

EMPOWER YOUR ANALYTICS WITH OPERATIONAL DATA

# Real-time Operational Protection and Cost-control for Mine Critical Assets

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A hand holding a smartphone is shown in the lower-left foreground. The background is filled with warm, out-of-focus bokeh lights in shades of orange, yellow, and pink, suggesting an indoor setting with decorative lighting. The overall tone is soft and inviting.

# PLEASE SILENCE YOUR PHONE

# About – GET Trakka



- ③ Formed 2014
- ③ Perth, Australia
- ③ Mining technology focus – rugged IOT platform
- ③ Locally designed and manufactured hardware
- ③ Connected Services Customer of OSIsoft
- ③ 2017 - commercial GET Breakage Detection solution





# GET - Ground Engaging Tools



- ⊙ Large hardened steel components
- ⊙ Attached to cutting edge of mining buckets
- ⊙ Designed to:
  - Penetrate the ground
  - Protect the bucket
  - Wear - sacrificial steel



## 📶 Rugged wireless sensor

- Temperature
- Pressure
- Shock
- Vibration

## 📶 Embedded into recess

## 📶 Consumed with GET



# Machine Hardware





- ② Globally 15,000 mine diggers consume over 2,000,000 GET components/year
- ② GET breakage is a significant issue
  - Safety hazards
  - Equipment damage
  - Production losses
- ② A single breakage event can cost millions \$\$\$



# Our Solution



- ④ Technology leading & only field-proven GET sensor system for mining shovels
- ④ Built-for-purpose industrial IoT platform
- ④ Scalable
- ④ OSIsoft PI System Architecture





- ④ Reliably identifies component breakage
- ④ Alerts operator and mine personnel
- ④ Minimise interruption from GET breakage
  - 20+ Breakages detected on one site in Africa
- ④ Reduce downstream equipment damage
- ④ Enable rapid return to production
- ④ GET metrics reporting

# The Bigger Picture



- ② Transformative change for a traditional industry
- ② Digital offering for GET
- ② Data driven decisions
- ② Reporting and visualisation from sensor data
- ② Data analytics for unique operational insights



# IoT System Platform



Data Server



PI Tags  
~1000 points /Asset

Network



Wireless Router



LTE Mobile

IoT Sensors



Data Rate  
0.25Hz – 25Hz





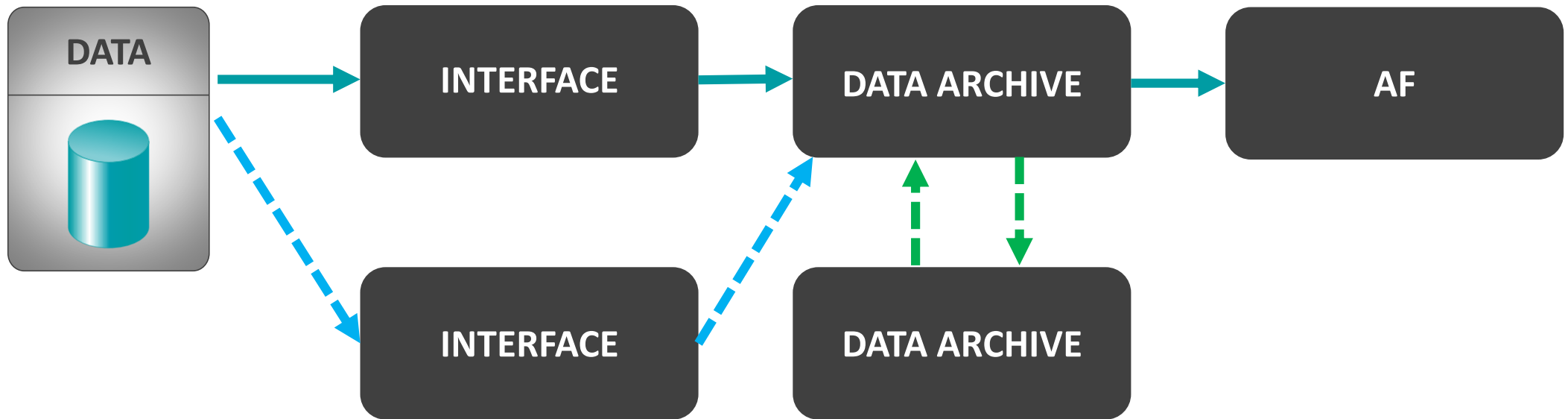


- ② Simplicity and reliability are key when working with mobile equipment
- ② Data from wireless IoT sensors, collected, stored and buffered on the asset
- ② Data transferred as low-overhead flat files across the mine network / cloud
- ② Data collected on the GET Trakka PI Server and consumed by the PI System UFL Interface
- ② Light-weight solution designed for minimal network loading and bandwidth

