

Esri Roads and Highways: Implementation Best Practices, Tips, and Tricks

Esri User Conference 2018

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SDCC Room 08

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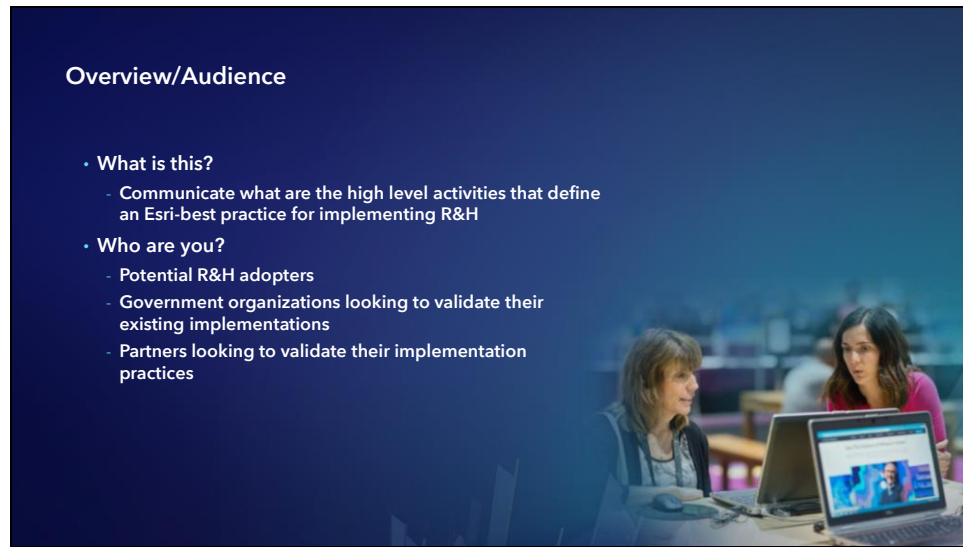
Clive Reece (creece@esri.com)

Slide 1



Title slide

Slide 2



Overview/Audience

- What is this?
 - Communicate what are the high level activities that define an Esri-best practice for implementing R&H
- Who are you?
 - Potential R&H adopters
 - Government organizations looking to validate their existing implementations
 - Partners looking to validate their implementation practices

The slide features a dark blue background with a faint image of two women sitting at a table, looking at laptops. The text is white and clearly legible.

In planning our talk, we thought back through the last couple of years of Roads and Highways implementation work ...
We also thought about who are you, and the topics that might give you the most benefit.
And briefly, who are we?

Slide 3



Over the course of the next 45 minutes we want you to consider **three** major themes within the context of Roads and Highways best practices:

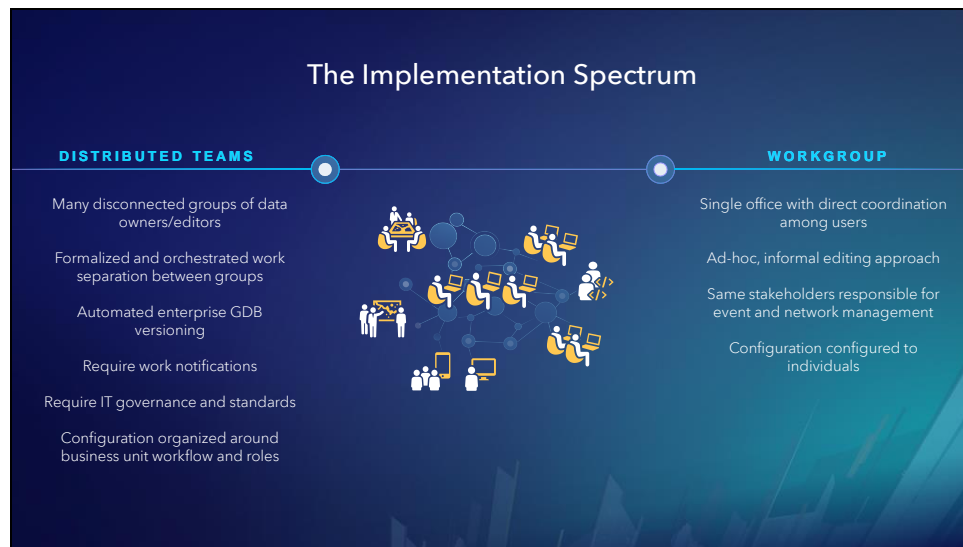
- Choosing the Right Implementation pattern for your organization
- Activities during implementation that are unique to a R&H project
- Securing your solution with ArcGIS Enterprise

