Best Practices: Running IT Like a Business Requires Creating an Architecture of Architectures

IT Strategies
European Manufacturing CIO Strategies
Asia/Pacific IT Opportunity: Manufacturing

MARKET OVERVIEW #MI212285

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MANUFACTURING INSIGHTS OPINION

IT executives at manufacturing firms are interested in running their organizations like a business — offering a catalog of services to the business unit and functional leadership of the company. Manufacturing Insights recommends that IT organizations put a high priority on creating service catalogs based on the latest incarnation of the IT Infrastructure Library (ITIL) standard. This effort involves identifying the services, including service levels and costs, that the organization offers, both directly and externally sourced, with the ability for internal customers to select and implement those services. Companies will converge the methodologies for creating a service catalog with the need to manage these four distinct architectures. Manufacturing Insights recommends that companies organize such that architecture governance sits between the customer-facing services it offers to the organization and the resource-facing services it uses to optimize utilization. Process blueprinting and management software for IT must also accompany these efforts. IT organizations in manufacturing firms will become more service centric and less project centric. At the center of this movement will be the need to govern multiple architectures needed to deliver these services. This "architecture of architectures" includes four distinct layers:

- Physical Delivery Infrastructure (PDI)
- Industry Process Platform (IPP)
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This report looks at the concept of running IT organizations like a business and how manufacturing CIOs can position themselves as change agents for business improvements. Using the ITIL version 3 standards as a guide, it sets a framework for creating a market-based corporate standards catalog. The role of the enterprise architect is highlighted around the Manufacturing Insights concept of creating an "architecture of architectures" to deliver modern services. Specific guidance on organization, best practices, and investment strategies are offered.

SITUATION OVERVIEW

Running IT Like a Business

Ongoing conversations with IT organizations reveal a trend toward planning, sourcing, and operating the group as a business. That is, getting better alignment between the product offered by IT — everything from basic infrastructure to business transformation — and the needs of the business leadership. CIOs and their organizations have three roles:

- **Custodian.** Large investments in infrastructure and applications must be maintained efficiently.
- **Compliance Czar.** Everything from Sarbanes-Oxley to industry-specific requirements such as Restriction on Hazardous Substances (RoHS)/Waste Electrical and Electronic Equipment (WEEE) in electronics or REACH in the chemical industry is information intensive. A lot of responsibility falls to the CIO to keep the company out of the media and executives out of jail.
- **Change Agent.** As the focal point for the automation of key business processes, the CIOs are in a position to drive significant business improvements and transformation.

For obvious reasons, it is this last role that is the most interesting to IT personnel and most valuable to the organization. In a recent focus group study, CIOs ranked professionalism, customer centricity, and responsiveness as the top 3 images they were trying to convey to the rest of the organization. However, that same focus group showed that outgoing departmental communications were targeted at individual users rather than the more important (according to the focus group) business unit (e.g., division presidents) and functional (e.g., supply chain or engineering) leadership.

The business unit/functional leadership is being presented with many options that allow it to circumvent the IT organization. Software-as-a-service (SaaS) applications don't require corporate infrastructure or capital expense review, and business process outsourcing firms bring their own software to the relationship. Further, as manufacturing companies move to a more globally integrated structure, business unit leaders are moving away from traditional line and staff organizational models to managing a portfolio of individual ventures that are based on product platforms, include key external partners, and are supported by common corporate or external business processes assembled to support that particular endeavor.

IT must get on this service bandwagon. An operating model based on delivering specific initiatives puts most IT organizations in "project prison." What is needed is a more service-oriented approach — an IT group that is organized around the services it provides to the company, not on the collection of projects it is delivering. The project approach leaves IT looking at the calendar while the business leadership they hope to satisfy is looking at its watch.

Manufacturing Insights recommends that IT organizations put a high priority on creating service catalogs based on the latest incarnation of the ITIL standard. This effort involves identifying the services, including service levels and costs, that the organization offers, both directly and externally sourced, with the ability for internal customers to select and implement those services. There are several software applications to help organize and automate service catalog processes, including Digital Fuel, Kinetic Data, and NewScale. More importantly, a new model for enterprise architecture must be devised to assure that the organization can deliver cost effectively on the service levels promised.

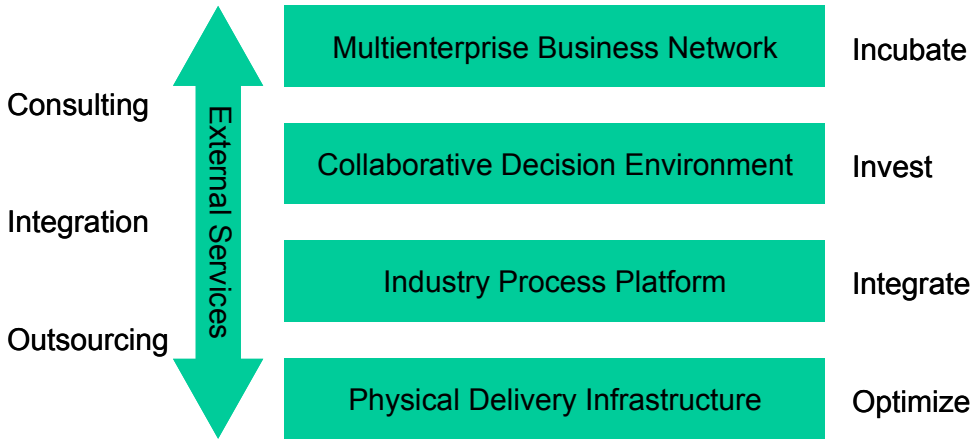
FUTURE OUTLOOK

An Architecture of Architectures

Having a service-oriented IT organization makes an obvious semantic connection with service-oriented architectures (SOAs). Recent work in the area of enterprise architecture has largely focused on moving the organization toward this SOA basis and, in fact, becomes the pivotal element in the creation and effective delivery of a service catalog. The next evolution in service-oriented architecture planning will be less about a single approach and set of corporate standards and more toward an "architecture of architectures" (as shown in Figure 1) aligned with the major classes of services that the IT organization will offer.

