Objectives

- To define current and best practices in service measurement both within and outside the railroad industry
  - Transit-times and reliability
  - Predictive, proactive and historical
  - Single-line and interline
- To understand the value shippers place on service performance and service measurement
  - Emphasis on merchandise shippers
- To discuss the business case considerations related to potential investments in service and service measurement
Project approach

What we did....

- Railroad executive interviews
- Literature search, industry and academic expert interviews and shipper interviews
- On-line shipper survey targeted at merchandise shippers

...What we learned

- Current and evolving practices
- Best practices and opportunities for improvement
- Criteria for carrier selection
- Performance of measurement practices across modes
- Impact of improved service and service measurement

Overview of findings

- Merchandise shippers have mode-neutral criteria for selecting carriers. Service and service measurement are important criteria.
- Motor carriers currently are outperforming railroads in service measurement. However, the gap is not insurmountable.
- The railroad industry and individual railroads are improving service and service measurement efforts, but these efforts currently fall well short of many merchandise shippers' requirements.
- Most of these findings are well understood in the railroad industry. However, no one has been able to hit on an 'easy fix.'
- Mercer’s research provides a tool for assessing the economics of service measurement improvement and suggests that there may be a business case for addressing the issue.
When considering alternative modes, merchandise shippers have basic, mode-neutral requirements

Most important criteria in selecting mode
% of respondents indicating criteria as important or very important

<table>
<thead>
<tr>
<th>Service reliability</th>
<th>Price</th>
<th>Availability of equipment</th>
<th>Advertising door-to-door transit time</th>
<th>Advance notice of service failures</th>
</tr>
</thead>
<tbody>
<tr>
<td>92%</td>
<td>82%</td>
<td>82%</td>
<td>79%</td>
<td>79%</td>
</tr>
</tbody>
</table>

“When I call, I want to know the transit time to my customer. My confidence in the reliability is based on my past experience with the carrier, but having reported history of reliability for the lane is helpful.”

Logistics Manager, Finished Metals

Motor carriers are meeting shipper service measurement requirements more often than railroads

Performance by mode at measuring and reporting performance (% indicating very good or excellent)

<table>
<thead>
<tr>
<th>Truck</th>
<th>Intermodal</th>
<th>Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>55%</td>
<td>31%</td>
<td>23%</td>
</tr>
</tbody>
</table>

“Our trucking providers are able to give us on-time delivery performance relative to our customer commitment. Railroads have been unable to do that.”

VP Logistics, Paper Company

Performance by mode at providing advance notification of service failures (% indicating very good or excellent)

<table>
<thead>
<tr>
<th>Truck</th>
<th>Intermodal</th>
<th>Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>29%</td>
<td>15%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Best-in-class truck service measures reported by lane

- Dock-to-dock transit time and performance against that transit time
- Pick-up reliability performance
- On-time departure, arrival and delivery
- Time between key supply chain events
- Root causes of delays
Rail does not meet service measurement requirements for single-line merchandise movements - even less so on inter-line movements

Percent of respondents receiving rail service performance information

- Average transit time – origin to destination
  - Single-line: 37%
  - Inter-line: 23%

- Average on-time performance of car delivery at destination
  - Single-line: 21%
  - Inter-line: 21%

- By lane transit time – origin to destination
  - Single-line: 18%
  - Inter-line: 13%

- Consistency of service by lane
  - Single-line: 16%
  - Inter-line: 11%

“I can get service measures from a third party but most of my traffic moves inter-line and they can’t really help me there.”

VP Logistics Paper Company

Rail shippers say that currently reported industry-wide information is not specific enough to be of value

Awareness of AAR reported measures

- 77% No
- 23% Yes

Usefulness of AAR reported measures

- Cars on-line: 40%
- Average train speed: 30%
- Average terminal dwell time: 15%
- Bill of lading timeliness: 35%

Shipper comments on AAR measures

- Measurement limited to industry wide operational efficiency, not quality of service
- Information across railroads measured inconsistently or not measured at all
- No correlation to my business – Doesn’t allow me to make changes in my supply chain
- Not as useful now that the merger problems are over
Individual railroads and Train II provide performance information, but there is no systematic documentation of trip plans or standards for inter-line traffic.

