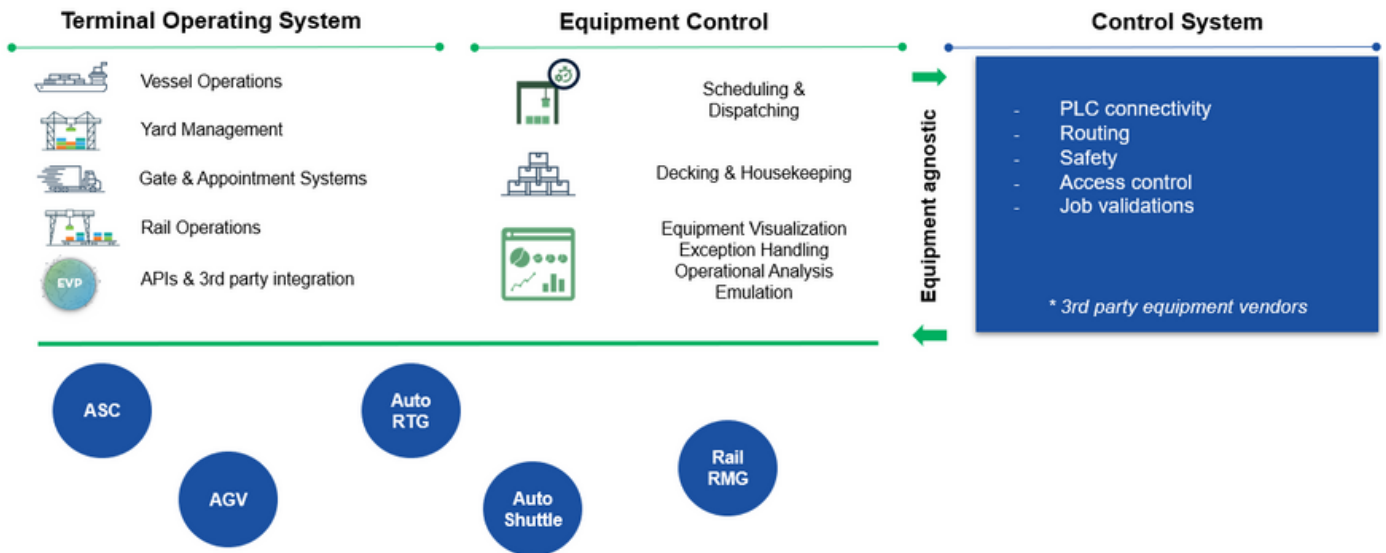


# navis<sup>®</sup> AUTOMATION

*Navigating Excellence in Terminal Automation!*

In the world of automation, Navis stands out as a premier provider of Terminal Operating Systems (TOS). Our Navis automation product module not only offers a diverse range of equipment automation combinations but also effortlessly integrates with our planning and execution modules, ensuring a seamless operational experience.

