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## Beyond the IT Monolith

A critical debate is currently underway which may well shape the future of information technology's place within the enterprise. Sparked by McKinsey's study of IT-driven productivity gains and Nicholas Carr's article in the Harvard Business Review, *IT Doesn't Matter*, a firestorm of controversy has emerged over the value and proper role of IT. In these studies and the broader discourse in which they participated, IT critics have raised important doubts about the strategic value of IT, its ability to confer strategic advantage, and the risks and sacrifices that major technology projects frequently entail.

Applying our years of research with technology companies, their customers, and industry analysts, we have identified leading companies that are employing a new approach to IT, an approach which points the way forward to a new model of software architecture and deployment. We believe these companies' successes indicate that the problems IT's critics have correctly identified are not, in fact, signs of the end of IT's importance, but instead motivators for the emergence of a fundamentally different approach to IT. This new model will enable us to tackle the vast array of business processes that have been largely ignored by process automation efforts to date and to do so in a way that sustains and enhances companies' unique competitive advantages, rather than eroding them through homogenization. Achieving this, however, will require companies to shift their IT strategy and solution set.

Our hypothesis was that using smaller, more flexible IT solutions to incrementally tackle focused problems would lower risk and enable companies to define their business processes for the good of the business not the software. Recognizing that small solutions are found primarily on the desktop, we identified large companies that used the Microsoft Office System as a platform to build uniquely flexible enterprise solutions to achieve dramatic business benefits. These solutions may well point the way forward to a new model for enterprise technology architecture and deployment.

### The IT Monolith

In recent years, our group in the Harvard Business School's Technology and Operations Management faculty has performed a variety of research projects investigating this issue through discussions with analysts, experts and customers. Our findings suggest that the death knell sounded

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Professor Marco Iansiti and Gregg Rotenberg prepared this note as the basis for class discussion.

by IT's critics is premature. Rather, the issues they raise are indicative of the flaws with most current approaches to the development and deployment of enterprise technology.

In the enterprise today, systems are often still purchased, customized and deployed in massive high-risk projects that often cost many millions of dollars and may take years to deliver a fully functional implementation (if one is delivered at all). The packaged enterprise applications at the heart of such deployments, such as ERP, CRM, SFA and SCM applications, are huge agglomerations of functionality. The company must, in a single moment of truth, select a single vendor's model for the automation of a vast spectrum of processes within their business. Further, the cost of customizing such software generally dictates that the company must change its business processes to suit the software, since changing the processes encoded in the software is impractically expensive, especially as the long-term total cost of software ownership is considered. These software monoliths, as they are implemented by company after company, often stamp generic process designs across whole industries. Companies are forced to undertake huge implementation and change management projects to shoehorn their business into the generic processes.

It is no wonder, then, that this monolithic approach has meant that the domain of processes within the enterprise that can be automated is greatly circumscribed. Indeed, the majority of enterprise processes are too complex, too unique or too changeable to yield to monolithic solutions. Such processes are the everyday knowledge work that drives the company, including such basic functions as discovering customer needs, delegating and monitoring task completion, and disseminating new ways of doing things. This is, of course, not to say that these processes have been unaffected by technology. Clearly, desktop application software has greatly impacted their performance. However, they have been largely exempted from the disciplined process review and end-to-end automation that has defined enterprise systems deployments, because they are perceived as too specific or quotidian to merit such attention. Our findings suggest, however, that coupling a disciplined review of business process with a new model of enterprise systems can bring about powerful cost savings and contribute to companies' strategic advantage by sustaining and furthering their areas of uniqueness.

## A Way Forward?

How, then, can businesses enhance the vast array of untouched processes and do so in a way that fits their actual needs, without adding excessive cost or risk? To add real value, the old mantra has once again emerged – technology should match the business problem, not the other way around. Delivering solutions for the next wave of business processes requires that software move beyond monolithic solutions by enabling businesses to design and efficiently automate their ideal business processes rather than forcing conformance to a generic way of doing business. Achieving this seemingly simple objective, however, will require us to rethink the very nature of IT systems.

