

OCTOBER 24, 2023

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# Creating a single version of truth for handling emergencies

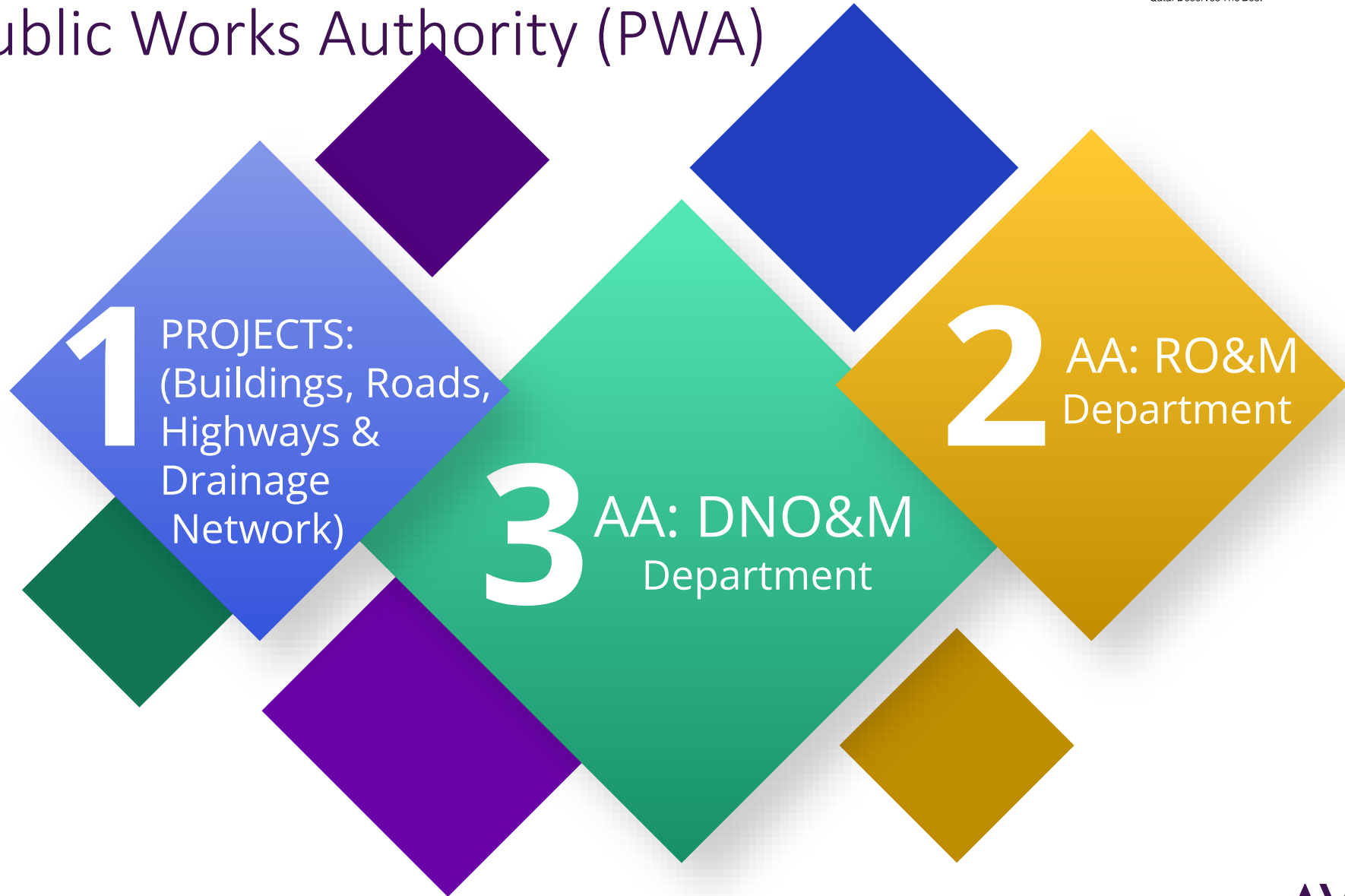
A case study from a utility company perspective

Abdullah Bahzad - Maintenance & Controls Engineer, Ashghal

Omer Bin Abdul Aziz, CEng, TUV FS Eng, IEC62443 Cyber Risk & Design Specialist – VP Digital Transformation, Avanceon



# Ashghal Public Works Authority (PWA) Qatar

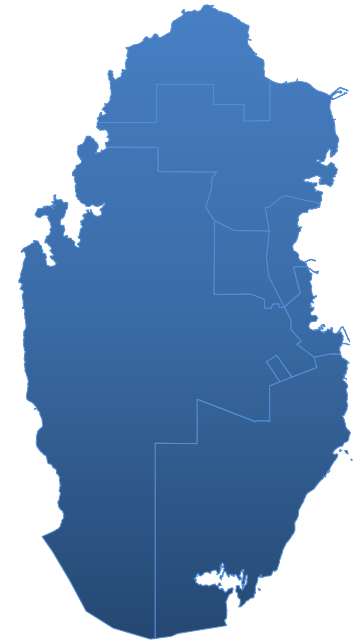


# Drainage Operations & Maintenance Department (DNO&M)

3000+ km of foul water network 2000+ meters of surface water & 2000 km of treated water network

~ 1 million m<sup>3</sup>/day capacity of treating sewage & ground water with 06 full scale and 20 packaged treatment plants

126+ pumping stations with a capacity of 4 million m<sup>3</sup>/day. 2000+ flow monitoring chambers man-holes flow