FIGURE 1

Architecture of Architectures Reference Framework



Source: Manufacturing Insights, 2008

At the bottom of the reference model is the physical infrastructure that represents the investment in networks, servers, storage, and client devices. This represents a large part of the CIO's custodial role, and the objective is to maintain service levels while driving down costs. At the top are multienterprise business networks that represent the ability for a company to enter into virtual joint ventures with other companies rapidly and effectively. These efforts are in the early stages and are drawing incubation-type investments that are about understanding capabilities and less about controlling costs. In between are the transaction backbone (process platform) and the decision support environment, which represent a more balanced (service level and costs) approach. We will look at each of these architectures individually.

Along the vertical axis of this model are external services, including outsourcing, system integration, and consulting. The goal should be to create a common service taxonomy that can describe what is offered by the internal organization and can be easily mapped to the service lines of external providers. With this alignment, service catalogs can establish the right level of granularity and, if done right, can be understood by the business unit leadership engaging the services.

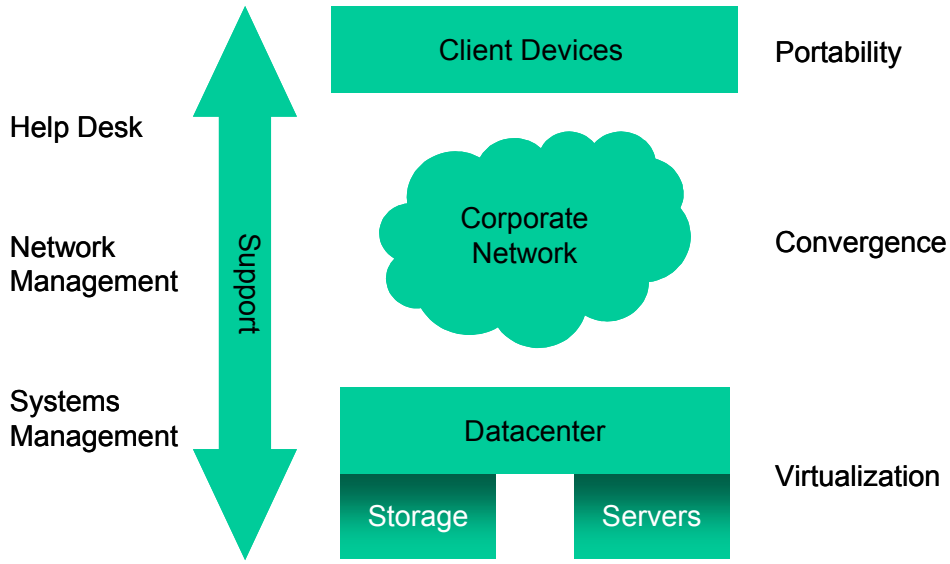
Physical Delivery Infrastructure — Invest to Optimize

The PDI architecture runs from the raised floor datacenter to the individual devices used by employees, connected by the corporate network topology (see Figure 2). There remains, especially in these economic times, a tremendous opportunity to lower the cost of delivery while simultaneously improving the quality of the service

delivered. External service firms offering datacenter outsourcing, network management, help desk, and remote monitoring are taking advantage of advancing technology and provide an alternative to delivering these services internally.

FIGURE 2

PDI Architecture Reference Model



Source: Manufacturing Insights, 2008

Datacenter — Virtualizes to Manage Growth

The classic IT cost challenge hasn't changed much — despite lower costs per CPU cycle of computing power and per megabyte of storage, demand for computing and storage grows even faster. The element that has changed the game has been virtualization. Instead of deploying servers and storage for a specific application, it has become easier to create virtual machines across a fabric of server and storage assets. The deployment of virtualization technology has substantially raised utilization rates and done more to get runaway infrastructure costs under control than anything else in recent memory.

The architectural construct must be devised to accommodate some of the challenges that come with virtualization, most notably the complexity it adds to systems management. Planning should include not just technology but people and process as well. Detailed guidance can be found in *Best Practices for Virtual Machine (VM) Management: People, Process, and Technology* (Industry Insights #ITMS5469, February 2008).

Network — Convergence Controls Costs

As differences between telephony and data, wired and wireless, and enterprise and consumer devices continue to fade away, thanks to the relentless progress of IP-based protocols, unified communications (UC) represents the "new virtualization" when it comes to taking significant costs out of operating the corporate infrastructure. Like virtualization, deployment will raise utilization rates and, unlike virtualization, management should become easier on a converged standard.

Network planning must take into consideration the opportunity new investment represents while also appreciating the likelihood of explosive growth in demand. Reconciliation of how wireless technology plays a role at the personal (Bluetooth), local (802.11), and wide area (cellular, WiMAX) levels will be imperative. Wireless may provide a primary role in some cases but represent redundancy for wired infrastructure in others. Again, investment should capture the savings opportunities while also raising service levels.

