

# **Taming the Agile Enterprise:** Value Stream Mapping for Knowledge Work

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A Synaptus White Paper  
*Strategically Aligned, Throughput Focused, and Human Powered*

## **SUMMARY**

Value Stream Mapping is a proven and effective way to address challenges within the manufacturing environment, an environment with static processes. This article expands on that, showing ways to modify it to be compatible with the world of knowledge work, where the challenges are more dynamic, complex and fast paced.

## **TRANSFORMATIONAL TECHNOLOGY!**

The CIO in today's fast-paced, complex world has a tough job. Technology is transforming the way business works across the country, across the world, and it should also be transforming your business. At least that is what business leaders are demanding: world class automation to support strategic plans.

### **Advances in Information & Communications Technology**

"I want an online presence like Amazon" is how one marketing executive explained what he wanted. "Shouldn't our Performance Management system be reporting that?" an operations executive queried. Why don't we have an iPad app yet? These are just a few questions I have heard executives ask. They are not really questions; they are statements of expectation.

Business leaders are aware of amazing technology. Although they are learning more every day, they don't know or need to know the details. That is IT's job. Some of the technology has already been implemented in their businesses and quickly became standard. Some of it has been tried and failed. Much of it is so new that we don't know what it can really do or what problems it will solve. Much of it is hugely expensive in upfront costs, development effort and maintenance, and returns are difficult to quantify.

How do technology leaders select and implement the right technologies to support strategic plans? Carefully and thoughtfully, as it is often a big bet. And quickly! The business wants it now.

### **The Big Obstacle**

Before the right technology architecture and solutions can be selected, the technology group must understand the business model, strategy, initiatives and challenges. The problem is that business and IT speak different languages. Compounding this problem, most organizations have become knowledge-based organizations at least to some degree. This is distinctly different from industrial operations as we will discuss later.

We need an approach to "see" the knowledge-based business in operational terms that both the business and IT departments can understand. One that exposes the complexities of the business model, focuses the enterprise on the business strategy and challenges, and can be produced and updated quickly. The approach should serve as a departure point for more detailed analysis and discussion of technology solutions.

The Value Stream Map for Knowledge Work is an enterprise business analysis approach that meets these needs. Following this approach, leading organizations right now are realizing significant improvements in operational effectiveness at a much lower cost.

## **STRATEGY PLANNING CHALLENGES**

Every business wants to improve its performance in any number of areas. Most companies have an annual strategic planning session in which they set improvement goals for the year. Company 'A' wants to improve customer service. Company 'B' wishes to lower product development times to bring new products to market faster. Company 'C' would like to increase margins by improving supply chain processes. In all likelihood, these companies would like to do all these things and, perhaps, a few more. According to a 2007 survey of more than 1,500 executives and managers worldwide by the American Management Association (AMA), almost half (47.6 percent) were executing two to three strategies at the same time, and more than a quarter (26 percent) were working on four to five strategic initiatives ("Keys to Strategy Execution: A Global Study of Current Trends and Future Possibilities, 2006-2016," American Management Association, 2007).

How do we know that companies are struggling with too many operational improvement initiatives? In the same AMA study, only three percent described their companies as "very successful" at executing strategy, and over a third (35 percent) said they were "mediocre or worse" at it. In a 2007 study by The Conference Board, 769 CEOs worldwide said their biggest challenge was "excellence of execution". The third largest challenge was "keeping consistent execution of strategy by top management". ("CEO Challenges 2007: Top 10 Challenges," The Conference Board).

### **Complexity**

Businesses are becoming increasingly complex on all fronts. Customers insist on customized products and services on demand. Customers, competitors and suppliers can be found all over the world. Regulatory oversight, stakeholder expectations and other influences contribute to complexity. Your organization must provide the competencies to address all of these challenges and more. Technology is a big part of the solution but also contributes to the complexity. New solutions are required.

### **Rapid Change**

Most businesses are facing competition, rapidly changing customer preferences and new business opportunities arising from technology that mean the business has a need to improve performance. They have shorter time frames; frequently changing business context; and limited time, money and management attention to focus on working "on the business". Rapidly changing markets and technologies demand that strategy be adjusted and communicated just as fast. And rapid change leads to uncertainty and risk that must be addressed. So, it is critical that they focus on the improvement initiatives that are most likely to result in improvement in the performance of the organization.

