Don’t Get SMACked:
How Social, Mobile, Analytics and Cloud Technologies are Reshaping the Enterprise

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SMAC: The New Enterprise IT Model

SOCIAL, MOBILE, ANALYTICS, CLOUD
Executive Summary

The consumer technology model is now penetrating, and beginning to transform, the corporation in a significant way. This new IT architecture, which we call the “SMAC stack” (for social, mobile, analytics and cloud), is enabling the creation of hyper-intelligent software platforms that address myriad issues, from sales to customer service to the design of new products to the management process. In short, the SMAC stack does not represent the next new technology to be “bolted onto” your existing business model. Instead, these technologies will transform the business model itself.

This white paper outlines three key interrelated issues:

1. **Technology: The SMAC Stack.** The next master architecture for enterprise IT, and its magnitude and importance.

2. **Business Models: “Unchained Businesses.”** How the SMAC stack will lead to the unbundling of tightly-coupled, industrial-age value chains, transforming key processes and, in some cases, entire industry structures.

3. **Killer Processes: Ground Zero for Change.** Successful transformations will occur in focused areas of the business in which the SMAC stack is already changing the competitive equation.

Whether you’re a general manager, head of information technology or leading your company’s strategy, a decade from now, you’ll be asked the same two questions: Did you see this technology-based sea change coming? And, once you did, what did you do about it? This paper is intended to help you answer those questions well.
From Widgets to Digits
If your company is more than 10 years old, its structure is probably wrong in many ways. Customers know it, employees know it, and investors know it. Multiple key processes, and the organizational and financial models that support them, were likely architected for yesterday's world of widgets and are floundering in today's onslaught of digits.

This business transition – from widgets to digits – is driving a massive value shift in many industries. For example:

• This year, there will be more than 10 times as many photographs taken than in 1992, and yet Kodak is in bankruptcy.
• More news is being generated on a daily basis than ever, and yet the Los Angeles Times is bankrupt, The New York Times' debt sits at junk status, and New Orleans' The Times-Picayune now publishes just three days a week.
• Americans are watching more movies at home than ever, and now rent more movies than they purchase, and yet the curtain has closed on Blockbuster.
• Book sales increased 27% in 2011 in the U.S., and yet Borders Books collapsed.

What's going on?
It’s too easy to dismiss these dislocations in photos, newspapers, video rentals and books as germane only to those industries, or to blame managers who didn’t “get it,” or to point to the digitization of the end-product in those sectors. Obviously, those are contributing factors. However, they distract us from the larger point that the industrial model “winners” crumbled under their own weight, with business models that no longer fit the new digital realities of their markets.

These examples serve as today’s canaries in the coal mine, and the dynamics that struck them early are now hitting nearly every industry with increasing momentum as “widget winners” are being quickly – and painfully – usurped by “digit winners.”

Very plainly, if you have not built key portions of your business on the principles and realities of an emerging computing model – the social, mobile, analytics and cloud information technology stack, or “SMAC stack” for short – then you are at risk of being usurped by those competitors that have.

The Value Chain: “Unchained” by Social Technologies
The impact of this new technology stack on the corporation is currently being under-hyped. SMAC stack technologies are not simply being “glued onto” the traditional corporate model; in many cases, they are creating an entirely new model. In the same manner that steam power, steel and electricity provided the platform for the industrial corporate model, the SMAC stack is providing the foundation for the knowledge corporate model. This envisioned future, in many ways, is already here.

Take, for instance, how Craigslist has transformed newspaper classified ads. As recently as 10 years ago, classified ads represented one of the primary revenue streams for newspapers in the U.S., generating $19.6 billion in revenues in 2000. By 2012, that figure has dropped to less than $5 billion. Where did many of those classified ads go? To Craigslist, where each month, more than 80 million new classifieds are posted, to an audience of more than 50 million unique visitors. And this is all managed by a grand total of 32 people in the Craigslist headquarters in San Francisco.

For decades, newspapers had managed this information-intensive activity as an industrial process, with the very expensive co-location of people, process and tools. This industrial process was replicated (redundantly) at hundreds of newspapers across the country, employing tens of thousands of people across local markets ... and it was eviscerated in just a few years by a few dozen people with origins in a different industry.
By no means is this story isolated to newspapers. Another example of the efficiency and disruption of a business model based on the SMAC stack is highlighted by the metrics of 11-year-old Wikipedia vs. 244-year-old Encyclopedia Britannica. Figure 1 reveals the incredible scale advantages of the SMAC-stack powered Wikipedia.

### Knowledge Transformation

<table>
<thead>
<tr>
<th>Wikipedia</th>
<th>Encyclopedia Britannica</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year founded</strong></td>
<td>1768</td>
</tr>
<tr>
<td><strong>Articles</strong></td>
<td>65,000</td>
</tr>
<tr>
<td><strong>Languages</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Words</strong></td>
<td>40 million</td>
</tr>
<tr>
<td><strong>Updated</strong></td>
<td>Annually</td>
</tr>
<tr>
<td><strong>Mistakes per article</strong></td>
<td>2.92</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$729</td>
</tr>
</tbody>
</table>


Small wonder that Encyclopedia Britannica published its last physical version in early 2012.

Craigslist and Wikipedia stand as extreme, yet simple, examples of dematerialization: the process by which material-based value chains go virtual. How many similar knowledge-based processes – now incorrectly structured and managed as industrial processes – exist in your organization?

This unbundling or dematerialization of knowledge processes is at the heart of many industry transformations. Figure 2 highlights the significant displacement occurring as a result of the proper implementation of SMAC stack technologies.

