



# Preparing for Automation

Transport Events – December 10, 2020

navis®

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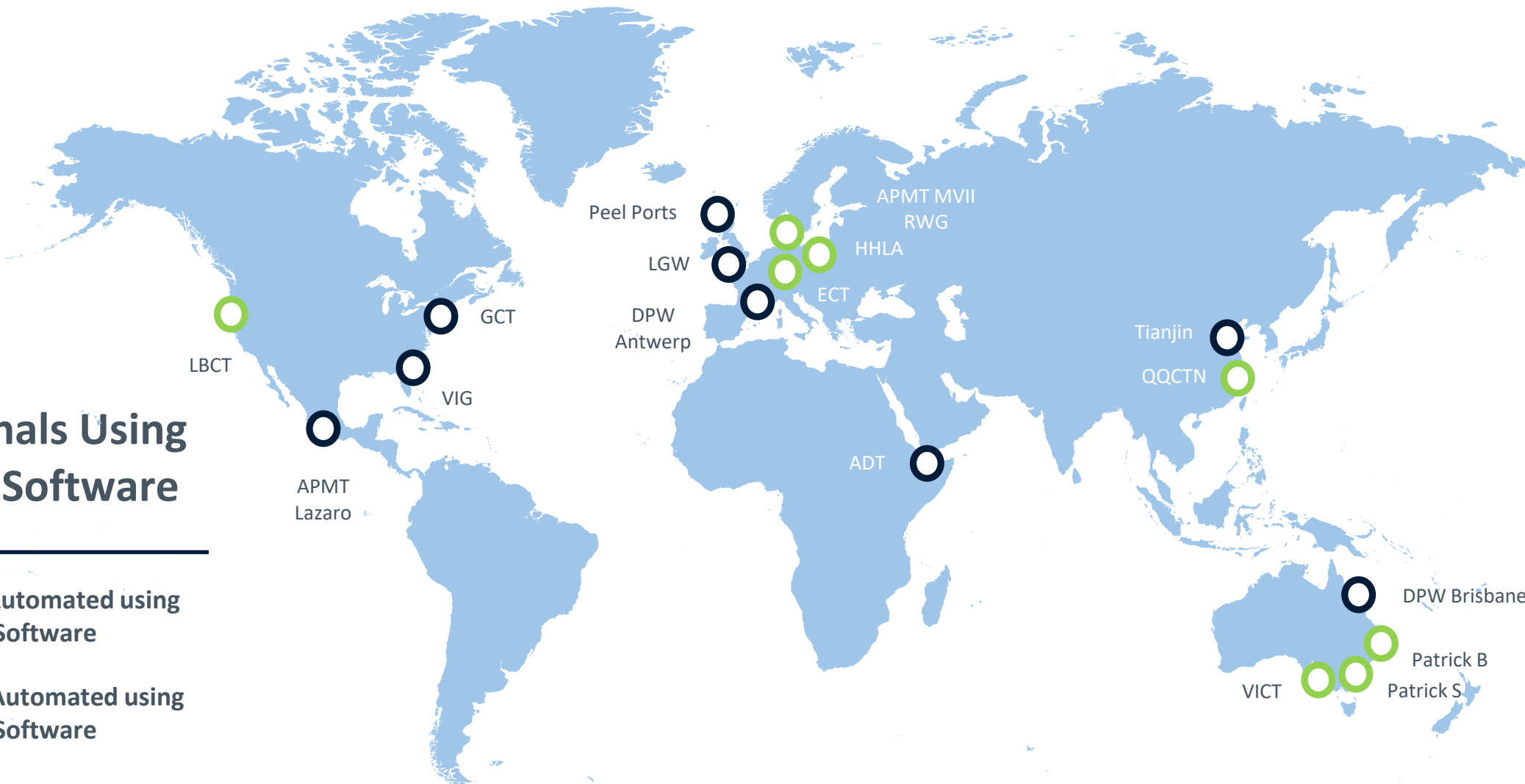
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# Our Experience in Automation