Companies that are successfully dealing with complexity, rapid change and uncertainty are deploying some or all of the following tactics. Decision making is being pushed or pulled to where the relevant knowledge exists. Managers and performers coordinate cross functionally, even if this is informal,

instead of waiting for orders from above. Groups are self organizing instead of waiting to be re-engineered. There is no time for waiting. For any of these tactics to be effective, business leaders must do their part to adjust and communicate strategic intent quickly.

Many industrial companies have successfully used Value Stream Maps to plan and deploy strategy. How does it work for knowledge-based organizations?

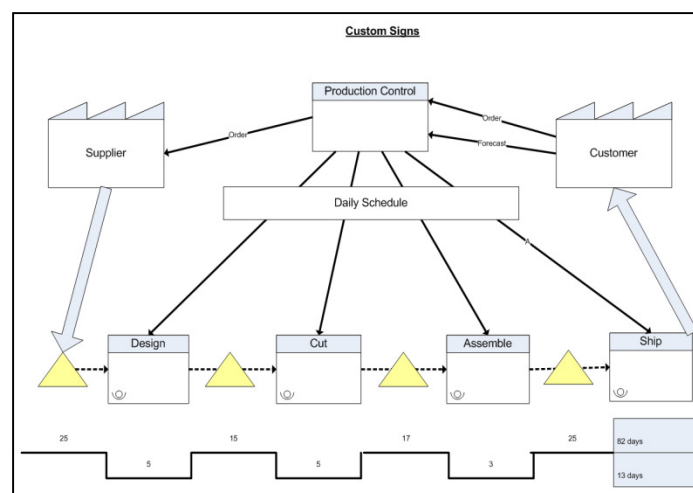
## VALUE STREAM MAPPING: THE LEAN MANUFACTURING APPROACH

Value Stream Mapping is a Lean manufacturing technique used to analyze the flow of materials and information required to bring a product or service to a consumer. Basically, it shows the sequence of steps in a repetitive process.

Producing a Value Stream Map (VSM) is a straight forward process:

1. Identify the product or service.
2. Draw a current state VSM showing current steps, delays and information flows.
3. Assess the map to identify performance gaps, constraints and waste.
4. Draw a future state map.
5. Develop a Roadmap.
6. Do it again at some point in the future.

Value Stream Mapping has significant benefits. It supports organizational learning and promotes a shared view across the business including the technology group. This is evident from the title of the book the Lean Enterprise Institute members use when they teach Value Stream Mapping, Learning to See by John Shook. The map is produced from the perspective of the customer of a product. It highlights constraints and areas for improvement and results in an improvement roadmap. The map is not one that is based on a perceived fairness but one that is focused on the best use of the company's time, money and management attention. Additionally, the VSM creates a clear context that empowers team members to improve locally in a fashion that is consistent with the larger plan.



While Value Stream Mapping is very beneficial in repetitive manufacturing work, it has significant shortcomings in knowledge work. The principles remain valid but the assumptions are not, making it the wrong approach for knowledge work. Value Stream Mapping works best with a stable, repetitive process. The approach expects repeatable actions and the ability to follow a control part to gather metrics used to identify bottlenecks. Unlike manufacturing where a process can be clearly defined, in knowledge work the workflows are dynamic and bottlenecks are transitive. Also, one increment of work will not be the same size as the next increment of work. Each increment of work will not be challenging in the same way, and the size and complexity are difficult to understand up front. Therefore, VSM process-specific metrics may not translate meaningfully to knowledge work. In fact, as valuable as VSM can be in the right situation, it may be organizationally harmful to force fit it to other types of work.

Value Stream Mapping focuses on value added activities. There are other activities that are also important, even if they cannot be strictly defined as value added, including enabling and controlling activities. And VSM does not provide a means to assess these activities in terms of risk, dependency or competitive differentiation. So, while you can find areas for removing obstacles, you won't identify the new opportunities.

Value Stream Mapping tends to focus on how work is done, not the outcomes, which can lead to "The How Trap" as described by Ric Merrifield in his book, Re-Think! For example, when a person describes his job as "checking an order against our invoice and then sending a customer an invoice for payment and then checking to see if we've received it," the fundamental purpose is not actually sending the invoice, it is billing the customer, or, even more critical to operations, it is collecting the customer payment. If the business focuses on improving the process by which it checks orders against invoices or by which it sends out invoices, it may miss opportunities to improve its collection process, which is generally more central to improving business performance.

