Data Life-Cycle Management

Looking at How We are Starting to Integrate Data Through the Life-Cycle Together

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Presentation Overview

Discussion about how we can gather and share information to support Planning, Design, Construction, Operations and Asset Management

- Identifying key issues, opportunities, progress related to:
  - Organization structure, staffing/skills
  - Standards, specifications, processes and procedure
  - Tools and technology
  - Bringing it all together

4 Pillars Road Map

1. Organization

1.1 AM Leadership

1.2 Performance Measures

1.3 AM Staff Hires

1.4 AM Unit Creation

1.5 Change Management

1.6 Training & Education

1.7 Risk Management

1.8 Asset Ownership

1.9 Corp Partners Plan

1.10 Strategic Plan Update

2. Data

2.1 Consistent Company Asset Identification

2.2 Data Dictionary

2.3 Data Hierarchy

2.4 Appropriate Location Means

2.5 Data Collection Standards

2.6 Common Data Collection Technology

2.7 Historical Condition and Cost Data

2.8 Asset Data Collection Cycle

2.9 Asset Data Exchange

2.10 Asset Data Reporting

3. Process/Work Methods

3.1 AM Business Processes

3.2 Data Collection Processes

3.3 Asset Criticality

3.4 Determine Asset Value

3.5 Determine Asset Deterioration Curves

3.6 Data Archive Process

3.7 Risk Determination

3.8 Contingency Plans Process

3.9 Preventive Maintenance Work Orders

3.10 Capital Investment Planning (CIP) Process

4. Technology

4.1 Common Database Main System (DBMS)

4.2 Data Collection Technology: Basic

4.3 Data Collection Technology: Advanced

4.4 BIM Data Model Standards

4.5 Document Management System

4.6 Financial System Tie

4.7 MMS System Tie

4.8 GIS - Dashboard System Tie

4.9 (Comprehensive) AM Software System (CEAMS)

4.10 Training Plan and Documentation

4-Pillars originally came from FHWA Demo Project 113, Integrated Transportation Information Systems. 1995, modified thru to AECOM 2022.

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The Vision

Complete life-cycle

Birth to death of asset:

- Justification/Planning
- Design
- Operation
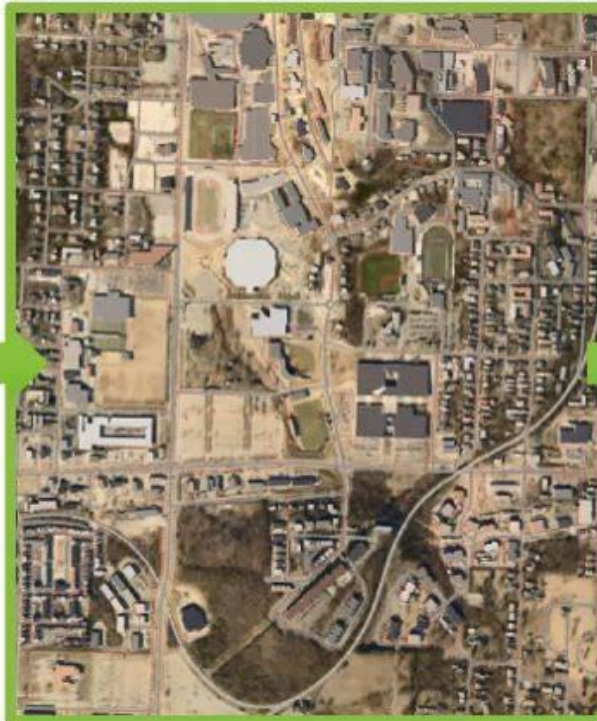- Maintenance
- Decomissioning

Understand asset:

- Design features
- Valuation
- Deterioration
- Maintenance regimes and treatments

