Optimizing The Extended Enterprise in the New Economy

B2B in Supply Chain Management
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Agenda

• Introduction
• Supply Chain Integration - A Definition
• The Changing Environment
• The Internet as Enabler
• Business and Technology Implications
• Emerging Opportunities
Introduction

• The definition of “Supply Chain Integration” has transformed over the last few years.

• The Internet has made possible virtual enterprises extending far beyond the boundaries of traditional supplier-manufacturer-customer material-based supply chains.

• Our business relationships now require more powerful capabilities to ensure high-performing, adaptive, flexible partners can meet business needs.

• Business as a result requires new processes, practices, techniques and tools.

• These will be used for designing, assessing, and optimizing the business capabilities of the new virtual enterprise.
Supply Chain Integration: A Definition
Traditional Supply Chain Definition

**CHALLENGE:** Balance of Customer and Shareholder Value

Supply chain = Activities within and between each circle

Supplier | Manufacturer | Customer

Supply chain = Entire context of the product life cycle

DISCOVER | DEVELOP | DEPLOY

**CHALLENGE:** Balance of Customer and Shareholder Value
Supply Chain Integration: A Model

- **DISCOVER**
  - Early Engagement
  - Preposition
  - Generational Learning
  - Standards/Reuse

- **DEVELOP**
  - Design for Market
  - Supply Chain Health
  - Yield Improvement
  - Market Monitoring

- **DEPLOY**
  - Supplier Selection
  - Qualification/Certification
  - Process Control
  - Continuous Improvement

- **Technology**
  - Technology
  - Early Engagement
  - Preposition
  - Generational Learning
  - Standards/Reuse

- **Cost**
  - Cost
  - Design for Market
  - Supply Chain Health
  - Yield Improvement
  - Market Monitoring

- **Quality**
  - Quality
  - Supplier Selection
  - Qualification/Certification
  - Process Control
  - Continuous Improvement

- **Availability**
  - Availability
  - Selection/Reuse
  - Capacity Installation
  - Supply Chain Mgmt
  - Flexibility
What Does Integration Entail?

Integration is:
- information
- coordination
- systems
- organizational linkage
- incentive alignment

Integration means:
- systems thinking
- shared vision
- team learning
These are no longer sufficient for competitive advantage
The Future of the Internet and Supply Chain Integration

Today’s internet is being used to do today’s business...

The internet’s power is its ability to create the business of tomorrow.
What Has Changed?
Environment Shifts

- Global markets - millions of customers
- Level playing field - millions of suppliers/partners

- The Internet Revolution – “a time of reckoning”
  - Sustained Growth is now the driver
  - Lifecycles in “Internet time”
  - Internet driving and enabling new business models

- Disruptive technologies enabling the future
  - transformation is dependent on critical mass and business change

- eBusiness (B2B and B2C) is huge; the $ is in B2B
- Information flows becoming as critical as (more valuable than) cash flows

- Supply Chains “morphing” into dynamic virtual enterprises and realigned industry structures
- Relationships and collaboration transforming the way business is defined and transacted
The Internet Revolution: Sustained Growth is Now the Driver

GartnerGroup E-Business Adoption Hype Cycle

Source: GartnerGroup
What Is Beginning To Happen

• The Internet is pervasive and entering a major new phase
  – Everyone gets it Everywhere – S L O W L Y

• Shift in power to the customer/consumer
  – Infinite choice, perfect pricing knowledge
  – The global Internet extends the reach and richness of interactions

• Economic downturn intensified the search for savings and efficiency

• The Internet eliminates “slack”
  – Slack time, inventory, slack/easy margin $$
  – No slack = No forgiveness for errors
The Future is Customer Centric!

- **Optimize transactions:**
  - integrate suppliers' services automatically into your processes
  - send services to customers which they can automatically integrate
  - use business intelligence of customer and market to drive SN responses
  - automate integrated business processes

- **Optimize information mgmt:**
  - receive data from multiple internal and external sources automatically
  - allows knowledge workers to focus on decision making activities, instead of information collection

Services are automatically available in the format in which people can intelligently use them
Emergence of Value Webs – The Future of e-Business

“Many enterprises are focusing on relatively low value (and low cost) opportunities – particularly in the B2B segment. As enterprises successfully use e-business applications to drive significant changes in their business models... organizations will focus more on the quantum opportunities, which although riskier, provide the source of real differentiated and sustainable advantage.”

