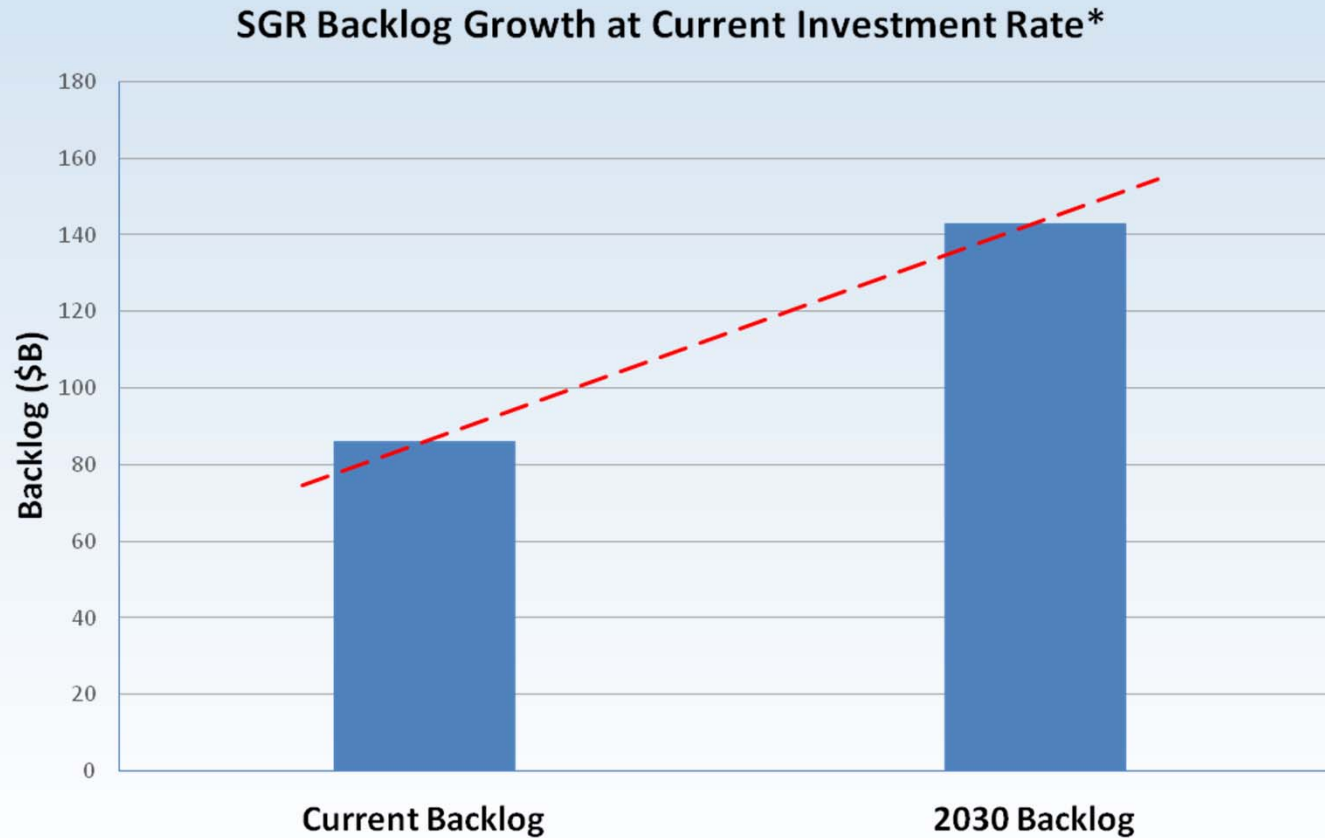


The State of Good Repair – Understanding and Applying it to Track and Rail Infrastructure

Martin P. Schroeder, P.E.
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Why We are Talking about SGR



* Based on FTA statistics in 2014.

