



How to make your Data Smarter...

and what are the benefits...

- About Data
- Making Data Smarter
- Case Studies



Data the new Oil

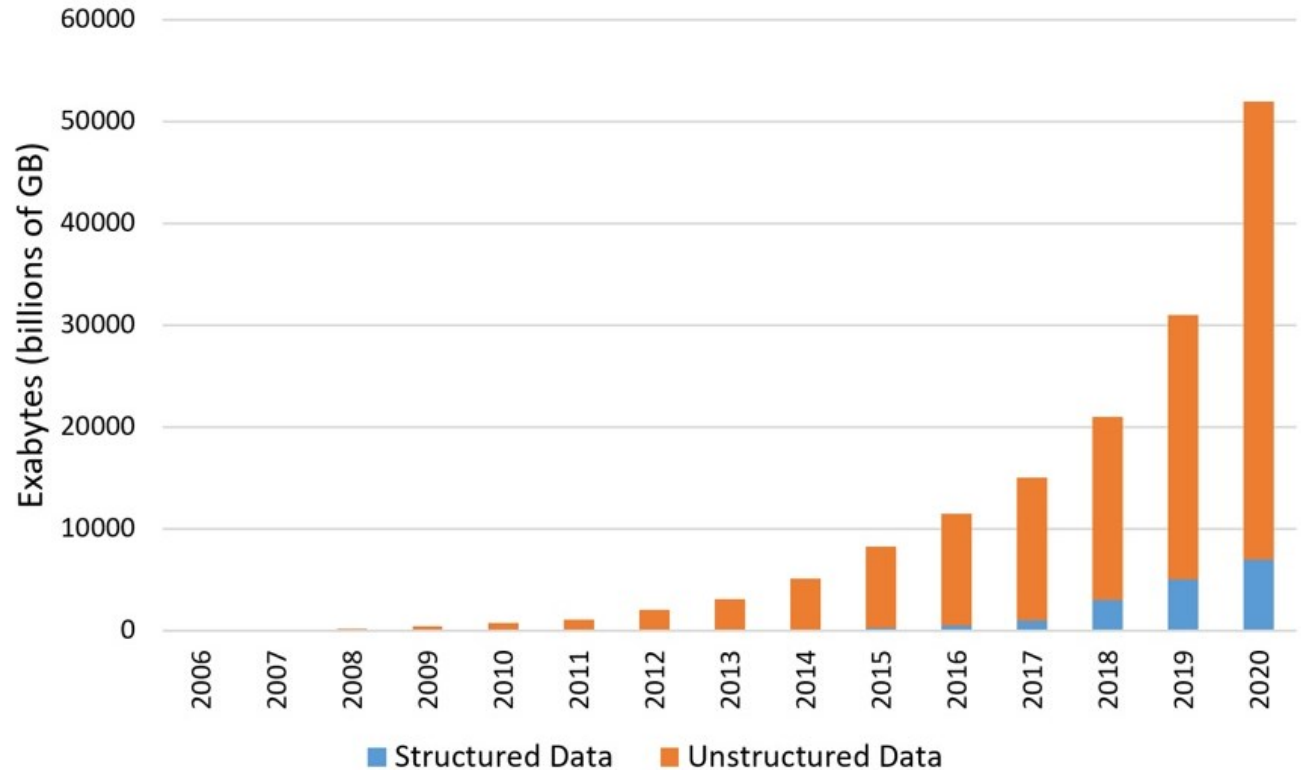


The Economist

Digital Transformation

50ZB of stored data in 2020
rising to 500ZB by 2030 - IDC

1ZB = 1 Billion TB



Between the dawn of civilisation and 2003, we only created five exabytes;

now we're creating that amount every two days.

- Hal Varian, Chief Economist, Google



Value of Data

Geospatial data is increasingly central to decision-making in all walks of life.

In fact, location based data has the potential to generate \$700 billion of value for the end user.

McKinsey Global Institute, The Age of Analytics: Competing in a Data-Driven World (2016),
<http://www.mckinsey.com/businessfunctions/mckinsey-analytics/our-insights/the-age-of-analyticscompeting-in-a-data-driven-world>

