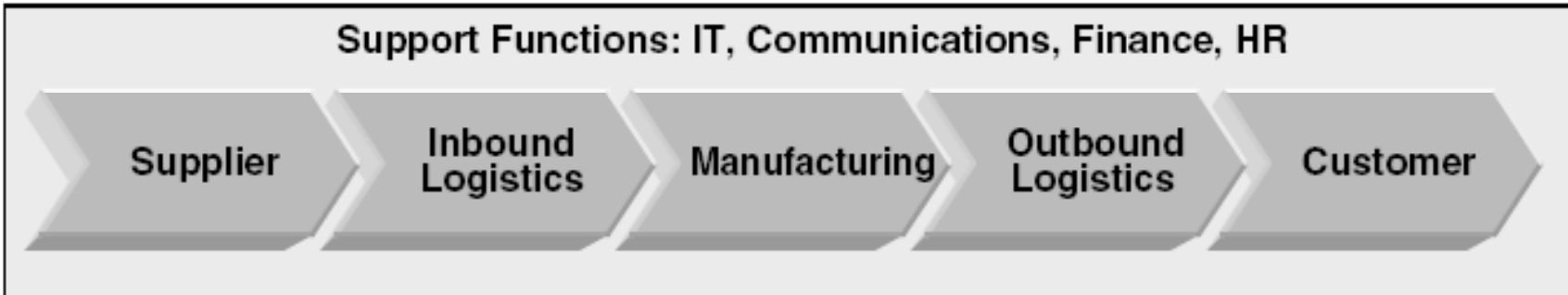
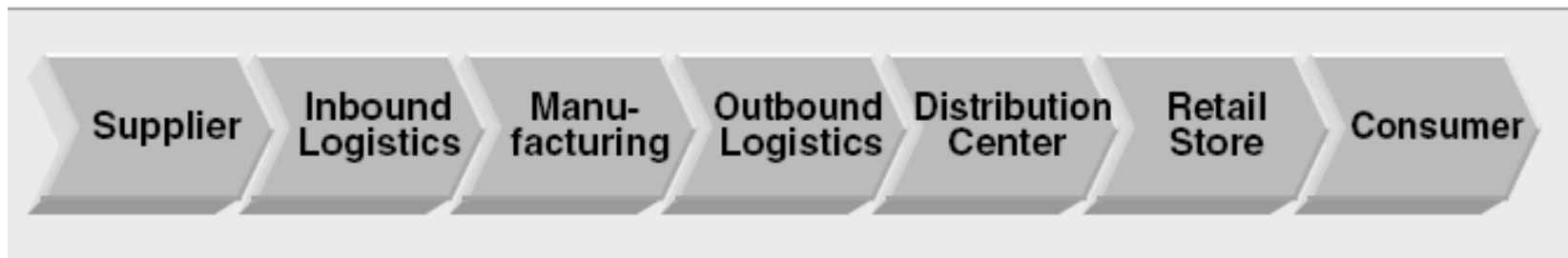


