

# ArcGIS Data Reviewer: An Introduction

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Jay Cary

# Workshop agenda

- Importance of data quality
- What is ArcGIS Data Reviewer?
- Automated review
- Semi-automated review
- Managing errors and data quality reporting
- Summary/resources

# Importance of data quality



# Defining quality

A business perspective

- Executive
  - Confidently make decisions
  - Reduce financial risk
  - Optimize organizational performance



# Defining quality

## A business perspective

- Executive
  - Confidently make decisions
  - Reduce financial risk
  - Optimize organizational performance
- Manager
  - Effective data stewardship
  - Drive increased usage
  - Maximize productivity



# Defining quality

## A business perspective

- Executive
  - Confidently make decisions
  - Reduce financial risk
  - Optimize organizational performance
- Manager
  - Effective data stewardship
  - Drive increased usage
  - Maximize productivity
- Knowledge worker
  - Increased efficiencies
  - Confidence in GIS



# Defining quality

A technical perspective



*ISO-19157:2013 Geographic information – Data quality*

# Defining quality

Sources of data quality requirements





# Defining quality

## Sources of data quality requirements

Industry  
standards /  
specifications



Subject matter  
experts



# Defining quality

## Sources of data quality requirements

Industry  
standards /  
specifications



Training and  
experience



Subject matter  
experts



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Quality  
assurance  
plans



# Data quality management

Capabilities of the ArcGIS platform

## Geodatabase integrity

- Schema constraints
- Geoprocessing tools
- Data load checks
- Versioning

## Advanced data types

- Topologies
- Parcel fabric
- Geometric/Utility network

## ArcGIS Data Reviewer

- Automated review
- Semi-automated review
- Error management
- Quality reporting



# What is ArcGIS Data Reviewer?

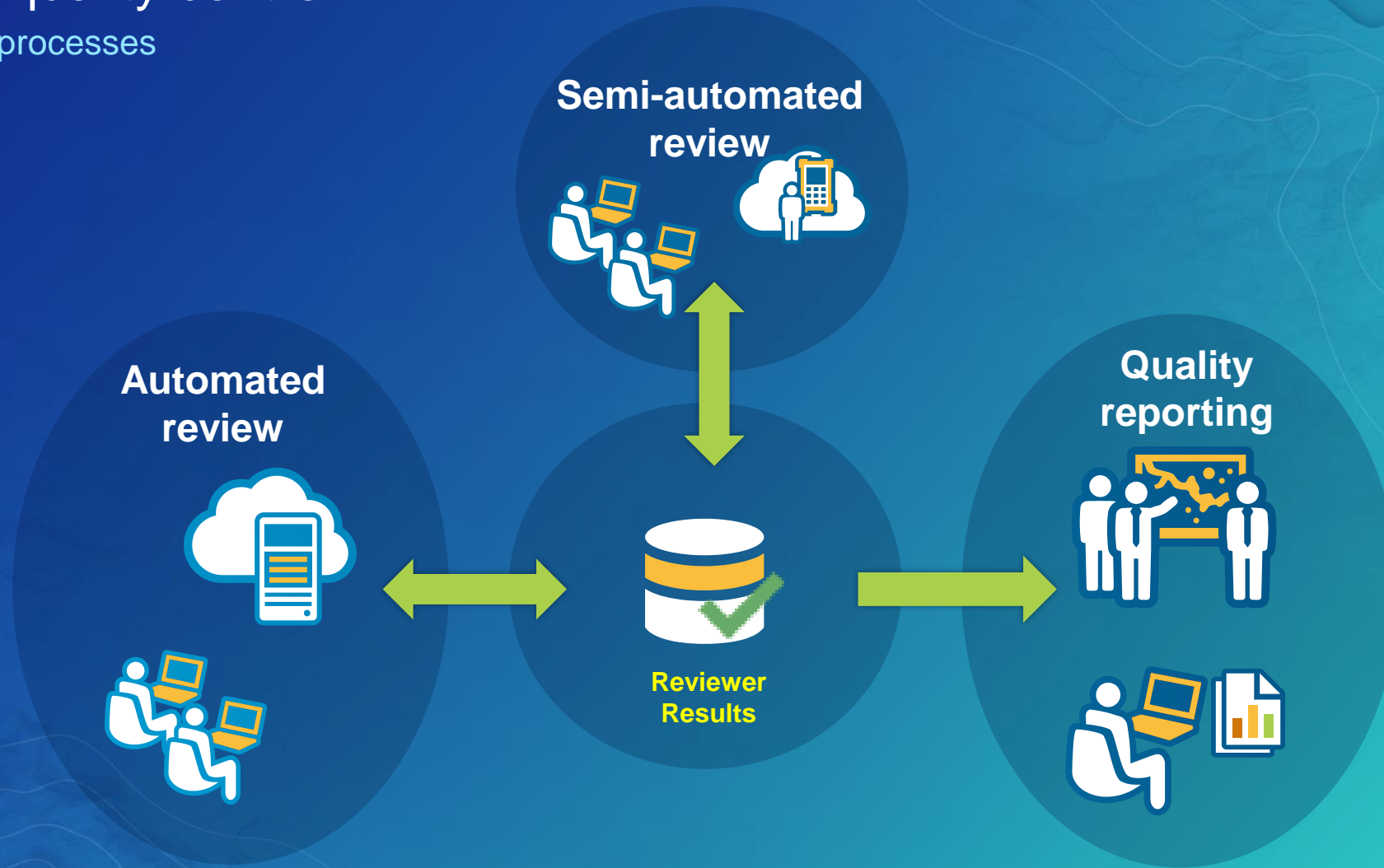
Data quality management in the ArcGIS platform

- Data Reviewer for Desktop
  - ArcGIS Pro
  - ArcMap
- Data Reviewer for Server
  - ArcGIS Server (standard or higher)
- Data Reviewer API
  - JavaScript
  - ArcGIS Pro SDK for Microsoft .NET
- Web AppBuilder for ArcGIS