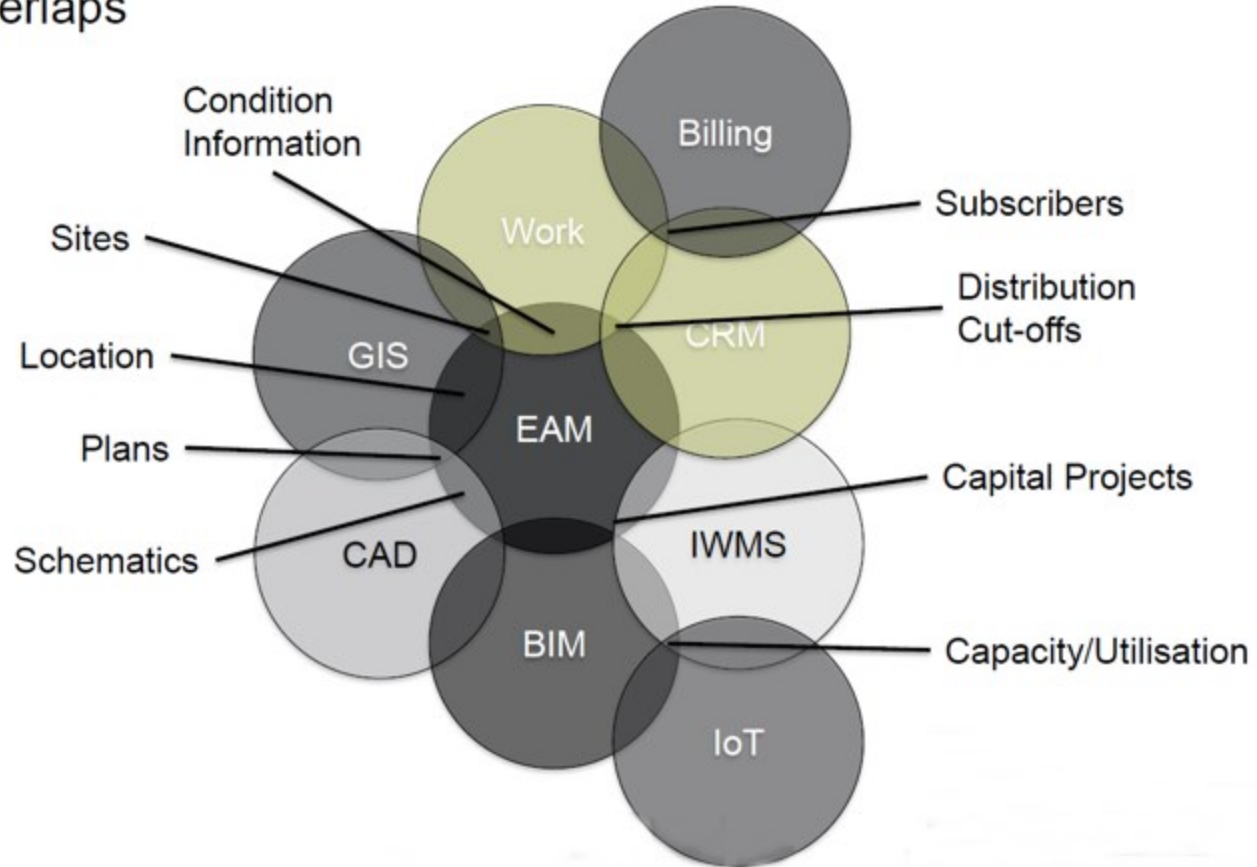


The importance of data quality

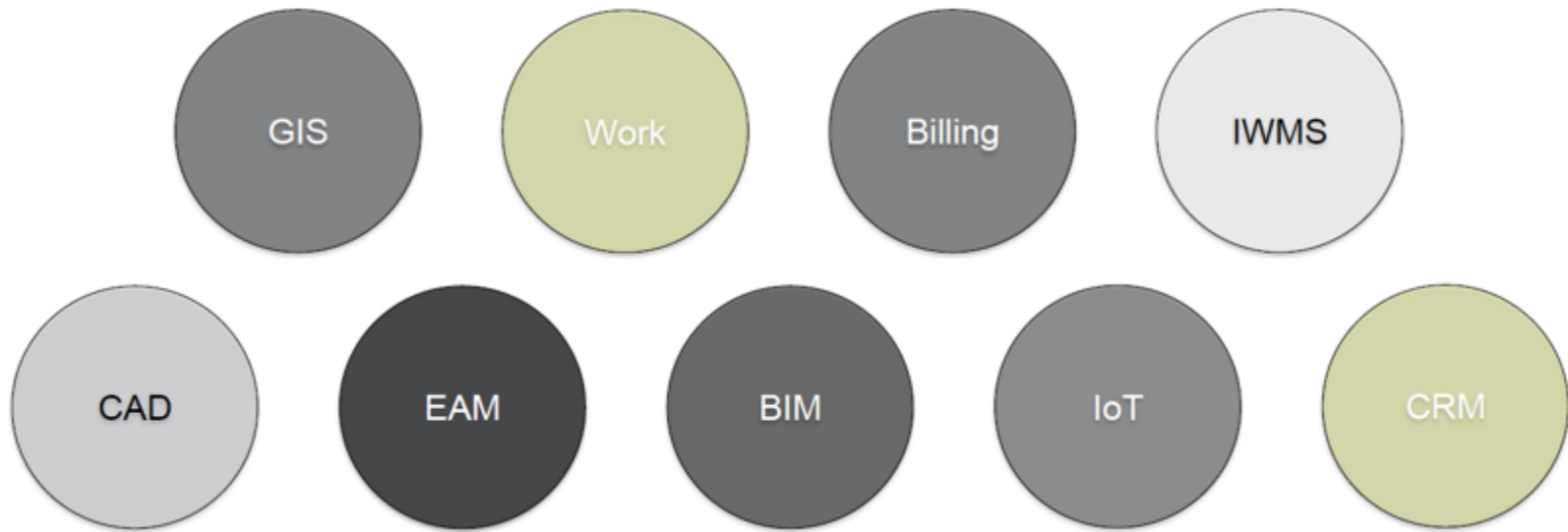
\$3.1
TRILLION

is how much IBM estimated
that poor quality data costs
the US economy each year

Data Overlaps

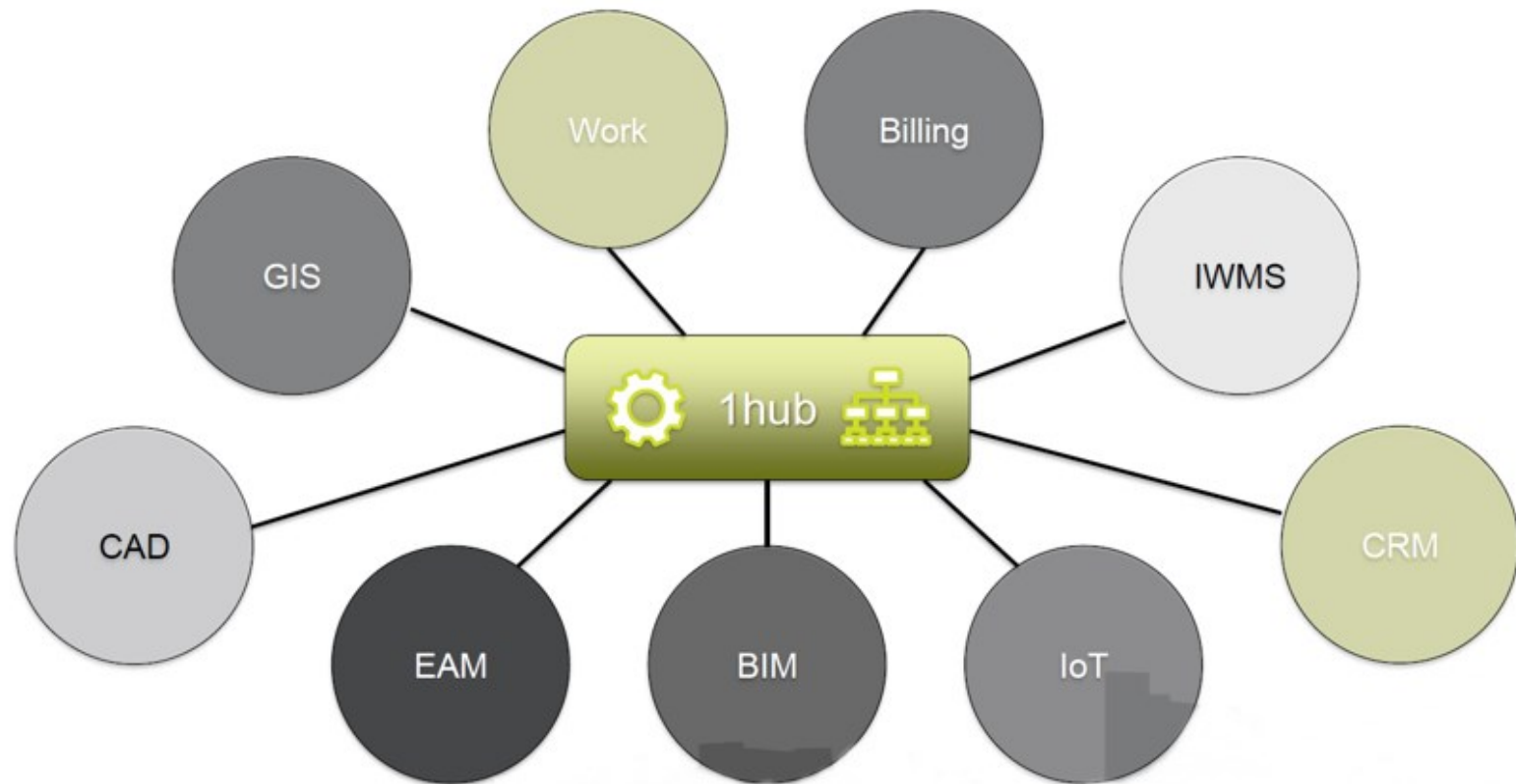


From isolated Data Silos...

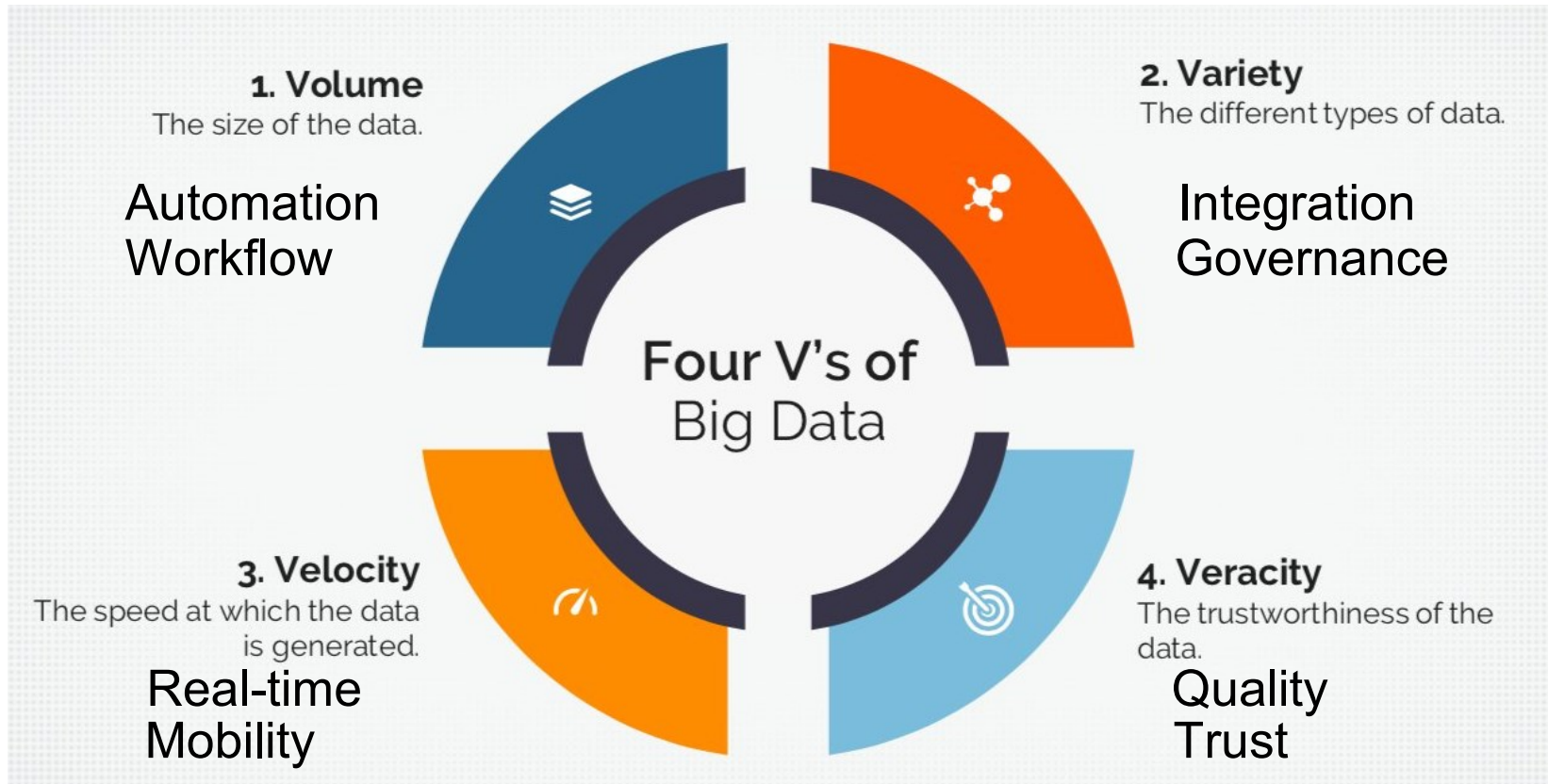


Own by different teams

To an integrated Ecosystem of Enterprise Applications



Challenges & Opportunities



Smarter Data

Data Validation

*Automate manual, time-consuming, subjective QA tasks.
Certification for proof of data quality (SLA's, legislation)*