<table>
<thead>
<tr>
<th>Train II</th>
<th>Individual railroad systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capabilities</td>
<td>Predictive and historical transit times available by customer and lane for single-line traffic</td>
</tr>
<tr>
<td>• Can provide predictive transit-times and ETA</td>
<td>• Ability of some railroads to provide dock-to-dock transit</td>
</tr>
<tr>
<td>• Provides actual transit times by car on a lane-specific basis</td>
<td>• On-time performance at car level</td>
</tr>
<tr>
<td>• Ability to provide actual transit for inter-line moves on portion of lanes</td>
<td>• Comparison to trip plan</td>
</tr>
<tr>
<td>• Can provide proactive notification through CLM</td>
<td>• Self-serve exception reporting</td>
</tr>
<tr>
<td>Limitations</td>
<td>Limited ability to include inter-line traffic but can be done with bi-lateral effort</td>
</tr>
<tr>
<td>• Interaction with, and payment to, 3rd party</td>
<td>• Difficult to compare measures across modes and rail carriers</td>
</tr>
<tr>
<td>• Incomplete, particularly for inter-line and short-line</td>
<td>• Difficult to conduct root cause analysis on inter-line service issues</td>
</tr>
<tr>
<td>• Missing many intermediate events</td>
<td></td>
</tr>
<tr>
<td>• Unable to provide performance against trip plan</td>
<td></td>
</tr>
<tr>
<td>• Does not provide causes of delays</td>
<td></td>
</tr>
</tbody>
</table>

Individual railroads are making efforts to improve service measurement:

- CN implementation of “Scheduled Railroad” and measurement of trip plan compliance by car
- CSX and CN collaboration to improve cycle times on selected inter-line lanes with detailed analysis of performance against plan
- UP and CSX working jointly on Express Lane service to reduce transit time, increase reliability and measure performance as ‘one railroad’ on selected lanes
- NS implementation of Thoroughbred Operating Plan to increase reliability includes efforts to measure dock-to-dock transit times against trip plan and connection performance at carload level
- BNSF’s implementation of Transportation Service Plan and ‘disciplined execution’ program includes reporting of trip plan performance by car
- CP implementing scheduled railroad approach to improve transit times, reliability and measurement against trip plan
However, major deficiencies, including limited capture of intermediate events and integration of trip plans, make it difficult to piece together inter-line door-to-door performance data.

Major improvements required:
- Collect trip plan data from all railroads as well as actual performance
- Standardize and collect data on all intermediate events (e.g., arrival/departure at intermediate yards and local yards)
- Enhance ability to extract and assemble data to report detailed breakdown of entire trip
  - Enable proactive notification at all stages of move
  - Enable inter-line railroads to conduct root cause analysis on controllable service issues

An on-line survey of logistics executives allows Mercer to estimate the impact on rail market share and yield at various levels of service.

**Freight Carrier Service Performance Survey**

Sample Scenario 2

<table>
<thead>
<tr>
<th></th>
<th>Rail Carload</th>
<th>Intermodal</th>
<th>Truck</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>5% more than current rate</td>
<td>10% more than current rate</td>
<td>Same as current rate</td>
</tr>
<tr>
<td><strong>Transit time</strong></td>
<td>3 days shorter than current</td>
<td>3 days shorter than current</td>
<td>Same as current</td>
</tr>
<tr>
<td><strong>On-Time Performance</strong></td>
<td>90%</td>
<td>93%</td>
<td>99%</td>
</tr>
<tr>
<td><strong>Ease of Order Placement</strong></td>
<td>Basic</td>
<td>Premium</td>
<td>Premium</td>
</tr>
<tr>
<td><strong>Proactive Notification and Tracking Capability</strong></td>
<td>Proactive notification and tracking</td>
<td>Tracking only</td>
<td>Proactive notification and tracking</td>
</tr>
<tr>
<td><strong>Ease of Claims and Dispute Resolution</strong></td>
<td>Same as current</td>
<td>Same as current</td>
<td>Same as current</td>
</tr>
<tr>
<td><strong>On-Time Service Guarantee</strong></td>
<td>Penalty charge</td>
<td>Service insurance</td>
<td>Service insurance</td>
</tr>
<tr>
<td><strong>Allocation of Shipment Tonnage</strong> (should add up to 100%)</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>
Survey results show that better service measurement and proactive exception reporting would generate significant merchandise share and yield gains.

Impact of improved reliability on merchandise car load traffic

Increase in rail market share (tons)

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Mercer 1995 survey¹</th>
<th>Mercer 2003 survey²</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>13%</td>
<td>9%</td>
</tr>
<tr>
<td>95%</td>
<td>19%</td>
<td>18%</td>
</tr>
<tr>
<td>99%</td>
<td>23%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Increase in yield (dollars)

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Mercer 1995 survey¹</th>
<th>Mercer 2003 survey²</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>1.1%</td>
<td>1.5%</td>
</tr>
<tr>
<td>95%</td>
<td>2.1%</td>
<td>3.1%</td>
</tr>
<tr>
<td>99%</td>
<td>3.5%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

¹ Relative to 80% on-time
² Relative to 85% on-time

Impact of track and trace and proactive notification for both single-line and inter-line merchandise car load traffic (at 85% reliability)

Market share 12%

Yield 2%

Note: Revised from November 4, 2003 based on additional survey responses.