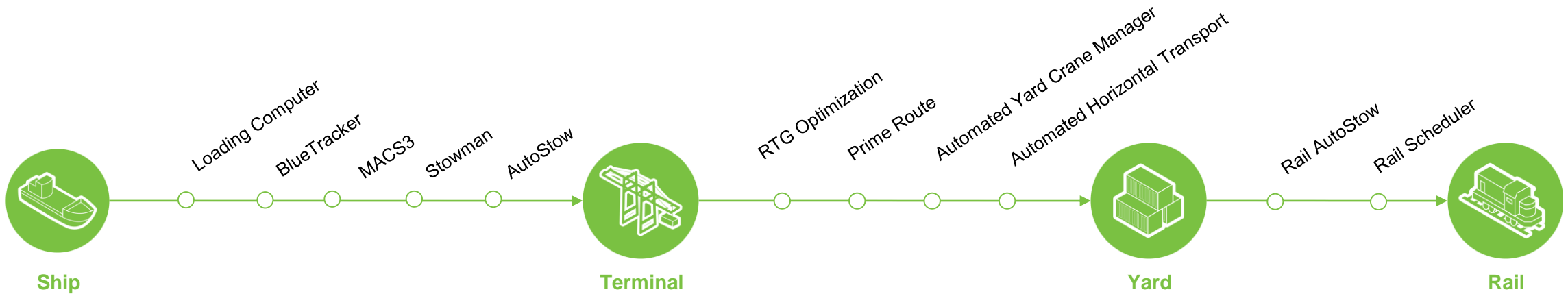
## Terminals Using Navis Software

-  Fully Automated using Navis Software
-  Semi-Automated using Navis Software

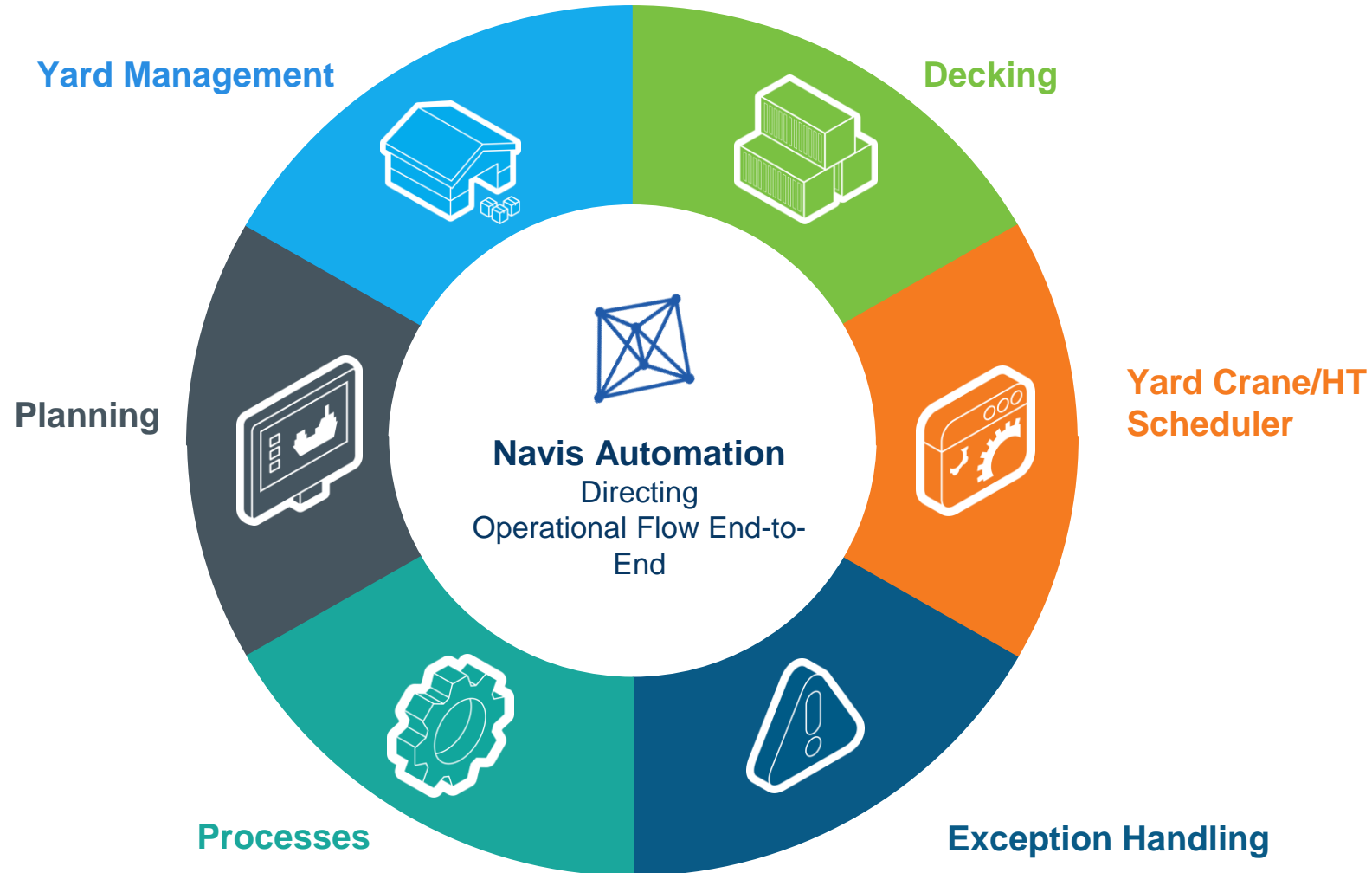


# Artificial Intelligence

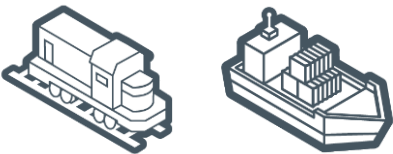
At every point of a container's journey,  
