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# Managing and Analyzing Integrity Data with APR and Enterprise Geodatabases

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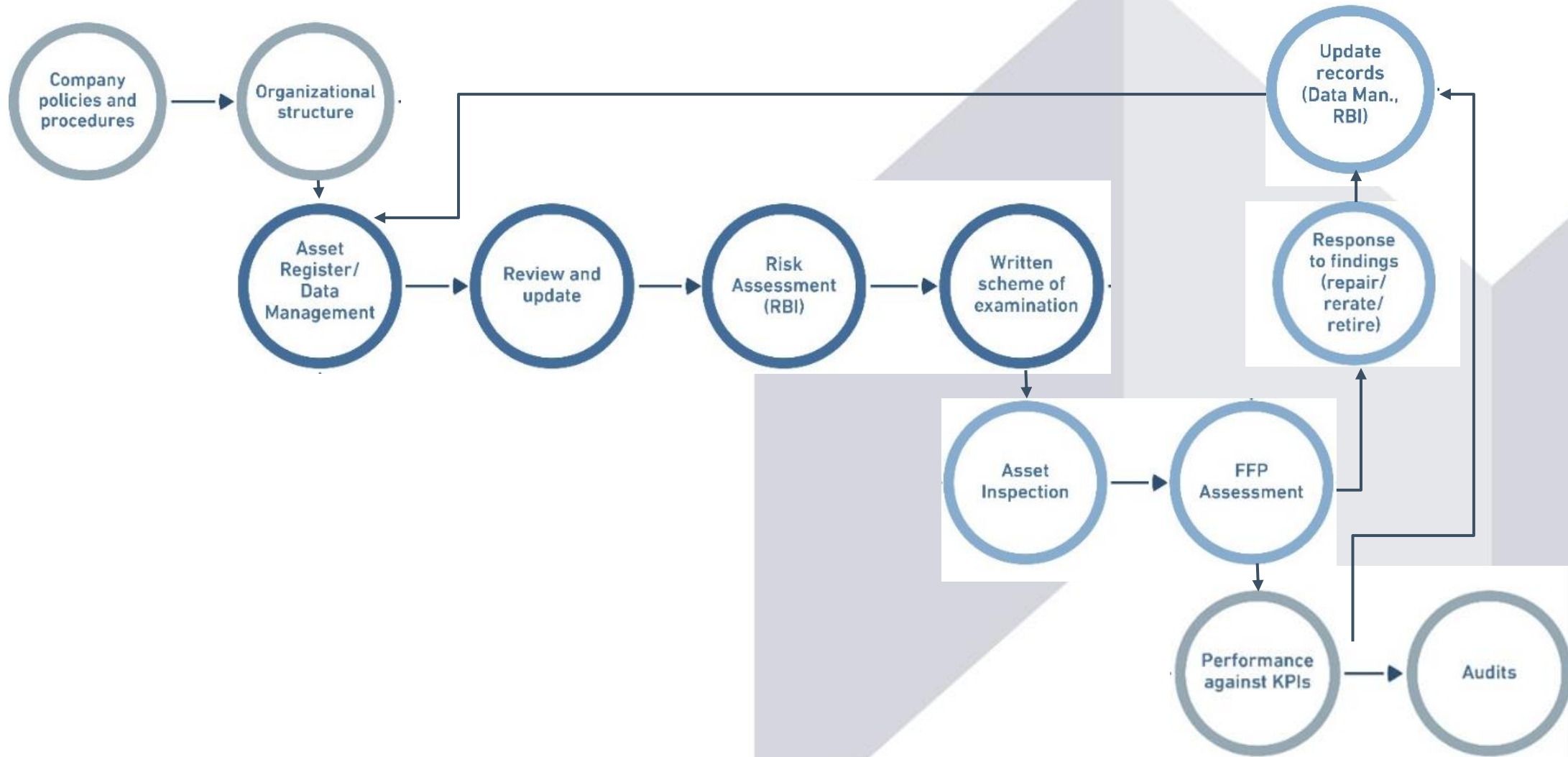
[ohuisman@rosen-group.com](mailto:ohuisman@rosen-group.com)



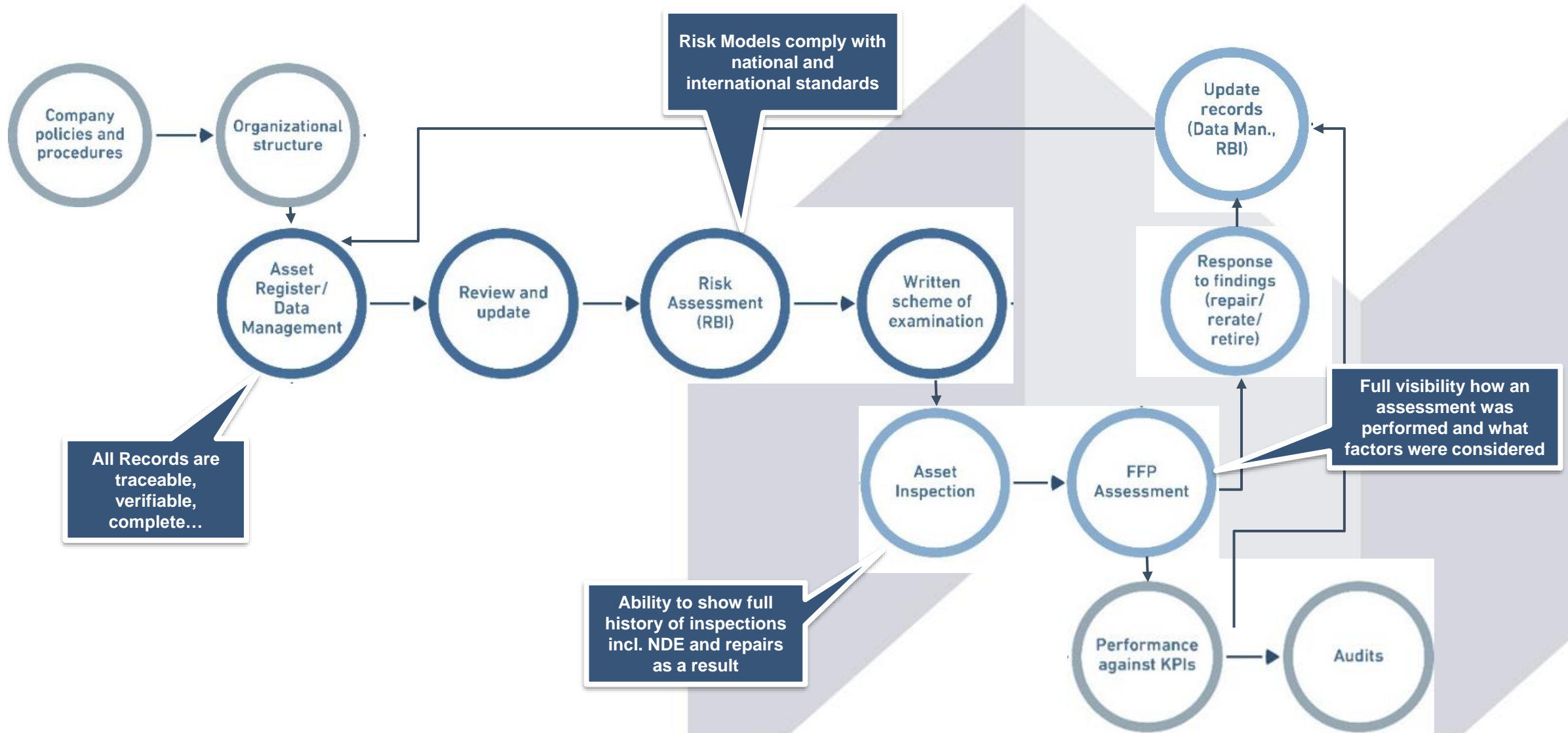
*Every integrity assessment can be represented by a “Process” that receives data and generates new information.*