Client Devices — Portability Presents Problems

Manufacturing companies now buy more laptops than desktops and, if consumer markets are any indication, smart handheld devices might soon outstrip both of them combined. This fact demonstrates that employees have become much less deskbound or, at least, have a need for constant contact when away from the office. And while there are de facto (Microsoft) and open (HTML) standards on the laptop/desktop front, the smart device world remains a Wild West of standards and approaches.

The client level represents a more classic architectural challenge — how to balance the desire to serve the user community by offering a great deal of choice versus the need to optimize resources by settling on a corporate standard. The path most companies have taken is to create a corporate guideline (not a mandate) and deliver to that guideline. Business units that wish to deviate must pay external service providers directly to accommodate the privilege.

It's Not All About Cost

While optimization is the operative word when devising a PDI architectural plan, the logical technology investments are not at odds with supporting some of the higher-level goals for IT services. Virtualization provides the flexibility needed to reallocate computing power and storage to where and when it is needed. Unified communications provides the essential mechanism for connecting those constituents outside your company. Both of these are important ingredients to supporting integrated processes, collaborative decision making, and multienterprise business networks.

Industry Process Platform : Invest to Integrate

The architectures of the business transaction systems large manufacturing firms have implemented have been discussed *ad nauseam*. Early investments were single-tier, mainframe-centric systems with dumb terminals. As personal computers and local area networks proliferated, these systems yielded to new client/server approaches, culminating with a huge wave of enterprise resource planning (ERP) software investment ahead of the year 2000.

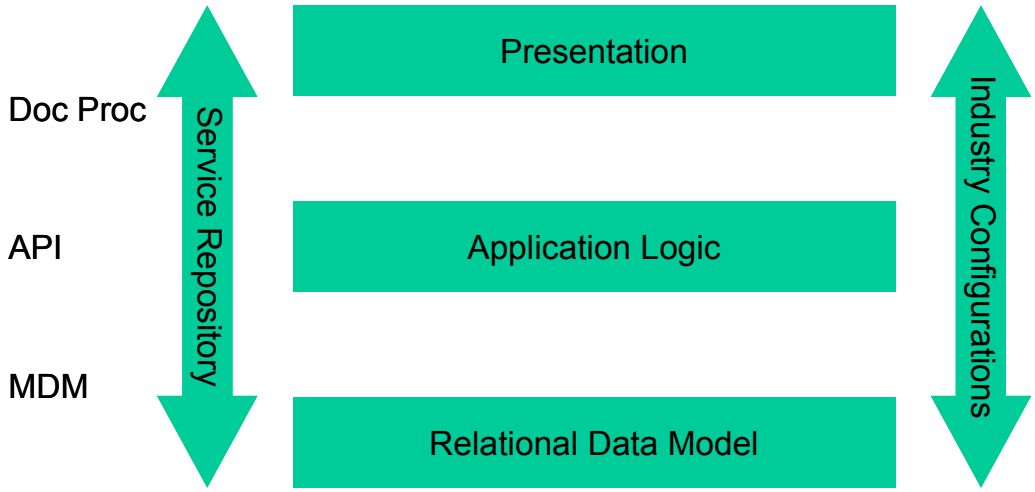
The vendor that grabbed the most market share in this wave, SAP, did so because its product was able to scale to thousands of users. Interestingly, that scale was achieved by not staying true to conventional client server wisdom — field level validation was eschewed for dumb terminal such as block mode processing, the SQL query engine was tuned to support this specific system, and fidelity to a fully normalized database was violated with things such as nested fields when performance could be enhanced.

The current generation is an n-tier construct, which separates data, logic, and presentation. There is a tendency to also associate these modern approaches with the Internet, most notably having a thin/dumb presentation layer that can be delivered via a browser. You may recall the silly battles the ERP vendors raged at the beginning of the decade around who was "100% Internet" and who wasn't. However, like SAP's success with straying from accepted client/server approaches, scale may come from coloring outside the Internet lines — some logic in the data and presentation tiers may be necessary to make knowledge workers more productive. Certainly, the interest in master data management tools and in Adobe- or Microsoft-friendly client delivery mechanisms is the evidence of this idea.

Figure 3 shows the current three-tier (multiple logic tiers make it n-tier) transaction system architecture. Many initial implementations took a multi-instance approach — separate instances by business unit or geography — and there have been a lot of recent efforts in consolidating those instances to lower the cost of ownership and support the move to more globally integrated business models. These initiatives have become the basis for upgrading to the latest version of the ERP platform and to align the software tiers with the physical tiers — storage with data, logic with servers, and a presentation with client devices and software.

FIGURE 3

Industry Process Platform Architecture Reference



Source: Manufacturing Insights, 2008

Instance consolidation should drive down the cost of operating transaction systems, but intentions at most manufacturing firms don't concentrate only on cost. Companies, satisfied with the breadth of processes offered by ERP, would like more vertical depth and look to specialized products to fill the white space and deliver a competitive industry process platform. The essential element of these efforts will be the effectiveness and manageability of integration.

Integration has been around as long as transaction systems. Single-tier systems used procedural languages with remote procedure calls that were usually kept in a single common procedure file. Client/server brought object-oriented programming and object libraries. Today's multitier architectures offer service repositories. The persistent challenge in these approaches is deciding on the right level of granularity that promotes reuse by balancing repeatability and convenience.