we apply Artificial Intelligence to optimize operations and automate decision making








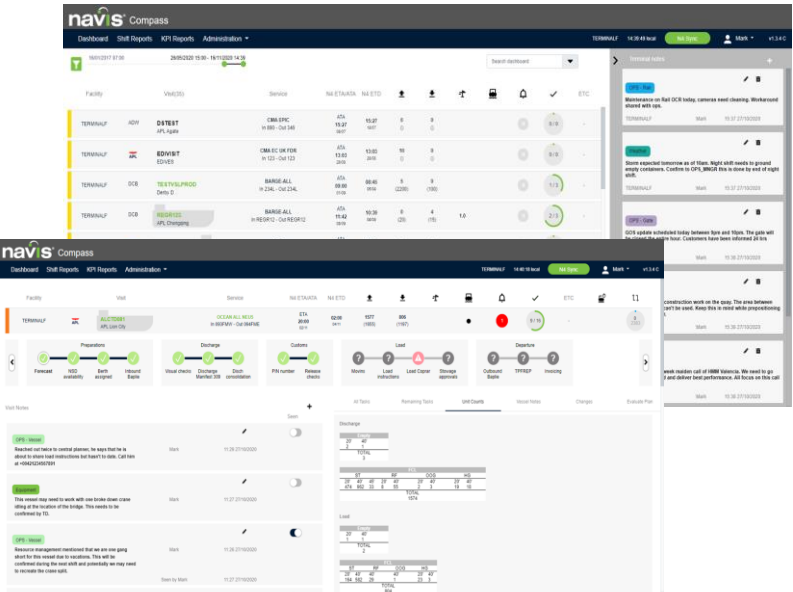
# We Build Automation on Optimization








# Automating Existing Processes



-   
Planning Manager
-   
Data/EDI Clerk
-   
Rail Planner
-   
Vessel Planner
-   
Operations Manager



