



Fleet-Wide Remote Dredging Vessel Monitoring

Daniel Stoye (Royal IHC) & Martijn Handels (Rolloos)



Integrator in a digital world

CUSTOMER EXPERIENCE



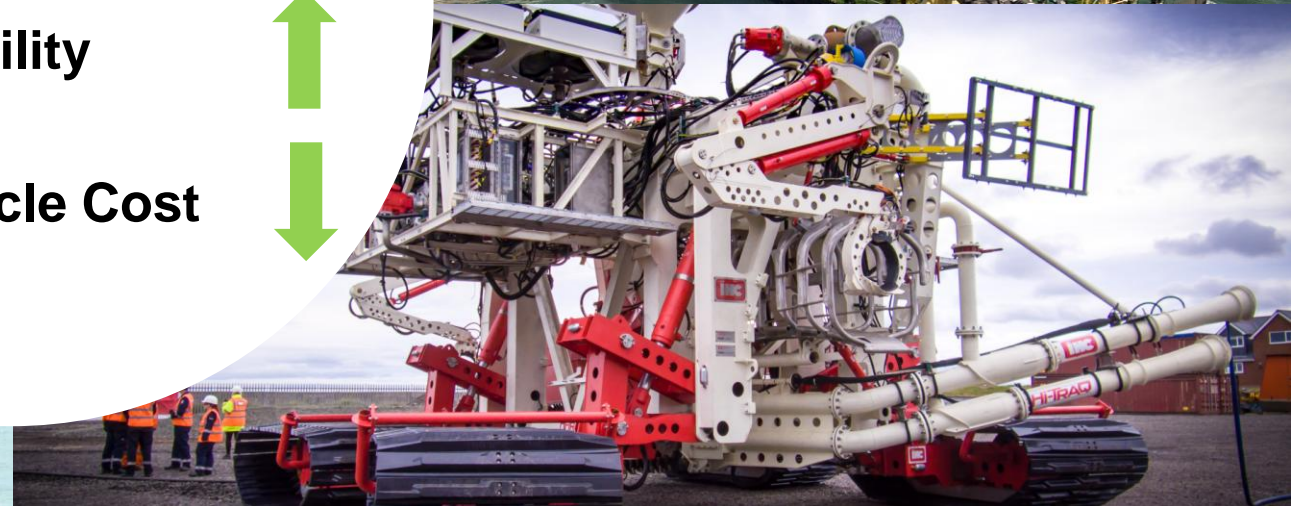
Performance



Reliability

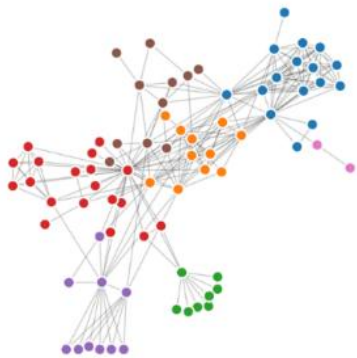


Lifecycle Cost



IHC's mission is to be an enabler

Enabling digital transformation by providing tools & capability



1. COLLECT & CONNECT



2. ENHANCE & STORE



3. VISUALIZE & ANALYZE

Excellent solutions benefit both customer & OEM

CUSTOMER BENEFITS



Remote access



Real time remote monitoring



Remote support & consultancy



Intelligent services

OEM BENEFITS



Design optimization



Customer experience



Revenue opportunities























Warranty

OSIsoft PI to fit challenging requirements

- World-wide operating clients
- None or limited connectivity offshore
- High frequency data
- Different vessel types
- All users must be able to make own dashboard; also clients IHC
- Reliability and data security must be evident



Roadmap

		Q1	Q2	Q3	Q4	2019	2020
<div>Standard</div> <div>Custom</div>	 <div>Beaver</div>						
	 <div>Beagle</div>						
	 <div>Mission equipment</div>						
	 <div>Custom built</div>						



