is related to embracing absolutely new constructs to do things that the enterprise has never done before. In other words, looking back to review what can be improved, then making these improvements, while simultaneously looking ahead to bring new solutions to emerging challenges. This is more than just another strategic move; it's a life mission – Mission Renew-New.

Renewing for transformational impact

Under mission renew, the enabling role of technology is elevated way above incremental improvement. The idea is to use clever innovation to create huge performance improvements in existing systems and processes that make a transformational impact on the enterprise. This is not a step-change, rather, a whole quantum leap. A notable example of this comes from a global pharmaceutical giant which renewed its distribution management system, not for some minor gain in supply chain efficiency, but to actually mitigate the threat of counterfeit medication and its tragic effects. A global serialization track-and-trace system built on their enterprise cloud provides visibility into products, supports distribution management, and ensures compliance with product security requirements. The app enables distribution partners to check the validity of medicines using an Android or iOS smartphone. In addition, the company leverages insights from big data to help identify spurious drugs.

Pink Plane - Blue Plane

Enterprises today are constantly dealing with challenges and opportunities spawned by the digital revolution. We, at Infosys, believe that succeeding in this new world order calls for a dual mission of Renew-New. Renew existing technologies, systems, processes, and mindsets – represented by the pink plane of human thought, referred to by author Arthur Koestler – so enterprises are ready to embrace a future on which they do not have a firm grip. Simultaneously, uncover completely new areas of technology, business, and thinking – represented by the blue plane of human thought. Renew-New must always go hand in hand.

Or consider how a Japanese automobile leader digitally transformed dealer communication by replacing its legacy dealer system with a portal that streamlined business processes to increase productivity by a whopping near 40 percent. The multi-browser, multi-currency, multilingual platform is accessed by more than 1,200 dealers and processes over 400,000 transactions every day. Secure connectivity and 24x7 access help dealers maximize sales and improve customer satisfaction. The scale of renewal is so big that it will deliver 70 percent ROI over the next five years.

Making new beginnings for new ends

Mission new, on the other hand, is a quest for new solutions to new problems, a veritable journey of reimagination. It is a call to the enterprise to immerse itself into new technologies, business models, and paradigms to discover or give rise to unprecedented sources of value. It is what a multinational office automation company did by employing a machine learning model to predict propensity-to-buy across customer segments and sales territories in the United States. The model costs significantly less than conventional statistical analysis tools and processes more than two million records in six seconds with

more than 80 percent accuracy. Visualization of output data helps sales teams prioritize action and improve service attachment rates through effective cross-sell services.

Another standout example of mission new implementation comes from the world of insurance. One of the largest personal lines property and casualty insurers in the U.S. shook off the industry's tech-laggard tag with a decisive move into advanced analytics that is enabling it to create new risk / pricing models and new customer value from big data.

The company is trying to build a totally new data science organization that is not only culturally different from one steeped in traditional analytics, but also leverages all new paradigms of data to make better products and enterprise decisions. One goal is to combine computer science and statistics to move decision-making to the front office, where machine learning automates and assists trivial and critical decisions, respectively. Another is to develop a suite of new data products based on the Internet of Things (connected homes, autonomous cars, etc.) to mitigate risk by notifying customers of an impending event so they can take timely, preventive action, and to also measure and price risk at a highly granular level.

Destined for bigger goals

But what use is a mission without milestones? More importantly, is Renew-New one singular mission that necessarily fits all enterprises? These are some questions that enterprises yet to find their Renew-New journeys are bound to ask.

The relevance of this approach is that it is as broad as it is focused. Each enterprise can chart its own course depending on its current context and targeted 'moving' end-state – 'moving' because renewing the old

while doing the new needs to be a constant, unending pursuit of the enterprise. That said, the goals of every enterprise today are the same – to deliver experiences that will survive the acid test of next-generation expectations; to engineer solutions that were only found within the realms of imagination until technology could bring them into the realm of possibility; and to produce significant, unprecedented economic value for all those whose lives they touch. So really, experiences, engineering, and economics are the milestones, as much as they are the mission.

About the Author



Pravin Rao

Chief Operating Officer, Infosys

As the Chief Operating Officer, Pravin Rao is responsible for driving growth and differentiation across portfolios at Infosys. Additionally, he oversees global delivery, quality and productivity, the supply chain, and business enabler functions. He is also the Chairperson of Infosys BPO.

Pravin has over 28 years of experience. Since joining Infosys in 1986, he has held a number of senior leadership roles such as Head of Infrastructure Management Services, Delivery Head for Europe, and Head of Retail, Consumer Packaged Goods, Logistics, and Life Sciences. Pravin holds a degree in electrical engineering from Bangalore University, India.

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CONSULTING IN THE TIME OF DIGITAL TRANSFORMATION



“If you don’t know where you’re going, any road will get you there.” - paraphrased from Alice in Wonderland.

Unlikely as it seems, this piece of Carrollian wisdom continues to guide much of enterprise IT strategy even today. By adopting new technology in bits and pieces ad hoc, or based on instinct, enterprises have created a highly complex landscape over the years. This landscape comprises intricate systems and applications, which pose several challenges related to scalability, agility, and risk, to name just a few. As organizations battle these legacy challenges on the one hand, while dealing with a number of externalities such as disruptive competition, technology evolution, and regulatory strictures, on the other, they need to take a comprehensive, long-term view of their businesses. At the same time, they must take stock of technologies that can enable a future vision. In short, they would need to create a master technology blueprint that would enable them to transform into successful organizations in a world that is being irrevocably digitized.

At Infosys, we are leveraging our extensive consulting knowledge, IP, and delivery experience to help a number of clients around the globe to create and realize their master technology blueprint – a transformational roadmap. This is an ongoing journey in which enterprises revisit and **renew** their existing technology landscapes and capabilities while exploring entirely **new** ones.

Since the renew and new imperatives are primarily directed by external realities, enterprises should start their journey introspecting on the biggest environmental factors driving their business. They should then use that insight to prioritize what to renew in their existing construct of business processes and supporting technologies, as well as how to acquire (or design, define, and execute) a new construct of capabilities.

As organizations battle these legacy challenges on the one hand, while dealing with a number of externalities such as disruptive competition, technology evolution, regulatory strictures, on the other, they need to take a comprehensive, long-term view of their businesses. At the same time, they must take stock of technologies that can enable a future vision.

This is necessarily a dual pursuit – when a business acquires a new capability, it has to connect it back into the existing landscape to reap the benefits at full scale; most times, this calls for renewing the systems that the capability is being connected to. At other times, a new capability, such as Design Thinking, enables an organization to devise an alternative solution to a ‘standard’ renewal problem or extract higher value from existing strategies.

As we delve deeper into these issues, the mutual reinforcement of the renewed and exploring the new will become self-evident.

A knowledge-based approach to renewal

The technology landscape at most enterprises consists of a core ERP solution, numerous applications, and underlying infrastructure powering it all. It is complex and expensive, to say the least. Hence, one very obvious goal of renewal is to simplify the landscape to make it both cost-efficient and tractable. But while efficiency is important, most enterprises would desire a lot more from a renewal initiative. For instance, they would expect their systems to become flexible and responsive enough to integrate new capabilities, once these are developed, into the ecosystem in a short time.

We believe that every renewal must essentially fulfill one or more of the following three needs:

Automate knowledge – simplify: Using knowledge-based engineering, organizations can tap into the vast knowledge resources trapped inside system silos, and thereby avoid duplicating applications and capabilities across the enterprise. To illustrate, consider a redefined Aerospace Integration Testing approach that we took for one of our clients. We replaced the traditional method based on predictive analytics with a hybrid approach combining structural dynamics and an aerodynamics data-modeler with artificial neural networks. This meant that ‘unbalance’ forces in an aircraft could now be predicted using historical flight data rather than

iterative flight tests. This reduced flight testing time and related costs by 50 percent.

Automate support – reduce cost-to-run:

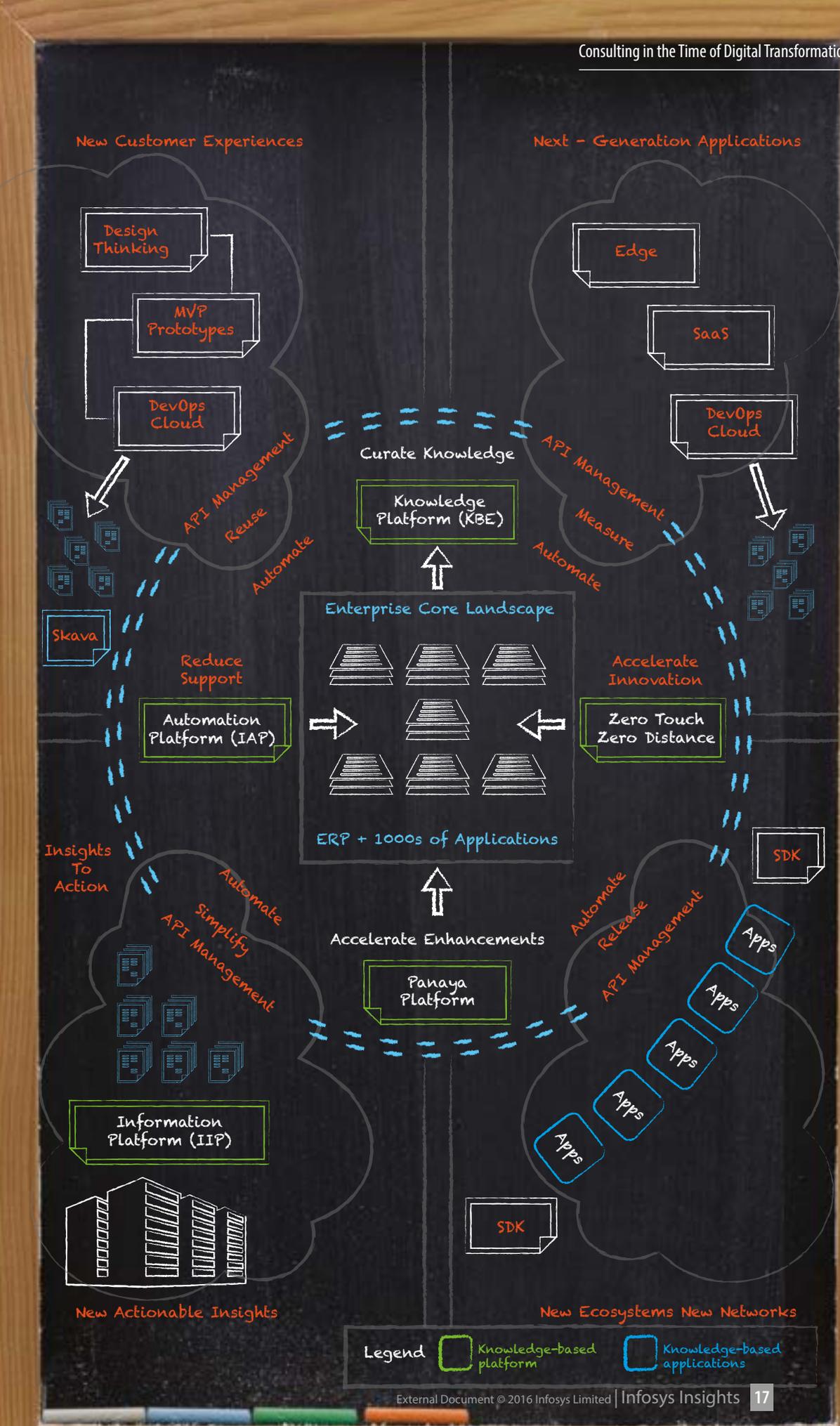
Enterprises can fulfill this requirement by using a support automation platform that leverages AI and automation technologies. At Infosys, we have developed an intelligent automation platform that incorporates sensing (Human-Machine interaction, M2M interaction), decision-making (reasoning and prediction, know-how, and learning), and task execution (orchestration and services). Recently, this platform helped a telecommunications company save US\$1.3 million while resolving issues 48 percent faster. Similarly, for an agribusiness, this platform enabled 25 percent faster resolution of tickets.

Automate re-engineering – reduce time-to-upgrade: Enterprises have to periodically release new capabilities into the market and update bespoke applications. They can leverage automation solutions to speed up these releases. Infosys continues to invest in such automation solutions and we recently acquired Panaya, a leading provider of automation technology for large-scale enterprise software management.

Renewal, as mentioned at the outset, is also deeply linked with the successful adoption of new capabilities. Hence, along with extracting knowledge, reducing support, and accelerating releases, facilitating the development, creation, and interfacing of new capabilities with the existing technology landscape is integral to the renewal agenda.

