

Cross-Asset Optimization at
Colorado Department of Transportation

*Developing an Integrated System for
Managing Investments in*

***Intelligent Transportation Systems, Fleet,
Maintenance, Bridge, and Pavement***

Scott Richrath

Performance & Policy Analysis Manager

Colorado Department of Transportation

9th National Conference on Transportation Asset Management

April 16, 2012



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Cross-Asset Optimization at Colorado Department of Transportation

- About Colorado DOT (CDOT)
- Managing Multiple Asset Categories – *In Development at CDOT*
- Beyond Pavement and Bridges:
 - Maintenance Levels of Service
 - Fleet
 - Intelligent Transportation Systems
- Lessons Learned and Next Steps:
 - Know Your Audience – Deal with the Black Box
 - Real Estate (Facilities)
 - Safety, Traffic, and Other Assets
 - Integrating with Enterprise Resource Planning (ERP) Software

Effective Asset Management

- ✓ Policy-driven
- ✓ Performance-based
- ✓ Analysis of options and tradeoffs
- ✓ Decisions based on quality information
- ✓ Monitoring provides clear accountability and feedback

Source: Asset Management for Sustainability, Accountability, and Performance



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TAM Guide Structure

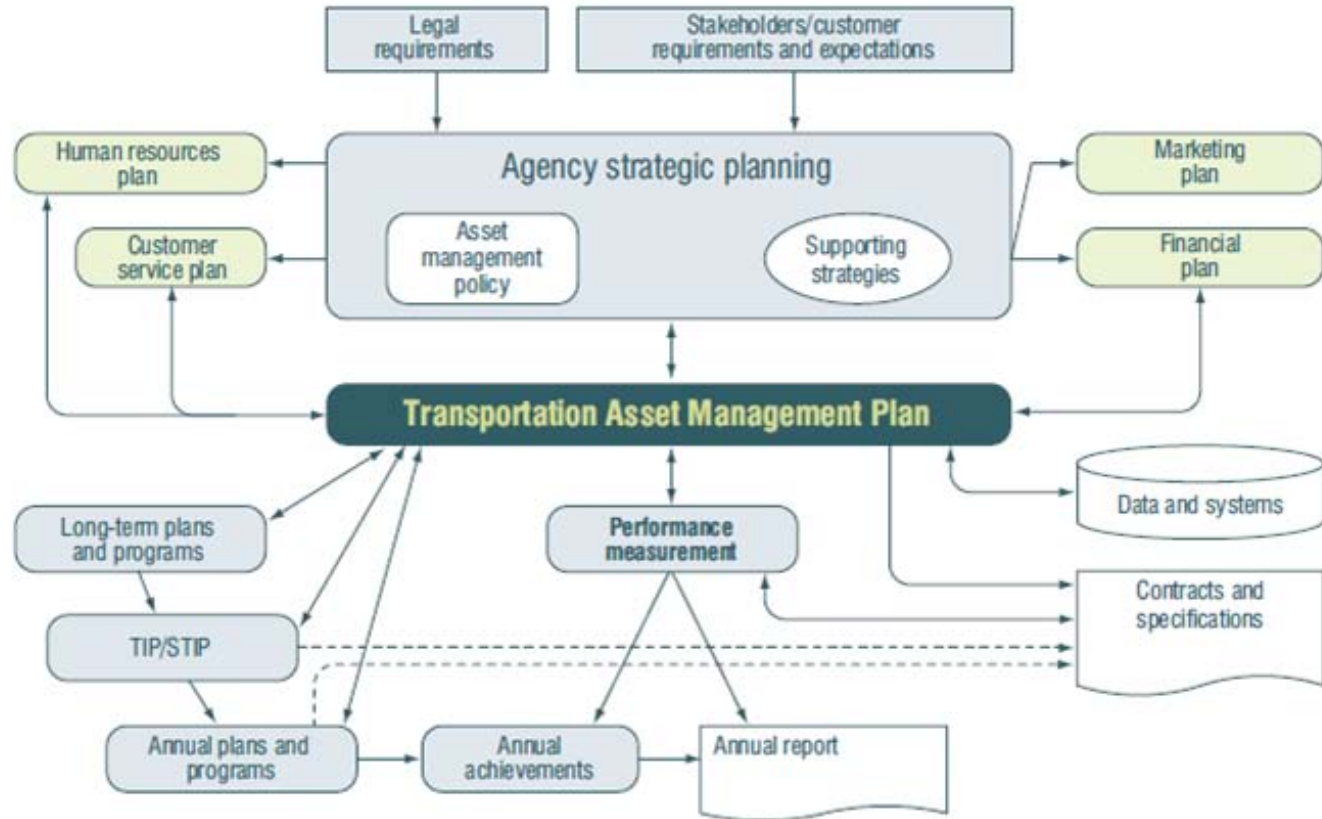


Figure 1-3. Asset Management Drivers and Relationships

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Managing Multiple Asset Categories



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Managing Multiple Asset Categories



Managing Multiple Asset Categories

Cross-Asset Optimization

- coordinates the management of several individual asset categories
- maximize the life and utility of interconnected assets