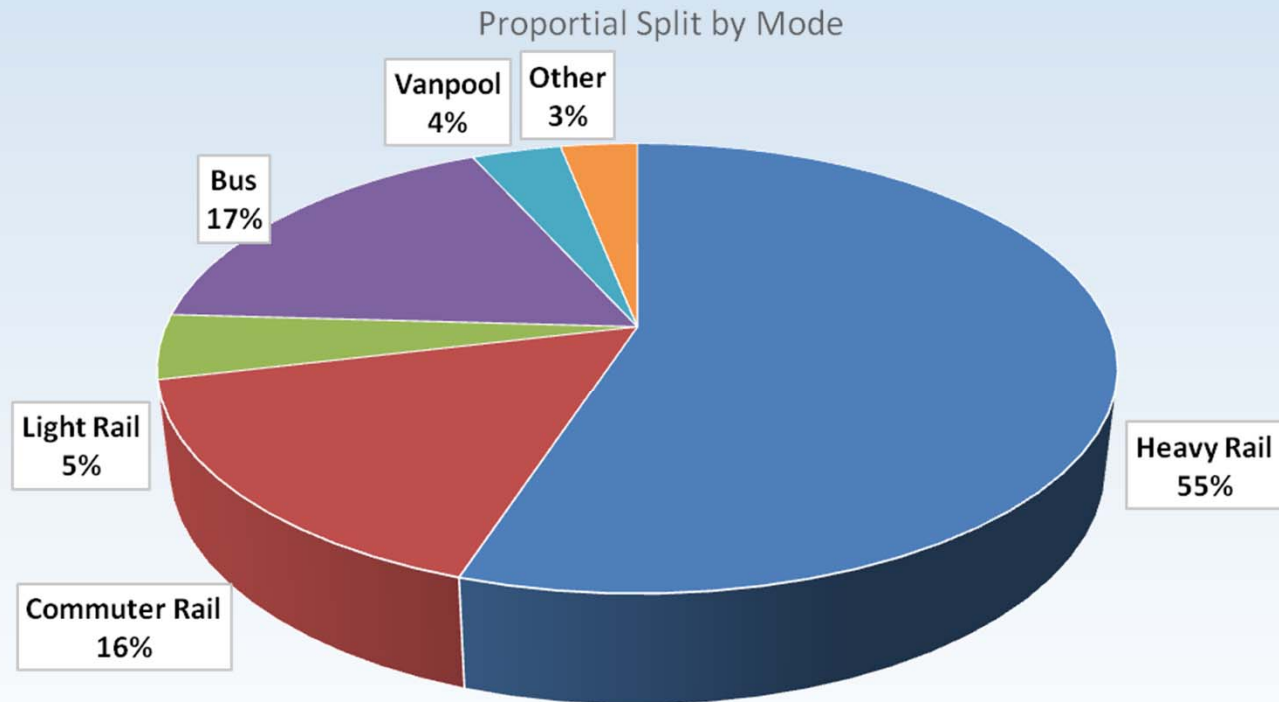


Funding Needed

- Current funding projects an added \$8.2B / year shortfall to eliminate backlog by year 2030
- \$18.5B / year needed
- Every year funding is less, increases time to eliminate backlog
- Funding at current levels results in annual backlog growth.
- **One third of transit assets are in marginal or poor state of repair AND track and structures classified as the asset type with the largest total value of marginal to poor assets.**