IN STOCK

Gain experience
Through small scale pilots

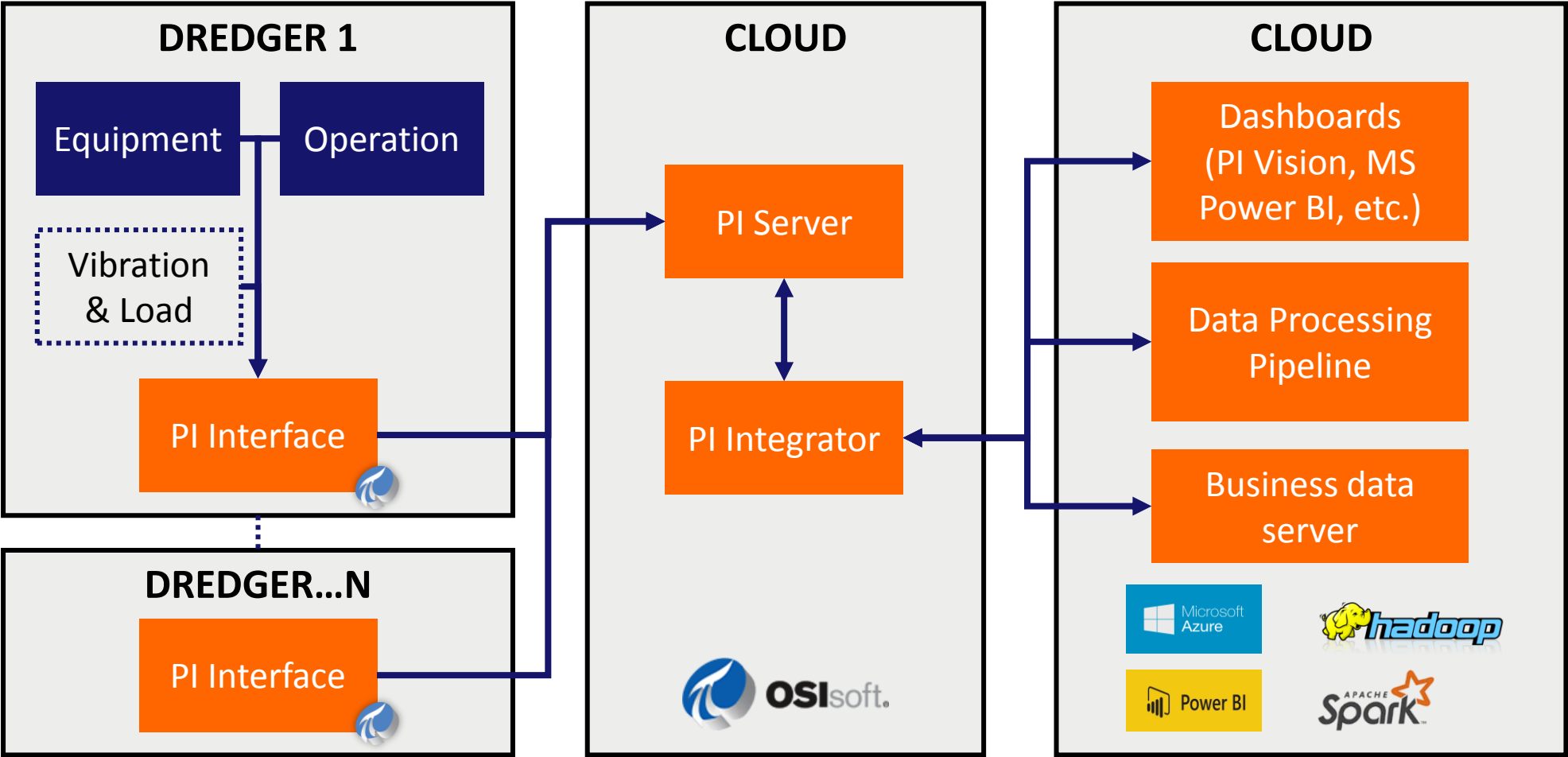
Start with a pilot to get things rolling



Three goals for 3-week pilot:

1. **Structuring** data of a IHC Beaver Cutter section dredger
2. **Visualizing** data to monitor fleet, fuel load and alarms
3. **Analyzing** data to solve custom analytics cases