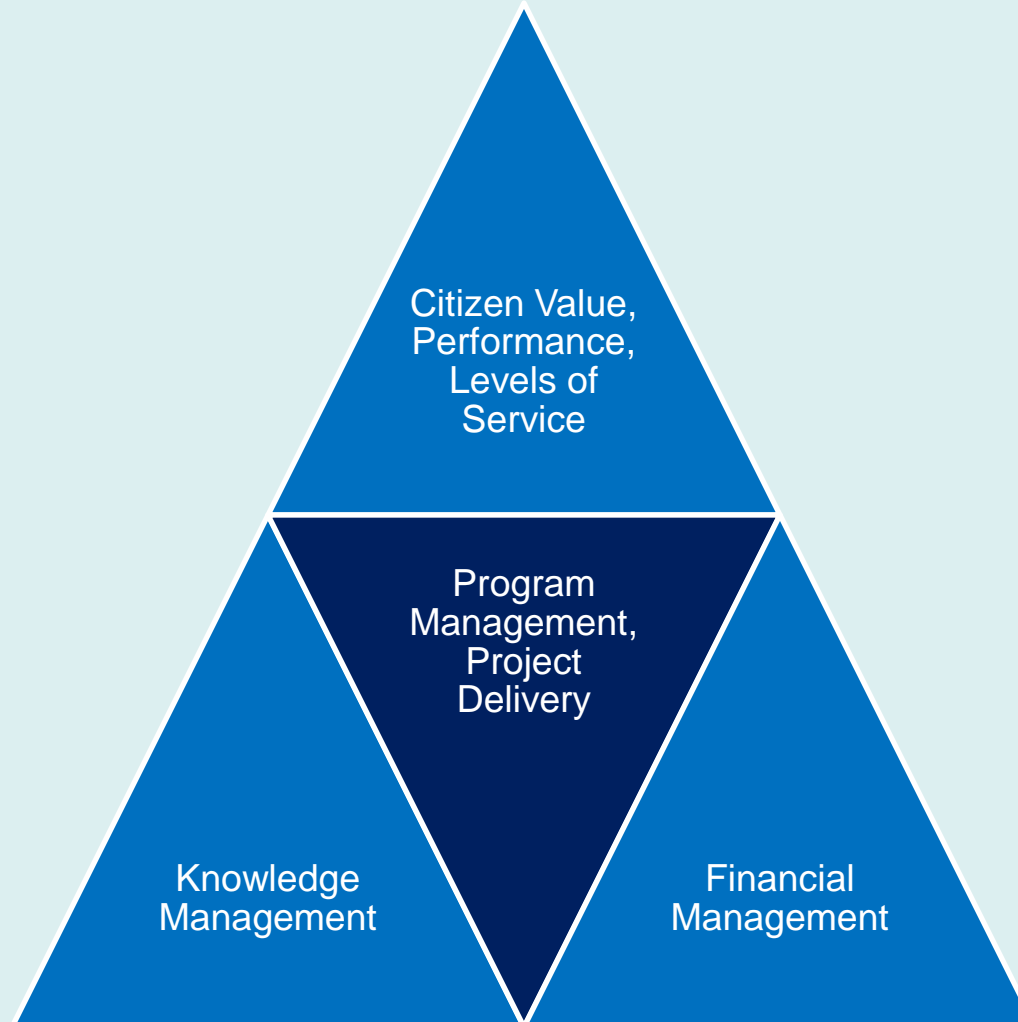
At a project level,

- coordinate pavement work on a bridge approach with bridge reconstruction
- cable barrier installation with a variable message sign posted in the median

