“One Design” Developing the Vision of BIM for Engineering Design at a Utility

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Class summary

This class will discuss developing the vision and plan for transforming Arizona Public Service's lines of business (T&D, Fossil Generation, IT Telecomm) using BIM for 3D intelligent design. We will explore tools for process mapping, requirements gathering, and future visioning.

The transformation of an organization's legacy engineering design systems first requires a vision and a plan. We call our goal "One Design." We want to:

- stop duplicating effort
- share information and design intent more easily between groups
- better manage our projects
- manage our assets more efficiently while providing a higher-quality service to our customers.

The transformation will include the implementation of a number of Autodesk, Inc., Solutions in an integrated mosaic of engineering design workflows. We will also discuss a strategic 4-year plan and change-management efforts to be used to convey the vision and build consensus across the organization.

Key learning objectives

At the end of this class, you will be able to:

- Discover methodologies for business-requirements gathering and strategic planning
- Learn how to implement methods used to develop requirements, design a solution, rollout a plan, and create a business case
- Learn how to apply and customize Arizona Public Service's plan for implementing BIM for utilities to your own organization
- Discover strategies for planning, adopting, and implementing new technology

Agenda

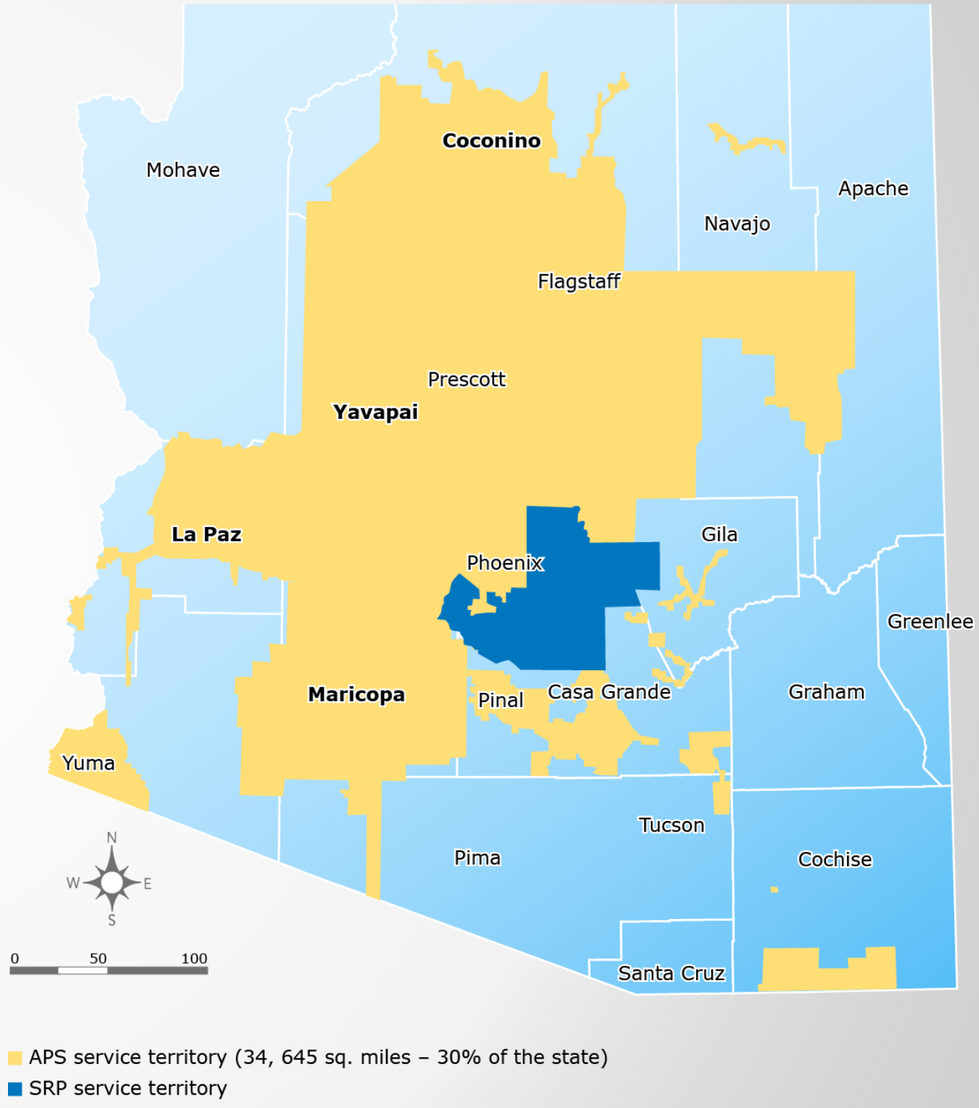
Agenda

- Why do we want to transform our business?
- What methodologies did we use to explore options?
- What are the next steps for APS?
- How can you apply this to your organization?

Arizona Public Service Company

APS Facts

- Founded in 1886
- 6,400 employees
- 1.2 million customers
- 34,646 square mile service area
  - 495 substations
  - 28,979 distribution line miles
  - 5,958 transmission line miles
  - 54 generation units, 6200 MW generation capacity
- Second largest generation fleet in the Western US



Why do we want to transform our business?