Structuring data with scalable architecture



Customized dashboards running in no time



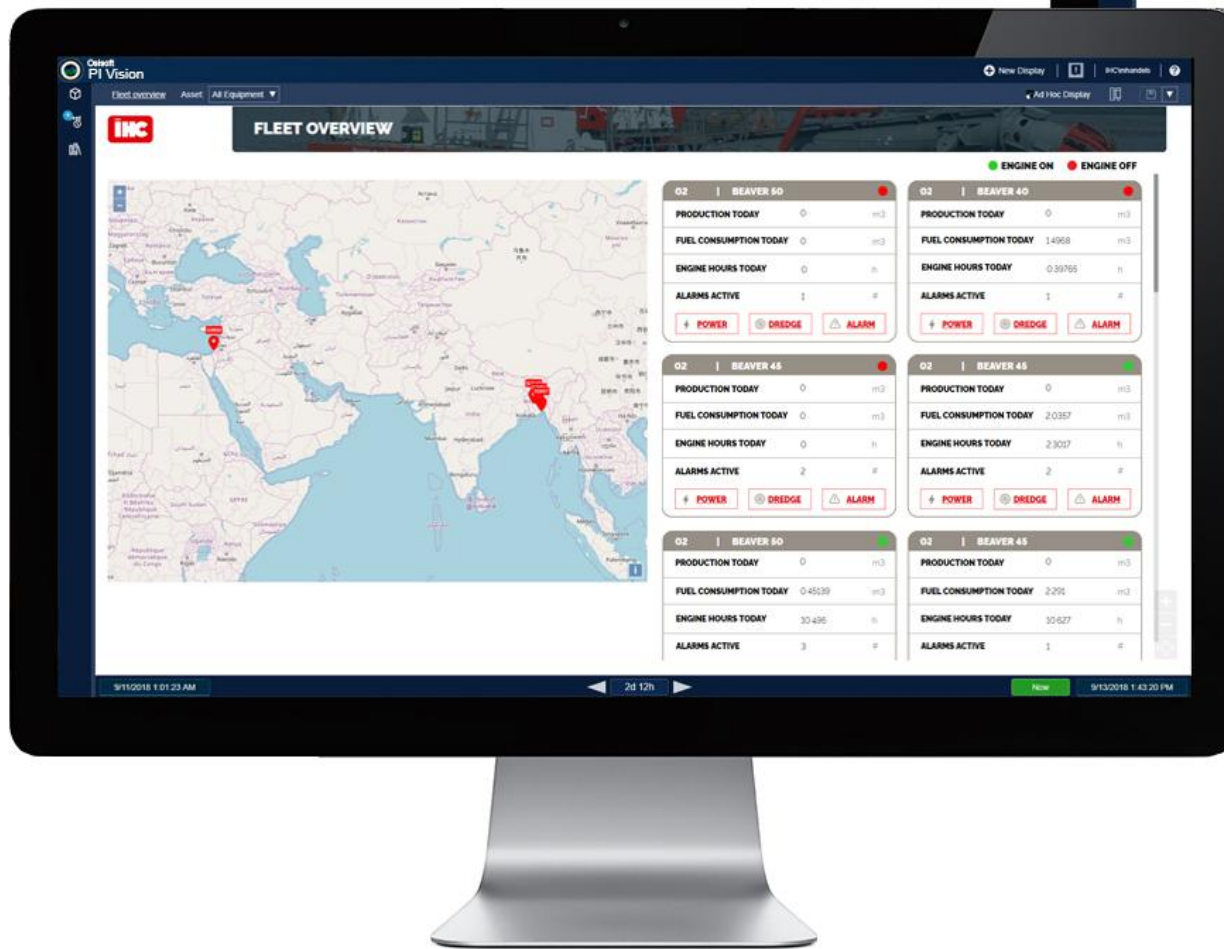


**Initial client facing
Through MVP**

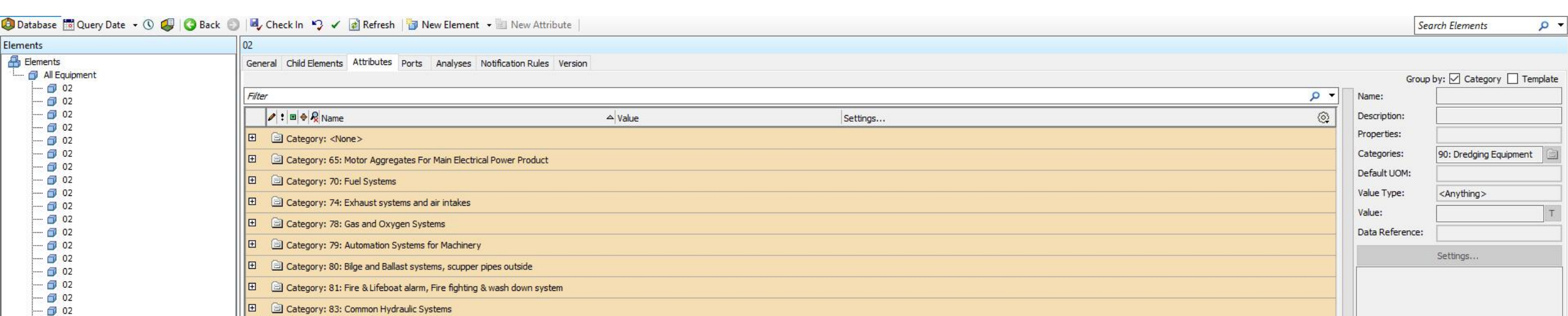
Launching MVP within 9 weeks

- 22 additional assets connected (Beavers)
- 250 tags + 200 analysis tags per asset
- 50 template based AF analysis calculations including binary alarm de-bit masking logic
- IHC branded PI Vision displays developed
- Multiple sprints to gather feedback on AF analysis and dashboard functionality





MVP Asset framework



- AF build on flat IFS/PBS structure using categories
- Main templates build vessel-specific
- Asset information captured in AF to change hierarchy using the AF transformation tool

MVP Asset framework – Categories

Database Query Date Back Check In Refresh New Element New Attribute Search Elements

Elements

02

General Child Elements Attributes Ports Analyses Notification Rules Version

Filter

Name	Value	Settings...
Category: <None>		
Category: 65: Motor Aggregates For Main Electrical Power Product		
Category: 70: Fuel Systems		
Category: 74: Exhaust systems and air intakes		
Category: 78: Gas and Oxygen Systems		
Category: 79: Automation Systems for Machinery		
Category: 80: Bilge and Ballast systems, scupper pipes outside		
Category: 81: Fire & Lifeboat alarm, Fire fighting & wash down system		
Category: 83: Common Hydraulic Systems		