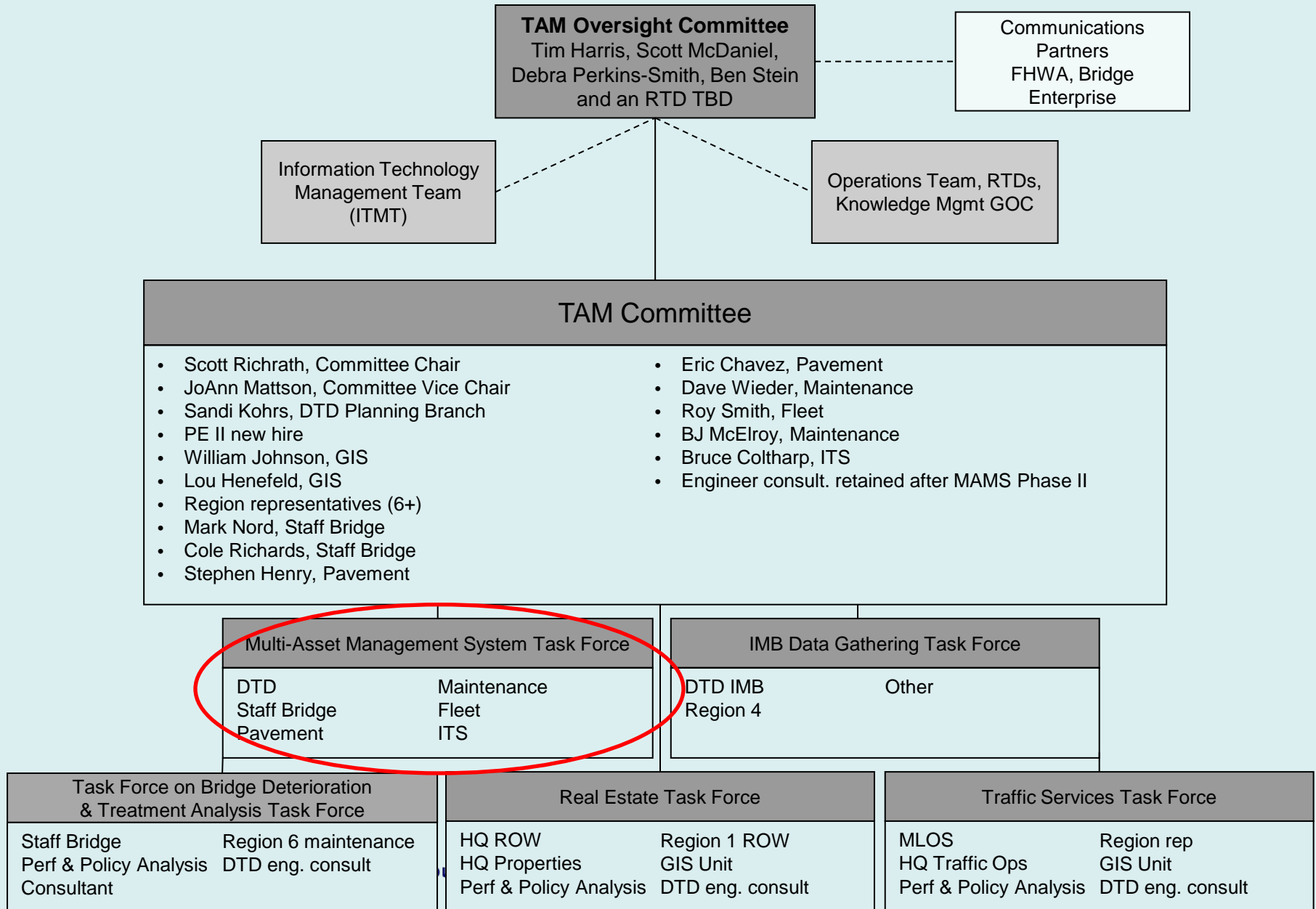
At a programmatic level,

- forecast the impact of investment decisions across multiple asset categories
- project asset condition at varying investment levels