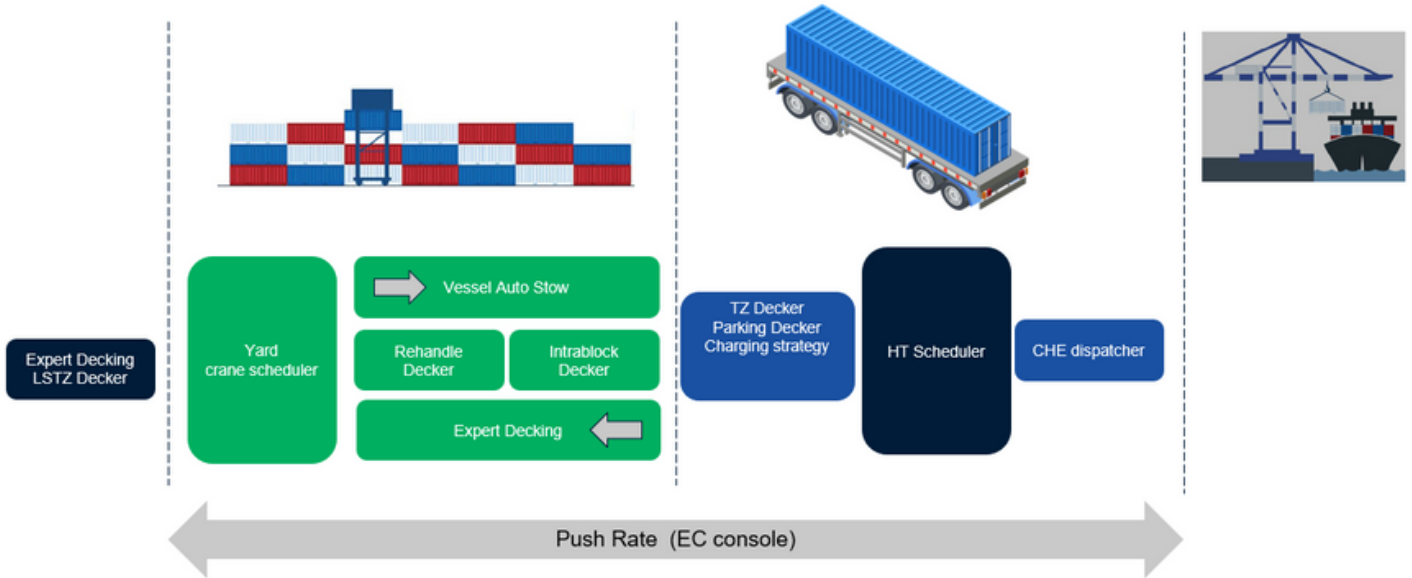


*Navis Comprehensive Automation Overview*

## Value Offering

- Enhanced Terminal Safety
- Optimized vessel productivity & truck turnaround times
- Reduction of recurring cost
- 24/7 operations
- Minimized potential for human errors
- Operational efficiency of large vessels
- Reliable and consistent performance that supports extended customer planning
- Innovative technology and modern work environment
- Environment friendly
- Achieving Liner KPIs

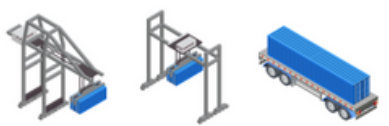




Automation - Basic Workflow

## Automation Types

In today's landscape, automated terminals fall into two main categories: **full automation** and **semi-automation**. Full automation encompasses the automation of both horizontal transport and yard cranes, while semi-automation focuses on automating yard cranes specifically. Notably, there is a rising trend in the automation of Quay Cranes (QC) for both of these variations. Additionally, gate automation consistently emerges as the initial phase in the journey toward terminal automation.



### Full Automation ASC - AGV

- QC Automation
- Automated Stacking Crane
- Automated Guided Vehicle



### Full Automation ASC - ASH

- QC Automation
- Automated Stacking Crane
- Automated Shuttle



### Semi Automation ARTG/C-ARMG - TT

- QC Automation
- Cantilever ASC
- Cantilever ARMG
- Manned Terminal Tractor



### Full Automation Auto Trucks

- QC Automation
- Auto RTG/C-ARMG
- Auto Terminal Tractor



### Full Automation Auto Strads

- QC Automation
- Auto Straddle Carrier



### Semi Automation ASC - ShC

- QC Automation
- Automated Stacking Crane
- Shuttle Carrier

Automation types in N4 - TOS Leader in Terminal Automation

## Automated Horizontal Transportation Manager

The Automated Horizontal Transportation Manager serves as a centralized control and monitoring system, optimizing AHT operations for consistent quality and throughput. It interfaces with the Equipment Control System (ECS) to control AHTs in both waterside and, in some cases, landside operations.

- **AGV**

N4 Automation supports both conventional AGVs and L-AGVs, enabling decoupled or coupled transfer of containers using various modes.

