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This is a rough draft  
of a paper I am doing with Noel  
- the Primozic brothers. I would like  
to focus on networks as power. Can we  
get information on global air cargo flows  
across regions and telephone calls any-  
where? Also any literature on the  
growing importance of networks as the key  
competitive unit.

# GLOBAL COMMERCE IN THE COMING HIGH PERFORMANCE NETWORK ECONOMY

How networks  
add value given  
individual  
elements.



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## I. INTRODUCTION

GATT or no GATT, NAFTA or no NAFTA, WTO or no WTO the trend toward greater international commerce is powerful and irreversible. By the early 21st century, it is likely that commercial borders will effectively supplant national borders. Global sourcing will predominate as advanced telecommunication and transportation technologies allow a wide geographic dispersion of component manufacturing sites and places of final assembly, predicated on raw material availability, labor costs and skills, and markets. Products increasingly will be uniquely designed and customized for markets throughout the world. The pace of market integration will intensify as more new products are introduced and existing products are improved. Routine mass production will be replaced by flexible production modes. A significant portion of the inventories that we see today will be replaced by quick response systems and direct shipment to the consumer.

The result of these global trends in markets and manufacturing is an acceleration of inter- and intra-regional global trade. Since the early 1980s, there has been a marked growth in the volumes of raw materials, components and finished products, and capital flowing across international borders. U.S. exports and imports more than doubled during the past decade reaching \$1.5 trillion in 1994,<sup>1</sup> with total world trade surging to over \$5 trillion.<sup>2</sup> Investment abroad by multinational corporations likewise mushroomed to over \$2 trillion in 1994,<sup>3</sup> while sales generated by multinationals outside their country of origin totaled \$5.5 trillion (million million).<sup>4</sup>

The growing interdependence of world markets is reflected not only in the growth of international trade and multinational companies, but also in international information flows and financial transactions. A key enabler of the developing economy will be the ability to synchronize the flow of money, information and materials globally. Between 1975 and 1994, international telephone calls to and from the U.S. (the vast majority for business purposes) increased 4,500 percent, from 375 million minutes in 1975 to more than 17 billion minutes last year.<sup>5</sup> Over the same period, Japanese, Western European and American banks became

financiers of large commercial, industrial and infrastructure projects around the world. By 1994, the volume of foreign exchange trading exceeded \$1 trillion each day. <sup>6</sup>

The shift of market priorities and structures is stimulating a search for new organizational forms that are better tuned to perform in a dynamic and fast-paced competitive environment. These high performance network organizations operating within the new knowledge-based global economy will demand unprecedented global presence for their goods and services. It is not unrealistic to suggest that within twenty years, advances in transportation technology will place local businesses within five hours delivery time of virtually any location around the world, providing same-day global access to nearly eight billion potential new consumers. These new economies and high-performance organizations will transform world trade as we know it today into new system of global commerce.

In this new global marketplace, those companies that can get to their customers ahead of their competition will be the winners. Advances in transportation and distribution technology and infrastructures will drive market and production strategies of entire industries. Growing pressure to cut the cost and time associated with development sourcing, production, and product delivery are already stimulating the development of new multimodal infrastructures and logistical systems. New logistical systems are being developed to provide a seamless integration of all elements of the value chain, from raw material acquisition to production to finished goods delivery. However, significant barriers –political, cultural and technological –must be breached before it is possible to achieve the seamless and transparent commercial system for the new global economy.

Dramatic changes are shaping how we will “do business” in the 21<sup>st</sup> century. The existing infrastructures and information systems are inadequate to the task. Proprietary information systems and unintegrated infrastructures all conspire to dampen the momentum toward the new global economy. They must be replaced by the new global business enablers that are evolving based on the new business standard of speed and agility in the creation of high-quality low-cost custom products. Global transparks that merge just-in-time manufacturing, distribution, and

transportation enable companies to use logistics as a competitive lever. New multimodal transportation gateways reduce both delivery time and cost. And new systems of information interchange provide real-time visibility and control across the supply chain. Together, these enablers are creating a seamless and instantaneous platform for global commerce. In this paper we describe the logistics environment that is emerging to propel the high performance network economy forward to the next level of productivity advance.

## II. HIGH PERFORMANCE NETWORK ECONOMIES

The changes that are occurring today are not mere trends but the convergent workings of inexorable and unruly forces –the globalization of markets and competition, the access to world-wide computer networks, and the dismantling of the hierarchical structures that have organized work since the mid-19th century. A new economy is growing up around these unruly forces whose fundamental source of wealth is no longer financial capital but knowledge and intellectual capital. The economy's primary productive assets are no longer natural resources but technologically-enabled information-rich global networks and distribution systems. This emerging global age will be organized around global *high performance network economies* focussed on enhancing the productivity of knowledge. The global high performance network economy will span geography, national identities, and traditional industry boundaries. These economies can be thought of as electronically linked economic systems which enable the integration of world markets and organizations to facilitate global commerce in the movement of raw materials, components, finished product, financial transactions, capital, services, technology, and *knowledge* across international borders.

A knowledge based high-performance network economy will not behave the way existing theory suggests an economy should behave. Networks of strategically aligned businesses will replace individual companies as the competing unit. A company's profitability will be determined as much by its suppliers' performance (cost, quality, delivery) and the performance of its downstream distribution firms as by the company's own internal operations. In many cases, the

distinction between what is a product and what is a service will be difficult to define. Today, the distinction between a physical product, such as a microchip or software, and the service or knowledge about how to use the PC is a good example. Because of expanding electronic networks, technological breakthroughs will no longer be contained within the geography of their discovery but freely flow throughout the world, just as capital and information do today.

The emergence of high performance network economies will create significant social, educational and economic pressures on national economies and businesses that are already under severe pressure from accelerating change and global competition. In every major country today, even the most highly advanced ones, the process manager and service provider comprise the most significant part of the work force. Today, service providers and process managers lack the necessary education and skills to be knowledge workers. The coming age will be a time in which knowledge and new technology will reshape lives, where globalization of markets will significantly change the rules of competition, and where the transition to global high performance network economies will both open up and shrink the world. The populations of developed countries are aging and, at the same time, the populations of the underdeveloped countries are becoming better educated and more aggressive. For many nations and corporations the issue will be how to move forward and exploit these new opportunities and not be exploited by those that do.

With the evolution of network economies, dramatic structural changes will occur within the established industries we recognize today. Technology is already stimulating the convergence of industries and the weakening of traditional industry structures. Boundaries are blurred in industries such as manufacturing, banking, retail, distribution, health, and education. And the identities of traditional industry leaders, both country and corporate, are shifting dramatically as the global economies intertwine through new types of alliances that extend beyond national borders. (Example?)

The emergence of high performance network economies will not only accelerate these structural changes in established global markets and industries as described above. They will also

stimulate new organizational capabilities and functions that will allow organizations to leverage their resources to become more innovative and creative in enhancing the supply, marketing, and distribution channels. As this occurs, functions, assets and responsibilities will be transferred between industry players, and in some cases, even eliminated. To meet these challenges, new organizational structures and relationships will evolve. Already, organizations are moving away from traditional hierarchical structures to linkage-network structures where groups of knowledge workers team together in response to short-lived market opportunities. These new organizations can be called *high performance network organizations* (HPNOs) because they will be globally linked into high performance teams

These highly innovative and results-oriented organizations encompass large numbers of constantly changing functions and resources that are linked together into dynamic networks. Exchanging information and knowledge across organizational boundaries allows the organization, and even countries, to greatly enhance their effectiveness and performance as shown in Figure 1. Visualizing, designing, and assembling the high performance network organization will require a greater emphasis on leveraging knowledge and organizing around a common vision and purpose. The glue that binds these dynamic and networked organizations will be the unique value that each provides to the shared vision and common purpose. When the value they provide dissolves— so do the links.

