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BEYOND THE MOMENT: THE KEY TO RENEWABLE COMPETITIVE ADVANTAGE

Robert E. Boykin III and Peter A. Zampino
Consortium For Advanced Mfg-International
3301 Airport Freeway Suite 324
Bedford TX 76021-6032

Robert C. Graham and Andrew D. Fraser
Rochester Institute of Technology
Center for Integrated Manufacturing Studies
111 Lomb Memorial Drive
Rochester NY 14623

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Paul Bentley

CAPT. PAUL BENTLEY, USAF
Project Engineer
Design & Production Methods Branch
Mfg. & Engineering Systems Division

Michael F. Hitchcock

MICHAEL F. HITCHCOCK
Chief
Design & Production Methods Branch
Mfg. & Engineering Systems Division

Gerald Shumaker

GERALD SHUMAKER, Chief
Mfg. & Engineering Systems Division
Manufacturing Technology Directorate

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6. AUTHOR(S)

Robert E. Boykin III, Peter A. Zampino - Consortium for Advanced Manufacturing - International; Robert C. Graham, Andrew D. Fraser - Rochester Institute of Technology, Center for Integrated Manufacturing Studies.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Consortium for Advanced Manufacturing-International
3301 Airport Freeway Ste 324
Bedford TX 76013-6032

Rochester Inst of Tech
Center for Integrated Mfg Studies
111 Lomb Memorial Drive
Rochester NY 14623

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13. ABSTRACT

In 1995 the Consortium for Advanced Manufacturing - International (CAM-I) was awarded an Agile Manufacturing project to develop and validate Qualification Criteria for Agile Enterprises (QCAE). The QCAE project involved a partnership between CAM-I and its industrial members, the Rochester Institute of Technology (RIT), the Oak Ridge Centers for Manufacturing Technology (ORCMT), and several federal agencies to address the critical challenges of identifying, selecting, and qualifying suppliers. The leveraging of industrial and federal funds, combined with active industrial participation, established an open and cooperative environment for experience sharing and developmental work. This report builds upon understanding and knowledge gained from the observations, findings, and results of the QCAE project.

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1. Acknowledgments

The breakthrough developments of the Consortium for Advanced Manufacturing - International (CAM-I) Strategic Supply Chain Program (SSCM) - Qualification Criteria for Agile Enterprise (QCAE) Project could not have been accomplished without a strong, mutually beneficial partnership between the CAM-I industrial members, the Department of Defense - Advanced Research Projects Agency (DARPA), the United States Air Force - Wright Patterson Laboratories, and the Center for Integrated Manufacturing Studies (CIMS) at the Rochester Institute of Technology (RIT). The significant contributions made by these organizations exemplify the value of cooperative development.

There are numerous individuals from these organizations who provided the support that made the achievements of the project possible. Corporations contributing to the findings and results of this report include:

Amoco Corp.
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Dr. Mike McGrath	Department of Defense - Executive Director of Manufacturing Defense Advanced Research Projects Agency (now serving as Assistant Deputy of the Under-Secretary of Defense for Commercial Programs)
Michael Hitchcock	Chief Design and Production Methods Branch, Air Force Manufacturing Technology Directorate
Capt. Paul Bentley	Air Force Manufacturing Technology Directorate
Dr. Karen J. Richter	Institute for Defense Analysis

The Qualification Criteria for Agile Enterprises Project represents a model of cooperation by industry and federal resources. This alignment of needs and requirements has enabled accelerated development of solutions necessary for both the commercial and defense industrial sectors to achieve competitive advantage, reduce total product costs, and reduce time-to-market of products.

The CAM-I project management team wishes to express special gratitude for the energy and dedication of these organizations and individuals that helped achieve the results detailed in this report.

2. Foreword

The Consortium for Advanced Manufacturing - International (CAM-I) is an international not-for-profit, industrial-led, industrial-driven organization dedicated to conducting pre-competitive development and deployment of critical business practice understanding and advanced enabling technologies. CAM-I provides a unique forum that brings together leading thinkers, visionaries within the manufacturing industry, and recognized academic institutions to address and resolve challenges to global manufacturing competitiveness.

In 1992, CAM-I, addressing member requirements, launched the Quality Customer/Quality Supplier (QC/QS) Program. CAM-I member companies recognized early the critical importance of the supply chain to the health and competitiveness of organizations. QC/QS was founded on the premise that to have *quality suppliers*, organizations must first be *quality customers*. Early QC/QS development activities focused on benchmarking those companies recognized as having "best practices" in customer/supplier relations and concentrated on the original equipment manufacturer (OEM) and first-tier suppliers. These best practices included supplier qualification criteria, sourcing strategies, electronic data exchange, logistics, procurement training, relationship building, and audit procedures.

The key observation that resulted from the QC/QS exploration was that the supply chain represented a tremendous potential for improvement opportunities in cost, time, quality, and customer satisfaction.

Other significant findings of the QC/QS Program development activities included:

- There was no generally accepted supply chain model for industry to follow.
- Getting past traditional adversarial customer/supplier relationships was not easily accomplished.
- Management awareness and focus on the supply chain was very low.
- The procurement function was not viewed as strategic.
- Many companies believe that they have made great improvements in the supply chain when in reality little had been done.

Based on the deliverables resulting from the QC/QS Program, the focus of the program changed. In 1995, the QC/QS Program was re-named the Strategic Supply Chain Management (SSCM) Program. The program was chartered with several new objectives:

- Define a common industrial view of the "supplier value chain."
- Elevate supply chain management to a top management issue.
- Develop a SSCM framework and SSCM process model to optimize the contribution of the supply chain.
- Create an environment within the SSCM Program and its members to share experiences, knowledge, and developmental work.

During 1995, the CAM-I SSCM Program was recognized for its efforts by the U.S. Department of Defense Advanced Research Projects Agency (DARPA) and was awarded an Agile Manufacturing Project to develop and validate Qualification Criteria for Agile Enterprises (QCAE). The QCAE Project involved a partnership between CAM-I and its industrial members, the Rochester Institute of Technology (RIT), the Oak Ridge Centers for Manufacturing Technology (ORCMT), and several federal agencies to address the critical challenges of identifying, selecting, and qualifying suppliers. The leveraging of industrial and federal funds, combined with active industrial participation, established an open and cooperative environment for experience sharing and developmental work.

This report builds upon understanding and knowledge gained from the observations, findings, and results of the QCAE Project and the CAM-I SSCM Program.

3. Prologue

Key Messages

- Market forces necessitate a better utilization of the resources contained within supply chains.
- Leading companies have been developing new practices for several years.
- Opportunity realization, current and future based, can be dramatically improved by using the supply chain.

3.1. *The Challenge of the 90s*

1. Customers and suppliers are reevaluating supply chain effectiveness.
2. Market forces demand higher value products with shorter lead times.
3. Markets of all nations are combining into a single global economy.
4. The rapid transfer of technology makes every company and economic region a potential direct competitor.

3.2. *Existing Conditions 1989-1992*

Most suppliers believed they were not treated as valued members of their supply chains, but subserviently, as necessary burdens. Messages were handed down the chain at almost every level that read, "If performance does not improve or meet our standards we can always find another supplier." Research into supply chains at this time yielded the following observations:

1. The collective ability of supply chains was basically untapped.
2. Supply chain optimization initiatives were fragmented, unstructured, and not integrated.
3. Competitive emphasis was rapidly changing from cost to quality to speed.
4. Make and buy decisions did not reflect total cost analysis.
5. Supplier-to-Customer communications were beginning to expand outside normal purchasing channels.

3.3. *CAM-I Members Developed the QC/QS Program in 1992*

During 1992, program members launched the QC/QS Program. CAM-I's customer members recognized that customer-supplier relationships needed to improve significantly and that suppliers have a critical impact on the cost, quality, and time-to-market of products and services. The QC/QS Program focused its work on the ideas that:

1. You must be a good customer to have good suppliers.
2. Two-way communications and two-way improvement initiatives are critical.
3. The supply chain contains critical knowledge resources and could be used to provide competitive advantage.

3.4. *SSCM Program Is Formed in 1995*

Early in 1995, CAM-I reconvened several of the companies that participated in the QC/QS Program along with others representing a diversity of industry sectors. The program name selected by members was the Strategic Supply Chain Management (SSCM) Program. The members soon developed a consensus around several major areas that required more analysis.

1. Supply chain management, as a critical business practice, needed to be elevated to the highest leadership level of every company.
2. Relationships between members of the supply chain had to evolve to the level of "partners achieving joint missions."
3. The supply chain members needed to act as a single organism.
4. The definition of compatibility was broadened from person-to-person relationships to include the compatibility of business and technical systems.

The SSCM Program was significantly leveraged and improved through the QCAE Project. The rest of this report reflects the compilation of efforts between the SSCM work and the QCAE Project.

3.5. *Industry's Response*

Many organizations embraced supply chain initiatives during the 1990s. The list below represents some of the many actions that companies are taking to develop new practices and processes that begin integrating the supply chain. Most of these actions represent critical components of supply chain management, the power of which becomes obvious when framed within a strategic context. Using the initiatives in the list below as a reference point, the SSCM program developed the Extended Enterprise Framework.

- Appointing Chief Supply Chain Officers
- Increase computer-to-computer interactions to reduce resource requirements and potential for errors
- Customers providing more on-site assistance to suppliers, especially shared training
- Developing more longer-term agreements
- Engaging in more co-development alliances
- Providing more value to companies through higher-level EDI links
- Simplifying and standardizing business systems
- Increasing early supplier involvement in product design
- More interaction with lower-tier suppliers by major OEMs
- More orders and payments managed at point of use
- Restructuring organizations around the resource acquisition processes
- More senior management involvement in activities and processes of supply chain
- More shared training programs
- More sharing of capital expansion costs
- More sharing of data, information, and knowledge
- More supplier-managed inventory
- More synchronization of member strategies

- More use of higher-level costing techniques such as target costing
- More use of third-party logistics managers
- Introducing performance measurement systems at all levels
- Proliferation of performance-based reward systems
- More products and functions are requiring process capability
- Purchasing function is becoming more integrated with manufacturing operations
- Reducing cycle times
- Requiring ISO certification
- Shared scheduling systems are more common
- Sharing benchmarking visits and information
- Smaller companies forming manufacturing networks
- Supplier relationship managers are being assigned
- Suppliers and customers are co-locating personnel
- Suppliers doing more design-and-build
- Supply-base rationalization and reduction

The remainder of this report will expand the details of the Extended Enterprise Framework and its applications.

4. Making the Case

Key Messages

- Supply chain optimization can dramatically impact an organization's bottom line.
- Adversarial supply chains must be converted to team relationships.
- The Extended Enterprise is a new business model.
- Core competencies are the key drivers for Extended Enterprise membership.
- Significant changes are required in organizational attitude, structure, and behavior.

4.1. *Renewing Competitiveness*

Most organizations understand the importance of suppliers. However, many critically misunderstand and underestimate the untapped knowledge and resources that reside within suppliers. Organizations reinventing their supply chain strategies and processes are recognizing higher margins, lower costs, faster product realization cycle times, higher quality, improved customer satisfaction, and dramatic improvement in competitive position. Improving the performance of the organization's supply community represents the most substantial improvement initiative an organization may embrace.