Because the next wave of IT-enabled business processes are more unique (to both the company and often the specific situation) and more rapidly evolving, they require an IT platform designed to maximize flexibility, adaptability, and ease of deployment. Once a system is in place, the continuous change experienced in many of the most crucial and strategic business processes demands that solutions provide extreme levels of adaptability. Moreover, to reduce the risk of IT implementation, companies must increasingly tackle more focused projects, attacking problems one piece at a time, while ensuring that each incremental module contributes to one coherent end-to-end solution. In so doing they reduce the risk of IT implementation by spotting problems earlier and at lower cost. What emerges from our findings is a clear sense that the IT solutions necessary to enable the remaining

enterprise business processes may have to be architected and deployed differently. This new model must emphasize flexibility and provide tools that can be used to address more focused problems.

As part of our ongoing efforts to better understand the specific characteristics required of these systems, we recently undertook a study of customer deployments built on the Microsoft Office System platform. These customers appear to have designed solutions that deliver substantial value through the enhancement of business processes that have traditionally been beyond the reach of the IT monoliths. Unlike traditional enterprise applications such as ERP, these customers pursued a different approach to enabling business processes, emphasizing the adaptability and ease of deployment.

















## Case Studies

We found that solutions built on the Office System platform, especially those leveraging information visualization capabilities, indeed created substantial value and had a clear impact on business operations. It should be unsurprising that data and process visualization go hand in hand with business process improvements, given the historical context of BPM diagramming.

It is also less than surprising that leading enterprises are turning more to visual interfaces, especially to manage business process. Because business process is a series of steps with a defined order and time sequence, highly visual interfaces are often much more effective than using a series of words and menus. While until recently it was more expensive and complicated to build visual application interfaces, powerful visual platforms such as Microsoft Visio have now embedded XML so deeply in their DNA that it is rather straightforward to build solutions using these platforms as the visual interface.

In these cases, companies appear to generate many millions of dollars of savings by bringing improved efficiency and new levels of data visibility to processes beyond the purview of the IT monolith. We studied these solutions to draw out lessons about the requirements for the technology that will enhance the vast array of business processes that have thus far been too unique and strategic to be automated through generic enterprise systems. These case studies are presented in the appendix, and an overview of each solution is provided on the following page.

Table 1

Case Study Highlights	
<b>REI</b>	
 Profile	\$700 million outdoor gear and clothing retailer with stores in 24 states & mail order delivery.
 Situation	Dire need for additional project management capacity in the group that manages private label gear.
 Solution	Users model & optimize project plans using a tool that facilitates project collaboration & monitoring.
 Benefits	<ul style="list-style-type: none"> <li>➤ Allocate and utilize resources division wide.</li> <li>➤ Bring products to market faster by increasing efficiency and consistency.</li> <li>➤ Ability to tightly monitor and better manage projects.</li> </ul>
<b>Carrier</b>	
 Profile	World's largest manufacturer of HVAC and refrigeration equipment.
 Situation	Sub-optimal process for designing and quoting custom HVAC systems.
 Solution	Users drag and drop custom Visio shapes to create one document that guides end-to-end quoting process.
 Benefits	<ul style="list-style-type: none"> <li>➤ Employee productivity increase of 10-20% in quoting process.</li> <li>➤ Significant improvement in the accuracy of designs used for quoting.</li> <li>➤ More quickly deliver and install HVAC systems.</li> </ul>
<b>P&amp;G</b>	
 Profile	\$40 Billion international marketer of 250+ consumer products (e.g. Pampers, Tide, Crest, Folgers, etc.).
 Situation	Cumbersome approach to sharing project details & documentation of new FDA drug submissions.
 Solution	Business users with minimal training can view and publish "eBooks" using largely MS Office applications.
 Benefits	<ul style="list-style-type: none"> <li>➤ More effectively track and monitor project process.</li> <li>➤ Capture key learning and knowledge gained from each project.</li> <li>➤ More quickly submit drugs to the FDA for regulatory review.</li> </ul>
<b>Motorola CGISS</b>	
 Profile	Leading worldwide provider of integrated two-way radio communications and information solutions.
 Situation	Sub-optimal process for designing custom two-way radio communications systems.
 Solution	Users drag & drop equipment components to design solutions that comply with configuration rules.
 Benefits	<ul style="list-style-type: none"> <li>➤ Consistent system designs using the latest products..</li> <li>➤ Improved efficiency of two-way radio communications system designs.</li> <li>➤ Improved efficiency of system installations.</li> </ul>

