The Agile Dance of Architectures – Reframing IT Enabled Business Opportunities

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Looking at the trajectory of IT architectures and approaches to business strategy, we see something remarkable on the horizon: the potential for companies to generate increasing strategic advantage from IT investment. We admit to a great deal of hesitation in even voicing such a perspective in today's environment. We run the risk of being viewed either as mad or as brainwashed flacks of the technology industry.

This view certainly stands in stark contrast to the backlash spreading through executive suites around the world regarding the economic and strategic potential of information technology. Disappointed by poor returns from an IT spending binge in the late 1990's, executives are increasingly skeptical about the business value of technology. Of course, they will all acknowledge that IT is essential for business operations, but they are tempted to view it as just one more factor of production, to be managed aggressively in terms of cost and performance. Conventional wisdom today suggests that information technology yields diminishing, if any, potential for strategic advantage.

On the other side, technology vendors continue to wax eloquent with grand visions about the transformational potential of technology. It almost seems as if the scale of the visions expands in direct proportion to the decline in technology revenues. The more skeptical users of technology become, the more evangelistic senior executives of technology companies become. We see a vicious cycle propagating – skepticism begets more evangelism and more evangelism begets even more skepticism. The only way to break this cycle is to peel away the rhetoric and emotion and focus tightly on the evolving role of information technology in helping to build and sustain strategic advantage. In the process, we need to reframe the discussion, bringing a new set of lenses to view both IT architectures and strategic architectures.

In reframing this discussion, we focus on two requirements for strategic advantage on a business landscape characterized by rapid change and uncertainty. First, companies must adopt a strategic architecture that strikes a new balance between definition of long-term direction and aggressive focus on near-term business execution. This strategic architecture, which we call a FAST strategy, demands a high degree of operational flexibility. It is therefore very difficult to implement within the constraints of current IT architectures that require significant investments and lead-times to support changes to business practices.

For this reason, building effective strategic advantage requires a new generation of IT architecture offering far more potential for flexibility and innovation. We believe that emerging service-oriented architectures (SOA) will offer this capability.

Mention "IT architecture" to most senior executives and they grow increasingly uncomfortable, looking for a way to quickly change the subject. This discomfort is understandable. "IT architecture" is a mysterious subject for most executives, one fraught with negative images. IT architectures are rigid. They often become obstacles to getting things done. Changing them is expensive and complicated. Changes inevitably demand long lead-times and offer considerable uncertainty regarding any tangible business benefits.

We understand the reluctance to engage on this topic. Nevertheless, we are going to discuss current developments in IT architecture because fundamental changes are occurring in this area. Increasingly, decisions made about IT architecture will determine business success. A new generation of IT architecture is on the horizon that will go a long way to reducing, if not removing, the obstacles that previous generations of architecture put in the way of near-term operational initiatives. More positively, this architecture will significantly augment the capability for business innovation. Even more encouraging, the new generation of IT architecture can be implemented in a much more pragmatic way - with incremental deployments, leveraging existing IT platforms and more clearly tied to tangible business benefits.

These new IT architectures and strategic architectures are beginning an agile dance in which each partner enables and shapes the other. It is precisely this dance that provides the power required to build significant new strategic advantage. One architecture without the other is not sufficient to overcome organizational inertia. The two together, however, can create an engine to propel the organization forward.

BUILDING MOMENTUM: IMPLEMENTING NEW STRATEGIC ARCHITECTURES

It has become a tired platitude to say that change is accelerating and uncertainty is increasing in business. Perhaps it has become so tired because it is so patently obvious. Two primary forces – technology innovation and long-term public policy shifts – are destabilizing the business landscape and reshaping the world we live in. Information technology has systematically reduced interaction costs and made it easier for businesses to extend their reach on a global scale. Long-term public policy shifts around the world have tended to reduce (but certainly not eliminate) regulatory barriers to entry and competition.

Both of these forces have converged to intensify competition. The net impact has been very challenging for businesses. Perhaps the most graphic illustration of the increasing volatility and uncertainty in business is a chart prepared by Dick Foster in his book "Creative Destruction", showing the average life-time of companies on the S&P 500. Over a period of six decades, the average lifetime of these companies has declined by 80% from 75 years in the late 1930's (certainly a challenging time for business) to 15 years in the year 2000. Even the very largest companies in the United States have succumbed to volatility and uncertainty. Clearly, the old management tools are not working as well as they used to.

At one level, we all know that our approach to strategy has to change. In particular, we recognize that we need to pursue strategies that place much greater emphasis on waves of short-term (typically, six to twelve months) operating initiatives. Some companies, especially during the dot-com frenzy, went to the extreme of throwing out strategy altogether, putting their trust in tactical "hustle" as the only way to create economic value. It became fashionable to say that strategies of movement were replacing strategies of position. The retrenchment following the collapse of the bubble demonstrated that hustle alone could not build sustainable businesses.