## **BUSINESS CAPABILITY**

There is a way to "see" your activities that addresses the unique needs of knowledge work and reveals new "hows" by focusing on outcomes. The beginning of such an analysis involves identifying "the activities, capabilities, and sub-capabilities" in the business (Merrifield, Calhoun, & Stevens, 2008). This is derived first by asking the business' functional leaders to describe their operations "in terms of outcomes or fundamental purposes" (Merrifield et al., 2008).

After managers identify and define their critical activities, their next job is to describe the capabilities that support those activities. For example, at one financial services firm, we asked the managers to list the capabilities that supported the activity of selling products and services. They came up with seven capabilities that supported this activity: "manage orders, manage sales, manage immediately filled sales, configure product pricing, manage contracts, qualify prospects, and conduct business intelligence" (Merrifield et al., 2008). After the capabilities supporting an activity are identified, the next task in the business capabilities analysis is to assess the activities that are most critical to the company's success and to determine the operational health of those activities, identifying any constraints that exist.

## Prioritize with Business Lenses

This is accomplished by assessing each activity and capability through several different lenses. To rank the relative importance of these activities, and thereby the importance of improving the capabilities that support them, the analysis examines them in the light of three fundamental criteria:

1. **Business value.** Does the activity (or the capabilities that support it) provide competitive differentiation? Is it critical to why your customers patronize you or continue to patronize you? Does it drive a key metric, such as manufacturing cost, product quality or time to market?
2. **Current performance.** Is the performance of the capability excellent, inconsistent or poor relative to the competition or the company's needs? Is it a constraint? How much would it cost to improve the capability, to raise it to the required level? And would the return on the cost of the improvement justify the investment?
3. **Risk.** Some capabilities are more difficult to improve and generally have a lower return on investment than others. Capabilities that have a high level of risk involved with changing them, either because of compliance requirements; high levels of coupling to other capabilities; hindering legacy technology or a lack of predictability in performance are typically higher cost to change.

Defining a capability through these business lenses will help both the business and IT leaders understand and focus on the specific activities, the “what’s” in the business, where improvement will likely yield the greatest benefit. It is important to remember that not everything can be fixed, and certainly not all at once.

For example, Salesforce.com, the leading on-demand customer relationship management (CRM) service provider, had 10-person teams using a relatively complex sales software configuration tool for order entry and many of the team members, whose orders were getting messed up, were getting frustrated with it. To address this problem and to improve performance, Salesforce first considered investing in building a new, web-enabled \$1 million configuration tool with a more user-friendly interface that would integrate with its catalog. But through a capability analysis they conducted, Salesforce realized that a) not everyone on those teams in fact *was* having trouble with the tool, and that b) putting those people who *weren't* having trouble full-time on the configuration tool would free the rest of the teams' excellent salespeople to focus on sales, which, in contradistinction to the configuration tool, was core to Salesforce's business.

Salesforce reconfigured the teams—not the tool—in one month, at a cost of zero dollars. Subsequently, sales doubled as salespeople focused on their customers, not on the tool.

Salesforce's main problem, it turned out, was not a tool problem; it was a people problem. The solution was found by focusing on the desired outcome—good software configuration for the sales teams—not on the problem, frustration with the configuration tool.

But managers typically are reactive. They see frustrated salespeople and they see that as the problem. They want to fix *that*. And while the P&L statement by which so many companies manage their operations may tell a manager that the sales teams are having a problem, it will not reveal what that

problem is, and it certainly will not tell the manager or the business unit head where the opportunity exists to improve the organization's ability to help the customer.

## **Value Drivers**

While still focusing on the outcomes of these activities and capabilities, managers can now consider alternatives to improving performance internal to each capability. This is where we start to consider "how" advances in information and communications technology can solve business problems in a way that both business leaders and the technology group can understand.

Each capability is considered to be a blend of three key value drivers: process, technology and talent. While this is not new, capabilities provide a way to focus this analysis. Managers can begin to consider process improvement initiatives (using Six Sigma, Lean, etc.); what technologies could be deployed in terms of applications, platforms or architectures – especially Services Oriented Architecture, for which this kind of analysis is an absolutely necessary precursor (Merrifield, Ric and Stevens D., Cloud Computing: Where to start when you have already started. Microsoft Corporation, retrieved from <http://technet.microsoft.com/en-us/magazine/ff709382.aspx> on July 15, 2010); what data is needed to support the improvements (involving CRM, knowledge management and collaboration tools, among others) and what investments in training or restructuring of personnel can be made. A final critical consideration is how these value drivers work together to deliver the desired outcome.

