moffatt & nichol

From Infrastructure to Intelligence: The Evolution of Port Operations

Terminal Technology and Trade Engagement

February 2026

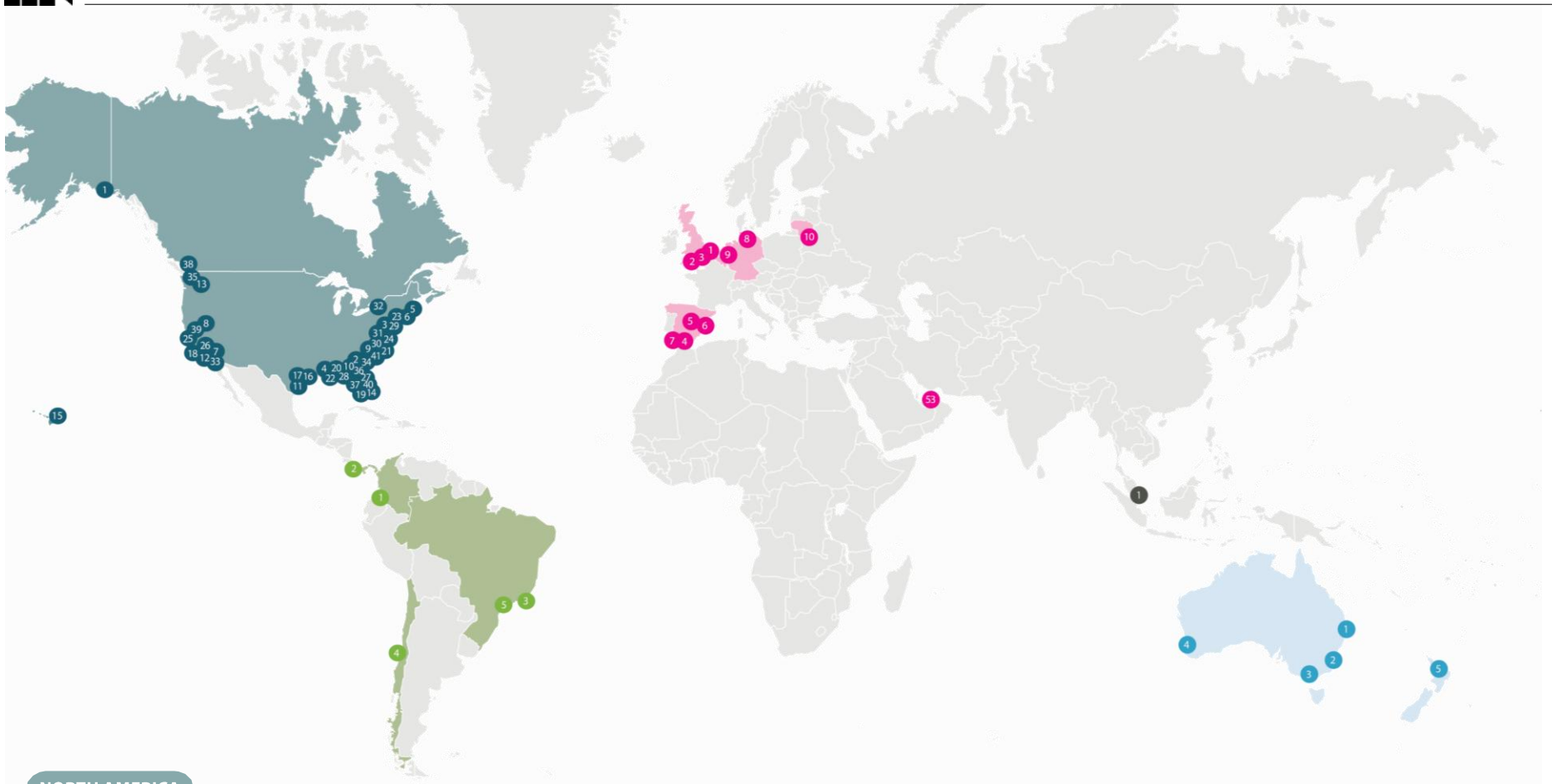
ABOUT US

CREATIVE PEOPLE, PRACTICAL SOLUTIONS

Moffatt & Nichol has a long-standing reputation for excellence in delivering engineering and consulting services to clients in the coastal, port and commercial services sectors around the world

As a team of just two when starting out in 1945, John Moffatt and Frank Nichol fostered a philosophy which has grown into a set of values to which we remain committed:

- Attract the best practitioners
- Work as a team
- Earn a fair return
- Respect employees and clients
- Operate always with honesty, integrity and decency.