Companies are beginning to realize that speed alone is not sufficient; it is also important to have a sense of direction. Long-term position still matters. Without some sense of long-term position, movement rapidly degenerates into random motion. Options tend to expand as change accelerates. Companies lacking a sense of direction tend to fall into reactive approaches, pursuing too many options at the same time. The result is that resources are spread too thinly and performance impact diminishes because all the initiatives are under-resourced.

Balancing these imperatives requires a new strategic architecture focused on two very different time horizons – a long-term horizon of five to ten years, creating a background for executive decision-making, and a much shorter-term horizon of six to twelve months, providing the foreground where operational and organizational initiatives play out. Without the sense of background to put events and actions into context, the foreground on the six to twelve month horizon where most line executives tend to operate begins to lose coherence. A sense of background becomes even more critical as environments become more turbulent and uncertain. Without this sense of background, one begins to lose any orientation or grounding. It becomes more difficult to make sense of events as they unfold. By forcing attention on the background, the new strategic architecture helps to create meaning and focus. It also helps to make choices, both in terms of what events and information to look for and in terms of what near-term actions will yield the greatest impact. This longer-term background also shifts attention away from the one to five year horizon that consumes traditional business strategies. All the real action occurs on the peripheries of this traditional horizon.

The background provided by the five to ten year horizon plays an additional role. It also helps to clarify for the organization the profound changes that most companies are likely to experience over a five to ten year period. This background does not, and in fact cannot, be described in detail. It is general enough that it can accommodate many different permutations of the future, yet specific enough to provide a framework for effective choice to be made regarding deployment of resources in the near-term.

Perhaps the classic example of an effective long-term statement of direction comes from the early days of Microsoft when the company developed a long-term direction that could be summarized in two sentences: "Computing power is moving inexorably to the desktop. If we want to be successful, we need to own the desktop." Simple and succinct, but clear enough to guide the company over at least two decades of massive change in the computer industry. Developing this long-term direction for the company requires a deep understanding of the likely impact of broader forces such as technology performance improvement trends, value migration trends and demographic trends.

In parallel, while the company is developing and refining this shared understanding of longer-term direction, senior management needs to focus on a different time horizon shaped by a second key business question: what can we do in the near-term (6-12 months) that will help us to accelerate movement toward this longer-term direction? In part, this question forces executives to identify and focus on the most promising two to three operational initiatives that can deliver tangible near-term performance impact and meaningfully move the company in the longer-term direction.

In focusing on near-term impact, it is important to differentiate between financial measures of impact and operational measures of impact. Financial measures of impact are generally not preferable because they are lagging indicators of performance. In defining the operational milestones to measure the progress of critical near-term operational initiatives, it is far better to focus on the operational levers that ultimately drive financial performance since these are usually leading indicators and provide a more granular view of the performance of the business. For example, if the operational initiative seeks deeper penetration of a target market segment, focus on measures like new customer acquisition rates, repeat purchase rates and retention rates rather than revenue growth.

These two to three operational initiatives differ from the notion of "experimentation" that has become quite popular in strategy writing recently. These initiatives are major resource commitments by the corporation that are complementary to, and often reinforce, each other rather than experiments to cover multiple options. These initiatives are designed to significantly impact the operating performance of the company over a 6-12 month horizon.

These initiatives are incremental in the sense that they are designed to yield near-term operational impact. They may or may not be incremental in the sense of supporting the previous trajectory of the business. If the business is performing well and does not confront significant market discontinuities over the next five to ten years – as in the case of a company like WalMart – this type of incremental initiative may be appropriate. On the other hand, if the business is not performing well or confronts significant discontinuities on the horizon – as illustrated by Kodak – the near-term operating initiatives may represent a significant departure from the current trajectory of the business. In this case, it is particularly important to focus on key operating metrics to measure progress, rather than financial measures. Financial measures tend to increase inertia. The core business will always appear to have a higher priority than new business initiatives given its much greater impact on overall corporate financial performance. For example, in a $10 billion business, a 1% improvement in performance in the core business will bring $100 million to the bottom line – swamping any possible impact that an entirely new business might be able to generate. Operating metrics like delivery of an operating prototype of a new product and acquisition of initial reference customers focus senior management attention on the necessary milestones new businesses must meet to become viable.

Often the near-term operating initiatives will represent a mix of both improvement of core business performance and fundamental new business creation initiatives, in the spirit of the "ambidextrous corporation" described by Michael Tushman and Charles O'Reilly. It is hard to over-emphasize the deep tensions that will need to be managed by senior

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executives in companies supporting both types of operating initiatives. The mindsets, cultures, risk profiles and metrics required to succeed in both types of operating initiatives are fundamentally different. Senior executives need to anticipate and honor these tensions, rather than applying a single management model in both areas.

By focusing the organization on rolling waves of near-term operating initiatives with aggressive performance objectives, this approach encourages innovations in practice that over time become reflected in the evolving competencies of the business. These incremental practice improvements are path dependent and become very difficult to replicate. Competitors may seek to copy the processes, but the advantage will remain in the practice that continues to advance in incremental waves.