### Model Change

<table>
<thead>
<tr>
<th>Industry</th>
<th>Widget Winners</th>
<th>Digit Winners</th>
<th>Tipping Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book retailing</td>
<td>Borders</td>
<td>Amazon</td>
<td>Borders bankrupt 2011; Amazon market cap, $99 billion.</td>
</tr>
<tr>
<td>Movie rentals</td>
<td>Blockbuster</td>
<td>Netflix</td>
<td>Blockbuster bankrupt 2011; Netflix streaming volume exceeds rentals in 2012 and constitutes one-quarter of U.S. Internet traffic.</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>Nokia</td>
<td>Apple, Google</td>
<td>Nokia market share at 1997 levels, 3% of peak market cap; Apple market cap, $500 billion; Google market cap, $215 billion.</td>
</tr>
<tr>
<td>Online communication platform</td>
<td>AOL</td>
<td>Facebook</td>
<td>AOL value 95% from peak; Facebook market cap, $48 billion.</td>
</tr>
<tr>
<td>Photographs</td>
<td>Kodak</td>
<td>Flickr, Shutterfly</td>
<td>Kodak files for bankruptcy in early 2012.</td>
</tr>
<tr>
<td>Maps</td>
<td>Rand McNally</td>
<td>TomTom, Garmin, Google</td>
<td>Garmin market cap, $7 billion.</td>
</tr>
</tbody>
</table>

*Source: Company reports; valuations as of mid-November, 2012.*
In every case, the industrial model (or widget) winners held significant advantages in brand awareness, customer relationships, distribution channels, research and development capabilities, management experience, employee depth, balance sheets and market valuation. Yet, the digit winners possessed one key advantage: Their value chains were in harmony with the realities of today’s information-based markets, because they had mastered the SMAC stack technologies. By 2012, they had all triumphed, pushing widget “champions” to either bankruptcy or market valuations 90% off their peaks.

In hindsight, the fight wasn’t even fair.

What’s going on today is not the digitization of products, but the digitization (and resulting virtualization) of entire business models. In this new landscape, it doesn’t matter how hard your organization works, how well you manage or what resources are at your disposal; if you are competing with an antiquated business model, you are at risk of facing your own Kodak moment.

Denial in industrial-age firms can be palpable, even in the most informed organizations. As stated by George Jones, CEO of Borders Group in 2008:

“What I found most compelling was the Borders brand and the people. Borders is a much-loved, highly regarded brand with some of the most intelligent and engaged employees I’ve worked with in the retail industry.”

Fewer than four years later, Borders was out of business. It got SMACked.

Make sure your organization doesn’t get SMACked by this new technology wave. Instead, understand it, and learn how to ride it. Start by focusing enterprise attention and resources on three key, interrelated issues:

1. **Technology:** Harness the multiplying effect of the SMAC stack to transform your business.
2. **Business Models:** “Unchain” your industrial value chain by creating boundaryless ways of working within your organization and with business partners and customers.
3. **Focal Points:** Identify key knowledge process areas where the confluence of new technologies and ways of working can truly differentiate your business.

**Part I: The SMAC Stack**

**Mastering the Fifth Wave of Corporate IT**

The year 2012 is a very important one in corporate IT, as the social, mobile, analytics and cloud technologies that have so dominated the consumer experience for the past several years entered the enterprise world in a meaningful way, laying the foundation for a new master corporate IT architecture.

To date, there have been four master corporate technology architectures: the mainframe, the minicomputer, client/server and the Internet. Each of these eras lasted roughly a decade and (as outlined by the “S” curves in Figure 3, next page) drove business productivity higher during those periods.

Each architecture focused on key business processes and supported “killer” technology applications (such as ERP with client/server and e-commerce with the Internet) to drive new levels of value. However, once those architectures were in place, early productivity gains waned, and investments reached points of diminishing returns (which is why the top of each “S” goes flat). After all, once you’ve put your ERP backbone in place, you don’t need a second one.

Today, it’s clear we are at the top of the fourth curve and starting to jump to the fifth. As with other “curve jumps,” this shift will generate significant dislocation and wealth creation on the supply (or vendor) side of the industry — across hardware, software and services sectors — and drive new levels of productivity on the demand (or user) side of the industry.

**SMAC as a Technology Stack: No Technology Is an Island**

Key to understanding this transition — and knowing what to do about it — is in viewing SMAC technologies as a “stack,” as an integrated architecture. Imagine your smartphone without its apps, disconnected from the Web, the cloud and your personal networks. On its own, it would a very expensive pocket watch.
The same is true with corporate technologies. Over the past few years, the potential of the discrete “piece parts” of this new technology architecture has been oversold, for when cloud or mobile technologies are implemented in stand-alone fashion, they rarely deliver meaningful business value. However, when these technologies are deployed as an integrated stack, they have a multiplier effect (e.g., mobile inputs driving real-time analytics) that can serve as the foundation for breakthrough business results.

This phenomenon is similar to the early days of the client/server wave. That is, in the late ’80s and early ’90s, various components of the client/server architecture – such as relational databases, Ethernet networks, Unix operating systems and PCs – were all commercially available. While the technical superiority of these piece-parts were recognized in technology circles, when implemented in stand-alone fashion, little business value was created. In fact, much value (and IT credibility) was destroyed when IT managers attempted to glue individual client/server technologies onto minicomputer architectures (e.g., replacing minicomputer servers with Unix servers). Only when client/server technologies were implemented as a stack, as enterprise application solutions that drove business value, did the architecture take hold (with the PCs atop Unix servers, connected over networks and tapping into relational databases).

The power of disruptive business models – such as those pioneered by Facebook, Apple, Netflix, Amazon, Google, etc. – originates from managing SMAC technologies as an integrated stack and fundamentally enabling business models by using this integrated technology stack.
Today’s SMAC Stack Masters Pave the Way

The power of disruptive business models — such as those pioneered by Facebook, Apple, Netflix, Amazon, Google, etc. — originates from managing SMAC technologies as an integrated stack and fundamentally enabling business models by using this integrated technology stack. For example, when selecting a book on Amazon, buyers are presented with recommendations based on analytics and very sophisticated algorithms. Once chosen, the book is served up from “the cloud” to a mobile reader of choice for instant enjoyment. Afterwards, if so motivated, the buyer can then recommend the book to their social network.