# PI System - Production Collective



- ④ GET Trakka Production Collective is a cloud environment designed for high reliability, functionality and modularity
- ④ The Collective can be expanded as needed for redundancy, load balancing and data segregation



# PI Server Asset Framework



- UFL interface automatically creates PI Tags required for new assets
- AF Database used to aggregate and categorise PI data into a human readable format

The screenshot displays the PI Server Asset Framework interface. On the left, a hierarchical tree structure shows the organization of assets. The tree starts with 'Elements' at the top, followed by 'Australia', 'Canada', and 'Namibia'. Under 'Namibia', there is 'Company 1', which contains 'Uranium'. Under 'Uranium', there is 'Site 1', which contains 'Asset 1', 'Asset 2', and 'Asset 3'. Under 'Asset 3', there is 'Bucket', which contains 'Lip Shrouds', 'NAS', 'Reference', 'Side Bar', and 'Teeth'. Under 'Teeth', there are 'Tooth.1', 'Tooth.2' (highlighted), 'Tooth.3', 'Tooth.4', 'Tooth.5', and 'Tooth.6'. Below 'Tooth.6', there are 'Asset 4', 'Asset 3', 'Asset 3', and 'Asset 3'.

On the right, the 'Tooth.2' data table is displayed. The table has columns for 'Name', 'Value', 'Time Stamp', and 'Description'. The data is organized into categories: ADC Readings, Alarming, Information, Movement Monitoring, PI Vision, and RF.

Name	Value	Time Stamp	Description
Category: ADC Readings			
Temp	44 °C	2/09/2019 10:56:28 AM	Sensor Temperature
Vbatt	2740 mV	2/09/2019 10:56:28 AM	Battery Voltage
Category: Alarming			
ActStatus	0	2/09/2019 10:56:28 AM	Activity status
LockedOut	False	1/01/1970 12:00:00 AM	FALSE = Unlocked, TRUE = Locked out (Manual or Soft-Lock)
MovStatus	0	2/09/2019 10:56:28 AM	Movement status
Category: Information			
Digger ID	SHOVEL13	1/01/1970 12:00:00 AM	Unique Digger ID
LastChangeout	7/08/2019 4:25:55 PM	7/08/2019 4:25:55 PM	Date that the GET was last changed out
TagID	81647	2/09/2019 10:56:28 AM	RF Sensor ID
Category: Movement Monitoring			
Activity	1	2/09/2019 10:56:28 AM	Activity bit
BucketTip	20281	2/09/2019 10:56:28 AM	Load Counter
Impact	0	2/09/2019 10:56:28 AM	Impact bit
Z	-33	2/09/2019 10:56:28 AM	Indicates movement in the z plane
Category: PI Vision			
AlarmStatus	1	1/01/1970 12:00:00 AM	0 = No Alarm, 1 = Not present for an hour, 2 = In-Cab Alarm
Connection	0	1/01/1970 12:00:00 AM	0 = Sensor not present, 1 = Sensor present
Category: RF			
RSSI1	No Data	2/09/2019 10:56:28 AM	Received Signal Strength Indicator - Antenna 1
RSSI2	-66 dB	2/09/2019 10:56:28 AM	Received Signal Strength Indicator - Antenna 2