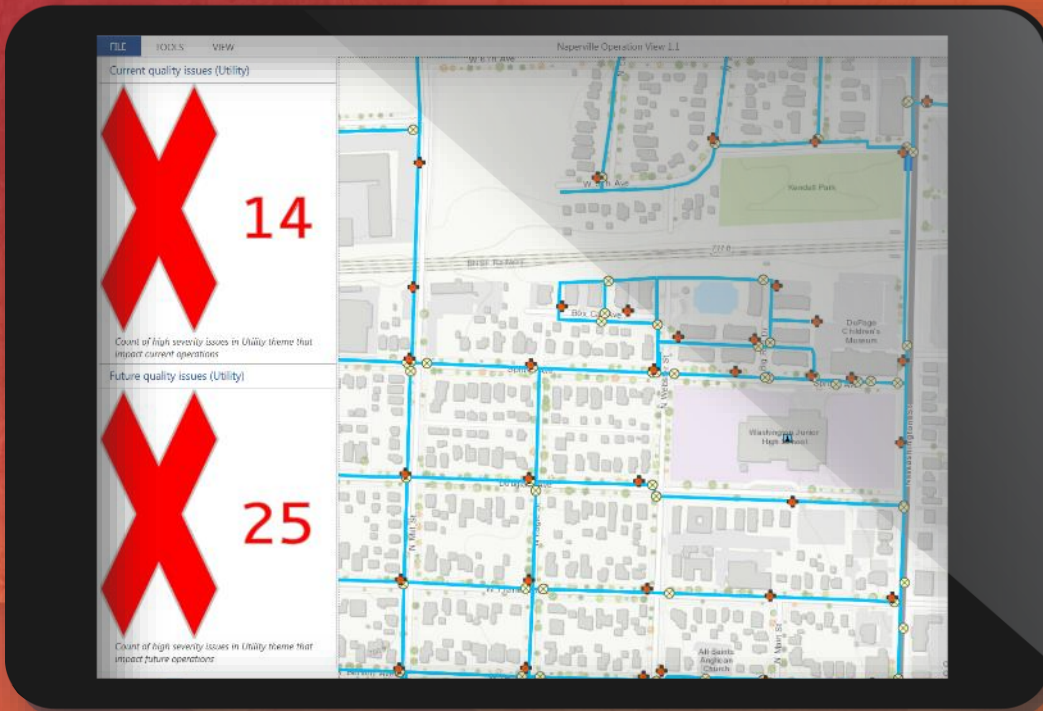
# Managing quality control

## Quality control processes

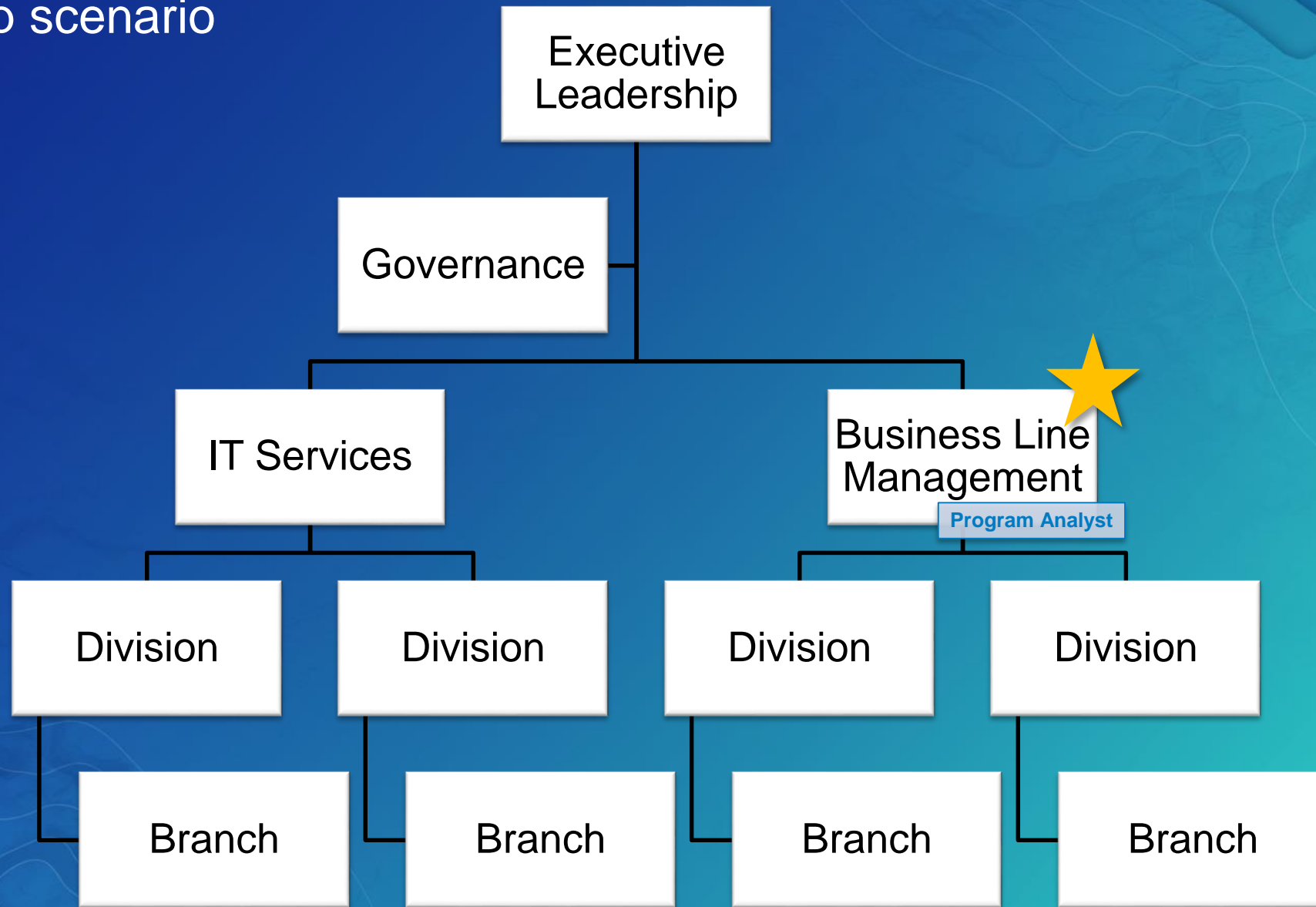




# Demo: Data quality reporting



## Workshop scenario





# Workshop scenario

**My organization needs to address data quality issues that impact future requirements from stakeholders.**

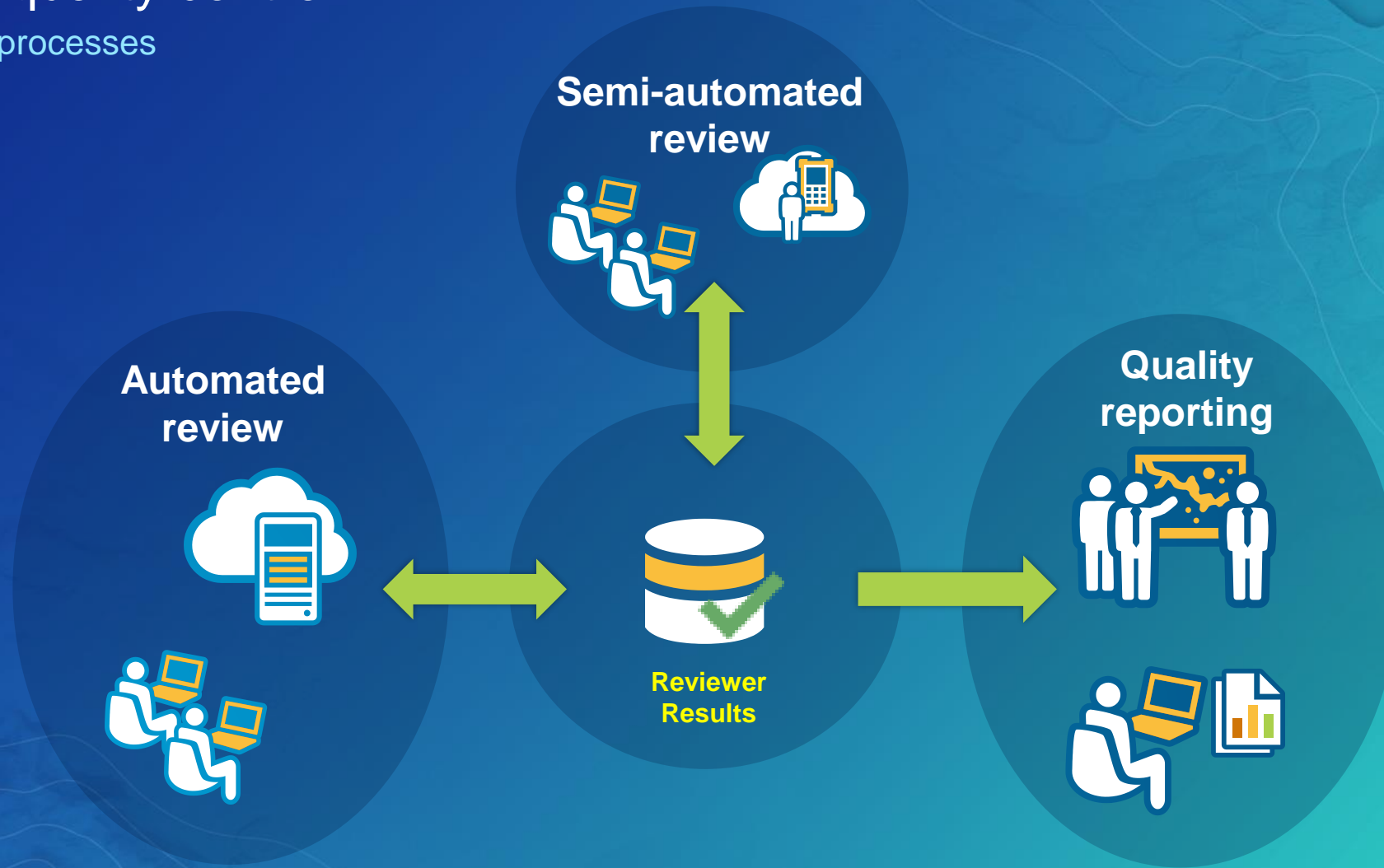
## **Success criteria**

- ☐ Future data quality requirements are integrated into existing data management workflows
- ☐ Key attributes are populated and have the correct values
- ☐ All features should be collected within the area of interest
- ☐ Features should be accurately positioned
- ☐ Data collection processes should be streamlined
- ☐ All errors are corrected and verified

# Automated review

# Managing quality control

## Quality control processes



# Types of quality control



## **Automated review**

**Fast**

**Consistent and  
repeatable**

**Objective**

**100% coverage**



# Automating data validation

## Implementing quality requirements

- 40+ configurable checks
- Feature integrity
  - Collection rules
- Attribution
  - Feature and table values
- Spatial
  - Spatial relationships

<http://esriurl.com/12379>

The screenshot displays the 'ArcGIS Data Reviewer Checks' interface. It features a blue header with the Esri logo and the title. Below the header, the interface is divided into two main columns: 'Database Validation Checks' and 'Default Checks'. Each column contains several check categories with descriptive text and illustrative diagrams or tables.

**Database Validation Checks**

- Connectivity Rules**: Returns geometries for features that violate the geometric network connectivity rules. Diagram shows a network with nodes labeled 'Main', 'Hydant', and 'Lateral'.
- Domain**: Validates coded value and range domains to ensure that all values meet domain constraints. Table shows 'LAND USE' with values 'UNCLASSIFIED', 'AGRICULTURE', 'RURAL', 'INDUSTRIAL', and 'AGRI'.
- Relationships**: Searches for records that are orphans or have improper cardinality in a relationship class. Diagram shows a hierarchy with 'CROP' (1), 'RICE' (2), and 'WHEAT' (3).
- Subtype**: Searches for feature classes with improper or null subtypes. Table shows 'SUBTYPES' with values '1 HIGHWAYS', '2 MAJOR ROAD', '3 LOCAL STREETS', and '4 ALLEY'.

**Default Checks**

- Invalid Geometry**: Finds features whose geometry is empty, nothing, or not simple, as well as features with empty envelopes. Table shows 'OBJECTID', 'SHAPE', and 'FEATURETYPE' with values like 'POINT', 'POLYLINE', and 'POLYGON'.
- Multipart Line**: Searches for polyline features with more than one part. Diagram shows a line with two parts labeled '1' and '2'.
- Multipart Polygon**: Finds polygon features with more than one part and polygon features with holes. Diagram shows two polygons, one with a hole.
- Nonlinear Segment**: Searches for nonlinear segments, such as arcs and curves, in line and polygon features. Diagram shows a curved line segment.

# Implementing data quality rules

## Rule implementation workflow

### Authoring workflow

- Identify and document requirements
- Identify relevant validation methods in ArcGIS
- Implement data quality rules



# Implementing data quality rules

## ArcMap workflow

### ArcMap

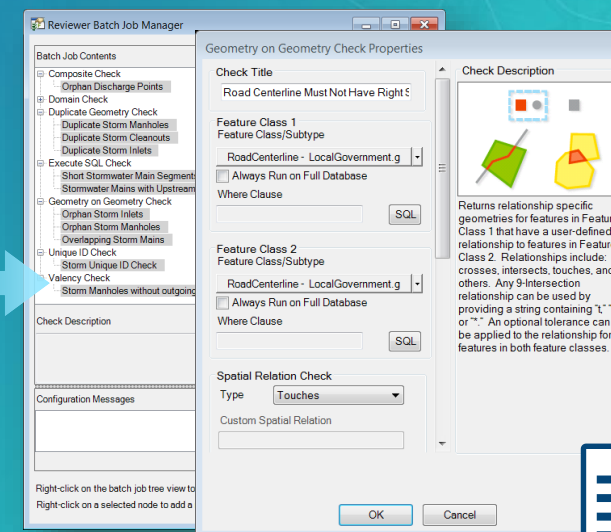
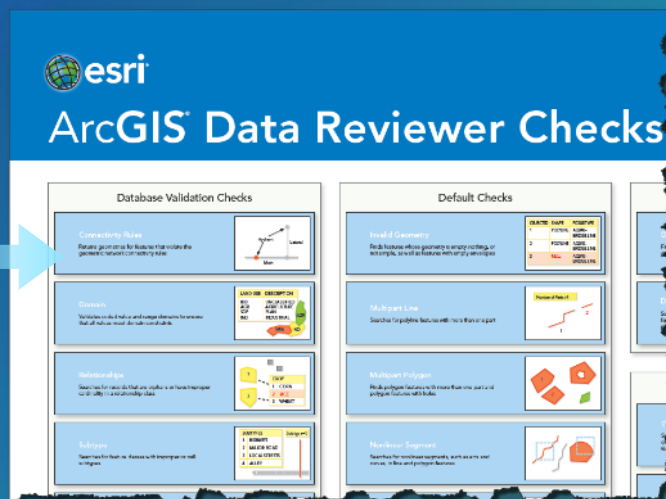
- Authored using Batch Job Manager
- Rules stored in a Reviewer Batch Job
- Shareable as a file from a network share or via email
- 43 configurable validation methods (v 10.5.1)

Industry  
standards /  
specifications

Subject matter  
experts

Training and  
experience

Quality  
assurance  
plans



# Implementing data quality rules

## ArcGIS Pro workflow

### ArcGIS Pro

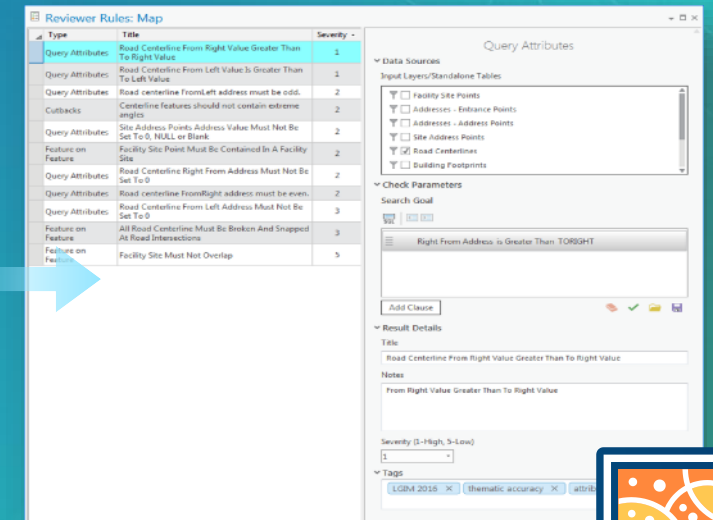
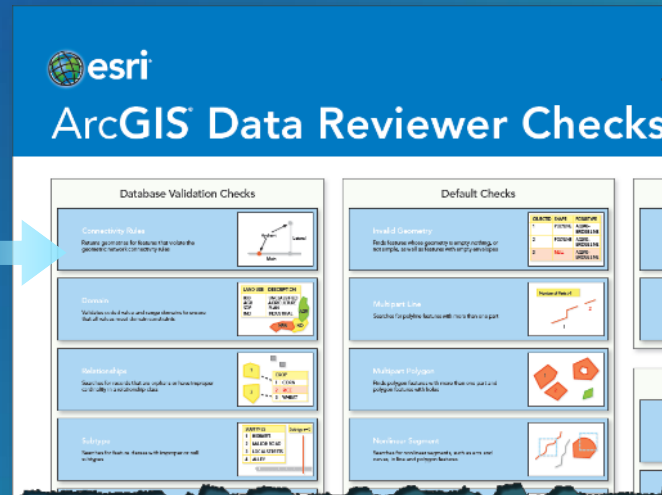
- Authored using the Reviewer Rules view
- Rules stored in map
- Shareable as a map or layer file/package and project package/template
- 7 configurable validation methods (v 2.0)

Industry  
standards /  
specifications

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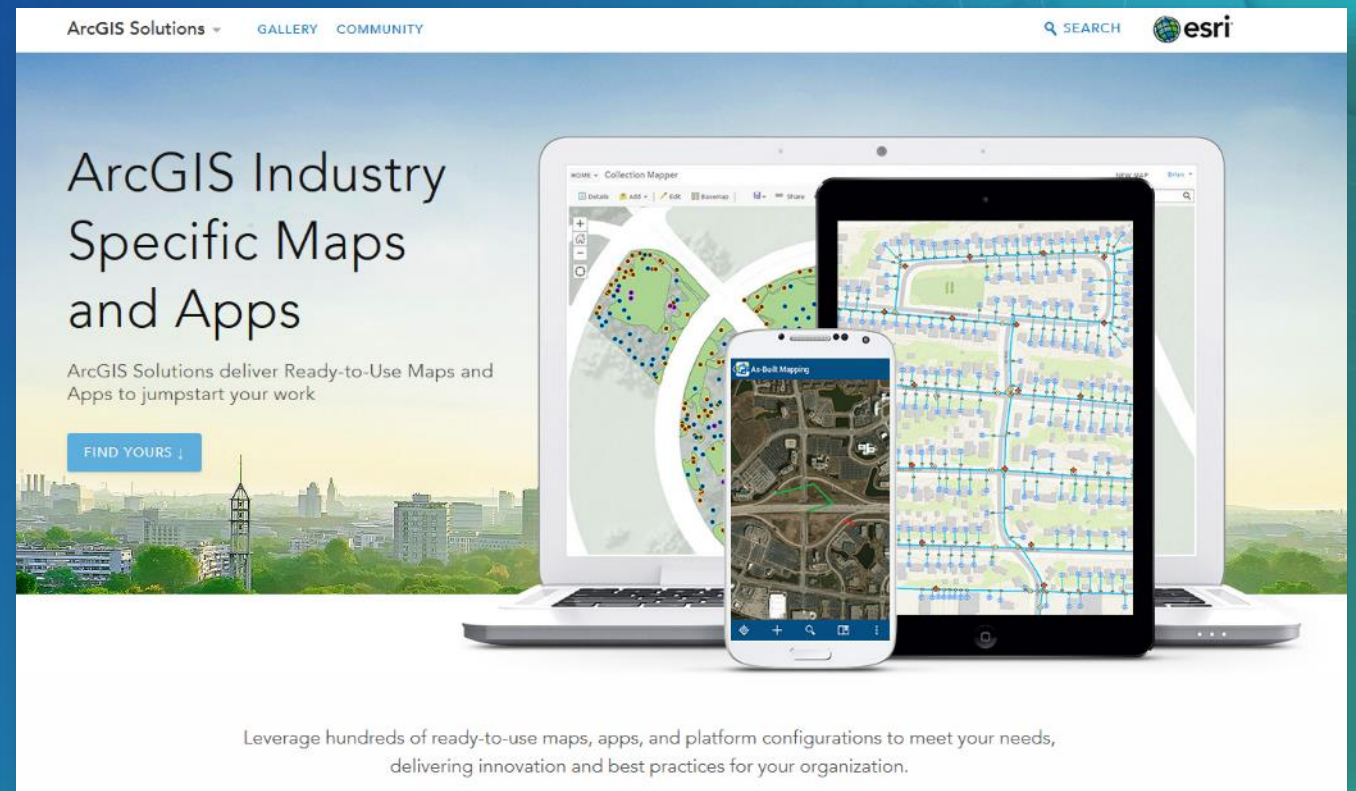