On the same 6-12 month time horizon, executives need to ask what organizational barriers are preventing the company from moving even faster in the near-term. They can then determine a set of near-term organizational initiatives designed to strengthen capability to support even more aggressive near-term operating initiatives.

Overall, constant iteration between these two time horizons helps to accelerate learning and performance impact by establishing tight feedback loops and pressure to translate the learning into near-term action. The background provided by a longer-term direction for the business helps to provide grounding, orientation and sense making – all key requirements for effective learning. The foreground, with its emphasis on near-term action, helps the organization to rapidly develop real-world experience that can help to generate valuable insight into what works and what doesn't, both in the near-term and longer-term. The emphasis on near-term action also pushes the organization to translate learning quickly into action, thereby repeating the learning cycle. In effective, the foreground created by this strategic architecture provides a basis for first loop learning while the background provides the context for second loop learning. This learning dimension of the strategic architecture makes it particularly valuable in times of rapid change and high uncertainty – speed of learning becomes a key strategic advantage in these environments.

At one level, we all understand the need for this new strategic architecture. Yet, few companies have implemented this approach. Most are still consumed in the conventional five-year planning exercises that have contributed to the declining lifetimes of S&P 500 companies. Why is this the case? One of the primary reasons involves the rigidity of traditional IT architectures. This rigidity makes it difficult to imagine a fundamentally different business five to ten years out. It also makes it very challenging to mount aggressive near-term operating initiatives that have not already been anticipated by a longer-term plan. To embrace this new strategic architecture in practice we must also discover a new IT architecture.

CREATING MORE CAPABILITY: THE EMERGENCE OF SERVICE ORIENTED ARCHITECTURES

Traditional IT architecture as a barrier to flexibility

This new strategic architecture is very difficult to implement in companies operating with traditional hard-wired IT architectures. The emphasis on aggressive waves of near-term operational and organizational initiatives places enormous strain on IT architectures that assume a more stable business context. It is not impossible to adopt this kind of strategic architecture – witness the examples of WalMart, Dell and Schwab - but it is certainly not easy. Given the constraints of these architectures, it is remarkable that even a few companies were able to overcome these obstacles and pursue more dynamic approaches to business innovation. Yet, it is revealing that the same few companies are always cited when looking for examples of continuous business innovation. Most companies have simply had too much organizational inertia to overcome, and hard-wired IT architectures have been a major impediment to rapid movement.

These hard-wired IT architectures make it expensive and difficult to support smaller, incremental modifications to business practices. As a result, these architectures paradoxically encourage executives to support "big bang" approaches to IT spending for many of the same reasons that these architectures encouraged hard-wired five-year strategy approaches. Small changes to the IT architecture are so challenging that it was difficult to justify these efforts. On the other hand, major business initiatives with very large pay-offs often could overcome the significant organizational inertia created by these IT architectures. There was only one problem: "big bang" approaches to IT spending rarely deliver on their expected pay-offs. Companies poured billions of dollars into ERP projects and Internet initiatives designed to transform the business, discovering to their dismay that the returns were smaller, longer in coming and far more uncertain than they had anticipated.

Large-scale transformational projects require massive resources to execute, but the returns are usually so far down the road that it is difficult to sustain the organizational commitment and momentum necessary to deliver the returns. Even where this commitment and momentum can be sustained, these projects often founder in terms of lack of adequate understanding of how work really gets done or inability to adapt rapidly to changing market conditions. Rapid incremental waves of business innovation, shaped by clear near-term operational performance milestones, are generally much more effective in delivering real business value from IT investments.

IT architecture has become a choke point for operational and organizational initiatives. If we want to implement more agile strategies, we need to confront this choke-point head on. Let's look at a specific illustration. Imagine a company producing and selling farm machinery. The senior management team of the company has looked ahead five to ten years. They have determined that the best way to continue to create economic value is to evolve into a customer relationship business, deepening relationships with large agribusiness customers and serving a broader range of customer needs based on a better understanding of the customer's business.

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That's an ambitious longer-term direction for the company. What can the company do operationally over the next six to twelve months to accelerate movement in this direction? Let's say it focuses on two initiatives. First, it wants to provide its customers with better visibility on product order status, both as a way of reducing its operating costs (the company maintains a larger order processing staff that consumes much time answering customer inquiries about order status) and to improve customer service. Second, it wants to expand the range of products it sells by sourcing some complementary products from third party product manufacturers and re-selling these products.

These aggressive operating initiatives run into a formidable obstacle known as IT architecture. It turns out that three different plants in the U.S. make the farm machinery produced by this company and two of the plants were acquired from other companies. As a result, the plants use different application software to run their operations. If you wanted to check on order status, you would have to access one of three different applications with very different application interfaces and ways of presenting product information. In fact, this is why the order entry staff spends so much time on order status queries, but at least they have developed the expertise required to handle the three systems. What would be required to make this information directly accessible to the purchasing systems of customers? The company would have to implement custom designed connections between each of the customers and the three manufacturing plants. Designing each of these connections would require a deep understanding of the applications at either end and the functionality would be specific to these applications.

