25th anniversary
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Optimizing Value at MARTA Using a Systems Approach

David M. Springstead
Senior Director of Engineering and Development

35th Anniversary
COMBINED BUS AND RAIL SERVICE FOR THIRTY-FIVE YEARS

Topics

1. Tee-up the Conversation
2. MARTA Agency Overview
3. Optimization Using SE
4. Capital Project Delivery Success
5. Benefits & Challenges


S E

Transit Relevance in Technology Markets

- New Products are Largely Driven by **Commercial Markets**
- New Products are **Not** Often **Designed for Transit Use**
- **Transits are Unique** and Complex Systems
- **Customer Expectations** are Higher Than Ever

  No Longer About Getting from Point A to Point B
- Time Management - **Access to Information** (Wireless)
- **Less Funding Available** - Get the Most for Your Investment
- Many Transit **Business Processes are Outdated**
- Very **Traditional Procurement Methods** & Standards
- **Technical Specifications** are Obsolete & **Lack Integration**
- Technology Purchases are **Rarely Fully Optimized**

To Remain Competitive…Transit Must Adapt to New & Emerging Technology

Perfect Application for *Systems Engineering*

- Selecting the **Right People** to implement your projects
- Selecting a **Proven Technology** to meet your needs
- Selecting the **Best Delivery Method**, minimizing risk & cost
    - Introducing **Non-Traditional Methods -** when needed

  Ex: CSI vs. Systems Specification (Building vs. System)
- **Verifying & Validating Performance**
- Understanding **Organizational Readiness**
- Understanding **Whole Life Cycle Management**

Metropolitan Atlanta Rapid Transit Authority

- Started bus and rail combined service in 1979
- 9th largest transit system in the U.S.
- 500,000 passengers daily (bus and rail)
- 338 rail cars, 48 miles of service via four lines
  Gold, Red, Blue and Green
- 122 miles of track
- 532 buses, 92 routes
- 187 Mobility (paratransit) vehicles

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marta

Going Back Five-to-Seven Years
Numerous Operating & Capital Challenges

- Constrained revenue stream & shrinking Federal Dollars
- Increasing backlog of systems and assets needing replacement
- Poorly defined project scopes, schedules & budgets (plug #'s)
- Projects not linked to Authority strategic goals & objectives
- No formal project prioritization process (lobbyist forum)
- No standardized processes within & across business units
- Limited visibility and timely controls (Oracle Financial vs Project)
- Unreliable asset data
  - No recent safety assessment
  - No recent condition assessment
  - No accessible performance data
- Long procurement cycles

Result: Under-executing CIP, Customer needs not being met!

Opportunity: improve financial & operational sustainability

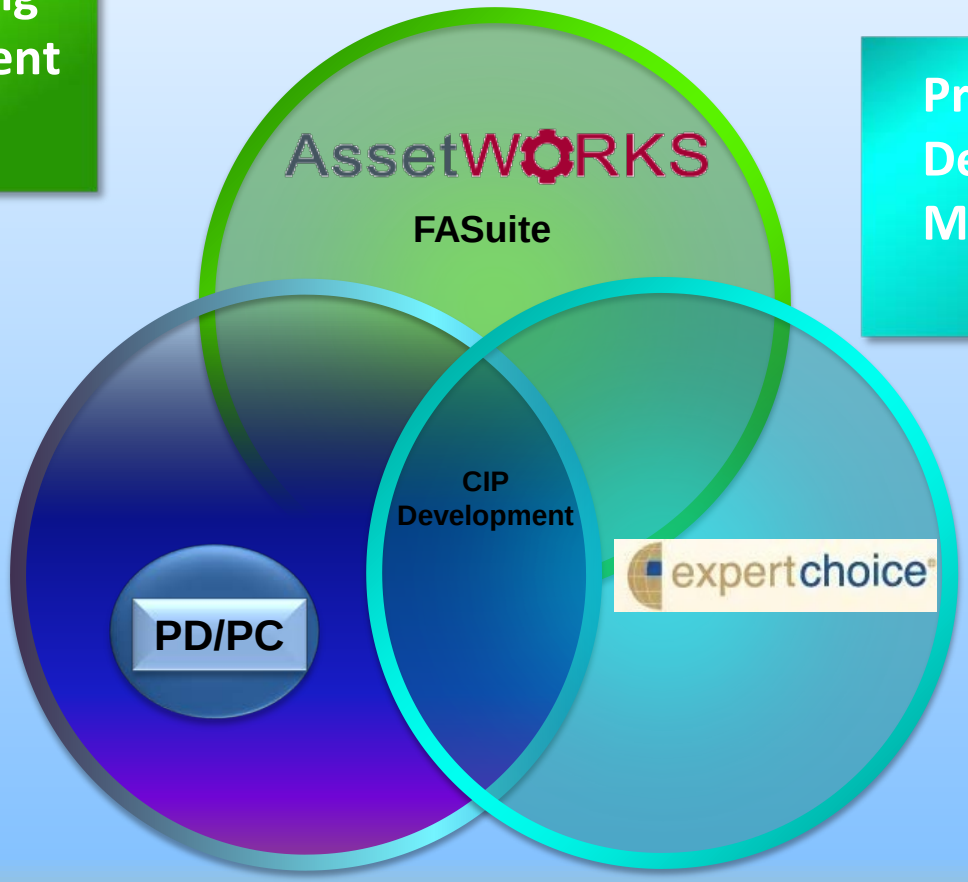
What Do We Do Next?