This is achieved by ‘fire-laning’ or isolating the complex core to prevent it from impinging on the enterprise’s new capability requirements of speed and agility. Using APIs, it is possible to create a variety of services that can drill into core systems to expose their capabilities or use data, algorithms, and workflows within, without touching current systems or infrastructure. For instance, a retailer can elevate the shopping experience on its ecommerce site by simply modifying the experience layer without tinkering

One very obvious goal of renewal is to simplify the landscape to make it both cost-efficient and tractable.



with the underlying system. Another way of building new functionalities is to create bespoke applications, again using new capabilities such as DevOps and automation. We used some of these techniques to create and manage an information platform to analyze customer data of the order of 30 million records per day, for a leading loyalty management company. Yet another way is to integrate with a third-party application based in the cloud. Once again, the Renew-New duality comes into play, as enterprises will be compelled to increase the flexibility and agility of current infrastructure to ensure it can interface with an increasing number of new applications that will originate and operate on the cloud.

A design-thinking approach to the new

Our new capabilities framework starts by taking a step into the unknown – an unknown realm in which problems and opportunities, as well as the solutions and capabilities to deal with them, are not known. Using the Design Thinking principles taught in our workshops, client organizations can discover these important, but yet-to-be-articulated problems, as well as the best ways to resolve them. For instance, we helped a leading European home automation company apply Design Thinking to change an ‘engineering’ product design mindset to one of customer empathy. As a result, they unearthed their customers’ true pain points and based on these, designed and tested a prototype solution that will soon hit commercial production. Through Design Thinking principles, we helped a consumer packaged goods company understand the pain points of different user personas and design its eProcurement platform with the active involvement of its users — requesters and suppliers.

Following problem discovery, enterprises take the next step of defining design challenges using Design Thinking principles, before moving on to the final step of creating a pilot and establishing proof of concept (POC). Sometimes, they may not have all the

requisite capabilities to build a functioning POC. In such a case, they can easily transcend their limitations by reaching out to alliance partners, third-party vendors, or even innovative startups to put it all together.

When a prototype approaches production-readiness, it needs to be integrated back with core systems and processes, or the production-grade environment in the enterprise. In this way, a cycle that began with the articulation of a new idea again ends with a renewal of the enterprise’s current landscape. And then it’s time to embark on another cycle of renewal, another new initiative. When it comes to Renew and New, the journey is indeed the destination.

Aikidō – Next-gen services that converge design thinking, platforms, and knowledge-based IT

Aikidō is an East Asian martial art that signifies the way of unifying life energy. And at Infosys, our Ai (Platforms), Ki (Knowledge-based IT) and Do (Design Thinking) services help combine the knowledge and energy in an enterprise towards its strategic path and priorities.

- **Ai (The Combining)** refers to platforms and platforms-as-a-service to build intelligent solutions. *Ai* is about platforms that help harmonize and unify the disjointed initiatives in enterprises – and help build solutions to emerging business problems.
- **Ki (The Energy)**, the first of these services, is knowledge-based management and evolution of landscapes. It captures the knowledge within an organization – in its people, structures, and systems over long periods of time. *Ki* is a large - scale, modular service to help renew enterprise landscapes.
- **Do (The Path)** refers to the service offering on Design Thinking and design-led initiatives that will provide Infosys the framework for finding, understanding, and defining the problems that are most important to clients and their businesses

A culture of learning and building thought leadership

When a company has to go through a fundamental transformation – whether it is a big box retailer grappling with digital, an oil major dealing with the reality of a hyper-connected world, or a fairly digitally advanced bank now addressing inclusive banking and next-generation kinds of opportunities – it calls for a change in mindset and attitude, along with acquiring skills higher up the value chain. It is in this context that training, education, and a culture of innovation, trust, and empowerment become instrumental for success.

At Infosys, we are steeped in a culture of learning traditionally, and we are further enhancing it by implementing Design Thinking training across the board. We believe that the user-empathetic dT framework will change the way we investigate, innovate, and deliver solutions for our clients. Similarly,

idea generation initiatives, involving crowd-sourcing of innovative ideas among employees, are strengthening our innovation ecosystem.

Thought leadership is fundamental to our consulting practice. We continuously invest in building capabilities within the company. This is supported by our primary research as well as collaborations with academic institutions and think tanks. Our collaboration ecosystem includes institutes such as Stanford University, Purdue University, East China Normal University, and over 100 strategic partners globally.

With an arsenal of knowledge-driven renewal of technology, Design Thinking principles for problem and solution discovery, and perennial learning, we are aggressively working towards being proactive design partners to our clients, and not merely aggregators of past knowledge.

About the Author



Sanjay Purohit

Executive Vice President and Global Head, Infosys Consulting

Currently, as the Global Head of Infosys Consulting, Sanjay is responsible for developing the consulting business at Infosys with operations across 20 countries, serving Global 2000 corporations. Prior to this, as founder CEO and MD of EdgeVerve Systems, a wholly owned subsidiary of Infosys, Sanjay was responsible for defining and introducing innovative cloud-hosted business software applications for digital marketing, omnichannel commerce, customer service, distributive trade, procurement, and credit finance.

Sanjay has over 25 years of diverse experience in incubating new businesses, product innovation, developing new business models, defining business strategy, and leadership development with leading businesses globally. He is deeply engaged with CXOs of global corporations in identifying and realizing new sources of business value and accelerating innovation.

Sanjay has a degree in mechanical engineering from the National Institute of Technology, Srinagar, India.

If you wish to share your thoughts on this article or seek more information, write to us at Insights@infosys.com

A BOLD BUT CRUCIAL IT MOVE FOR THE CONNECTED AGE

Insights on a new Enterprise IT model from the CEO of Everest Group



A keystone is the wedge-shaped stone placed in the middle of an arch. The other elements in an arch depend on this architectural foundation as it connects the sides together and distributes the weight down the sides. Without the keystone, the arch would collapse.

We're now entering the marvelous future we currently refer to as the Connected Age. It will change everything about the way we communicate, accomplish tasks, and conduct business processes.

Imagine the following scenarios

You're the new Chief of Value Creation (CVC) at a company called Turning Analytics. The

company's solutions leverage in-house technology and predictive modeling capabilities to help businesses turn their innovative ideas to realities. You proposed a new line of business to your company where your solutions help clients rediscover innovative ideas they had in the past, but which did not work, because they were ahead of their time or because the enabling / supporting technologies were unavailable.

You just returned from a trip to a cancer center where you learned good news. Before cognitive computing technologies, your routine blood test that indicated melanoma, leukemia, or any one of the more than fifty kinds of lymphoma, would have caused

Other elements in an arch depend on this architectural foundation as it connects the sides together and distributes the weight down the sides. Without the keystone, the arch would collapse.

weeks of dreadful anxiety and expense as you underwent invasive biopsies and nuclear scanning tests. Although these procedures were necessary as they enabled the oncologist to identify the type of cancer, assess its stage of growth, and determine treatment possibilities, they would have resulted in absences and low performance on your new job. With cognitive computing, your oncologist was able to quickly narrow down your condition to one variety of lymphoma, assess the stage, and begin one of the new treatments through pills! No damaging side effects of chemotherapy, you escaped biopsies, scans, and weeks of anxiety, and in just three days, you had the diagnosis and treatment protocol.

As you deplane from your flight, a sensor device on your briefcase lights up and directs you to your luggage. As you walk towards your car, your smartwatch enables you to talk to your colleagues and alert them on your arrival time for a discussion with Infosys representatives on two aspects of your new line of business. As you leave the airport, you rely on your car's smart seatbelt to transfer data about your heartbeat, blood pressure, and temperature directly to your electronic medical record, so your doctor is alerted on any conditions he needs to address. When you arrive at the office, your assistant uses the smart shirt embedded with sensors that you are wearing, to detect your emotions. The shirt alerts you when your stress level or management style borders on behavior that could result in disgruntled employees.

Possibilities such as those in the above scenarios are conceivable due to digital transformation. As exciting as they are, they are also volatile and disruptive. With its new technologies and the 'things' in the Internet of Things, the Connected Age is an environment rich with opportunities for your business to create innovative, highly differentiating products and services. But it's a fast-changing world; so, regardless of the industry, business

success in this environment requires eliminating barriers, such as data trapped in silos and thus available only in fragments to decision-makers, lack of alignment and collaboration across the enterprise, and slow time-to-market.

To accomplish these success criteria, your company first needs to position the keystone that enables holding up the weight. Although it may not be evident, the fact is that without this keystone, your company actually cannot move from where it is today to its future vision in the Connected Age.

The keystone: A new IT model

Digital technologies supporting the Connected Age connect people, resources, data, knowledge, and ideas. These connections change us in two ways: the way we communicate with others, and the way we do 'work'. Everything – including interactions and decisions – becomes more immediate, more informed, more precise, and more anticipatory.

The keystone is to radically rethink and

reorganize your company's IT to an 'Enterprise IT-as-a-Service' model so that it achieves faster response times and is aligned with the value your service lines present to the business.

Borrowing from the Infosys 'Renew-New' strategy, embracing new ideas requires renewing your business capabilities. The digital revolution, Internet of Things, and connections everywhere force companies to act faster to achieve new value and share decision rights with a variety of business stakeholders. However, centralized enterprise IT is unable to meet these needs. This is because, from the ground up, the layers of centralized IT (data center infrastructure, application development, security) are designed to be as efficient, robust, and cost-effective as possible – which does not fit with speed and shared decisions.

Your company first needs to position the keystone. Without it, your company can't move towards the future – into the Connected Age.

Some organizations have attempted to address this dilemma with business stakeholders purchasing 'rogue' IT – individual point solutions that meet their separate needs. But this solution gives rise to the same problems that distributed computing did, years ago. These independent decisions and purchases end up creating 'islands' of automation that cannot be integrated or scaled later, and also expose the organization to compliance and security risks. Therefore, this solution is not sustainable.

Centralized enterprise IT can't create or seize opportunities in the Connected Age because its functional approach doesn't work. Neither can the bolt-on technology approach of stakeholders, that results in automation islands with siloed data. What will work is a new, reconceived IT service delivery.

How to reorganize into an 'Enterprise IT-as-a-Service' model

In essence, rather than IT being aligned functionally, you must align it as a series of service lines. Each service line needs to be designed; first, for the value it provides to the business and second, for speed. IT must be

anchored in, and measured on its relevance to business value, rather than efficiencies and cost-effectiveness per technology function. In addition, it must be architected in a way that significant components are moved to the cloud and DevOps capabilities are leveraged so that IT services are far more agile and available at a lower cycle time.

However, shifting centralized, functional enterprise IT to an as-a-service model is not a trivial task. First, it requires defining IT differently with the user-perspective metrics on business value that the service provides. Next, it requires taking a supply-chain view of IT, reorganizing each component along service lines rather than function lines.

Paradoxically, your organization will also achieve significant efficiency gains by reorganizing into an as-a-service model. This is because the centralized IT model based on functions necessitates paying for over-capacity in the data center, server, and middleware layers. When you reorganize IT along the as-a-service line, you will cut through those over-capacitation inefficiencies and deliver IT more efficiently and cost effectively.



The mosaic of devices and business models in the Connected Age change the way we communicate with clients / customers, employees, partners, and colleagues, allowing us to anticipate their need for action before the action is required. In the area of machines, for instance, communications from sensors enable replacing parts before they break down. No downtime!

Additionally, technology changes the ways in which we interact with others. The days of unwanted emails to customers are over, as are situations where we deluge them with information at the wrong time, thus contributing to noise. New technologies enable personalized interactions that are truly useful and delight customers. It changes our ability to target and reach new market segments and involve ourselves deeper in helping our customers succeed.

Digital technologies also change the nature of work. We can use cognitive computing (like IBM's Watson) and analytics as thinking companions to dramatically enhance our knowledge, make decisions faster, and be more effective at work.

Then there's robotics and service delivery automation that change the way we perform

back-office functions by speeding up cycle time, improving accuracy, and reducing costs. At Everest Group, we conducted research on how automation impacts tasks in the finance and accounting process. We found that on average, fairly simple automation tools can eliminate 40 percent of resources performing repetitive functions. In one particular case, automation eliminated almost 80 percent of resources. The same scenario and outcome apply to other business processes. Besides cost savings and user / customer satisfaction, automation eliminates mundane tasks that frustrate employees. Once freed from these repetitive tasks, they can be retrained to perform more fulfilling knowledge-based tasks.

Creating all of these advantages and many marvelous opportunities for your business requires rethinking and shifting to a new enterprise IT model. It is a radical departure to fundamentally align IT to an Enterprise IT-as-a-Service model, and it is not easy. But businesses that accomplish this shift have the keystone and the path to success with compelling technology that is far more responsive to business needs, compliant, scalable, and sustainable over time.



About the Author



Peter Bendor-Samuel

Chief Executive Officer, Everest Group

Peter Bendor-Samuel founded the Everest Group in 1991 with the vision to assist the then nascent outsourcing and global services industry to evolve more powerful and effective mechanisms to create and capture value. Over the past two decades, he has led the Everest Group to be on the frontier of the global services industry, ensuring that the firm is constantly at the intersection of how leading firms take advantage of disruptive technologies, innovative service vehicles, and game-changing talent models.

