Capital Needs Inventory (CNI)

FTA 2017 Transit Asset Management Roundtable

August 29, 2017

Washington Metropolitan Area Transit Authority

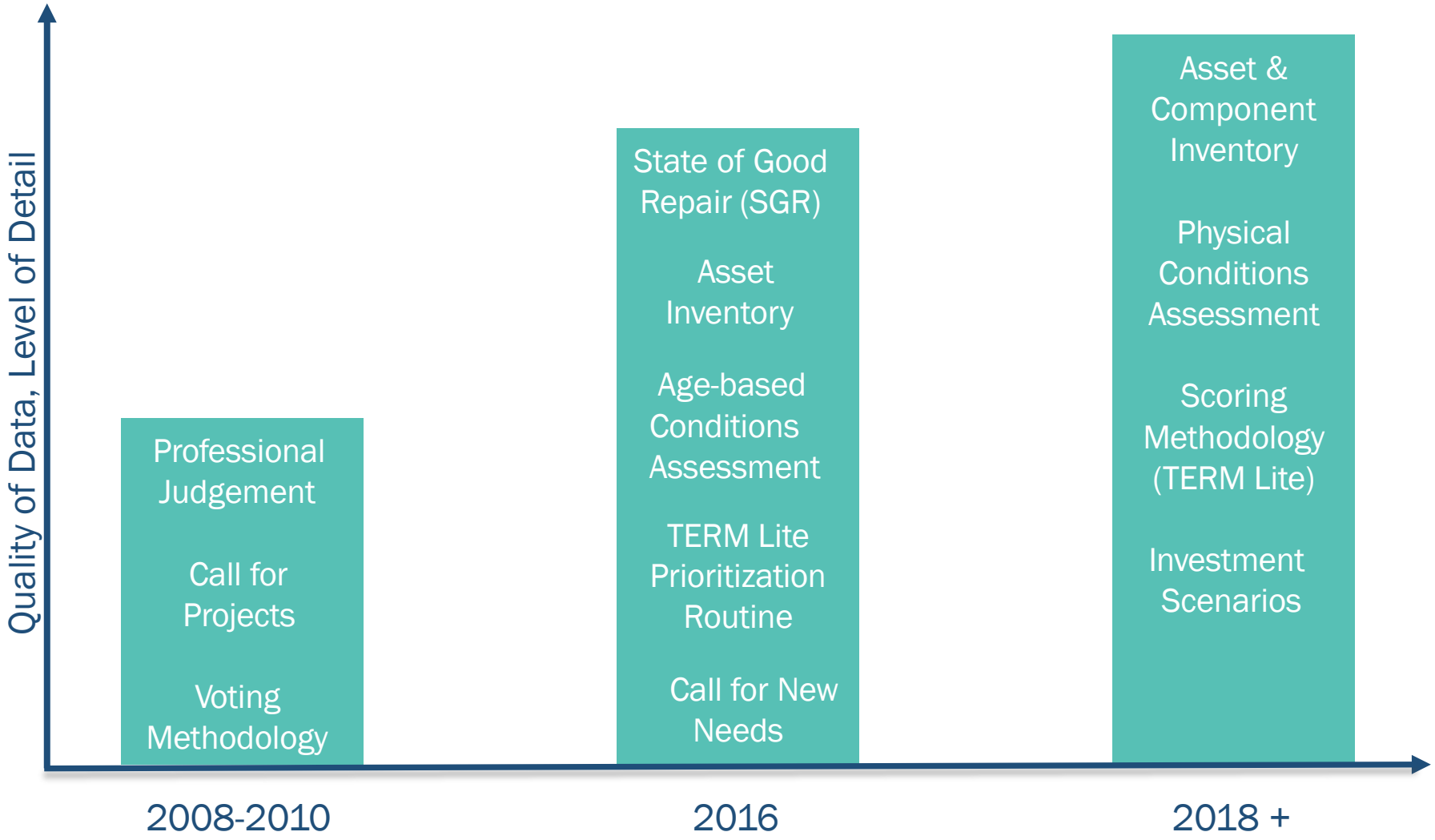
What is the CNI?

- A ten-year prioritized list of capital investment needs (2017 to 2026)
- Renew, replace existing assets to achieve a State of Good Repair (SGR)
- New capital investments needed to:
  - Match capacity to near-term demand
  - Address compliance needs (e.g., NTSB, FTA, etc.)
- Provides critical input to Capital Funding Agreement (CFA)

What did the CNI Achieve?