Modal Split in SGR Needs



** Based on FTA statistics in 2010.*



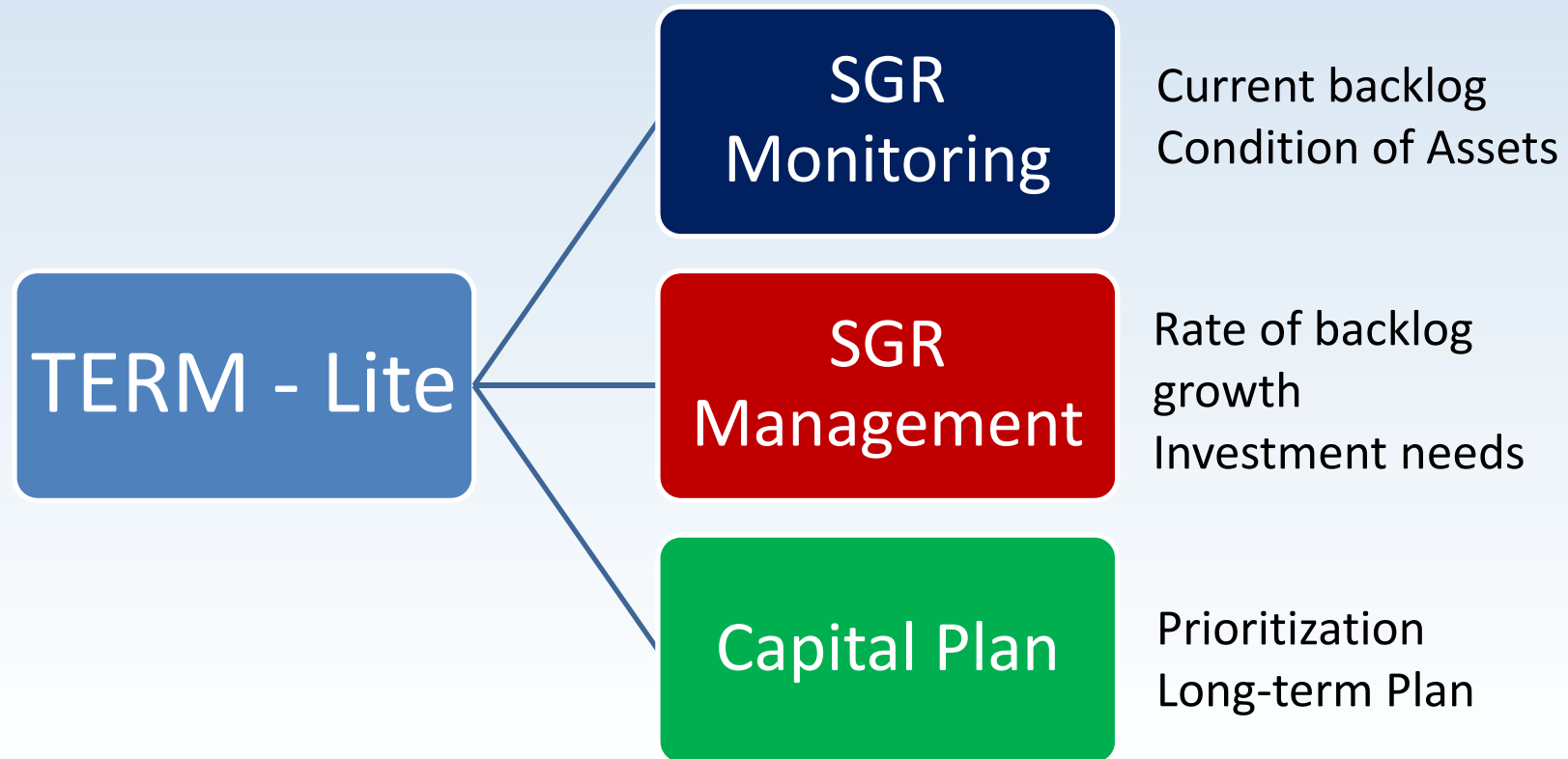
Evolution of SGR

- Industry experience
- FTA studies in 2006 / 2007 / 2010 / 2012
- FTA Tools – TERM Lite (2013) TAM 2012
- TRB Synthesis studies 2010 / Transit Asset Prioritization Tool 2014
- MAP-21 FTA Grant 2012
- APTA Recommended Practices 2013
- FTA ANPRM 2013 – APTA responded to 123 questions posed by FTA



TERM Lite (FTA)

Transit Economic Requirements Model



Foundations of MAP-21

- Includes SGR
- MAP-21 builds upon previous Federal laws
 - ISTEA
 - TEA 21
 - SAFETEA-LU
- Performance tied to funding
- Major piece of legislation expires in June 2015
- Continuing Resolution legislation likely



Elements of MAP-21

- Urbanized Area Formula
- Rural Formula Program
- Formula Grants for the Enhanced Mobility of Seniors and Individuals with Disabilities
- State of Good Repair Program
- Fixed Guideway Capital Investment Grants
- Bus and Bus Facilities Formula Grants
- Public Transportation Safety Program
- Transit Asset Management
- Planning and Performance Management – States
- Public Transportation Emergency Relief Program
- Research, Development, Demonstration and Deployment Projects
- Technical Assistance and Standards Development
- ...



Elements of SGR

- Provides grants to finance capital projects to maintain fixed guideway public transportation systems in a state of good repair.
 - \$2.1B FY2013
 - \$2.2B FY2014
- Need a definition for SGR
(“A condition in which assets are fit for the purpose for which they were intended.”)
- Need for Transit Asset Management Plan



National Transit Asset Management System

- Define State of Good Repair including objectives and ways to measure / assess asset conditions
- Establish SGR performance measures and targets
- Develop Transit Asset Management Plan
- Report NTD data on asset inventories and assessed condition of assets.