The challenge will be to develop and sustain a vision and common purpose that will attract, energize, bond and sustain the knowledge resources of the organizations that form these networks. Innovative alliances will become a vehicle for achieving quick responses to market demands and opportunities, and providing the ability to be any place at any time. Through the use of intranet-like electronic networks these network organizations will be able to share knowledge and technical expertise. They will be able to develop new leading-edge functions or links to new organizations that will enhance the competitiveness and/or effectiveness of the entire network. For the first time, organizations will be able to transcend national or geographic boundaries and thus truly become global high-performance network organizations.

### III. SUCCEEDING IN A HIGH PERFORMANCE NETWORK ECONOMY

The emergence of high performance network economies brings with it new criteria for success. First and foremost is the need for speed and agility in meeting customer needs. Low price and quality will no longer be the sole determinants of commercial success. Increasingly, responsiveness to unique and varied customer needs will be an essential component of any manufacturing strategy. Even though it may have the best product, a company's investments in research, development, manufacturing and marketing will be lost if the company can't get its products to the customer ahead of the competition.<sup>7</sup> Second, pressures for cost reduction have led companies to search worldwide for sources of low cost raw materials and labor. As a result, companies are transporting materials over greater and greater distances. For example, textile companies have found cheaper labor in Asia and South America, while U.S. electronics firms sourced components as far away as Singapore or Thailand.

As the hurdles to speed and quick response are raised due to the expanding global markets and the dispersion of productive resources, companies must rethink how they manage the flow of information and materials across their organization and supply chains. Manufacturers that are able to add significant customer value to their products through lower distribution costs, faster turnaround time, or better repair service will continue as industry leaders in the global high performance network economies. The personal computer industry is a good example of the benefits that can be achieved from streamlining distribution channels. Industry leaders have quickly learned the value of eliminating inventory in distribution channels and the value of providing 24-hour maintenance replacement policy for broken components. (Dell as example?)

Eliminating inventory from distribution channels, however, is just the first step to succeed in a high performance network economy. In a dynamic network economy, sourcing, manufacturing, and distribution will be fully integrated into a seamless delivery system. In contrast, over the last 25 years, manufacturing environments have been determined by a series of distinctive systems from mass production to lean manufacturing. In the mass production environment,

manufacturing processes are managed independently and there is little information sharing across production stages. Logistic functions are defined around the management and transportation of the inventory that buffers the stages of production. Just-in-time inventory strategies linked adjacent manufacturing processes in a “lean” system which gave a new importance to logistics—managing information to assure synchronized deliveries of components from suppliers to assemblers.

In the high performance network economy, the process is taken a step further. Manufacturing and transportation processes will be fully integrated into a single, agile, customer-focussed delivery process. Because of its critical role in linking processes, and its ability to span the multiple functions and boundaries of the organization, logistics is positioned to become the new knowledge center of the high performance network organization, coordinating and integrating processes and activities along the entire production supply chain. Recognition of the essential and critical role of logistics as an enabler for high performance network economies will separate the winners from the losers in the high performance network economy.

The emergence of high performance network economies and organizations is stimulating a restructuring of the transportation and distribution industries. The first phase of this restructuring was coincident with the trend of the past five years, corporate downsizing. If one examines more closely the costs that are associated with the logistics tasks of marketing, customer service, administration, distribution and the actual providing of the product and/or service, one finds that not only are they information-intensive, but people-intensive as well. By outsourcing logistics functions, managers are attempting to remove inefficiencies across the supply chain.

As global commerce strategies based on new logistics capabilities begin to unfold, the next phase of restructuring will be characterized not only by the consolidation of logistic functions within the organization, but also by consolidation and realignment of functions between organizations. In some cases, the elimination of cross-functional “people systems” may spur new organizations that will provide functions across multiple organizations. Major segments of industry and intermediaries of the logistic value chain will disappear as this restructuring phase progresses.

Restructuring will also provide an opportunity for new competitors and new entrants. In some instances, these new players will come from outside the industry and change the very nature of the industry itself.

Finally, an organization's success will increasingly depend on its ability to ensure it is able to achieve strategic advantage by exploiting not only its own internal resources, but the collective resources of the entire extended global enterprise. In today's economy, organizations are no longer pitted against "like" organizations. Instead, supply chains compete against supply chains— In this competitive environment, management's key role will be to identify these partners, including new innovative entrants, that will provide the key components of the value chain. The ability to orchestrate assets across many organizations will be greatly enhanced by developing a strategy to form alliances and partnerships and to utilize the industry-enabling functions being provided by innovative new industry entrants. These new entrants to the industry will change the rules of competition by providing not only key competencies for global commerce, but also key elements of logistics infrastructure.

#### **IV. A LOGISTICAL ENVIRONMENT FOR THE 21<sup>st</sup> CENTURY**

In the 21<sup>st</sup> century, efficient multimodal logistical systems will replace the unorchestrated construction of airports, ports, and road and rail connectors that comprises our global transportation infrastructure system. Today, infrastructure elements are being built without regard for the efficiencies that could be achieved by their integration. The logistical systems of the 21<sup>st</sup> century will achieve new economies through the integration of information, transportation and manufacturing. To date, attention has been focussed on developing new telecommunications networks and information highways rather than on creating modern transportation infrastructures which could provide nations with strategic advantage in the next century. When asked specifically about enhancements to the transportation infrastructure and distribution channels needed to ensure future industrial success in the next century, executives and politicians cite the importance of modernizing the ports and rail networks, restoring the

bridges and tunnels, upgrading the highways, and expanding capacity at major airports. Nonetheless, many of the nation's business and government leaders are still trapped in the old paradigm of the nineteenth and twentieth centuries and do not recognize the need for fresh approaches to infrastructure development that are driven by new ways of doing business in the 21<sup>st</sup> century.

Logistical systems for the next millennium will be characterized by flexibility, speed and redundancy. Increasing pressures for speed and agility will drive logistical systems toward increasing interconnections among and between regions, transportation modes and companies. In this seamless global distribution system all functions of the distribution chain, including freight forwarding, international air transport, ground transport, customs, and tracking of shipments will be integrated electronically so that the shipper or customer has to make only one contact to negotiate all the transactions required to insure that a shipment reaches its destination. As the global high performance network economies continue to evolve, the seamless global distribution systems will become a vital component in increasing the efficiency of worldwide manufacturing and distribution operations. Numerous global development and technological advances are already fueling the race to build such a system from the expansion of communications networks and the evolution of Intranets and Extranets to new competitive strategies based on real-time customer response. Looking ahead, two current trends suggest the future logistical landscape. The first is the increasing integration and consolidation of shipping and distribution channels worldwide. The second is the emerging power struggle over who controls these channels.

Already we see a major trend toward the establishment of transshipment centers through which flow large volumes of the world's freight. These centers serve as entry points to countries or major trading blocks. Over time, these locations will define a limited number of new global distribution channels that connect the largest members of the world economy, as shown in Figure 2. This consolidation will initially occur in the service provider industry as airlines, airfreight forwarders and integrated service providers build alliances to capture the growing market for logistical services, but the real impact will be felt as the global distribution channel consolidation

shifts to the infrastructure level of the airport and seaport. Particular global airports and seaports will emerge as industry leaders in the world distribution channels. As global commerce accelerates, a limited number of entry points, or gateways, will develop in a given region of the world. The majority of the international trade for the region will flow through these major entry points. Because these entry points will be connected with electronic channel support systems, global agile manufacturing centered around them will be placed in “virtual proximity” to manufacturing sites at other gateways. The information connectivity across all modes of transport at the gateways will change the definition of distance. Increasingly shippers do not purchase a particular mode of transport, but rather a delivery time. Proximity will be interpreted as being any location within a one- to twelve-hour travelling distance. The miles or kilometers will not be as important as the actual travel time to reach a destination.