- Established a **data-driven, risk-based asset evaluation framework,** with simple and transparent prioritization criteria
- Built an **asset inventory** to quantify investment needs utilizing previous and ongoing work
- Advanced critical **safety or compliance needs** and allowed decision makers to understand the **magnitude of investment needs**
- Delivered **defensible, high-level investment needs**, provided critical input to subsequent CFA

CNI Evolution and Improvements



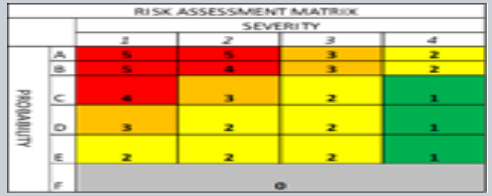
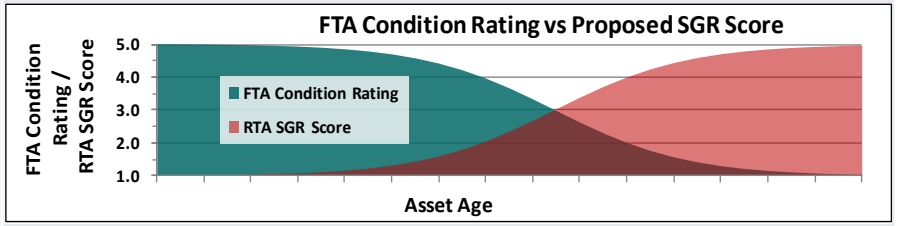
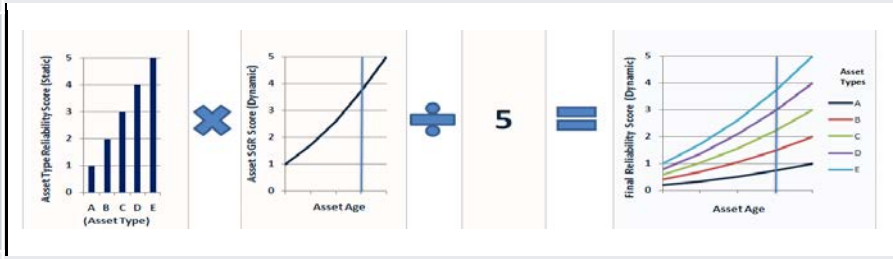
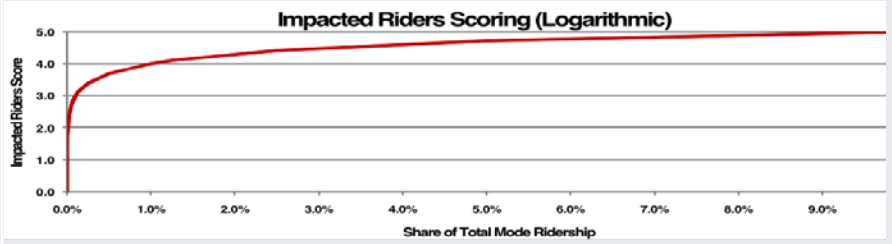
Overview of CNI Methodology

- Inventory of existing capital assets was updated from previous TERM Lite work at WMATA
- SGR Needs forecast and prioritized in customized version of TERM Lite (the 'engine' for the CNI Database)
- New Investment needs gathered through call for projects and prioritized separately within CNI Database

Choosing Prioritization Criteria

- Quantifiable and data-driven
- Kept to fewer than 5 for transparency and simplicity
- Cross functional leadership (the Capital Program Advisory Committee, CPAC) guided selection of criteria and measures
- Align to strategic goals

Measuring CNI Prioritization Criteria

Criterion	Scoring Guidelines	Scoring Approach
Safety & Security	• Static Scoring: Asset type • 1 is low risk of a safety or security incident; 5 is high risk of an incident *Based on industry standard (MIL-STD-882E)* • Data: Input from safety & security experts, asset owners and CAPS	
Asset Condition	• Dynamic Scoring: Asset condition • Based on FTA 5-point condition rating scale: 1 is Poor; 5 is Excellent • For priority, condition ratings inverted: asset in Excellent condition (5) scored 1 as low priority and an asset in Poor condition (1) scored 5 as high priority • Data: Some TAICA ratings & Metro modified decay curves	
Service Delivery	• Dynamic Scoring: Asset type and condition • 1 is 0-5% impact on customer satisfaction; 5 is over 20% impact on customer satisfaction (i.e., service reliability) • Data: Customer Survey data, Modal data and critical/support asset data	
Ridership Impacts	Static Scoring: Remains fixed throughout years of analysis 1 is little impact (less than 700 riders); 5 is extreme impact (more than700,000 riders) Logarithmic scale based on riders served by asset (location-driven) Data: Ridership by mode	