CDOT Structure

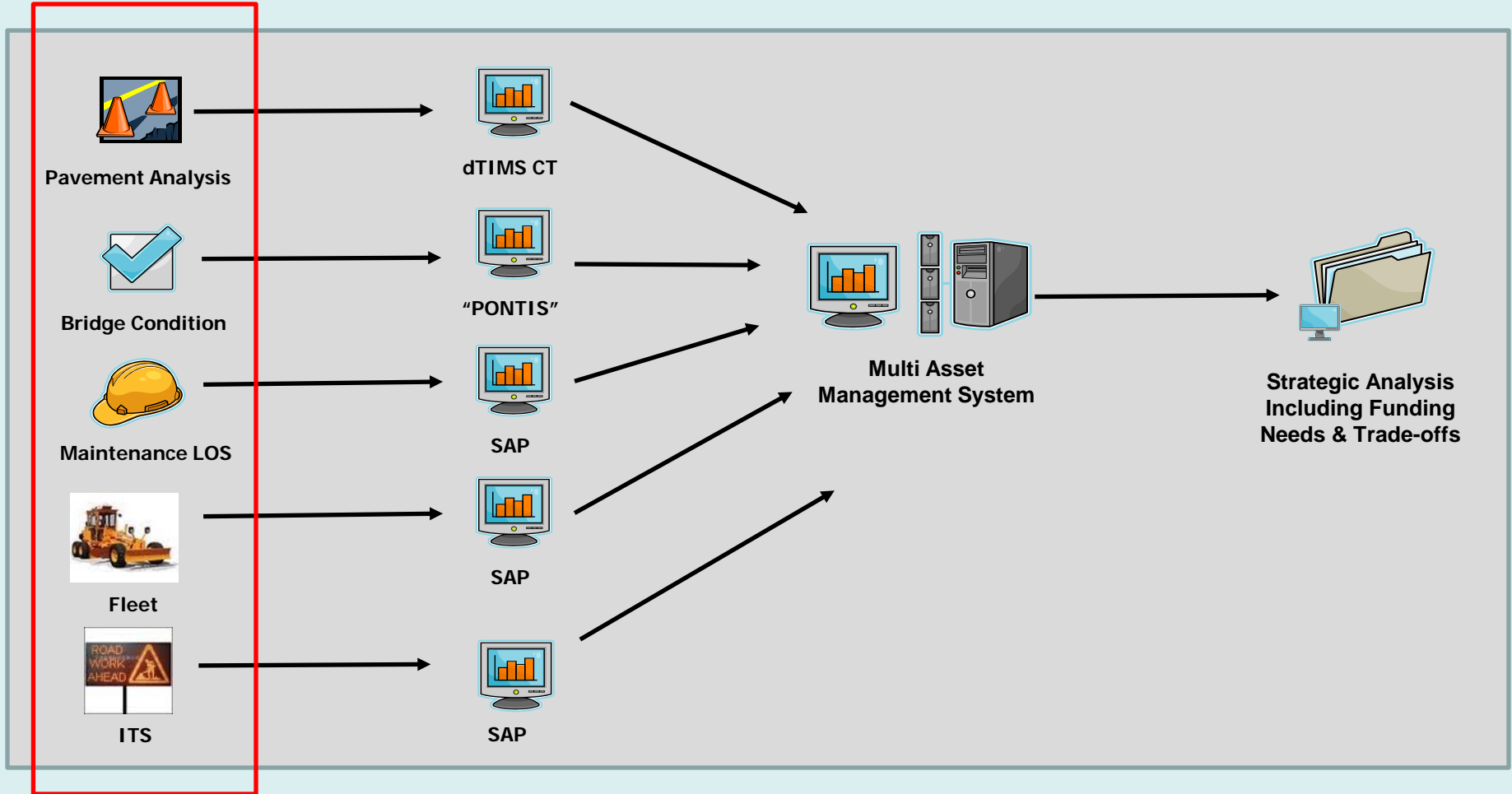


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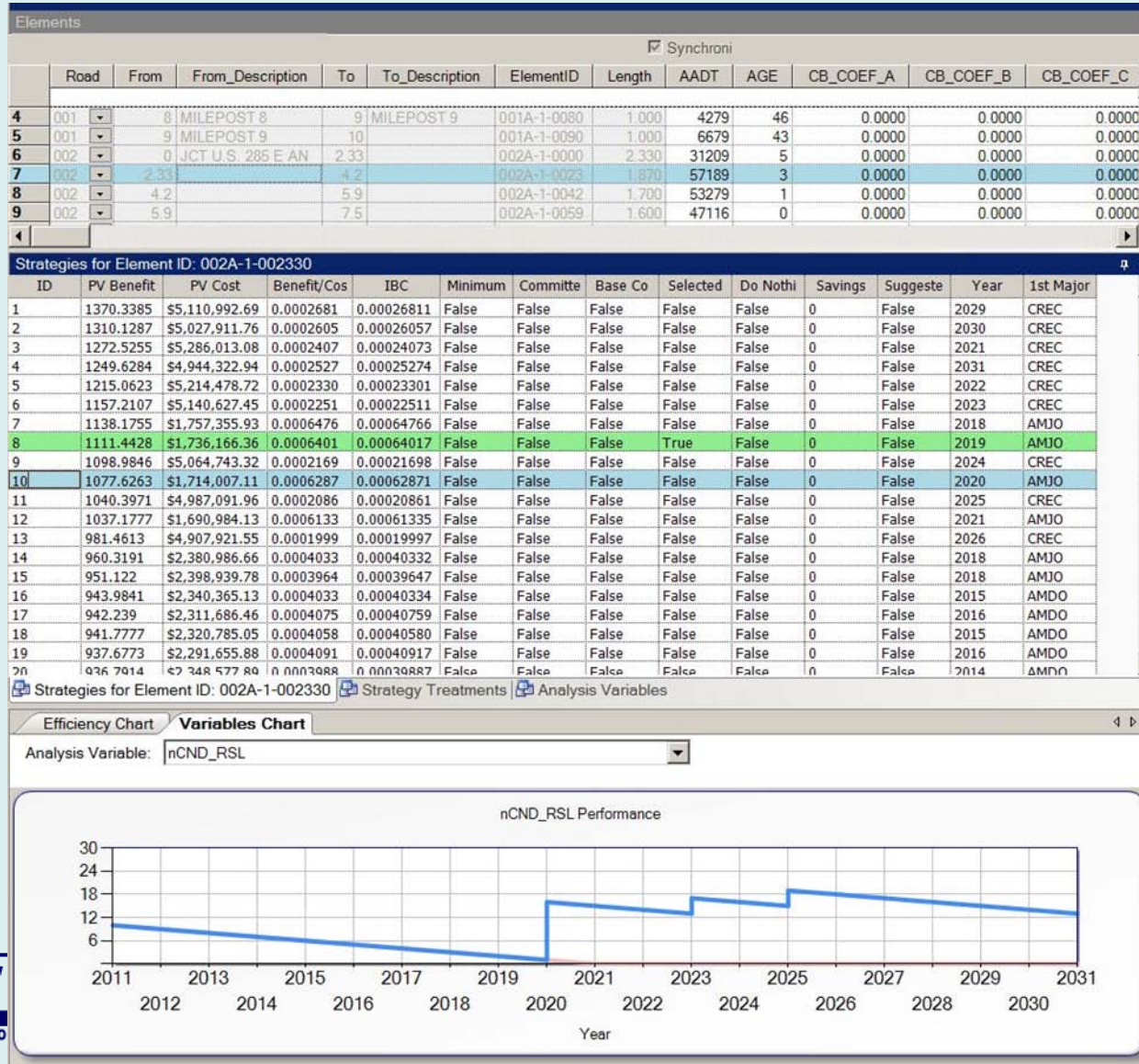
Managing Multiple Asset Categories



About 3,000 assets in each asset category.