Data Correction

Automate cleaning with repeatable, non-subjective corrective actions,

Data Enhancement

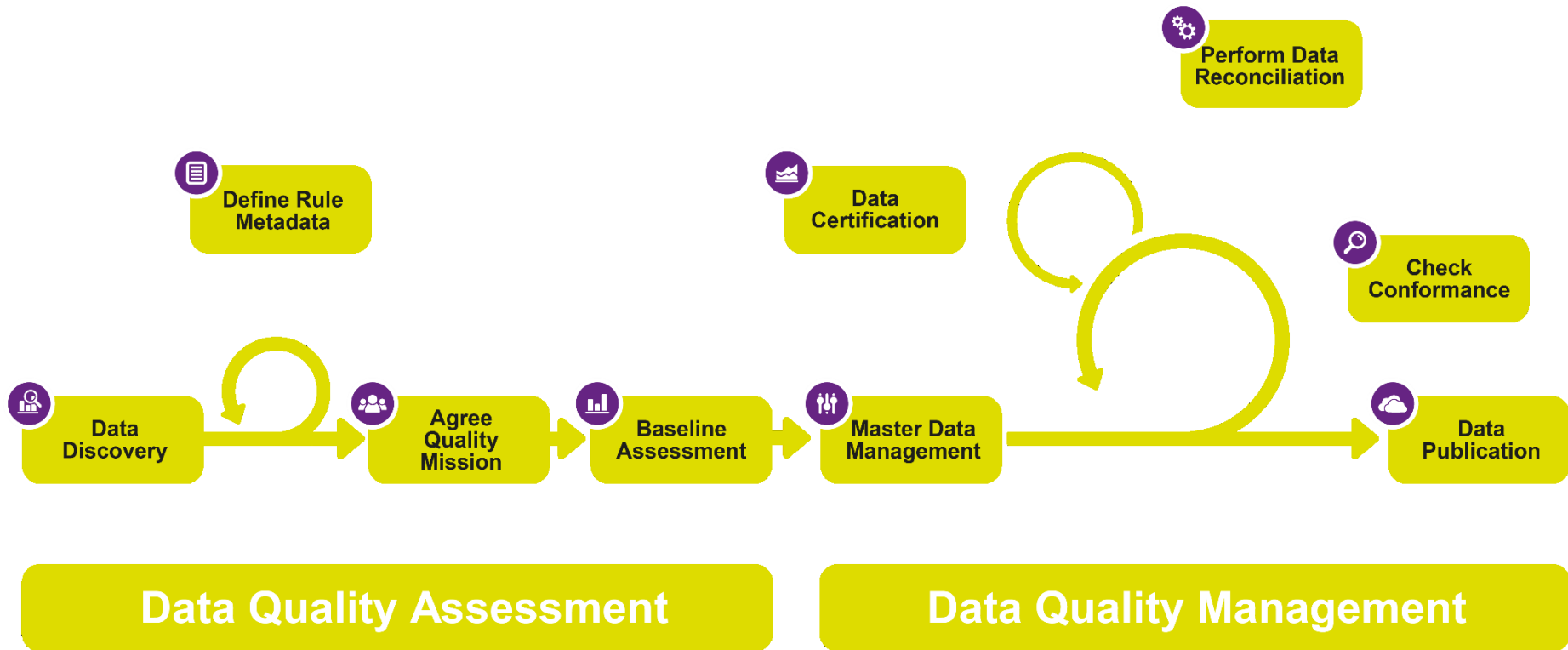
Integration: Maximise ROI through re-use, integration of data across the enterprise

Inference: Create new or missing data

Transformation: Restructure data to a new structure or location



Data Quality



1 spatialmanagement suite

1 spatialworkflow

Planning

1 plan

Maintaining

1 edit

1 exchange

1 transact

1 validate

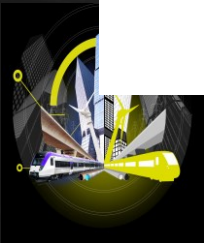
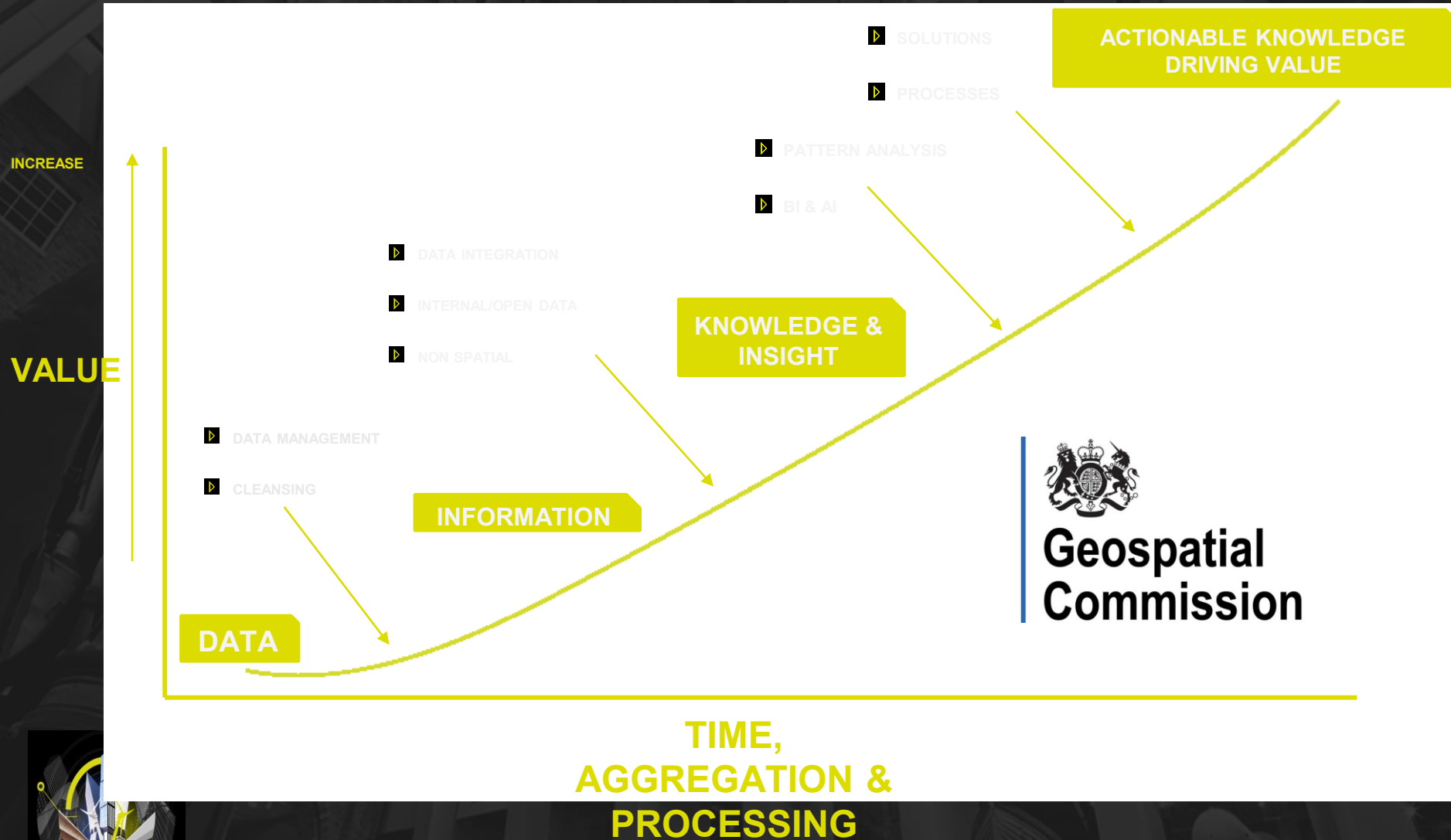
Publishing