Under Peter's stewardship, the Everest Group has evolved into a firm with a reputation for delivering high-quality consulting and research through a culture of individual and firm excellence, combined with a collaborative and values-based culture. This excellence model allows the firm to consistently be recognized for generating innovative insights and solutions that define and shape the next generation of global services.

Peter is the author of the industry best-selling book, 'Turning Lead Into Gold: The Demystification of Outsourcing'. He is a regularly featured thought leader in international business media including the Wall Street Journal, New York Times, and Financial Times, and is a frequent keynote speaker at various industry events.

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FINDING THE PROBLEM: A STRATEGIC NEW ROLE FOR TECHNOLOGY PROVIDERS

Be at zero-distance from the new realities of the digital world



Every business is keen to make sense of the digital revolution. As power is increasingly shifting to end users with the intermediary layers fast dissolving, enterprises are striving to survive in a world that will look and feel very different from the one that we work and live in now. Think open source P2P money. Think Internet-based self-care systems, including preventive and personalized medicines. Think smart homes. Think connected cars. Think 3D printing democratizing the manufacture of practically everything. With its roots in software and computing, digitization is making technological expertise a core differentiator across industries.

And the role of the technology partner, in enabling enterprises to grow and innovate in this dynamic environment, is rapidly gaining importance.

In a global survey that we conducted to take stock of the expectations that enterprises have from their technology partners, more than 500 enterprises spoke in unison - they want technology and technology services to rise to the occasion, transcend the silos of projects and mere execution, to participate in a way that they impact the strategic core of the business and create transformational value. The survey revealed four big expectations from technology partners:

The role of the technology partner, in enabling enterprises to grow and innovate in this dynamic environment, is rapidly gaining importance.

1. Proactive and strategic advice during implementation on how transformational improvements can be made to existing processes, solutions, and systems. While simultaneously focusing creativity and imagination on finding new solutions to new kinds of business challenges.

2. Manage transformation and articulate the value it brings not merely in terms of IT metrics, but also shareholder returns, customer acquisition, service and engagement, revenue growth, regulatory compliance, risk management, and competitive differentiation.

3. Assume end-to-end ownership of large, complex, strategically important programs and drive consensus among key stakeholders. From technology-specific, business value articulation to buy-in from the top desk – it is all a part of the package that is expected to be delivered.

4. When serving the same client organization, across multiple projects, share knowledge, experiences, and practices. Otherwise, enterprises are deprived of the full benefit of accumulated wisdom and end up spending more time and effort than they would like to, bridging project silos.

The results of the survey are an affirmation of the position next-generation technology services companies have adopted now – to not merely implement solutions, but to also act as strategic partners to clients by aligning technology programs to serve the disruptive and incremental innovation needs of their businesses. For this to happen, there must be a shift in the nature of the conversation with customers – from obsessing over solution-building to focusing first on real problem finding.

To be at zero-distance from this reality, I recommend a five-point framework that must be applied across all engagements:

1. Look, learn, and improve: Best-practices and next-practices garnered from projects across industries can help scale innovation.

2. Make 'what' improvements: Ask what more, what other things you can do, within the engagement, to bring more value to the project.

3. Seek out 'how' improvements: Figure a better, more efficient way to do things – in an ongoing project.

4. Clearly articulate business value: Help the business see the value of each improvement and innovation quantitatively, and substantively, in business terms.

5. Disseminate knowledge: Share information about the improvements achieved so others may be guided by the experience. In doing so, we have to ensure that the information is decontextualized in strict adherence to nondisclosure contracts with clients.

This framework is enabling us to focus our energy, our imagination, our intelligence on truly creating, innovating and charting great futures for all of us. We achieve this by renewing, reinventing, and teaching and learning together

At Infosys, the rigorous implementation of this simple framework as a business imperative across the company, has enabled us to help our clients in managing and forecasting, and looking ahead and around the corners. It has enabled us to focus our energy, our imagination, our intelligence on truly creating, rather than spending more time and effort than they would like to, and charting a great future for all of us. We achieve this by renewing, reinventing, and teaching and learning together, doing more of the purposeful things that we can be proud of.

I am sharing four anecdotal accounts from some of our recent engagements where we applied the five-point framework. These illustrate how we are renewing existing landscapes to extract operational excellence and greater value, even as we work towards new ways of growing and serving our clients.

We looked. We learned. We improved.

Infosys partners with a technology company and global innovation leader known to be several strides ahead of the industry when it comes to consumer experience. As their technology provider, we share their vision of creating the utmost seamless experiences across their range of devices and consumer touchpoints.

Having architected an online presence and conceived an ecommerce portal for several global retail majors, we quickly spotted several opportunities this client's online store presented in opening up new selling options, and creating an even better purchase experience for their customers.

The first improvement was a one-click purchase feature, integrated in the home page to minimize page navigation needed

to complete a purchase. This let customers choose, evaluate, and shop quickly and efficiently without having to trawl through pages of marketing content and 'optional extras'. A collateral benefit would come by way of marginally lower planned hardware capacity during new product introductions, thanks to rationalization of store traffic. We also proposed an alert feature for customers when out-of-stock products became available. Our third recommendation was to provide a visual representation of an order tracking in the store's workflow so customers could check anytime to see what steps remained before the delivery reached their doorstep.

These improvements – inspired by simple, ubiquitous features from the retail online world – is greatly enhancing the store's user experience, especially during new product introductions, delighting customers, and generating additional revenue for the business.



We made it our business to make 'what' improvements

Two years ago, Infosys was contracted by a global networking major for end-to-end development and maintenance of their remarketing applications, routinely leveraged by their executives to manage the refurbished inventory. As the engagement progressed, several 'what-if' questions emerged for us.

▶ Data was scattered across BI reports and collating consolidated reports meant days of manual labor. What if we could provide insights on remarketing through a single window with a 360-degree view?

▶ What if these reports were interactive with features that supported data trending and mining?

▶ What if the data could provide foresight into potential opportunities, new markets, and products in demand as well?

We presented the client with a prototype for the Insights Generation Platform, that could help create greater value for them from our ongoing engagement in which we developed and managed applications related to the inventory, wholesale quotations, and backlog forecasting, among others. The insights platform would give the client the much needed visibility into remarketing business data – including sales by region, product, and manager – as well as key market and product trends.

The platform is estimated to potentially deliver several benefits to the client's remarketing business, including but not limited to, identification and clearance of supply chain bottlenecks, and better demand forecasting for refurbished products.

How we made 'how' improvements

When a leading fashion retailer in the United States decided to tackle the challenge of a shrinking customer base, they realized the need to transform their online channel – and enrich it with 'on-demand' features. Infosys was contracted to deliver on this mandate.

Even as we began executing the project, we realized the importance of testing and its automation for effective solution delivery. We applied ourselves to figuring out how we might innovate to improve and execute this

in the most efficient manner. Among the improvements proposed was a custom UI Automation Framework, that leveraged an open source tool for progressive testing automation (parallel to development) and to ensure reusability of test scripts. Business layer testing was introduced to validate application logic and other services that are a part of the application business layer. This testing was facilitated

in parallel to development, ensuring early defect detection (and bug fixing) in the middle layers, thereby facilitating faster time-to-market. Behavior Driven Tests were also conducted to act as points of continuous interaction and validation for testers with business users.

These efforts resulted in a 70 percent reduction in manual test efforts, with commensurate dollar savings. With automation coverage in the range of 92 percent, the detection and fixing of several defects were completed earlier than envisioned, positively impacting the online channel's go-live.

We clearly established, through a demonstration and statistical model that this could bring 25 percent savings in development costs and performance improvement for fully loaded pages and video streaming of 40 percent and 60 percent respectively.



We articulated business value in terms that mattered to them

A leading satellite and pay TV provider in the United States was looking to renew their online portal, to counter the threat of new-age competitors, and enhance viewers' entertainment experience by making it more personalized and consistent across touchpoints. As a partner in this transformation, Infosys assessed their existing website and found that its tightly coupled architecture was hampering scalability, while inflating development and maintenance costs by forcing the client to maintain separate websites for desktop and mobile users. The need to transform the existing technology stack was obvious.

Drawing upon prevailing trends and our experience from other implementations, it was apparent to us that we must advocate replacing the legacy packaged-based architecture with cutting-edge, open source (Angular, Node, Play / Scala) technology. This would straightaway lower total cost

of ownership. We also clearly noticed that migrating the entertainment stack to a responsive and adaptive architecture, which facilitated customization and development as well as API-enabled integration with multiple devices, would support unification of the entertainment experience across television, desktop, and mobile. Further, the adoption of a cloud-enabled, microsite-based architecture would bring scalability and maintenance benefits.

With the help of a proof of concept (PoC), we helped the client understand what this technology transformation might translate to in business terms. We clearly established, through a demonstration and statistical model that this could bring 25 percent savings in development costs and performance improvement for fully loaded pages, and video streaming of 40 percent and 60 percent respectively. This helped engage senior business stakeholders (and influenced buy-in) in what might have otherwise remained an esoteric technology conversation.



We are committed to sharing the learning

The shared knowledge of the improvements we have made, project after project provide a halo, a great context around our collective abilities. The context we find ourselves in is crucial to the tangible results we deliver and the value we are able to create. Change the context, and the same person with the same inherent capabilities, often delivers a changed result. The great context that continuous learning and reskilling can provide goes a long way in greatly amplifying our potential, widening our knowledge, and puts within our hands the power to create a better future for ourselves and our clients.

The ethos that's behind it all

The zero-distance framework has been instrumental in amplifying our potential,

widening our knowledge, expanding our creative freedom, and helping us use it all to create a better future for our clients. This, in turn, is derived from our culture of continuous learning and our adoption of the design thinking approach to problem-solving with its equal-parts focus on cultivating creative confidence, finding problems worth solving, and creating path-breaking solutions with empathy for end users.

I believe, this approach, just as it helped our clients, can help any enterprise not just navigate the digital revolution but also benefit from it by bringing strategic changes to existing systems – renewing them to perform faster, better, and cheaper, even as it creates ways to explore new horizons that are absolutely unprecedented in expanse, vision, and ambition.

About the Author



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Ravi leads the Infosys Global Delivery organization across industry segments, driving digital transformation, application development and maintenance; independent validation services, engineering services, business intelligence, cloud and infrastructure, and enterprise package applications service lines. He is also on the board of Infosys Public Services and McCamish Systems (an Infosys company).

Ravi has over 18 years of experience in the consulting space, incubating new practice lines, driving large transformational programs, and evangelizing new business models across industry segments. He has played diverse roles across organizations within the CRM space for Oracle Corporation, building a next-generation CRM practice at Cambridge Technology Partners. He has also worked on process and technology transformation for the unbundling of Indian State Electricity Boards at PricewaterhouseCoopers.

Ravi has a master's degree in business administration from Xavier Institute of Management, Bhubaneswar, India.

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A POSTCARD FROM THE BACK, MID, AND FRONT OFFICE OF BANKING

An ABN AMRO senior executive narrates the bank's journey



Since time immemorial, the changing profile of the banker has offered lessons to the banking industry. In 2000 BC, temples in Babylon served as safe vaults for savings of the kingdom's subjects. Today, technology companies are emerging as intermediaries of financial services. The evolution of ABN AMRO, one of the oldest banks in the Netherlands, mirrors the dynamics of the business landscape and needs of customers over 300 years.

Banking for the digital native

From barter of goods to digital cash, much water has flowed under the Amstel bridge. In the Netherlands, digital natives use the debit card to pay for everything. The widespread use of the debit card has found expression in language: 'google' the Internet for information and 'pin' to pay. More than 1,400 supermarkets in the Netherlands do not accept cash. When the Dutch shop, on local ecommerce

websites, the iDEAL platform takes shoppers from the web store to the bank's secure website where details are already entered. You select the product or service and confirm the transaction amount.

ABN AMRO understands that serving the millennial generation requires providing the convenience of shopping within two clicks. After all, a bank competes with an online retailer or a technology company for the customer's wallet share. We evaluate our processes continually and benchmark them against a graph of customer convenience that increases geometrically. Technology has been a catalyst in the omnichannel banking journey of ABN AMRO.

We offer customers a consistent banking experience across channels with underlying technology that simplifies and standardizes banking at every touchpoint. Our bank decoupled the technical architecture

In the Netherlands, digital natives use the debit card to pay for everything. The widespread use of the debit card has found expression in language: 'google' the Internet for information and 'pin' to pay. More than 1,400 supermarkets in the Netherlands do not accept cash.

and adopted a three-tier architecture to deliver superior customer service. The new architecture implementation contributed to a significant spike in user adoption and repeat usage of our online banking channel. Today, we embrace a 'mobile first' philosophy and use the mobile channel as the starting point to deliver new services. After the success of a mobile initiative, we roll out the service across other banking channels and streamline processes for a seamless customer experience.