Source: Casewriter

Several key lessons emerged from the implementations we studied. Certainly, in every case these solutions had significant impact, bringing financial benefit while strengthening strategic differentiation. What emerges as the essential characteristic of such successes is that in each case, millions of dollars in value were created without the need to undertake the massive expense and risk of a large scale IT implementation. Because these companies assembled unique solutions out of general purpose desktop components with which most users were already proficient, critical business processes were very rapidly and affordably enhanced.

## Five Themes for the Future of IT

The future of IT is concerned with enabling the vast array of critical business processes previously too unique and too varied to yield to monolithic solutions. Achieving this will require solutions that are designed to adapt easily to a wide variety of business problems, rather than forcing them to fit a generic definition of the problem.

**Adaptability is indeed crucial.** The customers at REI, Carrier, Motorola Commercial, Government and Industrial Solutions Sector (CGISS) and P&G used similar software to design unique solutions that worked for them and their specific business process problems. By drawing on a set of highly interoperable components, they were able to adapt the technology to fit their unique processes without the massive expense, risk, and time required to customize a monolithic packaged application or to build from scratch themselves. These companies first defined the business processes that would be best for the efficiency and performance of the business, without focusing on the process encoded in their software. They then built applications that were custom composites of several adaptable industry-leading software applications. By leveraging the hundreds of millions of dollars already invested in these applications by Microsoft and others, these leading companies were able to automate their complex business processes at a low cost, while retaining adaptability.

**Business process perspective is still effective.** We found that applying the business process perspective common to traditional IT automation projects can greatly enhance the performance of most business processes. Many processes in the organization have never been exposed to this rigorous review, for it has never been practical to assemble systems that would enhance them. Now, as it becomes possible to automate these processes through a new generation of flexible solutions, these processes will be reviewed and streamlined through the attention to process design. In addition, customers such as REI and P&G told us that a great deal of benefit resulted simply from the fact that process designs were made more explicit through the creation of a formal process diagram which was shared with all key participants.

This explicitness itself, coupled with a flexible IT solution, can enable changes to be made more easily than ever before. Rather than massive change management and system re-tooling efforts, using process maps to communicate process manipulation can ease both the human and technical costs of evolving business processes. Some customers, such as REI, have indeed gone even further, making their process models more than simple diagrams by linking them to the application's functionality so that their process models drive the application's behavior. In a similar way, Motorola CGISS has made their application one that continually "evolves," in that the learning from best practices is continually embedded by business users. These companies have thus approached the holy grail of software adaptability, achieving new levels of low cost flexibility by empowering business users to change the process embedded in the software to fit their needs.

**Lean, focused, simple solutions.** In each of the cases presented here, customers chose to tackle relatively small scale projects over short periods of time. This enabled them to generate faster payback and reduce risk. This is one of the benefits of building on flexible, modular solution architectures, since they enable customers to piece together solutions quickly and at low cost without having to move to generic business processes. For instance, P&G was able to implement their entire eBook solution in just a few months, while REI achieved a fairly complex implementation in just over five months. In short projects such as these, mistakes are exposed and corrected faster, with far fewer wasted resources. We have seen countless examples of large scale implementations gone awry, in which it can take years to discover that a major miscalculation has been made. Highly focused, incremental, quick payback projects avoid such fiascos.

