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Chain of Perils: Hardening the Global Supply Chain And Strengthening America's Resilience

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EXECUTIVE SUMMARY

Over the course of the past several decades a significant change has taken place in the way by which raw materials suppliers, manufacturers, wholesalers, retailers and end users deliver and receive tangibles. Where stocked shelves in warehouses once provided testimony to the ability of a supplier, manufacturer or retailer to meet customer needs, now goods and materials are delivered "just-in-time" to meet manufacturing or distributing schedules. Distances between supplier and customer are now rarely "just across town" or "a few states away," but are often on the other side of the globe.

The global supply chain provides a particularly attractive target to terrorists since the economic consequences of a successful disruption of the supply chain could be enormous.

There are a number of factors that have driven this paradigm shift including the following:

- Businesses seeking and finding needed materials and products overseas at significantly lower costs than in the United States, often from single source suppliers.
- The explosive growth of containerized cargo, particularly in the maritime domain, that produces great efficiencies and reduced costs.
- The ability of the supply chain to deliver needed goods and material "just-in-time."
- The realization by industry that "just-in-time" meant that the supply chain itself could function as an attractive surrogate for the warehouse. The key benefits of just-in-time are the reduced cost of holding inventory and the increased agility/speed to match product design/mix to shifting demand.
- The development of sophisticated information technology systems that provide the ability to reliably and accurately direct and monitor inventory as it flows through the supply chain.
- The fundamental globalization process and global integration that provide better competitive and financial performance for global players.

What this combination of leaner inventories, more single sourcing, longer supply lines, and tightly meshed global communications networks leads to is a greater exposure to supply disruptions.

The Reform Institute

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The Reform Brief examines important public policy issues on the national agenda regarding topics such as government reform, homeland security, energy independence and the environment, economic policy, and immigration reform.

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Disruptions can be created by a number of events including, war, natural disasters, industrial accidents, labor unrest, sudden closures by major suppliers and terrorist attacks.

The global supply chain provides a particularly attractive target to terrorists since the economic consequences of a successful disruption of the supply chain could be enormous. The attacks of 9-11, the West Coast dock strike of 2002, Hurricane Katrina and the Northeast Blackout of 2006 – each of which had negatively impacted the supply chain – serve as profound reminders of the fragility of supply chains, the cascading effect of disruptions and the damage to the economy that such a disruption could inflict. The lessons of the 2002 West Coast dock strike are particularly relevant. The strike shut down West Coast ports for ten days and cost the U.S. economy approximately $15 billion. It took many businesses several months to recover. It should be noted that the Pacific Coast Longshore Contract between the International Longshoremen and Warehouse Union and the Pacific Maritime Authority expires on July 1, 2008. Although there is no indication that there will be a repeat performance of the 2002 debacle; the possibility of a recurrence provides those industries that rely on West Coast ports with a great deal of incentive to devise or review their contingency plans in order to be prepared for a possible disruption in their supply chain.

In certain instances, however, the agility gained by just-in-time can contribute to resilience. Wal-Mart's noted ability to respond rapidly to human needs in the Gulf states during the Katrina disaster was due largely to its advanced logistics capabilities. Much of what makes supply chains fragile is over-concentration of sources or channels.

As a critical part of our economy, the global supply chain represents a serious vulnerability, and is therefore an attractive target for terrorists. Reducing the susceptibility of our supply chain to severe disruption is key to strengthening the resilience of the nation. Resilience involves the ability of the U.S. to withstand and quickly bounce back from a catastrophic event. This report is a part of the Reform Institute's efforts to enhance the nation's resilience by identifying potential threats and recommending reforms that will mitigate the cascading effects of a catastrophic event, such as a natural disaster or terrorist attack.

Reducing the vulnerability of the U.S. to potential disruptions in the global supply chain cannot be accomplished by the actions of U.S. players alone. As discussed herein, maritime cargo containers are one of the most important components of the global supply chain, yet approximately 98 percent of container ships are foreign flagged and operated by foreign crews. Further, as the nation was shocked to learn during the "Dubai Port World fiasco," virtually all terminal operators are foreign owned. Consequently, to be effective, any major measures that we employ to bolster the security of the global supply chain will have to be the product of significant international cooperation. This will mean overcoming difficult issues involving sovereignty, culture, nationalism and perhaps most importantly, trust.

Most would agree that the first principle of "being in business" is to "stay in business." Sustaining business operations in the midst of crisis requires planning and a resilient supply chain. As a nation that has an extremely high dependence on the security and integrity of the global supply chain we need to pay attention to two major issues. We need to ensure that U.S. businesses of all sizes that rely on the supply chain for their viability develop, deploy and exercise meaningful continuity of operations plans. Secondly, we need to harden the supply chain by effectively implementing, without delay, two major initiatives – the 100% screening of U.S.-bound containers at overseas ports and the adoption of "smart" container technology.