Processes and technologies designed for the customer

ABN AMRO puts the customer at the front and center of our processes and technology. We believe that the simplification of banking technology enhances customer experience significantly. We adopt the 3x3 approach to standardize our back-end architecture: develop applications on three operating systems and deliver them on three versions of each OS. At any point of time, the number of versions of OS across the organization cannot exceed this number. Our guiding principles have helped us navigate regulatory

compliance, capitalization stress tests, and consolidation after mergers and acquisitions.

TOPS, our operations hub, is responsible for upgrading technology and refining processes so that we can sense and respond to the needs of the digital generation. Our hub harnesses information and communications technology, big data, cloud, and automation to deliver a seamless customer experience across online, branch, or ATM banking.

We adopt a personalization approach that recognizes the unique needs and aspirations of customers. Our bank's International Clients (IC) Desks offer services via phone, internet, or mobile banking. Our experts at the IC Desks offer personalized financial advice in more than 25 languages. Our consumer and commercial clients business unit caters to the consumer market, small and medium-sized enterprises, companies, and institutions in the private and public sector. We calibrate the degree of personal contact depending on the customer profile, and determine the distribution method based on the banking product or service to be delivered.

Incubating the next-generation bank

The Netherlands has a rich history of innovation in banking technology. Significantly, the government has been a change agent and helped introduce innovative banking tools and services. Girotel, a national giro-based payment system, was the Netherlands' formative Internet banking service from Rijkspostspaarbank. The credit facility guarantee for small- and medium-sized enterprises via the Nederlandse Middenstandsbank is another notable innovation under the auspices of the government.

Archimedes had his 'eureka' moment in a bathtub. The next big innovation in banking may well emerge from a watering hole!

ABN AMRO takes a leaf out of the innovator's handbook. In 2013, our bank established an Innovation Center to help our clients, partners, and employees share ideas, identify business partners, and co-create solutions. It is strategically located in the middle of our Amsterdam headquarters, so that employees walk through the Center to access another department. You can feel the buzz of emerging banking technologies at every turn. Our 'corporate garage' is exploring innovative business models from smart transactions to peer-to-peer finance. Our projects include reusability of raw materials, the exchange of goods in the 'sharing economy', and wearable technology in the context of banking.

Our Innovation Center organizes 'Start-up Friday', a monthly event where start-ups pitch

their business plan to bankers and companies. Ideas and conversation on a designated financial services theme flow over drinks on a relaxed Friday afternoon. Archimedes had his 'eureka' moment in a bathtub. The next big innovation in banking may well emerge from a watering hole.

ABN AMRO set up TSO Munt Sq., a collaborative workspace for start-ups in financial technology and other sectors. We are creating a habitat to cross-pollinate ideas in a milieu of diverse cultures and disciplines. The smart workplace opens doors for networking and co-creation. Promising start-ups can access the skills of pop-up bankers, innovation gurus, and domain experts. Our banking network helps start-ups seek advice on finance and meet a prospective client or investor.

Aligning stars in a constellation

Our bank works closely with IT partners to help us look at business challenges in a different light. Our partner ecosystem has charted a robust banking technology roadmap, a better coupling of business and IT, and enabled faster introduction of products and services. In June 2015, we invited our partners, including Infosys, for #HackITon. Six teams developed 21 concepts for ABN AMRO's role in the API economy in 31 hours flat. We learned crucial lessons from this hackathon:

#1: Compelling third-party services can be delivered while safeguarding customer privacy and data integrity.

#2: The velocity of decision-making and product development increases when business and IT professionals complement each other.

At ABN AMRO, we regard the regulator to be a partner in our ecosystem, not an invigilator, and regulatory compliance as a strategy to boost customer confidence, not an operational overhead. Our continual dialogue with regulators across financial markets ensures that regulation gets more focused to protect the interests of customers. We want to transcend regulation and convert it into an opportunity for operational excellence. For instance, when regulators set data reporting standards, we developed a simplified and standardized data structure



for easier maintenance and superior quality of data. While regulators seek deeper mining of customer data, we focus on the context and quality of data. Our bank contested the regulator's rationale of barring masked data on the public cloud. After ABN AMRO discussed the merits of storing masked customer data with the regulator in specific user scenarios, the data privacy regulation was relaxed.

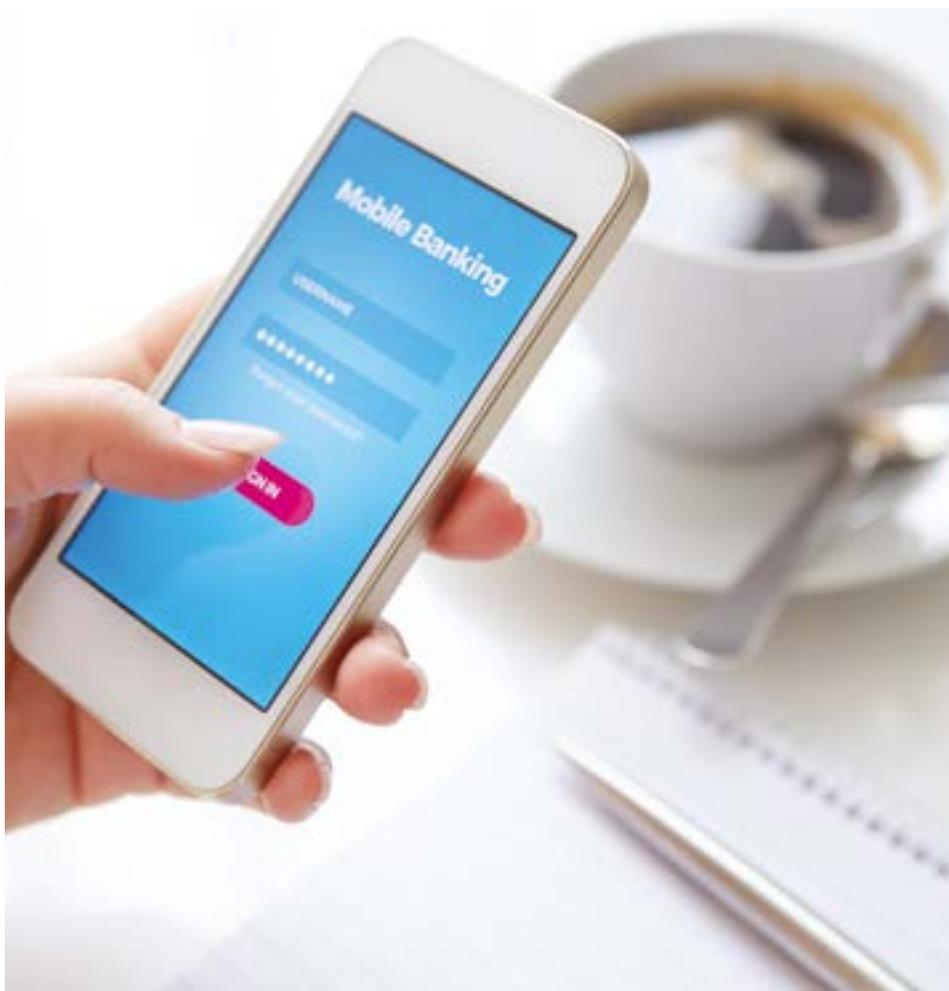
Our bank believes that regulators, banks, and IT partners need to keep the channels of communication open to develop a dynamic regulatory framework, that is responsive to the needs of millennials while addressing market dynamics. ABN AMRO is a proud member of the Banking Industry Architectural Network (BIAN), a consortium of leading banks that strives to achieve standardization through service-oriented architecture in the financial services industry, and

interoperability among financial institutions. Infosys supports the banking consortium as an advisor to co-create open standards that will shape the future of banking services.

Banking on the future

The millennial customer seeks to bank at home, at the workplace, and on-the-go. The customer wants to open a bank account, and buy financial products and services in the shortest possible time, with minimal human intervention and paperwork. If the bank cannot deliver what the customer wants, alternatives are a tap, click, or phone call away.

A financial service enterprise will inspire trust and confidence only when it understands the aspirations of customers at each life stage, capitalizes on technology to transform the customer experience, and renews processes for enhanced convenience.



About the Author



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Stefan has been working at ABN AMRO for the past 18 years and currently heads Operational Vendor Control, CoE Tooling, and CoE Software Development. He has been involved in the sourcing area since 2005. His main responsibilities include ensuring that vendor sourcing strategy is followed and operationally managed in the right way; ensuring the right SDLC tools are implemented, upgraded, and maintained; ensuring that the right standards are in place and maintained for software quality and that high quality software is delivered into the production environment; and setting up and executing the Continuous Integration Continuous Delivery (CICD) program.

This article was written with inputs from Puneet Shukla, Associate Manager, Client Services, Infosys.

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REBOOTING THE OPERATING SYSTEM FOR DIGITAL FINANCIAL SERVICES



Conventional structures and business models are being upended by pulls and pressures in the financial services industry. On one hand, parallel currencies, crowdfunding, peer-to-peer lending, and shadow banking systems are altering market dynamics; while on the other, millennial customers seek to seize control and participate in the creation of financial products and services.

Significantly, another constituent is demanding course correction: Regulatory bodies are making a case for more enhanced consumer choice in addition to better systemic security and customer protection. Benjamin M. Lawsky, Superintendent of Financial Services at the New York State

Department of Financial Services, released the BitLicense framework at the BITS Emerging Payments Forum in Washington DC in June 2015. He discussed the potential of digital currency to drive changes in the payments landscape. "It generally takes you longer to transfer money electronically than it would to physically transport that cash to another state or country," noted Lawsky.

Digital technology has transformed banking and financial services. At the same time, it provides convenience, more engaging experiences amid stiffer competition, and stringent regulations. Financial service enterprises need a 'Renew-New' strategy that capitalizes on technology to achieve operational efficiency and drive innovation.

A subculture has emerged with the 'sharing economy.' Millennials expect convenient and almost instant services – be it opening a bank account, transferring money, or making a mortgage payment. The digital natives bypass financial intermediaries if they cannot access financial services as, when, and how they want the services.

'Renewal' opportunities

Lean IT infrastructure

The technology infrastructure of financial service enterprises needs to be upgraded continuously to address the dynamic landscape – online banking, mobile banking, digital displays and signages, IP-based video services, biometric protection systems, and a near real-time data network. IT teams should plan the infrastructure taking into account the sensitivity of mission-critical operations, complexity of applications, projected computing demand, regulatory compliance, and the user experience.

Migrating the computing infrastructure to the cloud makes business sense in the context of demanding business requirements and shrinking margins. Cloud-hosted Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS) models, combine flexibility and scalability with on-demand availability while rationalizing investment. An enterprise view of platforms, processes, and applications, optimizes the cloud environment and streamlines the create-adopt-manage lifecycle.

Financial service enterprises require an ultra low-latency data network for accelerated execution. The network should ensure reliability of a large volume of data across the ecosystem. In addition, the data and network of banks, capital market companies, and financial intermediaries, need to be safeguarded with robust authentication and authorization mechanisms. A centralized security framework enables regulatory compliance, including the Sarbanes-Oxley Act and Gramm-Leach-Bliley Act, for protection of customer data and reporting data leakage or loss. Moreover, centralized control mitigates risks in the event of a security breach.

Robotic process automation

Typically, rules-based automated systems cover only 70 to 80 percent of a business process. Systemic issues and the 'subjective

layer' of a business process demand human intervention to complete automated tasks. Robotic Process Automation (RPA) or rapid automation combines algorithms with artificial intelligence and machine learning to automate end-to-end business processes.