Consolidation of ocean shipping has already started in Asia, where Singapore and Hong Kong have developed as major logistics centers for Pacific traffic, and in Europe, where Amsterdam is an established transportation hub. These new global distribution channels will eliminate today’s fragmented solutions in international transportation. Capacity in these channels will not be restricted by the number of aircraft or airport runways, but rather by the limitations of the domestic distribution channels that they feed. The trend toward consolidation is also beginning to appear in the United States on both the East and West Coasts. Over time the remaining air and sea centers will operate as feeder hubs for the gateways, creating an integrated domestic system. The current lack of integrated domestic distribution channels that can link with the global distribution channels is a major barrier to the effectiveness and efficiency of the air cargo industry.

The consolidation of shipping channels is being accompanied by a power struggle in the industry that is shaking the foundation of global distribution. Transportation companies and logistics service providers are searching for new strategies to maintain their dominance and competitive edge. It is no longer enough to move freight; it is a race to deliver shipments predictably and to provide timely and accurate information about the location of the shipment through the distribution channel. Over time, this race will result in a major restructuring of key industry

players, favoring these who can provide full-service, end-to-end management services for controlling cargo on-the-move. The international air cargo industry, in particular, is being upset by players who do not have a legacy stake in outdated systems and processes. These new competitors have effectually used technology to position themselves as the new leaders in global distribution. In fact, high performance network organizations are becoming a reality because of the significant enhancements provided by the new contracts such as FedEx, which can provide door-to-door delivery overnight virtually anywhere in the world.

As we approach the next century, it will be necessary to understand who will own or control the distribution channels, and what impact these channels will have on the manufacturing and distribution strategies of high performance network organizations. Today it is apparent that integrated service providers' like FedEx, UPS, DHL, Airborne and Emery aim to fill this niche. These providers are developing their own end-to-end systems that, from the customer's point of view, function as a seamless global distribution system. With the use of new and emerging technologies, these providers have developed vast networks and information-exchange systems that allow them to pick up, deliver, track, notify and bill the customer for shipments in an efficient and cost-effective manner. They provide their customers access to quality service, timely shipment information and price consistency. In addition, they provide their customers with instant access to on-line systems that provide the “know-how” and documentation necessary to prepare and process domestic or international shipments— all from the convenience of their own office.

The goal of the integrated service providers is to make their system an integral part of the customer's business operation. They want *their* system to be perceived as the customer's system, an integrated solution for all of the customers' shipment needs. To obtain this goal, they provide the user with a single interface/image—one contact point and a single invoice for all service needs— whether the package is moving within their own system or via another carrier. Through collaborative innovation with their customers, the integrated service providers continue to develop value-added services which go far beyond just shipping the product. These services include inventory control and distribution systems, returned item handling, pickup and

packaging. Providers share software, networks and processes with their customers and, in many instances, provide software and hardware in conjunction with their services.

In contrast, freight forwarders have historically coordinated shipments for customers by assembling a customized set of independent providers (carriers, forwarders, intermediaries, truckers, and delivery services) to manage each shipment. Although a freight forwarder appears to the customer as an “integrator” the forwarder has none of the advantages of economies of scale that can be realized through truly integrated technology and information management. The forwarder provides the range of services found in integrated service providers, however, transaction costs are higher –and delivery can take longer– since the provider has to negotiate price, service levels, information requirements, claims processing, insurance, quality of service, and a host of other issues, with all of its independent providers. The traditional non-integrated service provider's systems are dependent upon their ability to establish and maintain a high quality, efficient, and cost-effective network of service providers. The forwarder approach has been successful in the past, however today forwarders are in a life-or-death struggle with integrated service provides the outcome of which will shape the future of the industry.

Two key challenges face the traditional non-integrated service provider. First, competition for market share by the integrated service providers will continue to accelerate. According to Boeing's World Air Cargo Forecast, integrated air carriers like FedEx have deepened their hold on the United States domestic air cargo market last year. This drive is fast being mirrored on the international scene. And most combination carriers and freight forwarders have done little in response to the threat of the market share deterioration at the hands of the integrated service providers. The second challenge is to minimize the real costs, direct and indirect, associated with providing a seamless system. From the customer's point of view, the traditional non-integrated service provider's approach may appear to provide the same level of service and reliability as a seamless global distribution system. However, the costs can be considerably higher since they include cross-organizational transaction costs. And service offerings may be limited by geography, shipment size, or technology.

A third option, alliance partnerships between logistics service providers and carriers, could create “customized” seamless global distribution systems. By aligning core competencies and integrating their operations, providers and carriers also t can provide substantial advantages in quality, service and reductions in cost for all parties involved, including their mutual customers. The alliance partnership providers can leverage the strengths of its members and provide a more efficient, flexible and cost effective approach to the provisions of logistics servers that will meet the challenge of the integrated service providers. Such an approach will win out over any attempt by an individual airline to create an internal integrated system, and this strategic choice may ultimately separate the winners and the losers in air cargo. Moreover, the alliance partnership approach creates inherent competitive advantages over integrated carriers in terms of flexibility, capacity and breadth of service. The real question becomes, can the traditional air cargo industry provide the leadership, direction, and sense of urgency to move beyond the current phase of trying to define data standards to becoming, in effect, a high performance network organization.

## **V. HIGH PERFORMANCE ENABLERS FOR GLOBAL COMMERCE**

Throughout history, transportation technology has played the key role in shaping patterns of economic development and global commerce. The world’s first great commercial markets grew up around seaports. The seas and oceans were the highways of the world. The next wave of economic development, the industrial revolution, was localized around river and canal based cities and towns. With the subsequent introduction of steam engines and the railroads came the third wave of industrial development. Railroads opened the landlocked interiors of most countries to manufacturing commerce. Major processing and distribution industries developed as the rail centers and terminal hubs developed. The fourth wave of commercial development was spurred by the shift from rail transportation to the highways. Trucks and automobiles became the prime mover of people and goods. Freeways, beltways, expressways and interstate highways resulted in decentralization of business and fostered the development of large suburban centers, industrial parks, and distribution centers that sprouted as far as 50 miles away from major cities. We are now entering a fifth, and perhaps most opportune, economic era. The fifth wave is being

driven by advances in aviation. Air transport opened international markets in all corners of the world and allowed time-based competition to emerge as a new source of competitive advantage. Three innovations in air logistics and communication will drive global commerce in the fifth wave as shown in Figure 2. These innovations– the Global TransPark (GTP), the Integrated Interchange System (IIS), and the International Gateway (IG)– are spurring a paradigm shift in the industrial and transportation strategies of the high performance network organization.

### **A. The Global TransPark**

The Global TransPark (GTP) is an advanced industrial complex that provides the logistical environment for successful 21<sup>st</sup> century manufacturing and distribution. At the GTP, just-in-time (JIT) manufacturing is merged with the global air-freight systems and multimodal surface and waterborne transportation systems to accelerate production and distribution of products worldwide. The Global TransPark, however, is more than an airport located at an industrial park. The GTP is a systems concept for 21st century manufacturing in which goods and material flow seamlessly through the transportation system from supplier to manufacturer to customer with little or no waiting time in inventory or in warehouses.

The GTP is designed to improve the efficiency, flexibility, reliability, and profitability global supply chains. Inventory minimization and substantially reduced sourcing, production, and delivery cycle times will drive the operational logistics of the GTP. Costly inventories will be avoided by enabling uninterrupted material movement from source to manufacturer to customer. As soon as an order is placed, raw materials or component parts will be acquired by surface transport from regional sites or by cargo planes from more distant sites around the country and the world. Manufacturers will quickly assemble finished products and deliver them overnight by surface and air-freight to domestic and international markets.

The GTP system uses many proven elements of a modern industrial park, but what sets it apart is the notion of integrating manufacturing and commercial processes with multimodal transportation. The GTP is not so much a fixed plan as it is a flexible framework to accommodate a wide variety of tenant industries, geographic sites, and physical layouts. The

framework allows that the actual plan can be modified as new technologies and infrastructure advances occur. However, several elements are essential to the GTP system as described below and shown in Figure 3.