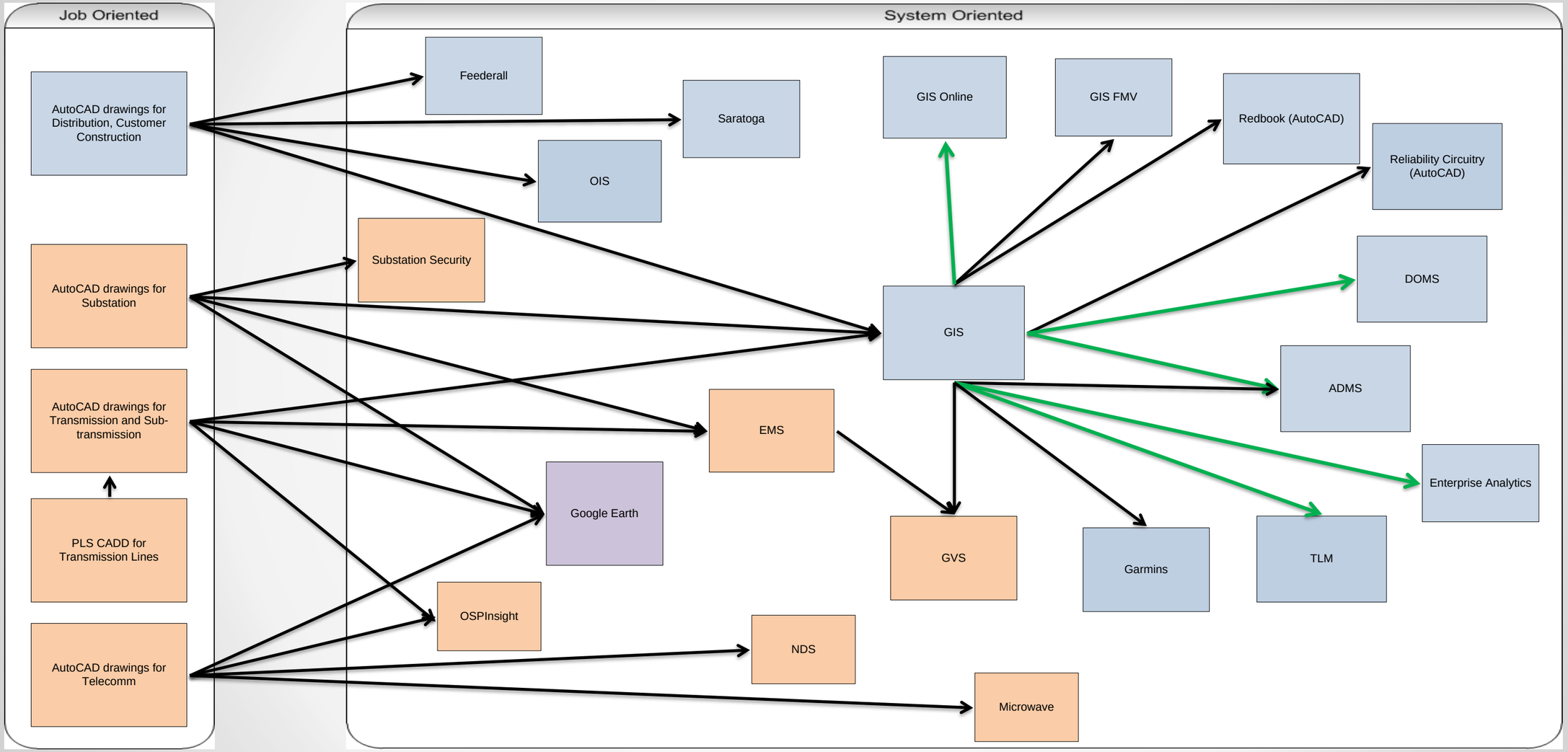
Why are we doing this?

- What we are going to discuss isn't unique to Utilities…
- Consolidated AutoCAD products/versions on Citrix
- Fresh outlook at environment – started asking questions
- Attended Autodesk University and saw some great things…do they apply to us?
- Are we positioned for the future? What are our challenges?

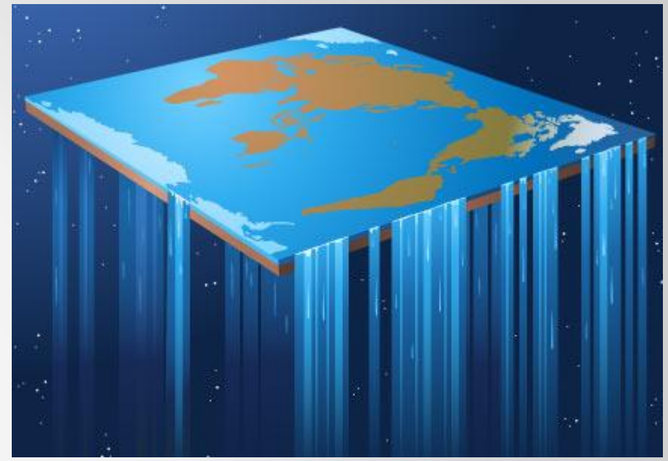
The Crazy Train

- Reentry of data into multiple systems
- Redo, limited reuse
- Numerous handoffs
- A picture is worth a thousand words…

The Crazy Train



Are We Using the Right Tools?



- We are still operating in a 2D world
  - Our Engineering Service Providers are using advanced tools
- How do we attract new talent? Where's the cool 3D stuff?
- What products are made specifically for our vertical?
  - Highly customize the tools we have because they aren't geared to our business
- What is BIM (Building Information Modeling) and how does it apply to us?

BIM = Intelligent Model-Based Design

- 3D model-based, rules-driven design process
  Providing accurate, accessible, and actionable insight throughout project lifecycle

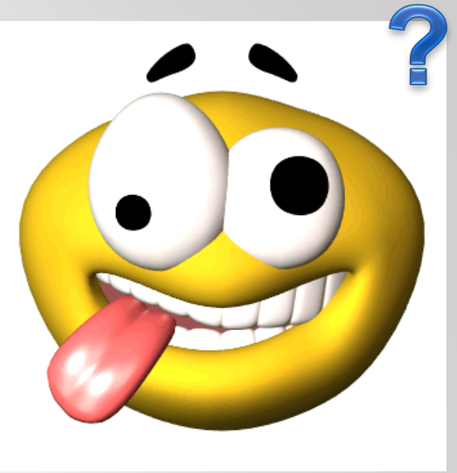
- Better preconstruction planning
  For staging, sequencing, scheduling, quantity take-off, and estimating

- Better Construction operations
  Able to support schedule (4D) and cost (5D) project management

Our Vision - Designing Operational Excellence with "One Design"

- Improve ***operational effectiveness, cost control, reliability***, and ***safety***
- ***Transform*** APS' engineering and design data creation and workflows
- ***Leverage*** Intelligent Model-Based Design

Am I crazy?