4.2. *Rethinking Traditional Approaches*

Traditional approaches to supply chain management have created an adversarial relationship in which suppliers have been pitted against each other to provide the lowest cost bid. More progressive organizations realize that the lowest bids seldom result in the lowest total cost when quality and supplier support costs are considered.

Recent experience has led many organizations to realize that total supply chain performance must be understood and managed. It is imperative that organizations understand the contributions of supply chain members and create an environment that leverages and optimizes the resources that exist within the supply community. Each supply chain member has a unique set of abilities and resources that can significantly contribute competitive advantage.

4.3. *A New Business Approach*

A new business philosophy has emerged which recognizes the critical importance of supply chain members. The Extended Enterprise concept views the entire network of organizations that combine to deliver products and services as a collective team. In most cases, the team is led by a market maker (e.g., an OEM) that identifies and assembles various organizations to provide specific value-added activities that result in delivered products and services. The members of the Extended Enterprise function as a unique system of collective competencies and resources with a strong focus on the customer.

4.4. *Alignment and Synergy*

The objective of the Extended Enterprise Model is to develop an environment where all members operate as a single entity with a single purpose to create value for its customers. This alignment of purpose creates synergies within the Extended Enterprise and opens opportunities for cost reduction, investment leveraging, cycle time reduction, and knowledge sharing, all of which can contribute to customer satisfaction.

Companies embracing the Extended Enterprise Model are creating newly found competitive advantage and are highly visible because of improved bottom-line performance. Companies such as Chrysler, Xerox, Caterpillar, and Motorola have created a management approach to optimize the performance of their Extended Enterprises and are reaping the benefits.

These highly successful companies have not shifted management philosophies overnight. The migration path to an Extended Enterprise management approach has been a continuous learning experience. The Extended Enterprise Model requires substantial changes to organizational attitude, structure, and behavior. It requires organizations to adopt a view of collective competition and requires companies to view Extended Enterprise members as strategic and critical to total performance.

4.5. *The New Organizational Style*

Organizations that move to the Extended Enterprise Model have identified the core competencies on which they will focus, and they understand the competencies of each enterprise member. This competency identification is the basis by which each Extended Enterprise member chooses or solicits Extended Enterprise membership.

Companies that adopt the Extended Enterprise approach elevate external resource acquisition to a strategic level. The business planning process must specifically identify internal and external resource requirements and plans. The business plan must specify what resources will be provided internally and which will be acquired through Extended Enterprise membership.

4.6. *Benefits*

Delivered Value

Profit contribution is the critical success metric for all members of the Extended Enterprise. Companies will only deliver maximum value to customers by receiving maximum value from supply partners. As enterprise resources are employed within the Extended Enterprise, total costs and cycle time will decrease, and profit margins and customer satisfaction will increase. Any single company will find it very difficult to compete against competitively-aligned Extended Enterprises.

Concurrency

Concurrent development of both processes and products are driving exponential improvement in responsiveness and resource allocation. Organizations achieving these improvements understand the power of sharing required knowledge to develop effective decision support systems. Each

member must not only be the lowest cost or most efficient producer, but must also contribute to the design and development of new products and markets. This is the highest form of integration and will help reduce costs and cycle times throughout the Extended Enterprise. The concurrency of Extended Enterprise processes can help members rapidly identify and develop new markets and opportunities.

Speed

The ability to accept, commit, and deliver orders quickly, to schedule manufacture-to-order production, and to closely coordinate delivery schedules creates a competitive advantage for Extended Enterprises. This is rapidly becoming as important as cost and quality in the minds of the buyer, especially in markets where the customer is assuming more power. Those companies that develop core competencies in teaming and integrated performance have recognized significant bottom-line improvements and compete on a new level.

Reduced costs of inventory

Visibility of enterprise-wide inventory helps reduce the high cost of maintaining physical inventories at highly dispersed distribution sites. With enterprise-wide inventory visibility, companies can rely on virtual inventories and handle remote inventory requirements from a central inventory.

Reduced costs of materials

Materials are significant costs in the life cycle of a product. The focus during the 1970s on labor reduction, during the 1980s on quality improvements, and during the 1990s on business processes have for the most part overlooked the tremendous opportunities in the supply chain. A well integrated Extended Enterprise will have a range of options available to improve performance in many areas.

4.7. *The New Challenge*

To successfully implement the Extended Enterprise Model, internal and external resources must be brought together in a seamless integration of knowledge and improvement. Management must think and act in terms of win-win scenarios within the Extended Enterprise. New relationships among Extended Enterprise members must be established and nourished. New metrics must be established and utilized to guide the performance of the Extended Enterprise as a whole. These metrics focus on the following fundamental requirements:

- Alignment of vision or purpose
- Compatibility of culture and values
- Trust
- Effective and efficient communications
- Shared risks and rewards
- Constant improvement

5. The Extended Enterprise

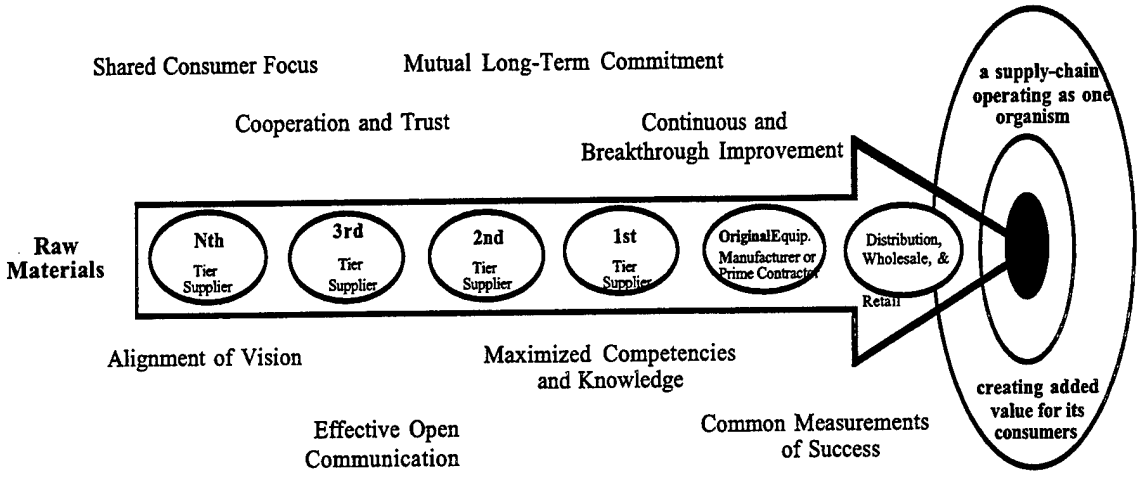
Key Messages

- The keys to rapid time-to-market, cost optimization, and higher quality reside in the members of an Extended Enterprise.
- Each member of the Extended Enterprise adds a specific unit value to the product or service being produced.
- Leveraging knowledge and capacity across the entire Extended Enterprise is fundamental to competitive success.
- Competitiveness extends throughout the Extended Enterprise.
- New types of organizational linkages are being developed.

5.1. *Introduction*

The Extended Enterprise is the network of firms that creates value for its customers by developing, producing, selling, servicing, and recycling products and services as an integrated system. Figure 5.1 provides a view of the Extended Enterprise concept.

Figure 5-1 Extended Enterprise Model



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This concept is based on the view that significant resources and value are added by each member of the supply community that participates in a company's product realization process. The Extended Enterprise concept is a management approach that directs and integrates a network of firms to provide added value. It requires participating firms to act as a value creating system rather than individual links. It requires a shared customer focus, a synergy of resources, open communications, cooperation and trust, knowledge sharing, and an understanding that all members mutually benefit from participation within the Extended Enterprise.

5.2. *Relationships*

Conventional approaches to supply chain management have primarily focused on first-tier suppliers. There have usually been strong links between market makers (e.g., OEMs) and first-tier suppliers. However, lower-tier levels have often been considered inconsequential. Suppliers have often been viewed as second class citizens. The OEM's in-house capabilities and knowledge have been considered of critical importance while supplier contributions have often been ignored.

Lower-tier suppliers become much more important to the Extended Enterprise because an Extended Enterprise selects and incorporates members based on core competencies, corporate culture, and customer focus alignment. The Extended Enterprise optimizes the knowledge and resources resident within each enterprise member to produce the highest value for its customers. Members are not selected strictly on cost structure, but rather on specific competencies and on the ability to act as part of a system.

5.3. *Leveraging Joint Contributions*

Successful organizations recognize that product realization involves numerous interrelated value-added activities by each member of the Extended Enterprise. These activities must be coordinated as part of a single effort to optimize the performance and execution of the product realization process. Each member contributes knowledge and capacity resources and assets that add value to the products and services being produced. The principles and practices represented in the Extended Enterprise Framework align these contributions to build synergistically on the core expertise of each member. While each organization is expected to pursue their individual strategic goals, this carefully managed collaboration combines the expertise of each member to satisfy the customers of the Extended Enterprise.

5.4. *Leveraging Core Competencies*

Driven by the increasing range of core competencies needed to develop products and services in the rapidly changing, global economic environment, the ability to leverage knowledge and capacity across the entire Extended Enterprise is fundamental to competitive success. The collective resources and assets of an Extended Enterprise can distribute and assume a greater total risk than that of any single organization. No organization can be expected to be competitively competent in all processes necessary to meet consumer product requirements and demand. Leveraging is essential and fiscally advantageous.

5.5. *New Types of Organizations*

The relationship linkages in an Extended Enterprise may be compared to the bonds found in a molecular structure. An example reflecting the interdependencies and complexity of relationships found among the members of the Extended Enterprise is shown in figure 5-2. Depicted are the supporting supplier members (S1, S2, S3) connected to the prime manufacturer (EE1) of the Extended Enterprise. These lower-tier members may, in turn, support one or more of the higher-

tier members, depending on sub-component or service need. These members also may occupy positions in other tiers.