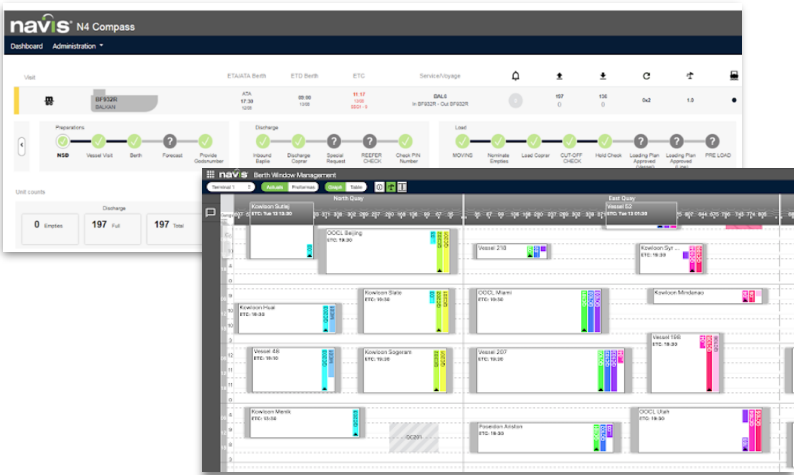
-   
Customer Support
-   
CI / PEX Teams
-   
IT/Application Support
-   
EQ / TAM Teams
-   
Claims Manager

# The Human Factor

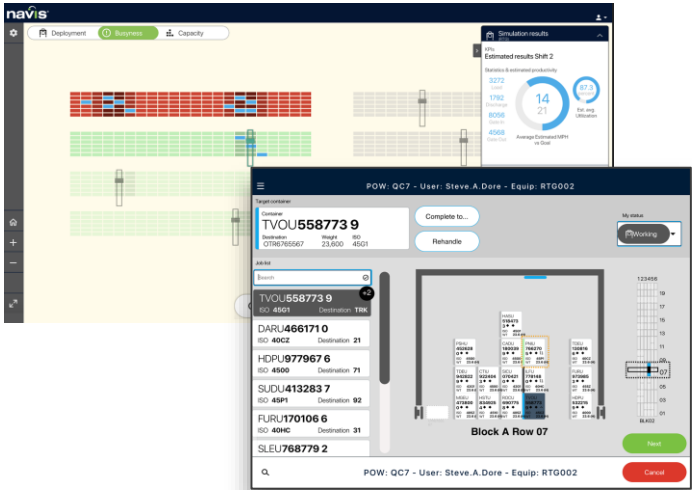
Remove variability and repetition



Leverage creativity and people skill set



Focus on a proactive way of working



# New Expertise is Needed



# Digitalization & Automation Increases Data Volume



Source  
Applications



Other Data  
Sources:  
IoT, SQL, Oracle,  
MongoDB,  
Firebase, etc.