Slide 4



Transition slide to Roads and Highways Implementation Patterns

Slide 5

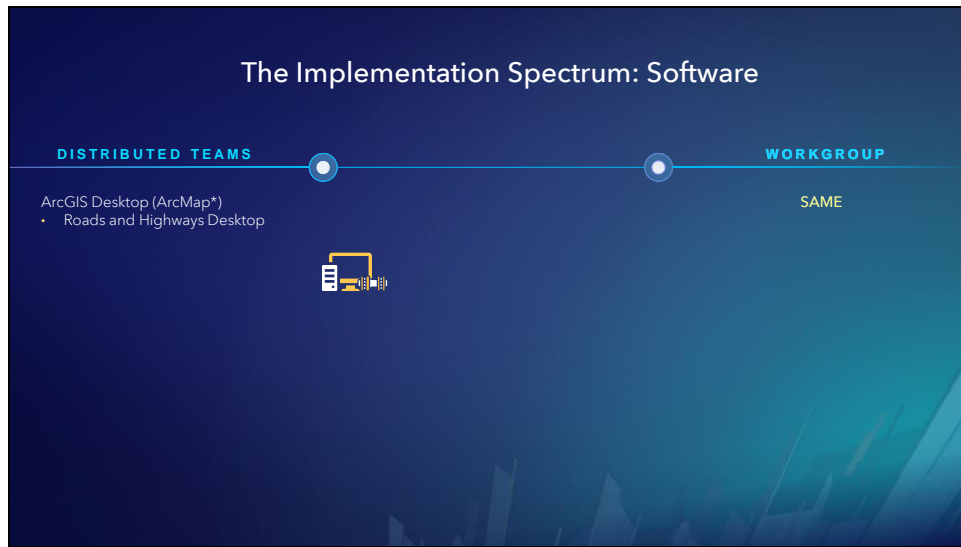


When we look at the cross section of Roads and Highways implementations we are seeing a fairly well defined spectrum for the style of implementations based mostly on the organizational model.

On one end of the spectrum there are medium to large enterprise customers that have widely distributed teams.

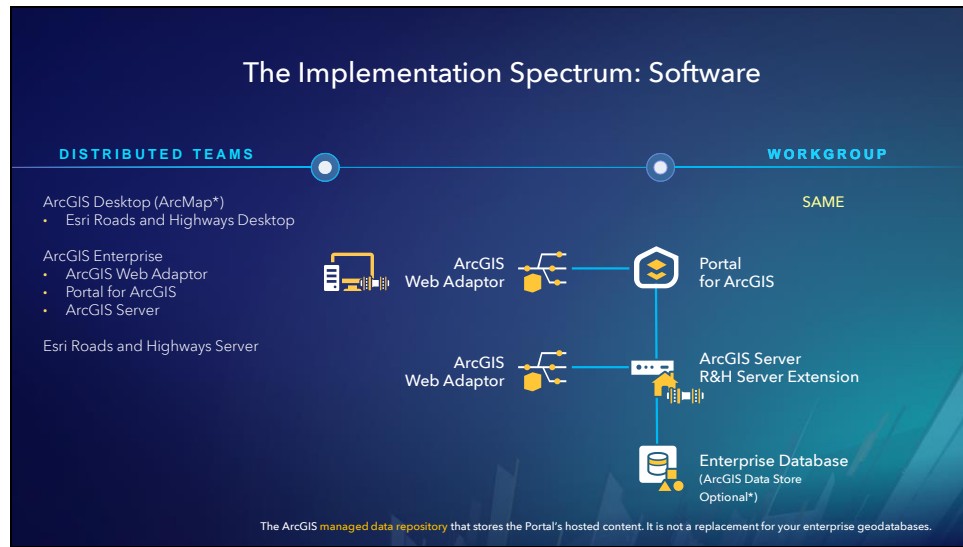
On the other end of the spectrum there are smaller, single offices we consider having more of a workgroup philosophy.

Slide 6



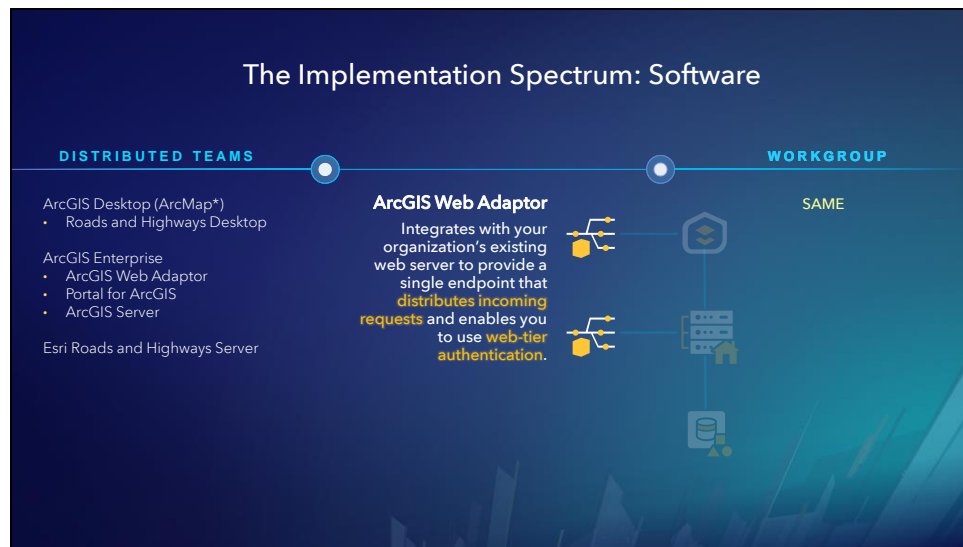
From the perspective of configuring software to create a Roads and Highways solution, for the most part no matter whether your organization falls on one end of the spectrum or the other, there are some basic elements that all configurations share. So let's take a look at what you need to get up and running with an enterprise highway data management solution.