'Robots' in RPA software manipulate data, and identify, as well as interpret, actions of specific processes. Smart algorithms adapt to dynamic requirements, trigger responses, and initiate predictive actions. Since the software interacts directly with enterprise systems, RPA is useful for processes involving large volumes

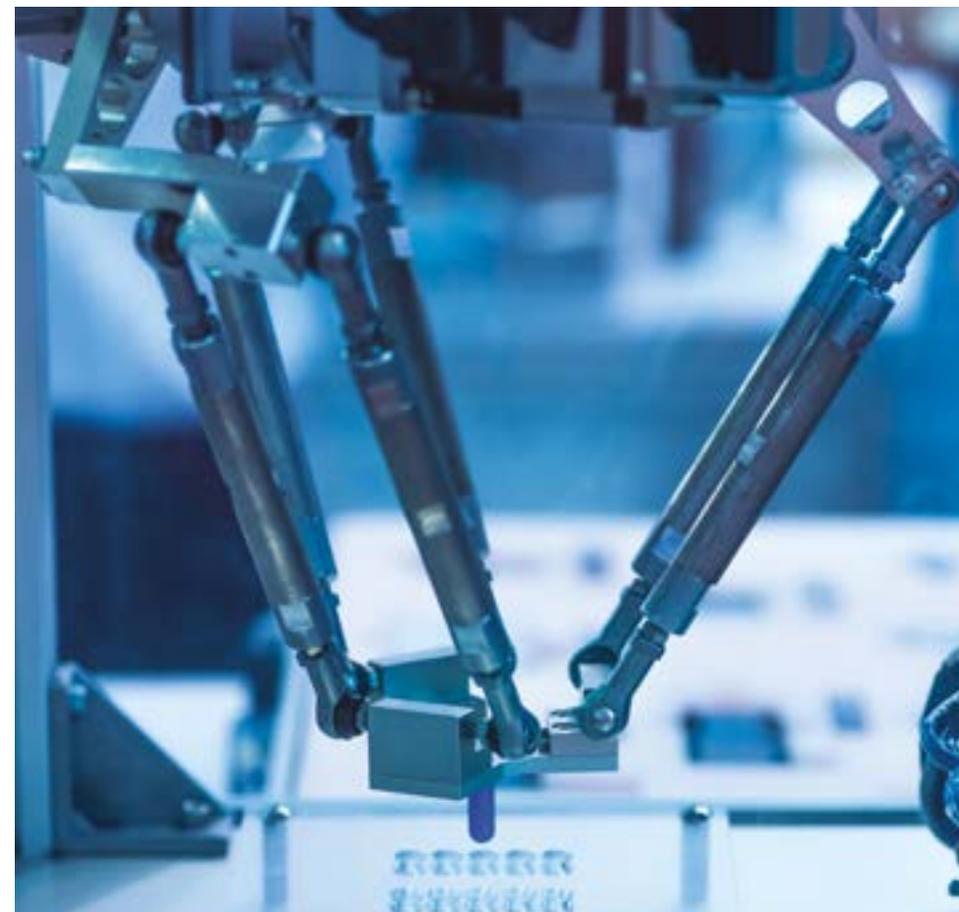
of transactions and data from multiple sources.

RPA can be applied in back, middle, and front office processes and functions in shared services or captive process centers at financial institutions. It supports remote management of IT infrastructure, IT support and service desk operations, and network management. RPA improves the accuracy of invoice

processing, reconciliation, and application processing. Significantly, robotic process automation facilitates execution of subjective tasks and exceptions management through rules-based decision support.

RPA does not require process re-engineering. Software robots access systems through the graphical user interface with a login ID and password – in the same manner as users. Automatic tracking of tasks performed by the robot provides an audit trail and ensures better operations management. RPA technology minimizes costs significantly, accelerates cycle times, ensures scalability, and boosts productivity. Moreover, robotic agents are notable for their consistent performance, 24x7 availability, and operational excellence.

RPA technology minimizes costs significantly, accelerates cycle times, ensures scalability, and boosts productivity.



Risk and compliance management

Centralized systems for risk and compliance management are a business imperative for omnichannel financial services. Digital wallet interfaces for mobile payments and a digital ecosystem increase reputational and operational risks. An enterprise-wide, multi entity system, should be combined with responsive tools to safeguard customer data and digital assets, prevent fraud, and mitigate credit, market, and regulatory risks. The risk management system needs to aggregate data across products and locations for comprehensive reporting and disclosures.

Automated risk management monitors risk factors and compliance parameters across applications and business processes. A unified platform helps identify, measure, and control risks. Integrated risk management boosts productivity and enhances

responsiveness to events. It provides a transparent system that inspires confidence while addressing regulatory requirements such as Basel III, Foreign Account Tax Compliance Act (FATCA), and the Dodd-Frank Act. Financial institutions can explore cash and credit management strategies to reduce risk exposure supported by visibility into the risk management lifecycle.

Predictive models and robust audit processes detect unusual behavioral patterns and activities, thereby preventing fraud. Modeling facilitates stress tests based on large volumes of transaction data from internal and external sources as well as simulation of market conditions. Dashboards and reporting templates aggregate risk elements and offer real-time visibility into enterprise risks. Early diagnosis of likely issues and accurate analysis help risk managers take informed decisions to manage liquidity, credit, and operations.

Omnichannel customer service makes the financial service enterprise vulnerable to cyber attacks. In addition, the diversity of user devices and applications adds to the demands on the data and network security solution. Identity management solutions built on biometric characteristics such as fingerprint, palm vein, iris, and face or voice recognition, ensure end-point security.

'New' opportunities

Digital transformation

Digital technologies are transforming financial services – from business models, infrastructure, and processes; to products, services, channels, and the customer experience. Digital transformation empowers banks and financial intermediaries in three strategic areas – personalization, straight through processing (STP), and omnichannel experience.

The millennial customer seeks personalized products and services. Unified digital marketing platforms help financial service providers share comprehensive information that allows customers to make informed choices. In addition, it offers a consistent experience across banking channels. At the same time, unified marketing platforms provide a holistic view of customers by combining data from structured data sources as well as social media. Analytical tools support marketing by predicting behavior and value across the customer's lifetime.

Straight through processing is the holy grail of financial services. An end-to-end digital workflow – from deal capturing to final settlement – accelerates transaction processing across financial instruments. STP minimizes errors, fraud, and risks, by eliminating human intervention and ensuring near real-time capturing, processing, and reporting. STP of payments and receivables improves transparency across the financial enterprise.

Quality of service influences customer behavior in the future. Context-aware products and services deliver a rich, omnichannel experience, while reducing the cost of operations. A mobility strategy benefits customers and agents of financial service providers. It allows customers to consult financial advisers anytime. Mobile devices help customers contact agents of providers, address queries by accessing customer / product data, as well as sales / marketing information.



Advanced analytics

Financial intermediaries and banks need to capitalize on opportunities and deliver outcomes across the value chain while simultaneously minimizing costs and mitigating threats. Sophisticated data and analytical capabilities help financial enterprises grow in the dynamic environment by migrating from react-and-remedy to predict-and-prevent operations.

Predictive analytics helps banks, insurance companies, and capital market firms transcend budgeting, forecasting, and reporting. It offers actionable insights to boost productivity and efficiency, increase profitability, drive revenue, and mitigate risks more effectively. However, a prerequisite for next-generation analytics is a robust data management system that can manage petabytes of data and support emerging analytical techniques. Enterprise systems should discover data in real-time across sources, structures, and formats, and seamlessly integrate new data sources with the analytical framework.

Data mining and analytics deliver compelling value across the customer lifecycle. Insights into customer behavior and accurate micro-segmentation improve campaign management, marketing, and sales processes through cross-selling, upselling, and loyalty initiatives. Customer analytics improves

strategies to acquire and retain customers. It helps increase the wallet share in the most profitable segments and cultivate relationships with high-net-worth individuals through personalized engagement, niche products, and flexible pricing.

Risk analysis enables banks and financial service providers to make risk-aware decisions, improve credit management, and streamline collections as well as recovery. Transaction pattern analysis identifies and manages applications as well as transaction fraud. Credit scoring models mine unstructured data to support credit-related services.

Collaboration

Collaboration is increasingly shaping the growth and profitability of companies across industries. Wikipedia, the co-created repository of information, sounded the death knell of the encyclopedia business. Banks, insurance companies, and investment management firms should collaborate with customers, peer enterprises, and even competitors to remain relevant in the digital age.

Collaboration should transcend dissemination of data on online forums or blogs. Its potential can be realized by generating ideas to drive innovation, and create new products, services, and experiences. It should help employees

Six leading banks – Bank of America Merrill Lynch, Citigroup Inc., Commerzbank, JPMorgan Chase & Co., Société Générale, and Standard Chartered – are collaborating with SWIFT to develop an industry utility for compliance with Know Your Customer (KYC) norms.

connect within and beyond the enterprise, and actively participate in knowledge sharing. Gamification-oriented social collaboration accelerates innovation, while enriching the experience of delivering services for employees.

Financial institutions need to collaborate with third-party service providers or create consortiums to develop utilities as a shared service, rationalize costs, and address business challenges. Six leading banks – Bank of America Merrill Lynch, Citigroup Inc., Commerzbank, JPMorgan Chase & Co., Société Générale, and Standard Chartered – are collaborating with SWIFT to develop an industry utility for compliance with Know Your Customer (KYC) norms. The Bank Innovators Council is a consortium of banks to facilitate and support innovation. It was established to help financial institutions benefit from shared expertise.

Financial enterprises can streamline the payment process for customers by partnering with technology providers. Several multinational banks, credit card providers, and money transfer agencies leverage Apple Pay for mobile payments. Plaid, a tech start-up, is developing a unified application program interface for banks by accessing their data. Plaid applications will help banks deliver contextual data of every customer transaction.

A digital renaissance

Financial service enterprises can achieve faster time-to-market and improved regulatory compliance through digital transformation. Banks, insurance companies, and capital market firms can attract and retain digital customers by assimilating new technologies, re-orienting processes, and renewing core operating systems.

About the Author



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Roshan is the Infosys management representative for the Netherlands and is Head of Financial Services for Benelux and Nordics. He is an industry leader in partnering with clients to shape strategies and execute transformational programmes leveraging business and technology services. He has been with Infosys since 1999 and has managed financial services clients across the globe (US, UK, and Europe).

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DIGITAL TRANSFORMATION IN THE LIFE SCIENCES INDUSTRY



An expert perspective from IDC Health Insights

As an industry actively transforming itself in the pursuit of re-establishing long-term sustainability, life science organizations are just beginning to embrace true digital transformation. They are now adopting a more holistic strategy that embraces a broader organizational approach to transformation than the current incremental focus on near-term technological innovation, operational efficiency, and externalization of noncore competencies, common in industry

transformation efforts today.

Within the broader IDC view, digital transformation has the potential to fundamentally transform the organization, challenging the traditional approach to leadership, and incorporating technological advances (both near- and longer-term), more effective information usage, evolving social norms, and an increasingly collaborative mindset on the next step in operational excellence.



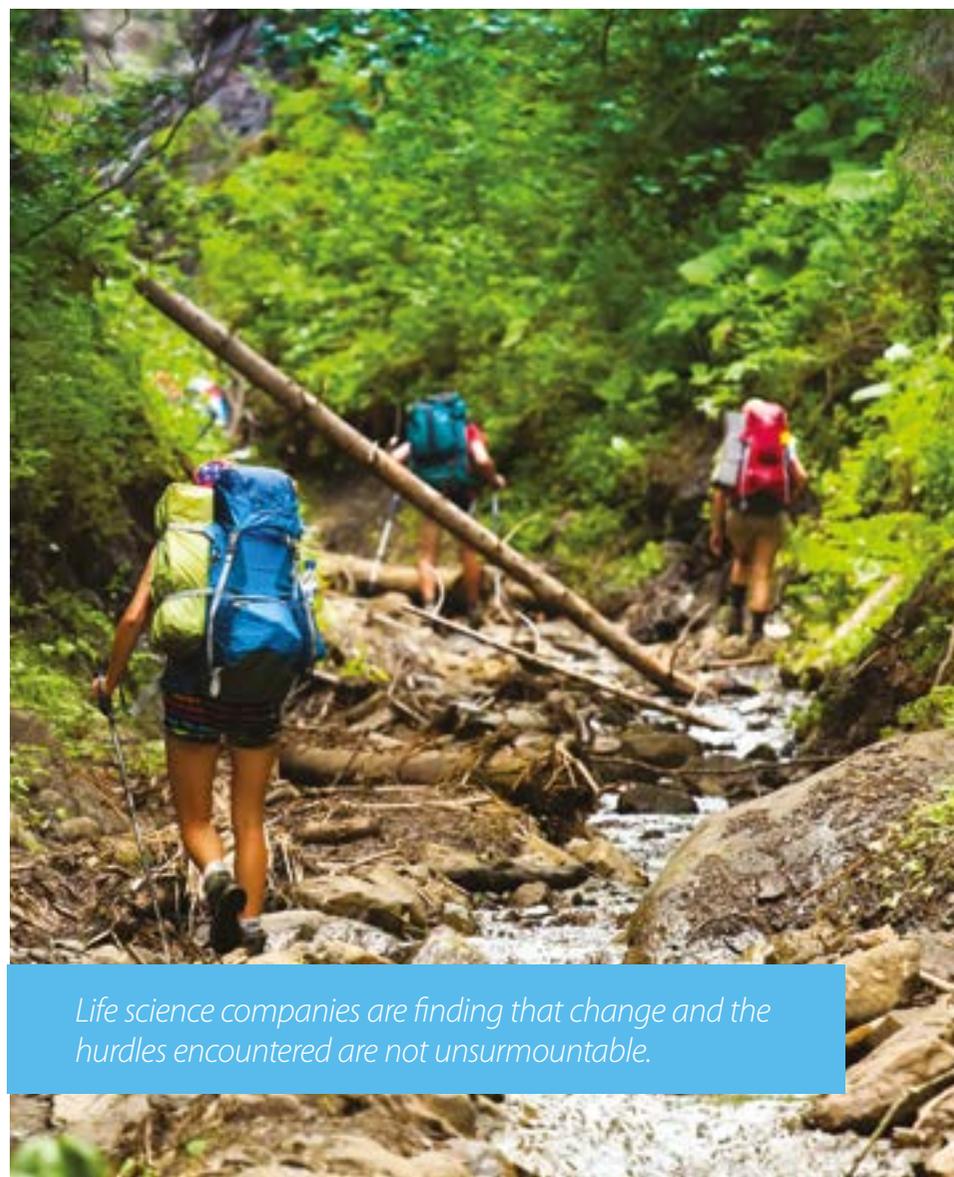
In this paper, we will focus on the role of transformational, technological, and process innovation in industry change, built on an expectation that more effective data, information, and knowledge exploitation are just three key business innovations needed to help life sciences companies succeed in moving ahead.