**Information visibility is key.** Using IT to enhance business processes isn't just about automation. Indeed, experienced managers will always be central to the solution, but information technology can play a crucial role in making their decision processes more effective. Effective business process software solutions bring the right information to the right people and present it in a way that is easy to use. Once the manager's decision is made, they make it easy for him to impact the execution of the process. In each of the case studies, the customer effectively used graphics to visualize and instantly communicate data that otherwise would have been difficult to conceptualize. Yet at many Fortune 500 companies, similar applications would have been built sub-optimally using a forms based interface. The key lesson is that an improved view and understanding of the data will almost always translate into higher quality decision-making.

Best practice companies are using visual tools like Visio to "see the data" that is most critical to their business. Because a picture really is worth a thousand words (or columns of numbers), successful companies like REI and Motorola are developing visual dashboards that communicate key project information quickly and efficiently.

**Integrate with and leverage existing applications.** Business benefit from IT doesn't have to mean starting over, with all the associated costs of updating IT skill sets, retraining the business organization, and putting working infrastructure at risk. Instead, the customers in these case studies leveraged, extended and connected to existing interfaces using leading technology that both the technical and business teams were already familiar with. This minimized deployment costs and provided the best chances of success.

Perhaps just as importantly, these customer applications are able to grow along with the underlying software. As leading applications such as Visio and Access continue to add functionality, it will be simple and low cost for customers like Carrier and P&G to enhance their software with new functionality. By using standard XML interfaces, upgrading to new applications is easy and significant functionality enhancements are always just a few months away.

## Building Flexible and Focused IT Solutions

IT critics have raised essential questions about the role of today's IT solutions in the enterprise. A new model has emerged for improving enterprise performance beyond traditional IT applications, involving highly focused solutions architected to adapt easily to the company's business process challenges. If we adopt such solutions we can bring new IT benefits to the array of business processes that have heretofore remained unimproved. Doing so will require a new mindset from the IT industry, but will make good on IT's potential by providing a renewed opportunity for companies to leverage IT to further their competitive advantage.

## Appendix 1 REI Case Study

### *Business Description*

Recreational Equipment Inc. (REI) is a \$700 million outdoor gear and clothing retailer that has stores in 24 states and sells direct through the internet, telephone and a mail order catalog. They are one of the nation's largest consumer cooperatives, with more than 2 million members who receive patronage dividends equivalent to about 10% of their purchases. REI sells products made by the industry's most respected outdoor gear manufacturers, in addition to their own award-winning private label products.

### *Situation Overview*

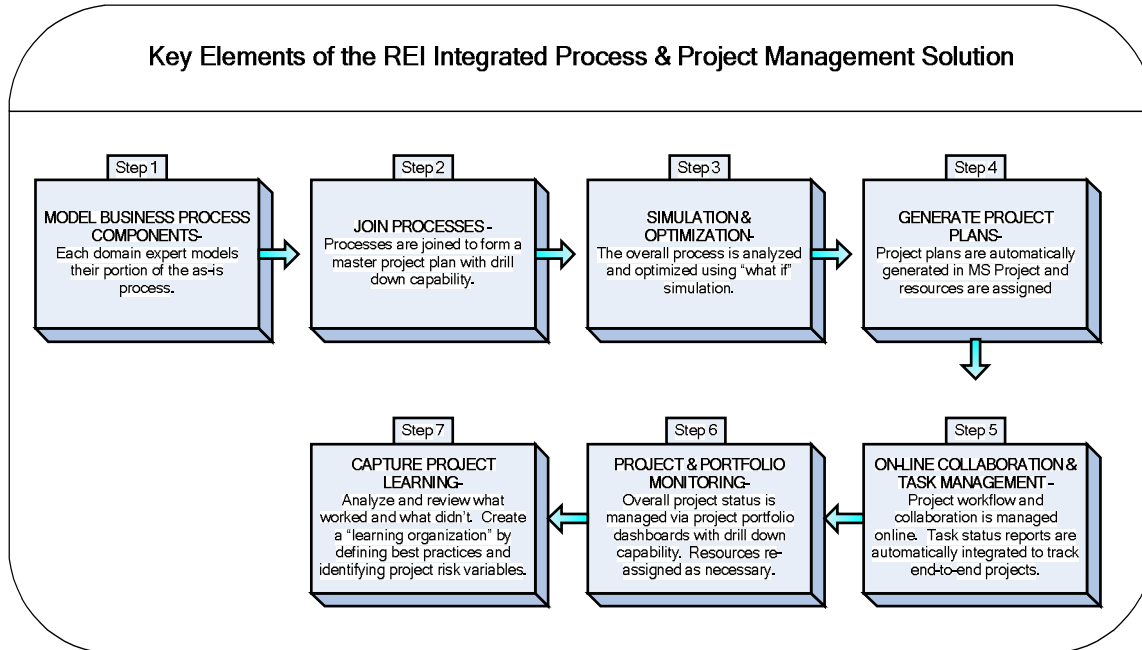
The REI Gear & Apparel division is an internal design and sourcing group tasked with developing high quality profitable products that will bear the REI brand name. This group researches product alternatives, and then designs and creates more than 600 products each year.

