EMC Thinks Differently about IT
# (as We Used to Know It)

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Management Summary

Big ideas are hard to communicate. We get so set in our use of vocabulary and our traditional modes of thinking that new ideas are easier to dismiss or defer to a future point beyond where we currently are focused. Every once in a while, we get hit by a big idea when we are not expecting it, which is when we are most vulnerable to new thinking. This happened at an EMC Analysts' meeting in Hopkinton in April. Jeff Nick, CTO of EMC and a specialist in large-scale, long-term strategies, mapped out a number of business challenges to traditional IT operations. Exhibit 1, below and repeated on each of the following pages for your reference, summarizes what he had to say.

The four sides, *infrastructure*, *information*, *applications*, and *interaction*, represent four facets of IT. Each is an area that involves choices, not just more of them but selecting carefully and appropriately among them. It is crucial that the choices made not inhibit increasing scale and functions that your business will need.

The four corners are even more interesting. How you address them determines the scope of your business and, most likely, its success or failure. The pervasive reach of security to address all facets and all corners of Nick's vision is what can turn this vision into a pragmatically useful reality. For a walk through the dimensions and vectors of EMC's vision, please read on.

Exhibit 1
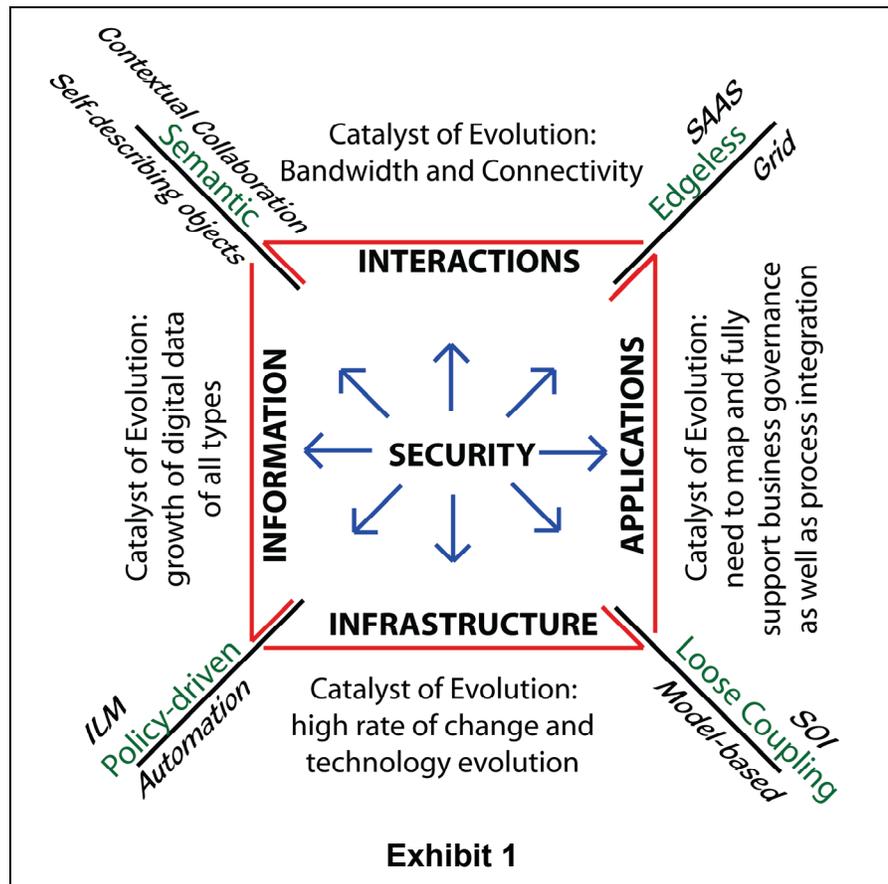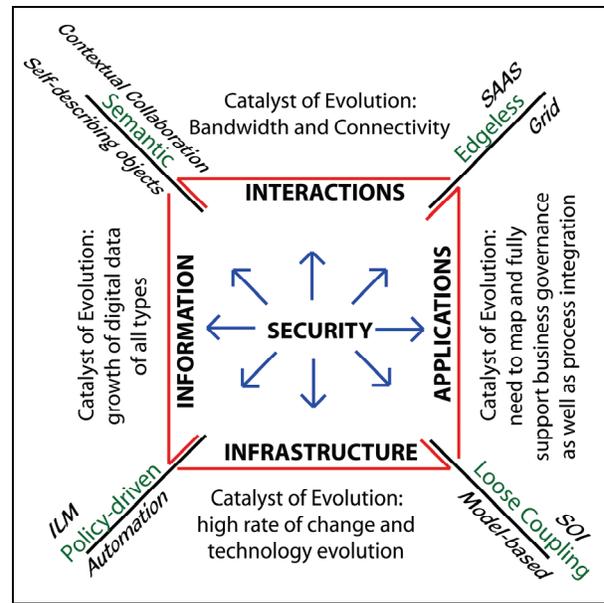

