Transit Asset Management
11th National Conference on Transportation Asset Management

Moving the Dial – Realizing the Benefits of Asset Management

10:00 to 11:30 am
July 12, 2016
Moving the Dial – Realizing the Benefits of Asset Management

Successes, Challenges and What’s Next?

Planned Maintenance Percent Complete

Labor Utilization

Month 12 Month
Moving the Dial –
Realizing the
Benefits of
Asset Management

Successes, Challenges and What’s Next?
Q & A from the Front Lines

- David Rose, PhD, Gannett Fleming
- Collette T. Ericsson, P.E., LEED A.P.,
  MTA Bus & New York City Transit Dept. of Buses
- John McCormick, BART
- Mike Hubbell, Dallas Area Rapid Transit
- Lou Cripps, RTD
- Paul Edwards, UTA
- Satyen Patel, MBTA
Just over 2 years ago, at the TRB 10th Conference on Asset Management, April 25, 2014, I presented a paper titled “Lessons Learned Implementing the FTA Transit Asset Management Guide.” The paper concluded that the path to improved asset management maturity is through the heavy lift foundational work that puts in place enterprise wide management systems (business and technology) that address the fundamentals. This is because technology enabled business change is key. It provides the data and tools for basic asset management, reliability engineering, and performance management. The graphic below (taken from the presentation) stands and is reinforced by the transit industry’s experience since then.

Basic Asset Management Maturity Requires EAM System (Business and Technology) that Address

- Asset hierarchy
- Location hierarchy
- Maintenance data, Failure data
- Asset registration, Asset inventory
- Condition Inspection and Performance data
- Work order management
- Maintenance crew scheduling
- Fault management
The challenge today is that our asset management improvement work needs to focus on outputs – meaning what will be different as a result of implementation and outcomes – meaning how agency performance and the customer experience will be changed. These outputs and outcomes are the benefits we realize from improved asset management practice. The intent of this panel is to jump start that conversation.

• In the two years since the last TRB asset management conference we can add the experience of 1) agencies that have made steady progress improving their “basic asset management” 2) others that have established asset management improvement programs that they are now advancing.

• We know that with the right approach and investments, there is great opportunity to improve agency performance. With the enactment of the MAP-21 requirements and, their implementation through the forthcoming FTA Rule, transit agency management has a galvanizing mandate to improve asset management. The timing is right to prioritize asset management investments and improve the state-of-practice.
Asset management improvement takes place in a very fragile environment. The operating environment is fragile for the very reasons that improving asset management is so important; aged infrastructure, under investment in maintenance and modernization, labor force transitions, and for some heavy ridership growth. It can be really difficult to stick to a PM schedule if there is so much continuing Corrective work required because the assets are old and failing. The policy and management environment is fragile we are under the gun to deliver results quickly. Our slow pace of change is compared to other industries and transit agencies have many equally important competing budget priorities.

The resulting situation for improving asset management maturity is one that can be akin to “flying the plane while we are building it.” We address operational continuity – meeting the schedule as published – while implementing far reaching people, process, and technology changes that will improve service delivery. Agencies have to stay the course. Key to accomplishing this is focusing on results and how our efforts are moving the dial. That is the focus of this panel paper.
Greatest Risks to Asset Management Improvement Programs

Risk 1 – Implementation Requires a Multi-Year Sustained Effort
Implementation requires a multi-year sustained effort of business and technology change across multiple functional areas. Can result in benefits taking many years to be realized.

Risk 2 – Focusing on Federal Compliance
Focusing on Federal Compliance, Preparing the Plan versus Asset Management Outcomes. Approaching Asset Management from a compliance mindset can detract from the fundamentals which are to align the performance of the assets with improving agency performance. Can take our eye off moving the dial – improving outcomes.

To Manage these Risks: Align implementation with value. Focus on how we move the dial. Tell the story.

- To manage risk to our asset management improvement program we need program management to focus on outputs – meaning what is different as a result of the implementation and outcomes – meaning how the performance of the delivery of service as experienced by the customer has been effected. These outputs and outcomes are the benefits we realize from asset management. The intent of this panel is to advance that conversation. The panel observations are not based on theory but from experience driving the foundational improvements that are prerequisites for moving the dial.