# SUPPLY CHAIN , INTRODUCTION

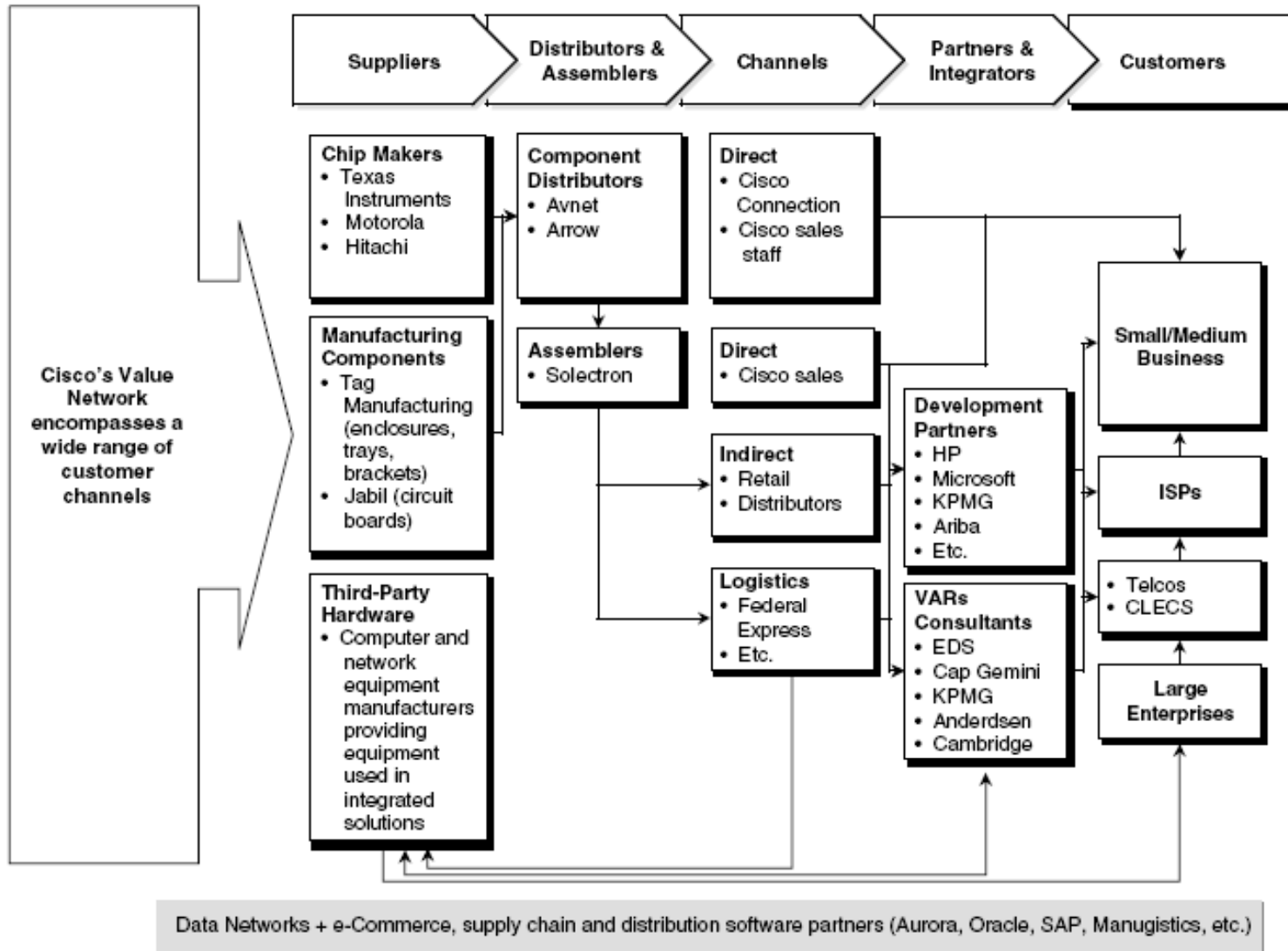
Traditional supply chain

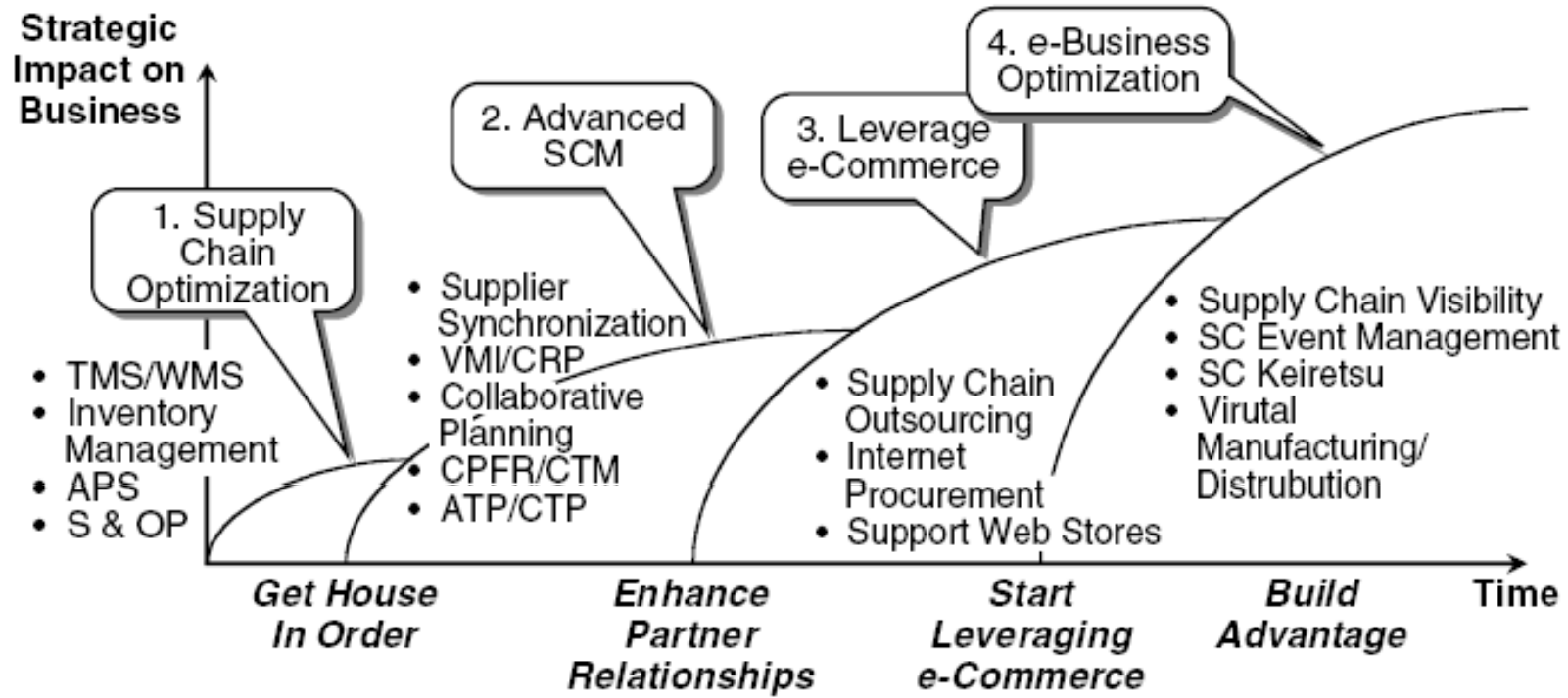


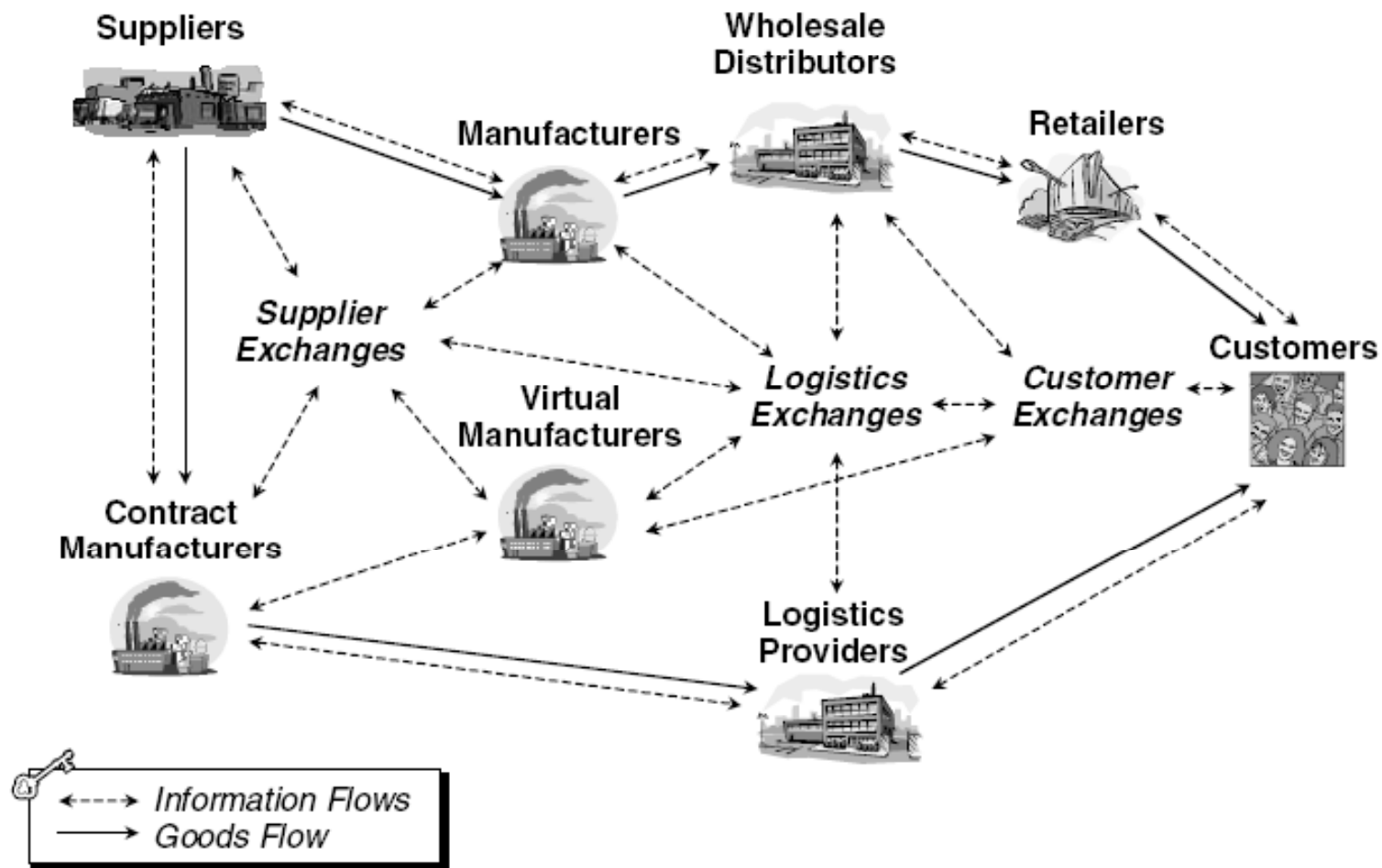
Extended supply chain











- Level 1, internal/functional, focuses on sourcing and logistics, concentrating on internal needs and business unit efficiency, while neglecting organizational synergies.
- In the first level of supply chain evolution, the firm invariably works on an internal basis, seeking to expand its cost improvement effort, while focusing on total supply chain processing.
- The methodology is to look at functional improvement (getting better at buying, planning, warehousing, and shipping) and operational efficiency (lowest cost to manufacture), typically within a specific business unit. Departmental silos and independent operating units cover the landscape.
- Little cross-organizational cooperation exists in this early level and is rarely encouraged. Real savings are possible, particularly from improvements to sourcing and logistics within a business unit.
- The supplier base is reduced, volumes are leveraged, and costs decline. So long as quality is not impaired, savings can be significant and funding is created to continue the effort into the other levels.