# Where to start

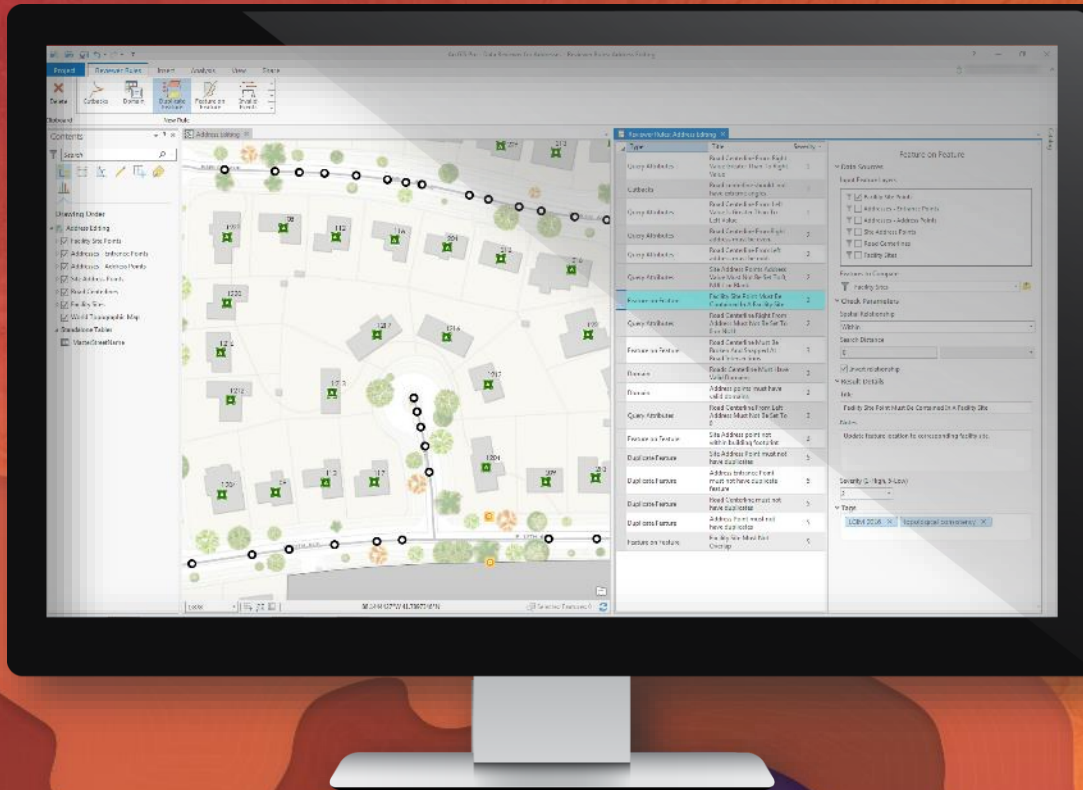
## Leveraging templates

- Data Reviewer templates
  - Local government
  - Topographic mapping
  - Utilities
    - Electric
    - Gas
    - Water
  - Water resources
- Based on Esri industry models
- Use as starting point



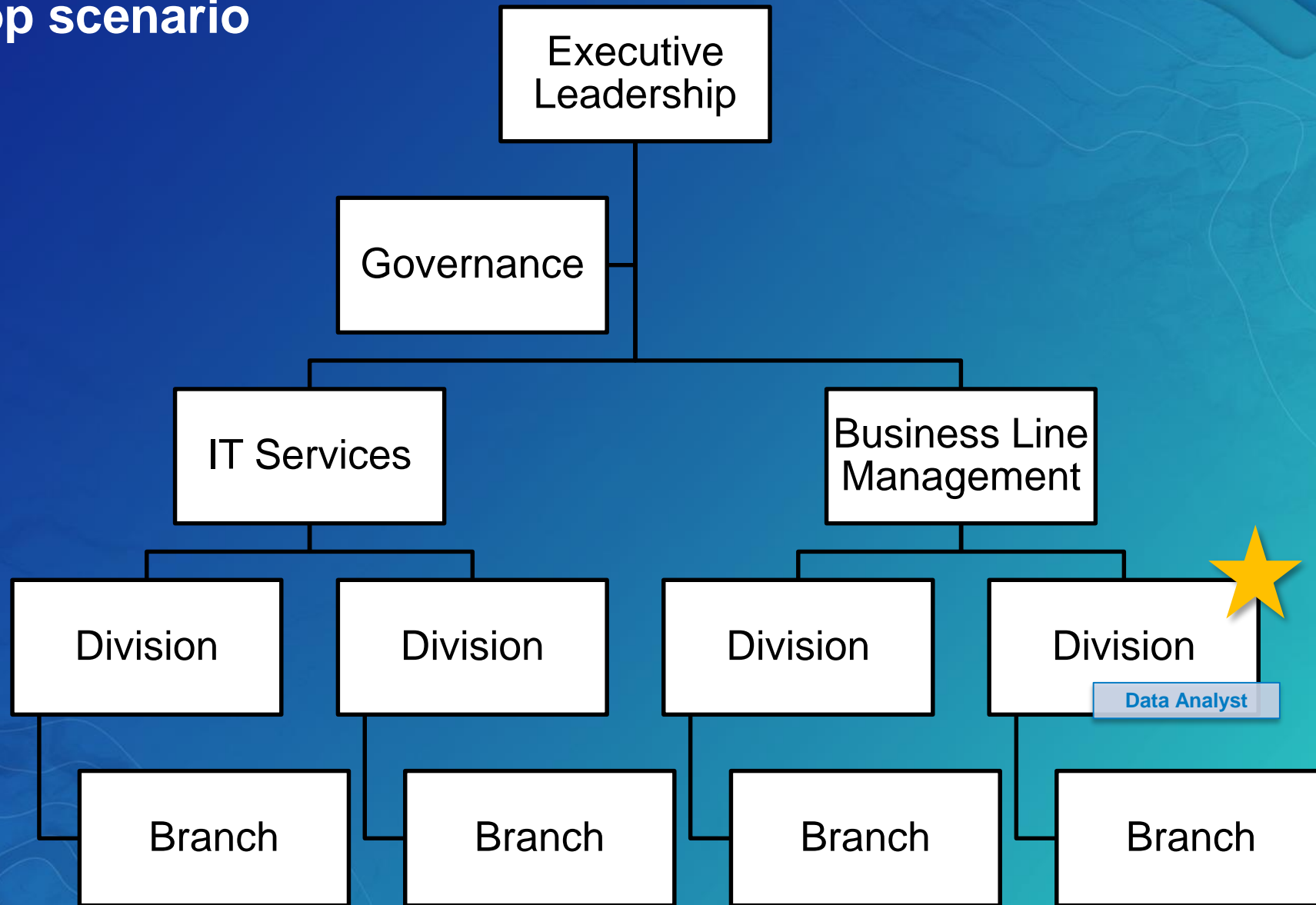
[solutions.arcgis.com](https://solutions.arcgis.com)

# Demo: Authoring data quality rules





# Workshop scenario



# Workshop scenario

**My organization needs to address data quality issues that impact future requirements from stakeholders.**

## Success criteria

- ☐ Future data quality requirements are integrated into existing data management workflows
- ☐ Key attributes are populated and have the correct values
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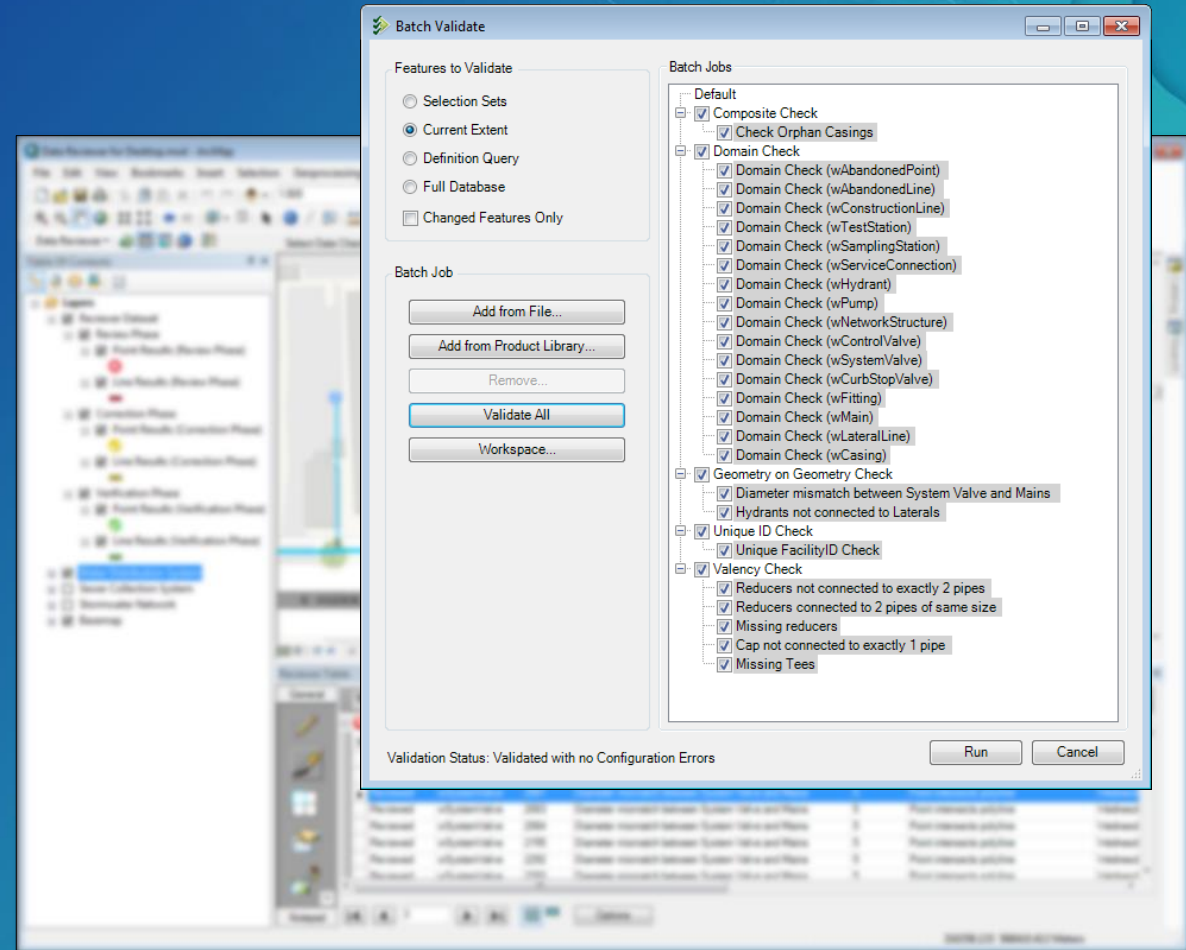
# Automated review