BACKGROUND

During the past twenty years there has been a dramatic shift in the way that industry and government manage their supplies of goods and material. From the dawn of the industrial revolution

until the past few decades little had changed in the way that manufacturers, wholesalers, retailers, raw material suppliers and consumers maintained adequate inventories of goods and materials. By and large, the method employed was to order inventory well in advance, store it in warehouses, rotate the warehouse stock to ensure that the newest materials were used last and to continuously monitor inventories. Although such a system has both benefits and drawbacks, the drawbacks may seem more obvious.

The system described above requires a significant investment in both warehouse space and warehouse personnel. Retailers, wholesalers and manufacturers all devoted large amounts of real estate in which to store inventories of components and finished goods. Additionally, large inventories of goods and material were kept on hand which, in addition to being inefficient, created the risk of inventory stock becoming outdated or unusable. This system was costly. In the area of retailing, for example, each store had to have a large area devoted to the simple storage of inventory prior to its being needed to stock store shelves. Thus, large amounts of square footage could not be used in direct retail activities, but rather were carried as an overhead expense in order to maintain inventory.

During the past decade this has all changed dramatically. The proliferation of containerized freight along with a corresponding explosion of information technology (IT) capabilities introduced immense efficiencies into what was rapidly becoming a truly global supply chain.

The global supply chain is a thing of beauty that defines the notion of efficiency. Container ships, ocean terminals, intermodal terminals, rail carriers, truck load carriers and, perhaps most importantly, the IT systems that underpin them, are all focused on delivering goods and material as quickly and efficiently as possible while maintaining maximum visibility into where things are within this complex dynamic. The system has been created to deliver supplies to retailers, wholesalers, manufacturers and consumers "just-in-time" to meet their needs. What this just-in-time delivery system has accommodated is the storing of inventory not in traditional warehouses, but rather the supply chain itself becoming the warehouse.

Retailers, for example, are now able to devote greater amounts of floor space to revenue producing activities such as sales and lesser amounts to expense producing activities such as the storage of inventory. Sophisticated IT programs allow for the centralization of inventory management. For example, at the headquarters of the typical "big box retailer" they are able to know, with astounding precision, how many tubes of a particular size and flavor of Colgate toothpaste are on each store shelf across their entire inventory of more than 3,000 stores. As tubes are sold the inventory is automatically updated and when it reaches certain tolerances the stock will be refreshed…just-in-time.

When one drills down a bit below the surface of this beautifully efficient supply chain one cannot help but encounter a dark and foreboding fact. For all its magnificent efficiency our global supply chain is extremely fragile and not constructed to easily withstand the disruption potentially brought about by a catastrophic event such as a terrorist attack. The tolerances within the system have become so critical and so compressed that there are now many firms that will experience disruptions in their ability to operate in the face of supply chain interruptions as minimal as a few days; in some extreme cases their fragility may even be expressed in hours.

Retailers, suppliers, and logistics providers are among the types of firms that rely heavily on the "just-in-time" supply chain and are therefore vulnerable to disruption. These companies are crucial to our economy and are responsible for millions of American jobs. Examples of notable U.S. companies that are deeply dependent on the supply chain include Wal-Mart, Dell, McDonald's, Home Depot, FedEx, and UPS.

GLOBALIZATION

Over the last several decades we have seen vast changes that have been brought about by

globalization. Where once U.S. manufacturers relied on raw materials and component parts that primarily were produced within the United States, it is now typical for manufacturers to rely on raw materials and components that may have originated from anywhere on the planet. The same is true for finished goods such as electronics, clothing, furniture, accessories, textiles, heavy equipment and so forth. This change came about for two reasons. First and foremost, manufacturers, wholesalers and retailers discovered that they could acquire the goods and material needed to conduct their businesses overseas at costs far less than they would pay in the United States. Secondly, with the development of a highly proficient global supply chain they could ensure that the goods and material that they needed would be efficiently and economically transported from just about anywhere on the face of the earth to their facilities within the United States.

There are many within the United States and around the world who express strong disapproval for what they see as the perils of globalization. Among the hazards that worry such critics are the great disparities in wages and working conditions that exist between developing countries and the industrialized nations. Protesters argue that globalization not only takes unfair advantage of workers in third world countries, but also siphons off to overseas producers jobs which might otherwise have been available to workers within the United States. Globalization critics also decry the vast differences in standard of living, life expectancy, literacy and health care that exist between the major economic powers and the poorer nations.

