

BRIDGING THE DATA FLOW GAP IN ENVIRONMENTAL COMPLIANCE AND REPORTING

August 20, 2020

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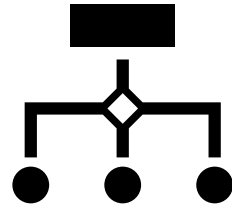
Arcadis U.S. Inc.,

10205 Westheimer Rd., Suite 800, Houston, TX 77042

Overview

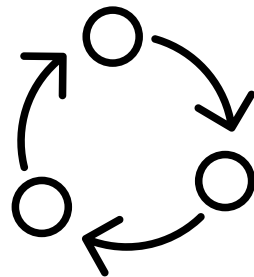
➤ What are the 3 tiers of data for Environmental Compliance?

- Operations
- Permitting
- Reporting



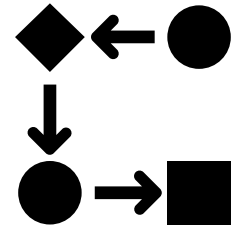
➤ Activities and challenges of data collection and processing at each tier

- Process changes
- Regulatory changes
- Personnel changes
- Technology changes



➤ Solutions

- Environmental Management Information Systems
 - Big EMIS
 - Hybrid systems
 - Custom built tools
 - Spreadsheets
- Digital solutions and automation
- The human element
- Management of Change
- Workflows and support infrastructure



Elements of Environmental Compliance

- State and Federal Regs
- Fugitive Emissions
- Mergers and Divestitures
- Process changes/New projects/New Products
- Consent Decrees
- Texas Audit Privilege Act (TAPA)
- Incident Management



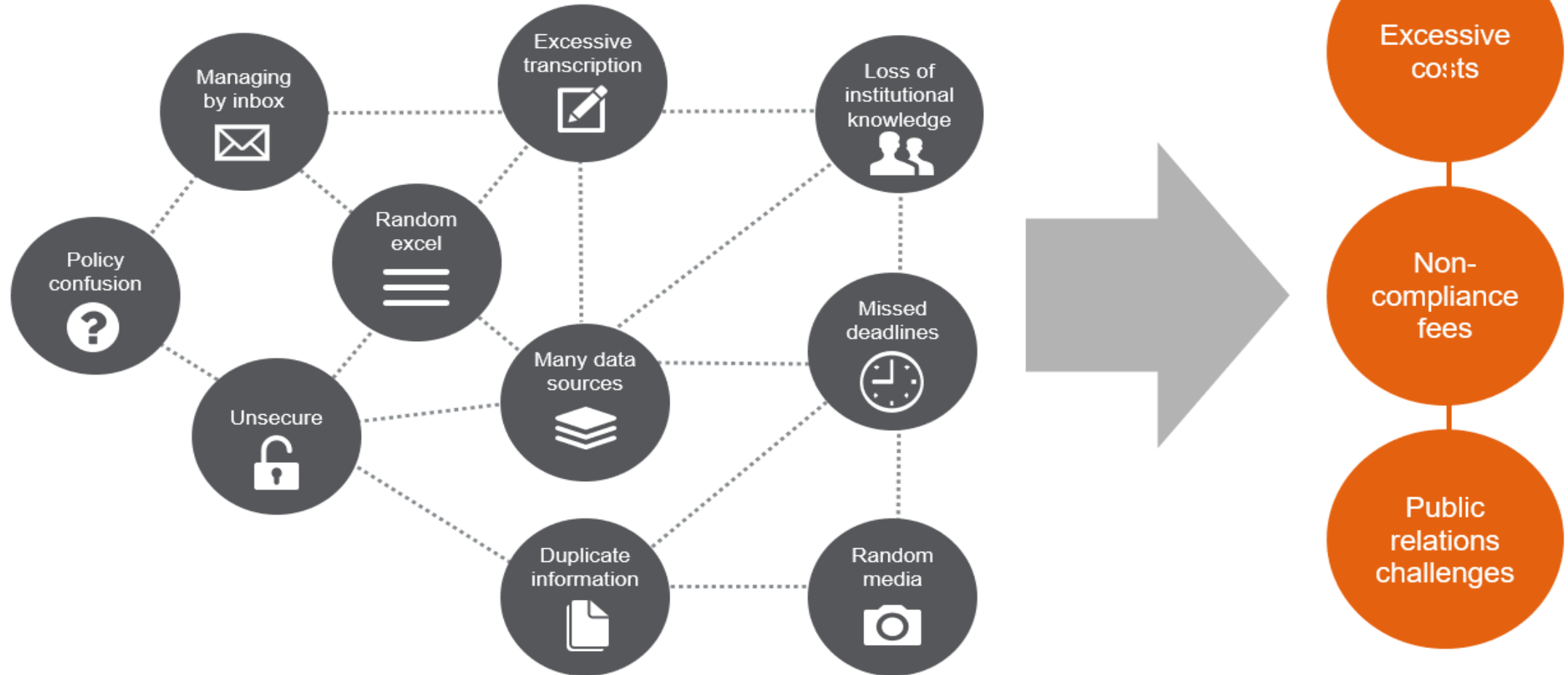
Questions to Ask

- What are the regulatory drivers?
- What systems do we currently have and how well do they work?
- What solutions are available to us?
- What budgetary, staff, and time constraints do we face?
- What are the opportunity costs of keeping current set-up vs. a new one?



If it ain't broke.....