For example, one of Harvard Pilgrim Health Care's critical activities was identifying subscribers as early as possible who were at risk for developing chronic diseases (and who would therefore place greater resource demands on the health care provider). Once it defined this activity as business critical, Harvard Pilgrim was able to recognize that it lacked the advanced data-mining and analysis technologies that the activity required, and was therefore able to make the decision to outsource the function to a provider that possessed the requisite capability. To date, this strategy has contributed to Harvard Pilgrim's turnaround (Merrifield et al., 2008).

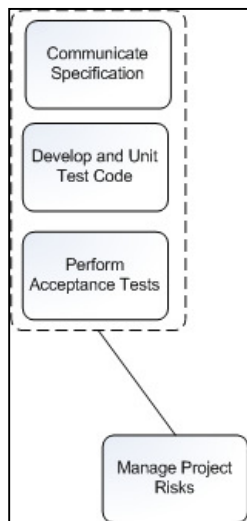
## Classify activities as value-added, supporting or controlling and draw strong relationships

Classifying activities as value-added, supporting or controlling helps you identify where to improve. Not every activity in the company contributes directly. Those activities that do contribute directly to producing what the customer pays for are the value creating capabilities. In a software product development company, these would include discovering customer needs, defining the requirements, developing and testing the application, implementing the application and providing customer support. We include billing and collections in the value creating capabilities.

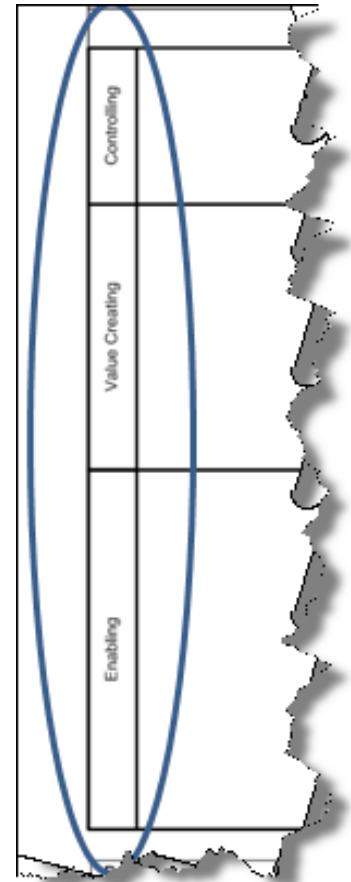
Enabling capabilities are those that help the business perform the value creating capabilities. These might include legal, service provider management, architecture, project management, HR, training and Information and Communication Technology support. All of these are necessary to support the business, but aren't what customers pay the company for. Controlling capabilities are those that set policy, provide governance or measure performance.

The value creating capabilities can typically be placed left to right in a timeline association. Then the enabling and controlling can be associated

with the value-creating capabilities by placing them in the appropriate row. This segmentation helps focus where to improve and to define the goal of any improvement. The goal of improving is get to better at producing value for the customer. So, an improvement in value-creating capability will achieve this directly. You wouldn't improve an enabling or a controlling capability for its own sake; improvements there should result in a related improvement in a value-creating capability.



Showing relationships in VSM-KM is less structured than manufacturing VSM. Capabilities that are performed in tandem or that are interdependent can be grouped together within a dashed box. There is no indication of order because in knowledge work a work item often moves between several capabilities in an undetermined fashion. A solid line between capabilities shows a strong influencing relationship between those capabilities. These relationships are important. They support exploring root cause of a performance gap and also help to understand potential unintended consequences in making a change in a capability.



## BUSINESS CAPABILITY HEAT MAP

Just understanding your capabilities is a good start. However, it is not always enough if we are analyzing a complex environment. We must understand how these discrete capabilities work together. After all, it is the business system that produces value, not the individual activities. Edwards Deming described such a system in The New Economics for Industry, Government, Education. “A system is a network of interdependent components that work together to accomplish the aim of the system.”