1 generalise

1 integrate

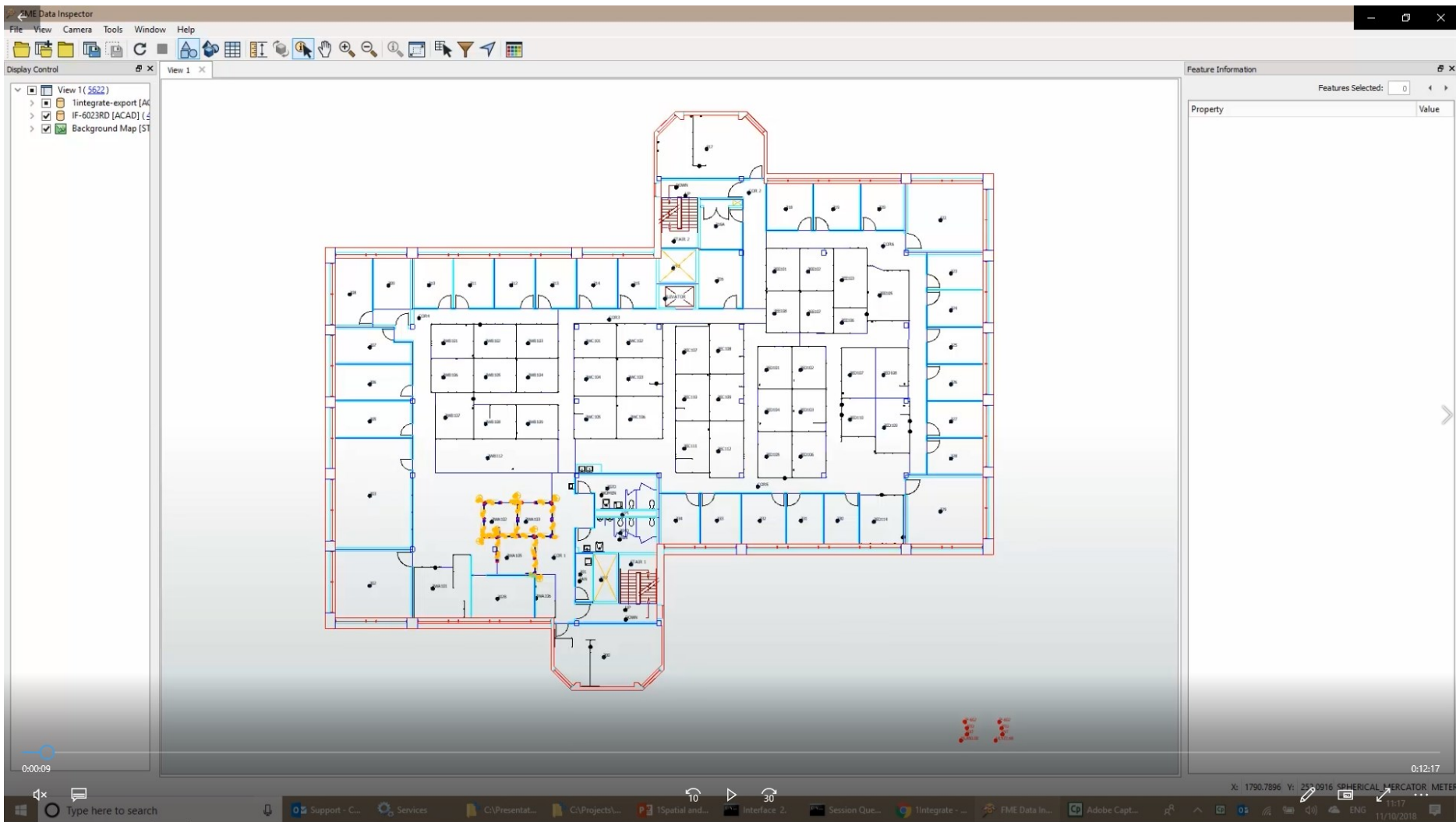


SMARTER DATA LANDSCAPE



Case Study Example

Google



Suppliers information - CAD File



1Integrate

cam1050.1spatial.local:18888/integrate/html/#/sessions/Facility%20Management/TRIRIGA%20Validate%20CAD/\$task-1/\$cache?tab=legend

1integrate

Session Legend

Filter...

Toggle

- ☒ Buildingmisc
- ☒ Column
- ☒ Door
- ☒ GROSS
- ☒ GROSS\$TXT
- ☒ Hardwall
- ☒ Label
- ☒ Markup
- ☒ RM\$
- ☒ RM\$TXT
- ☒ Stair
- ☒ Utility
- ☒ Window

1spatial
YOUR WORLD SMARTER

2926.605, 1604.949

What the client see's in IBM® TRIRIGA®



Validate Data through Business Rules...

The screenshot displays the 1Integrate web application interface. The browser address bar shows the URL: `camI050.1spatial.local:18888/1Integrate/jsp/integrateFrames.jsp#session`. The application has a top navigation bar with tabs: Data Stores, Rule Discovery, Rules, Actions, Action Maps, Sessions, Admin, 1Spatial, Logout, and Help. A left sidebar lists various sessions, with "TRIRIGA Validate CAD" selected. The main content area is divided into "General" and "Tasks" tabs. The "Tasks" tab is active, showing a list of tasks. The first task, "Open Data: { Facility Management / Idaho National Labs / CAD Data }", is expanded, revealing a summary of processed objects and a list of classes with their respective counts and error statuses. Below this, a list of check rules and apply actions is visible. The interface includes a "Save" button in the top right and a "Google" logo in the bottom left. The bottom status bar shows the time as 0:02:03 and the 1Integrate version as 2.1.2.

1Integrate

Data Stores Rule Discovery Rules Actions Action Maps Sessions Admin 1Spatial Logout Help

New Edit Tools

Sessions

- Demos
- FME
- Facility Management
 - TRIRIGA Validate CAD
- Lidar extracted Buildings
- NW Hackathon 2018
- NY State
- Projects
- Testing
- Training
- USGS
- Recycle Bin

General Tasks

Open: All Data Buffer 0 ☐ Run as multiple partitions ☐ Enable Production Mode 1

Error Summary Timings

Open Data: { Facility Management / Idaho National Labs / CAD Data } Rewind ✓

Processed 1432 objects (0 errors)

Class: 'Buildingmisc' [7 Processed (0 errors)]
Class: 'Column' [134 Processed (0 errors)]
Class: 'Door' [80 Processed (0 errors)]
Class: 'GROSS' [2 Processed (0 errors)]
Class: 'GROSSTXT' [8 Processed (0 errors)]
Class: 'Hardwall' [477 Processed (0 errors)]
Class: 'Label' [3 Processed (0 errors)]
Class: 'RMS' [94 Processed (0 errors)]
Class: 'RMSTXT' [94 Processed (0 errors)]
Class: 'Stair' [119 Processed (0 errors)]
Class: 'Utility' [233 Processed (0 errors)]
Class: 'Window' [181 Processed (0 errors)]

All Classes ☒ OWM Workspace Data Store... ☒ Enable Topology

[View Map Download Results \(xml\): Summary](#)

☐ Pause Rewind ⏮

- ☐ Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Duplicate Features 2 }
- ☐ Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Duplicate Vertices 2 }
- ☐ Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Kickbacks 2 }
- ☐ Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Spikes 2 }
- ☐ Check Rules: { Facility Management / Idaho Prototype / Rooms must be closed polylines }
- ☐ Check Rules: { Facility Management / Idaho Prototype / Rooms must be within GROSS Area }
- ☐ Check Rules: { Facility Management / Basic CAD Validation / Doors must be within Rooms }

☐ Pause

- ☐ Apply Actions: { Facility Management / IdahoPrototype / Essential Geometry Fixes / Remove Duplicate Features }
- ☐ Apply Actions: { Facility Management / IdahoPrototype / Essential Geometry Fixes / Remove Duplicate Vertices }
- ☐ Apply Actions: { Facility Management / IdahoPrototype / UpdateRooms / Fix Rooms to be closed }

☐ Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Duplicate Features 2 }

☐ Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Duplicate Vertices 2 }

0:02:03 1Integrate 2.1.2 US Patent Number: 9,542,416 B2 (2017-01-10)



Correct Data using Business Rules

1integrate

caml050.1spatial.local:18888/1integrate/jsp/integrateFrames.jsp#session

1integrate

Data Stores Rule Discovery Rules Actions Action Maps Sessions Admin 1Spatial Logout Help

New Edit Tools

Sessions

Demos

FME

Facility Management

TRIRIGA Validate CAD

Lidar extracted Buildings

NW Hackathon 2018

NY State

Projects

Testing

Training

USGS

Recycle Bin

General Tasks

Open: All Data Buffer 0 Run as multiple partitions Enable Production Mode

Error Summary Timings

Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Kickbacks 2 }	Conformance: 100%	Rewind	✓
Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Spikes 2 }	Conformance: 100%	Rewind	✓
Check Rules: { Facility Management / Idaho Prototype / Rooms must be closed polylines }	Conformance: 98.93%	Rewind	✓
Check Rules: { Facility Management / Idaho Prototype / Rooms must be within GROSS Area }	Conformance: 100%	Rewind	✓
Check Rules: { Facility Management / Basic CAD Validation / Doors must be within Rooms }	Conformance: 97.5%	Rewind	✓
Pause		Rewind	✓
Apply Actions: { Facility Management / IdahoPrototype / Essential Geometry Fixes / Remove Duplicate Features }		Rewind	✓
Apply Actions: { Facility Management / IdahoPrototype / Essential Geometry Fixes / Remove Duplicate Vertices }		Rewind	✓
Apply Actions: { Facility Management / IdahoPrototype / UpdateRooms / Fix Rooms to be closed }		Rewind	✓
Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Duplicate Features 2 }	Conformance: 99.72%	Rewind	✓
Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Duplicate Vertices 2 }	Conformance: 100%	Rewind	✓
Check Rules: { Facility Management / Idaho Prototype / Rooms must be closed polylines }	Conformance: 100%	Rewind	✓
Check Rules: { Facility Management / Basic CAD Validation / Doors must be within Rooms }	Conformance: 100%	Rewind	✓
Pause		Rewind	00
Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Overlaps }			
Check Rules: { Facility Management / Idaho Prototype / Planar Partition - Find Gaps }			
Pause			
Build Topology			
Check Rules: { Facility Management / Standard / Essential Geometric Checks / Check for Overlaps }			
Check Rules: { Facility Management / Idaho Prototype / Planar Partition - Find Gaps }			
Check Rules: { Facility Management / Idaho Prototype / Check for Gaps or Overlaps v0.2 }			
Pause			
Copy To: { Facility Management / Idaho National Labs / CAD Data }			

0:05:30

1integrate 2.1.2

US Patent Number: 9542416 A2 (2017-01-10)



Transportation Case Study

Demonstration - Smart Signing, Lighting, and Guarding

What?