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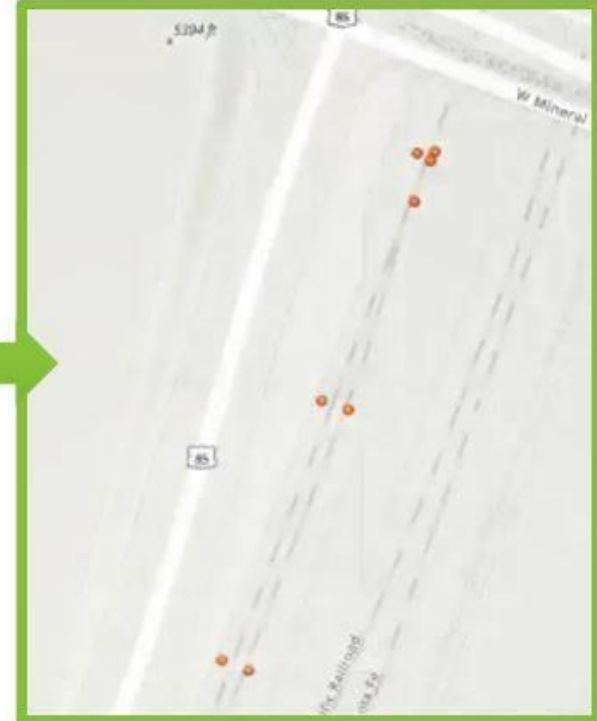# Vision: Integration of BIM/Design local enhancement for GIS and Asset
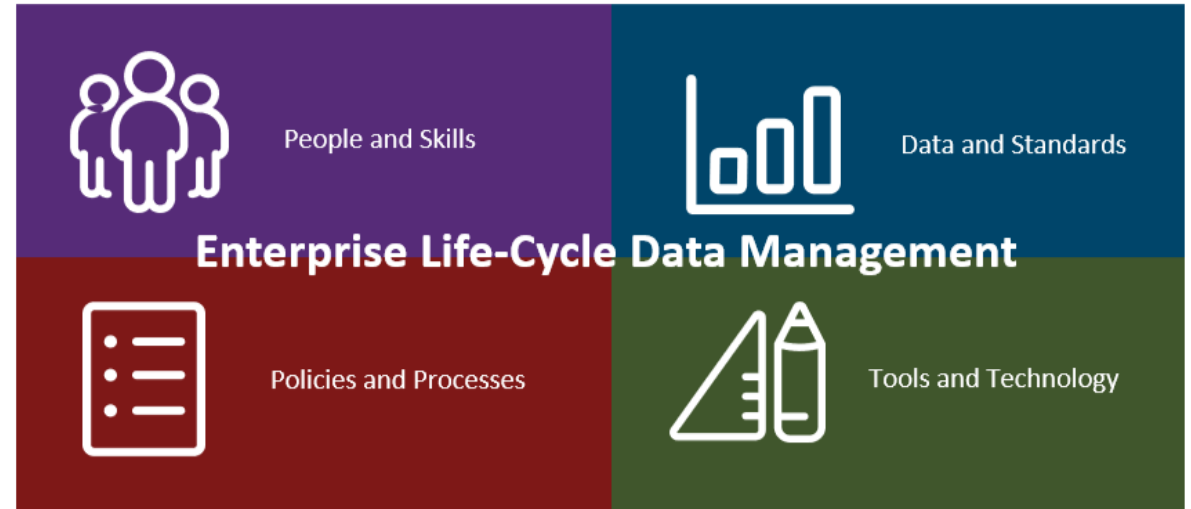

Access GIS Data

Generate Context

Create detailed Assets

Publish back to GIS

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Why is Enterprise Data Life-Cycle Management Important?

Decision making,

Data quality,

Process improvement

Accuracy, constancy – data entry,

Sustainability,

Cost savings,

Safety,

Accountability

People and Skills

Data and Standards

Enterprise Life-Cycle Data Management

Policies and Processes

Tools and Technology

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What are the structural and institutional issues limiting organizations from success (EDLM)?