**Navis Smart Data Layer**  
Data Consolidation, Streaming Service, ETL



**Apps and Services**  
What Apps and Services  
do you need?



**Analytics**  
Historical Trends, ML, etc.



**OpsView**  
Real-time Reports



**APIs**  
Custom Applications



# Actionable Intelligence



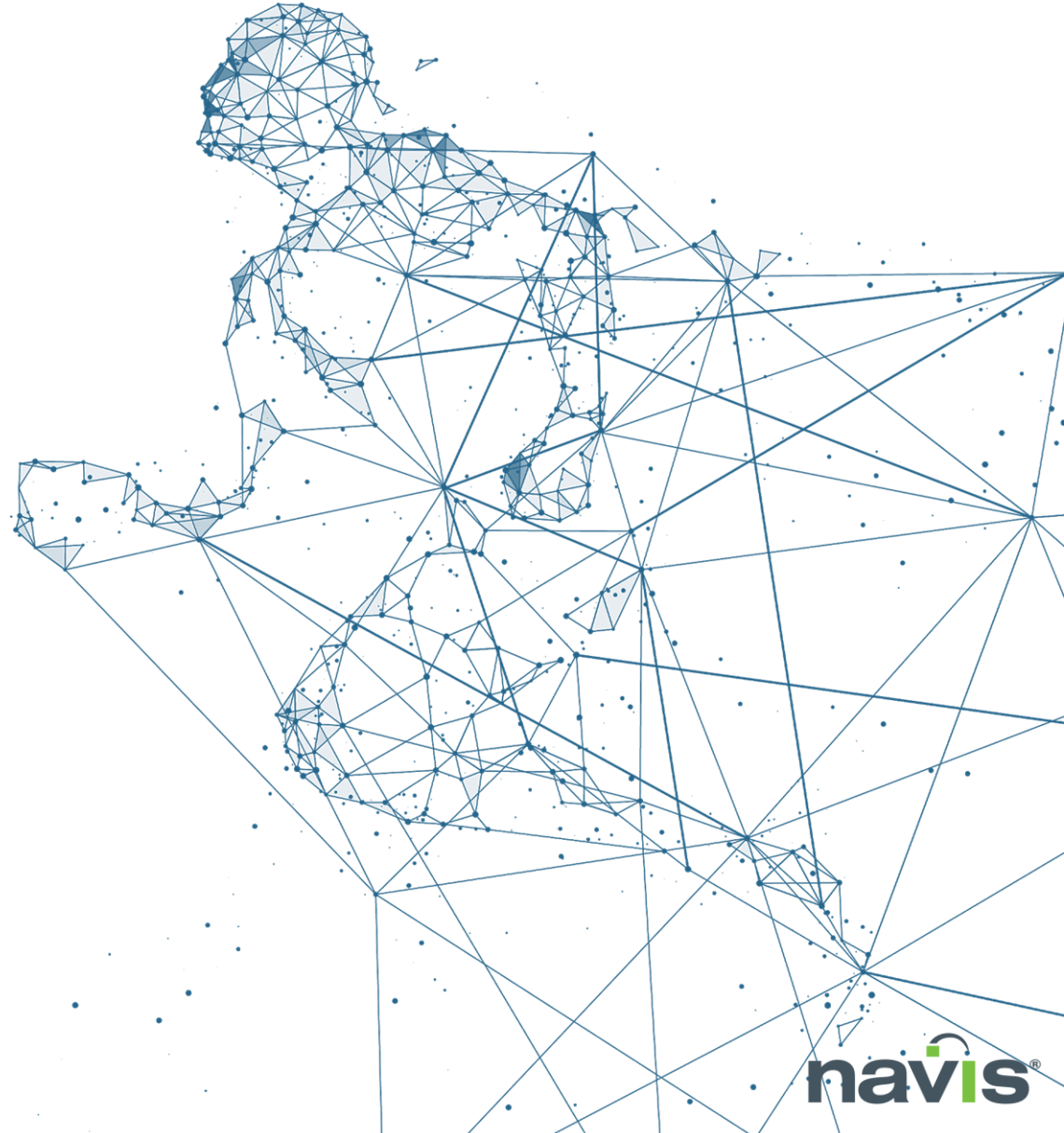
**Having the necessary information immediately available...**



**to deal with the situation at hand quickly and efficiently...**



**in a 12 to 72 hour period.**



# We Considered a lot of Different Use Cases

Towards more accurate situational awareness

## PREDICT CARGO VOLUME, MODE, TIMING, COST/REVENUE

- Predict equipment needs
- Predict the need to prep for wind/weather
- Predict estimated time of arrival of ships, trains or trucks
- Predict mode of departure
- Predict long term yard utilization
- Suggest appointment quota per hour
- Suggest block space in yard for recurring cargo
- Predict gate visits, pickup time of imports
- Predict estimated time of departure of vessels
- Predict container damage
- Predict weight discrepancies

## DYNAMICALLY SET PARAMETERS THAT CONTROL THE SOFTWARE

- Set expert decking parameters
- Update allocations
- Set prime route parameters
- Dynamic drive time calculation
- Improve EDI data accuracy
- Automate gate rule failures (including fail to deck)
- Optimize berth and crane assignment
- Set all manual input needed for automated vessel planning
- Auto create pre-defined work patterns