# Methods for executing data validation

Validating features using Reviewer Batch Jobs

Execute data validation using

- ArcMap

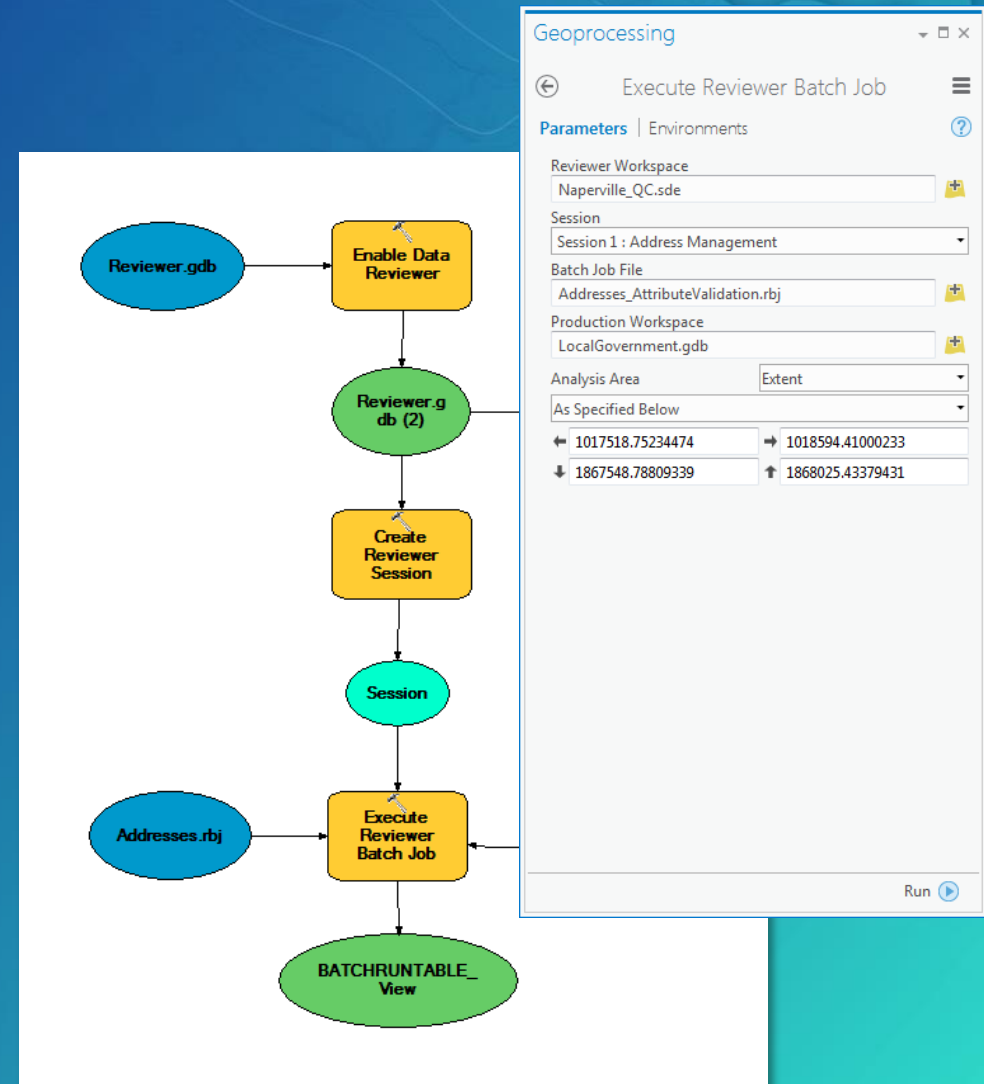


# Methods for executing data validation

Validating features using Reviewer Batch Jobs

Execute data validation using

- ArcMap
- Geoprocessing



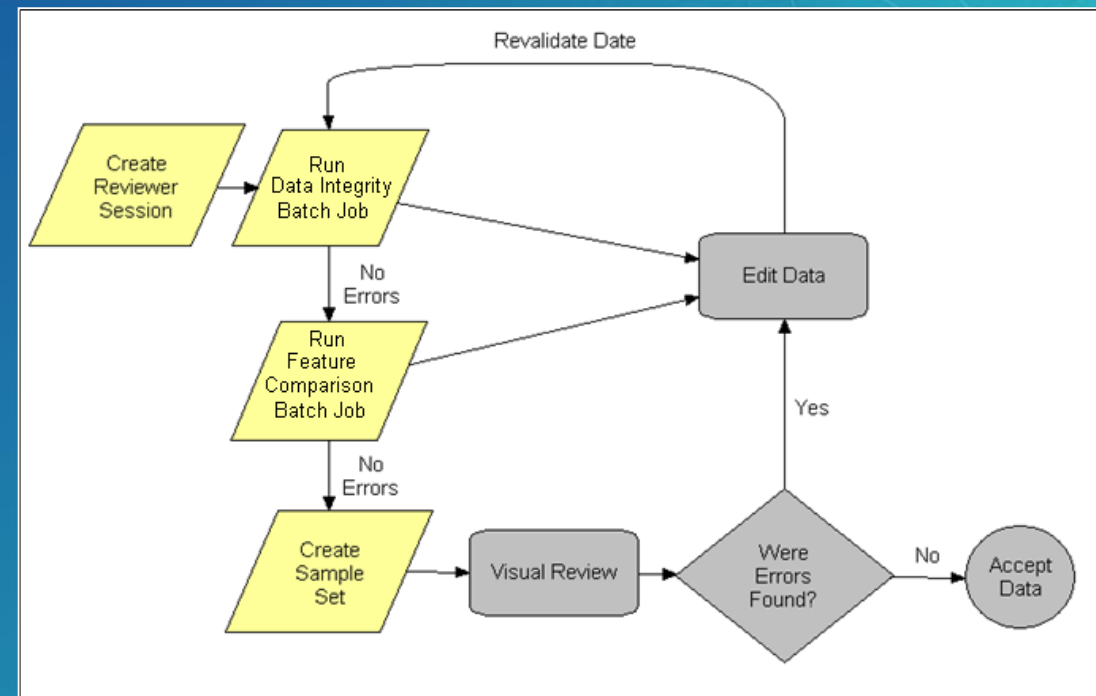


# Methods for executing data validation

Validating features using Reviewer Batch Jobs

Execute data validation using

- ArcMap
- Geoprocessing
- ArcGIS Workflow Manager





# Methods for executing data validation

Validating features using Reviewer Batch Jobs

Execute data validation using

- ArcMap
- Geoprocessing
- ArcGIS Workflow Manager
- ArcGIS Server

[http://bit.ly/DR\\_BVM](http://bit.ly/DR_BVM)

The screenshot shows the Batch Validation Manager web application. The browser address bar displays `/BatchValidationManager/`. The application header includes the Esri logo and the title "Batch Validation Manager". Below the header, there are two tabs: "Schedules" (selected) and "Executions". A link "+ Schedule Batch Validation" is visible next to the "Executions" tab. Under the "Schedules" tab, there is a "Show:" section with radio buttons for "all" (selected) and "active", and a "by" dropdown menu set to "all users". A green "Refresh" button is located to the right of the dropdown. Below this, a table lists the scheduled jobs:

Job Title	Schedule
<input checked="" type="checkbox"/> Stormwater Validation	Daily
<input checked="" type="checkbox"/> Water Utility Validation	Weekly
<input checked="" type="checkbox"/> Sewer Validation	Weekly

To the right of the table, a sidebar titled "Water Utility Validation" provides details for the selected job:

- Batch Job: Water.rbj
- Session: Session 1 : Water Utilities (Wo...
- Runs: Weekly
- Scheduled By: Jay
- Data Workspace: C:\Demos\ArcGIS Data Review...

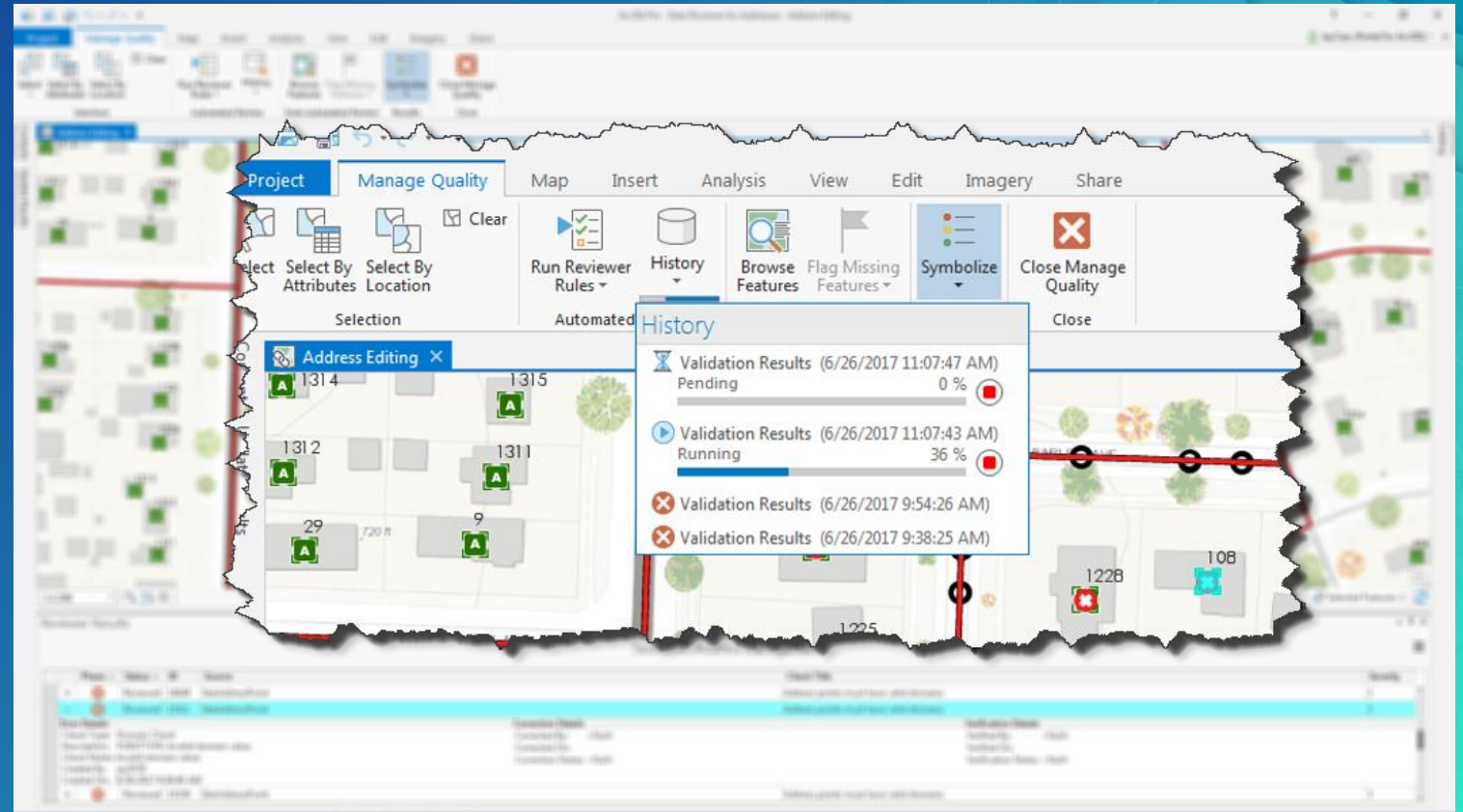
At the bottom of the sidebar, there are "Modify" and "Delete" buttons. A note at the very bottom states: "Changes will be applied to all future executions of this job."

# Methods for executing data validation

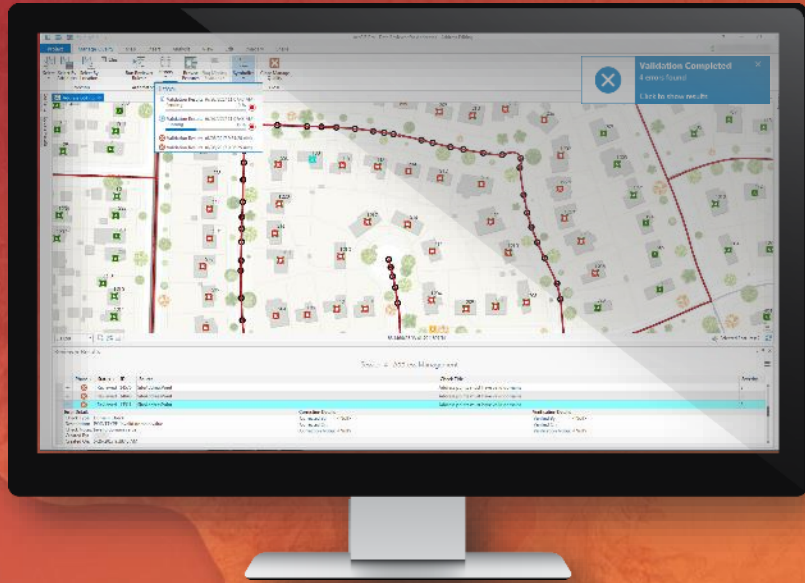
Validating features using Reviewer Rules