Data Management -> Integration -> Analysis -> Decision ->

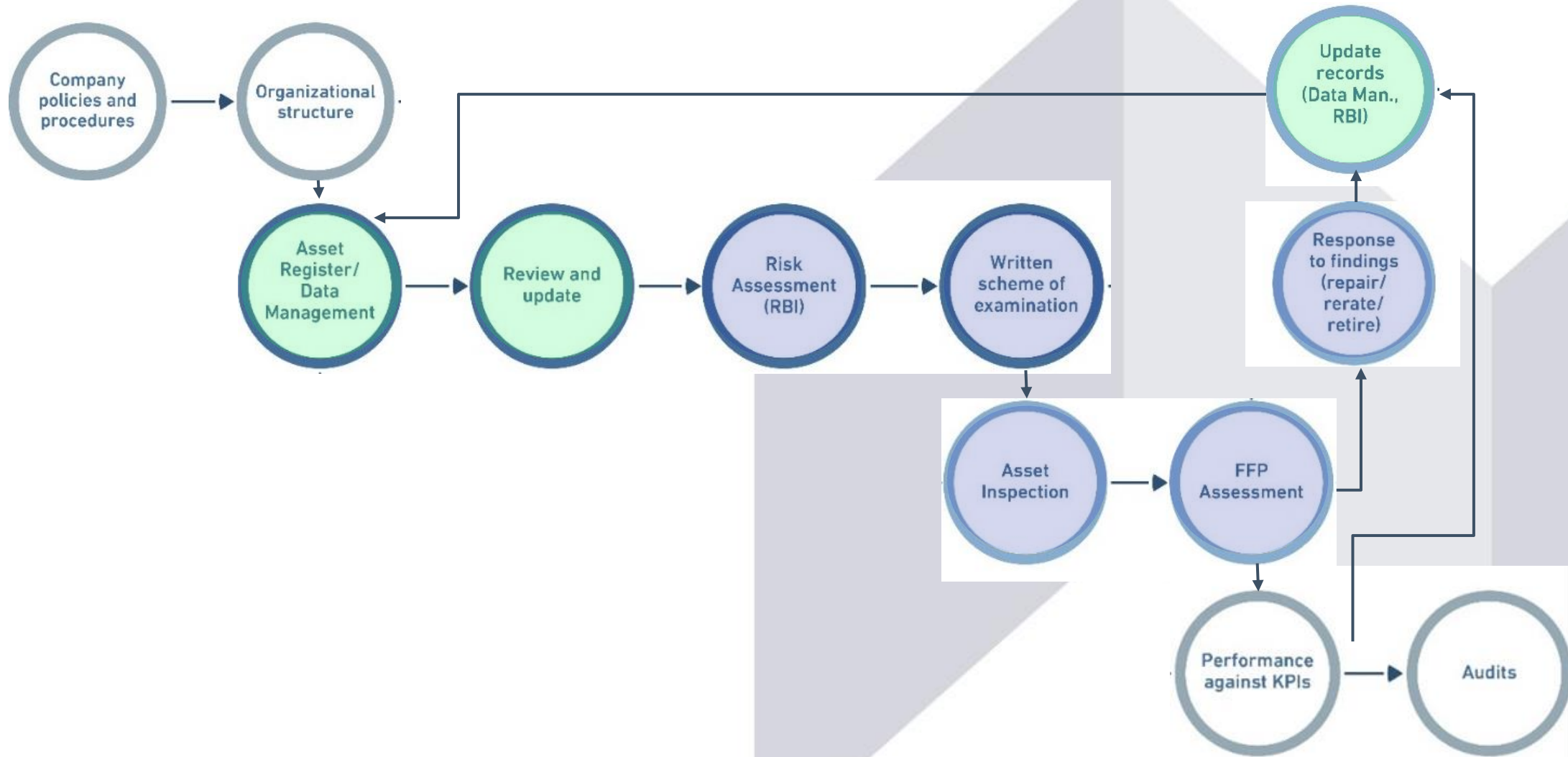
# IM Processes



# IM Processes



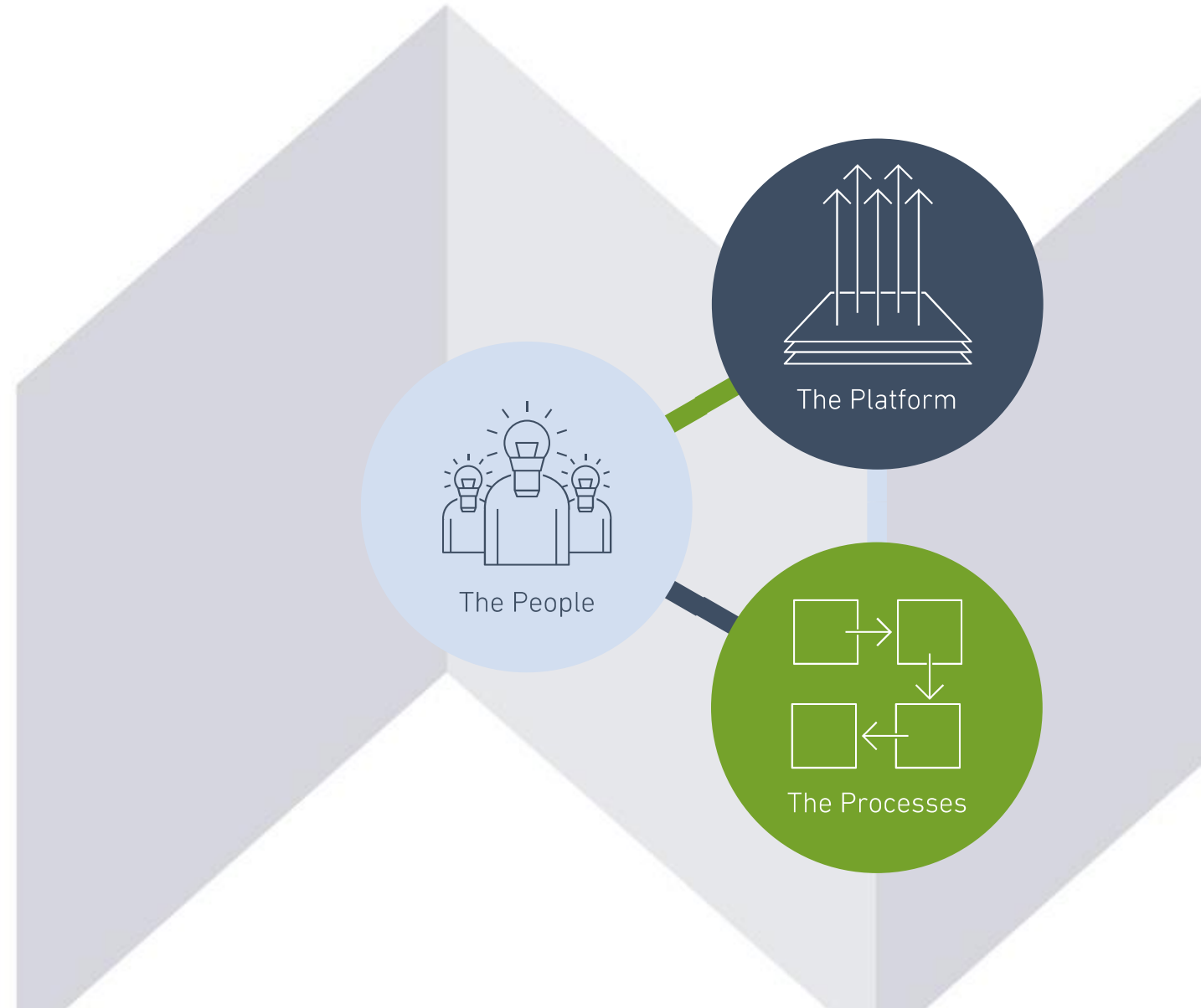
# IM Processes



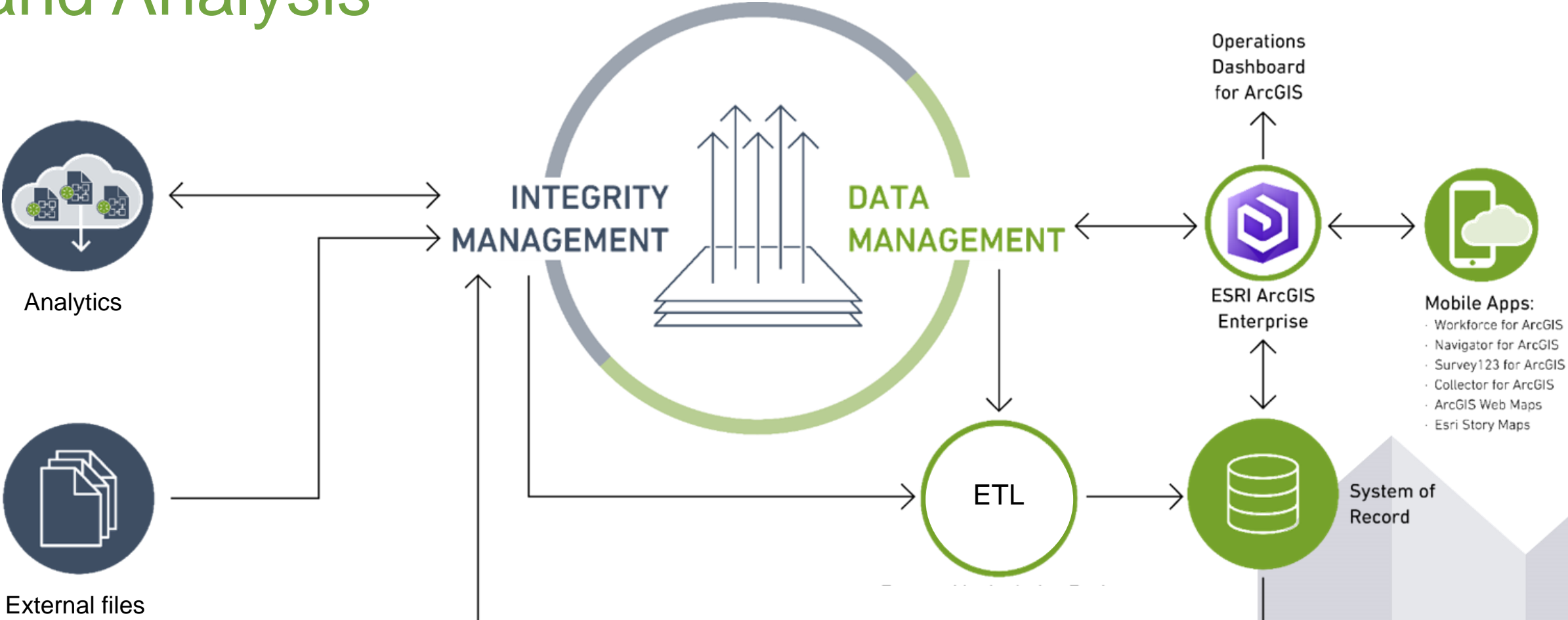
# The Framework for Decision Support

What's required:

- **(Analytic) Processes** in the form of best practices defined by the industry
- **People** that execute the work and apply engineering judgement as part of the decision making
- **A Platform** to define and execute Integrity-relevant processes