A legacy of safe change

With the increased urgency triggered by the arrival of the patent cliff, the industry has actively embraced both incremental and transformational change, where directly supported by measurable ROI. Once a taboo, industry leaders are also increasingly considering best practices from outside the industry as they seek to leapfrog the chasm, and quickly transition to operational excellence. While the limitations of a highly regulated, operational ecosystem have made change significantly more difficult compared to other industries, life sciences companies

are finding that change and the hurdles encountered are not unsurmountable.

Concurrently, the industry is also continuing to expand, both geographically and into adjacent industry spaces (i.e., healthcare provider and consumer), as it pursues new business models to support long-term growth. By shifting beyond their traditional boundaries, companies are running into new business and regulatory hurdles that will need to be identified and overcome, although it remains to be seen which expansions will prove to add sufficient value to justify the added cost and complexity of these new strategies.



Life science companies are finding that change and the hurdles encountered are not unsurmountable.

Defining digital

As we at IDC define the industry transition to digital, we are not thinking about the transition of data from analog to digital, or the transition from computer mainframes to PCs, tablets, and smartphones. Striving for a holistic perspective, IDC is redefining discussions around digital to the more dynamic and all-encompassing need to access, process, and exploit data, information, and knowledge; virtually instantaneously by an agile workforce, on any platform, regardless of geography, and more transparently, so that it can be directly linked to improved business outcomes. This mindset is strongly supported by IT innovation, enabled by the third platform – the increasingly ubiquitous adoption of the cloud, big data and analytics, mobile technologies, and social communications (also described as SMAC). While life sciences continue to lag behind other industries in the adoption of digital, particularly in mobile and social communications, industry progress in areas demonstrating low-risk and high-reward, have been heartily embraced. For instance, improving accessibility and agility of unregulated research data by placing it in the cloud, analyzing increasingly complex datasets using big data technologies, shifting away from traditional PCs to laptops, iPads, and/or smartphones, and mining the social ecosystem for customer sentiment and potential candidates for clinical trials.

The life sciences industry has concurrently taken the notion of digital transformation further by actively reconsidering its entire information management infrastructure, including process-specific applications (e.g. predictive modeling, ELN, EDC, drug safety, other clinical trial applications, and collaboration platforms), business applications (e.g. BI, CRM, ERP, and project management), and general business processes (e.g. HR and accounting) with a view towards optimizing business outcomes. Large life sciences companies

have rationalized their application portfolios, reducing the number of solutions from more than 10,000 to just a few thousands in a few years. In the clinical trials space, companies are no longer focused on the EDC platforms specifically, but are looking for ways to better share data across applications (including EDC, CTMS, drug safety, quality, and regulatory compliance), to directly improve process efficiency and increase patient safety. eClinical is the new EDC and the focus on processes is shifting towards a view focused on outcomes.

The case for disruptive digital innovation

As IDC looks beyond the 3rd platform to digital transformation, we have extended the discussion from IT and infrastructure to the data, information, and knowledge-centric processes that will yield actionable insights and improve business outcomes. Scientists, project managers, and senior executives are

expected to benefit from some or all of the following:

- ▶ Geographic IT independence
- ▶ IT infrastructure independence
- ▶ Technology platform independence
- ▶ IT and application process automation with data inputs and process outcomes as the primary touchpoints
- ▶ Real-time access to relevant data, information, and knowledge based on intent,

instead of simple keyword searches

- ▶ Effective, secure, intelligent, enterprise-wide global collaboration platforms; designed to more transparently and automatically capture IP, manage access control, and protect against threats to the organization (both inside and out)

- ▶ Automatic and transparent collection, aggregation, analysis, and sharing of data, regardless of location to support project and business decisions in real-time
- ▶ Access to reusable libraries of active workflows that allow for automation of industry best practices, including real-time monitoring of key data (e.g. identification of potential drug safety issues or recognition of project milestones) and automated generation of alerts, where appropriate

eClinical is the new EDC and the focus on processes is shifting towards a view focused on outcomes.



► Comprehensive, transparent compliance with continually evolving global regulatory requirements

Many of these anticipated benefits will be enabled and empowered by technological and process innovations in the industry. Virtualized IT infrastructure via the cloud, complex analytics of increasingly oversized data resources, cognitive computing, anywhere anytime access on mobile devices, and other technological innovations are all powering these new capabilities, with support from solution and service providers, aligned towards the common goals of ubiquitous, real-time global operational excellence. With data volumes, variety, and velocity, all greatly exceeding the industry's ability to consume them, life sciences companies urgently need new ways to stay on top in an increasingly global competitive industry. Digital transformation promises to be a paradigm changer and will likely forever change the conversation, both now and for the foreseeable future.

The path forward

While organizational inertia ensures that change will never be easy, it is clearly time for the life sciences industry to begin to embrace digital transformation in the path towards long-term sustainability. For

the life sciences industry, new scientific discoveries, continuing technological innovation, increasingly ubiquitous global interconnectivity, increased digital access, and the growing availability of new data resources (including EMR data, patient insights via social media, and HEOR data), are advancing independently as the industry focuses on its more immediate concerns.

In looking beyond incremental innovation, the industry needs to embrace change at a more fundamental level. Building on the current technologically - enabled data, information, and knowledge - centric approach to new drug development, the industry needs to further transition towards a more comprehensive 21st century operational experience, including changing the way that:

- Leaders interact with their organizations
- People interact with both their peers and the organization at large, in an increasingly virtualized, 24/7 global ecosystem
- Data, information, and knowledge are captured, managed, analyzed, and used
- Companies operate, taking into account new virtualized value chains, increasingly global collaborative ecosystems, and expanded ecosystems
- Workers are resourced in an increasingly externalized, service-oriented industry

For the life sciences industry, the strong inertial resistance to change has been overwhelmed by the much anticipated arrival of the patent cliff, and its associated blockbuster revenue losses. The recognition that the traditional blockbuster drug model is dead has further driven the industry to look beyond traditional sources of new revenues, including niche small market blockbusters (especially cancer), and value-added products (e.g. drug associated diagnostics and direct patient monitoring). Because these more near-term strategies will likely not yield sufficient revenues to replace blockbuster losses, most companies will need to think bigger, taking into account a global transformation in business, industry, and society, enabled by technological innovation. With the

traditional barriers between academia and life sciences companies and consumers / patients continuing to evolve and dissolve, leading innovators will need to expand their mindset towards a future where companies will participate in and contribute to a much more global and interconnected ecosystem. While the few remaining major medical unmet needs (e.g. Alzheimer's disease and other CNS diseases, regenerative medicine) will likely provide opportunities for a few companies to quickly regain their footing, the rest of the industry will need to quickly innovate, or slowly fade into the sunset. Status quo is not an option. Change is coming and those willing to embrace transformation will more likely succeed in the future.

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Research director, Alan S. Louie, Ph.D., is charged with spearheading IDC Health Insights' Clinical Development, Strategy, and Technology Research service with coverage of innovation and best practices in pharmaceutical R&D, and a further emphasis on technology and innovation in clinical development, business analytics, translational research, and personalized medicine. Dr. Louie has authored more than 160 reports on innovation in life sciences and blogs regularly on the topic in the IDC community. Dr. Louie graduated with a Ph.D. in biochemistry from the University of California at Riverside and holds a B.A. in biochemistry from the University of California at Berkeley.

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THE RETURN OF THE BIG BOX

Can brick-and-mortar retailers match the game of online giants?



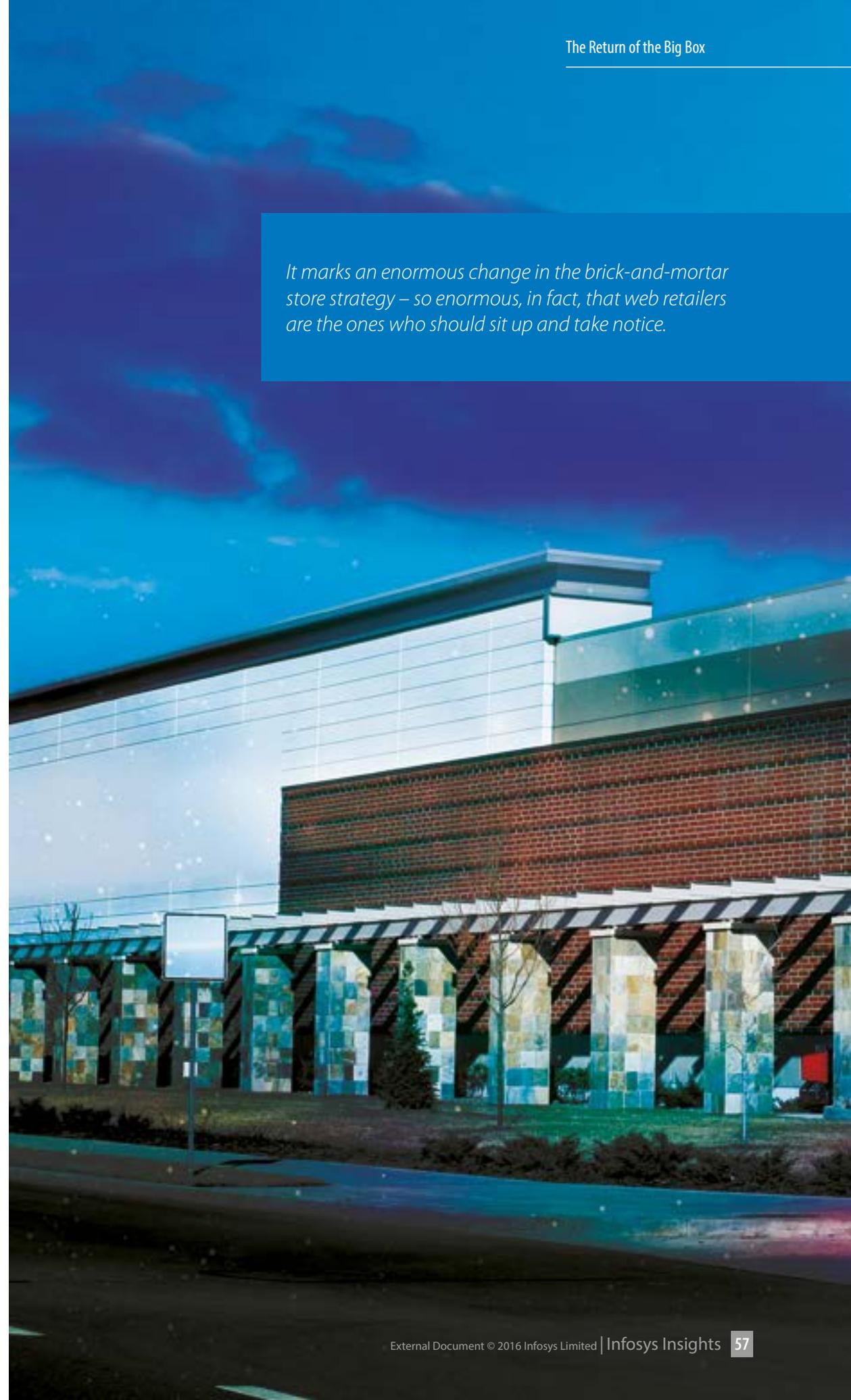
The battle between online retailers and traditional brick-and-mortar stores is entering a new and exciting phase. Less than a decade ago, experts had predicted the demise of the big box retailer because with online retailing, people could shop for larger inventories from the comfort of their homes and get items delivered in a relatively short time. These experts claimed that traditional brick-and-mortar sales strategies were going to be the cause of their quick demise. And until recently, big box retailers were indeed struggling to beat the large online retailers at their own game.