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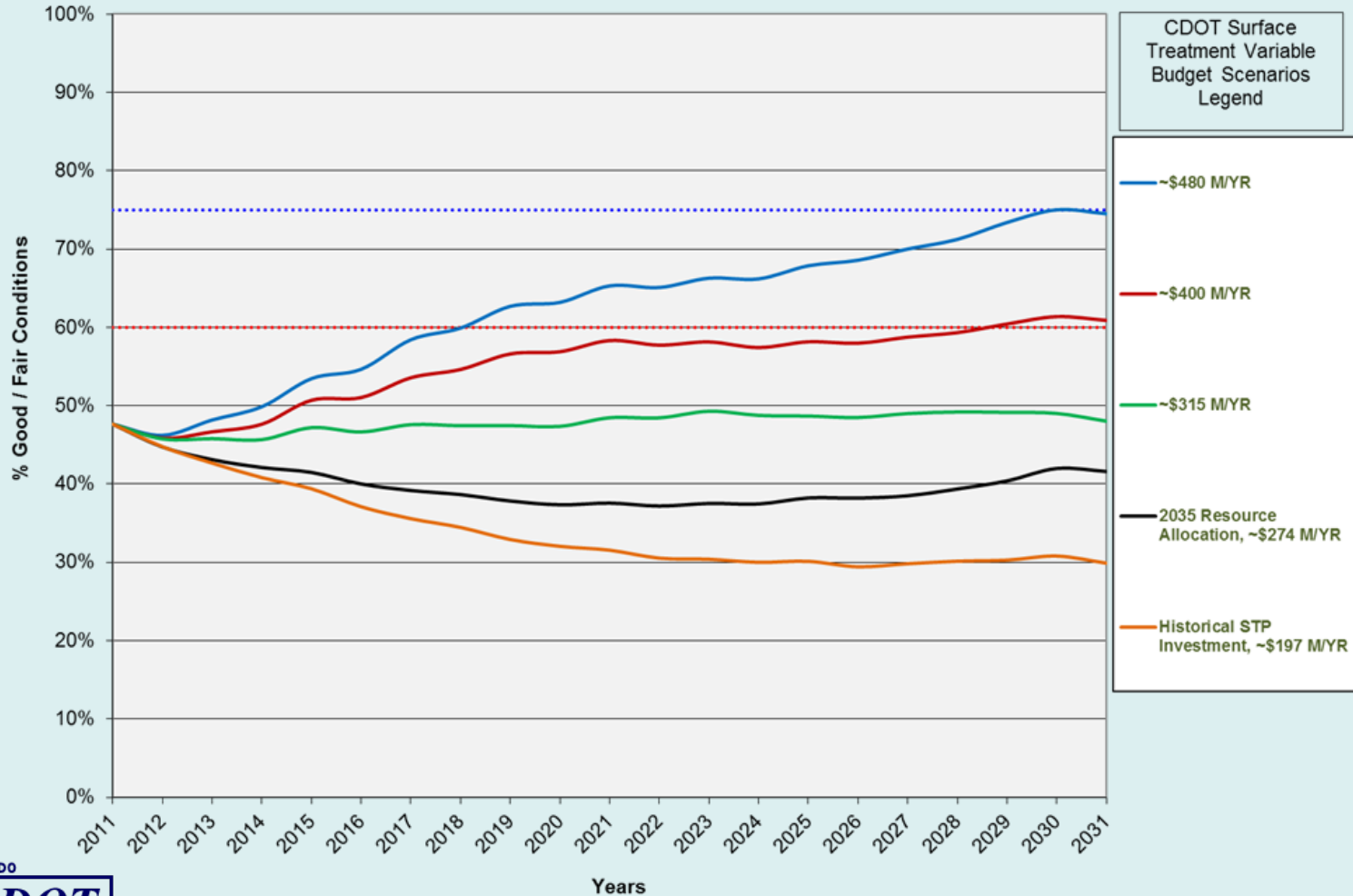
Life Cycle / Deterioration Curves...



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...provide Spending-Performance Forecasts