To illustrate, one might have a service that performs a lookup of a customer name and another that validates and adds a customer to the database. The first is fine grained and could be reused in many scenarios but doesn't drive convenience because it is more a fragment of a process rather than a complete unit. The more coarse grained second example is the opposite. An effective service repository must be built on a foundation of fine grained tasks that are used to define subject matter objects (e.g., suppliers, products, assets, customers, and employees) which are, in turn, used by coarse grained workflows that are delivered via Web service standards. These services can then be combined to deliver full composite processes. The caution is that to

fully realize this type of nested service repository that promotes reuse from both a broad applicability and a convenience perspective takes significant effort, good management tools, and effective governance.

Integration also plays a role when selecting a third-party specialist application to extend the installed ERP base. Here process logic is less important, so one shouldn't get hung up on whether those processes can be included in the corporate repository. The challenge in integrating with your ERP application will remain largely at a data level. Manufacturing Insights has identified the following types of integration:

- **Data-less models.** In this situation, the specialist application provides support for industry-specific processes but uses the existing ERP data model exclusively. This approach is by far the easiest to manage but isn't always possible.

- **Bus-based models.** Applications using this approach use a persistent connection to the integration bus of the ERP platform to access application program interfaces (APIs) that allow for harmonizing of data. The updates are more timely but put more of a strain on resources.

- **Translation table models.** Applications using this approach tend to take more of a batch approach, where changes to its database are submitted for update in the ERP system at certain intervals. There can be latency in synchronizing the data, which causes dissonance between the records in the two systems. However, there can also be greater flexibility in implementation.

- **Self managed.** In this scenario, the specialist application offers no direct capability for integrating to certain ERP platforms but simply provides its own set of APIs for integration. The system owner must use its own integration platform to connect the two systems. This approach is the least desirable but may be unavoidable if the specialist application represents significant business value.

This continuum of integration approaches is admittedly oversimplified but can be used as a starting point when evaluating options for building an industry process platform for an organization. Remember that the best approach is no integration (data less), but when that is not feasible, decisions must trade off timeliness and flexibility. Certification of a specialist application by the ERP vendor provides some advantage but shouldn't eliminate the other alternatives.

Having an industry-process platform is the basis for driving more consistent execution at the globally integrated manufacturing firm. Implementing an ERP system is only a first step, albeit an important one, and provides little competitive advantage (competitors can buy

the same software) until it is extended to support the process needs of an industry segment and, further, an individual company. Investing in a comprehensive, standards-based approach to integration optimizes the cost of delivering that platform.

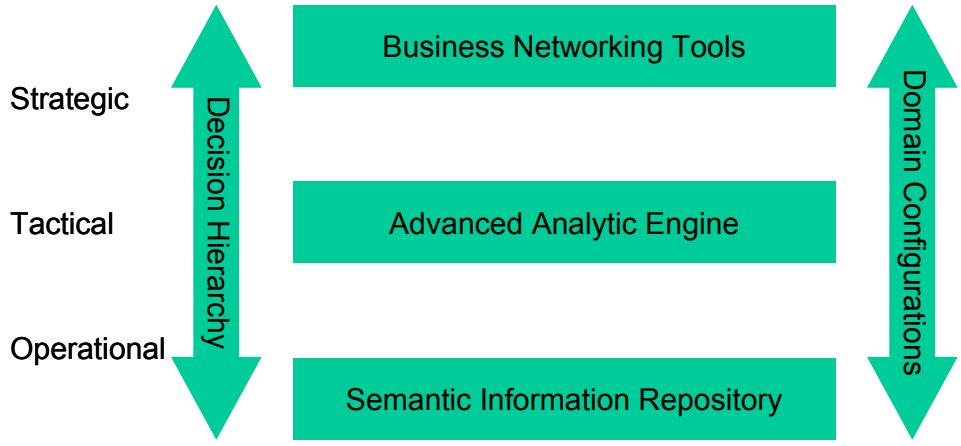
Collaborative Decision Environments — Creating Corporate Feedback Loops

Manufacturing Insights has paid significant attention to the expressed desire of large manufacturing enterprises to speed up and improve their decision making. We have published frameworks to help clients discuss how to link strategic objectives to tactical planning to operational execution and provided guidance on the technical architecture that enables the activity. Our recent global supply chain innovation study provided validation as "faster, better decisions" was the most popular supply chain strategy for manufacturers with over 10,000 employees.

In our discussions with IT organizations, we have come to a conclusion on a name for what firms are trying to build — Collaborative Decision Environments (see Figure 4).

FIGURE 4

Collaborative Decision Environment Reference Architecture



Source: Manufacturing Insights, 2008

A CDE is made up of three key components:

- **Semantic Information Repository (SIR).** Essential to improving decision making will be the ability to organize all types of information. At the heart of the repository for large organizations

will be an enterprise data warehouse that can organize large volumes of transactional data into hierarchical, analytic friendly forms. The data warehouse should be augmented by effective master data management that can provide a harmonized view of key subject matters such as suppliers, products, assets, customers, and employees. The ability to bring some structure to unstructured content like documents completes the repository.

- **Advanced Analytic Engine (AAE).** The second key ingredient to the CDE is the ability to construct and run analytic models. This capability will include the ability to do retrospective (what happened), perspective (what is happening), and predictive (what will happen) analytics. The AAE will be dependent on a well-built SIR to feed it the necessary information in the context of the analysis being performed.

- **Business Network Tools (SNC).** Analysis is only effective if people can take action on the results. The final piece of a CDE will be the ability to identify, recruit, induct, and activate the right personnel, both within and outside the company, to either effect corrective action or magnify positive results. These tools are similar to Web 2.0 tools such as social networking and wikis but come with business context and scale.