# A Platform for Data Management and Analysis



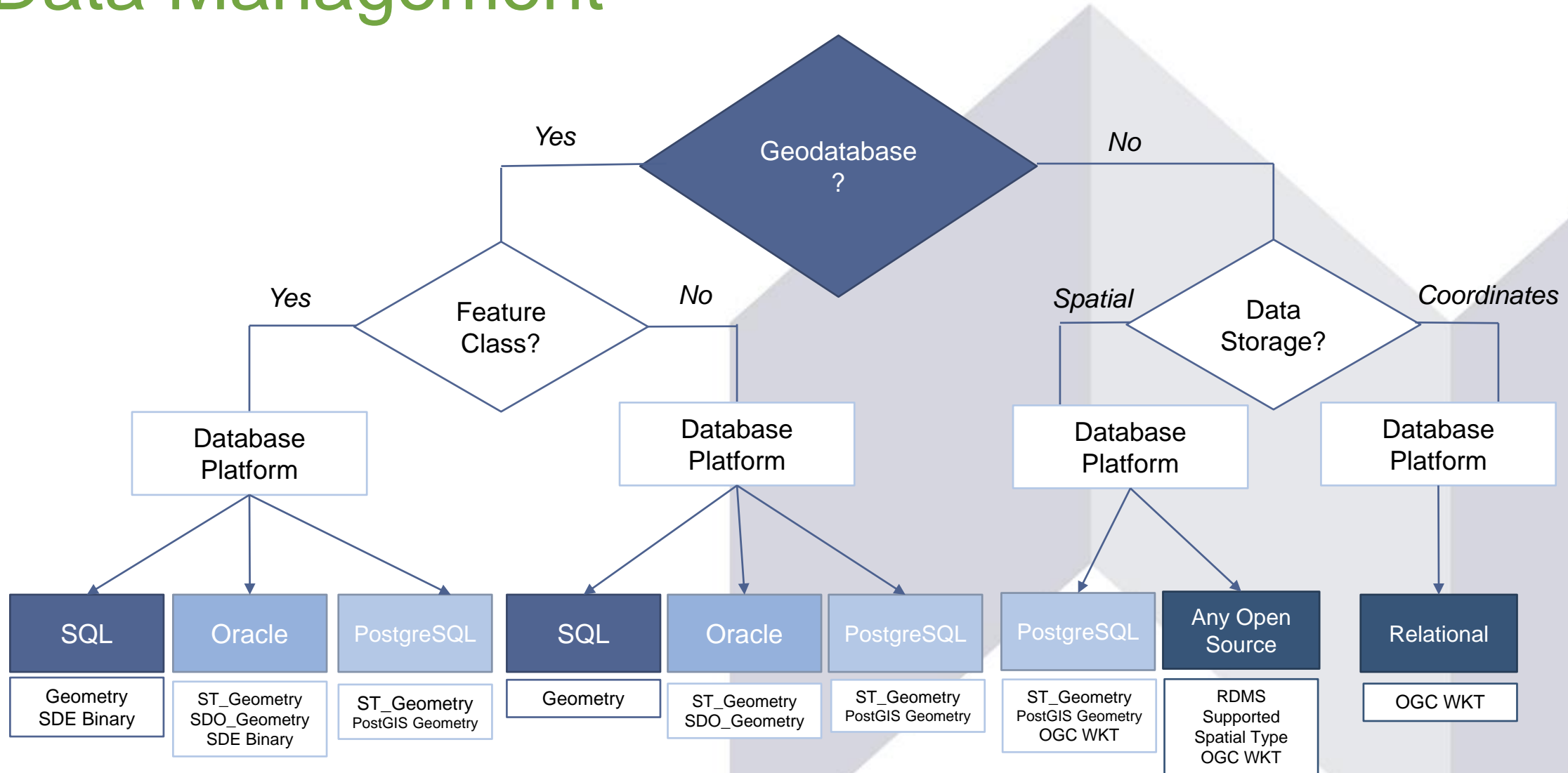


## Integrity Data





# Data Management



# Populating the system of record?

Data integration issues:

- ✓ Different types of data
- ✓ Data sources
- ✓ Different technologies
- ✓ Tools/Technologies to aid with integration
- ✓ Spatial data and Relational data
- ✓ Validation and quality control
- ✓ Tracking and maintaining edits
- ✓ Efficiency and simplicity?



Survey123 for ArcGIS

## Pipeline Survey Protocol

Pipe To Soil Potential [mV]  
Format: Negative decimal values with up to two decimal places

▼ Joint Inspections [...]

▼ Target Weld

Weld Number

Seam Orientation [°]  
Format: Integer values between 0 and 359

-  +

Create A Sketch?  
 Yes

Seam Orientation Sketch

jj\_target\_seam\_sketch-736b5d8aaf444ecda44455bcf4559f95.jpg

✓



Total Digs 2018

# 45

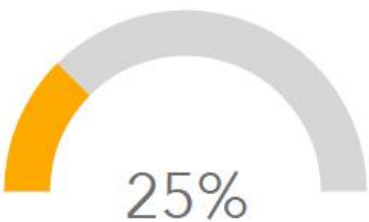
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Dig Progress