- In the area of logistics, transportation costs are reduced, warehouse space is matched with need, and inventories are scrutinized for possible reduction. Transportation management systems (TMS) and warehouse management systems (WMS) are features of this part of the evolution.
- Most firms finish Level 1 with an improved order entry and order management system that eliminates errors that confound such systems and speeds the cycle time from receipt of order to receipt of cash payment.
- Some Level 1 firms try to apply these improvements across business units to establish a basis for intra-enterprise interaction and cooperation, but are generally driven back because the units and functions refuse to share resources and information or accept help outside their limited boundaries.
- No firm wants to remain in Level 1, but several will never leave that part of the progression.
- The potential to add profits to a firm's profit and loss (P&L) probably peaks around 1 to 1.5% in this Level. That means a company's profit margin before taxes can increase from 5% to 6 or 6.5%.

## Level 2: Internal/Cross-Functional

- Level 2, internal/cross-functional, focuses on internal excellence, breaking down the internal walls and beginning intra-enterprise integration.
- In the second level of progress, the company remains internally focused, starts to move away from functional organizational structures and begins building a foundation for an optimized internal supply chain.
- The walls that typically separate parts of the organization and inhibit leveraging the full scale of operations are broken down. Now the company starts cooperating within itself and a cross-functional effort begins.
- Separate business units come together to see what they buy in common, what they process and ship, and to determine where the opportunities exist to collaborate without harming market capabilities or functional excellence.
- Some form of shared services based on aggregated demand is created within the firm to take advantage of the full size of the organization. Transportation needs across the firm are studied to see where synergies can be applied.
- Sharing of best practices starts to move across functions and units. The seeds of advanced technology are planted as a communication intranet is established and software introduced to enhance planning and scheduling.

- Features will include advanced planning and scheduling (APS) and sales and operations planning (S&OP). It is a time for getting the organization primed with respect to supply chain process steps that are vital to market success.
- Level 2 companies sort out their customers by segmenting them into classes that define their importance to the firm and the needs important to each class. Performance metrics that relate to customer satisfaction begin to appear as the idea is to match service with value rendered and received.
- Technology, as an enabler, also begins on an internal basis as the *intranet* is used for sharing information across the firm. Enterprise-wide resource planning (ERP) systems come into the picture as the transaction engine for the firm. Some form of advanced supply chain planning solution, from such firms as i2 Technologies or Manugistics, will be in place to identify system constraints and smooth planning and manufacturing flows.

- Leaders will reach the point where they have an available-to-promise capability to show the best customers what is in the supply pipeline and to make delivery date commitments that are kept.
- Somewhere close to 70 to 80% of all companies studied fall into this level, although many of those firms have footsteps in multiple levels.
- Because some business units will progress with or without the rest of the company, firms can find themselves with parts of the organization spread across the entire evolutionary progression.
- Not every firm, or all parts of a firm, must leave this level. Another 1 to 1.5% can flow to the bottom line in this level.

## Level 3: External Network Formation

- Level 3, external network formation, focuses on the customer through collaboration with selected partners. A strong cultural wall stands between Levels 2 and 3 — a wall that schools all effort should be focused on internal excellence. Customers are an important by-product of the effort, but compensation, bonuses, and payoffs are still strongly related to what gets pushed through the improved internal supply chain.
- Only with an external view can the firm move forward with the help of partner collaboration. Now the company begins to link its processes with selected customers via the previous market segmentation, while eliciting the help of a few key suppliers to make sure promises made can be promises kept.
- An *extranet*, designed to link these partners, comes into being. The company seeks out willing constituents of the supply chain that can assist in finding the next level of improvement.
- An extended enterprise perspective is brought to the discussions as the firm realizes it is only one part of the network of companies focused on a particular customer or consumer group.

### Level 3: External Network Formation

- Together, these allies focus on customer satisfaction and align supply chain efforts so a distinctive advantage is gained in the eyes of those customers.
- ERP-to-ERP connections and alignment occur in this level, as those typically large investments begin to pay off from an external perspective through the valuable integration of knowledge that helps all network partners.
- Vendor managed inventory (VMI) and customer replenishment planning (CRP) systems mature in this level. The firm finds it can now offer available-to-promise (ATP) and capable-to-promise (CTP) features as well.
- Only about 10 to 15% of my sample of supply chain firms has made it over the cultural wall and is firmly planted in Level 3. Here we find the companies that determined it was necessary to take an external viewpoint to process improvement and to elicit the help of willing and trusted partners.
- It is here that companies really work for the benefit of their customers and do all they can to optimize the end-to-end processing that results in satisfaction for those customers

- A caution must be mentioned here. There are as many stories of failure in this transition from Level 2 to 3 as there are success stories.
- The failures typically involve firms trying to move too much of the company to a higher position too fast before the internal house is in order.
- Most firms successfully reach this level, not because of a corporate-wide effort, but because one or two visionary business leaders take the initiative and moved their units into the necessary external environment.
- With proof of success, others then follow the example. A full two points of profit can be added to the P&L when this level is completed.

