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

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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
Roads and Highways Best Practice Themes

**PATTERNS**
- Organizational Models
- Communication
- IT Governance
- Data Flow
- Business Process
- ArcGIS Platform Adoption

**PROJECT DELIVERY**
- Planning
- Data Model Design
- System Architecture
- Data Migration
- Configuration
- Training & Sustainment

**SECURITY**
- Web Services
- Event Editor
- Roadway Reporter
Patterns
The Implementation Spectrum

DISTRIBUTED TEAMS

- Many disconnected groups of data owners/editors
- Formalized and orchestrated work separation between groups
- Automated enterprise GDB versioning
- Require work notifications
- Require IT governance and standards
- Configuration organized around business unit workflow and roles

WORKGROUP

- Single office with direct coordination among users
- Ad-hoc, informal editing approach
- Same stakeholders responsible for event and network management
- Configuration configured to individuals
The Implementation Spectrum: Software

DISTRIBUTED TEAMS
ArcGIS Desktop (ArcMap*)
- Roads and Highways Desktop

WORKGROUP
SAME
The Implementation Spectrum: Software

**DISTRIBUTED TEAMS**

- ArcGIS Desktop (ArcMap*)
  - Esri Roads and Highways Desktop
- ArcGIS Enterprise
  - ArcGIS Web Adaptor
  - Portal for ArcGIS
  - ArcGIS Server
- Esri Roads and Highways Server

**WORKGROUP**

- Portal for ArcGIS
- ArcGIS Server
- R&H Server Extension
- Enterprise Database (ArcGIS Data Store Optional*)

The ArcGIS managed data repository that stores the Portal's hosted content. It is not a replacement for your enterprise geodatabases.
The Implementation Spectrum: Software

**DISTRIBUTED TEAMS**

ArcGIS Desktop (ArcMap*)
- Roads and Highways Desktop

ArcGIS Enterprise
- ArcGIS Web Adaptor
- Portal for ArcGIS
- ArcGIS Server

Esri Roads and Highways Server

**WORKGROUP**

ArcGIS Web Adaptor
Integrates with your organization’s existing web server to provide a single endpoint that distributes incoming requests and enables you to use web-tier authentication.

SAME
The software component that enables the ArcGIS Enterprise portal. Portal for ArcGIS is the web frontend and API backend that supports a user’s interaction and overall experience with your Web GIS.
In a base deployment ArcGIS Server should be configured with a GIS Server licensing role and as the hosting server. In this capacity it gives you the ability to publish and share maps and layers from ArcGIS Pro using your own business databases and by copying data to the server.
The Implementation Spectrum: Software

**DISTRIBUTED TEAMS**
- ArcGIS Desktop (ArcMap*)
  - Roads and Highways Desktop
- ArcGIS Enterprise
  - ArcGIS Web Adaptor
  - Portal for ArcGIS
  - ArcGIS Server
- Esri Roads and Highways Server

**WORKGROUP**
- SAME

*ArcGIS Data Store (Optional for R&H)*
The ArcGIS managed data repository that stores the Portal’s hosted content. It is not a replacement for your enterprise geodatabases.
The Implementation Spectrum: Software

**DISTRIBUTED TEAMS**

ArcGIS Desktop (ArcMap*)

ArcGIS Enterprise
- ArcGIS Web Adaptor
- Portal for ArcGIS
- ArcGIS Server

Esri Roads and Highways Extension (Desktop/Server)

**WORKGROUP**

ArcGIS Workflow Manager (Desktop/Server)
Roads and Highways Solution Configuration

**DISTRIBUTED TEAMS**

- Automatically managed Workflow-specific GDB versions
- Business-unit and task specific configurations for editing (network and Events)
- Users are mapped to roles
- Conflict Prevention Enabled

**WORKGROUP**

- User-specific GDB versions
- Static or manually created GDB versions
- User-specific MXDs saved to desktop
- User-specific bookmark to an Event Editor configuration
- Conflict Prevention Optional
Demonstration: Workgroup vs Distributed Team Patterns
Roads and Highways Solution Configuration

**DISTRIBUTED TEAMS**

**Pros:**
- Stakeholder-specific workflows to align data management and business process with software
- Automated communication among distributed users
- Repeatable, institutionalized work promotes transparency and accountability
- Data management granularity

**WORKGROUP**

**Pros:**
- Simple to configure, roll out and administer
- Each user is on their own - easier to complete ad-hoc assignments
**Roads and Highways Solution Configuration**

**DISTRIBUTED TEAMS**

Cons:
- More moving parts to the initial system roll out
- Learning curve
- Additional steps to complete work
- More steps to complete ad-hoc assignments

**WORKGROUP**

Cons:
- There is no orchestrated communication mechanism
- No automation of process and software
- Each user is on their own - less likely to have reproduceable workflows
- No enforcement of when user edits get posted
Project Delivery
Project Delivery

• What are the common pitfalls at each stage?
• Any lessons learned to prevent schedule slip?
Focus Kickoff on Change Management Planning

- What business objectives are driving the LRS system change?
- Ask how much will business stakeholders and downstream systems will determine/force the data design?
Issues

• Want to forecast how users will use the system … but no one has R&H experience!
• The data model is going to change

Risk Mitigation

• Use prototyping to evaluate alternate design options
• Data design tools (e.g. Enterprise Architect)
Plan for a System Architecture
refresh before deploying production
Factors

- Preserving shape?
- Preserving measures?
- Are you translating the legacy data to a new LRM?

Tools

- Data Reviewer
- Make Route Event Layer (MREL)
- Identity
- Locate Features along Routes (LFAR)
- Custom GP tools
- Symmetrical Difference
- Data Interoperability extension

Quality Assurance plan ... Nothing lost and nothing gained, inspire confidence
Example Event Migration Process

Source Event Data

- Legacy LRS
  - Dynamic Segmentation
    - Record counts
    - LOC ERROR
    - Establish shape

LRM translation

- Segment to P-Network
  - Record counts
  - LOC ERROR
  - Track shape change
  - Create new event measures

- Calc Event Measures
  - Source to target field mapping

Primary Network

- Staging Event Table
  - Shape length = Event measures
  - Target shape length = Source shape length
  - Target geometry = MREL geometry

Target Event Data

- Register Event
  - Remove Duplicates *

- R&H Network
  - R&H Network
  - LRM translation
  - (MREL)
  - (Identity)
  - (LFAR)
  - Network reference >
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)

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

- User Workflows
- Security
- Conflict Prevention
- Event Editor
- Roadway Reporter

Artifacts

- Inventory of events by data editors and business owners
  - Role-oriented Event editor "configurations" and attribute sets
- ArcGIS Enterprise content configuration plan
- WMX job types and workflows
- As-built configuration document
- Software training
- Scenario-based holistic coaching
- In-production support
- Plan for annual editors workshop
Solution Configuration
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
## ArcGIS Enterprise: Securing Event Editor

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- **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
Securing Event Editor with IWA

- 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”

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Securing Event Editor with OAuth

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

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

**ArcGIS Online**

- **Audience**
  - Internal users
  - Other State agencies
  - Local government
  - Public

- **Technical notes**
  - 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

**Portal for ArcGIS**

- **Audience**
  - Internal users

- **Technical notes**
  - Roadway Reporter must be deployed on a separate web server than where the Portal web adaptor is installed
Thank you
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Scroll down to find the feedback section

Complete answers and select “Submit”