Anecdotal rail industry evidence supports this finding.

Carload trip plan compliance

<table>
<thead>
<tr>
<th>Year</th>
<th>CN 1999</th>
<th>CN 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>81%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Change in merchandise traffic

Carloads vs. prior year

Rail carloads of California potatoes

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre Express Lane (UP)</th>
<th>Post Express Lane</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>400</td>
<td>13%</td>
</tr>
<tr>
<td>2000</td>
<td>800</td>
<td>40%</td>
</tr>
<tr>
<td>2001</td>
<td>1,040</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>1,116</td>
<td></td>
</tr>
</tbody>
</table>

CAGR 41%

Union Pacific also reports ability to capture rates closer to other modes of transportation in addition to increased carload volume.
Shippers and carriers say that better measurement and reporting would drive improved performance and rail traffic.

“If we could get a better understanding of rail delays, we could work together with the railroads to improve some of our own problems [which lead to delays].”

“...if someone was able to show me specifically that rail could meet my transit and reliability requirements [on inter-line] at a lower cost, that would certainly open the door for a conversation.”

“If we had access to published railroad performance relative to advertised transit times for the past 30, 60, and 90 days that would help us be more successful in selling intermodal as a viable alternative to truck on specific lanes.”

“If we could get a better understanding of rail delays, we could work together with the railroads to improve some of our own problems [which lead to delays].”

We use truck to transport our finished product to customers but if someone was able to show me specifically that rail could meet my transit and reliability requirements [on inter-line] at a lower cost, that would certainly open the door for a conversation.”

We worked jointly with another Class I to improve and track performance on select interline lanes. We showed a few major customers charts that clearly indicated service improvement and they started moving more with us.”

Although there are challenges to creating a standardized measurement and proactive notification system ...

The challenge of standardization

- Different rules for exclusion of specific moves from measurement
- Different definitions as to when a move starts and ends
- Different operational legacy systems
- Cultural differences around sharing measures
- Different application of transportation plan
- Diverse reporting consistency and discipline
- Lack of root cause analysis on inter-line moves
- No demonstrated commitment to standardize

Source: Class I Executive Interviews, Expert Interviews.
... the payback could be significant in terms of increased merchandise carload revenue

### Annual Revenue Increase
Merchandise carload revenue

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Preliminary estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>~$0.7B</td>
</tr>
<tr>
<td>Track &amp; Trace/Proactive notification</td>
<td>~$1.0B</td>
</tr>
<tr>
<td>Total</td>
<td>~$1.7B</td>
</tr>
<tr>
<td>~13% increase in merchandise carload revenue</td>
<td></td>
</tr>
</tbody>
</table>

### Present value of increase in market share and yield
Combined impact of improved reliability and track & trace and proactive notification on Class I merchandise carload revenue

<table>
<thead>
<tr>
<th>$Billions</th>
<th>Reliability</th>
<th>Track &amp; Trace/Proactive notification</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$8.7</td>
<td></td>
<td></td>
<td>$14.5B</td>
</tr>
</tbody>
</table>

Assumptions:
- 460M tons merchandise carload volume
- $13B merchandise carload revenue
- 12% discount rate net of arbitration
- Improved reliability from 85% to 90%
- Availability of track & trace and proactive notification on single-line and inter-line
- Excludes incremental costs and investment requirement

- Note: Revised from November 6, 2003 based on additional survey responses

Will this growth in revenue increase earnings enough to generate a sufficient return on the investment required?

Service measurement can improve both service management and shipper communications and may generate significant rewards

- Standardized industry-wide service measurement
- Investment required

- Ability to 'manage what you measure' across railroads
- Improved service performance
- Increase in revenue
- Earnings growth and return on investment?
- Improved stock valuation

- Ability to report improved performance to shippers

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Next steps

- The research results to date are compelling, but more survey responses are needed to narrow the statistical confidence range and support business decisions.

- We have left the web-based survey instrument open. Next steps could include:
  - Targeted research for individual carriers
    - Produce statistically significant results at carrier level
    - Builds industry database
  - Research for the industry to test a business case for implementing a proactive service performance measurement system
    - Quantifies benefits and costs
    - Analyzes payback on investment