And that's just for the first operational initiative. If we also want to re-sell products from third party manufacturers and provide the same level of order status information to customers, we would also need to create custom-designed connections between each customer and each of the supply chain applications run by our product suppliers.

The complexity, cost and lead-times mount – and we're still only talking about the initial deployment. Let's say we decide later that we want to add some functionality to these connections – perhaps giving customers some limited ability to modify orders before they are shipped. That functionality would have to be coded into each of these connections. While there might be some common code that could be leveraged across all these connections, each enhancement would need to be tailored to meet the custom design of the connection. Let's also imagine that some of the first wave of product suppliers don't work out and we have to drop them and add some others. It is unlikely that we will be able to leverage much of the initial effort to connect the initial suppliers because each connection is custom designed. So, complexity, cost and lead-times continue to mount.

Is it any wonder that business executives become discouraged? If you want to implement anything, it will be very expensive and take a long time. If you then want to change anything, the complexity and expense escalates. In fact, complexity and expense increases exponentially as the number of applications and databases grows. The more complex the connections, the harder it is to add functionality over time.

The problem is with the IT architecture. IT architecture refers to the way technology resources are organized in order to perform tasks – much in the same way that businesses are organized in terms of definition of roles and relationships. Because IT was expensive

in the early days of computing and delivered relatively limited performance, efficiency was the primary objective shaping the definition of IT architectures. Roles and relationships were very tightly defined to optimize use of scarce and expensive technology resources. Flexibility was very expensive.

The word "architecture" is generally quite misleading for what most companies have today. Architecture calls forth images of the neat schematics of an architect, carefully thinking through in advance all the needs of the occupants of a building and designing a structure that optimally meets these needs. Today's IT "architectures" are far better described with a geological metaphor - imagine geological sediments accumulating, one on top of the other, in different continents. In this case, the sediments are the various generations of information technology that have been deployed in large enterprises – mainframes, minicomputers, desktop computers, servers and mobile access devices in terms of computing power and equivalent generations of electronic networks. Rather than ripping out previous generations of technology and designing a greenfield architecture to more effectively exploit the capabilities of new technology, companies deployed new technology next to existing platforms. Where necessary, they implemented custom-designed connections to create a semblance of integration. These custom-designed connections were also necessary to bridge across departmental silos and enterprise firewalls – the equivalent of continents in the geological metaphor. Geological time is also a better way to capture the lead-times required to move across these sediments and continents, especially as the complexity of the connections increased.

As the above description suggests, traditional IT architectures are a problem for business because of their way of coping with diversity and the growing need to connect IT resources to support business operations. Custom designed connections are very efficient in their use of IT resources, but they are expensive to implement and even more expensive to modify over time. These custom designed connections are aptly described as "hard-wired" because of their lack of flexibility.

Shifting to the next generation of IT architecture

The service concept. We are on the cusp of a major shift in IT architecture, enabled by further price performance improvement of processing, storage and networking technology. The new IT architecture that is just beginning to emerge goes by the name of "service oriented architecture" (SOA). The name focuses on a significant shift in the view of software resources. Software has traditionally been viewed as functionality designed to support a specific business context and installed at the site where it will be used. In contrast, services are designed without knowing in advance the exact uses and tasks they will be called upon to support and are accessed when needed from wherever they reside. The location of the software becomes largely irrelevant from the user perspective.

This service concept represents a profound shift in the mindset of technologists. Rather than operating at a much more granular level of individual actions performed upon data, the services concept's power is best realized when it affords opportunities for technologists to operate at a higher level, viewing the building blocks of the architecture in terms that much more closely mirror the way business executives would describe their

business. In effect, the service-oriented architecture could be viewed as a business operating system, generating new services from pre-existing building blocks and then orchestrating these services to support changing business needs. In this way, the SOA becomes a perfect complement to more flexible strategy architecture, with their emphasis on rapid, near-term waves of business initiatives.

This service approach is especially helpful as companies wrestle with the challenges of coordinating activities within an extended supply chain or a diverse set of distribution channels, requiring technology resources to be connected across multiple enterprises. Our traditional IT architectures have tended to be enterprise-centric – they assume that the relevant technology resources are all located within a single enterprise. Some of the greatest challenges in automating business activities in the past occurred when multiple business partners were involved. The automated connections, if they existed at all, tended to be very expensive, complex and difficult to modify.

If services can be accessed when needed from wherever they reside, this reduces the need for users to specify functionality in advance, since the functionality can now be accessed on demand. This has profound implications in terms of enhancing flexibility. Of course, it assumes that a broad range of highly specialized services can be quickly accessed and brought together to address a specific business need. Price performance of technology is essential to deliver this capability. For example, relatively inexpensive, high bandwidth communication networks are necessary to provide reliable and quick delivery of required software functionality.

Flexibility does not necessarily mean that companies will abandon all relationships and resort instead to transaction specific deals with the "best" (or cheapest) business partner of the moment. For many good reasons, much of business activity is likely to be conducted in the context of long-term trust-based relationships. The flexibility provided by service oriented architectures is much more likely to be valuable in broadening the number of business partners and making it easier to access specialized capability as required within established process networks.