However, another dynamic came into play: The online-to-offline strategy, which was expected to rewrite the rules of web commerce radically, was not working so well. Fleets of unmanned delivery drones and fulfillment kiosks are yet to manifest and prove themselves. In the meantime, traditional brick-and-mortar stores found their stride, created excellent websites, and armed themselves with a host of IT tools, big data, and analytics.

These traditional stores are changing time-tested strategies. Take, for example, the Adidas store in Lower Manhattan in New York City. It houses a high-tech digital wall showcasing every Adidas offering in existence. The multimedia display is akin to an endless aisle – a small store but with a huge inventory. Customers can scroll through the display and select sneakers, their colors, and features, and plug all the information into the system. Once that is done, the salesman, the first human interaction in the store, appears with the exact pair the customer requested.

Everything is customized and is ready to wear. Should the customer wish to purchase the sneakers, it is instantaneous, without the wait time that one will encounter in an online order. This example of sneakers is one of many. It marks an enormous change in the brick-and-mortar store strategy. Expect big boxes like Walmart and Best Buy – the latter just announced that it would be selling the new Apple Watch at its stores – to use their brick-and-mortar outlets as an advantage.

It marks an enormous change in the brick-and-mortar store strategy – so enormous, in fact, that web retailers are the ones who should sit up and take notice.





Most consumers do not view a trip to a big box retailer as a chore. To them, it is a pleasurable experience.

Big box stores as demand fulfillment centers

The growing phenomenon called 'showrooming' is when customers drive to a store, peruse a wide selection, chat with the knowledgeable sales staff, and determine which appliance or item of clothing is right for them. Then they drive home and order that item from a pure-play web retailer for a cheaper price. Not so good news for big box retailers, but then they also figured something out that became a game-changer: What 'showrooming' also implied was that most consumers do not view a trip to a big box retailer as a chore. To them, it is a

pleasurable experience because the displays are always changing and the retailer focuses on promotions and informs them about these on mobile devices while they are in the store. The process of demand fulfillment using IT software, big data, and real-time predictive analytics showed that big box retailers can ensure inventory that beat the prices of online retailers. Likewise, a customer takes pleasure in buying an item on the spot instead of having to drive to some fulfillment center or wait for a courier to bring it to her doorstep, after having ordered online.

Big box retailers have realized that their spacious stores are essentially fulfillment centers – but much better looking. Their



well-trained sales associates are a tremendous advantage over the experience of someone simply scrolling down a web page and looking at products. Customers can continue to drive to their favorite stores to kick the tires. And they can also order the merchandise from the same retailer online should they wish to. Target's newly introduced ship-from-store program at 136 stores in 38 markets has the ability to reach 91 percent of American households by ground transit within two days.

Omnichannel retailing – Where consumers genuinely enjoy a trip to the store

Big box retailers can tell in real time which customers have entered what store, and based on their previous purchasing patterns, they can focus special promotions on them within the store.

The traditional stores now have websites that are just as good, if not better, than the online retailers. A recent study revealed that 44 percent of American shoppers access their smartphones while they are in a store. They can bring the online experience to the physical store on their mobile devices. So retail chains now have a broader digital (online, mobile, kiosk, social media, etc.) presence than ever before. The digital consumer who prefers scrolling down web pages in the privacy of her home can order products online. But she does not have to wait for the mail to arrive. If she has ordered the item from a big box retailer's website, she can drive (or, depending on where she is, even walk) to the actual store and pick it up immediately. Therefore, we are seeing the rise of the stores as local fulfillment centers.

The reason why a technologically-savvy big box retailer can successfully take on the Internet giants is its ultra-modern command of the supply chain and inventory process. Showrooms and impressive websites are the direct outcomes of the digitization of the supply chain. Inventory fulfillment and operations management have been utterly transformed by IT. Big box retailers can tell in

real-time which customer has entered what store, and based on her previous purchasing patterns, they can focus special promotions on her within the store. The business model

that is now transforming the marketplace is based on an effective combination of digital and brick-and-mortar locations.

Shoppers might not want to admit it, but hunting for deals and discovering sales online can be addictive. Brick-and-mortar retailers are also providing them with the fun shopping experience of hunting for deals in a physical store. They are engaging their consumers in a one-on-one retail relationship. They are achieving this focus by utilizing the very best analytics and big data tools. The result is omnichannel

retailing in which customers genuinely enjoy a trip to the store.

Online retailers' answer to 'showrooming'

On the other hand, online retailers, who invented this category, are not standing by. That is because, if a customer decides to 'showroom' and then go back home to order the item online, he might find 10 versions of the item he saw at the brick-and-mortar store. Simply put, online retailers are trying to negate the growing trend of big box stores as fulfillment centers. They are giving brick-and-mortar stores a shot across the bow, demonstrating that whatever a customer might find in a physical store, he will find a far larger and more expansive inventory online. And because of this vast inventory, online stores can afford to cut prices. Brick-and-mortar outlets might have won the initial battle, but the online giants are also making a comeback.

Like every other web success story, this is far from being the last chapter. Expect innovative ideas, fierce strategies, and a gala time for consumers.

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Amitabh is a leader in the practice focusing on client relationships globally in addition to focusing on the CoE for Retail Supply Chain and Merchandising Solutions. Amitabh has 19+ years of IT and Business Process Delivery experience with Retail and CPG clients. He has been recognized as a thought leader and has authored several white papers in the areas of supply chain management and merchandising. Amitabh holds an MBA from the Indian Institute of Management, Calcutta, and a mechanical engineering degree.

If you wish to share your thoughts on this article or seek more information, write to us at Insights@infosys.com

CRACKING THE CODE BARRIER



In a 2014 study conducted in the United States and the United Kingdom, manufacturing companies lamented the shortage of not manufacturing, but digital talent. The massive demand for advanced technology skills and the near impossibility of fulfillment is a recurrent theme that runs through virtually every industry today. The United States alone will create 1.2 million new jobs in Science, Technology, Engineering, and Math (STEM) fields by 2018, which it will struggle to fill, says a White House initiative called US2020. Likewise, Digital Agenda for Europe, a Europe 2020 initiative under the aegis of the European Commission, predicts their region will fall short of at least 825,000 Information and Communication Technology (ICT) professionals at the end of the decade. Here, it is necessary to clarify that the broad technology domain requires a variety of skills related to STEM qualifications, digital literacy, and code literacy. While they are often bracketed together, in any discussion on talent shortage, STEM qualifications, digital literacy, and code literacy are all different.

Clearly, digital is the new literacy in the job market. With 90 percent of jobs in a long list of fields requiring digital skills in the near future – if they do not already – digital literacy is fast becoming employability hygiene. And as the demand for digital literacy goes up,

derivatively, inevitably, so will the need for code literacy.

Which is why, it is hard to understand that so little is being done to build this vital skill from an early age. Even as advanced computing has come off its pedestal to become personal, pervading every aspect of day-to-day life, basic computer science – coding, programming, developing – has clung on to remain the esoteric preserve of a few.

In the United States, and likely elsewhere, the relegation of code literacy is rooted in a variety of legacy societal issues, ranging from financial to social to cultural. But now a new narrative is slowly unfolding, scripted by a grassroots movement to build coding awareness and education in the country, made famous by none other than President Obama himself, who even knuckled down to write some. Organizations such as Code.org and The New York Academy of Sciences are working tirelessly with school districts across the country to get them to make coding part of the curriculum, right from the early grades. That apart, they are socializing the need through the 'Hour of Code' campaign, exhorting every American student to spend just one hour trying to learn programming, and organizing events around the Computer Science Education Week, to name a couple.

Clearly, digital is the new literacy in the job market. With 90 percent of jobs in a long list of fields requiring digital skills in the near future – if they do not already – digital literacy is fast becoming employability hygiene. And as the demand for digital literacy goes up, derivatively, inevitably, so will the need for code literacy.



Coding, a life skill, really?

They probably said the same thing about reading and writing, when these were the prerogative of a select group of scribes. But today these skills are considered 'infrastructural', as ingrained as they are in the fabric of our lives as the predominant means of connection. The same reasoning applies to code literacy, which is currently in the 'privilege' phase of its lifecycle. Code must trickle down to all sections of society, if future generations are to be creators, and not merely consumers, of technology.

But while the whole idea of improving code literacy may sound simple, it is in fact an enormous agenda. There are huge challenges in execution, ranging from the absence of nationwide harmonized standards for school curricula and a lack of assessment frameworks to a shortage of funding for teacher training and other resourcing and legislative issues. But the biggest challenge by far is changing the people's mindset from 'coding-is-for-geeks' to accepting it as a fundamental skill that can really change lives.

Not just any job, the best job

Hi-tech digital jobs routinely top the listings. Cutting-edge careers are now made in artificial intelligence, data science, robotics, and gaming. Naturally, they also pay better, almost twice the U.S. average, says the Bureau of Labor Statistics. But the closing argument is that soon jobs requiring digital skills will be the only ones available. A list of ten jobs that will soon disappear has only one digital entry, Social Media Manager, at number ten. On the other hand, digital jobs will become more and more fantastic, opening up opportunities to telesurgeons, media remixers, simplicity experts, and robotic counselors.

For those trapped in dead-end jobs at risk of redundancy, the acquisition of coding skills might well mean a new lease of life. For instance, a worker in a traditional assembly line could find himself at the cutting-edge of manufacturing if he learns how 3D printing models and the software used to create them, are built.

Do more, be more

So you don't want to be a programmer? You do not even want a 'science' job. Fair enough. But knowledge of code is still relevant because it enables you to excel at your chosen profession. Or simply, do things more efficiently. Here are some scenarios: Today's filmmaker does pretty much everything from shooting to screening, digitally. Knowing how the software is built would enable her to extract maximum performance from it. Now

think of a sales head in a bank. Familiarity with the code of a corporate banking app would enable him to tell a client whether the customization they were asking for was possible or not, without having to check back with IT. Now cut to the legislative domain, where lawmakers connected with NSA hearings are now expected to understand concepts like encryption.

Essentially, knowledge of software code facilitates a better understanding and

appreciation of the working environment surrounding any job involving the use of technology. Code literacy is of higher import than mere computer literacy, because where the latter teaches people how to use digital tools from the outside, the former helps them understand the very same tools from the inside, and thereby exercise greater control over them.

For those trapped in dead-end jobs at risk of redundancy, the acquisition of coding skills might well mean a new lease of life.

For one and all

The U.S. technology workforce is starkly homogeneous – White or Asian, middle class to affluent, and male. That's because access to computer science education – the pipeline the workforce feeds off – is highly unequal. Data on the U.S. high school AP computer science enrollment says, 15 percent are girls, and about half that, 8 percent, are African American or Hispanic. The reasons for exclusion are, to a large extent, cultural and steeped in stereotypes – "girls can't code", or "it's too hard" and so on. By excluding computer science from their education, vast sections of the population, most of whom are economically and socially disadvantaged, are shutting the door on an attractive computing career and the prospect of upward mobility. Clearly, governments concerned with issues of diversity and inclusion should leverage code literacy as a powerful instrument of that agenda.

Economics

In a recent joint study, two leading analyst firms predicted that digital technologies could add as much as US\$1.36 trillion to the world economy of 2020. While that might

not be much in itself, the important thing is that digital growth also improves economic growth rates in general. Thus, a 10-point (on a scale of 100) improvement in digital density is likely to accelerate developing economy growth by 50 basis points.

This is why computer science is being hailed as the most important driver of wealth in the post-Industrial Revolution era. Given that wealth is increasingly being generated through Intellectual Property, modern economies that fail to develop the necessary infrastructural computer skills base will soon lag behind.

So, is there a solution in sight?

While it will take years of effort for the code literacy message to sink in within our social and educational systems, the idea is already resonating strongly within the industry community. The technology industry also recognizes the need for throwing its weight behind the code literacy movement. Infosys, for instance, is trying to help the development

of coherent career pathways for kids right from an early age by supporting computer science education in schools and colleges. Infosys Foundation USA is engaging with a number of agencies involved in various related activities, ranging from service delivery and advocacy to research and policy-making.

Such top-down efforts are necessary, but they can only do so much. For the coding literacy needle to move, there needs to be an urgent demand at the grassroots level for computer science education. It is imperative that parents get involved with their local schools and communities to participate in the conversation around the future development of school curricula, and petition the lawmakers to legislate in its favor. They also need to see the bigger picture, that by advocating the recognition of computer science as a core standard, they are not only solving some of the greatest problems of today, but also preparing to meet the challenges and opportunities of tomorrow.

By an Infosys Staff Contributor

If you wish to share your thoughts on this article or seek more information, write to us at Insights@infosys.com

ENHANCING ASSET EFFICIENCY IN THE PROCESS INDUSTRY



Companies in the process industry operate in a complex business landscape. A global survey commissioned by Infosys and the Institute for Industrial Management (FIR) at the RWTH Aachen University reveals that complexity presents opportunities to be more responsive with the right combination of technology and processes, resulting in enhanced production efficiency for process manufacturers. As part of the survey, an Industry 4.0 asset efficiency maturity mapping exercise was conducted. It assessed the process industry and found that companies in this industry planned more improvements, compared to all other industries, till 2020 to enhance their maturity.