- Perform gap assessments to determine the State of MARTA
- Identify needs and create a road map
- Use reliable empirical data
- Re-align or establish business processes to:
  - Standardized, **value-added**, transparent
  - Achieve strategic goals
  - Increase efficiency; reduce cost
- Put the right people, processes and technology in place – "tools"
- Align CIP with Authority, Community & Regional needs
- Monitor & Report performance - project, program and agency levels
- Prioritize & Invest capture the greatest benefit/most value

THE BIG Picture

Asset Planning & Management

Prioritization & Decision Making

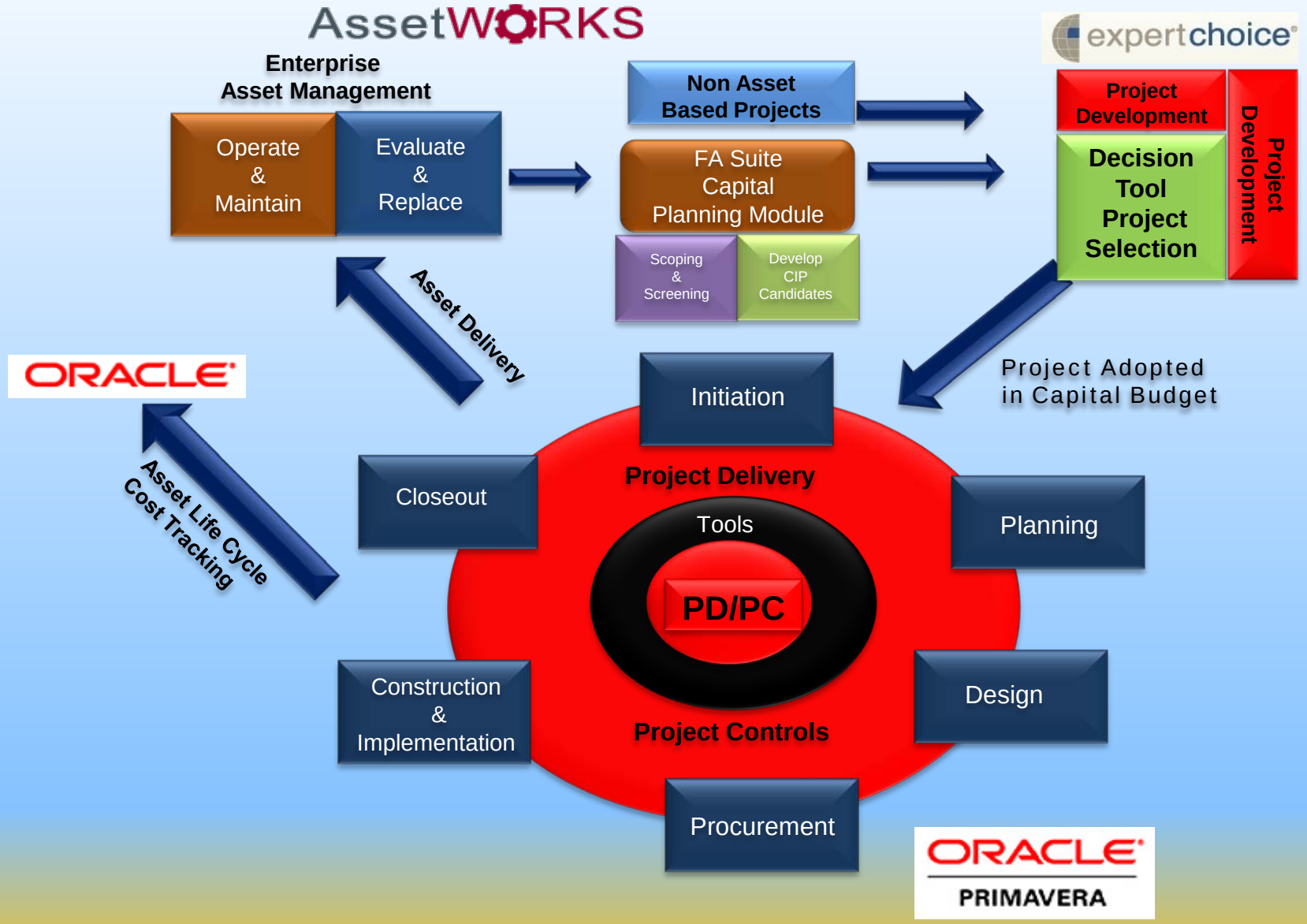


Project Delivery/ Project Controls

Systems Engineering
(basic definition)

- interdisciplinary **approach**
- under a **structured development** process
- focused on defining **customer needs**
- focused on required **functionality** (early)
- focused on **best performance** at **lowest cost of ownership**
- **business** and **technical** needs fully understood
- **documenting** those requirements
- proceeding with **design** synthesis
- **verifying** and **validating** performance
- **implementing, operating & sustaining**

MARTA's Fully Integrated TAM Model – How it Works!



Enterprise Asset Management - Asset Database

Priority Codes:

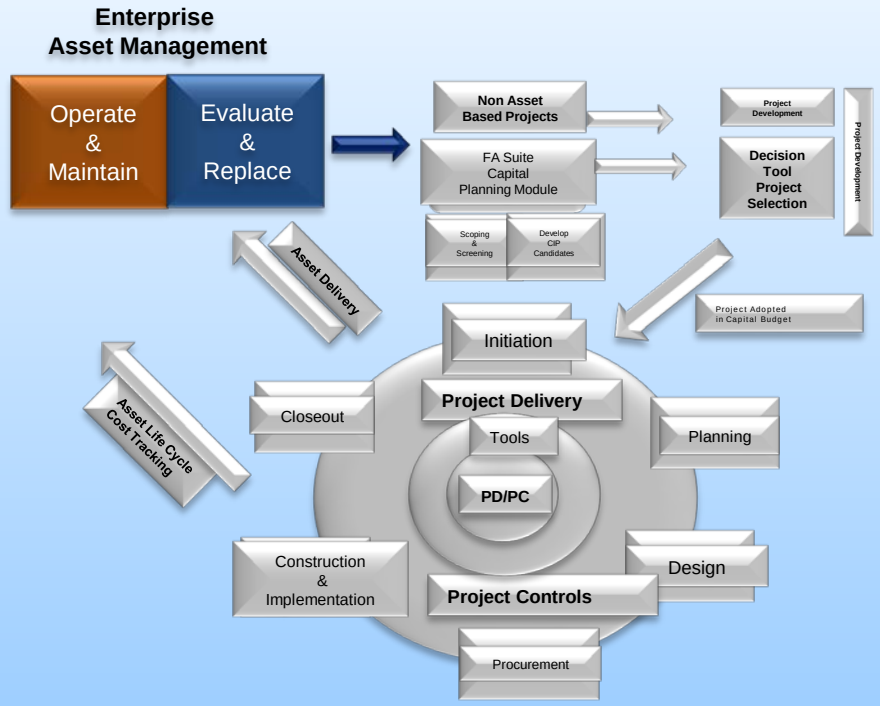
1.Life Safety Critical
2.Regulatory
3.Operation Critical
4.Operation Support
5.Operation Enhance
6.Failed
7.Decommissioned

