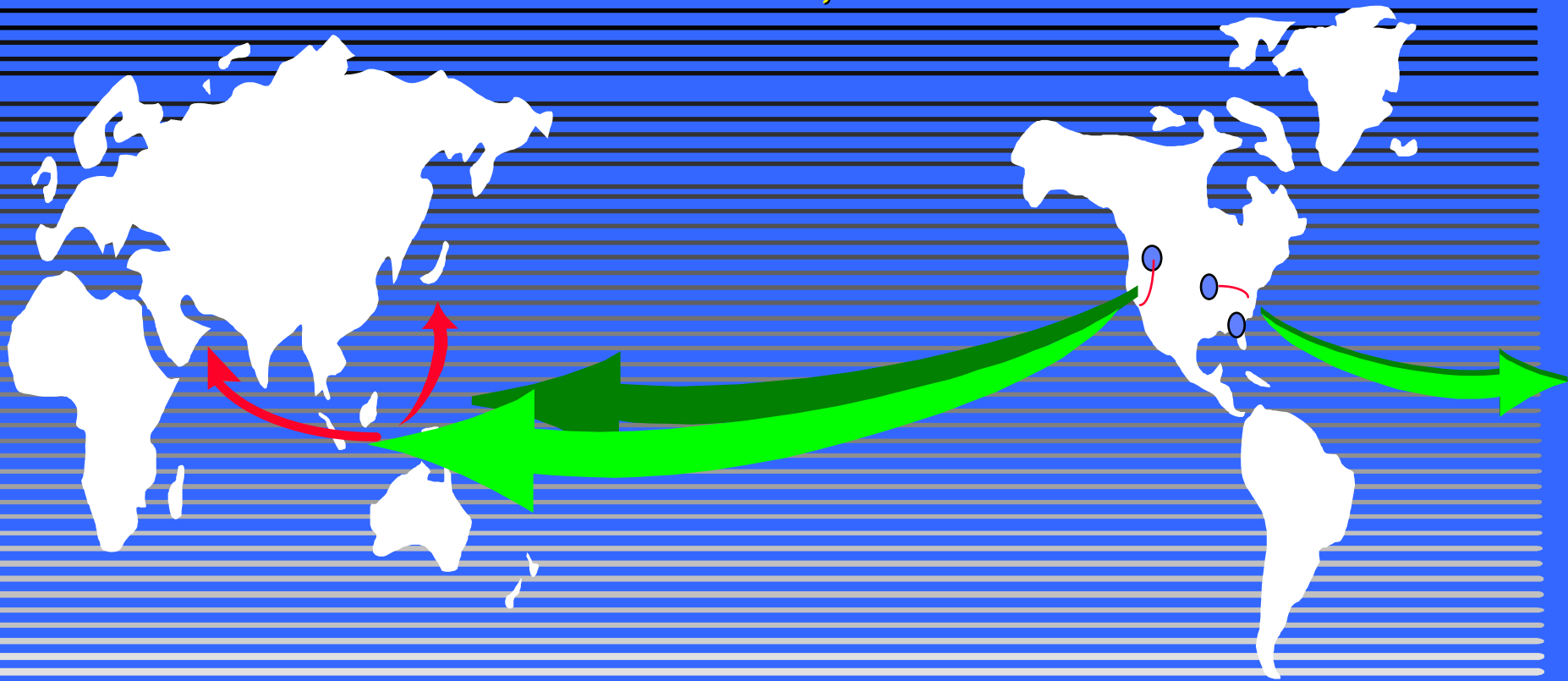


AGILE PORT TECHNOLOGIES: A Look into the 21st Century

***Presented at the International Workboat Show and Conference
Isaac Maya, Ph.D., P.E., CCDoTT Executive Program Manager
November 7, 1997***



***Prepared by the Center for the Commercial Deployment of Transportation Technologies
in Cooperation with Science Applications International Corporation***

WHAT IS AN AGILE PORT?

