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THE FOURTH INDUSTRIAL REVOLUTION REDEFINES THE RELATIONSHIP BETWEEN BUSINESS AND TECHNOLOGY

Sai Mandapaty
AND
Dan McClure

INTRODUCTION

A transformation of the relationship between business and technology, one that brings diverse parts of the enterprise into far closer collaboration, is fast approaching.

We've identified this as a shift to "tech at core". It's an enterprise change driven by an exciting new era of business opportunity and disruption. The World Economic Forum calls this emerging hyper-creative marketplace a Fourth Industrial Revolution, projecting that the "scale, scope and complexity of the [economic] transformation will be unlike any humankind has experienced before... disrupting almost every industry in every country".

Dramatic changes in the marketplace inevitably flow back into the enterprise. Future business leaders will not be satisfied with streamlined versions of their existing organizations. They will expect complex innovations and quick responses to shifting market opportunities. To deliver this new standard of organizational creativity, business and technology will become deeply collaborative, nimble creative partners that can deliver unique and original ideas to market.

Few—if any—organizations are ready for this challenge. A journey of change is ahead. Over the following pages, we look at this transformation in three parts: the underlying market change, the opportunities created, and finally, practical steps for building new agile enterprise capabilities.

When the World Economic Forum proclaimed the coming of a Fourth Industrial Revolution, it gave a name to a gathering of global trends that have been building toward a deep transformation of both business and technology.

Something big has been happening, so it's not hyperbole when Klaus Schwab, executive chairman of the WEF, says: "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work and relate to one another. In its scale, scope and complexity, the transformation will be unlike anything humankind has experienced before."

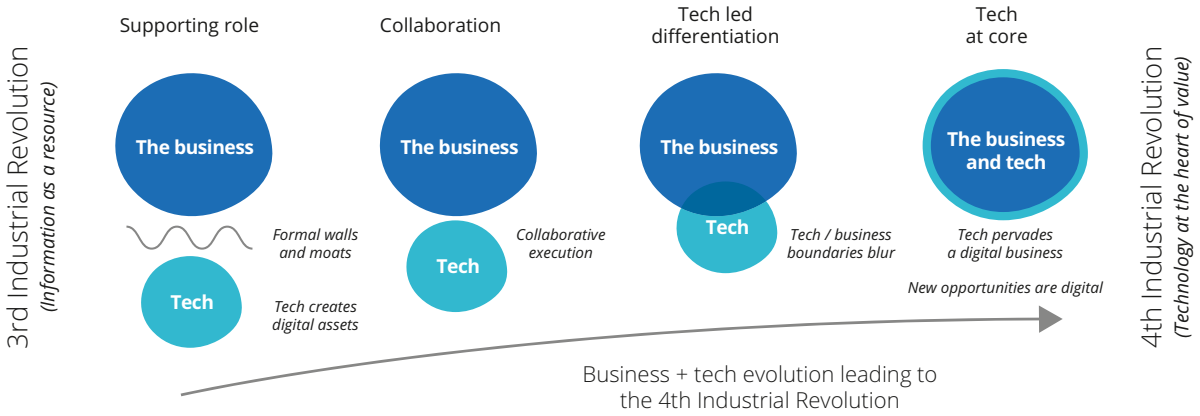

Figure 1 - The Fourth Industrial Revolution creates a deeply integrated relationship between technology and business

Long time business and technology leaders may be tempted to see this as the normal hype that surrounds major new technologies like the Internet of Things (IoT), Big Data, and the Cloud. While this technology is exciting and a key component of the Fourth Industrial Revolution, the changes at hand are deeper and more substantial than just an expanded tool box.

We've been writing about this oncoming transformation for some time, and what lies ahead is not simply "more" tech, but a radical reshaping of the relationship between technology capabilities and business opportunities. It's a fundamental change that shifts the role of technology from creating "digital assets" to being pervasively embedded within a "digital business", an organization whose most creative market opportunities are shaped and enabled by technology.

IT began as a support function to the business, enabling scalability and efficiency as part of the Third Industrial Revolution. While information mattered, it was not the principal source of business value, so technology development could often proceed on its own slow steady course, separated from the hurly-burly of a shifting marketplace. This situation is shown in the left side of figure 1; a process and control dominated relationship conducted at arms length between IT and the business.

As market opportunities increasingly leveraged technology, business leaders began to collaborate more closely with technologists, increasingly seeing them as partners in developing differentiated services and products. Agile delivery techniques became widely accepted and market centric product development teams adopted market responsive techniques like User Centered Design and Lean Startup thinking. This team level collaboration was the beginning of a shift from the Third to the Fourth Industrial Revolution.

Today, the final step in this evolution requires a much deeper enterprise-wide disruption; a new way of thinking and working that moves technology into a position where it is the prime enabler of new business opportunities.

We call this "tech at core" and it is, quite literally, game changing.

Tech at core reshapes the approach to creating business opportunities and forces foundational changes in the way organizations work. While there have always been technology driven innovators, they were seen as crowding into the NASDAQ and competing within their own private club. That is no longer the case, as today *every business* is fundamentally a new kind of digital business with technology at their core.