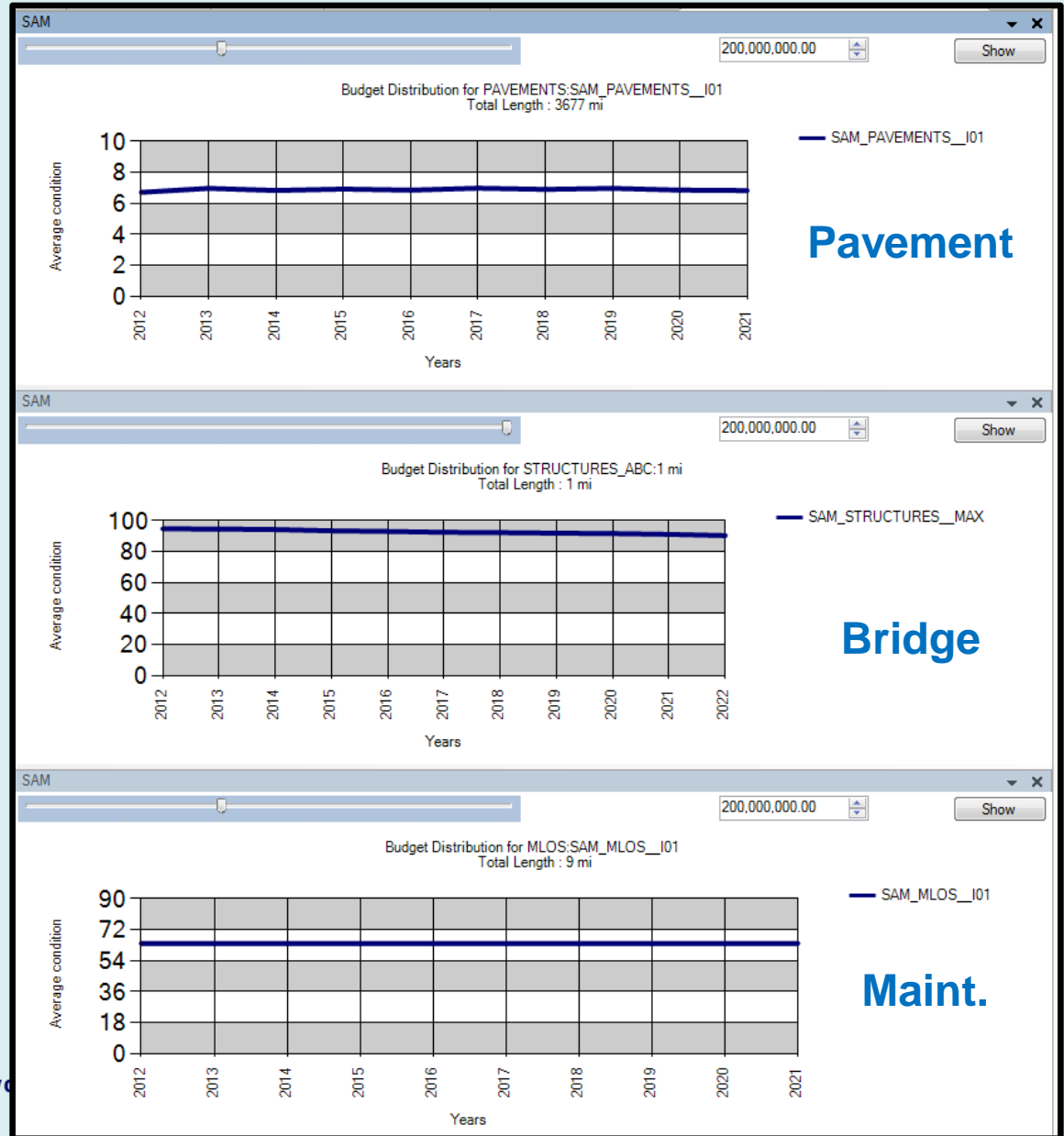
2011 20-Year Good/Fair Projections



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Multi-Asset Management System:
Integrated Analysis



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Maintenance Levels of Service

Home System: SAP

Annual Budget: ~\$242,000,000

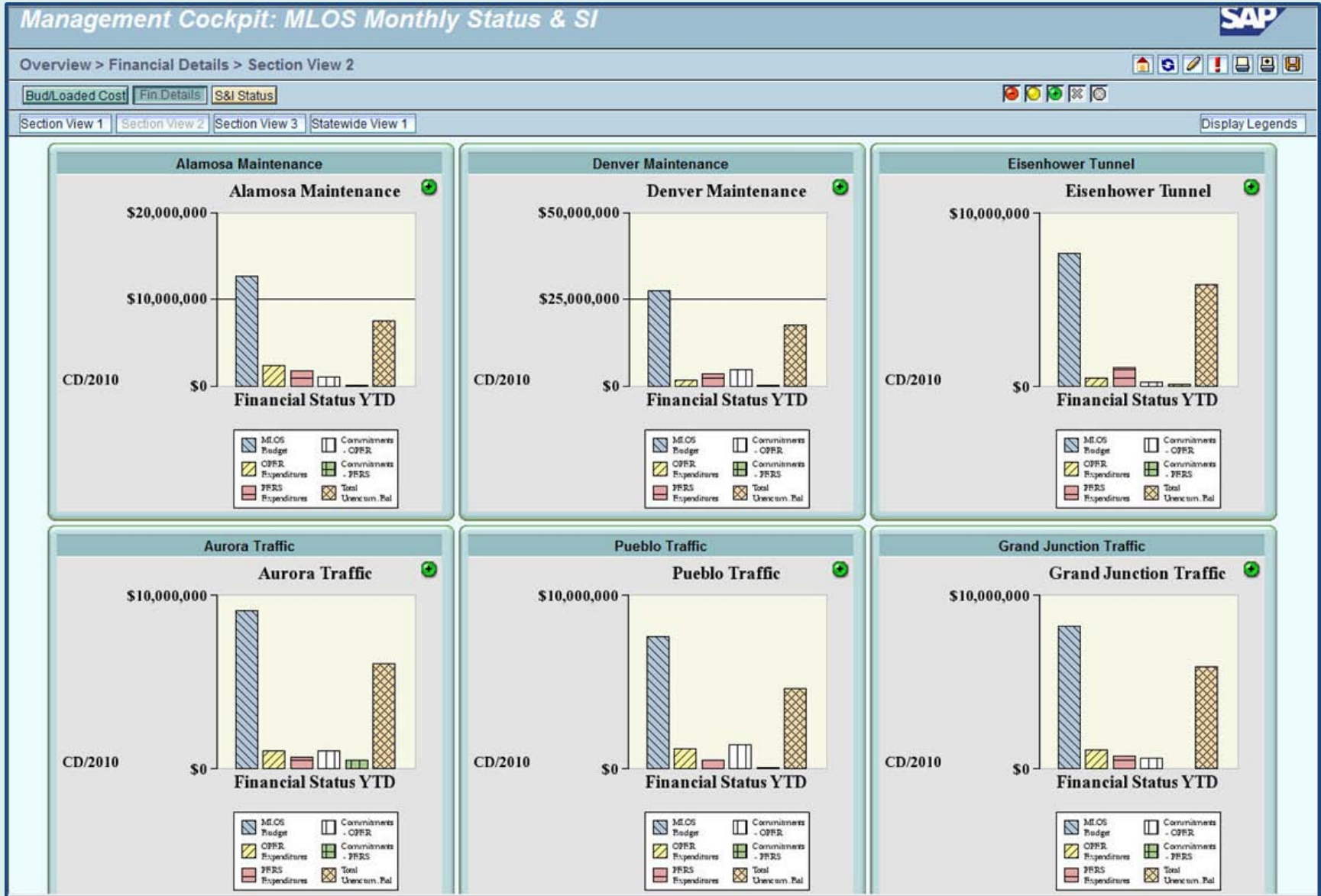
Performance Measure: Letter grade as evaluated by peer crews

MAMS “win:” Provide budget-performance and performance-budget analysis



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Maintenance Levels of Service



Fleet

Home System: SAP

Annual Budget: ~\$15,000,000

Performance Measure: % Expected Life per mfr. specs

MAMS “win:” Demonstrate benefit of reduced maintenance costs



Intelligent Transportation Systems

Home System: SAP

Annual Budget: ~\$15,000,000

Performance Measure: % Expected Life per mfr. specs

MAMS “win:” Seat at the table for annual budget setting



Lessons Learned

Know your climate and audience

- How do they define “Long Term?”
- View at the statewide level or the neighborhood street?
- Deal with the Black Box



Vs.

