EMPOWER YOUR ANALYTICS WITH OPERATIONAL DATA

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

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About – GET Trakka

- Formed 2014
- Perth, Australia
- Mining technology focus – rugged IOT platform
- Locally designed and manufactured hardware
- Connected Services Customer of OSIsoft
- 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

IoT Sensors for GET

- Rugged wireless sensor
  - Temperature
  - Pressure
  - Shock
  - Vibration
- Embedded into recess
- Consumed with GET

Machine Hardware

Market Drivers

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

Our Solution

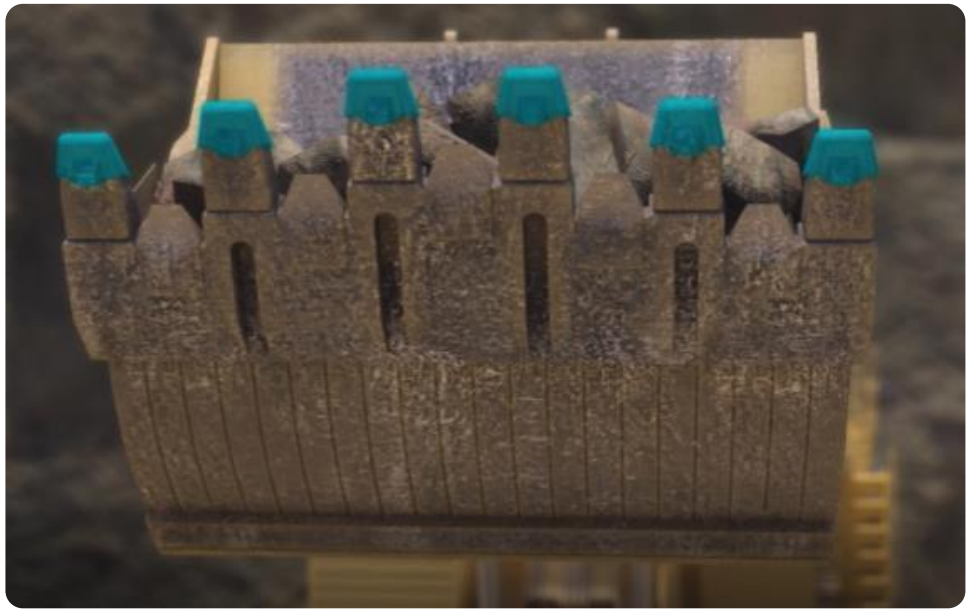
- Technology leading & only field-proven GET sensor system for mining shovels
- Built-for-purpose industrial IoT platform
- Scalable
- OSIsoft PI System Architecture