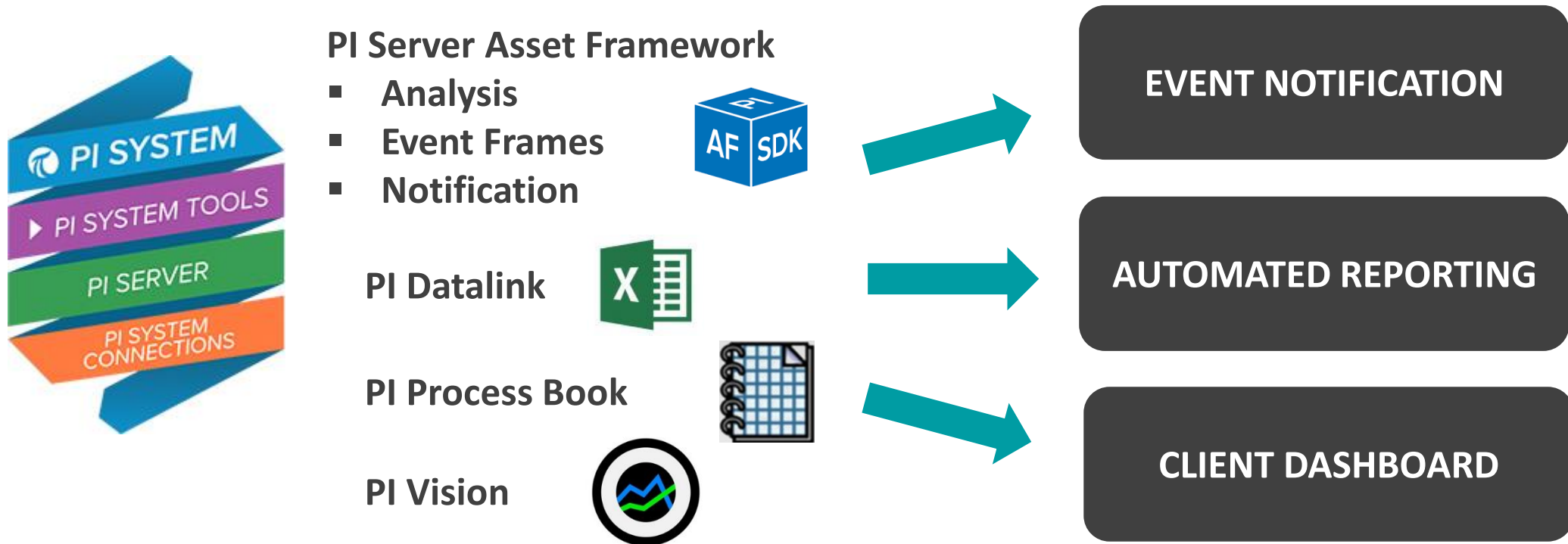
- Users can swiftly navigate an intuitive hierarchy



# PI Server Asset Analytics – Actionable Information



- ② GET Trakka use a range of PI Server Client Tools to analyse site data, automate calculations & provide actionable information to our customers
- ② Custom solutions developed using PI Server Asset Framework SDK to integrate with the PI Server





- Ⓢ Automated Notifications are dispatched on the generation of key Event Frames
- Ⓢ Alert operators and responsible personnel on critical events such as GET Breakage alarms
- Ⓢ Dispatched in the form of priority email or text message

# Productivity Plus Reporting



PRODUCTIVITY PLUS WEEKLY GET SUMMARY REPORT										
Start Date: 15-Jul-2019 08:00			End Date: 22-Jul-2019 08:00			Total Report Hours: 168				
Shovel ID	GET Type	Change Outs This Period	GET OEM	Alarms	Breakages	Avg Internal Temp	Peak Internal Temp	Scoops Since Changeout	Scoops Since Bucket Change	Scoops this Period
1	Teeth	6	x	0	0	48°C	133°C	2,734		
	Lip Shrouds	0	x	0	0	34°C	44°C	54,769	121,086	4,063
	Side Bars	0	x	0	0	27°C	35°C	54,769		
2	Teeth	0	x	0	0	53°C	94°C	21,584		
	Lip Shrouds	0	x	0	0	36°C	54°C	21,584	21,584	4,190
	Side Bars	0	x	0	0	29°C	44°C	21,584		
3	Teeth	4	x	1	0	62°C	104°C	98		
	Lip Shrouds	0	x	0	0	35°C	64°C	35,126	65,963	4,536
	Side Bars	0	x	0	0	26°C	36°C	67,245		
4	Teeth	5	x	1	1	45°C	109°C	1,419		
	Lip Shrouds	0	x	0	0	30°C	47°C	14,803	120,084	1,972
	Side Bars	0	x	0	0	27°C	44°C	91,615		
5	Teeth		x						14,264	1,781
	Lip Shrouds		x							
6	Teeth		x							
	Lip Shrouds		x							
Shovel ID	Comment									
1										
2										
3	Sensor alarm due to excessive wear / holing, triggering an alarm									
4	GET Breakage detected on Tooth 5, see Breakage Report for more details									
5	System Not Installed									
6	System Not Installed									