- Automatic creation and sharing of traffic management plans for Street works.
 - Meeting the needs of Traffic Signs Manual (TSM) Chapter 8.

How?

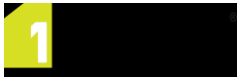
- Set Business Rules specifying speed limits, traffic flow information & asset inventory based on TSM.
- Data standards and rules based automation for traffic plan creation.
- Sharing platform.

Benefits?

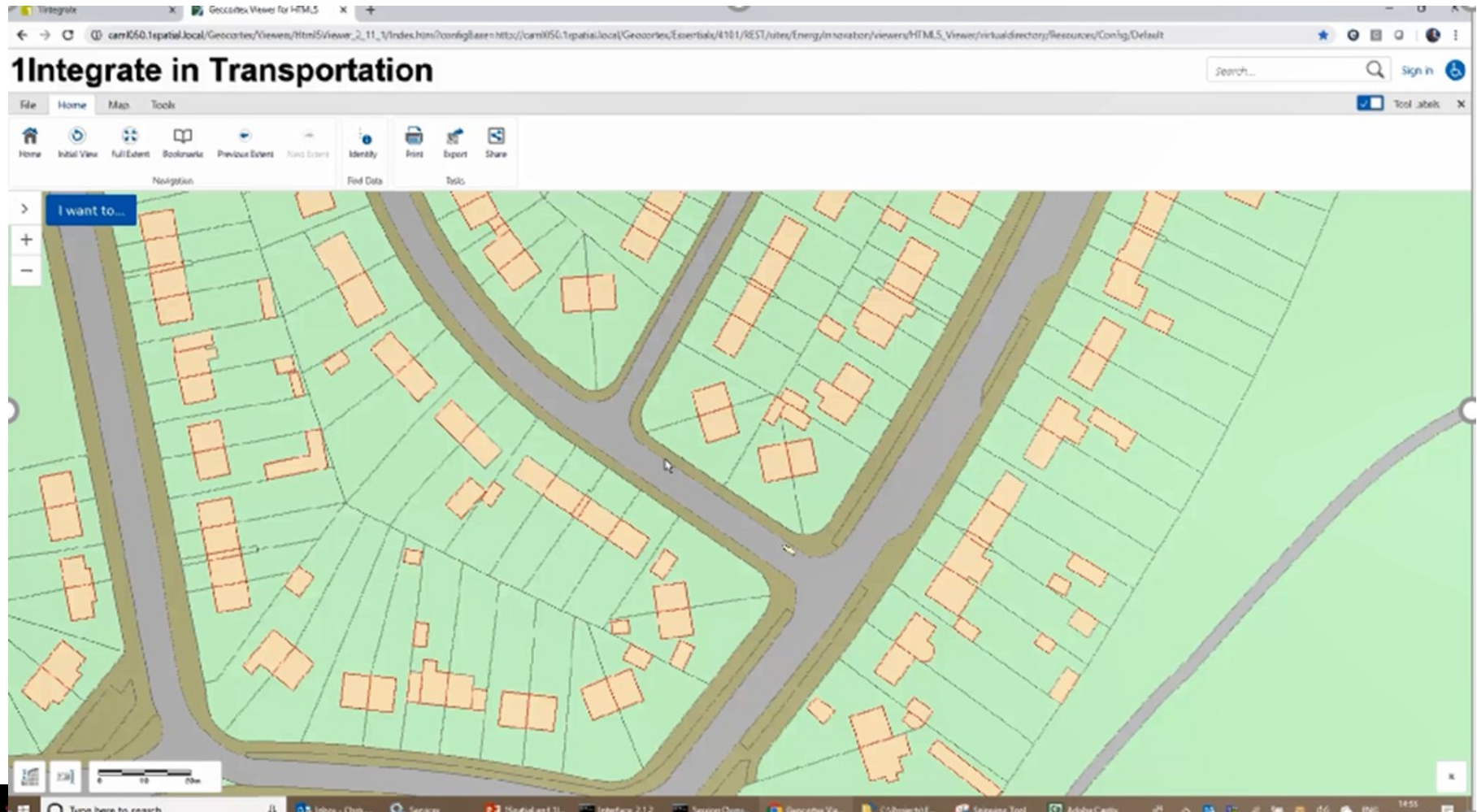
- Reduced time and cost to prepare traffic management plans.
 - 2M plans created per annum through surveys ~ £2bn
- Reduced cost and environmental impact of 'wasted journeys'
 - Estimated at £2.5m per annum



Reducing corporate fines - March '18 BT fined £90k for poor traffic works in Bishopsgate



Transportation Case Study Cont...



Transportation Case Study Cont...

1integrate

Data Stores Rule Discovery Rules Actions Action Maps Sessions Admin **1Spatial** Logout Help

New Edit Tools

Sessions

Demos

- Change Only Update
- Inferred Data
- LIH2
- Philadelphia
- Road Works
 - Scenario 1**
 - Scenario 2 - 1
 - Scenario 2 - 2
 - Scenario 2 - 2 - No Pause
 - Scenario 3
 - Scenario 4
 - Scenario 5
 - Scenario 6
 - Scenario 6 - No Pause
 - Scenario 9 - 1
 - Scenario 9 - 2
 - Scenario 9 - 3
 - Scenario 9 - 4
 - Smart_Signing_ORIG
- Schematics
- Studio FME
- Supply Chain Demo
- Utility Demo
- Workflow
- FME
- Facility Management
- Lidar extracted Buildings
- NW Hackathon 2018
- NY State
- Projects
- Testing
- Training
- USGS
- Recycle Bin

General **Tasks**

Open: Bounding Box Buffer 0 ☐ Run as multiple partitions ☐ Enable Production Mode