REI believed there was a more effective way to develop these products than the traditional approach of face-to-face meetings, conference calls, faxes and email. The project managers knew that their project plans were sub-optimal, that employees sometimes worked on overlapping tasks, and that with the right tools, division-wide resource allocation could be improved. REI executives described the project team staff as perpetually "redlining" – a term that reflects the exhausting sprints associated with managing a workload beyond the group's capacity. They believed that the right solution could make the project development process far more efficient, allowing them to dramatically increase project capacity, while reducing the pressure on the team and maintaining the company's strict quality standards.

REI executives envisioned a more integrated, analytics-based solution that would allow users to visualize project plans, diagram a project's key processes, and then optimize the product development process. They wanted users to then be able to manage and analyze the projects from initial project launch to completion, allowing all team members to view and collaborate on project details and deliverables in real time.

### *Solution Description*

REI worked with Microsoft and two Microsoft partners<sup>i</sup> to develop an integrated solution that would be deployed in five months and align all process and project management tools, tasks, data and documents. By linking **Apprentice Process Modeler**, a solution developed on the Visio platform, to other Microsoft software including Project Server and Outlook, REI was able to quickly deploy a flexible, yet robust end-to-end project management solution. This solution includes seven key elements, as illustrated in the chart below:



Source: Casewriter

1. **Model business process components:** Because multiple domain experts are required to model most processes, projects are usually initiated by asking domain experts across the organization to visually map the workflows that they are responsible for managing. Each of these experts individually maps his own component of the as-is process in detail<sup>ii</sup>, including the task and project dependency variables that will ultimately be analyzed and improved.

Using **Project Apprentice**, a customized process mapping tool that was built on top of Visio, experts can easily drag SmartShapes onto the drawing page that depict key milestones, project start/end dates, resources, dependencies, etc. Because these SmartShape symbols have been designed to ensure conformity with REI project management guidelines, each domain expert produces a standardized timeline that represents the as-is process. By leveraging this customized modeling tool, complex models that show key project interval durations and milestones become easier to map, while providing a consistent and accurate picture of project complexity and risk.

2. **Join the business process components:** After the individual domain experts across the REI Gear & Apparel division have modeled their portions of the overall product development process, business process owners can integrate or link these various process models to provide an interactive big-picture view (with very granular drill down capability) of the entire as-is process model.
3. **Simulation and optimization:** Once the complete process model has been assembled, REI process owners can experiment with to-be processes, what-if scenarios and optimize the process based on current business requirements and priorities. Project architects can easily experiment with resource assignments, estimate costs, and consider the impact of various process components running a few days late or finishing a few days early.

**Project Apprentice** includes a powerful analysis and simulation tool that domain experts and process analysts across the division use to make sure the most critical questions have been answered (e.g. “do we need to lab test this product?”) and identify opportunities to improve resource allocation and overall efficiency. Project architects and managers compare the costs, schedules, and resource allocation of multiple project approach alternatives and can almost instantly see the effect of schedule changes on resource availability, resource allocation and cost.