OUR OPERATIONS

Moffatt & Nichol operates as a substantial global infrastructure consultancy with over 1,400 professionals across 60 offices worldwide.

We maintain strategic operations across Australia, Southeast Asia, Europe, Latin America and North America.

Our firm ranks as the largest port engineering consultant in the United States according to Engineering News-Record for **four consecutive years**, demonstrating our leadership in maritime infrastructure solutions.

2022-2025 ENR #1 TOP UNITED STATES DESIGN FIRMS MARINE & PORT FACILITIES MOFFATT & NICHOL

60+ OFFICES

14,000+ PROJECTS COMPLETED

80% REPEAT BUSINESS

NORTH AMERICA

1. Anchorage, AK
2. Atlanta, GA
3. Baltimore, MD
4. Baton Rouge, LA
5. Boston, MA
6. Bridgeport, CT
7. Carlsbad, CA
8. Carson City, NV
9. Charlotte, NC
10. Chipley, FL
11. Corpus Christi, TX
12. Costa Mesa, CA
13. Federal Way, WA
14. Fort Lauderdale, FL
15. Honolulu, HI
16. Houston, TX
17. Katy, TX
18. Long Beach, CA
19. Miami, FL
20. Mobile, AL
21. Morehead City, NC
22. New Orleans, LA
23. New York, NY
24. Norfolk, VA
25. Oakland, CA
26. Ontario, CA
27. Orlando, FL
28. Pensacola, FL
29. Philadelphia, PA
30. Raleigh, NC
31. Richmond, VA
32. Rochester, NY
33. San Diego, CA
34. Savannah, GA
35. Seattle, WA
36. Tallahassee, FL
37. Tampa, FL
38. Vancouver, BC
39. Walnut Creek, CA
40. West Palm Beach, FL
41. Wilmington, NC