# Our Global Presence



**+30**  
 Years of  
 commitment



**+12**  
 Key  
 partners  
 worldwide



**+1,500**  
 Medium &  
 large-scale  
 projects



**+200**  
 Government &  
 blue-chip  
 customers



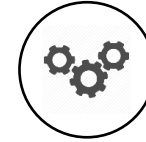
**+200**  
 Employees



**+9**  
 Offices, 3  
 Operating  
 Centers



**+15**  
 Industrial  
 Segments Served



**+70%**  
 Control System  
 Engineers



**+300K**  
 Man Hours



**Worldwide Headquarters**  
**North America**  
 Regional Operations Center  
 Exton, PA, USA



**Middle East Operations**  
 Saudi Arabia, UAE & Qatar



**Southeast Asia**  
 Regional Operations Center  
 Lahore & Karachi

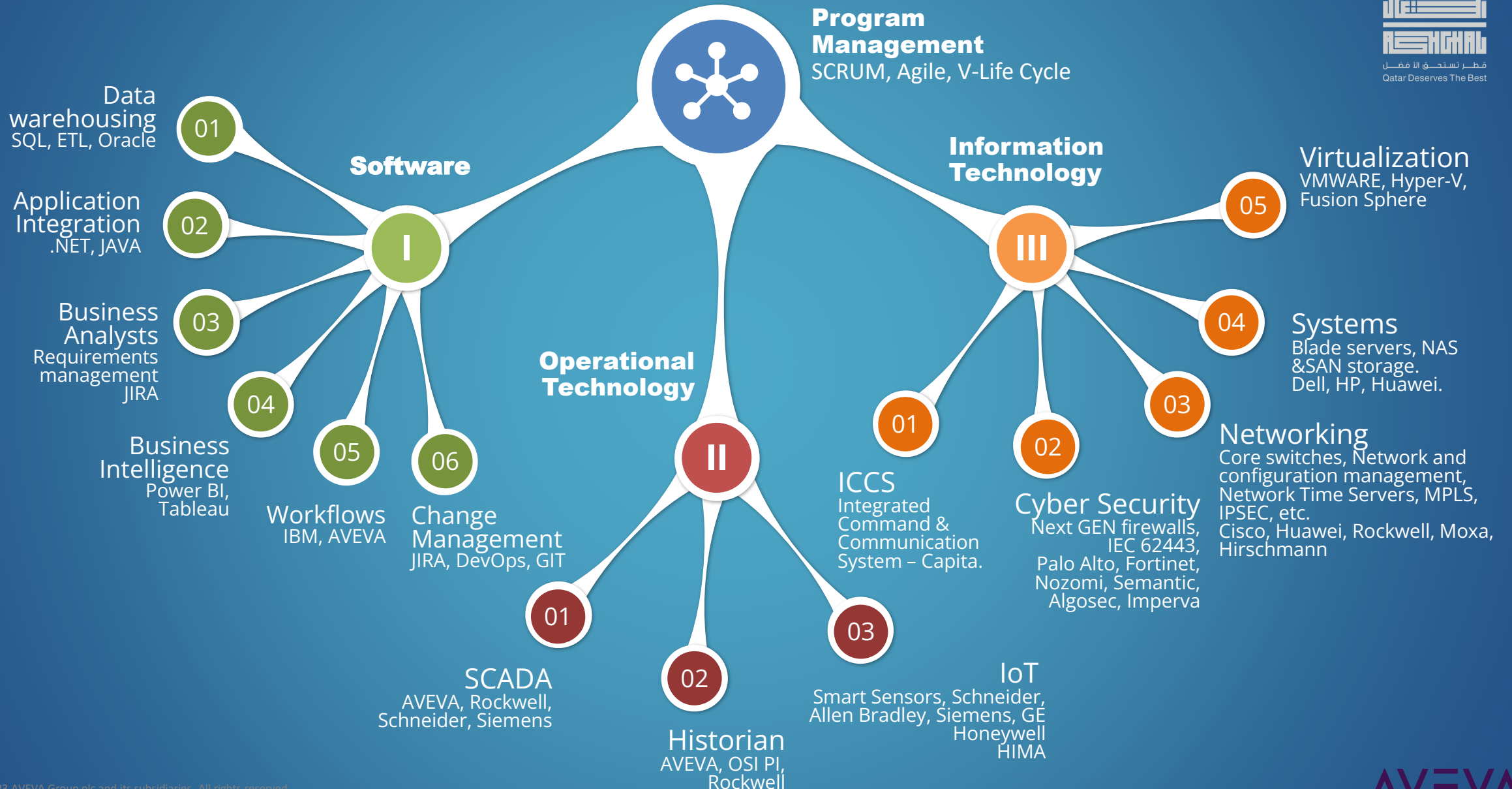
# Next Gen OT/IT Converged Control System & SCADA

**AVANCEON**

Tomorrow's solutions, today.



قطر تستحق الأفضل  
Qatar Deserves The Best



# Digital Transformation

**OmniConnect**  
Collects data from any source



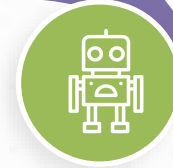
**Analytics**  
Publishes data on any visualization or analytics software