- ***The use of state-of-the-art material and cargo-handling technologies, tagging, tracking, and information management systems and technologies to expand the ability of commercial terminals to:***
 - ***quickly accommodate military cargo***
 - ***minimize the impact on commercial transportation from military surge deployments***
 - ***improve the ability of terminals to accommodate a variety of ship types, including HSS***
- ***The integration of the physical port and terminal configuration design with material and information handling to permit cargo to pass through more rapidly than under current practices***

BENEFITS OF AN AGILE PORT

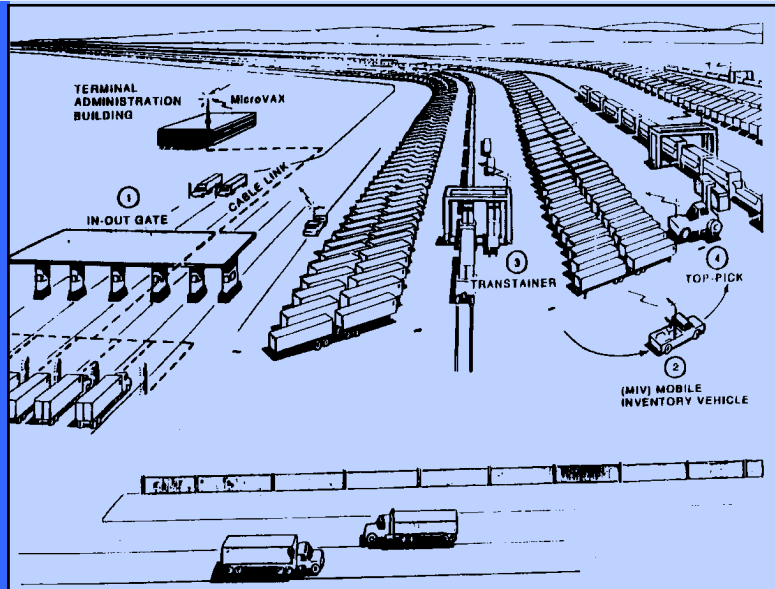
- ***Increased port throughput***
- ***Decreased port congestion***
- ***Increased port mobilization capabilities***
- ***Increased asset visibility***

PROCESS

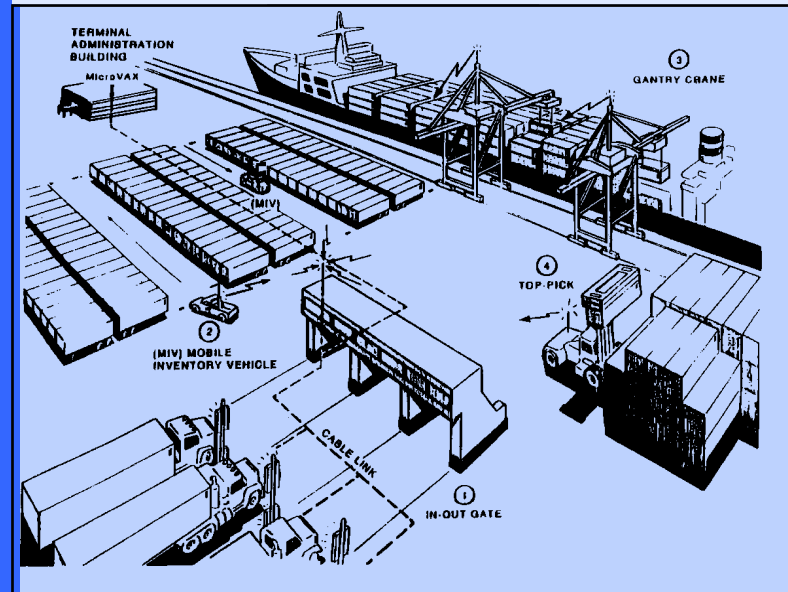
Planning Activities Unit Activities Movement to POEs POE Operations TML Lift Strategic Operations POD Operations TML Tactical Assembly Area Movement to Marshaling Area / Preparation for Combat