SOUTH AMERICA

1. Bogotá, Colombia
2. Panama City, Panama
3. Rio de Janeiro, Brazil
4. Santiago, Chile
5. São Paulo, Brazil

EUROPE

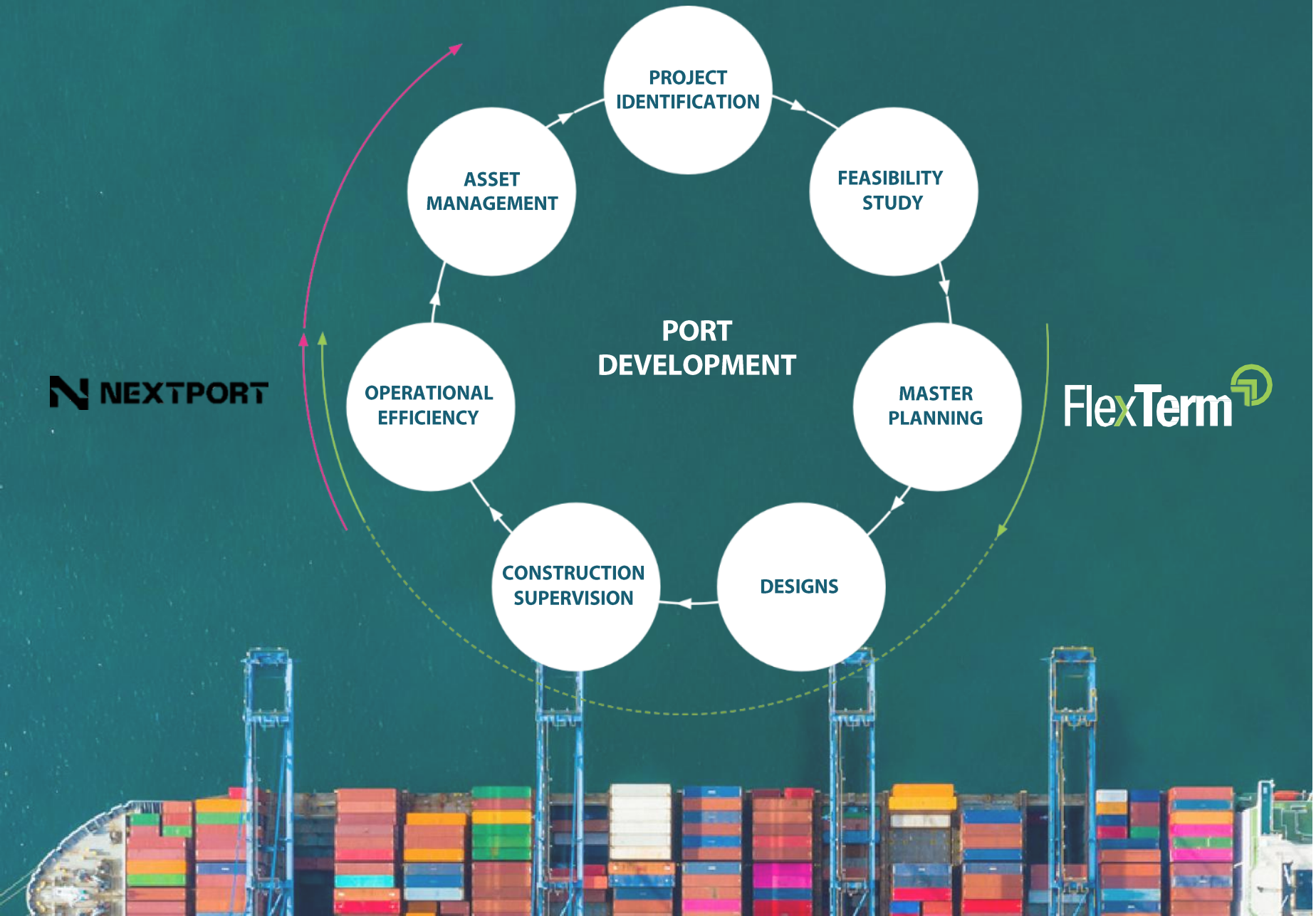
1. London, United Kingdom
2. Exeter, United Kingdom
3. Farnham, United Kingdom
4. Algeciras, Spain
5. Madrid, Spain
6. Valencia, Spain
7. Rota, Spain
8. Hamburg, Germany
9. Rotterdam, Netherlands
10. Vilnius, Lithuania

OCIANIA

1. Brisbane, Australia
2. Sydney, Australia
3. Melbourne
4. Perth
5. Auckland

ASIA

1. Singapore



PORTS & MARINE TERMINALS

From the early days of containerisation to today's complex logistics challenges and tomorrow's sustainable port ecosystems, Moffatt & Nichol's port professionals continue to shape the evolution of maritime infrastructure worldwide.

Across all port and marine terminals, we provide comprehensive services throughout the project lifecycle — from commercial advisory and feasibility studies to master planning, detailed design, construction and operational support — delivering optimal solutions for our clients' unique needs.

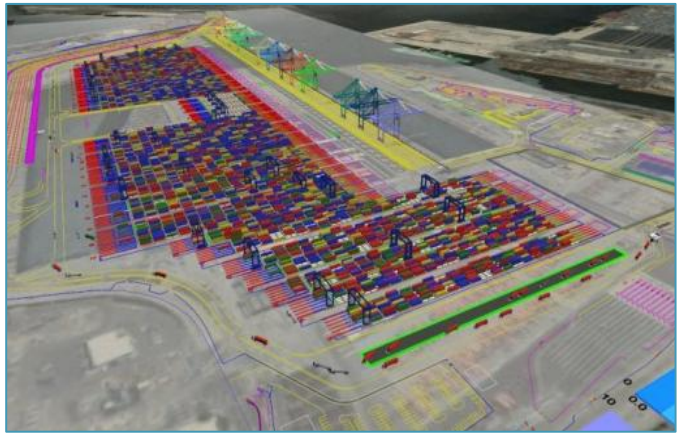
We integrate terminal development, structural design, coastal engineering and marine construction expertise to deliver innovative projects globally, even in the most challenging and remote environments.