SMAC Stack: A Step-Change Driving Exponential Growth in Computing Devices and Data

By any definition, this market shift is occurring faster – and at dramatically greater scale – than prior technology shifts (see Figure 4 and sidebar, next page). According to multiple estimates, by 2020:

• The SMAC stack will represent $5 trillion in spending.7
• As many as 100 billion computing devices will be connected to the Web.
• Corporations will be managing 50 times the data currently managed.

2020: When Computers Outnumber Humans 10 to 1

Notably, with each wave of corporate IT, the number of computers worldwide has increased by roughly an order of magnitude, and the data generated has grown at an even faster rate. In looking back at the previous four master IT architectures — and understanding the dynamics of the transitions between architectures — we begin to recognize that the speed and scale of the coming transition will greatly outstrip prior shifts.

The Two Steps of SMAC Stack Evolution

The massive leap in computing devices and data under management will occur in two steps in the next several years. The first step, which we call the “mobility movement,” will be driven by the 10 billion smart devices in the hands of the world’s people. The second step – which will take the numbers to remarkably high levels – will be the “Internet of Things” movement, driven by 100 billion devices mostly in the “hands” of machines.
Quick Take

A History of Technology Shifts

1. The Mainframe Era: 100,000 computers
   This market topped out at roughly 100,000 computers worldwide (combining the approximately 15,000 mainframes installed at the height of this era and all of the ancillary computing devices attached to these machines).

2. The Minicomputer Era: 10 million computers, 2.6 exabytes of data
   Led by companies such as Digital Equipment Corp., Data General, Wang, Prime Computer and Stratus, this era ushered in a trend of smaller, departmental computers (ironically—by today’s standards—called “mini,” as the 1.5-pound iPad has significantly more processing power than the 750-pound DEC VAX of 1980). At the end of the minicomputer era, approximately 10 million computing units were installed across enterprises worldwide, with 2.6 exabytes of data under management.

3. The Client/Server Era: 100 million computers, 15.8 exabytes of data
   The early 1990s brought another order of magnitude growth in computers in the enterprise. Once the PCs, Unix boxes and network routers were installed to run the new enterprise systems, more than 100 million computers were sold, with 15.8 exabytes of data in the associated databases.

4. The Internet Era: 1 billion computers, 54.5 exabytes of data
   Connectivity to an entire new generation of devices and users drove the number of computers worldwide to 1 billion and tripled data under management to 54.5 exabytes.

5. The SMAC Stack: 10 billion computers, 1,800 exabytes of data
   The number of computers is quickly on its way to 100 billion, and data volume is growing to 35,000 exabytes (more than 600 times the data under management at the end of the Internet era).

Step One (2012-2015): Mobility and Analytics Lead the Way

By 2015, we will have roughly 10 billion computing devices in use, generating 1,800 exabytes of data. (Yes, we will soon cross the line where there are more computers on earth than people. If this number seems overstated to you, simply take inventory of the smartphones, tablets, PCs and gaming consoles in your home ... then take inventory of your work-related devices.) The number of computers has been largely driven by human usage, with dramatic growth at each layer of the SMAC stack. In particular, the growth in mobility and data highlights the need to focus on these two areas in the near term.

Mobile: “The smartphone in your pocket has more computing power than all of NASA did when it put a man on the moon in 1969.”

And yet all you do is play angry birds.

Seriously, when it comes to mobile adoption, we are very close to full market saturation. That is, by now you should assume that any customer you want to sell to, or any talented employee you wish to hire, is carrying a sophisticated smart device at all times. What’s now important is not who has a smart device, but what they are doing with it. They’re already doing a lot, and this will only accelerate over time.

For example:

- In 2012, mobile network data will exceed fixed network data for the first time.
- 45 billion mobile apps will be downloaded in 2012, and it is predicted over 200 billion will be downloaded in 2015.
- Mobile apps will grow from a $6 billion industry today to a $55.7 billion industry by 2015.
- Mobile unit sales are now more than double those of PCs, and mobile device revenue has also surpassed PC revenues.
- The number of smartphone shipments is expected to be one billion in 2016.
- After its first weekend on the market in September 2012, the iPhone 5 sold 5 million units.
- From May to December 2011, the number of Android Market apps doubled to more than 400,000 apps.
• Globally, mobile data traffic will increase 18-fold between 2011 and 2016, reaching 10.8 exabytes per month by 2016.18
• Global mobile data traffic will grow three times faster than fixed IP traffic from 2011 to 2016. Global mobile data traffic was 2% of total IP traffic in 2011, and it will be 10% of total IP traffic in 2016.19

By any statistic or definition, it’s now a mobile world. The question is, where will it lead us, or where will we lead it?

Analytics: “In God we trust; all others must bring data.” – W. Edwards Deming

If you feel overwhelmed by information, you should; it means you’re paying attention. Between 2008 and 2020, the amount of data being managed by corporations will grow at least 44-fold.20 As a result, Gartner has highlighted business intelligence and analytics as the current number-one priority for corporate IT.21

This explosion of data is being driven by the SMAC stack in two stages. First, with the growth of mobile devices and social networks, your systems are constantly being hit by suppliers, customers and employees across your entire value chain, and they are talking openly about your company, in an “anytime, anywhere” fashion. This alone will lead to a five-time growth in data. However, as highlighted in the following section, this growth will be turbocharged when we reach the second stage, at which point it’s not just humans but also machines that are persistently connected across your business and engaged in constant communication.

With such a radical shift in the digit-to-widget ratio of an organization, the management teams that win will be those that can make sense of the explosion of information in – and around – their businesses.

Step Two (2015-2020): Mobile Machines and the “Internet of Things”

In the current instantiation of the market, each layer of the SMAC stack is experiencing outsized growth. However, by the end of 2015, things will get really interesting as the SMAC stack becomes the staging area for another (much more profound) leap in the scale and ubiquity of computing, the “Internet of Things.”