Although such protest movements may foment attempts to attack or disrupt the supply chains upon which globalization depends, the purpose of this paper is not to examine the legitimacy of the protester's issues per se. Rather the aim here is to discuss the realities of our current system as it is and what we as a nation can do to reduce the spectrum of vulnerabilities that arise as a result of this system.

The fact is that global commerce is a critical part of the U.S. economy and any event that disrupts the flow of goods in and out of the country would have a severe impact on jobs and economic activity. Imports from abroad provide American consumers with more choices for the goods they purchase. The opening of foreign markets also provides more opportunities for American producers to sell their goods through exports. The fortunes of many U.S. companies, and therefore many American jobs, are intricately tied to the flow of imports and exports. A 2007 study conducted for the American Association of Port Authorities found that 8.4 million American jobs in 2006 were tied to cargo moving through U.S. deepwater ports. This figure includes not only those employed at the ports, but the millions of American who work for retailing, manufacturing and distribution firms that rely on imports/exports. The same study also found that maritime cargo activity in 2006 generated nearly $2 trillion in economic activity.[1]

The U.S. railroad industry is also a critical part of the supply chain and has benefited immensely from increased international trade, especially with Asia, in recent years. Expanded trade and the development of the cargo container that could easily be unloaded from container ships directly to freight trains breathed new life into the ailing freight rail industry. Such intermodal traffic is the fastest growing rail traffic segment and has created numerous jobs in that sector. We cannot afford to ignore the importance of the supply chain to our economy. Understanding how the global supply chain works and developing strategies for hardening the supply chain must be priorities for public and private sector leaders.

THE MECHANICS OF THE GLOBAL SUPPLY CHAIN

The least costly way to move goods and material around the globe is to ship them over the oceans. For about $2,000 a U.S. importer can ship a container that measures 40'x8'x8' from Asia across the vast expanse of the Pacific Ocean to the West

Coast of the United States. Such a container has a cubic capacity of over 2,300 cubic feet and a payload capacity of over 60,000 pounds. Dr. Stephen E. Flynn, of the Council on Foreign Relations and a well known authority on maritime transportation, observes that this "makes the postage stamp seem a bit overpriced." Thus, the efficiency and the low cost of shipping via container coupled with the fact that goods and materials move on a global basis have made the maritime container the centerpiece of the global supply chain, and to a certain extent, the entire global economy.

The maritime transportation system consists of a worldwide fleet of ships and barges that move goods and material in one of several ways. Liquids such as petroleum products, liquefied gasses and liquid chemicals move via tank ships. Grain, dry chemicals, coal, and the like travel via bulk cargo carriers. Automobiles, trucks and heavy equipment are transported using "roll on-roll off" or "RO-RO" ships and for small loads and/or mixed cargo, particularly in developing nations, there are still many "break bulk" freighters plying the seas of the world. With due deference to the bulk carriers, tank ships and RO-ROs, the container ship is, however, the "800 pound gorilla" of the global maritime transportation system.

Ports and vessel carriers report their container volumes differently, sometimes using TEUs [twenty-foot equivalent units] or FEUs [forty-foot equivalent units]. However, the basic unit of measure in the "container trade" is, for the time being, the TEU. This may be a bit misleading since although there are many twenty foot containers, the majority of sea containers are actually forty feet in length, the equivalent of two TEUs. So, therefore, an 8,000 TEU container ship might contain somewhere on the order of 5,000 or 6,000 individual containers; the majority being 40 feet in length. Thus, a seaport's annual reported volume of 500,000 FEUs is actual a volume of 1 million TEUs.

To illustrate the continuing innovation and thirst for reduced container expense within the logistics industry, ocean carrier APL has recently introduced a fifty-three-foot ocean container. Until recently, 53-foot containers were limited to intermodal applications for U.S. domestic truck, rail and barge markets because they lacked the physical rigor needed to withstand ocean transport. APL's new Ocean 53 is engineered to meet ocean-going standards and is believed to be a money saving innovation since it will accommodate larger payloads and will eliminate the need to transfer loads from smaller ocean containers to 53-foot boxes at U.S. distribution centers.

Sea containers are "stuffed" at manufacturing plants and raw materials producers in countless locations around the globe. From their point of stuffing they are transported on a truck chassis or rail car to a seaport. In most cases, if the container is initially delivered to a smaller port it will then be transported by barge or smaller container ship to one of the "mega-ports." At the mega-port, the container will be stored within a storage yard at a large ocean terminal, for no more than three days, until it can be consolidated with other containers for loading onto a giant trans-oceanic container liner. From there it will be swiftly transported across the sea to one of a number of major ports in the U.S.

