Lessons Learned from Integrating SAP and GIS

2014 Esri International User Conference

Joel Smith
American Water
GIS Program Manager

Contents

- **American Water Company Background**
- **Overview of Business Transformation Project**
- **Composite Asset Register**
- **Asset Lifecycle Overview**
- **Implementation at American Water**
- **Challenges of Implementation: storage space, speed, etc.**
- **Benefits of Integration: locating assets in mobile, etc.**
- **Other Asset Systems: SCADA, IDA, etc.**
- **Possible Future Areas**
- **Q&A**

American Water Company Background

- American Water, through its subsidiaries, provides high-quality water and wastewater services to approximately 14 million people in more than 30 states, as well as parts of Canada. Headquartered in Voorhees, NJ, we are the largest publicly traded water and wastewater utility company in the United States, and are the parent company to our state subsidiaries. We employ more than 6,700 people who give back to the community each day by doing their part to provide the highest quality service possible. Our professionals are committed to customer service, operational excellence and the delivery of high-quality, reliable drinking water, safe and effective wastewater treatment and release and other water-related management services. Our teams live and work in the communities they serve.

- Though our business is complex, in simple terms, we have two types of operations — those in which we own the assets - our regulated operations - and those in which we manage assets and provide water and wastewater services for a municipality or other entity - our non-regulated operations. We principally serve residential homes and businesses, we also perform non-regulated contract operations for municipalities that own their utility systems. Additionally, American Water develops and implements solutions to help meet our country's many water supply challenges.

- The primary mission of American Water's state subsidiaries is to be your local, trusted water resource company dedicated to delivering innovative solutions, environmental stewardship, and community infrastructure investment.

Primary Areas of Focus for Business Transformation

To increase focus on driving standardization, operational excellence, and so we're able to continue delivering safe, reliable water, our program objectives are to …
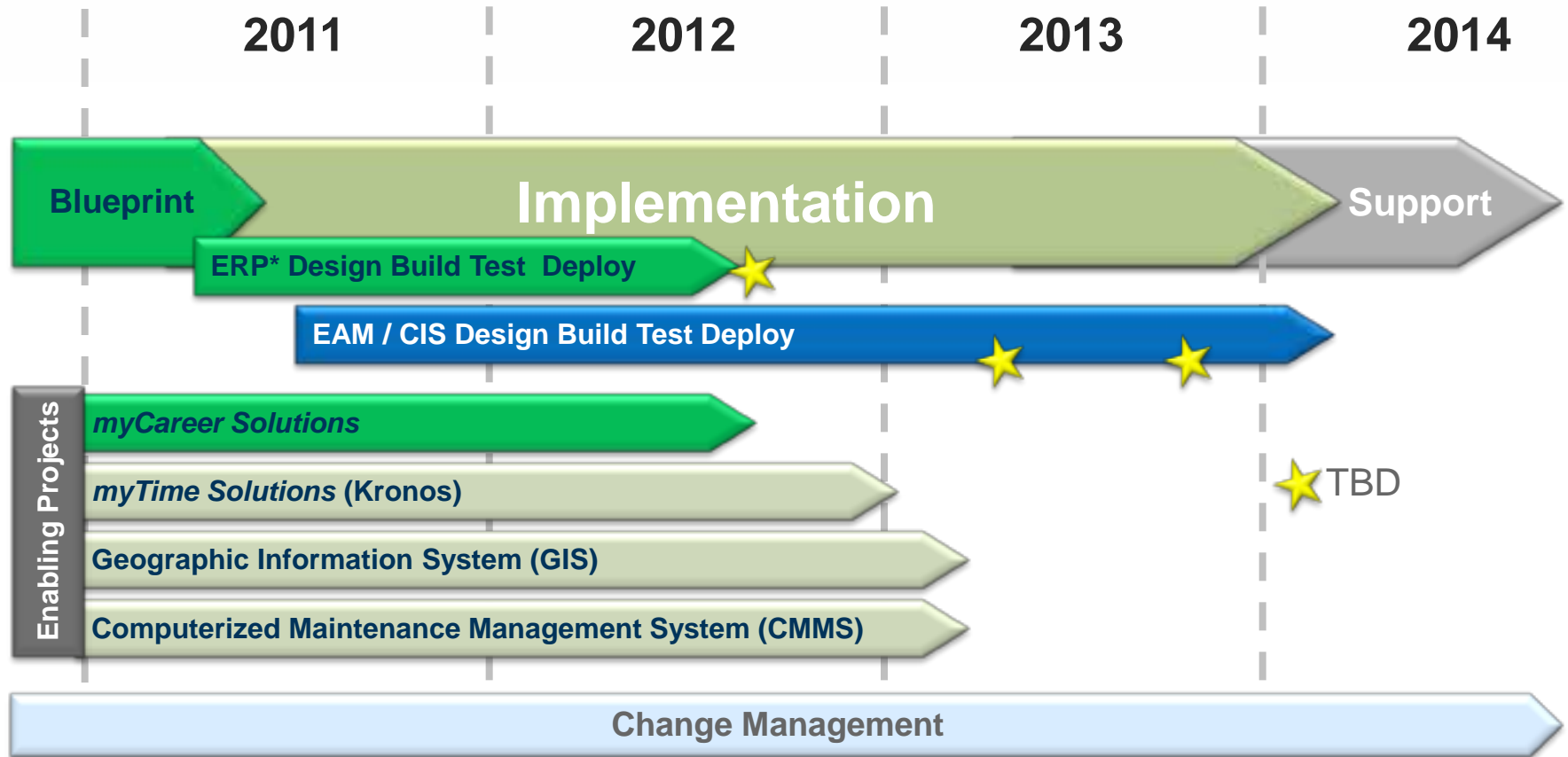
> **Replace legacy systems near the end of useful lives**