Category: 85: Common Electric & Electronic Systems		
Category: 86: Electrical Power Supply		
Category: 87: Common Electric Distributio Systems		
Category: 90: Dredging Equipment		
Category: Alarm		
Category: Asset data		
Category: GPS		

Group by: ☒ Category ☐ Template

Name:

Description:

Properties:

Categories:

Default UOM:

Value Type:

Value:

Data Reference:

Settings...

MVP Asset framework – Calculations

[illegible]

MVP Asset framework – Transformer

Database Query Date Back Check In Refresh New Element New Attribute Search Elements

Elements

- Dredge Pumps
 - DP12569_96
 - DP12569_98
 - DP13457_98
- IHC Beaver
 - All Vessels
 - Vessel A1
 - Vessel A2
 - Vessel A3
 - Vessel A4
 - Vessel A5
 - Vessel A6
 - Vessel A7
 - Vessel A8
 - Vessel A9
- IHC Hoppers
 - All Vessels
 - Vessel B1
 - Vessel B2
 - Vessel B3
 - Vessel B4
- Element Searches

DP12569_98

General Child Elements Attributes Ports Analyses Notification Rules Version

Filter

Name	Value	Settings...
Category: Cutter		
Attribute1		
Attribute2		
Category: Dredge Pump		
Asset ID	12569_98	
Engine Power	1825	
Engine type	Caterpillar 3516C SCAC	
Pump type	IHC_HR_MD_121-26-60	
Year	2016	

Group by: ☒ Category ☐ Template

Name: Attribute1

Description:

Properties: Configuration Item

Categories: Cutter

Default UOM: <None>

Value Type: String

Value: Press F2 to show the Text V...

Data Reference: <None>

Settings...