What is the Internet of Things?23 It’s the networked interconnection of everyday machines to one another, as well as to humans. As an example, think of your next car as a truly connected device, with many of its systems online at all times. Whether next-generation GPS systems, the streaming of music to the dashboard or real-time engine diagnostics, multiple core systems will be online and continually transmitting data via the Internet. In fact, the car may even drive itself. Additionally, your car will not be in isolation. It could be connected to your calendaring system, so that if you are 15 minutes late, it will automatically notify whomever you are driving to see. On your way home, the car will communicate with your home security and air conditioning systems, so upon your arrival the house is open, properly lit and at your desired temperature.

Machine-to-machine-to-human connectivity will have a profound impact on the consumer and home experience, as well as transportation systems, retail, industrial supply chains, energy grids, security and public safety. Retailers will be able to provide precision retailing at minimal cost. Manufacturers of complex products will provide predictive maintenance. Doctors, through remote care, will be in regular contact with post-surgical patients, remotely monitoring their key vital signs and recommending recuperative steps in real-time. The use cases are myriad and promise to create rapid dislocation in industry after industry.24

SMAC Stack Summary
• The SMAC stack represents the fifth wave of corporate IT, and it’s just getting started in 2012.
• The power of this technology platform is in treating it as a stack, for its components have a multiplying effect when they work in combination.
• In the enterprise, following consumer models can destroy value. The key is tying SMAC technologies to key core processes.
• We are entering an era of explosive growth in computing devices and data creation.
• We are on the cusp of the “Internet of Things,” a tipping point when most computing devices, and the majority of data created, are done so without human intervention.

PART II: The Natural State of Organization

The Age of the Great Decoupling and Dematerialization

In nature, elements become unstable with significant changes in temperature, and must transform to regain harmony with their environment. Similarly, many businesses have become highly instable in this era of hyperconnectivity. Just as rising temperatures force change upon matter (with, say, ice turning to water), today’s rapid rise of information is forcing structural change upon many corporate models.

Structural Changes in Nature

Each year in New England the changes in season turn winter’s ice rink into summer’s swimming pond. Whether one skates on the ice, swims in the water or stares up into the clouds, the integrity of the water in any of its forms is never questioned. Water is water, for regardless of its state, it is always two parts hydrogen, one part oxygen. Importantly, we inherently understand the stability of each form given its environment (see Figure 5).

Today, there’s a strong parallel between the natural states of matter and the proper, or natural, state of an organization. Just as the state of matter naturally changes with increases in temperature, the state of the organization must change with meaningful increases in information (see Figure 6).

Unfortunately, too many managers today are confused. They focus on the state of their organization instead of its substance. For example, management at retailers such as Borders and Blockbuster defined themselves as physical retailers that happened to sell books or rent videos, instead of book and video providers that needed to take on the appropriate form for their market context. Incorrectly conceptualizing the business proved deadly in those markets.

Quick Take

Overwhelmed by SMAC’s rapid ascension? Here are three key questions your organization should be solving for now:

1. How do you manage in a world where “everything” (machines and humans) is IP addressable and always online?
2. What happens when the data surrounding your company grows 50-fold in the next 10 years?
3. What happens when information in your company transcends its traditional physical boundaries, beyond departments, companies, industries and countries?

Talking SMAC

States of Matter

![States of Matter Diagram](image)
Rearchitecting for Information Markets

The over-arching business challenge of the next decade is to reestablish balance between a business and its overall ecosystem context, and to reset business to the customer expectations and financial realities afforded by the SMAC stack. The rapid growth in computing devices and data (outlined above) will soon drive many industries to a “tipping point,” where the economics of information will usurp those of capital and hard assets.

This is the natural state of organization. The SMAC stack will drive structural change in the corporation (see sidebar, next page).

States of Organization

Figure 6

Tightly Coupled
- Widget-based value chain.
- Physical coupling of people and process.

Hybrid
- Widget-digit value chain.
- Combination of physical and virtual coupling of people and process.

Loosely Coupled
- Digit-based value web.
- Virtual coupling of people and process.

Tightly-Coupled Value Chains Morph into Loosely-Coupled Value Webs

Challenging the Fundamental Underpinnings of Value Chains

Many of today’s senior managers — industry aside — grew up with the Michael Porter “value chain model” of business management26 (see Figure 7, next page). This value chain model, which breaks down a company’s key activities and the linkages between such activities, had fundamental underpinnings based on industrial-age assumptions:

- Communication costs were expensive.
- Humans and information had to be co-located.
- Coordination costs were high (leading to internal ownership).
- Information was finite and proprietary.

Due to these constraints, the “molecules” of this value chain model (both functions and people) had to be co-located, or “tightly-coupled,” much like the molecules in a solid. Additionally, most companies found it more efficient and effective to own as many aspects of the value chain as possible. This is precisely why, for example, in building Ford Motor Co. and General Motors, Henry Ford and Alfred Sloan built massive factories, mostly in Detroit, to sit atop their vertically integrated value chains. With the high costs of communication, and relatively low levels of information flows, it was imperative to have people, processes and functions all co-located.

This seminal organization model has served as a blueprint of organizational design for nearly a century, regardless of the nature of a company’s product or service. With the emergence of the SMAC stack, such business model design in many situations is now fatally flawed, as the four key pillars of industrial business design are under assault:
Communication costs, for all intents and purposes, have plummeted to near zero.

People and information are now rarely co-located.

Coordination costs have essentially disappeared (as exhibited by the explosion of global sourcing, whereby third-party specialists can deliver better-faster-cheaper in a highly coordinated manner).

Information is now nearly infinite and universal in the Google age.

Yet why isn’t this yet universally obvious?
Value Chain Transformation: From Widgets to Digits
The SMAC stack, if applied holistically, can help organizations unbundle tightly-coupled, industrial-age value chains and transform business, if not entire markets, creating boundaryless ways of working.