Slide 7



Note that the software stack for a Workgroup configuration is the **SAME** as for distributed models

Slide 8

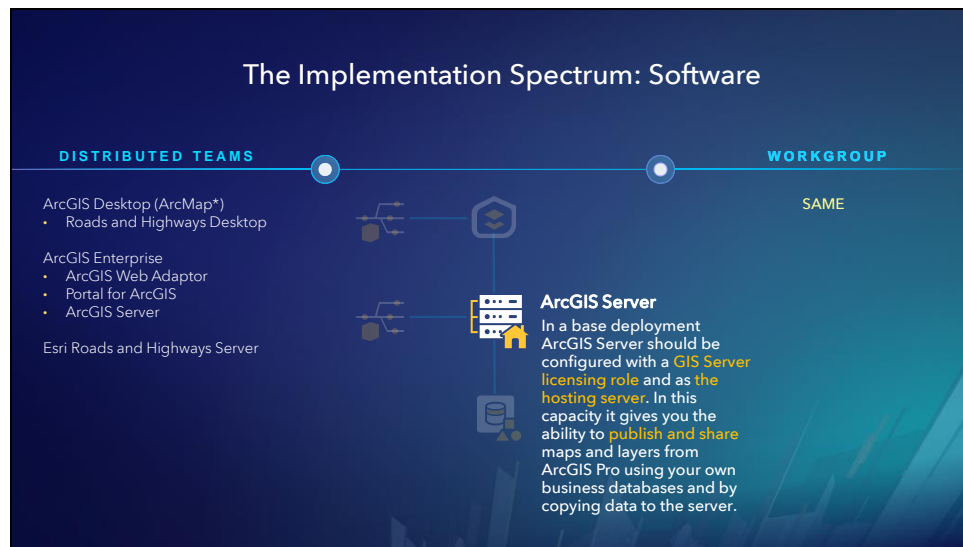


Slide 9



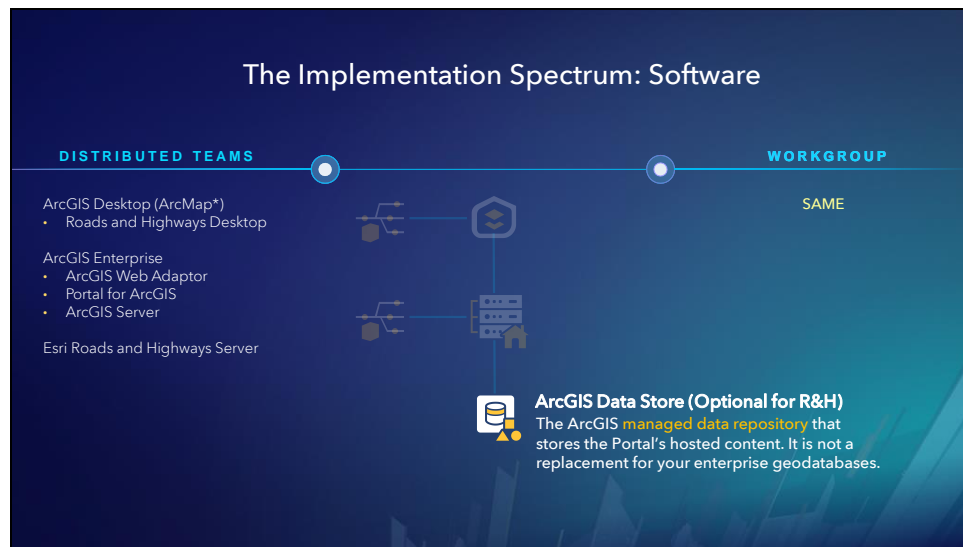
Yes – Portal is a key component for the Roads and Highways solution configuration. We use portal for configuring and storing webmaps, securing and sharing content, and identify management, and enabling additional productivity tools in Event Editor and Roadway Reporter

Slide 10



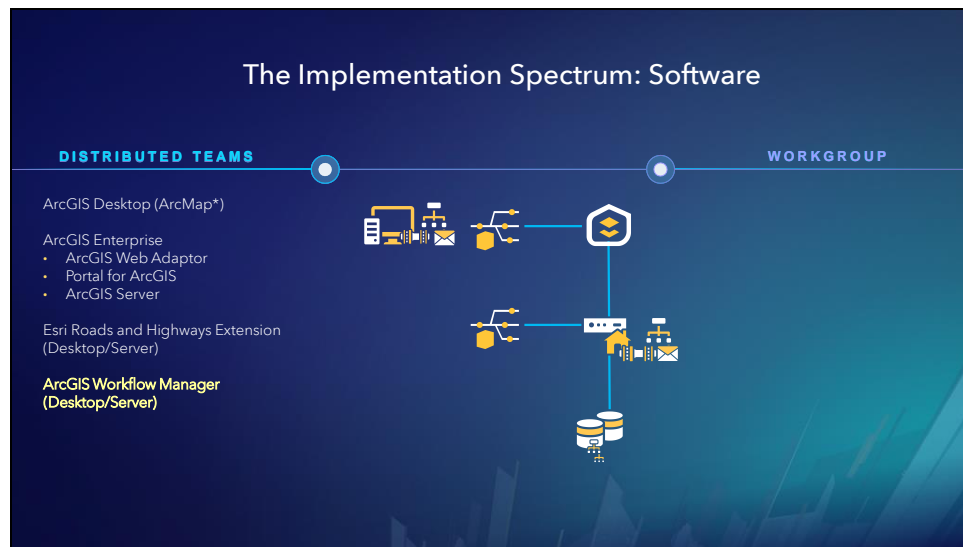
Of course, ArcGIS Server is the foundation for content publishing from out of your enterprise database. Roads and Highways is still an extension to the GIS Server licensing role.