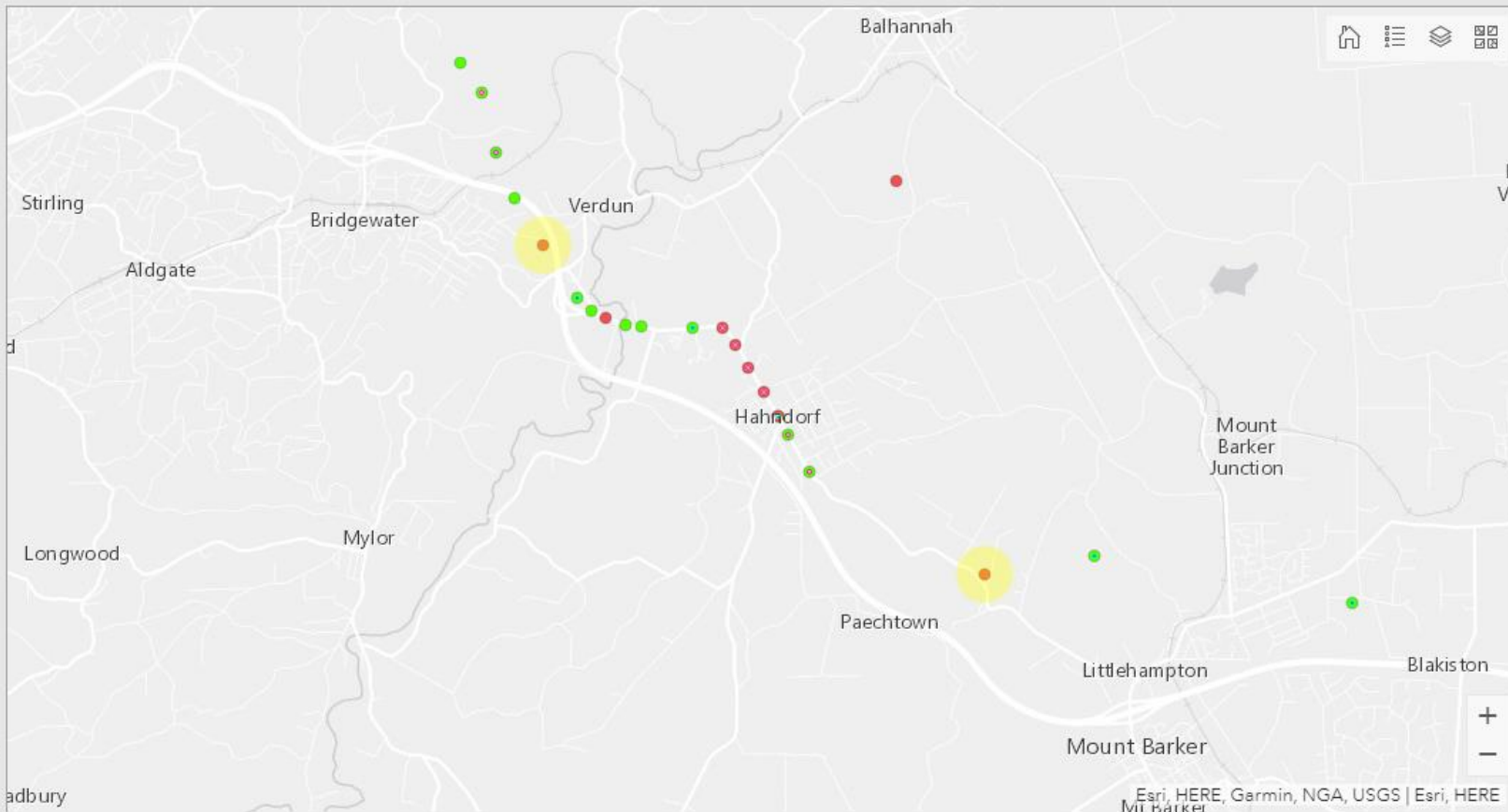
## 24 Executed 19 Planned

Last update: a minute ago

Location Confirmed



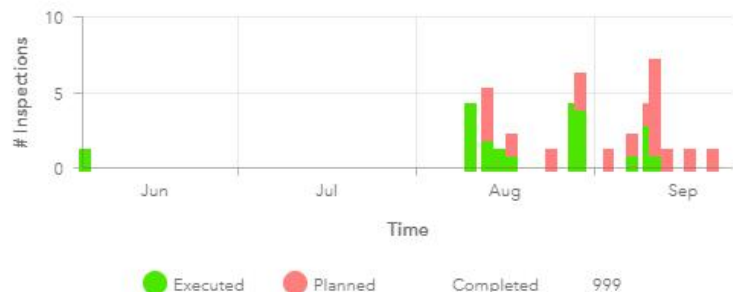
Last update: a minute ago



List of Survey Sites

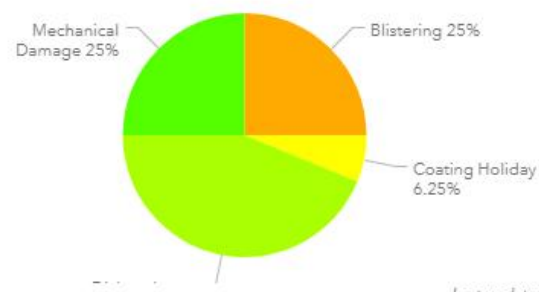
- ohuisman Executed 8/10/2018, 2:52:00 PM
- ohuisman Executed 8/10/2018, 3:07:00 PM
- ohuisman Executed 8/10/2018, 3:11:00 PM
- ohuisman Executed 8/10/2018, 3:26:00 PM
- ohuisman Planned 8/13/2018, 3:55:00 PM
- ohuisman Executed 8/13/2018, 3:50:00 PM
- ohuisman Planned 8/13/2018, 3:46:00 PM
- ohuisman Executed 8/13/2018, 3:30:00 PM
- ohuisman Planned 8/13/2018, 6:24:00 PM
- rherrera Executed 8/14/2018, 11:27:00 AM
- ohuisman Executed 8/16/2018, 5:44:00 PM
- ohuisman Planned 8/17/2018, 10:26:00 AM
- mfriedrich Executed 8/17/2018, 10:34:00 AM