OUR TECH SOLUTIONS

Holistic Design-To-Implementation-To- Operation of Ports and Container Terminals

Simulation

FlexTerm



- Discrete Event Simulation
- Infrastructure & Layout Design
- Assets & Equipment Evaluation
- 3D Render & Visual Replay
- Logistics Modeling & Optimization

Emulation

FlexTerm

- System Testing & Development w/ TOS
- User Virtual Training
- Systems & Algorithms Tuning w/ Live Data
- 3D Render & Visual Replay
- System Optimization

Digital Twin

NEXTPORT

- Live Monitoring & Exceptions Handling
- Predictive & Prescriptive Capabilities
- What – If Scenario Evaluation
- Next-level Digital Tools & Data Analytics UX

VIRTUAL MODEL
A computerised model of a real-world system in which every physical or functional entity is represented by a digital counterpart.

FlexTerm
BY MOFFATT & NICHOL

FLEXTERM

Simulator & Emulator

FlexTerm is a simulation & emulation platform where complex logistics systems are studied, designed, optimised, developed, and tested before being deployed into production.

Addressing critical factors for a successful port, including:

- Operational systems (RTGs vs. automated RMG, terminal tractors vs. AGVs)
- Optimised terminal layout
- Capital costs, e.g. stevedore equipment
- Capacity and performance validation
- Strategic, phased investment to enhance operations and meet future demand

FLEXTERM PROJECTS

FlexTerm Projects have been diverse including:

- Container Terminals
- Ferry Terminals
- Passenger Cruise Terminals
- Oil and Gas Terminals
- Roll-On Roll-Off Terminals
- Offshore Wind Marshalling Terminals
- Emissions studies
- Intermodal Terminals

Successfully delivered over 100 projects in the past decade

Every project has **unique challenges**

Our software flexibility allows new feature developments for clients who **need unique requirements**

The Port of Long Beach stands as one of the world's most technologically advanced and environmentally responsible port terminals, with electric-powered equipment establishing it among the cleanest container operations globally.

PORT OF LONG BEACH MIDDLE HARBOR

Location: Long Beach, California

Client: Port of Long Beach / Long Beach Container Terminal (LBCT)

Date: 2004 – 2017

The Middle Harbor Redevelopment Project combined two aging container terminals into one modern, fully automated facility at the Port of Long Beach. This USD3.4 billion project created a 132-hectare terminal capable of handling more than 3 million TEUs annually, using electrified equipment that reduces terminal emissions by 50 percent while doubling capacity.

Challenge and Outcomes: The challenge was transforming outdated, irregularly shaped terminals into a rectangular, efficient facility while maintaining port operations throughout construction. The project successfully created 22 hectares of new land through 5 million cubic yards of fill, implemented full automation, and adapted to evolving vessel sizes (from 12,600 TEU to 24,000 TEU vessels). The terminal became the first fully automated facility in the US and one of the world's cleanest container terminals.

Services:

- Program management
- Operational master planning and facilities planning
- FlexTerm terminal simulation
- Heavy-duty pavement design
- Structural assessments
- Environmental controls and permitting support
- Infrastructure and terminal operations integration