The lost luxury of focusing

Management experts of the Third Industrial Revolution advised businesses to focus on a specific market position and support that choice with a set of core business skills. Focus was the foundation of operational excellence, so organizations were willing to cede other parts of the opportunity space to firms who were not competitors in their core competencies.

For large enterprises, this meant that technology teams could work on improving efficiency and enabling scale. Within organizations driven by a need for operational excellence, prudent CIOs focused on technologies proven as industry best practices. Broad adoption was seen as a virtue. It avoided the risk of investing in a technology that never gained traction and helped assure that an adequate pool of skilled technologists would be available in the future.

In this instance, being right is more important than being first. Big firms seeking to implement industry standard practices were willing to wait for package enterprise software vendors to build capabilities rather than pioneer the field themselves. Enterprises willingly gave up the opportunity to take advantage of technologies at innovation's frontier in exchange for managed risks and predictable performance.

In contrast, fast moving insurgents seeking to break into new markets have been driven by different priorities. Pioneers get little advantage from building toward a stable, scaled-up future and focused on mining new technologies for capabilities that could differentiate them on the leading edge.

A gap in the ability to absorb new technology naturally opens up between these two different types of organizations. The older and more deeply entrenched the business, the wider the gap becomes, and as technical advancements continue to accelerate (remember Moore's Law), the gap between a tool set available to disruptors and an established enterprise's technologies can become substantial. point out that similar gaps appear when looking at a firm's flexibility to respond to new market insights. The more an organization focuses its
efforts on performance optimization, the less capacity it has to quickly pivot toward new market opportunities. (figure 2)

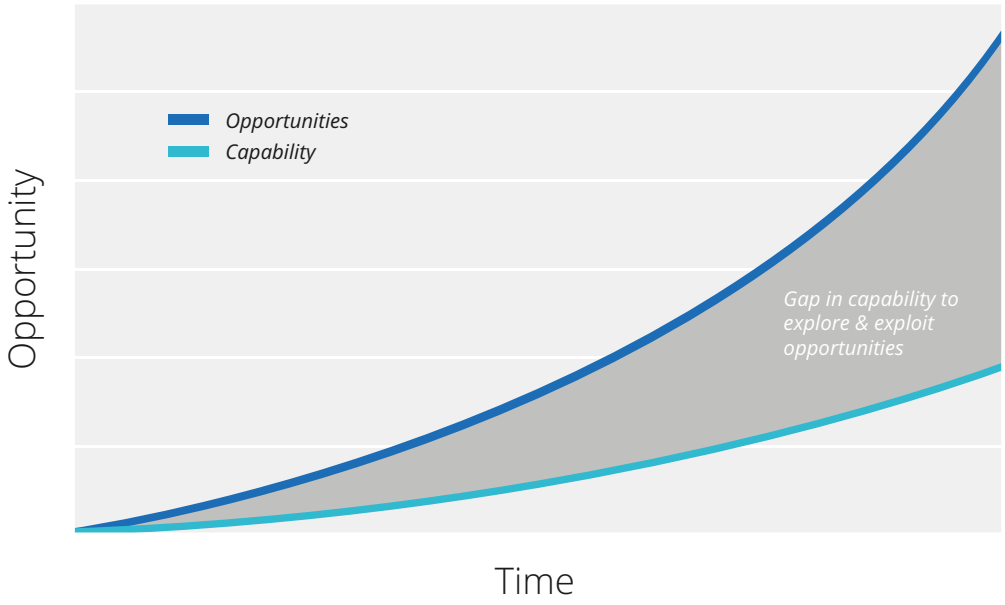

Figure 2 - Gap between insurgent opportunity and enterprise capacity to respond

What is important to note here is that in the world of the Third Industrial Revolution, the choices of both the enterprise and the insurgent are grounded in valid market needs. Large enterprise leaders in slowly evolving industries are justified when they pursue strategies that support an ability to scale and optimize their operations. Similarly, startup entrepreneurs are not less sophisticated because they discount many of the concerns of an operationally focused CIO.

New opportunities close the gap

The market rationale for partitioning technology strategies begins to crumble with the advent of the Fourth Industrial Revolution. New technologies empower business model level disruptions that create a new type of opportunity, one where it is possible to reinvent entire industry ecosystems.

These are possibilities that are both deeply threatening and immensely exciting, and they will force business and technology to draw together in a shared ownership of the future. This is not just about the use of a new technology or the introduction of a new product. Uber's story suffers from overexposure, but even with all the print dedicated to it the point of the change is often missed. Uber didn't just field a better service offering or find an innovative use for mobile technology. They redefined the rules of an industry.

In *"Big Bang Disruption"*, Larry Downes and Paul Nunes describe how these disruptive competitors enter the market better, cheaper and more customized.

