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"In the 'real world,' consumer technology (CT) and operational technology (OT) are as effective in value delivery as IT is. To understand modern software, we need to think in terms of IT+CT+OT."

— Israel Gat, Guest Editor

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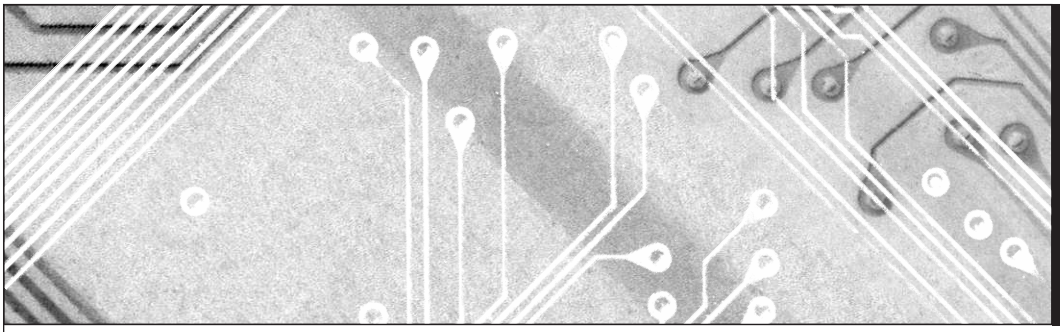

Cutter IT Journal

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Part of Cutter Consortium's mission is to foster debate and dialogue on the business technology issues challenging enterprises today, helping organizations leverage IT for competitive advantage and business success. Cutter's philosophy is that most of the issues that managers face are complex enough to merit examination that goes beyond simple pronouncements. Founded in 1987 as *American Programmer* by Ed Yourdon, *Cutter IT Journal* is one of Cutter's key venues for debate.

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Opening Statement

by Israel Gat, Guest Editor

SOFTWARE EMANCIPATED

I still remember the nights filled with the tremendous rush of adrenaline that accompanied my getting the Technion[1] IBM 360/50 in stand-alone mode for system programming work. Being the sole "master" of millions and millions of lines of operating system code was intoxicating for the young kid that I was then. Drawing a distinction between software and IT had not occurred to me at all — the IBM 360/50 with its millions and millions lines of code (was it the MFT operating system or was it actually its "cousin" MVT?), together with various IBM applications and "free" on-premises customer support, were tightly bundled together physically, logically, and contractually. As far as I was concerned back then, IT was the sole channel for any software.

Fast-forwarding to July 2013, I perceive the two — software and IT — as completely independent. IT is just one possible channel through which software delivers value. Moreover, the traditional IT channel is being outclassed, outgunned, and outmaneuvered along two dimensions, as follows:

1. Within the corporation, IT is becoming departmental. For most practical purposes, marketing already has its own IT; other departments will no doubt soon follow. These inhouse structural and budgetary shifts are accentuated by the rise of a new class of service providers such as Amazon Web Services (AWS), Heroku, Cloud Foundry, and AppFog.
2. In the "real world," consumer technology (CT) and operational technology (OT) are as effective in value delivery as IT is. From Spotify on our iPhones to utilities, cars, and cities becoming smarter and smarter,[2] software, to a large degree, is delivered and creates value either independent of IT as we knew it, or as part of an overall configuration in which IT is not necessarily the most important component. To understand modern software, we need to think in terms of IT+CT+OT.

From what I glean in various client engagements, what we are experiencing these days is transformative. Both CT and OT are disrupting well-established paradigms we accepted and followed "forever." In particular, the information and communications technology (ICT) paradigm that prevailed through the fifth technological revolution[3] is sort of becoming "ICT on steroids." As Cutter Fellow Robert Charette recently told me, he does not expect his grandchildren will drive cars, let alone know *how* to drive them.

Forthcoming evolution in any one of the three areas — IT, CT, and OT — is quite intriguing. When all three evolutions are pulled together in a synergistic manner,[4] they have the potential to turn into a revolution.

A PRISM FOR THE READER

If you accept the premise articulated in the previous section, the natural question to ask is, "What is a CIO to do?" If the projected changes indeed take place, the breadth and complexity of the issues to deal with might be overwhelming even for the best and the brightest.

I would suggest you use this issue of *Cutter IT Journal* as kind of a prism that refracts the overarching trend into five kinds of "light," as follows.

First, Cutter Fellow Steve Andriole addresses the reorganization of IT. Andriole expects most of the "action" to reside in the business units, while three functions — infrastructure, architecture, and security — will remain centralized. These will report to the CFO as part of the enterprise audit function.

Likewise, our second author, Paul Clermont, foresees a revolution in the IT function, which he refers to as the "ITF." At the CxO level, aggressive tooling for "ITF 2.0" is called for. At the individual level, Clermont sees it as a matter of "adapt or die." For those who would not adapt, he suggests that a career in organic farming is as noble a pursuit as IT is.

Conversely, in our third article, authors Enrique Castro-Leon, Robert Harmon, and Mazin Yousif perceive services in general, and service innovation in particular, as the "glue" that will continue to hold IT together. They are actually bullish to the extent of asserting that "IT

innovation has never stopped, and there is no indication that it will ever will."

Our fourth author, Cutter Fellow Vince Kellen, differentiates between tactics and strategy. Strategically, firms will continue to use IT capabilities to succeed in the market. Tactics for so doing, will, of course change. New architectural and organizational skills will be required to exploit those new tactics.

Last but not the least, Yesha Sivan considers IT as the driver of innovation. He examines five kinds of innovation platforms: process innovation platforms, generative innovation platforms, ready-made innovation platforms, technological innovation platforms, and "build-your-own" innovation platforms. Sivan argues that in enabling, supporting, and building these innovation platforms, IT plays a crucial role in innovation.

ACTING ON THE TEA LEAVES

This issue of *Cutter IT Journal* is rich in actionable insights. Some of these insights are already being acted upon in segments where the pros clearly trump the cons. For example, numerous chief marketing officers (CMOs) are *de facto* running their own IT departments. Some do so as shadow IT, some in collaboration with their CIOs. Either way, in conjunction with the new generation of software providers discussed above, software has been emancipated by these CMOs.

The pragmatic question readers of this issue will wrestle with is, "When does an actionable insight become worth acting upon?" For example, if you are a CIO, you may wonder what the right time for reorganizing your IT department along the lines proposed here might be.

My answer to this question is "sooner than you think." The only thing one needs to add to the qualitative approach used in this issue is a rigorous quantitative analysis. Once such an analysis is available, the decision as to which insight to act on now and which one is better left for the next year or the year after becomes a fairly straightforward calculation.

The ancient Greeks believed that the future is behind us.[5] To their way of thinking, we can see the past and the present — they are in front of us. Conversely, the future (which can't be seen) is behind us. I would humbly submit that, metaphorically speaking, the future of IT is indeed behind us. It will take backing into it to clearly understand where it heads and to act on this understanding. The articles in this issue of the *Cutter IT Journal* will serve you well as you back into the future.

ENDNOTES

[1]Technion = the Israel Institute of Technology.

[2]For a comprehensive list of the potential OT applications, see: "Smart Infrastructure: The Future." The Royal Academy of Engineering (UK), January 2012.

[3]Perez, Carlota. *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. Edward Elgar Publishing, 2002.

[4]For example, through a construct similar to "full-stack mobile."

[5]Knox, Bernard. *Backing into the Future: The Classical Tradition and Its Renewal*. W.W. Norton, 1994.

Israel Gat is a Cutter Consortium Fellow and Director of the Agile Product & Project Management *practice, a Fellow of the Lean Systems Society, and a member of the Trident Capital SaaS advisory board. Dr. Gat is recognized as the architect of the Agile transformation at BMC Software, where, under his leadership, Scrum users increased from zero to 1,000, resulting in nearly three times faster time to market than industry average and 20%-50% improvement in team productivity. Among other accolades for leading this transition, he was presented with an Innovator of the Year Award from* Application Development Trends *in 2006.*

Dr. Gat's executive career spans top technology companies, including IBM, Microsoft, Digital, and EMC. He has led the development of products such as BMC Performance Manager and Microsoft Operations Manager, enabling the two companies to move toward next-generation system management technology. He is also well versed in growing smaller companies and has held advisory and venture capital positions for companies in new, high-growth markets.

Dr. Gat currently splits his time between consulting and writing. He focuses on technical debt, large-scale implementations of Lean software methods, and Agile business service management ("devops"). His e-book, The Concise Executive Guide to Agile, *explains how the three can be tied together to form an effective software governance framework. Dr. Gat holds a PhD in computer science and an MBA. In addition to publishing with Cutter and the IEEE, he posts frequently at* The Agile Executive *and tweets as agile_exec. He can be reached at igat@cutter.com.*

Out of the Gate and Running Wild:
Why There's No Stopping IT Now

by Steve Andriole

Information technology (IT) is changing *again*.

The organization, delivery, and governance of IT have changed before, but this time the change is here to stay. There are three major drivers of this change:

1. Accelerating consumerization
2. Available "ready" technologies
3. Growing "participatory governance"

There will be three major outcomes of this change:

1. Post-federated/decentralized technology adoption and delivery
2. Agile technology–enabled business models and processes
3. A restructured business technology marketplace

THE DRIVERS

Consumerization

Everyone has stories about how personal technology made its way into their company. The explosion — and availability — of technology capable of solving countless personal productivity and business problems has forever changed the technology adoption process. iPhones and iPads were in use well before IT organizations declared them safe or made them standard issue. The same is true of Skype, Dropbox, Expensify, and Basecamp, among a growing number of technologies and technology-enabled services.

Consumerization is about a technology repertoire enabled by major and non-major vendors that sell — or *give* — directly to individuals. Consumers adopt these technologies on their own and share them among their friends and colleagues. But the difference today is that consumerized technologies now solve *business* problems, and they do so easily and cost-effectively.

Often to the chagrin of the IT staff, consumerization is now as much a part of technology acquisition and delivery as the due diligence teams that filled countless conference rooms for decades. Instead of endless presentations by vendors about just how great their technologies are, consumers now routinely try-and-buy technologies quickly and cheaply from the consumerized infrastructure and applications marketplace.

These trends are accelerating. More and more of the technology hard at work inside companies has its roots in a smartphone or tablet. Advertisers, friends, bloggers, and family all keep the lists current: look at the number of times you've heard about a new technology from friends versus the number of times you've heard about technology from your IT department. This process will not change.

Employees (AKA consumers) vote their digital preferences with laptops, tablets, smartphones, and applications that make them productive — not from votes cast by their technology managers. They go to the cloud to store documents and data, host digital meetings, and find productive applications. Sometimes these clouds are part of their company's delivery infrastructure, but increasingly they are not. The same employees are also seeking advice in "the crowd" (the consumerized help desk) where opinions, expertise, and problem solving are instantly and continuously available.

Ready Technology

Twentieth-century technology adoption models were predicated on the diagnosticity of business requirements and technology maturity. The assumption was that technology and business requirements evolve at a pace that justifies phased adoption. Early deployments were assumed to be risky, costly, and therefore unnecessary.

Defined business requirements were prized. An enormous industry was created around "requirements analysis," "requirements modeling," and "requirements validation." Books, articles, conferences, and workshops were everywhere. The prevailing wisdom was that business requirements modeling and validation were prerequisites to technology adoption, and that structured

pilot demonstrations with compelling TCO and ROI results were necessary to justify deployment. Technology also had to integrate and interoperate with existing technology infrastructures and architectures. If it failed to cost-effectively integrate, adoption was often halted. If it did integrate, then a structured transition period was defined to test and deploy the new technology before it went into "production." Finally, "new" technology — just like old technology — required continuous support and expensive refreshes.

The new cloud-based technology delivery models and the proliferation of consumerized devices and applications have completely changed the governance game.

Technology adoption is different today. "Requirements" are often undefined and driven by employee-consumers who look to solve a variety of problems with technologies that are acquired — and sometimes even supported — way outside the corporate firewall.

Consumer-driven requirements analysis, exploration, *and discovery* are the mainstays of ready technology adoption. Note also that what I previously described as controlled pilots are today largely ad hoc opportunistic experiments that sometimes quickly turn into technology deployments — with or without the approval of corporate IT. Support is provided by ready technology vendors who also keep the technology current (even as they perform backups).