- Focusing on moving the dial addresses the two greatest risks as I see them to transit asset management improvement.
Recognizing the Multi-Year Implementation Timeline and Managing It

- We need to structure this timeline so that we realize benefits and show how we are moving the dials as we implement.

- We know that for our transit agencies implementation of basic enterprise asset management maturity alone can take 5+ years. I am including implementation planning, data capture and cleansing and other change. BART, MARTA, WMATA among others are many years into their implementations. We have a growing body of experience to draw on. The lengthy timeline is because implementation is not simply a matter of implementing a system but populating that system with data and using the technology to enable process changes that result in data-driven maintenance and capital planning, prioritization. These are the building blocks which then allow us to consider the whole lifecycle in our asset creation and delivery.

- Reviewing the lessons learned across different agencies, it is clear that the process of doing gap assessments and preparing implementation plans can be simplified and streamlined. My view is that in a matter of months an engaged agency can chart its desired end state and target states 3 to 5 years out. We can then clarify and specify the benefits – how the dial is moved when these target states are reached. This provides the basis for defining the improvement program and moving quickly into implementation planning and budgeting.
Panel Context
– Realizing the Benefits of Asset Management

Focusing on Moving the Dial

- The promise of asset management – improved reliability, reduced lifecycle cost, and reduced safety risk is great. For many, the benefits are self evident. The management challenges we face are that the implementation price tag is high in terms of: budget, pain experienced by front line employees and their supervisors, and leadership bandwidth consumed. Benefits don’t flow until something is implemented and this can be a number of years into the future.

- Getting results and realizing benefits as we put in place the building blocks for mature asset management presents one of the greatest challenges we face.

- In the following graphics we illustrate some ways to align managing implementation with results and moving the dial.
### The Promise: Significant Long-Term Benefits

<table>
<thead>
<tr>
<th>Business Scenario</th>
<th>Key ROI Data Points</th>
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<tbody>
<tr>
<td>Labor Utilization</td>
<td>Up 10 - 20%</td>
</tr>
<tr>
<td>Asset Availability</td>
<td>Up 3 - 10%</td>
</tr>
<tr>
<td>New Equipment Purchases</td>
<td>Down 3 - 5%</td>
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<tr>
<td>Warranty Recovery</td>
<td>Up 10 - 50%</td>
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<tr>
<td>Inventory</td>
<td>Down 20 - 30%</td>
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<tr>
<td>Inventory Carrying Costs</td>
<td>Down 5-20%</td>
</tr>
<tr>
<td>Material Costs</td>
<td>Down 5 - 10%</td>
</tr>
<tr>
<td>Purchasing Costs</td>
<td>Down 10 - 50%</td>
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Source: Gartner Group Report: G00122453
Each agency has a different starting point. Look your baseline, see where the opportunities for moving the dial are. Target those in your implementation early on. Demonstrate results

<table>
<thead>
<tr>
<th>Moving the Dial Through Basic Asset Management – Selected Examples</th>
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<tbody>
<tr>
<td>Reduce employee overtime cost through eliminating rework, labor and downtime through better planning</td>
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<tr>
<td>Increase in maintenance productivity</td>
</tr>
<tr>
<td>Reduce contracted maintenance cost through more efficient planning and oversight</td>
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<tr>
<td>Reduce inventory levels</td>
</tr>
<tr>
<td>Reduce cost of overtime for unscheduled service and unscheduled maintenance through improved reliability and availability</td>
</tr>
<tr>
<td>Reduce claims expense through better identification of and response to hazards</td>
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<tr>
<td>Improved warranty recovery</td>
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Panel Context – Alignment With Your Agency’s Strategy & Business Objectives

BUSINESS OBJECTIVES
- Reliability
- Reduce Lifecycle Cost
- Reduce Safety Risk
- Improved Customer Experience

BENEFITS DRIVERS
- Increased Customer Satisfaction
- Enhanced Regulatory & OEM Relationships
- Improved Safety / Lower Risk
- Increased Asset Availability / Service Reliability
- Increased Labor Productivity
- Reduced Material Costs
- Reduced Service Costs
- Reduced SGR Need
- Reduced Facility SGR Needs
- Links Capital to Maintenance
- Lower Lifecycle Costs