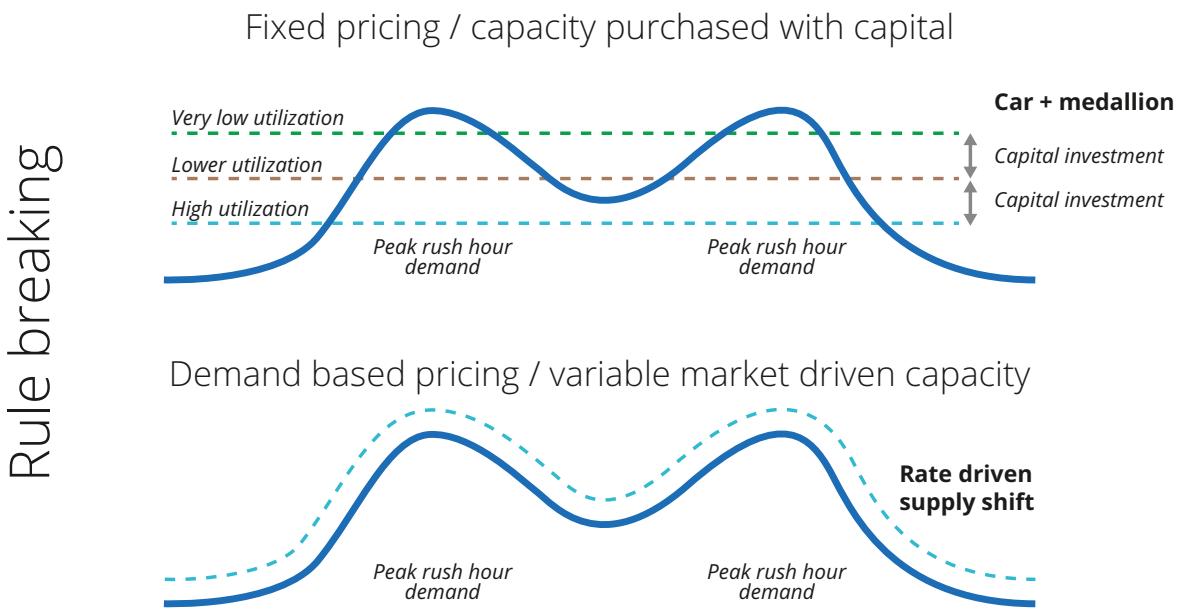

Figure 3 - Uber changes the rules and creates unfair advantages

At Uber, Garrett Camp and Travis Kalanick did this by architecting a fundamentally new business ecosystem with a radically different set of operating constraints. For example, instead of being locked into fixed capacity purchased and sustained at great cost, they coupled variable pricing with on-demand capacity to automatically respond to the ebb and flow of travel needs. They could put more cars on the road when it mattered and simultaneously avoid paying for unused capacity in down times.

Many disruptors make multiple changes in the business model. In Uber's case they also changed the customer acquisition model. Traditional taxis have particularly inefficient ways to acquire customers, literally driving around the crowded streets of a city waiting for customers to raise their hands. For a traditional taxi company, the same limited resource that earns revenue, must also be used to search for customers. Uber and the other firms that have adopted on-demand mobile apps avoid this inefficiency completely. They can also use it to expand the market conditions they serve, since even in low demand times a customer can find a car that's only several blocks away. Uber plays by different rules. It's not a fair competition, and that is why it only took four years from their 2011 New York City launch to put more Uber drivers on the street than the venerable NYC taxi companies.

The ability to innovate at scale may be the headline, but it is far from the only type of opportunity that occurs when tech moves to the core of an organization's business strategy. The combination of technologies like IoT, Big Data, and The Cloud can open doors to highly personalized products and services (figure 4). For example, retail experiences are ripe for a reimagining that goes far beyond the mechanics of omni-channel service and online buying. Retailers who understand the nuances of the life of a customer in real time can deliver the right service, at the exact moment of need.

CLICK HERE TO PURCHASE "Big Bang Disruption" by Larry Downes and Paul Nunes

Fourth Industrial Revolution technology combined with the move to tech at core allows the next generation of retailers to escape from the box that has defined the store for a hundred years.

When technology is at the core of businesses, an entire spectrum of possibilities ranging from industry disruption to ruthless efficiency becomes possible (figure 4). Building tight strategic collaboration between technology and business allows each of these areas of opportunity to be pursued in newly aggressive and creative ways.

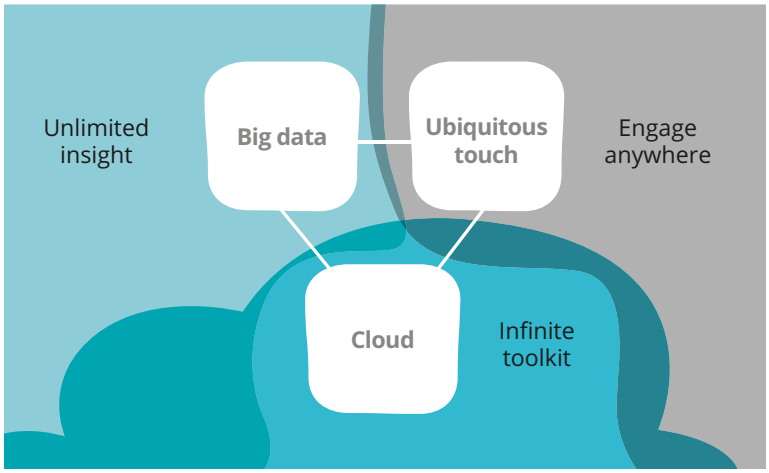

Figure 4 - IOT, Big Data, and the Cloud provide powerful strategic synergies for reshaping customer experience

The divide between enterprise and insurgent thinking blurs, with neither the startup nor the enterprise free to focus on their end of the spectrum exclusively. For example, a race is currently underway to redefine the financial sector. Trillions of dollars of managed assets are in play, meaning large global players have invested hundreds of millions of dollars on multi-year innovation programs, only to have a startup with few legacy anchors quickly deploy a competitive business ecosystem with only $25 million in investment.