This industry snapshot is the outcome of a global survey commissioned by Infosys and the Institute for Industrial Management (FIR) at the RWTH Aachen University, Germany, to gauge the readiness and maturity for Industry 4.0 enabled asset efficiency.

'Industry 4.0' traces its origins to the Industry 4.0 working group set up by the German government in January 2012. It is part of

the hi-tech strategy action plan 2020 that provides strategic inputs to sustain Germany's leadership in manufacturing and industrial automation.

Industry 4.0, smart manufacturing, or the industrial Internet of Things is the technological evolution from embedded systems to digital manufacturing and production systems powered by big data and advances in technology, such as artificial intelligence, rapid automation, robotics, and additive manufacturing. Industry 4.0 is therefore set to transform production by boosting efficiency and effectiveness across the value chain – productivity, ensuring consistency in quality, reducing costs, and optimizing inventory.

Early adopters ahead of the curve

The process industry today is among the most mature industries for several reasons:

- ▶ Seamless interaction between supply chain partners along the value chain with end-to-end supply chain planning that minimizes costs

Industry 4.0 is set to transform production by boosting efficiency and effectiveness across the value chain – productivity, ensuring consistency in quality, reducing costs, and optimizing inventory.

- ▶ Focus on implementing standards for interoperability and harmonization between diverse applications
- ▶ Significant investments in innovation, specifically in-house R&D
- ▶ Focus on process simplification, complexity management, and risk management
- ▶ Sustainable approach to minimize environmental footprint in a resource-intensive industry
- ▶ Major shift in operations with a lower cost structure and higher degree of safety
- ▶ Significant technology implementation for process monitoring, with three-fourths of wireless sensor network revenue originating from the process industry

However, looking ahead, this industry is facing numerous and complex challenges that could mean an opportunity or a potential threat, in both the short and the long terms, illustrated as below.

While there is going to be no single remedy, a systematic strategy to address these key aspects can help companies outperform their peers.

Industry 4.0 and process manufacturing

In an Industry 4.0 process manufacturing landscape, cyber-physical systems create a smart network across the extended value chain. Digital manufacturing systems bring together physical assets, processes, and people for seamless interaction. Digital connectivity and sensors enable continuous monitoring of performance parameters and process variables from pressure vessels, mixers, pipelines, valves, and field equipment. Streaming data can be analyzed to harness useful insights on asset utilization, predicting failures, and improving asset lifetime.

Machine-to-data technologies and remote monitoring offer real-time visibility on the condition of individual assets. This, when combined with prescriptive analytics, builds a responsive production system. This new way of interaction between field devices and processes enables timely detection of issues, prompt repair and preventive maintenance to improve the safety of assets, and prevent expensive, unplanned outages and enable regulatory compliance. Significantly, insight on the health of assets is useful in increasing asset efficiency and effectiveness.

Survey findings

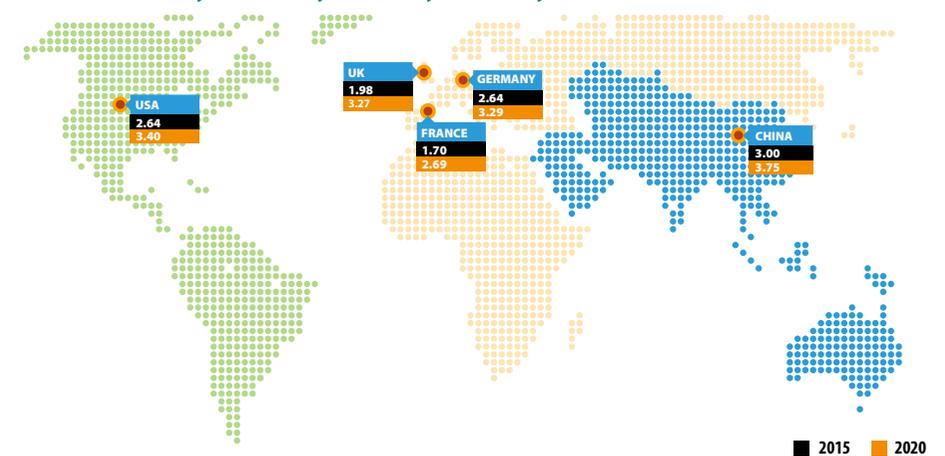
Infosys and FIR, RWTH Aachen, Germany, conducted an empirical study to assess the maturity of asset efficiency in industrial manufacturing. We surveyed more than 400 manufacturers across the aerospace, automotive, electronics, machinery, and process industries in the UK, the USA, China, France, and German-speaking countries. We partnered with Vanson Bourne, a specialist technology market research provider to conduct the survey outside Germany.

Our research focused on four key dimensions of asset efficiency – maintenance, operations,

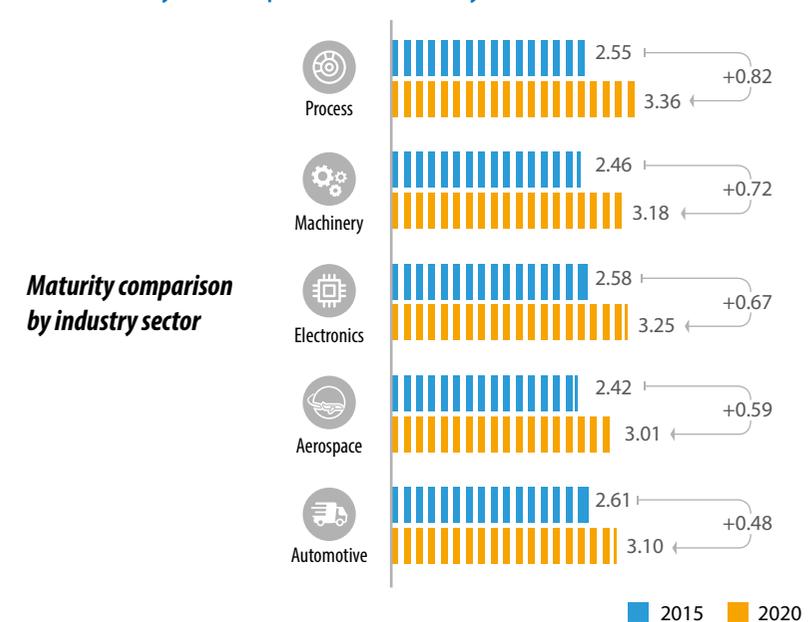
information, and energy management. Production managers, plant technical managers, COOs, asset efficiency consultants, and heads of R&D / manufacturing shared their strategies and goals for 2020 via online forums, telephone, and personal interviews.

We used the Industry 4.0 framework to assess the effectiveness of asset management processes on a four-point scale, which ranged from 'Not Implemented (lowest maturity)', 'Potential Recognized' and 'Partially Implemented' to 'Systematically Implemented and Benefits Realized (highest maturity)'. Assets included equipment and machinery used for production, machines, and tools.

Asset efficiency maturity level by country



Asset efficiency in the process industry



Maturity comparison by industry sector

VOLATILE MARKETS

- ▶ Sustenance in a volatile market – both past and future
- ▶ Oil prices have settled below the key US\$50-a-barrel mark margin
- ▶ Major shifts in demand patterns

INHERENT COMPLEXITY

- ▶ Complexity everywhere by its very nature – processes and operations, characteristics of chemicals, and product portfolios
- ▶ Complexity in the huge volumes of data generated
- ▶ Stringent process, environmental and regulatory requirements

LACK BREAKTHROUGH INNOVATION

- ▶ Lack of game-changing innovation for decades
- ▶ Not open to open-innovation – most of the R&D is in-house
- ▶ Need for flexible solutions to aggressively deal with the challenges



The four dimensions cover the major effects of Industry 4.0 in terms of asset efficiency

Asset efficiency

Asset efficiency is a key driver for competitiveness in the asset-intensive industries and also with process manufacturing. Although 85 percent of manufacturers recognize the role of digital technologies and the potential of Industry 4.0 in increasing asset efficiency, only 15 percent of companies have dedicated strategies for enhancing asset efficiency.

Our survey therefore clearly reveals that there are significant opportunities for the process industries to improve the efficiency of their assets by taking advantage of technologies – in turn leading to increased productivity and profitability.

This survey critically analyzed asset efficiency in four dimensions and provided key insights on how industrial enterprises can develop their roadmap for improving asset efficiency and effectiveness.

Maintenance efficiency

While 87 percent of companies are aware of the potential of preventive maintenance driven by real-time data and analytics, only 15 percent of companies implemented condition

monitoring, and 17 percent of companies incorporated machine status data in their maintenance workflow.

Maintenance is the single largest controllable cost in an asset-intensive enterprise. In fact, up to 90 percent of maintenance costs could be saved with the right maintenance strategy. The annual maintenance budget exceeds the net profit at several process plants. Asset reliability programs should therefore capitalize on technology advancements in industrial sensors and apply engineering expertise to accurately detect anomalies and predict equipment failure.

A robust maintenance strategy focused on predictive and reliability-oriented maintenance through condition monitoring, planning and scheduling, and root-cause analysis can increase the lifetime of equipment by 20–40 percent.

Operational efficiency

While 57 percent of companies optimize assets based on KPIs, only 13 percent use real-time data. Further, operational efficiency is systematically monitored and optimized at the asset level in only

16 percent of companies.

Among global manufacturers, one-half of equipment availability is lost in maintenance, upgrade, shutdown, and replacement activities. Global manufacturers can therefore significantly maximize asset performance and utilization to improve return on assets with real-time visibility into asset performance, production efficiency, and logistics processes.

Performance improvement programs that can gain vital real-time information to enhance performance can boost operational efficiency by 20–25 percent.

Information efficiency

While 82 percent of enterprises recognize information interoperability, data security, and data standards as preconditions for achieving efficiency, it has been implemented by only 11 percent of companies. Significantly, 83 percent of companies plan to use data across the enterprise for a comprehensive analytics beyond specific purposes.

The process industry relies heavily on real-time data from sensors and process instruments to make intelligent decisions for efficient operations and uninterrupted production. Therefore, the complex interrelationships between asset lifecycle stages, if intelligently integrated with operational data and business intelligence can address the information gap and help optimize asset performance. Poor asset information management increases the risk of safety, health, and environmental incidents, which can imperil an enterprise's very survival.

An asset lifecycle information management system based on a data quality framework and knowledge - based engineering delivers cost savings of 5–10 percent.

Energy efficiency

While 88 percent of companies identified energy management as a key dimension of asset efficiency, it is planned and managed well only at 15 percent of companies. Further, while 53 percent of companies monitor resource and energy consumption, only



Operations efficiency

- ▶ **Manufacturing intelligence, real-time visibility, virtualization** to increase production flexibility
- ▶ **Advanced technologies** for automation, control, and quality, and improving OEE

Maintenance efficiency

- ▶ **Condition monitoring and predictive maintenance** to eradicate expensive downtime of machinery
- ▶ **Intelligent maintenance strategies** to reduce maintenance costs

Information efficiency

- ▶ **Radical integration** between products, processes, data, tools, and services – both new and legacy in an IT–OT converged enterprise
- ▶ **Uniform lifecycle information management** is critical EDM / KBE / MBSE / SLM)

Energy efficiency

- ▶ **Put energy to maximum use** – institute technology for sustainable, energy-efficient production processes and reduce CHG emissions
- ▶ **Use technology building blocks** for modeling, monitoring, automation, and control

Inefficiency is a thing of the past

14 percent have systematically integrated energy efficiency to their overall asset efficiency strategy.

While asset-intensive industries are capital intensive, they are also energy intensive. Therefore, a well-maintained asset will consume less energy and improve its asset sustainability index. One of the major reasons for missed energy efficiency opportunities is the lack of data on energy use in asset industries.

Energy management and sustainability programs are therefore key to track

asset efficiency and can reduce energy consumption by up to 25 percent in these industries.

Summary

Inefficiency is a thing of the past for process manufacturers. Process manufacturers who dynamically respond with the right combination of technology, processes, and solutions can capitalize on business opportunities and seize the competitive advantage with Industry 4.0 to become industry leaders of the future.

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Dr. Ravikumar brings together more than 24 years of research and industrial experience. His areas of interest include Aircraft Structures, KBE, Advanced Analytics, Composites, and Industry 4.0. He has authored more than 35 technical papers and filed one patent. He has worked on various prestigious engineering design & development and KBE projects. He is involved in the design and development of software systems for composites (CADD-Composites) and also in the development of solutions for Industry 4.0. He obtained both a PhD and MTech from IIT Delhi and BE (Hons) from BITS Pilani, India.

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