ASSET MANAGEMENT OUTCOMES
- Increased asset availability and greater in-service reliability
- Maintenance effectiveness/reliability centered maintenance
- Increased asset life
- Reduces lifecycle costs
Transit Asset Management Objectives

- Improve service reliability
- Reduce total cost of ownership
- Reduce safety risk
- Improve the customer experience
Our Panel Focus

Moving the Dial

The Questions

1. What Asset Management Results are Your Agency Managing to?
   • 12, months, 24 months, Next 5 years
2. What are Your Top 3 Successes - Measured by Business Impact?
3. What are Your Barriers to Moving the Dial? How Are You Addressing Them?
4. What is Next? How Can We Add Value and How Long Will It Take?
• Collette T. Ericsson, P.E., LEED A.P., ENV SP, CRL
  • Chief Sustainability Officer & Enterprise Asset Management Lead
New York MTA has nearly $1 trillion in capital assets

- 5,700 buses
- 74 shops/yards/depots
- 9 road bridges & tunnels
- 2,393 commuter fleet
- 713 stations
- 6,465 subway cars
- 2,078 miles of track

- 350 power substations
- 1,322 miles of 3rd rail
- 291 pump rooms, etc…
What Asset Management Results are Your Agency Managing to?

- In 2014-15, we performed a Gap Assessment against 1) ISO 55000 and 2) a well-established Reliability-Based Maintenance Maturity Continuum. Using this, we charted a master plan or roadmap for improvement. How fast we mature depends on the commitment of senior management, the buy-in from our workforce and the level of resources we apply to improving our asset management.

- From now till the end of 2017, we are a) building our maintenance planning capabilities, b) training staff in the application of reliability tools and techniques, c) applying reliability-based maintenance to critical systems of our bus fleets and d) hiring maintenance planners and reliability engineers.

- Between now and 2020, we plan to progress from ‘Aware’ to ‘Competent’ in the ISO 55000 asset management system and from a ‘Reactive/(barely)Planning’ state to a ‘Reliability’ state.
MTA

What are Your Top 3 Successes - Measured by Business Impact?

- Recognition by all managers that their decisions must be based on evidence derived from data analytics (and we put a powerful business intelligence tool on top of our CMMS and onto their dashboards to enable this). This was a huge Culture change!
  
- Cleaning up our CMMS, especially around the system-component-defect-repair relationships. This helps to ensure that good data goes in;
  
- Training our first 2 Maintenance Planners---- but this is only a 1st step. We can’t yet claim success.
What are Your Barriers to Moving the Dial? How Are You Addressing Them?

- Many staff are trapped in their thinking that the way we manage assets now is the way it will always be---- that we just need to do the things we do now, but better. No! In many aspects of our business, we need to transform our asset management systems and we are showing our staff through demonstration projects and small wins how things can change.

- Most of our managers are ‘swamped’ with their current workload and they do not have the capacity to add one more thing to their agenda without letting something else slip. To address this, we are hiring more staff over the early years of our asset management improvement program, but we are still asking more of our managers.

- Not having process maps for how we currently work, how information flows, how decisions are made and who is responsible. We are mapping our work flows, in some cases for the first time.
• Develop better analytics on lifecycle cost of assets to better inform investment decisions. This occurs incrementally as we improve our work processes and data quality. We plan to have enough improvement to inform our next 5-year capital plan which starts in 2020.

• Continue transforming the organizational culture and competencies to embrace planning and reliability-based maintenance. Get all managers on board and fully engage our represented workforce. This will take us out to 2030.

• Gain the confidence of our customers and funding partners that we are managing our assets at the optimal level for safety, performance and lifecycle cost.
• John McCormick
  • Bay Area Rapid Transit District
  • Department Manager, Operations Planning
  • jmccorm@bart.gov
About BART

- District spans three counties
- 104 miles of track (20 more on the way)
- 440,000 passengers on a weekday
- Opened in 1971
- Oldest Fleet in transit – new cars on the way
- Three extensions under construction
- Two more extensions under environmental review

- 3,800 employees
- Year 4 of AM
- 40,000 assets
- 6 classes/18 subclasses
- >$30B Asset Value
- $9.6B Backlog, half unfunded
- $3.5B bond in November
- ISO 55000 IAM Philosophy
What Asset Management Results are Your Agency Managing to?