**MultiCloud**  
Ingests and pushes to any cloud



**Machine Learning**  
Artificial Intelligence & Machine Learning



**Data-lake**  
Stores data into any data-lake



**KPIs**  
Computes and configures KPIs as required



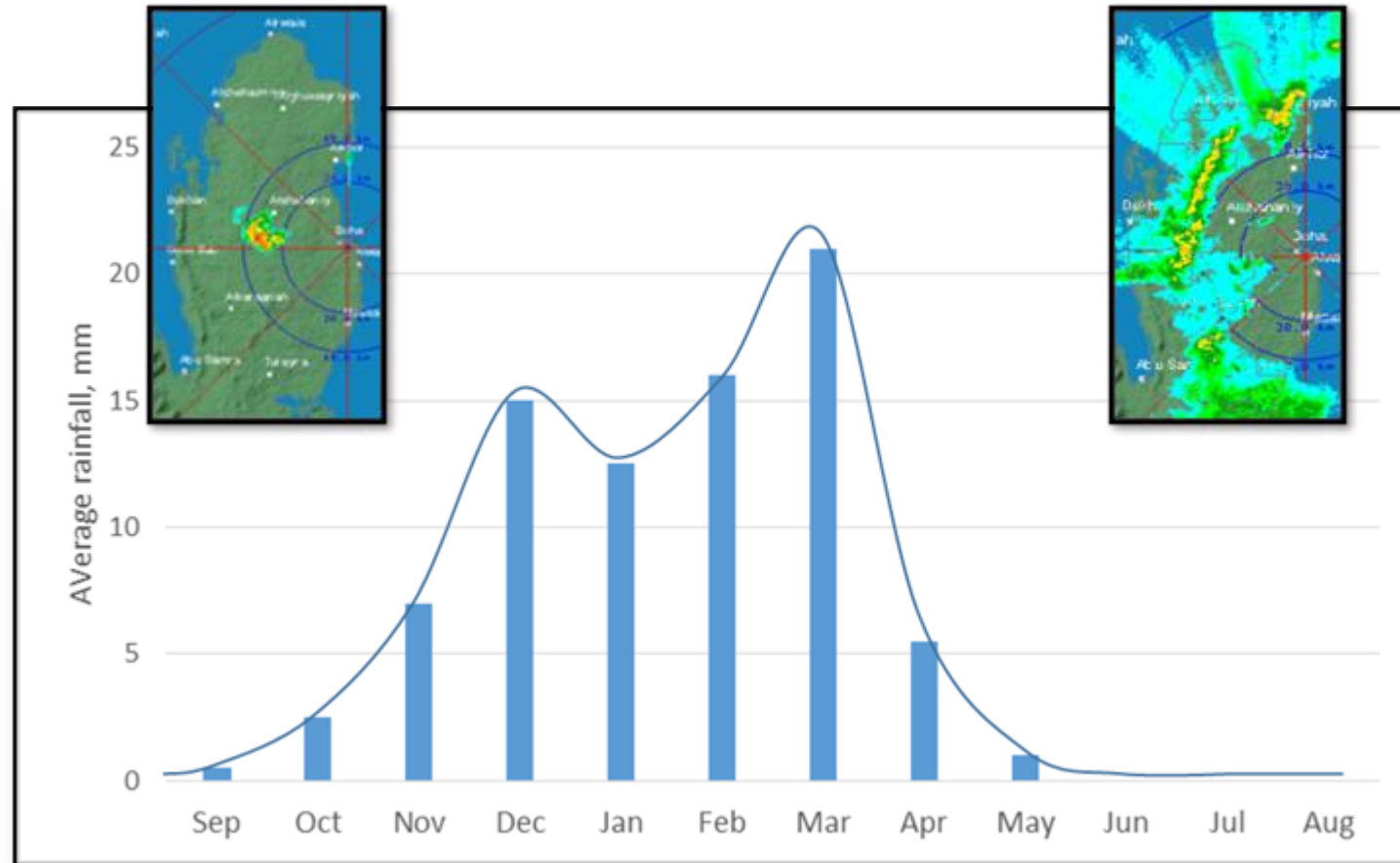
Octopus  
Digital

## SYSTEM OF SYSTEMS TO MANAGE EMERGENCIES

# When it rains... it pours

While it does not rain often, short storm bursts can stretch the limits of the networks and personnel involved in responding to such situations. Here is an example of what we mean.

# Qatar's rainy season



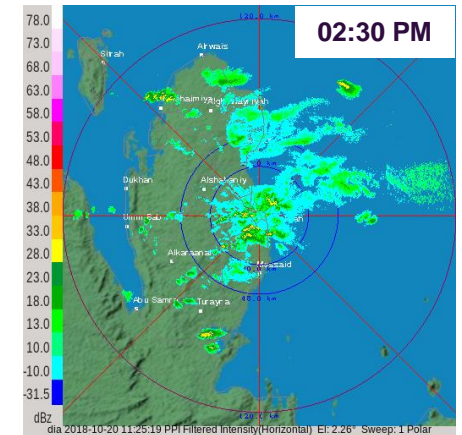
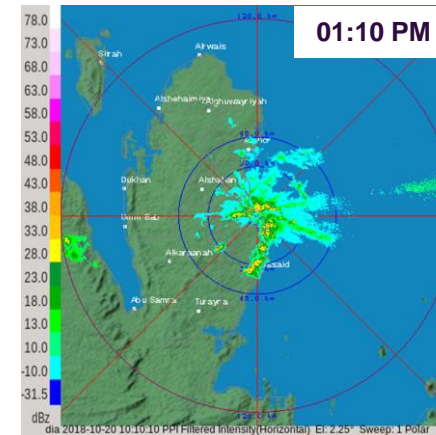
**2015-16**  
 38 Alerts  
 13 Incidents  
 2 Emergencies

**2016-17**  
 11 Alerts  
 6 Incidents  
 1 Emergency

**2017-18**  
 7 Alerts  
 4 Incidents  
 0 Emergencies



# 2018 rainfall event



**Recorded Intensity up to 76 mm/h (preliminary analysis)**

# 2018 rainfall event

Table 5-5 IDF values – best fit for Al Siliyah

Return Period	Rainfall Intensity in different durations (mm/h)															
	5min	10min	15min	20min	30min	45min	60min	90min	2h	3h	4h	5h	6h	12h	24h	
2	42.2	29.7	23.9	19.6	15.0	11.5	9.6	7.4	6.1	4.6	4.0	3.5	3.1	1.8	1.0	
5	71.3	49.7	39.2	31.6	24.3	18.4	15.1	11.3	9.0	6.6	5.5	4.8	4.2	2.5	1.5	
10	97.0	66.4	51.5	41.2	31.6	23.8	19.3	14.2	11.2	8.0	6.5	5.6	4.9	2.9	1.8	
20	127.3	85.3	65.0	51.8	39.6	29.6	23.9	17.3	13.5	9.5	7.4	6.2	5.5	3.2	2.1	
25	138.2	92.0	69.7	55.4	42.3	31.6	25.4	18.4	14.3	10.0	7.6	6.4	5.7	3.3	2.2	
50	176.2	114.5	85.2	67.6	51.2	38.3	30.5	21.8	16.7	11.6	8.5	7.0	6.2	3.6	2.4	
100	221.6	140.4	102.6	81.2	61.0	45.6	36.1	25.5	19.4	13.3	9.3	7.6	6.6	3.8	2.6	

Limit of  
Drainage  
Infrastructure



20 October 2018 EVENT

← Local Roads (1 in 5 years)

← Highways (1 in 10 years)

← Underpasses (1 in 50 years)

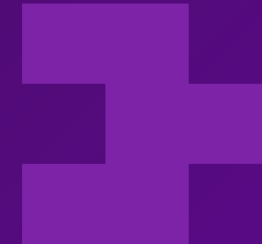
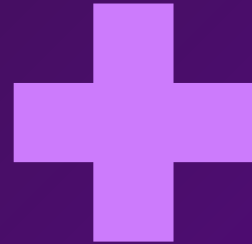
➔ Rainfall exceeded a 1 in 100 year event