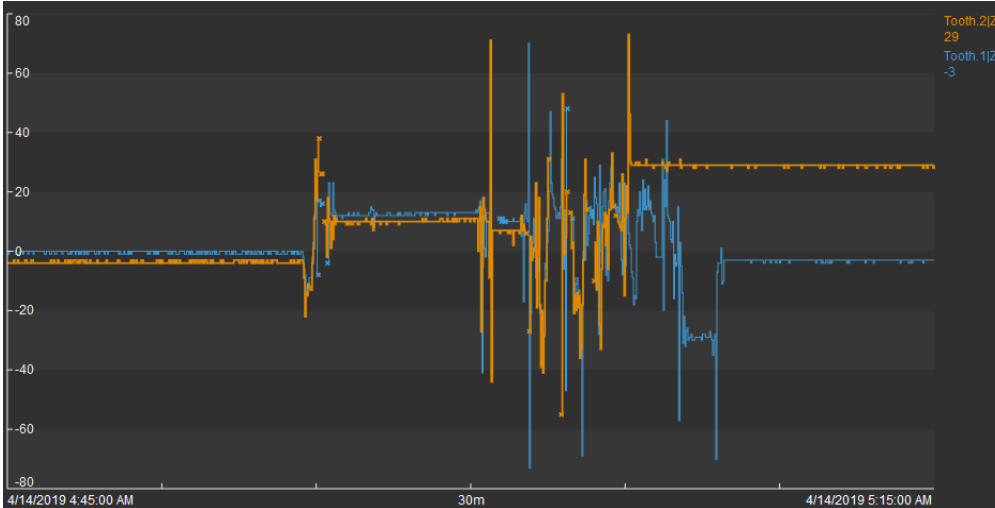
⊙ Scheduled reports to provide clients actionable information to assist with:

- Maintenance scheduling
- Supply chain
- Vender benchmarking
- Productivity

⊙ Reports are created by utilising PI DataLink, PI Server Asset Framework real-time analysis and custom add-ons



# Productivity Plus Reporting



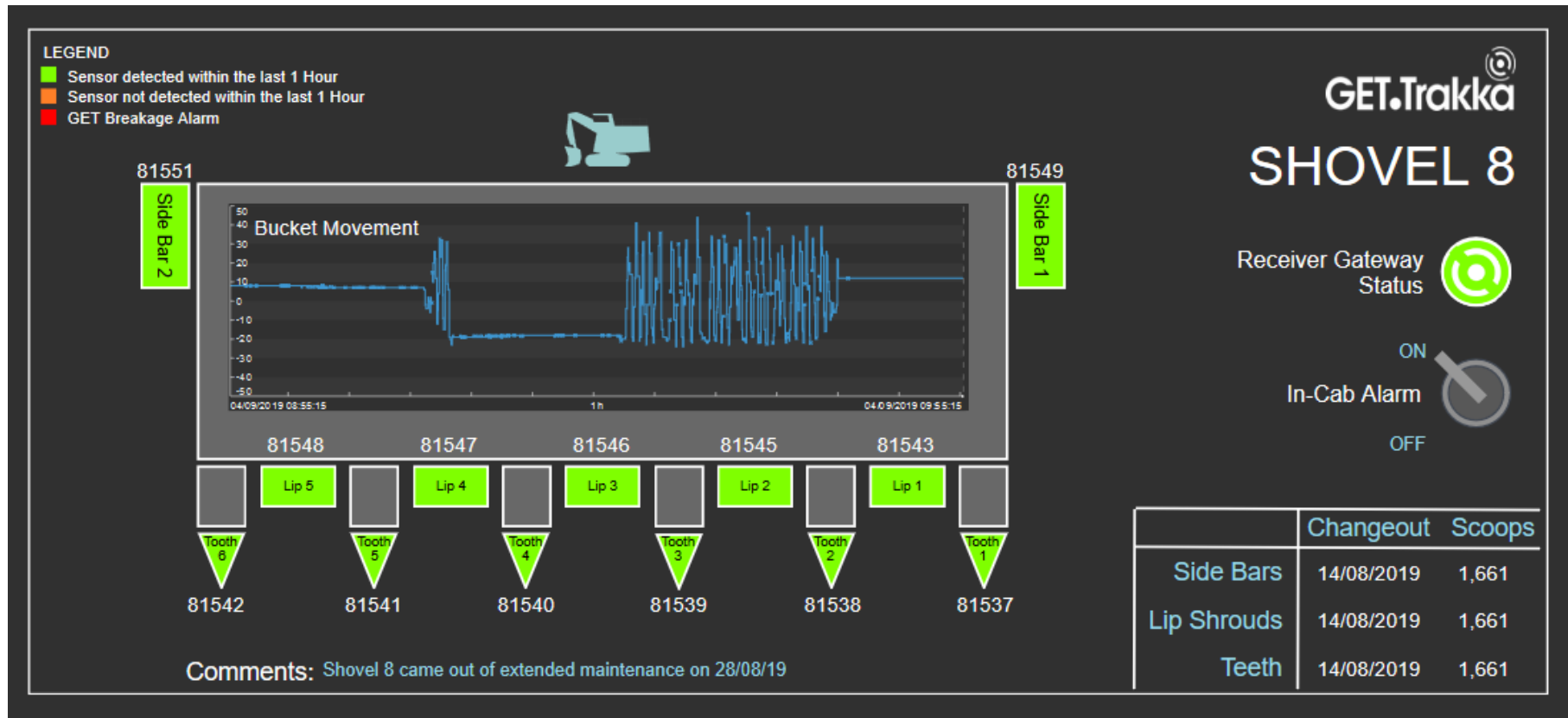
Value	Event Time
Warning, Teeth, Movement, 2	14/04/2019 5:07:54 AM
Alarm, Teeth, Movement, 2	14/04/2019 5:08:26 AM
Alarm sent to Module	14/04/2019 5:08:26 AM
Alarm Acknowledged, Teeth, 2	14/04/2019 5:08:47 AM