There's a growing number of technologies ready to go to work immediately. Many of these technologies are cloud-based, open source, and live outside corporate firewalls. Many of them are easily and inexpensively accessible to corporate professionals and will therefore continue to find their way into companies of all shapes and sizes — regardless of what CIOs think about the readiness of the technologies.

Participatory Governance

In the 20th century, governance was largely about technology standards and control. As we moved into the 21st century, things began to change, first from centralized to federated and then, more recently, to "participatory." Governance now involves more stakeholders than it ever did, most of which live outside the corporate firewall. Participatory governance is emerging as the post-federated governance model.

In fully centralized technology organizations, all of the decision rights belong to an enterprise control group. In decentralized organizations, decision rights are diffuse, spread across the enterprise and the business units. In federated technology organizations, rights are shared across the enterprise, the business units, and even specific corporate functions.

Since the mid-1990s, the governance pendulum has swung wildly. In the mid- to late 1990s, technology was considered strategic. After the dot.com crash in 2000, the pendulum swung back to operational control. It stayed that way until 2003, when technology budgets began to increase again. The pendulum swung once more from operational to strategic, where governance was shared between the enterprise CIO and the business unit CIOs (or just the business unit technology directors). We stayed on this course until the world melted down in 2008, and the governance pendulum swung all the way back to total budget lockdown, in which governance was centralized in the hands of a few senior executives — or just one, such as the CFO, the COO, or (infrequently) the CEO.

During all this swinging, something changed. Almost as though it was clandestinely taking advantage of budgetary distractions, technology freed itself from the control of both enterprise and business unit professionals. It escaped from all of the arguments that had it swinging back and forth for decades. In fact, it rendered the "control" word moot: *technology commoditized, consumerized — and left the building*. It also finalized the near-total dependence business has on the reliability, scalability, reach, and security of its digital technology. Put another much simpler way, business cannot function, or exist, without information technology — and everyone knew it.

In spite of the warnings and trepidations, business units are now aggressively adopting new technologies. Consumerized, cloud-delivered technology has changed the rules around acquisition, deployment, and support. Business units no longer ask corporate IT if they can rent software or buy iPads. They just rent and buy as they choose — often without even telling IT about what they've done.

"Shadow IT" is bigger than ever.[1] The ability of business units to do what they please is fueled by the technology itself. Cloud computing — renting rather than buying technology — and easily supported devices — like smartphones and tablets — make it easy for anyone to acquire, deploy, and support digital technology. The new cloud-based technology delivery models and the proliferation of consumerized devices and applications have completely changed the governance game.

THE OUTCOMES

Post-Federated/Decentralized Technology Adoption and Delivery

Within five years, IT "departments" will disappear in many companies. "Technology" will merge with business models and processes, or, more accurately, become seamlessly immersed in them. The technology function will exist across the business, fueling numerous business activities and processes — such as sales, marking, finance, customer service, innovation, and supply chain management — among all of the business functions and activities that comprehensively define a company's business models.

In practice this means that there will be "technologists" on all of the business teams. There will be sales technologists, marketing technologists, finance technologists, customer service technologists, innovation technologists, and supply chain management technologists (among others) who understand both business processes and models and current and emerging digital technology.

These business technologists will be opportunistic. They will acquire and deploy technology as quickly and cheaply as possible. They will do so because they will be (business unit) *project* — not (enterprise) *standards* — driven. They will be problem solvers working side by side with their colleagues in the business functional areas. Many of them will also work side by side with their customers and suppliers, since digital technology is the glue of business.

Enterprise IT — what we now describe as the keepers of a company's technology infrastructure — will also move. Unlike what we describe today as "business partners," though, infrastructure jockeys will move to the enterprise audit function. They will pursue a three-pronged agenda: architecture, infrastructure, and security. Enterprise IT in corporate audit? It's a natural fit. Audit already owns security and operational performance. The addition of the architecture function is consistent with audit's role as an optimizing group responsible for making things consistent, compliant, and measurable. After it moves to audit, enterprise IT — responsible for infrastructure activities like email, storage, backup, and recovery — will do what operational IT does best: deliver secure, recoverable basic services as cheaply as possible. The architecture function is important because it will ensure that the technologies the lines of business deploy will not crash networks or corrupt infrastructure applications. Audit is the best place to enforce the architectural standards that enterprise IT groups have failed to enforce for decades. Audit is also the best place for another new core competency: cloud and application service-level agreement (SLA) negotiations and management. Since procurement is often part of the larger audit team anyway, it's a natural place to locate cloud SLA management.

Agile Technology–Enabled Business Models and Processes

Agile's still all the rage, and why not? Anytime anyone can simultaneously attack an ineffective/slow/expensive process and replace it with a better/faster/cheaper one, there's happiness all the way around. Agile is about the role that technology plays in business problem solving. Agile is financially unconstrained. Where we previously invested huge amounts of capital in technology assets that locked us into long-term amortization commitments, today we invest operating dollars in technology assets we've never met and to which we have no long-term financial relationship. The whole technology acquisition and deployment process is now fluid, dynamic, and unconstrained.

Cloud delivery enables agility, while offering low-cost infrastructure and applications. Low-cost (and sometimes free) applications enable agility. Business technology pilots are not designed to validate discrete requirements, but to discover new continuous ones. If none are discovered, you can then move to the next technology-inspired solution. This is agility.

The conventional approach to technology acquisition and design has been replaced by visits to the app store and the cloud. The number of truly new application design and development projects has fallen dramatically and will continue to fall. The Agile-versus-SDLC argument just isn't that relevant anymore.

In the context of organizational change, Agile refers to the approach companies take to technology acquisition and delivery. *We can invest and divest in the same day* — something that wasn't conceivable in the 20th century. Invest-and-divest agility impacts every aspect of business. Technology-enabled models and processes are quickly discoverable, modifiable, discardable, and reconstitutable. The more "agile" the company, the more competitive it will be — without the financial drag of old technology acquisition and delivery cycles.

A Restructured Business Technology Marketplace

The technology marketplace is still largely controlled by a relatively small number of vendors. IBM, HP, Microsoft, Cisco, Dell, EMC, Oracle, and a few others own a disproportionate percentage of the corporate technology market. But this is changing. Some new entrants like Amazon, Rackspace, and Apple are now serving more and more companies and eating into the market share of the perennial elephants. Perhaps more importantly, the number of emerging technology vendors is growing dramatically. The *Wall Street Journal* reports that an increasing number of companies are buying from emerging or even startup technology vendors.[2] Others report that emerging technologies are becoming mainstream technologies almost overnight.[3] This is a huge change and directly related to the need for speed and agility. In fact, Guy Currier of *CIO Insight* reports that the drivers of emerging technology adoption include "improving business agility, creating cost savings or productivity enhancements, and opening up new markets or opportunities for the enterprise." Many old-school technology buyers and vendors operate within a waterfall procurement process with distinct steps that eventually lead to procurement. The new technology adoption process is much more about speed and relevance — and rapid assessments about the contribution that the technology is (or is not) making to the company.

Companies need speed and agility, and the structure of the new marketplace will continue to satisfy these demands. Established technology vendors must adapt to the new technology delivery models even as they struggle with some profit loss: vendors make more money, for example, from licensing enterprise software to their clients versus clients' paying only for what they use. Smaller vendors will attack the markets previously owned by the major established vendors, resulting in a much wider set of vendor options for customers seeking fast/cheap/adaptive solutions to their well- *and* ill-defined requirements.

The impact of the new technology marketplace will be profound. It will expand the horizons of the enterprise and business units. It will legitimize the inclusion of vendors, products, and services that 10 years ago would never have been piloted. The new marketplace will also empower emerging technology vendors that used to think that they had no chance of landing a large account in an IBM or HP shop. The real impact of the new marketplace, though, will be increased innovation and creativity.

CONCLUSIONS

Figure 1 suggests what the new structure will look like. Note that much of what we today describe as operational technology is now reporting to enterprise audit and the CFO (to whom audit usually reports). Operational technology consists of desktops, laptops, tablets, smartphones, servers, and the policies and procedures for acquiring, supporting, and securing them. Audit also owns architecture and the principles by which technology integrates and interoperates. The

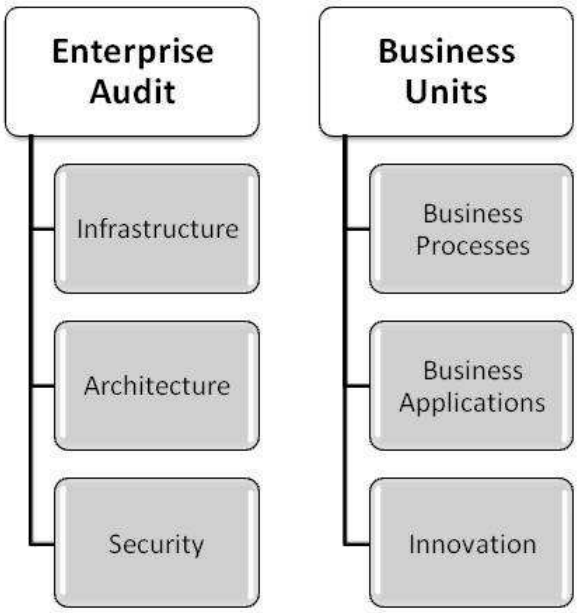

Figure 1 — The reorganization of "IT."

business units own their processes (marketing, finance, sales, manufacturing, supply chain, quality control, etc.) and the digital applications that support all of these processes. They also own business technology innovation.

Enterprise audit and the business units will acquire and deliver technology via the cloud, app stores, and other consumerized venues. "IT" as we know it today will vanish like a disassembled old car sold off for parts. However, the parts will reassemble in ways that will enable the exploitation of new technology delivery models and business agility. The drivers of this change are all around us and unlikely to abate.

What about the technology professionals who will populate this new world? Many of them will fully immerse themselves in the business units. Others will end up in enterprise audit. The skills and competencies going forward will not change as much as where they're applied. While there will definitely be some new skills and competencies — such as cloud SLA design and management — many of the full-immersion skills and competencies already exist in our best business relationship managers. The best infrastructure jockeys know how to optimize basic services, regardless of where they sit.

Budgeting will follow the lead that federation has already defined. Enterprise budgets for infrastructure, architecture, and security will be raised by taxing the business units, which will self-fund their own technology investments.

This brave new technology world will be quite different from the one with which most of us are familiar. Depending on your perspective, the changes may be revolutionary or evolutionary. But one thing is for sure: IT's out of the gate and running wild, and there's no stopping IT now.

ENDNOTES

[1]"Shadow IT" is what the industry refers to as "unauthorized" technology spending. Many business units buy their own technology without the participation or knowledge of the central/corporate technology organization. Shadow IT expenditures can be as high as 2%-3% of gross revenue, especially in weakly — or inappropriately — governed organizations.

[2]Worthen, Ben. "Start-Ups Emerge as Tech Vendors of Choice." *The Wall Street Journal*, 28 August 2012.

[3]Currier, Guy. "Emerging Technology Adoption Trends in 2011." *CIO Insight*, 3 January 2011.

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What Do We Mean, Asking If IT Is Relevant Anymore?

by Paul Clermont

Exactly. What *do* we mean? Is this a stupid question, or is it really insightful?

It's both. Let me explain with an "if by whiskey" argument[1] that offers two different answers, depending on how you think about the term "IT."

If you think about information technology as our great-grandparents might have (i.e., before it became an acronym), you would see two distinct words, each with a clear meaning, which — when put together — would mean technology (using that term in the broadest sense rather than as synonymous with "high-tech") used to gather, store, and transmit information. By that definition, IT is relevant and always has been and always will be. The question is stupid.

But if instead you think about IT as an organizational function or entity charged with providing and maintaining technology to gather, store, and transmit information, then the question indeed becomes insightful. This is not to say that such entities are doomed, it's that their organizational positioning and what they do and how they do it must and will evolve as technologies evolve. As we will see, there's nothing new in that. Roles have already substantially changed just since the dawning of the computer age more than half a century ago.