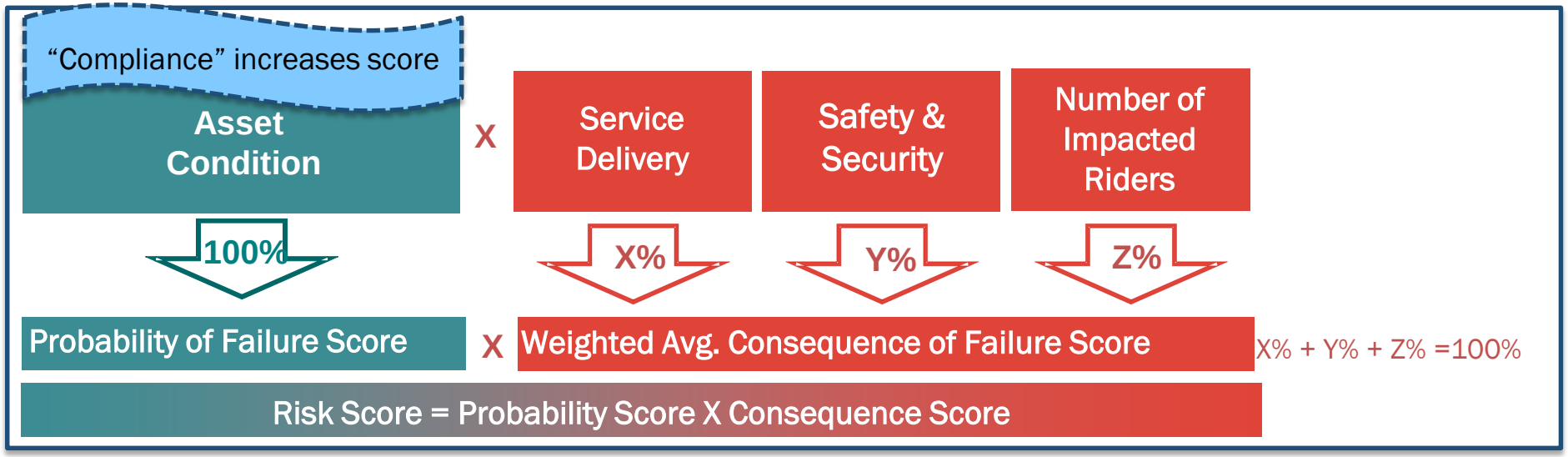
Service Delivery Example

Metrobus, Metrorail, & MetroAccess Scores:	(high impact on satisfaction) 5	4	3	2	(low impact on satisfaction) 1
Percent impact on customer satisfaction	> 20%	20-15%	15-10%	10-5%	5-0%
Examples from CY15 aggregate results	Reliability for bus and rail	On-time Performance (OTP)	Rail signage & graphics, faregates, bus climate control	Train climate control, train cleanliness, station climate control, bus fareboxes, bus stop signage	Vertical transport (ELES), station lighting, paper signage, station/ train & bus announcements
	Distribute by: Minutes of Delay (Metrorail), Missed Trips (Metrobus), and Fleet Failures (MetroAccess)				

Metrorail Asset Types	Total Minutes Delay	Priority Score
Vehicles: Rail Cars	8,917	5
Systems: Electrification	3,245	5
Systems: Train Control	2,488	5
Guideway: Trackwork	2,329	5
Systems: Communications	186	4
Systems: Utilities	15	4

Weighting Methodology

- Risk-based priority scoring chosen based on FTA's guidance and collaborative risk management (CRM) work
- WMATA's version of TERM Lite was modified to support this approach
- Uses criteria to represent either the likelihood or consequence of asset failure
  - Asset condition as likelihood
  - Weighted average of other criteria as consequence