The creation of CDEs will form the basis for the next wave of IT investment in manufacturing. Like the early stages of the last sizable software investment, ERP, there will be a considerable opportunity for service firms to assist in making the investment more effective. Like business process before it, decision processes should be reviewed and streamlined. The term that comes to mind is "reengineering," although there may be too much negative baggage associated with that term.

The opportunity is not lost on the vendor community as is evidenced in a spate of activity designed to better position the companies to support customers' efforts by bringing together the right combination of tools.

Teradata announced a significant partnership with SAS. This brings together the most highly respected provider of large-scale data warehouses with the most highly thought of supplier of analytic tools. The combination, if the two companies can reconcile the product overlap, represents a very compelling offering for large manufacturing firms. The partnership covers two-thirds of the CDE, and it is assumed that the business networking tools component will come from a third party.

SAP acquired Business Objects (BOs). SAP has brought the Business Information Warehouse (BW) a long way, but the addition of the business intelligence, analytics, and customer base of BO will help propel them into the center of CDE projects, particularly at companies where SAP is the primary ERP vendor. Also, SAP's recently

demonstrated workspace capability can support the business network tool requirements with slick functionality for composing both ad hoc and structured collaboration.

After acquiring Hyperion earlier this year, Oracle has also picked up BEA. The BEA acquisition bolsters the company's integration capability and brings a host of customers outside of manufacturing, but the most interesting element is the product investments BEA has made in social/business networking. These modules give Oracle a complete collaboration coverage and, when combined with its database and analytic capability, positions the company to be a formidable force in building CDEs.

HP may come to regret that it didn't acquire BEA. A long-time partner, BEA was HP's preferred service-oriented architecture integration platform, and the business networking products would have complemented the Neoview messaging well. HP is having some early success with Neoview, but there are serious questions as to whether they can make an impact coming late to the market with what is essentially an online transaction processing (OLTP) architecture applied to data warehousing. Right now, its message is all about cost when competing with the likes of Teradata. An acquisition of MicroStrategy or another business intelligence (BI) tool vendor may be needed to add the appropriate analytic/BI elements while also bringing an installed base.

IBM has a very comprehensive portfolio in supporting the creation of a CDE. The Database 2 (DB2) information management family includes robust data warehouse and analytic capability. The Lotus and WebSphere product lines represent support for collaborative processes. The issue is that none of these lines are market leaders, and getting large manufacturing enterprises to take the complete set will be a steep challenge. The best opportunity for IBM to profit from this investment wave will be in global services. IBM has tremendous industry expertise and resources to build CDEs for manufactures regardless of the underlying software.

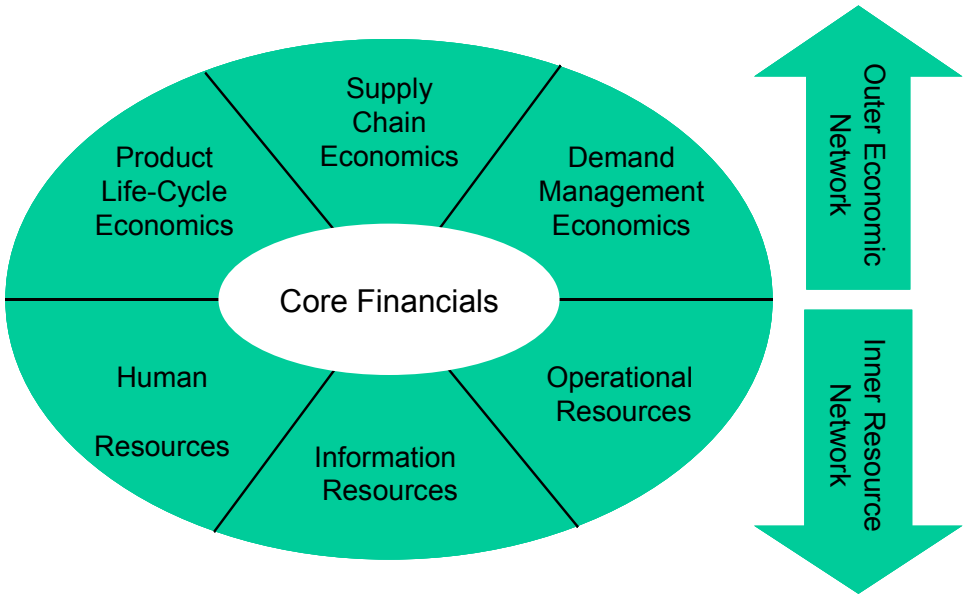
The proliferation of Microsoft-based desktop software and the continued integration of Groove Networks' capability represents a significant opportunity for the company to be the de facto business networking collaboration platform for CDE projects. Microsoft has good products in data warehousing and analytics, but, at an enterprise level, its best strategy will be to strengthen partnerships with Teradata/SAS and HP around the collaboration tools.

Once the architectural components are in place, manufacturing firms must then consider how to roll out these environments to the business. In the past, the business has come to IT with a specific issue — better market segmentation, operations optimization, or root cause quality analysis, for example — and IT has obediently delivered. What is required is a program-level view, one that bridges the broad generic capabilities of the architecture and the individual problem solving challenges of the business.

Manufacturing Insights recommends that companies take a domain view to establish six collaborative decision environments within the company as depicted in Figure 5. The lower three domains represent the inner resource allocation decisions that have to be made, while the upper three domains represent external economic decisions. All six instances bring semantic context to the domain consideration but remain linked to the core financial metrics of the organization.

FIGURE 5

Network Decision Domains



Source: Manufacturing Insights, 2008

The objective for each of the domains is to create a complete feedback loop that speeds up decision making across all time horizons and better connects strategy to execution.