*Preliminary estimate is that the event was*

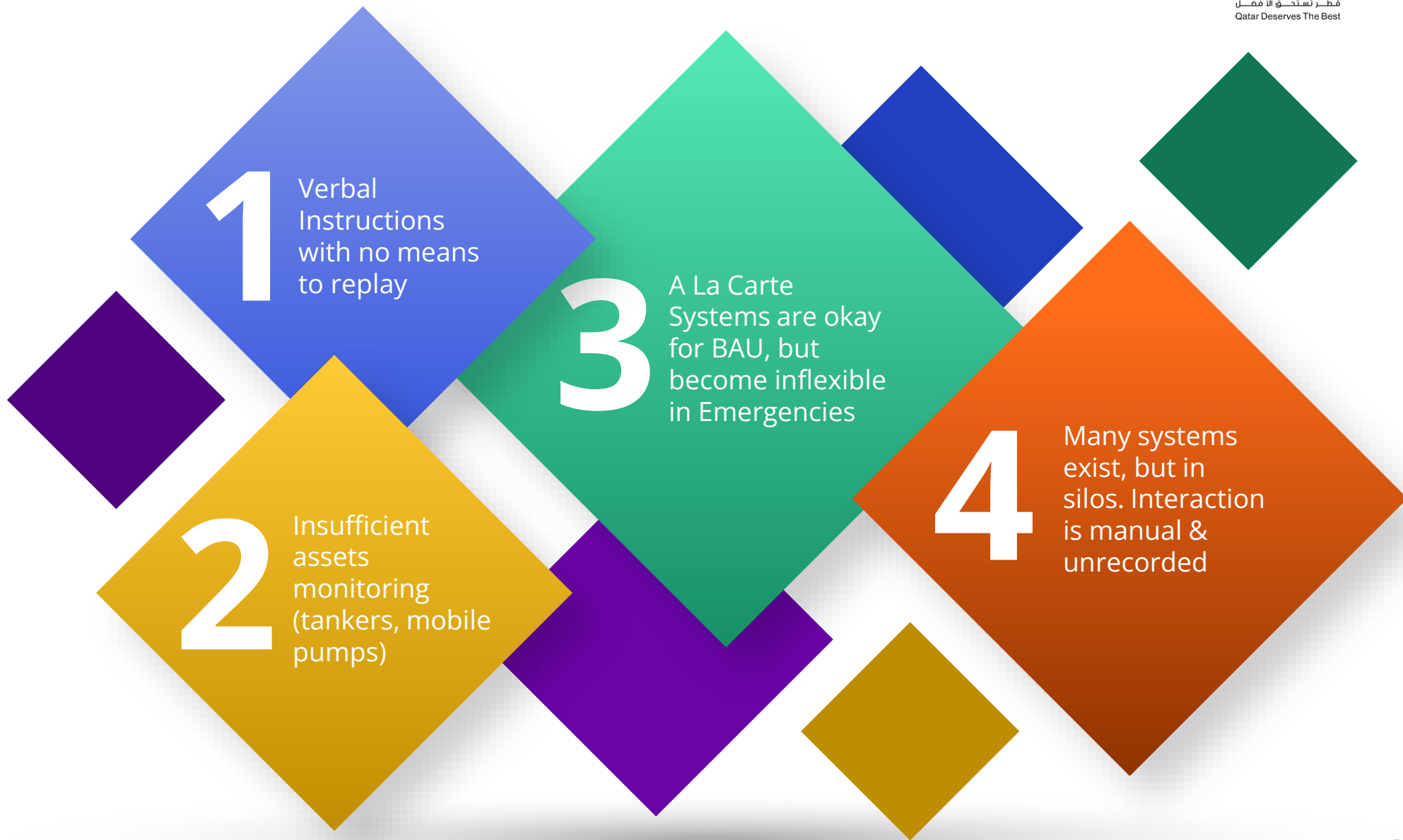
**3 times the design event capacity**

SYSTEM OF SYSTEMS TO MANAGE EMERGENCIES

# Gaps identification

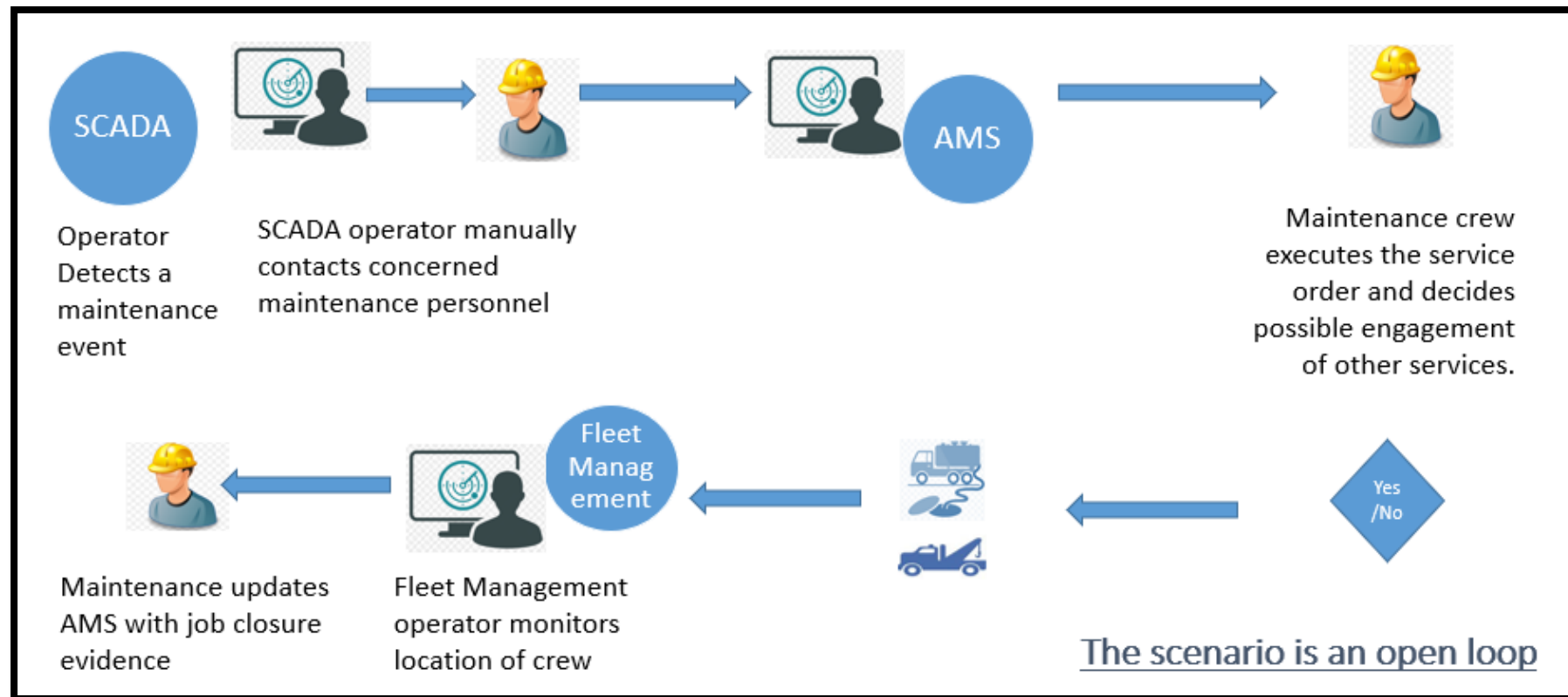


The need for a system of systems to manage interactions across various platforms, define workflows that allow express interaction and build a BI layer to provide a single version of truth.