Condition Codes:

5. Excellent
4. Good
3. Adequate
2. Marginal
1. Poor

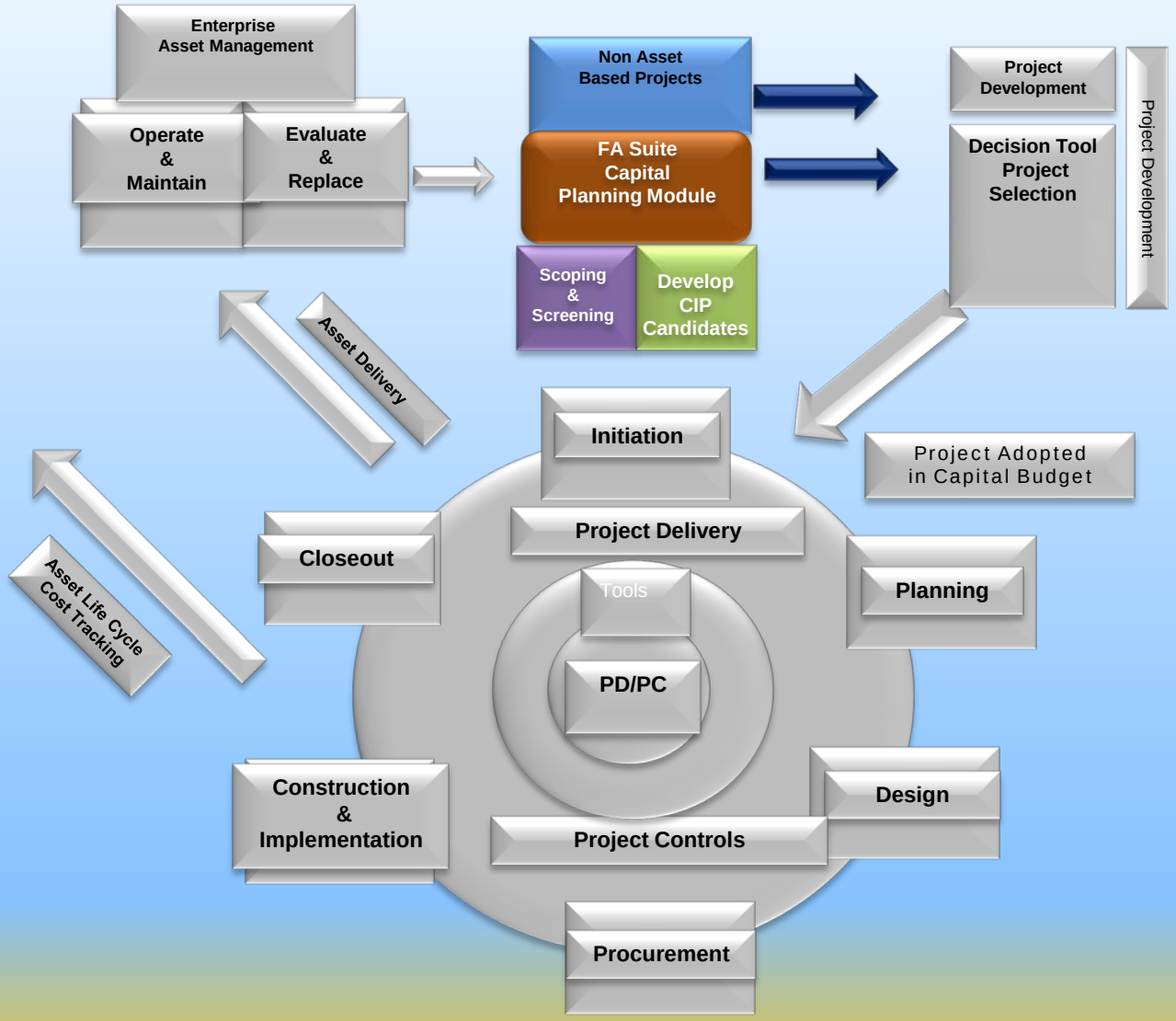
Minimum Req'mts:

1. Equipment ID
2. Description
3. Asset Category
4. Equipment Type
5. EUL
6. Location
7. Life Cycle Status
8. Condition ID
9. Date in Service
10. Original Cost
11. Planned Retirement