Timeline



Last update: a minute ago

Anomaly Type

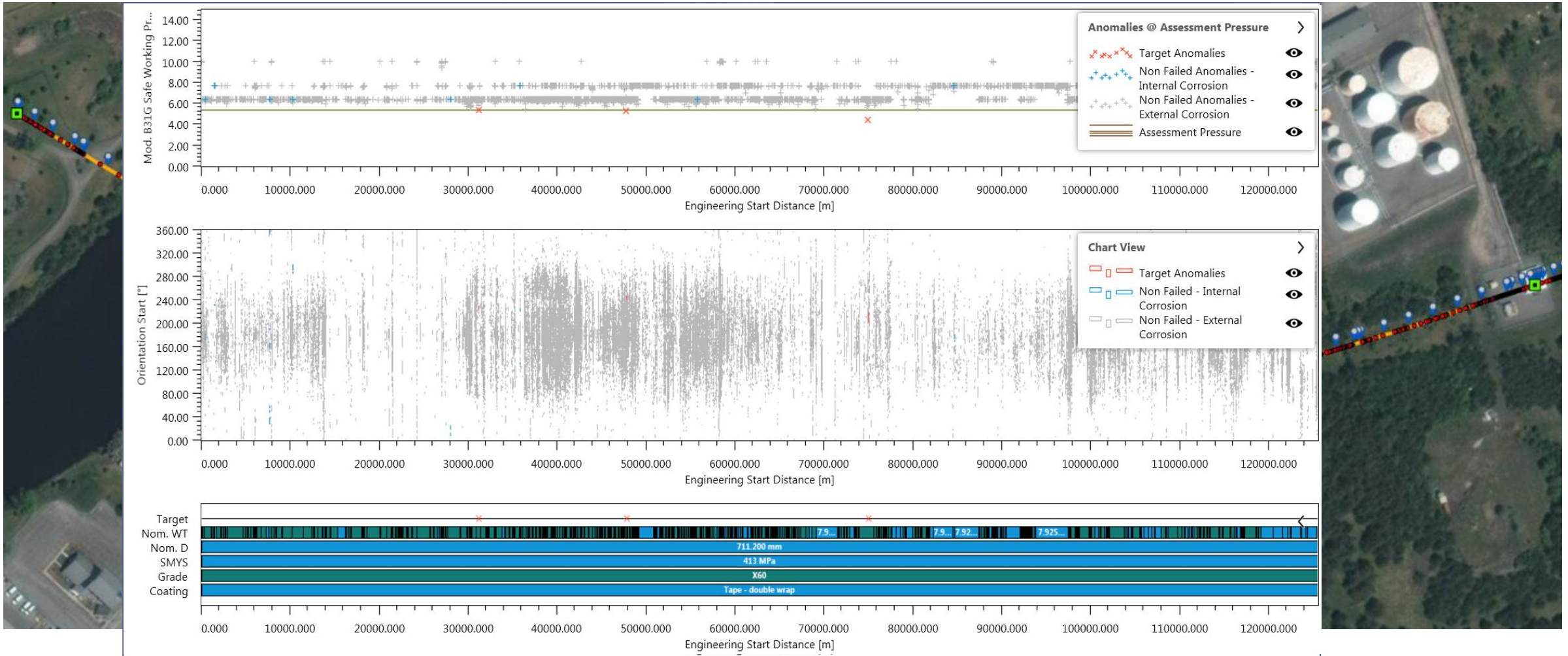


Coating

Anomaly

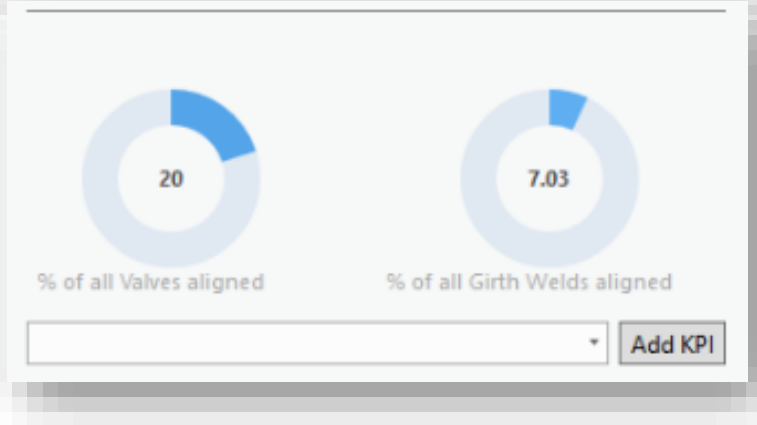
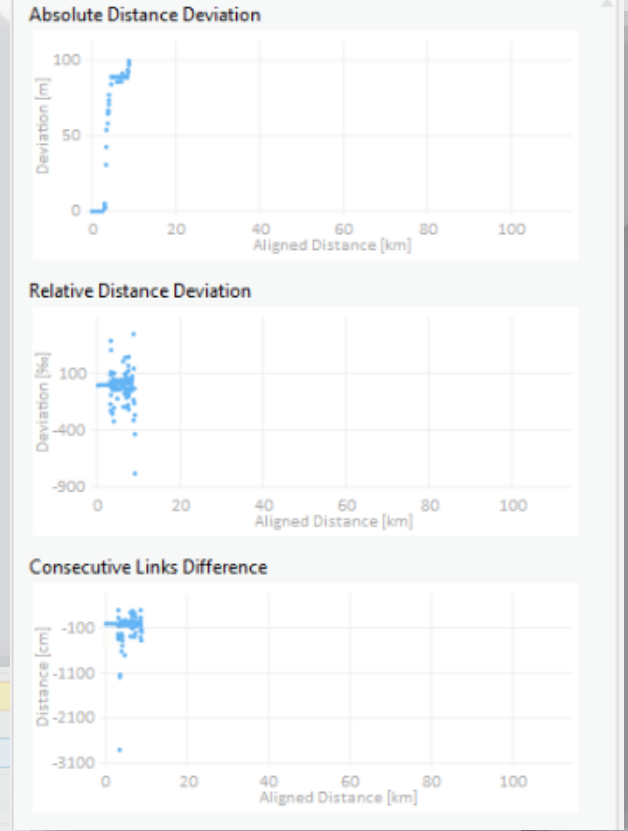
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# ILI Data alignment



## ILI Data alignment

Inspection			Route		
Distance [m]	Type		Distance [m]	Type	
-13.18	ILI Tool Info	○	-0.112	Tee	○
-6.29	Branch Connection	○	1.234	Weld	○
28.61	Branch Connection	○	12.366	Weld	○
30.21	Valve	○	18.309	Weld	○
31.88	Branch Connection	○	28.801	Weld	○
33.71	Branch Connection	○	30.206	Valve	○
34.5	ILI Tool Info	○	31.55	Weld	○
43.38	Branch Connection	○	31.883	Tee	○
46.4	Girth Weld	○	32.328	Weld	○
57.6	Girth Weld	○	32.914	Weld	○
69.3	Girth Weld	○	33.711	Tee	○
79.6	Girth Weld	○	46.4	Weld	○
80.8	Girth Weld	○	57.6	Weld	○
109.5	Girth Weld	○	69.3	Weld	○
121.1	Girth Weld	○	79.6	Weld	○
132.3	Girth Weld	○	80.8	Weld	○
143.8	Girth Weld	○	109.477	Weld	○
155	Girth Weld	○	121.081	Weld	○