Once the business capabilities are defined, the company’s managers can proceed to create a “diagram that lays out all the firm’s activities and identifies those that are critical and those whose capabilities need to be improved” (Merrifield et al., 2008). Improvement can be through acquisition, reengineering, investments in technology, people or by outsourcing, as was the case with Harvard Pilgrim. This diagram, called a “business capability heat map”, enables companies to focus first on those capabilities that are a) most critical to business performance, i.e., those that provide the greatest enterprise value; and b) performing most poorly, while addressing the complexities of the organization.

The Capability Heat Map is a Value Stream Map for Knowledge Work. It shows the components, the dependencies and the aim on one diagram. It is intuitive and requires very little explanation to understand.

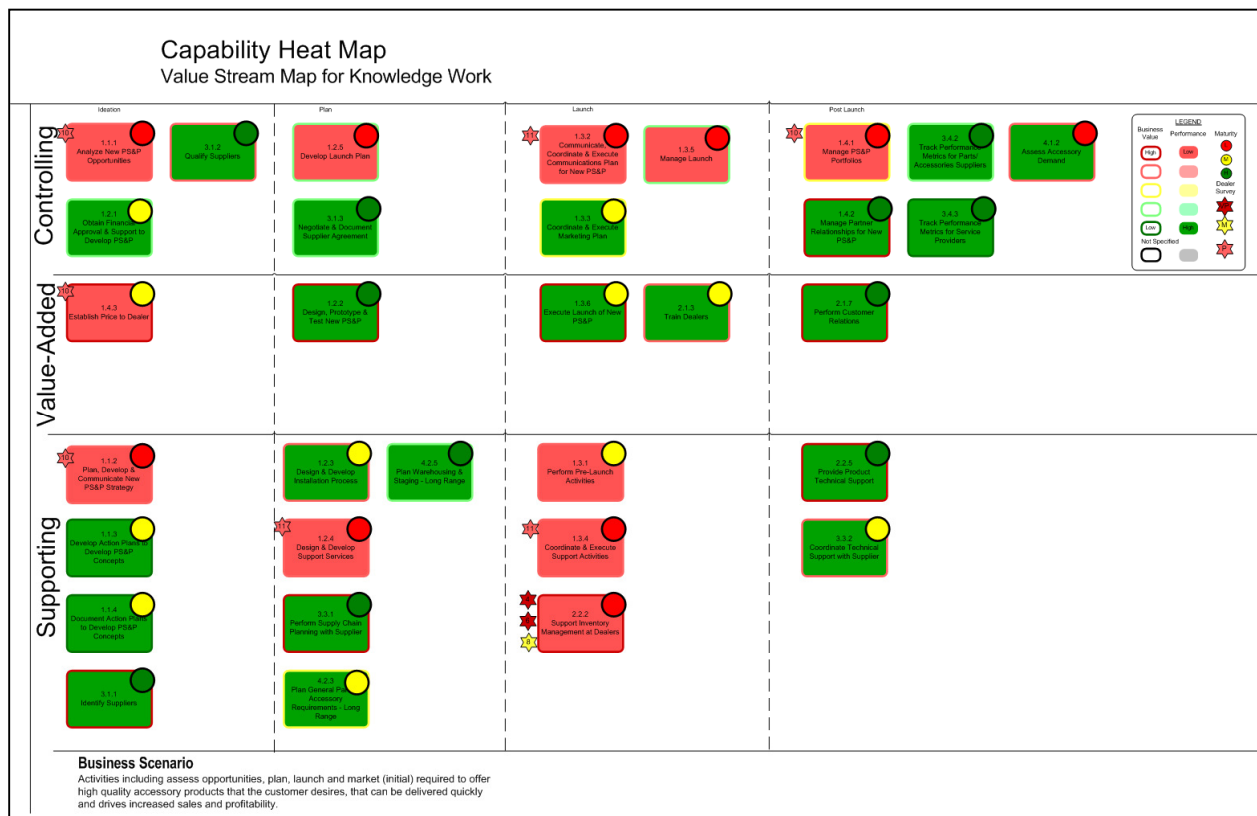
### Putting it Together

After identifying the product or service, follow these four steps:

1. **Describe your activities in terms of desired outcomes.** Resist the temptation to describe your operations in terms of the work people do (“We send customer invoices requesting on-time payment”) or how they do it (“We check orders against our invoices”). This leads to a long list of tasks. Instead, describe operations in terms of desired outcomes, such as “Collect Customer Payment”.
2. **Classify activities as value-added, supporting or controlling.** Supporting and enabling activities are not value added but are necessary to support value added activities. “Train Employees” is a necessary supporting activity to most value added activities. Controlling activities provide guidance and oversight for value added activities. “Manage Service Orders” or “Communicate Performance Metrics” serve a controlling purpose.
3. **Draw strong relationships.** Most activities are inter-related, some more strongly than others. Group activities that are most strongly related. Show other moderate or strong relationships with lines.
4. **Apply business lenses.** Analyze each activity and apply heat-map colors (red, yellow, green with red indicating most interesting) to visualize the relative results. Business value is represented by the border color, Performance by the fill color, and Risk by a small “dot” icon. For example, an activity that is most interesting, that is high business value and low performing will have a red border and fill.

Sometimes, a company develops a terrific new product and then wonders why it is not returning the value predicted for it. For example, John Deere acquired a unique technology, a camera that would sit

on a wing of an airplane and, using GPS, would determine the height and density of a field’s vegetation as the plane flew over it. The data from the camera would then be fed into a program that would provide a prescription for how to improve the field’s productivity: what nutrients it needed, how much water, etc. This program would feed information to the boom on the Deere tractor, telling it to apply the prescription, resulting in higher yield for the farmer at a lower cost. However, the deployment of the technology proved problematic. Deere spent a lot of time, energy and money trying to deploy this technology on airplanes that were located near the farmers’ fields. Additionally, getting the data from the airplane to the program that processed it involved manual transfers from the camera to a server at the airport and then to a server in Deere’s data center. Finally, Deere lacked an adequately robust order-taking process for the product. With Synaptus’ help, Deere examined what capabilities it already possessed and what capabilities it needed to build or acquire to reap the value of this new product. Deere was able to leverage existing capabilities to establish its order-taking process. But more importantly, Deere was able to change the overly complex process of capturing the data that involved mounting equipment on an airplane and supporting servers in remote airfields. The company identified a much simpler way to accomplish the “what”: put the cameras on the tractors that already drove the fields.



## AGILE ENTERPRISE ANALYSIS

The Value Stream Mapping for Knowledge Work (VSM-KW) provides an informative picture of the “network of interdependent components that work together to accomplish the aim of the system.” (The

New Economics for Industry, Government, Education, W. Edwards Deming, 2000) Recall from earlier that complexity is a primary strategic planning challenge. The exercise of developing the VSM-KW helps organizations “see” the complexities of their business and where they must focus to effectively deploy their strategy. This contributes significantly to strategic alignment and forming a common understanding of the business system. While understanding the challenge is valuable in itself, business leaders still have to “manage the system”. There remains the hard work of developing business solutions in a rapidly changing environment. Lean-Agile thinking provides some guidance here.

## **Collaboration and Feedback**

The VSM-KW facilitates collaboration and feedback to discuss complexity within the business. IT leaders now have a way to discuss specifically “what” the business does, the business value of each capability and performance gaps. This is no longer a vague discussion but now becomes focused conversations about the most important challenges the business faces and how IT can help. One senior executive explained the benefit this way, “A big benefit of adding VSM-KM to our PMO is that IT discussions are no longer solely focused on fixing some perceived technology problem – they are talking about how to improve how their job helps the deliver value to the customer.”

## **Responding to Change**

To improve business performance, there will be a relatively small subset of capabilities in the value stream that require performance improvement, those underperforming capabilities associated with high business value activities. And more often than not, the enabling or supporting capabilities turn out to be the biggest causes of underperformance. The business must get better results for these.

To be clear, we are not suggesting that nothing should be done with the other areas of the business, just that this critical subset of capabilities should get first priority of resources and attention. Many others, if not most, are lower business value capabilities and performing adequately. These are targets for efficiency improvement. This is an important distinction, whether our objective is to perform better or more efficiently for any specific capability.

Iterative and incremental development (IID) will help businesses respond to change. Address this small subset of underperforming capabilities incrementally. Start and finish them before starting on others. We recommend 100-day projects. How much can be accomplished within a 100-day period to improve performance? The business should realize benefit within this timeframe. Re-evaluate whether this is still the next most important thing to work on. The objective is not to be great at any specific activity but to identify and address the next constraint to make the entire business system perform.