Execute data validation using

- ArcGIS Pro

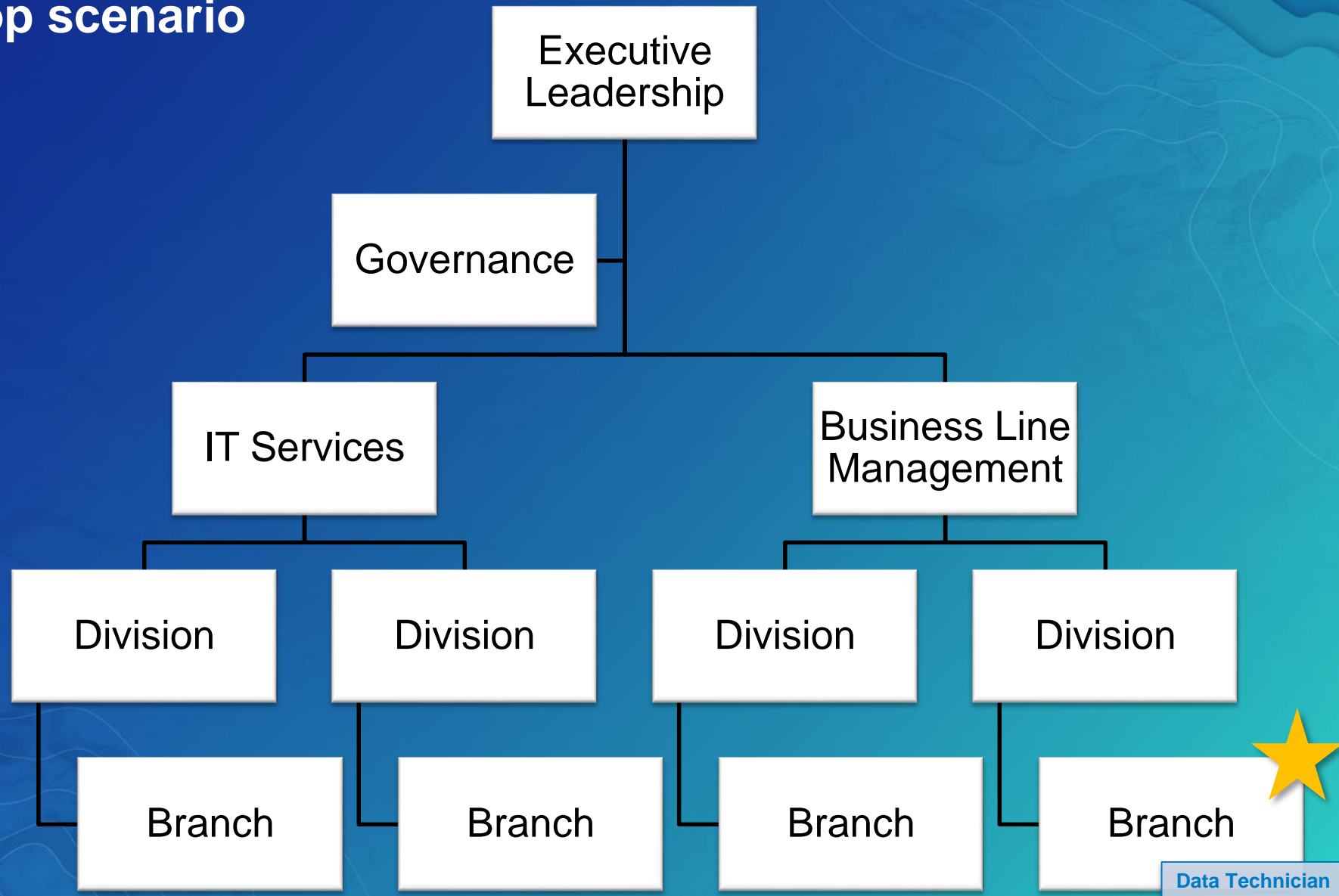


# Demo: Automated review





# Workshop scenario



Data Technician



# Workshop scenario

**My organization needs to address data quality issues that impact future requirements from stakeholders.**

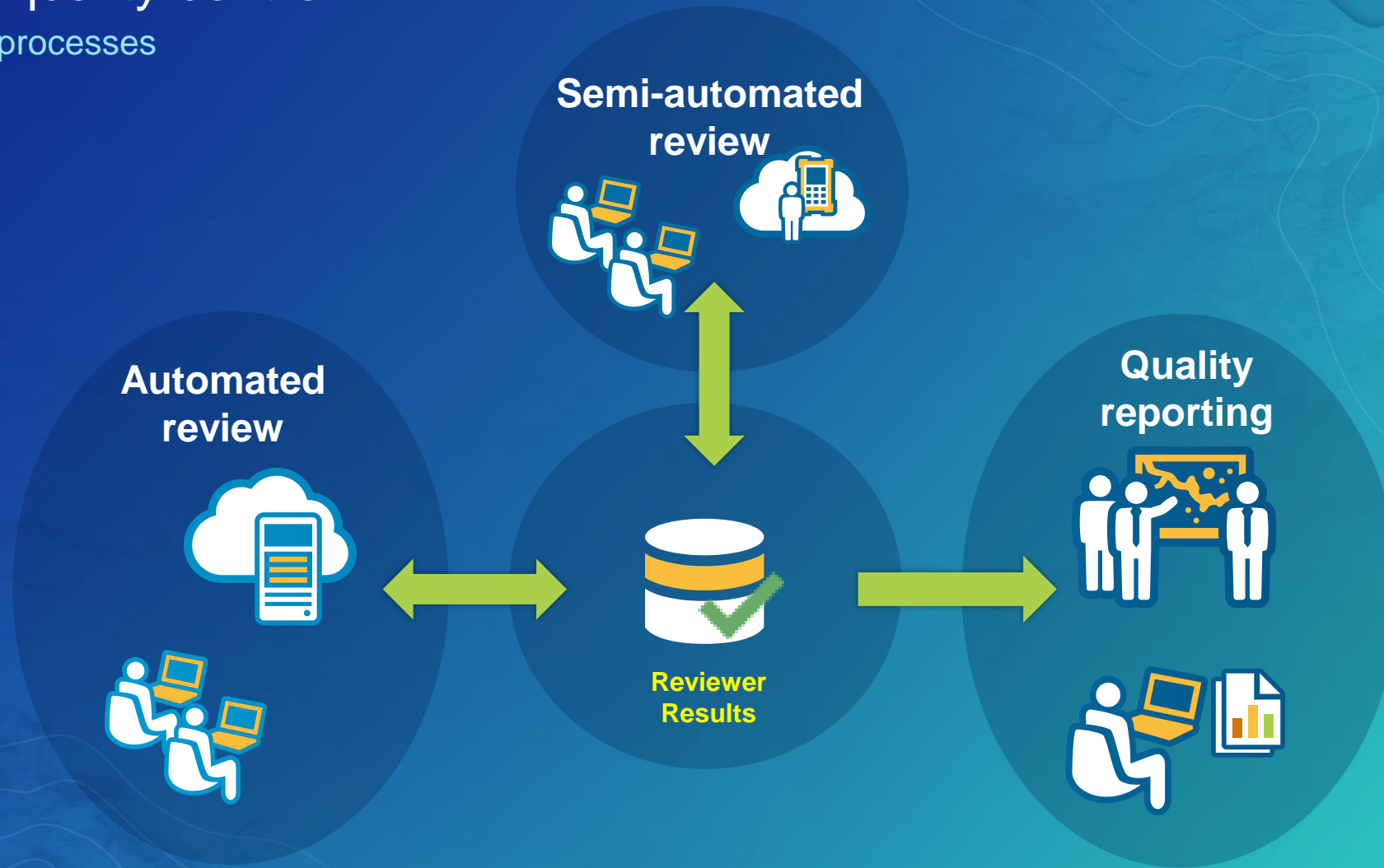
## Success criteria

- ✓ Future data quality requirements are integrated into existing data management workflows
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# Semi-automated review

# Managing quality control

## Quality control processes





# Types of quality control



## Automated review

**Fast**

**Consistent and  
repeatable**

**Objective**

**100% coverage**



## Semi-automated review

**Guided Workflows**

**Streamlined processes**

**Subjective**

**Sampling**



## Semi-automated review methods

### Visual review

- Redlining
- Systematic review
- Sampling

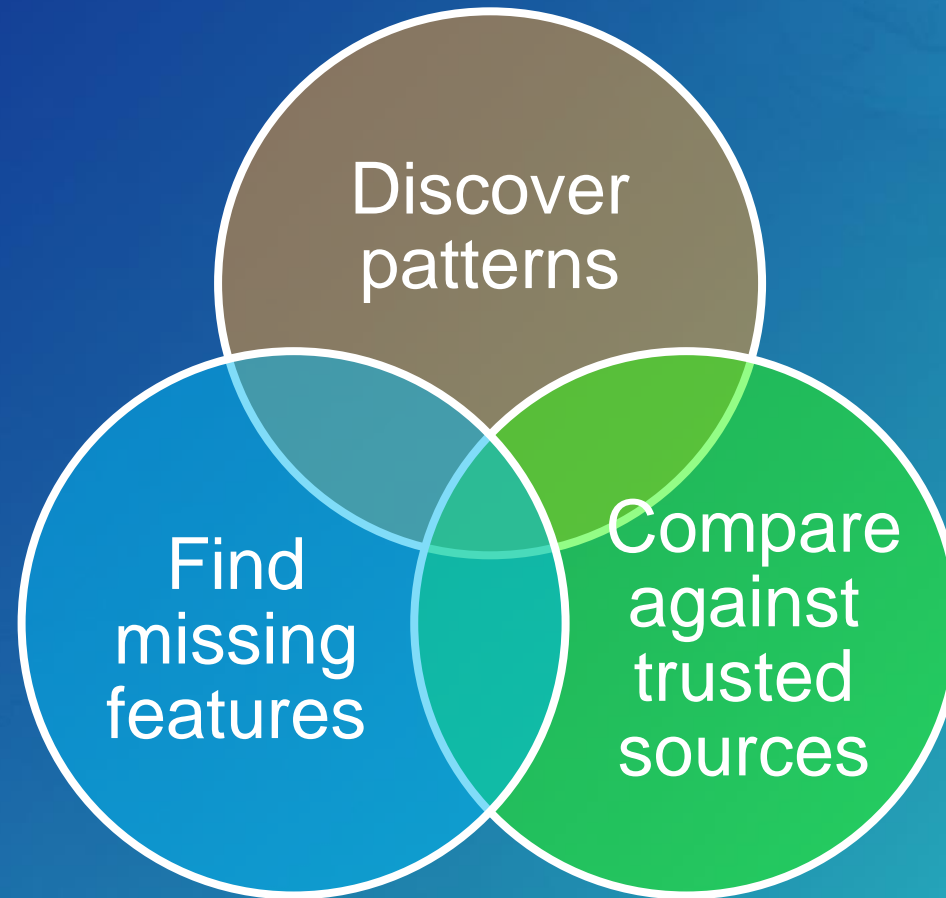
### Data inspection

- Feature counts
- Attribute review
- Version differences

### Positional accuracy

- Assessment tool

## Value of performing visual review

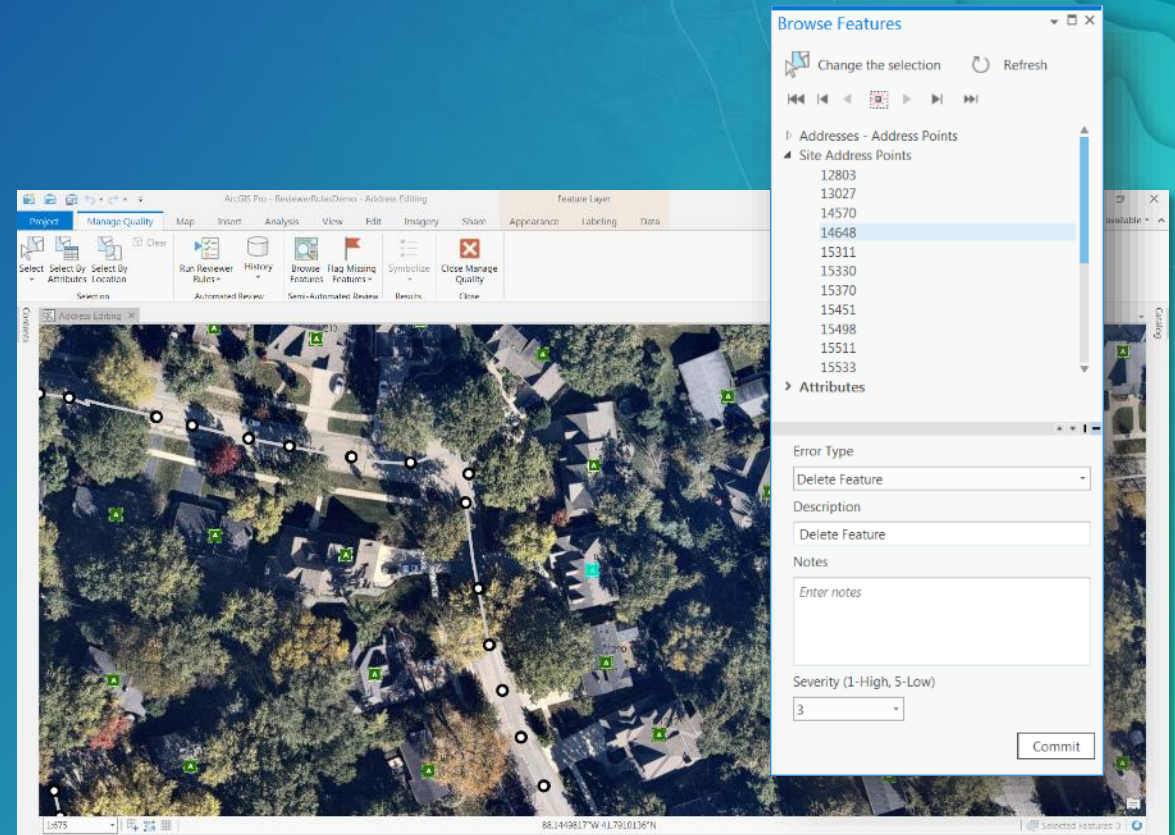


# Semi-automated review

Leveraging ArcGIS Desktop

## Tools supporting semi-automated review

- Selecting/browsing features
- Redlining missing features
- Flagging existing features in error
- Random sampling
- Assessing positional accuracy (ArcMap)
- Comparing geodatabase versions (ArcMap)