> **Promote operating excellence, efficiency, and economies of scale**

> **Enhance the customer experience**

> **Increase employee effectiveness and satisfaction**

Program Timeline

AMERICAN WATER

| 2011 | 2012 | 2013 | 2014 |

Blueprint → **Implementation** → **Support**

ERP* Design Build Test Deploy ⭐

EAM / CIS Design Build Test Deploy ⭐ ⭐

Enabling Projects

myCareer Solutions

myTime Solutions (Kronos)

Geographic Information System (GIS)

Computerized Maintenance Management System (CMMS)

⭐TBD

Change Management

⭐ = Go-live

*Note: ERP includes Finance, HR and Supply Chain

High-Level Overview | ERP, EAM, CIS

Enterprise Resource Planning (ERP)

Hire To Retire
- Time & Labor
- Benefits
- Learning
- Retirement
- Recruiting
- Hiring
- On-boarding
- Payroll

Record To Report
Collects and delivers financial information to all of our stakeholders

Procure To Pay
Ensures we have goods & services to serve customers (e.g., chemicals to treat water, electricity, pipes)

Enterprise Asset Management (EAM)

Plan To Build
Managing our physical assets from water pipes and meters to water treatment and purification plants
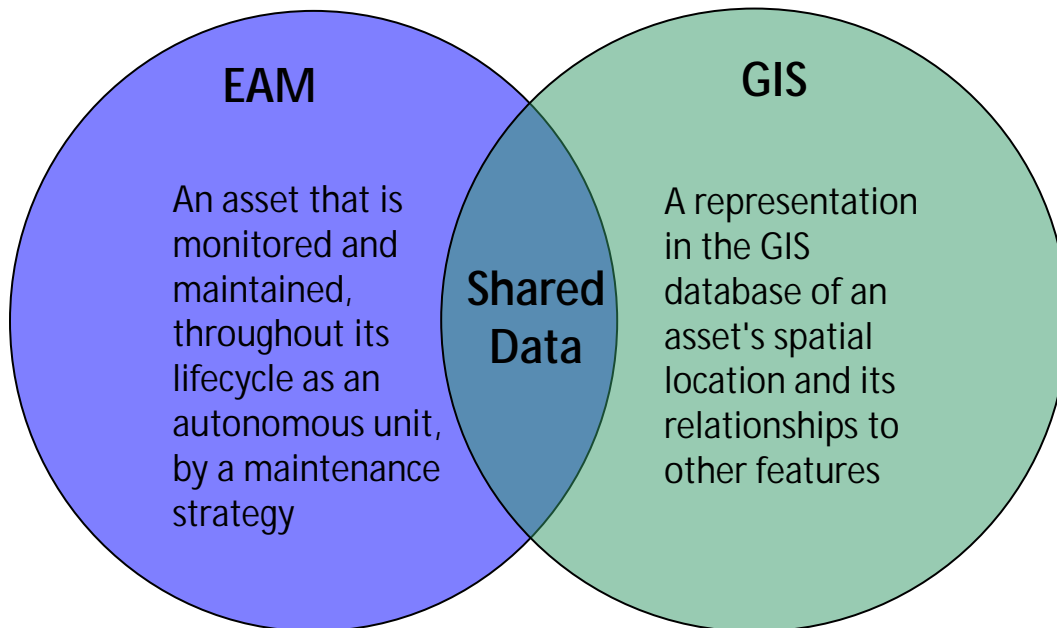
Customer Information System (CIS)