Source: NerveWire, Gartner
Market Trends - Integration

New Value Web Business Models Dominate – The ValueNet Integrator

Traditional Competitive Model

- Customer Intimacy
- Value Disciplines
- Product Innovation
- Efficiency

Market dominance enabled by leadership in a single discipline

New Economy Competitive Model

- Enterprise
- Demand Integrator
- Design / Innovation Integrator
- Supply Integrator

Demand Integrator

Market dominance achieved by obtaining the right combination of ownership, control and access across all integration positions in the industry value web

Source: NerveWire
What Are the Implications?
Market Environment - 2004

- Competition is global and fierce; especially in growth business
- Technology alone is no longer a sustainable advantage
- Primacy and speed is necessary, but not sufficient
- Radical shifts in traditional channel and distribution models
- Solutions preferred over technology building blocks
- Deliberate management of technology innovation coupled with market intelligence will bring competitive advantage
Technology - 2004

• eBusiness evolving from transactions and content delivery to Total Customer Experience

• Customer and partner relationship tools and business process-based integration are required to enable Collaborative Commerce

• Personalized browsing, event driven activation, peer to peer collaboration, services-based interaction, and dynamic business links required

• Wireless grows to ubiquity, broadband making inroads

• Sensor networks and agent-based computing herald the arrival of proactive computing

• What are the usage models for business?
• What does brand, service, and competitive performance mean in this world?
Setting the Stage

• **New business models will value agility more than raw speed**
  – The ability to change/add partners/suppliers rapidly
  – The ability to attack new opportunities and head in new directions quickly
  – Modular processes that facilitate interaction and change

• **Speeding up basic processes is still valuable**
  – A faster process is a less expensive process in general
  – More kinds of information – often unstructured – will have to be exchanged, more often

• **Integration of the entire enterprise: from demand to supply and from new product creation to market, must occur seamlessly**
  – Feedback from the market needs to drive new product development and business model evolution
  – Real collaboration with outside organizations – extensions of the enterprise
Where Does This Take Us Next?
As companies diversify into new businesses and markets, and work to transform their core businesses with technology innovation AND market leadership, a number of new opportunities need to be explored:

**Enter New Markets/Extend Existing Business**

- New partnership creation (geographic extension, product extension/integration)
- Develop strong demand integrator capabilities including downstream suppliers (to drive markets and product opportunity)
- Apply market research and analysis capabilities to determine customer preference and product characteristics (driving both brand strategy and capacity/supplier management)
- Integrate/synchronize product marketing strategies with supply chain design and execution strategies
- Develop market & eBusiness strategies through competitive business models and enabling capabilities (technology, business) to drive leadership position in products/services and business execution
Demand Management

Investigate impact of “bull-whip effect” on demand and supply
• Respond with collaboration planning and share upstream demand to downstream supply
• Investigate semiconductor capacity constraints and shorter product life cycles increasing bull-whip effect
• Understand the overlapping lifecycles of each of the products as a secondary effect of the above
• Systematically differentiate between NPI, full production, and EOL and determine when to switch from one set of principles to another
• “Manage” product release timing and pricing policy to manage demand/supply and market

Investigate forecasting methods
• Determine strategies to address out of sync front-end supply forecasting and lead time with back-end customer service and order cancellation policies
• Apply Business forecasting techniques– where the market is going (products, volumes, etc) to improve demand/supply/capacity forecasting techniques
• **Market Strategies affecting SN performance:**
  – Pricing / Promotions / Allocation
  – “Moving the Market”

• **SN Strategies to transform Market response:**
  – SN oscillations and responses (FGI, Hubs, etc)
  – Localized optimization & SN performance
  – Inventory responses (FTO, Product Transitions, Ramps)
  – Flexibility embedded in CE!

• **Emerging Opportunities:**
  – SCV – collaborative design and transformation
  – Internal Markets – changing the nature of S/D optimization & response
  – Web Trust – the meaning of Brand
  – NG Model-based standards and interaction
Understanding Complexities

Demand & Product Family

Inventory in Chain

Capacity Relative Desired

- Demand Peak (Million Units)
- Available Inventory
- Fear
- Capacity Relative to Desired
- Hope
- Need
- Fear
- 1 Yr
Emerging Opportunities:
New Conversations for Business Collaboration
SN Collaboration

• As supply chains require more flexibility and responsiveness, and as effective supply chain coordination across functions and companies becomes more and more critical, traditional organization structures, processes, and interactions will become increasingly irrelevant.