4. **Generating detailed project plans:** With the click of a mouse, REI resource managers import these optimized processes into Microsoft Project, where they are translated into comprehensive project plans. Once resources are assigned to each task using Outlook to view the availability of each team member, each project plan is stored on-line and kept up to date by the multiple project managers that are responsible for each product development effort.

REI is able to capture a great deal of efficiency from the ability to quickly generate optimized project timelines based on different context assumptions, and then convert these timelines into project plans with the click of a mouse. What used to take two days to accomplish using more traditional template-based solutions now takes REI project managers less than two minutes. These tools make it easy for project managers to experiment with a wide variety of project approaches and almost instantly analyze the impact of these alternative scenarios.

5. **Online collaboration & task management:** Once the initial project plan is finalized, resource and project managers can efficiently manage projects online and division-wide. REI team members communicate, collaborate, and manage workflow and documents in an online project management environment. Each user is assigned a profile, including role and security level, which is used to build a custom view and to determine which fields the user can view and edit.

Using this online collaboration tool, all the participants know that they are working with the most complete picture of the overall project. Users can view their assignments, and accept or delegate task updates from the project managers, who regularly request and receive status reports from each team member. These reports are then consolidated into one comprehensive status report that summarizes the overall project status. This approach ensures that information is shared proactively to prevent bottlenecks and mitigate risks before they impact the success of the project.

6. **Project & portfolio monitoring:** Senior managers are able to manage the entire project portfolio online and assign resources division-wide. Using customized “project dashboards”, managers can review the status of the overall portfolio<sup>iii</sup>, and drill down to whatever level of detail they require in each of the various projects. Rather than settling for optimization at the local workgroup level, they can collaborate with REI business managers to utilize resources from the entire Gear & Apparel resource pool and re-assign tasks based on overall project risk and data that describes each employee’s skill set and availability. This allows for an extremely efficient management of resources where each team member’s strength is leveraged and team energy is directed towards the highest priority work.
7. **Capture project learning:** The culmination of these steps occurs as REI Gear & Apparel experts capture the key processes from the most successful product lifecycles, further improve them, and then integrate the improved processes into new product projects. For the first time, REI has begun to track detailed results from each project (e.g. “we built in 2 weeks for lab testing this type of product, but it actually took 3 weeks to complete”). This allows REI to

learn from each experience and incorporate their cumulative knowledge into the overall product development process.

It's interesting to note that REI used the same methodology to develop the solution itself. In the first two weeks of the project, REI created extensive process maps detailing how the solution would fit together and work to make the development process more efficient. REI believes that performing this key step upfront made the aggressive five month implementation possible.

### *Key Benefits*

By visualizing, documenting, and analyzing current REI product development processes, REI is able to reduce process inefficiencies, tighten schedules, and utilize resources better while drawing from a division-wide resource pool. The solution's strong document management, resource allocation, and cross-division collaboration features, enable REI to improve project management efficiency and ensure consistency of product delivery. The solution helps REI bring products to market faster by increasing efficiency and consistency, while tightly monitoring and managing project risk. While it is too early to calculate the total value of this solution, we believe that REI will improve their bottom line by several million dollars using the project management tool set that has been deployed. Eventually, we expect REI to connect their product development processes through integration with their financial planning systems and other existing IT systems, producing even greater financial benefits.

## Appendix 4 Motorola CGISS Case Study

### *Business Description*

Motorola's Commercial, Government and Industrial Solutions Sector (CGISS) is a leading provider of integrated radio communications and information solutions, with more than 65 years of experience in meeting the mission-critical requirements of public safety, government and enterprise customers worldwide.

### *Situation Overview*

Designing and selling custom public safety two-way radio communications systems is an unusually complex and technical business. Typically a great deal of system configuration requirements and data are gathered from customers before a custom system can be designed and quoted. Designing these systems is a collaborative process with multiple team members sharing information throughout the design process.

