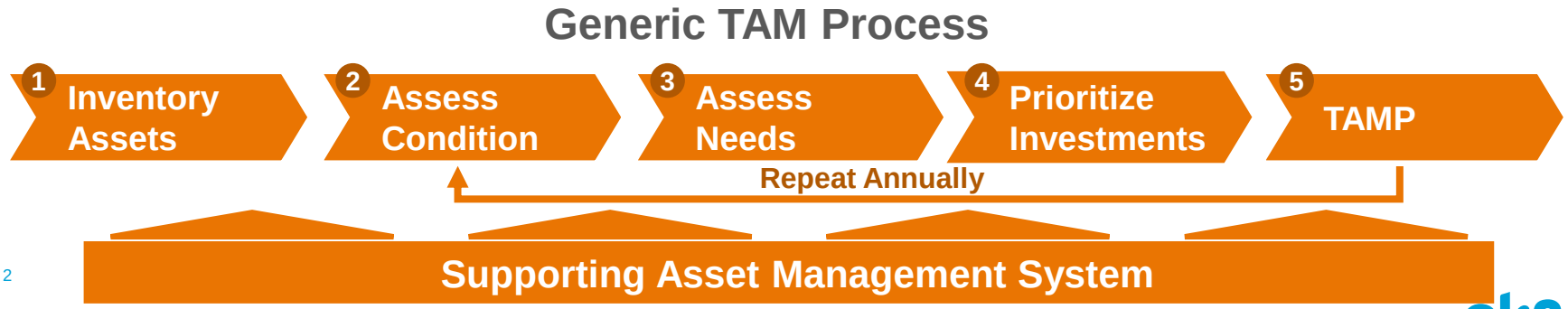

# TAM Implementation: Lessons Learned

## 11th National Conference on Transit Asset Management

Rick Laver

# TAM Implementation: Lessons Learned

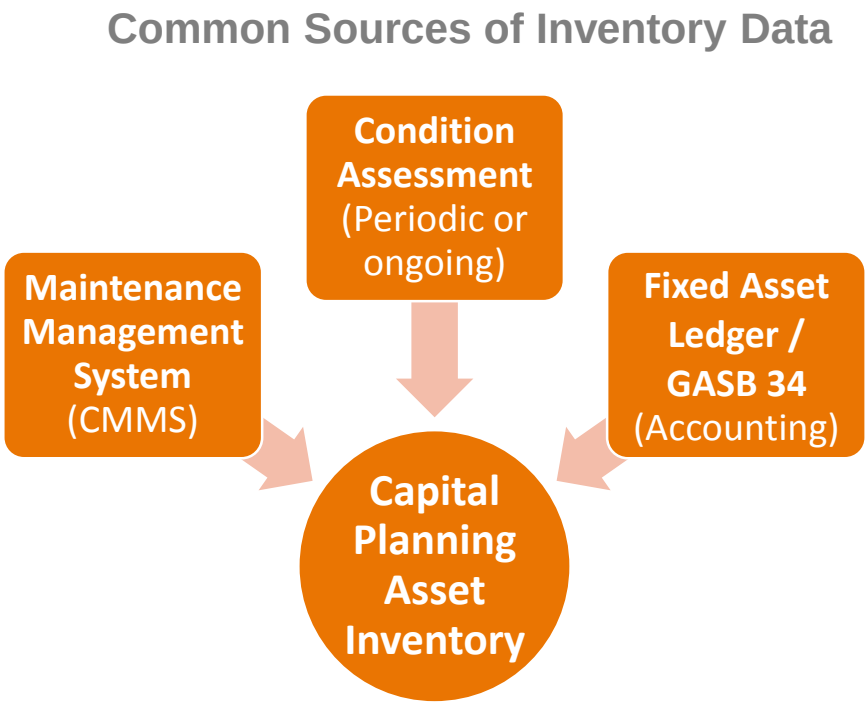
- International best practices and MAP-21 identify the following as key TAM program components:
  - ✓ Inventory
  - ✓ Condition Assessment
  - ✓ Performance Measures
- What challenges have agencies encountered in implementing these key elements?
- What opportunities to benefit from lessons learned?



# Asset Inventory

# Overview: Inventory Development Status

- Development status ranges widely across agencies:
  - In process of populating / migrating to single EAM/MMS
  - Stand-alone, manually maintained (worksheets or DB, not connected to other asset systems)
  - Initial inventory from multiple sources ("Franken-inventory")
  - Have not started
- Agencies face many challenges assembling initial inventories and moving to long-term solutions



# Inventory Development Challenges (by Source)...

## MMS/EAM

- Limited asset coverage (some types missing)
- Configured for work orders not asset holding reporting
  - Key fields may be unpopulated (date built, replacement value)
  - "Parent-child" relationships may not support easy pull of parent record
  - E.g., station components may be recorded by location but not as child of overall station asset
  - MMS level hierarchy not aligned to broader asset category level

## Fixed Asset Ledger

- Designed for depreciation / accounting
  - Record contract value, not asset value
  - Include capitalized cost of rehabs and professional services
  - GASB-34 (modified) an exception

## Condition Assessment

- Snap-shot data
  - Frequency of update?