- NEW: AM Program 4-year maturity plan, aligned with BART Strategic Plan
- Maps out incremental AM Program progress by each ISO55000 primary element

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<tr>
<th>Strategy &amp; Planning</th>
<th>CONTINUOUS IMPROVEMENT KEYS</th>
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<td>NEW: AM Program 4-year maturity plan, aligned with BART Strategic Plan</td>
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<tr>
<td>Maps out incremental AM Program progress by each ISO55000 primary element</td>
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<tr>
<td>BART Strategic Plan Framework (BSF) &amp; 4 Year Workplans</td>
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<tr>
<td>Identify new AM Program objectives that support BSP 4 Year Workplans &amp; finalizes federal requirements</td>
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<tr>
<td>Update the AM Policy based upon progress made toward formulating new AM objectives &amp; obtains board approval of the updated AM Policy</td>
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<tr>
<td>Implement &amp; monitor the effectiveness of the AM support of BSP &amp; 4 Year Workplans</td>
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7/13/2016 Moving the Dial – Realizing the Benefits of Asset Management
What are Your Top 3 Successes - Measured by Business Impact?

- Full Time Staff of Three
  - Already had the buy-in of executives and departments but a focused team was needed

- Alignment of the AMP, Needs List, Strategic Plan, Workforce Plan, and Knowledge Management

- Data Maturity Scorecard
  - Purely objective assessment in relation to business maturity and incremental growth
  - Governance process to measure and drive improvement (data owned by the dept.)
What are Your Barriers to Moving the Dial? How Are You Addressing Them?

- Cultural understanding of value beyond basic/baseline
  - Connection to business maturity
  - Communication Plan on the way
- Time/focus
  - ISO is more challenging than basic requirements
- Creation of meaningful KPI’s with authority, aligned to BSP and 4-year work plans
- Managing Asset Flows
  - Onboarding/retirement
- Implementation of technical solutions
  - IT/AM bench contract underway
BART

What is Next? How Can We Add Value and How Long Will It Take?

- 4-year work plans for all departments (2017-18)
  - Aligned to Strategic Plan, Asset/Risk registers, Financial Plan

- Maturing data – score card to drive asset data improvement (2016)
  - Enables calculated condition and function scores

- BART Workforce Plan (2016)
  - Quantity and alignment of skills over time

- Life-cycle costs for high priority assets (2017)
  - Transferring from qualitative to quantitative focus
  - Structure complete by 2017 – benefits as data improves
• Mike Hubbell
  • Vice President, Maintenance
DART

Multi-modal transportation system serving 13 cities in the Dallas/Ft.Worth Metroplex, operating buses, the longest light rail system in North America and commuter rail system in partnership with the Fort Worth “T”.

- System
  - 120+ bus routes
  - 90 miles light rail
  - 35 miles commuter rail
  - Paratransit & vanpool
  - ~750 sq mile service area
  - 92.5 million passenger trips annually

- Assets
  - ~1,675 total vehicles
  - ~70M square feet facilities
  - ~340 miles railroad ROW
  - ~$4.8B assets
DART

What Asset Management Results are Your Agency Managing to?

- Managing DART assets to the SOGR standard established by DART using the following definition 'An asset which can operationally achieve the scheduled performance required of it in the environment in which it is operated.'

- Asset reinvestment / replacement expenses are projected, by asset class, on an annual basis over the life of the DART 20-year financial plan.
As a result of business practices in place since inception of the agency and the 20-year financial plan, during a 10-year period of no revenue growth, DART was able to still:

- More than double the length of our light rail system;
- Triple the length of our commuter rail system; and,
- Maintain the SOGR financial commitments and performance of our bus networks.
What are Your Barriers to Moving the Dial?
How Are You Addressing Them?

**Barriers**

- Aging legacy software tools for asset maintenance and project management
- Inconsistent level of maturity of asset identification & management across all asset classes
- Project investment & prioritization modeling is immature and laborious

**Moving the Dial**

- Project to replace aging legacy software systems with state of the art asset management and project management systems now out for solicitation.
- Developing mature and consistent asset definitions and hierarchical relationships across all asset classes.
- Procuring robust project investment modeling tool to aid in developing prioritization alternatives and decisions.
What is Next? How Can We Add Value and How Long Will It Take?