Limiting WIP, or projects (work) in progress, works hand in hand with IID to support responsiveness. By focusing on fewer projects at any given time, the organization will deliver higher quality solutions more quickly. Of course, both of these can be organizationally challenging. IT must earn the trust of the business that it will deliver increments of high quality solutions quickly and start on the next challenge promptly. Despite the challenges, these approaches are necessary to be responsive, and VSM-KW supports both.

## Iterative and Incremental Development

Iterative and Incremental Development (IID) is an approach to development that supports quickly delivering value and integrating feedback into the product as it emerges. This is particularly valuable in software product development where it is difficult, if not impossible, to articulate exactly what is needed to achieve a specific outcome on the front end of an effort.

Incremental development is a staging and scheduling strategy where various parts of the system are developed at different times or rates, and are integrated as they are completed. You can do this in a waterfall project or an iterative project. The alternative to incremental development is to develop the entire system with a “big bang” integration.

In iterative development the team iterates, or goes back over parts of the system, to revise and improve the system. In iterative development, testing and/or user feedback is used to revise the targets of the successive deliverables. The practice of iterations arises from a desire to coordinate feedback from increments with revising a future deliverable.

A Brief History of Iterative and Incremental Development:

1957: Gerald Weinberg runs a project at IBM using IID practices.

1960: Gerald Weinberg starts teaching IID at the IBM’s Research Institute.

1969: Robert Glass published a paper on current practices in IID in ACM Computing Surveys.

1975: Vic Gasill and Albert Turner publish “Iterative Enhancement: A Practical Technique for Software Development in IEEE Transactions on Software Engineering”.

1980: Gerald Weinberg publishes “Adaptive Programming: The New Religion”.

1984: Tom Gilb recommends two-week iterations as a best practice.

1985: Barry Boehm promotes the spiral model – using risk as the key prioritization method.

1986: Fred Brooks publishes “No Silver Bullet”, which articulates the benefits of IID over waterfall.

1988: Tom Gilb publishes “Principles of Software Engineering Management”, showing an evolutionary approach to development.

1990s: Scrum, DSDM, RUP, XP and FDD all become mature practices.

It is just in this decade, fueled by improved development tools, lower cost computing and network and in response to pressure to rapidly deliver solutions with a high level of unknowns that IID, in the form of Agile methods, has become commonplace.

For example, a large U.S. distribution company was charged by its main supplier with improving retailer and customer satisfaction. The capabilities analysis identified about 20 activities and 140 supporting capabilities in the business as a whole and matched them to business value, current performance and risk. After being plotted on the VSM-KM to target priorities, the company identified three capabilities that it had to improve or fix immediately to meet the supplier's mandate: order fulfillment, so distributors would receive the right product at the right time; marketing collateral, so that retailers could more effectively sell the product; and sales tracking, so that retailers would be able to identify good and poor product performance quickly and respond appropriately (Merrifield et al., 2008).

Through the capabilities analysis, three solutions presented themselves. Improving order fulfillment involved training the retailers on the existing and relevant technology. Better product tracking involved increased automation to replace manual processes. In the marketing support area, the company invested in software to support improved distribution of marketing material to the retailers.

There were other process improvements that the distributor needed to address. However, the map showed that these were the ones that would provide the greatest immediate value, and at the same time were the easiest and least costly (relative to the expected return) to fix. Subsequent to the analysis and the implementation of the improvements, the distributor's customer satisfaction increased significantly.

## **Innovation**

The VSM-KW serves as a stable business architecture that enables innovation on a number of fronts. It has been used to develop technology architecture in support of SOA initiatives as described in "The Next Revolution in Productivity". Because of the effective strategic dialog, technology leaders can better develop and communicate their technology strategy to support the business' strategic vision.

## **Rethink with Capabilities**

To boil it down, the approach to performing this kind of business capability analysis includes:

- a description of those capabilities that support a company's key, value-creating business activities;
- an understanding of which ones add the most value to customers;
- the discovery of performance gaps and the constraints on the process and;
- the identification of the levers needed to address those constraints, whether that means IT, process improvements, people, etc.

Following that breakdown, the company must ask itself these questions about the business drivers:

- What is the profit potential of improving the identified capability?
- How good does a particular capability need to be? (For example, payroll or janitorial services only need to be so good and improving them would not significantly impact the bottom line.)
- How hard (or expensive) would it be to execute the improvement? (For example, how inflexible is the company's outsourcing contracts? Are there regulatory or compliance barriers that would make change more difficult and expensive to achieve?)