Challenges to EHS Excellence

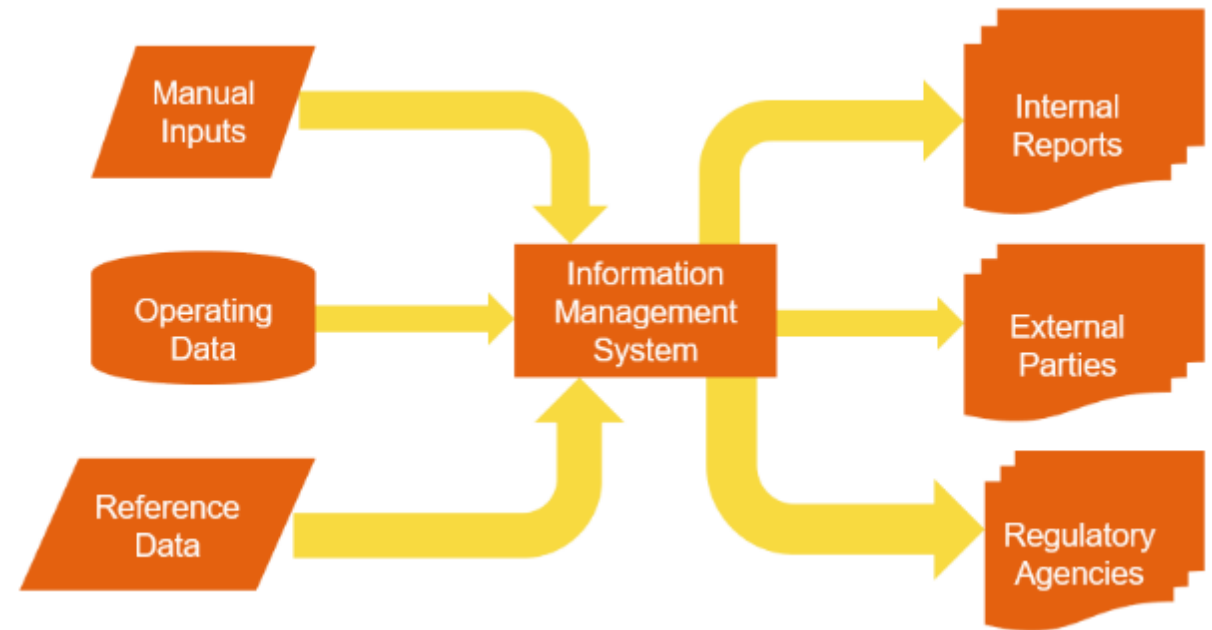


Can't see the forest for the trees

The Data Flow Challenge

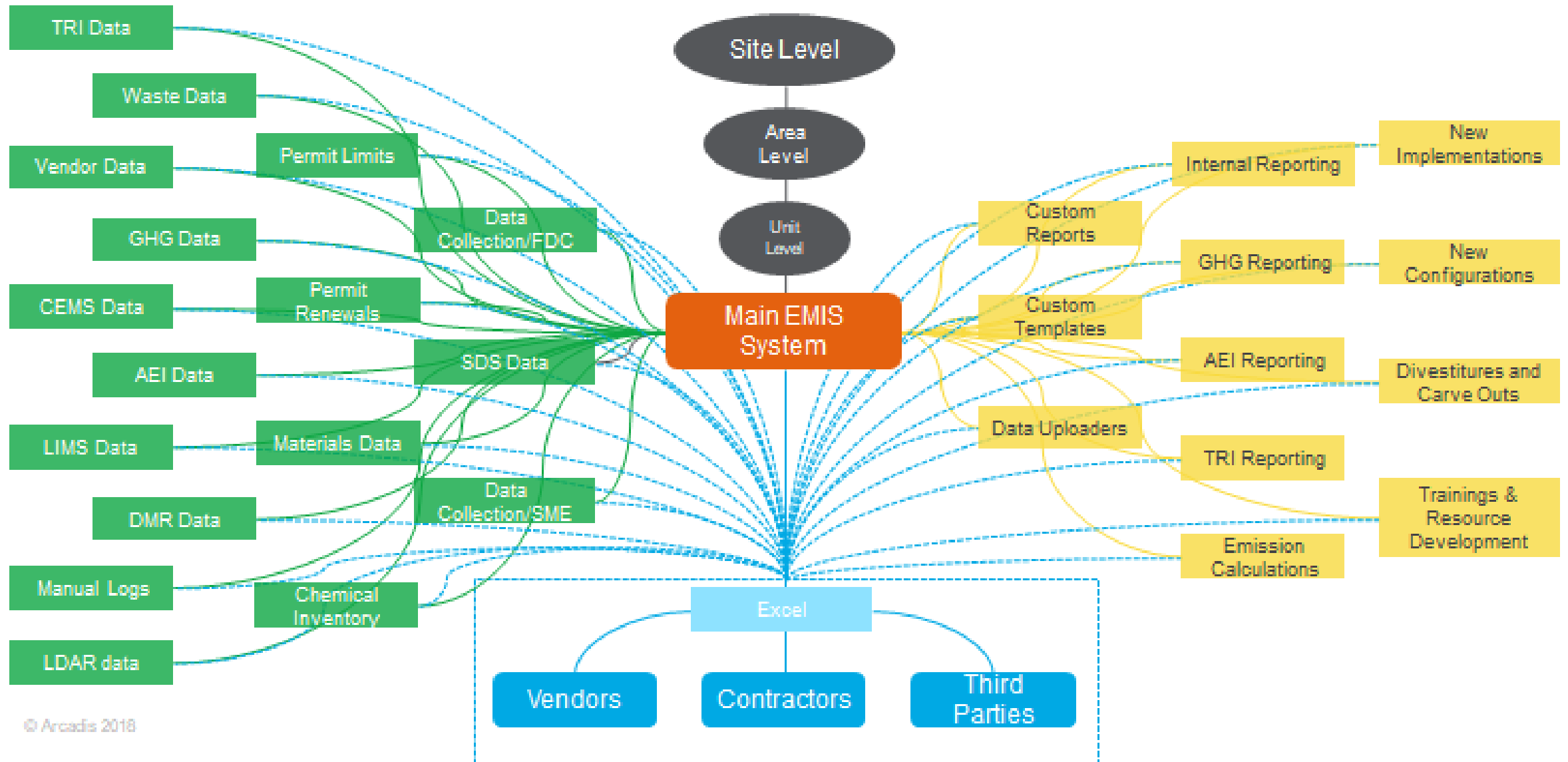
Competing priorities for use of data can create gaps in understanding:

- Correlating data to operations or process areas
- Corporate and facility reporting requirements
- Permitting and regulatory requirements
- Management of change
- New technologies, equipment and processes



An effective “bridge” must facilitate smooth flow of data between these three competing “tiers” of reporting, permitting, and operations in a sustainable way by connecting the dots from data collector through processing by the system, to reporting to all stakeholders

- Data Analytics
- Data Dashboards
- KPIs
- Custom Tools
- SSRS Reports
- Training & Program Documentation



Data Collection

Never before has data collection been more of a challenge than now due to the following:

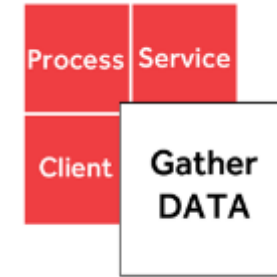
- Drowning in an abundance of data
- Constant change on the ground resulting in a domino effect on data collected
- Too many data connections (interfaces)
- Connections between multiple disparate systems
- Often a single Reporting Manager having to manage multiple data collection points
 - Collection → aggregation → reporting → operations improvement