Different Forms of Matter, Different Forms of Industry
If your industry isn’t yet addressing this structural challenge, it’s because your sector – like a substance in nature – simply has a different “melting point.” It’s why so many managers, yet to be SMACked by this technology wave, make statements like, “That’s a music or book thing, but our industry is different.” And yet, the only difference is the industry’s melting point. For example, water melts at 32 degrees Fahrenheit, but aluminum melts at 1,221 degrees and tin at just 449 degrees. Just as no substance is immune to heat, no industry structure is immune to today’s explosion of information. It’s just a matter of the level of information (see Figure 8).

Melting Points
Just as natural substances melt at different temperatures, there is also variance among industries as to their “melting points.”


Figure 7

*Before*
*After*
So how can your organization determine its melting point? If your business fits three or more of the following criteria, its SMAC stack melting point may well be near.

1. **IP businesses**
   
   The majority of revenue in these businesses originates from knowledge-based products vs. physical products or services (e.g., financial services, media and entertainment, life sciences, healthcare, news and information services, large portions of retail, etc.). These industry “supply chains” are, in truth, already knowledge chains and have high levels of information intensity. IT budget as a percentage of revenue is a key indicator.

2. **High millennial concentration**
   
   These are businesses where a majority of customers and/or employees are 35 years of age or younger. Millennials are the first generation of digital natives. They grew up online and view virtual experiences and interactions as being as “real” as physical ones. These customers and employees have little use for business models that do not keep up with their technical expectations and are often key agents of change.

3. **Geographically-distributed businesses**
   
   Business models that transcend geographical boundaries with relative ease in the widget world have accelerated their transition in the digit world. This is true on both the demand and supply sides of the business. Industries that have exhibited a high level of fluidity internationally in an industrial model have exhibited the ability to transform quickly to a digital model.

4. **Core offer commoditization**
   
   With the “what” a customer purchases standardized, the “how” it is purchased is open for radical change. This was a common element with books, music, maps, travel, movies, etc. and is clearly in place in portions of retail banking, consumer products, media and entertainment and retail.

5. **Well-defined regulatory environment**
   
   It’s axiomatic that “innovation doesn’t like regulation.” Actually, that’s not fully accurate. In reality, innovation doesn’t like potentially changing regulation. As such, markets with stable regulatory environments are ripe for SMAC stack innovations.

Part III: Knowledge Processes: Ground Zero for Business Transformation

**Knowledge-Based Processes**

The transition to boundaryless business models will not be uniform across your company. It will occur process by process, as certain parts of the business may experience fundamental change in the next couple of years, while others may stand seemingly untouched.

A key to success is being “process first” vs. “technology first.” That is, technology-led initiatives such as “we aim to become a social enterprise” or “we will become an analytics-led organization” are hopelessly vague, rarely drive results and often widen the gap between IT and the business. Instead, the focus should be on key processes, focused on your most important constituents. Over time, after a series of process-level successes, the overall IT architecture will evolve.

So, where to start? First, look to processes based on knowledge-based (or digital) inputs and outputs. Dozens of such processes exist in every company, and – as most are currently incorrectly architected as industrial processes – the opportunity for massive productivity gains abounds.

Steve Jobs framed the issue very well, although he was speaking on a related topic, of the value of knowledge workers:27

“In most businesses, the difference between average and good is at best 2-to-1, right? Like, if you go to New York and you get the best cab driver in the city, you might get there 30% faster than with an average taxicab driver. A 2-to-1 gain would be pretty big.
The difference between the best worker on computer hardware and the average may be 2-to-1 if you are lucky. With automobiles, maybe 2-to-1. But in software, it’s at least 25-to-1. The difference between the average programmer and a great one is at least that much.

The secret of my success is that we have gone to exceptional lengths to hire the best people in the world. And when you’re in a field where the dynamic range is 25-to-1, boy does it pay off.”

In the same way that “ERP,” “CRM” and “HRM” were key solution areas for the client/server stack, we believe four key SMAC stack solution areas are quickly crystallizing.

Jobs’ insight on the value of knowledge talent – which has had much to do with Apple becoming the world’s most valuable company – is equally applicable to knowledge processes. That is, a 5% productivity improvement on the factory floor (by, for example, updating an ERP module) is meaningful. Yet, we live in a time when 500% productivity improvements in knowledge processes exist. (Again, Craigslist vs. all newspaper classifieds is a prime example). As such, careful consideration should be given to the allocation of your time, budget and most valued staff members. Should they be focused on that final 5% of the client/server IT legacy, or on the potentially game-changing – yet not fully understood – opportunities made available by the SMAC stack? Unfortunately, too many organizations are making the mistake of focusing on the former rather than the latter.

So, in determining a starting point, where do many of these knowledge processes exist? We see four key areas, some of which are so large that we will all look back in several years and collectively say, “That was pretty obvious.”

Emerging SMAC Stack Solution Areas
The SMAC stack can transform the interactions with your key constituents, so these are the first places to look. The four primary areas are:

1. **The customer interface**: Next-generation marketing, selling and servicing.
2. **The machine interface**: Seizing advantage with Smart Products and the Internet of Things.
3. **The partner interface**: Collaboration and co-creation of products and services.
4. **The employee interface**: Mastering the new management process in the social enterprise.

In the same manner that the “ERP,” “CRM” and “HRM” categories were created 20 years ago as key solution areas for the client/server stack, we believe four key SMAC stack solution areas are quickly crystallizing. Note how each area detailed below provides an opportunity for quantum increases in innovation, effectiveness and productivity through dematerialization, with “unchained” business models based on SMAC stack technologies.

1. **The Customer Interface: Lowering Cost, Making Tighter Connections through the Dematerializing Sales Chain**

Ground zero for the initial business impact of the SMAC stack, in many industries, will be at the customer interface. This is where customer preference and expectation (particularly in markets with a high millennial customer demographic) is meeting with the growing SMAC infrastructure.