Priority Status Assignment

- "Compliance" status identified by
  - Compliance issues (change in regulation or code)
  - Accidents or safety concerns (damaged, requires replacement in audit, investigation)
  - Technological obsolescence (no longer fit for service)
- Complete review of existing inventory assigned "Compliance" to individual assets for SGR scoring
- Project managers submitted New Investment Needs and designated projects by "Compliance" definitions above
- "Compliance" scoring forces maximum conditions score

Developing WMATA's Risk-based Weights: Facilitated Discussion

How WMATA developed unique criteria weights:

- Worst case risk outcomes defined for "consequence" criteria through the measurement process
- Real world experience with these outcomes discussed with CPAC to baseline risks to the agency:
  - Financial impacts
  - Stakeholder credibility
- Scenario weights for criteria were developed from both facilitated team rankings of outcomes and individual CPAC surveys

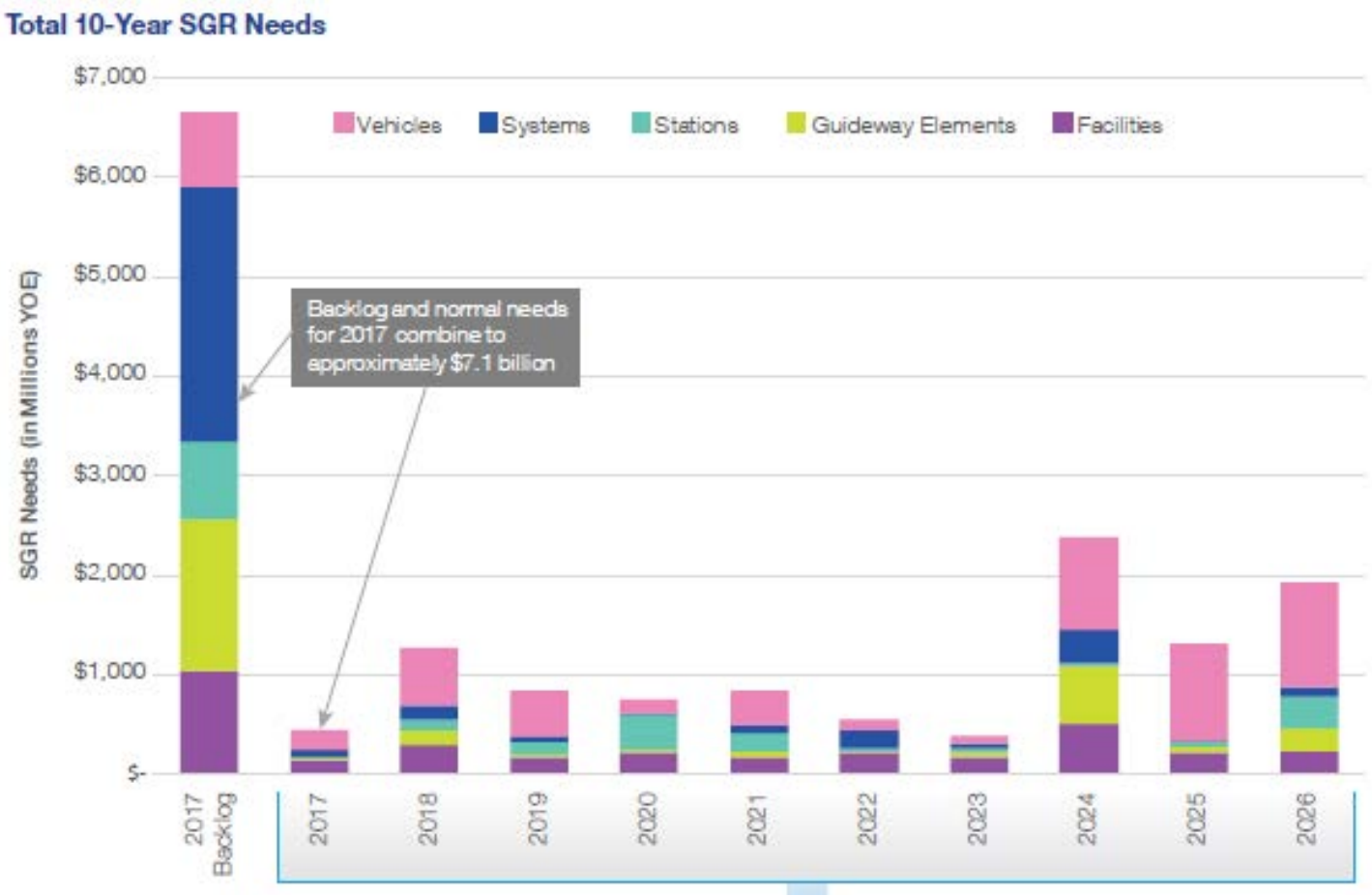
Four Weighting Scenarios Tested

- Throughout the CNI 'testing' period both SGR and New Investment Needs were tested against four scenarios
- Each scenario focused on a different consequence over others
- CPAC members reviewed results and chose *Safety & Security* Focus for CNI