EVOLUTION OF IT IN THE COMPUTER ERA

- **Processing** — from periodic batches to online to real-time
- **Storage media** — from tape to disk to the cloud
- **Retrieval** — from sequential to random access to hierarchical databases to relational databases to search algorithms to Big Data
- **Geographic access** — from local to private networks to the Internet
- **Presentation** — from printouts to text-only terminals to graphics to animation

A convention for this article: Henceforth, to reduce confusion, I will use "IT" in the purely generic sense our great-grandparents would recognize. When referring to the IT function, I will call it the "ITF."

THE EVOLUTION OF IT: AN OVERVIEW

We have always had information technology. All that's changed over the millennia is the technology and the scope of the information:

- Even in preliterate hunting and gathering societies, there was plenty of information, from tips on spear throwing and recognizing edible plants to customs and behavioral norms. The technology was word of mouth, creating oral tradition.
- The invention of writing vastly expanded the scope of information that could be recorded and the consistency with which it was transmitted. However, individually hand-crafted media like carved stone tablets and manuscripts meant that few would see them, and thus few had any need to become literate.
- The invention of the printing press allowed mass distribution of written information, which drove a surge in literacy, as learning to read became worthwhile for ordinary people. Thus was the monopoly on information held by the literate few irrevocably broken.
- Mass media, starting with newspapers and progressing through radio and television, shortened the cycle from when events happen to when information about them is widely available.
- Then came computers and data communications. The computer era, from the 1950s onward, has been characterized by one quantum leap after another in our capability to collect, store, manipulate, retrieve, and distribute information, with no end in sight. (See sidebar "Evolution of IT in the Computer Era.") The more powerful the technology, the more information can be collected, stored, manipulated, retrieved, and distributed. In theory — though not always in practice — more and timelier information can lead to

smoother operations, better service, and better managerial and executive decisions. The more information is used, the more creative ideas we come up with for using still more information, fueling the demand for ever more powerful technology, over and over again, year after year. It seems that the more we know, the more we realize we don't know, so there is no theoretical upper limit to demand.

Each of these stages involved a form of "priesthood" of custodians and transmitters of information, expert in the technology of their era:

- Without a written language, elders and shamans constituted the priesthood. They commanded and demanded — and mostly received, because of their knowledge and wisdom — the respect of their community and could levy sanctions against those who flouted its norms.
- When state-of-the-art IT was a manuscript on parchment and you were the only literate person in your village, you were the priest — and in the Middle Ages when this was generally the case, you were the priest in title as well as in metaphor.
- With the advent of the printing press and on through mass media, the priesthood was a combination, often at odds with one another, of publishers and censors. The former were motivated in part commercially as well as politically, while the latter were motivated to hang onto the near absolute power they were used to having. Control of information was critical to the survival of the established order. (See sidebar "Those Who Control Information …")
- The technical complexity of IT in the computer era, with its neck-snapping pace of change, brought forth the ITF as a priesthood of highly specialized experts in hardware, software, and telecommunications technologies who had the mission — not always well fulfilled — of helping their organizations find and exploit the information contained in the masses of data they generated.

Thus the role of the priesthood has evolved as IT evolved, but the role does not disappear. Indeed, it has evolved considerably in the computer era alone.

Evolution of the IT Priesthood in the Computer Era

What I am calling the ITF has also evolved. Until the late 1970s, it was usually referred to as "data processing" (or DP) because that's what it did — process the data in transactions to update various ledgers. In that era, the DP organization was a full-service shop, producing final products. If recipients wanted something, they had to ask DP for it. The boundary between IT and non-IT people was very clear.

As DP's potential to provide managerially oriented information via random access and database management became more clear, the DP organization was typically rechristened "information services" (or IS).[2] Coincident with the advent of departmental and desktop computing, the IS shop provided near-final products, and end users had tools for further manipulation and presentation. The IT/non-IT boundary thus started to get fuzzy. Was a spreadsheets wizard working in the finance department (and thus not in a formal IT budget) really an IT person? Did it matter?

As data communications emerged as a key enabler of progress, the more general term "information technology" acquired currency. Not only did desktop and laptop computers proliferate, but highly functional and sophisticated software packages like enterprise resource management (ERM), customer relationship management (CRM), and supply chain management (SCM)

THOSE WHO CONTROL INFORMATION …

- The job of Winston Smith, the hero of George Orwell's *1984*, was to cut out any paper records of historical facts the regime no longer wanted known and to feed them into a "memory hole," where they would be consumed by a giant incinerator. One of Big Brother's slogans was "Ignorance Is Strength."
- Such things did not just occur in fiction. Stalin had old group portraits of the Politburo doctored to eliminate the images of members who had subsequently fallen out of favor and been liquidated.
- Attempts by the governments of China and Iran, among others, to limit access to the Internet make current news.
- Could the Protestant Reformation launched by Martin Luther in 1517 have succeeded without the invention of the printing press in 1452, which enabled the Bible and Luther's 95 theses to be widely distributed in languages people actually spoke and could read? Would-be reformers of the previous century, such as Jan Hus in Prague and Girolamo Savonarola in Florence, were burned at the stake or hanged for their efforts.
- Finally, at the micro-level, every bureaucracy has people who hoard information, hoping to increase their status and power.

provided easy-to-use tools for end users to obtain customized information. In addition to these horizontal packages, other vendors provided turnkey vertical packages that even small businesses like neighborhood bars and restaurants could afford. Concurrently we saw the commoditization of hardware, networks, and general-purpose software for data and network management. Thus ended the information monopoly held by ITF practitioners as more and more IT functionality was provided by an end-user "laity" no longer dependent on the ITF's priesthood.

The full-service ITF of the early days, mostly a thing of the past already, will continue to shrink, and the impact on the ITF and on the careers of IT professionals, already significant, will only become more so as commoditization of yesterday's unique and custom IT innovations continues. While the transition is gradual and continuing, it is useful to think of the evolution in two phases, ITF 1.0 and ITF 2.0. Roughly speaking, ITF 1.0 is typical of the first decade of the 21st century, and ITF 2.0 will be more the norm in the third decade, leaving our current decade as the time of transition.

The share of IT planning, control, applications, and operations done by the ITF (the internal priesthood) versus the end users (the laity) and vendors has declined and continues to decline, as illustrated conceptually in Figure 1. But having said all this, can we conclude that the IT priesthood is as obsolete as the shamans and elders and medieval priests?

Not at all.

There is plenty of meaty and intellectually demanding IT-related work that is most definitely not a commodity. It requires us to ask the following questions:

- What data should we collect to ensure valid and reliable information?
- How can we structure and manipulate the data to provide actionable information?
- What logic should we apply to aggregate information into knowledge?
- How can we present knowledge to maximize strategic and tactical insights?
- How can we use the insights to improve the enterprise's performance?

Businesspeople will take the lead in much of this, but without the rigorous, hard-edged analytical skills and structured thinking that good-quality IT people bring to the table — not to mention the specialized IT expertise to make even prototypes work — results will fall well short of what a *business/IT symbiosis* can deliver.

THE BUSINESS/IT SYMBIOSIS

Past IT priesthoods, from shamans to publishers, have always felt a deep personal stake in the impact of what they do. The computer age priesthood has been a bit of an exception. The work is so technical and detailed and so unlike so much of what the rest of the people in the enterprise do that its practitioners have had difficulty

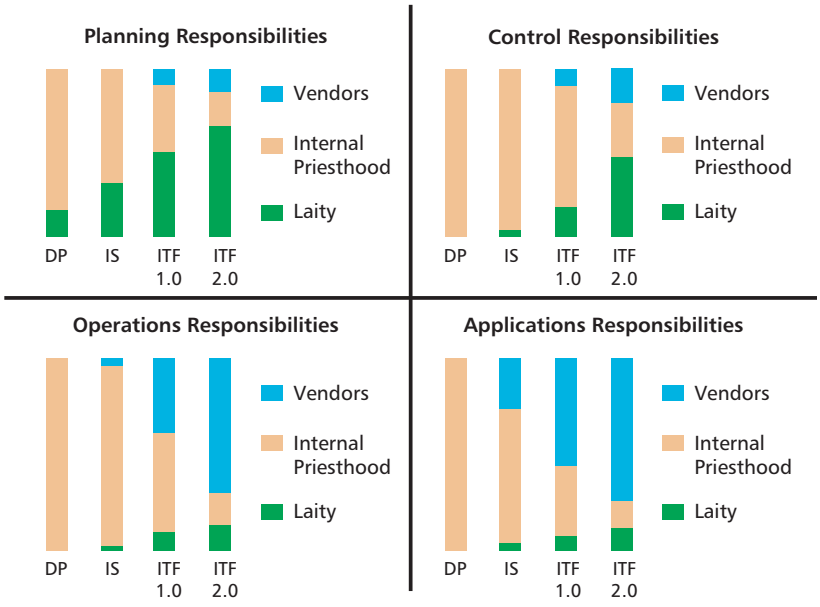

Figure 1 — The changing shares of IT work done by the IT vendors, the IT "priesthood," and the "laity."

maintaining a simultaneous focus on the details of implementation and the impact on the enterprise. Not surprisingly, this has engendered classic problems in IT management, such as a lack of strategic linkage (doing what the enterprise really needs) and difficulty demonstrating quantifiable results.

In the business/IT symbiosis, in contrast, IT people feel and know they have a clear and direct role in producing good business results.[3] The business/IT symbiosis requires a retooling of the priesthood, not only in terms of the work content, but also of orientation. For years, IT professionals have thought of themselves first as IT professionals who happened to be working for an insurance company and might next year be working for a retail chain or a pharmaceuticals manufacturer. That is changing and will continue to change. Tomorrow's successful IT professionals will come to think of themselves first as insurance or retail or pharmaceuticals professionals equipped with exceptional IT skills.

The New Role of the IT Priesthood in the Enterprise

For non-commodity IT, the primary task is building and maintaining the business/IT symbiosis — productive partnerships with the rest of the enterprise dedicated to improving performance and competitiveness through clever and innovative use of IT. In addition, the new priesthood must:

- Keep up to date with state-of-the-art technical possibilities
- Use concepts and approaches related to enterprise architecture, if not the full-blown methodology, as much as is helpful in maximizing the value of IT people's skills in analysis and structured thinking
- Develop proof-of-concept prototypes for IT innovations as needed in conjunction with business
- Source acquisition of "industrial-strength" versions of successful innovations
- In very limited circumstances, implement innovations for which no suitable contractor can be found

Even for commodity IT, there remain important tasks within the enterprise, some or all of which can be worth centralizing, especially the last:

- Keep up to date with the state of commercial practice
- Ensure security of data
- Acquire and manage contracted IT services, ensuring quality and good value for money
- Promulgate and enforce a "just right" level of standards, to fight the tendency toward entropy that has always bedeviled the ITF

The last task is perhaps the most difficult, technically and politically. Penalties for not enforcing a reasonable degree of standards are well known: declining data integrity, technical incompatibilities, and inconsistent data formats and definitions that are extremely costly or impossible to rectify when they get in the way of nimbly implementing business strategies.

The activities listed above are not suitable for outsourcing to lower-paid people in other countries. While domestic outsourcing is possible, it makes the most sense in the form of collaborative consulting projects rather than the turnover of a function.

Long-standing management concepts like the "IT organization" and the "IT budget" will continue to lose their meaning. IT-oriented people will be everywhere, and the value of trying to organize or account for them separately is unclear. The IT budget will be primarily hardware, software, and outside services, plus the relatively small set of tasks related to commodity IT.

The ITF Must Come Out of Its Comfort Zone

Within the enterprise, the IT skill mix *and orientation* will need to change to make business/IT symbiosis a reality. A different priesthood — and inevitably some different priests — will emerge (see Table 1).

Is Business/IT Symbiosis the Only Future for IT People?

Of course not. As vendors come to provide much of the IT once supplied from within the enterprise, they will need IT talent and lots of it. People who genuinely like solving IT design and implementation problems (i.e., those who see this as a worthy and fascinating end in itself rather than just as a means to a business-oriented end) clearly can have a great future, but probably not with enterprises that simply use IT rather than build and sell it. That said, they will have to be really good at it, because if they're not, they will be highly vulnerable to competition from less-expensive talent in other countries.