Upon arrival at a U.S. port, the container ship will be rapidly unloaded at a modern container terminal where huge gantry cranes quickly remove the container from the cargo deck and drop it on a waiting chassis. Within minutes the container can be inserted into the U.S. internal intermodal transportation system. Containers are loaded onto rail cars, over-the-road truck chassis or even barges, or a combination of several modes of transportation, for further transportation to their ultimate destination. In most cases, a container that was stuffed at a location half a world away can be delivered to its ultimate destination within the United States within a couple of weeks, at an extremely low cost and never having been opened – indeed typically having received very little scrutiny – during the entire length of its voyage.

THE PARADOX OF TECHNOLOGY

The global supply chain is elegant in its efficiency. Huge container ships can now be loaded and off-loaded in a matter of hours – something that would have taken several days before the widespread adoption of containerized cargo. Containers move seamlessly between ships, ocean terminals, rail terminals, rail cars, long-haul trucks, barges, intermodal terminals and local haulers. It is a carefully choreographed ballet timed so that cargo is constantly in motion and that costly ships, trains, trucks and barges are rarely sitting idle.

The supply chain is constructed of interdependent entities – producers, manufacturers, distributors, wholesalers, retailers, freight forwarders, shippers, consolidators, customs brokers, terminal operators, ocean carriers, rail carriers, roadway carriers, private fleets and local haulers – all of whom are working in furtherance of the same goal – the rapid delivery of cargo between its point of origin and destination. What makes this all possible is the technology that has been applied to the global supply chain over the last couple of decades. The rapid and seamless transition of a container from one mode of transportation to another can only be accomplished by the application of refined cargo handling technology, advanced terminal operations equipment, modern rail cars, large and fast container ships and ultra-sophisticated IT systems to manage the entire process.

A chilling paradox, however, exists as a result of the intricacies, efficiencies and interdependencies inherent in the global supply chain.

A chilling paradox, however, exists as a result of the intricacies, efficiencies and interdependencies inherent in the global supply chain. For as efficient as the supply chain is; it is also fragile and vulnerable. A prime example of this occurred in the hours following the attacks of September 11th.

Although the anti-globalization activists would lead you to believe otherwise; there are still a sizeable number of automobile manufacturing plants in the State of Michigan. However, a significant percentage of the component parts are actually manufactured in the Province of Ontario, Canada and are trucked across into Michigan on a continuous basis. Since the manufacturers are not interested in devoting valuable real estate to the storage of components, shipments of components continually arrive through the supply chain from component manufacturers on a just-in-time basis.

The Ambassador Bridge, which spans the Detroit River and connects the U.S. and Canada at Detroit, is an important artery of international commerce and a critical node in the global supply chain. This one privately owned bridge accounts for one quarter of all trade with Canada with 6,000 trucks a day – one every 12-15 seconds – carrying all manner of goods and material including critical components bound for the approximately 40 automobile manufacturing plants within a day's drive of Detroit. Within hours of the attacks of 9-11, Customs officials at the bridge went into a "Level One Alert" – the service's most rigorous inspection regimen. As a result, traffic backed up for twenty-five miles with average wait times of sixteen hours. These delays caused the shut down of automobile assembly plants from Flint, Michigan to Hermosillo, Mexico. The industry rapidly went from "just in time" to "dead in the water." This was just one aspect of the global embargo that the United States imposed upon itself in the hours and days following 9-11 and that resulted in economic losses that took years to recover from.

THE THREAT

Arguably the most virulent threat to the global supply chain is that posed by radical Islamist terrorists – a threat that has not diminished since the attacks of 9-11. Indeed, there are those who would argue that the threat may have actually increased.

The attacks of 9-11 were against targets that were both symbolic and economic. The lesson that would-be terrorists learned is that attacking symbolic targets only strengthens U.S. resolve and that they can get greater "bang for the buck" in attacking economic targets. As targets go, this makes the global supply chain a particularly attractive one.

Since 9-11, Islamic terrorists have not engaged in any attacks against targets that would yield a substantial loss of life or personal injury. The 2005 London subway bombings are a prime example. In a city resplendent in highly populated, symbolic targets (where would one begin to even list them?) the terrorists placed their bombs on subway cars and detonated them in darkened tunnels. Their goal was obviously to deter citizens from using the subway system and thus strike an economic blow against the city. Although 52 commuters were killed and some 700 injured, this pales in comparison to what the toll might have been had the bombs been detonated at one of London's busy tourist sites.

A well-planned and executed attack against the global supply chain would have potentially catastrophic consequences on a world-wide basis. If the goal of the terrorist organization is to effect maximum disruption of the global economy there would be few targets more attractive than the global network that will move some 200 million containers through the world's ports in 2007. The most likely method would be to use a weapon of mass destruction comprised of both conventional explosives and fissile material – known as a radiological dispersion device (RDD) or so called "dirty bomb" – and to hide it within a sea container and have the device detonate at a critical point somewhere within the supply chain.