- Should we be doing **One Design**?
- Should we be moving towards **BIM** or more **Intelligent Model-Based Design**?
- Is ‘do nothing’ an appropriate option?
- Took thoughts to the DPC (Design Process Committee)

No, I’m not crazy!

- They not only agreed, but they couldn’t wait to start…

Can we start tomorrow?

What took so long?

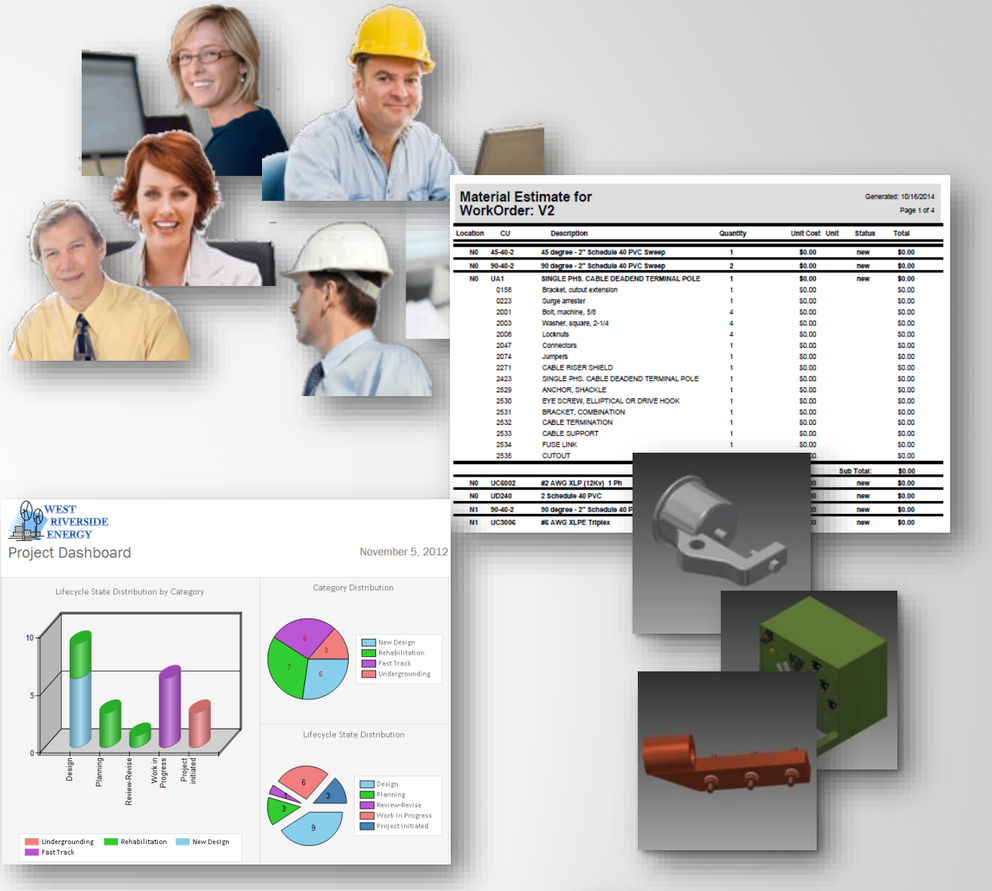
Here are my folks!

We’ve been needing this!

When do you need the participants?

APS Guiding Principles

- Purpose-Built, Model-Based and Collaborative Solutions
- Improves the APS Financial Environment
- Enables Future APS Personas
- Meets Regulatory Requirements and Addresses Key External Factors



Energy regulators

What methodologies did we use to explore options?

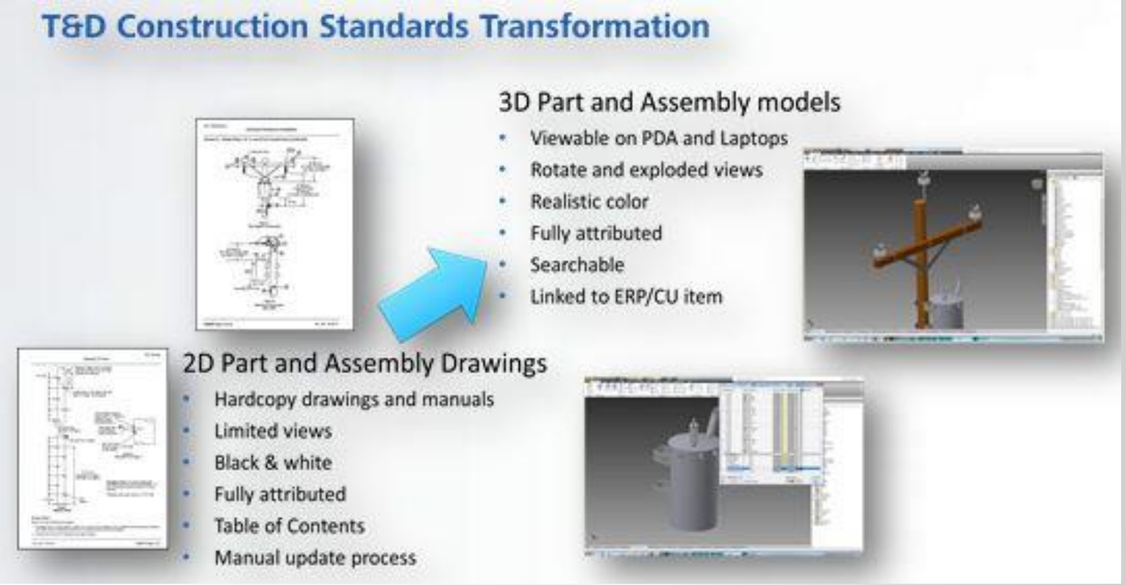
Strategic Plan - Timeline and Milestones