PREPARING FOR ITF 2.0

Career paths in IT will bifurcate. Success will require choosing how you identify yourself. Are you an IT professional who wants to work for the Oracles or SAPs or high-tech startups of this world, developing the clever

Table 1 — The Evolution of Enterprise IT Skills and Orientation

The Way of the Past	The Way of the Future
Mastering existing IT architecture and infrastructure	Designing future IT architectures and infrastructures
Raw technical skill	Skill applying IT to the enterprise
Doing purely IT work	Causing IT work to be done and ensuring its quality
Broad and deep control orientation	Selective control focused primarily on architectural and infrastructural standards
Formal planning	Responding rapidly to changing circumstances and opportunities
Orderly and highly structured intellectual processes	Much more messiness and ambiguity to deal with
Formal work processes and methodologies with handoffs and approvals	Continual, fluid, ad hoc interaction at all levels with businesspeople

technical solutions needed to bring the next release to market? Or are you a business person deeply conversant with an industry and an enterprise and equipped with the IT skills to maximize the value your employer derives from Oracle's and SAP's and the startups' products?

Current trends suggest there is limited opportunity for people who are not technically proficient enough for the one path or business-oriented enough for the other. Individuals who fail to appreciate this will face premature obsolescence and stunted careers. ITF organizations that try to hang on to their historic roles will ill serve their enterprises, creating waste and inefficiency, losing opportunities to compete with information, and contributing to a gradual (or maybe precipitous) business decline.

Not least, this must be a concern for Mr. or Ms. CxO. If your enterprise's ITF is not aggressively retooling itself as ITF 2.0, *you* need to take action!

Remember the Dinosaurs

An IS manager I consulted with in the early 1980s pooh-poohed Lotus 1-2-3 spreadsheet software for the recently minted PCs, saying, "My guys could easily deliver that capability from the mainframes on IBM 3270 terminals." I wanted to tell him he was hell-bent for the cliff, but as a new consultant assigned to one of my firm's best clients, I held my tongue. Moving on to another client and project, I soon lost track of him, as, I subsequently learned, did his employer.

So it's adapt or die. Not all of us welcome that idea. If we don't, IT with its neck-snapping pace of change is the wrong place to be. Organic farming might be a more temperamentally compatible and satisfying — and yet at least as noble — a pursuit.

ENDNOTES

[1]This comes from a 1952 speech by a Mississippi politician asked to take a stand on the legalization of alcoholic beverages in that state, where Prohibition was still the law. The full text, not very long and quite amusing, can be found at http://en.wikipedia.org/wiki/If-by-whiskey.

[2]Too often, the change was in name only.

[3]Technically oriented IT people who do not feel a clear connection with enterprise success are analogous to typesetters in the publishing industry — skilled and vital, but by themselves unable to affect business results directly, in contrast to, say, editors.

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IT-Enabled Service Innovation:
Why IT Is the Future of Competitive Advantage

by Enrique Castro-Leon, Robert Harmon, and Mazin Yousif

Nicholas Carr's 2003 article "IT Doesn't Matter" [1] created quite a stir among IT professionals and business strategists. Carr asserted that IT exhibited all the characteristics of built-out infrastructural technologies with commonly available commoditized components. Therefore, the adoption of these technologies conferred, at best, the ability to reach parity in terms of IT-enabled competitive advantage. Under these circumstances, developing a business strategy around IT is little different from building it around electricity generation or water usage. IT strategy defaults to a defensive approach that emphasizes cost reduction, late technology adoption, and risk minimization.

While the case can be made that IT has devolved to commodity status in the cases of computing, storage, network technology, and a number of applications, Carr did not anticipate the service revolution. The adoption of SOA (2003- 2007) and its current incarnation in the form of cloud computing (circa 2007) is revolutionizing IT to become an obligatory player in business transformation. For the past several years, the continuing evolutionary changes in technology have been overshadowed by the emergence of the service paradigm, business process innovation, mobile computing, and Big Data. IT is an exciting enabler of innovation that can adapt to challenging business circumstances and drive business and market transformations as well. IT-enabled services are increasingly important for the development of future business, customer, and societal value.

PERSPECTIVE

> Information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without the talking about the other.
>
> — Bill Gates

The IT industry does not sit still. The past 10 years have seen a significant increase in efficiency within IT organizations, with the most advanced having shifted from being mere cost centers to playing critical roles as active partners in the development and execution of corporate business strategy. IT has evolved its capabilities from providing no accountability on resource utilization, to making efficient use of capital, to subsequently becoming a nimble participant in a broad range of organizations and initiatives.

As we shall see, the state of the art for IT organizations today is epitomized by the rise of cloud computing under the service paradigm. From a historical perspective, IT services have moved through three developmental stages:

1. **Application services.** The first IT services era, roughly from 1995 to 2003, featured application server– and connectivity-independent software and operating system vendors such as Microsoft and various Unix vendors. Single vendors competed to build ecosystems around proprietary frameworks. For example, application service providers needed to retool legacy applications for e-commerce. This approach achieved limited adoption partly due to concerns in IT organizations about vendor lock-in.
2. **Service-oriented architecture.** During the second era, from approximately 2003 to 2007, SOA gained popularity as IT organizations rearchitected legacy applications from silo implementations to collections of service components ostensibly working together. Most of the service components were internally sourced (resulting perhaps from the breakup of former monoliths) and combined with a few noncore, third-party services. The technology transformation costs were significant, as was the demand on practitioners' skills. As a result, the benefits of SOA were available only to large companies. Small and medium enterprises (SMEs) and individual consumers were left out of the equation.
3. **Cloud services.** The third and current era, which gained traction around 2007, is characterized by the emergence of cloud technology and the development of resource pooling with large data centers as drivers for IT services. We are observing an exponential economic impact from services due to reduced barriers to

participation and the velocity at which business solutions can be assembled under the service paradigm. The benefits are no longer confined to large corporations only. They are accessible to SMEs and even to individual consumers in any geography. Basically the only requirement is a good Internet connection and a credit card. This is another instance of Metcalfe's network effect: most any application can be built out of prefab service components, and the application can be monetized through direct consumption or by turning it around and exposing it through an API to be consumed by other applications.

Technology strategy has become inseparable from business strategy and the need for a customer value–creating market focus.

THE EVOLUTION OF IT SERVICE INFRASTRUCTURE

The evolution in the delivery of IT services is no different than the evolution that has taken place in other, more mature industries. The development of cloud computing and its associated service delivery model mirrors that of other infrastructure-dependent industries. The cloud has become the *de facto* platform for innovation for the next wave of IT services. As Carr predicted, the trend toward the commoditization of IT has continued unabated for the past 10 years. However, these commoditized IT capabilities remain a keystone for business innovation. Hence, IT strategy should emphasize business value rather than just IT cost mitigation. The value is not intrinsic in the technologies involved, but rather how forward-looking innovators uniquely integrate these components to gain competitive advantage. This integration is being achieved through emerging service paradigms. From this perspective, technology strategy has become inseparable from business strategy and the need for a customer value–creating market focus.

The physical infrastructure for modern data centers is not radically different from that of five years ago, and there are plenty of older data centers still in operation. However, it is the *way* these assets are logically organized and deployed that is changing. Similar to the manner in which credit and other people's investments drive advanced economies, the cloud economy is driven through *other people's systems* (OPS); that is, through infrastructure provided by third parties. Scaling a business often involves partnerships and investment relationships with organizations and individuals outside the business organization. Scaling a computing system may similarly be accomplished by leveraging OPS. The use of OPS has a strong economic incentive: it does not make sense to spend millions of dollars on a large system for occasional use only.[2] The following observations are instructive:

- Large-scale projects such as marketing campaigns can require significant amounts of computing power and are "peaky" in the usage of infrastructure assets. Carrying high capacity to meet intermittent peak demand results in poor asset utilization and inefficient use of capital.
- Big, complex projects usually start with small trial development runs that are not computing-intensive, with larger runs occurring as key milestones are met. A large system that lies idle during the development stage yields poor ROI.
- A capital procurement lifecycle that normally takes three to five years from planning and acquisition to asset disposition is badly mismatched to a marketing campaign or similar requirements that might last only three months.
- Cloud computing increases the efficiency of capital use through resource pooling that delivers flexible, large-scale computing power through a service model. The large capital investment associated with this infrastructure gets amortized over a larger community of multiple business units in a private cloud and multiple corporate customers in a public cloud, or some mix in a hybrid cloud configuration.

In the cloud era, IT capabilities can be built out of infrastructure-related services. The US National Institute of Standards (NIST) describes these capabilities in terms of three levels:[3]

1. Infrastructure as a service (IaaS) for computing and storage infrastructure
2. Platform as a service (PaaS) for development platforms
3. Software as a service (SaaS) for software and business services

IT capabilities can be built from vertically integrated infrastructure plus a combination of services. Much of the core IT innovation today emanates from figuring out the beneficial relationships between the vertically integrated infrastructures (usually legacy), the service components, and customer requirements.[4]

Ideally the recombination of these components is done as an operational decision. This action is called *late binding*. It's not always been this way. A historical perspective may be useful at this point:

- In the early days of computing, starting in the mid-1950s, most applications were built inhouse, and any change in an application required recompilation.
- In the late 1980s, it became possible to build applications using shrink-wrapped software and precompiled libraries.
- By 1995, the three-tier model became firmly established in the industry, with back-end, business logic, and presentation tiers addressing scalability and capacity problems. Application instances were usually segregated by software platforms: Windows, Linux, and several Unix flavors.

Even within a software platform the tier components could not be too far apart in versioning, or the application would not work properly. Also, applications were bound to the hardware platforms. Users started reporting inefficiencies in two aspects: low utilization and server sprawl. Perversely, advances in hardware performance oftentimes resulted in lower equipment utilization rather than increased application throughput.

In order to overcome the drawbacks of the three-tier architecture, vendors started developing message-driven, loosely coupled architectures, the first instantiation of SOAs. The initial efforts were vendor-specific under frameworks such as Microsoft .NET and IBM Websphere. Visionary large enterprise users, concerned about energy use and realizing that these inefficiencies were ultimately unsustainable, started rearchitecting corporate application portfolios around SOA principles. In addition, they demanded that service frameworks be interoperable across vendors.

The SOA era has also seen the pervasive adoption of server virtualization, first as a mechanism to increase the utilization of the server infrastructure and thereafter to actually decouple software from the hardware platform on which it runs. This double decoupling — namely, virtualization and SOA's making applications independent of the underlying operating system — opened a slew of new technology alternatives to corporate end users. This change, plus advances in networking, allowed some services to be standardized and outsourced to service providers. This led to the rise of cloud computing and enabled the capabilities we have today.

Cloud computing is the transformative source of IT service innovation. The paradigm is moving from a predominantly internal focus to an external orientation with a focus on supporting corporate strategy for addressing new markets and customers. For instance, some companies make their infrastructure and applications available to customers. Amazon did this with its Web services (AWS) as a way to monetize capital expenses and gain industry influence.[5] Others develop specific applications to address market opportunities such as social media, mobile computing, gaming, entertainment, sustainable IT services, and other cloud-based applications.