Order To Cash
Managing work related to the customer life cycle from the point service is initiated until the account is closed, including meter reading, billing, payment process, and collection activities

Request To Completion

EAM | Managing work related to customer field service work, scheduling, dispatch, and execution of field service, transmission and distribution, and production

CIS | Managing work related to customer interaction as it relates to customer service center activity, resulting in a service order or other follow-up activity

Composite Asset Register

EAM

An asset that is monitored and maintained, throughout its lifecycle as an autonomous unit, by a maintenance strategy

Shared Data

GIS

A representation in the GIS database of an asset's spatial location and its relationships to other features

Shared Data Questions
- Who is the Master?
- Does it need to be shared?
- How should it be shared?
- Are the data models reconciled to support shared data?

ASSET: A physical item that makes up the utility network and has financial, operational, and/or engineering characteristics.

- Both the Enterprise Asset Management System and Geographic Information System repositories contain asset data.

- Integrating these assets allows the full perspective of asset information to be viewed across all applicable dimensions at varying levels of detail
  - Spatial
  - Technical
  - Financial

- While preserving each system's representation and functionality for the same asset.
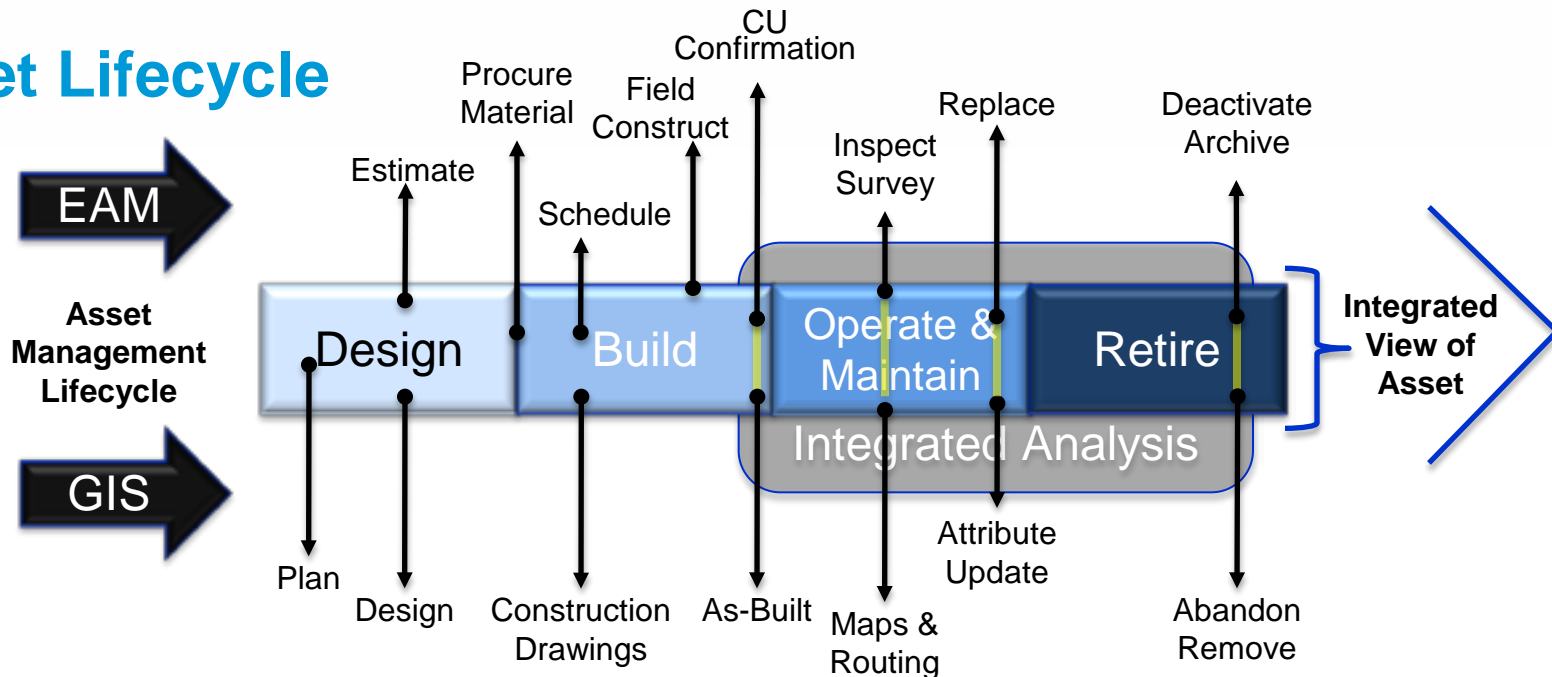
Composite Asset Register