Delivering Value

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

The Bigger Picture

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



IoT System Platform

Data Server

Cloud Data

PI Server

PI Tags
~1000 points /Asset

Network

Wireless Router

LTE Mobile

IoT Sensors

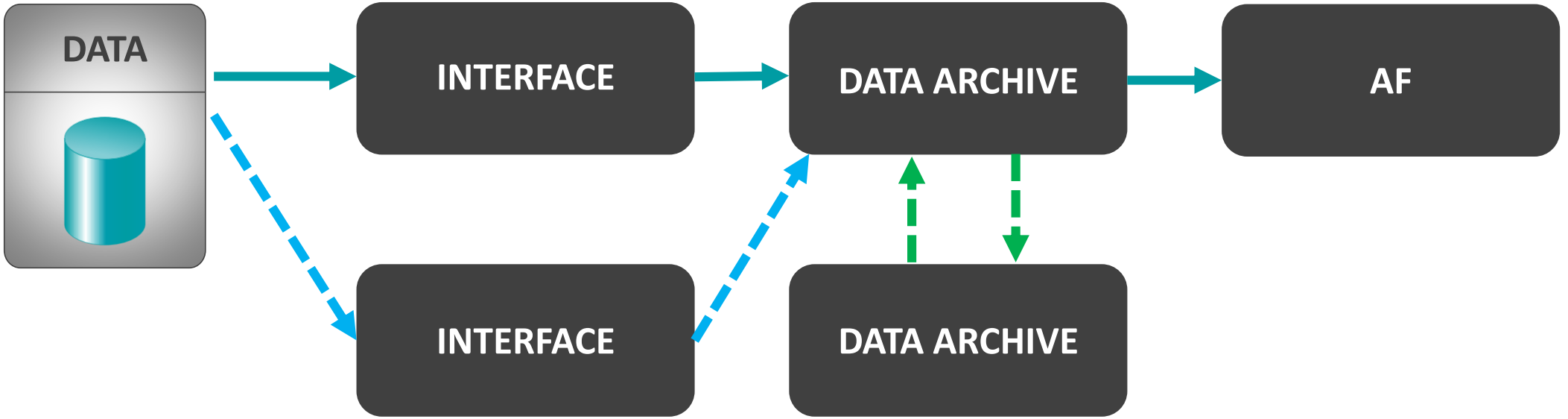
Data Rate
0.25Hz – 25Hz

Data Flow & Handling

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

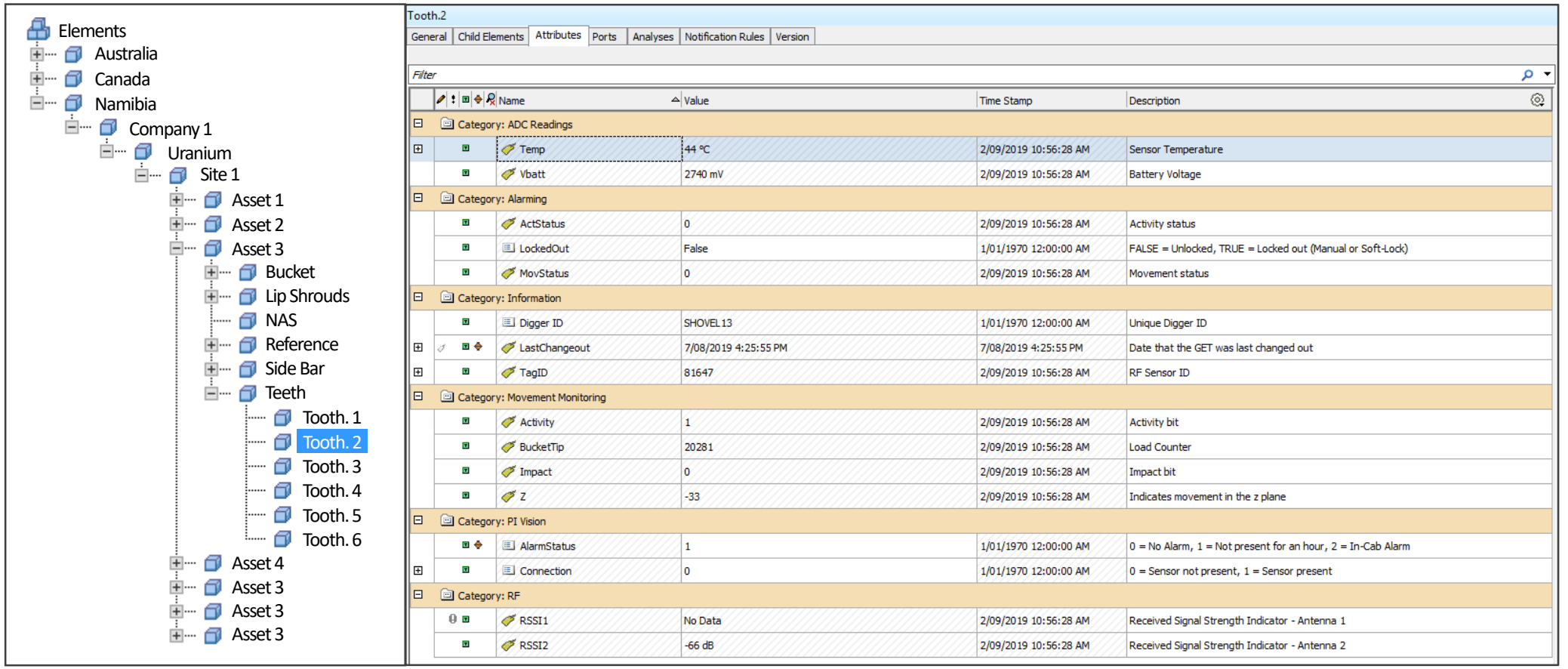
PI System - Production Collective

- GET Trakka Production Collective is a cloud environment designed for high reliability, functionality and modularity
- 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