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Of note, I would also like to call out the ArcGIS Data Store. For Roads and Highways specifically, it is not required

Slide 12



Up to this point, both organizational models have shared the same software characteristics. However, when looking to create a solution configuration where you want to connect distributed teams within the organization to the software and provide added value in terms of orchestrating and managing work assignments, creating role-based processes, enabling email notifications etc then we go to ArcGIS Workflow Manager.

Additionally, MWX as we refer to it is also an excellent tool for managing centralizing and standardizing operational business practice and also allows you to monitor performance and efficiency.

Slide 13



Now, let's jump in to the nuances between how you configure the software and what the expected user experience will be based on these organization models.

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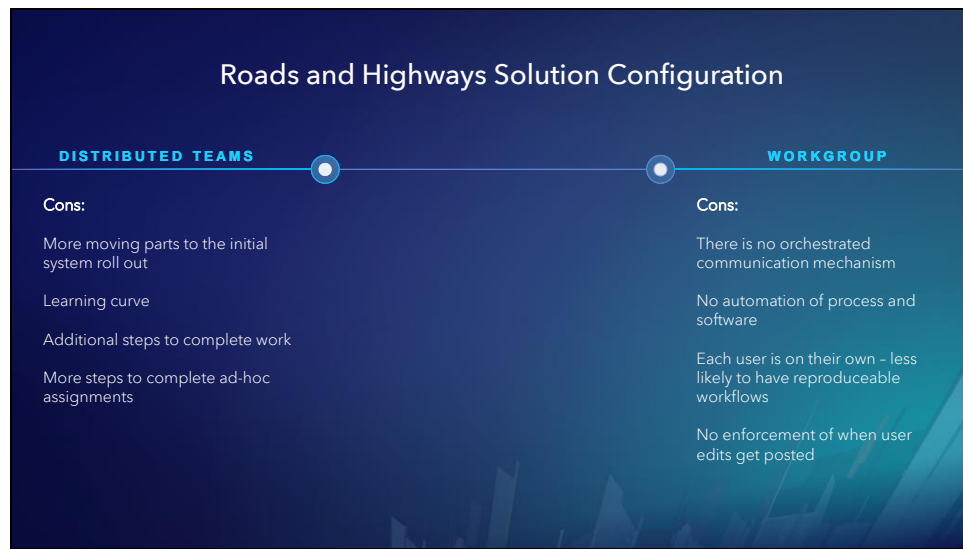
Esri software demonstration of Workgroup LRS edit compared with Distributed team LRS edit. Note the starting point for a Distributed Team pattern is Workflow Manager (WMX client), not Roads and Highways.

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Review Pros of each implementation pattern

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Review cons of each implementation pattern.

Note that “Each user is on their own” in the Workgroup pattern can be considered both a positive and a negative.

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Transition slide to Project Delivery topic

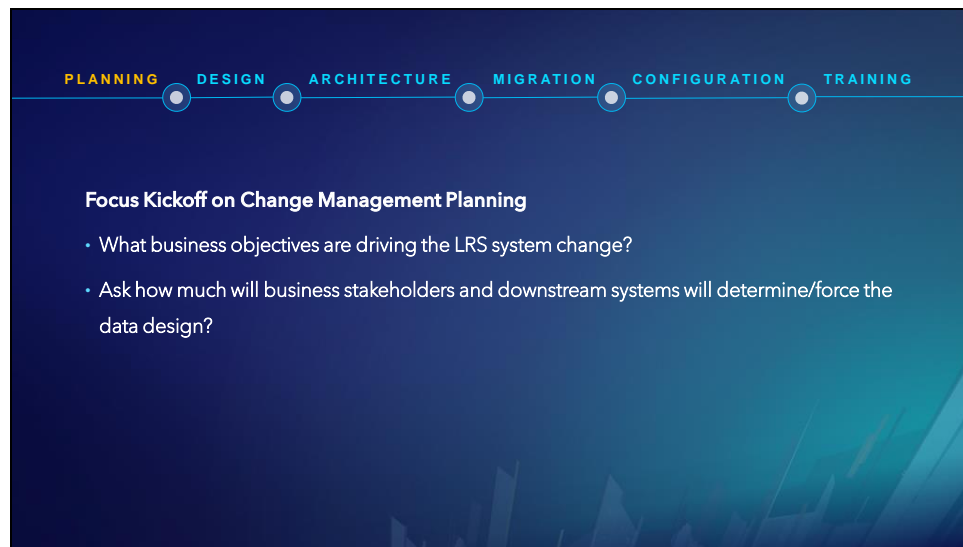
PLANNING DESIGN ARCHITECTURE MIGRATION CONFIGURATION TRAINING

Project Delivery

- What are the common pitfalls at each stage?
- Any lessons learned to prevent schedule slip?