MinX 432988.0 MaxX 433019.0
MinY 432460.0 MaxY 432479.0

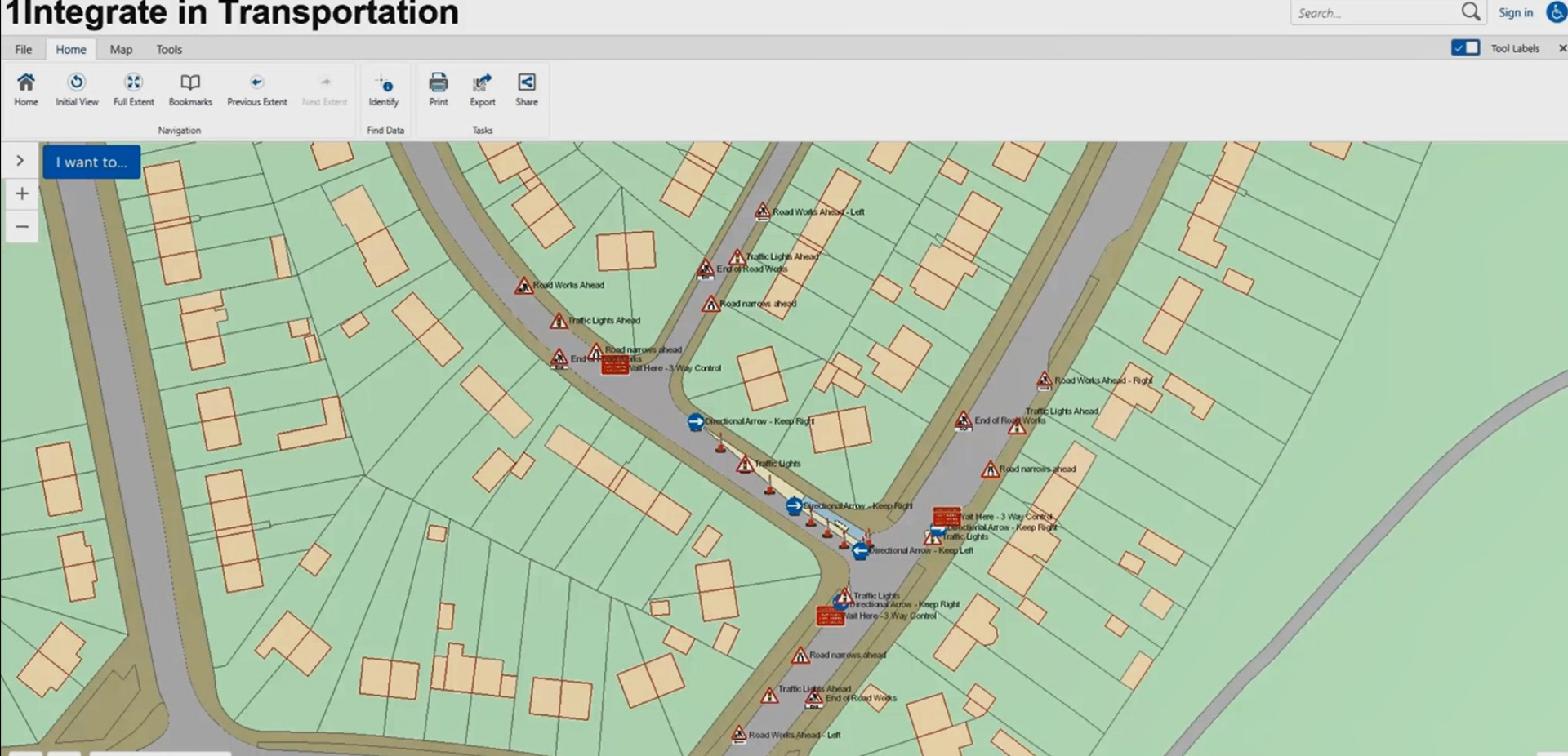
Error Summary Timings

Open Data: (Demos / Road Works / Inout)	Rewind	✓
Open Data: (Demos / Road Works / Outout)	Rewind	✓
Pause	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Capture Work Area Anti-Clockwise)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 001 Create Toco Roads)	Rewind	✓
Apply Actions: (Demos / Road Works / 005 Signage / 001 Road Works Ahead / 001 Create ROAD CENTRE LINE)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 002 Split HIGHWAYS)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 003 Disaggregate HIGHWAYS)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 004 Clean-Up HIGHWAYS)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 005 Split LINK)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 006 Disaggregate LINK)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 007 Clean-Up Link)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 008 Assign Speed Limit HIGHWAYS)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 009 Assign Road Width HIGHWAYS)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 011 Merge Toco Roads close to WORKS AREA)	Rewind	✓
Apply Actions: (Demos / Road Works / 001 Generic Rules / 001 Create Toco Roads / 010 Assign Traffic Flow)	Rewind	✓
Copy To: (Demos / Road Works / Inout)	Rewind	✓
Pause	Rewind	91
Apply Actions: (Demos / Road Works / 001 Generic Rules / 002 Square Work Area / 003 Create WORKS AREA vertex points (road))		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 002 Square Work Area / 004 Create WORKS AREA vertex points (path))		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 002 Square Work Area / 005 Create WORKS AREA lines)		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 002 Square Work Area / 006 Remove invalid WORKS AREA lines)		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 002 Square Work Area / 007 Create WORKS AREA polygon)		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 003 Create work space / 001 Create work space)		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 003 Create work space / 002 - Create direction lines)		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 003 Create work space / 003 Extend working space - two way road)		
Apply Actions: (Demos / Road Works / 001 Generic Rules / 003 Create work space / 004 Extend working space - dual carriage way)		



Transportation Case Study Cont...

1 Integrate in Transportation



Winner of the UKSTT Award for

- **Application of Digital Technology**



Ordnance Survey Great Britain



What?

- Centralised and collaborative maintenance of National Geographic Database i.e. OS MasterMap
- Product ready database design

How?

- Data standards for defining creation of OS products from OS MasterMap.
- Rules for automating data governance - 1SMS (1Workflow, 1Exchange, 1Validate, 1Transact).

Scalability

- 650 users within both OS and external contractor organisations
- 4000 jobs per day
- 36 million features per day throughput
- 313,000 features per day updated
- 99.9% availability



Engagement in Utilities

Utilities

- Water, Gas, Electric
- Telecommunications

Spatial Solutions

- Primary business requirements driven by regulators
 - In water the current focus is water leakage
- Data and application focused
- Smarter use of spatial information
- Innovation driven
 - Hackathons
 - Proof of Concepts

Return on Investment focused



Utility Case Studies

Northern Gas Networks

- Asset data quality & publication
- Automatic schematic generation
- Mobile workforce enablement



Northumbrian Water Limited

What?

- Mapping 13,500 km of private drains and sewers when only 5% of the inherited network was mapped

How?

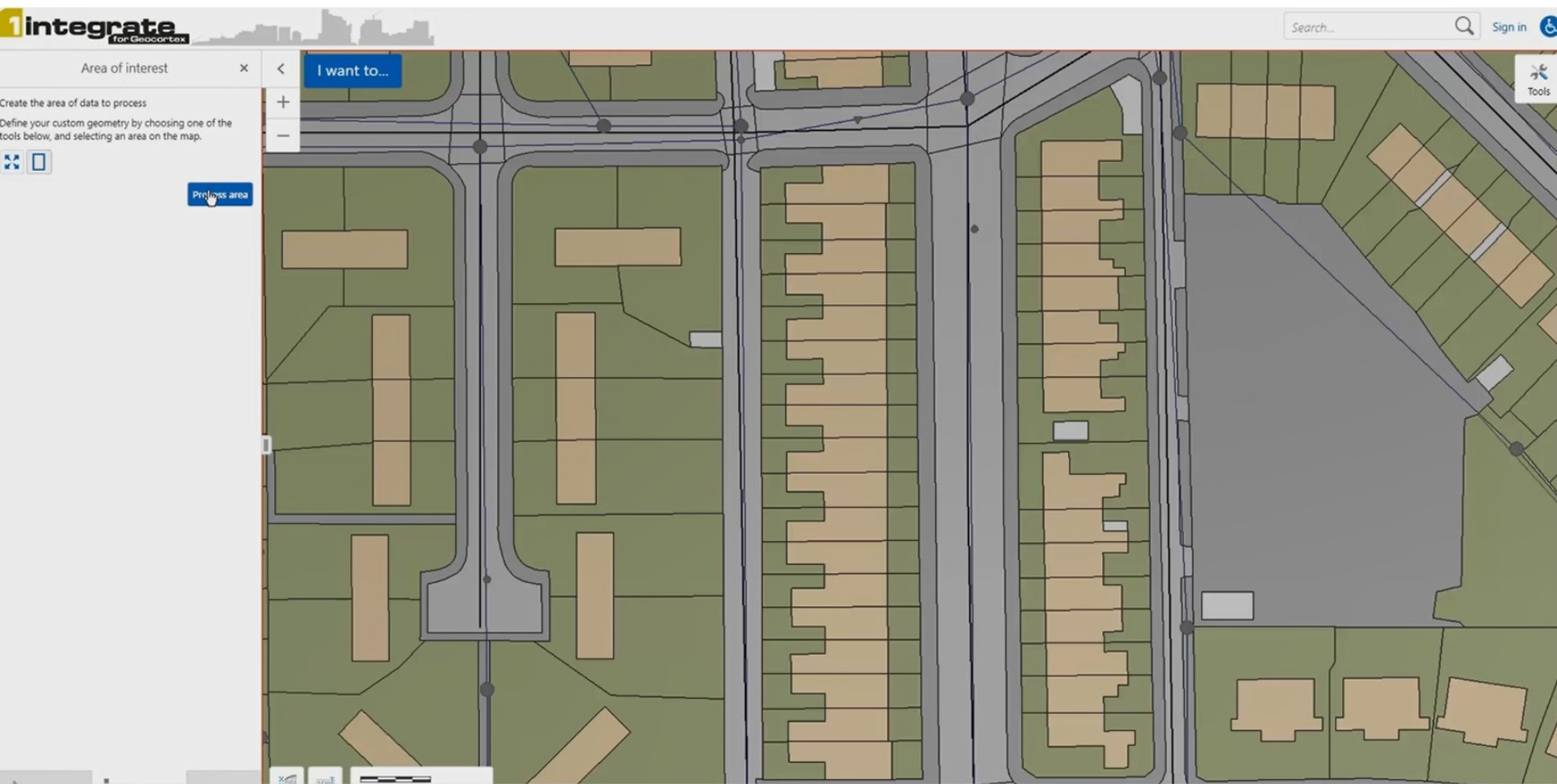
- Data inference utilising 1Integrate and other source geospatial information

Benefits?

- Reduced cost against original plan - saved 87% against the 5 year budget.
- Improved acquisition and integration of information.
- Improved maintenance of data.



Utility Case Studies Cont...



Utility Case Studies Cont...



Data Gateway – Web Based Validation

Why Develop Data Gateway?






- Business need in the many to 1 data supply chain
 - Quality & content of data submissions
 - Gives rise to re-submissions
- Highly prevalent in a federated data model
- Highly prevalent in a contractor supply chain
- Reduce time and cost of the data supply chain




Data Gateway – Web Based Validation Cont...