First, a well-equipped international cargo airport with runways capable of handling fully-loaded air freighters lies at the heart of the GTP. Manufacturing, distribution, and cold-storage facilities can be located directly along customized taxiways and ramps, allowing air freighters to come virtually to the “factory door.” Direct multimodal (highway and rail) linkages to a seaport is another critical element of the GTP concept. A cargo transfer system carries materials, components, and finished products throughout the GTP on an internal network of dedicated rights-of-way. This network links off-ramp tenants to the central cargo area, a state-of-the-art intermodal complex, providing access to air freighters, trucks, and materials-handling systems. In addition, the cargo transfer system will connect tenants and the central cargo area to an intermodal rail facility or surface transport terminal. The intermodal rail facility will primarily handle bulk and heavy cargo, and will be a particularly valuable connection to port facilities. (Figure 4 provides a generic illustration.)

The hub of the central cargo area and of the cargo transfer system is the central cargo facility located along the airfield’s main taxiway. The central cargo facility provides off-ramp and off-site factories, warehouses, cold-storage facilities, and distribution centers with sorting capability, customs clearance, and air freighter access. Since most GTP tenants will not have sufficient cargo to justify direct air-freighter docking, the central cargo facility offers them air access via the cargo transport system and/or direct truck cross-docking at the rear of the facility. The entire complex will be served by a multilane highway providing efficient access to all parts of the GTP, to regional highway systems, to the intermodal rail facility, and to the ports. GTP internal road networks will connect the central cargo area and tenants to the highway.

Along with its multimodal transportation and cargo-handling systems, the GTP will support its tenants and users with comprehensive electronic commerce capabilities. Electronic data interchange and other telecommunications systems utilizing the latest technologies, including

fiber optics, multimedia networks, and on-site digitized satellite uplinks and downlinks, will offer tenants superior electronic access to the global commercial world. Global manufacturers must have virtual access to commercial support services such as financial institutions, marketing, sales and employment agencies, legal services, exposition centers, and transfer and exchange centers. EDI will improve supply-chain management and a variety of other logistical practices as it tracks, coordinates, and controls commodities, materials and product flow across transportation modes, both domestically and internationally. Plug-in software systems will allow tenants real-time access to supplier, distributor, and customer databases worldwide. Expedited customs procedures using automated manifest systems and express custom clearance are essential to facilitate import and export activities of tenants.

Finally, to ensure that appropriately skilled workers and managers are available to tenants, a wide range of worker training, education, and technology-transfer functions will be provided through an on-site education and training center. A key feature of the education and training center is its distance-learning capability providing tenants with real-time audio, video and tactile worker training customized to tenant needs, from virtually any location in the world. The GTP will provide virtual or physical proximity to knowledge resources that can generate or stimulate innovation and provide a reliable source of trained workers and managers. Among the most important knowledge-based organizations on which global businesses depend are labs engaged in technology development, vocational schools, community colleges and universities providing trained personnel and research capacities.

A Global TransPark is currently being built in Kinston, North Carolina, at the site of an underutilized FAA airport. This 15,000-acre site in eastern North Carolina is within overnight tracking distance of all major industrial areas along the East Coast. A GTP is also being built at U-Tapao, Thailand, the site of a former United States airbase in the heart of Thailand's rapidly developing eastern seaboard manufacturing zone. This area of Thailand has been receiving hundreds of millions of dollars of industrial investment annually and is projected to be one of the world's major manufacturing growth areas. A third GTP is being built in the Philippines at the former United States military base at Subic Bay. A fourth GTP is planned for Germany.

These four GTPs will anchor the new global logistics network for the 21<sup>st</sup> century that links major economic markets in North America, Europe, and Asia. As the next century evolves, this network of high-tech manufacturing sites will develop into an extensive global system of TransParks and feeder satellites in support of the high performance network organizations. Secondary routes will connect these satellites in South America, Australia and Africa to the United States-Europe-Asia axis. Intermodal transportation and air cargo service from a set of satellite TransParks will be developed in a hub and spoke arrangement within each continent. This network of primary and secondary feeder routes will enable delivery between virtually any two points in the world within a maximum of 48 hours. The GTP system is able to support just-in-time manufacturing on a global basis by coordinating activities production activities with revolving time zones around the world. Manufacturing can begin in Asia as night falls in North America. Parts, components and finished products travel across the GTP at night. The network will also utilize the flow of the jet streams that enable a shorter absolute travel time from east to west.

The Global TransPark is an important new concept for global manufacturing. Manufacturing and distribution processes once viewed as mutually exclusive are freely integrated in time and space. The integration of these two processes now allows lower manufacturing costs, smaller inventories and reduced cycle times as well as the ability to respond to new markets with a variety of quality products, many of them individually customized for the customer. The GTP will enable companies to become truly global agile corporations. By linking markets and production worldwide, the Global TransPark Network represents a key step towards the realization of global high performance economies. Tremendous opportunities can be realized by visionary companies that use this infrastructure to transcend the barriers of time and space in responding to customers needs anywhere in the world within only hours.

## **B. Integrated Interchange Systems**

The changing relationships between sourcing, manufacturing, warehousing, and transportation

require innovative leadership and thinking about the role of international cargo systems and information networks that support the high performance network economy. The aim must be the integration of these activities into an end-to-end information system that provides information on the steps in the overall distribution processes and the location of the freight moving through the system. The solutions that have evolved to date, although improvements over the past, are still independent and proprietary solutions that do not provide the interconnectivity on which the high performance network organizations depend. Until the industry takes a strong leadership role in the development of such an international system in which all members of the transportation industry worldwide can participate, the industry will not be able to meet the future needs of global manufacturing for the evolving global high performance network economies

Creating such a solution requires the forming of a multitude of alliances and partnerships as a vehicle for facilitating interorganizational information exchanges. This alliance, referred to as an Integrated Interchange System (IIS), is itself a high performance network organization. By combining capabilities and assets, two or more partners can bring their services together to provide a better business solution for the shipper. Such a solution will provide more value to the shipper each could offer separately. The real value of IIS is in the synergy the members provide with respect to breadth of access and service, quality service levels, universal standards for technology and information systems, and industry leadership. Because the members of the system are independent, yet interdependent players in the IIS network, on-going competition in the forms of lowest costs, best service, and creative innovation is assured. In addition, since this is a membership organization, high levels of performance and standards can be enforced for the participants.

Examples of this paradigm shift can be seen within the industry today. The integrated service providers have developed seamless distribution channels for ground and air transport that connect the shipper to the consignee. These channels allow both freight and information to flow end-to-end as shown in Figure 5. For the integrated service providers, shipper information systems now provide information on the movement of freight as well as offer systems for customer order entry processing, inventory control, billing and accounting functions. These

systems are integrated into the customers operations and suggest the potential of seamless distribution channels. This approach can be compared to traditional non-integrated providers that are still focused on moving freight with multiple independent systems and connections. Inside the “cloud” of the traditional non-integrated strategy are hundreds of information exchanges associated with even a single shipment as shown in Figure 6.

Alliances are beginning to form among international airlines, roadfeeder service providers and customs brokers. Ultimately, the creation of an IIS will entail the total integration of remaining service providers such as international airlines, roadfeeder service providers, customs brokers, ocean and rail industries, forwarders and the integrated carriers into seamless distribution channels. However, several things must happen before an IIS will emerge.

First, the major international transportation players in all modalities must come together as a group or association to provide the flexibility and precise services that shippers increasingly demand. This group can play a pivotal role in the development of universal standards and procedures that provide instant compatibility among the integral elements of the world wide distribution system. These standards and procedures would create a platform upon which any two or more parties can easily offer their services as a coordinated business solution for the shipper, manufacturer, supplier or consumer.