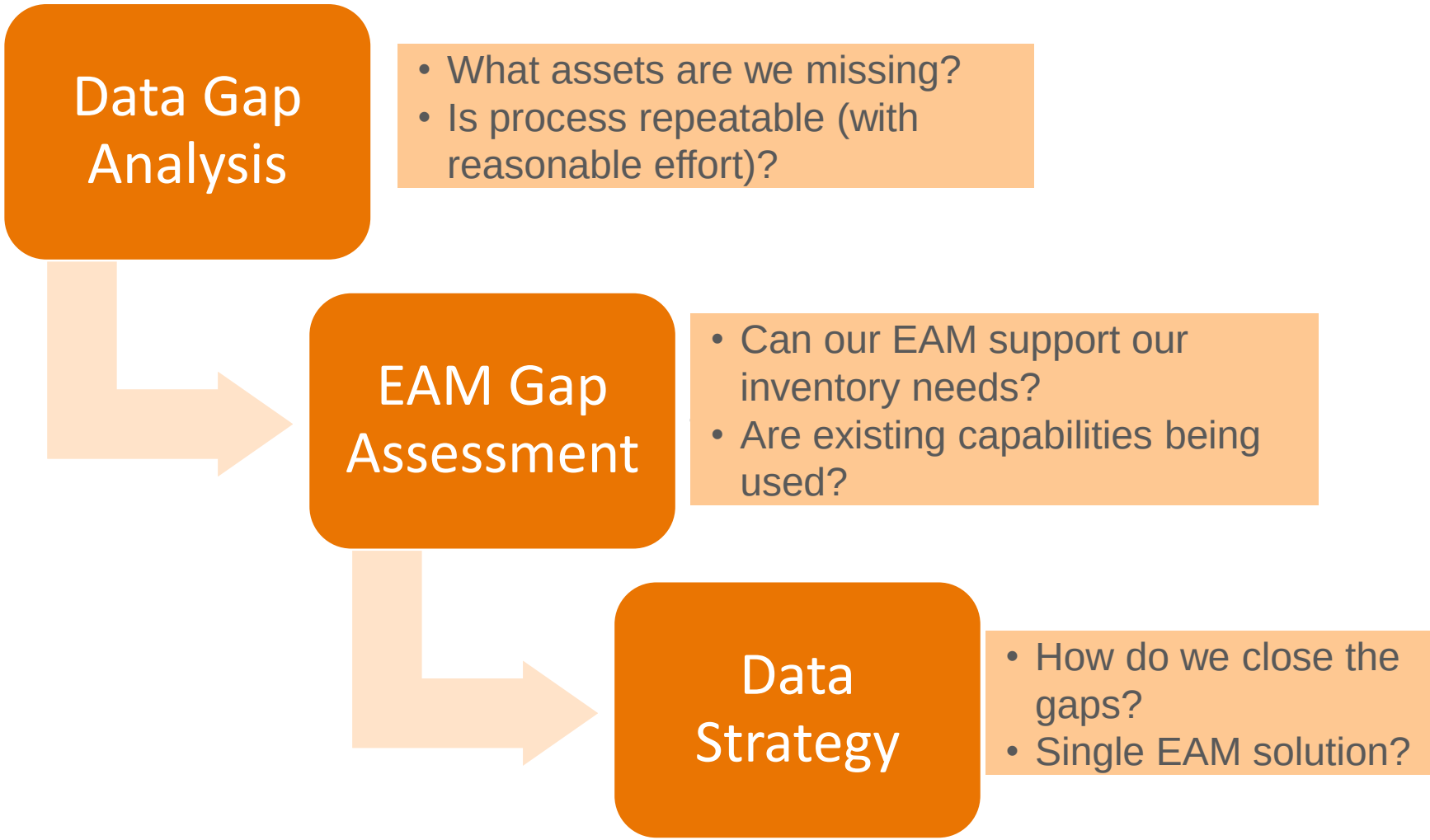
# Inventory Development Challenges

**Un-populated fields**

**No install date or cost data**

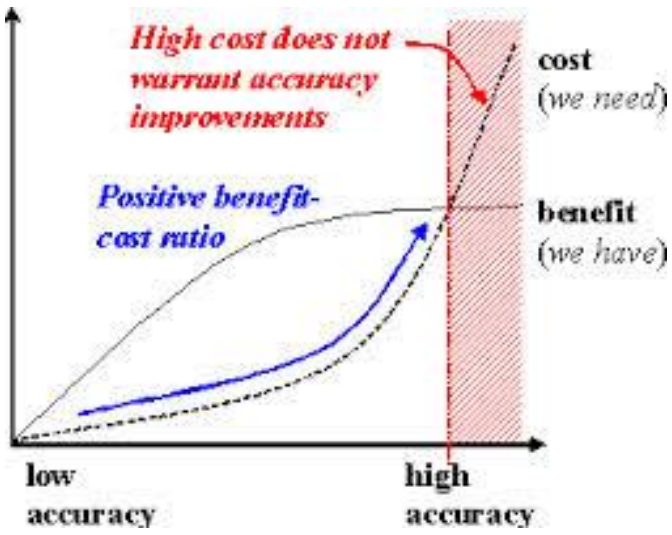
| ASSETNUM | DESCRIPTION | LOCATION | BINNUM | PARENT | ASSETTYPE | STATUS | ITEMNUM | ISLINEAR | INSTALLDATE |
|---|---|---|---|---|---|---|---|---|---|
| 1255697 | ASSY 14BRT | | | | | OPERATING | | 0 | |
| 1255743 | ASSY 121A-4 XMTR 522HZ/17HZ | | | | | OPERATING | | 0 | |
| 1255746 | ASSY 121A-4 XMTR 1.1KHZ W/10ST | | | | | OPERATING | | 0 | |
| 1263628 | Disconnect Switch,NC SW35S1 | | | | | OPERATING | | 0 | |
| 1263350 | Grade Crossing, | | | | | OPERATING | | 0 | |
| 1261049 | ASSY XCVR MOD COMPLETE 348.0HZ | | | | | OPERATING | | 0 | |
| 1261050 | ASSY XCVR MOD COMPLETE 790.0HZ | | | | | OPERATING | | 0 | |
| 1257606 | Auxiliary Module | | | | | OPERATING | | 0 | |
| 1257330 | Section Insulator | | | | | OPERATING | | 0 | |
| 1258389 | ASSY 1101 BT/R XCVR 1.9KHZ | | | | | OPERATING | | 0 | |
| 1259215 | Track switch,R,facing | | | | | OPERATING | | 0 | |
| 1259216 | Track switch,R,trailing | | | | | OPERATING | | 0 | |
| 1259217 | Insulated Joint at 495+00, track 1 | | | | | OPERATING | | 0 | |
| 1257663 | Milling Machine, SuperMax | | | | | OPERATING | | 0 | |