NextPort

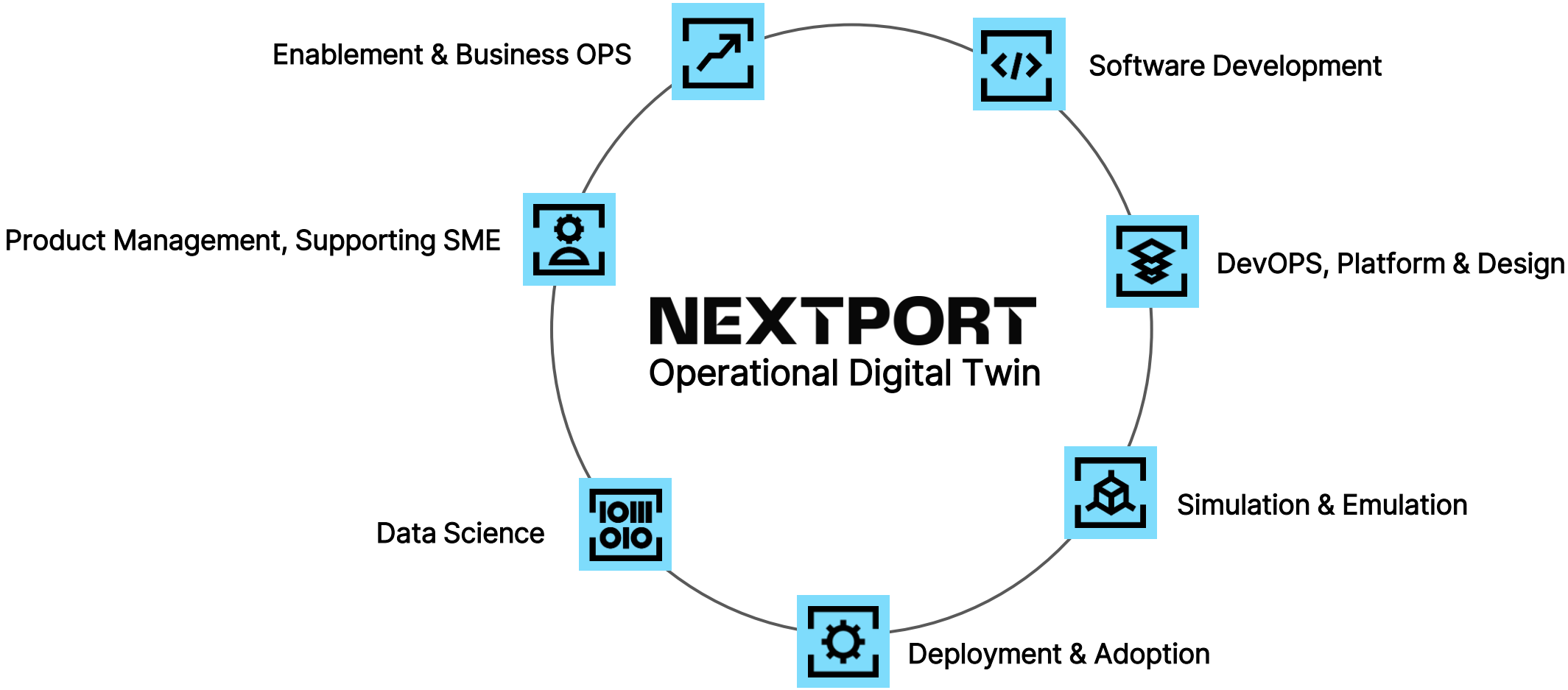
M&N's commitment to Digital Twin & AI technology

- **Technology and Innovation** Division of M&N
- **Software Solutions for** Ports and Terminals
- Early **Adopter Portfolio**
- **Transforming Industry Standards** with Cutting-edge Technology and domain expertise

Deep Domain Expertise

NEXTPORT

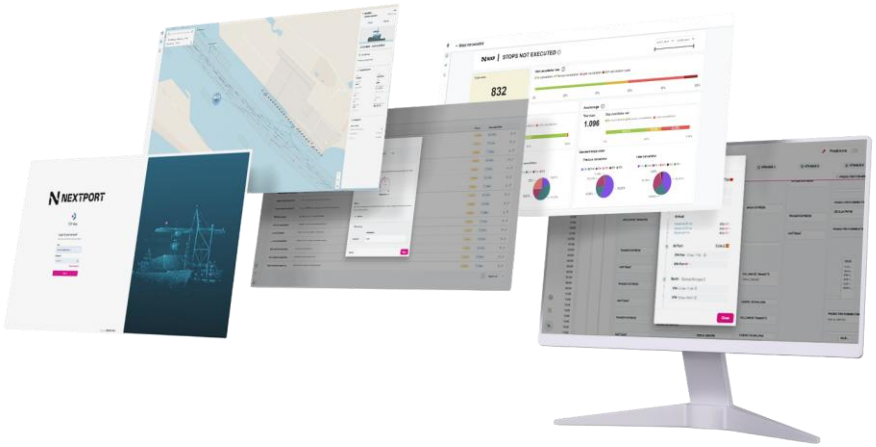
40+ Specialists Powering Innovation in Maritime Solutions



NextPort Operational Digital Twin

Assisting the users with a 360 Digital Twin Solution that connects the dots across decision domains at Ports & Terminals