• YE 2017 - Document formal transit asset management plan consistent with FTA MAP-21 concepts
• YE 2018 - Improve data integration with existing enterprise financial system, optimize asset health & condition assessment processes
• YE 2019 - Align DART asset management activities with ISO 55000 principles and concepts
• YE 2019 - As part of the EAM / EPM project additional benefits anticipated are:
  • Improve asset on-boarding process
  • Strategic sourcing & procurement of long lead time materials
  • Enhance material demand forecasting & inventory replenishment
• Louis Cripps
  • Senior Manager, Asset Management
RTD

- Service area 2,410 sq. miles
- 1000 + transit coaches,
  - >140 routes
- 110 Park-N-Rides / Stations,
  - >10,000 stops
- 6 Rail lines
- 172 LRV’s (+29 on order)
- 56 Commuter Rail vehicles (PP3)
- Accessibility services,
- Call-n-Rides,
- seasonal rides and many other programs
- 5 new lines opening in 2016
RTD currently uses Asset Management generated information more as a tool for managing our assets verses an output we manage towards. RTD’s asset management is a data-driven approach that guides our investments, resources, and policy decisions to achieve goals. Results help us highlight areas of challenge, identify necessary adjustments, and communicate measured success.

Starting in 2017 RTD will transition its major emphasis from designing and building back onto operations and maintenance. At the same time, our Asset Management and State of Good Repair programs will continue to mature and to fully encompass all departments and asset types.

Over the 5-year horizon RTD believes that implementation of the ISO 55000 standards will better align our investments, management practices and asset maintenance with regional and national goals.
What are Your Top 3 Successes - Measured by Business Impact?

- Leadership support and commitment. This drove the cultural shift and agency acceptance to the idea of asset management or life-cycle management for our assets. This included creation of full-time asset management staff creating processes, procedures, standards and completing assessments.

- Inventories, data cleaning, and dashboards. Data cleaning has been critical. Before that, there was good reason to have a low level of confidence in information generated from our data.

- Providing better information to decision makers (uses including project evaluation, prioritization, driving effectiveness and efficiencies)
What are Your Barriers to Moving the Dial? How Are You Addressing Them?

- **Barrier:** Not having a final rule making.
  - **How we are addressing:** We are moving forward with the hope that we are aligned with the final rule making.

- **Barrier:** Although we have made significant strides there are still inconsistencies and difficulties obtaining data as well as challenges with how data is organized or formatted for ease of use.
  - **How we are addressing:** Working to standardize.

- **Barrier:** Responsibility without authority. Asset management functionally has no penalty or rewards related to adoption or compliance.
  - **How we are addressing:**
RTD

What is Next? How Can We Add Value and How Long Will It Take?

- Maturing data, improving data quality, analytics and collection methods (12-24 months)
- Adopting ISO with full agency implementation. This will include an explicit process for continuous improvement. This is the long-term value of asset management – the perpetual emphasis on improvement. (36 – 60 months)
- Focus on reducing Life Cycle Costs for high priority assets; transitioning from qualitative to quantitative approaches (36-60 months)
- We are always open to making adjustments as needed.
Paul Edwards
Senior Program Manager
• About UTA:
  • Public Transit District
  • Serves 2.3 million people in District
  • Covers an Area - 130 miles by 20 miles
  • Currently Employs - approx. 2300
  • Operate 700 Buses, 400 Vans, 146 LRVs, and 60 Commuter Rail Vehicles
• Performance Measures obtained by following process below:

- Budget Projections
- Deterioration Forecasting
- Condition Rating
- Risk Evaluation
- Maintenance
- Inspection Process
- Inventory
What are Your Top 3 Successes - Measured by Business Impact?

- Transit Development Plan budget allocation. Asset management budget needs are funded after operations and routine maintenance. Previously asset management needs were funded at the bottom of the budget and only received money if it was available.

- Development of a specific five year asset management budget and project development plan using the UTA TAM system.

- Project management of all SGR projects is retained in one group. This gives us the ability to complete projects in the funded fiscal year and spend all of the allocated budget. Doing this gives us a greater chance of obtaining additional funding in the next budget cycle.
What are Your Barriers to Moving the Dial? How Are You Addressing Them?