Below are three examples that highlight how SMAC technologies are quickly dematerializing many sales and marketing chains:

- The future of customer management: Intimacy in a virtual world.
- The future of money: Mobile commerce and the cashless economy.
- The future of retail: The rise of the “Intelligent Store.”

**True Customer Intimacy, Without a Physical Presence: The Wide Applicability of the Netflix Model**

Netflix’s 26 million subscribers now stream over one billion hours of video per month via the service (translating to more than one hour per day per customer), and the Netflix platform now constitutes a quarter of all Internet traffic in the U.S.
Much of that success comes from the personalization and customer intimacy provided by Netflix’s Cinematch engine. In analyzing the billions of hours of movies watched online by its customers, Netflix can offer highly customized — and remarkably accurate — movie recommendations based on a detailed statistical analysis of each customer’s viewing history and tastes. It’s a model in which high insight greatly outpaces high touch. Or, more accurately, where virtual high touch is greatly valued over the in-person high touch of the corner merchant.

Netflix customers cannot walk into a Netflix store, and the vast majority has never met a Netflix employee. Yet the company continually provides a level of personalization and recommendation accuracy that a traditional competitor could never provide, even if Roger Ebert himself were working the counter of the local store. After all, Netflix’s Cinematch engine can more successfully recommend movies to individual customers than the world’s best movie critics could, for while both Cinematch and the movie critics are experts on movies, the Cinematch engine is also (and more importantly) an expert on each customer.

This model of virtual customer intimacy applies equally to selling insurance policies, banking products, prescription drugs and healthcare policies. In fact, millennial-age customers who have grown up with the personalization, immediacy and transparency of the Netflix-type business model find purchasing in more traditional industries to not only be a waste of their time, but, in some cases, a violation of their trust. After all, when a company is unable or unwilling to provide them with full and unbiased product reviews and pricing transparency, trust in both the product and the brand is eroded. When it comes to personalization, efficiency and transparency, the juxtaposition between successful SMAC business models and more traditional experiences is too jarring for these customers, and companies that do not interact with these customers in a manner that meets their expectations risk losing brand value that no amount of advertising spend can replace.

The Future of Money: Mobile Commerce Drives the Cashless Economy

Mobile commerce — in the form of retail transactions conducted directly from one’s smartphone, and thus bypassing the need for cash or credit cards — is predicted to boom in North America and Western Europe over the next five years. According to Gartner, mobile payment transaction volumes will grow by 42% annually through 2016, to $617 billion worth of transactions by 448 million users.28

The smart device has already become the hub for one’s communications experience, and now it may also become the hub of one’s financial experience. As an example, multiple small transactions on a typical morning commute (from buying a cup of coffee, grabbing a newspaper, buying breakfast and paying for the train), will all be conducted directly from one’s mobile device. Japan has been at the vanguard of this movement (having introduced it in 2004), and today more than 67 million Japanese consumers utilize their “osaifu keitai” (mobile wallet) in their daily lives.

In the U.S. and Western Europe, the race for cashless economic leadership is on. The question remains, who will be the winners and losers when the value chain of money for retail transactions becomes so dematerialized and disintermediated? Technology vendors (e.g., Apple with Passbook), e-commerce platforms (e.g., PayPal), technology providers (e.g., Square) and traditional credit card companies are all vying for leadership in this burgeoning space. However, the natural leaders ultimately should be established retail banks. After all, that’s where the money is and where the deepest customer relationships currently exist. Will these banks get SMACked by this movement, or will they move fast enough? It’s a potential Kodak moment for these venerable financial institutions.

If leading retail banks do succeed in driving this effort, their platforms for mobile commerce will become trusted and widely used, and they will gain the ability to transform the relationship with consumers. Banks could provide individualized customer relationship management capabilities, leveraging the “big data” customer exhaust of such transactions to recognize their customers’ usage patterns, identify similar patterns with other customers and then tailor specific offerings based upon those empirical patterns. Banks could work hand-in-hand with their customers, helping them achieve their goals in fiscal fitness, much as is already being done in the world of physical fitness.

Lose It! (at www.loseit.com) is a highly successful online weight loss program that, to date, has enabled its members collectively to lose more than 10 million pounds. Banks could follow Lose It!’s approach of offering tailored, transactional-level guidance
One of Loselt!’s most effective tools in helping customers succeed is providing social networks for users who have similar health profiles and weight loss targets. Members of these social networks become more loyal to Lose It! and – most importantly – end up being more successful in their weight loss programs through the information, empathy and motivation they find from their like-minded and like-goaled peers online. A virtual community of loyalty and trust is established, and with it comes significant brand “stickiness.” Banks should take note of this trend.

The future of money is upon us. With this SMAC stack solution, banks could achieve Steve Jobs’ 25-to-1 productivity gain via high-touch, personalization, customer intimacy and trust, as well as a one-to-one relationship with the customer. Will banks get there or cede the opportunity to upstarts? The race is on.

The Future of Retail: Combining the Best of Physical and the Virtual Shopping in the Intelligent Store

Too many people currently define the retail worlds as “in-store” and “online.” The future will combine the best of the physical and the virtual.

That is, for big-box retailers (which still earn the majority of their revenue in the physical store), most customers now walk into the store carrying a smart device. Additionally, some 70% of shoppers conduct Internet research before entering a store these days. Many continue to do their online research after they walk through a store, using smartphones or tablet devices to compare the prices they see on the shelves with retailers down the street or on Amazon (called “showrooming”). Facing this dilemma, several major retailers have launched projects to transform the way shoppers use their mobile devices when they enter stores, a concept we refer to as “the Intelligent Store.”