• **New types of conversations and relationships will be required** for success of these high-performing integrated supply networks.

• Successful companies in the future will need much more effective ways of **rapidly designing, redesigning, and co-managing across their supply networks**.

• Agility will improve if players can effectively share and leverage knowledge that is distributed across the supply network to make decisions and respond to change.

• This can be done by providing new capabilities for capturing, modeling, visualizing, and sharing relevant knowledge within a business and across its supply networks.
Business Drivers

• As business boundaries become more transparent, the relationships between suppliers, customers, and service providers drive the need for new forms of system integration, analysis, and business interaction.

• New mechanisms and tools for managing and improving these virtual enterprises are required for:
  – better understanding: of supply chains at different levels of abstraction (high level, by relationship, detail levels, etc) via non-traditional interfaces: TUI and GUI
  – faster analysis and reconfiguration: implement change in SC faster through dynamic modeling and simulation
  – faster decision making: to make decisions in the SC by providing process-directed knowledge management across the supply chain
SN Collaboration: New Challenges

This transformation to integrated business environments brings with it new challenges:

- Standard contracts vs relationships and trust
- Information and knowledge sharing
- The need for fluid, dynamic, and integrated business policies and practices
- Enhancing the overall performance of the enterprise may be in conflict with individual business metrics and drivers
- Increased business dispersion and diversity increases:
  - Ownership and control issues
  - System and business process conflicts
- Interactive business collaboration environments are required
- Development and extension of modeling / simulation tools and techniques to address complex supply network ecosystems
Emerging Opportunities:

Closing the Gap between Market Dynamics & Supply Response
Aligning Capacity to Market Demands

• One of Intel’s most important (and most expensive) resources is its manufacturing capacity.

• Intel spends substantial amounts of time, money, and management talent on allocating this resource.

• The current mechanisms for managing this resource is less efficient and less flexible than it could be.

• The worst possible scenario is to highly utilize this capacity and respond to the market with the wrong result at the wrong time.

• How can market theory and dynamics be introduced into the planning process to ensure maximum return on these resources?
Creating an Internal Market

- **Two of the most common kinds of resource allocation mechanisms are:**
  - hierarchies (centralized planning)
  - Markets

- **Markets often require (and allow) more information processing**
  - (more people’s minds can be working on problems in parallel)

- **Markets often have more efficient and flexible results**
  - Most people assume it works in national economies
  - Why not inside companies?

- **Market mechanisms can provide insight at two levels:**
  - Into the overall performance of a market environment, as well as
  - Provide greater individual accountability

**What if internal markets were used to proactively align supply and demand?**
Summary
Opportunities to Excel

- Create a global virtual enterprise connected and synchronized via the Internet
- Understand the new economics of information and networks
- Make your processes information-driven, automated, and networked to speed up and lower costs
- Transform ubiquitous data to information, knowledge, and decisions
- Culture change… think horizontal/virtual not vertical/internal
- Inter-company business process and integration standards enable virtualization – support their widespread deployment
- Apply broad and deep use of automation to link related internal AND external markets
- Use data “exhaust” to optimize all elements of the supply network, industry forecasting, and customer needs assessment
- Make the Internet a market, a channel, and a delivery platform

Rethink where your business boundaries begin and end
The Path to Action

• Willingness to **redefine the industry** you compete in
• Readiness to **reshape the boundaries** of your business
• Ability to leverage world-class **partners** providing scale and complementary core competency
• Discipline to focus on the **unique value added** by your business while letting go of the rest
• Alignment throughout the enterprise to **move rapidly and consistently**
• Implement the systems required to **manage the new interfaces** and exploit new information flows

**These points are not new, but in a virtual world, the answers are!**
Where Do You Fit in the Internet Economy?

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<th>Today/Future</th>
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<td>• eBusiness = Business</td>
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<td>• Supply chains (linear, sequential)</td>
<td>• Global, virtual value enterprises</td>
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<td>• “Batch” information</td>
<td>• Information glass pipeline</td>
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<td>• Supplier centric</td>
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<td>• Data exchange</td>
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<td>• Few interface standards</td>
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<td>• Suppliers &amp; Customers</td>
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Yesterday