In Kurt Schwab's words, this is a revolution that "is disrupting almost every industry in every country." It's an exciting and frightening prospect with every firm—both insurgent and established industry leaders—being empowered to aim at a diverse array of cutting edge business opportunities.

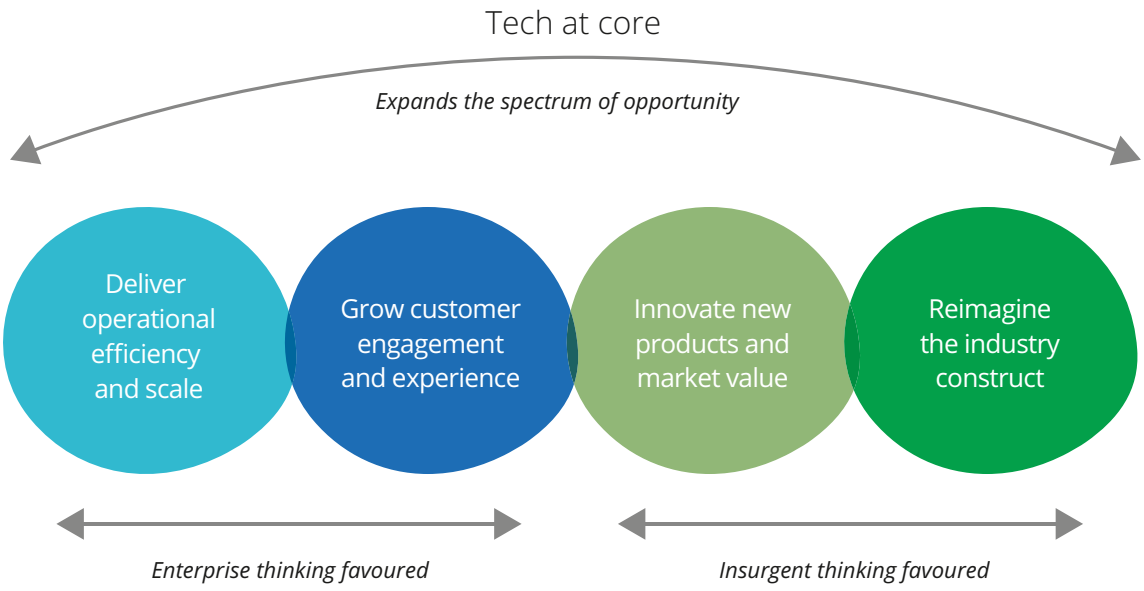

Figure 5 - Tech at core enables a broad set of business opportunities

Courageous new leaders

The WEF doesn't sugarcoat the scope of the change ahead as the Fourth Economic Revolution—and by extension, the move to tech at core—requiring changes to the very fabric of how a business works: "The breadth and depth of these changes herald(s) the transformation of entire systems of production, management and governance."

This business transformation is not limited to IT or sequestered in a few specially designated teams. Not only is every business now a digital business, but every part of every business is digital. As a result, a growing team of tech empowered CXO's is emerging to lead the cross enterprise application of technology.

New roles such a Chief Digital Officers, Chief Innovation Officers, Chief Information Strategy Officers, and Chief Data Officers are charged with integrating technology and business in new and original ways. Existing enterprise roles such as CEO, CFO and COO are also drawing on a deeper strategic view of technology and unsurprisingly, traditional tech leaders—CIOs and CTOs— long responsible for reliable operations and timely project deliveries, find it necessary to become creative, business-savvy partners.

ATTRIBUTES OF COURAGEOUS LEADERS

Courageous leaders driving tech at core are often distinguished by:

1. Diverse background the spans both technology and business thinking.
2. Strategic mindset that sees the big picture behind challenges and opportunities.
3. Outcome (results) not output (project completion) focused.
4. Risk savvy. Willing to take risks, but also smart about how to mitigate risk in uncertain situations.
5. Passion for change. Not attached to the status quo.
6. Dependable courage. Willing to stick with uncomfortable ideas and pioneering teams, even after the initial excitement wears off.

Together, these roles are making a push into the Fourth Industrial Revolution, leading disruptive change in both their own organizations and in the markets that historically defined their business. It is important for them to be tech savvy, but in our experience, the essential attributes of a successful leader in this space is a form of passionate courage (see box).

These leaders are developing enterprise capabilities across the entire spectrum of tech enabled business opportunities. They are developing the capacity to deliver new, complex ecosystems that disrupt their industries whilst simultaneously working to create an agile enterprise that's responsive to new insights from the market. Finally, they are redefining the role of legacy assets, expecting both flexibility and scale from long-term investments.

