In his opening remarks, Mr. Carmel noted that much of globalization depends on supply chain management. Improvements in these systems have permitted companies to ship more materials more places at less cost than ever before. However, all of these improvements come at the cost of increasing vulnerability.

**Taking a Revolution in Military Affairs perspective**

- The Revolution is not in technology but in organization
- Container shipping is very much involved
  - Just had its 50th anniversary
  - Much has been said about how container shipping has changed the world
  - Really the changes have come from how companies have re-organized themselves to take advantage of what containers offer
- Exploiting economies of scale has helped
- Outsourcing is being done at all levels and at great scales
  - Whatever can be done more cheaply elsewhere is being done there
  - All of this depends on the free flow of information

**Concentration of suppliers has occurred in many industries**

- Example: 90% of the world’s power switches come from one company in Taiwan
  - They are the best at building them and do so much more cheaply than anyone else
- Made-in-America labels even on weapons systems are illusionary
  - Europe’s Airbus has more parts made in America than the equivalent Boeing plane whose parts largely come from Asia
  - Cut backs in Airbus will hurt many US jobs

To bring the concept of globalization to the average consumer the *New York Times* ran a recent article on the sources of a loaf of Sara Lee bread

- 16 countries produced its ingredients
- The loaf was “assembled” in the US
Three layers of networking are involved in globalization
1. Physical – ships moving around the world
2. Financial – the ability to price and distribute risks, especially in dangerous areas
3. Informational – all digital tracking now; paper invoices only slow down shipping

Statistics
- In 2006 container trade involved 417 million TEU (transport equivalent units)
  - Total container ship capacity was > 11 m TEU
  - 9.4 m TEU were cellular containerships – requiring assistance from ports to load/unload
- 11% of all container movements (46.3 million moves) were into / out of U.S.
- Terminology: TEU vs. FFE
  - TEU are generally 20-foot-long containers – most of those in the world
  - FEU are Forty (40) foot Equivalent Units – increasing in number worldwide
  - Sometimes used interchangeably
- Much misuse of information in developing container statistics at different ports
  - Are empties counted?
  - What about trans-shipments?
  - Sometimes military loads are not counted
  - Sometimes domestic shipments are not counted
  - Bottom line: beware of statistics cited about containers
- Global container trade has about tripled since the mid 1990s
  - The US percentage of it has fallen somewhat
  - Over 90% of goods from overseas come in by container
  - China is actually the greatest user of containers
    - China’s domestic use is about 2/3 of the world’s number

Container use has been growing for materials coming into and going out of the US
- China is the single biggest destination of containers shipped from the US
- Much of what is shipped out of the US is in the middle of a production cycle
  - What gets sent to China is often processed there and sent back as completed items
  - There may be several value-added stops along the way in the production process
  - So if severe trade sanctions are slapped on China could hurt US industries, too
    - It use to be that only whole widgets were exported
    - Now making parts and conducting assembly in different locations is just part of the process
  - Bottomline: Consequences of trade sanctions are much more complicated now that US industries involved (think of the US Airbus workers)

Port rankings and significance
- The Los Angeles/Long Beach complex is biggest in US – handles 43% of containers
  - Insignificant if compared to Singapore or Hong Kong – always 1st/2nd in world
- China knows how important LA/LB is to them
  - US does not realize how important Singapore and Hong Kong are to it
  - Any problem there would create big problems here
Problem: Americans tend to view the world as US-centric, but China’s growth is feeding much of shipping growth

In 2005 US had 26 million TEU move through its ports
- Average was 71,000 TEU per day / 30,000 TEU were imports
- Only 5% were inspected
- Issue: What would it do to global trade if the US insisted on inspecting all containers?
  - Also a problem about what comes by land – already equals what comes by sea
  - Expect even more to come by land since can’t move much more through US ports
  - Canada has new, still under-utilized port at Prince Rupert (Vancouver)
    - Helps to avoid US rail system until Chicago – an advantage
    - Condition, crowding of US rail system makes it more difficult
  - Mexico is also considering a new post-Panamax port