	Month 1	Month 2	Month 3	Month 4	Deliverable
Awareness	BIM for Utilities Awareness Sessions				Executive and End User BIM Awareness
Strategic Analysis		As-Is Workshops As-Is Assessment			High Level Business and Technical Requirements, Challenges, and Opportunities
Visioning			Visual Strategy Workshop		Strategic Planning of APS Future State for Executive Alignment and Support
Strategic Planning				To-Be Solution Definition Develop Strategic Implementation Plan Estimate Costs and Develop Business ROI	Strategic Implementation Plan, Cost Estimate, Schedule & Supporting Business Case

Kick Off

Present Plan

Awareness Sessions



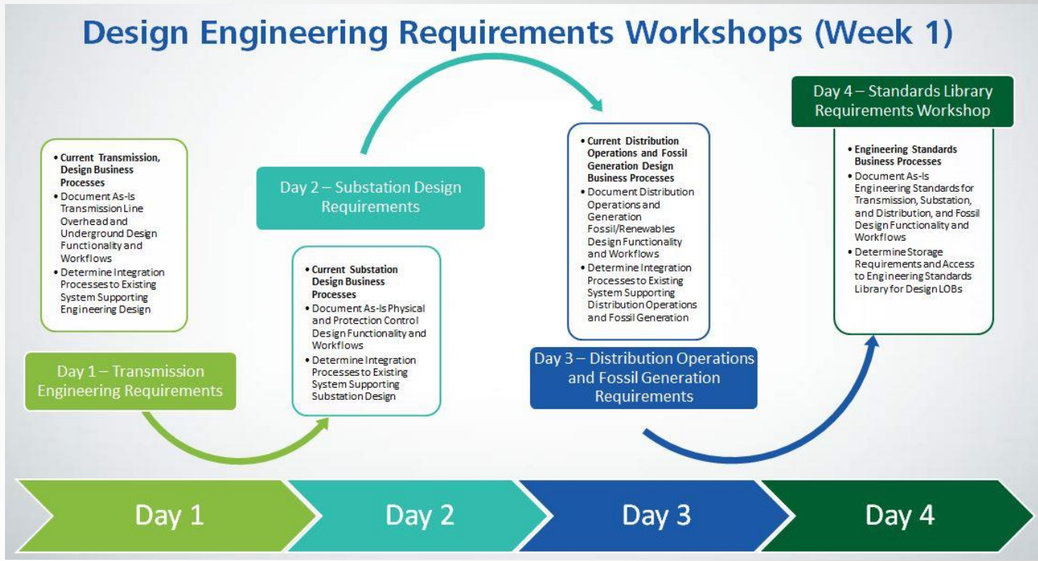
- Purpose:

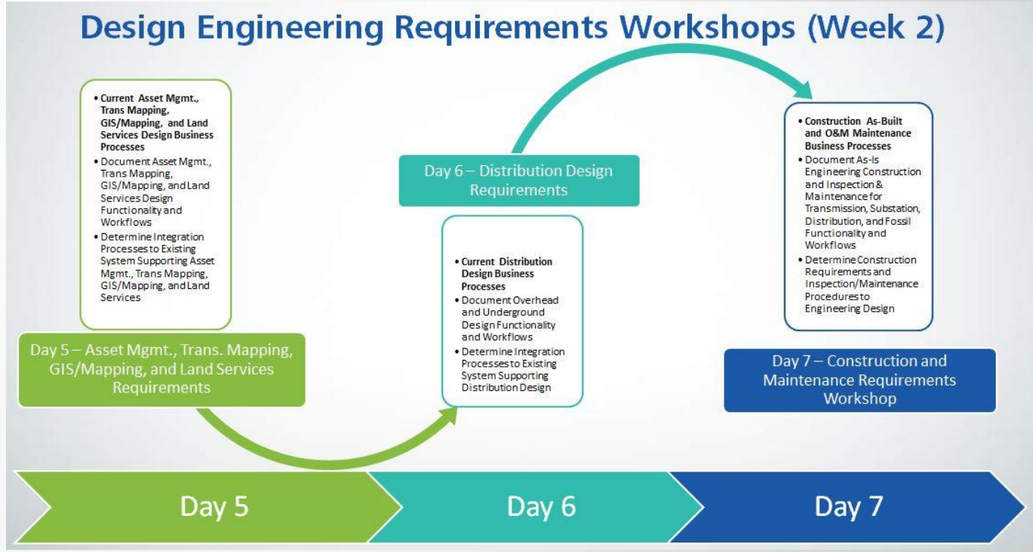
  Open minds to what is possible…

- What BIM for utilities might mean for each Line of Business
- For all workshop participants
- Included middle and upper management, executive sponsor

