The Digital Transformation of Rail Yard Planning and Operations

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Technology is disrupting every aspect of our lives

Graphic courtesy of Oliver Wyman
Yards are ready to be disrupted
The service battle for carload business is won or lost in yards/terminals/interchange

Consider how much Amazon has invested in warehouse automation

How much has the North American rail industry invested in yards?

All Amazon Warehouses

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Robots*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>15k</td>
</tr>
<tr>
<td>2015</td>
<td>30k</td>
</tr>
<tr>
<td>2016</td>
<td>45k</td>
</tr>
<tr>
<td>2017</td>
<td>100k+</td>
</tr>
</tbody>
</table>

*Per New York Times, Business Insider, robohub.org

• Selected automation
• Minimal decision support
• Localized planning and execution
• Minimal real-time asset tracking
• Ad-hoc network considerations
The challenge – How to improve network efficiency?

Current Situation: Inefficiencies and service failures at yards/terminals/interchange
- more time spent at the yards/terminals/interchange than in transit

Our vision: More automation, enhanced visibility PLUS advanced decision support will unlock network efficiency & productivity
Opportunity 1: Increase asset velocity intra-network

Transform a corridor/terminal area on a railroad

- Leverage the integrated components to drive:
  - Dwell time reduction
  - Increased car throughput
  - Increased asset productivity
Opportunity 2: Increase asset velocity inter-network

Leverage Rail TMS connectivity to remove work downstream across carriers

Transform and connect corridors on more than one railroad

• Provides a competitive advantage by driving
  - Increased supply chain visibility
  - Dwell time reduction
  - Increased car throughput
  - Increased asset productivity
Transport Logistics Software & Customer Footprint

Connecting the transportation landscape

Example shipper customers

- Rail: 92% Shortlines on TMS product suite
- Ports: 40% US imports on Port Optimizer platform today ... targeting 60% this year.

Product Penetration

GE Transportation Role

Provide industry data visibility solutions

- Rail: Assist with SL-C1 visibility; provide advanced import cargo visibility at Ports.
- Ports: ↑ rail utilization, customer service and throughput.
- Shippers: ↑ rail utilization through better visibility.
Opportunity 3: Increase asset velocity through the supply chain

Planning engine/concepts will be applied to multiple business lines to maximize value

RAIL CUSTOMER

OBJECTIVE
Load cars in a sequence that reduces downstream switching

CLASS I
Block cars in a sequence that reduces downstream work on or off network

SHORTLINE
Consider multiple factors to reduce downstream switching and spotting work

RAIL PIPELINE VISIBILITY & PLANNING SOLUTION
The Yard of the Future
Combining **strategic planning tools** with the **tactical level execution** is the foundation for our road map.

- **TODAY**
  - Consistent Data & Control

- **SHORT TERM**
  - Proactive Network Planning

- **LONG TERM**
  - Autonomous Yards

- **LONGER TERM**
  - Decentralize Yard Activities

Everything is...

VISIBLE

SMART

AUTONOMOUS

CONNECTED

Combining strategic planning tools with the tactical level execution is the foundation for our road map.
How real-time planning in yards will improve productivity

**Shipper/receiver yards:**
- Load to reduce downstream work
- Improved carrier visibility/data connectivity

**Short Line & Regional RR yards:**
- Streamlined planning & execution
- Build more blocks
- Switch considering downstream factors

**Class I yards:**
- Build more blocks
- Reduced dwell
- Improved connections
- Reduced variability
Yard Planner Systems

Our goal is to empower the movement of goods by rail through the creation of a shared analysis and decision platform that connects and unites each yard with the broader network objectives.

- Improved car connections: 10%+
- Reduced re-work rate: 10%+
- Reduced car dwell: 5%+
- Average car dwell: 44%
- Reduced administrative & planning effort: Avg 44%
Decision support for hump yard operations

- Inbound train-to-track assignment
- Inbound train metering
- Hump sequence
- Block-to-track assignment
- Block stacking
- Re-hump sequence
- Bad order processing
- Pull-back sequence
- Class track-to-train assignment
- Outbound train-to-track assignment
- Departure-driven planning
- Departure time updates

Plus seamless work execution at each step of the operation
Working toward the future
To advance the Yard of the Future, a unified approach is needed

Data visibility across partners
Seamless sharing of the right information to the right party at the right time

Real-time asset tracking
Scalable platforms that remove the need for manual yard inventory data entry

Integrated planning tools
Proactive decisions that consider network conditions and keep assets moving

Remote planning and execution
Move from local control to regional control of yards to...

Railroad Automation is about people first, process second, and products third
For more information:

https://www.getransportation.com/digital-solutions

Read the GE Transportation white paper: “Transportation’s Evolution: A Promising Future”
http://www.getransportation.com/whitepaper

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