- Standard reports offered:
  - Weekly GET Summary
  - Breakage Event Report
  - Monthly Operation Summary
- Reports can be tailored to customer requirements

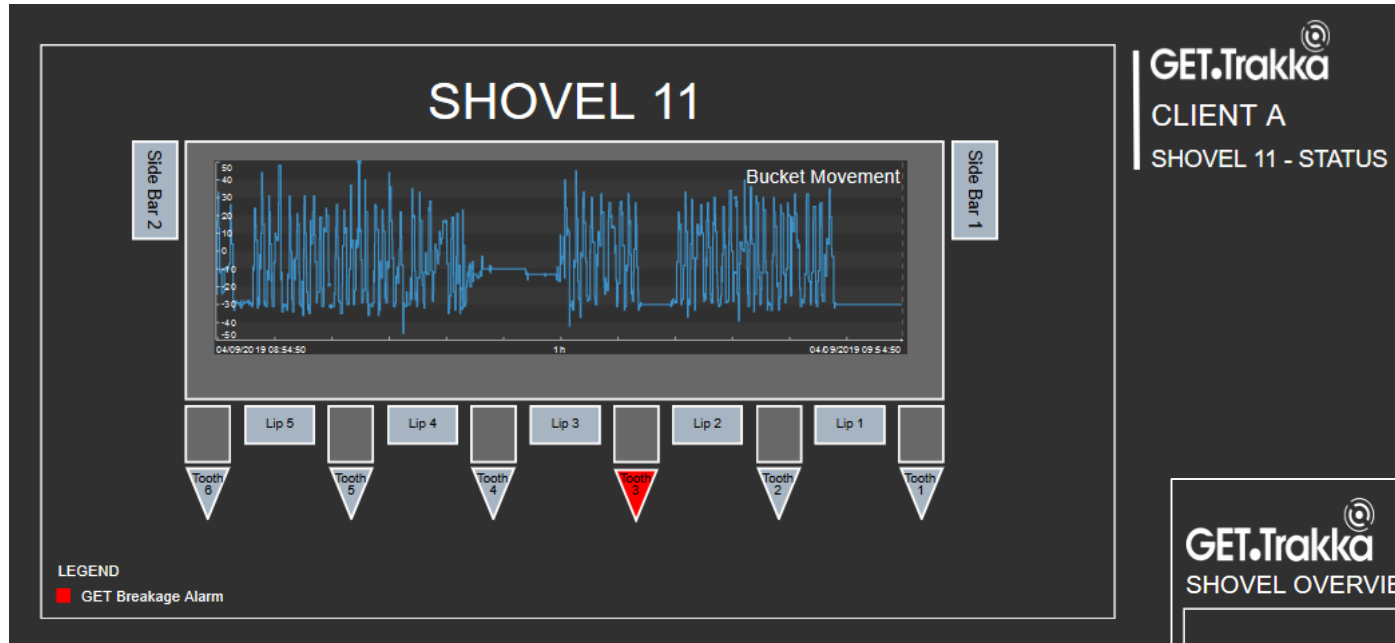
# PI Vision – Client Dashboards



- GET Trakka clients use PI Vision Dashboards to monitor assets in near real-time
- Dashboards and data content are tailored to specific site installations and user groups, ranging from macro to micro depending on requirements