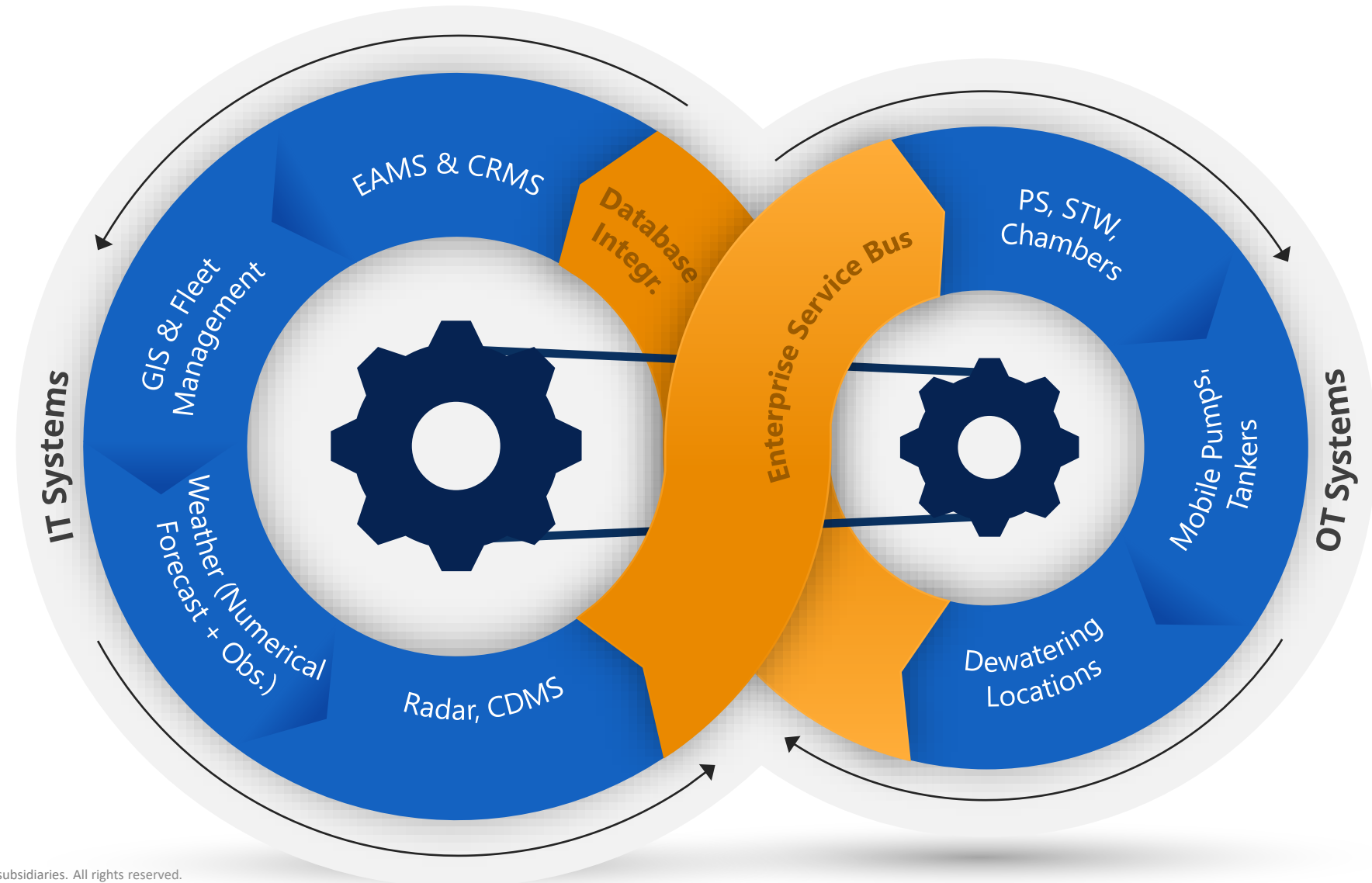


# Earlier scenario: multiple silos

## Multiple touchpoints and manual interactions

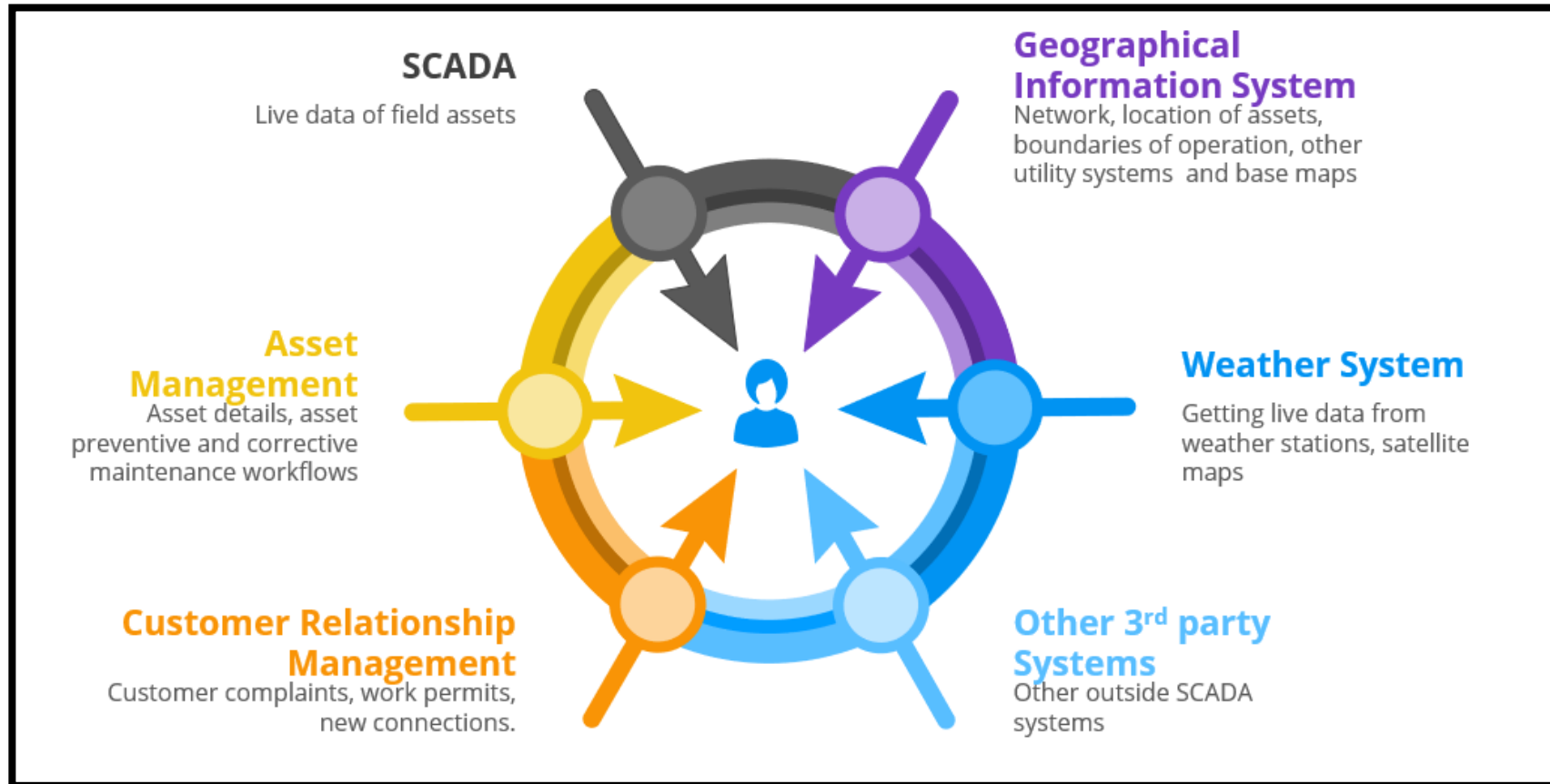


# Developing a system of systems



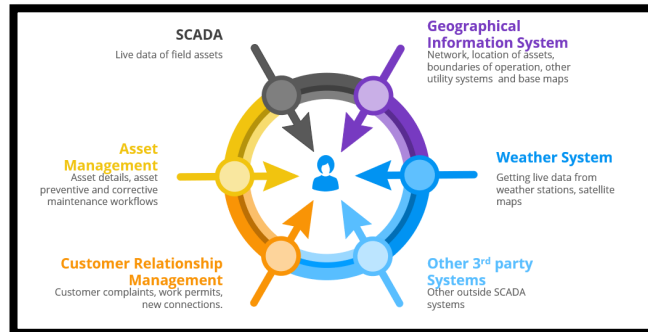
# Single touchpoint for all systems

AVEVA™ System Platform as the focal point



# Single touchpoint for all systems

## AVEVA System Platform as the focal point



690+ Remote sites connected over MPLS (50+ Operators)

Full complement of Cyber Solutions