Let's look more closely at the key initiatives needed to help develop these principal tech at core capabilities.

(1) Enable complex ecosystem innovation

At the far right of our spectrum of opportunities lies the possibility of leading deep disruptive changes in a market's business ecosystem. These radical opportunities redefine the industry's construct, both by changing the rules of the market and often making incumbent positions obsolete.

However these are not incremental improvements to existing products and services; and are seldom even a new product idea deployed in the existing business construct. Instead, true disruptions change the underlying architecture of the business ecosystem, which requires complex innovations at a system level. Diverse stakeholders are bought together in new ways, meaning the change involves a wide range of skills, not just technology. Well-honed conventions within the business are upended.

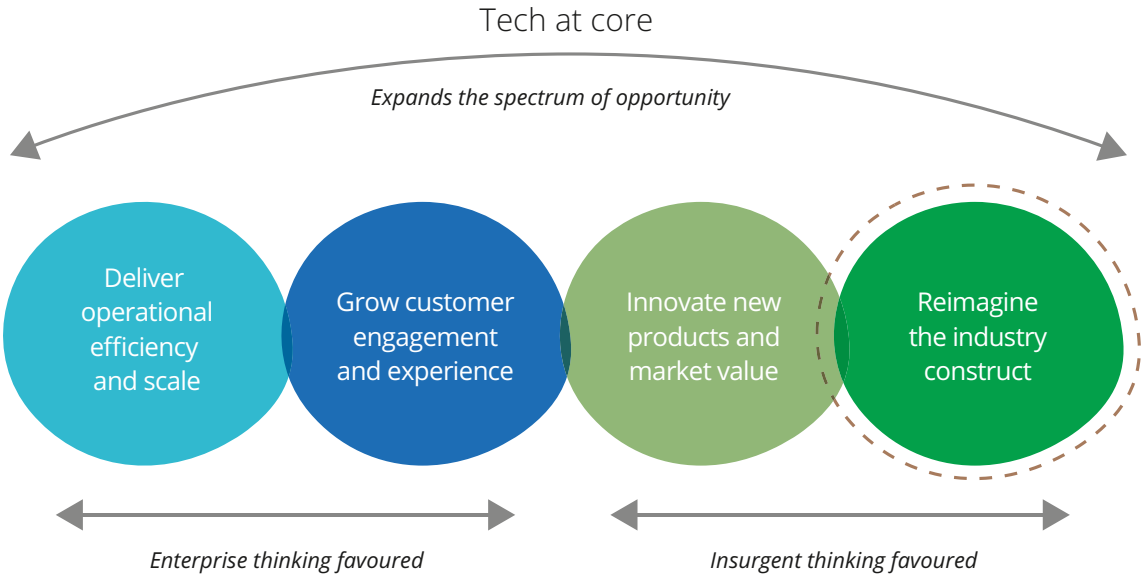

Figure 6 - Enabling your disruptors to work at the frontier

It is a journey where even startups are often poorly positioned to succeed. Sophisticated business incubators and venture capital operations can have shockingly low success rates. Y-Combinator, a well-respected incubator in New York City, has a graduation rate as measured by scaled up business operations of only 12%.

Four strategies can help a firm develop the capacity to build disruptive new business ecosystems:

- Embrace complex innovation. Historically, innovations in a business were intentionally simplified and limited in scope. Conventional innovation practices like Lean Manufacturing and Lean Startup kept the scale of change small, (figure 7) and organizations sought out the tame corners of creative change, while avoiding the "Messy Middle" where opportunities required bold architectural changes at scale. Teams must be encouraged to imagine and build complex new ecosystems, even when there is no clear path to completion at the beginning of work.

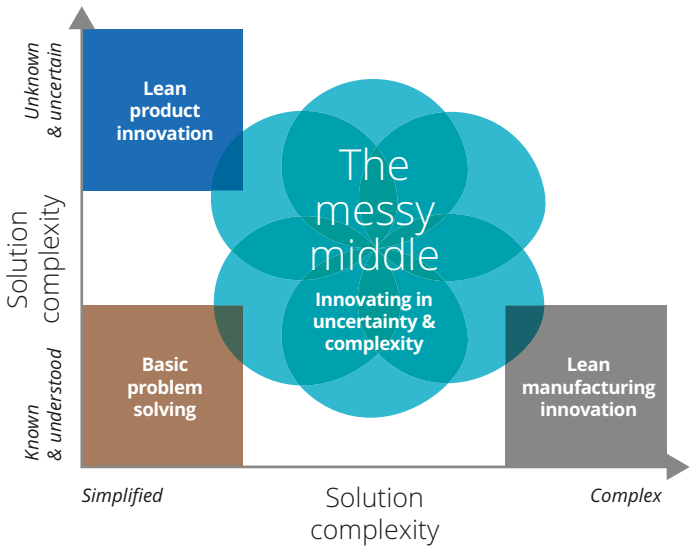

Figure 7 - Innovation methodologies often focus on simplified problems – disruptive innovation works in the Messy Middle

- Aggressively break silos. Re-architecting ecosystems is not a job for narrow specialists working in isolation. Historically, the capabilities of a product team were thought of in terms of a factory assembly line model, separating functional areas into categories such as strategy, user experience, app dev, QA, and infrastructure support. To tackle the complexity and multiple dimensions of an entire business ecosystem, these old walls must be broken down. This is only the start, however. The walls between functional areas in the business must also be breached, so that disruptive innovation teams can ruthlessly cut across all the business and technology silos of the organization.