NXP | Ports



NXP | Terminals

Real Time monitoring with exceptions handling

Predictive & prescriptive capabilities

'What If' Scenario simulations evaluation

Next-level digital tools & data analytics UX

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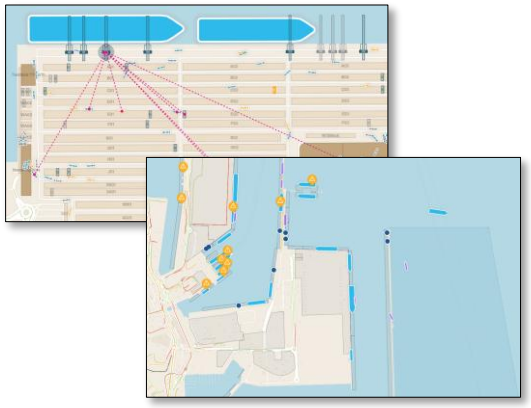
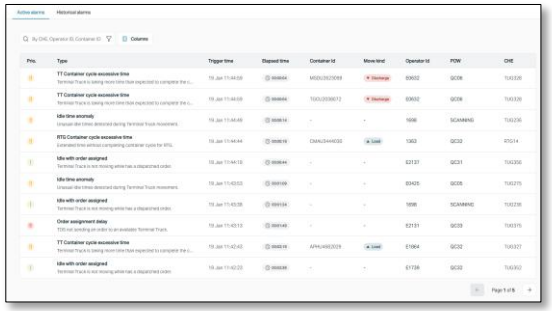
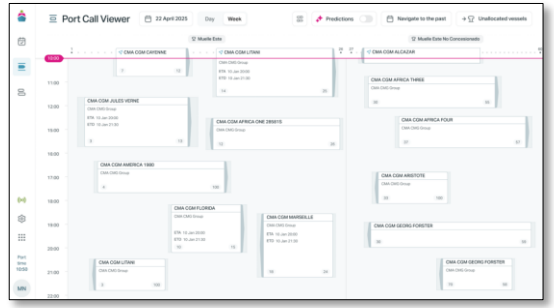
NextPort Operational Digital Twin