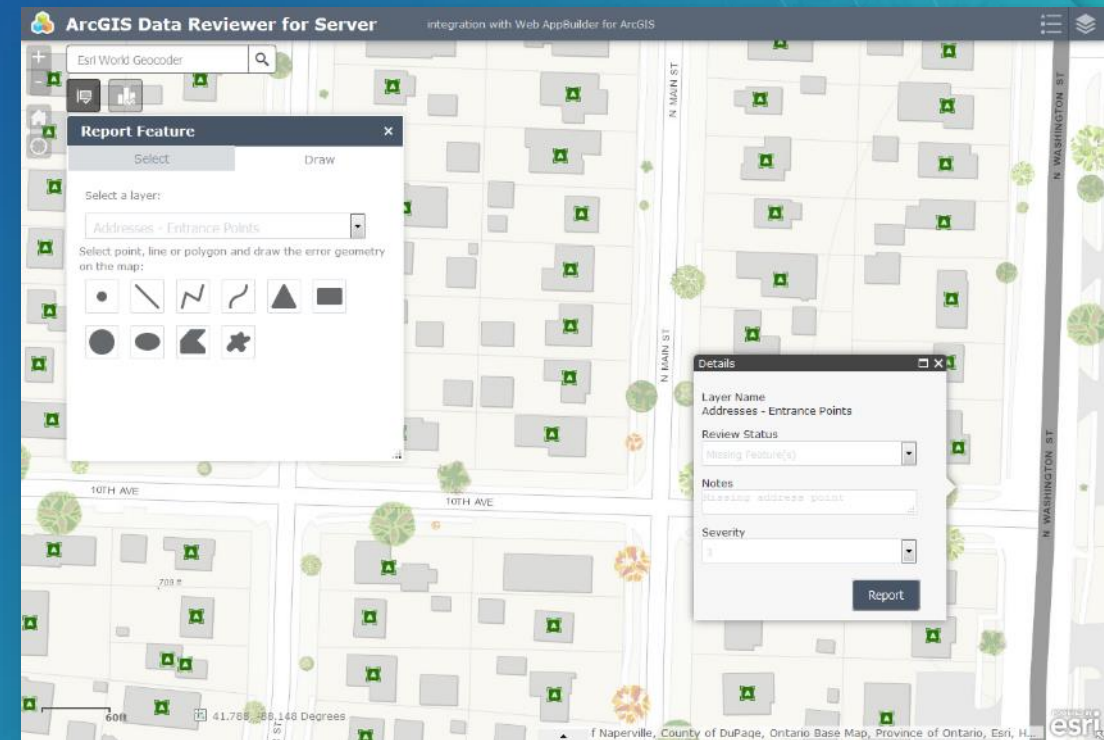




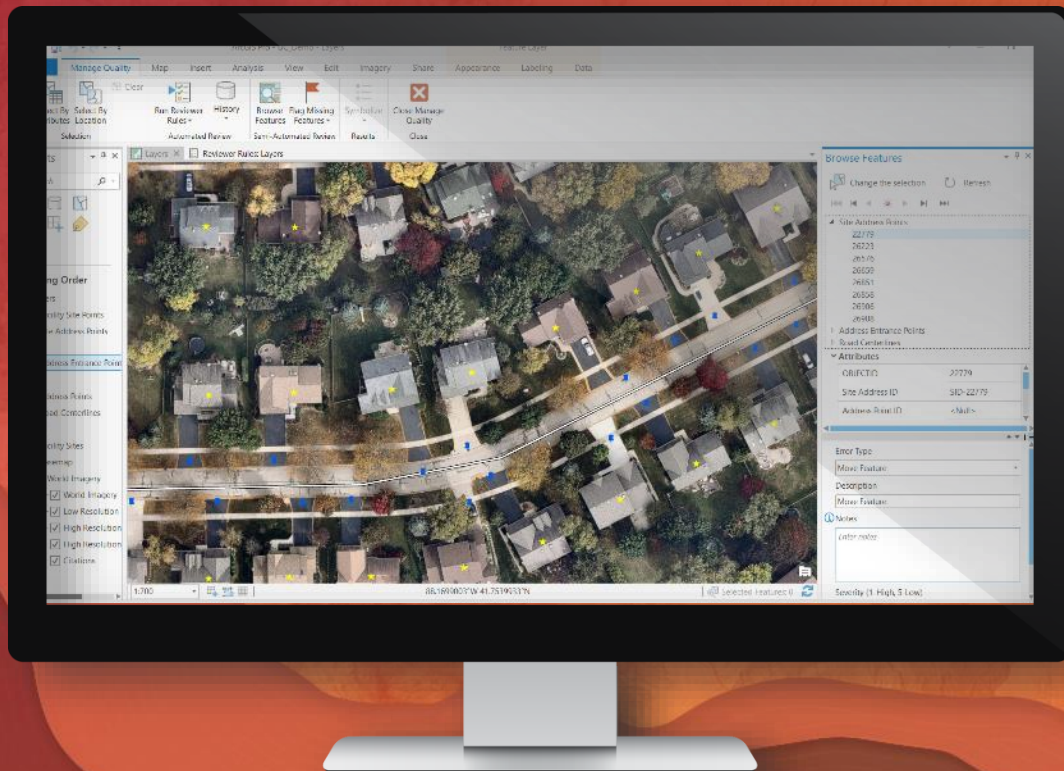
# Semi-automated review

## Leveraging ArcGIS Server

- Extending quality control workflows to other communities
  - QC review across the ArcGIS platform
  - Simple-to-use tools for error identification
  - Manual QC workflow “automation”

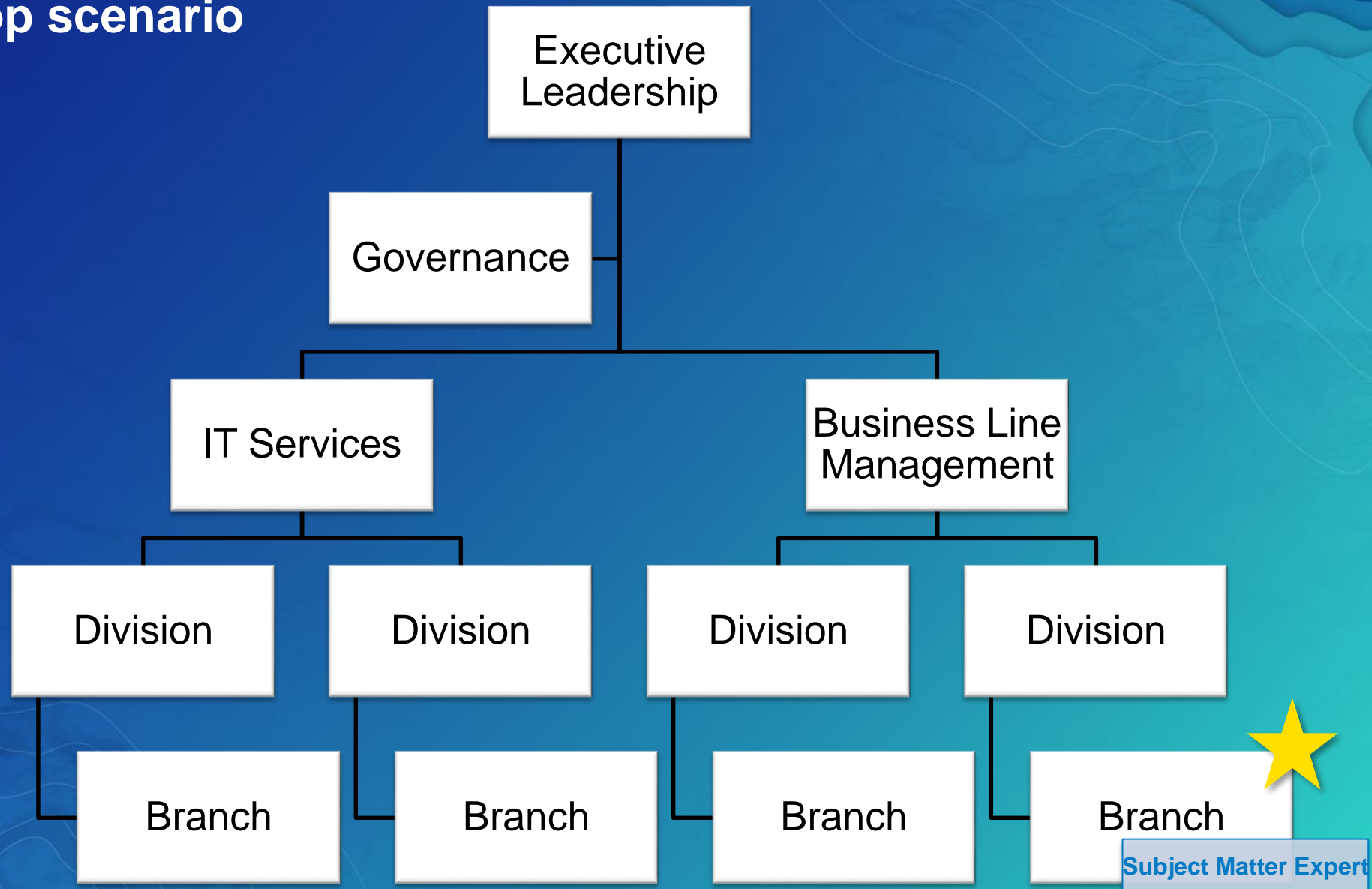


# Demo: Visual data review





# Workshop scenario





# Workshop scenario

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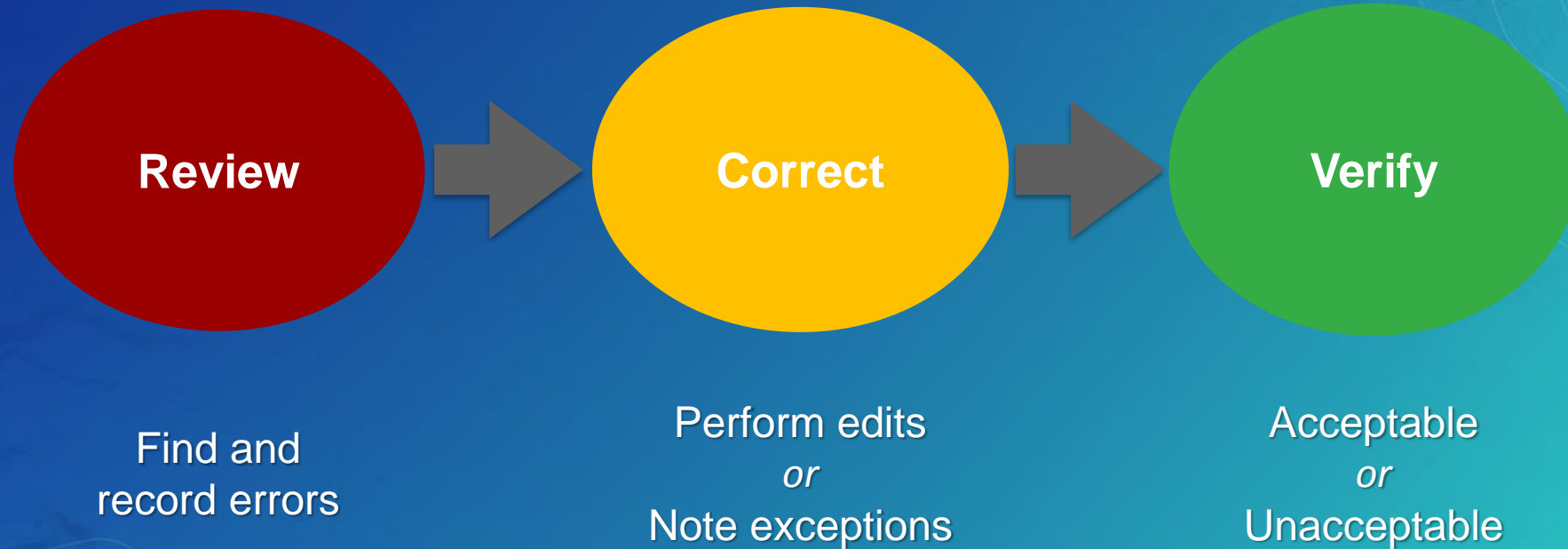
## Success criteria

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- ☐ All errors are corrected and verified