- Open the door to the tech frontier. Traditional conservative IT practices that rigorously prove out each tech stack choice must be balanced against the opportunity to create advantage by using new technologies. Technology leaders must recognize that some tech choices made at the frontier will prove to be dead-ends, and that later rework will be needed. Of course, these same pioneering choices may also create an early beachhead within the business for the technology of the future.

- Demonstrate the art of bold failures. Both IT and business must be aligned on the virtue of bold risks and leverage the same kinds of motivators that enable startups to operate the technology frontier—with a series of investments and sustained commitment over time. Ironically, while IT is often maligned by business partners as a barrier to nimble action, agile practices based on fast feedback, small experiments and responsive learning are often an organization's best example of a new test-and-learn way of thinking about risk.

(2) Build a lean learning enterprise

While big disruptive innovations claim the headlines, there are substantial opportunities in the middle of the spectrum. This is an area where serving new customer needs and improving customer experiences can be done within the existing marketplace models.

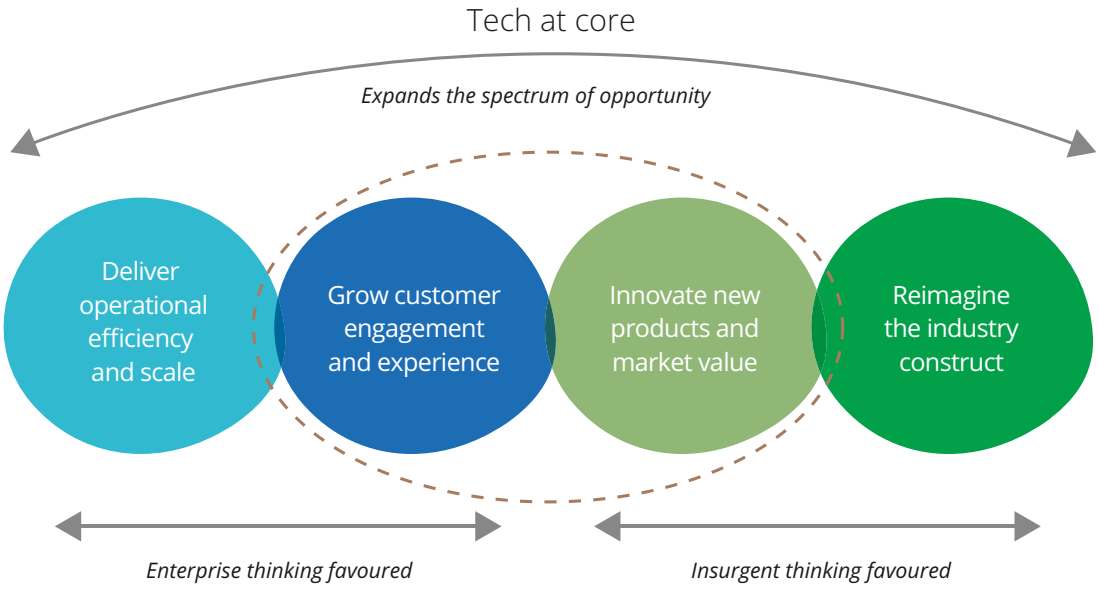

Figure 8 - Empowering teams to learn and respond

"Middle of the spectrum" business opportunities have historically been the domain of groups such as marketing and sales, while IT focused on efficiency and cost. One of the dirty little secrets of early customer relationship management (CRM) system investments was that the initiatives were seldom motivated by an interest in customer experience. The real goal was a Third Industrial Revolution focused on operational and cost efficiency.

Tech at core organizations flip this thinking. For example, a bank can rethink customer facing business processes without going as far as reconstructing the industry. Number 26, "Europe's most modern bank account", combined design thinking, data innovations and mobile to make it possible for a new customer to open a bank account in eight minutes without leaving home or submitting any documents.

It's exciting when technologies such as Big Data, context aware recommendations and omni-channel engagement combine to enable new high value customer experiences. However, simply having new tools are not enough.

Tech at core innovation requires broader changes in enterprise behavior so that teams are continuously engaged in learning and responding to market insights.