MVP Asset framework – Assets

Database Query Date Back Check In Refresh New Element Search Elements

Group by: ☐ Category ☐ Template

Search

	Name	Description	Category	Type	Template
+	Dredge Equipment			None	
+	IHC Beaver			None	
+	IHC Hoppers			None	

Elements

- Elements
 - Dredge Equipment
 - Dredge pump 1
 - Dredge pump 2
 - Dredge pump 3
 - IHC Beaver
 - All Vessels
 - Vessel A1
 - Vessel A2
 - Vessel A3
 - Vessel A4
 - Vessel A5
 - Vessel A6
 - Vessel A7
 - Vessel A8
 - Vessel A9
 - IHC Hoppers
 - All Vessels
 - Vessel B1
 - Vessel B2
 - Vessel B3
 - Vessel B4
- Element Searches

Data security and client access management

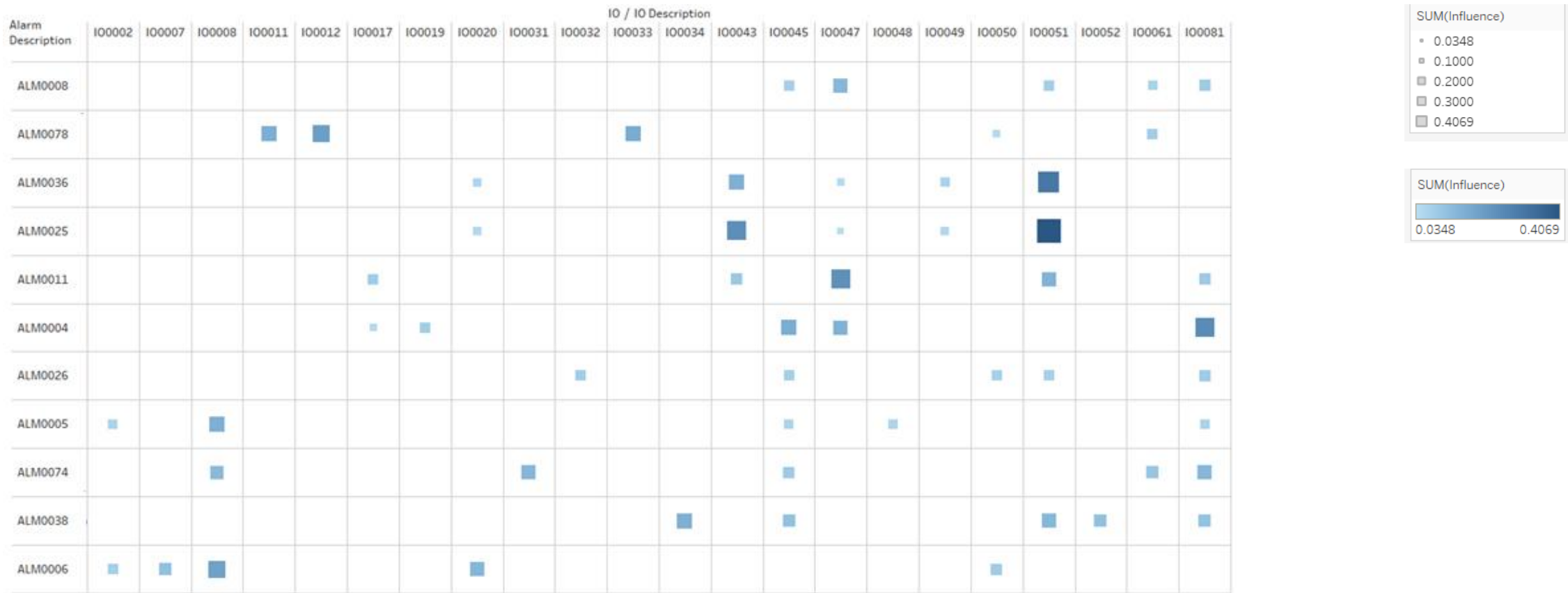
- Kerberos: AF and tag based access rights using RBAC model
- Claims based authentication for PI Vision in Azure B2B for non IHC external users
- Using OSIsoft PI security Audit Tools
- Expose PI Vision to internet through reverse proxy
- Pen testing PI Vision front end