Connecting terminal and port decision-making domains







Top View
Operations Visual Management

FlowOps
Process Orchestration

LeanIQ
Continuous Improvement

Port Call Viewer
Berthing Visualization

Existing Client IT Ecosystem
TOS, ECS, PLC, IOT, CMMS

COMPLIANCE

IHO International Hydrographic Organization · TIC4.0 · dcsa

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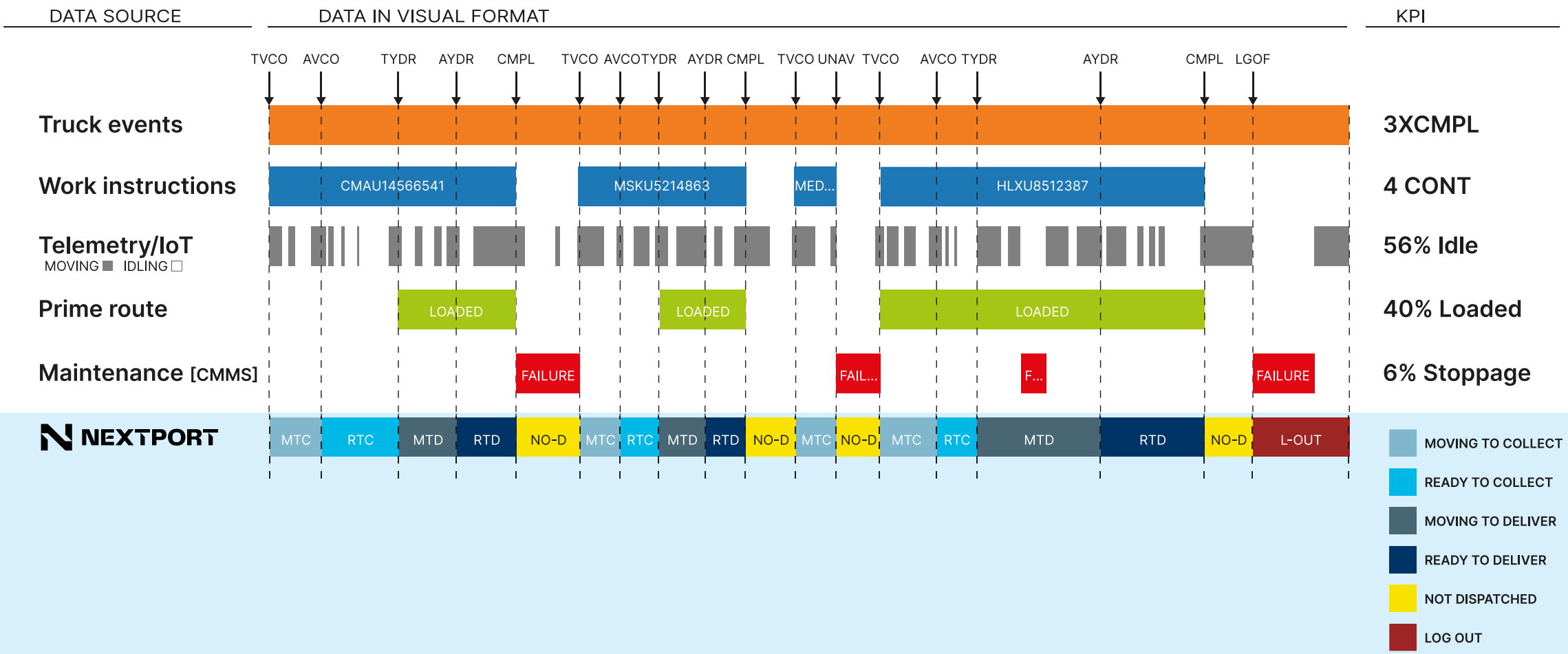
Container move "data-story" is fragmented

From siloed information to a single source of reliable data



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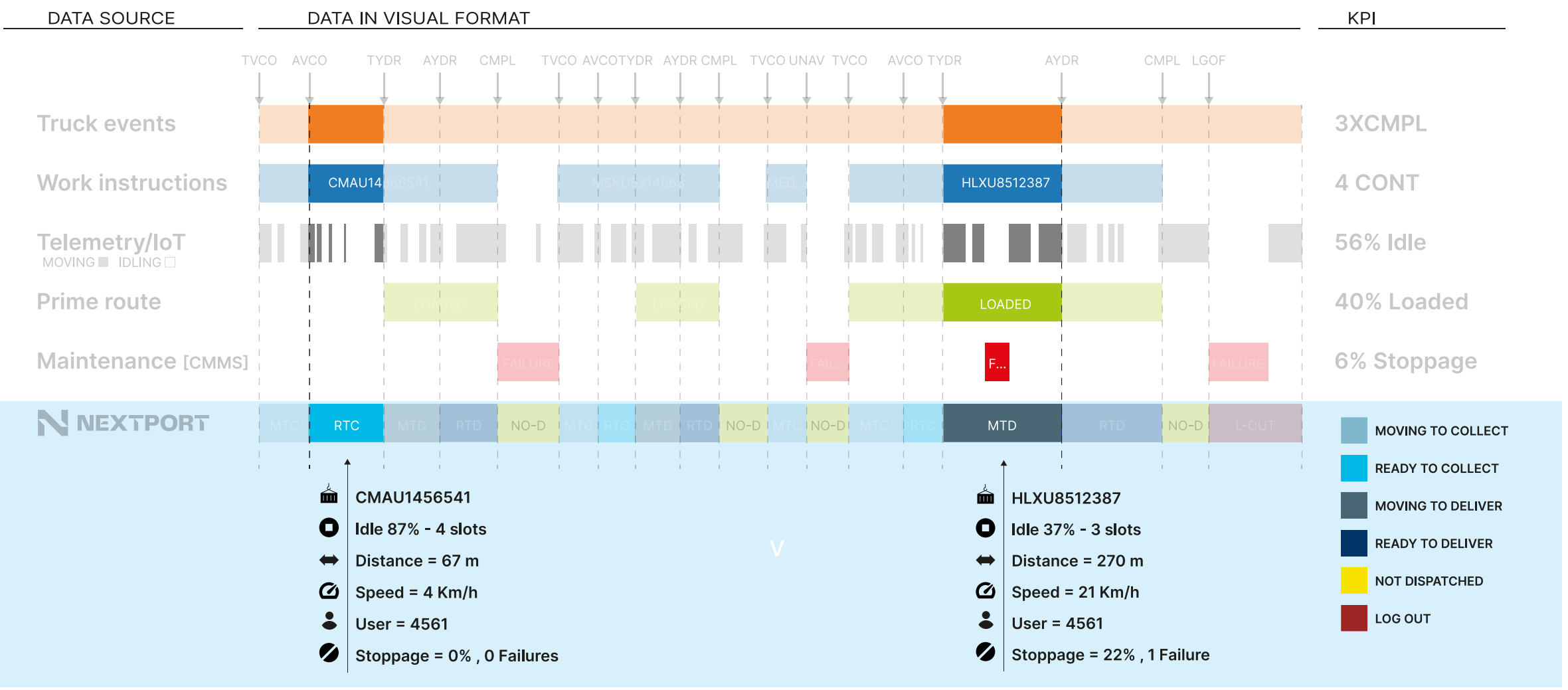
NextPort Smart Data model