1.2 million assets with a history of 4.5 million work orders

Integrated Communications (UHF/VHF/Mobile/Landline)

History of 150,000 customer complaints

Digital Operator Log

300+ Dashboards with playback and <1 min. update for ECC

Workflows: Activities, Events, Integrated with SMS gateways



A BRIEF DEMO

# Complaints Management Workflow

This demo will showcase the integration and workflow capabilities of the system in order to handle incidents and emergencies

WHAT'S NEXT?

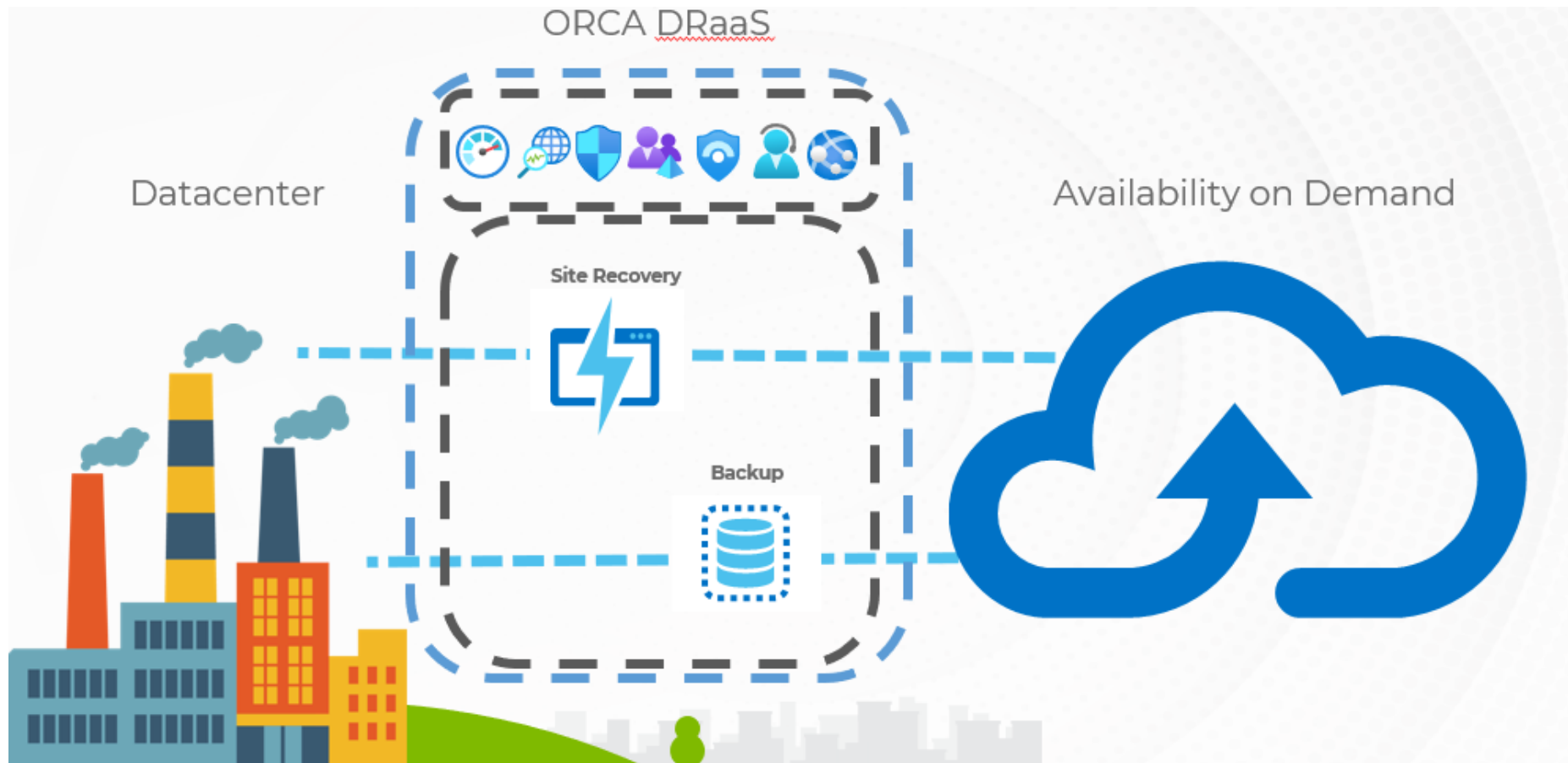
Cloud is the limit!