Strategic decisions are made in the long term (quarters to years) and try to balance risk and reward in a portfolio type analysis. This should form the basis for the configuration of the domain network (e.g., supply chains, sales channels, and collaborative design Webs). The decisions made at the strategic level create the policy and parameters for the next level, tactical decisions, which seek to evaluate various scenarios (over weeks to months to quarters) to determine a whole set of optimization decisions around performance trade-offs (generally service levels versus costs). The optimization decisions create the operating parameters by which the performance of operating processes are monitored and controlled. Table 1 provides a basic framework for these domains and their decision hierarchies.

CDEs are a top priority for manufacturing IT organizations, especially those that have their ERP systems and industry process platforms in a fairly steady state. This priority makes perfect sense as the ability to harvest value from information assets and provide relevant services to the business comes more from using the information than from producing it.

TABLE 1

Domain Structure for Collaborative Decision Applications

	Strategic	Tactical	Operational
Supply chain economics	Correct mix of suppliers based on portfolio-based risk/reward analysis and *configuration* of the supply chain based on scenario-tested opportunity and risk	Trade-offs of service levels versus costs in planning and scheduling of inventory, transportation, and production and the *calibration* of the supply chain to demand expectations	*Control* of supply chain execution in line with the policies established by the strategic and tactical decisions that were made, including procurement, inbound materials, production, and outbound finished goods
Demand management economics	Correct mix of customers/partners based on portfolio-based risk/reward analysis and *configuration* of sales channels based on scenario-tested opportunity and risk	Trade-offs of demand generation versus costs in planning and scheduling of marketing, promotions, pricing, and customer service and the *calibration* of sales channels to supply capacities	*Control* of demand generation execution in line with the policies established by the strategic and tactical decisions that were made, including marketing, sales, and customer service
Product life-cycle economics	Correct mix of engineering contributors based on portfolio based risk/reward analysis and *configuration* of design collaboration network based on scenario tested opportunity and risk	Trade-offs of product performance versus costs in designing for manufacturability, serviceability, and compliance, quality and the *calibration* of the design collaboration network to market requirements	*Control* of design and engineering execution in line with the policies established by the strategic and tactical decisions that were made, including ideation, product engineering, systems engineering, manufacturing engineering, and so forth
Operational resources	Correct mix of property, plant, and equipment based on portfolio-based risk/reward analysis and *configuration* of the plant/operational network based on capital budgeting prioritization	Trade-offs between tooling, setup efficiency, operational effectiveness and the *calibration* of the operational resources to the demand take time	*Control* of operating assets to assure availability, efficiency, and quality output based on the business policies set as part of the tactical decisions
Information resources	Portfolio management of assets, applications, and projects based on risk/reward analysis and *configuration* of the operating environment based on IT alignment with the business	Trade-offs between delivery costs and service levels and the *calibration* of the information resources to the business scope	*Control* of the operating environment and implementation projects based on policies set by the tactical decision process
Human resources	Right mix of skills based on risk/reward analysis and *configuration* of human network based on the skills needed based on the financial strategic planning process	Trade-offs between the cost of direct employment, temporary staff, and business process outsourcing versus the required worker output and the *calibration* of the availability of skills to the business workload	*Control* of recruiting, hiring, deployment, and dismissal of personnel based on the policies established as part of the tactical planning

Source: Manufacturing Insights, 2008

Multienterprise Business Networks — Keep Your Head in the Cloud

If collaborative decision environments are the top priority today, support for multienterprise business networks will move to the top of the list in the near future. As we said previously, globally integrated manufacturing companies will move from a business model based on operating units with divisions designing, producing, and selling specific products to operating units that are a collection of specific ventures that leverage their relationships within an ecosystem. Examples include:

- A military helicopter sustainment program where the military branch along with the airframe manufacturer, engine producer, and avionics company want to operate a specific system to manage the maintenance of the fleet

- A consumer products company as a packaging variation and feature set that is exclusively sold through a major retailer where the company identifies the need for a dedicated system to coordinate demand and supply

- A telecom services provider, handset manufacturer, and chip manufacturer with a product designed for a specific geographic market (A dedicated system is identified as extremely beneficial.)

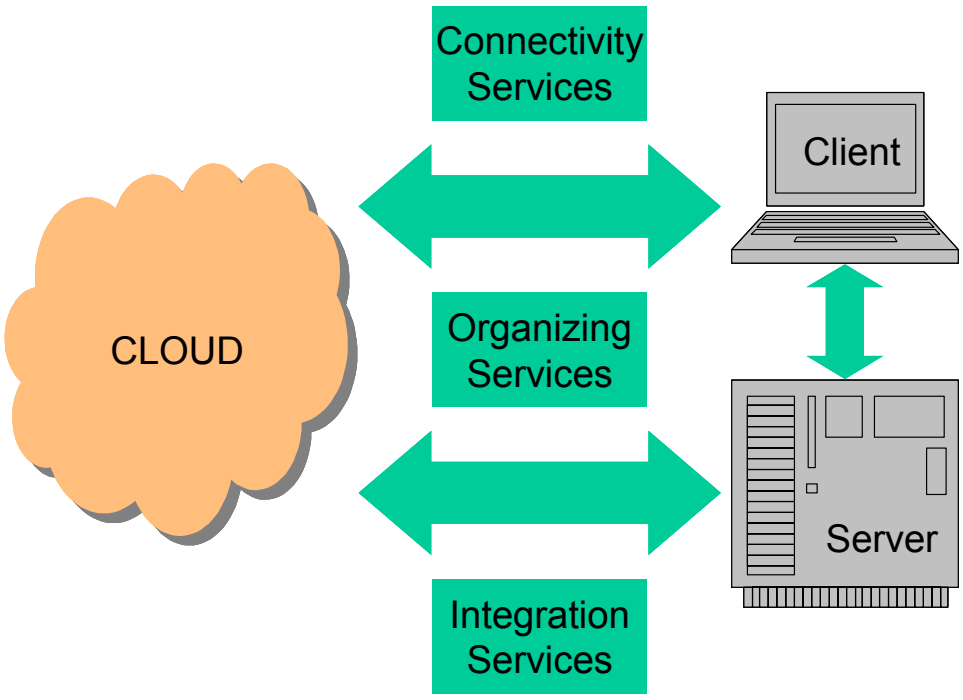
In each of these examples, the group of companies represent a virtual joint venture and are hampered by the traditional latent asynchronous exchange of information. They wish to stand up a management system as a mashup of various capabilities and use it to manage the venture through its operating life. This growing need can be supported by having access to a computing cloud, one that can provision infrastructure and applications from the internal systems of the participants and from external sources available.