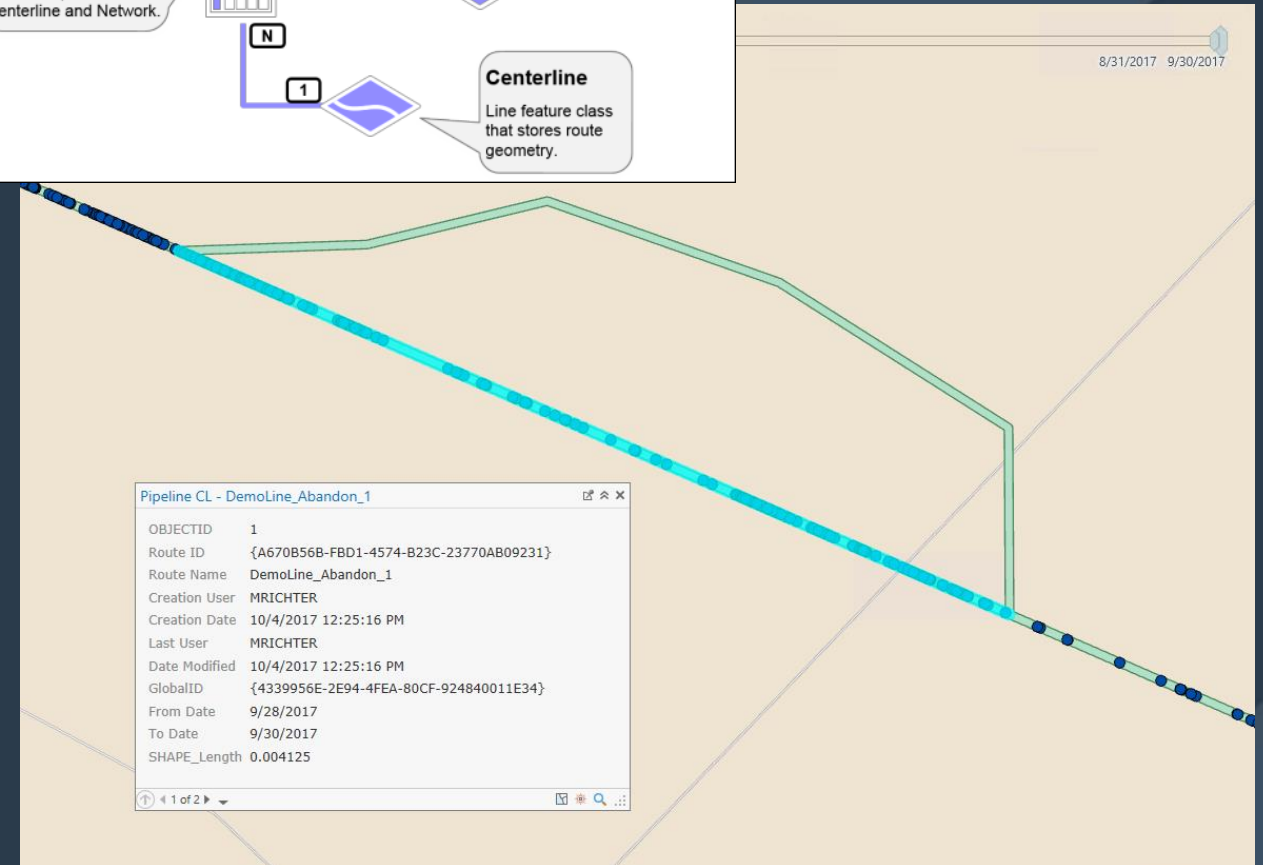
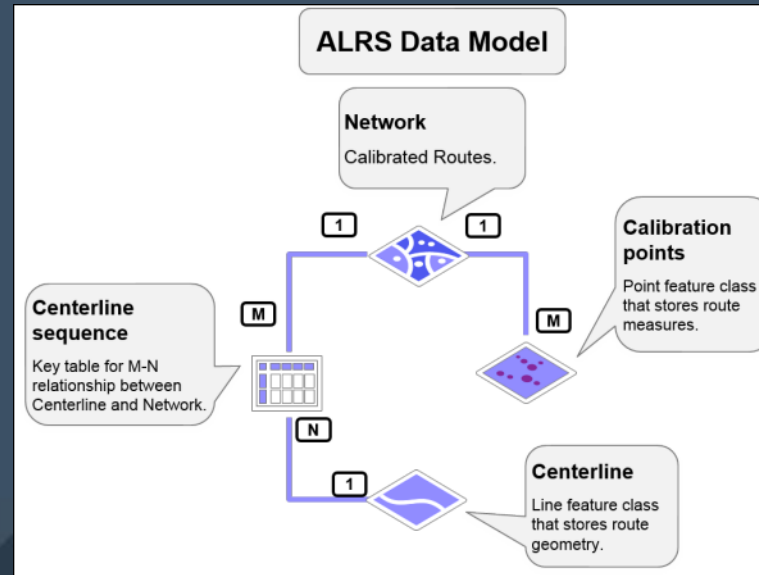






# Pipeline Referencing

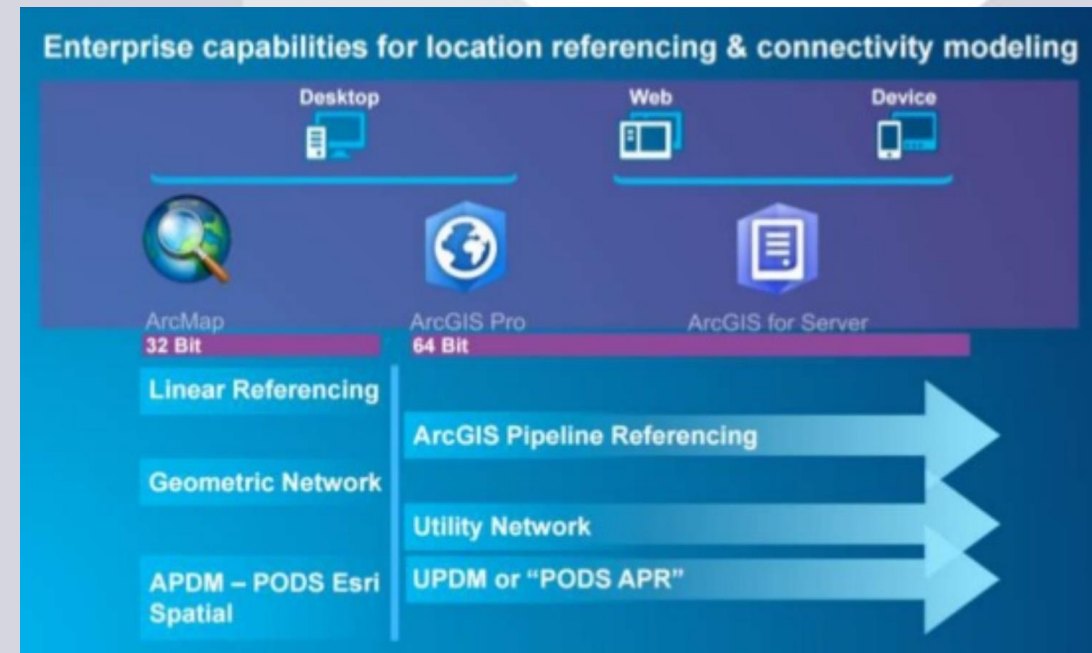
- ✓ 'Core tables' are managed by APR extension
- ✓ Use of calibration points to manage aligned data
- ✓ Time awareness provides the key to historical route management
- ✓ Multiple referencing systems (distance, etc).
- ✓ Work is ongoing...





# Data Models

- Legacy extensions to support APR are possible e.g. PODS Spatial flavours
- Decisions and data management strategy should look to the expected architectural changes around 'Enterprise GIS' functionality
- Current choices are UPDM and PODS Lite, PODS v7 is still under development
- Regardless of the data model chosen, significant customizations are likely required to store all needed data, or links to legacy databases need to be engineered (and maintained)!