The Four Facets of IT

Interaction

It is best to start with *interaction*, the basic process of business. The demands of interaction are growing fast. Bandwidth and connectivity have made more options possible. Competitive pressures and the need to control costs have forced the use of distributed workers and virtual teams. These days, many of them are out on the road, servicing and selling to customers. Acquired companies often stay in place. **Changes in the kinds of and how interactions must be supported drive the requirements in all other areas.**

Nested between the *need to understand the available information better* (the *Semantic* corner) and *the challenge of doing business wherever the customer requires* (the *Edgeless* corner), interaction is more than just a question of bandwidth. Email has brought remote workers into easy correspondence with each other. Instant messaging (IM) has enhanced this, but both fall short in supporting business use. While less intrusive than phone calls, they are less than satisfactory for on-the-same-page collaboration. They do not support teaming, except by an overuse that drives us all crazy. More is needed in the way of *application functionalit*y (an adjacent edge). More is demanded of the data itself (i.e., *Information*, the other adjacent edge) in terms of how it describes itself to facilitate widespread proper use. Security must extend to encompass this new edge (or lack thereof), to protect the interaction, the applications, and the information, and yet not compromise business functionality.

Applications

The catalyst for changing how applications are developed comes from the requirement that they more fully support business process in an accountable way that supports business governance. **The alignment of the IT process with business process, rather than viewing IT as complementary process tools (such as office productivity), has exposed application integration challenges and exacerbated the need to support a rapid pace of change.** The tight integration of applications with infrastructure, in many cases, has become an impediment to business use of that infrastructure. A more loosely coupled, callable processing, now known as *services*, is a well-recognized alternative with a long history going back to RPCs and CORBA. It is something IT has always leveraged at larger enterprises. Recently, a combination of this loose coupling predilection with XML standards, messaging to support loose coupling, and declaratively-written components has made inte-

gration less of a scrum[1] and more of a choreography. The pervasive use of sophisticated XML has made application mashups a convenient way to add functionality. Most recently, SOA initiatives have focused on creating composite workflows – with the business governance built in.

Supporting a rapid rate of change is always a hard challenge. The more the applications that support business processes become integrated (which is beneficial), the harder safe change becomes. The edgeless imperative that comes from the more distributed interaction requirements exacerbates the situation by challenging the control and security systems of the past. As a result, the application tier that so benefited the enterprise when it was separated from the underlying databases is itself fragmenting into presentation applications (portals), web-side functionalities, mash-ups and other application-level widgets, and software as a service (SAAS). Many of these are indirectly coupled, both through service requests with the physical IT infrastructure and through shared architectures like Grids[2].

Infrastructure

As applications increasingly support business process, demands for their flexibility and agility expose a chasm between the modularity of applications and the traditional IT infrastructure support of

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[1] A good, chiefly British, word describing *a disordered or confused situation involving a number of people.* [*The American Heritage® Dictionary of the English Language, Fourth Edition.* Houghton Mifflin Company, 2004. 16 Apr. 2007. <Dictionary.com http://dictionary.reference.com/browse/scrum>.]