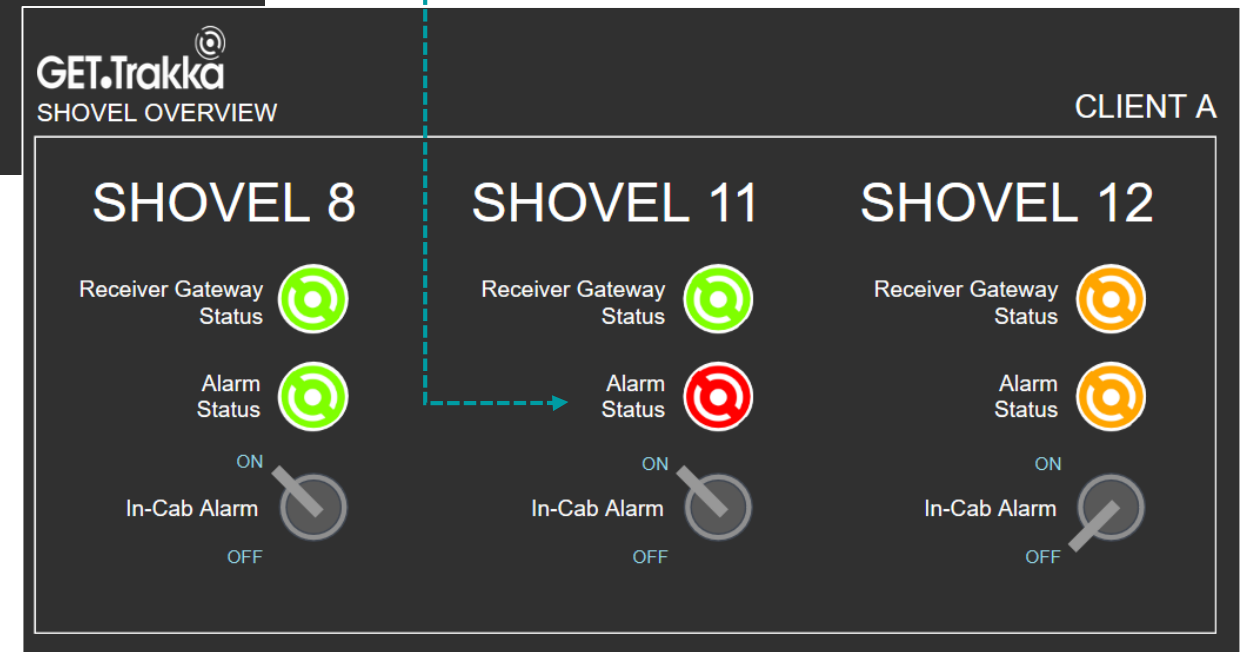
# PI Vision – Client Dashboards



Audible alarm



Custom symbols have been developed and incorporated into dashboards to provide functionality such as in-browser audible alarms