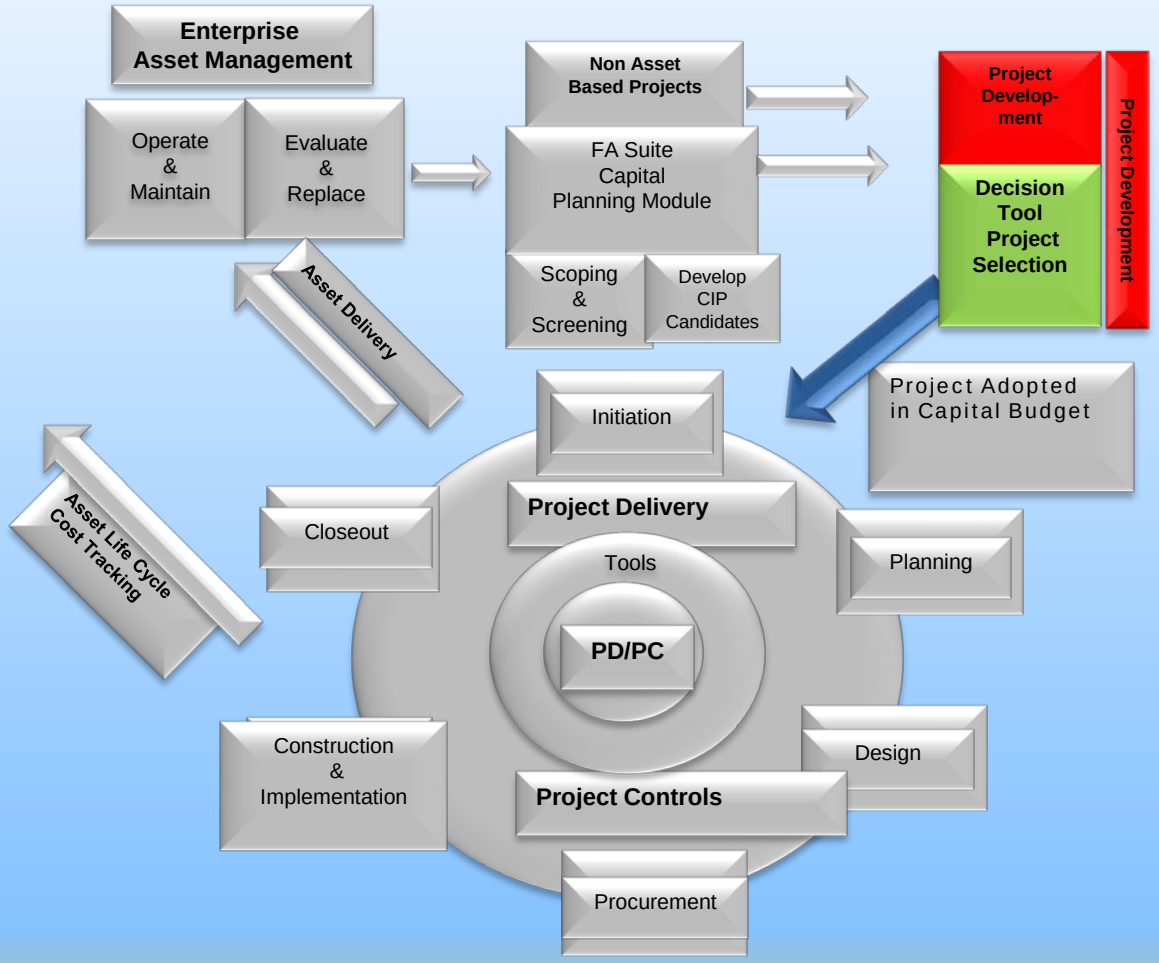
- **Daily management of asset data (PM, PdM & I)**
- **Trusted, readily accessible data**
- **Triggers procurement decisions**
- **Cornerstone of our Capital Improvement Plan**

Capital Program Formation



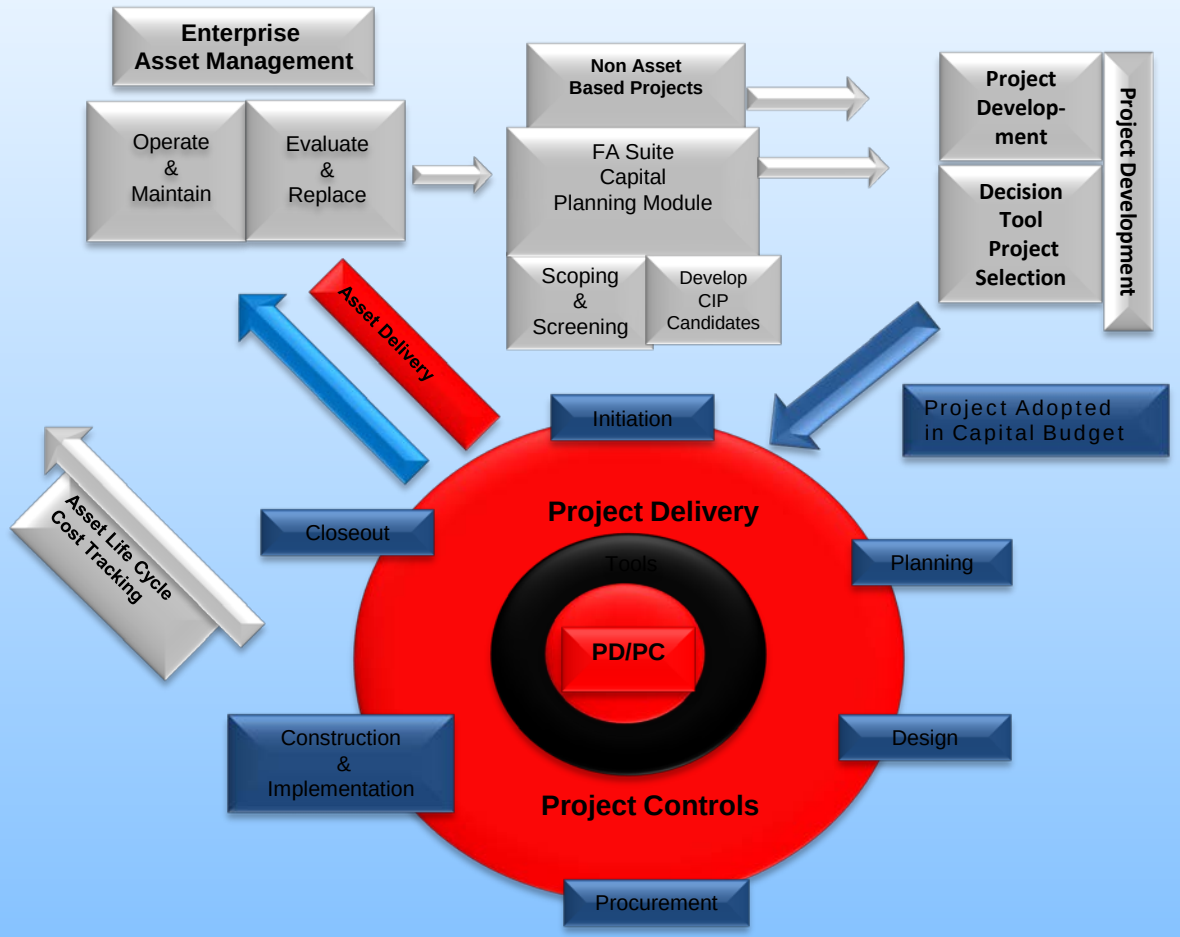
- **Integrated asset management module**, tie-in to FASuite asset tracking and management
- Categorizes assets in meaningful “buckets”
- Identifies replacement assets meeting agency established criteria
- Ensures agency is continuously aware of assets ready for replacement and project identification