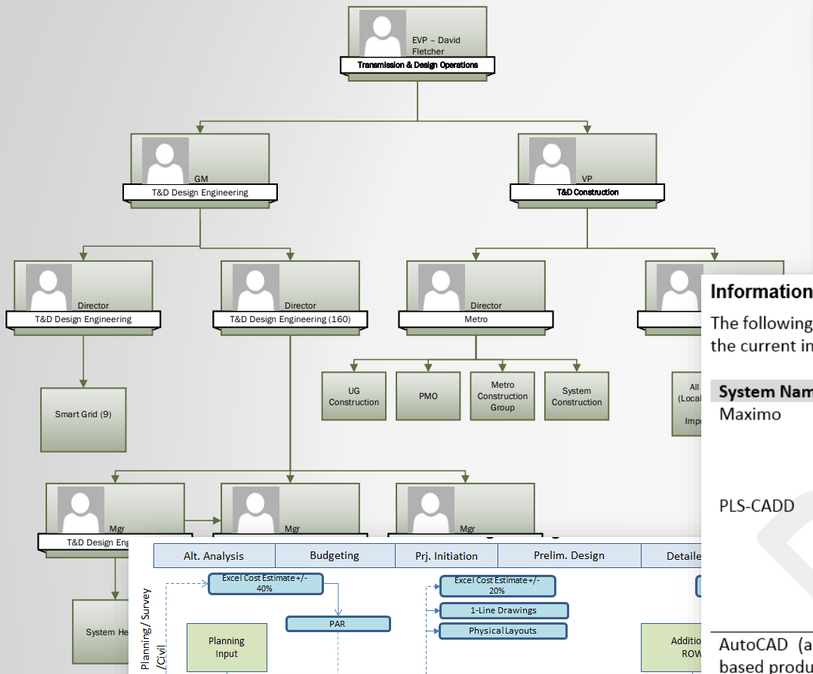
As-Is Workshops

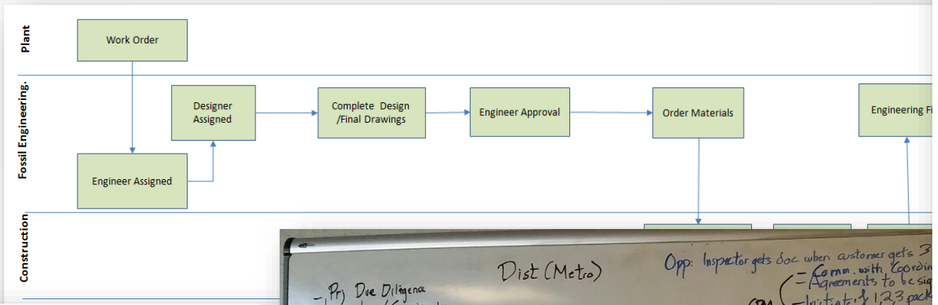
- APS made 40+ people available, including Frontline and Managers
- What works well? What doesn't work well?
- Process mapping

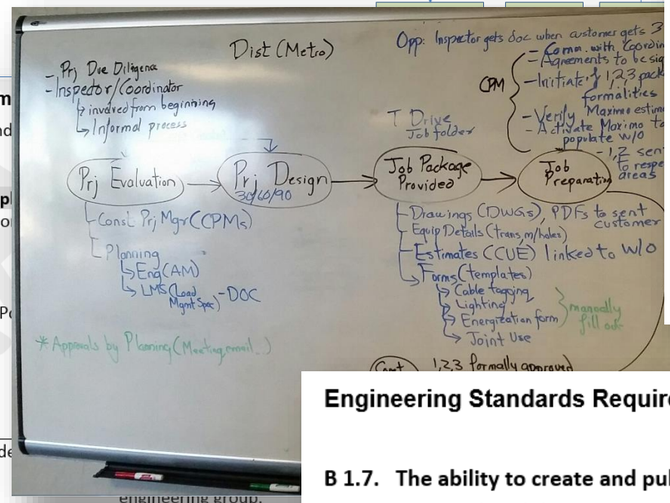




As-Is Workflows



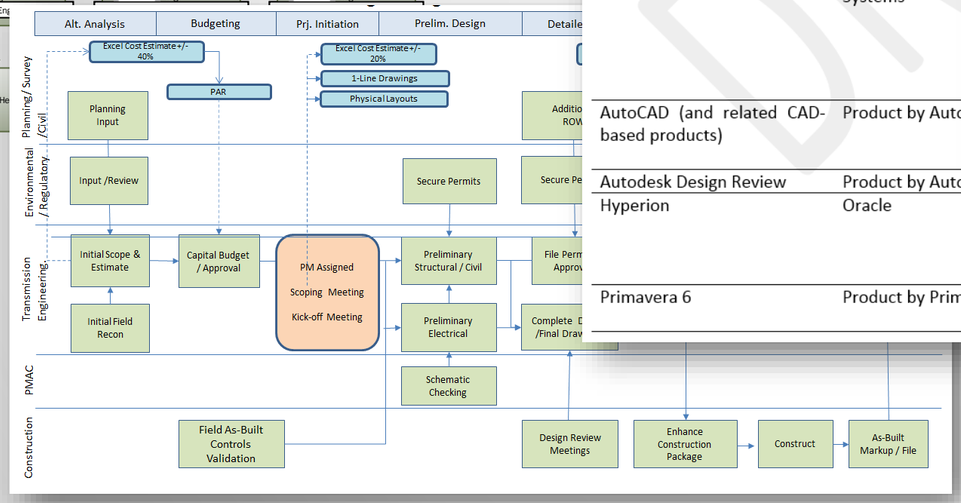




Information Technology and Data Managem

The following information technology solutions and the current information technology environment:

System Name	Technology/Suppl	
Maximo	Product by IBM, o	
PLS-CADD	Product by P Systems	
AutoCAD (and related CAD-based products)	Product by Autode	
Autodesk Design Review	Product by Autodesk	Used by IT/Telecom
Hyperion	Oracle	Used by Finance for p financial perform analysis of estimate v actuals.
Primavera 6	Product by Primavera	Project scheduling project status tracking.