Figure 5-2 Extended Enterprise Relationships

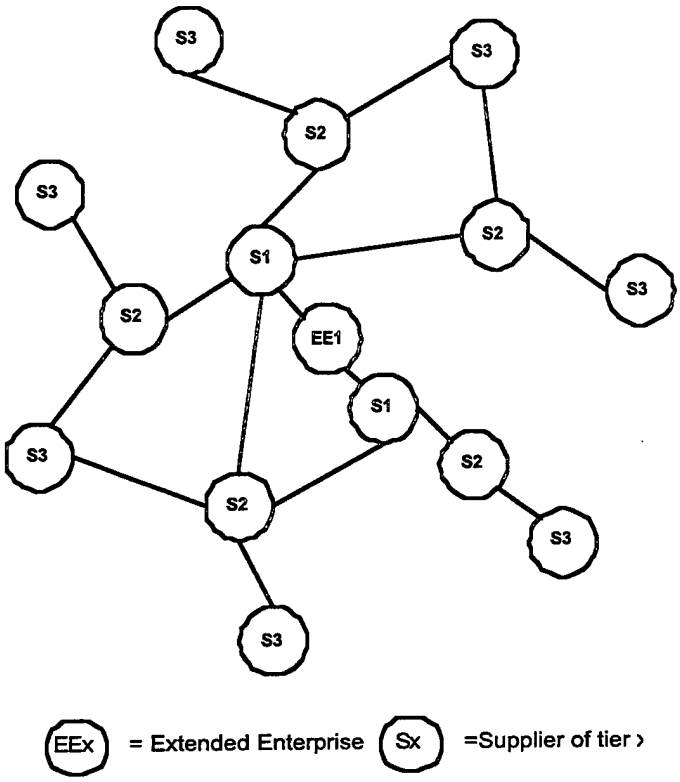
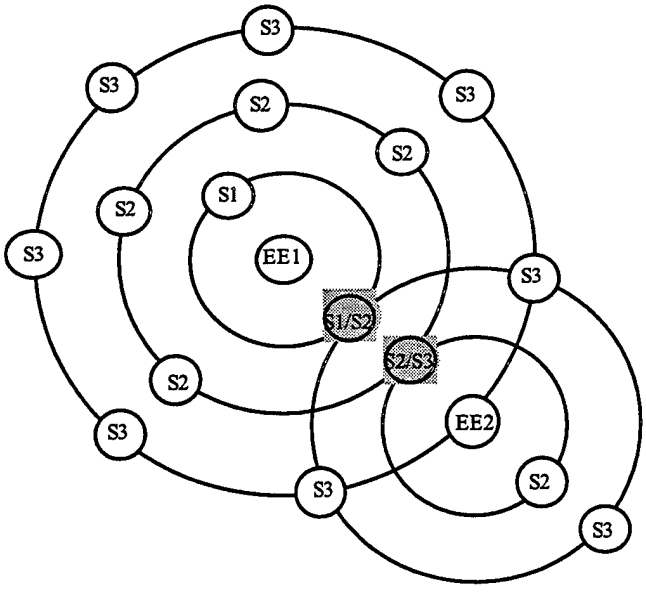


Figure 5-3 Extended Enterprise Teaming



From the complex relationships depicted in fig. 5-2, it is easy to see that leveraging competencies within the supplier ranks, can contribute substantially to the Extended Enterprise.

5.6. *Multiple Linkages*

An Extended Enterprise can include other Extended Enterprises. Each Extended Enterprise leverages its own core competencies to form a delivery structure to fulfill customer needs. The SSCM Program observed and researched examples in the aerospace, consumer products, and automotive manufacturing industries which illustrate the integration of multiple Extended Enterprises. Extended Enterprises can "pick and place" needed resources and assets through this linkage with other Extended Enterprises.

The model shown in figure 5-3, described by Dr. Robert Ellinger of Northrup Grumman, represents supplier tiers as rings around the "catalyst organization" of the Extended Enterprise. It shows how a first-tier supplier for one Extended Enterprise can be a third tier supplier for another. It further illustrates that an Extended Enterprise can be a lower-tier supplier to another Extended Enterprise.

5.7. *Benefits and Advantages*

SSCM Program members have identified numerous benefits of organizing as an Extended Enterprise. These benefits include the cross-migration of best practices and enabling technologies, leveraged research and development, effective communication, and improved coordination of activities.

As the business environment changes, so does the ability of companies to add specific or unique value to their products or services. As part of an Extended Enterprise, a company is in a stronger position to develop and assimilate technology that creates and improves processes. Each Extended Enterprise member is also better positioned to identify and understand customer needs. The Extended Enterprise can constantly evaluate and align the capabilities of each member and adjust the level of integration throughout the Extended Enterprise.

By viewing the entire product realization process as a quest to deliver value, an effective Extended Enterprise deals with a significant number of variables. The challenge of the catalyst organization of each Extended Enterprise is to increase value by managing the Extended Enterprise as a system. Management of an Extended Enterprise should be viewed as the optimization of a complex and dynamic system.

Historically, companies frequently acquired specific products or services without major consideration or understanding of how supply partners could contribute to the success of the endeavor. Many companies have completely misunderstood or grossly underestimated the importance of enterprise partners. Suppliers have been seen as subservient and completely replaceable. The Extended Enterprise approach recognizes suppliers as a strategic asset that play a critical role in product development and delivery.

5.8. *Rethinking Relationships*

Today's understanding of the complex and dynamic business environment is driving companies to rethink the relationships and interdependencies that exist within a supply chain. Limited resources, global competition, and a demanding customer base dictate the variability and complexity of the marketplace. In order to maintain a competitive advantage, organizations will need to reconfigure themselves continually to optimize total available resources.

Collaboration is driven by competitive necessity. Some collaborations are based on scarcity of goods and services in the marketplace. Other collaborations have been built on historical relationships between organizations. This is especially true as larger companies reduce the supplier base and move more responsibilities to their remaining suppliers.

Much attention has been given to the capabilities Chrysler Corp. has developed through interactions with suppliers and customers at all levels. Figure 5-4 demonstrates the characteristic changes in both process and relational areas.

Figure 5-4 Supplier Management Practices at Chrysler Have Changed.

Process Characteristics		Relational Characteristics	
1989	1994	1989	1994
Suppliers chosen by competitive bid • Low price wins • Selection after design	Suppliers presourced • Cost targeted to a set price • Selection before design based on capabilities	Little recognition or credit for past performance Transaction oriented	Recognition of past performance and track record Relationship orientation
Split accountability for design prototype and production parts	Single supplier accountable for design, prototype, and production parts	No responsibility for supplier's profit margin	Recognition of supplier's need to make a profit
Minimal supplier investment in coordination mechanisms and dedicated assets	Substantial investments in coordination mechanisms and dedicated assets	Little support for feedback from suppliers	Feedback from suppliers encouraged
Discrete activity focus No process for soliciting ideas or suggestions	Focus on total value chain improvement Formal process for soliciting supplier's suggestions	No guarantee of business relationships beyond the contract	Expectation of business relationships beyond the contract
Simple performance evolution	Complex performance evaluation	No performance expectations beyond the contract	Considerable performance expectations beyond the contract
Short term contracts	Long-term contracts	Adversarial, zero-sum game	Cooperative and trusting positive-sum game

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5.9. *A Call to Action*

The Extended Enterprise provides a framework in which the supply chain can operate as one organism creating value for its customers. Each Extended Enterprise member is recognized as both an individual entity and a contributor to the collective knowledge and capacity of the Extended Enterprise. Because Extended Enterprise members may potentially belong to a number of Extended Enterprises, the relationships between members of any given Extended Enterprise must be carefully monitored, nurtured, and maintained. The selection criteria for the Extended Enterprise members must be approached with strategic thought and evaluation.

6. Framework to Develop and Manage the Extended Enterprise

Key Messages

- There is a structured, integrated framework for the Extended Enterprise.
- Success requires alignment of all Extended Enterprise members.
- There are new tools which establish and foster alignment of Extended Enterprise members.

6.1. *Introduction*

SSCM Program participants have observed across all industries, the heightened attention to supply chain issues and challenges. Over 50 percent of SSCM Program participant organizations are currently engaged in some substantial form of supply chain performance improvement. While on the surface this seems encouraging, a careful review of these various initiatives reveals that most organizations are failing to develop a comprehensive and integrated approach to supply chain optimization. This conclusion has been reached through review of recent literature, by analysis of information disseminated at supply chain conferences, and through focused dialogue with practitioners in industry.

This is not to say that supply chain improvement initiatives are not substantial or are not providing competitive advantage for organizations. However, the SSCM Program's research has been unable to identify any single organization that has developed a comprehensive, fully integrated supply chain process. While it is accurate to state that companies such as Chrysler, Xerox, Honeywell, Caterpillar, and Eastman Kodak are reaping tremendous benefit from supply chain initiatives, it is projected that even greater profitability improvement is available as they fully integrate the supply chain process. As companies restructure their approach to supply chain management, it becomes their strategic objective to develop the competency to identify, engage, and leverage the resources in current and future supply chains.

This philosophy is significantly different than most current approaches. Many organizations have been reactive rather than proactive to supply chain issues. The supply chain has often been viewed as a necessary burden rather than as a competitive resource. Many organizations have mistrusted suppliers or felt a loss of control of critical external resources and assets. Additionally, many of these companies are apprehensive when dealing with internal company divisions over strategic supply chain issues.

This general apprehension or mistrust of external suppliers led many organizations to under-use the resources and overlook the opportunities that exist within current and potential supply chain members. Many organizations have recently recognized the need to improve supply chain performance. However, most have a limited awareness of the potential benefits that might be realized. Therefore, supply chain improvement initiatives have fallen grossly short of the mark.

6.2. *A Structured Approach*

The SSCM Program has identified a set of key elements of the Extended Enterprise that provides a structure for developing an integrated approach to competitive improvements by leveraging the resources of all of its members. The construction of the framework signifies the breadth and depth of effort required to establish competitive Extended Enterprises.

6.3. *The Extended Enterprise Strategic Plan*

The entire business, strategic, and execution planning process must be framed within an Extended Enterprise view. This requires the understanding that substantial knowledge and ability exist beyond the organization's walls, and that those resources may be brought fully to bear with the appropriate alignment of vision, commitment, and reward.

It is extremely difficult for any organization to migrate to this view without a leadership that considers members of the Extended Enterprise as essential value contributors. This requires each current and potential Extended Enterprise member to continuously improve their ability to contribute value. This further requires individual organizations to identify core competencies and build on the other capabilities within the Extended Enterprise.

6.4. *Leveraging Resources*

Traditional strategic business models have often been disconnected from resource assessment. Many business strategies have been developed without identifying whether the supporting resources were available internally or whether they must be acquired. Often, the lack of specific resource identification has led companies to develop new knowledge and capacity internally or to look for it externally in an often inappropriately short time frame. Many companies have been forced to desperately search for process ability or specific capacity when existing abilities were incorrectly assessed.

In "Strategic Intent" (Harvard Business Review, May-June 1989), Hamel and Prahalad identified two contrasting models of strategy between Western and Eastern managers.

> "Both models recognize the problem of competing in a hostile environment with limited resources... but, while the emphasis in the first [model] is on trimming ambitions to match available resources; the emphasis in the second is on leveraging resources to reach seemingly unattainable goals."

The article clearly suggests the benefits Eastern companies acquired by leveraging external resources.

Visionary companies are increasingly viewing external suppliers as a natural extension of their own company. They are also recognizing the range of knowledge and capabilities that external suppliers can bring to an Extended Enterprise. Each external supplier possesses at least one of the following: a unique understanding of customer wants and needs, process knowledge, or

advanced technology. Because these companies appreciate the competitive advantages that exist within each enterprise member, they are giving suppliers responsibilities and authority unthought of just a few years ago.

Once competitive resources have been identified within Extended Enterprise members, the alignment and integration of those resources affect how members contribute to the product realization process. While the business planning process may provide the structure and discipline necessary to leverage external resources, it alone cannot guarantee success. Because each enterprise member plays a unique role in the product realization process, each member must think and act as part of an integrated system.