Project Decision Making

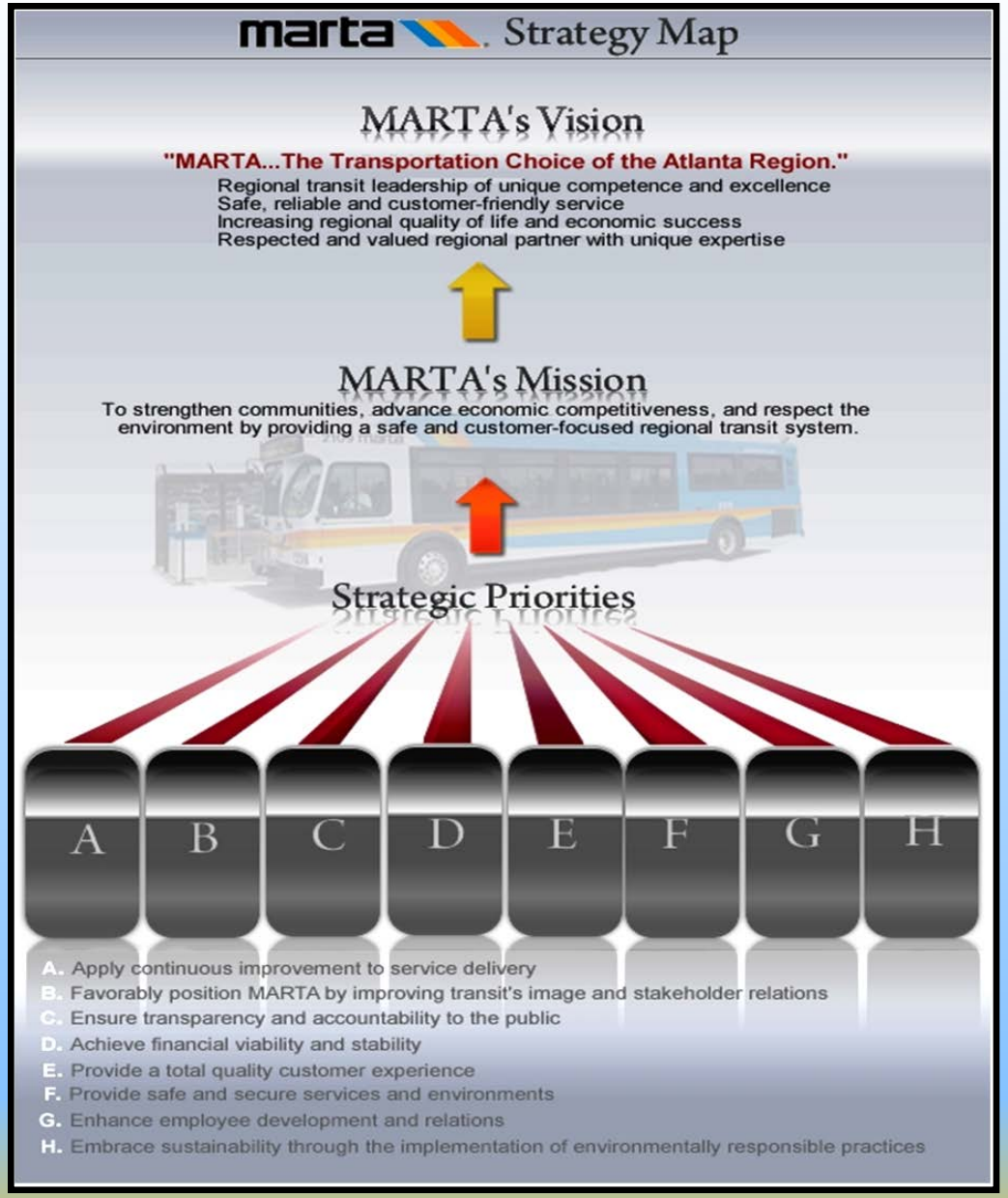


- **Integrated project decision making**, tie-in to FASuite asset database and capital module
- Groups candidate replacement assets by agency-driven criteria
- Creates executive level scenarios optimizing capital project decision making
- Presents financially constrained capital improvement plans ensuring informed decision making