Problems also growing because newer ships are so large
- Post-Panamax ships will not fit through the Panama Canal
- Larger Super Post-Panamax ships are coming – See Emma Maersk
  - Largest container ship – from bow to stern 1,303 ft., longer than aircraft carriers
  - Out of hundreds of US ports, very few can handle them
- Only 10 US ports really matter – only 2 can handle Post-Panamax ships
  - LA/LB and Tacoma
  - Maersk opening new automated Post-Panamax terminal in Norfolk shortly
    - Required a good deal of cooperation among parties involved
    - Example: to make it economically feasible had to raise nearby railroad bridges to accommodate double decker containers
- Problems growing with railroads especially in the US West which will reach near capacity by 2010-2012
  - Railroads are masters at scheduling rolling stock but nearly maxed out

Studies show that LA/LB handles 43% of imports at about $500 million / day
- On any given day over 300,000 TEU already on the way to LA/LB in 115 ships

Post-9/11 Security Initiatives
- Many things have been discussed and/or made law
  - system, it could be done in many ways
    - US actions could lead to shutting down its own ports
      - New law taking effect in 4 years requiring 100% inspections may make that happen
      - US would be doing damage to itself this way

Other complications
- Waters in New York ports are too shallow for super-post-Panamax ships
- One small port in Italy has become a gateway to Central Europe
  - Many railways run north from there
- Few ports can handle post-Panamax ships let alone the super ones
- New *Emma Maersk* is larger than an aircraft carrier
- Cranes at most ports cannot reach across ships far enough to unload them

Network connections
- Major shipping services (routes) follow the same route and meet in only a few places
  - A US container going to South Africa must first go to Europe to change services

![Network Connections](image)

**Figure 1. Maersk Line, Limited shipping services work as a network**

- Containers continuously moving so need very good scheduling for ships/air/etc.
  - Day and hour of arrival and departure well-known; schedule must be kept
  - A container arriving on a Saturday night and leave a port on Sunday morning

Maersk is a major mover of DoD material to Iraq
- Most material goes there by ship
- Note: Dubai Ports World (DPW) runs major hub ports along that route
- Controversy about DPW buying US ports was useless – only minor ports to DPW
  - Need to watch out for unintended consequences of political decisions

More complications
- Rail networks at/near capacity here and in Europe
- Shipping is a seasonal business – high season: August to October for Christmas goods
- Reached rail gridlock in Europe 2 years ago; expect it here by 2010
  - Becomes a potential national security issue since could not move troops/equipment in crisis

Wal-Mart and other major customers work the same way as shipping companies
- Use hubs and nodes for distribution near major sea/land transport hubs
The whole hub and spoke distribution system goes deep into the economy
- Wal-Mart has a big impact on the national economy
  - Studies show that having one in an area drops food prices about 9%
  - Prices drop about 4% on non-food items if there is competition from Wal-Mart
- If Wal-Mart’s suppliers are affected, there could be a rippling effect through the U.S. economy
  - Eventually, supply-side inflation from Hong Kong will hurt mortgages in Iowa

Developing countries need adequate infrastructures to become part of the world economy
- While it takes 14 days between manufacturing and export in the US, the same process would take about 61 days in Africa
- Need to have a strong information system to manage the transport infrastructure
  - Without it, all other investments are a waste of money

Network vulnerabilities
- Congestion in the transport system will have impact shortly
  - 9 million containers being crammed through a system built for 2 million

Maritime threats
- Example: *Lindberg* attacked near Aden by small boat with explosives
  - Caused little damage to the huge tanker; fixed quickly and continued on
  - But price of oil went up 48 cents a barrel
  - If something happened that had caused cost to go up 3 times as much, could expect loss of many US jobs and much money