Where are “crashes” likely to happen?
How can we avoid them?



We typically use the kickoff meeting to level set on scopes and schedule. What we have learned is the main focus should be on Change Management Planning. Users will have new workflows. Dependent business systems will be connecting to a new solution.

(i.e. how much opportunity do you have to change to new business processes?)

What business objectives are driving the LRS system change?

Ask how much will business stakeholders and downstream systems will determine/force the data design?

No Flexibility

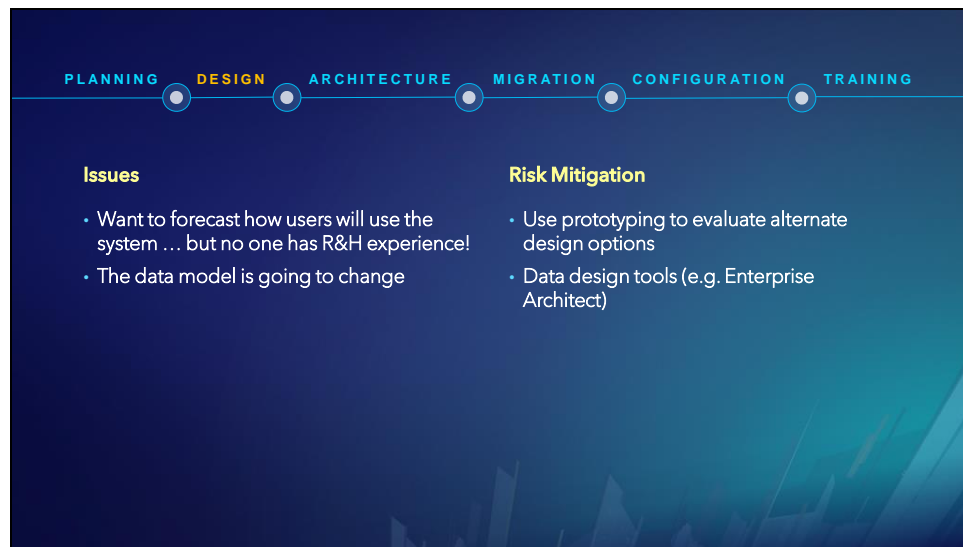
- No change to LRM or geometry
- No change to business processes
- Software capability demonstrations focused on eliciting possible future benefits of change

Flexible

- Opens opportunity to eliminate or simplify institutional “workarounds”
- Software capability demonstrations focused on evaluating user impacts of design decisions

Document change management and business stakeholder communication plan

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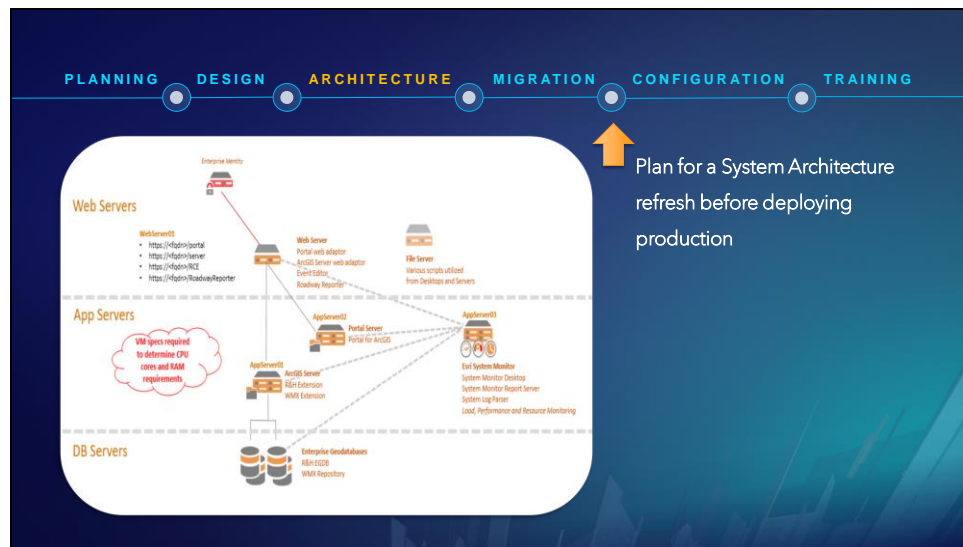


The Customer understands their data and legacy system. They use this as the basis for judging change. That also means they don't know what they don't know.

When looking at design alternatives, try to consider the business user's perspective on engaging the software rather than focusing solely on whether you can fit the legacy LRS into the COTS software.