Project Delivery



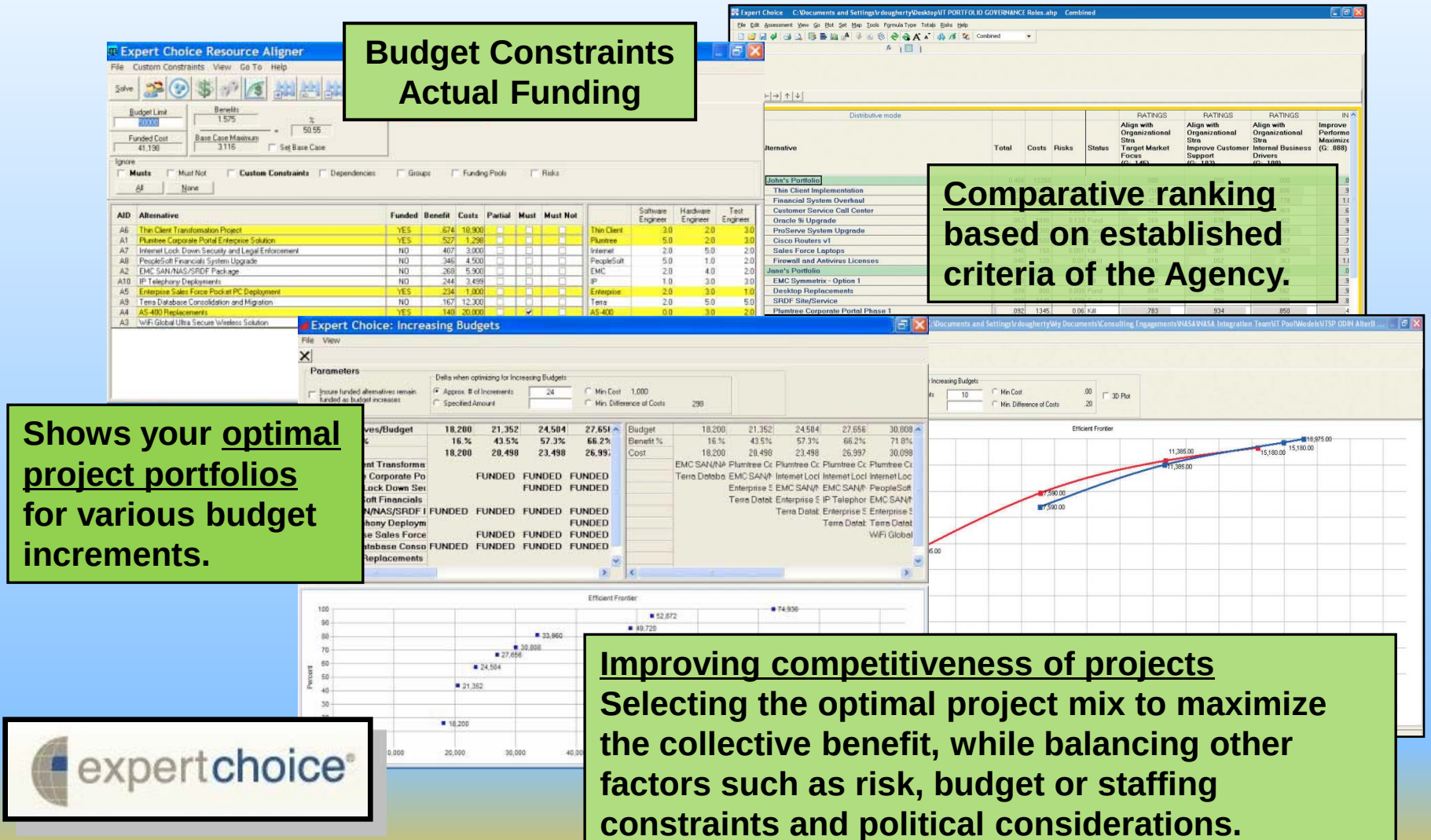
- Ongoing project monitoring and reporting throughout project lifecycle
- Proposed adjustments to project budgets evaluated through capital project decision model
- Actual project costs captured and stored in FASuite database for future capital planning
- New asset data delivered by contract and entered into EAM



Decision Criteria

1. Customer Service
2. Sustaining our Assets
3. Funding Optimization
4. Financial Impact
5. Regional and Other Collaboration Opportunities
6. Environmental Stewardship
7. Project Deliverability

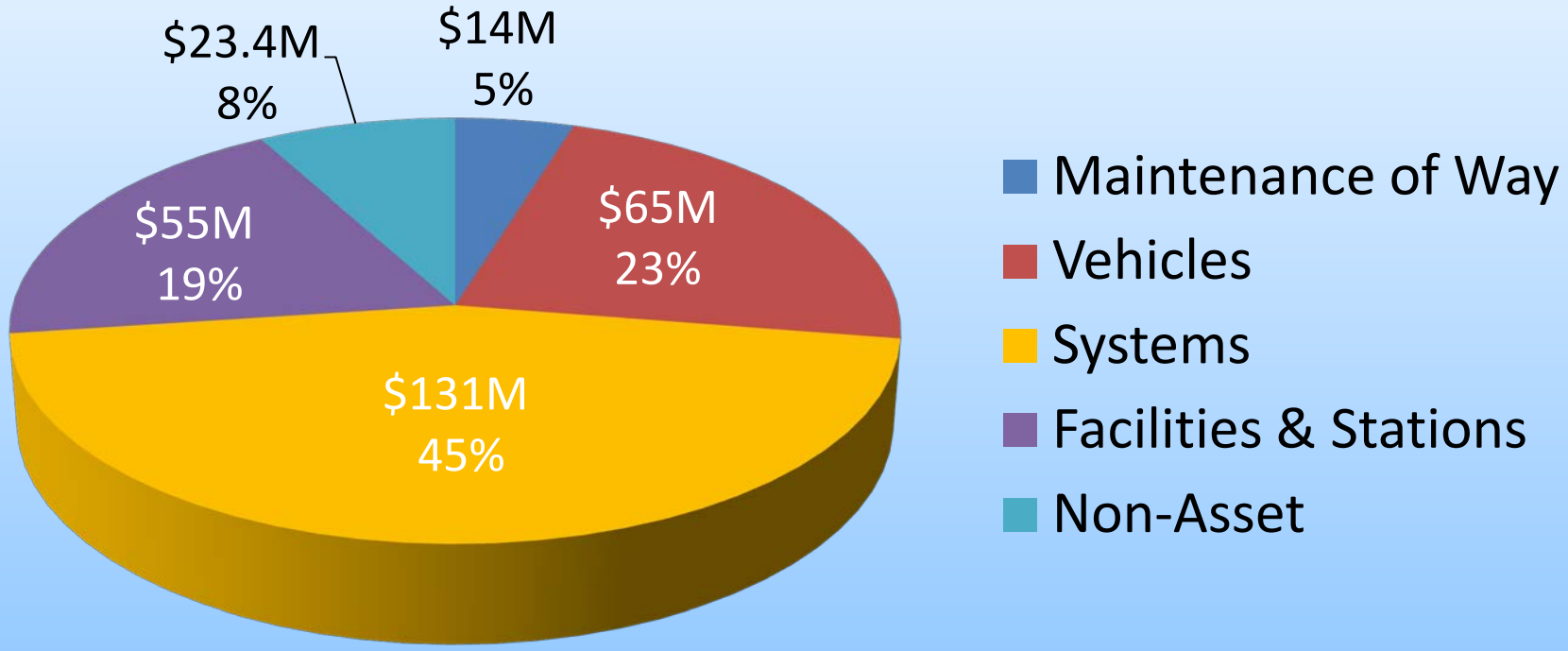
Decision Making Software: *Expert Choice*



Improving competitiveness of projects
Selecting the optimal project mix to maximize the collective benefit, while balancing other factors such as risk, budget or staffing constraints and political considerations.