- Users can swiftly navigate an intuitive hierarchy

PI Server Asset Analytics – Actionable Information

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

PI Server Asset Framework

- **Analysis**
- **Event Frames**
- **Notification**

PI Datalink

PI Process Book

PI Vision

EVENT NOTIFICATION

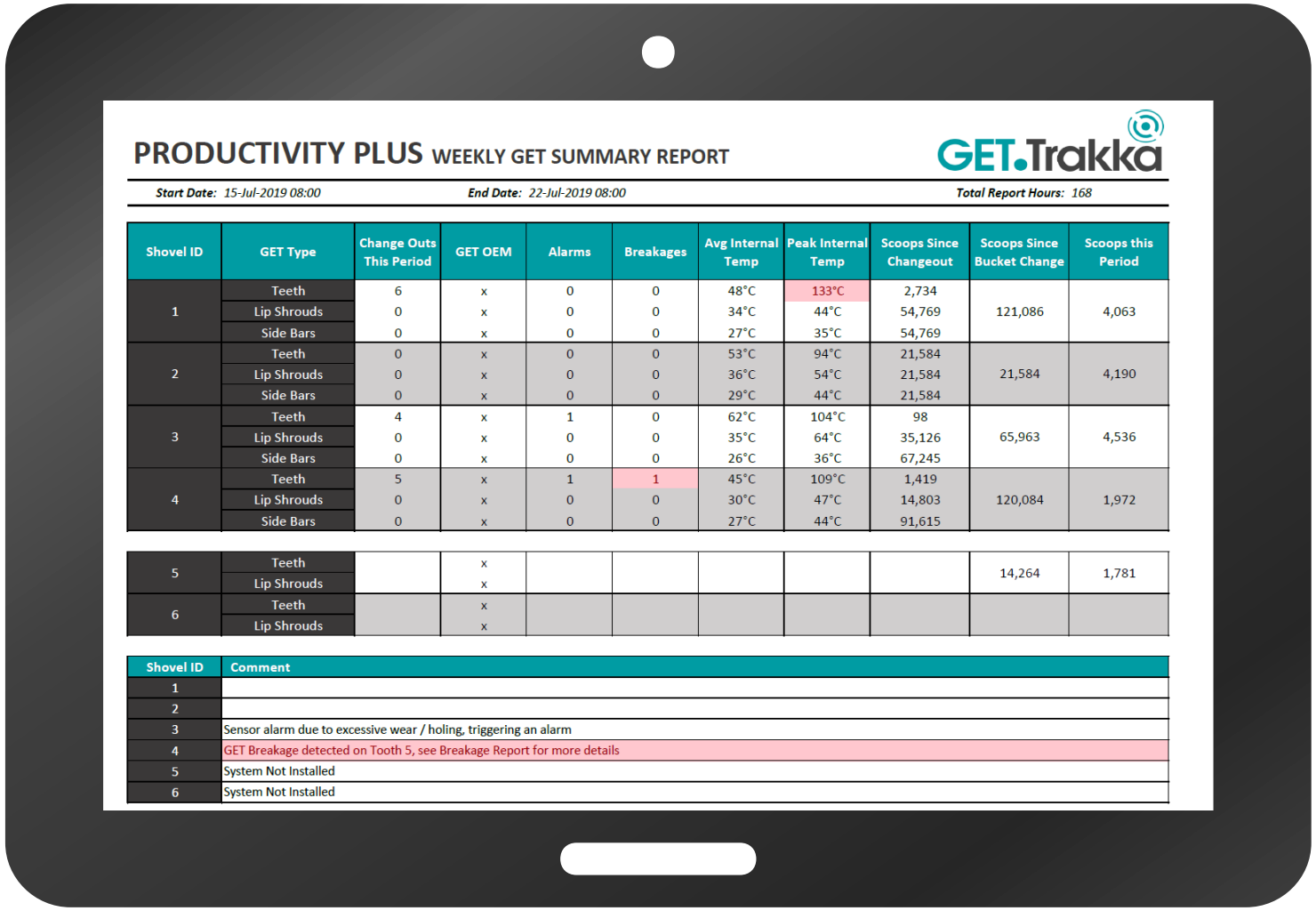
AUTOMATED REPORTING

CLIENT DASHBOARD

Event Notifications

- 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

GET.Trakka

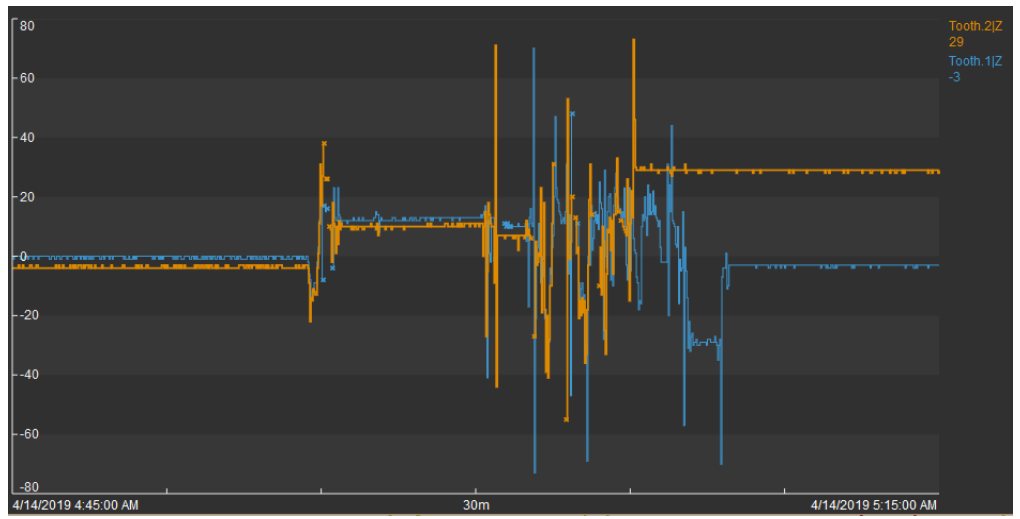
Start Date: 15-Jul-2019 08:00 *End Date:* 22-Jul-2019 08:00 *Total Report Hours:* 168