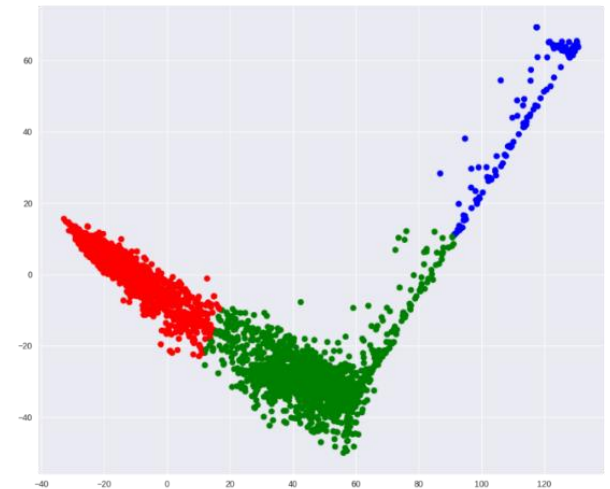
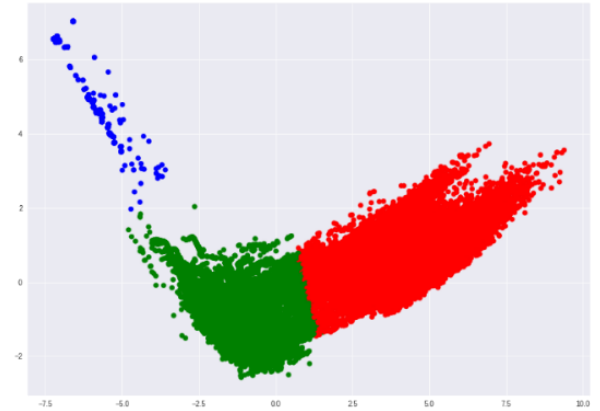
Exploring analytics
Leveraging data into
valuable insights

Relating I/O's and alarms using ML



Benchmarking your operational mode

- **Clustering is an iterative process:** we use different time sliding windows (time intervals) and number of clusters and compared the results
- We identified different beaver states over data time period
- We compared sensor outputs over time periods and identified which periods belong to what operation



Pilot & MVP outcomes

- ✓ Use OSIsoft to handle machinery data
- ✓ OSIsoft solution provides quick to market solutions for data visualization and KPI generation
- ✓ OSIsoft provides easy context and management of time-series data
- ✓ Utilize partners to accelerate learning and abilities (market affinity needed)
- ✓ Integrate with Microsoft to store data & expand machine learning possibilities.
- ✓ Hybrid solution possibility and integration with other platforms is a must from chosen partners



IHC's next steps
Towards digitalization of
products

Next steps

1. SERVICES

- Real time remote monitoring
- Remote support & consultancy
- Intelligent services



2. ASSETS

- Small cutter dredgers
- Mid/large size dredgers
- Pipelay towers
- Enabling data sharing through PI-to-PI connection for customer



3. ANALYTICS

- Business analytic integrator
- Kafka, Hortonworks Spark
- Use OCS, OMF and edge datastore for lightweight software solutions on board

Know what you want, but do not overthink

- Identify a clear development strategy
- Think **BIG** but start small
- Understand your market and their needs
- Be innovative and ignore the norms
- Research thoroughly and develop clear vendor selection criteria
- Explore more than one vendor
- Carry out pilots (fail and/or succeed fast)





**THE TECHNOLOGY
INNOVATOR.**

IHC/Rolloos

Fleet wide monitoring solution



CHALLENGE

Connecting remote asset and organize data in a structured and time synchronized manner and enabling creation of providing ad-hoc visualization for remote support and vessel monitoring

- Remote asset with limited data connection
- IO Data quality issues
- No central database without proper tools to access the data
- Data Access for all IHC users

SOLUTION

Real time remote monitoring solution for vessels performance and remote support and troubleshooting for IHC internal and client usage

- 22 vessels connected and streaming real time data to grow to 50 by end of the year
- Fully automated tag configuration, data QC and AF template configuration for onboarding new vessels using , PI AF, PI Vision, Interface for RDBMS, AF transformation tool, Integrator for BI
- Ad-hoc and summary display in PI Vision

RESULTS

Client and IHC access for remote trouble shooting and vessel performance monitoring

- Deployment from pilot to MVP for fast time to value by partnering
- Enabling access to data for support and troubleshooting
- Lightweight solution for gathering customer feedback and rapid iteration cycles

Fleet-Wide Remote Dredging Vessel Monitoring



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Questions?

Please wait for
the **microphone**

State your
name & company



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