Composition of the CIP

by anticipated FTA Asset Category



"System Renewal"

I've Got the Solution!

- Build in-house SE competency
  - Limited in-house skill; small but mighty
  - Largely discipline engineers
  - Build a case for budget request – takes time!
- Secure external SE support
  - Industry is lean; spread thin
  - Maybe we're looking in the wrong place? (Transit)
  - Solicitation (pending) – had to justify

Only One Problem…The Rest of the Agency Hasn't Got a Clue!!!

Challenges

- **Agency Culture & Processes**

  awareness, buy-in, structure, participation
  - How to Implement SE in a Non-Mature Environment?
  - Break the traditional mold
    - Within Engineering
    - Within Contracts & Procurement
    - Within Operations & Maintenance (Stakeholder/End-User)
    - All Other Contributing Business Units – including leadership team!
- **Lack of Resources**
  - Where to find personnel that have a basic SE understanding?
  - Where to find SE expertise to deliver your projects?
  - How to "gather requirements" from a busy Operations & Maintenance units?
  - How to deliver once awarded?

Project Demonstration Method

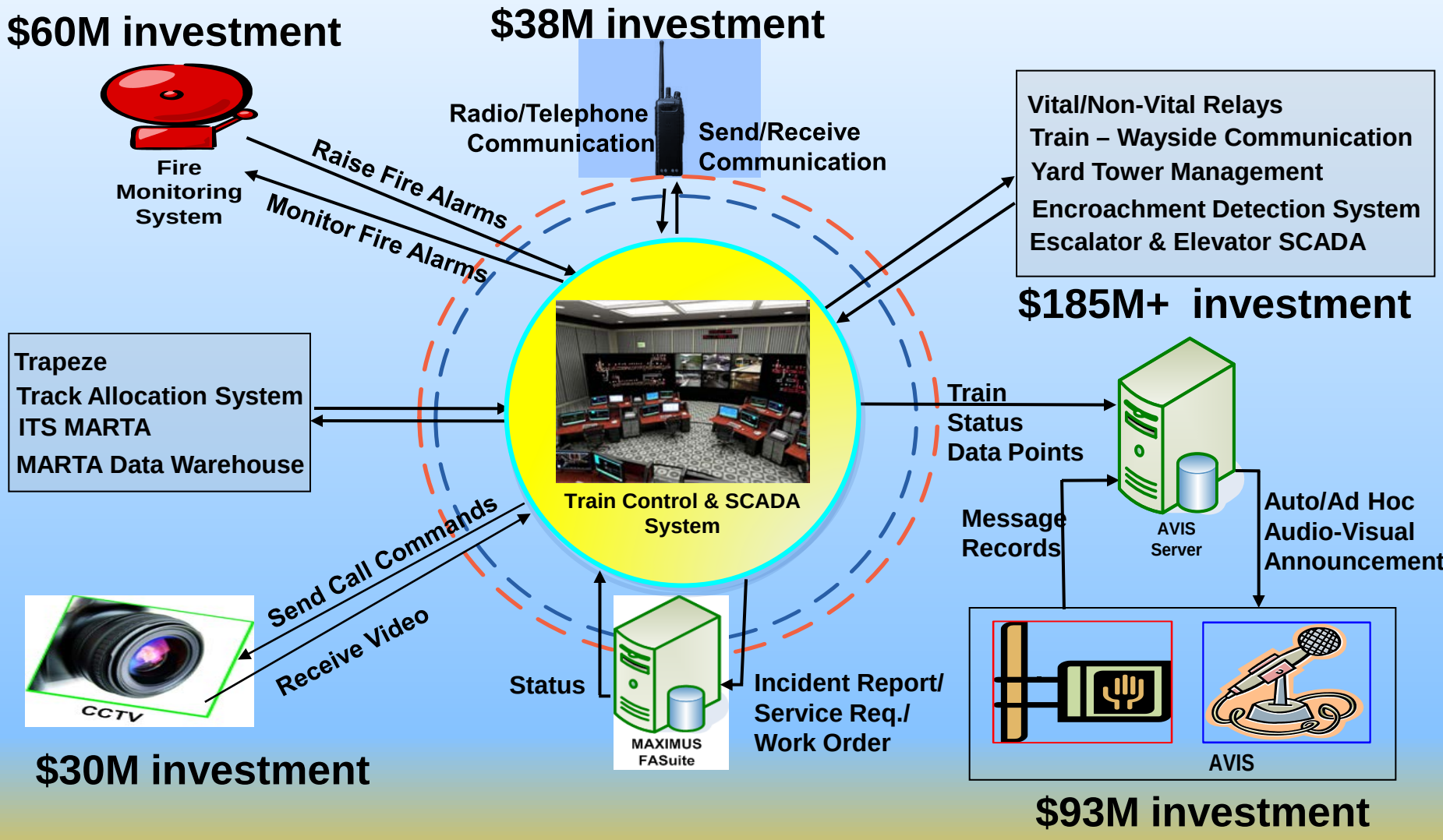
- Identify upcoming projects that could be used as a proving ground for an SE approach
    - Fire Protection System Upgrade
    - *Train Control & SCADA Upgrade*
    - Audio Visual Information System Upgrade
    - Tunnel Ventilation System Upgrade
- Conceptualize, plan, develop and implement these projects
- Demonstrate success and/or contrast against projects that fully or in-part failed to apply a systems engineering approach