- Global acceptance of the need and benefits of a robust asset management system. Using a double pronged approach to move in this direction:
  - Coaching and educating at the front-line employee level
  - Educating at the Executive and Board level
  - Assist the Executive Champion in obtaining organization wide acceptance and utilization of the system

- While we believe the UTA TAM system will be compliant with the rule that FTA will provide, there is some level of hesitancy to continue to go forward with system improvements until it is known what the rule is.
What is Next? How Can We Add Value and How Long Will It Take?

- Expanding TAM plan to address entire final rule once its published.
  - Defining all performance measures
  - Defining condition rating process for different asset types
  - Defining reporting process
  - Gaining global support for TAM Plan

- Timeline:
  - Two years from date of Final Rule publication

- Continue to share information from other agencies.
MBTA

Satyen Patel, MBA, CEng, MEng, MIET
  Director of Asset Management
MBTA

- **About MBTA**
- The Massachusetts Bay Transportation Authority is the nation’s oldest Subway System (opened 1897)
- 5th Largest Transit Agency, based on ridership
- 175 member cities and towns with
  - 3200 square mile area
  - 4.7M residents
- 401M Annual unlinked passenger trips
- **Transit**
  - 666 Train cars, 129 stations, 4 lines
  - 1055 busses, 8000+ bus stops
- **Commuter Rail**
  - 80 locomotives, 410 coaches
  - 137 stations, 12 lines
- **Commuter Boat**
  - 7 terminals, 2 routes
  - 14 vessels
- **Private Carriers/Paratransit**
  - 16 routes/door to door (paratransit)
- Daily Ridership of 1.3M trips, 55% of work trips to Boston are made on the MBTA
What Asset Management Results are Your Agency Managing to?

- New Fiscal Management and Control Board – MassDOT and MBTA joint goals
- MBTA Strategic Plan to come...
- 12 months - fully aligned CIP to Asset Management requirements and concentration of funding going towards SGR projects.
- 24 months - more refinement of our SGR backlog numbers as our infrastructure program comes online and starts to provide useful data
- Next 5 years - MBTA managing Capital dollars in relation to Asset management requirements low number of "ribbon cutting" projects.
What are Your Top 3 Successes - Measured by Business Impact?

- Formal "Department of Asset Management" established with dedicated personnel hired (Director of Asset Management, Asset Information Managers, EAMS Information Manager, with more to come)

- All CIP projects now are aligned strategically to one or more of the 3 MassDOT goals.

- Organizational Restructure involving a more aligned Capital Design and Construction and an O&M Maintenance division.
MBTA

What are Your Barriers to Moving the Dial?

How Are You Addressing Them?

- MBTA has entered the first stage of mass attrition at the Authority, we are losing highly knowledgeable staff daily.
  - Working with HR and headhunters to bring more talent back to the MBTA
  - Reinforcement of Asset Management Program Core elements
  - Minimum of 300+ personnel by December 2016

- Adoption of AM principles is a challenge as its a new way of thinking and working
  - Education of staff to "carry the torch" and be the "champion"

- Line of sight principles is new to the Authority and not all departments are involved with creation of new strategic policies
  - More awareness of the AM program to all areas of the business and educating leaders to the benefits it can provide them.
What is Next? How Can We Add Value and How Long Will It Take?

- Establish the EAM and verify all assets and Asset data.
- Establish key metrics for assets
- Benchmark and align with other agencies, hierarchies metrics, types of equipment
- Form alliances with agencies to establish R&D programs and new thinking and Asset Management Industry Standards!
- Start now! We are all entering a period of massive investments in our systems, start talking and sharing design, equipment specs etc. to standardize. Building resiliency, additional capacity for expansions and prolonged use.
- Develop life cycle cost standards for both CAPEX and OPEX from the design phase. Learn from each other on lessons learned so that those issues experiences at one agency are designed out at another and then share that design.
- How long will it take......? That depends on how willing everyone is to work collaboratively.
Answers and Dialogue

Answers:
• We Have Documented these in the Panel Paper
• Copies ask me David Rose drose@gfnet.com

Continue the Dialogue:
• Provide your examples
• We will catalogue them, update, and repost
• Tell the story