Asset Categorization



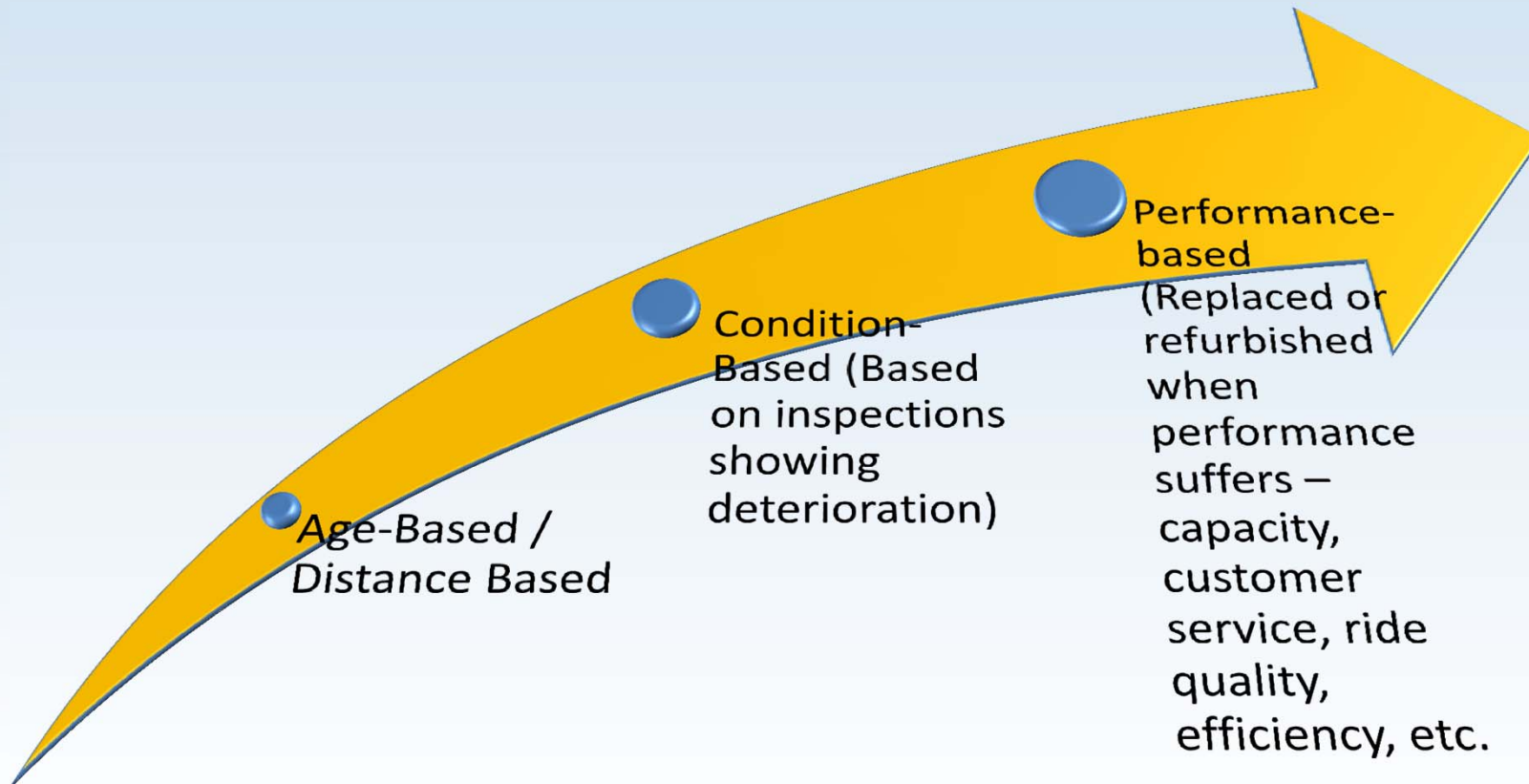
Top tier	Fleet	Facilities	Rail Guideway	Systems	Stations
Second tier	revenue coaches	Property (rail repair facility)	line	signaling	Hawthorne Station
Third tier	All coaches within a production group	building (service building)	tracks	audible	escalator
Fourth tier	individual coach	roofs	Rail / wheel	relay	escalator motor
Fifth tier, etc.	Vehicle components (e.g., engine Cummins ISB)	adhesive system	Linear (station 02 to 03)		



Track segment defined by milepost, varying length, track feature, related wayside infrastructure, tonnage, vehicle use, etc.