Support for these multienterprise business networks should be incubated today so that the IT organization has the competency to support the activity when the inevitable demand comes. Failure to do so will lead to business unit leaders trying to do it themselves with insufficient support and higher costs.

The architectural reference for these systems is what Manufacturing Insights calls "Cloud-Client-Server" (CCS) computing. As we discussed previously, the movement from centralized single-tier to two-tier client/server to n-tier Internet constructs was all about where the data, business logic, and presentation layers resided. In a CCS architecture, it is about the right combination of data, logic, and presentation at each tier as is shown in Figure 6.

FIGURE 6

Cloud-Client-Server Architecture



Source: Manufacturing Insights, 2008

The venture or cloud layer represents a business system necessary for multiple organizations to come together to operate a venture as virtual organization. The interface is likely to be purely HTML with standard business logic available similar to SaaS-based applications. Data will be specific to the venture, and users will pay a subscription fee to connect.

The enterprise or server layer represents the connection between an individual participating company and the multicompany venture. Activity within the venture that has accounting implications for the participating company must be identified and integrated. Similarly, any transactions that are executed on the company's transaction system that are relevant to the venture must be integrated. Interface, logic, and data will be defined by each company's process platform.

At the client level, the ability to seamlessly blend the information on the corporate systems with that on the venture systems (and an individual may be participating in multiple virtual ventures) dictate a richer client software stack and the ability to support multiple client devices. The client will need the interface, logic, and data and specific packages for the task at hand.

One can think of this similarly to massively multiplayer online role-playing games (MMG) where players are in a common game environment (e.g., Second Life, EverQuest, and Ultima) but come together with a set of players around a common goal. In fact, the programming models used to build these environments are likely to be applied to enterprise efforts to build massively multiorganization goal based commerce (MMC). The added twist will come from synchronizing information with individual corporate systems and supporting a more sophisticated client. Several capabilities must be available:

- **Personnel credentials.** The operators of the clouds are likely to support a standard way for authenticating and authorizing users across the virtual venture. Companies should look at how their identity management investments can be extended to support single sign-on and follow-me user credentials.

- **Service contribution.** This capability represents the ability of an individual company to contribute a workflow/process to the virtual venture. For example, an aircraft company may want to make a product simulation program available to the venture. The ability to connect the system to the cloud, share authentication as discussed, and perhaps even be compensated for the contribution needs to be established.

- **Data integration.** The venture's processes will be orchestrated in the cloud, but important activity (e.g., accounting) will dictate that data from those processes be harmonized with corporate systems on the server. This doesn't necessarily have to be very sophisticated real-time integration; batch translation table-based approaches may be fine.

- **IP protection.** Data harmonization shouldn't leave proprietary information vulnerable. Mechanisms for information protection and digital rights management will have to be deployed as part of these models.

The next wave of information technology investment in manufacturing will represent very interesting work and perhaps have the most impact on business performance. IT has moved from processing forms (mainframe era) to integrated accounting flows (ERP) and, now, to creating the basis for supporting new and dynamic business models.

Actions to Consider

Create a Service Catalog, Use Market Based Pricing

As discussed in this report, IT organizations are moving from those that manage a portfolio of discrete projects to those that offer a catalog of continuous services to the organization.

Manufacturing Insights advises organizations to include the service levels and costs of acquiring similar services from external organizations in order to present truly market-based pricing to the business leadership. Doing this takes a bit of courage, but it makes it easier to liquidate expenses through chargeback based on the consumption of services. Also, avoid the temptation to charge a management fee if internal customers choose an outside service. Rather, offer relationship management as another service and then that customer can decide whether to manage it themselves or through IT.