Define the Problem: Operation's Challenges

- Many of our assets are **"original"**
- Last major system upgrade to software and hardware was **prior to the 1996 Olympic Games**.
- **RSCC Facility** itself is inadequate for the intended use
- **Wake-up call July 4th, 2009 -** MARTA experiences **multiple RSCC server failures** during one of the busiest days of the year (Peachtree Road Race, Fireworks, Braves Game and several other events); required immediate system wide support; invisible to the riding public.
- **RSCC Stabilization Project** initiated – life support services for the RSCC until MARTA could complete a multi-year project, **Train Control & SCADA Upgrade (TCSU) Project**, which was in the early stages.
- **Despite these challenges Rail On-Time Performance ≈ 98%,** a

Example: $200M+ Project, Two Contracts
1) Integrated Operations Center (IOC)
2) Train Control & SCADA Upgrade (TCSU)

Single Platform for Integrated Systems



IOC Building Design (Renovation)
Traditional Invitation For Bid (IFB)

Project: Designed to Optimize Our Operation Flexibility, Growth and Regional Opportunities

- Rare opportunity to design and build an industry leading, combined **Integrated Control Center** (IOC) and **Emergency Operations Center** (EOC), housing Rail, Bus and Police control and communications staff.
- **Scalable design**, open theatre, universal work stations, customizable display board, training center, and room for **regional expansion & partners**.
- ***This project is more about a successful business transformation than it is a technology upgrade!***

In Contrast!

Limited SE Approach Used: Lack of Stakeholder Input

Armour Yard Facility 2005: $300M

- **On schedule - under budget – state of the art**

Operations-wise:

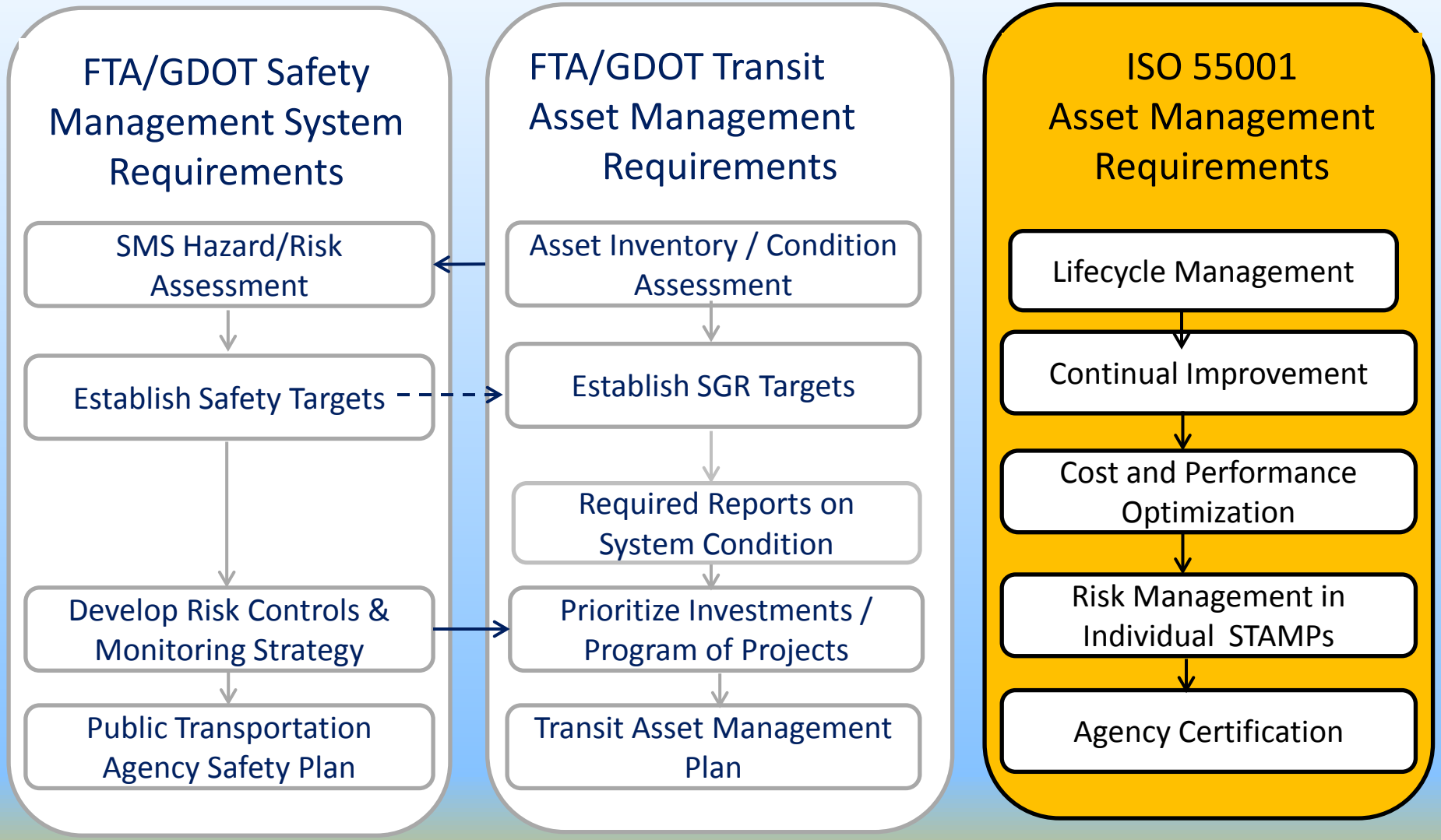
- **Yard location is not optimal; problematic**
- **Dead-end tracks (wash track & cleaning platform) and lack of a run-around track – unnecessary moves.**

Benefits of an SE Approach

- ✓ Identification of gaps and required changes
- ✓ Prioritization of initiatives
- ✓ Right tools and technology capabilities
- ✓ Integrated decision making and reporting
- ✓ Improved business & operating processes
- ✓ Improved operational performance
- ✓ Meaningful Key Performance Indicators (KPIs)
- ✓ Higher probability of a successful outcome
- ✓ Organizational culture change

Mainline, Yard and Maintenance Facility
Not Optimized

MAP-21 Compliance: It's All Connected!



dspringstead@itsmarta.com