*Going down
the same
rabbit hole
every year
expecting
different
results*

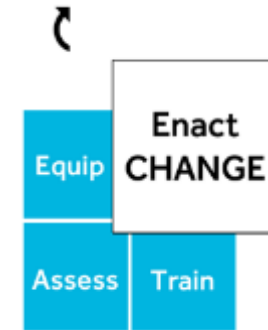


Data Driven Decisions

Stage 1 – Develop a culture of data collection



Stage 2 – Promote regular data review intervals



Stage 3 – Create specific action plans based on findings

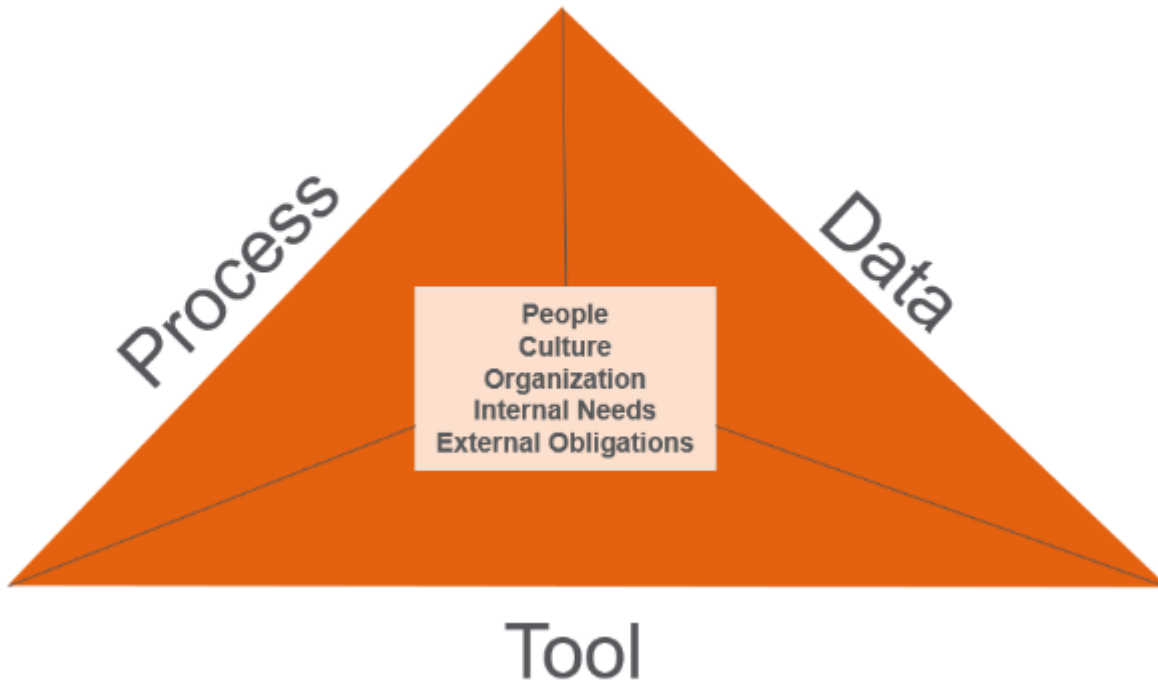


Stage 4 – Scale changes for effective results



Reporting Practices

The Balancing Act



How data is represented, verified, validated and presented

- Know the audience: internal and external stakeholders
- Tables of data vs. visualization of issues
- Preparing reports: system vs. assigning teams of people
- Use of tools such as Power BI throughout processes and organizations to produce consistent outputs
- Processing of information by people: data tables vs. visual picture
- Dashboards for internal consumption of information vs. tabular reports for regulatory reporting

Challenge: Maintaining current systems vs. continual improvement

The Element

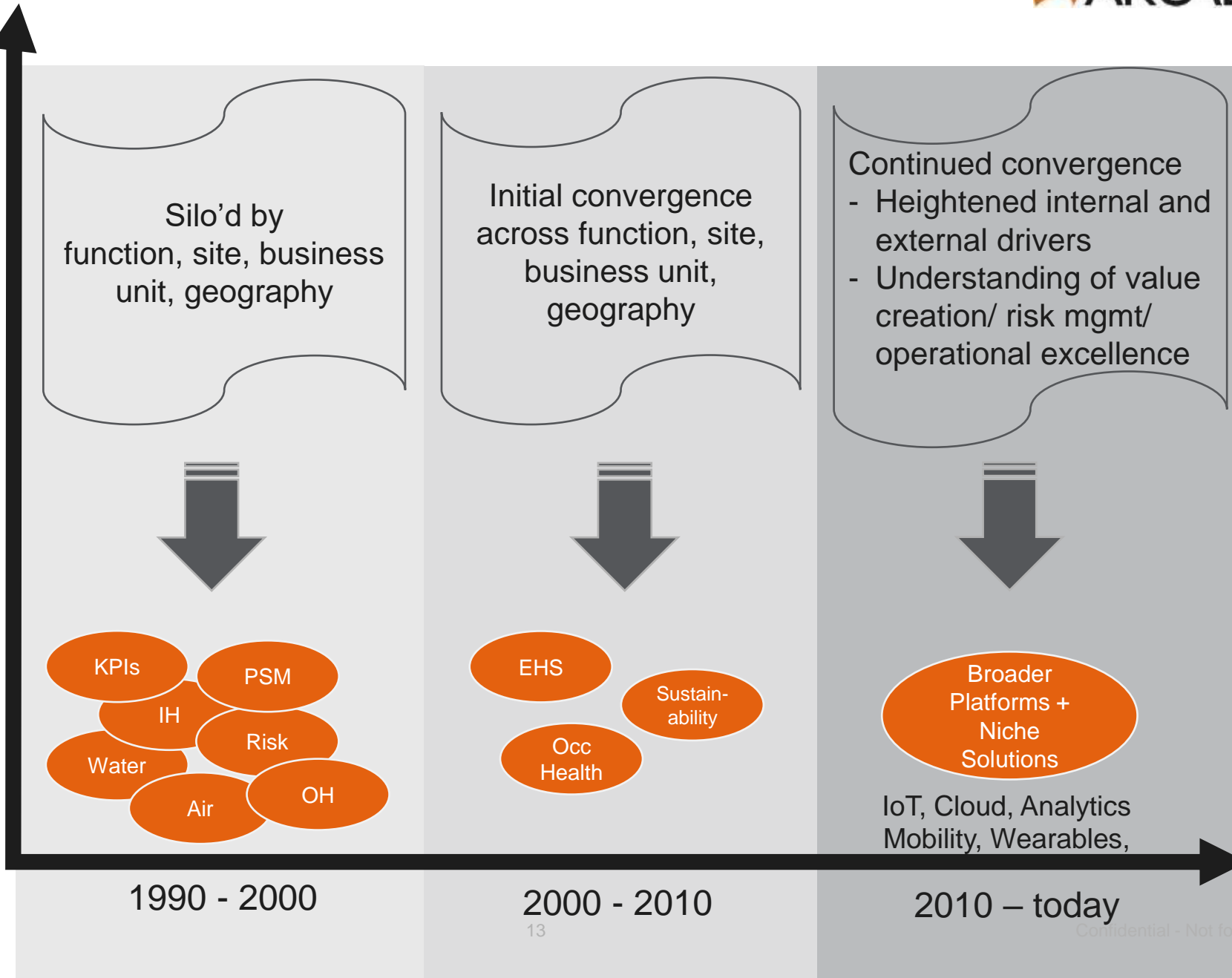
- Data flow gaps cannot be filled by systems alone
- EHS Team structure should contain the following:
 - Subject Matter Experts (SMEs)
 - System Administrators
 - Data Managers/Coordinators
- Regularly scheduled personnel training
 - Cross-trainings to ensure knowledge retention during turnovers
 - Online learning libraries
- Communication channels open between management and technical specialists



Why?