- **EAM-GIS integration is the management of core asset data across EAM and GIS to enable more effective and efficient maintenance planning and programs; and load/growth, replacement, and reliability planning and programs with the end objectives of achieving optimal capital and O&M spend and maximized reliability.**

- **For a utility that has attained leading practice in T&D asset management, EAM is the T&D system of record for all maintenance plans, maintenance and inspection activities, inspection observations, measurements, and diagnostic asset analysis. In addition, GIS is the T&D system of record for the as-built model, spatial attribution, and complete as-built connectivity including all mains, valves, pumps, etc. in a water/wastewater system.**

- **EAM-GIS integration consists of:**

  - A shared asset data model with identified data ownership
  - Integrated workflows and business processes to manage the creation, update, and viewing of asset data across EAM and GIS
  - Supporting application integration components
  - GIS-enabled EAM maintenance and inspection enhancements
  - Composite EAM and GIS data for reporting and analysis

Composite Asset Register

- **EAM-GIS integration allows asset information to be viewed, shared, and leveraged across several required dimensions – spatial, technical, financial, and performance - at varying levels of detail**

- **EAM-GIS Integration is integration at the data entity level**

  - It is not limited to location-based relationships

  - This is a fundamental construct that provides multi-dimensional asset intelligence for asset management, planning, and engineering users need to support their lifecycle asset information management needs

Asset Lifecycle

Diagram labels:

- EAM
- GIS
- Asset Management Lifecycle
- Design
- Build
- Operate & Maintain
- Retire
- Integrated View of Asset
- Integrated Analysis

Top arrows (EAM): Estimate, Procure Material, CU Confirmation, Inspect Survey, Replace, Deactivate Archive

Middle: Field Construct, Schedule

Bottom arrows (GIS): Plan, Design, Construction Drawings, As-Built, Maps & Routing, Attribute Update, Abandon Remove
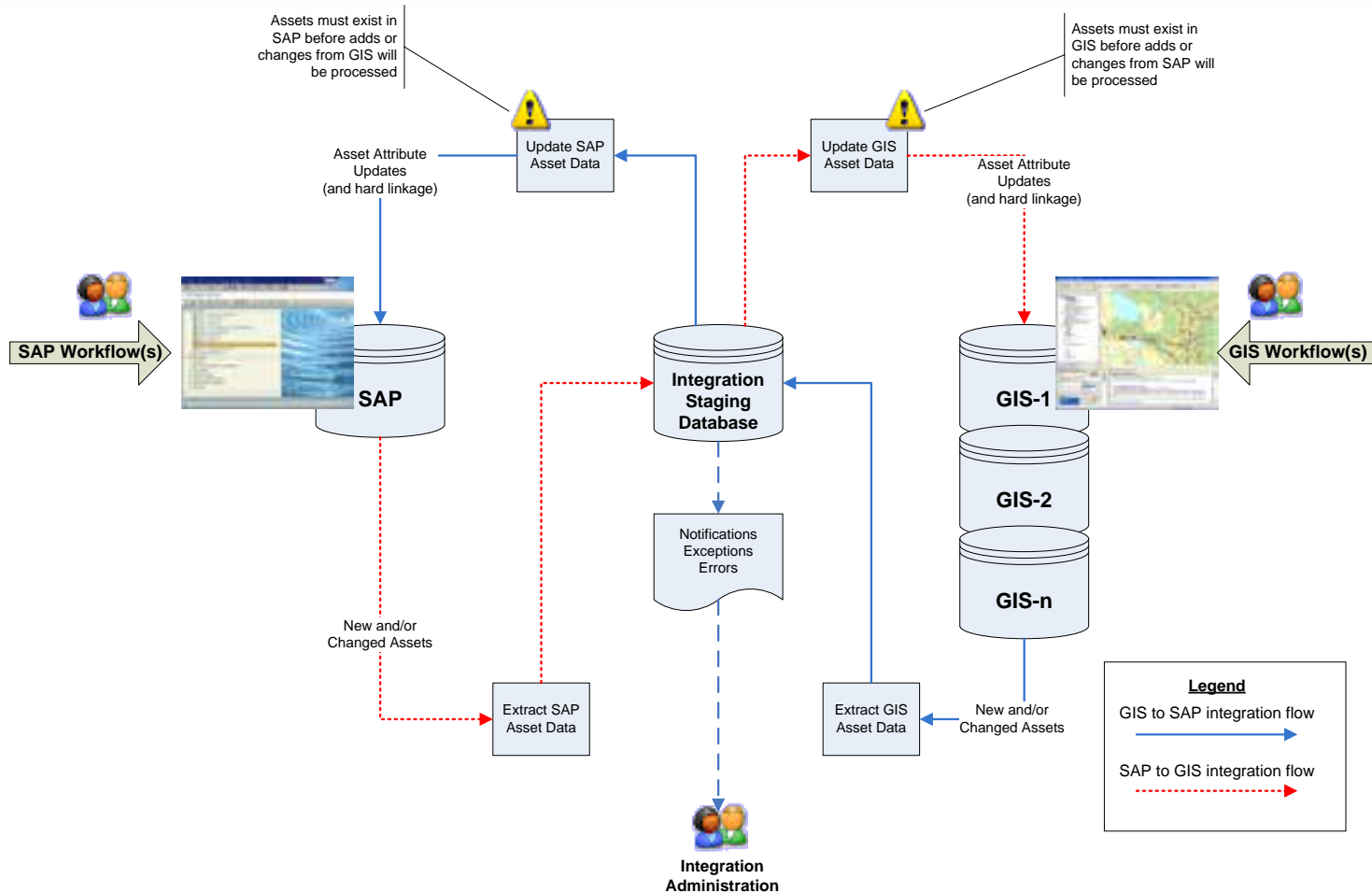
- **EAM-to-GIS integration flows through the entire asset management lifecycle**
  - Separate views maintained during design and build
  - As-built is the integration trigger
  - Integration heavily leveraged during Operate & Maintain
  - Carried through to retirement
- **Any downstream system which obtains asset data from either EAM or GIS, by default, becomes a participant in the integrated asset view**