Second, the development of common information linkages must occur. Technology is available today to provide freight tracking reports, traffic analysis, currency translations and billings on a global basis. And standardized forms for all types of shipments could be created for use by all shippers, customs and service providers, across all modes of transportation and country borders. The common information linkages will not be as rigid or expensive as current EDI systems. With groupware, and fourth or fifth generation programming languages, these new linkages will be easier to implement and provide more functionality.

Finally, non-transportation industry leaders must assist in exploiting technology to develop non-proprietary solutions. The solutions must be seamless and easily integrated into the operations of

all transportation industry members, shippers, and consumers. The technology utilize global telecommunications networks, bar coding, cellular communications and GPS tracking, handheld terminals, and new forms of groupware information exchange. These non-transportation industry leaders can communicate the features and advantages of the IIS system to the global community, businesses, government, and members of the transportation industry.

The development of an integrated interchange system would radically alter today's business practices. Consider, for example, the development of a universal shipment reservation system for cargo similar to passenger reservation systems Sabre. Such a system would offer shippers an array of routes, schedules and rates. Depending on customer requirements, a shipper can choose the transportation mode that best meets the time commitments or cost requirements, whether that is one day or one month. Options can be tailored to meet the precise manufacturing and cost requirements, or customer requirements. The user of the system will be able to select from an array of transportation moves and will be able to mix modes and options quickly as shipment types and location change. In addition to efficient intermodal transfers of goods and materials, the ability to track, communicate and transfer shipment information will be easily made through the system.

The alliance partnership must be enabled by electronic channel support systems, which allow members to transfer information and functions among organizations. The use of advanced technologies to create electronic channel support systems makes many new types of strategic alliances possible in which organizations are glued together electronically and not by means of brick and mortar or through outright ownership. In the air cargo industry, especially the joint development of computer applications and product distribution systems is essential to provide a single image to the customer. For example, forwarders, carriers and other service providers, working together in the movement of freight, exchange information about shipments, but only one system captures, tracks and makes the information available to customers. This could also apply to the other functions like accounts receivable, accounts payable, local or domestic transportation services. There appear to be some competitive concerns in the air cargo community regarding the sharing of universal data interchange systems to disperse information

throughout the industry. This short-sighted paranoia has delayed the industry from fully reaping the benefits of this new technology. Yet there are a myriad of cases of similar unfounded reactions to new technology in other industries in the past.

### **C. International Gateways**

Air cargo will play an increasingly important role in the high performance network economy. No other means of transportation is better equipped to meet the economic realities of the coming era where global sourcing, changing market demands, exploding technology, and fierce competition require producers to receive and ship smaller quantities more frequently and quickly over longer distances. To best serve the rapidly changing requirements of global commerce, the focus will shift from viewing air cargo as an additional cost or emergency action to viewing air cargo as a key strategy for global commerce. In prior economic periods, when speed of delivery and production flexibility were less crucial to competitive success, air freight was considered a luxury. It was confined primarily to small, lightweight, compact products with high value-to-weight ratios or to items needed on an emergency basis at distant sites. Today, essentially anything that can be loaded onto a large aircraft is routinely shipped by air— automobiles, heavy machinery, high-tech equipment, textiles, furniture, pharmaceuticals, live cattle, bulk seafood, poultry and agricultural products.

Air freight is also creating entirely new industries such as shipping freshly-cut flowers and other highly perishable goods direct to the customer within hours. Customers are not only paying for speedy, reliable delivery, they also are paying for extra for freshness in perishable goods or products being delivered on demand. Many catalog retailers and brand manufacturers have begun using overnight and two-day air express as a means of providing value to the customer. The competitive advantage of using air cargo delivery extends well beyond high-tech products and perishable goods, and is as applicable to the supply chain part of the business as it is to the distribution chain part of the business. It is not unrealistic to suggest that, within 20 years, advances in aviation technology will place American's businesses within five hours delivery time to virtually any other part of the world, providing same-day global access to nearly eight billion

potential consumers. It is critical to America's competitiveness in the world and to the economic success of businesses and communities that plans be developed for these inevitable technological advances in the air cargo industry.

As global commerce continues to accelerate into the next century, a limited number of major cargo airports will evolve into the international gateways. These gateways are major multimodal centers that serve as centralized hubs facilitating global commerce between major trading regions of the world. The majority of the international trade for the region will flow through these gateways as shown in Figure 7. Because these entry points will be connected with the integrated-interchange system, global agile manufacturing and distribution centers could become Global TransParks. International gateways will be the center of shared and efficient transportation networks that extend across the globe. These international airports will be linked together to facilitate the flow of goods, materials, and information. The 21<sup>st</sup> century delivery system will be a truly seamless global distribution system that will allow agile manufactures to integrate their internal inventory and distribution systems with the multimodal transportation service provider.

Access to this seamless distribution channel will be through a single, transparent interface, the IIS, which will allow for speedy hand-offs of product and materials from one agile partner to another along the global value chain. The users of this system will be able to plug into this global transportation network by specifying only the final destination. The system will make use of the availability of different types of transportation along the delivery route to provide cost, speed, and flexibility to the shipper. The use of different modes of transportation or transportation routes will be transparent to the users of the network. This will occur because the gateway will function as an industry enabler by being proactive in developing and providing integrated services beyond the physical airport. The international gateway will serve as a center of global commerce for a region, or a country, much the same way as the seaports, canals, railroads, and interstate highways did in the past.

Anticipating that industrial air commerce will be a major part of the new global high performance network economies, the international gateway will emerge as a major component of

global infrastructure. As a centralized multimodal hub, the international gateway will be comprised of three critical components. The first component is the international airport itself and the surrounding facilities including facilities for storage and processing in-transit cargo. The second component is the supportive transportation network including rail, road, and sea access. Airports became international gateways because they have the foresight to understand the strategic values of forming alliances to develop a transportation network consisting of rail, road and sea transport, in addition to critical air transport. By linking the airport to local customers through intermodal feeder access, the international gateway becomes a virtual airport. Shipments flown into an integrated gateway can be delivered to customers several hundred miles away within hours. In this way, more remote customers can acquire the benefits of the international gateway as if it were “virtually” next door. The final major component required for the development of the gateway is the information and communications infrastructure that shares information among all the involved parties and ensures that service level standards are met. The evolution of these electronic channel support systems will be based on wired and wireless communication technology. An integrated, worldwide broadband network based on fiber optics, cellular, and satellite communications technology will link the international gateway to other international gateways, Global TransParks, and global customers.