The Intelligent Store has many key elements, including:

- Signaling to store management that the shopper has entered the store (especially the most profitable customers), via a customer’s smart device.
- Providing instant help and directions to set up appointments with store personnel for personal shopping advice.
- Making a sequential shopping list to help shoppers navigate the store most efficiently for the items they want to purchase, redeeming coupons online. (Learn more by watching our video on automated coupon redemption.)
- Provision of automated coupon redemption, ensuring the best customers receive the best price.
- Paying without having to go through a long checkout line through in-aisle checkout.

The end result: Consumers can apply the right information, delivered with the right context, on their device of choice. This ensures more-informed purchases and a superior customer experience.

Such services are likely to create customer loyalty, not unlike the Apple Genius Bar, where customers are treated like royalty. Moreover, store associates, armed with the right knowledge, can be of much greater use to customers and their employers. Just-in-time knowledge helps to not only boost customer satisfaction, but also to increase store revenue. With the Intelligent Store, store associates traditionally consigned to the stock room or checkout counter can increase up- and cross-selling initiatives. (Learn more in our white paper “Building the Intelligent Store.”)

2. The Machine Interface: Smart Products Change the Man-Machine Interface

With the Internet of Things, millions of everyday machines (from toothbrushes, to coffeemakers, to cars, to locomotives) will be IP addressable and continually online. As these machines become social and “talk” to us, the manufacturers of these products have enormous opportunity to greatly enhance their value proposition through improved product quality, customer experience and lowered cost of operations.

A Consumer Example of Smart Products for Everyday Life

An IP addressable toothbrush: Sounds ridiculous, right? Yet, consider this. According to multiple studies, 90% of us brush our teeth incorrectly. Considering the (very real) pain and cost of bad brushing habits, the advent of the smart toothbrush can save people from countless cavities, gum disease and root canals.
Several leading toothbrush manufacturers are now creating smart electric toothbrushes. These machines, Bluetooth-enabled and connected to the Internet, monitor one’s brushing and provide feedback on the user’s pressure, angle, location and length of brushing. In addition, the toothbrush monitors itself, notifying the user about brush life, battery strength and the overall mechanics of the machine. Clearly, if this is possible with a simple toothbrush, one’s television, oven, exercise equipment and car will all soon become smart products.

In this new world of SMAC-enabled consumer products, competition will soon focus not simply on the physical product itself but also on its information exhaust, how consumers interact with it and, ultimately, how it improves the lives of the consumer. Consumers will care more about the software capabilities and “user experience” of the product than its mechanical capabilities. As such, IT departments in such companies must develop the associated SMAC competencies (including design) to lead in the development and usage of such next-generation products.

An Industrial Example: Social Machines

General Electric is now at the vanguard of turning sophisticated products into smart machines. GE has created “GE-Share,” through which a complex GE machine, such as a jet engine or a power turbine, becomes the center of its own social network. This machine continually posts its real-time performance information to the appropriate engineers — either at GE or at a GE customer site — creating a collaborative network of machines and humans, all working together virtually to ensure optimal performance, head off incipient failure and provide optimal maintenance of these machines.

Making a machine social requires a change in mind-set, but once in place, it can yield dramatic results. For example, through machine-centric social networks, GE can establish much deeper relationships with its customers. The cost savings (and reputational savings) of solving problems at their inception — instead of at their conclusion, with machine failure — are dramatic. And such machine-based networks drive superior engineering and design, as the next version of the product contains enhancements and improvements based on actual usage and performance.

Whether in simple consumer products or sophisticated industrial machines, the new man-machine interface of smart products would be impossible without the SMAC stack.

- **With social, these machines create social networks around themselves**, continuously “talking” to their human users. Additionally, those humans can, in turn, create social networks around certain topics and issues associated with the machines.

- **With mobile, these Internet of Things applications will change our perspective** as most any object is IP addressable, updating its status — from anywhere to anywhere — in real-time.

- **With analytics, the data that is continually generated by these machines is analyzed** to create empiricism on best use and best practices. As such, analytics will serve as the backbone of these solutions.

- **With the cloud, most of these solutions will live off premises** from the company that depends on them to do business.

In the coming decade, winning manufacturers will be those that not only build quality machines through industrial processes, but also actively manage the knowledge networks that will surround those machines.

3. The Partner Interface: Co-Creation in Design and Development

The design process — in envisioning, prototyping and commercializing new products and services — will finally be liberated by the SMAC stack, for it’s been a knowledge process long trapped in an industrial model.

The design and development of new products and services, which are based upon a combination of fundamental creativity and empiricism, were never well suited for the classic manufacturing model. After all, how can innovation truly spring from a handful of people co-located at corporate headquarters, when the real answers are often in the field (and often beyond the corporate boundaries), with supply chain partners, the sales organization or with end customers themselves? In fact, there is a growing body of evidence that breakthrough innovation and design does not occur at the core (through formal R&D efforts), but at the edge with customers, partners and employees who are liberated to view old problems in a new way.31
The assembly of knowledge products — such as software development, financial instruments, and healthcare policies — should not be designed in a “factory” model that relies on getting the right people to the right place. Instead, this approach is being turned on its head in a knowledge model, which focuses on bringing the right work to the right people at the right time.

The Cognizant 2.0 platform is a knowledge-sharing platform that, in essence, combines the disciplines of project management and knowledge management in an interface that is as intuitive and engaging as Facebook’s. In other words, it is a platform that has virtualized the process of ideation to implementation at the company. Overall, it has improved efficiency of client delivery by 17% and has boosted employee retention and engagement materially.

To highlight the power of virtual, collaborative design, the Cognizant 2.0 platform was employed at one of Cognizant’s clients in Korea to help apply innovation ideas to cost-savings purposes. Through Cognizant 2.0, Cognizant employees (from around the world, and not just those formally assigned to the Korean client) could propose innovative ideas under the banner of the “Idea Management System.” Through the use of this social media platform — formally structured in Cognizant’s design process — employees around the world could offer their knowledge and expertise to the client, in the proper context and format.

While the Cognizant employee community was engaged through Cognizant 2.0, the output of the system was then integrated into the client’s local systems for review. Through this approach, the ideas were then submitted to the client in a familiar and standard form, and a “meritocracy of ideas” took hold.

