

## **Session 10**

### **Port Management & Operations**

### **Part 3: The Exploitation of IT is the Key to Rapid Expansion, The Singapore Story**



# PORT DEVELOPMENT AND COMPETITIVENESS

## **Session 10**

### **Port Management & Operations**

#### **Part 3: The Exploitation of IT - The Key to Rapid Port Expansion, The Singapore Story**

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## **Outline**

- IT System and Support
  - IT Support in Singapore Port Operations
  - Connecting Port IT with the rest of the nation

### **Discussion 5:**

Engineering and IT matters – The Singapore approach

## **IT System and Support**

- PSA Singapore needs to ensure that containers are not damaged as goods can cost more than US\$100k per container
- With so many containers being moved around the terminal each day, PSA Singapore meticulously plans and ensures that containers are not lost or damaged in the port
- PSA Singapore also provides facilities and services for containers that need special attention, are time-sensitive, or require controlled temperatures for cargoes that need to be stored in refrigerated containers (or reefers)

## **IT System and Support**

- PSA Singapore constantly innovates through automation and the use of intelligent systems to enhance its customers' hubbing operations and competitiveness.
- Its operations are managed on a network of more than 300 advanced servers.
- Applications such as Computer Integrated Terminal Operations System (CITOS®) and PORTNET® have given PSA Singapore the edge to achieve greater levels of productivity and efficiency.

## IT System and Support

- Exploitation of IT and its support for Port Operations, PSA Singapore has been through an evolution tapping on ICT, Automation, Technology, and Digitalization:
  - 1970s – BoxNet/DataNet
  - 1980s – Port Clearance System (port-related government agencies), One-Stop Documentation, MarineNet, TradeNet
  - 1990s – Terminal Operations System (TOS), Enhanced TOS, CITOS
  - 2000s – Enhanced CITOS with Automation
  - 2010s – Maritime Single Window (MSW), Port Clearance, Health & Immigration, e-Commence platform for Port to Single platform for Maritime Community, Big Data technology for Next-Gen Port

## IT System and Support

- Advanced Planning & Control Systems:
  - Well before a ship arrives at Singapore Port, sophisticated computer systems will have planned all the details of its needs while in port.
  - The result: One of the fastest container port turnaround times in the world.
- PSA Singapore's extensive connectivity and staggering volumes are supported by its IT backbone - Computer Integrated Terminal Operations System (CITOS®).

MESTO  
PRISTASANYA

FREN FRENCIA  
PRISTASANYA

Container Depot and Logistics Association (Singapore) **CDAS**

## IT Support in Singapore Port Operations

**CITOS<sup>®</sup>**  
COMPUTER INTEGRATED  
TERMINAL OPERATIONS SYSTEM

An Enterprise Resource Planning system that coordinates and integrates every asset from prime movers, yard cranes and quay cranes to containers and drivers

<https://www.singaporepsa.com/our-commitment/innovation>

Operasi  
Penera

ZA  
KONTESNER

ZA RANJIK

Container Depot and Logistics Association (Singapore) **CDAS**

## IT Support in Singapore Port Operations

- CITOS<sup>®</sup> was first developed in 1988 and re-developed in 2002-2008
- CITOS<sup>®</sup> is a powerful tool that allows the port to manage its equipment and people seamlessly, flexibly and in real-time
- Some examples of how CITOS<sup>®</sup> directs port operations:
  - Berth Planning System ✓
  - Vessel Planning System ✓
  - Yard Planning System
  - Resource Planning System I TEU
  - Flow-through Gate Operations System
  - Remote/Automated Crane Operations System
  - Yard Operations Systems

### **IT Support in Singapore Port Operations**

- On a typically day, >60 vessels of different sizes call at the port
- Berth Planning System allows most (>90%) of the vessels to be berthed on arrival (BOA)
- Planning begins 72 hours before the ship arrives, when the shipping line applies for a berth and sends stowage instructions to PSA Singapore through PORTNET®
- After the shipping line confirms the ship stowage and connection instructions, 12 hours before the ship arrives, Vessel Planning System schedules the container job sequences to optimize the crane intensity to minimize the vessel's port stay

### **IT Support in Singapore Port Operations**

- Once berthed, the quay cranes unload boxes destined for other ports or for import, and load boxes brought in by other vessels or for export.
- The containers are transported by prime movers that move off to container storage areas in the yard. These prime movers are tracked individually via GPS and distributed dynamically among the vessels.
- In the yard, the yard cranes lift containers from prime movers and stack them in the yard.
- The sequence is reversed for delivery out of the yard to a connecting vessel.