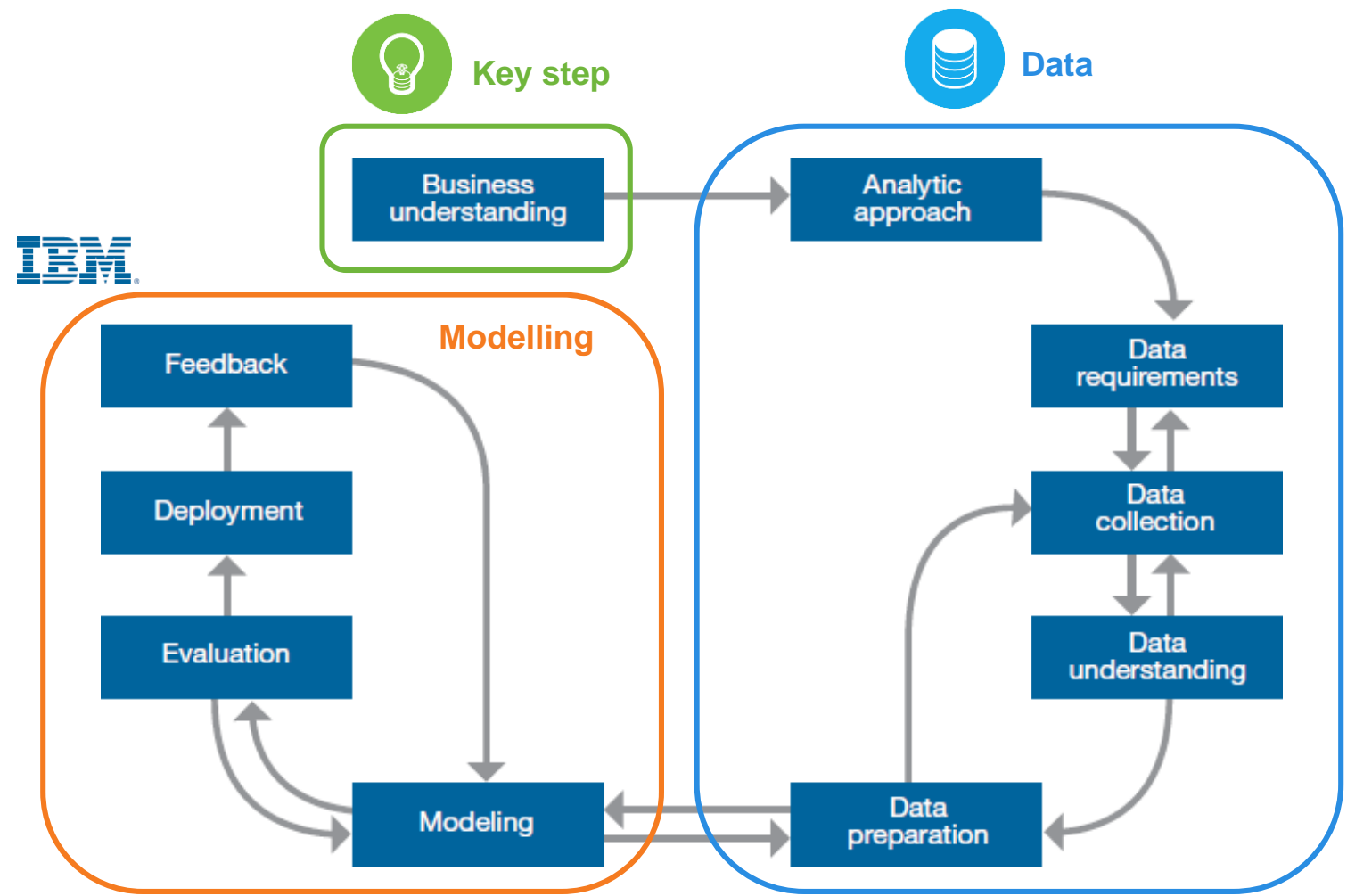
## AUGMENT EXISTING DECISION- MAKING SOFTWARE WITH INSIGHTS GENERATED THROUGH DATA