Organizational Structure ,
“Needs” &
“Wants” &
Drivers

Software Solutions



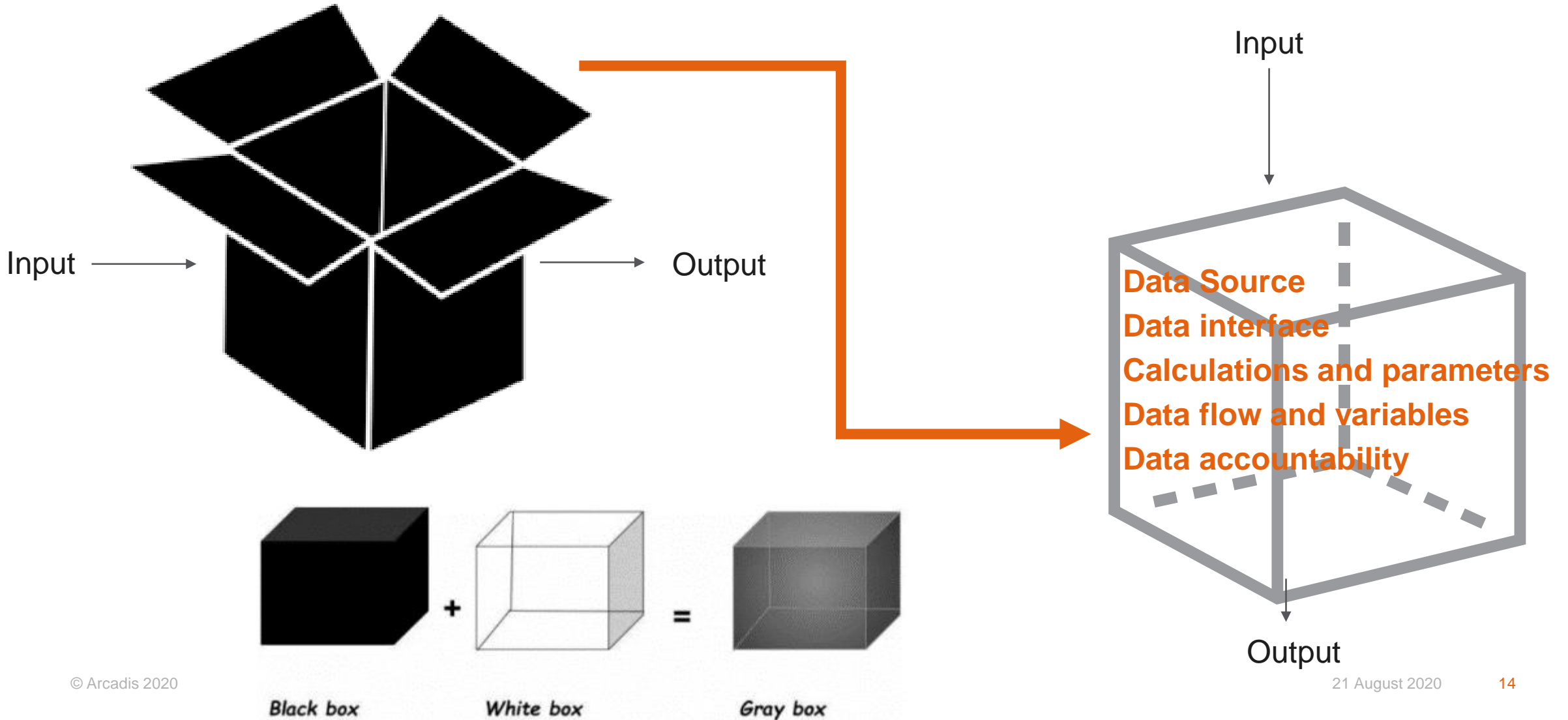
1990 - 2000

2000 - 2010

2010 – today

- Organizational Awareness & Convergence – across previously silo’ed “functions” and across the enterprise (at the site, BU, and corporate levels)
- Software providers aggressively investing in organic and inorganic growth to meet these “new” needs
- Wearables, Cloud, IoT, Data Analytics
- Real-time/near-time, Leading Indicators, Predictive, “Insights”

Out of the Black Box and into the.....



Elements of Automation - Technology Stack

Automation typically involves a stack of compatible technologies that can work together and with the right licenses, can be implemented behind corporate firewalls without a need for external hosting or other complications



Robotic Process Automation tool – UIPath
 Mobile Data Collection - FieldNow forms