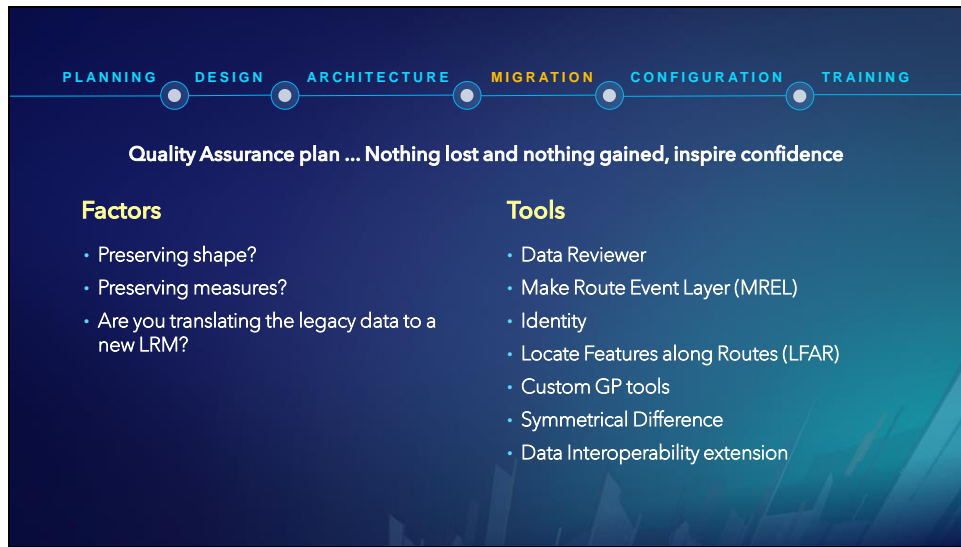
Prototyping examples:

- Dual Carriageway ... geometry, Route ID, calibration, gaps
- Route concurrency ... route dominance, geometry
- Intersections
- Single field versus multi-field events



ArcGIS Enterprise changes the game ... plan for it. That means Portal and an identity. We will talk about this in a later section. For now, the main point here is you need to plan and budget for a System Architecture refresh before deploying production. Here (arrow)

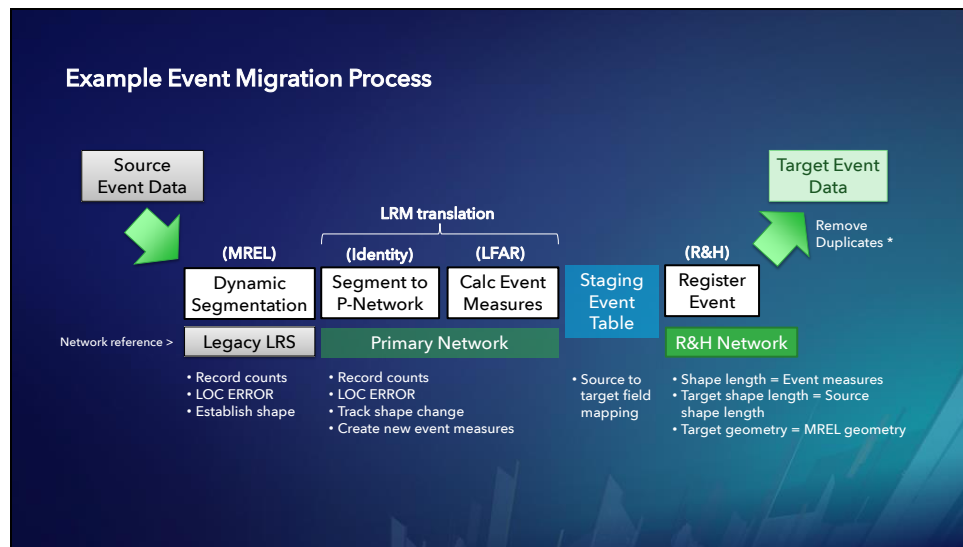
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Custom GP tools includes classifying self-intersecting shapes

Legacy LRM ... migrate the old route network as an event

Slide 23



Here is an example of how we strung together steps using out of the box tools.
Emphasize unique aspect ... events had

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PLANNING DESIGN ARCHITECTURE MIGRATION CONFIGURATION TRAINING

QA Statistics

- Source record-level tracking – create a pseudo-ID if necessary
- Track changes at each stage in the process
- Calculate source-target QA statistics after final data processing
- Dissolve events as a post-process (if required)

Differences between Staging Processes and Registered Target Event				
Count Change	Sum of Shape Length - Sum of Event Mileage	Per Record Shape Length difference > 0.001 Miles (Per Net_Suppl_ID)	Count of symmetrical differences between source event features and registered event	
410	-0.00055	0	0	✓
648	-0.00096	0	0	✓

*** Note on converting meters to miles ... DO NOT use a floating point conversion factor. **USE Miles = meters * 3937 / 1200 / 5280**

QA Statistics

Source record-level tracking – create a pseudo-ID if necessary

Track changes at each stage in the process (the purpose here is to identify the exact step where a problem occurs)

records

shape length

event measure length

After final data processing

Symmetrical Difference

Change in shape length

Change in event measure

Count number of records that differ by 0.001 mi

Dissolve events as a post-process (if required)

Legacy LRM ... migrate the old route network as an event

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By Solution Configuration, we mean the operational design

User Workflows

- How does work get assigned?
- Is more than one person involved to complete a job?
- Business may not have these things documented
- Strategy for bulk data loading versus continual editing

Security

Conflict Prevention

Event Editor


- Webmaps
- Attribute sets

Roadway Reporter templates

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PLANNING DESIGN ARCHITECTURE MIGRATION CONFIGURATION TRAINING

- Software training
- Scenario-based holistic coaching
- In-production support
- Plan for annual editors workshop



The image shows a group of people in a modern office environment, likely attending a training session or workshop. They are seated around a long table, working on laptops. A large screen is visible in the background, and the room has large windows and glass partitions.