[2] For more on the time-sharing of Grid and SOA, see the April 25, 2007, issue of **Clipper Notes** entitled *Multiplexing the Data Center with SOA and Grid*, available at http://www.clipper.com/research/TCG2007055.pdf.

business process. **As infrastructural elements have become more resilient, more deft and less intrusive, and unexpected failure more unusual, managing it has changed from a janitorial function to one requiring planning, tactics, and even strategy.** Automation has facilitated the migration of data, and virtual machines are facilitating the deployment and redeployment of workloads on Intel/AMD platforms. This has allowed infrastructures to be more loosely coupled to the platforms they support. As computing becomes redefined as a service rather than as the state of the hardware that supports that service, the relevant metrics become ones of latency and utilization rather than simply availability. Modeling allows the infrastructure to be seen as aggregates of resources (infrastructure, data sources and applications) supporting a process. This reorientation of focus is something Nick calls *Service Oriented Infrastructure (SOI)*[3].

As industry standards proliferate, proprietary, limited-scope management tools become expensive to support. Like all vendors, EMC has its share of proprietary products, and the tools are needed for certain infrastructure differentiators that these proprietary products support. There are growing standards to support more heterogeneous approaches to IT infrastructure management. So EMC, together with other vendors, is increasing the scope of its management tools. **The management of the whole (and particularly the management of change) has become less a matter of focusing on each piece of infrastructure and more a matter of inventory management, discovery, assessment, and modeling to reduce testing and increase insight while still keeping change safe.**[4]

Information

The policy-driven nature of infrastructure management is also reflected in the use and management of information. Information is growing fast. It pours in from multiple sources. The details that once would have been considered only of short-term interest turn out to be critically important for courting markets and dealing with customers that you see only through their Web behavior. Information is kept longer – partly because of compliance issues but also because it is used longer. As collaboration is facilitated by that driving edge of

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[3] Nick reserves SOA for the components of applications that are coupled (again, loosely) into composite applications, reducing redundant but inconsistent processes that underlie a great deal of time wasting and overspending.

[4] For the opinion of another forward-looking thinker, see **The Clipper Group Observer** entitled *eBay Infrastructure – a Prototype for the Future*, dated November 9, 2006, and available at http://www.clipper.com/ressearch/TCG2006097.pdf.
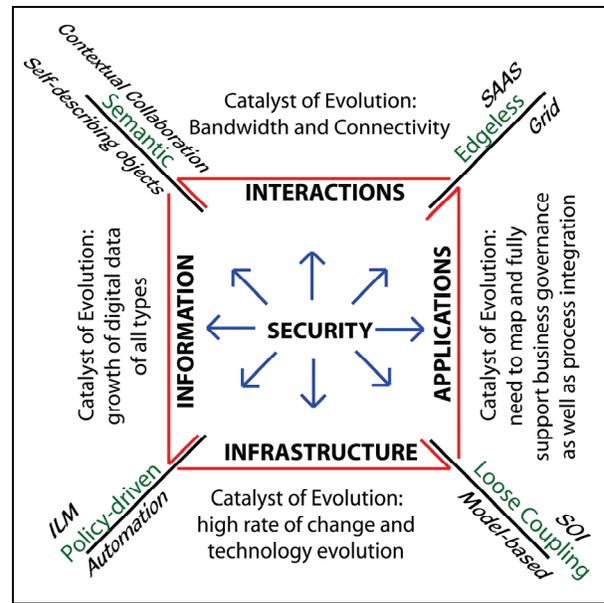
interaction, more users (applications and business units) may wish to leverage it to make their own initiatives better integrated into the corporate strategy. **The focus of information moves from the information itself (as replication has become easier and its variants more familiar) to its management and the descriptive metadata that allow it to be properly used – and to what librarians would call** *finding aids* **– like** *indexes* **and** *taxonomies.*

The Corners' Building Blocks

The edges provide a nice framework, but it is the corner concepts at their intersections that give an armature of context in which to examine many IT challenges that often cause queasy panic. The corner concepts may become the new IT facets of the future. They certainly offer today's enterprise many ways to get a step up on their competition.