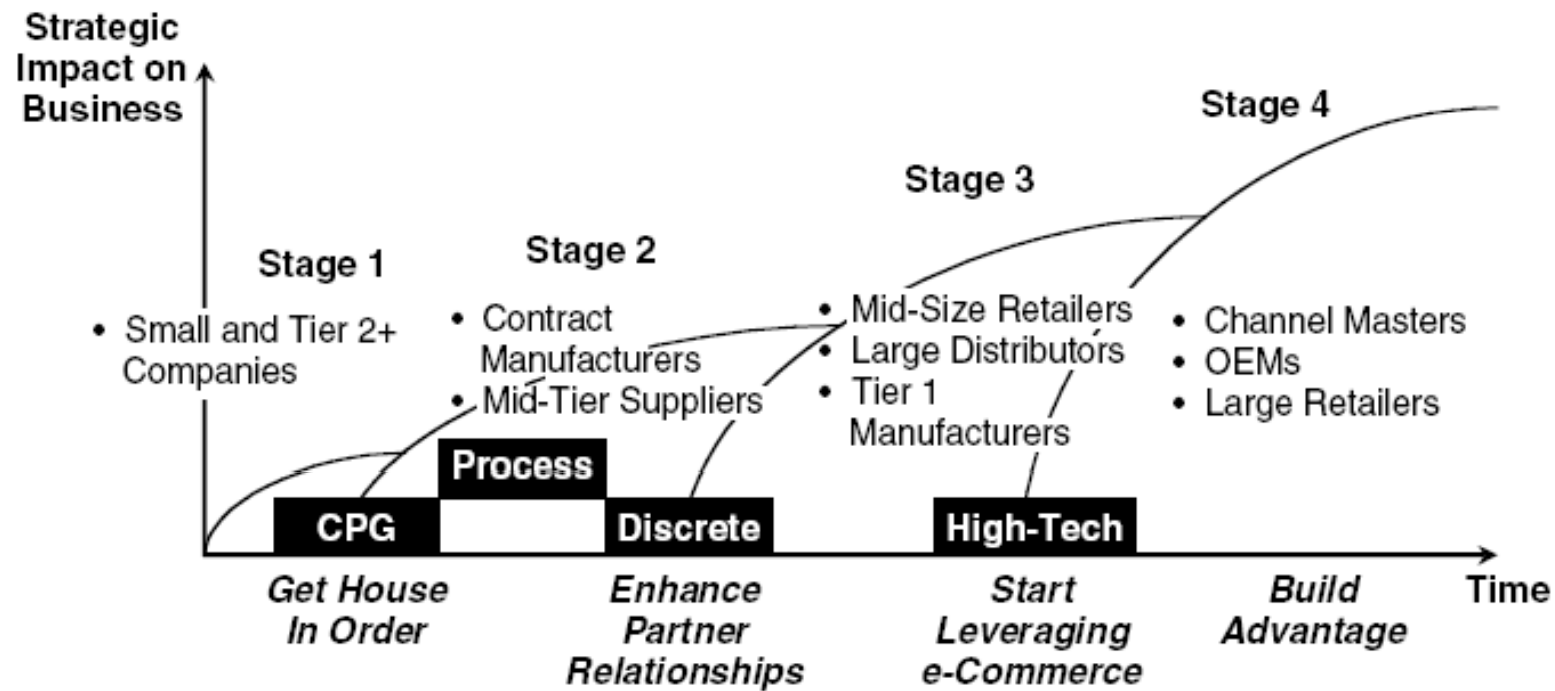
- Level 4, external value chain, focuses on the consumer with partners and establishes inter-enterprise synchronization. As collaboration succeeds and technology is used as a key improvement tool, the linked firms move into an industry leadership position where a value chain constellation begins to form.
- This entity is a set of firms cooperating as an extended enterprise to dominate a particular market or industry by virtue of having the delivery system of choice in the eyes of the desired business customer. Now the firm is part of a constellation of companies that represent the end-to-end value chain, with all of its complexities understood and under an overall improvement effort.
- Firms in this level look seriously at supply chain outsourcing to find the most capable constituent for process steps. E-procurement systems are in place and supporting Internet communication systems link the partners.
- A new dimension is added. Realizing that any supply chain ends with consumption, the focus moves to a targeted end-consumer group. Now network resources move from attention to the bottom line (cost reduction) to the top line (new revenues in the desired market sectors)

## Level 4: External Value Chain

- The supply chain becomes a value chain effort in this level, as enough information is shared to pinpoint all the costs and values from end to end of the network, and partners focus on how they can optimize all the process steps.
- Working together, members of the value chain begin to synchronize efforts across the inter-enterprise network. That means firms align the supply chain process steps into a single, logical, extended enterprise, operating as a fully linked and optimized end-to-end B2B2C network from suppliers to consumers.
- The number of firms in this level is very small and rates only 1 or 2% of the total sample. Here we find the firms that have worked collaboratively with suppliers, distributors, and customers to build new business models focused on end consumption.
- These models are enhanced front to back with e-commerce features and the best cyber-based technologies. Another one to two points can flow to the bottom line in this level.

