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The Review of Advanced Technologies for Ports and Terminals World-Wide

# Terminal management technologies speed up container operations

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## ABSTRACT

**N**avis has a number of software systems to provide gate, yard, vessel, and rail operations management, as well as other functions. These can interface with other technology, such as radio frequency (RF) networks, position detection systems, and optical character recognition (OCR) scanning, to produce significant gains in speed, and in efficiency for both the terminal and its customers.

## Introduction

The paramount topic of security at container terminals, coupled with the transportation requirements of rapid and accurate workflows, brings a number of proven technologies to seaports worldwide.

Ocean carriers, rail lines, and truckers need quick container turnaround service from ports and their terminal operators. Customers of carriers, such as manufacturers, demand just-in-time delivery to production lines, and retailers must be able to fill shelf space as required, hence any lost time along the international supply chain can be costly. Loose links found at the gates, in the yards, and during vessel loading and unloading, by truckers and terminal planners are lessened with better scheduling and equipment handling systems.

## SPARCS and Express

An Oakland, California, based terminal management, and container handling software provider, Navis' information technology solutions for terminal planners, container handling operators (CHO), port authorities, and shipping lines are in the Synchronous Planning and Real Time Control System (SPARCS), a graphical software product, and in Express, an Oracle database that interfaces with SPARCS in real time to provide gate, yard, vessel, and rail operations management. The SPARCS-Express graphical planning and data management tools benefit users with more efficient use of labour, yard space, and handling equipment to result in improved productivity and profitability at terminals.

In order to meet fast turn times for containers at all domestic and foreign ports, tighter control over the movement of terminal assets, such as containers, rubber-tired gantry cranes (RTG), and straddle carriers, as well as trucks, all are managed by two SPARCS computer modules.

"The Expert Decking product is used for efficient high density stacking. PrimeRoute, the scheduling solution, is issued to streamline the use of equipment and the movement of containers, which saves time for terminals," according to Navis' Jim Schreitmueller, Vice President of Sales and Marketing.

"Conventional yard planning creates city-blocs of containers, with long lines of trucks waiting, which slows down quay cranes. Expert Decking tries to create homogeneous stacks of containers

of, for example, all twenty-foot containers of the same weight, the same port, and the same vessel, with widely distributed stacking over the whole yard spreading out the work. PrimeRoute pools resources, so any truck can work with any container-handling equipment, serving any point of work, in the terminal. Both modules work in real time updating every few seconds," said Schreitmueller.

Terminal operators and truckers share information and management time with Express' appointment management, interfacing with Expert Decking. As Schreitmueller explains

"Importers can't predict when trucks will show up to get the box. Moreover, when should the terminal be ready for the trucker? Express helps to designate a time slot so that the terminal can plan the day for the trucker to come by appointment to pick up the container and allocate equipment better. Terminal congestion is lowered, turn times are increased for more moves per day, for more efficient operations and lower transportation costs".

A recent interview by the American Journal of Transportation with Tom Armstrong, Information Technology Manager at Georgia Port Authority (GPA), found measurable benefits at the GPA's Garden City Containerport Terminal. Armstrong oversees technological improvements across the 1,015 acres (411ha) where 36 container carriers call – none with dedicated space.

"Navis helps orchestrate and organise 24 hours per day, 7 days per week. Without Navis systems we could not operate our daily 3 1/2 vessel calls, 3,500 truck moves, and over 1,000 on/off railcars on our on-dock rail facilities," said Armstrong.

In addition to SPARCS and Express products, Armstrong explained that the entire facility has a Radio Frequency (RF) network of 180–190 units, which communicate real time information during the day into Express. Any activity by an operator, or any movement of equipment, is communicated. Navis' Web Access furthers planning and visibility at terminals, by enabling all information to be viewed through a Web browser and Internet connection.

Armstrong finds that Navis' "tremendous planning and workflow tool" satisfy Home Depot, Wal Mart, Pier One, Dollar Tree, K-Mart, and Best Buy, each of whom have built distribution facilities in a nine million square foot (84ha) area a few miles from the Port. He explains that, "Home Depot's distribution centre can actually see that event changed from vessel to yard, and ready for Home Depot to pick up by truck or, even, have a hot box and be alerted via e-mail, fax, or on-screen."

To enhance Navis' powerful planning and control capabilities for terminals and shippers there are numerous technology companies that work in concert with the SPARCS-Express software. Handheld and wireless devices, position detection systems, and digital imaging technology companies partner with Navis, and become certified, or "NavisReady".