SERVICE INNOVATION: IT'S RAISON D'ÊTRE

The disruptive nature of cloud computing has set the stage for IT organizations to move beyond the development and provisioning of IT systems. IT is more than infrastructure, products, and software. IT is becoming the critical enabler of business strategy through technology integration with the business under the service paradigm. Given the dominance of services as value creators and the commoditization of products in most advanced economies, organizations seeking to grow must rely on the development of knowledge-based services for continued business success. Businesses are becoming increasingly dependent on services as extensions of their product models or are remaking themselves into service companies. IT has an essential role in enabling the development and implementation of innovative service strategies.[6]

Disruptive innovation is recurrent in the computing industry.[7] Service innovation changes industry dynamics by reducing barriers and transforming industry boundaries.[8] Service innovation disrupts markets by changing the way value is created, from value-in-exchange that is transactional in nature to value-in-use that is customer-oriented and relationship-based.[9] Service innovation can be either continuous or disruptive. David Lubin and Daniel Esty studied the drivers of the IT and quality megatrends of the 1980s to identify a common framework that companies and industries followed as they migrated from cost-reduction and efficiency-related strategies to disruptive innovation.[10] The migration path consists of four megatrend strategy stages:

1. Reduce costs, waste, and risk
2. Reengineer products, services, and processes
3. Transform the core business, integrate new ideas
4. Develop new business models for disruptive innovation

Table 1 — Cloud-Based IT Service Innovation Strategy Migration (Adapted from Harmon and Demirkan)

Stage	Megatrend Strategy	IT Service Innovation Value Migration	Strategy Focus
1	Reduce costs, waste, and risk	1. Reduce energy and other costs from computing operations, especially data centers. 2. Ensure compliance with regulations and standards and manage risks to minimize the negative environmental and other impacts of computing.	First Wave: Internal focus on IT and company cost containment
2	Reengineer products, services, and processes	3. Design IT products and services that are "better, faster, cheaper" than alternatives. 4. Streamline business processes and ensure that they support service development.	
3	Transform the core business, integrate new ideas	5. Engage stakeholders to build trust-based relationships and collaboration for co-creation of value. Map service opportunities and intellectual capital issues. 6. Develop an organizational culture that is "service smart" to support service innovation.	Second Wave: External focus on market and customer value creation
4	Develop new business models for disruptive innovation	7. Design and implement the IT service innovation platform. 8. Iteratively pilot and refine the new services.	

In Table 1, we use Lubin and Esty's framework to show the migration path of the business value curve for cloud-based IT service innovation. As a company or industry moves through the stages, it is analogous to moving up the business value curve, with each stage characterized by increased value-generation potential. This transformation in the business dovetails and is highly synergistic with the three-stage technology services evolution from application services to cloud services described above.

The first wave of the cloud service innovation megatrend encompasses the first two stages in Table 1. It is characterized by cost savings, energy efficiency compliance, and reengineering of products and processes. The focus of these initial stages is mostly internal to the business (and IT) organization. The first era of IT services (application service provider), the second wave (SOA), and the initial implementations of cloud computing focus on process simplification and cost savings. Indeed, the initial focus of green IT was more on cost savings than environmental concerns. There is a push for "better, faster, cheaper" and standardization of products, services, and processes in the first two stages.

The emergent second wave of cloud strategy focuses on business transformation through service innovation and the creation of new service innovation–oriented business models. Second wave cloud-based IT has become a key driver and enabler of corporate strategy and the foundation for service innovation. The leading companies here are IBM, Google, Facebook, and Amazon.

Of particular interest is the concept of the IT service innovation platform. The idea is to integrate the value innovation potential of all cloud-based IT dimensions into a platform for market growth. The platform is predicated on the ability to identify new market opportunities, collaborate to co-create value with customers, and create innovative solutions to drive business performance.[11]

A key challenge for IT managers desiring to develop effective externally focused service programs is that IT initiatives are frequently disconnected from business strategy. This means IT service initiatives are often ineffective, as the greatest opportunities to benefit customers and the firm are not easily identified by IT managers. A more business strategy–oriented approach to IT service innovation is needed. On balance, IT managers are more comfortable developing services for internal use within the IT domain, but the greatest potential business impact can only happen when IT services are coordinated and integrated with business strategy through viable business models. Businesses must integrate a service innovation perspective into the same strategic framework used to identify new markets,

develop new technologies, understand competition, and establish partnerships and alliances. This is not easily done. However, organizations should consider the following steps for integrating service innovation principles into IT and business strategy:[12]

- **Identify points of intersection.** The first step is to identify where service innovation issues intersect with the IT organization in the normal course of business. These are called *inside-out linkages* where IT strategy impacts the customer. This could include everything from data center design to IT operations and the use of IT applications to create value for the customer. *Outside-in linkages* indicate where and how external customer requirements impact the IT organization in terms of opportunities, constraints, and risks. Understanding the dynamics at the points of intersection can provide insights about future opportunities and the creation of competitive advantage.
- **Understand the competitive context.** Competitive context refers to the dynamics of the industry and its key players. It involves the quantity and quality of business resources, the rules that govern competition, the capabilities of the competitors, the size and sophistication of demand, the availability and capability of the firm's value chain members and relationships, and the characteristics and capabilities of key stakeholders. The IT organization needs to understand the relationships, how and where sustainability issues will have an impact, and the potential for the development of partnerships and alliances.
- **Choose the best service innovation opportunities.** IT managers must choose high-impact service opportunities that intersect with the firm's key business initiatives. Ideally the choice will align with IT initiatives to create shared value that provides meaningful benefits for customers, the firm, and the IT organization. To ensure that the IT organization can meet its business goals, service opportunities that are in the firm's strategic interest should be given priority.
- **Create a service innovation agenda.** The IT organization should engage the firm's stakeholders to identify service innovation opportunities. Managers should be able to choose between *responsive* services and *strategic* services for agenda development. Responsive services attempt to deal with key stakeholder demands. However, the responsive approach can often lead to one-off solutions that are of little strategic value and do not impact the overall competitive context. Strategic services raise the bar to focus on issues that directly impact the competitive context and transform value chain activities to enhance customer value by supporting business strategy.
- **Create a service innovation dimension for all value propositions.** To address service innovation strategy, the IT organization will need to ensure that service innovation principles are at the heart of every value proposition. IBM has been successful in organizing its sustainability services around the concept of a "smarter planet." This positioning opens the door to myriad opportunities and provides a unifying theme for the value proposition.

In this article, we have focused on the evolution of the IT service innovation megatrend. Our intent is to provide technology managers with a place to start by introducing the concepts and issues within a strategic framework for developing successful approaches to service innovation. To that end, we will close with insights for radical service development from Mark Jones and Fran Samalionis, leaders in service design and innovation at IDEO:[13]

- **Develop insights about the market.** Monitor your industry, markets, customers, technology, competitors, and business operations concurrently. Look for patterns that reveal unmet or underserved needs. Develop strategic frameworks that describe the opportunity space and customer pain points that can lead to meaningful ideation.
- **Create radical value propositions**. The goal of radical innovation is to acquire and retain new customers. In a crowded marketplace, people need a good reason to try your new service. Go beyond what they experience from their current service. Help them appreciate the value of your new service. Consider new services that fill a market gap (e.g., Amazon grocery home delivery), steer markets in new directions (e.g., iTunes), or create a new class of service (e.g., Zipcar). Prototype, simulate, or act out new service experience scenarios. A good prototype will engage designers to consider consumer desirability, business viability, and technical feasibility.
- **Explore creative service models.** Innovations that redefine markets usually result from fundamental changes in the industry, technology, and customer requirements. Creative solutions are necessary to make new service offerings viable. Google's service model enables the monetization of offerings through ad revenues without compromising the service experience. Championing the desirability of an innovation forces the organization to build new constructs to nurture radical innovations. Facebook is now a billion-user-strong marketing platform that captures user information on interests, behaviors, and personal networks. Creative new service models will drive the monetization of that information.

- **Bend the rules of delivery**. Part of the innovation process is learning from failure. Service design teams need reassurance that it is acceptable to try new service concepts that have many unresolved questions. Fear of failure makes radical service innovation impossible. Get buy-in to experiment and learn from the results. The often ambiguous nature of early-stage radical service concepts means that such concepts may not have an immediate business case that will meet existing corporate financial or Six Sigma guidelines. This is a major barrier to innovation. So design new metrics for success that focus on customer value, emotional design, and customer experience. As the new service concept matures, more traditional measures can be considered.

IT will always remain relevant since it is a discipline that thrives on innovations and disruptions.

- **Iteratively pilot and refine the new service.** Radical innovation means new-to-the-world new services. It redefines and creates new markets. Conducting a pilot test of the new service is a recommended way to assess and manage risk before the service is scaled. But test marketing a new service exposes the company's intent to competitors. Understandably, companies are reticent to pilot if they are to protect first-mover advantage. One approach is to go with the results from the beta testing. Radical innovation is based more on the evolution of customer behavior and market trends than quick breakthroughs. Success of a new service can depend on a small nuance that is hard to pinpoint in a market test. Monitoring reactions to your service and making quick iterative refinements is critical to risk management. In the rapidly evolving marketing landscape that characterizes new service development, customers expect nimbleness as a key element of innovation.

DOES IT MATTER?

Service zeitgeist aside, the 10-year retrospective of Nicholas Carr's controversial article suggests that Carr viewed each technology as the end of an evolutionary line with little regard for how these components could be combined to generate additional business value. This led to an unnecessarily pessimistic assessment of IT's prospects. Whether IT is relevant or not should not be the question. IT will always remain relevant since it is a discipline that thrives on innovations and disruptions. The key for any enterprise is to pinpoint the innovations and adopt the specific disruptions that blend with its business strategy so it can differentiate itself from the competition and thrive.

Following Carr's reasoning, companies like Amazon and Google were able to streamline components such as data center infrastructure, email, and search such that it became feasible for them to offer these capabilities as services. What Carr did not anticipate was the innovation that would arise from combining these capabilities. An example of this innovation is Big Data, a recent industry trend that allows businesses to extract value from the mountains of data they collect. The key here is to exploit data specific to the enterprise's markets as well as establish associations with data from other enterprises. For example, a telco provider can exploit customer usage data and correlate it to GPS data, contact data, financial data, and retail data. Through this metadata, a complete profile of the customer and his or her personal network and lifestyle behavior emerge. Prediction of likely future behaviors is next. The challenge is to find specific bit patterns that have business value, something that is not easy to do and that requires a great deal of mathematical/statistical expertise alongside business acumen. This is where the intelligence is; that is, the analytics that allow enterprises to find the specific bit pattern and enable a major differentiation in where and how IT brings value to the business.

Another industry trend is IT consumerization, which is on a fast path to adoption by enterprises. Companies have already adopted paradigms such as "bring your own device" (BYOD). The catalyst for this is employees who feel more empowered, comfortable, and, consequently, more productive when using their preferred devices. BYOD may be built out of standardized components and processes yet have a unique expression for each company. The decisions that IT makes will have an enormous bearing on employee productivity and, ultimately, corporate profitability. Another example is WebRTC (Web Real-Time Communication), which allows high-end collaboration among employees and also has a positive impact on productivity.

Does IT matter? We believe that the cycle of innovations and disruptions has morphed over time, reflecting business challenges. IT innovation has never stopped, and there is no indication that it ever will.

ENDNOTES

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Is IT Relevant Anymore? Just a Tad

by Vince Kellen

Except for thespians and artists, I doubt there is any other group of professionals that engages in as much soul-searching and self-doubt as IT folk. Every year or so, without fail, a new crop of challenges causes IT pundits and some IT leaders across the globe to wail and grind their teeth. After all, the end of time is coming swiftly, riding the dark horse of disruptive, technology-induced change, carrying a scythe that will cut down the unworthy.

It's a narrative as old as human existence. It has a predictable pattern. Hannibal is at the gate! The Normans are invading! The current order will be upset and replaced with a new reality, hostile to the indigenous tribes, favorable to the invading forces. Success will come to those who kneel before the new gods of the conquerors. Then we can again enjoy a period of peace and prosperity as humankind advances, or at least all the tribes on the winning side can.

While the phrase "Is IT relevant anymore?" is designed to cause a spike in cortisol, some heart palpitations, and a strong desire for those fearful readers to anxiously analyze the threat, it unfortunately frames the dialogue incorrectly. The question assumes that IT is a thing distinct from other things, like marketing, sales, operations, finance, and distribution. It also assumes IT is a monolithic thing, singly referred to as IT. The central premise of this article is that IT is, now and forever, intractably and inseparably intertwined with humankind. To ask the question "Is IT relevant anymore" is sort of like asking "Is language relevant anymore?"

Language and IT have similarities. Both can be endlessly refashioned by people to suit their aims, for good or ill. Both are now ubiquitous, with many people across the globe skilled in many aspects of both. Yet we have language specialists of all sorts today and none of us are asking if language is relevant anymore. The fashioning of language remains, to this day, a critical competitive skill for organizations and individuals. And in an increasingly information-rich world (thank you, IT!) that exceeds human attention, this makes sense. We all have to "fashion our message" and "get the word out" in order to compete successfully.

IT IS A TOOL? REALLY?