SSRS – SQL reporting automation



Python – Scripting for autonomous process, AI & Machine Learning



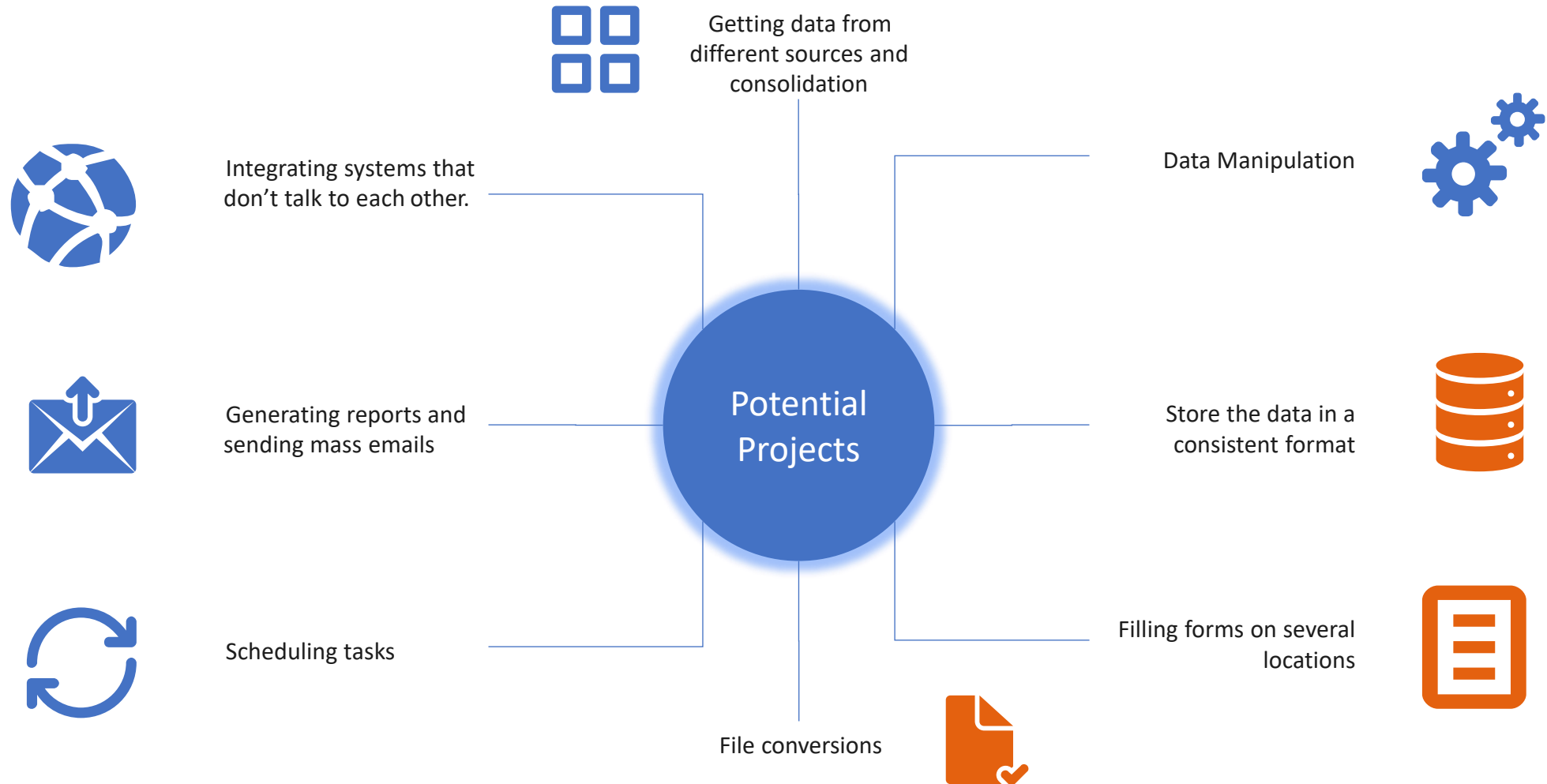
Microsoft Power Platform

PowerBI – Data Analytics & Visualization

SharePoint – Data storage, visualize

Azure services – Storage, analysis, extraction and conversion

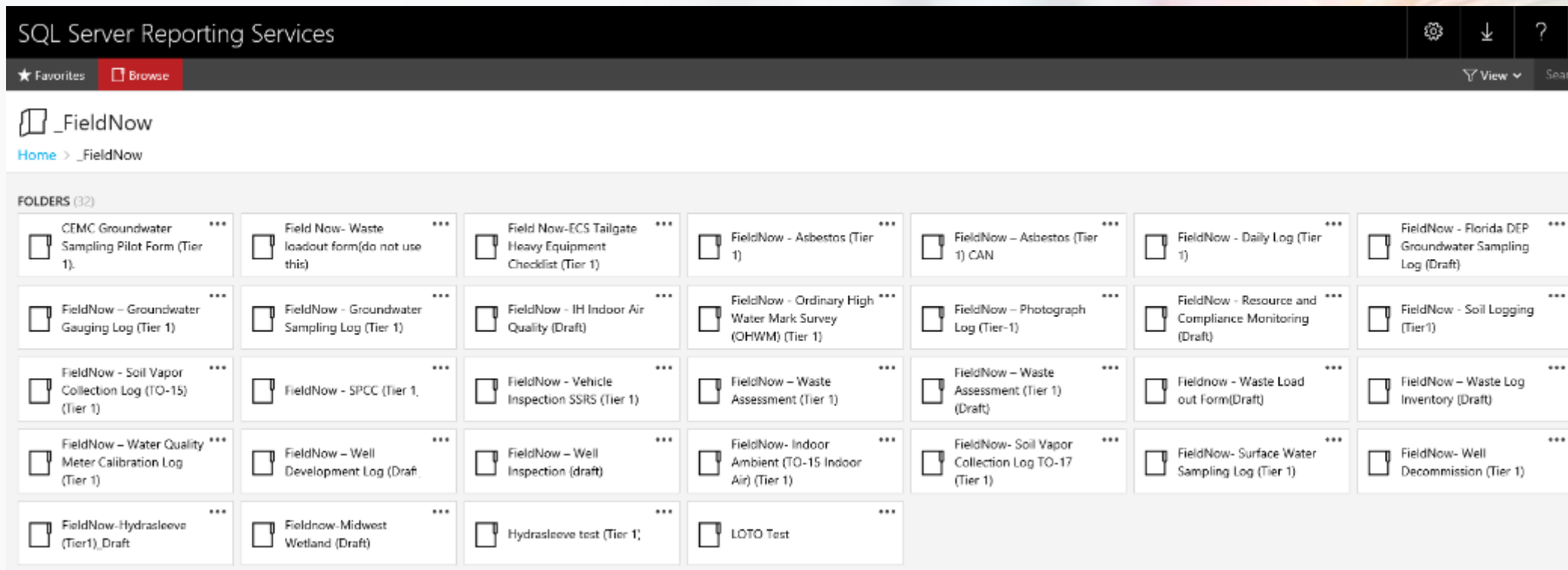
Robotic Process Automation



The use of FieldNow® allows for **standardized data collection** and **streamlined, automated reporting**

Example: Mobile data collection within FieldNow® applications like Fulcrum allow for data to flow into a SQL Server Database. **SSRS** (SQL Server Reporting Services) is the reporting platform where the template is designed using the SQL data sources.

Staff can access the self-service, standard reports through a web interface.



Sample Forms using FieldNow®

- FieldNow - Waste Loadout Form (Tier 1)**
Waste Loadout Form for OMM teams SME: Rebecca Hensel, Lucas Cullen, Amanda Lucchino created by R. Miller
Last activity about 10 hours ago
- FieldNow - Waste Log/Inventory (Tier 1)**
Used to track on-site waste Updated: July/August 2019 Primary Contacts: Rebecca Hensel and Amanda Lucchino
Last activity 4 days ago
- FieldNow - Waste Assessment (Tier 1)**
Primary Contact: Amanda Lucchino
Last activity 4 days ago



FieldNow - Waste Loadout Form (Tier 1)

FIELDS	LAYOUT (FIELDS: 28)
Basic	<input type="text" value="11:27"/> Time on-site
<input type="text" value="abc"/> Text	<input type="text" value="11:27"/> Time off-site
<input type="text" value="123"/> Numeric	Transportation Observations
<input checked="" type="checkbox"/> Yes / No	<input type="text" value="abc"/> Transportation Company
<input type="text" value="17"/> Date	<input type="text" value="abc"/> Truck Driver's Name
<input type="text" value="11:27"/> Time	<input type="text" value="Photo of License Plate"/>
Choice	<input type="text" value="Photo of Truck Manifest"/>
<input type="text" value="Single Choice"/>	<input type="text" value="Photo of Labels and Container"/>
<input type="text" value="Multiple Choice"/>	<input checked="" type="checkbox"/> Waste Classification
<input type="text" value="Classification Field"/>	<input type="text" value="Waste Type"/>
Design	<input type="text" value="Container Type"/>
<input type="text" value="Section"/>	<input type="text" value="Estimate Truck Volume/Weight (gal/ton)"/>
<input type="text" value="Repeatable"/>	<input checked="" type="checkbox"/> Was tanker/truck cleaned before arriving at site?
<input type="text" value="Label"/>	<input type="text" value="Previous locations of tanker pump-out (if not cleaned)"/>
Media	<input type="text" value="Previous tanker Manifest"/>
<input type="text" value="Signature"/>	
<input type="text" value="Photos"/>	
<input type="text" value="Videos"/>	

FieldNow - SPOC (Tier 1)

South Ranchland

West Ranchland

Recipients

Name: Waterway/Soil Gauge Earth

Name: Location, Distance and Direction

Name: Roadway, Distance and Direction

NOTE: If recipient information is unknown enter supervisor

TANK FORM

ENGINE, GENERAL OIL, TRANSPORTATION & COMMERCE

Site Instructions

Site:

General Comments

TANK FORM

ID

Container ID/Equipment ID

Contents

Diameter (feet)

Means of Diameter measurement

Length/Height (feet)

Means of Length/Height measurement

Capacity

Capacity Measurement

Is tank the largest in this area?

Abovementioned Underground

Single-walled or Double-walled

Test Orientation

Vertical Tank Orientation

Tank Shape

Number of Tanks

Excavated or Non-excavated

Excavated

SECONDARY CONTAINMENT CALCULATIONS

Precipitation Data:

2011 - 2014 (ft. Storm Depth)	5.25	ft
Secondary Containment Area	1,200.00	sq ft
Rainfall Volume	725.00	gal

Net Volume Calculations:

Largest Tank Volume	2,902.99	gal
Required Containment Volume	2,970.99	gal
Displacement Area (All Tanks)	1,190.97	sq ft
Displacement Area (Largest Tank)	143.40	sq ft
Actual Tank Volume Area (ft ² - Imperv)	1,047.57	sq ft

Minimum Berm Height Calculations:

Max. Possible Containment Area	120.12	sq ft
Minimum Berm Height Required	170.79	in
Secondary Containment Elevation	4	ft

Equations:

Secondary Containment Area: Length of Containment x Width of Containment = ft²

Rainfall Volume: 2011 - 2014 (ft. Storm Depth) x Secondary Containment Area = ft³

Largest Tank Volume: Largest Tank x 42 (gal/ft³) x 7.48 (ft³ - gal) = ft³

Required Containment Volume: Rainfall Volume + Largest Tank Volume = ft³

Displacement Area (All Tanks): (Number of Tanks) x (pi x Diameter of Tank²) = ft²

Displacement Area (Largest Tank): (pi x Diameter of Tank²) = ft²

FieldNow - Groundwater Sampling Log (Tier 1)

Evacuation Details

Is Well Head PID Reading required?