People and Skills

Resources   Communication

Lack of Coordination

Unclear Roles

Training Lacking

Lack of Structured Data Framework

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People and Skills Questions

People and Skills

- **What is the "why"? Is there a business case for doing EDLM?**

- **What does success look like when it comes to organizational arrangements?** Ex. Staff structure, Sustainability, Communicating the Why, Resilience/Continuity, Road Map (timelines, measures, and activities)

- **What staff/skills are needed to support enterprise level data management?**   Ex. Data Modeling, Data Literacy, Champions, CDO, Data Modelers, Analysts and Architects

Issues: Standards, Processes, Procedures

Siloed – CADD, GIS, Construction

Data Collection Processes

Pilots – Processes don't support data

Data Needs - For some but not all No Metadata

Communication

Siloed – Data Management

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Standards Questions

- **What standards, policies, specifications do we need to have in place to be successful?**

- **How should these be successfully rolled out and implemented?** (centralized oversight, sub-groups, specific to the team...)

- **Who should guide the processes and how should it be communicated?**

Process Questions

Policies and Processes

- **What policies or processes do you have for data management?** (CAD standards, Data Governance Doc, Data Quality Standards, intelligent data delivery/asbuilt, etc)

- **Do policies across your agency support enterprise data management?**

- **What are the things limiting your organization from developing and implementing enterprise data standards and policies?**

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Issues: Technology

Lack of Metadata

Siloed Applications–Planning, CADD, GIS, Construction

Lack of Clear Workflows

Lack of Centralized Databases

Lack of Training/ Time

Tools and Technology Questions

- **What are the biggest limitations with working across data silos?**

- **How do we align and integrate our standards across planning, design, construction, GIS, asset management systems?**

- **How do we integrate the data systems (tools/technologies, databases) across the silos?**

- **How do we keep up with it?**

The Tools and Tech
(so many thing to know)
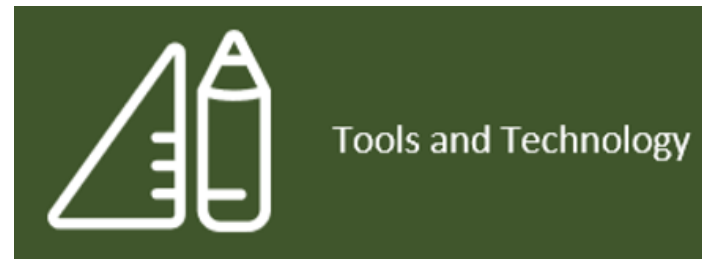
IT Database Management – Oracle, SQL Server, ArcSDE, DBS

Design/Survey – Civil3D, Revet, OpenRoads, Topcon, Trimble,

Project Management – Masterworks, MS Project, Daptiv

Construction – eTicketing, Document Management, Redlining, AASHTOWare, Site manager

Operations – MMS, GIS/FieldMaps, Portals/Dashboards, MAVRIC

GIS – ESRI ArcGIS Server, FME, Informatica

Asset Management/Dashboarding – Deighton, AgileAssets, Vueworks, Roads and Highways, SAP, AASHTOWare, Exor, PowerBI, Tableau

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Breakout Report Out

People and Skills

What staff/skills are needed to support enterprise level data management?

Data literacy – everyone in the organization has a roll

Balance of top down, bottom up

Clear roles and responsibilities – work into job descriptions

Soft skills for working across the silos

Flexibility with leads, program manager, data business owners

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Breakout Report Out

People and Skills

What could success look like when it comes to organizational structure?

Knowledge management – prepare for staffing shifts

Sources of truth for data driven decision making

Partnerships between the teams and IT

Organizational change management / risk management

Authoritative high-quality data

Use the data to support the project (but collect it once and maintain over time)

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Standards Report Out

Data and Standards

- CADD Standards need to be enforced, modernized
- Procurement – data architecture plan
- Enterprise data standards / policy
- Data Governance
- CADD specifications
- Location and time documentation
- Common language

- Informed policies – what will be accomplished
- Implementation plan – dedicated staff support
- Rules of engagement
- Metadata standards
- Standards for how to produce scopes
- Consistent communication

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Tools and Tech Report Out

- Diverse groups/needs/competing priorities
- Build in tools/processes for having good data quality
- Murky data lakes need to become more clear
- Growth mindset for solving problems/limitation and adapt
- Project versus asset focused
- Show me the money – invest in systems, people, etc.
- Resistance to change – fear of lack of ownership of the data, data integrity
- Aligning standards / integration of business systems
- Closed technology systems
- Communication!!!