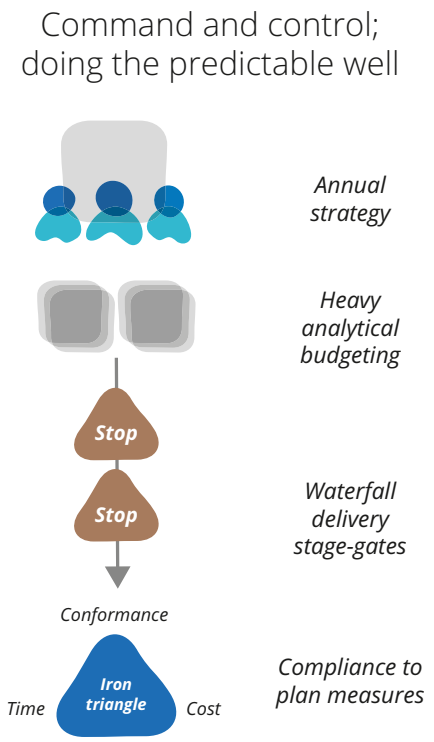

Figure 9 - Command and control models block market learning

- Measure market outcomes not project outputs. Traditional business management is based on command and control, where budgets are established, fixed requirements are captured, and action is taken. Success is measured by conformance to the original plan (figure 9), and this methodology works when measuring engineering performance improvements. It is far too inflexible and inward focused to deal with the shifting opportunities that drive customer engagement. Teams measured on simple completion of work (outputs) will never be motivated to pursue the insights needed to drive market performance (outcomes).

- Empower teams to learn and choose. Nuances of customer experience and product desires are best gathered and acted upon by multi-skilled teams who are working on the front lines of product construction and design. Adding powerful tools like Big Data and advanced analytics is of little value if teams are not empowered to use them creatively in response to the market. Empowering teams means that senior leaders must reimagine their role; giving up the right to control others, and instead setting the target business goals of work.

- Create diverse teams that do their own work. Traditional IT organizations often slice large queues of work into smaller pieces, scattering them amongst teams based on application responsibility or technology platform. This can succeed when initiatives are predefined and fixed, but it doesn't work when new insights from the market continually shift the direction of work. Teams need to have control over most of—if not all—the elements of their effort and should ideally pursue one mission at a time. This requires a new discipline in portfolio management, since letting teams focus on a specific effort to create market value means that new work can only be taken on when existing efforts are completed or cancelled.

(3) Create flexible legacy assets

The idea that a large enterprise can simply abandon the practice of operating efficiently at scale is naïve. Scaling a market opportunity is the way that investments in innovation pay for themselves. As a result, operational efficiency and scale, the left hand side of the opportunity spectrum, remain areas where organizations must have well developed capabilities.

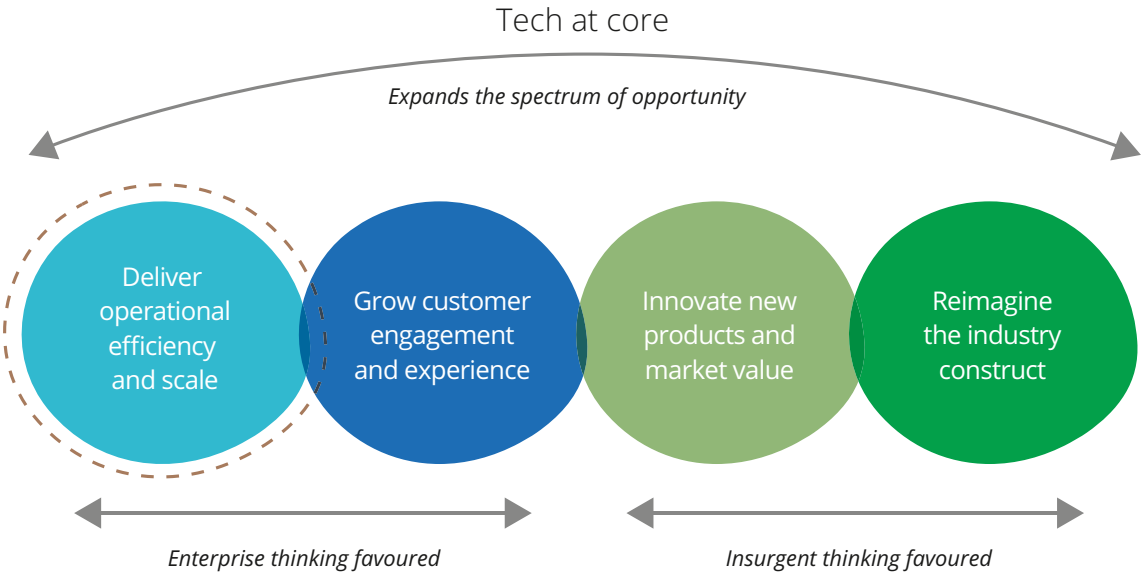

Figure 10 - Replacing anchors with flexibility

This does not mean that IT can approach technologies in the same way they did when operating efficiency was the primary concern of the firm. Disruptive change will fluctuate with increasing frequency into even foundational business systems. This presents one of the greatest challenges to the tech at core technology architects; they must create a technology that provides services at scale, without burdening future opportunities with inflexible enterprise systems. Fortunately, this is a challenge that has received a great deal of attention recently, with strategies emerging to allow enterprise leaders to have size and flexibility too.

- Leverage assembly / architect creative platforms: Traditional enterprise systems were built to serve complicated but well defined business activities. Their use and operation was expected to remain relatively stable over time and when changes did occur, these legacy applications required radical re-engineering. This often forced organizations to choose between a massive system replacement "death march" or the acceptance of years' worth of accumulated tech debt. New software models aspire to serve needs at scale, but leverage loosely coupled architectures that minimize lock-ins. These creative platforms evolve a range of services that grow and shift over time (figure 10).