Performance Measure

- ✓ *Average Remaining Service Life*
- ✓ *Level of Service*
- ✓ *% Deck Area Good/Fair Condition*
- ✓ *% Down-Time*
- ✓ *% Expected Useful Life*

Next Steps

- Multi-Asset Management System enhancement
 - Facilities (HQ, maintenance sheds, etc.)



- Public Budget Formulation in ERP
 - Linking spending to asset performance.
- Data Collection for other assets (safety, traffic, maint...)
 - Developing business plan to maintain data.

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Public Budget Formulation in ERP

Order REAC 1800047210 Service-John Deere Loader#4323
Sys.Status CLSD PCNF NMAI PRC SETC TIME

Order REAC 00047210 Service-John Deere Loader#4323
Sys.Status CLSD PCNF NMAI PRC SETC TIME

Location data
MaintPlant 3001 Region 3 plant in Grand Junct.
Location
Room
Plant section
Work center R3S02P21 Section 02 Patrol 21
ABC indicator A Object A
Sort field

Account assignment
Company Code 1000 CDOT - HAA Denver
Asset 3000000353 / 0 LOADER - OVER 3 YD

Person responsible
PlannerGrp 2SS / 3001 Sec 02 Shop Suprv
Mn.wk.ctr R3S02P21 / 3001 Section 02 Patrol ...
Notifctn 90036167
Costs 0.00 USD
PMActType 458 Equipment MT...
SystCond. N Non Participati

Dates
Bsc start 01/04/2007 07:00 Priority
Basic fn. 01/04/2007 15:30 Revision

Reference object

Work durtn 4 H Number 1 Oprtn dur. 4 H
Person. no 0

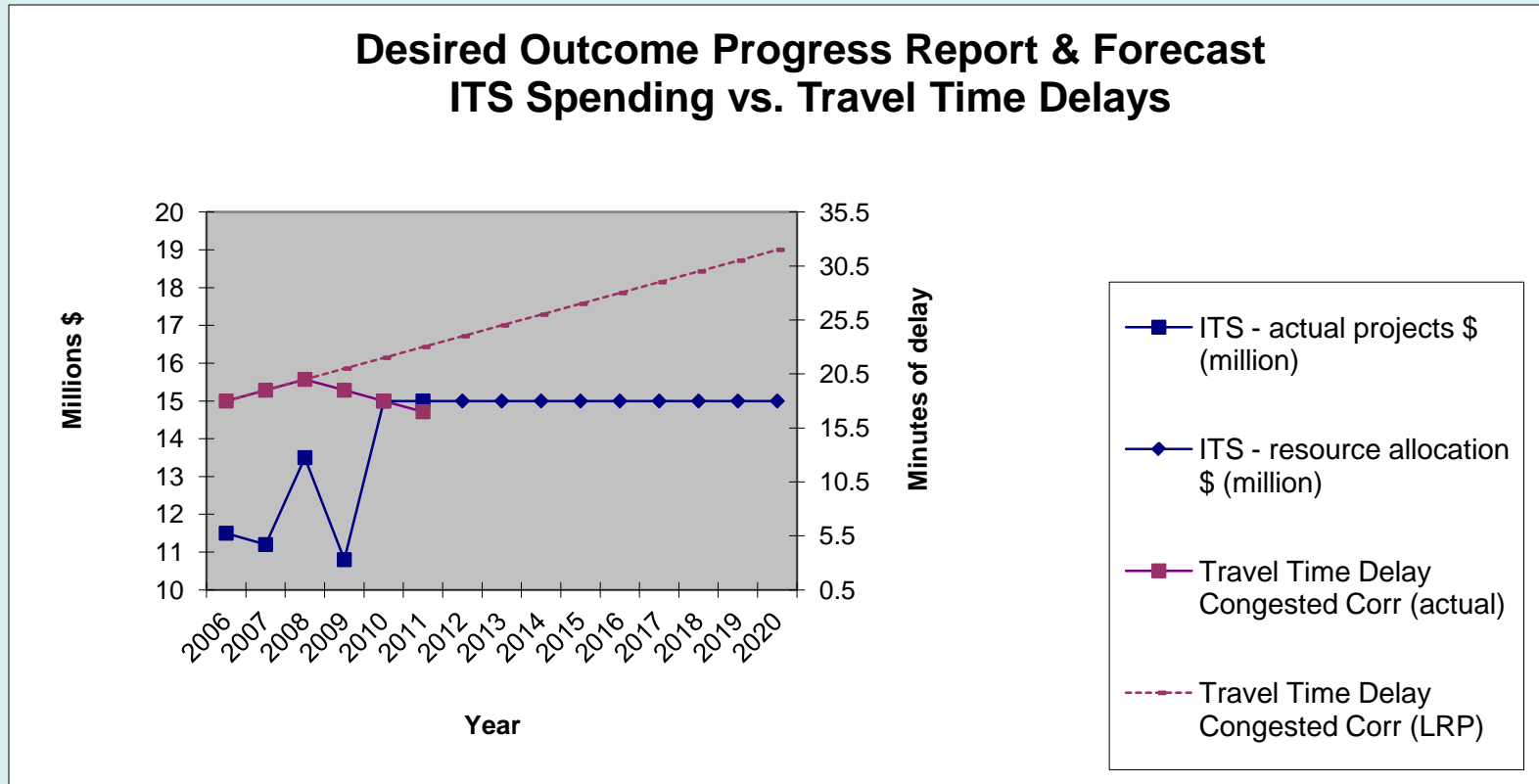
More than 50 fields are available (not required) in CDOT Maintenance Work Orders within Enterprise Resource Planning software.