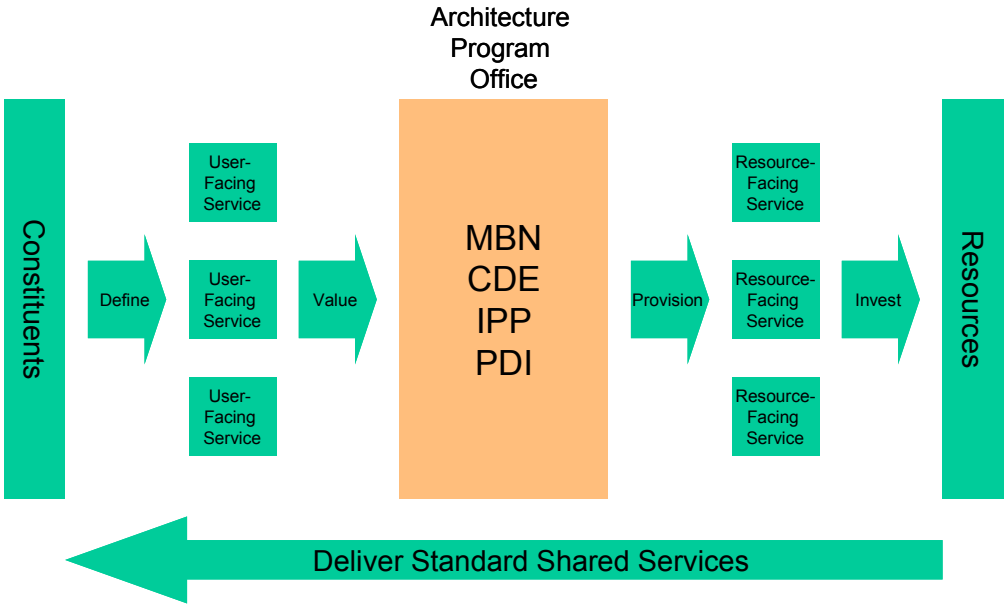
People: Organize Around Services, Put Architects in the Middle

ITIL version 3 makes some specific distinctions between resource-facing and customer-facing services (see Figure 7). Manufacturing Insights believes that this is a good approach and IT organizations should staff service managers in both areas. Obviously, the customer-facing service managers must have predominant communication skills, while resource-facing service managers must have technical skills.

Between the two sets of services lies the enterprise architects. The architectural reference models represent the prism through which the customer-facing demand is balanced with the resource-facing supply. The effort should be led by a lead enterprise architect but should include an individual architect for each of the four models presented in this report.

FIGURE 7

Service-Oriented IT Organization



Source: Manufacturing Insights, 2008

Process: Communicate, Invest, and Repeat

An interesting finding from the aforementioned focus group with manufacturing industry CIOs was that IT organizations tend to communicate well with individual contributors but fall short in reaching out to the more important business unit and functional leadership. The services catalog becomes a great communication tool to have a conversation with this constituency about what services they need, the relative quality of the service, and, of course, the cost.

The business unit leadership conversation is optimal because it is the right audience discussing the right things. This will allow the IT organization to achieve the ever-illusive business/IT alignment, as it will better target investments for the greatest corporate good. This communicate and invest cycle shouldn't be a one-time exercise; it should become an ongoing, top-priority activity.

Technology: Time for the Cobbler's Children to Get Their Shoes

IT professionals have made a career of preaching the virtues of effective business systems for better company performance. If the IT organization endeavors to run like a business, shouldn't it also have management systems to assist its efforts? The answer is an unqualified yes.

HP (Mercury), IBM (Telelogic), and Primavera (Pro Sight) all have IT portfolio management tools that can link corporate IT demands to resources. Smaller vendors such as Stratana provide support for the IT strategy process, and the previously mentioned service catalog creation vendors build on their experience supporting ITIL-based service management.

Getting these systems in place is imperative to effectively supporting the organization we discussed previously. Organizational changes and process mapping should take place before implementing, but once completed the software rollout should be fairly straightforward and begin to deliver value quickly.

Invest in the Architecture Portfolio

This report is prescriptive in terms of the actions for each architecture category — optimize, integrate, invest, and incubate. Underpinning these approaches will be investment in four megatechnology areas:

- **Virtualization.** Virtualization is clearly a game changer when discussing the cost of deploying infrastructure, but also represents the ability to move capacity quickly to where it is needed, which will be important in the cloud-client-server future. Investment in virtualization gives IT organization that rare opportunity of simultaneously lowering costs and raising service levels.

- **Autonomization.** Applying service-oriented technologies will underpin the necessary integration of process platforms but will not make a huge difference in business operating capability. What will deliver both lower costs and higher service levels will be a modernization of processes (product management, supply management, demand management, et al) by wiring them for automatic data acquisition and control. This modernization will come through the investment in technologies such as RFID, sensors, GPS, and the networks that will transport the data they deliver. Processes will be wired to report data and autonomically take corrective action.

- **Web 2.0 for collaboration.** Manufacturing organizations should exercise caution before getting caught up in the hype around things such as social networking and wikis. However, these applications represent an opportunity to improve two long-standing trouble spots — decision support and knowledge management. Companies have invested in the foundational elements of a collaborative decision environment — data warehousing, analytics, business intelligence — but have struggled with providing tools that let decision makers initiate action on that analysis. Knowledge management has failed because it was generally implemented as a corporate edict. Web 2.0 borrowed approaches can deliver the necessary tools to make decision support systems truly closed loop

and can make knowledge management organic by assisting in expertise location, relevant content identification, and organizational collaboration.

- **Cloud computing.** What to invest in is less clear (perhaps even cloudy) for this topic. Manufacturing Insights recommends experimentation with applications offered within the cloud from companies such as Amazon, Google, HP, IBM, or Microsoft.

These four technologies should be given top priority and should align nicely with the architectural elements. Setting the right cadence for investment will quickly deliver additional services to the organization and allow for not only running IT like a business but running IT like a successful business.

LEARN MORE

Related Research

- *Machine-to-Machine Communication: Technology Overview and Market* (Manufacturing Insights #MI210473, April 2008)
- *SHOMI 2008: Influence Has Its Privileges* (Manufacturing Insights #MI210439, February 2008)
- *Worldwide Industry 2008 Top 10 Predictions* (IDC #210588, January 2008)