There are those that argue that the most likely scenario is not as described above, but rather the placement of a nuclear device in a bulk cargo carrier or a large yacht and to have the bomb detonate within one of our ports. They argue that terrorist organizations having made the substantial investment in time and money in procuring, transporting, rigging and deploying such deadly weapons would hardly give up control over the process by allowing the device to operate autonomously in a container working its way through the supply chain. However, just such a postulation ignores the new dynamics associated with our reliance on the "just-in-time" supply chain and underestimates the sophistication of our enemies. The supposition that the terrorist's motive is to incur maximum loss of life and physical damage is based on outmoded thinking. We must awaken to a new reality – that terrorist networks such as al Qaeda care less about the loss of life and physical damage, for they have a bigger target in their sites. They intend to bring the global supply chain and the western economy to its knees.

How might this be accomplished? Since 9-11 the United States has created a patchwork of programs designed to bolster the security of the maritime transportation system. Among them are the Container Security Initiative (CSI) which employs U.S. Customs officials at fifty-four foreign ports to examine high-risk containers and the Customs-Trade Partnership Against Terrorism (C-TPAT), a public/private partnership that seeks to identify and certify "trusted shippers" whose shipments are subject to a lower level of scrutiny. Now the EU has developed the counterpart to C-TPAT called the AEO (Authorized Economic Operator), and its own review of port security through the EU Commission's FP-7 program designed to maximize both supply chain efficiencies and security. If a determined terrorist organization wanted to do maximum damage to the global supply chain they would have to concentrate on accomplishing several things. First, they would want to place an RDD in a container that had been identified as coming from a trusted C-TPAT shipper. They could accomplish this by bribing, co-opting or otherwise infiltrating the transporter of the box once it had departed its stuffing point. They would also want to make sure that the box was one of those that passed through a CSI port. The fact that it came from a trusted C-TPAT shipper would ensure that the box received minimal scrutiny at its port of

loading and the fact that it was a C-TPAT shipment that passed through a CSI port would ensure minimal scrutiny at its port of off-loading. Finally, they would ensure that the box would not detonate until it had moved through the intermodal transportation system within the United States.

Again, there would not need to be substantial loss of life for this deadly mission to yield enormous results for the terrorist organization. Detonating a box that had been identified with CSI and C-TPAT would call into question the security and viability of the entire system.

The Bush Administration has been heavily criticized for what has been characterized as an overreaction by the government in essentially shutting down all avenues of commerce in the hours following the attacks of 9-11. Of course, the administration may have been just responding to what it read as the national mindset. Interestingly, in the United States, following a catastrophic event such as a natural disaster or industrial accident there is no automatic assumption that there may be another disaster about to strike. Not true in the case of the terrorist attack, where we tend to assume that "there may be another bomb out there" and we better "shut things down until we can find it." In places such as Israel or Iraq, for instance, the mindset is entirely different. Their citizens know that there is another bomb out there, they do what they can about it and then go about their business. Human behavior is capable of considerable adaptability and resilience.

In the scenario described above, this reaction coupled with the fact that the device had circumvented two known safeguards – CSI and C-TPAT – would help ensure that a measured response by U.S. authorities would be unlikely. In the described scenario the likely response would be a total shutdown of our ports and a catastrophic disruption in the global intermodal supply chain.

U.S. industry needs to take a proactive role in developing, deploying and exercising plans that will ensure that the effect of a disruption in the supply chain will not result in a crippling blow to their respective businesses.

CONTINUITY OF OPERATIONS

If the first principle of "being in business" is to "stay in business" then, in the face of the scenario described above, U.S businesses that rely on our highly efficient, cost-effective, yet vulnerable supply chain need to ask "how long can I operate in the face of a catastrophic disruption in the supply chain?" and "what can I do to lengthen that time?" The irony is that the answers involve the types of strategic planning that businesses should have been doing all along to address a wide range of threats to their operations including natural disasters, pandemic influenza, industrial accidents, labor unrest as well as terrorist attacks.

There are many potential threats to the global supply chain. The scenario described above may be the most devastating; however, there are others that may be more immediate. During the past few years Americans have begun to learn that there are a number of things that can have a severe negative impact on our supply chain. There was, for example, at least one positive thing that came out of the tragedy of Hurricane Katrina. That was the sudden and painful realization by our citizenry that a catastrophic event in the area of the United States where most of our energy comes from can cause an acute and immediate impact on the price and availability of gasoline, heating oil and natural gas. The Hurricane shut down virtually all the oil refineries in the Gulf region, which caused gas prices to spike by 40 cents a gallon or more and also triggered gas shortages in some places. In 2002, a strike by the International Longshore and Warehouse Union closed twenty-nine West Coast ports for ten days. The price tag for this shutdown has been estimated

at approximately $15 billion and it took six months to fully recover from the episode. This event, though painful, was a planned, anticipated and peaceful one. One can only imagine the economic consequences of a terrorist strike such as that described above were it to successfully shut down all U.S. ports for a period of time.