<u>Creating new kinds of connections.</u> For this service approach to deliver real flexibility, traditional approaches to connecting technology resources also need to be re-thought. In the past, we relied on hard-wired connections. Since all the functionality required for the business needed to be defined well in advance, it made sense to design connections across technology components based on a deep understanding of the underlying functionality in each component. This makes the connection more computationally efficient since each connection was designed specifically for the task at hand and the performance of the connection could be optimized to use as little resource as possible. But there was a catch. If the functionality at either end of the connection changed, the connection itself had to be redesigned. In the 1950's and 1960's when industries and markets were more stable, this was not a high price to pay in return for improved efficiency. As industries and markets became more dynamic, this represented a more significant barrier. Companies today consume large portions of their IT budgets on integration activities – establishing new connections and redesigning old ones to keep up with changing times.

Service oriented architectures rely upon a different approach to establishing connections. They favor loosely coupled connections. In this approach, all the information required to establish a connection – what outputs the software can deliver, how those outputs need to be accessed and who is authorized to access these outputs – is described in the interface of the service. In the example of the farm machinery company cited earlier, the interface to the manufacturing application might specify that it can provide certain information about the manufacturing status of a product and indicate what protocols and standards the user of the service would need to use in order to access this information. The interface however would not go into detail regarding how this information is generated – all the user of the service really cares about is understanding what information can be accessed. More traditional hard-wired connections require the designer of the connections to understand in detail how the information is generated in order to be able to efficiently access the information.

Of course, the information provided in the interface needs to be presented in a way that is broadly understandable. This is the key role for standards and protocols in supporting loosely coupled connections. Unless standards and protocols are widely adopted, the range of feasible connections becomes very limited, just as someone who speaks only Turkish would have a hard time delivering services to businesses around the world. The rapid spread of eXtensible Markup Language (XML) as a foundation standard, and a whole series of other standards and protocols derived from XML help to provide an effective framework for creating broadly understandable, and accessible, interfaces.

If these standards and protocols are in place, however, a much more flexible set of connections can now be established. Since these standards and protocols can be "read" and understood by computers, connections can be automatically created as the need arises.[1] The connection focuses on understanding the output of the service rather than the fine-grained methods used to generate that output. This means connections can be established much more quickly without requiring deep understanding of the underlying functionality at each end of the connection. In effect, a service-oriented architecture represents a modular approach to organizing IT resources. As with all modular approaches, the key requirement is standardized definition of interfaces so that modules can be quickly and easily mixed and matched to meet the requirements of the moment.

This approach to loose coupling is critical to enabling more flexible delivery of services. As the recent McKinsey Quarterly article "Designing IT for Business" suggests, many companies are carving out IT resources to be delivered as shared services, either within a single company or across multiple companies. Sharing resources is often more efficient than proliferating resources that perform the same function. The challenge is how to connect to these shared services. If traditional hard-wired connections are employed, rigidity begins to set in and the ability to adapt to changing business needs may be compromised. The only way to make shared services truly supportive of rapidly evolving businesses is to deliver them with loosely coupled connections.

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[1] Indeed, they can be dynamically created at run time – at the time one uses the service – or they can be implemented through design tools that dramatically simplify the job of the programmer at the time the connections are built. In this latter case, tremendous utility is still realized since either end of the connection can be changed without requiring reprogramming at the other end.

Once again, though, loose coupling does not imply short-term relationships. Even in long-term relationships, both parties are rapidly evolving and the relationship itself needs to evolve. Hard-wired connections tend to make relationships brittle – they often break down because the relationship cannot adapt rapidly enough to the changing needs of the partners. Loose coupling can help to build more robust relationships by providing enhanced ability to adapt to new requirements.

<u>Loosely coupled services in action.</u> Let's turn back to our example of the farm machinery manufacturer to illustrate the benefits of an SOA. Recall the mounting complexity of proliferating hard-wired connections that created such an obstacle in implementing operational initiatives. How would an SOA support these initiatives?

An SOA would begin by "exposing" the necessary functionality in each of the supply chain management applications through the creation of a standardized interface, providing the information necessary for other applications to understand what functionality is available and how to access it. In this way, the relevant functionality regarding order status would be available as a service that could be shared by any other application needing to access this functionality and using the same standards and protocols.

This service would be accessed through a loosely coupled connection, meaning that the connection would only be established "on the fly" when needed because all the information required to establish the connection would already be represented in the service interfaces. If the consuming application (in this case, the customer's procurement software) did not already know which manufacturing plant to query for the order status, a directory service could help the consuming application identify the appropriate services to access. A variety of enabling services like the directory services and security services to support the connections could also be delivered as loosely coupled services and shared across all connections, rather than designed into each of the connections in advance.