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

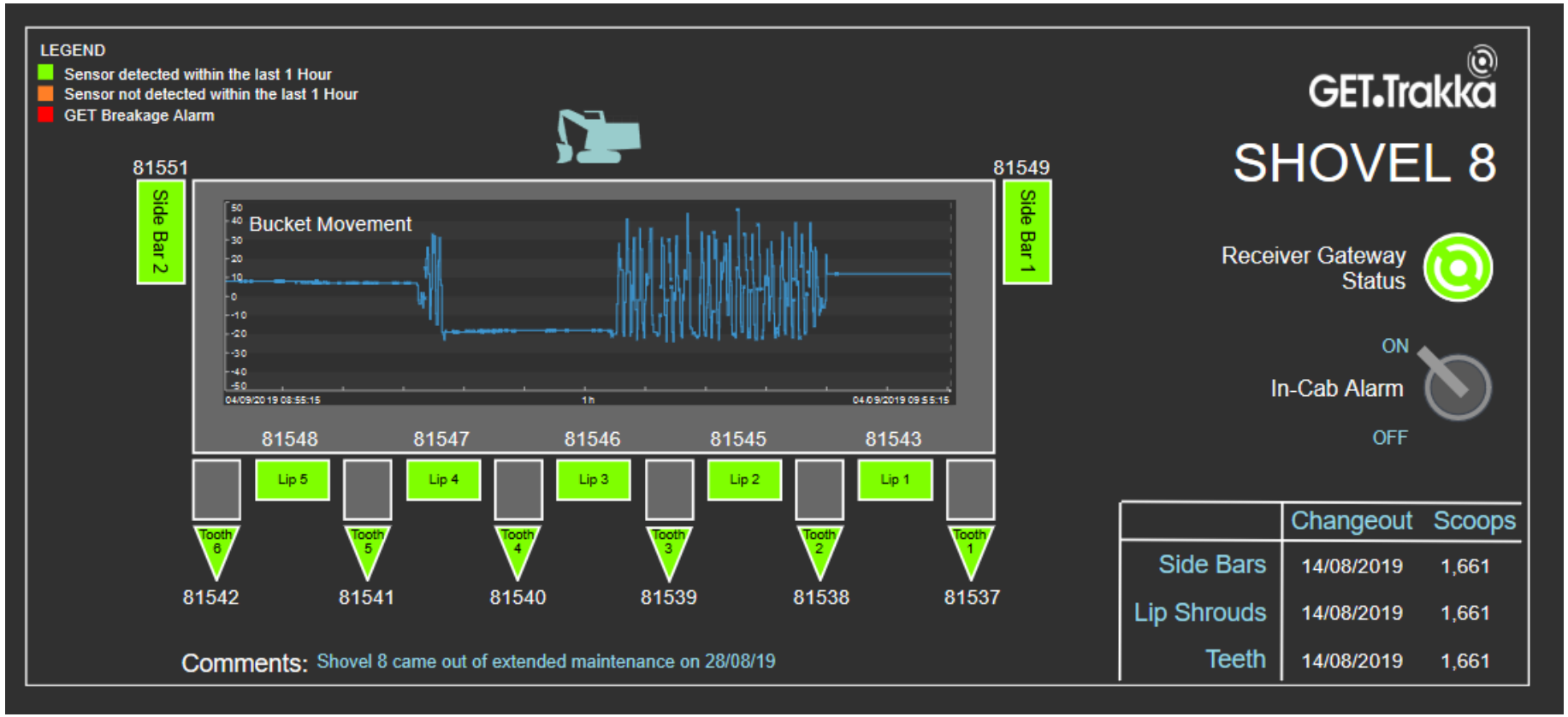


Value	Event Time
Warning, Teeth, Movement, 2	14/04/2019 5:07:54 AM
Alarm, Teeth, Movement, 2	14/04/2019 5:08:26 AM
Alarm sent to Module	14/04/2019 5:08:26 AM
Alarm Acknowledged, Teeth, 2	14/04/2019 5:08:47 AM