From building a disaster recovery site to creating a data lake & performing machine learning .. Cloud is the limit!

# Disaster recovery

Full functionality disaster recovery on Azure Cloud -



# Digital advisor

## Reimagining the relationship between humans and technology

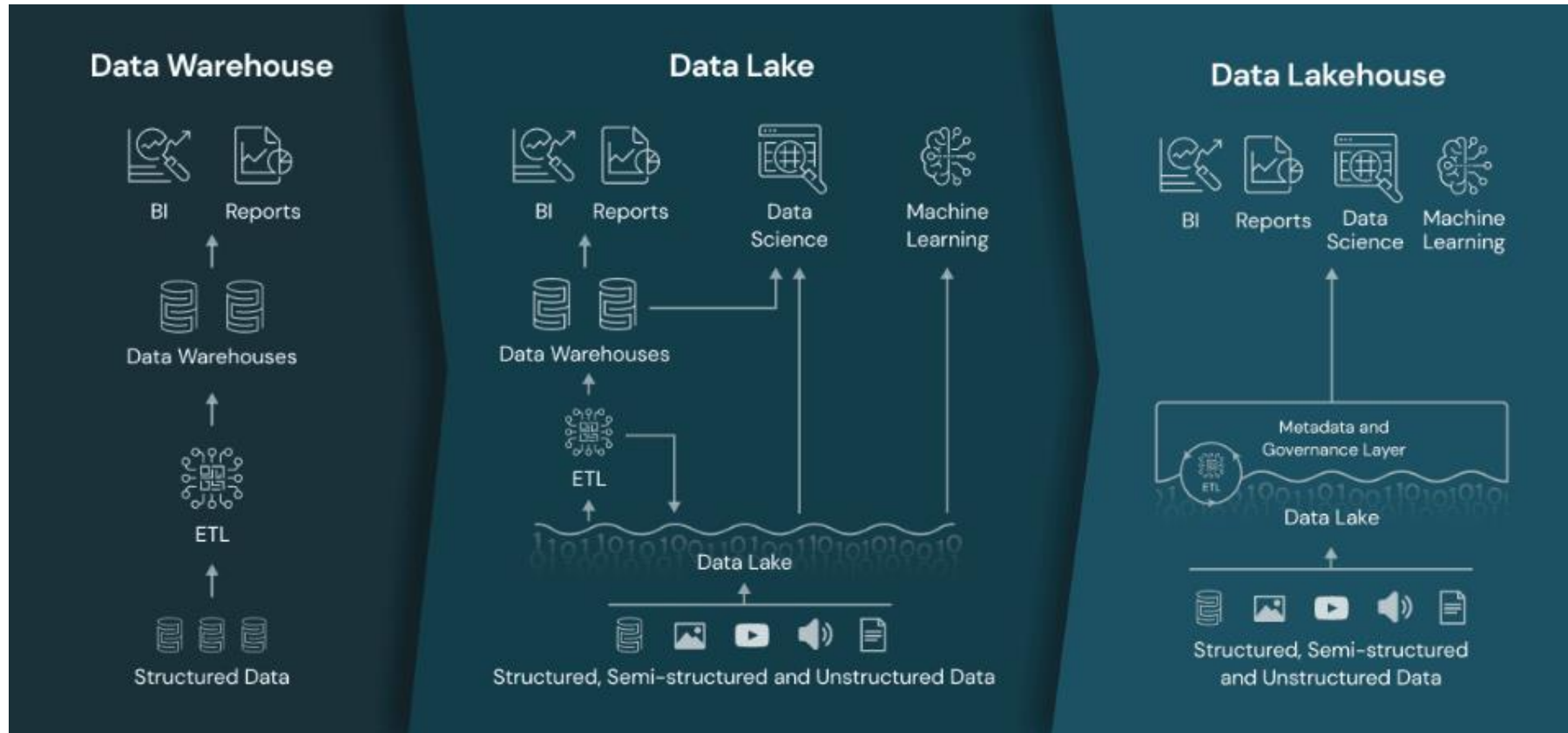
- Machine learning and NLP based AI digital advisor
- Will have access to all internal data stores and relevant third-party applications
- Will provide unprecedented decision support and predictive analysis capabilities.



AVEVA

# Build a data lakehouse

Data – going places!



FROM THE HEART

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# Lessons learned

Few things that can be better or we could have done in a better way. We often take pride in the robustness and availability. Sometimes it comes in the way of flexibility as well!

# Stress Testing

- Stress testing is very important to understand how the system will behave when all users are operating it with full data load.
- SCADA systems often lack the capability of carrying out automated stress testing.
- Automated testing is also very limited.

# 01

# System Reporting

- Certain parts of the of the application / functionalities do not render themselves to internal or external reporting.
- In IT applications, all data is kept in accessible databases. These can be used to generate reports such as user access metrics (e.g. user login / logout reports, how many times a specific user accessed each feature/graphics page, load times of individual graphics etc.)

# 02



# GIS Performance

- SCADA based GIS systems are okay for limited GIS data.
- As the data set expands, the performance deteriorates.
- AVEVA GIS (GISIZE) has the capability of WMS and WFS (exceptional – no other SCADA vendor has this). However, the performance becomes a bottleneck at high loads.
- GISIZE is working on a web client that may address the performance issue, but it is not launched yet.