# Many Agencies Need to Assess Capabilities and Develop a Long-Term Data Plan

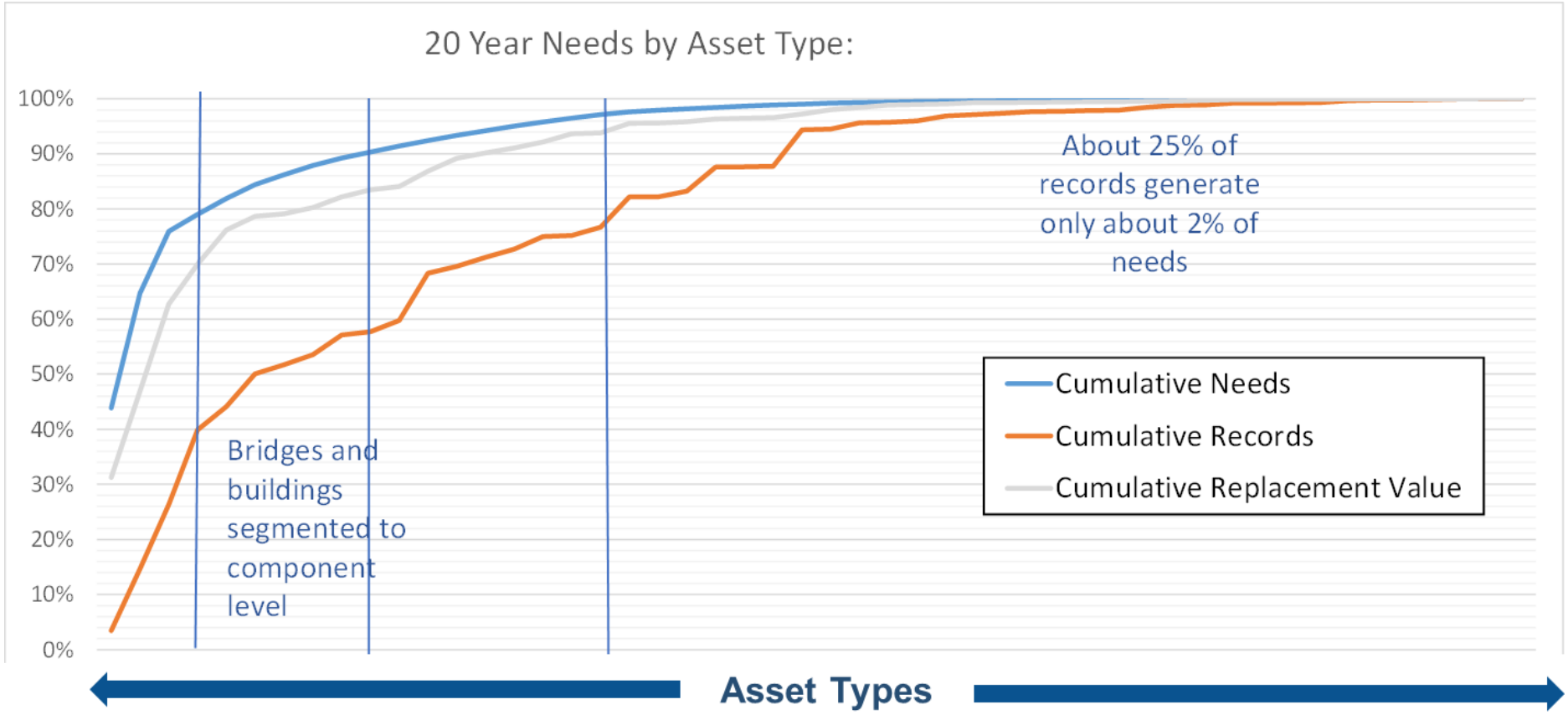


# Inventory: What Level of Detail?

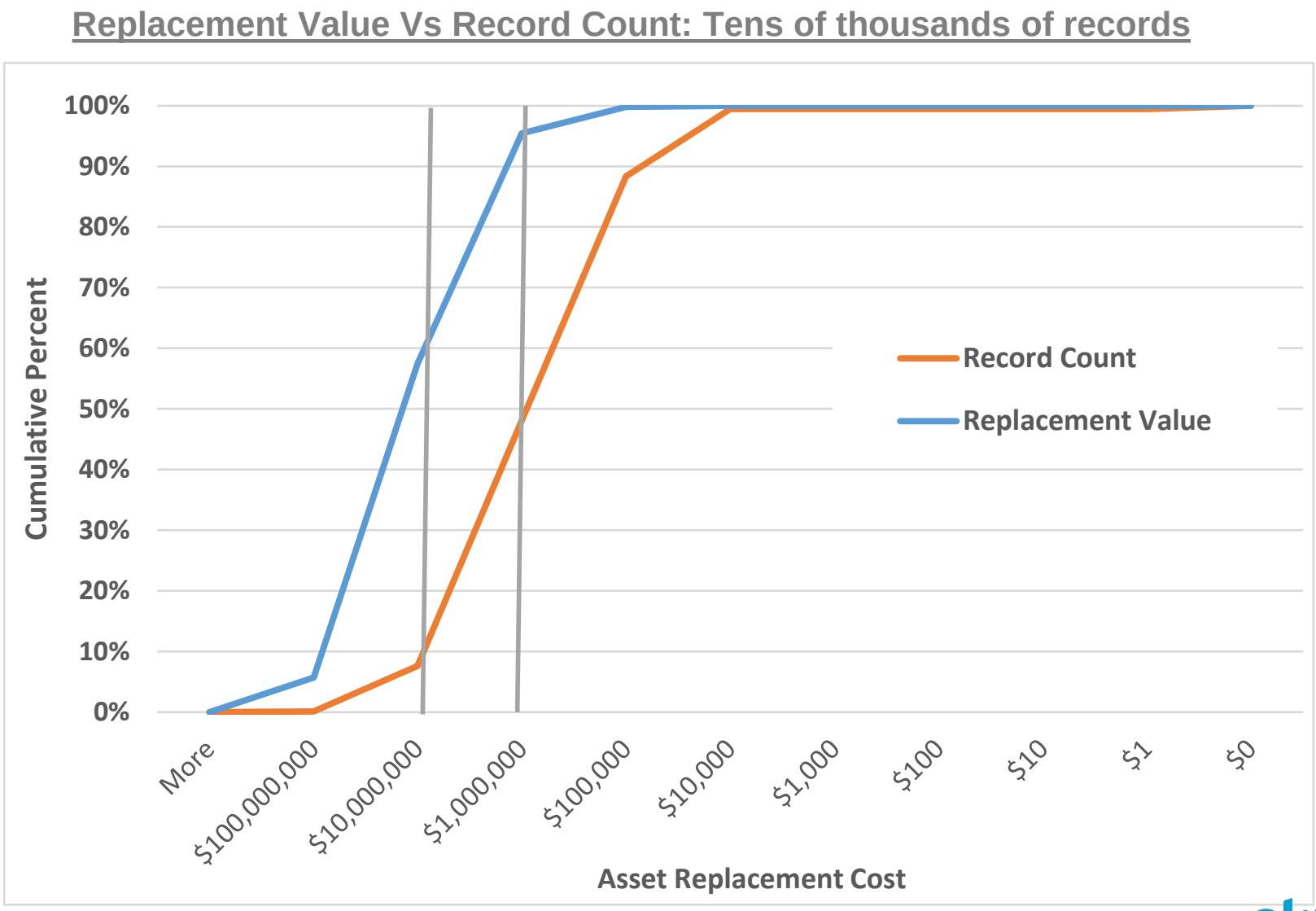
- Collecting and maintaining asset records is costly
- Optimal level of detail is a tradeoff between accuracy and cost
- General guidelines:
  - Focus on assets that generate most needs (“80/20” rule)
  - Avoid maintaining records for low cost assets (if not needed)