# Managing quality results

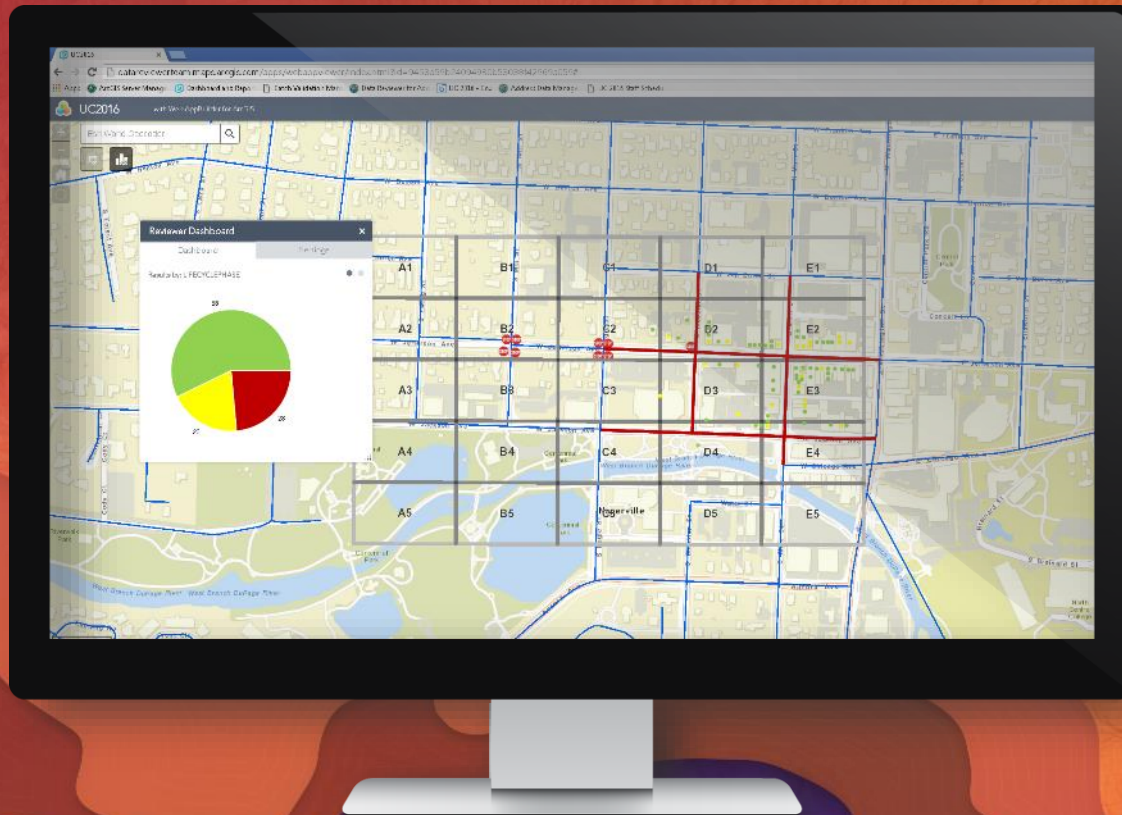
# Managing quality control

QC lifecycle management

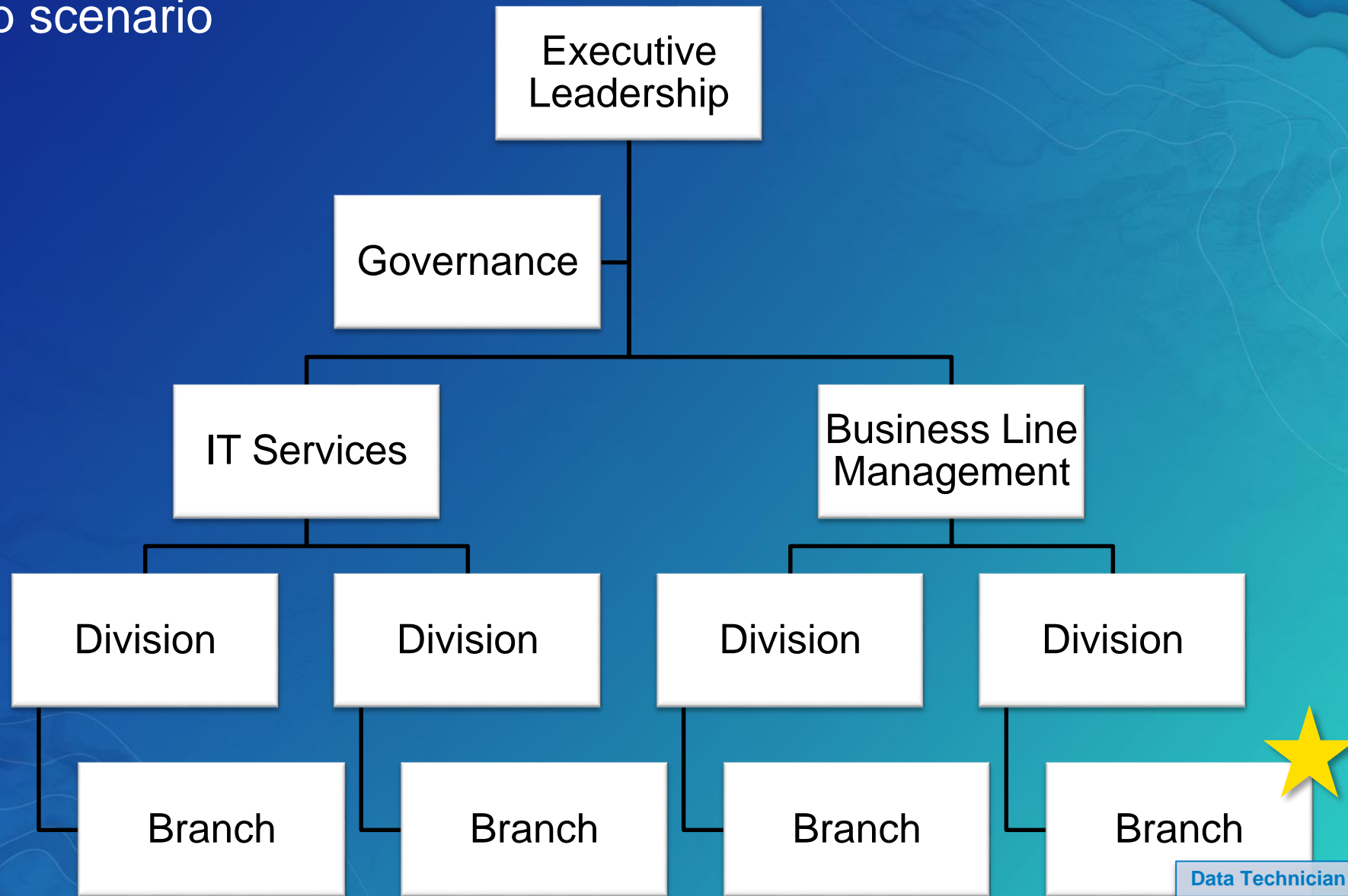




# Demo: Managing quality results



## Workshop scenario



# Workshop scenario

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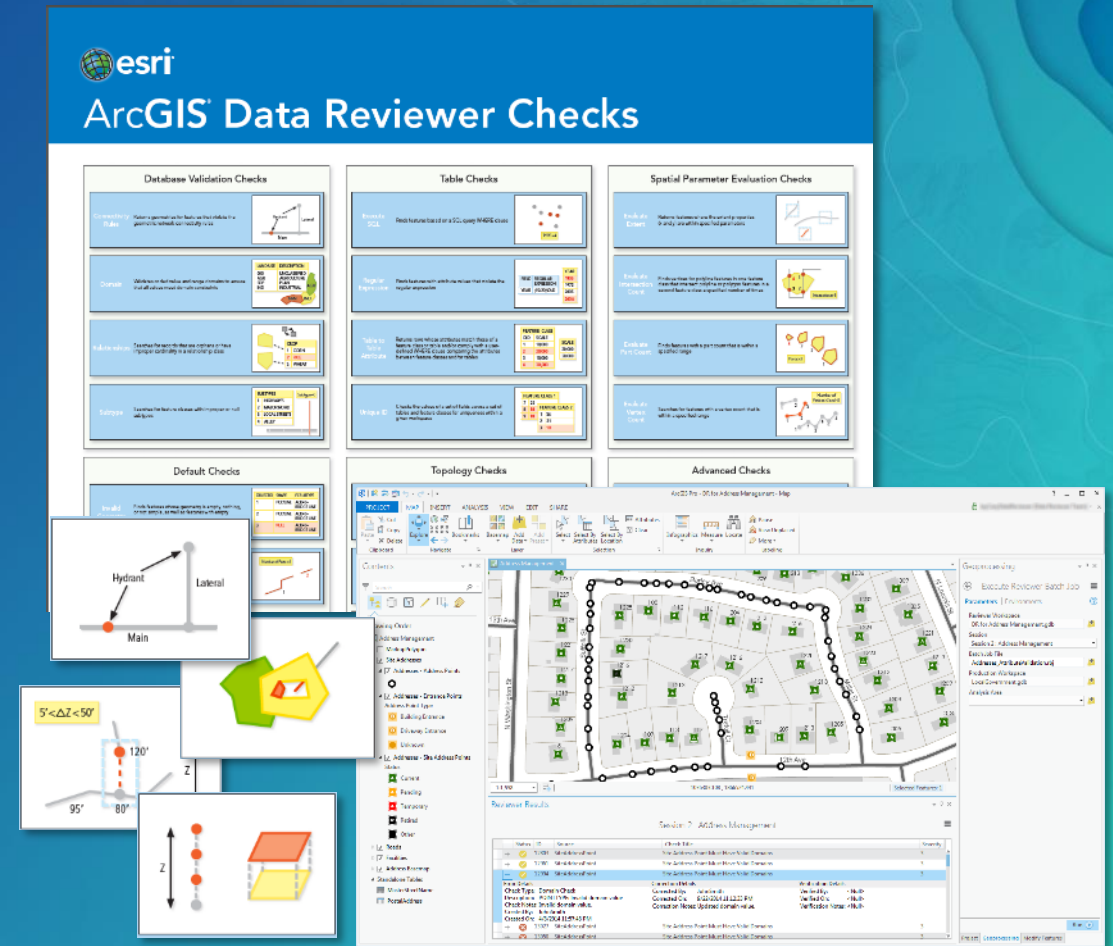
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# Workshop review

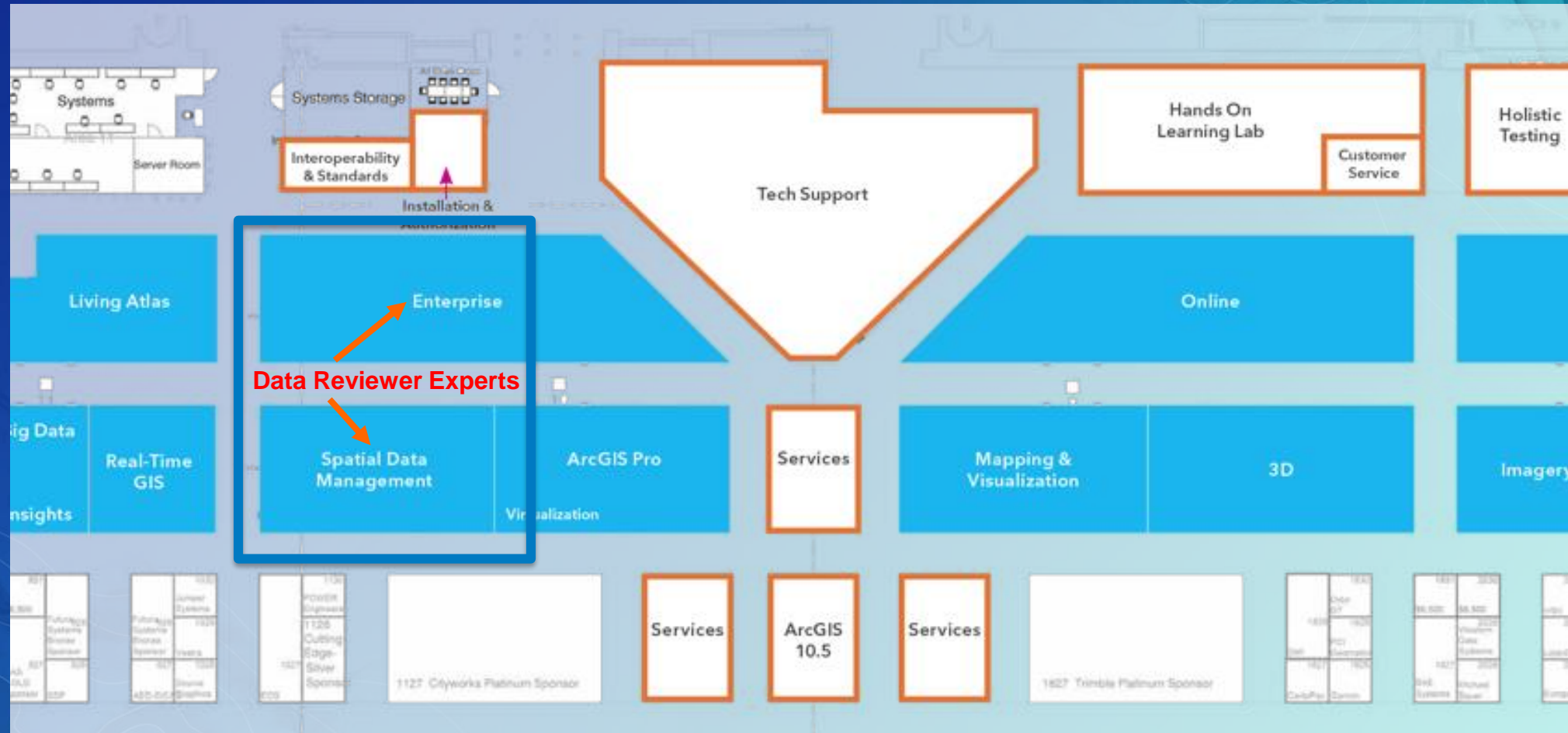
- Importance of data quality
- Forms of data quality control
  - Automated review
  - Semi-automated review
- ArcGIS Data Reviewer
  - Automated validation checks
  - Semi-automated tools
  - Error lifecycle management
  - Data quality reporting



# Want to learn more this week?

Day and Description	Type	Time	Location
Tuesday, July 11			
ArcGIS Data Reviewer: An Introduction	Technical Workshop	10:15 – 11:30am	Room 31B
Wednesday, July 12			
ArcGIS Data Reviewer: An Introduction	Technical Workshop	3:15 – 4:30pm	Room 31B
ArcGIS Data Reviewer: Integrating Data Validation Capabilities into Web Applications	Demo Theater	3:30 – 4:15pm	Demo Theater 8 Enterprise
ArcGIS Data Reviewer: Implementing Data Quality Reporting in Web Clients	Demo Theater	4:30 – 5:15pm	Demo Theater 8 Enterprise
Thursday, July 13			
ArcGIS Data Reviewer: Advanced Data Validation	Technical Workshop	8:30 – 9:45am	Room 31A
ArcGIS Data Reviewer: Leveraging Geoprocessing for Data Validation	Demo Theater	9:30 – 10:15am	Demo Theater 6 Spatial Data Mgmt
 ArcGIS Data Reviewer: Validating Linear-Referenced Events	Demo Theater	10:30 – 11:15am	Demo Theater 6 Spatial Data Mgmt

Want to learn more this week?

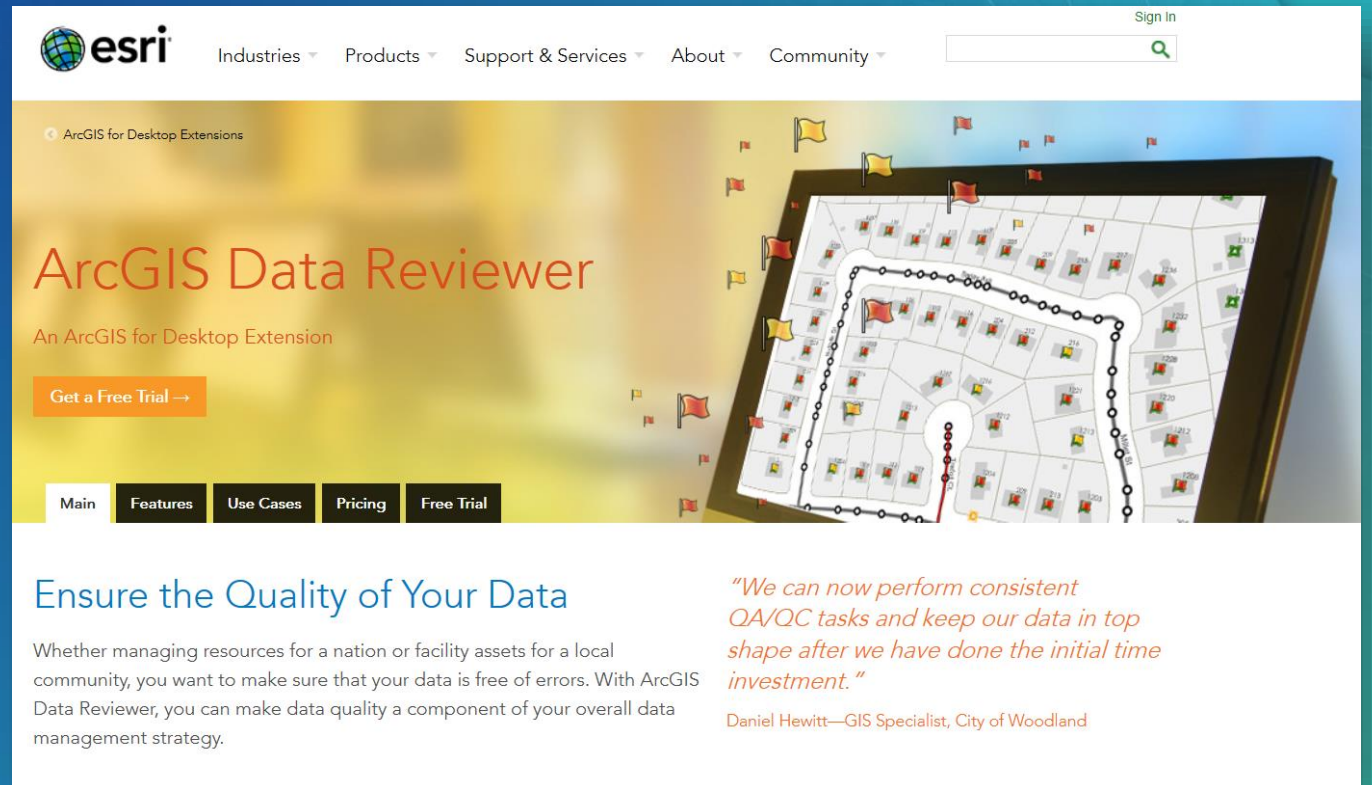




# Want to learn more?

## Product information

[www.esri.com/datareviewer](http://www.esri.com/datareviewer)