Another example of the potential impact of a disruption in the supply chain involves the European electronics manufacturer Ericsson – *once* one of the world's leading producers of cellular telephones. In March of 2000 a lightning bolt struck the Phillips semiconductor manufacturing plant in Albuquerque, New Mexico and ignited a fire in a single furnace. The fire was extinguished within ten minutes, however, not without contaminating millions of chips as well as the "clean rooms" needed to fabricate them. The plant was effectively shut down for months. Unlike Ericsson's competitor Nokia, which demanded that Phillips provide chips from an alternate source in Europe, Ericsson relied on assurances that the plant would be back on-line within a few weeks and too late discovered that this was not true. Ericsson lost $2.34 billion and was forced to withdraw from the cell phone market…and they have never returned.

Although there are many U.S. firms that have invested enormous amounts of money in developing continuity of operations plans, many others have chosen to stick their respective heads in the sand and be lulled by the administration's "continue to shop and travel" reassurances. Many U.S. companies that have come to rely on the ultra-efficient supply chain are ill-equipped to sustain a catastrophic interruption and have done little to build the organizational resilience that will give them the ability to bend and to bounce back from a hardship. With much of the global supply chain's critical components in private hands, and mostly offshore, the ability of the United States Government to protect U.S. industry from the consequences of a major disruption is very minimal. U.S. industry needs to take a proactive role in developing, deploying and exercising plans that will ensure that the effect of a disruption in the supply chain will not result in a crippling blow to their respective businesses.

The current trend of reliance on just-in-time delivery and single-supplier arrangements increases the risk of business interruption. Although some firms attempt to limit potential losses by purchasing insurance, it is unlikely that traditional insurance would adequately protect a company's reputation and market share. Instead, business leaders should be developing business continuity strategies that address many of the following issues:

- Understanding the dependencies and interdependencies within the supply chain.
- Identifying the weak links.
- Identifying those supply chain risks that can be mitigated or eliminated.
- Focusing on maintaining a nimble and agile supply chain so that while risks are managed opportunities are not overlooked.
- Identifying and monitoring of key risk indicators, both "upstream" and "downstream," that might result in potential disruption.
- Determining recovery time objectives.
- Exercising, reviewing and updating continuity plans.
- Determining regulatory requirements that may impact continuity plans.
- Integrating business continuity philosophy into the corporate culture.
- Ensuring that employees know their roles and responsibilities in the event of a disruption.
- Seeking to understand the business continuity plans of key suppliers.
- The establishment of a business continuity planning team comprised of members from each of the critical business components such as IT, security, operations, HR etc. charged with:
    - Conducting a business impact analysis of the potential loss of key functions;

- Pinpointing critical processes and interdependencies and the development of plans to maintain operability in the event of a disruption; and
- Formulating a recovery plan that prioritizes business functions and provides a logical schedule for bringing people and functions back on line.

The goal for any U.S. business that has little tolerance for downtime is to achieve a state of business continuity where critical systems and communications systems are continuously available no matter what happens. This translates into acquiring an across-the-board corporate mindset of proactive thinking about engineering and materials availability, security and the reliability of processes in order to support critical business continuity requirements. This is not done, however, without significant impact on a company's overhead expenses. It will compete for attention with compulsory compliance with Sarbanes-Oxley, EPA and OSHA regulatory requirements. Accordingly, it will entail a continual process of juggling trade-offs among multiple forms of risk/cost/benefit.

Perhaps what we really need to be addressing is a higher order commitment to "business resilience" rather than preparing for a rapid return to "business as usual." After a major disaster/crisis, business as usual may be neither desirable nor possible. To get to resilience, we need to determine how we can adapt our business to new conditions following a major disaster/disruption. The cyanide attack on Tylenol in 1982 imposed new, irreversible requirements for the packaging of consumable products – medicines, food, beverages, etc. – across a whole industrial sector. Those firms that were most agile in adapting quickly to those new requirements gained market share and profits at the expense of those firms that were slower and more resistant to change. The Enron, WorldCom, etc. scandals of seven years ago led to new operating requirements imposed by Sarbanes-Oxley as well as nervous investors. Those who have been quicker to adapt to those new requirements have profited at the expense of those who have been less agile.