Measuring Point (mp) Description

Casing Diameter (Inches)

Well Casing Material

Static Water Level (ft-bmp)

Total Depth (ft-bmp)

Water Column

Gallons in Well

Reference Note: Well Volume Calculation [πr²h, where h = Well radius (inch): Volume (Gal./foot): Volume (ml./foot)

Purge Method

Type of Equipment used

Sample Method

Sample Depth (ft-bmp) (e.g. pump intake)

Shims Start

ARCADIS Groundwater Sampling Form Page 1 of 2

Project Number: 10000000000000000000 Well ID: TW-242 Date: 8/22/2019

Project Name/Location: Weather(°): Partly Cloudy, 60°

Measuring Pt. Description	Top of Casing	Screen Setting (ft-bmp)	Casing Diameter (In)	Well Casing Material			
Static Water Level (ft-bmp)	7.90	Total Depth (ft-bmp)	10.15	Water Column(ft)	2.25	Gallons in Well	0.35
MP Elevation		Pump Intake (ft-bmp)	0	Purge Method	Low-Flow	Sample Method	Low-Flow
Sample Time	11:30	Volumes Pumped (gallons)	0.29	Sample ID	TW_242_002	Sampled by	Edy J. Colon
Purge Start	10:00	Gallons Purged	1.65	Register/Code No.			
Purge End	11:30						

Time	Meters Flagged	Rate (ml/min)	Depth to Water (ft)	Gallons Pumped	pH (Standard Units)	Conductivity (µmhos/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Radius (ft)	Reference
10:00		100	7.90	0.00							
10:05	\$	100	8.02	0.13	7.21	1.15	247	0.76	16.0	0.1	Clear No
10:10	\$	100	8.3	0.26	7.13	1.13	127	0.77	17.0	0.8	Clear No
10:15	\$	100	8.3	0.40	7.1	1.13	115	0.49	17.0	4.8	Clear No
10:20	\$	100	8.31	0.53	7.1	1.13	99.6	0.48	17.6	3.1	Clear No
10:25	\$	100	8.31	0.66	7.1	1.13	89.3	0.45	17.6	2.1	Clear No
10:30	\$	100	8.21	0.79	7.1	1.12	96.1	0.43	17.7	5.6	Clear No
10:35	\$	100	8.31	0.90	7.08	1.12	74.0	0.44	17.7	1.1	Clear No
10:40	\$	100	8.31	1.06	7.05	1.12	61.0	0.46	17.7	0.8	Clear No
10:45	\$	100	8.21	1.19	7.09	1.12	52.7	0.47	17.6	0.4	Clear No
10:50	\$	100	8.31	1.30	7.08	1.12	54.3	0.57	17.6	0	Clear No
10:55	\$	100	8.31	0.15	7.05	1.11	53.2	0.84	17.6	-0.6	Clear No
11:00	\$	100	8.31	1.50	7.05	1.11	53.1	0.38	17.5	-1.11	Clear No
11:05	\$	100	8.31	1.70	7.04	1.11	50.7	0.36	17.5	-1.5	Clear No
11:10	\$	100	8.31	1.86	7.03	1.11	49.4	0.37	17.7	-1.6	Clear No

Conductivity Sampled: 49.4 µmhos/cm

Dissolved Oxygen: 0.38 mg/L

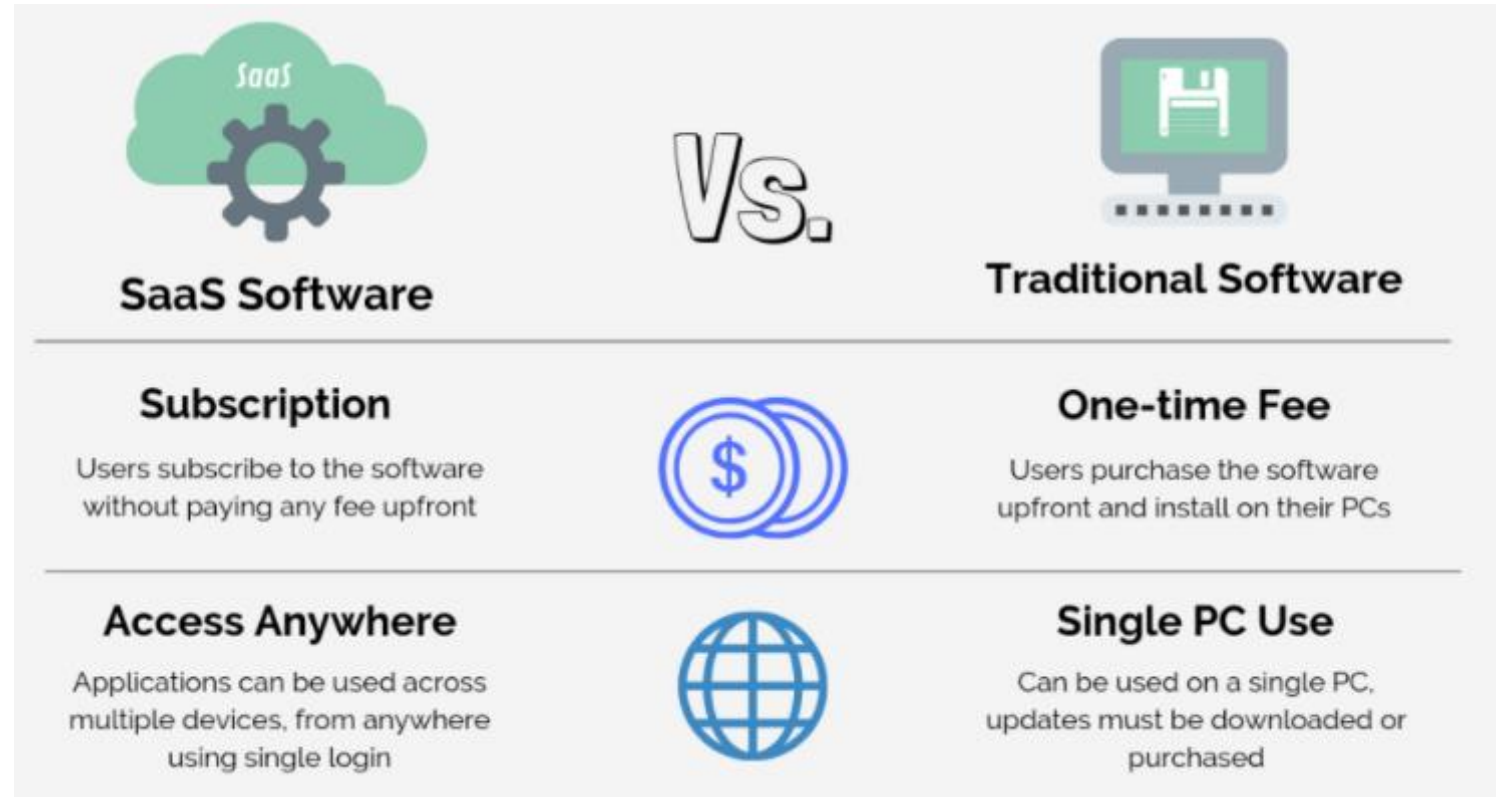
Temperature: 17.5 °C

Well Casing Volume Calculation

ft-bmp = feet below measuring point
 ft = feet
 ml/min = milliliters per minute
 mg/L = milligrams per liter
 NTU = Nephelometric Turbidity Unit
 °C = degrees Celsius
 µmhos/cm = microSiemens per centimeter