The advantages of this approach are significant. The traditional approach required a new connection to be custom-designed in advance for each pair of resources that might need to interact with each other. The SOA approach requires a single investment to "expose" (in other words, to describe, register and provide pointers) the resource as a service. Once that investment is made, the service can be accessed by any other application with an interface adhering to the same widely available standards and protocols. That initial investment is amortized further each time a new connection is created to that service, in contrast to traditional hard-wired connections where there is less reusable code and each new connection represents a significant programming effort. Because of the significant effort required to create these hard-wired connections in traditional IT architectures, any operating initiative involving new connections requires significant lead-time. With the loosely coupled connections of SOA's, new business partners and customers can be added quickly and efficiently, especially if these entities have already exposed their resources as services.

<u>Requirements for broader adoption.</u> To avoid misunderstanding, these service oriented architectures are only now in the earliest stages of emergence. The current deployment of Web services technology represents a promising early initiative in the direction of service-oriented architectures. Web services technology – in particular, the foundation

standard of eXtensible Markup Language (XML) – provides a major advance in terms of creating ubiquitous standards to use in presenting data and defining the interfaces required for loosely coupled connections. However, even for companies like General Motors, Merrill Lynch and Eastman Chemical that have started to focus on the implications of service oriented architectures, these architectures remain largely conceptual drawings rather than broad-based implementations. Early implementations of Web services technology tend to be very limited in scope and targeted on a specific area of the business.

Far from being a cause for skepticism about the potential of these broader architectures, these early implementations actually create optimism about the business appeal of this architecture. Not only can it provide much more flexibility in supporting business operations, but service oriented architectures can also be implemented in a more incremental fashion than previous generations of IT architectures. Each stage of implementation can be geared to specific business initiatives and, with relatively modest investments and short lead-times, deliver tangible business value. In other words, these SOA's can be deployed in a manner very consistent with the strategic approach outlined above. In one respect, this is what makes these SOA's so powerful: they represent a true inflection point in terms of enhanced flexibility, but they can be implemented incrementally, leveraging vast resources that are already in place by exposing these resources and making them accessible as services.

Again, to use the example of the farm machinery manufacturer, this company does not need to shift its entire IT architecture to enjoy the business benefits of SOA capability. It can begin with a focused effort to support the specific operating initiatives discussed earlier. Relatively few IT resources will be accessible in this company's SOA at first – they will be the supply chain applications in the manufacturing plants – but they will be the IT resources most relevant to near-term operating initiatives. The business benefits – in this case, the operating savings from direct customer access to order status data and revenue benefits from enhanced customer satisfaction – will help to fund this first stage in the transition to an SOA.

The shift to this architecture is pragmatic in another sense as well. SOA's do not require removal of existing IT resources. In fact, they were developed specifically to help businesses to get more value from the IT resources already in place. Over time, SOA design principles will lead to the development of entirely new services but, in the early stages of deployment, the bulk of service creation will focus on exposing existing resources and making them more accessible through an SOA.

To be sure, many obstacles will need to be overcome before these architectures become pervasive in the business world. Web services standards like XML provide only a framework for developing shared meaning regarding the content of business tasks. Much hard work will be required for businesses to develop and refine this shared meaning over time.

SOA standards and protocols will need to become much more robust before they can effectively support the full functionality required to support mission-critical, long-lived transactions. Today, the first generation of Web services standards and protocols are used largely to automate publishing and distribution of business information, rather than

automating business processes like the complex and lengthy series of interactions required to execute and to close a securities transaction or a travel itinerary involving multiple travel providers.

Broadly distributed service oriented architectures also demand new trust frameworks - both at the level of technology, as in the use of robust authentication techniques, and at the business level, focusing on shared meaning, incentive structures and use of risk management programs like performance bonds. These trust frameworks will be required to support effective sharing of technology resources, especially as we move across enterprise boundaries. We are just beginning to understand how these trust frameworks must be designed and managed.

The business significance of SOA's

SOA's will represent a true inflection point in the capacity for business innovation. With more tightly coupled architectures, the business context had to be specified in advance and subsequent modifications to the software were expensive and difficult to make. With services designed to be context-free, companies can move more quickly because they can mobilize services that are already available and deploy them in new business contexts.

Loose coupling makes it easier to experiment with new ways of doing things at the local level. It reduces the risk that changes in practices at the local level will ripple through business processes and create unintended consequences in other areas. This will enhance the ability to rapidly prototype new products, business process redesigns and even new business models because it reduces concerns about potential disruption of existing business activities.

In the case of the farm machinery manufacturer, once the hard-wired connections are deployed, executives must move very cautiously before implementing any changes in the resources being connected together. Let's say the farm machinery company wants to streamline its manufacturing operations in one plant and makes some corresponding modifications to the manufacturing application used in that plant. Each custom-designed connection between that manufacturing application and each of the customers would need to be re-tested and possibly reconfigured because the proper functioning of the connection depends on assumptions regarding how the information is actually being generated. Where hard-wired connections have proliferated, business managers are reluctant to modify anything. Rather than freeing business managers, these connections begin to resemble prison bars, making it harder and harder to move in any direction. Of course, the manufacturer could reduce complexity by creating a shared portal enabling customers to connect to the manufacturing plant operations through a common platform. Without a service oriented architecture, though, any changes to the applications running in one of the plants will still likely require expensive and time consuming changes in the connections to the customer portal.