HARDENING THE SUPPLY CHAIN

In addition to the need for companies to ensure that their respective supply chains are resilient, as a nation we need to harden the global supply chain across a broad spectrum, from a cargo's point of origin to its ultimate destination. The most effective way to harden the global supply chain is to focus on hardening what is arguably its single most important component – the container. This can be accomplished to a major extent by implementing two important initiatives: the deployment of "smart" container technology and the commencement of X-ray screening at foreign ports of ***all*** U.S.-bound containers. A detailed analysis of the importance of cargo container screening and the benefits of "smart" containers and 100% screening can be found in the recent Reform Institute paper, *Containing the Threat: Protecting the Global Supply Chain Through Enhanced Cargo Container Security.*

The "smart" container offers the potential to harden the global supply chain by making it a far less attractive target to a wide range of terrorists and trans-national criminals who use the supply chain to traffic in drugs, humans, counterfeit goods, weapons, precious metals, currency, and stolen goods. There are essentially two types of smart containers. One uses radio frequency identification (RFID) tags that are installed within the container and are connected to a sensor that detects when a container door is opened. The second type of system typically uses a more sophisticated suite of sensors that can detect when the integrity of a container is breached and also typically uses satellite communications technology rather than radio frequency to communicate the intrusion.[2]

Smart containers provide both supply chain security and commercial benefits. From a security perspective smart containers provide a significant deterrent to a would-be terrorist and even in the

event of a successful attack, the detailed electronic audit trail provided by the smart container will provide a powerful forensic tool. From a commercial standpoint, all manner of transportation providers within the supply chain will benefit from far greater visibility into the movement and status of their cargos.

Although the notion of requiring 100% radiation screening of all U.S.-bound containers is a subject that has been feverishly debated for years, the recently enacted *Implementing the Recommendations of the 9/11 Commission Act of 2007* (HR 1), has injected a new sense of urgency into the discussion. Among the many provisions of the new law is one that requires radiation screening, within five years, of 100% of U.S.-bound maritime cargo before loading at foreign ports. The Secretary of the Department of Homeland Security is, however, permitted to extend the deadline two years at a time in the event that he or she determines there are technical or other concerns preventing the implementation of the provision.

A variety of players in both the public and private sectors strenuously opposed this component of the bill. They contend that the requirement is beset with problems, not the least of which is the fact that the technology to perform the screening may not exist, that it is not clear precisely what is to be scanned, that how the cost will be allocated has yet to be addressed and that the process may delay the flow of inbound goods. While some of these arguments have merit and must be addressed in implementing the provision, they need not prohibit this critical initiative from moving forward. These concerns were addressed in *Containing the Threat.* The bottom line is that one hundred per cent inspection technology is ready, working and should be deployed without delay.

One must keep in mind, however, that no initiative designed to harden the supply chain can succeed without significant international cooperation. The sad fact of the matter is that the United States, with the possible exception of commercial aviation, is a bit player in an industry described in an IBM "white paper" as the "Global Movement Management" industry. All the major shipping lines are foreign owned. Four companies – Hutchinson Port Holdings, Dubai Port World, PSA (formerly the Port of Singapore Authority) and A.P. Moeller-Maersk – control the operation of the world's ports and are also foreign owned. Port security measures such as those mandated under the SAFE Port Act, the Container Security Initiative, the Megaports Program, Foreign Port Assessments, and other foreign port assistance programs will only succeed to the extent that foreign governments and foreign port operators (usually privately owned) are willing to cooperate or are provided suitable inducements to cooperate. Long standing issues of sovereignty, culture, and nationalism will not be solved over night.

The growing recognition that the vulnerable global supply chain represents a serious threat presents an opportunity for international cooperation that can lead to stronger global ties and lead to more partnerships in other areas. A recent report from the World Economic Forum, *Global Risks 2008*, identifies the vulnerability of the supply chain as one of the key global risks that must be confronted through global collaboration. The report states, "…ultimately, effective management of global risks requires a collaborative and coordinated approach in public-private partnership at an international level. Given the macroeconomic and microeconomic impact of supply disruptions arising from a range of global risks, improved dialogue and policy on these risks is crucial to the effective management of the global economy."[3] International organizations such as the World Customs Organization provide a convenient forum for global collaboration. Done right, implementing cargo screening can be a catalyst for such cooperation and dialogue. However, done poorly, instituting such a policy could damage already strained international relations and adversely affect global trade.

There are encouraging signs that the U.S. acknowledges the need for a comprehensive strategy to harden the supply chain that stresses international

cooperation. A key element of the SAFE Port Act required the Department of Homeland Security to develop a strategic plan to enhance the security of the international supply chain, including protocols for the expeditious resumption of the flow of trade following a disruption or security incident in the transportation system. An initial version of the *Strategy to Enhance International Supply Chain Security* was released in July of 2007 with a final report due to Congress in October, 2009. The strategy focuses heavily on post-incident trade resumption and the establishment of protocols for the prioritization of vessels and cargo. It acknowledges that there are a multitude of threats that may adversely impact the supply chain, but that resumption itself is an "all hazards" requirement. It wisely notes that many parts of the supply chain are outside the jurisdiction of the United States and that strong international partnerships will be necessary for meaningful supply chain security.