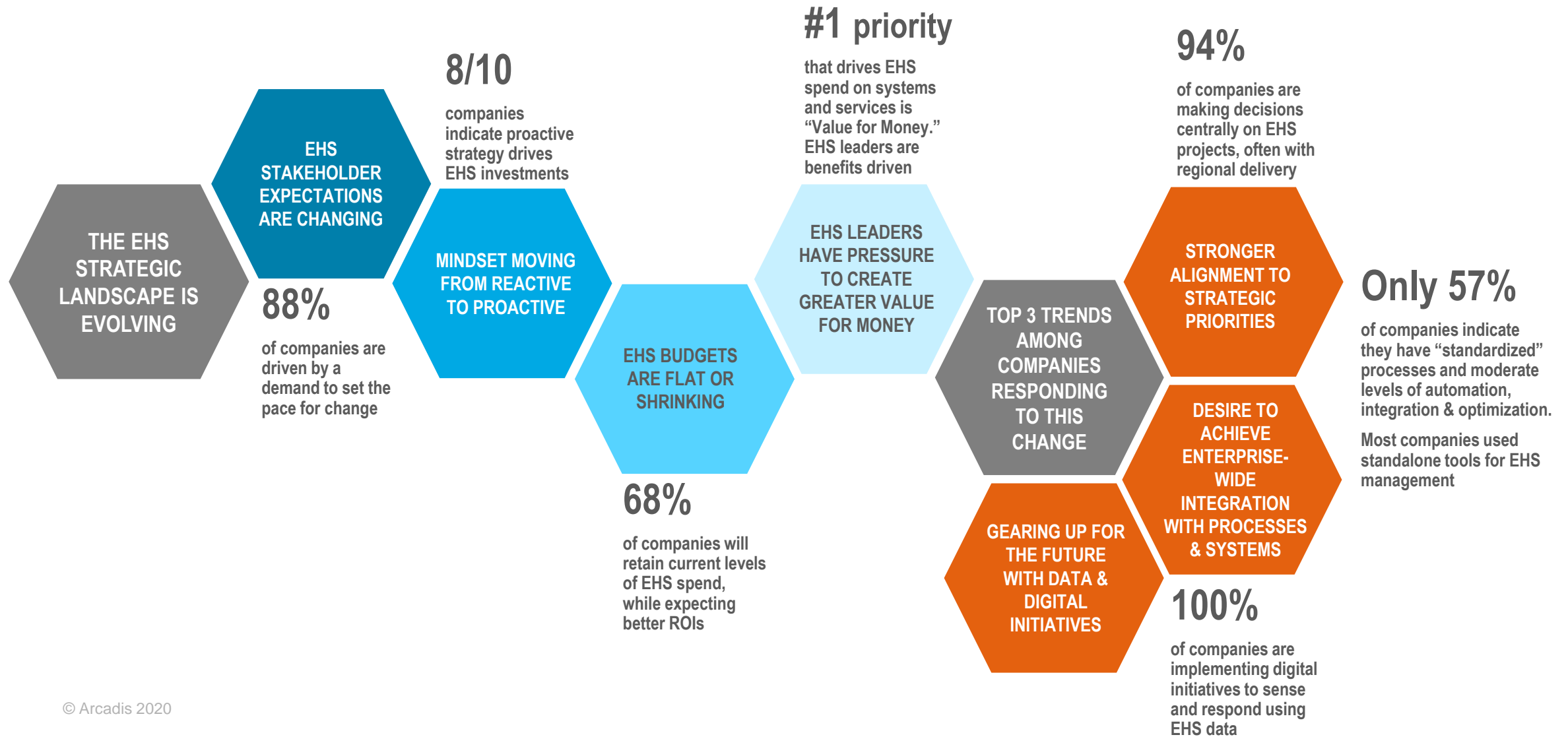
Software as a Service vs. Platform Systems

- Regulatory needs
- Current system requirements and deficiencies (legacy system evaluation)
- Budgetary constraints
- Personnel support
- IT requirements