Loose coupling can be enormously liberating for business managers in the farm machinery company. They can try out a new business process in one of the manufacturing plants without worrying about unanticipated disruptions in the functions of customer IT systems.

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Loose coupling also supports business innovation beyond the boundaries of the enterprise. This method of connecting technology resources can be very helpful in automating business connections with other enterprises, making it easier to add value to customers by accessing resources owned by other companies. As we saw in the example of the farm machinery manufacturer, the task of implementing custom-designed connections with customers and business partners can become overwhelming in its complexity, especially since the diversity of technology platforms multiplies and a deep understanding of each technology platform is required to build efficient custom-designed connections. SOA's are particularly valuable where there is not a single decision-maker (as in the case of a strong CIO within a company or a company with significant buying power in dealing with its suppliers) who can enforce a common set of platforms on participants. Diversity of platforms in these situations is a given. This diversity demands an SOA that embraces diversity in resources and concentrates on implementing appropriate standards for the interfaces to connect to each other.

In parallel, this loose coupling capability will also accelerate a more fundamental unbundling of the enterprise, allowing companies to focus more tightly on the activities that they are distinctive in. Companies will use loosely coupled SOA's to rebundle the assets and capabilities required from a broader range of companies. In the example of the farm machinery manufacturer, the enhanced ability of SOA's to quickly and cost-effectively establish automated connections with other product manufacturers will accelerate the movement of this company towards its goal of focusing on its core strength – the customer relationship business. At the same time, the SOA can help in offloading more and more of the product manufacturing activities to more specialized companies with distinctive advantages in this area since the automated connections will provide more visibility and coordination capability in dealing with contract manufacturers

But their impact does not stop here. Loose coupling makes it easier to automate connections across business activities. This in turn automatically generates rich information about the performance of the connections and the outputs at each end, simply as a by-product of managing the connection. In contrast, if the connections are maintained manually, capturing the information requires an additional, time-consuming step. The automation of these connections provides business decision-makers with much better information about overall IT and business performance, including systematic identification of the exception conditions that drive a lot of the inefficiency of business processes. For example, the farm machinery manufacturer would generate detailed information about customer inquiries into order status as a by-product of its automated connections. This information could help the manufacturer to further improve customer service by systematically cataloguing the information regarding order status sought by customers and providing a basis for designing proactive order status reports for certain types of customers and types of orders.

The flexibility of SOA's also makes it easier to mobilize appropriate stakeholders and to equip them with timely information and other resources required to address mundane (and not so mundane) breakdowns and exception conditions. These architectures similarly help to capture the learning from these experiences and to quickly modify the practices necessary to support smoother operations. Rapid performance improvement based on continual refinement of business practices and processes becomes possible with

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tighter performance feedback loops, more effective mobilization of appropriate stakeholders and enhanced capacity for specialization and local experimentation.

Earlier, we made the case that new strategic architectures will focus on near-term business initiatives against the background of a compelling long-term direction that helps to provide orientation for, and make sense of, the choices required today. SOA's enable this strategic architecture by providing more flexibility for the near-term business initiatives but also creating the flexibility required to support much more radical long-term outcomes. The power of these SOA's is hard to ignore. Even companies like Dell, WalMart and Schwab that managed to deploy new strategic architectures successfully in spite of the constraints of traditional IT architectures are moving rapidly to implement these SOA's.

OVERCOMING ORGANIZATIONAL INERTIA THROUGH RADICAL INCREMENTALISM

Overall, the new generation of IT architecture and strategic architecture will help to overcome organizational inertia by creating a platform for radical incrementalism. SOA's make it easier to implement radical changes to business practices at the local level, leading over time to radical changes in overall business practices and business structures. These SOA's, however, can only create the capacity for change. The new strategic architecture is necessary to harness that capacity by driving executives to design rapid waves of well-focused incremental business initiatives. Like DNA, these new IT architectures and strategic architectures will interweave to help companies overcome organizational inertia.

In particular, the implementation of these new architectures will help to address two traditional sources of organizational resistance – mindset and culture – thereby transforming organizational DNA at an even more fundamental level. Mindsets – the assumptions, often implicit, that executives bring to their decision-making – often become a significant barrier to rapid change. Most executives view uncertainty as a disruptive force, something to be avoided wherever possible. This is especially the case when the organization falls into a reactive mode, without any clear view of longer-term direction and hampered by hard-wired IT architectures. In this environment, uncertainty creates additional demands on scarce resources and represents a threat to today's approach to creating value. On the other hand, if the management team has a shared view of long-term direction, clearly identifying new opportunities created by uncertainty and change, executives begin to embrace uncertainty as a source of value creation.

These changing views of uncertainty also foster more openness to exploring the periphery as the most promising area for value creation. If uncertainty is something to be feared, then executives tend to focus on internal operations of the business because this is where they can manage uncertainty most effectively. If uncertainty creates opportunity for additional value creation, executives are more inclined to venture out beyond the boundaries of their enterprise or their industry, exploring opportunities to create new kinds of relationships with business partners or customers. They will also begin to think

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more broadly about relevant markets and industries, seeking out opportunities beyond the horizon of well-established (and well-understood) market niches.