People often call IT a tool or a technology and immediately compare it to other technologies, such as the printing press, the telegraph, railroads, and electricity. The problem with these comparisons is that each of these and many other technologies or tools have a very finite number of arrangements that matter, and it is this lack of inherent flexibility that makes them powerful. Infinite options breed infinite conundrums. A railroad is good because it reliably delivers collections of atoms. Standardization of the railway is good because it enables faster and cheaper delivery of goods.

IT is a tool like no other tool. Other tools can only be fashioned in so many ways and often expensively so. A sword must fit into a hand and cut. Those who wield a sword alter their physical dexterity with much practice in order to be skillful with it. IT also must fit the user, but it can be fashioned so as to require little to no practice to become reasonably skilled in its use. It can also be fashioned and refashioned to do anything that the human mind can envision. A sword cuts, and a railway delivers things, and neither does the other. IT can do nearly anything that humans can express.

It is better to think of IT as composed of, at the least, materials that are then fashioned into a series of fit-for-purpose tools. IT then is a tool-making skill more than a tool itself. In this regard, it is similar to metallurgy, which in Neolithic times advanced from bronze to iron and, later, to all sorts of metals and tools. Along the way, as metallurgy improved, new tools become possible. IT then, is a capability, not a tool, and like sword fighting or sword making, doing it extremely well requires high levels of skill.

Now the comparison with language makes sense. IT professionals use their architectural and creative skills to arrange basic computing materials (devices, computers, programming languages, networks), which are akin to a vocabulary of words, in an endless array of specific tools fit for purpose (business and consumer applications, robotic devices, etc.), which are akin to sentences. How fluent one is in the language of IT will partially

determine how successful one is in applying the IT tools created. Just as clever people use language to get what they want, organizations use IT to gain advantage. And the similarities between language and IT run perhaps even deeper.

Information technology processes information. Information is language. Information literally is a collection of words and numbers (or visual symbols standing for or tagged with words). To be comprehensible to human beings, information must be expressed in a human language. All of IT serves to bring meaning to data via language, verbal, mathematical, and visual, all of which wind up being assigned semantic, verbal categories. Thus information technology is an extension of our language-generating skills. Organizations then describe and categorize data along the lines of language relevant to the organization. One could argue that the reason different firms exist in the first place is because each firm describes its world differently in ways that it feels are superior to its competitors. Differences between organizations are at their core merely differences in language. These differences in language give rise to unique arrangements of atoms and electrons in the form of products, services, people, and messages.

For example, the iPhone is a concept deeply indebted to the modes of thought and use of language, visual and written, of its inventors. The company extends and diffuses the iPhone's design language in its store designs, innovation approach, organizational structure, and marketing. The information technology at Apple is then compelled to capture, express, and analyze meaningful semantic differences between the iPhone and other phones on the market. While many things in IT and in phone technology will be similar between Apple and its competitors, some things will not and cannot be the same. These semantic differences distinguish firms from each other.

To compete well, firms need to differentiate themselves. As they fashion language and products, all firms wind up fashioning their IT tools in unique ways for two reasons: to better capture and understand those competitive semantic differences in IT tools (databases, analytics, etc.) and to fashion both the IT tools and the organizational behavior patterns that deliver differentiation (workflow, business process automation, etc.) so they function well together. The sword bearer does not have the opportunity to alter the sword but must adapt his or her coordination to the tool. In contrast, the firm has the opportunity to fashion both at the same time — and these days very quickly. The simultaneous tailoring of organizational dynamics and IT tools is the stuff of dreams and competitive advantage.

Extending the sword-making metaphor further, one could ask, "Is IT as a capability more like metallurgy or sword-making?" Laying the metaphors out, we can discern the relationships in Table 1.

Clearly, IT capabilities are found in manufacturing standard components (e.g., mobile phones, operating systems, enterprise software), creating differentiating tools, and developing differentiated activities (strategic capabilities). Each one builds upon the others, with the relationship between organizational development and enterprise architecture levels being the most ambiguous and promising part. This analysis so far generates two simpler questions that can clarify what the question about IT relevance ought to be:

1. What IT activities will no longer differentiate a firm from its competitors?
2. What kinds of IT activities will be removed from the organization or significantly reorganized in some manner beyond what has occurred in the past?

Let's tackle the first question first. What IT activities will no longer differentiate a firm from its competitors?

Table 1 — Swords and IT Tools Compared

Swords

Inputs	Process	Output
Copper, tin	Metallurgy	Bronze
Bronze	Sword-making	Superior sword
Superior sword, person	Training	Sword master

IT Tools

Inputs	Process	Output
Hardware, programming languages	IT component engineering	Standard component
Standard component	Enterprise architecture	Differentiating tools
Differentiating tools	Organizational development	Differentiated activity

Over the past 40 years or so, we have seen that individual components no longer, by themselves, differentiate firms. Companies do not make their own computers and, increasingly so now, do not make their own enterprise software and many other IT components. Standard components no longer differentiate firms, and hence the corresponding IT activity doesn't either, except for manufacturers of those components.

Organizations that can change their cultures, their structures, their incentives, and their behavior to better wield differentiated systems have the best chance of competing in their environments.

Properly assembling and configuring a collection of standard components, on the other hand, *can* clearly be differentiating for many if not most firms. Many standard components, including enterprise software, are designed to invite customization and tailoring. Because of great variation in configuration and customization, no two enterprise systems are the same, despite using the same standard software components. Each firm has unique requirements that often need special attention, and each enterprise system is integrated with other standard components in unique ways. Lastly, organizations that can change their cultures, their structures, their incentives, and their behavior to better wield differentiated systems have the best chance of competing in their environments. Most likely they will have developed differentiated activities that intertwine employees with information systems in ways that competitors cannot easily match.

In this analysis, not much regarding the differentiation of IT is changing now, in my estimation. Most firms realize that how they handle the human and technical aspects of IT together is what leads to success. What is changing, but only somewhat, is who specifically performs these activities. This leads to our second question: What kinds of IT activities will be removed from the organization or significantly reorganized in some manner beyond what has occurred in the past? Looking broadly at the activities in the process column of Table 1, we can see that the business world has already experimented with insourcing, outsourcing, centralizing, or decentralizing each of them. Who performs these activities has historically varied and will continue to vary. Most firms no longer create their own standard components, relying instead on outsourcing vendors. In many cases, firms have used consultants to perform critical activities such as enterprise architecture or blended an inhouse team with an outsourced team. For some time now, firms have routinely used external management consultants to help them change their organization structure and culture. In this regard, nothing new is being introduced by recent changes in technology.

With cloud all the rage today, one can assume that this set of technologies will disrupt strategic uses of IT. I don't concur. The cloud merely lets firms decide what legal and physical entity will run standard components in an operating environment. Over time, more and more firms will choose not to be in the data center business (which does not differentiate most firms now) so as to avoid distraction or to lower costs and will instead reallocate resources to creating differentiated tools and activities. The cloud doesn't, by itself, radically change who will create these differentiating activities. That tends to be the responsibility of the executive team. While more components can be outsourced now than before, the art of value creation will most likely proceed as it has in the past. After all, firms exist to create value for their tribes. The leaders of those tribes will hold close these value-creating activities. As IT intertwines with business so much now and so much more in the future, the IT processes that distinguish firms will continue to be designed and arranged by the firm leaders.

Firms have varied as to where they put these IT functions. Some decide to place them in a central group or reasonably high within larger business units that are part of a much larger firm, especially the differentiating tools activity (enterprise architecture). Many firms locate differentiated activity design where the differentiated activity may lie. If it is within a business unit, then that initiative is more likely to be led from within that unit. If the activities are broad and encompass the entire organization, then those design activities might be handled within a central group. How to array IT services, from infrastructure to organizational development, is not just a matter of whim or political choice. Empirical evidence gives some clues as to where these activities ought to be performed.[1] Has technology fundamentally changed this logic recently? Not really. Changes in IT might be accelerating existing trends more than reversing them. While many firms are now catching up to these best practices, most likely through refocusing attention away from undifferentiated activities to differentiated ones, the basic approach described here is not new and is something many of us in leadership have been discussing for at least a decade or two.

Based on this analysis, then, it seems that not much is causing fundamental changes that would make IT more

or less relevant. Since IT, like language, is infinitely expressive, requiring experts fluent in its expressiveness, IT capabilities are likely to continue to confer competitive advantage. In fact, as IT becomes ever more deeply intertwined with human thought and action, it is *more* likely that organizations are going to want to keep experts in IT tool and practice differentiation inhouse or, if outsourced, captive in a contract for a reasonable length of time.

WHAT THEN *IS* CHANGING?

I think what is changing is how winners are conceptualizing IT work. In any industry, one can find a few companies and a few people who are at the competitive frontier. These lucky tribes appear to be connected more closely with their markets and market makers and are able to produce differentiated offerings at a pace and quality competitors fail to match. They understand the innards of technology, the innards of customers, and the linkages between players in their ecosystems. They understand the technical aspects of the buyers' and sellers' conditions and are aware of their connectedness to other frontier players. This frontier capability is a combination of technical/business knowledge and human relationship capital.

I believe much of this frontier practice is largely conceptual, strongly related to more fundamental human relationship building skills, perhaps tacit, and certainly idiosyncratic. This means these industry frontier practices are not always easily written down, captured, conveyed, and put into practice elsewhere. How one firm knits together a differentiated activity can be very different from another based on people, history, human relationships, technologies adopted so far, executive insights and mental models, cultures, and political contexts. Frontier activities emerge unplanned perhaps more so than they spring, fully formed, from the mind of a single creator.

IT has, I think, nearly exhausted what value can be created from a contained, planned, and rational approach. Planned and rational approaches will still be required and, yes, they do intertwine the irrational and unplanned in organizations. Just as any project manager who is using sound rational approaches to managing a complex project can run into organizational defensiveness and other human irrationalities that may render the plan obsolete. Planning and rationality will be required, but the degree to which these kinds of activities are reliable and repeatable is the degree to which they might be outsourced. The new leaders are focusing on much more than the science of knitting together differentiated activities. They are focusing on where the rational meets the irrational; where the planned meets the unexpected. In short, IT will be increasingly relevant if it helps the organization cope with change, complexity, and uncertainty, wherever that dynamism may lie. This dynamism requires more firms to engage other entities across new lines of cooperation and competition.

This new approach:

- Uses emergence and self-organization principles, internally and externally
- Fosters the growth of beneficial ecosystems
- Recognizes extreme temporality
- Is sensitive to the difficulties in transforming human cultures
- Takes a renewed interest in how basic and applied sciences address complexity and innovation

Command and control doesn't work anymore. Leaders sense that success emerges from rich conditions more than it comes from the mind of a single leader. With the speed and agility of many competitors, firms are acutely aware of the fleeting nature of windows of opportunity. This recognition of extreme temporality causes firms to grab whatever foothold they can at the time it is available. Moreover, firms now try to encourage ecosystems of innovation that can generate footholds that the firm may find valuable in the future. Rather than insourcing some innovation practices, firms let the ecosystem perform the innovations and then acquire the innovation through licensing, outright purchase, or destructive competition. It is hard for firms to plan, engineer, or control these Schumpeterian forces. More indirect, emergent, and community-focused approaches to value creation are needed.

Part of this use and fostering of ecosystems requires firms to understand that people at the frontier of value creation have unique strengths and weaknesses, cultures and orientations. Mindlessly messing with these cultures can cause tacit knowledge held in these peoples' brains to flee. Because of that, leaders in making IT relevant know that organizational culture and deeply human attributes matter. Since the blending of IT architectures and organizational development is critical for firms' enriching themselves, firm leaders need to understand that the irrationality of human psychology and sociology must be handled carefully.

Lastly, with the emerging complexity of all forms of technology, the role of computing that underlies the

creation of any and all technology, and the emerging growth of technologies at nanoscale in many industries (materials and chemical engineering, pharmaceuticals and medicine, animal and life sciences), firms are latching onto and securing fundamental and applied research coming out of corporate, government, and university research groups. The race is on for the next new thing, and that next new thing is likely to be deeply complex, requiring mastery of the frontiers of science. These days these frontiers of science lie in the arrangement of molecules and the further understanding of atoms. That requires a cadre of extremely focused and intensely smart scientists. Successful firms (and countries) will have to gain and keep access to these frontiers of knowledge.