- **Autoshuttle**

N4 Automation also supports the automated movement of shuttles on the waterside, capable of decoupled moves under the QC backreach and ASC transfer point.

## Yard Crane Automation

The Automated Yard Crane Manager (AYC Manager) efficiently manages container movements for automated yard cranes, including ASCs, ARMGs, and C-ARMGs. It centralizes operations planning, resulting in accelerated terminal operations, enhanced flexibility, increased safety, higher equipment and yard utilization, and improved control.

Supported Moves:

- Vessel load and discharge
- Rail load and discharge
- Road delivery and receipt
- Yard moves between blocks and across the yard
- Opportunistic moves like housekeeping and rehandling

- **ASC**

The Navis ASC optimization/ automation module streamlines the end-loading yard crane operations by automation and optimizing decision-making. Both coupled and de-coupled horizontal transport interchanges are supported.

- **RTG**

The Navis RTG optimization/automation module streamlines side-loading yard crane operations by automating and optimizing decision-making. It ensures that RTGs execute jobs with efficiency, minimizing unproductive moves.

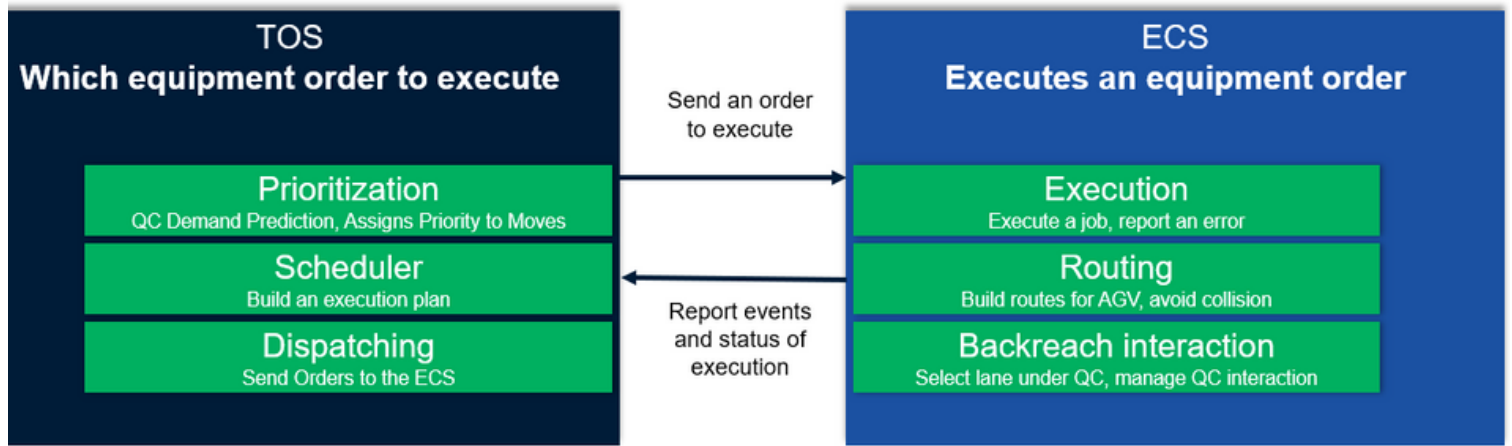


## Waterside and Landside Process Automation

- **QC Automation** : N4 Quay Crane Automation offers an automation and optimization framework for both Dual- and Single-Trolley Quay Crane operations. It supports various operational scenarios, including platform operations, OCR and Hatch Clerk processes, and twin, tandem, and quad capabilities.
- **Gate Process Automation** : The N4 gate automation module integrates with GOS for automated gate stage processing and handling of road trucks at the ASC and auto RTG transfer points, offering highly configurable gate flows.

## Standard Interface with ECS

N4 seamlessly integrates with Equipment Control Systems (ECS) in automated terminals to send job orders and keep track of equipment movements. The interface ensures effective communication between N4 and the robotic equipment.



Clear functional split, clear boundaries