Proposed Test Scenarios	Focus of Consequence Weights
Scenario 1	Service Delivery
Scenario 2	Safety & Service Focus
Option 1	Safety & Security Driven
Option 2	Riders Impacted

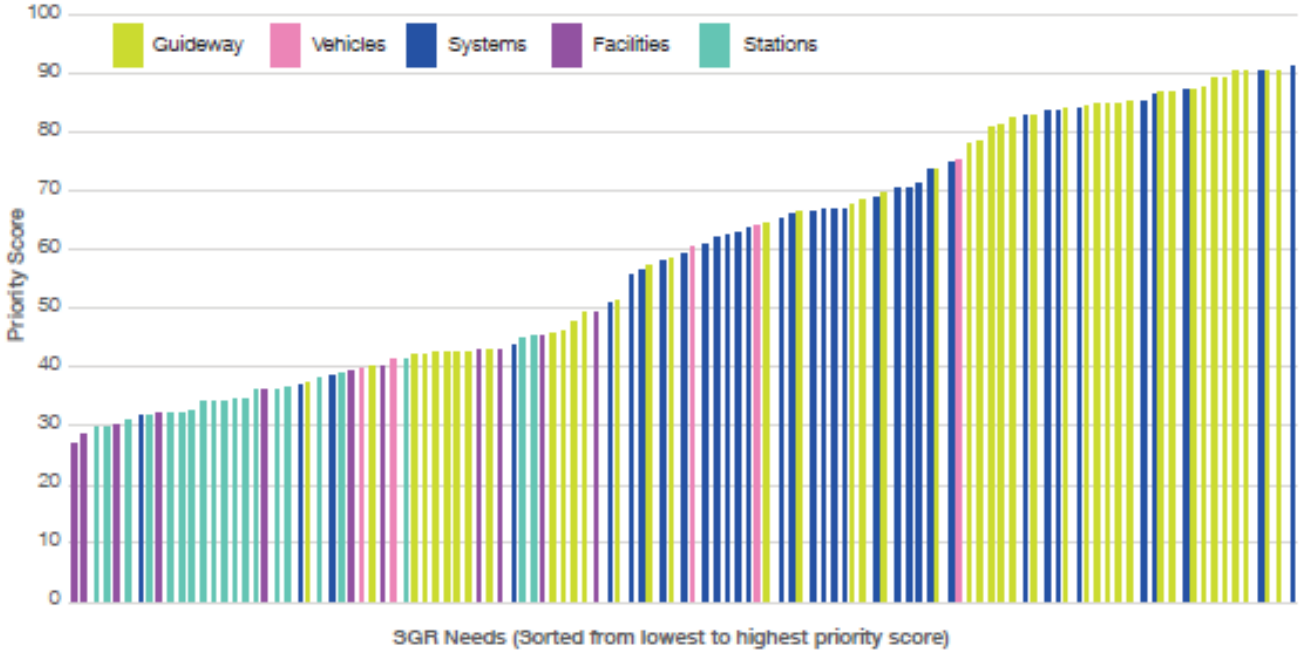
State of Good Repair Needs
Unconstrained 10-Year Estimate

- SGR needs over the 10-year period <u>total to $17.4 billion</u>
  - Needs unconstrained by budget, time and execution capacity
- Current backlog estimated to be about $6.5 billion