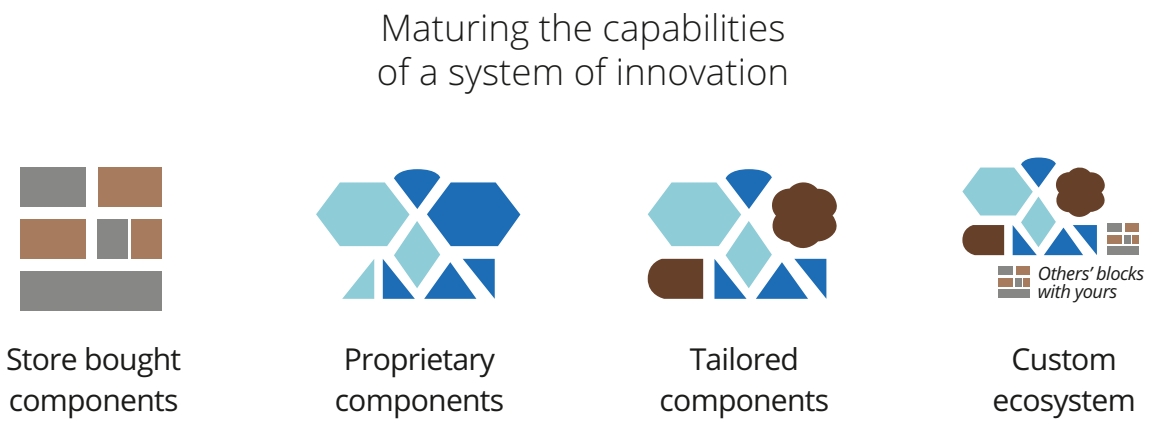

Figure 11 - Component assets can evolve to provide both operational scale and creative flexibility

- Slowly strangle legacy systems. The final challenge is often one of the most troubling. Legacy systems were seldom designed for flexibility, so after years of patches and force fit changes, they are typically rife with technical debt, brittle components and are nearly impossible to change. Huge "big bang" re-writes are seldom successful and can paralyze an organization for years. An alternative strategy is to incrementally strangle these legacy systems. Thin slices of functionality are strategically migrated to a new, more flexible architecture. As new capabilities are bought in line, the old system gradually loses its ability to block new innovations.

Courageous leadership into the fourth industrial revolution

The World Economic Forum says the "the introduction of new technologies creates entirely new ways of serving existing needs and significantly disrupt existing industry value chains."

The courageous leaders of tech at core organizations have many new technologies to embrace in this Fourth Industrial Revolution. Yet this technical undertaking will seldom be the biggest barrier to success in the new marketplace. It will often be far more difficult to build new capabilities for creative invention across all the dimensions of an enterprise. We are warned that "the inexorable shift from simple digitization (the Third Industrial Revolution) to innovation based on combinations of technologies (the Fourth Industrial Revolution) is forcing companies to re-examine they way they do business."

If you are one of these leaders, there will be few of the comfortable certainties that existed in an age of clearly defined projects and slowly evolving services. Tech at core opens the door to the bold and creative pursuit of unprecedented new market opportunities. While success will certainly depend on investing in the right technology assets to sustain a competitive edge, the broader challenge will be recognizing the critical new role of tech in enterprise strategy and transforming the products, people and processes of the organization to claim a place in this new economy.

DAN McCLURE

Innovation Design Lead

Dan McClure supports executive teams and program leaders of creative organizations working to extend the impact of their innovation investments. He draws on over 30 years of hands on experience leading and enabling enterprise innovation, working with a wide range of retail and commercial firms in diverse business sectors, as well as government agencies, humanitarian and not for profit organizations.

He has collaborated with some of the world's largest retailers, enabling organizational change agents to respond to disruptive change in their marketplace. He leads ThoughtWorks' efforts to stretch and extend innovation practices, focusing on the emerging challenge of doing "big innovation" with complex enterprise scale ideas that have the potential to disrupt and transform markets.

SAI MANDAPATY

Global Head of Strategic Client Partnerships

Sai Mandapaty is a senior business executive and growth champion at ThoughtWorks, with global responsibility for executing strategies that create disruptive client value. In addition to guiding client change, he leads internal organization transformation initiatives critical to ThoughtWorks growth agenda.

His passion is building global technology businesses. With experience that spans 25 years, he has engaged in a broad spectrum of business capability building, including the development of strategies, marketing, selling and delivering solutions across the technology consulting industry. He has hands on experience with the challenges of enterprise change, managing end to end P&L's, leading global teams, and guiding transformation efforts.

Reflecting the importance of rooting change in powerful market needs, Sai approaches transformations with a clear bias toward markets, clients, and consumers. He leverages a broad background in organizational leadership, drawing on time spent as Managing Director of ThoughtWorks North America and Global Head of Demand. Prior leadership roles include Global Head of Financial Services and Global Head of Travel & Transportation verticals at Satyam Computer Services (now Tech Mahindra), a US $2B IT services firm. His training reflects the cross disciplinary message of tech at core, combining both business and technical degrees.

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