Today/Future
Common Problems with Supply Chains

• Hard to explain “intangible” supply chains

• Hard to understand and manage supply chain dynamics
  – Within one company, across companies, and over time
  – With rapid response to changing needs

• Hard to rapidly invent, redesign, and reconfigure whole supply chains

• We need to change the nature of the conversations
Supply Chain Visualization

The Problem with Supply Networks (SN)
- **Intangible**: hard to quickly grasp underlying dynamics
- **High complexity**: Hard to manage across entire network
- **Change**: Hard to rapidly invent, redesign, and reconfigure

**Vision**
- 3D manipulation of SN process models by multiple users

**Interdisciplinary: Integrating 3 Components**
- Tangible User Interface (TUI)
- Systems Dynamics models and simulations
- Process Handbook Knowledge Repository

**Value**
Solve SN collaboration issues (product mix, demand variability)
Tangibly illustrate dynamics of SN system
Enable comprehensive rapid analysis and redesign

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**Process Knowledge Repository**
Extending the semantic network of entities and relations with the **Process Handbook** to capture the semantics of SD and support SN modeling

- **Software**: repository engine, web server, editing tools
- **Business Content**:
  - Over 5000 processes & activities
  - Generic business models
  - Taxonomy of generic activity types
  - Case examples
  - Structured model taxonomy (substitutions)

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**System Dynamics**

- Modeling with “Molecules”
- Simulation for relationships & interactions
- Analytical Approach – Loop Advisor
- Working with real world data

Surprising power of applying Process Handbook specialization concepts to systems dynamics models

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**TUI: Sensetable**

- **Patten, Ishii, Pangaro 2000**

  - TUI platform to track multiple Supply Chain objects and their states on a table with video projection.
  - Using GUI to map tangible objects to the things they represent
  - WIP: tracking large # of smaller objects to support rearrangement & construction of Supply Chain models

Surprising power of tangibility and the power of using “multi-handed” simultaneous manipulation of controls.
Broader value of interacting with “intangible” systems via tangible interfaces
Technical Value

- We expect TUIs to provide the means for people to access and utilize abundant online information in an ordinary physical environment.

Expanding the paradigm beyond GUIs will be a breakthrough in electronics, computing and software applications development.

- The Systems Dynamics research has the potential to revolutionize the system dynamics practice by significantly increasing the insight that is extracted from system dynamics work. Currently, analysis is informal, difficult to learn, difficult to replicate, and time consuming.

In addition, the ability to integrate discrete event and SD simulation will allow abstraction and analysis of localized behavior as it relates to global SC behavior and performance.

- Integrating the SD “Molecules of System Dynamics” with the “Taxonomy of Business Processes” in the Process Handbook will create a coherent body of knowledge.

This will have significant value to businesses and greatly impact how systems dynamics models are created, taught, shared, and analyzed.
Business Value

• As the world moves to ubiquitous computing, we expect TUIs to provide the means for people to access and utilize abundant online information in their natural physical environment and location.

This could dramatically increase computer usage in many more natural settings.

By taking advantage of multi-modal human senses and skills developed through a lifetime of interaction with the physical world, TUIs should improve the communication bandwidth with the computer and provide a more natural level of abstraction for manipulating very complex information.

• As the complexity of the computational task grows, more powerful end user abstractions are needed to for users with the specific business domain knowledge to tackle real organizational policy issues.

The SD analysis will enable practitioners to discover what structure is responsible for what behavior in a model, thereby enhancing the usefulness of simulation.

Providing new User Interface metaphors in both the Tangible user interface (TUI) and Graphical User Interface (GUI) will significantly improve experiential learning of business users around the policy decisions inside supply chain management.
Internal Markets could help to simultaneously:

(a) allocate manufacturing capacity, and
(b) determine the prices, delivery dates, and product mix of the products being sold to customers.

The key idea here is that a set of much more decentralized, market-like processes could be used to make these same decisions.

What differentiates an Internal Market is access to more information, increased interaction, and incentives that enable individual and overall market performance.

Continuing reductions in the costs of information technology now make it feasible to implement such market-like processes in many situations where it would have previously been prohibitively complex or costly to do so.

Our hypothesis is that such market-based processes, if implemented well, could result in much more profitable and timely decisions at much lower cost.