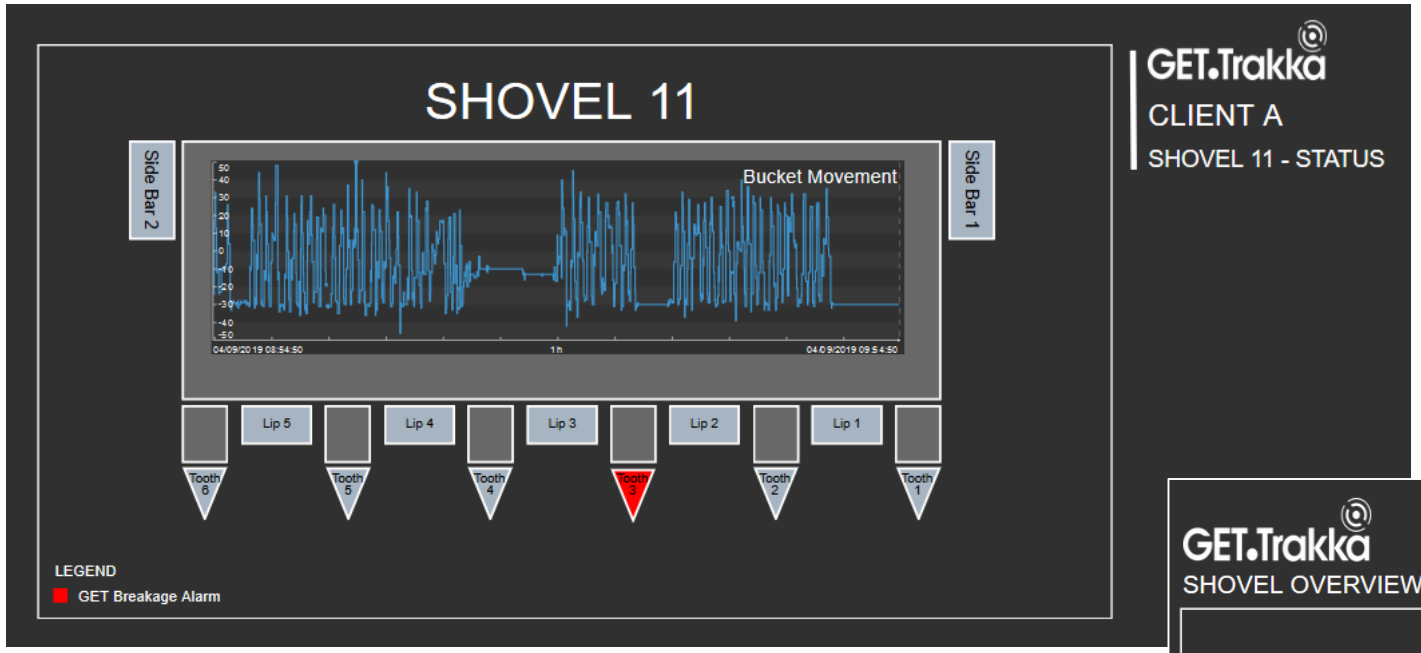
- Standard reports offered:
  - Weekly GET Summary
  - Breakage Event Report
  - Monthly Operation Summary
- Reports can be tailored to customer requirements

PI Vision – Client Dashboards

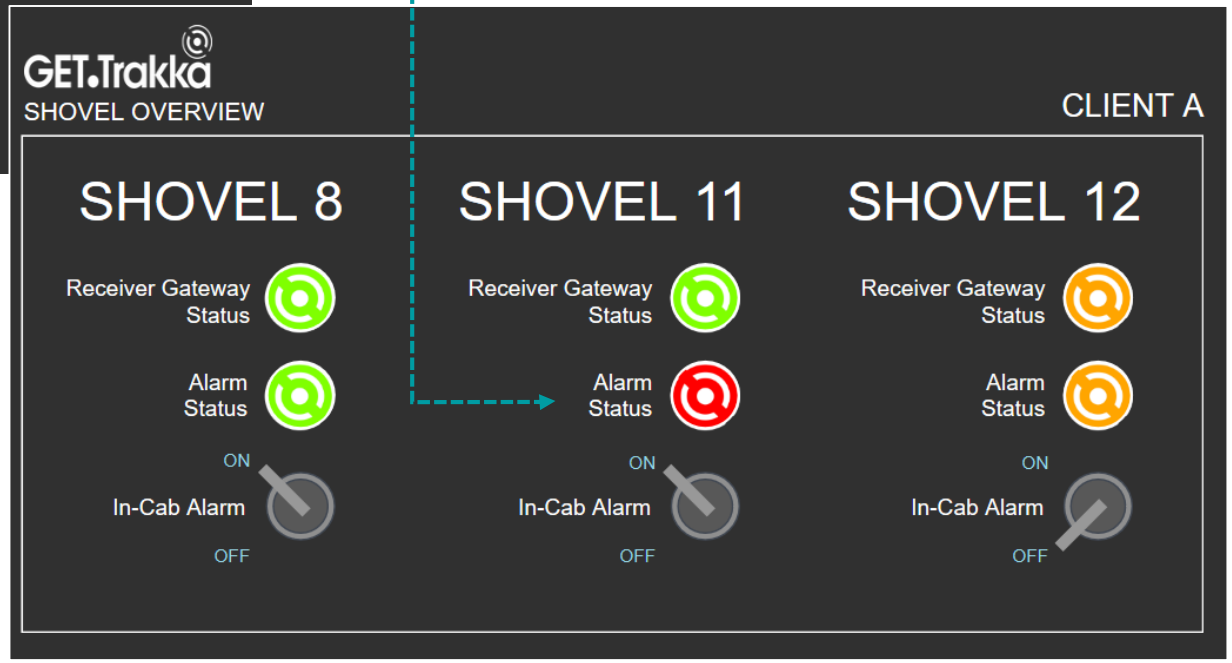
- GET Trakka clients use PI Vision Dashboards to monitor assets in near real-time
- Dashboards and data content are tailored to specific site installations and user groups, ranging from macro to micro depending on requirements