Implementation at American Water

Assets must exist in SAP before adds or changes from GIS will be processed

Assets must exist in GIS before adds or changes from SAP will be processed

Update SAP Asset Data

Update GIS Asset Data

Asset Attribute Updates (and hard linkage)

Asset Attribute Updates (and hard linkage)

SAP Workflow(s)

GIS Workflow(s)

SAP

Integration Staging Database

GIS-1

GIS-2

GIS-n

Notifications Exceptions Errors

New and/or Changed Assets

New and/or Changed Assets

Extract SAP Asset Data

Extract GIS Asset Data

Integration Administration

Legend
GIS to SAP integration flow

SAP to GIS integration flow

Challenges

- **24 GIS Databases across 14 states**
- **291 SAP Top Level Functional Locations**
    - § Each representing a unique water or wastewater system
    - § Consistent naming formats for unique identifiers across multiple systems
- **SQL Server cursor updates to the GIS Databases for hundreds of thousands of assets consumes many gigabytes of disc space as well as creates thousands of entries in the state lineage table in SDE**
- **Very large water systems (i.e. - St. Louis County) delta processing consumes more than 8GB of RAM in the SAP processing queue.**

Benefits

- **Foundation for system integration laid**

  § The SAP equipment ID has been passed over to the GIS System when assets have been linked by the integration

  § Use of a map to locate SAP linked features rather than SAP equipment hierarchy

  § Ability to view Work Order and Notification Details from within GIS:
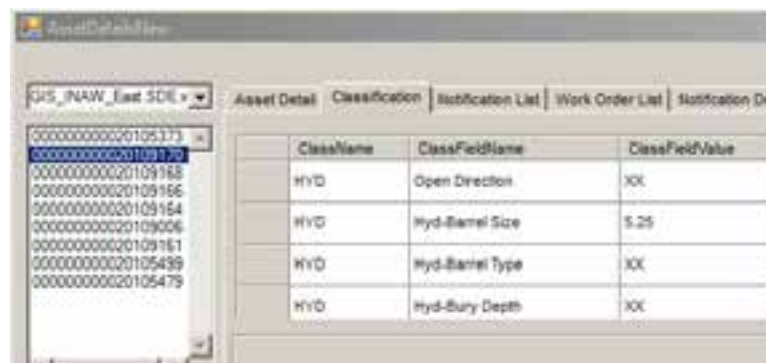
Other Asset Systems

- **SCADA**
- **Security**
- **Incident Management**
- **Main Break / Overflow**

Future Possibilities

- **Analytical interaction between SAP and GIS**

- **View based integration?**

- **Mapping more fields between SAP and GIS with more efficient processing**

Questions & Answers

Thank You!

- **Joel Smith, American Water –** Joel.Smith@amwater.com