Data Gateway – Web Based Validation

































Click here to select data file OR Drag and Drop your data file here




View Uploaded Data
Water_Network_Zone_A (216 Features)


Ruleset

	Asset ID must have a unique value	Pass: 216 / 216 features valid (100%)	
	Calculated must have a value	Pass: 216 / 216 features valid (100%)	
	Diameter does not equal Null	Fail: 183 / 216 features valid (84.72%)	
	Geometry Does Not Equal Null	Pass: 216 / 216 features valid (100%)	
	Geometry Type is a Line	Pass: 216 / 216 features valid (100%)	
	ID is unique and Not Null	Pass: 216 / 216 features valid (100%)	
	Legal Status Equals Public	Fail: 212 / 216 features valid (98.15%)	
	Material does not equal Null	Fail: 189 / 216 features valid (87.5%)	
	No Currently Burst Pipes	Fail: 202 / 216 features valid (93.52%)	
	No Operational Floating Pipes	Fail: 213 / 216 features valid (98.61%)	
	No Overshoot shorter than 1cm from inters...	Fail: 214 / 216 features valid (99.07%)	
	No Pipes Burst more than twice	Fail: 199 / 216 features valid (92.13%)	
	Operational classed as In Use or Abandoned	Fail: 204 / 216 features valid (94.44%)	

  Ruleset

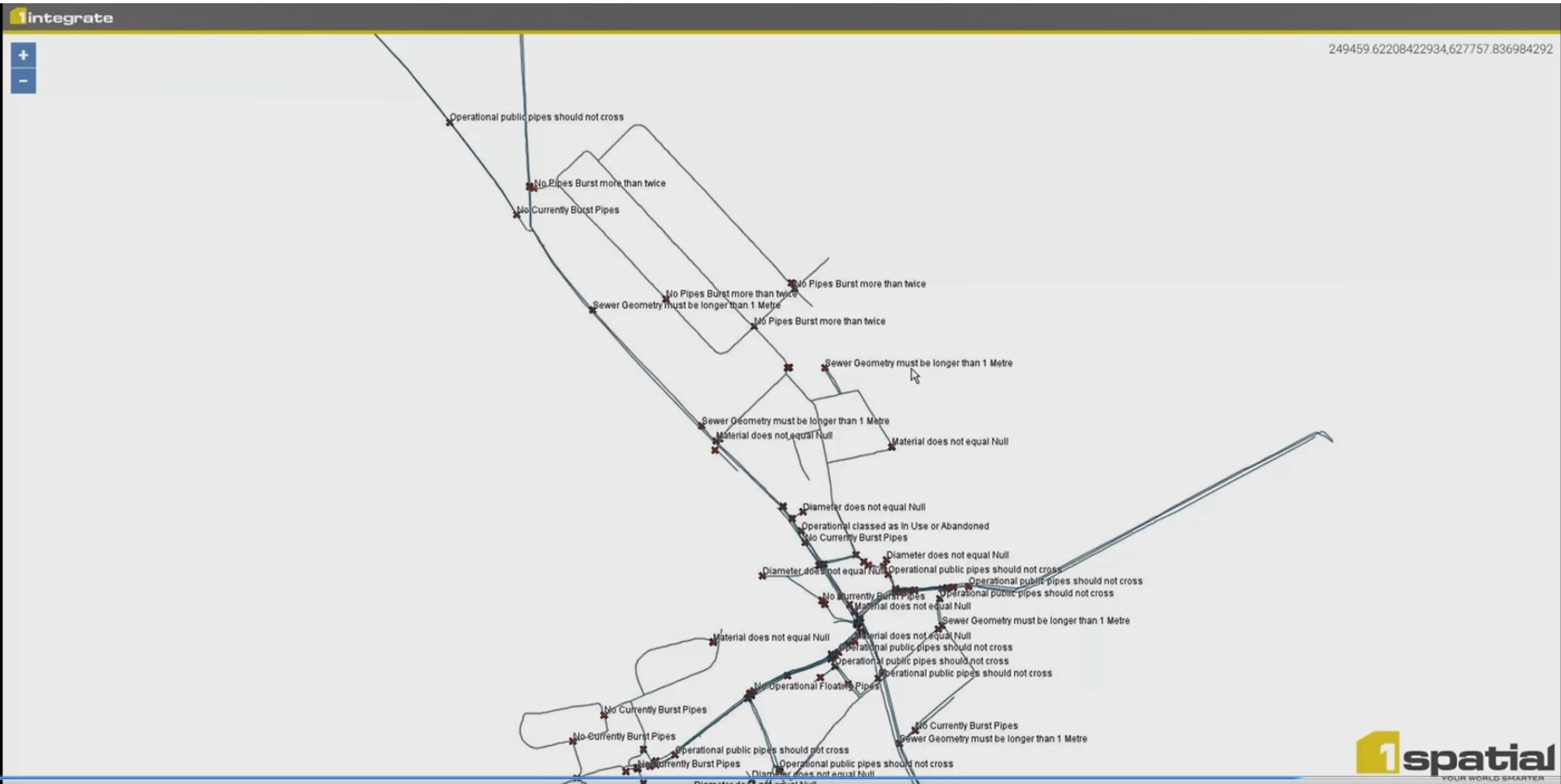


Click here to download data (.zip)

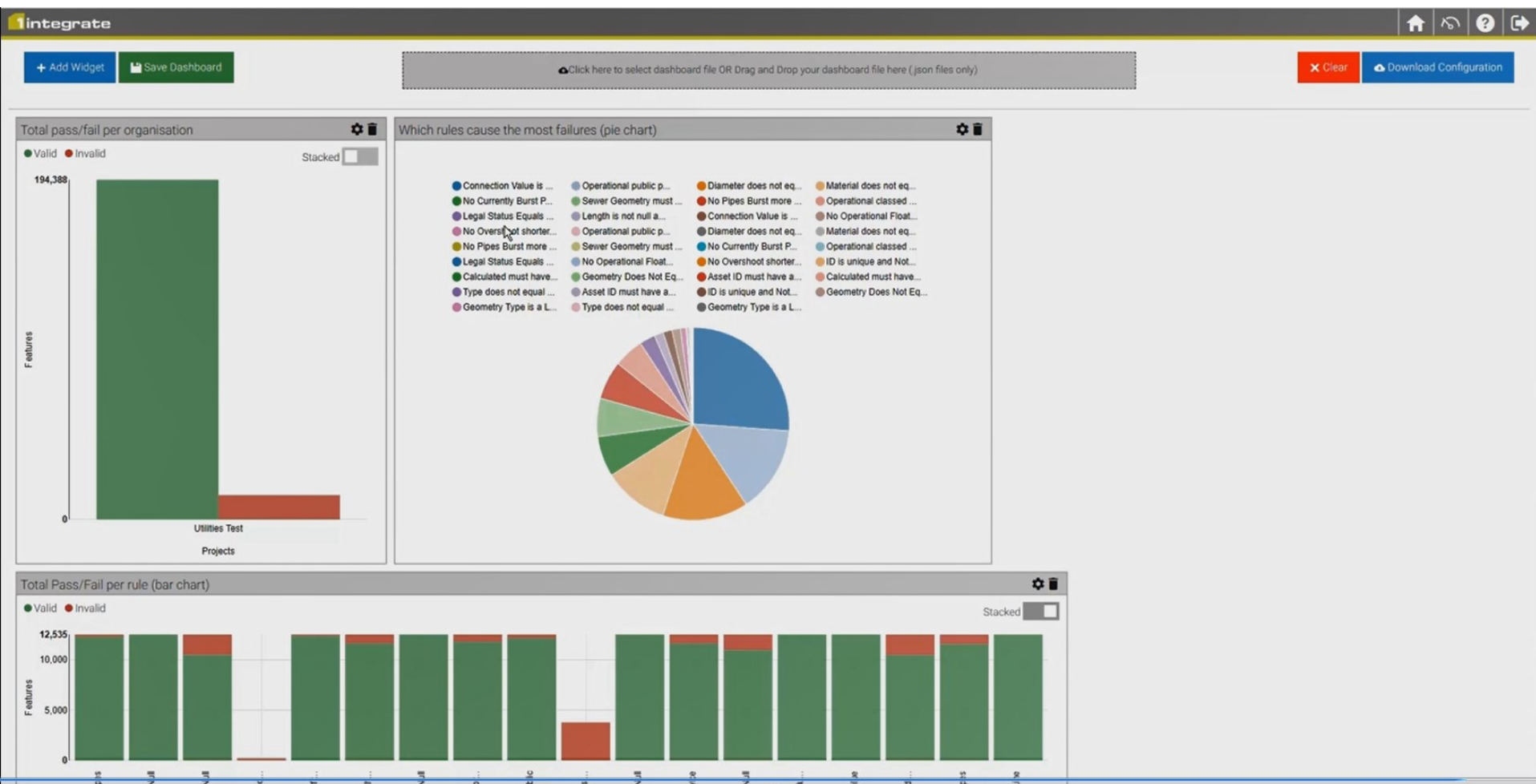


View Result Data

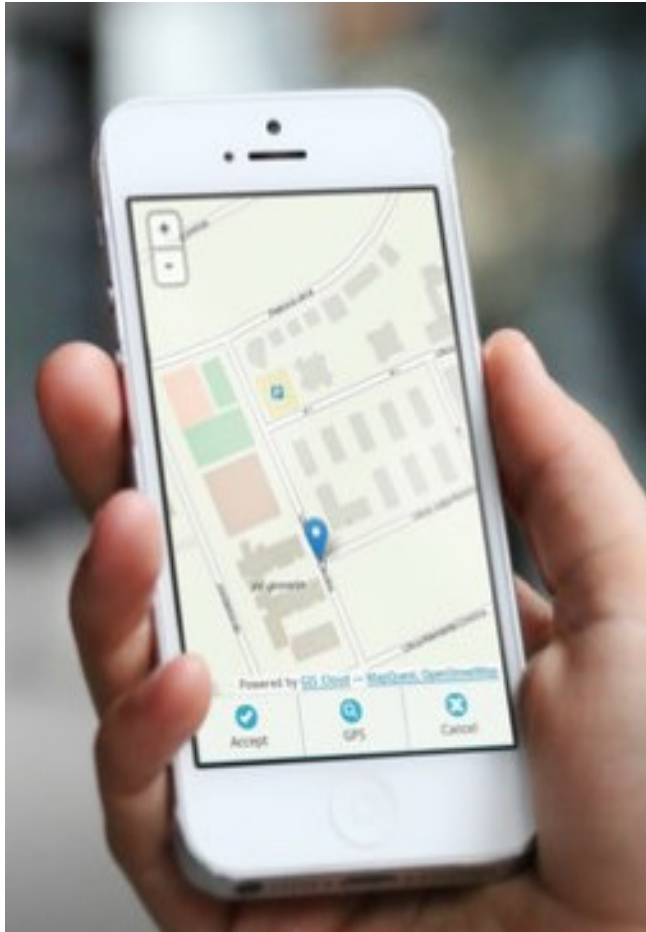
Data Gateway – Web Based Validation Cont...