# Pareto Analysis: Tens of Thousands of Records



# Low Value Records Contribute Little to Needs...

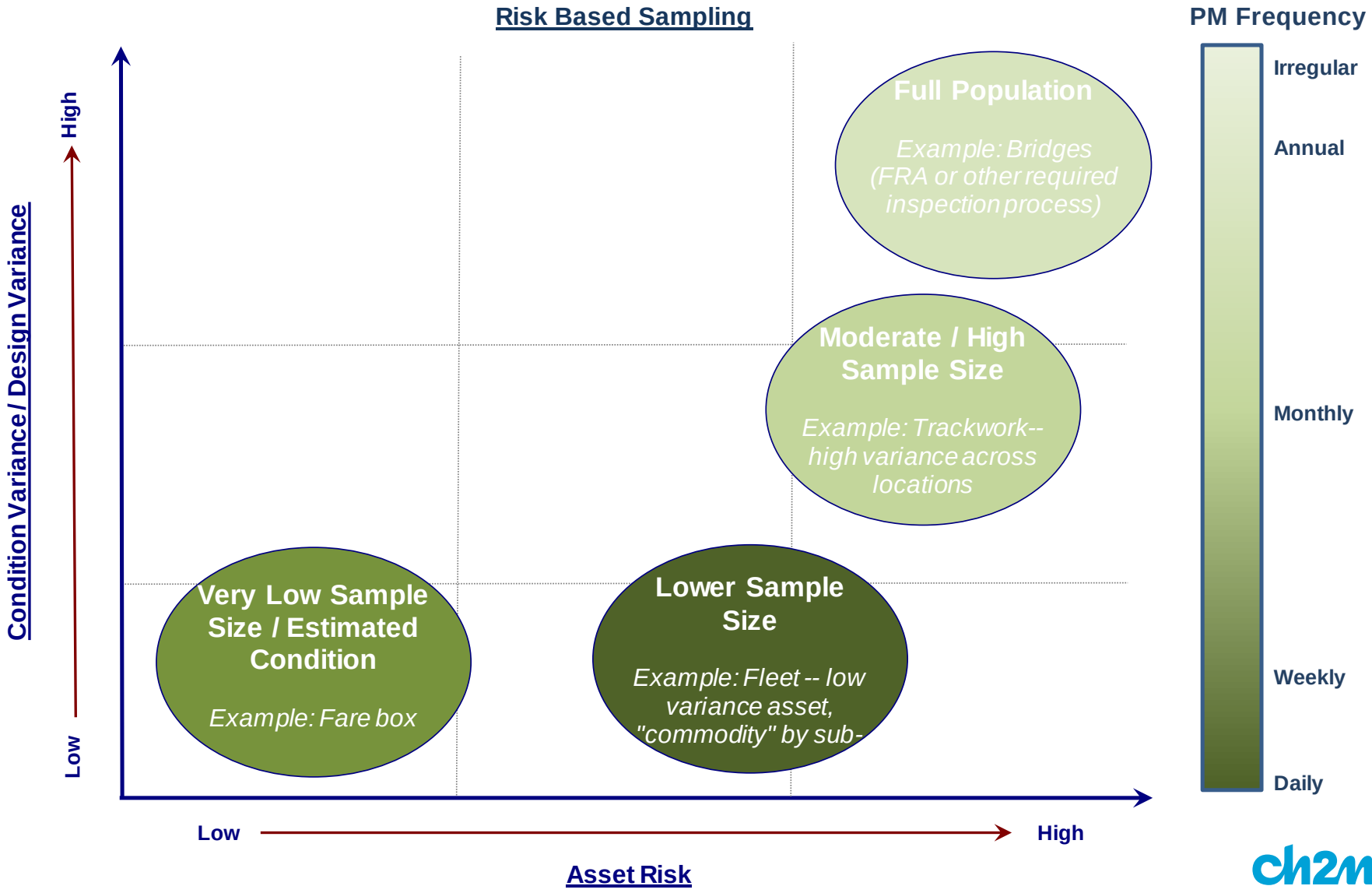


# Condition Assessment

# Condition Assessment

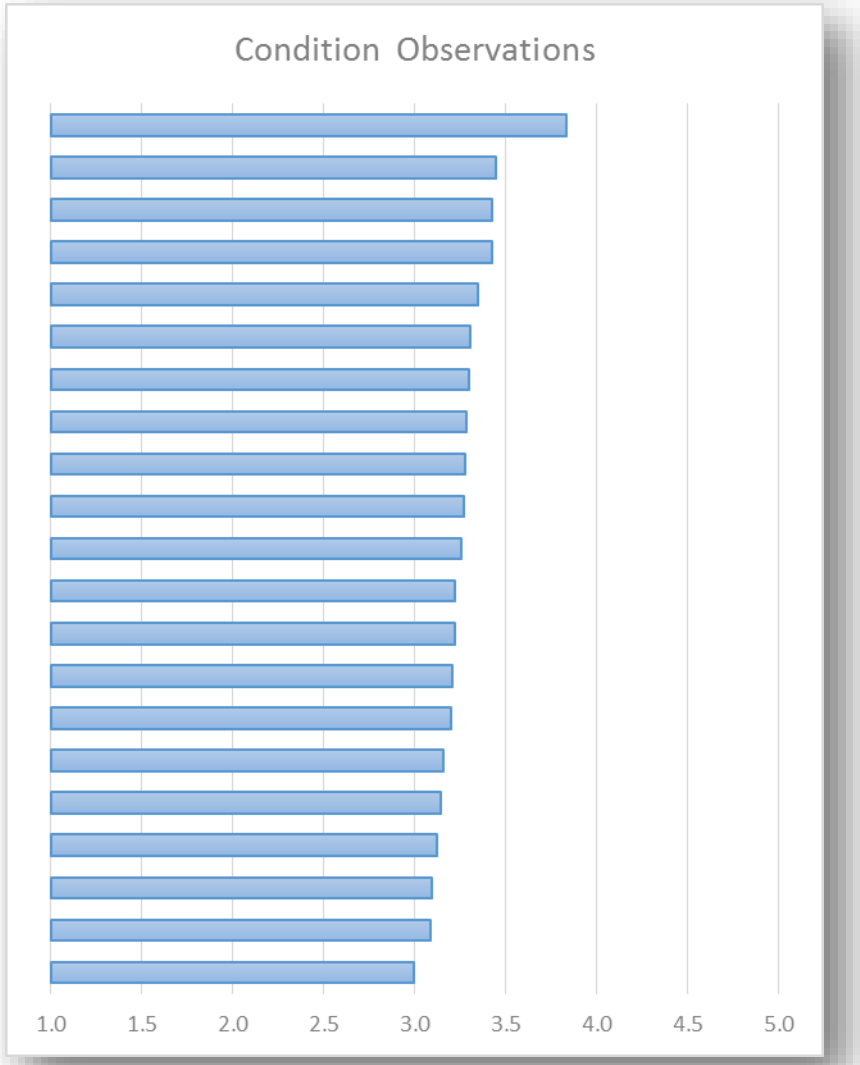
1. On-site condition assessment is expensive:
   - Large stock of diverse assets to assess
   - Update every 1 to 3 years
   - Agencies may be collecting more condition data than needed
   - Costs can be significantly reduced by sampling
2. Agencies may not be making optimal use of data collected:
   - Opportunities to mine condition data for improved investment decisions