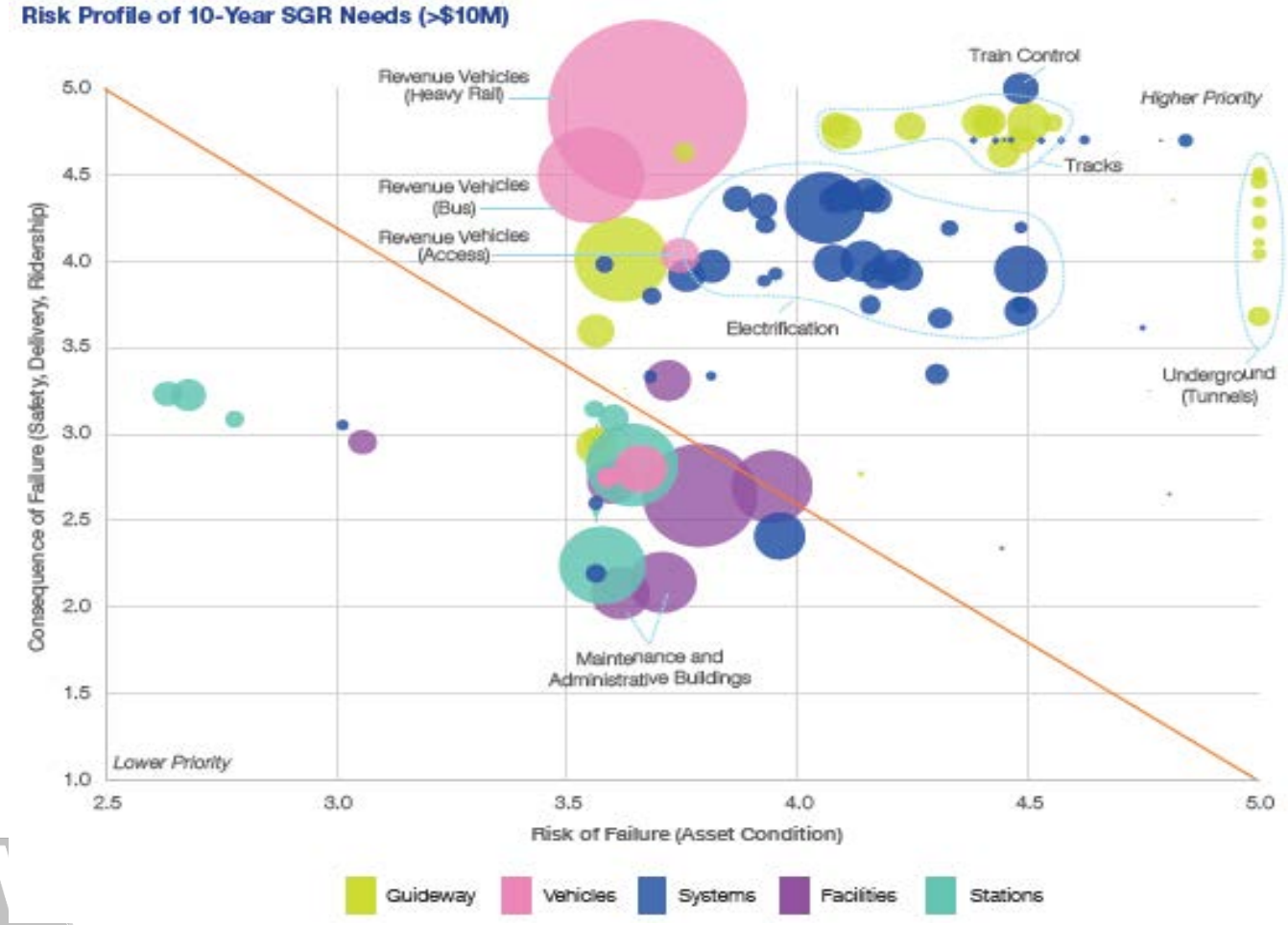
SGR Priority Results

- All SGR needs score above 25 with most scoring above 50 (out of 100 possible points)
- Guideway elements and rail **Systems** score the highest
- Railcars are the highest scoring **Vehicles** (due to ridership impacts)
- All **Stations** and **Facilities** needs score in bottom half of SGR needs