Appendix B – APS Staffing by Organization

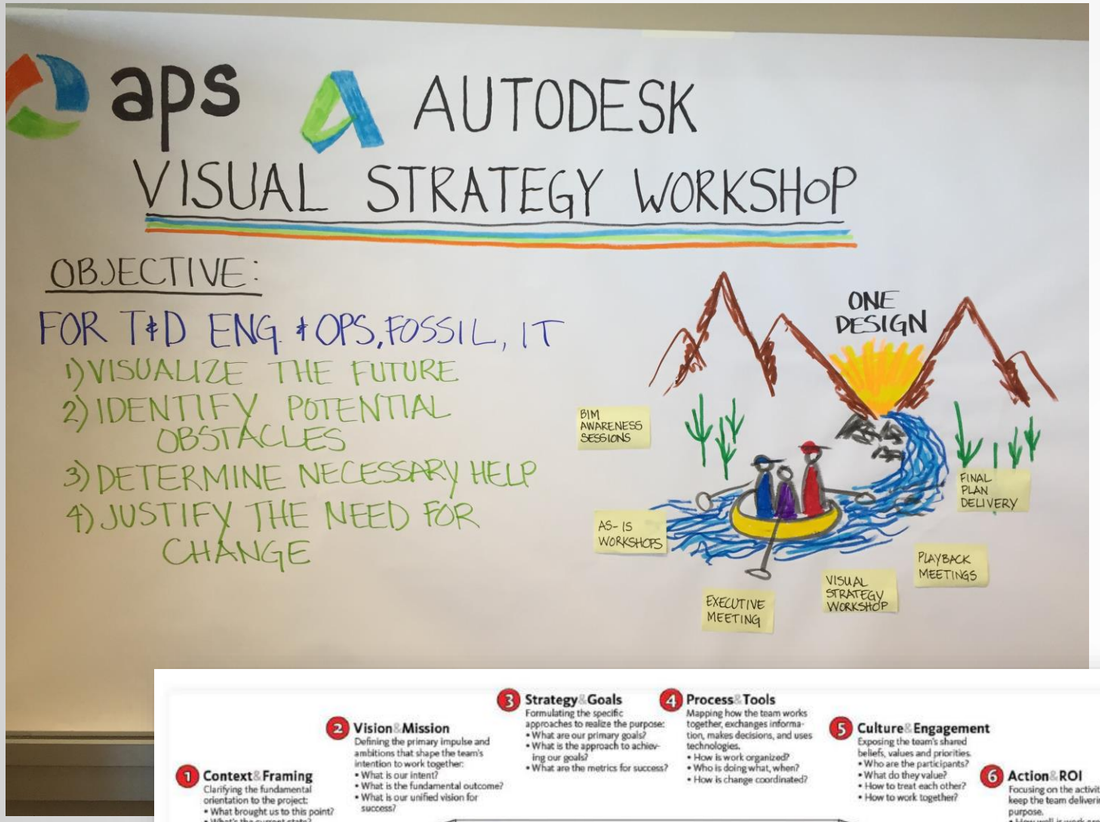
Group	Title	Staff	Contract
Transmission Engineering Design	Engineers/Designers	24	
Substation Engineering Design	Physical Designers	3	
	Control	2	2
	Engineers/Designer Electrical	3	1 (Rotational)
	Civil Designers/Engineers	2	1 (Intern)
	Apparatus Designers/Engineers	2	
PMAC	Engineers	12	5 (Engineers/Techs)
	Techs	4	
IT Telecom	Engineers	9	
	Designers/Techs	4	
Fossil O&M	Designers	4	
Engineering Standards	Managers	1	
	Designers	1	
	Analysts	1	
	Reliability Coordinators	2	
	Engineers	7	
Transmission Construction (69Kv and down)	Staff – Includes PM, Engineers, and Construction	106 (in-house)	
Substation Construction	Substation – Includes PM, Engineers, and Construction	100 (in-house and outsourced)	
Distribution (all but Metro)	Staff - Includes PM, Engineers, and Construction for Local Distribution, O&M, Capital Improvement)	40-50	
	Project Managers	30	

Engineering Standards Requirements

B 1.7. The ability to create and publish engineering standards manuals

- **F 1.7.1.** The ability to create 3D models of each component (pole, cross arm, insulator, etc.) that is part of the existing Transmission, Distribution, Substation, Fossil Generation and IT Telecom Construction Standards Manual.
- **F 1.7.2.** The ability to reproduce the current 2D manual pages, including drawings, tables and notes from the 3D models.
- **F 1.7.3.** The ability to produce an exploded view from any model for use in training instructional materials.
- **F 1.7.4.** The ability to provide a 3D visual for use on a mobile computing device in the field to aid in understanding complex devices and assemblies.
- **F 1.7.5.** Provide online access to standards to internal company users and external contractors.
- **F 1.7.6.** The ability to apply standards changes to all affected drawings.