6.5. *Leveraging Learning*

Taking this thinking a step further, Hamel and Prahalad state that an organization's ability to improve existing skills and to learn new ones is the most defensible competitive advantage of all. This is in concert with the SSCM Program's contention that creating a continuously learning and improving Extended Enterprise is critical to competitive advantage. The leveraging that occurs within the Extended Enterprise is clearly a competitive resource. However, it must be carefully and constantly evaluated and developed.

The SSCM Program participants believe the Extended Enterprise resources are not fully employed unless an organization develops a strategic plan to identify and utilize these resources. This high-level plan must begin with a specific strategy that the organization has developed and is committed to accomplishing. Given this starting point, the organization must then take a structured approach to identifying its current and desired core competencies.

As Extended Enterprises develop and compete, each must position its own identifiable sphere of competency. Each member of the Extended Enterprise must possess a unique set of competencies that compliments the Extended Enterprise to which it belongs. This competency positioning requires continuous assessment because of dynamic changes in market conditions. The positioning of Extended Enterprise members is not a one-time event, but rather a continual process.

To design and develop the Extended Enterprise, each potential member must establish its own business strategy. It is likely that some organizations may participate in multiple Extended Enterprises, create new ones, or change membership depending on market conditions and strategy. Each Extended Enterprise member must use its individual strategies, competencies, and resources to drive choices of where and how to participate.

Given that each organization has its own strategy, competencies, and resources, the SSCM Program has developed a framework (figure 6-1) to guide the design, selection, implementation, and measurement of Extended Enterprise membership.

Figure 6-1 Extended Enterprise Framework

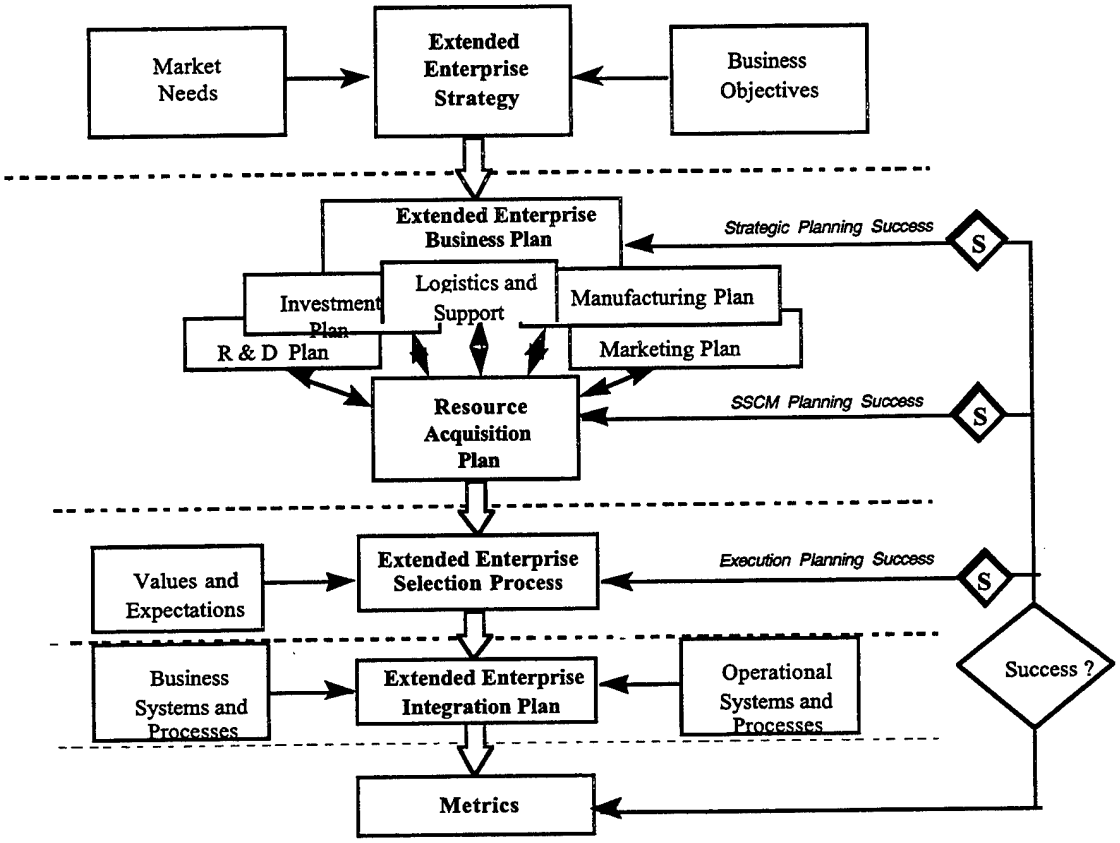
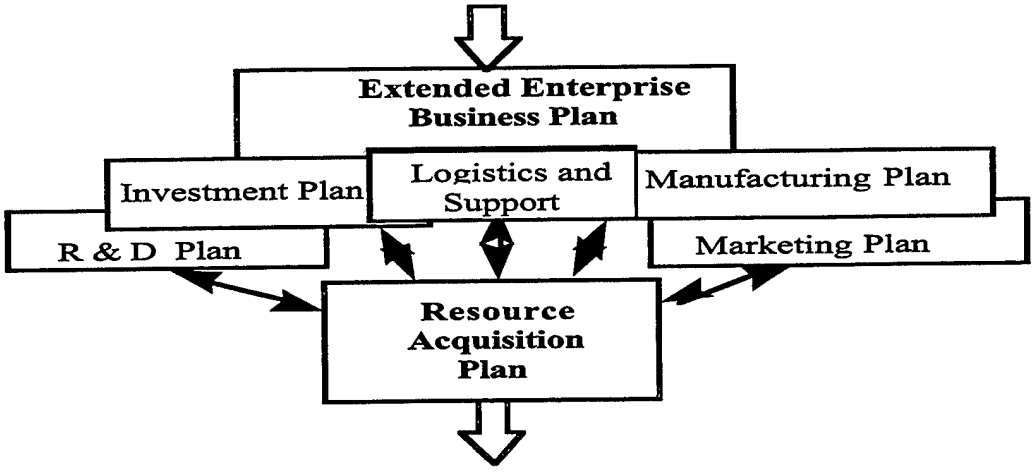


Figure 6-5: Extended Enterprise Business Plan



6.6. *Business Planning*

The framework requires the organization to establish a specific Extended Enterprise plan that identifies the core competencies and resources it will maintain or develop, and the core competencies and resources it will acquire from Extended Enterprise members. This management approach is radically different than the traditional approach to acquiring materials or services. This approach shifts the focus from an individual organization to the entire group of organizations competing as an Extended Enterprise. The Extended Enterprise Framework views Extended Enterprise members as partners rather than vendors. The framework elevates the traditional "make vs. buy" decision to a strategic-level resource and competency decision.

A business plan is the resource and activity plan used to accomplish the organization's strategy. An Extended Enterprise business plan differs from a traditional business plan, in that it specifically includes and integrates input from external as well as internal enterprise resources and activities.

Traditional business planning models usually have several components as reflected in Figure 6-2. Business plans include a marketing plan, a research and development plan, an investment plan, a manufacturing plan, and a logistics and support plan, among others. Each one of these plans needs to identify the activities and investments that must occur to accomplish the company's business strategy. Although each organization has its own custom set of plans, in general they include the elements illustrated in Figure 6-3 .

Figure 6-2 Common Business Plan Elements

Marketing Plan
- Products
- Markets
- Sales and Distribution

Research and Development Plan
- Next Generation Products
- New Technologies

Logistics and Support
- Products
- Delivery Requirements
- Field Services

Investment Plan
- Plants
- Property
- Equipment
- Technology Requirements

Manufacturing Plan
- Products
- Processes
- Capacity

Supply chain management has historically involved a chain of independent firms, each adding separate value to items purchased from others. Price and performance were shopped for in the open market, and suppliers were consistently exchanged for other lower-cost suppliers. Firms kept an arm's length relationship with suppliers and were extremely hesitant to depend on or trust them. The arm's length approach led to a massive under-use of supplier competencies and resources. Supplier-developed technologies, research and development efforts, and customer knowledge have not been fully used in many customer-supplier relationships.

Maximum customer satisfaction requires maximum supplier contribution. Organizations cannot compete strictly on the basis of internal competencies and resources. The Extended Enterprise

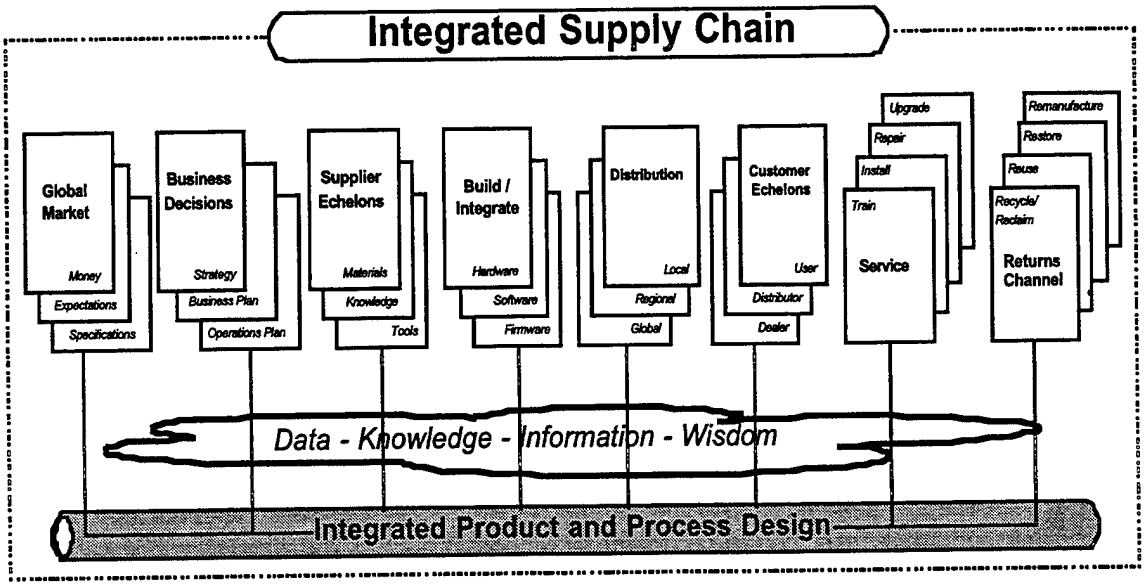
business plan identifies the key activities, resources, and knowledge provided by enterprise members. This structured approach requires a high-level planning process that commits external resources as part of an integrated business plan. The resources of all Extended Enterprise members should be reviewed and incorporated, as appropriate, as business plans are established. Research and development expertise, marketing abilities, manufacturing capabilities, logistics and support, and investment in plants and processes all exist within suppliers. The ability of the Extended Enterprise to systematically incorporate and leverage these resources provides a strong competitive advantage.

Because higher costs and longer cycle times occur when supply chains are poorly integrated or insufficient relationships exist, an Extended Enterprise business plan is evaluated at each level of the Extended Enterprise Framework. These evaluations analyze the level of inter-enterprise integration of the individual strategic plans. In performing this analysis, such competitive attributes as engineering-to-engineering coordination, manufacturing-to-manufacturing coordination, concurrent marketing activities, collaborative research investment planning, level of alignment, and future visions of core competencies are reviewed. Future Extended Enterprise planning is also established at this level. Taking advantage of inter-enterprise integration enables the Extended Enterprise members to increase return on assets, reduce costs, and reduce cycle time.