# 03

# Business Process Modelling

- Creating a business process model in software is easy – defining the business process can be tricky!
- It usually requires extensive work with multiple stakeholders.
- Your model will never be perfect the first time – but it is important to role it out in production and implement improvements in next releases. Otherwise, you will never go-live!
- Consider implementing Agile principles in your project

# 04

# Enhancements

- The concept of “maintenance” and “enhancement” is very different in such systems as compared to traditional IACS systems. In an IACS system, once it is put in operation, requirements for both maintenance and enhancements are fewer and far in between. In an integrated system, maintenance and enhancement is part of everyday life. Business Integrations are fragile no matter how well designed these are. As the business evolves, the definitions of KPIs and metrics evolve as well requiring new insights, which means enhancing the analytics layer. This additional burden of maintenance and enhancement should be kept in the project budget.

# 05



“For the first time, we were able to carry out effective live monitoring of the rain emergencies. Our contractor’s response time has improved by 42% for responding to these scenarios.”

Abdullah Shamsan, Section head Centralized Control Section, Ashghal.



“Working with Avanceon, we were able to build (phase01) the first fully functional OT disaster recovery (In Qatar) on Azure within 06 weeks and were delighted to see how well the system performed on cloud.”

Aziz Hassan Abedrabuh Hassan, Ashghal, DNMC Head, Ashghal.



The AVEVA system platform engineered by Avanceon help us provide enhanced situational awareness across our roads and drainage assets.

Ahmed Mohamed Sh. Mohamed Al Ahmad, Director Asset Affairs Ashghal

## WATER AND WASTEWATER | QATAR

# Ashghal responds to emergencies 42% quicker with a single version of the truth across IT/OT

## Challenge

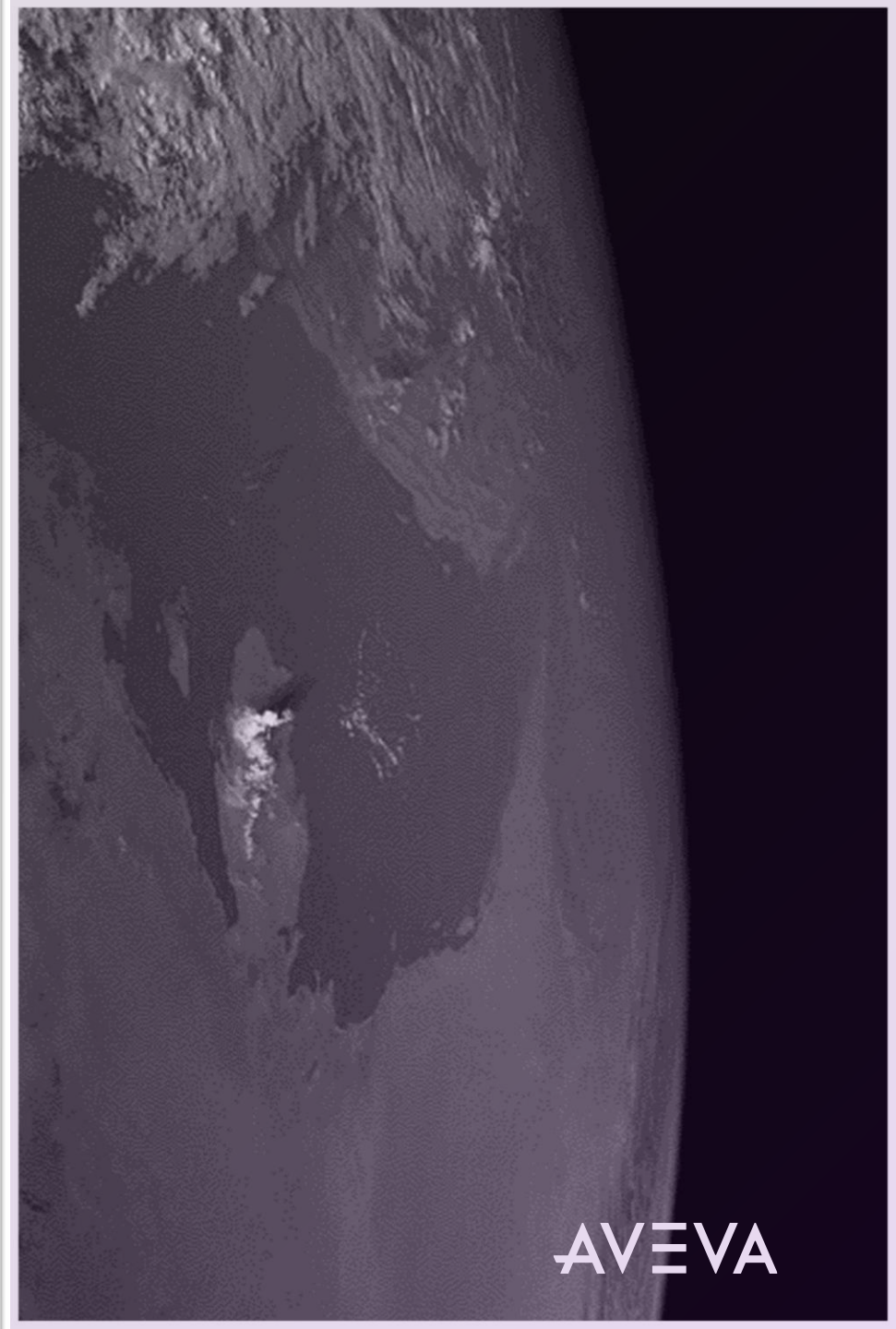
- Qatar is a desert country. It rarely rains – but when it rains it pours!
- Handling rain emergencies entailed interacting with multiple systems with no combined workflow. The response to incidents was slow.
- SCADA operators were flooded with alarms in BAU & incidents.
- Report generation was manual and took considerable time.
- Trust on figures was low.

## Solution

- All business and OT systems were integrated using GIS aware AVEVA™ System Platform.
- Express workflows were developed to interact with sub-systems for handling emergencies

## Results

- **42% improvement in contractor response time for responding to incidents**
- **68% reduction in active alarms due to re-design of alarms philosophy**
- **Post event comprehensive report generation duration reduced from 24 hours, down to 05 minutes!**





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# Questions?

Please wait for the microphone.  
State your name and company.



# Please remember to...

Navigate to this session in the mobile app to complete the survey.



# Thank you!

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

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