- Optimize AGV/ASC scheduling
- Choose the right AutoStow strategy

## RECOMMEND ACTIONS FOR THE CONTROL ROOM

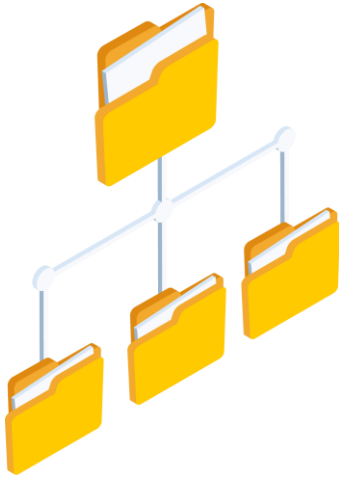
- Predict congestions
- Manage pushrate/MaxPM
- Update CHE ranges
- Hazardous planning
- Suggest time of replanning or work queue balancing without replanning
- Understand cause and duration of crane delays and/or AGV delays
- Recommend multi-lift opportunities
- Learn how user handles exceptions and do it automatically
- Activate optimum automatic work queue activation
- Recommend times for lower energy consumption
- Suggest housekeeping/work for idle equipment

# Methodology for Data Science



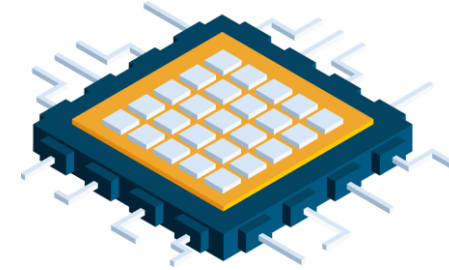
# Built Two Models

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## Extreme Gradient Boosting Model:

- Mean Absolute Error: 5.7 Moves Per Hour
- Accuracy score: 92.4%



## Deep Neural Network (Deep Learning) Model:

- Mean Absolute Error: 1.5 Moves Per Hour
- Accuracy score: 98.4%



# Leveraging Data Across Our Platform

## Integrating Predictions

navis<sup>®</sup> Compass

Dashboard Reports Administration

TERMINALC 10:10:45 local N4 Sync admin v1.2.3 C

Facility

Visit

Service

N4 ETA/ATA

N4 ETD

ETC

TERMINALC

SQL

CGMTF362  
ADELINA D

AWCEX  
In CGMTF362 - Out CGMTF362

ETA  
09:37  
01/09

0  
0

0  
0

0

0 / 4

-

0  
0

Preparations

Discharge

Departure

Inbound  
Baplie

Forecast

Discharge  
Manifest 309

Outbound  
Baplie

Visit Notes

All Tasks

Remaining Tasks

Unit Counts

Vessel Notes

Changes

Evaluate Plan

Predict Performance

Prediction 3 01/09/2020 10:08

Planned

ETA ETD Vessel Productivity

09:37 - m/h

Prediction 2 01/09/2020 10:07

Planned

ETA ETD Vessel Productivity

09:37 - m/h

Prediction 1 01/09/2020 10:06

Planned

ETA ETD Vessel Productivity

Predicted

Vessel Productivity ETC

46.5 m/h 10:51

Predicted

Vessel Productivity ETC

46.5 m/h 10:51

Predicted

Vessel Productivity ETC

New prediction requests are made whenever changes to the plan are made, in order to validate, reinforce and increase the confidence level.

# Prepare for the Port of the Future



## Equipment is the Key Driver

Workers link individual process steps and direct yard operations



## Management by Process

- Business processes mapped to TOS
- Decisions made by control tower operators



## Automated Equipment

- Scheduling & Optimization Algorithms
- Management by Exception



## AI Driven Ecosystem

- Automated Control Rooms with Social Cobots
- Optimizing flow of cargo between Carriers, port complex, and larger logistics supply chain

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# THANK YOU!



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