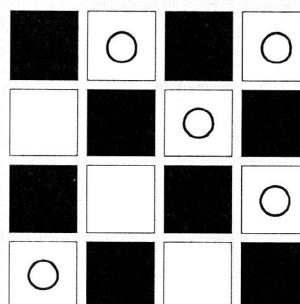
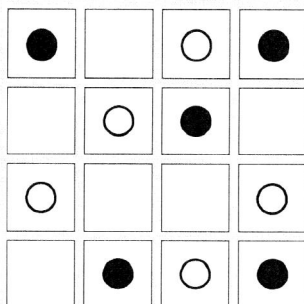
## IT Support in Singapore Port Operations

- Containers are not stacked in a random manner.
- When information is captured through PORTNET®, CITOS® automatically generates ship stowage plans and yard plans based on factors, such as:
  - Ship stability (for stowage planning)
  - Size and Weight of container
  - Destination Port
  - Special requirements
    - E.g., reefers (RF), dangerous goods (DG), out-of-gauge (OOG) cargo, tight connections(T/C)

## IT Support in Singapore Port Operations

- CITOS® allows PSA Singapore to
  - maximize land use
  - optimize container storage & retrieval
  - track the location of each container
  - maximize resource productivity by planning ahead

### Example: Yard Optimization – Templating Concept

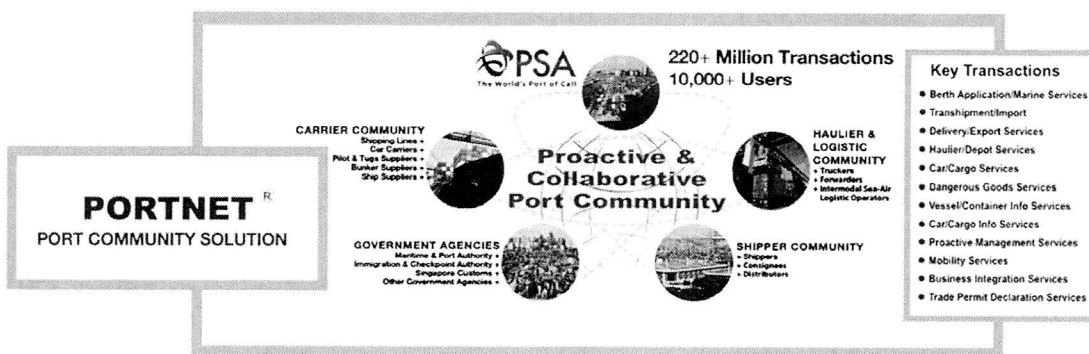


Seeds of the same color repel.  
No further insertions possible.

Black seeds go to black boxes.  
White seeds go to white boxes.

Checker Board → Yard Template; Seed → Yard Cluster; Seed Colour → Vessel Calling Day

### Connecting Port IT with the Rest of the Nation



World's first nation-wide B2B port community IT solution and a winning entry in the National Infocomm Awards (2006)

<https://www.singaporepsa.com/our-commitment/innovation>



## Connecting Port IT with the Rest of the Nation

- PORTNET® provides the logistics industry with a single sign-on network portal and helps the entire port and shipping community to increase productivity and efficiency through greater use of IT and the Internet
- Connects shipping lines, hauliers, freight forwarders and government agencies, helping them to manage information better and synchronize their complex operational processes
- Unparalleled capability to provide real-time, detailed information on all port, shipping, and logistics processes crucial to users' businesses
- More than 10,000 integrated users
- Processes 220 million transactions a year

## Connecting Port IT with the Rest of the Nation

- PORTNET® simplifies and synchronizes millions of processes for customers moving their cargo through Singapore, with
  - EZShip® that manages complex transshipment processes of shipping lines
  - ALLIES™ that supports slot exchanges among alliance partners
  - TRAVIS™ that enables companies to monitor performance and make critical business decisions
  - Haulier Community System™ that integrates port documents seamlessly with the haulage processes and workflow, and
  - CargoD2D™ a documentation portal between shipping lines and shippers

## **Discussion 5**

**Engineering and IT matters  
– The Singapore Approach**

**Questions?**