From siloed information to a single source of reliable data



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Our AI Value Proposition

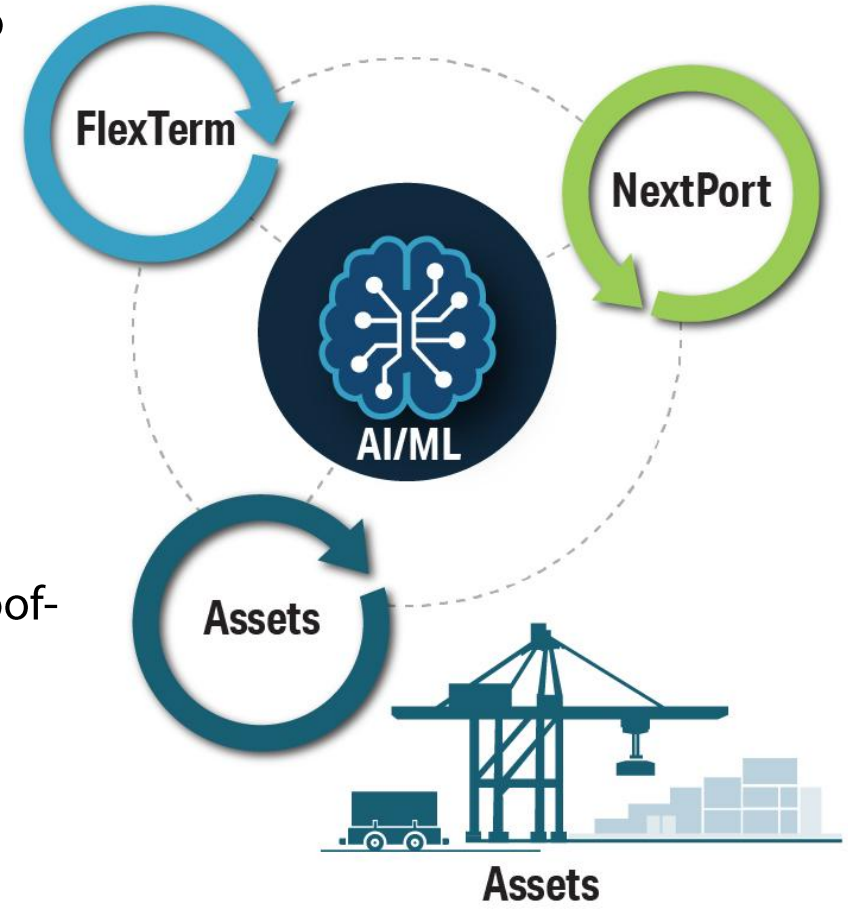
NEXTPORT

Augmenting Human Intelligence

AI/ML as the Enabler – Connects into our intelligent ecosystem to support decision-making.

Value Amplification – Unlocks deeper insights, innovation, and augmented decision-making from existing systems and data.

Future-Ready Infrastructure – our digital products are future-proof-solutions: AI-enabled and scalable for next-generation operations.



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