- Level 5, full network connectivity, focuses on cyber technology as the value chain enabler to achieve network optimization.
- The final level of progress is more theoretical than factual because of the limited number of firms that occupy this space. It is an area where full network connectivity has been achieved in which all of the important transactions are visible online.
- Partners share vital information electronically and bring an unprecedented low cycle time to the processing that takes place across the full network.
- Supply chain visibility is achieved, inventories are viewed on a real time basis, and forecasting error is reduced to workable levels or banished in favor of direct linkage to consumption.

- Manufacturing, distribution, and transportation are virtual efforts taking advantage of all the modes in a system. New products come out in a fraction of typical time frames with a higher possibility of success.
- The opportunity to create savings while generating new revenue is possible for all parties in the value chain. There are so few Level 5 organizations, we cannot give it a percentage.
- This is the land of opportunity where the final points are added to profits, bringing a total improvement of 5 to 8% to the bottom line of the P&L.
- That means a firm starting with a before-taxes profit margin of 5% can increase that figure to 10 to 13%.



- Supply chain is the latest business performance improvement effort for good reason as the results are proving.
- It is the umbrella process under which a firm can merge the best of its previous continuous improvement efforts to gain the next level of better performance and customer satisfaction.
- Taking best advantage of supply chain management requires defining the end-to-end process steps involved, the scope of what must be achieved, and then progressing through evolutionary levels to the level necessary for the firm to achieve a market advantage.

- Level 2, is sufficient for at least the early supply chain effort , the firm sets that as its target.
- Small companies and Tier 2 suppliers (suppliers two steps removed from an OEM or final manufacturer) fit this part of the evolution. Consumer products firms are advised to adopt this level as minimum progress.
- Firms well upstream in a supply chain, supplying minerals , power, water, chemicals, or farm products, also fall into this area of concentration.

- enhancing partner relationships,
- mid-tier processing firms (office products , manufactured sub-assemblies, plastic products) , manufacturing automobile assemblies, airplane parts and sections, and defense equipment.
- Financial service organizations typically fall in here with banks and lending organizations.
- Discrete manufacturers making products for retail sales also span this and the next level as they need to link their output with what is being demanded in the stores.
- Examples include sports gear, clothing , cosmetics , furniture , and accessories.

- As the firm moves into Level 4, start leveraging e-commerce, the need for connectivity with partners begins to increase dramatically. Now we find
- medium-size retailers, large distributors, and Tier 1 manufacturers.
- High-technology firms must have a footstep in this and the next level of the evolution, as that entire industry is on the forefront of moving to Level5.
- Firms engaged in electronic equipment and entertainment also have little choice but to move to this level.
- Appliance manufacturers are well advised to follow suit.

- When the determination is Level 5, build advantage, the need to have full network connectivity is essential. Now we see t
- the nucleus firms or channel masters that will dominate their industries.
- Original equipment manufacturers (OEMs) and the very large retailers fill this space.
- Names like Ford, General Motors, Kraft Foods, Boeing, Procter & Gamble, Siemens, General Dynamics, Nestlé , Sainsbury , Kroger , Carrefour, Sears, and Wal-Mart fit in this level.

## THE TREND IN SUPPLY CHAIN

<b>Progression</b>	<b>Levels 1 &amp; 2</b> Internal Supply Chain Optimization	<b>Level 3</b> External Network Formation	<b>Level 4</b> Value Chain Constellation	<b>Level 5</b> Full Network Connectivity
<b>Business Applications</b>	Supply Chain Optimization	Advanced Supply Chain Management	e-Commerce	e-Business
<b>Design, Development Product/Service Introduction</b>	Internal Only	Selected External Assistance	Collaborative Design – Enterprise Integration and PIM-Linked CAD/CAM	Business Functional View – Joint Design and Development
<b>Purchase, Procurement, Sourcing</b>	Leverage Business Unit Volume	Leverage Full Network Through Aggregation	Key Supplier Assistance, Web-Based Sourcing	Network Sourcing Through Best Constituent
<b>Marketing, Sales, Customer Service</b>	Internally Developed Programs, Promotions	Customer-Focused, Data-Based Initiatives	Collaborative Development for Focused Consumer Base	Consumer Response System Across the Value Chain
<b>Engineering, Planning, Scheduling, Manufacturing</b>	MRP MRPII DRP	ERP – Internal Connectivity	Collaborative Network Planning – Best Asset Utilization	Full Network Business System Optimization Shared Processes and Systems
<b>Logistics</b>	Manufacturing Push – Inventory-Intensive	Pull System Through Internal/External Providers	Best Constituent Provider	Total Network, Virtual Logistics Optimization
<b>Customer Care</b>	Customer Service Reaction	Focused Service – Call Centers	Segmented Response System, Customer Relationship Management	Matched Care – Customer Care Automation and Remediation
<b>Human Resources</b>	Regulatory Issues/Hiring, Recruiting, Training	New Work Models, Training	Inter-Enterprise Resource Utilization, Training	Full Network Alignment and Capability Provision
<b>Information Technology</b>	Point Solutions Internal Silos	Linked Intranets Corp Strategy/Architecture	Internet-Based Extranet Shared Capabilities	Full Network Comm. System Shared Architecture Planning

The design and development effort for new products is usually engineering driven, with pressure on creating best product features, designing breakthrough innovations, and finding applications of current technologies.