Visual Strategy Workshop

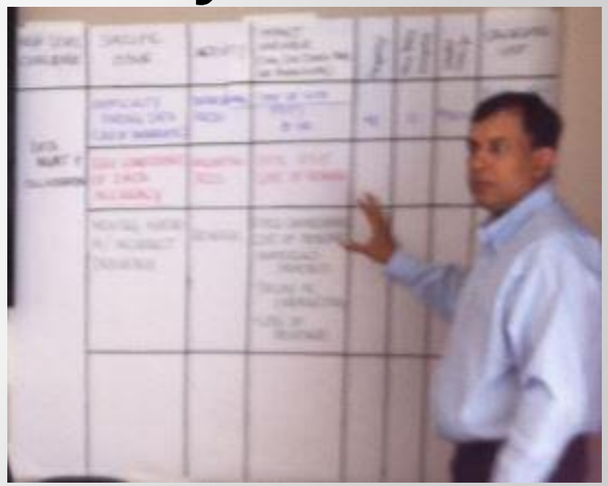


Rocks and Rapids

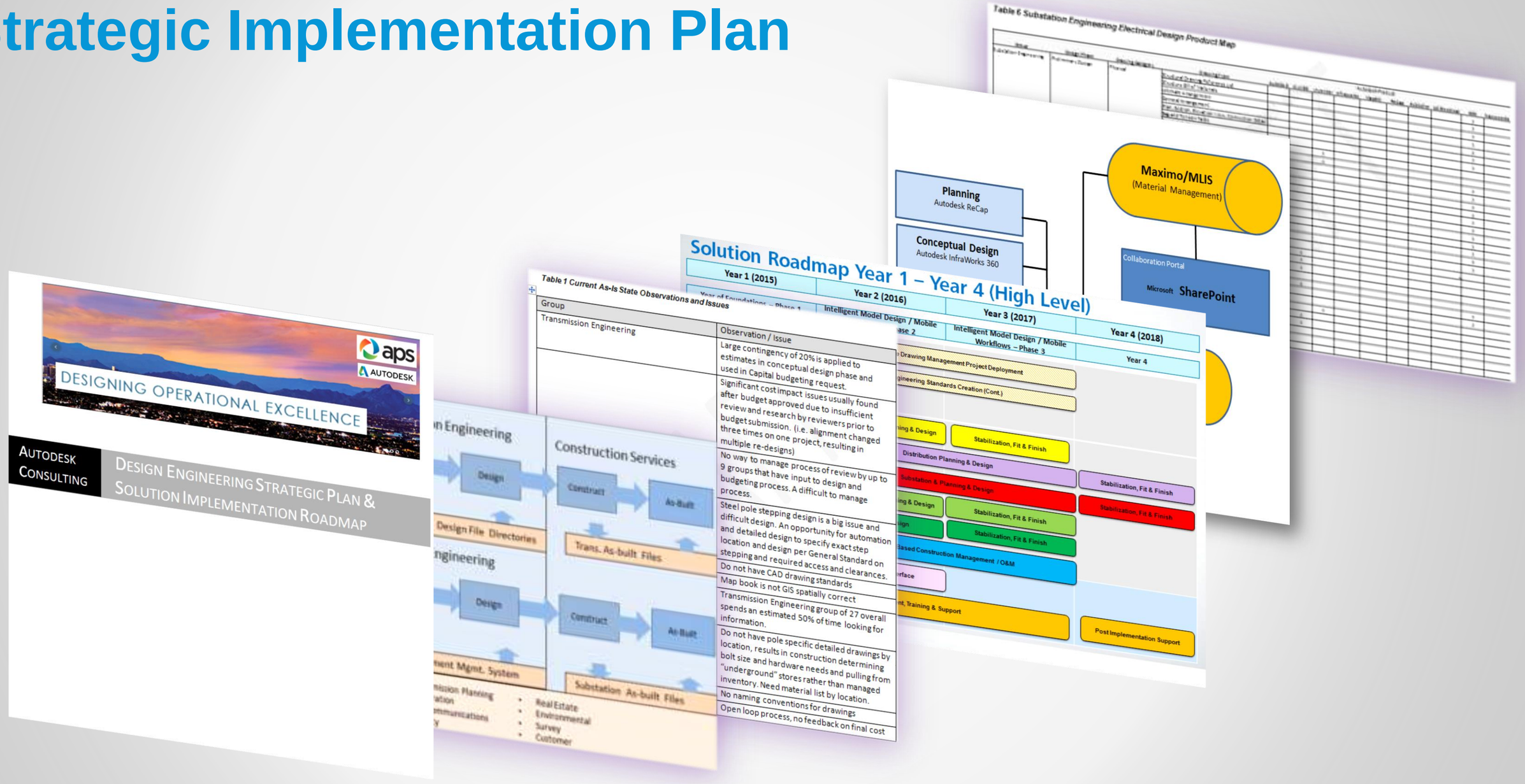
1. Management Support and Commitment
2. Resources
3. Business Planning
4. Training/Improvement
5. Change Management/Culture
6. Funding and Time

Visual Strategy Workshop
Business Case Exercise

- Describe how they would like to:
  - See and do things differently
  - Impact their work and collaboration
- Describe impact of being more competitive
- Quantify the value of doing work more efficiently
- Develop impact statements/formulas
  - How much time does it take?
  - How often do you do it?
  - How much does it cost?



Strategic Implementation Plan



What are the next steps for APS?

Call To Action

- Develop a Comprehensive **Change Management** Program
- Build a Strong **Foundation** – Start with Standards and Data Management
- **Priority-Based and Phased** LOB Implementation
- Centralize Creation and Management of all T&D Construction **Standards** – Industry Best Practice
- Identify **Quick Wins** and Create Momentum
- **Participate** in the Substation Design Solution Industry Consortium

Develop a Comprehensive Change Management Program

Establish a Two-Tier **Business Support Process Group**

Design Engineering Steering Team

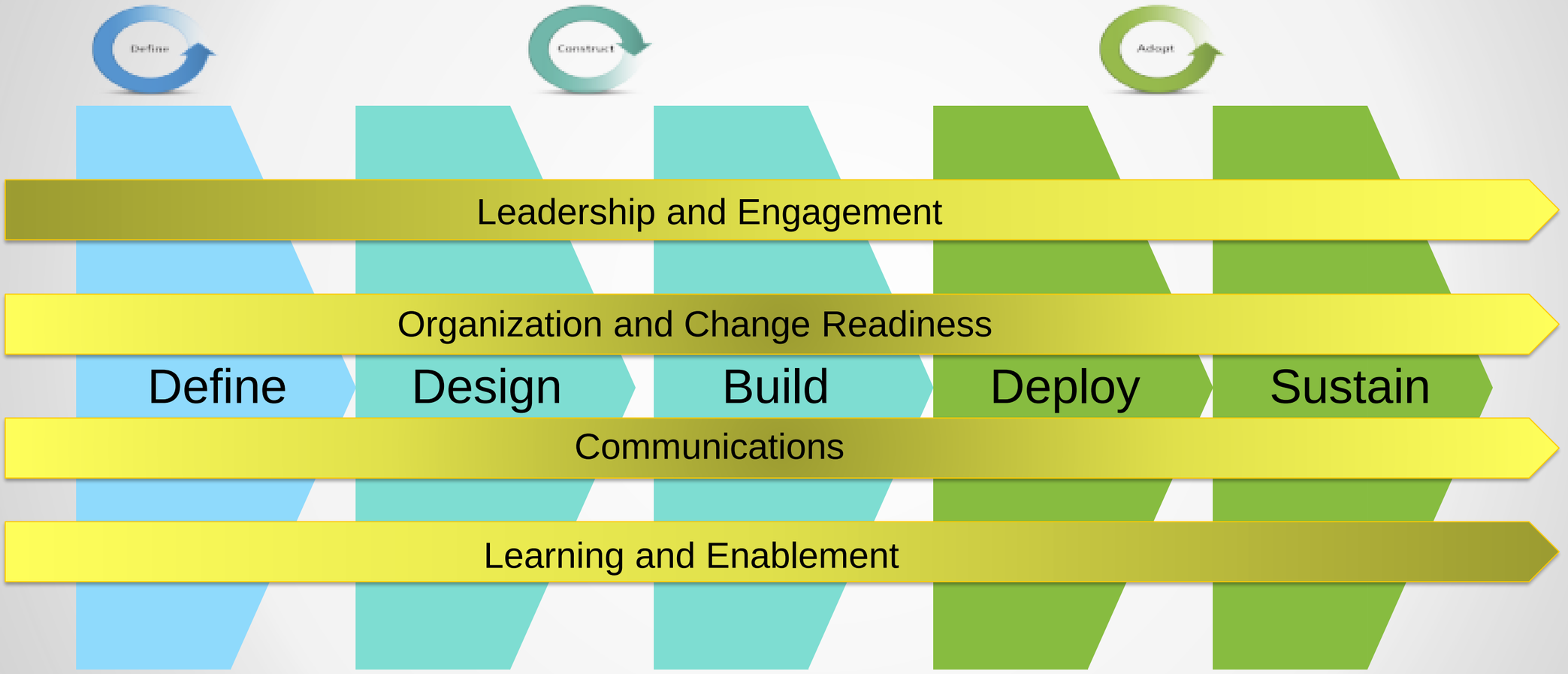
- Drives vision and strategy for Intelligent Model Design
- Seeks funding and creates right incentives and organization structure
- Responsible for Data Validation Strategy