## RF communications

Psion Teklogix of Ontario, Canada, uses Radio Frequency (RF) wireless technology, which can communicate with the Navis SPARC applications, in a number of devices widely used at 204 ports, or terminals, around the globe, including the Georgia

Port Authority. Specifically, these are Teklogix handhelds of the 7000 series, and the Vehicle Mounted Terminals (VMT) of the 8000 series.

"The VMTs provide mobile port workers with a daily job schedule that allows them to complete their tasks quickly and efficiently, and VMTs can also run truck messaging applications that increases truck turn-around time. The handheld computers enable yard workers to update the inventory of container handling equipment (CHE), and the container terminal databases in real time. The RF system in both devices communicates with the Navis SPARC applications based on Narrow Band technology or 802.11b," said Winston Chai, Business Development Manager, Psion Teklogix Corporation.

## Savcor One system provides graphical representation

Position detection system developer Savcor One, based in Finland, integrates their Container Position Information System (C-PIS), using data uploaded from SPARCS, to provide a graphical representation of a terminal, and the location of all containers and/or equipment in a Psion Teklogix 8000 Windows-based, vehicle-mounted terminal.

Also, Savcor's C-PIS works by updating SPARCS through sensors installed on the CHE that detect when, and where, containers move in the yard, and processes that container position information in the CHE operator's cabin. Then, client-server software relays the latest container position to SPARCS for the terminal operator and CHE driver. Savcor One works with Navis in European terminals to keep yard inventory one hundred percent accurate.

## Wheretag tracks in real time

Another position detection system, that works with SPARCS for mobile terminal operators, is from WhereNet of Santa Clara, California. A Wheretag, the size of a small pager, is attached to any container terminal asset that a company wants to track in real time, and is programmable from a hand held device. The tag's programmed transmission rate is picked up by WhereLan's hardware location sensors, installed 750-1,000 feet (230-305m) apart on light poles. The tags and sensors work with WhereNet visibility server software, which is the operating system providing updated wireless location, and communication capabilities, of terminal assets.

"WhereNet customers using similar systems showed rapid time to benefit with 60-90 days installation time, and return on investment in less than one year," claimed Matt Armanino, Vice President of Business Development, WhereNet, although unable to confirm any seaport customers.

## OCR technology partners

A final pair of NavisReady technology companies are Science Applications International Corporation (SAIC) of San Diego, California, the multi-billion dollar employee-owned firm with digital imaging solutions of OCR technology, and LA King of Long Beach, California, providing the gate communication systems for efficiency and security at port terminals.

SAIC has its Intelligent Intermodal Solutions family of products using OCR technology at terminal gates in: the Port of Los Angeles for American President Lines (APL); at the Port of Newark, New Jersey, for P&O Ports; and for Union Pacific Railroad at various rail locations.

The OCR technology is used to identify International Standards Organisation (ISO) container and chassis numbers, for processing through terminal gates in cooperation with clerks using Navis Express software for yard management of container trucks. Trucks roll up to the gate, where there is a pedestal box containing intercom, printer information to driver, cameras, and an interface for the gate clerk. A digital imaging camera images ten to twelve pictures of the container, chassis, and truck as the container goes by, and automatically passes the images to the computer, with the OCR technology reading the numbers off the takes. The gate clerks at APL, for example, can look at the containers and ISO numbers on their screens, before giving approval to progress.

"Once approved, information is passed to Navis Express for a ticket to the driver which instructs him where to park," said Terry Gibson, Vice President, Marketing, SAIC.

If a container raises any suspicion before, or through, the OCR scanning process, then SAIC's Vehicle and Cargo Inspection System (VACIS) uses gamma-ray technology to scan the containers, rail cars, or vehicles, in seconds, without any delay in gate processing.

The Vehicle and Cargo Inspection System is embraced by US Customs security initiatives of 'pushing the borders out' whereby a total of twenty international ports, including Canadian, Singapore, and Rotterdam, have signed, or plan to sign, agreements with the United States to allow US Customs inspectors to be posted in those ports.

## Summary

By harnessing the power of technology, Navis and complementary technology companies meet specific terminal requirements that quicken inbound and outbound container and cargo movements at ports throughout the world. At Georgia Port Authority, for example, Navis has allowed them to absorb volume increases in two years from 750,000 to 1.2 million TEUs per year handled, without any significant increases in the work force.

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