Field systems engineers historically initiated designs for public safety systems on paper, using tools that weren't specifically designed for technical diagramming. Some others used complex computer-aided design (CAD) tools that had a steep and painful learning curve. In either case, system and equipment data was gathered and manually entered into spreadsheets or back-end systems. Cabling requirements were determined manually in a process that could lead to mistakes. Many graphic diagrams and equipment layouts were not completed until the end of the design process.

It was very challenging to integrate new products and components into the design process. In order for Motorola CGISS to design systems with its newest products, information about them had to be transferred to the field systems engineers in a systematic way.

Motorola CGISS recognized the need to reengineer the design process and to develop a solution that optimized the integration of all relevant diagrams, documents, and data. Motorola CGISS believed that this new solution would need to allow them to quickly integrate new products into system designs. They envisioned an end-to-end solution that would integrate with their back-office systems, generating system and implementation documentation directly from the system configuration, racking, and cabling diagrams.

Motorola CGISS believed that they could design an efficient, consistent method for field systems engineers to gather system configuration requirements and data from customers in order to facilitate a new level of collaboration throughout each project. They believed that this new system would improve design efficiencies and facilitate faster system deliveries.

### *Solution Description*

Motorola CGISS worked with **Apprentice Systems** and Microsoft to design an end-to-end solution that leverages general purpose desktop software such as Excel, Access, and Visio. The solution allows a system design team to quickly assemble SmartShapes that contain design knowledge, configure system equipment, and then generate racking and cabling diagrams in 2-D and 3-D views.

The Motorola CGISS system merges customer requirements, product configuration rules, and system design knowledge into an integrated, end-to-end system configuration solution used by hundreds of field systems engineers worldwide.

Some of the key components of the solution are described below and in the process diagram on the final page of this case study:

### **Equipment configuration**

Motorola CGISS field systems engineers capture customer system requirements and begin to design a customized equipment configuration. System engineers design a system by opening a visual template that contains the product shapes which contain configuration rules. These rules are specified by product experts.

Field systems engineers are able to design systems very quickly using the visual drawing tool. Motorola CGISS has designed the solution so that product configuration rules are used to automatically add accessories where appropriate. Components automatically know where and to which equipment they can connect according to the configuration rules. This improves the overall quality of the designs.

When an engineer opens a template, rules determine which components can be used in that particular system configuration. If an engineer drags a product component onto the drawing page that's incompatible with the type of system they are creating, the tool displays an error message and provides a visual cue next to the problem. Real time error messages are also triggered when an engineer tries to finish specifying a piece of equipment before all required information has been selected and the tool suggests various ways to complete the task.

The field systems engineer is also able to view different aspects of the equipment design at various levels of detail. For example, when engineers drag shapes that represent sub-systems, onto the drawing page, the tool provides a drill-down view of the sub-system.

### **System alternatives and optimization**

Once the field systems engineers have developed a diagram, they can experiment with what-if product scenarios until they determine the best equipment configuration. Designing these systems is frequently an iterative process; engineers create multiple configuration alternatives to optimize the design for their customer's unique needs. Each customer solution can be evaluated visually.

### **Quoting and order processing**

Because each of the shapes also is linked to up-to-date equipment specifications and pricing information, engineers can convert the optimized equipment configuration into accurate equipment lists. The solution is capable of downloading the data directly into Motorola CGISS' ordering systems. This process shortens the design-to-order cycle time.

### **Racking equipment and routing cables**

After a purchase order is placed, Motorola CGISS uses configuration rules to determine the physical layout of the equipment and its installation. This includes the layout of the equipment in the racks, the racks on the floor, and the routing of the cables.