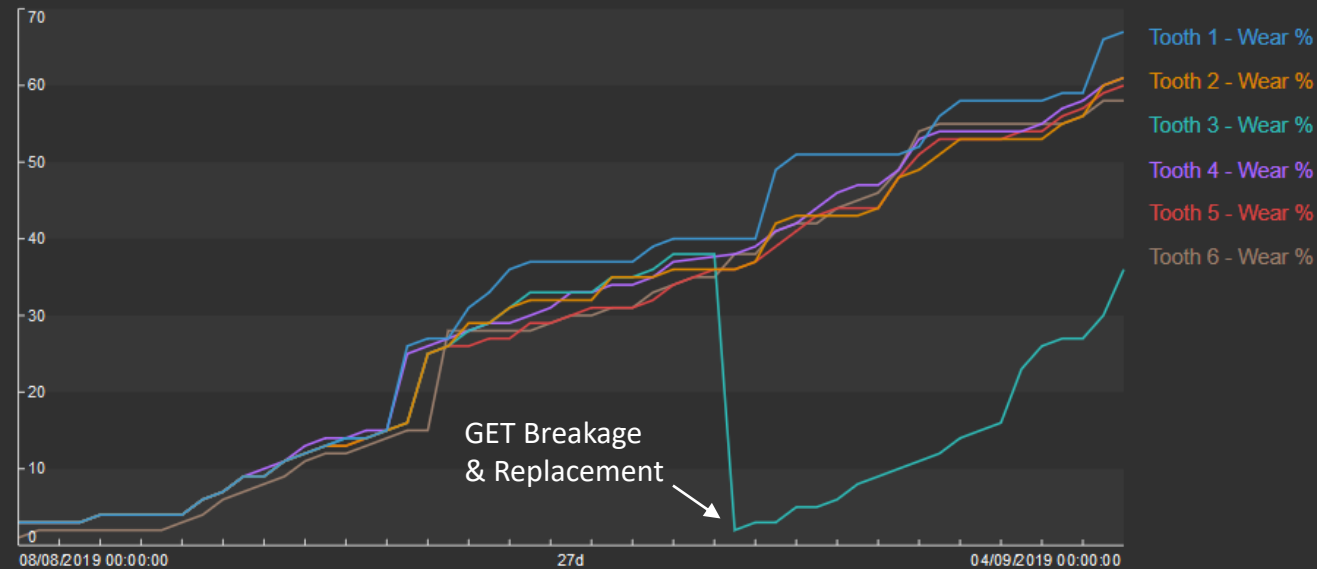
# Operational Data from Analytics



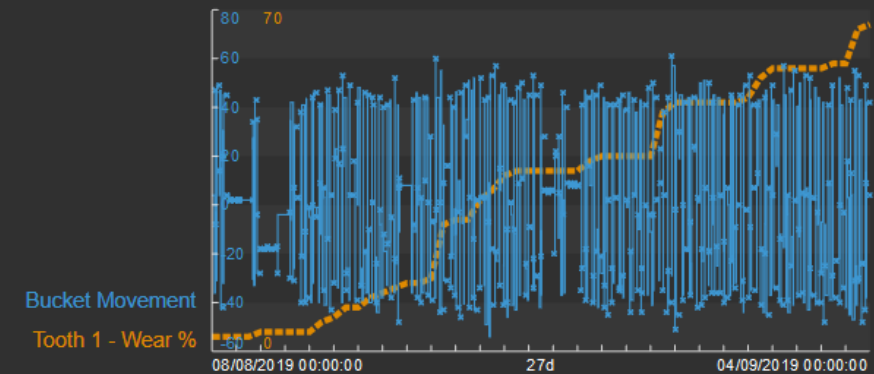
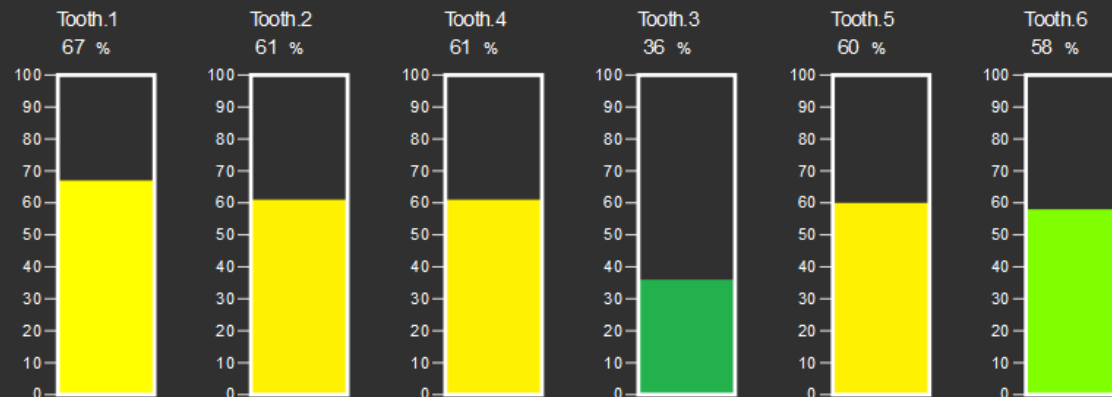
GET.Trakka

SHOVEL 8

Tooth Wear Rates



	Changeout	Scoops
Tooth 1	06/08/2019	19,149
Tooth 2	06/08/2019	19,149
Tooth 3	24/08/2019	8,902
Tooth 4	06/08/2019	19,149
Tooth 5	06/08/2019	19,149
Tooth 6	06/08/2019	19,149