# Risk Based Condition Assessment: Don't Need to Look at Everything…



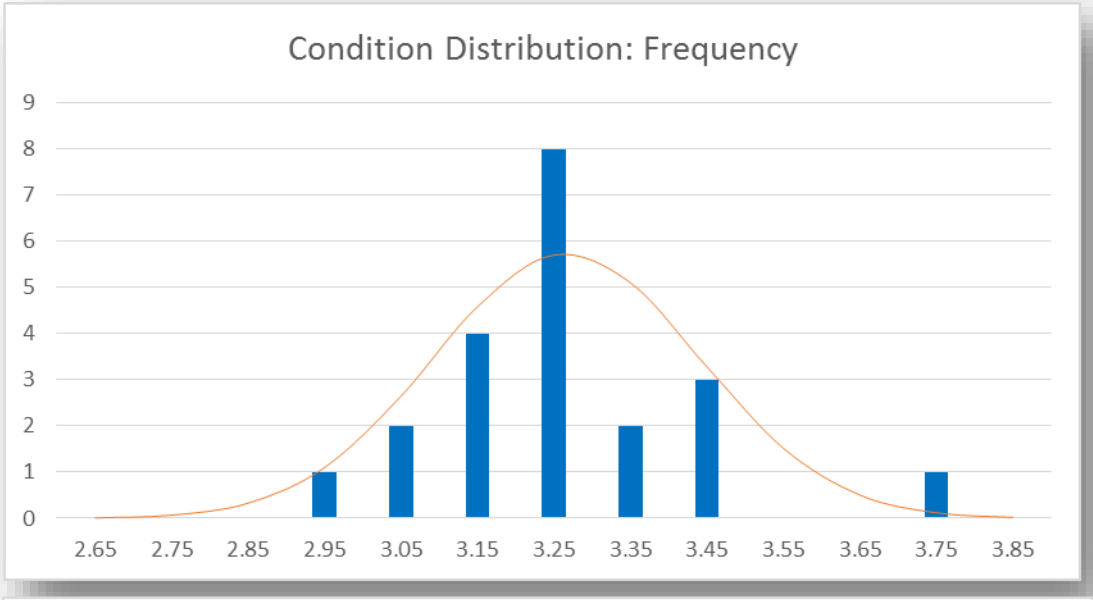
# Example: Fleet Condition Sample

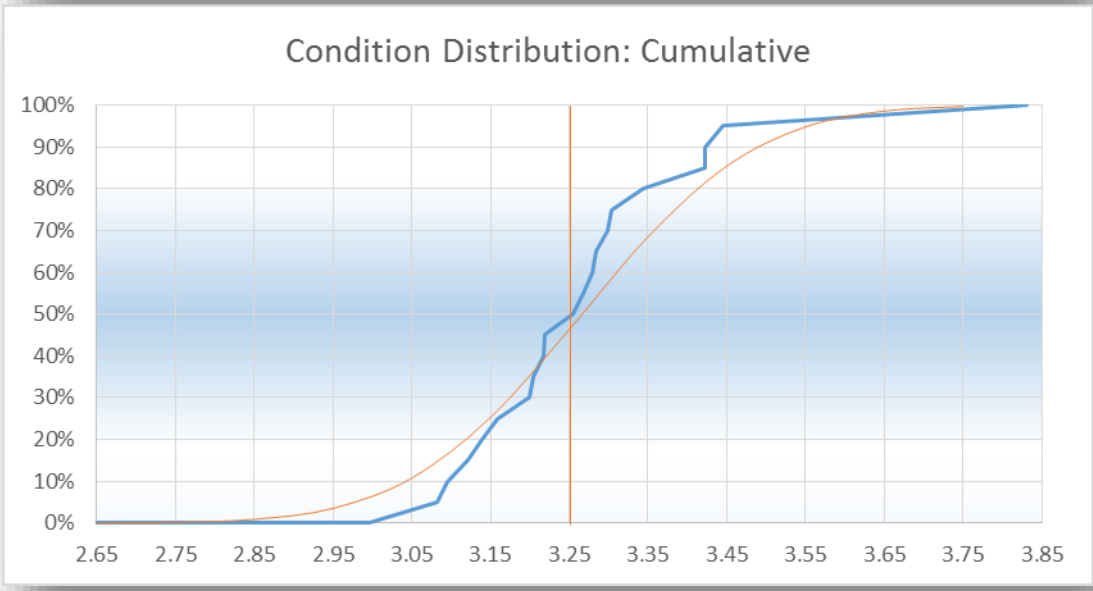
- Variation in conditions within a vehicle sub-fleet tends to be very limited:
  - Once you've seen five...
- Example:
  - Sub fleet of 53 over-the-road coaches
  - Entered service in 2004
  - Condition Sample = 21 vehicles (39%)
  - 90 components assessed on each vehicle
  - FTA 5 (excellent) through 1 (poor) scale
  - Weighted average condition presented



# Example: Fleet Condition Sample

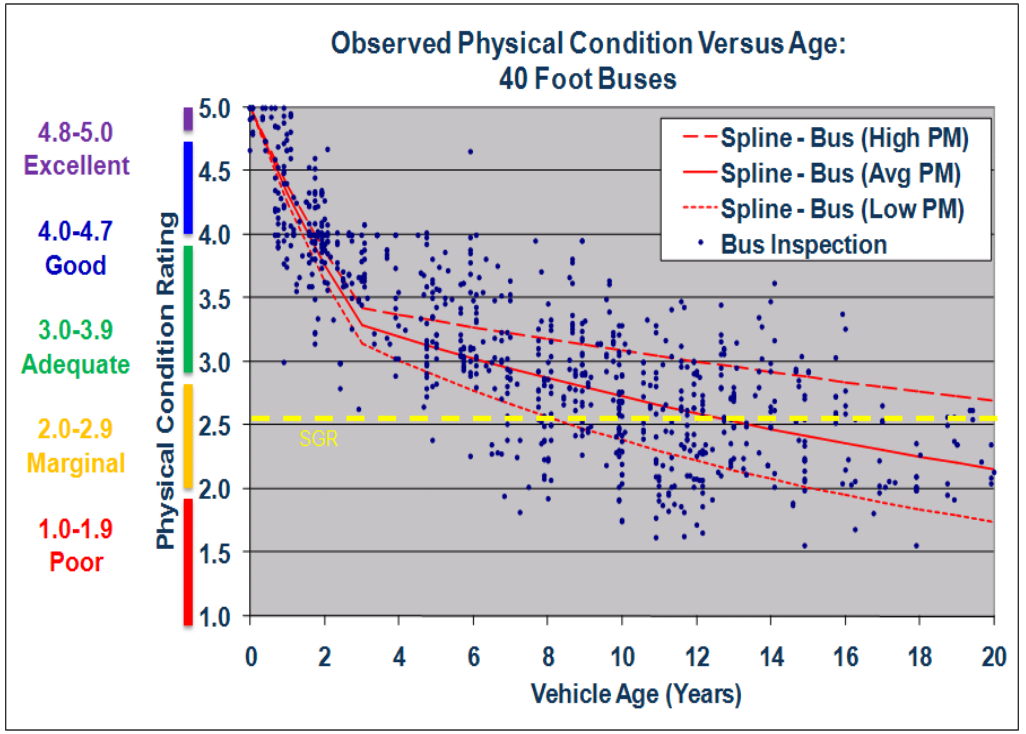
- 21 vehicle observations
  - Peak at 3.25 (mean)
  - 60% of observations within ± 0.10 of 3.25
  - Normal distribution
- Why inspect more vehicles?
  - Sample sufficient to:
    - ✓ Identify typical deficiencies (for rehab)
    - ✓ Assess structure useful life