Discuss training and importance of annual baselining of LRS editing operations.

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Transition slide to Solution Configuration topic.

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ArcGIS Enterprise: Securing Roads and Highway Components



- Typically, one of the most challenging aspects of implementation
- Things that can (*should*) be secured:
 - Web Services: ArcGIS Server-based map and geoprocessing services
 - Event Editor
 - Roadway Reporter
- Relative to Conflict Prevention, Anonymous authentication is not a best practice

Configuring Roads and Highways is one of the more challenging aspects of implementation.
The effort should not be trivialized.

ArcGIS Enterprise: Securing Event Editor

Case	ArcGIS Server Authentication	Portal for ArcGIS Authentication	Event Editor Authentication	Single-Sign On	App Distribution & Usage Reporting
1	IWA	IWA	IWA	Yes	No
2	Federated	IWA	IWA	Yes	No
3	Federated	IWA	OAuth	No	Yes
4	Federated	Not IWA	OAuth	No	Yes

- **Terms:**
 - **IWA:** User identity framework leveraging Windows Web-tier authentication through IIS
 - **Not IWA:** User identity framework in Portal leveraging named users whether they are built-in, enterprise Windows Active Directory, SAML, or LDAP. Web tier authentication is turned off in IIS
 - **OAuth:** Event Editor redirects the user to the Portal sign in page to log in

Semantics play a large part in understanding how ArcGIS Enterprise interacts with Roads and Highways.. There are a few terms everyone who is setting up or administering an enterprise solution like Roads and Highways needs to be familiar with.

- **IWA:** User identity framework leveraging Windows Web-tier authentication through IIS
- **Not IWA:** User identity framework in Portal leveraging named users whether they are built-in, enterprise Windows Active Directory, SAML, or LDAP. Web tier authentication is turned off in IIS
- **OAuth:** Event Editor redirects the user to the Portal sign in page to log in

Securing Event Editor with IWA

Case	ArcGIS Server Authentication	Portal for ArcGIS Authentication	Event Editor Authentication	Single-Sign On	App Distribution & Usage Reporting
1	IWA	IWA	IWA	Yes	No
2	Federated	IWA	IWA	Yes	No
3	Federated	IWA	OAuth	No	Yes
4	Federated	Not IWA	OAuth	No	Yes

- Key Take-Aways:
 - Outcome for the user: Single-Sign on experience for users
 - Potentially less configuration (No app Id required)
 - Event Editor identity based on Windows username
 - Pre-10.6.1: App config.json security must be set to "none"

In each case, I'd like to first focus on the expected end user *and* administrative expectations. Note the two columns on the right of the table. These actually define the explicit combinations for how you configure ArcGIS Server, Portal for ArcGIS and Event Editor.

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Securing Event Editor with OAuth

Case	ArcGIS Server Authentication	Portal for ArcGIS Authentication	Event Editor Authentication	Single-Sign On	App Distribution & Usage Reporting
1	IWA	IWA	IWA	Yes	No
2	Federated	IWA	IWA	Yes	No
3	Federated	IWA	OAuth	No	Yes
4	Federated	Not IWA	OAuth	No	Yes

- Key Take-Aways:
 - OAuth will redirect users to Portal Identity approval page
 - Event Editor configurations must be registered with Portal
 - Pre-10.6.1: App config.json security must be set to "portal"
 - (Case 4) Event Editor identity based on Portal username
 - *Best Practice: If using conflict prevention, make Portal named users match Active Directory (computer logon) usernames
 - *or* require Rec/Post operation step at end of R&H desktop edit workflow

Notes on using Oauth for securing Event Editor

ArcGIS Enterprise: Securing Roads and Highway Roadway Reporter

- Not an editing tool
- Currently, IWA not supported for securing access to Roadway Reporter
- Options:
 - No security (Anonymous)
 - Register app to a portal

Table 14.29
Lane Miles of State Roads by County
as of December 31st, 2013

County	Mileage	Rural Roads	Urban Roads	Lane Miles	Total	Mileage Factor
Barnstable	222,165	22,307	199,858	463,201	0.000	
Berkshire	231,523	188,135	43,388	465,448	0.003	
Bristol	248,385	18,952	235,515	505,149	0.000	
Essex	379,982	28,890	345,042	762,982	0.000	
Franklin	230,220	172,724	57,496	463,353	0.000	
Hampden	181,062	52,861	128,201	374,986	0.000	
Hampshire	245,522	120,520	125,002	500,288	0.000	
Middlesex	712,218	87,260	674,968	1,616,599	0.000	
Norfolk	280,674	0.000	280,674	682,533	0.000	
Plymouth	444,197	87,719	406,478	959,230	0.000	
Suffolk	112,373	0.000	112,373	284,651	6.209	
Worcester	788,996	310,049	478,927	1,590,868	0.000	

Notes:

1. Lane mileage in this report are indeed more accurate than those produced in the network and no comparison should be attempted due to the precise rules for reporting "lanes" in the network.
2. In 2013 more mileage was made in accordance for reporting "lanes" than in previous years. However, many were added on-ramp and frontage systems are not shown and some are estimated.