6.7. *Resource Acquisition Plan*

Visionary companies are increasingly viewing external suppliers as a natural extension of the company. They are giving suppliers responsibilities and authority unthought of just a few years ago. The resource acquisition plan requires the Extended Enterprise to map out and specifically identify its internal and external sources of product knowledge and capacity. Figure 6-4 exhibits the product and process design steps that organizations must move through as they deliver products to the global marketplace. As Figure 6-4 depicts, there is a highly integrated process

Figure 6-3 The Integrated Supply Chain



that converts market opportunities into delivered products that must eventually be retired. The Extended Enterprise Framework (Figure 6-1) directs the business planning process to develop a resource acquisition plan, which drives the Extended Enterprise selection process. The resource acquisition plan details those resources which must be obtained through the Extended Enterprise members.

An example of this strategy or plan is displayed by Nike Inc. During the physical fitness boom of the 1980s, Nike positioned itself through a specific resource acquisition plan to become the market leader in sales of athletic shoes. Nike achieved this sales leadership position without owning any full-scale production facilities.

Nike's strategy involved concentrating on its core competencies of research, design, and marketing. By developing and engaging supply chain members to manufacture and distribute its products, Nike developed an integrated supply network that complimented its own core competencies.

6.8. *Extended Enterprise Values and Expectations*

During the last several years, SSCM Program participants recognized that behavioral issues have been a major impediment to optimizing supply chain outputs. Adversarial relationships must be replaced with relationships characterized by mutual respect and high levels of trust.

Because behavioral issues are critical to the successful development of Extended Enterprises, the program spent great effort developing a set of axioms for inter-organizational behaviors and relationships. Without a common set of understandings, it is difficult to create a level "playing field" for all Extended Enterprise members. The Axioms of the Extended Enterprise have been deployed and validated by several leading Extended Enterprises and are being adopted by numerous others. These axioms require a major shift in perspective.

Axioms of the Extended Enterprise

I. There is a shared, specific focus on satisfying the common end consumer.
II. There is an alignment of vision.
III. There is a fundamental level of cooperation and performance to commitment (trust).
IV. There is open and effective communication.
V. Decisions are made by maximizing the use of the competencies and knowledge within the Extended Enterprise.
VI. All stakeholders are committed to generate long-term mutual benefits.
VII. There is a common view of how success is measured.
VIII. All members are committed to continuous improvement and breakthrough advancements.
IX. Whatever competitive pressures exist in the environment are allowed to exist within the Extended Enterprise.

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A more thorough analysis of these axioms is required to understand their competitive significance to all Extended Enterprise members.

Shared focus

The first axiom, and primary focus of successful Extended Enterprises, is that the goal of all members of the Extended Enterprise is to satisfy the end consumer of the product. The ultimate consumer of the product must be paramount in the minds of all Extended Enterprise members.

Alignment of vision

Extended Enterprise members must have an alignment of vision. All members need not have identical visions, nor should they be expected to. There is, however, a need for all the organizations to have visions that complement the vision of the Extended Enterprise. This joint commitment could be to pursue new opportunities or to remain in a highly competitive manufacturing environment. Alignment of vision of all enterprise members helps ensure that individual business strategies can be pursued within a collective direction.

New levels of trust

Successful relationships develop a state of interdependence which provides mutual advantage for all member companies. Trust is an indication that all members recognize this interdependence. As trust builds between enterprise members, aversion to risk decreases, allowing the enterprise increased flexibility and adaptability.

Competitive success is related to the level of trust among the members of the Extended Enterprise. Trust allows for rapid response to changes in customer requirements by avoiding lengthy re-establishment of business understandings. Trust also reduces the risk for all parties involved in the Extended Enterprise. While trust may be difficult to establish, once embedded in the Extended Enterprise it becomes "the glue" that holds everything together.

Communication

Open and effective communication between all members of the Extended Enterprise is key to achieving trust and competitive market responsiveness. Technological advances have provided critical enablers which integrate and optimize Extended Enterprise communications. Real time, multi-media communication makes the competitive difference in time-to-market of many products, and it strengthens relationships between Extended Enterprise members.

Competencies

Business and operational decisions must be based on the highest degree of competency or expertise within the Extended Enterprise. An example of this successful strategy is Chrysler Corp.'s strategic decision not to be a specialist in the purchase of raw copper, a significant component in manufacturing. It was recognized that the core competency to monitor, analyze, and control cost targets of raw copper rested in a fifth-tier member of the Extended Enterprise. This supplier, with Chrysler's financial support and authority, became the source for all raw copper for Chrysler's Extended Enterprise.

Measures of success

Questions still exist regarding long-term mutual benefits vs. easy-in/easy-out Extended Enterprise relationships. Research by the SSCM Program has identified advantages to each type. Small- and medium-size enterprise members, whose major contribution is manufacturing processes, need to maintain high machine usage rates and, thus, participate in more easy-in/easy-out Extended Enterprises. SSCM participants strongly believe that long-lasting, mutually beneficial relationships are preferable due to the ability of individual members to identify new opportunities and share with other members.

Alignment of expectations and behaviors

The success of the Extended Enterprise is rooted in expectation alignment and the behavior of all members. What might seem a reasonable profit to one member may be unsatisfactory to another. The measurements of success must be quantifiable, understood by all, and in line with the anticipations of each member. Expectations must be established early in the relationship and a clear understanding must be reached.

Continuous improvement of people and processes

It has been eloquently stated that to remain satisfied with the existing situation is to perish. All members of the Extended Enterprise must be strongly committed to continuous improvement of assets, resources, human systems, processes, and technologies. It was observed during the SSCM Program development efforts that a great emphasis was placed on "the human contribution" in several successful large Extended Enterprises. Executives should recognize that this most important resource is equal to or greater than any other resource the company may have.

Recognizing external forces

The Extended Enterprise must have a realistic perspective of itself, its competitors, and the marketplace. The Extended Enterprise must acknowledge that external forces and factors beyond the control of the enterprise exist. These external forces can be created by federal legislation, international upheaval, and/or acts of nature. They add chaos to even the most well-made plan. These factors of dynamic change must be recognized, accepted, and responded to proactively. Extended enterprises must maintain constant awareness of these outside forces and be prepared to rapidly respond to interruptions and new opportunities. Those organizations unable to adapt to changing conditions may eventually be required to leave the Extended Enterprise.

While the SSCM axioms should be a set of underlying principles in relationships within the Extended Enterprise, the degree by which they are applied may vary. Different members of the Extended Enterprise have different levels of risk and reward. For example, an Extended Enterprise member of critical importance may have a higher level of risk, investment, and commitment than those of lower supply tiers.

Types of relationships

The SSCM Program members developed three categories of Extended Enterprise relationships:

Strategic members provide an indispensable value-added component to the end product or service. Strategic members have the highest degree of alignment in values and

expectations, which are usually tied to the success of the end product. These members are usually few in number but crucial to the competitiveness of the product in the marketplace.

Tactical members provide a needed component to the end product or service. These members are committed to fulfilling the needs of the Extended Enterprise, but their values and expectations are not as closely associated as those of strategic members. Extended Enterprise organizations may have numerous tactical members. Secondary-source contingency plans may be developed if it is perceived that the member may have difficulty in meeting commitments to the Extended Enterprise.

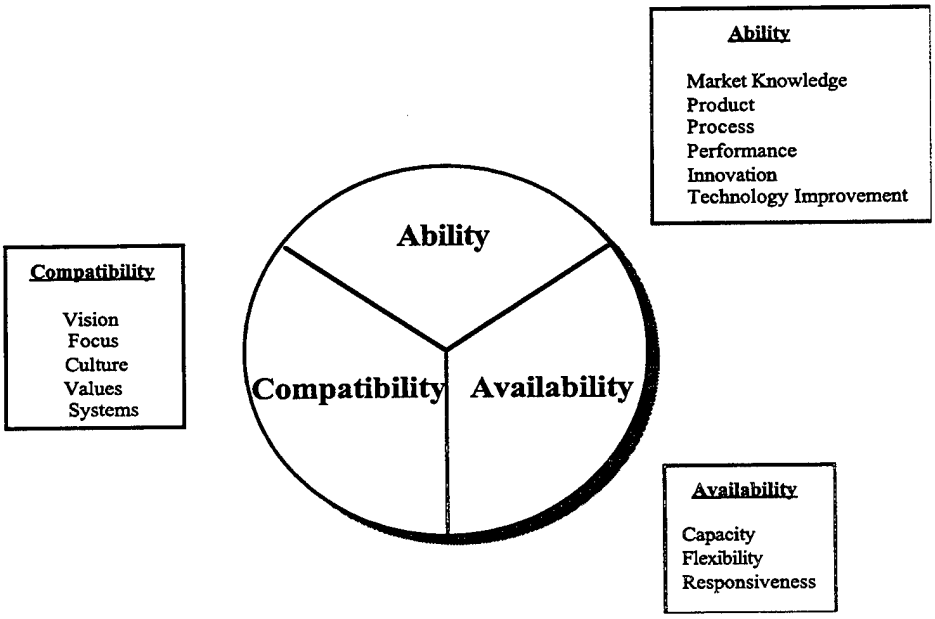
Operational members provide low-cost, high-volume parts or components. Values and expectations of these members do not necessarily have to be in complete alignment with the Extended Enterprise; however, individual contribution of quality, availability, and cost must conform with Extended Enterprise standards. Despite the degree of criticality, operational members are, nonetheless, expected to practice the behaviors and philosophy described by the axioms.

6.9. *Extended Enterprise Selection Process*

In an Extended Enterprise, quality suppliers act as a single entity to address the competitive demands of the marketplace. It is difficult to imagine a "plug and play" process where Extended Enterprise members could be identified and then immediately put into place. There is, however, a common set of criteria all members should possess.

While traditional selection criteria focuses on the product characteristics of cost, quality and delivery time, the Extended Enterprise selection model (figure 6-5) focuses on the supplier characteristics of ability, availability, and compatibility.

Figure 6-4 Extended Enterprise Selection Model



"Ability" is the set of criteria that addresses the technical ability of the supplier, within the scope of design and manufacture, to provide a product or service that the Extended Enterprise needs to satisfy its customers.

"Availability" addresses the concern, "Will the supplier be able to provide its product or service when needed?" Availability is a capacity and flexibility issue. It is important for the Extended Enterprise to be responsive to changes in the internal and external environment. Developing a high level of flexibility and responsiveness in an Extended Enterprise provides a competitive advantage for its members.

"Compatibility" is another critical qualifier used in the Extended Enterprise selection process. Compatibility has two dimensions: cultural compatibility, and technical compatibility. Cultural compatibility is the compatibility of organizational visions, culture, and values. It is important for building trust, sharing ideas, cross-training, and risk taking. Technical compatibility is the compatibility of computers, machines, communications, and language. Technical compatibility is important for data exchange. One difference between cultural and technical compatibility is that technical compatibility can be bought, while cultural compatibility must be learned.