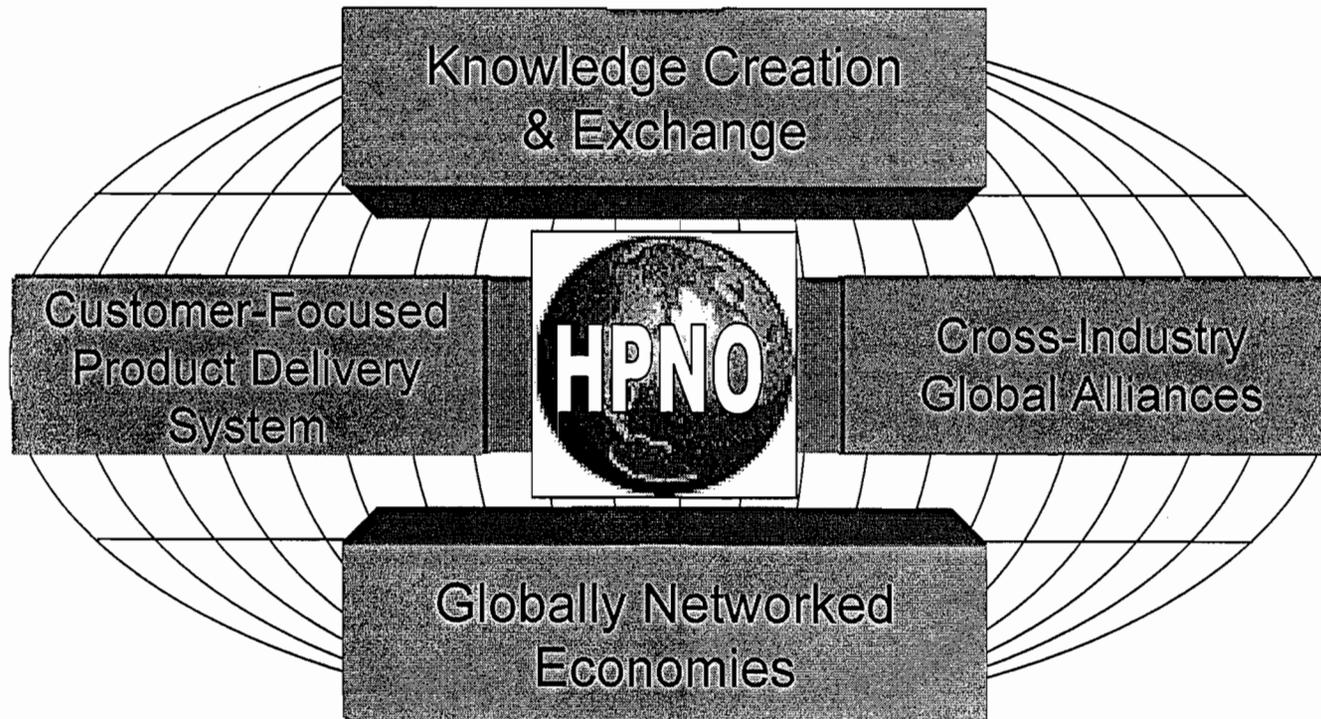
## **VI. Conclusions**

Through the integration of multimodal transportation systems and new communication technology, organizations will be able to create collaborative, seamless, global distribution systems. These systems will be powerful tools enabling agile manufacturers to respond to the demands of the global marketplace, and to the continuing competitive needs of the industry to improve efficiency, flexibility, reliability, and profitability. The organization, its partners, and its customers will now have the ability to act as one in reducing sourcing, production, and delivery cycles. A truly effective, global marketplace will exist by creating an uninterrupted logistical system of materials movement from the suppliers to the manufacturers to the world markets.

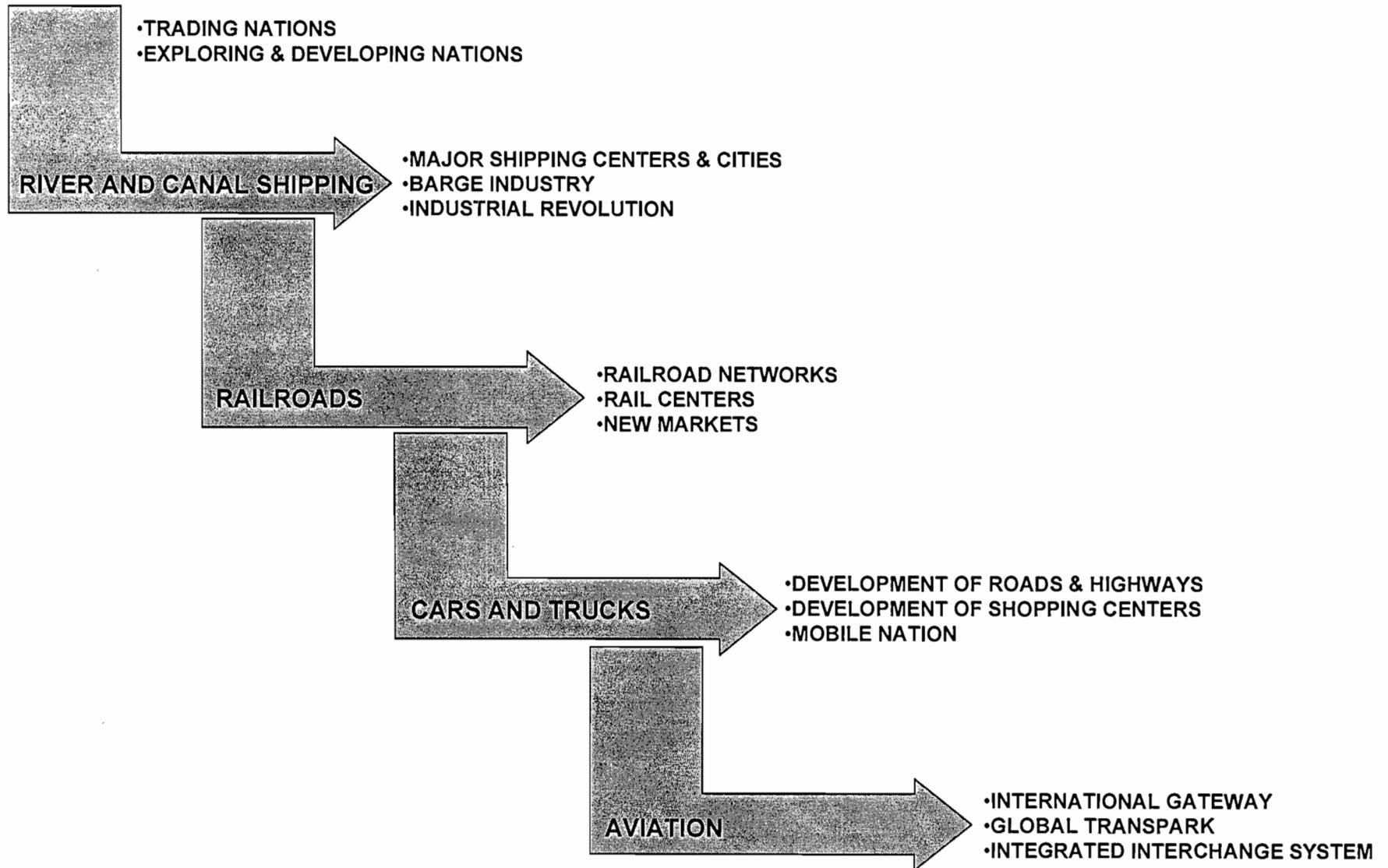
## ENDNOTES

- <sup>1</sup> U.S. Trade Facts, "Business America 116 (May 1995): 17.
- <sup>2</sup> "World Trade Growth 1994 Highest in Almost Two Decades," World Trade Organization Press Release 8 (March 28, 1995).
- <sup>3</sup> Russell B. Scholl, "The International Investment Position of the United States in 1993, 3 Survey of Current Business 74 (June 1994): 69.
- <sup>4</sup> Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, U.S. Direct Investment Abroad: Operations of U.S. Parent Companies and Their Foreign Affiliates, Preliminary 1992 Estimates "Washington, D.C.: GPO (June 1994): Table III.F1.
- <sup>5</sup> Federal Communications Commission, Common Carrier Bureau, Industry Analysis Division, 1993 Section 43.61 Interrogational Telecommunications Data (Washington, D.C.: U.S. Federal Communications Commission, revised December 2, 1994): Table A 1; and Trends in the International Communications Industry, 1975-1989 "Washington, D.C.: U.S. Federal Communications Commission, October 24, 1990): 17.
- <sup>6</sup> Bank for International Settlements, Central Bank Survey of Foreign Exchange Market Activity (Basle, Switzerland Bank for International Settlements, 1995).
- <sup>7</sup> "How Information Gives You Competitive Advantage," Michael E. Porter and Victor E. Millar, Harvard Business Review (No. 85415).