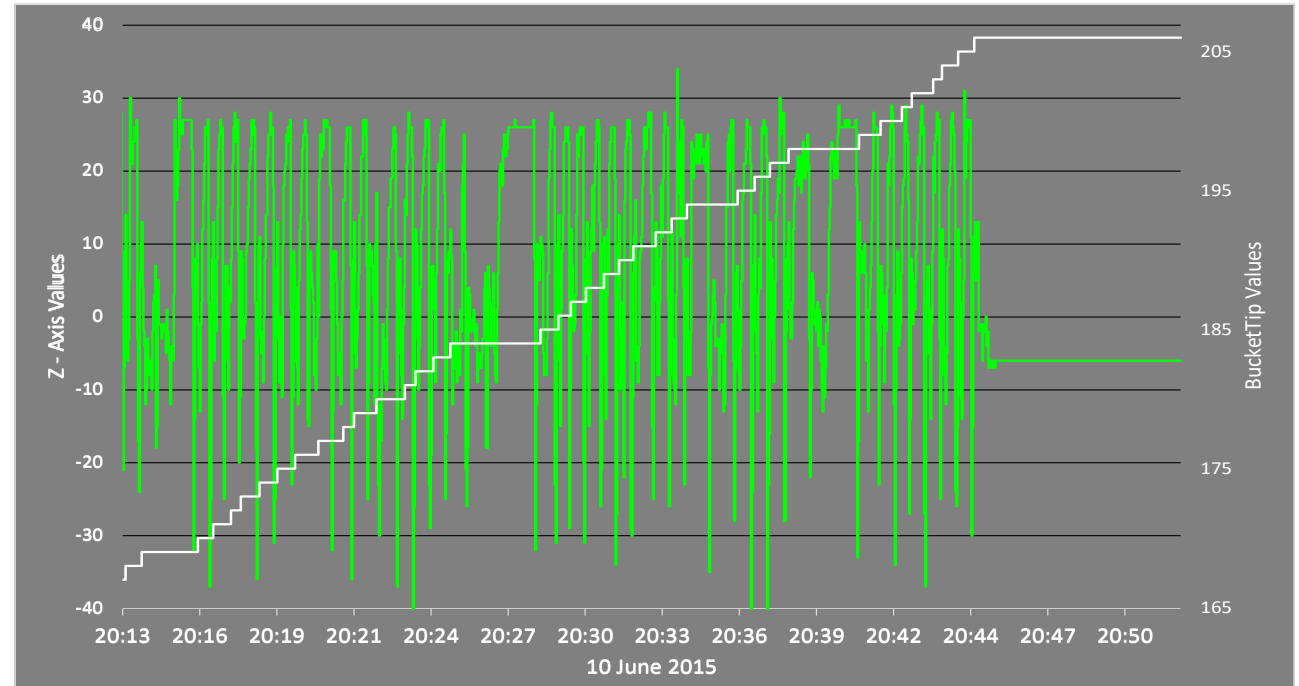




# Distributed Data Processing



- ③ PI System has provided the platform to collect, understand and analyse the data
- ③ Once tested, algorithms can be pushed down to the Gateway or Sensor level
- ③ Onboard calculations allow for data load balancing across the IoT solution



# Next Steps – PI System on the Edge



- ④ Demands for lower latency, near real-time data and higher-level processing on the asset has led to the application of PI System on the Edge
- ④ PI Server installed on an embedded PC, ~1000 PI Tags /asset
- ④ GET Trakka IoT sensor technology combined with PI System on the Edge processing enables the generation of unique process variables and event notifications on the asset
- ④ Data Analytics on the asset together with PI in the cloud creates a powerful and balanced combination for distributed data processing





GET TRAKKA PTY LTD

The PI System real-time infrastructure has enabled GET Trakka to deliver a world leading IoT solution to monitor and detect Ground Engaging Tool breakage, provide valuable productivity data, and asset metrics.

Ian Hamilton – General Manager & Daniel Minjoot - Engineering Manager



## CHALLENGES

**GET Breakage**

**IoT wireless sensing in harsh environments**

**Digital disruption**

## SOLUTION

**Rugged wireless sensors sending data to the cloud**

**Distributed data processing**

**A PI System for real-time data analytics, visualization and reporting**

## RESULTS

**Technology leading & only field-proven GET sensor system for mining shovels**

**Rich offering of actionable information**

**Unique insights into GET**

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DANKON

TANK

TAPADH LEAT

KEA LEBONA

MISAOTRA ANAO

KÖSZÖNÖM

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PAXMAT CAĞA

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WAZVIITA

FALEMINDERIT

ありがとうございました

SIPAS JI WERE

TERIMA KASIH

UA TSAUG RAU KOJ

ТИ БЛАГОДАРАМ

СИПОС