Rail Intermodal Terminal

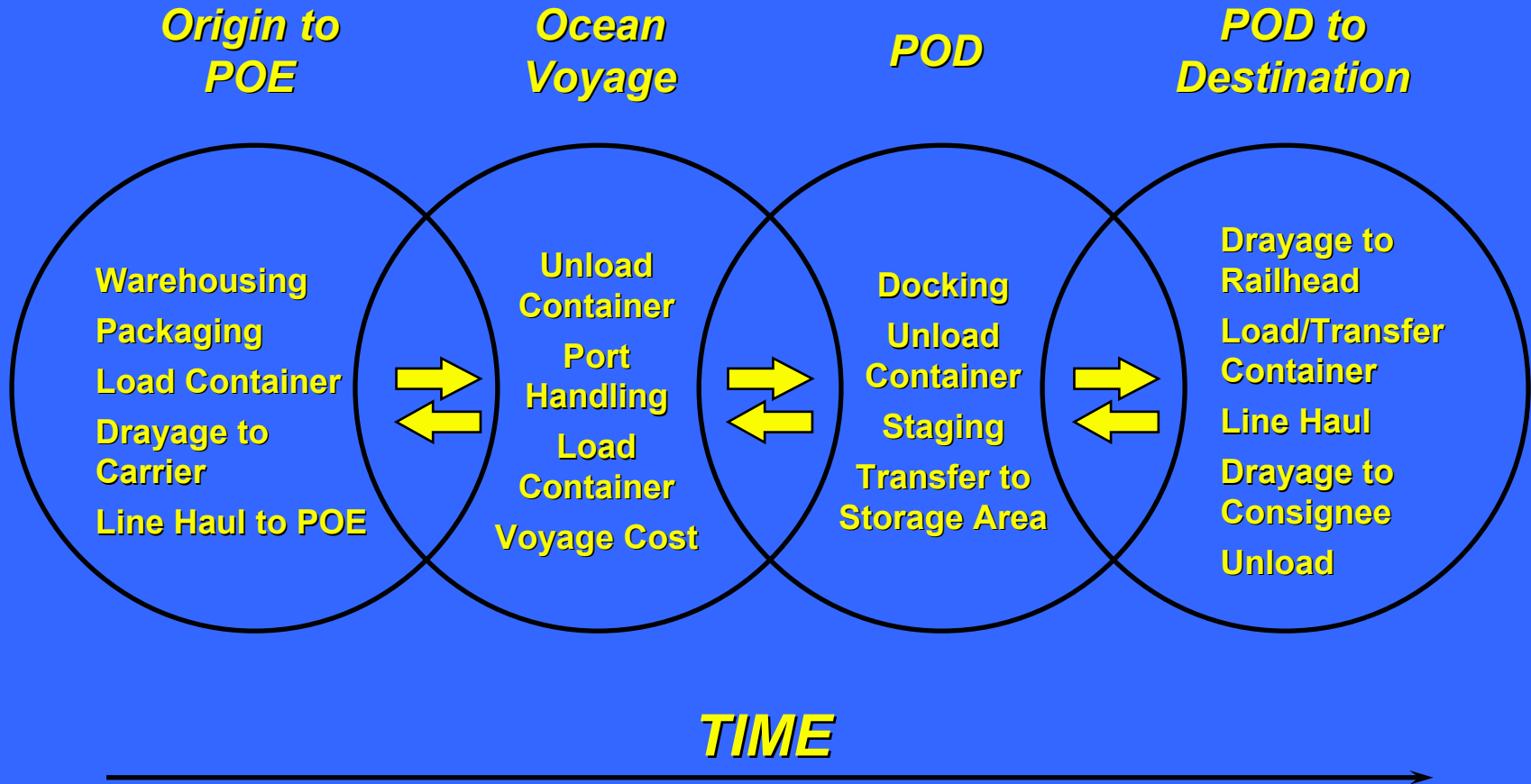


Ocean Container Terminal

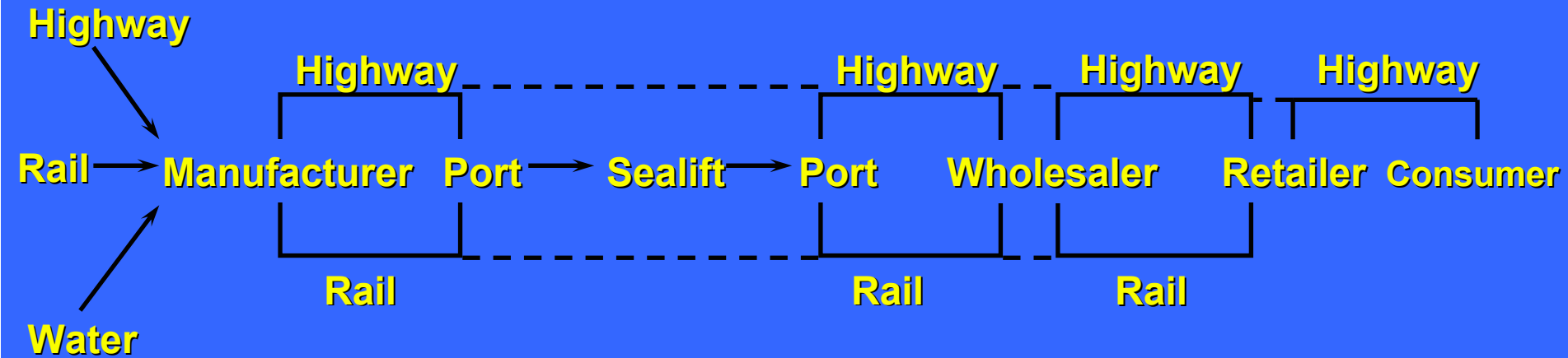


Point: Use Technology to Increase Throughput (Tags, Video, Sensors, GPS)

END-TO-END PRODUCT FLOW

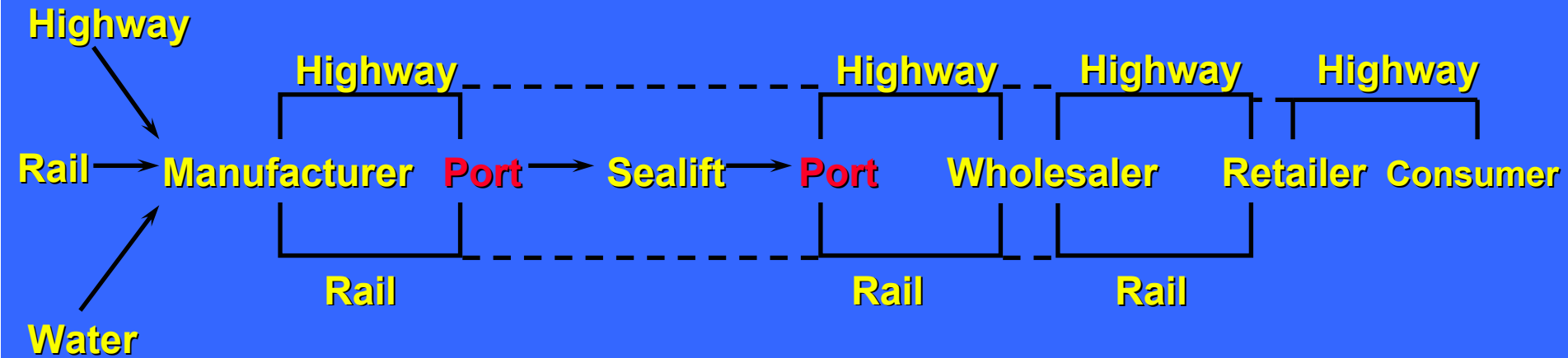


Supply Chain Management



Point: The Distribution Process

Supply Chain Management



Point: Seaport is connecting link for 3 modes of transportation

Challenge = How to increase efficiency and productivity

Ports of the 21st Century

Issues

- **Environmental**
- **Port Congestion**
- **Ship Draft vs Water Depth**
- **Land Side Access**
- **Gate Processing**
- **Manual Operations**
(Administration, MHE, Inventory)
- **Cargo Dwell Time**
- **Aging Infrastructure**