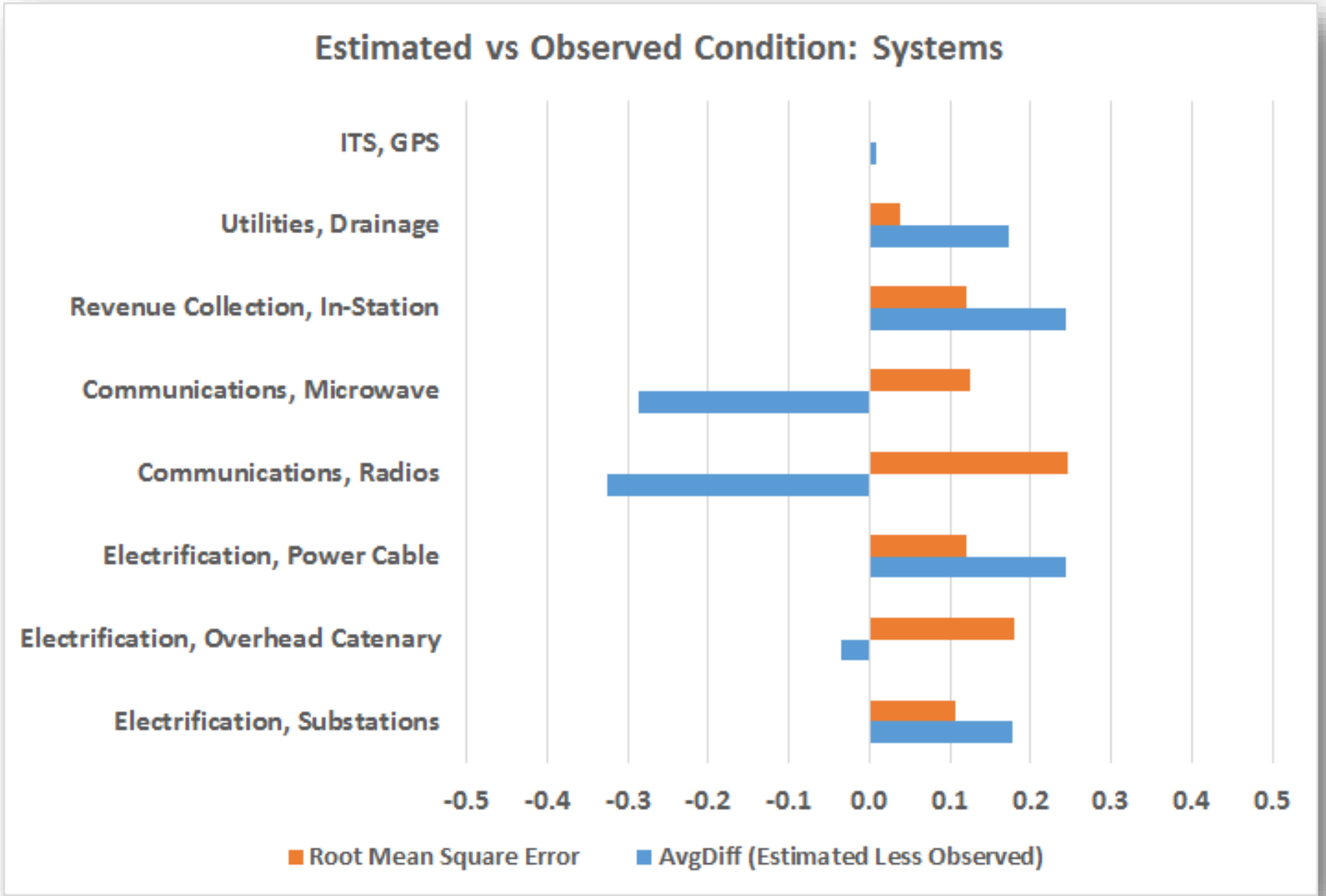
# Condition Estimation

- NOT recommended for most asset types
- However, can be used for lower risk, more standardized asset types:
  - E.g., bus radios, fare boxes
  - This assumes an agency wants a condition value to assist in prioritization
  - Decay curves need to be calibrated to actual experience



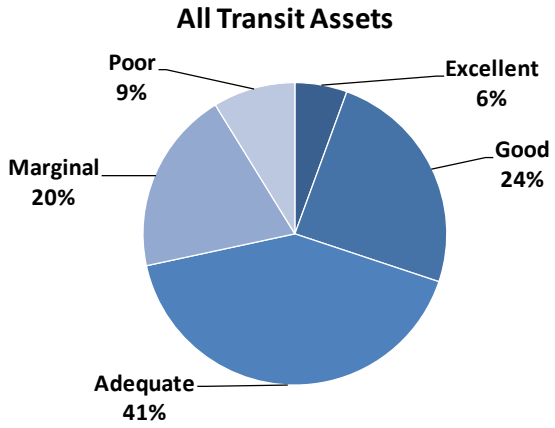
# Example: Estimated Condition Vs On-Site Assessment (FTA – 5 to 1 Scale)

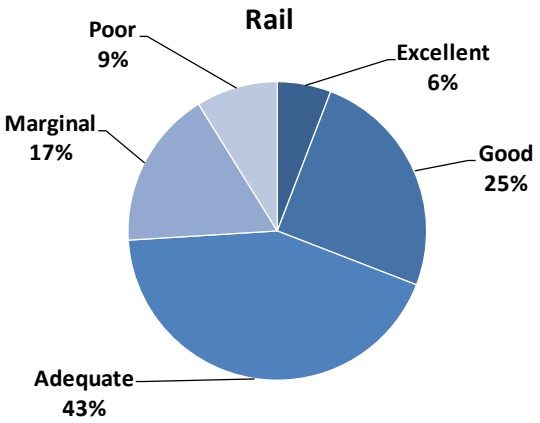
**Estimated condition not recommended for most asset types**

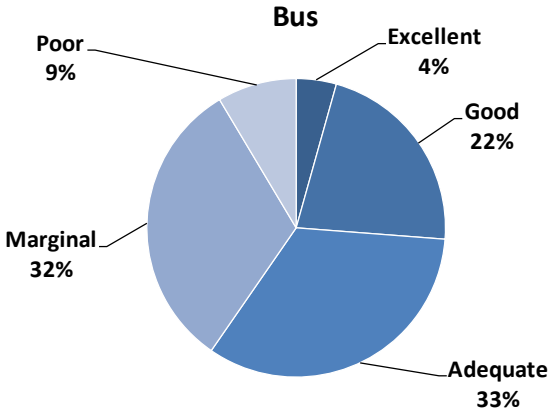


# Condition Data and Decision Making

- Condition data frequently collected for:
  - Initial inventory development
  - Prioritization support
  - Performance measure / trend reporting
  - MAP-21 Reporting
- Not always used for basic reinvestment planning:
  - What's broken now?
  - What should we include in our next rehab?
  - Are we approaching the end of useful life?



# Three Views...High Level (Park and Ride Example)

- Highlights overall service quality and areas of general concern
  - Helpful for reporting to management
  - But beware of averages...

| Corridor and Lot | Lot Average | Access | Bus Lanes | Parking Area | Loading Area | Shelters |
|---|---|---|---|---|---|---|
| | | | County property | | | |
| **East** | | | | | | |
| Hewatt Road | 3.49 | 3.41 | 3.08 | 2.94 | 4.00 | 4.00 |
| West Conyers/ Sigman Road | 3.58 | 3.57 | 4.00 | 2.57 | 4.00 | 3.77 |
| **North** | | | | | | |
| Acworth | 3.77 | 4.17 | 4.10 | 2.74 | 4.20 | 3.65 |
| Busbee Drive | 3.62 | 3.96 | 3.84 | 2.32 | 3.99 | 4.00 |
| **West** | | | | | | |
| Douglasville MMC | 3.30 | 2.50 | 3.13 | 2.96 | 4.00 | 3.92 |
| Mableton | 4.24 | 4.40 | 4.05 | 4.13 | 4.20 | 4.44 |

# Three Views...Mid Level (Park and Ride Example)

- What's really going on?
  - What types of needs do we face?
  - Are needs widespread or spotty?
  - Are any needs critical (or can they wait)?
  - What needs pose the greatest risk?

| Group | Element | Count | Condition | Risk | Condition Distribution | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Excellent | Good | Adequate | Marginal | Worn |
| County property | | | | | | | | | 6 lots, 2035 spaces |
| Bus Lanes | Curbs / drains | 3 | 4.2 | 0.73 | | 66.7% | | | |
| | Signage | 2 | 4.3 | 1.40 | | 50.0% | | | |
| | Striping/markings | 6 | 2.9 | 2.47 | | 33.3% | 33.3% | 16.7% | 16.7% |
| | Surface | 5 | 3.8 | 1.76 | | 40.0% | 40.0% | | |
| Passenger Loading Area | Lighting | 3 | 4.0 | 2.00 | | 100.0% | | | |
| | Platform / Sidewalk | 6 | 4.2 | 1.47 | | 66.7% | | | |
| | Seating | 5 | 3.9 | 0.84 | | 80.0% | 20.0% | | |
| | Security Cameras | 3 | 4.0 | 2.00 | | 100.0% | | | |
| | Signage | 4 | 4.0 | 1.60 | | 100.0% | | | |
| | Trash Receptacles | 5 | 4.0 | 0.40 | | 100.0% | | | |
| Passenger Parking Area | Curbs / drains | 3 | 4.3 | 0.67 | | 33.3% | | | |
| | Emergency Phone Kiosk | 1 | 4.0 | 2.00 | | 100.0% | | | |
| | Fencing | 1 | 4.0 | 1.20 | | 100.0% | | | |
| | Landscaping/grounds | 1 | 4.0 | 0.40 | | 100.0% | | | |
| | Lighting | 2 | 4.5 | 1.50 | | | | | |
| | Retaining Wall | 1 | 4.0 | 1.60 | | 100.0% | | | |
| | Security Cameras | 1 | 4.0 | 2.00 | | 100.0% | | | |
| | Sidewalks | 3 | 3.8 | 1.73 | | 33.3% | 33.3% | | |
| | Signage | 5 | 3.5 | 2.00 | | 60.0% | | | 20.0% |
| | Striping/markings | 6 | 3.2 | 2.27 | | 50.0% | 16.7% | 33.3% | |
| | Surface | 6 | 2.8 | 2.60 | | 16.7% | 33.3% | 50.0% | |
| Passenger Shelters | Canopy | 6 | 4.2 | 1.47 | | 66.7% | | | |
| | Lighting | 5 | 4.1 | 1.90 | | 80.0% | | | |
| | PA | 3 | 3.0 | 2.40 | | 66.7% | | | 33.3% |