The emphasis on near-term initiatives and results helps executives to resist a mindset favoring "big bang" transformational initiatives. Instead, they focus on finding high value, relatively easy to implement operational initiatives that can yield tangible, near-term business impact. By making these near-term initiatives easier to implement, SOA's contribute to the success of executives who focus on near-term results.

Radical incrementalism helps to refashion organizational culture as well. By rewarding those who move most aggressively to seek near-term impact, this approach fosters a more risk taking and performance driven culture. It also encourages more willingness to leverage third party resources to add value to customers in the near-term. Executives are rewarded for performance delivered, rather than size of headcount or assets managed. Greater clarity around long-term direction also makes it easier for executives to determine what resources need to be owned to realize long-term value and what resources can be provided by third parties to enhance core value delivery.

ANTICIPATING THE FUTURE

With service-oriented architectures, what you own will matter less than developing the insight and skill required to access and mobilize the resources of others to deliver more value for your customers. Customers will use these architectures to become more involved in the value creation and delivery process. Over time, these architectures will play a significant role in restructuring markets and industries. Companies that understand the capabilities of these new architectures and use these capabilities to re-define their business and their industries will be in a position to create significant economic value. Ironically, just at the time when everyone is dismissing the strategic value of information technology, it may be on the verge of offering us more opportunities for strategic advantage than we have ever witnessed.

SIDEBAR: BUILDING THE FOUNDATION

Four senior executives – the CEO, Chief Process Owners (CPO's), the CIO and Chief Strategy Officer (CSO) - will play a pivotal role in building the institutional capability required to exploit the convergence of new IT architectures and strategic architectures. These four executives will need to redefine their roles in key ways.

CEO's must dive into the details of the business in order to make the long-term direction come alive

CEO's of large companies tend to withdraw from the details of the business and focus on high-level policy and strategy questions. The new strategy architecture outlined in the article requires that CEO's more actively navigate between the two time horizons and

become much more directly involved in near-term operational and organizational initiatives. To effectively communicate the long-term direction to the organization, the CEO must work actively with line executives to prioritize near-term initiatives. The high impact, near-term operating initiatives discussed above typically cut across the domains of multiple senior executives, so the involvement of the CEO often becomes critical to ensure that these initiatives are appropriately scoped. By helping to make key choices in the near-term, CEO's clearly demonstrate the implications of the long-term direction of the company. At the same time, by wrestling with difficult near-term choices, CEO's develop a richer understanding of the long-term direction of the company. CEO's need to become more adept at the capability of "zooming in and zooming out", often within the course of a single meeting. Zooming in involves exploring the very tactical implications of long-term direction. Zooming out involves understanding the longer-term implications of new experiences and information generated through near-term business initiatives. This capability is especially necessary for near-term operating initiatives that represent a significant departure from the current trajectory of the business.

Chief Process Owners (CPO's) need to shift their management approach to exploit the potential of loosely coupled business processes.

CPO's are accustomed to managing hard-wired business processes where process manuals specify in detail the actions that must be performed to deliver value to the enterprise. SOA's create an opportunity to develop more loosely coupled business processes, but these require a very different management approach. In particular, the focus must shift from specifying and managing activities to specifying and managing interfaces at the boundaries of modules of the process. Specifically, CPO's must define in some detail the deliverables at the end of each module of activity and the methods of communication across modules so that other modules can function smoothly. This creates more flexibility within the modules of activity for staff to experiment with new approaches without worrying about disrupting other parts of the process. This approach is also much better suited to management of business processes that extend across multiple enterprises.

CIO's must become strategists and relationship managers to effectively exploit the capabilities of SOA's

As SOA's become more broadly deployed, CIO's will need to become much more actively involved in strategic decisions regarding both IT and broader business resources. These architectures will make it easier to access resources owned by other companies as well as to generate more business value from the company's own resources, by making them more broadly available to others. CIO's will need to think strategically about the choices involved in owning or accessing resources from others. CIO's will also need to develop much deeper relationship skills, actively structuring and managing relationships with third parties to generate as much value as possible from both owned resources and third party resources.

**CSO's need to tighten performance feedback loops and ensure
that organizational learning is rapidly translated into action**

In implementing a new strategic architecture, CSO's will become the key integration
point managing the learning that is generated across multiple horizons of the business. In
order for the new strategic architecture to realize its full potential, the organization must
rapidly process learning from aggressive near-term business initiatives and use that
learning both to refine the definition of long-term direction and to shape the next wave of
near-term business initiatives. By working with the rest of senior management to define
effective performance metrics designed to accelerate movement towards a longer-term
destination, CSO's can play a significant role in shaping near-term actions and focusing
the learning experience from these actions. Appropriate performance metrics will also
help to ensure that this learning is rapidly converted into higher-impact operational
initiatives.

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