Legend

Anomaly

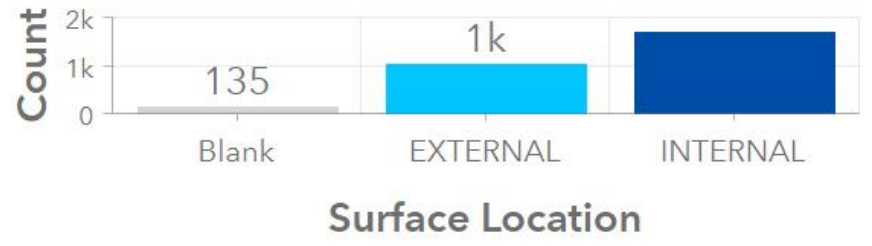
- Anomaly
- Bending Strain
- Coating
- Cracking
- Extra Metal
- Geometry
- Material Defect
- Max Strain
- Metal Loss
- Unknown
- Other

DigSites

CorrosionGrowthRate

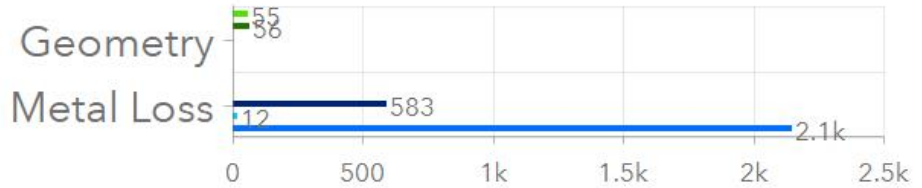
Risk

Surface Location Distribution



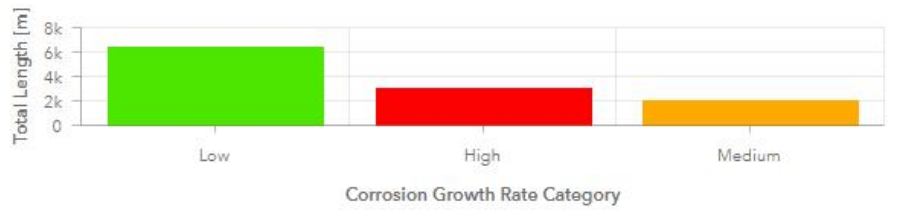
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ILI Anomaly Type/Anomaly Sub-Type



Last update: 13 minutes ago

Internal Corrosion Growth Rate

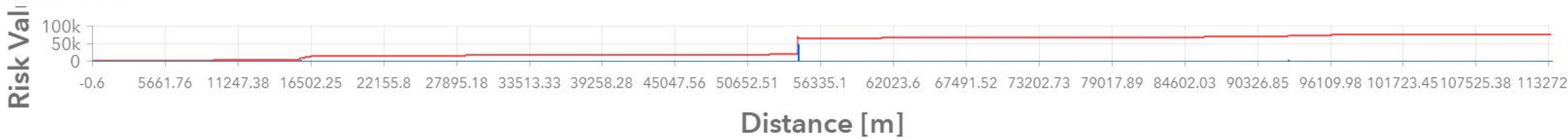


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- Internal Cat.
- External Cat.
- Internal CGR
- External CGR



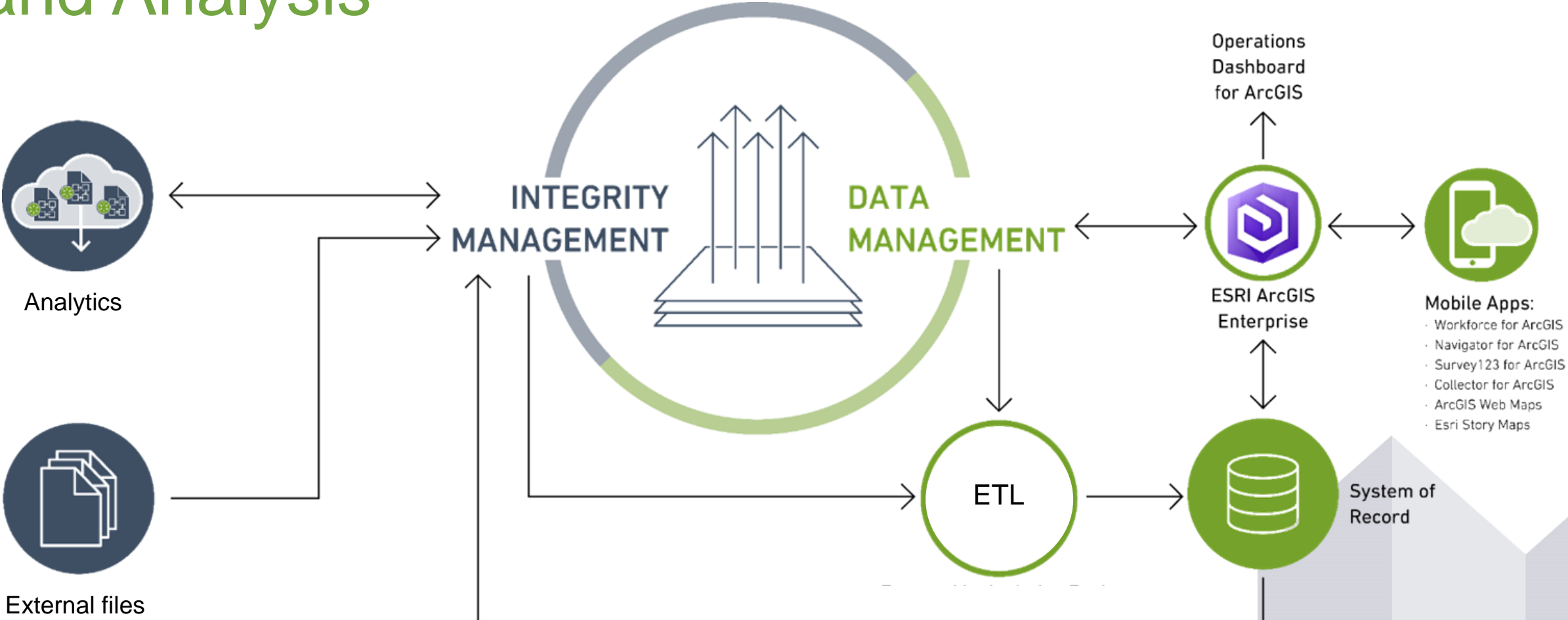
Risk Value over Distance



Last update: 13 minutes ago

- Risk Profile
- POF Profile
- Risk Cat.
- COF Profile
- Measured Elevation

# A Platform for Data Management and Analysis



# Key Take-aways

- ✓ Data management is a complex process, but one which has fundamental implications for the accuracy, availability and traceability of the data (and resulting calculations) throughout the enterprise
- ✓ Enterprise GIS are able to provide most if not all of the features required for the management of all kinds of integrity data, including time awareness and plug-and-play dashboards and apps
- ✓ As always there will be dynamics in the pure 'software' market. Focus on the direct and future business needs and plan ahead!

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Thank You!

**Questions and / or comments?**

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