Survey of the Current EHS Landscape

Arcadis/College of William & Mary Market Survey Results



Why Companies Replace Their EHS&S Software Systems



Dissatisfied with overall performance



Dissatisfied with customer support and user engagement



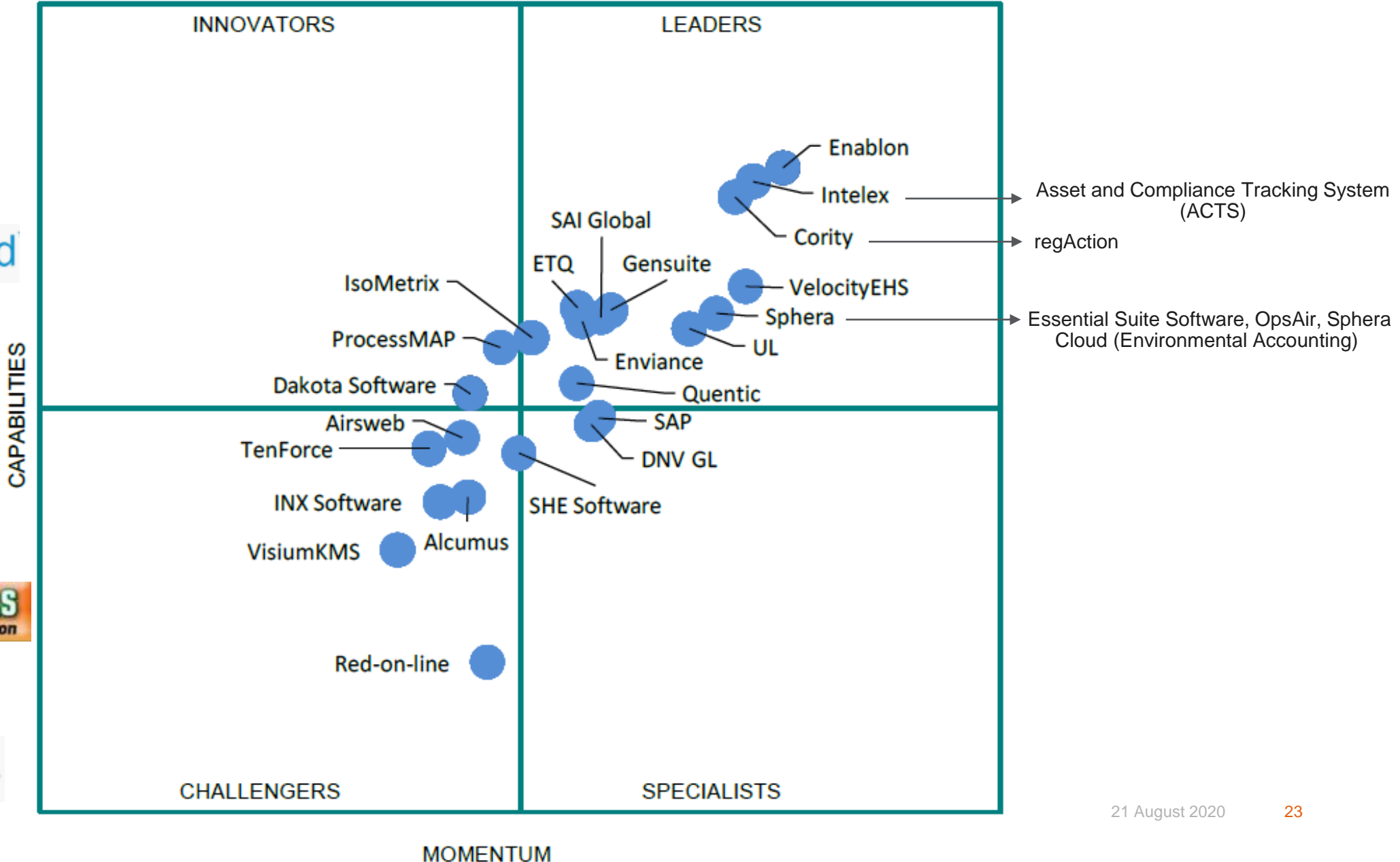
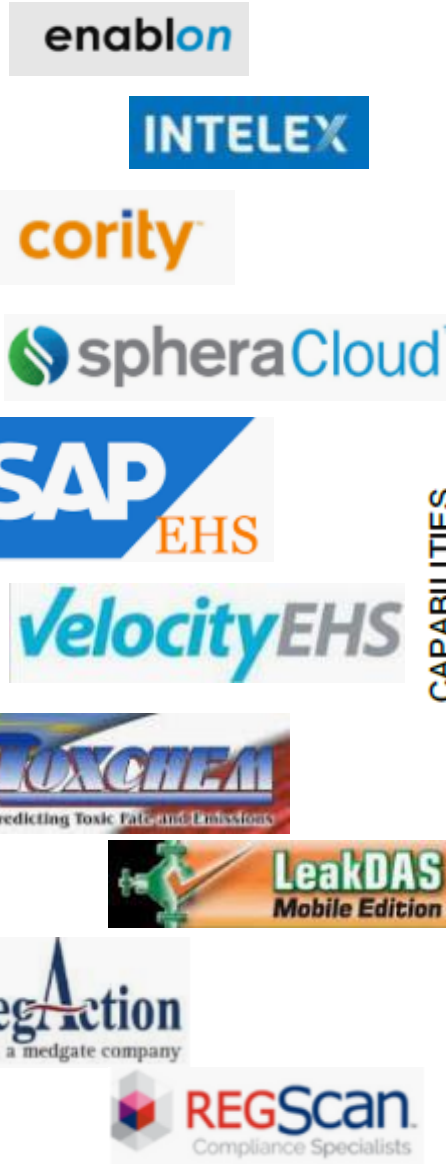
Dissatisfied with flexibility of customization

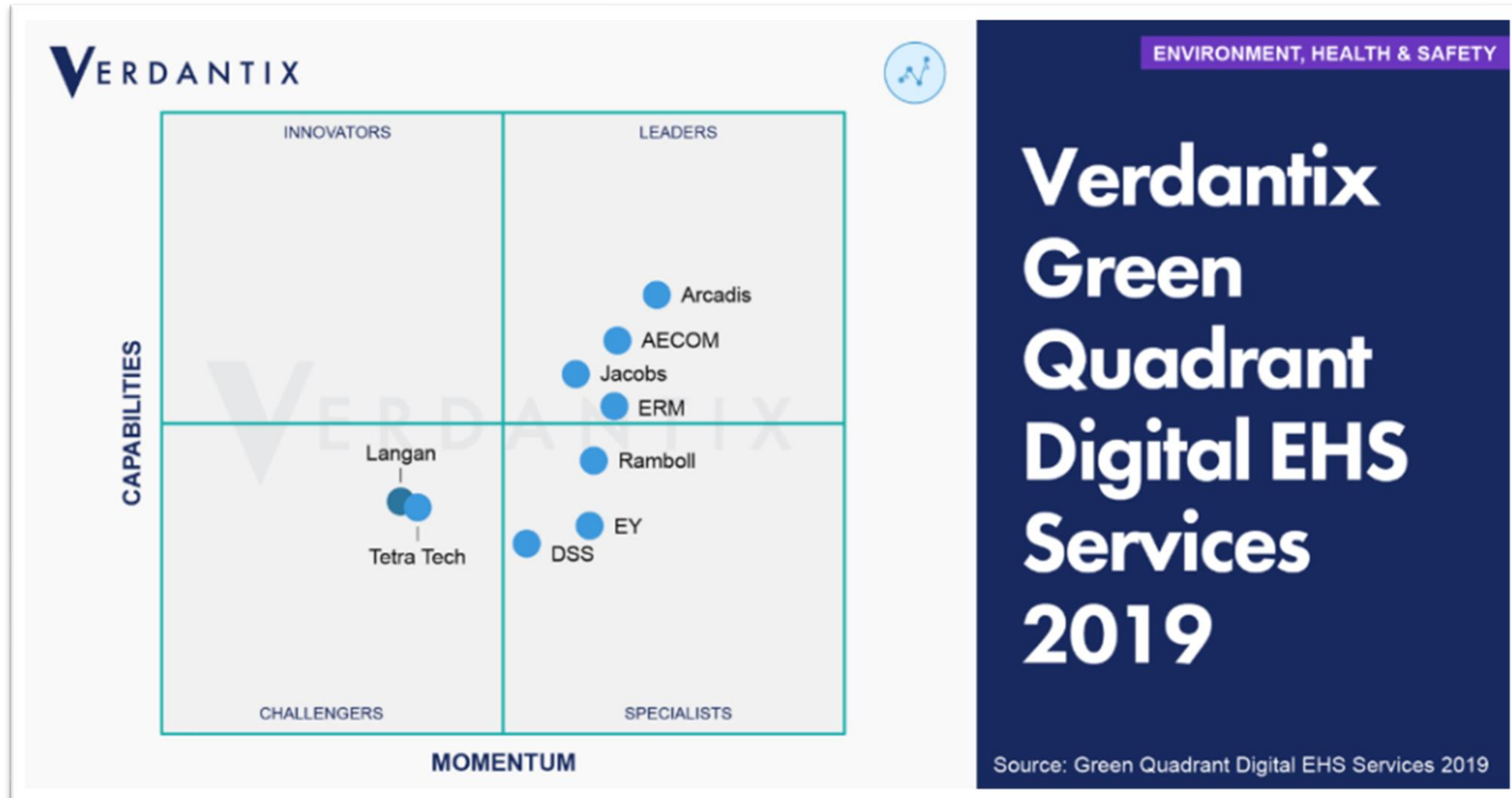


The most important criteria for those shopping for a new software system



Verdantix Green Quadrant EHS Software 2019





Thank you for attending! Any questions?

For more information on permitting, reporting, EMIS Systems, Compliance strategies, and digital solutions, please contact us at:

Humaira.Hazur@arcadis.com

Digital Solutions: The Key to Working SMARTER