The screenshot shows the ArcGIS Data Reviewer product page. At the top is the Esri logo and a navigation menu with links for Industries, Products, Support & Services, About, and Community. A search bar is located on the right. Below the navigation bar, the page features a large banner with the title "ArcGIS Data Reviewer" in orange, followed by the subtitle "An ArcGIS for Desktop Extension". An orange button labeled "Get a Free Trial" with a right-pointing arrow is positioned below the subtitle. To the right of the text is a 3D illustration of a tablet displaying a map with various colored flags and a white path. Below the banner is a horizontal navigation bar with tabs for Main, Features, Use Cases, Pricing, and Free Trial. The main content area below the tabs has the heading "Ensure the Quality of Your Data" in blue. The text below this heading states: "Whether managing resources for a nation or facility assets for a local community, you want to make sure that your data is free of errors. With ArcGIS Data Reviewer, you can make data quality a component of your overall data management strategy." To the right of this text is a quote in orange: "We can now perform consistent QA/QC tasks and keep our data in top shape after we have done the initial time investment." Below the quote is the attribution: "Daniel Hewitt—GIS Specialist, City of Woodland".

esri Industries Products Support & Services About Community

Sign In

ArcGIS for Desktop Extensions

## ArcGIS Data Reviewer

An ArcGIS for Desktop Extension

[Get a Free Trial →](#)

Main Features Use Cases Pricing Free Trial

### Ensure the Quality of Your Data

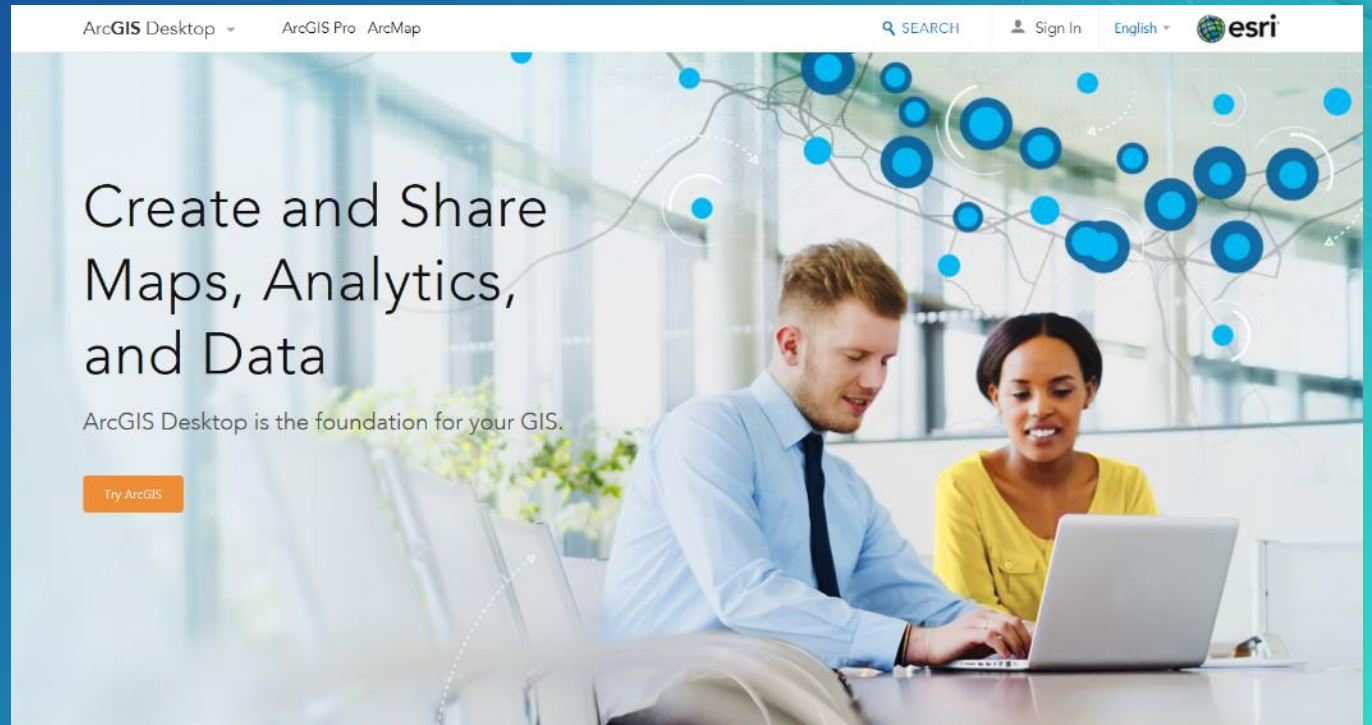
Whether managing resources for a nation or facility assets for a local community, you want to make sure that your data is free of errors. With ArcGIS Data Reviewer, you can make data quality a component of your overall data management strategy.

*"We can now perform consistent QA/QC tasks and keep our data in top shape after we have done the initial time investment."*

Daniel Hewitt—GIS Specialist, City of Woodland

# Want to learn more?

- Documentation
  - Desktop ([desktop.arcgis.com](https://desktop.arcgis.com))



# Want to learn more?

- Documentation
  - Desktop
  - Server (*server.arcgis.com*)

The screenshot shows the ArcGIS Data Reviewer for Server documentation page. The header includes 'ArcGIS Enterprise' and 'Documentation' tabs, a search bar, and user options like 'Sign In' and 'English'. The main heading is 'ArcGIS Data Reviewer for Server' with 'Home' and 'Help' sub-links. Below this, it states the 'Released Version: 10.5 (December 2016)' and 'Previous Version: 10.4.1 (May 2016)'. A brief description follows: 'ArcGIS Data Reviewer for Server gives the ability to integrate data quality capabilities in workflows for web and mobile client applications.' The page is divided into two main columns. The left column features two cards: 'Find Dangles' (describing finding polyline features with nodes not connected to other features) and 'Monotonicity' (describing finding polylines with vertices that are not strictly increasing or decreasing in value). Below these is a section titled 'Deploy Data Quality Services' with a description of automatically detecting errors and a 'Show me how >' link. The right column has a 'Manage Quality Feedback' section with a description of using visual review tools and a 'Show me how >' link. A 'Quick Links' sidebar on the right lists various resources like 'What's new?', 'System requirements', and 'Template gallery'. At the bottom, there are more visual elements and a 'Community and support' section with a 'Blog' link.

ArcGIS Enterprise Documentation

SEARCH Sign In English esri

## ArcGIS Data Reviewer for Server

Home Help

**Released Version:** 10.5 (December 2016) **Previous Version:** 10.4.1 (May 2016)

ArcGIS Data Reviewer for Server gives the ability to integrate data quality capabilities in workflows for web and mobile client applications.

### Find Dangles

Finds polyline features with nodes that are within a user-defined tolerance but not connected to other polyline or polygon features.

### Monotonicity

Finds polylines with vertices that are not strictly increasing or decreasing in value or are trending based on specified conditions.

### Deploy Data Quality Services

Automatically detect errors in your data using out-of-the-box validation checks. Configure these checks to meet the unique business requirements of your industry or organization without writing custom code.

[Show me how >](#)

### Manage Quality Feedback

Some errors in data get overlooked using automated methods. Implement simple-to-use visual review tools to identify missing or misplaced features, improperly attributed features, and other errors that can not be detected automatically.

[Show me how >](#)

### Quick Links

- [What's new?](#)
- [What is Data Reviewer for Server?](#)
- [System requirements](#)
- [Installation guide](#)
- [ArcGIS REST API](#)
- [ArcGIS API for JavaScript](#)
- [Template gallery](#)

### Related components

- [ArcGIS for Server](#)
- [All installation guides](#)

### New to ArcGIS?

- [Learn ArcGIS lessons](#)
- [Training courses](#)

### Documentation for previous releases

- [10.4](#)
- [10.3 and earlier](#)

### Community and support

[Blog](#)





# Want to learn more?

- Documentation

- Desktop
- Server

- Training (*training.esri.com*)

-  - Assessing Data Quality using ArcGIS Data Reviewer (*Seminar*)
-  - Evaluating Positional Accuracy Using ArcGIS Data Reviewer for Desktop (*Seminar*)
- Data QC with ArcGIS: Automating Validation (*Web Course*)
- Data QC with ArcGIS: Visual Review (*Web Course*)
- Quality Control Using ArcGIS Data Reviewer for Desktop (*Instructor-Led*)

# Want to learn more?

- Documentation
  - Desktop
  - Server
- Training
  - Assessing Data Quality using ArcGIS Data Reviewer
  - Evaluating Positional Accuracy Using ArcGIS Data Reviewer for Desktop
  - Data QC with ArcGIS: Automating Validation
  - Data QC with ArcGIS: Visual Review
  - Quality Control Using ArcGIS Data Reviewer for Desktop
- GeoNet ([geonet.esri.com](http://geonet.esri.com))
  - Data Reviewer place

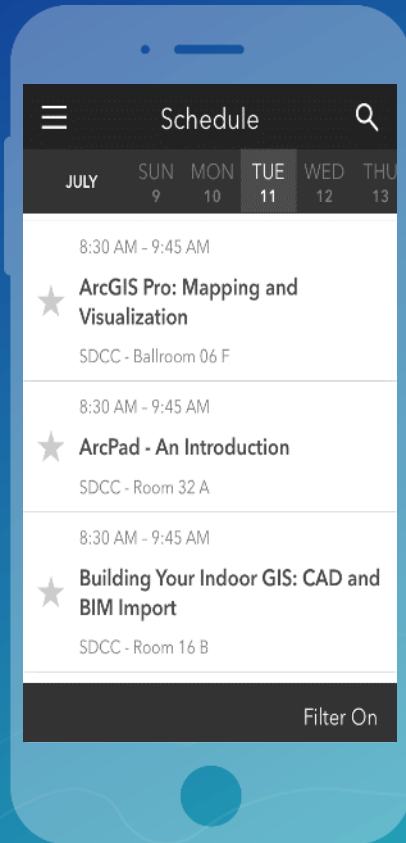


# Please Take Our Survey on the Esri Events App!

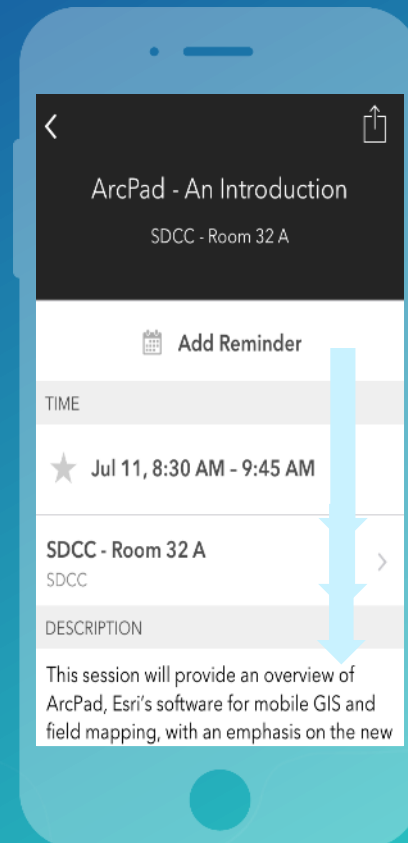
**Download the Esri Events app and find your event**



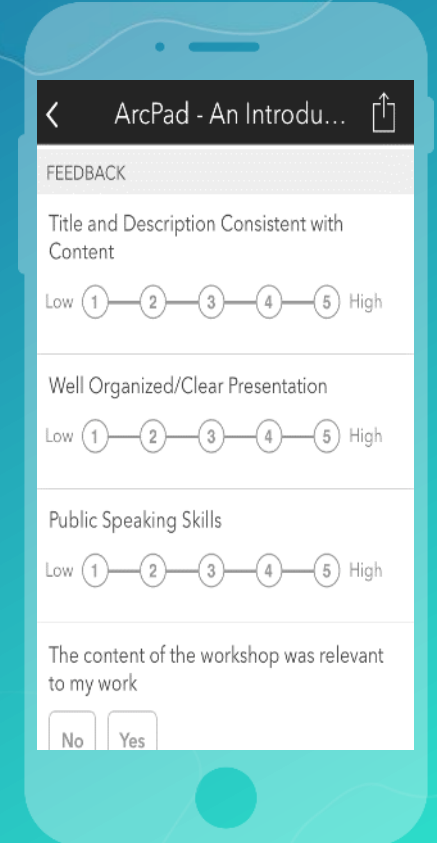
**Select the session you attended**



**Scroll down to find the survey**



**Complete Answers and Select "Submit"**







esri

THE  
SCIENCE  
OF  
WHERE