SGR Risk-Profile Results

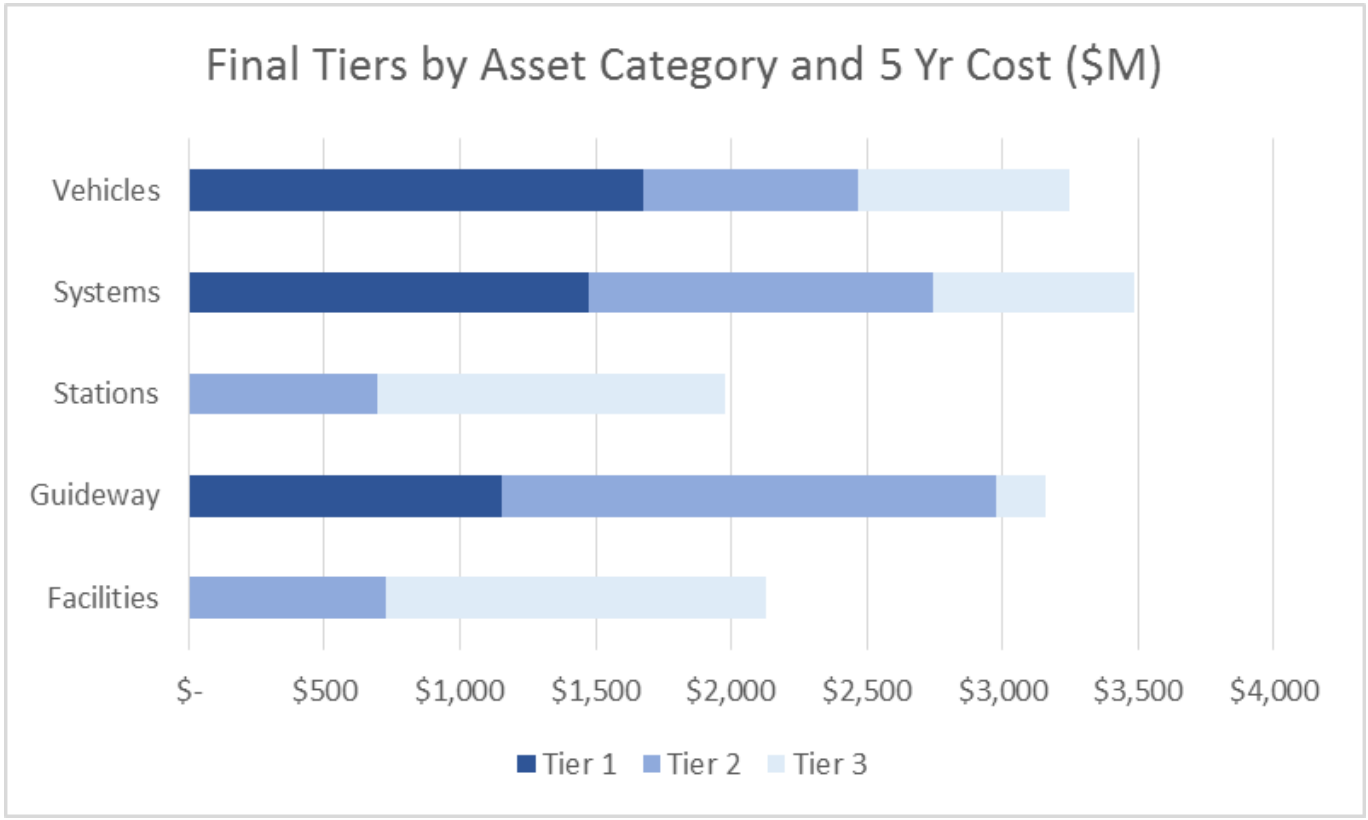
Profile illustrates the relationship between likelihood and consequence of failure



- Tunnels have the worst condition (overall) and highest likelihood of failure due to water intrusion
- Rail revenue vehicles have the highest consequence of failure

Priority Tiers: For Comparison to CIP Funding

- Methodology
  - Create tiers for easier interpretation/communication of needs and comparison to current CIP funding
  - More evenly distributed investment packages in terms of priority (i.e., three tiers versus 300+ “projects”)
- Tier 1 are the highest priority assets (scoring greater than 70 out of 100)
  - Tier 1 is only SGR-related needs
- Tier 2 includes assets scoring from 40 to 69
- Tier 3 includes assets or projects scoring less than 40
  - Tier 3 is a mix of SGR and New needs



Ten-Year Combined Needs

Cost	Considerations
▪ Total Capital Needs: $25.2 billion • SGR, $17.4B • New needs, $7.0B • Unallocated capital expenses, $800M o Minor repairs and maintenance o IT, engineering, environmental services	▪ Needs are not projects – *yet*. They inform decisions about project development resources. ▪ Once project development and evaluation are complete, *projects* may advance into construction, acquisition ▪ Needs estimate will be refined as Transit Asset Inventory & Condition Assessment matures