# Three Views...Asset Level (Park and Ride Example)

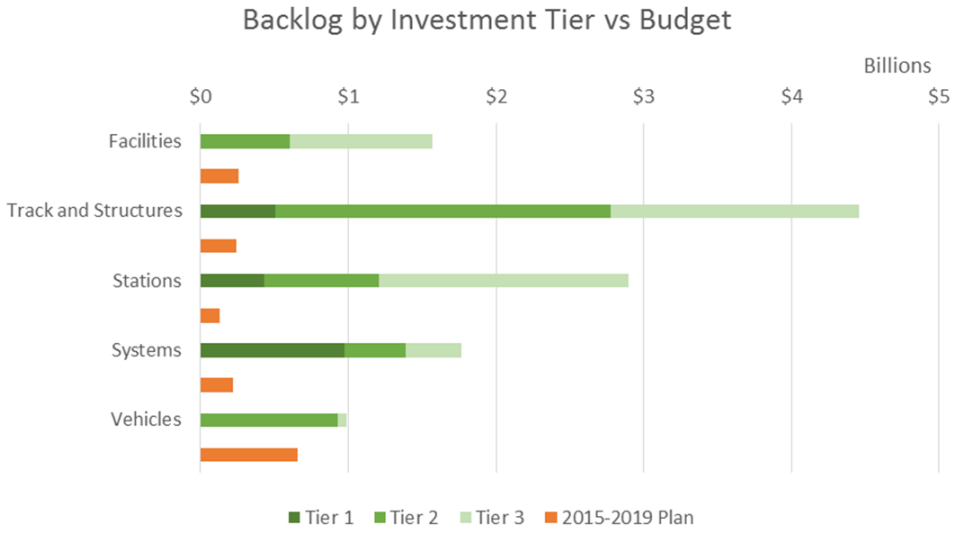
- Which specific assets?
  - Are needs concentrated in specific locations?
  - Which needs pose the greatest risk?
  - Detailed view valuable to asset managers

| | | Condition Distribution | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Group | Element | Excellent | Good | Adequate | Marginal | Worn | Risk Consq | Risk Score | Comment |
| **Hampton/ Boothe's Crossing** | | | | | | | | | Lease |
| Access | Surface | | | | | 1.5 | 4 | 3.60 | Accessway limited to two entrances to parking lot. Ashpalt; poor condition, weathered, near end of service life. |
| | Signage | | | 3.0 | | | 4 | 2.40 | One small GRTA sign on main road |
| Bus Lanes | Surface | | | | | 1.0 | 4 | 4.00 | Asphalt; poor condition, weathered, extensive cracks & alligatoring |
| Passenger Loading Area | Seating | | 4.0 | | | | 2 | 0.80 | 2-seat bench, aluminum, good condition |
| Passenger Parking Area | Surface | | | | | 1.0 | 4 | 4.00 | Ashpalt; weathered, extensive cracking, aligatoring, past its service life |
| | Striping/markings | | | 3.0 | | | 4 | 2.40 | Fair, observable; handicap symbols repainted in recent years |
| | Signage | | | 3.5 | | | 4 | 2.00 | Handicap parking only, one leaning |
| Passenger Shelters | Structure/frame | | | 3.0 | | | 3 | 1.80 | Half-barrel translucent panels; one panel missing |

# Backlog Prioritization and Performance Measures

# “Deconstructing” the Backlog

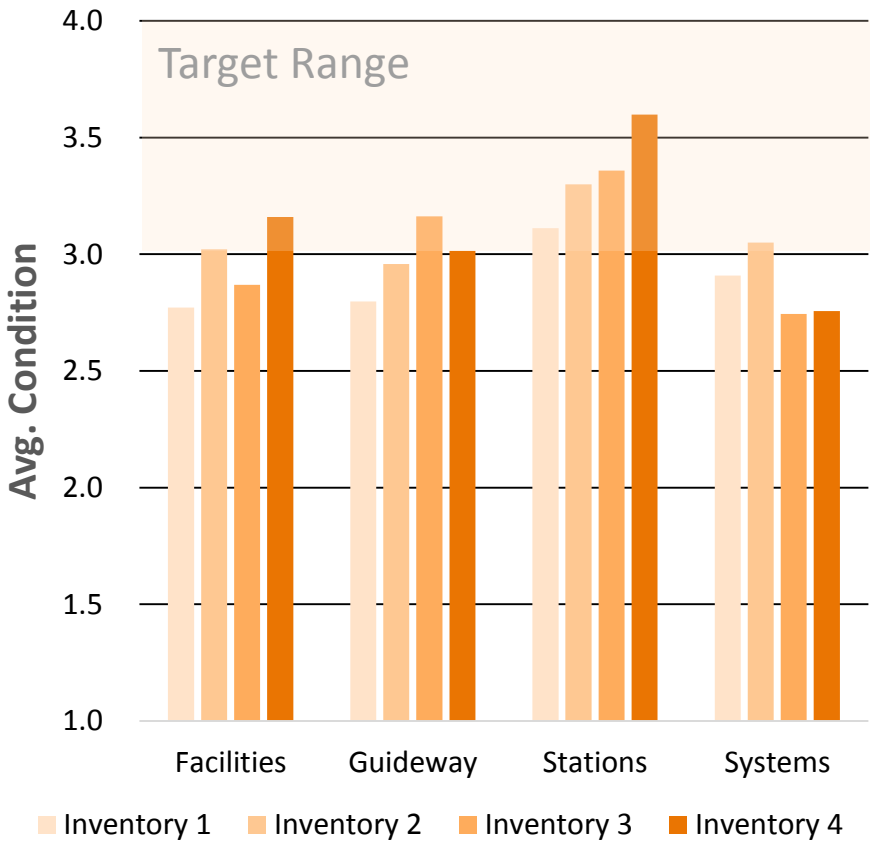
- Annual reporting of large, growing backlog numbers that significantly exceed existing funding capacity leads to stakeholder:
  - “Backlog fatigue”
  - Declining interest
  - Claims of “Chicken Little”
  - “Gloom and doom”