Semantic

Interacting with information beyond its routine use has, to date, usually been a matter of analytics. With customer information, for example, there are many precisely named elements leading to many metadata elements to be extracted and used. In a table, for example, selecting many columns on which to pivot helps to examine the patterns created as other elements realign. Customer requirements are another kettle of fish. There are fewer elements, perhaps more outlying one-offs. **How they are aggregated matters more than what they are.**[5]

In this era of economic globalism, businesses of all sizes suffer from the challenge of innovation. Innovation often is poorly supported with pre-determined taxonomies and even keywords. **You can**

[5] This is where ontologies become important.

start to plan by considering the landscape of *what you would like to know* about the information you work with – in the context of both the information and the interactions people and processes have with it. **You can see where semantic analysis would be useful, where taxonomies give all the insight you need, and where other strategies such as navigational search are needed.**

Ontology is a word you probably have not heard since your college days – and never heard in a business context. Ontologies contrast with taxonomies. Nick states, "Taxonomies are hierarchical and constrained by a typing (classification) process that makes assumptions about use" (like the key terms in an elementary school's list of ten vocabulary words about monarch butterflies). Ontologies, by contrast, make no assumptions and use discovery and analysis (via search and other methods) to find relevant relationships, patterns, and characteristics in context. Much of data about data (*metadata*) is taxonomic precisely because it can be prescribed up front, but support for the self-describing, semantic kind of description is needed to surface relevant insights (such as *if A and B, then C*). **The *semantic approach* supports contextual collaboration in business interactions. It is also important in building the recognition of patterns into management systems of incipient device failure and risky patterns of device use.**

When you begin to get a handle on the relevance of these concepts in the interaction of business processes, you can apply them to the other end of the information facet to see how their use can help in developing IT infrastructure policies. In particular, they may be useful in addressing the challenge of complex process dependencies.

Edgeless

If you consider the effect *edgelessness* has on both your business interactions and your applications, you gain another perspective on your organization that you might not have considered without Jeff Nick's template. Customer self-service is an area in which most enterprises have a good deal of experience. Many have used customer councils, but now, with the wikis and collaboration tools that are available, how could these early initiatives be built out further? Where is *seepage of applications into interaction* most helpful? How can you involve your stakeholders more fully in your organization (building familiarity and loyalty in the process)? Are there ways to harvest more useful information from beta projects? Are there ways to engage people, like university students, whom you may want to engage in the future as customers or as employees? What applications
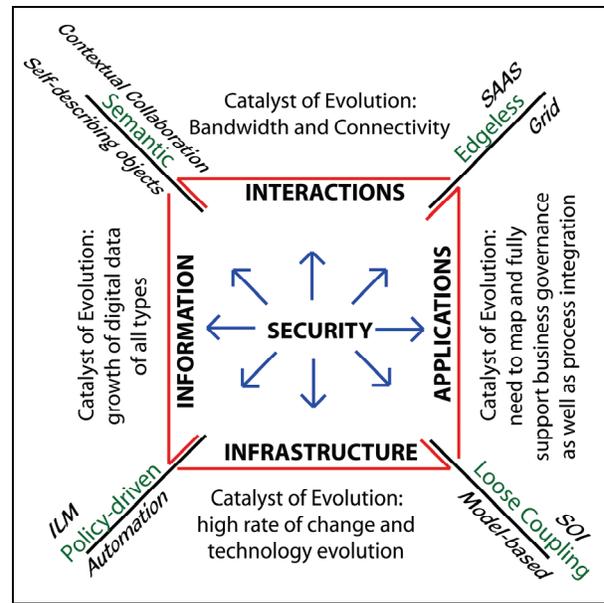
do you have and what portals could you create to enhance the information your business units have to work with? EMC has ideas in all these areas.

Policy-Driven

If Semantics and Edgeless resonate easily with business operations, *Policy-Driven* and *Loose-Coupling* corners are points of resonance within IT operations. If you picture the facets of *Information*, *Infrastructure*, *Interaction*, and *Applications* as strings, you can almost feel the whole IT realm vibrate. Policies naturally rest at the intersection of information and the infrastructure elements that use the information. Policies to automate routine actions and reactions can be derived from scripts. As policies, they can be more consistently deployed across the environment, driving consistent IT practices and more predictability into the environment. Policies are needed to cover not just business information and IT management information (the adjacent facets) but also applications, which are, as EMC's *VMware* would remind us, just another instance of information.