(Prior to ERP, >50 legacy systems.)



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Public Budget Formulation in ERP



Fictitious Data

Data Collection

Owners / Originators

- Survey Unit – desktop or Document Management System
- Maintenance & Operations – ERP
- Environmental – desktop
- Transportation Development – GIS
- Bridge (culverts) – PONTIS, desktop

Other Users

- Traffic Safety – TS Assessment systems
- Access Management – desktop
- Design Engineering – CAD, desktop
- Others



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Data Collection

LiDAR



Point Cloud
Time of Flight
1.2m PPS
1cm - 10cm
1cm - 5cm
Day / Night

Photogrammetry



Color Image / Depth Map
Triangulation
27m PPS (equiv)
30cm - 1m
2cm - 10cm
Day

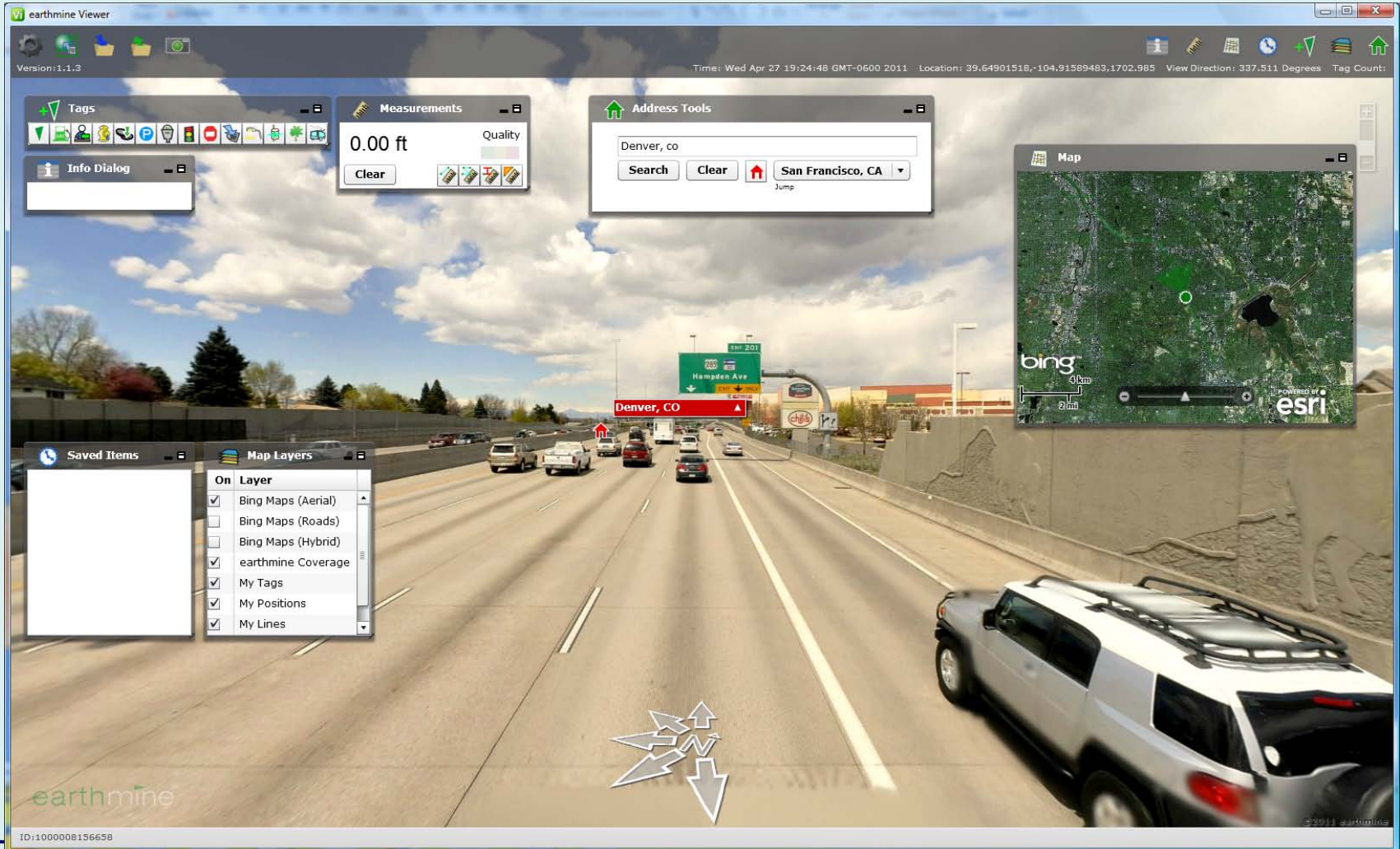
Photo/Video Log



Color Image
(Approximate)
N/A
10m+
N/A
Day

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Lots of Assets. Lots of Data.



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