Data Gateway – Web Based Validation Cont...



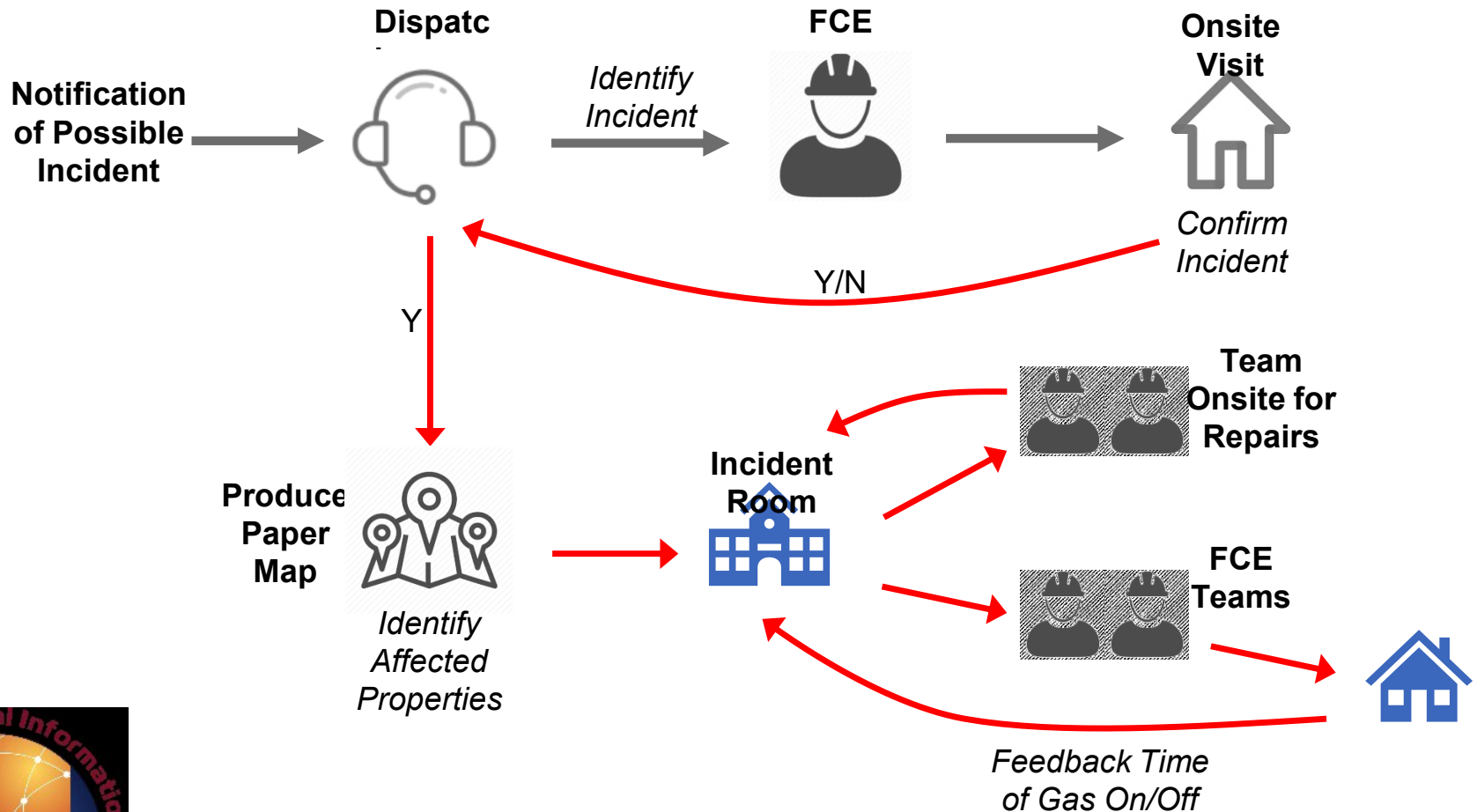
Mobile Solution



- **Market Feedback**
- **Current solutions**
- Fall short or too complex
- Lack definable data validation
- **1Spatial Proposition**
- User defined – 70/30 rule
- Right first time
 - Real-time validation & inference
 - Online & Offline
- Open integration with backend systems
 - Best of breed
- Customer engagement process

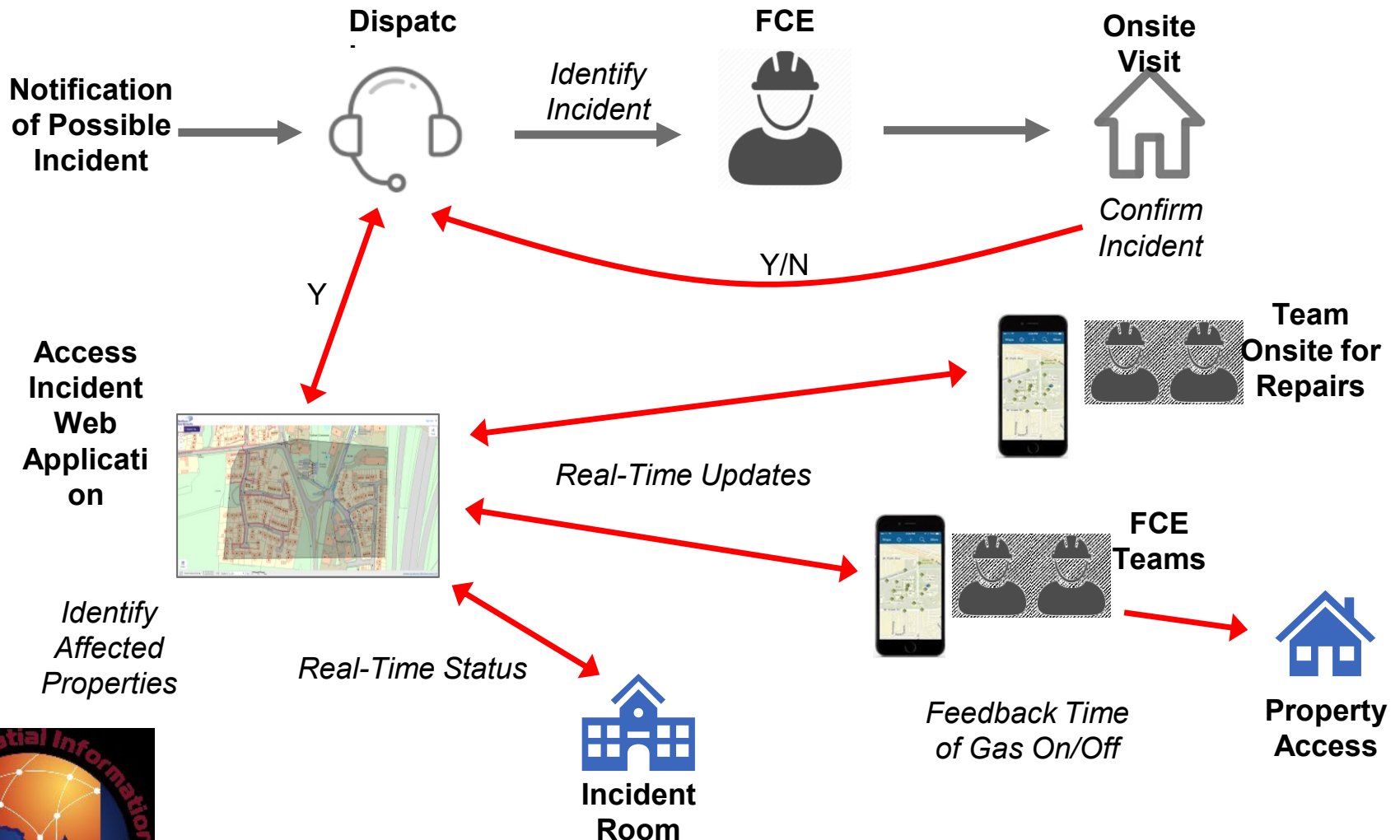
Incident Management App Case Study

Current Process



Incident Management App Case Study Cont...

New Process



Conclusion

- **Digital Data is being created and used in numbers that have never been seen before...**
- **Spatial Digital Data is our business... and it is worth a great deal to the community.**
- **Valid Digital Data will save an enormous amount of money.**
- **We can help you make your Data Smarter...**



Thank you for listening



Come and see us in the exhibition area for more information

Or

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