TECHNOLOGY

Planning
Preparation
for Combat

Unit
Activities

Movement
Activities

POE TML
to POEs

Strategic
Operations

POD TML
Lift

Movement to
Marshaling Area/
Tactical Assembly
Operations Area

Inland Port/Virtual Ports

- | | | | | |
|--|--|--|--|---|
| <ul style="list-style-type: none"> • TrAMS • MHE • Packing Tech | <ul style="list-style-type: none"> • Double Stacked Cars • Aluminum/composite material • Sideless secure containers | <ul style="list-style-type: none"> • AP <ul style="list-style-type: none"> -TrAMS -Video -Imaging -MHE <ul style="list-style-type: none"> <input type="checkbox"/>Load <input type="checkbox"/>Unload -GPS -Intermodal -ID Demo & testbed Port/Host -Robotics for cargo handling -Terminal throughput & cost models -Advanced ship loading & unloading <ul style="list-style-type: none"> <input type="checkbox"/>Load by wire <input type="checkbox"/>Cranes for multiple container lift <input type="checkbox"/>Monorail system for intermodal terminals <input type="checkbox"/>Cell elevator for rapid container handling <input type="checkbox"/>Cargo positioning system for increased productivity <input type="checkbox"/>Develop anti-sway system for cranes <input type="checkbox"/>Integrate skycam in port operations <input type="checkbox"/>Cargo staging yard simulation <input type="checkbox"/>Training simulators for cranes and cargo operations | <ul style="list-style-type: none"> • HSS/Shipyards • Supersonic A/C • Pogo Rocket • Airships | <ul style="list-style-type: none"> • AP • (Mobile/Deployable Capability) • JLOTS |
|--|--|--|--|---|

Ports of the 21st Century

Issues

- **Environmental**
- **Port Congestion**
- **Ship Draft vs Water Depth**
- **Land Side Access**
- **Gate Processing**
- **Manual Operations
(Administration, MHE,
Inventory)**

Solutions

- **Recognition, Planning,
Teaming, Partnering**
- **Inland ports; “Virtual Ports”**
- **Dredging; off shore floating
ports; smaller vessels**
- **Highway connectors; on
terminal rail; dedicated corridors**
- **Technology (RFID, OCR, Video)
Automation**
- **Automation; “Smart” MHE,
Robotics, video, intelligent
spreader bars, EC**

Ports of the 21st Century

Issues (cont'd)

- **Cargo Dwell Time**
- **Aging Infrastructure**

Solutions (cont'd)

- **Direct movement from rail to ship/ship to rail**
- **Expert Systems**
 - **Yard planners - resource allocation**
 - **Stack management**
 - **Train load assistant**
- **Knowledge based auto. systems**
- **Private investment; innovative financing (loan guarantee / ins.)**
- **Job creation**

Ports of the 21st Century

Control Center

Information
Dominance

Decision Support Tools

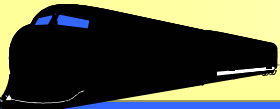
- Terminal Throughput & Costs Models
- Advanced Ship Loading & Unloading Models
- Integrated Skycam in Port Operations
- Simulations - Cranes, Cargo OPN's, Staging Yards



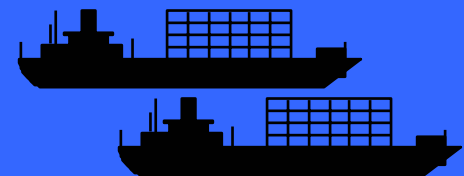
- RFID
- OCR
- VIDEO
- EC

- Smart MHE
- Video
- GPS
- Robotics
- Expert Systems
 - Yard Planners
 - Stack Management
 - Train Load Assistant

- Video on Crane
- Automated All Weather Cargo Transfer System
- Intelligent Spreader Bars
- Cell Elevators
- Cranes for Multiple Container Lifts
- Crane Anti-Sway System
- Direct Rail to Ship



Point: Profitable Ports in the 21st century will be agile, technologically enhanced, information dominant, easily accessible from land & water



FUTURE DIRECTION

- ***Develop Global Measures of Port Productivity***
- ***Quantify Agile Port Issues and Requirements***
- ***Identify Candidate Technological Components and Configurations of Agile Ports and Intermodal Transfers***
- ***Develop End-to-End Economic Models of Agile Port and Intermodal Transfer Configurations***