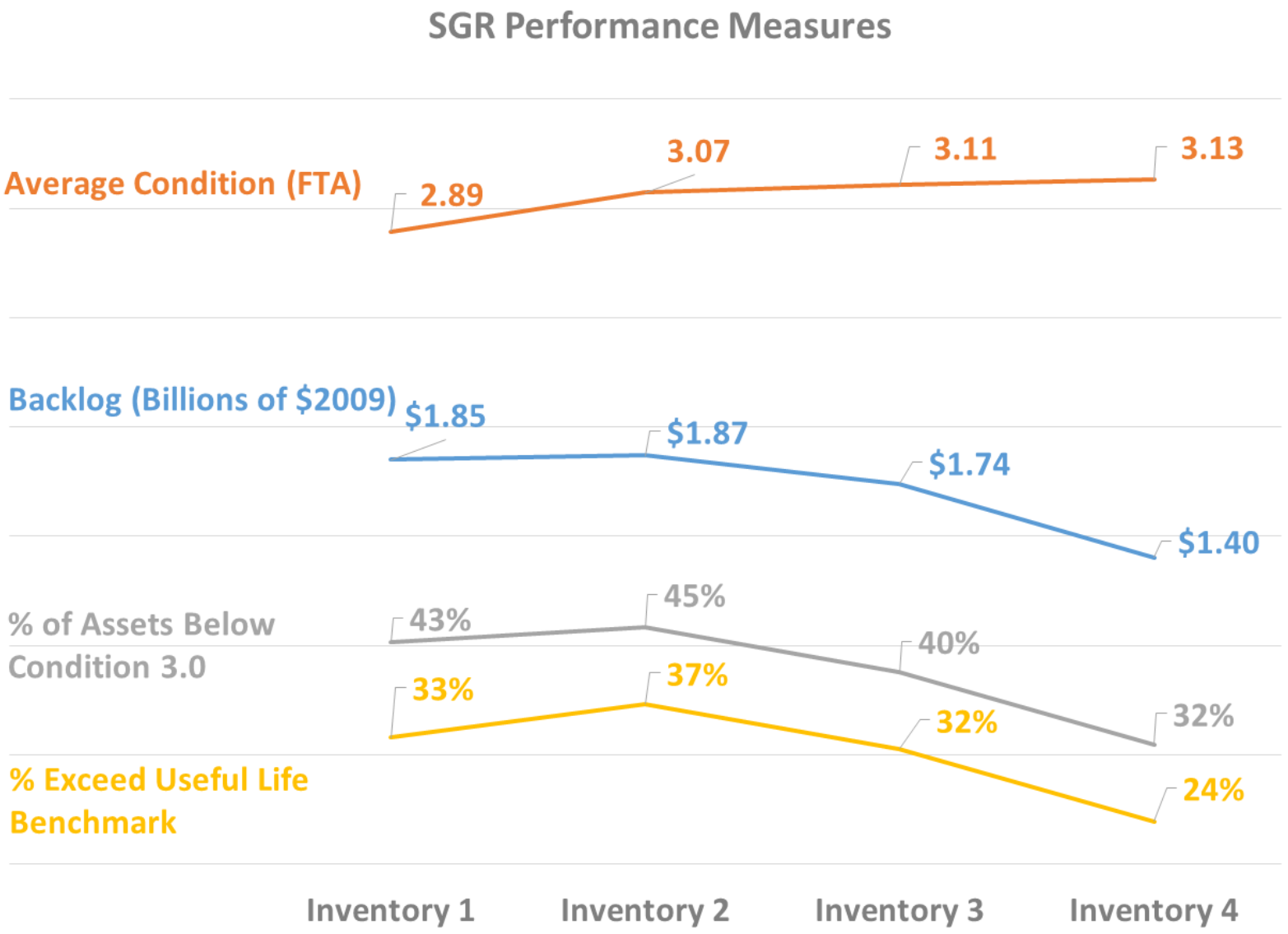

- Objective: Develop ways to assess, prioritize and report on the backlog that:
  - Maintain stakeholder interest
  - Provide meaningful understanding of backlog composition (what can we live with and what “keeps us awake at night”)
  - Makes mitigation of key backlog risks appear attainable

# SGR Performance Measure Caveats...

- Performance measures key to assessing:
  - Current status
  - Progress towards targets
- Many SGR PMs (e.g., backlog, condition) are really:
  - "Indicators" of performance"
  - Measure of financial need
- Important to ensure PM's calculations provide true "apples to apples" trend comparisons



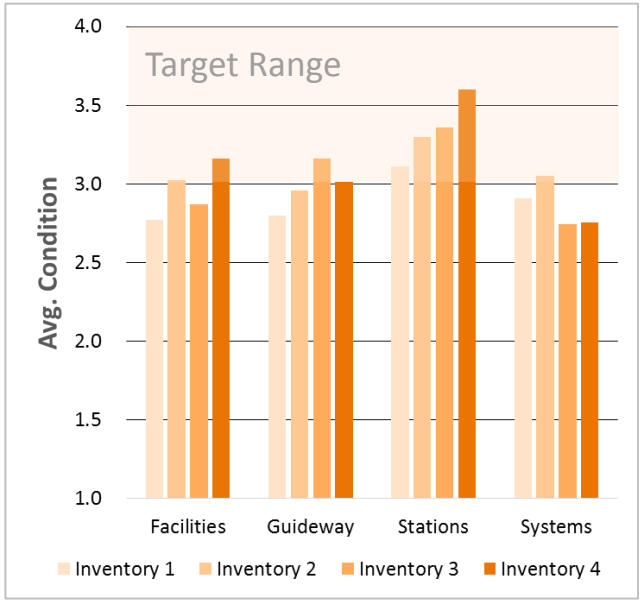
# What story do the PM's below tell?

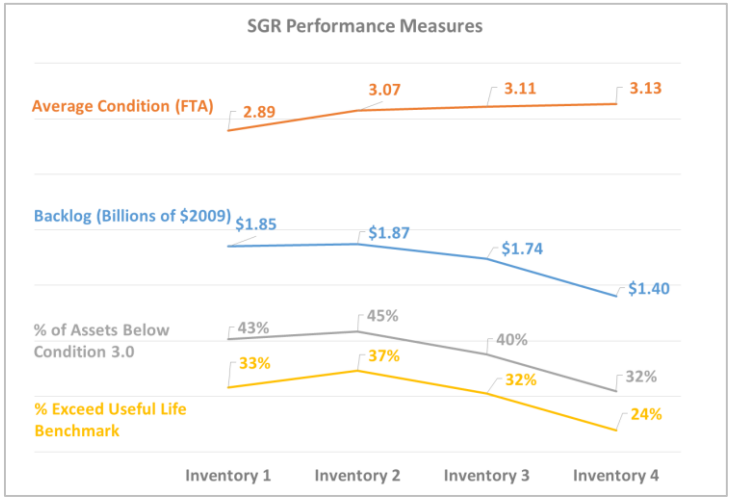


# Actual Story?....Changes in Inventory Data....

- Preceding charts are for operator with a significant funding gap:
  - TERM predicts operator is falling behind
- Chart trends mostly due to...
  - Ongoing inventory revisions / improvements
  - Revisions to useful life, unit cost, rehab requirement assumptions
  - Increasing asset detail (more records)
  - Changes in data sources
  - Some reinvestment

...Trend comparisons of aggregate PM's can be problematic (but can be managed with a little analysis)



# A Few Themes: Data collection is expensive so...

- Develop a data collection / maintenance plan:
  - Collect data to align with your decision making needs (and no more)
  - Ensure data value exceeds cost of collection
  - Develop long-term plan to maintain inventory data efficiently
- Ensure data value is fully exploited (mine your data!)
- Take care when calculating / comparing aggregate PM trends
  - Adjust for changes in costs, policies, level of detail...

# Questions?

**Rick Laver**
Transit Asset Management
CH2M Hill
703-946-5065
richard.laver@ch2m.com