SGR Approaches for Asset Assessment

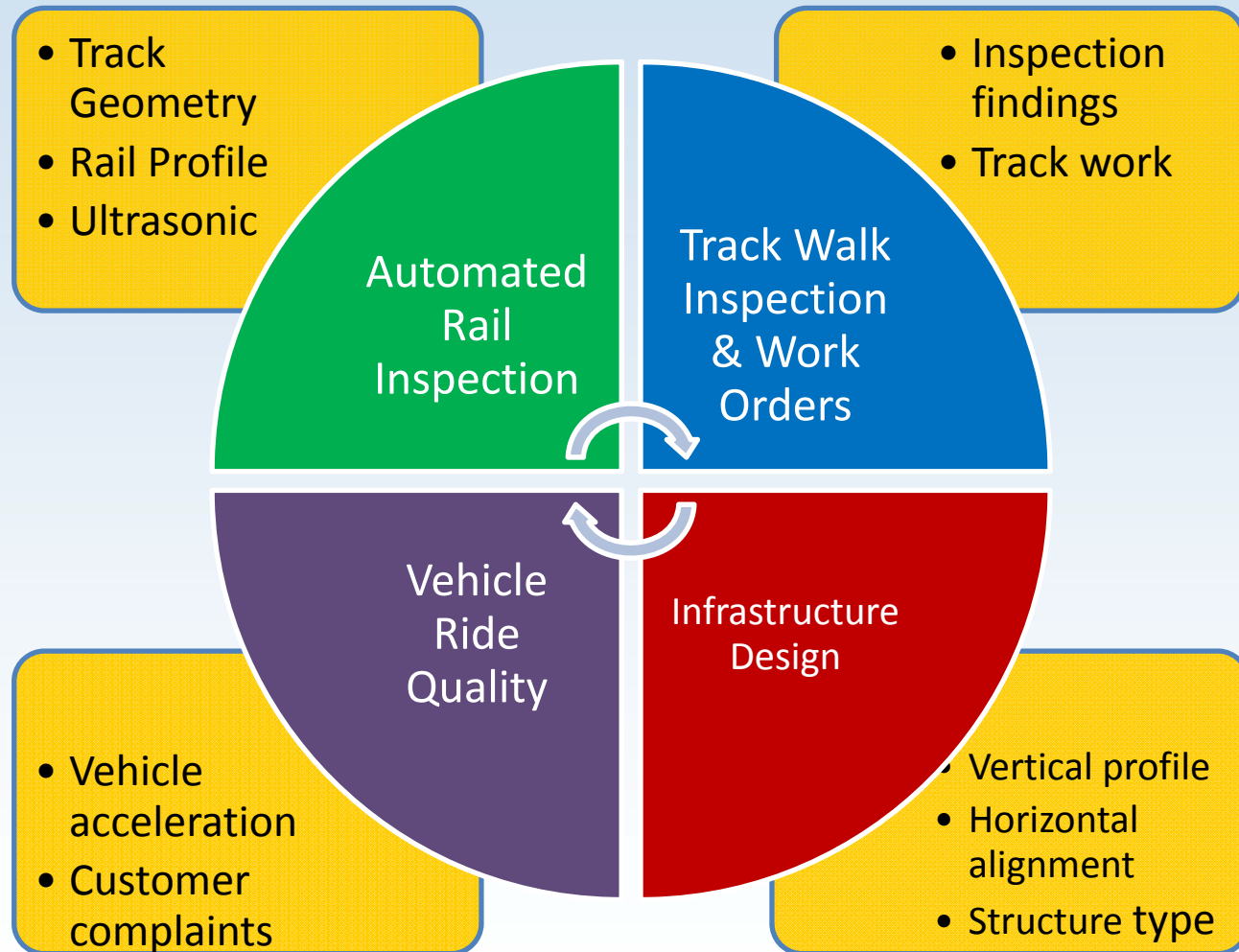


Performance Measures

- Maintenance cost per vehicle mile
- Percent of useful life
- Mean distance between failure
- On-time performance and capacity
- Customer service
- Noise and vibration / ride quality
- Asset condition and priority code
- Quantitative condition rating system
- Continuous Quality Improvement



Wealth of Track Data



Integrated Data is Key

- Integration of data is needed to help answer key questions from disparate data systems and to make decisions on needed actions. For example:
 - Replacement and work history
 - Rail head wear rate
 - Gage variation
 - Conicity
 - What work can be done while addressing other issues to improve efficiency and reduce costs?
- Many agencies developing or installing data integration technologies



Data Analysis Capabilities - Example

- Run-on-run automated rail inspection comparisons
 - Match data sets using feature identification algorithm to locate by position
 - Develop data filtering approach to smooth data to an appropriate level of fidelity, such as moving average (boxcar filter) of adjustable temporal scale
- Compute arithmetical difference between runs and examine rate of deterioration using an exponential decay $e^{-\lambda t}$
 - Correlate changes in rail and likely effect on wheel profile, ride quality and wear



Conclusions

- SGR is a big issue and will be a focus of our attention for the foreseeable future
- SGR definition in development – Awaiting NPRM
- Major funding and investment will be needed to eliminate SGR backlog
- Rail and track infrastructure are a major area in need of SGR
- Data integration will be key in managing any type of SGR for rail and wheel / rail maintenance
- Methods available for interrogating inspection data for rail and wheel



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