Design Engineering Management Work Team

- Achieves goals set by planning process
- Responsible for standard workflows
- Drives implementation on a day-to-day basis

Develop and communicate commitment to invest in and support Intelligent Model Design initiative

Change Management - Integrated Approach



Build a Strong Foundation

- Consolidated Standards
- Enterprise Drawing Management
- Land/GIS

Priority-Based and Phased LOB Implementation

- Who decides who's first/what's next? How do we prioritize?
  - By Complexity?
  - By Who's ready?
  - By Financial impact?
- These are the questions we are asking ourselves

How can you apply this to your organization?

What can you do with this information?

- Do you have a vision for where you want to be?
- Do you need to have awareness sessions?
- Who should be involved in your as-is workshops?
- How does the visual strategy workshop help you explore opportunities?

What can you do with this information?

- Have you identified an executive sponsor?
- How will you keep participants and executive sponsor aware of progress and receive feedback?
- The value is in hearing from your own people

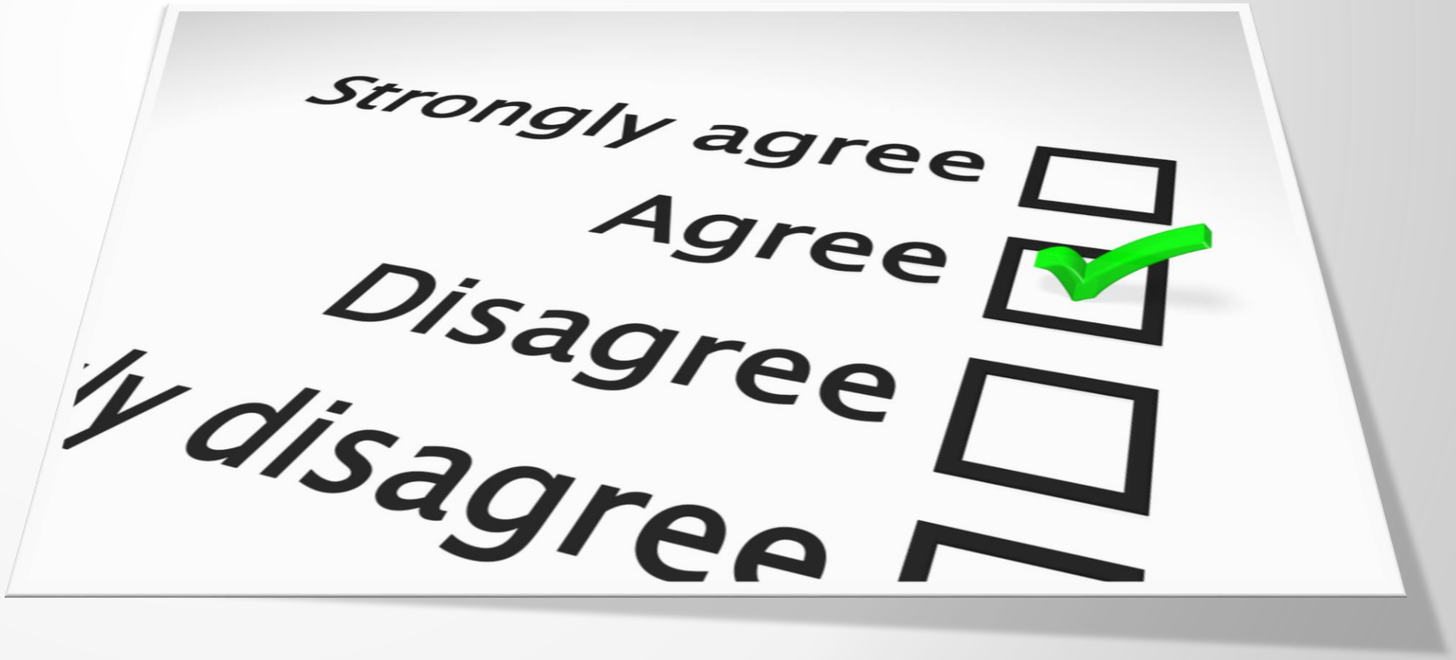
Lessons Learned/Final thoughts…

- Even if don't have all the answers, don't wait to start
- Course corrections are okay and necessary
- Multiple levels involved – inclusion is important
- Remember the employee of the future
- Give people the necessary time to participate in the workshops

Questions?

Be heard! Provide AU session feedback.

- Via the Survey Stations, email or mobile device.
- AU 2016 passes awarded daily!
- Give your feedback after each session.
- Give instructors feedback in real-time.



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