The degree to which a supplier needs to be compatible varies with the criticality of the supplier's contribution to the Extended Enterprise. When it is appropriate and suitable for suppliers to be integrated into the Extended Enterprise, compatibility is very important, because the more closely the members are aligned, the easier process integration can occur.

6.10. Five Box Model

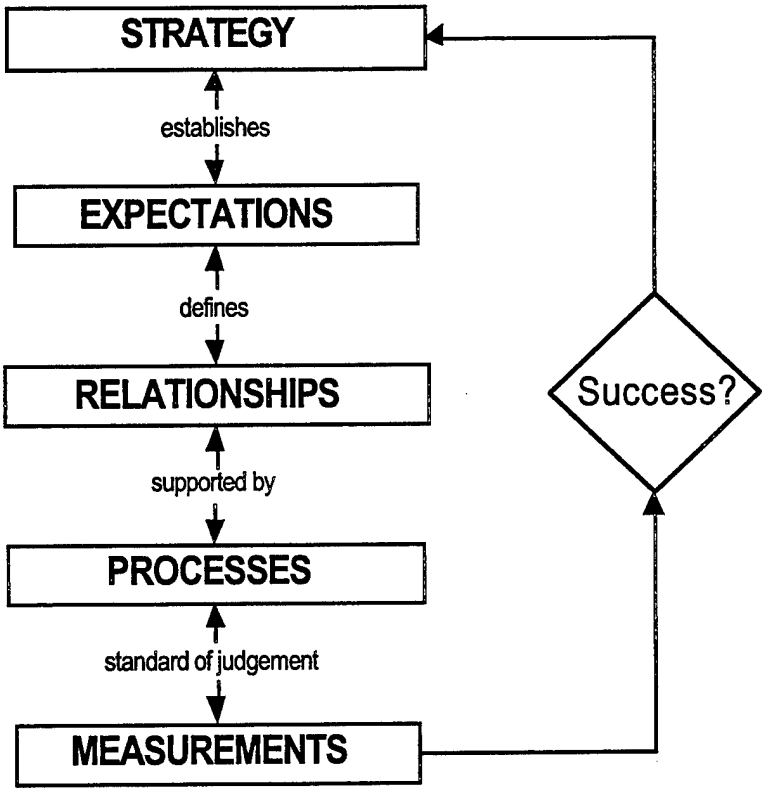
Recognizing that all Extended Enterprise members play different roles in the collective output of the enterprise, SSCM Program members created the Five-Box Model (Figure 6-6) to identify the specific types of relationships and processes that are necessary to support each enterprise member.

The first block, "Strategy," is defined for each member by the catalyst organization that brings the Extended Enterprise together. Simply stated, the strategy represents the key abilities in the Extended Enterprise.

The "Expectations" block states the specific expectations of that enterprise member. Expectations vary between enterprise members, but the minimum expectation of each member is to deliver the agreed products or services and to participate as a whole.

Expectations are based on current abilities, but they may also include future requirements. The degree of member expectations drives the specific relationships within the enterprise. Higher expectations require stronger, more interdependent relationships. The "Relationships" block is driven by expectations.

Figure 6-5 Five Box Model



The "Processes" block shows that relationships are supported by specific processes. Here again, the degree of control or flexibility is determined by the strategy, expectations, and specific relationships. These processes can be grouped as follows:

A. Business processes and systems such as activity-based management, target costing, and financial compensation schedules
B. Product-related processes and systems for electronic CAD/CAM interface, tooling and fixturing, and rapid response to problem resolution within the Extended Enterprise
C. Operational processes and systems which provide the technological integration necessary to optimize manufacturing and distribution efficiency and performance

The "Measurements" block identifies the necessity to measure results. All processes have a standard, or standards, for judgment. The measurements should provide performance feedback to monitor or adjust the process. Each organization must establish the specific metrics required; however, it is critical to ensure that each enterprise member accomplishes its specific value contribution.

6.11. *Extended Enterprise Integration Plan*

Enterprise Integration

Enterprise Integration is the discipline that connects and combines people, processes, systems, and technologies to ensure that the right people and processes have the right intellectual and physical resources at the right time. Enterprise Integration comprises all the activities necessary to ensure that a company is well-coordinated, by itself and within an Extended Enterprise.

Enterprise Integration includes:

1. Use of the company's work force, technology, and management practices to implement a set of strategies, concepts, and values that align ongoing business and product-related processes with the company's performance objectives
2. Use of systems that create well-managed physical, financial, people, and information infrastructures that bind the business processes together
3. Development of enabling practices and technologies such as:
   - Fully implemented, seamless information networks
   - Flexible, responsive organizational structures adapted to 21st century needs
   - User interfaces and tools that enable seamless knowledge access and exchange
   - Metrics and tools for operational strategies that enable companies to implement and measure levels of performance to mutual goals

Leadership

Senior management must guide Extended Enterprises, using principles and practices that foster compatibility among people, processes, and information. Much of what is being done today is establishing inter-organizational, cross-functional teams which provide intellectual learning and experience sharing of best practices across the Extended Enterprise.

Process simplification through integration

The goals of Extended Enterprise integration are to remove non-value-added activities; simplify processes, practices, and policies; and optimize Extended Enterprise resources of knowledge and capacity. Enterprise integration technology enables the Extended Enterprise to respond to change.

Integrated product and process design

Companies are responding to global competitive pressures by reducing the time it takes to bring new products to market. Increasingly, companies find themselves distributed across industrial sites and across national and regional boundaries. Improving enterprise results requires a special level of coordination of systems and interactions.

Concurrent development of product and process is driving exponential improvements in responding to customer demands and allocating proper knowledge and capacity resources. Organizations achieving these improvements understand the power of cooperation developing effective decision and support systems.

> "Contract manufacturers must face a customer-focus strategy whereby employees are not only trained in their job skills, but in the tools of total quality and encouraged to develop process improvements. This leads to joint product development teams that save millions of dollars for the customer, and bring new products to market in a shorter time frame."
> -Trident Tool, 1996 Baldrige Award Winner. (From *MetalForming*, Feb. 97)

Complications of systems diversity

The challenges of the integrated enterprise solutions are complicated by the variety of systems in place. Many systems are the result of a continuum of sophistication that has been put in place and functions well within the individual enterprises. However, these systems may lack the ability and robustness needed to assure the seamless interoperability of computing tools, used in manufacturing planning and control functions across the Extended Enterprise.

Balanced structure

Integration of the Extended Enterprise must be tailored to fit the unique requirements of each specific member and its defined objectives. Integration is fundamental to the concurrency and synchronization of all enterprise processes. It provides common information and unique knowledge to all processes of the Extended Enterprise. Integration enables dynamic interaction among all enterprise members.

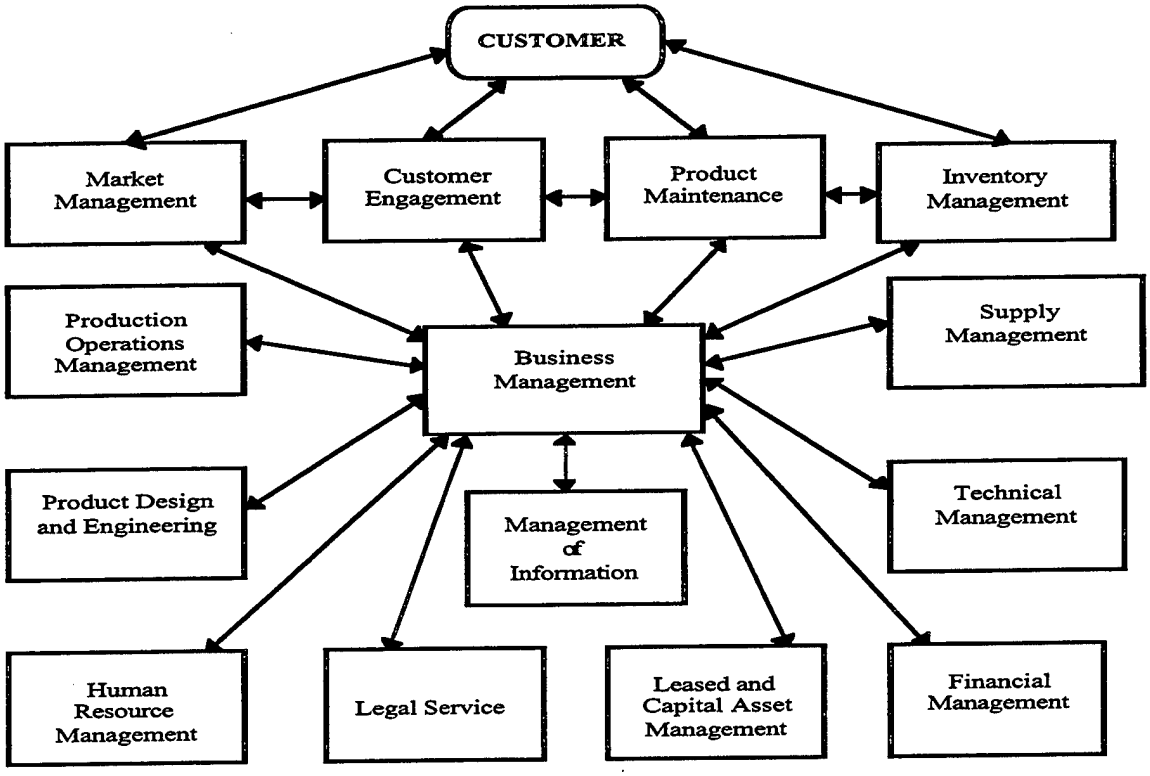
The first stage of Extended Enterprise integration should focus on a systems approach to simplifying and improving all business processes. Michael Hammer defines a business process as "a collection of activities that create value for a customer." He has developed the following characteristic of a business process:

1. All processes can be improved by both corrective and preventive actions.
2. All processes consume resources (cost) during work transformation activity.
3. All processes have inputs from suppliers and provide outputs to customers.
4. All processes involve actions that can be described, measured, and studied.
5. All processes that produce value have a transformation activity called work.
6. All work is composed of processes.

Enterprise integration is about integrating business, technical, and operational processes. Today's market leaders focus on improving processes as well as products. Information technology is becoming the primary enabler of product and process management.

Because no two organizations are alike, there is no generic integration model. The following are two representative examples of enterprise integration models that show the diversity of approaches. Xerox Corp. has linked internal business processes as described in Figure 6-7.