For industrial products, quality is often worked into the designs after products are manufactured and tested.

For consumer products, there's a long list of developments in the queue and a considerable amount of marketing input, with only a slight guarantee that any new introduction will become successful after reaching the market.

Only about five percent of Level 1 and 2 developments achieve commercial acceptance.

- The purchasing, procurement, and sourcing functions demonstrate another progression. In Levels 1 and 2, the emphasis is typically on leveraging volume and supplier share for the lowest unit cost. That's generally done at the individual business unit level first, but could progress across the firm, especially in non direct categories of buy. It is difficult for any firm concentrating on internal excellence to do much more than hammer its supply base for continual cost reduction. A few strategic relationships will be found as the number of suppliers is reduced, but true collaboration comes later in the progression.
- In Level 3, purchasing is better understood as a strategic tool and leveraged at the full intra-enterprise level. Then comes a move to expand the leverage through aggregation across the network.
- In Level 4, the role of purchasing expands dramatically in the eyes of senior management, and this function begins to play a central role in the network formation effort by bringing in key suppliers to make an impact on design, planning, and manufacturing. Supplier expertise is sought and used to enhance the production processes. As the emphasis also shifts to core competencies, this function plays a critical role in identifying the suppliers that can provide larger assemblies or take responsibility for entire parts of the production process. The function also finds new sources, often in nondomestic locations, where superior parts, delivery, and pricing can be found. This is definitely an area where the typical engineering and manufacturing push back has been subdued.
- E-procurement begins to be a factor as transaction costs are reduced by virtue of having a buying robot do a lot of the tedious work involved in catalog search, bidding processes, and vendor selection.

- The marketing, sales, and customer service functions collectively take on new roles as well. In Levels 1 and 2, the emphasis is on internally developed programs and promotions, as the firm is convinced the route to success is through providing what they think is best for the customer and the need to push production toward the customer.
- It is in these levels that we hear a lot of talk about the importance of the customer but very little real meaning. Compensation systems are an inhibitor here as they generally favor the push system and rewards for volume outweigh any customer satisfaction measures. Account ownership is a central issue and is viewed as a sales strategy.
- In Level 3, the emphasis shifts toward the business customer as firms begin to share what is in their databases and use it effectively to generate new revenues. The role of selling changes dramatically here, from that of information provider, order seeker, and negotiator to becoming the voice of the key customers.
- Marketing moves from doing research and building planning systems that create new demand, to collaboratively analyzing data on customer buying patterns and habits to develop new revenues with the aid of network partners. Customer service moves from being the repository of complaints and customer anguish to being a proactive partner in planning,

## BECOME LINKED PROCESSES

- the engineering, planning, scheduling, and manufacturing portion of supply chain. In Levels 1 and 2, these functions are discrete, without any formal linkages and collaboration, a truly silo type of environment where the emphasis is on MRP, MRP II and distribution resource planning.
- This is an area where the poor planning function struggles with weak forecast accuracy, trying to satisfy customer needs and falling back on schedule interruptions and expediting to meet many of those needs.
- In Level 3, a sharing of manufacturing schedules begins so there is less confusion and expediting. Engineering specifications are shared and standardized, and external resources used to make them stronger.
- First tier suppliers are made aware sooner of manufacturing plans for new products and often make valuable contributions to the design. Some suppliers are used to assemble tools.
- This sharing does not come easily, particularly as most members of the network will be using different systems. As the firms progress to ERP systems, integration of planning becomes a very serious effort.
- The nucleus firm must play the central role, working with the partners to integrate the disparate systems so crucial information sharing can begin. Now interactive planning and scheduling makes sense, as the partners work together to determine the actual demand and match it with the actual capability to manufacture.
- Level 4 sees the introduction of collaborative network planning, with a team-focused approach to engineering, and production planning appears. The partners seriously evaluate which has the core competency and how best to utilize network assets. Suppliers have access to CAD/CAM and PDM tools and information.