While the fundamental logic of how firms use IT capabilities to succeed in markets may not be changing, the tactics firms use are changing and quickly at that. Firms should use indirect, less planned, and more emergent approaches. Firms should engage and foster ecosystems inside and outside their borders, tap into and keep close human creativity, and forage for basic and applied scientific insights, while recognizing the fleeting nature of opportunity due to market dynamism. IT capabilities intertwine with all of these activities, and many firms today still do not have enough IT skill, especially the architectural and organizational skills, to exploit these new tactics.

Does IT matter? Hell, yes. Is IT relevant? As a set of activities focusing on developing differentiated activities that create success, yes. A lot. An awful lot. For those who disagree, the rest of us who compete with you are counting on that.

ENDNOTE

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Innovate with IT:
Five Information Technology Innovation Platforms

by Yesha Sivan

> Innovation distinguishes between a leader and a follower.
>
> — Steve Jobs

Where is IT headed these days? I propose one direction: IT will enable, support, and build innovation platforms. The claim is simple. Innovation is vital to the organization. Information technologies are key to many aspects of it. IT leaders, with their deep know-how of information, will play a critical part in enabling innovation. Hence, IT has a special role in innovation.

The purpose of this article is to upgrade "innovation" in the eyes, mind, and hands of CIOs and other IT leaders — "eyes" in the sense of recognizing different platforms for innovation, "mind" in the sense of understanding the relevance of such innovation platforms for the organization, and "hands" in the sense of driving some actions.

I will examine the contribution of IT within five kinds of innovation platforms:

1. Process innovation platforms
2. Generative innovation platforms
3. Ready-made innovation platforms
4. Technological innovation platforms
5. "Build-your-own" innovation platforms

These platforms will serve as backgrounds for depicting the unique role of IT. Before we delve into the platform descriptions, a word about the organizational imperative to innovate.

Much has been said about innovation. The argument for innovation is twofold:

1. On the positive side, we look at innovative companies like Facebook, Google, Apple, and Amazon (all examples of hard-core IT innovation) or companies like Walmart, Dell, and Progressive (all examples of "regular" firms that use IT particularly well). We see and appreciate how they invent new products, services, and ways of conducting business.
2. On the negative side, we look at firms like Kodak (missed digital photo taking), Nokia and BlackBerry (missed smartphones), Microsoft (arguably missed the tablet market), Borders (killed by Kindle), Tower Records (killed by MP3 and iTunes), Blockbuster (killed by Netflix), and many more. These are firms that were lords of their domain and were killed by the innovation of others — usually disruptive innovation.[1]

To put it bluntly, organizations that do not innovate enough are destined to die. The death may be relatively fast, or relatively slow, but it is likely. In fact, with the increasing rate of innovation (using some of the platforms I will describe soon), the opportunity is growing and so is the danger. Lack of innovation causes a spiral of decline; it is a harbinger of demise. In the IT realm, CIOs who do not innovate will be replaced, demoted, or simply lose their organizational relevance.

I contend that innovation as a force (both positive and negative) is growing. In general, for a non-IT firm, innovation used to demand 5%-10% (of, say, the number of people or operational budget devoted to it), depending on the industry. These days that figure is more like 20%-30%, and in some cases more. In fact, in organizations that are more IT-enabled, most of the energy is going to innovation (think Google or Facebook, where most employees develop new products and services and fewer employees do things like sales and maintenance). The role of research and development departments is growing. The role of business development and corporate VCs is growing — all with the hope of taming the innovation opportunity and threat.

Business innovation has long-standing ties with information, but information technology used to play only a supporting part to technology itself. In recent years, however, we are seeing many more innovations that connect directly with information technology. For example, Otis Elevator Company long ago mastered the use of mechanical technology in its elevators, but it has

since used OTISLINE, an integrated service and support IT system, to create a competitive edge that is based on information.[2] Similarly, FedEx enhanced its delivery service (transportation technology) by introducing package tracking, an IT innovation. Recently, we have seen many industries change due to information technology:

- Zipcar uses IT to change the way we rent cars by allowing short-term — even hourly — rentals.
- Progressive is changing the way we buy insurance by constantly offering IT-based innovations.
- The Octopus smartcard payment system is at the heart of the Hong Kong transportation system (in, fact it has turned into a universal combination of payment card, key, and identity card).

Many other diverse industries, including travel, health, defense, publishing, and services, are changing due to advancements in information technology. Clearly IT plays a significant part in innovation.

IT WITHIN FIVE INNOVATION PLATFORMS

To fully appreciate and act upon IT's unique role in innovation, we will now explore five different innovation platforms. Each platform looks at innovation from a different angle, and in each kind of platform, IT has a somewhat different part to play. Mastering these platforms — and IT's contribution within them — will enable IT leaders to bring value to the organization.

1. Process Innovation Platforms (Big, Medium, and Small)

The simplest platform for examining the relations between IT and innovation is the common role of IT as an enabler of process innovation. IT enables new business processes on three levels — big, medium, and small innovation:

- **Big innovation**, often called Blue Ocean innovation,[3] rebuilds entire markets. Apple iPhone/iTunes is a good example. The role of IT is clear: beyond the IT side of the hardware itself, the entire software layer and iTunes back-end design are all about IT. In fact, issues such as cloud backup, user profiles, and market are key to Apple's overall strategy. IT is an enabler.
- **Medium innovation** has to do with specific business processes. Apple can also serve as an example here. Compare Apple stores to Walmart or Home Depot. There is ample innovation in the Apple retail process. In an Apple store, you find many more sales associates, and they walk around with mobile terminals to get your details. (Of course, these are iPhones fitted with barcode readers.) They connect wirelessly with the printers to print your invoice. Again the role of IT is clear: these processes were designed with the availability of terminals, small printers, and bar codes in mind. This is innovation at the process level. Note that all the technologies were available to other retailers, including Walmart and Home Depot, yet it is Apple that chose to repackage the retail process in an innovative way.
- **Small innovation** has to do with quickly testing new process improvements — checking them out, gaining feedback on them, and replicating the process in the entire value chain based on the chosen micro innovation. Let me share one example, again from the Apple store (can you tell I like Apple?). In my latest visit to the Hong Kong IFC mall Apple store, I noticed a minor change in the retail process. In the past, as I entered the store, one of the sales reps would approach me and ask me what I needed. If I wanted to buy an iPad, he or she would bring the iPad to me as I continued to stand at the table. That is, the salesperson would "disappear" for three to four minutes and come back with the iPad. On this latest visit, I asked for a white iPhone 5. The salesperson tapped on his terminal then asked me what else I needed. To my amazement, as we continued to talk, another salesperson approached us and handed my sales rep the white iPhone 5 I had asked for. Consider the retail value of this minor improvement. The salesperson never left me alone to change my mind about my proposed purchase, and he was able to sell me an iPad keyboard besides. Apple could make this micro process change because it is possible to add this feature to the Apple retail systems. I assume that once the experiment proves it is working, the same process will be installed in all Apple stores.

2. Generative Innovation Platforms (Individual, Organizational, and Network)

Another way of examining the role of IT in innovation looks at how IT supports the innovation process. To that end, we need to examine the changing nature of invention and innovation. Following the lead of group-innovation guru Charles Leadbeater, we can see an evolution taking place through three ages of innovation:[4]

- The 19th century was the age of **individual innovation**. People like Thomas Edison supported themselves with a lab with a few assistants and led the process from idea to experimental product.

- The 20th century was the age of **organizational innovation**. Companies like IBM, Dow, and GE, as well as defense companies and governmental agencies like NASA, designed invention processes in which large groups of people developed new products and services.
- The 21st century is the age of **network innovation**. Firms are looking to partner with external inventors, other startups, individuals, professional amateurs, and even competitors to innovate. The network innovation process is much messier than organizational innovation; it involves more people from different locales and disciplines with different business goals. Academia is also involved in a different way (still to be further deciphered).

IT should support this new innovation process in two ways: with *internal* systems to share knowledge (internal portals), and with connection to *external* systems to allow outside knowledge to stream in and relevant internal know-how to stream out. This is a new and complicated area both for the organization (which needs to attend to IP concerns) and for the IT department (which needs to open up communication channels). Systems like Salesforce Chatter support such sharing of internal knowledge. However, we do not yet have common off-the-shelf systems to facilitate network innovation. One homemade system for managing network-based innovation is employed by Intellectual Ventures LLC (IV) to support a network of 4,000 inventors who help them solve problems. (Disclosure: I'm one of them.) With this Web-based system, a request for invention (RFI) is emailed to the 4,000 inventors in the network. Then, using an IV site, an inventor can submit an idea and follow the internal process within the system. It is also possible to collaborate with other inventors and share ideas and jointly submit solutions.

The unique role of IT in facilitating innovation is portrayed visually in C.K. Prahalad and M.S. Krishnan's "New House of Innovation."[5] In their model (adapted in Figure 1), they define the new creed for innovative firms: use global resources and talent (R=G) to satisfy the needs of one customer (N=1). For example, Apple is using hundreds of suppliers globally to create the iPhone (Resources=Global). Then, using its App/App Store/iCloud architecture, each user can tailor the product to his or her own needs (Number of users = 1).

In Prahalad and Krishnan's model, I see IT acting as the roof and the floor. We have already covered the "roof" under the need for network technologies to enable network innovation. The roof has a lot to do with a culture

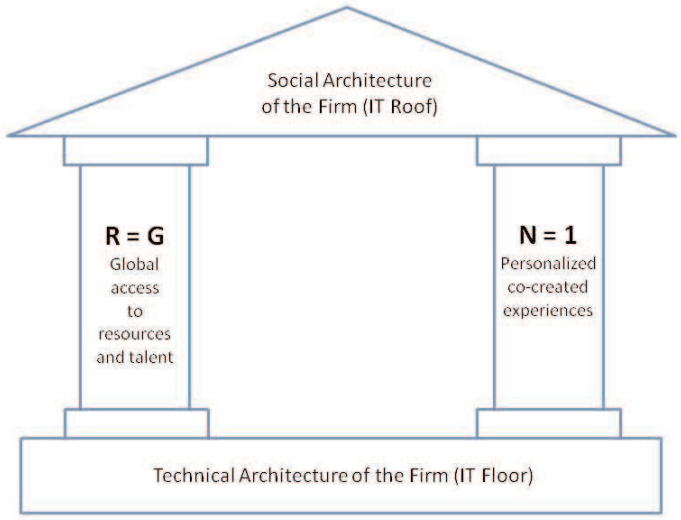

Figure 1 — The House of Innovation (adapted from Prahalad and Krishnan) and IT's roles.

that allows the organization to encourage, accept, and digest innovation — sort of an anti-NIH (Not Invented Here) approach. IT acts as the "floor" by providing the infrastructure for effective global sourcing and personalization. This is the technical architecture of the firm, as shown in their model. It is the combination of a classical SCM package and an extensive CRM system that enables specific tailoring. In this sense, I see the Apple App Store as a CRM system extended by Apple.

3. Ready-Made Innovation Platforms

A third kind of IT innovation platform can be called a "ready-made" platform. Let's start with one of the paragon examples: LinkedIn. LinkedIn is changing the way we deal with the organizational human factors. It has changed the way we hire people and follow our own employees. For instance, ones that update their profile substantially should be looked at carefully. Are they searching for another job, and if so, how should we respond? That info, readily available, may be a call for action.

Not surprisingly, new issues emerge with ready-made platforms, such as privacy, how the firm is seen on LinkedIn (see company pages), and the history of current, future, and past employees. LinkedIn is not just about managing the firm's human resources; it also involves marketing, sales, customer support, competitive analysis, market trends, updating key people's profiles with news items, managing groups (of individual followers or company followers), and so much more.

US-based platforms such as LinkedIn, Apple IOS, Android, Amazon, eBay, Google, Facebook, Wordpress,

and Twitter, as well as Chinese platforms such as Baido, YouKu, Renren, Alibaba, Tencent, and QQ (among others) present deep innovation platforms that call for understanding, monitoring, and value creation. In fact, entire businesses can be constructed based on these ready-made innovation platforms. Conversely, other businesses may collapse as they become irrelevant. For example, if you are a publisher of books, you should have looked carefully at Amazon Kindle and pondered your steps as this innovation platform emerged. Such innovation platforms may affect other innovation platforms, as well as other businesses that do not (yet) connect to them.