File: Table14.29.PDF State Highway System Log Page 1

Roadway reporter is ***NOT*** an editing tool, therefore it should not require as much security as Event Editor.

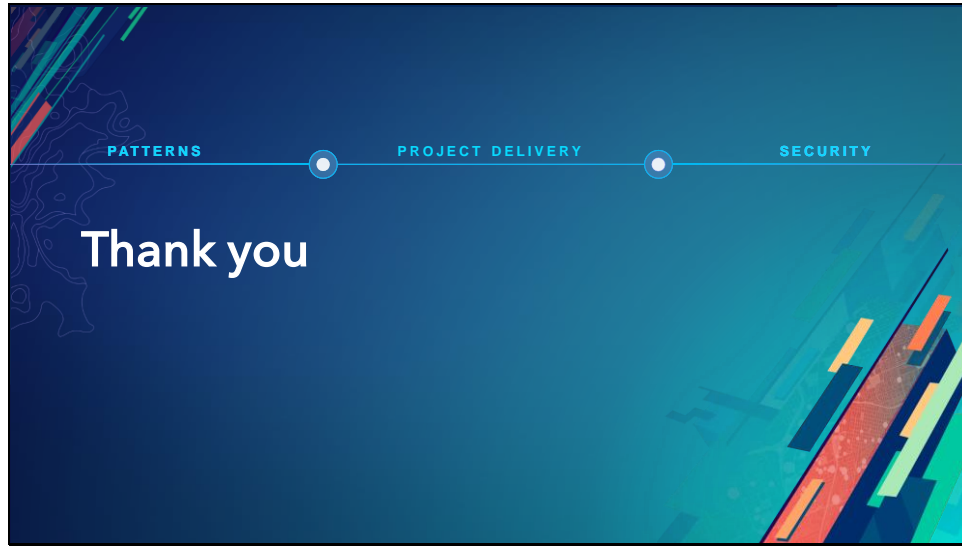
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Roadway Reporter Decision point:
What portal will you use to save report templates and share reports?

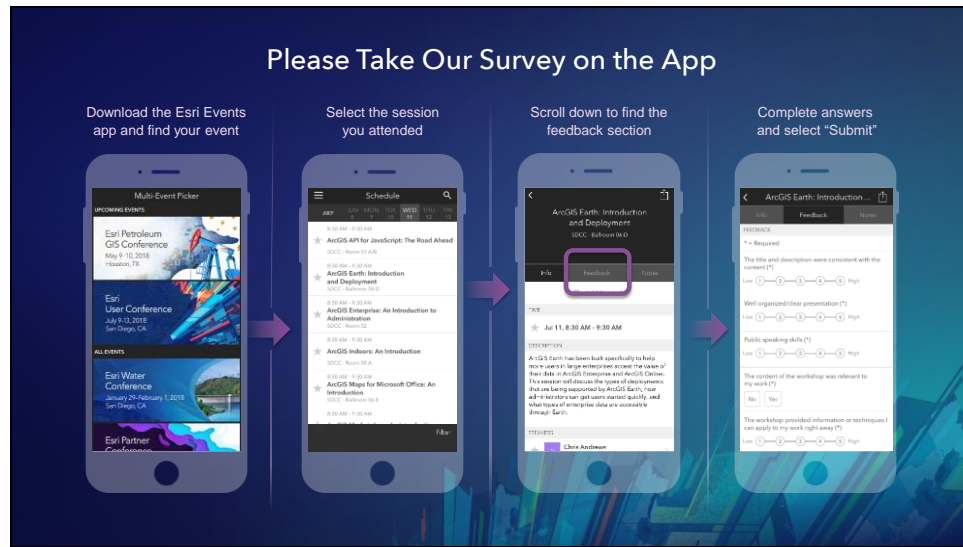
ArcGIS Online	Portal for ArcGIS
<ul style="list-style-type: none">- Audience<ul style="list-style-type: none">- Internal users- Other State agencies- Local government- Public- Technical notes<ul style="list-style-type: none">- Roadway Reporter can reside on the same web server as the Portal web adaptor- If server is federated with Portal, web layers in Portal must be Public- App and webmap can be secured in ArcGIS Online	<ul style="list-style-type: none">- Audience<ul style="list-style-type: none">- Internal users- Technical notes<ul style="list-style-type: none">- Roadway Reporter must be deployed on a separate web server than where the Portal web adaptor is installed

Implementers can use either ArcGIS Online or a local Portal for ArcGIS deployment for saving Roadway reporter templates and results.

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Thank you. Please feel free to contact us by email:
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Clive Reece (creece@esri.com)



Please give us your feedback. Thursday, July 19, 1pm-2pm, SDCC Room 08

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