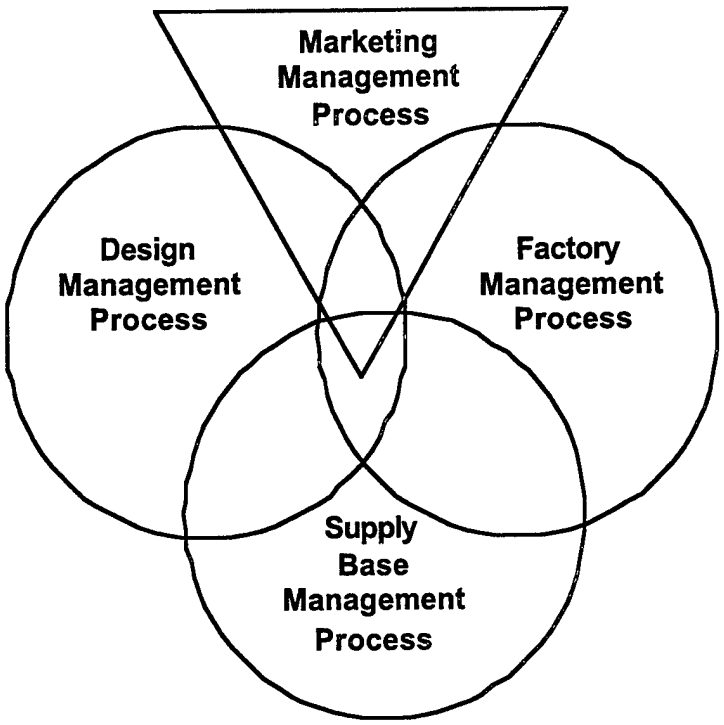
Figure 6-6 Xerox Enterprise Processes



Used with Permission of
Xerox Corporation From
Business Process Benchmarking
Robert C. Camp 1995 p 320

The Collins Avionics and Communications Division of Rockwell Defense Electronics has included Supply Base Management as one of four core processes as shown in Figure 6.8.

Figure 6-7 Collins Core Process Model



Supply chain as an organizational entity

Members of Extended Enterprises require a leadership that encourages and facilitates the flow of enterprise information and knowledge. All members of the Extended Enterprise must concurrently organize internal structures and processes to facilitate the flow of information and knowledge between internal and external processes and resources. Specific enterprise member guidelines and emerging technology standards can assist in these efforts. A high level of leadership focus and commitment is required to develop processes that support real-time, on-time analysis and decision-making at all levels.

There is a growing number of Extended Enterprises in which each component of the chain, from suppliers to distributors, contributes equally to the final value of the end product. Understanding values, expectations, organizational structures, and the differences between members of the Extended Enterprise largely determines the actions that offer the best prospects for significant gains in competitive advantage through integration.

6.12. *Evaluating and Improving Supply Chain Performance*

The DARPA/U.S.A.F. QCAE Project and other projects including Metrics for the Agile Virtual Enterprise Project, the Supply Chain IPPD Project, and the Agile Information Management Systems Project are providing new and advanced business tools and understandings for the pre-qualification, qualification, and source selection of members of the Extended Enterprise. These tools look beyond traditional evaluation criteria, which were based solely on cost, quality, and availability measurements of products and services.

RIT's Center for Integrated Manufacturing Studies (CIMS), a QCAE Project partner, has been developing new understandings about Extended Enterprises in cooperation with organizations such as Eastman Kodak and Xerox. Early in their project planning efforts, CAM-I recruited CIMS to help accelerate QCAE efforts and develop a tool set to:

1. Evaluate the current supply chain practices of enterprise members
2. Provide tools to identify areas for improvement within or between Extended Enterprise members

These QCAE assessment tools, called *The Wheels: A Vehicle for Dialogue*, have been designed to provide new insights into the assessment criteria for members of the Extended Enterprise. The QCAE assessment tools are designed to concurrently evaluate the supplier, the customer, and the type, quality, and results of the relationship between the Extended Enterprise members. These tools provide the dialogue for improvement between participating organizations.

The Process

There are logical steps involved in achieving improvements in any organizational construct. They are:

1. **Know what is required.** Descriptors for excellence and several assessment tools are available. More companies are involved with benchmarking activities than ever before.
2. **Assess the current situation.** The answers to assessment questions from established programs provide the prescriptions for action.
3. **Acquire needed information or skills.** Information and skills can be acquired by retraining current staff, hiring new staff, contracting help from others, or developing alliances with other organizations.
4. **Continuously improve.** Organizational learning and the documenting of past experiences are emerging as important methods to keep from repeating previous mistakes. Organizations must always strive for a higher level of innovation or improvement. Better performance, breakthrough thinking, and a feeling of community are results of organizational learning.

Supply chain organization is constantly evolving. Today, customers and suppliers have expectations of each other that would have been unimaginable just a few years ago.

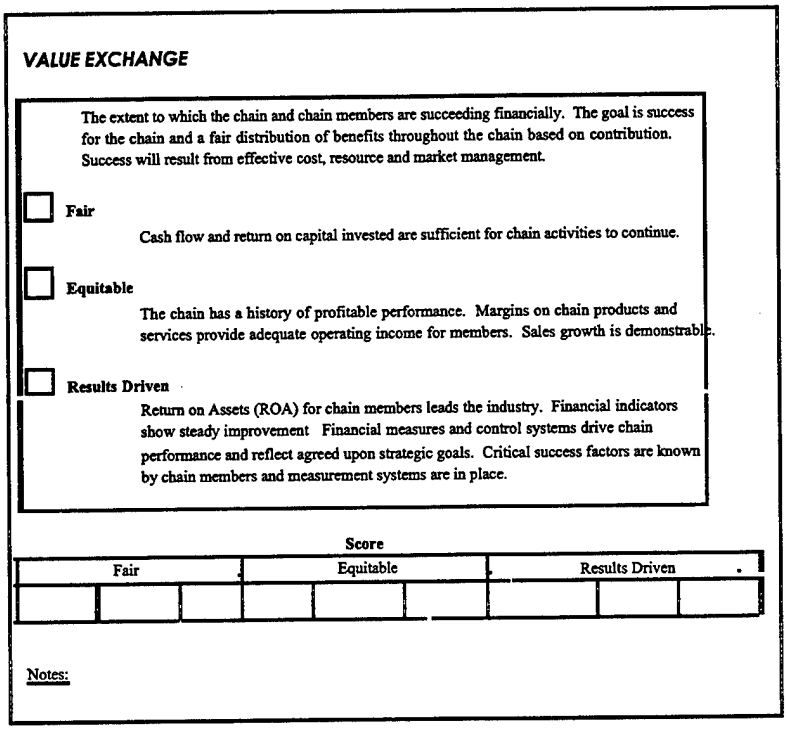
The assessment process is the initial step in any performance improvement program. An effective assessment process requires judgment, calculation, appraisal, and estimation. A well-

designed assessment provides a foundation for organizations to objectively consider the value of business processes in a deliberate and well-conceived manner.

In supply chain management, the assessment process works best when members of the supply chain are allowed to assess each other in a collaborative, structured manner. A common structure defines a baseline from which to form comparisons. Assessment results drive the creation of effective, jointly developed action plans.

The Wheels assessment focuses on the activities related to a particular product or service, produced by the supply chain members. This focuses attention on the value exchange and not the individual company. A detailed assessment of customer and supplier capabilities is then prepared by each organization. This is a comprehensive assessment and requires the participation of a cross-functional team to provide the necessary information. Results of this assessment are analyzed by all parties and lead to the identification of mutually beneficial improvement opportunities.

Figure 6-8 Sample Page from *The Wheels*



VALUE EXCHANGE

The extent to which the chain and chain members are succeeding financially. The goal is success for the chain and a fair distribution of benefits throughout the chain based on contribution. Success will result from effective cost, resource and market management.

☐ **Fair**

Cash flow and return on capital invested are sufficient for chain activities to continue.

☐ **Equitable**

The chain has a history of profitable performance. Margins on chain products and services provide adequate operating income for members. Sales growth is demonstrable.

☐ **Results Driven**

Return on Assets (ROA) for chain members leads the industry. Financial indicators show steady improvement Financial measures and control systems drive chain performance and reflect agreed upon strategic goals. Critical success factors are known by chain members and measurement systems are in place.

Score

Fair			Equitable			Results Driven		

Notes:

The final step is for each organization to assess the results of the relationship. This step reveals each organization's perception of the performance of the entire supply chain. Analysis of these results gives each company the ability to align expectations and provide a path for future improvements.

Results of this bi-directional analysis are reviewed and evaluated. The results provide the foundation on which to build an effective relationship and improve performance and efficiency.

Additionally, deficiencies in processes or lack of critical competitive resources are brought to light and subsequently addressed by continuous improvement processes.

The QCAE assessment tools use a radar or spider chart to display Extended Enterprise performance enablers. The radar chart's resemblance to a wheel gives the tool its name, *The Wheels*. The "spokes" of the wheel represent the key issues and challenges to developing a successful relationship (e.g., process capability, quality system, safety and environment, delivery-to-commitment). The level of performance in each key issue is measured by the distance along each spoke from the hub of the wheel (Figure 6-10).

The further away from the hub of the wheel, the more accomplished the organization is in the performance of the attribute, characteristic, or process. This method allows for rapid visual identification of areas of excellence (leading edge) and reciprocally targeted domains for improvement. This activity serves three purposes: it provides quid pro quo for identifying improvement opportunities; it provides knowledge for improving the organization; and it establishes a relationship for future opportunities.

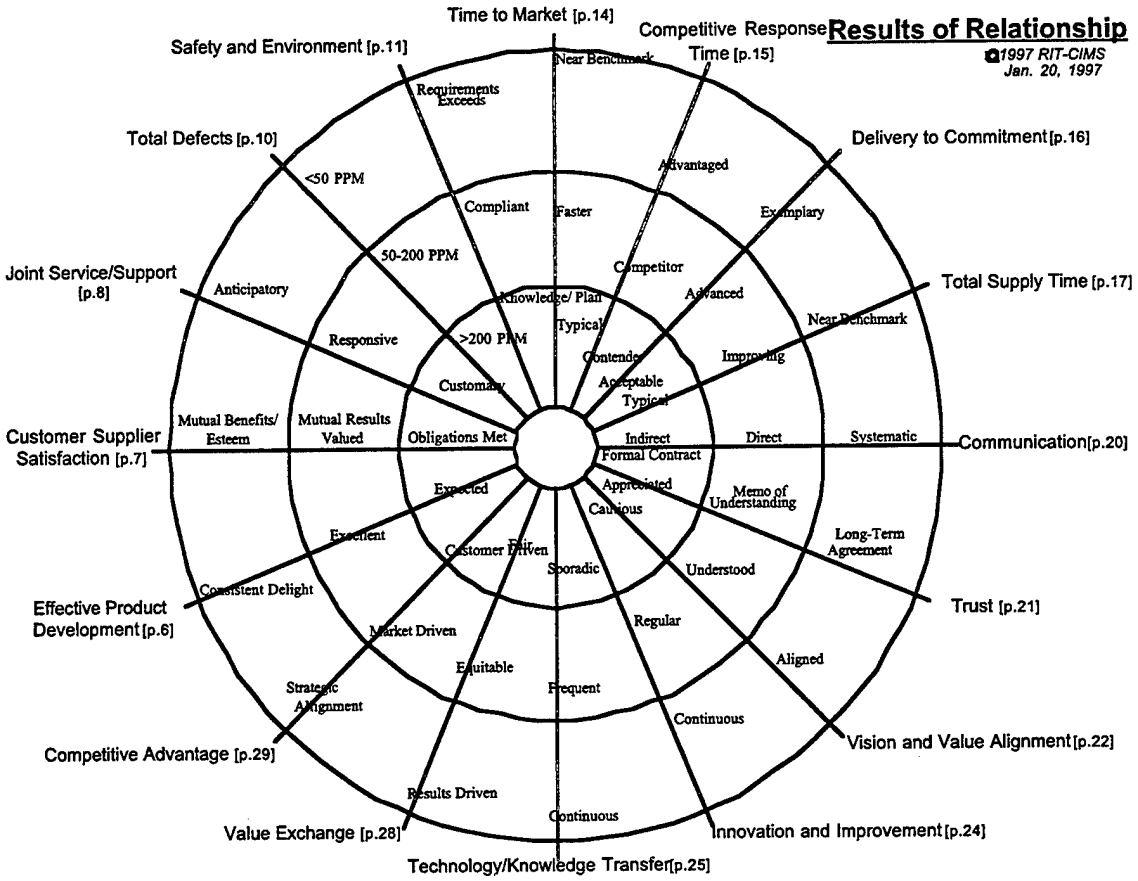
CIMS is deploying these assessment tools within several Extended Enterprises. Preliminary results are extremely encouraging. The QCAE assessment tools appear to be useful for companies of all sizes. They are applicable to both the manufacturing and service industries.