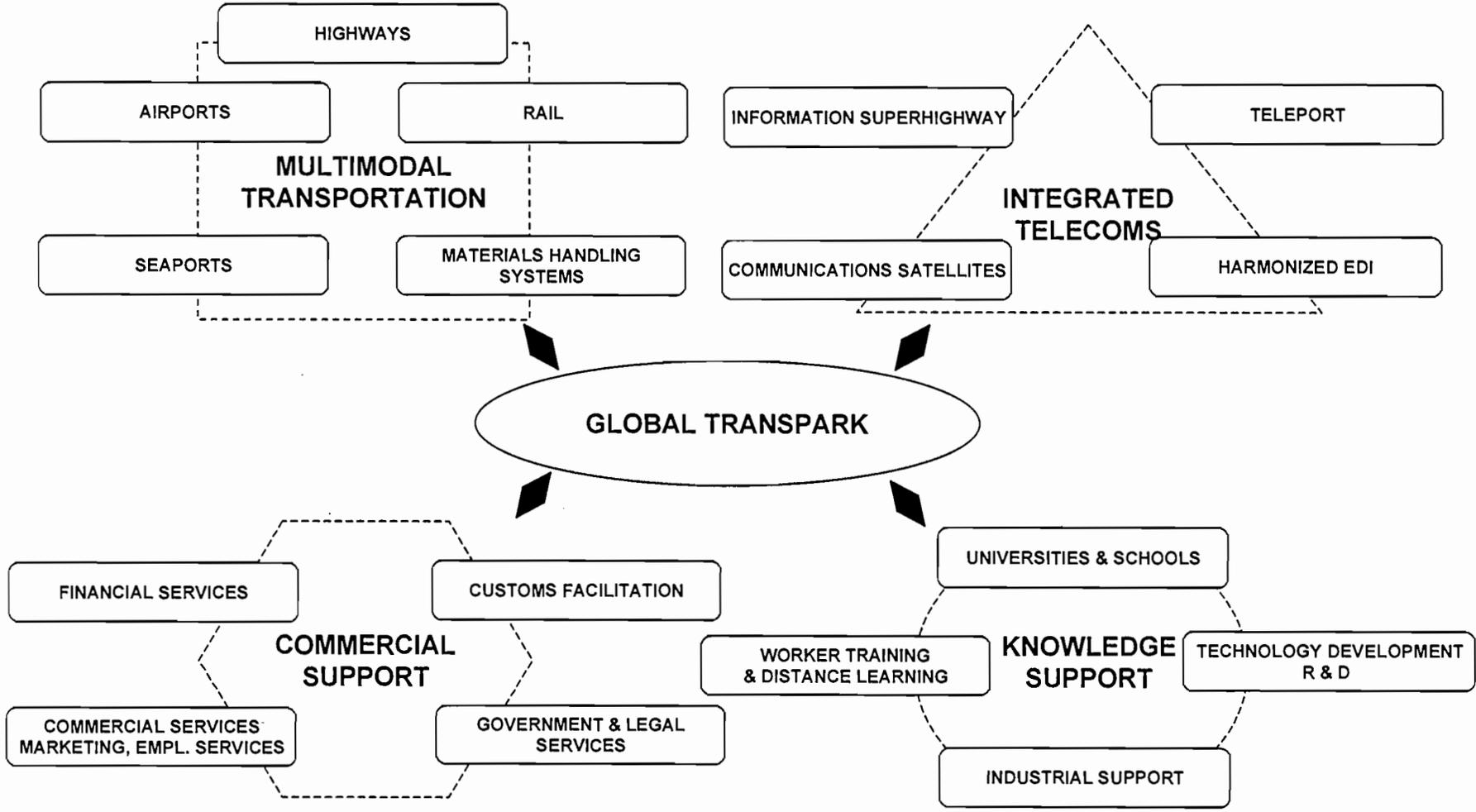
**FIGURE 1**  
**HIGH PERFORMANCE NETWORK ORGANIZATIONS**  
**WILL DOMINATE GLOBAL COMMERCE**