This system has provided a continuous stream of innovations, small and large. Within the first year, 124 ideas were identified as having the potential for implementation, and 70 were eventually implemented. Aside from the very promising year-one results, the ideation platform has also established a new level of energy at the client.

4. The Employee Interface: The New Management Process

Finally, it may be the management process itself that is most dramatically revolutionized. After all, management and leadership, at their core, are exercises in knowledge and communication. The SMAC stack is naturally suited for the rich exchange of information and ideas, yet most managerial structures, methods and cultures are trapped in approaches that are centuries old and ignore the power of these technologies. The failure to leverage SMAC-based approaches is creating a credibility crisis for many senior management teams with their younger employees in particular. This current generation gap — between the divergent expectations of millennial employees and the managerial approaches of their baby boomer bosses — must be bridged.


The vast majority of Global 2000 companies currently manage through a command-and-control hierarchy. However, millennials prefer to work in heterarchies instead of hierarchies. What is a heterarchy? Also called “the wirearchy,” it is a dynamic network of connected nodes, without predefined priorities or ranks (see Figure 9). For example, think of your e-mail system.

Hierarchy vs. “Wirearchy”

To formulate a new sales initiative, a CEO operating in a hierarchical organization would need to navigate various chains of command; in a wirearchy, he can dynamically interact with individuals at all levels of the organization, regardless of rank and seniority.
Having grown up using social networks and collaborative platforms, millennials are very facile with and trusting of heterarchical structures. They recognize wirearchies instantly, choose to live in them, and find the key players within them very quickly. In these networks, status is earned through knowledge and a willingness to share. Unfortunately, for millennials working at Global 2000 companies, they all too often recognize the organization is completely out of sync, as the formal hierarchy is misaligned with, and often ignorant of, the realities of the wirearchy. This dissonance is unsustainable, and if not rectified, it can be highly destructive to the morale and performance of the organization. Additionally, there's no turning back. Millennials will choose to live and work in wirearchies, and as such, the organization can no longer ignore this construct.

Is your organization misaligned? As an exercise, first look at the hierarchy, the organizational chart. Then, imagine the e-mail traffic map overlayed on the physical pyramid. Do these two charts overlap? That is, do the people with the most formal authority on the org chart send and receive the most e-mail? Are they included in the most important conversations? Are they the go-to resources? Quite often, they aren't. In today's world, the organizational chart may represent bestowed power, while the e-mail chart may represent earned power. When this is recognized by the employee base, and ignored by senior management, employee belief and morale can suffer dramatically.

Now, will hierarchies disappear? Of course not. The best model is a hybrid of the two. In the coming decades, the most effective senior managers will be those who consciously live in both physical and virtual power structures.

**Employee Engagement through the SMAC Stack**

In this hybrid era of “command and control” and “motivate and mentor,” management teams need to put the tools and processes in place to fully engage the new workforce.

The Cognizant 2.0 platform again serves as a case study to highlight the transformation of the management model. Through Cognizant 2.0, participation and collaboration between employees (regardless of physical location) is stimulated through several key tools on the platform, including:

- Blogs, wikis and multi-layered discussion forums. Of particular popularity is “micro-blogging,” based on the Twitter model (called “Cweets” within Cognizant 2.0).
- A real-time “activity stream” that aggregates notifications.
- “I-space,” a platform for crowdsourcing and idea campaigns.
- An integrated learning capability, providing recommended courses for an individual associate.

With such a platform, individual associates can continually tap into the resources and capabilities of – and find value within – the full community of Cognizant employees (as well as the extended ecosystem of Cognizant's clients and partners).

"The world is a book and those who do not travel read only one page." – St. Augustine

"The organization is an encyclopedia and those not working on the SMAC stack read only one page." – A corollary to St. Augustine’s quotation

Armed with SMAC stack tools, the employee experience has been fundamentally altered. Prior to this platform, one's purview on the organization could have been greatly limited to one's direct manager, project team and associates in a physical office. With the SMAC stack, they can tap into the right thinking, resources and capabilities of the firm, regardless of time or location.

**Management’s Ability to Sense and Respond**

How do management teams deal with this rapidly accelerating rate of change, the dissolution of industry boundaries and ongoing changes in customer preferences?

Francisco D'Souza, Cognizant's CEO, is fond of saying, “Managing change has become the killer behavior,” for in our knowledge markets, change is constant, and its beta is only growing. The core tenets of industrial management theory was structure and control, as the central management goal was to limit deviations in behavior and performance. Today, in rapidly evolving markets, we specifically need to find – and exploit – those deviations. Thus, the management process must facilitate flexibility and adaptability.

The SMAC stack, in both its networked architecture as well as its implementations, naturally supports these new management requirements. Candidly, without the implementation of SMAC stack technologies, a would be impossible to achieve such goals.
Most client/server enterprise applications are important “data servers” for this process, but as “systems of record,” they have fundamental limitations in assisting with the true needs of the management process. SMAC stack systems, as “platforms of collaboration,” become central to the modern management process and naturally support values such as openness, transparency, empowerment, opportunism, flexibility and collaboration.

Looking Forward: Embracing the SMAC Stack

In summary, it’s easy to be confused about, or even dismissive of, the role of consumer technologies in the corporation. However, ignoring the impact that the SMAC stack will have not only on information technology, but also on the fundamental nature of business itself, is a very dangerous path to follow.

The SMAC stack will enable new organizational models, by which the creation of economic value and the foundation of competitive advantage will be based on winning with key knowledge processes (see Figure 10).

Winning businesses in the coming decade will:

- Master the SMAC stack.
- Unchain their business models.
- Implement key knowledge processes.

Companies that ignore this transition may soon face their own Kodak, Blockbuster or Borders moments.

Don’t get SMACked.

Footnotes

9. An exabyte equals one million terabytes.
About the Author

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