Tools and Technology

'Why' Tools and Technology – For Data Creation, Transmission and Use

- **Plan** infrastructure repair, rehabilitation, replacement, construction work
- **Survey** site and build visualization models
- **Design**: Conceptual, Preliminary, Detailed, Final
- **Letting**: Create Construction Contract Model / Documents
- **Construction**: Build, Inspect and Hand-off to Asset Management
- **Operations & Maintenance**: Asset Inventory, Inspections, Mobility, Safety
- **Asset Management:** Performance-Risk management, Life cycle planning

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How can the vendors/consultants help?

- Enterprise-wide assessments – roadmaps

- Discouraging rogue IT – start with the CIO and IT team leads so things that get built meet organization standards

- Need to put the governance and standards up front when a project kicks off

- Vendors can help us expand requirements and clarify with a more enterprise focus

- Help write a roadmap – project pages with deliverables, process steps, scope

- Project intake and approval process – team to report to executives

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How can the vendors/consultants help?

- Change and stakeholder collaboration soft side focus
- Work days into the schedule to get the feedback along the projects
- Vendors need to be ready to provide their leadership
- RFI before RFP so vendors can help us with clarifying our specifications – Identify what we can actually accomplish
- Help us understand our whys without a specific technology focus so vendors can work to solving the why
- Don't get mired in the processes but have the processes clearly defined up front
- Vendors can help us convey urgency with upper management
- Two sets of requirement – business process and technology
- Be realistic in your timelines for organizations – Agile/Iterative

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Identified Best Practices for Enterprise Data Management

- Need to have a **clearly defined why** – what is the elevator pitch, and how to make it relevant at all levels?

- There needs to be an **enterprise focus** (think outside the silos) and an enterprise budget to support enterprise data lifecycle management

- Need a **clear roadmap** for the delivery of enterprise data lifecycle management with benchmarks along the way and staff assigned roles to meet the benchmarks

- Communication is key – **Everyone** has a role in data management, what needs to be aligned with position descriptions, training, etc. to support this?

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Identified Best Practices

- Need to have at least one person (or a staff) who is responsible for oversight and implementation at an enterprise level, "**Master Facilitator**"

- **Continuity is an issue** – need staffing risk management plan (succession planning), cross training, and champions at several levels to mitigate staffing shifts

- **Enterprise data governance policies** need to have a component that applies to all employees

- Staff need to **know their role** is no matter how small

- Project dollars need to be tied to data delivery/data governance

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Identified Best Practices

- **Guidance Documents** – Enterprise Data Management Plan, Data Governance Plan, Data Quality Standards, CADD Design Standards – These need to be developed with an enterprise focus where appropriate with the right stakeholders involved

- **Communication is key**, clearly document the why, and rolls

- **Clear processes** for managing support moving data across silo walls. Need to know what training needs to be done to support the staff in the effort – **Data Literacy** is an important part of this

- Need to create **space for Innovation** (process improvement, new technologies, etc.)

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Identified Best Practices

- Must have **clear roles/obligations** more than "gentle suggestions and voluntary compliance" when rolling out data plans

- **Explain limitations** when building things to put out to put out a fire or answer a quick question

- **Processes need to evolve** over time and be regularly reassessed and updated

- Implementation policy need **LONG-TERM support** (years not months)

- Need to have **funding and resources** defined for the process

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Steps for Success

1. Get executive champion / key stakeholder buy-in
2. Define policy
3. Define roles and responsibilities across agency
4. Define what data is to be managed as an enterprise asset
5. Define data management practices (Data dictionary, data governance, specifications, standards, metadata, data quality, records management)
6. Revisit/Iterate Steps 2-5 (May be 2-4 years cadence)
7. Implement enterprise tools (quality, catalog, warehouse)
8. Define key performance indicators, track progress, have accountability

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Thank you!

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