However, the strategy has been criticized for being light on specifics. Private and public sector actors must work together to develop a concrete operational plan in the case of a catastrophic event affecting the supply chain. Companies reliant on the supply chain need to know who in the government will be responsible in such a situation for coordinating the resumption of business in the aftermath and effective procedures and lines of communication must be established.

Disruptions are inevitable and it will be those companies that understand the vulnerabilities and have developed and executed sensible business continuity strategies that will prevail.

RETHINKING THE SUPPLY CHAIN

Notwithstanding the adoption of the measures described above, U.S. industries that have come to rely on the "just-in-time" intermodal supply chain need to re-examine their dependence on such a system. There is no security system that will ever be invented and deployed that will completely eliminate the chance that a determined terrorist will be successful in creating an event that will bring the supply chain to a sudden and unanticipated halt. This is even truer of natural disasters, industrial accidents and labor unrest. A fail-safe, bullet-proof, global supply chain is simply never going to be a reality.

This will require businesses across many sectors to conduct detailed assessments of their relative reliance on this methodology and determine whether or not a potential disruption could create an unacceptable threat to the viability of their business. If it is determined that an unacceptable level of vulnerability exists, then they need to evaluate how to ameliorate that risk by employing the business continuity strategies described above and by remodeling the way that goods and/or material critical to their businesses arrive at their loading docks.

This is not a "one size fits all" solution. As noted earlier, just-in-time and complex supply webs may indeed contribute to resilience as well as to vulnerability – it depends on the details. What's "unacceptable" depends on the particular circumstances of a particular company at a particular time. The calculus of risk/benefit/cost is relative to other needs and options. "Compared to what?" is an essential question, even if it is commonly overlooked. What's acceptable in the context of a company's own, immediate interests may entail negative externalities that other actors in the firm's environment may consider unacceptable to them, but that they may not be able to control. The same applies to the interests of members of one industry compared to those of other sectors and actors. Therefore, the strategy pursued by one company in isolation could be quite different from what it might pursue in concert with other firms and/or in compliance with regulations imposed by public policies.

SUMMARY AND CONCLUSIONS

Supply chain networks have increased in complexity due to a variety of factors including outsourcing, globalization, and volatility in the trading environment. Contemporaneously, the risk of disruption has also increased. Terrorist threats, natural disasters, geopolitical turmoil, cyber security threats and pandemics, among other things, loom large as potential barriers for logistics providers, suppliers and customers to sustaining a steady state of business continuity. Customers have shifted the burden of maintaining business continuity to logistics providers who are now expected to ensure that the global supply chain moves along smoothly and at highly competitive prices.

Logistics providers have continued to create "lean" supply chains by successfully wringing out waste and inefficiencies while at the same time consolidating the industry into one dominated by a handful of major players. Resultantly, the global supply chain has become more brittle and less able to withstand shocks and disruptions that might have a lesser effect in a more distributed environment. While many of the potential disruptions would be attributable to external sources such as war, pandemics and natural disasters, in today's environment the sudden closure of a major supplier in a tight and lean supply network could have catastrophic effects on downstream businesses.

U.S. businesses that rely on the smooth and uninterrupted operation of the global supply chain – and that may very well be the majority of them – need to not only understand the inherent fragility of the system, but also need to take decisive measures to protect their respective businesses from risks posed by this fragility. We live in a global marketplace that drives a global economy that is powered by a global supply chain. Events that occur half a world away and have a disruptive influence on the supply chain will be felt in every corner of the globe. Disruptions are inevitable and it will be those companies that understand the vulnerabilities and have developed and executed sensible business continuity strategies that will prevail.

Innovations such as smart containers and new cargo screening technologies will be integral in hardening the supply chain, but will only be effective if employed in conjunction with collaborative efforts on an international level. Businesses and government must also exhibit leadership in confronting the challenge now and preparing accordingly. It is not only good business, but also critical to homeland security that the public and private sectors take decisive and timely action to enhance the resilience of the global supply chain.

ENDNOTES

[1] Martin Associates, *The Local and Regional Economic Impacts of the U.S. Deepwater Port System, 2006, September 5, 2007.*
[2] The Journal of Commerce online, *Smart Containers and the Chain of Custody,* Traffic World, *February 12, 2007*, James Giermanski, Chairman, Powers International.
[3] World Economic Forum, *Global Risks 2008: A Global Risk Network Report*, January 2008.

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