6.13. Results Measurement, Analysis, and Feedback

Extended Enterprises and their members compete through the dynamic collaboration of members of various functions, organizations, and companies. To promote the integration and rapid response that support successful Extended Enterprises, metrics must be adaptable to a variety of collaborative relationships and to changing competitive environments. To appropriately drive performance, metrics must be well grounded in the existing knowledge base and must measure results without prescribing the method to those results. One strategy for designing a metric that is both comprehensive and efficient is to provide modules so that users can focus only on the set of concerns that is relevant to the current situation.

The Wheels assessment tool (see example in Figure 6-10) provides a set of metrics that meets the needs of the supply chain for a structured analysis of its strengths and weaknesses. The chain can then build its improvement strategies from a good working knowledge of its present capabilities.

Figure 6-9 "Results" Wheel Chart



The tool helps cross-functional teams focus dialogue on relevant improvement areas and build on supplier selection and certification processes already in place. Extended Enterprises can use the tool in a variety of ways:

- to evaluate suppliers, customers, and results
- to establish criteria and measure results
- to identify training requirements
- to identify benchmarking opportunities
- as a vehicle for structuring conversation among members of a supply chain

The current competitive climate is characterized by rapid entry of new competitors, fast paced changes in technology, and ongoing shifts in customer requirements. To succeed, an Extended Enterprise must engage in frequent, planned, structured, cross-functional analysis of critical competitive measures. An analysis of the enterprise's competitive strength can be organized around the answers to the following six essential questions.

1. Are we developing and producing the right things?
2. Are we producing the right things well?
3. Are we delivering the right things quickly enough?
4. Are we creating the best operational climate?

5. Are we collectively anticipating and improving?
6. Are we all becoming more successful?

The first three questions address the traditional dimensions of cost, quality, and delivery time. In an Extended Enterprise, however, the members' ability to respond to a rapidly changing marketplace and compete collaboratively is also important. This concern is addressed in the last three questions.

Results measurement and analysis include each supply-chain member's answers to these six questions as well as the answers from the Extended Enterprise as a whole. The following areas of analysis provide the data to build reasoned answers to these questions.

"Are we developing and producing the right things?" This question addresses the issues of developing products and services that meet or exceed customer requirements. This includes:

- Effective Product Development

  The chain must demonstrate that it is developing products and services that meet, exceed, or anticipate consumer requirements.

- Customer-Supplier Satisfaction

  Customer-supplier satisfaction is the extent to which the customer and the supply chain members are satisfied with one another's capabilities, interactions, and results, and the mutual benefits of the relationship. Early in a relationship, satisfaction is based heavily on meeting obligations. As the relationship develops, satisfaction is based on additional factors and reflects growing interdependence, trust, and respect.

- Joint Service and Support

  Joint service and support refers to the level of customer service and support that members of a supply chain provide to one another in response to needs, inquiries, and requests. This level of service must be mutually satisfactory to all members.

"Are we producing the right things well?" This question addresses how a supply chain defines, achieves, and improves quality and safety throughout the organization. Key measures are:

- Total Defects

  Total defects are the cumulative defects observed by the consumer from the start of manufacturing to the end of product life. Appropriate measures may vary with industry, process, and or volumes.

- Safety and Environment

How well does the supply chain manage its resources and product designs using a systems-based approach to safety and environmental issues? An Extended Enterprise fully complies with regulations by introducing product and process changes which exceed performance goals. Members participate in the formulation and beta testing of new standards.

"Are we producing the right things quickly enough?" This question addresses the capability for on-time delivery in an Extended Enterprise production system.

- Time-To-Market

Time-to-market is the time from the initial product idea to delivery of the first production unit (or completion of "pipeline fill" in some industries). An Extended Enterprise anticipates market needs and continually compresses development time.

- Competitive Response Time

Competitive response time is the ability of the member in the chain closest to the paying customer to satisfy the customer's delivery time requirements.

- Delivery-To-Commitment

Delivery-to-commitment is the measure of on-time performance in customer-supplier interactions. It includes the achievement of targeted goals for promised delivery of products, services, and materials; product specifications; process control data or other information; and payments. The Extended Enterprise meets all on-time performance goals set at or near the industry benchmark.

- Total Supply Time

Total supply time is the sum of the lead times for each segment of the supply chain. An Extended Enterprise collaboratively produces breakthrough improvements in total supply time, thus differentiating its performance in the marketplace.

"Are we creating the best operational climate?" This question focuses on the Extended Enterprise's ability to achieve superior results by having members work together to satisfy customers.

- Communication

Assessment of communication includes both the types and effectiveness of communication among customers and suppliers in an Extended Enterprise. An Extended Enterprise uses real-time information links that allow free and easy communication, thus creating a competitive advantage over competing supply chains. Members of an Extended Enterprise routinely access one another's' planning systems in a direct, timely manner for the exchange of business and technical communications.

- Trust

  Trust is an intangible attribute of a customer-supplier relationship. It connotes the degree of confidence and security the involved parties have in one another's' capabilities and commitments. It is demonstrated by a collaborative style which creates win-win results. Members of an Extended Enterprise have enough confidence in each other's capabilities and commitments that they add capacity in anticipation of need. The long-term, mutually-dependent relationships of the Extended Enterprise result in a commitment to do more than is formally required.

- Vision and Value Alignment

  Vision and value alignment is measured by the extent to which a vision of collaborative strategy or integrated operations exists and is implemented consistently among members of the Extended Enterprise. A Extended Enterprise vision is based on the values of customer delight, mutual responsibility and shared risk and reward. Vision and value systems are documented, fully aligned, and deployed.

"Are we all learning and improving?" This question asks if the Extended Enterprise can act as a single organization that learns and adapts rapidly in response to unpredictable change. An Extended Enterprise applies new ideas that positively affect cost, system performance, products, processes, and interfaces. An Extended Enterprise's ability to anticipate change is regarded as a enterprise-wide strategic imperative.

- Innovation and Improvement

  These criteria measure the appropriate application of new ideas that positively affect costs, systems, products, processes, and/or interfaces. Demonstration includes both improvements to existing products and processes, and the development of new products or approaches. An Extended Enterprise achieves innovation and improvement rates which are the best in the industry by focusing on the strategic imperatives of the business.

- Technology/Knowledge Transfer

  The transfer of information, including technology, strategies, tactics, practices, and knowledge, allows all parties to continually improve their capabilities and results. An Extended Enterprise quickly incorporates up-to-date customer requirements into design and manufacturing approaches across the entire chain. An Extended Enterprise facilitates strategic innovation and improvement by transferring knowledge to all members.

"Are we all becoming more successful?" This question asks whether a Extended Enterprise is earning a return on investment which contributes to the success of all members of the supply chain.

- Value Exchange

  This measures the extent to which the chain and chain members are succeeding financially. The goal is success for the chain and a fair distribution of benefits throughout the chain based on contribution. Success results from effective cost, resource, and market management. All members of the supply chain must agree to the boundaries of critical success factors and drive performance that achieves strategic goals.

- Competitive Advantage

  Members of an Extended Enterprise must be strategically aligned to achieve sustainable competitive advantages and continuous improvement.

Joint assessments contain a certain element of risk, but they allow each participant to learn how they are perceived by the others. A structured dialogue is needed to ensure that differences of opinion can be addressed in a systematic and objective manner. It is reasonable to disagree, but the emphasis should be on achieving higher levels of awareness and realizing potential opportunities.

The answers to these six questions and the ability of the Extended Enterprise members to grow and prosper are tied to the two basic issues of intent and methods. No one group has all the answers to the important questions that supply chains face, nor will this report provide the ultimate solution. However, a good metric provides a basis from which to seek solutions. *The Wheels* tool enables suppliers and customers to improve their probability of finding the optimum solution. Additionally, it supports the ability to make informed choices so that continuing improvements can lead to strengthened and renewable competitiveness.

7. Summary

Companies will no longer compete against other companies. Instead, Extended Enterprises will compete against other Extended Enterprises.

This new competitive environment mandates that organizations identify and leverage resources outside the internal "organizational walls." The acquisition of these resources will require new approaches to supplier relationships.

A substantial level of energy and effort is required to pursue supply chain optimization. Leadership must first realize the tremendous resource supply chain members can contribute, and they must create an environment that allows these resources to be harvested.

The Extended Enterprise Framework provides a structure to help elevate supply chain management to a strategic level. The framework highlights the critical necessity of identifying and incorporating core competencies and resources. The framework requires the business planning process to specifically state which core competencies will be incorporated to accomplish the organization's strategy.

The concept of the Extended Enterprise is being incorporated across many highly successful organizations. Aligning supply chain members is providing significant competitive advantage for companies engaging in this strategic management approach.

Developing the organizational environment to implement the Extended Enterprise requires a set of common values and expectations shared among its members. This report presents the Axioms of the Extended Enterprise. These nine critical understandings set the stage for the behavior of all Extended Enterprise members.

The Extended Enterprise selection model provides a powerful tool to identify and evaluate potential enterprise members. This model ensures that the membership selection process encompasses a holistic view of a member's specific attributes.

The Five-Box Model uses strategy and metrics to refine and link the expectations, relationships, and processes that guide the Extended Enterprise to perform as a collective system.

Finally, the QCAE assessment tools facilitate a mutual understanding of customer-supplier performance. The QCAE assessment tools provide a "vehicle for dialogue" which is the first and most important step toward integrating supply chain members.

The Extended Enterprise Framework, axioms, selection model, Five-Box Model, and QCAE assessment tools all represent industry-developed tools and models to approach supply chain optimization.

Presented in this report are several key concepts and models which will help frame supply chain improvement initiatives. Since each organization has a unique set of competencies and resources, there is no generic model that can assure supply chain optimization. There is, however, a set of essential understandings that will help organizations dramatically improve performance by using all assets and resources of the Extended Enterprise. This report is intended to provide a foundation and framework to accelerate the efforts of companies engaging in the supply chain improvement journey.