Many new innovations build upon these platforms. A unique combination of a few platforms and some creative ideas can even generate Blue Ocean businesses. 1-800-Flowers became a viable business when it connected two readymade platforms (credits cards and shipping). Zynga emerged because of Facebook. Face.com (a small startup from Israel) was able to prove its face recognition technology because of Facebook's ability to give each user a database of faces that relate to the user. (As an aside, Face.com was successful enough to be purchased by Facebook for over US $50 million, according to the Dow Jones AllThingsD site.[6])

The role of IT, with these readymade innovation platforms, is much different than with the previous two platforms. While in both previous platforms that role was operational (in the first, to actually do the IT part of the innovation, and in the second, to enable the tools for innovation), the role here is more analytic and strategic in nature. A new IT/business skill must connect the past, present, and future abilities of such readymade platforms and the past, present, and future of the organization. This is active analysis — not just reading about the platforms, but true hands-on experimentation. The level of experimentation depends on the type of organization and the business goals. For example, for a B2B firm, deep connection with LinkedIn (i.e., actually signing up as a developer) would give a heads up regarding a new feature (say, "company profiles") and thus allow new innovation in the firm's B2B sales processes.

4. Technological Innovation Platforms (Cloud, Mobile, and Data)

The ready-made innovation platforms just covered are relatively easy compared with what can be called technological innovation platforms. Technological platforms are a basket term for technologies that serve general-purpose business goals. These platforms, such as cloud, mobile, and data, can connect with many business functions and facilitate tremendous innovation. IT should adopt the innovation perspective when looking at such technologies.

Cloud

Consider cloud platforms, for example. Their innovation value can be recognized by looking at the evolution of virtualization. A graph from *The Innovative CIO*[7] depicts how cloud takes us from saving capital expenditures, to saving operational expenditures, to achieving agility (being able to do many things at low cost), to ultimately producing revenue faster (see Figure 2).

The three major kinds of cloud (infrastructure as a service [IaaS], platform as a service [PaaS], and software as a service [SaaS]) expose the different innovation values.

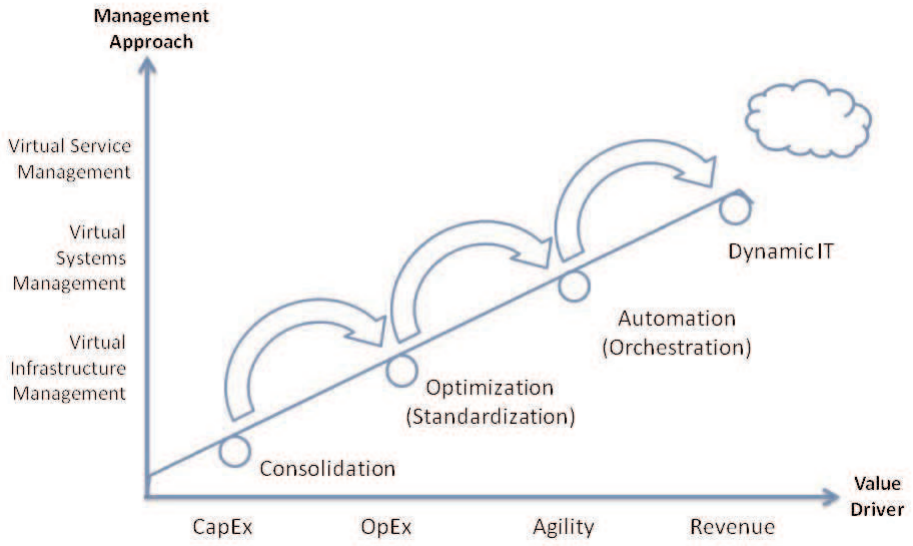

Figure 2 — Virtualization maturity that leads to dynamic IT. (Adapted from Mann et al.)

In IaaS, we can install new systems quickly, we can back up and replicate various versions, and we can store older systems and bring them back only as needed. In PaaS, we can develop services quickly in a scalable manner. Usually such systems are working on all devices out of the box. Smart and powerful network-based applications can be easily deployed to match our unique needs. Finally, SaaS allows us to get the latest commodity applications at a fraction of past cost. We can just start using a new service and test it. If we like it, we can add more users or service. If we don't, we can close the service.

But cost is just one factor. With cloud services — especially at the SaaS level — we enjoy central backup and disaster recovery planning, as well as rapid changes. (For example, in Gmail there is no need to train users, as they are educated to get new features all the time.) Furthermore, we get cloud-based features like spam filters that get their value from being crowd-generated. In many ways, in many applications, that type of IT *is* a commodity (à la Nicolas Carr[8]). IT is needed to examine the technological platform and make the right decisions about it.

Mobile

Mobile platforms are yet another major force in innovation. Employees arrive with ever-stronger smartphones, which will require IT to manage part of them (BYOD). Suppliers, partners, and customers also expect to connect via mobile devices. GPS, cameras, always-on status, and other sensors enable organizations to propose new services. Banks are now moving from merely presenting information to allowing their customers to perform payments with their phones. Retailers are sending us SMSs with the latest sales items as we arrive at the mall. Health management organizations (HMOs) can use phones with sensors to measure our heart rate.

GetTaxi is a startup that is changing the taxi market. With the GetTaxi application, you can order a cab (based on your location and the location of nearby GetTaxi cabs), you can rate the driver, and you can even pay. The market for taxi stands and dispatchers is changing. GetTaxi presents one more example of the impact of this technological infrastructure.

GetTaxi was born in Israel, where Waze controls the navigation market. Waze has taken mobile technology to new levels. By combining smartphones, user-created content, and community building, Waze has created navigational software that gets updated on the fly based on other users. In a matter of a few years, it has amassed 50 million users, steadily eroding established GPS navigational players (see Figure 3).[9] It is no wonder that Google paid over $1 billion to grab this unique service in June 2013.

Data

Data platforms are yet another kind of technological platform. In the last few years, we have seen amazing development in the area of data. First, the trend toward disconnecting data from applications, historically a good practice, allows us to replace applications — and

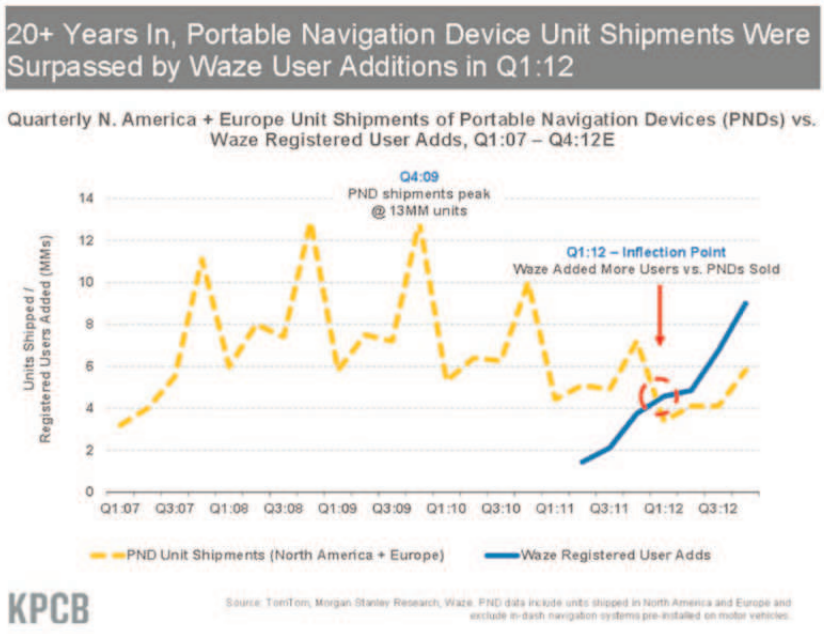

Figure 3 — Waze (a new navigation player) grabs market share from past leaders. (Source: Meeker and Wu.)

innovate — quickly. Big data techniques enable us to process data and generate unique insights and ideas from data.[10] This is beyond "end of the year" analysis; this is already on-demand, on-the-fly analysis. SAP, the ERP giant, has been pushing HANA as its innovation platform since 2010.[11] HANA is a collection of in-memory technologies that presumably will change how we do enterprise computing. Open data is yet another technology platform that can generate innovation, as the firm provides raw data in accessible forms, allowing new ways of presenting and manipulating data. For example, a small not-for profit Israeli outfit took open budget data and presented it in different, more accessible ways to the public. Finally, public policy discussions can be based on budget facts.[12]

Data and analytics enable what Erik Brynjolfsson from the MIT Center for Digital Business calls the innovation cycle. It comprises the following four steps (see Figure 4):[13]

1. Measure the data.
2. Experiment with a small change and check the data again.
3. Gain feedback on the change.
4. Replicate the change.

This cycle turns the enterprise into a designed and measured innovation engine. Digital giants like Amazon and Google are using such A/B testing and replication as their prime Agile development method.

Such technology platforms demand IT's careful and deep understanding — not just of the technical capabilities, but also of the business meaning of these innovation platforms.

5. "Build-Your-Own" Innovation Platforms

Lastly, we arrive at the holy grail for 21st-century innovation — the ability to develop innovation platforms. Amazon as a store is based on a system that connects many suppliers and many affiliates to enable selling of products. Apple, with iTunes, allows an ecosystem of developers to build up applications. Google, with ads, allows affiliated Web sites to gain value from its content. eBay is a network of sellers. Alibaba is a network of B2B players. Amazon Kindle is yet another innovation platform for publishers that allows everyone to gain monetary value from their creations.

Let's examine the value Apple gleans from its App Store. In its June 2013 WWDC keynote,[14] Apple announced it has paid out $10 billion to developers since its App Store for the iPhone and iPad launched in 2008. That's up from $7 billion in January and $5 billion a year ago. Needless to say, Apple's App store revenues are accelerating.[15]

Building such innovation platforms is not for every company or every industry. It is also not for every IT department or IT leader to design or lead. But such innovation platforms bring a lot of value for both the company and hundreds of third-party partners (usually small and medium enterprises or even micro businesses).

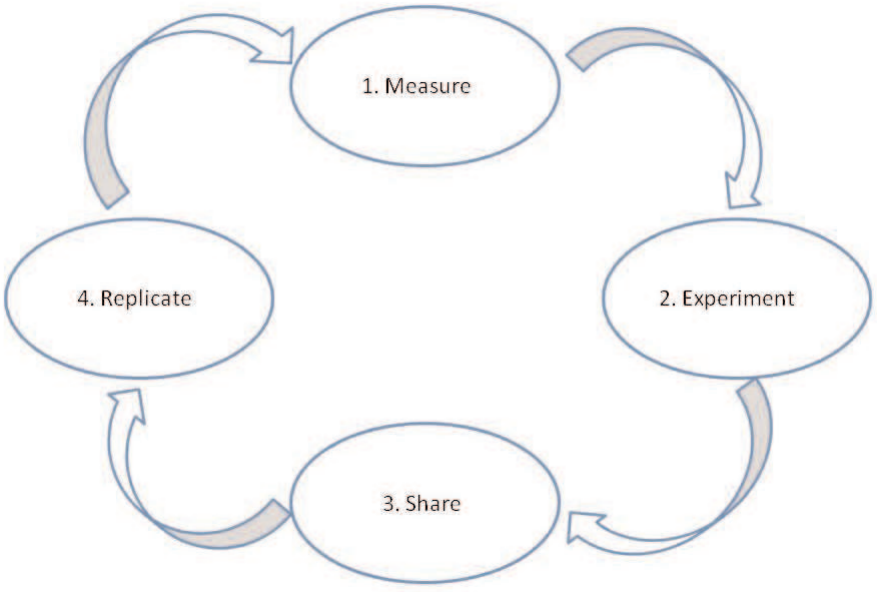

Figure 4 — How IT supports innovation in four steps. (Source: Brynjolfsson.)

CONCLUSION

IT-based innovation is accelerating. Innovation needs to be driven in at least five platforms: process, generative, ready-made, technological, and, when appropriate, build-your-own innovation platforms that are built as a core engine of growth. IT leaders can — and in fact should — transform themselves into leaders of innovation.

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