In the logistics function, the Level 1 and 2 firms work with a manufacturing push system. That means the function is primarily in house and oriented around maximizing internal efficiency, and is less focused on customer satisfaction, so the emphasis is on moving products to market in the most efficient manner. These firms tend to be very heavy in inventories as the drive is to push product toward consumption. Incentives are based on high utilization of manufacturing capacity, which rewards a full truck, even at the expense of delayed shipments to customers. Many firms maintain their own assets to make sure they have strong control over this function. When they do turn externally for shipment, carriers are worked to find the best shipping lanes and the lowest cost per mile. In Level 3, the focus still may be on manufacturing capacity, but begins to shift toward a pull system and customer satisfaction. Existing linkages connect orders to shipments, but there is still a lot of expediting to meet actual demand. Then the same people start looking at having the right product at the right place just in time to meet need without all of the commotion. They begin looking at metrics that calculate on-time delivery and fill rates. Often, where the customer has strong leverage, the firm is required to meet time slots when their equipment can be unloaded — true collaboration hasn't blossomed. Logistics lag the supply chain process in that respect. Now third-party logistics providers (3PLs) enter the picture and discussions begin on why the firm is in the transportation business and not working on core competencies. At that point, many firms give up ownership of the logistics assets to one of these 3PLs as this entity accepts responsibility for equipment, drivers, and delivery. In Level 4, the network view causes those in logistics to consider who is the best constituent for providing transportation for the pieces that go into the final product. The best constituent provider means a part of the transportation function could be outsourced to let a supplier deliver and pick up finished product. Now a global view of warehousing, transportation, and delivery comes into play, as the nucleus firm drives an effort to seek lowest-landed cost with the right products being at the point of need. With inbound and outbound freight on either side of each constituent, the question becomes how to make the best use of all available equipment and resources. Truck utilization on a nationwide basis, for example, is estimated to be no better than 60 to 70%, because of all the less-than-full outbound loads and empty backhauls. That becomes an opportunity to better utilize assets. In Level 5, the idea of virtual logistics is part of the collaboration that takes place as the network members want to find the best costs and satisfaction, whether the orders go through traditional channels or are processed through an Internet channel. With residential package delivery, for example, expected to top 2.1 billion per year by 2003, this latter situation is of great interest to business to consumer (B2C) channel providers. Here lead logistics providers (llp) can enter the equation — firms with little to no physical assets, but the wherewithal to find the best

## FROM COMPLAINTS TO PRO-ACTIVE MATCHED CARE

•Moving into the area of customer care, we find a function that is still being defined. In Levels 1 and 2, the firm concentrates on a vanilla version of customer service. Representatives are given the responsibility for responding to customers and helping them with their needs. Much of this work involves dealing with problems, changes, and expediting situations. It's basically a complaint-reaction system. Statistical information is kept on these complaints and Pareto charts are created to get to root causes. Rebates and incentives are often used to promote sales. In Level 3, most firms move to a more focused customer service effort, with call centers to handle the wide variety of inputs received. Call centers are a mechanism to provide some level of consistent service to customers seeking information or redress. These centers are primarily cost centers inside the firm. Some efforts are made to generate new sales by having reps suggest extra values for adding to orders or entering new orders, and thus offsetting expenses. The familiar 1-800 locations have people handling phone calls and trying to satisfy customers, but now an effort

•The Human Resources function is another area going through a transition to keep pace with the changes brought on by the digital age. In Levels 1 and 2, the efforts tend to focus on regulatory, hiring, recruiting, and training issues. Screening applicants is done with internal views for staffing and resources. Little involvement occurs in business planning and strategy. Level 3 of Human Resources involves new working models and using the intranet for creating better communications with employees. Access to training that many might overlook, for example, becomes a feature. Seeding academic programs and career enhancement with business requirements appears. One big U.S. issue was telecommuting as employee lifestyles changed. It is a time when larger firms move a serious amount of data onto the intranet for employee access

## DRIVING THE EFFORT

•Levels 1 and 2 of Information Technology are characterized by point solutions, generally intended to improve some facet of performance for an internal function and, as we note, a silo mentality exists within the company. No consistent use of technology resources occurs as most work is devoted to getting the basic systems in place, particularly accounting. Companies often outsource a portion of the effort with little or no strategic benefit. Few corporate standards are in place as divisions and business units set their own directions. The architecture is usually product based. If there is a corporate architecture, it is from a centralized team and is often an academic exercise that is little used. In Level 3 of IT, the intranet appears and flourishes, linking the various internal groups. A corporate architecture begins to appear, which connects to the corporate strategy. It is a voluntary system but used fairly often. Migration from silos is under way and intra-company communications are improved dramatically. Some published standards are in place to assist in communication with key suppliers. E-commerce appears in Level 4 of IT and brings the Internet-based extranet into play as the firm begins to partner with other firms to build a network. The corporate architecture is in place and adherence is mandatory. Capabilities are shared to find the best systems solutions for what becomes an effort focused on satisfying customers. Initiatives are made in establishing inter-company technology standards. Focus groups are working on integrating systems with the most important customers so a .

Business Application	Optimization/ Supply Chain	Advanced Supply Chain		
	Optimization	Planning	e-Commerce	e-Business
1. Design/ Development of Products and/or Services				
2. Purchasing, Procurement and Sourcing				
3. Marketing, Sales and Customer Service				
4. Engineering, Planning, Scheduling and Manufacturing				
5. Logistics				
6. Customer Care				
7. Human Resources				
8. Information Technology				
<b>Column Totals</b>				
				<b>Totals</b>