Many business-facing IT policies are applied across *specific process domains* (e.g., insurance claims processing). In a business, technology is now required to perform many functions for many aspects and user groups. There is a need to consider policies broadly and figure out how to construct rational points of reconciliation between policies. In IT management, together with the policy engines to apply policy and the authentication points to enforce it, there are service buses to translate/transform requests and arbitrate how they are fulfilled. Elements like change and configuration databases document the particular requirements of all parties involved. **Now is the time to think about the architectures of your policies and how to build them as a rational whole.**

Loosely-Coupled

Core processes and key repositories may continue as the embodiment of a business (rather like the old headquarters that corporations used to cherish), but most revenue-driving processes, subject as they are to frequent amendments, are better considered as services. Traditionally, IT has been extremely *asset oriented*. This focus has led to a preoccupation with the *many-ness* (itemized lists) of things. Looking toward the future through lenses filled with the clutter of things is difficult. Focus on the application services will align the many-ness of IT assets in useful ways.

Much has been written about ways to build the flexibility of loose coupling into enterprise IT environments, most of them using the phrase "enterprise agility." Jeff Nick reminds us that **loose coupling is needed not just at the painful intersection of applications with infrastructure but also at each of the corners that connect the enterprise facets.**

Security

As the enterprise facets benefit from greater articulation and more pervasive loose coupling, security must pervade all dimensions and corners while not constraining their development. This calls for security to be baked in – something EMC has initiated in its *Symmetrix* and will push out to all its product lines. With its *RSA*, *Authentica*, and *Documentum* acquisitions, EMC has the capability needed to extend security to where it is needed. With its information focus and this template, a broad, integrated information-centric security strategy could do much to mitigate the risk that widespread use of relevant business information across an organization or an industry ecosystem poses. This could deliver the proverbial *Golden Fleece* in open systems, a way to replicate what the mainframe has offered, at least for data.

Optimization

Jeff Nick was not through bending our minds. Using ILM as an instance, he brought up the matter of optimization. ILM – as EMC has used the term – optimizes data access across tiers of storage based on access immediacy requirements. In a number of localities, Nick noted, optimizing for *energy use* is going to become a new requirement. This demands a philosophy of *Green ILM*, based on the environmental costs of data storage as well as other factors.

Conclusion

Jeff Nick has given us a template for useful thinking. It can make easier considering options
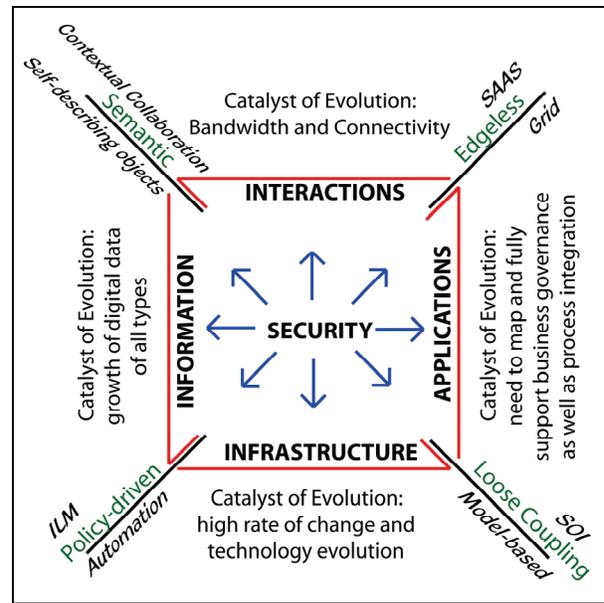
and formulating strategies about your interactions with, and use of, business information. It makes extending these strategies to the realms of applications and infrastructure easier. And, incidentally, it makes it easier to think about many things, including storage, as a business asset. This template is also being used across EMC, which plans to use the considerable assets at its disposal to build new solutions to support the key functionalities exposed by this template for thinking.

It is no wonder that Mike Kahn, Managing Director of The Clipper Group, upon seeing Jeff Nick's presentation, called him "the most dangerous man at EMC". **EMC should be commended for seeing that there are tools that can be used on all dimensions of the IT environment and that development of these tools is a high priority. For EMC, this is a radical, provocative thought – with mind-bending implications for the industry**.

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