**Benefits**

Motorola CGISS has captured significant productivity and quality improvements as a result of their end-to-end solution. While the benefits permeate the entire design and delivery process, three key benefits stand out as having the highest impact:

**Consistent Designs that Use Motorola CGISS’ Latest Products**

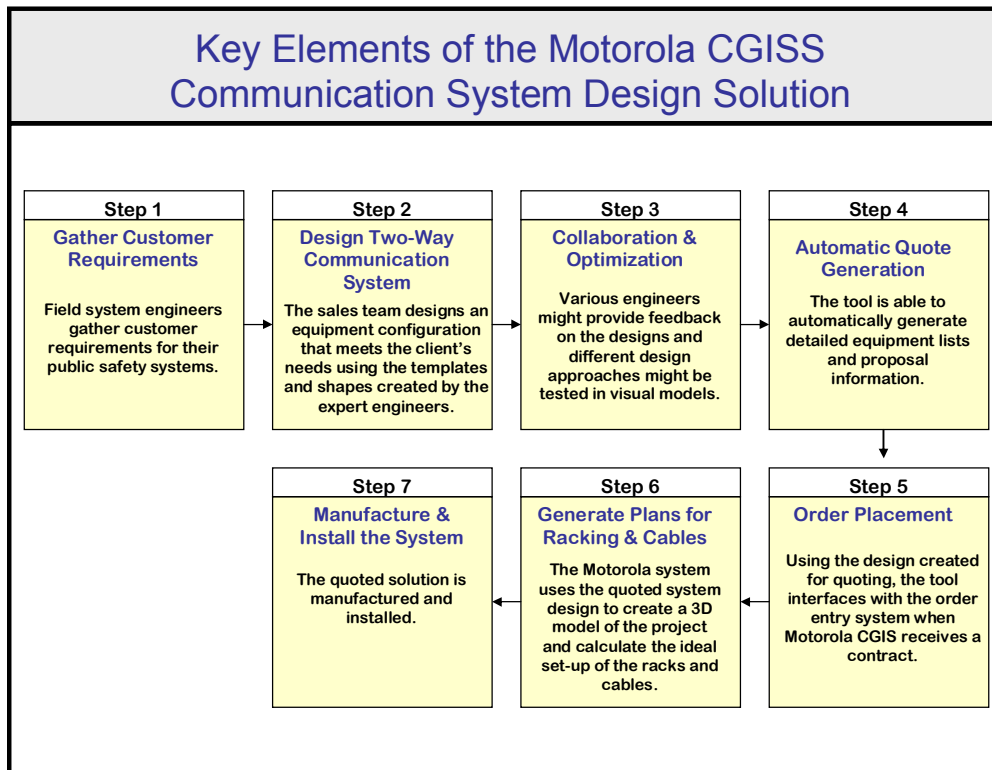
Because Motorola CGISS’ product experts regularly update the stencils and shapes that are used throughout the design process, their field systems engineers create consistent system designs that leverage current “best practices” and utilize the latest equipment components. When a piece of equipment changes, the engineers are able to incorporate updated stencils into the design tool in a timely manner, ensuring the latest products are used in customer solutions.

**Improved Efficiency of Two-way Radio Communications System Designs**

The Motorola CGISS solution ensures that systems are designed more consistently and accurately, which reduces rework and provides diagrams that help everyone understand concepts more quickly. The effective communication of system information inspires confidence and a significant increase in efficiency associated with easier diagramming and automated order input.

**Improved Efficiency of System Installations**

The Motorola CGISS solution saves field systems engineers considerable design time in optimizing the cable layout of designed solutions by calculating the most efficient cable configuration.



Source: Casewriter

## End Notes

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<sup>i</sup> REI credits two key vendors as being instrumental to the project's success - The project management methodology and approach were designed by Project Management Solutions ([www.pmsolutions.com](http://www.pmsolutions.com)) and the process modeling software and automation tools were provided by Apprentice Systems ([www.apprenticesystems.com](http://www.apprenticesystems.com)).

<sup>ii</sup> REI describes one of their most valuable early learning points coming from the benefit of having adjacent process managers work together. Discoveries of "I didn't know you did that with my work product" are leading to valuable changes in their process designs.

<sup>iii</sup> Note that dashboards occur on multiple levels, from individual participants viewing what tasks they have outstanding to the brand manager, who might want to review all projects that are currently "at risk" in the pipeline.