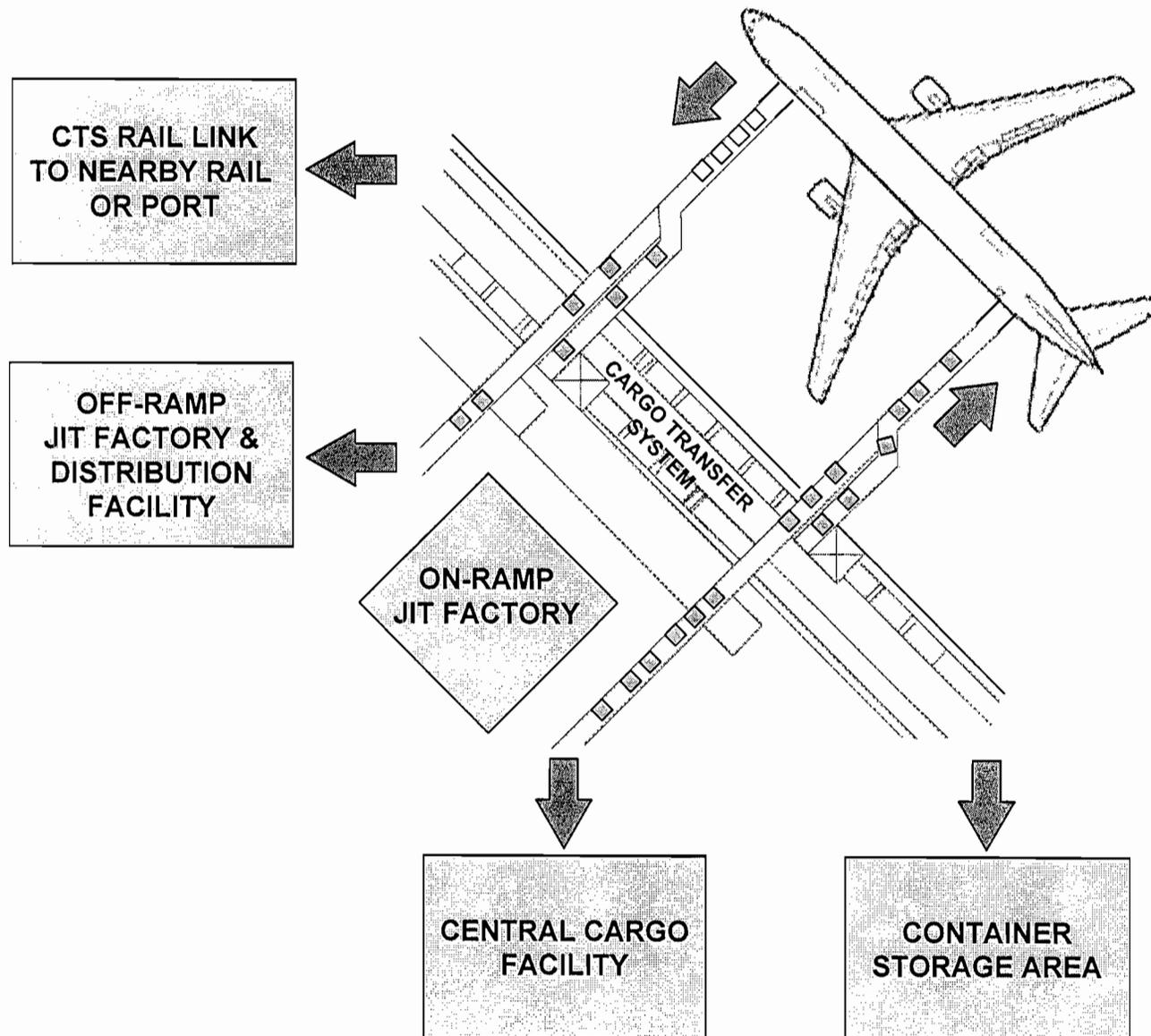
## FIGURE 2 WAVES OF INDUSTRIAL DEVELOPMENT AND COMMERCE



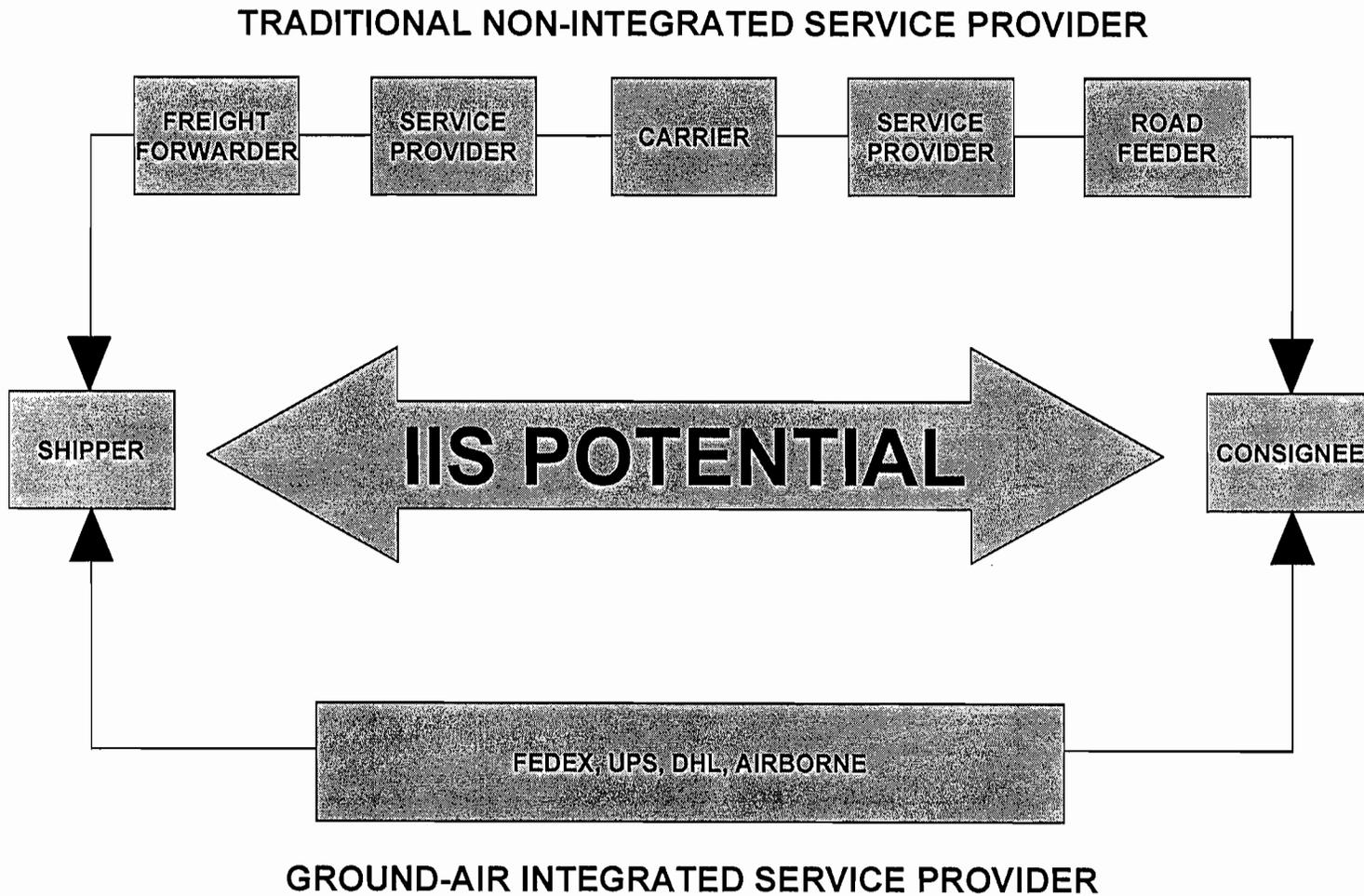
**FIGURE 3  
THE GLOBAL TRANSPARK CONCEPT**



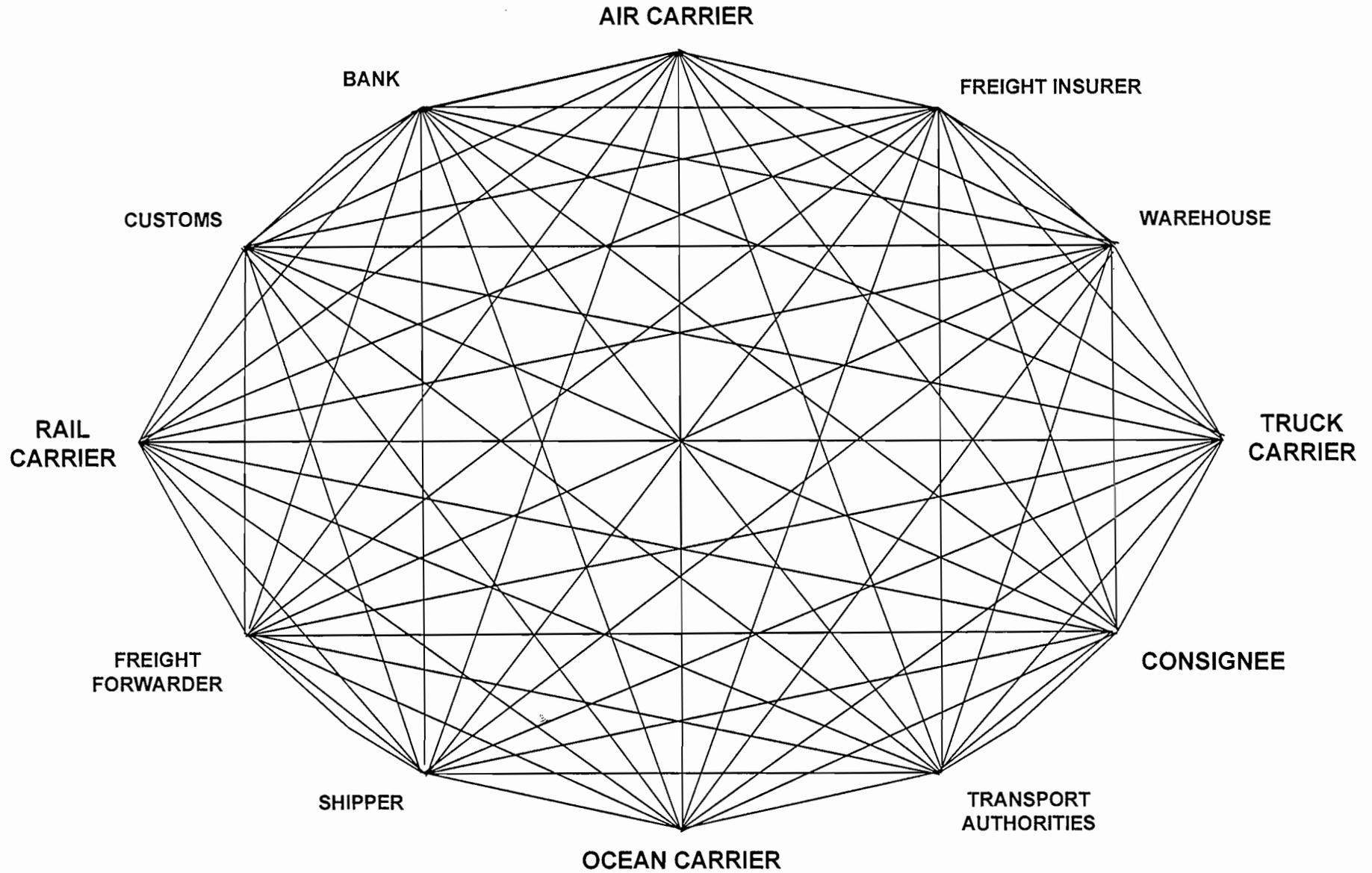
**FIGURE 4**  
**INTERMODAL INTERFACES AT THE GLOBAL TRANSPARK**



**FIGURE 5**  
**MOVING TO AN INTEGRATED INTERCHANCE SYSTEM**



**FIGURE 6  
INFORMATION EXCHANGE “CLOUD”**



**FIGURE 7**  
**INTERNATIONAL GATEWAYS FOR GLOBAL COMMERCE**