PI Vision – Client Dashboards

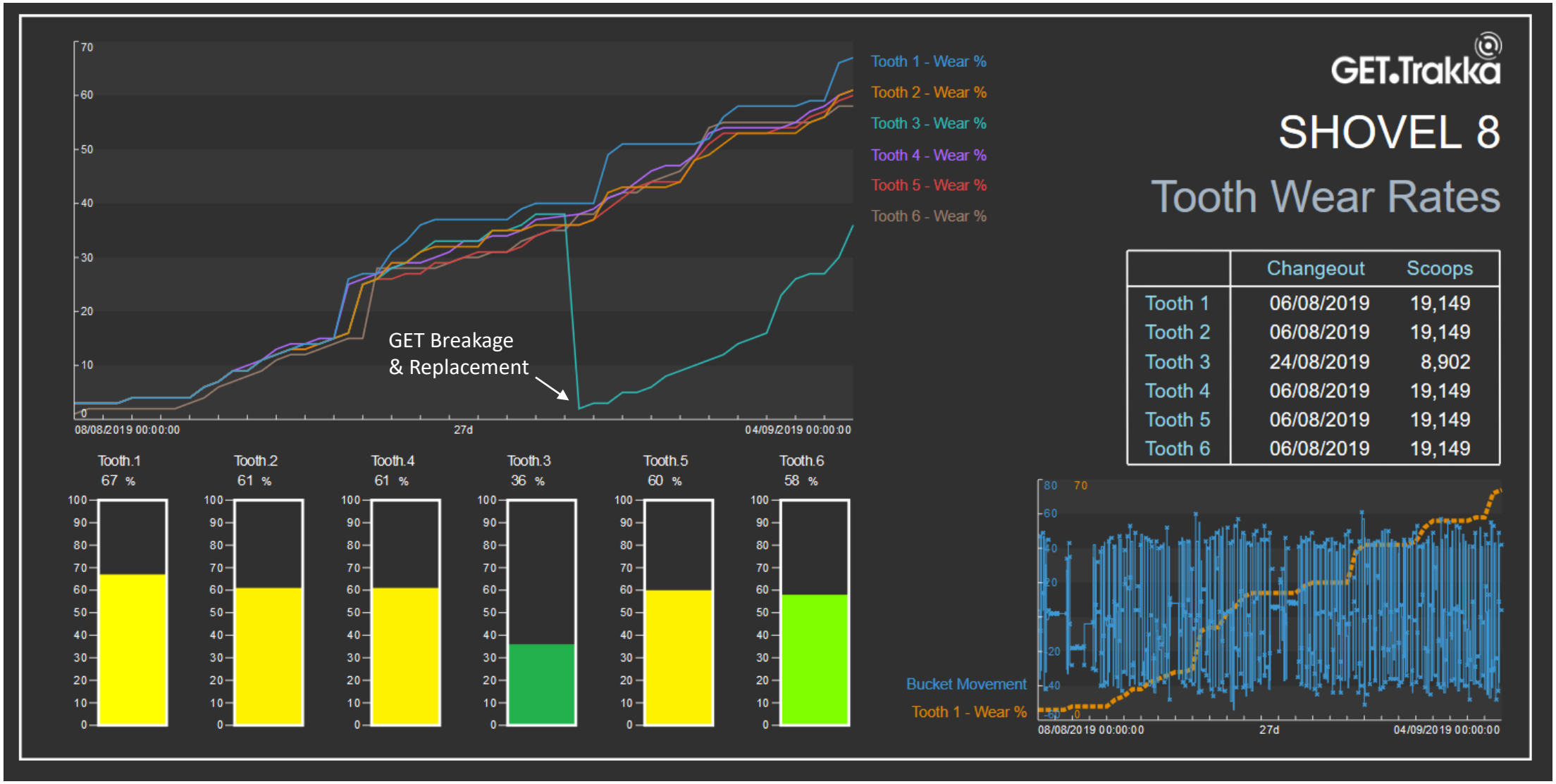


Audible alarm



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

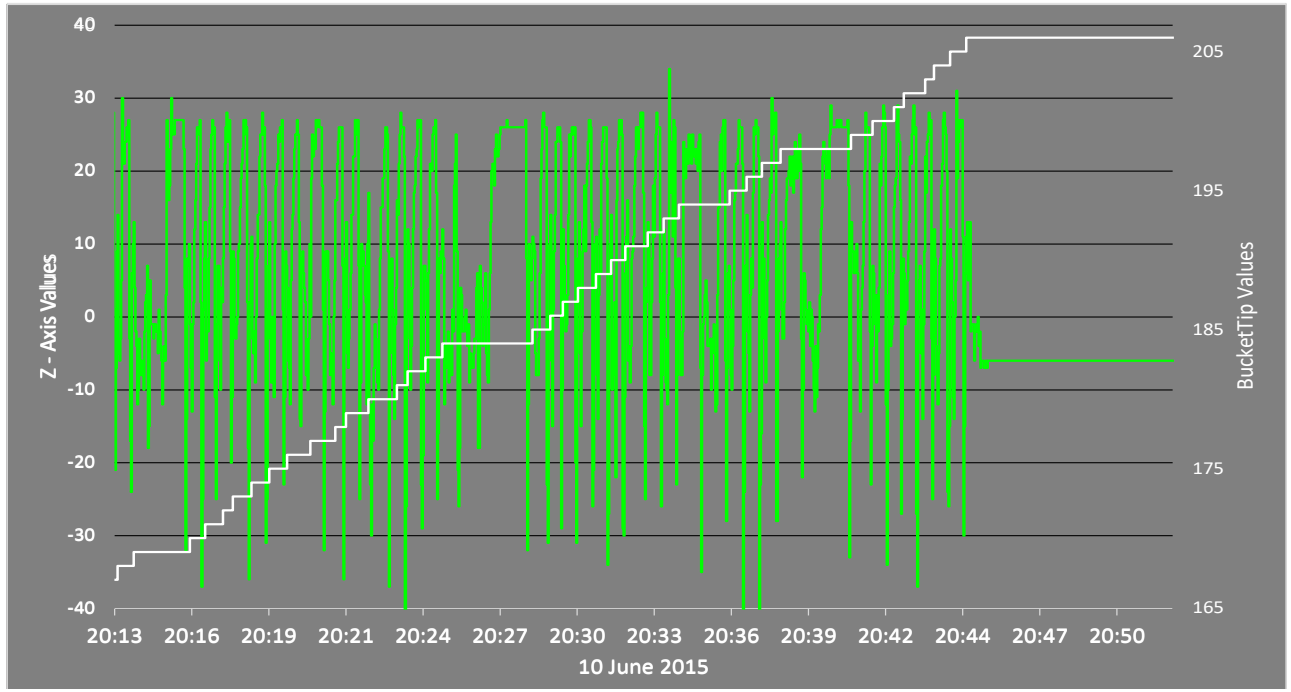
Operational Data from Analytics



	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

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



Next Steps – PI System on the Edge

- 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
- PI Server installed on an embedded PC, ~1000 PI Tags /asset
- 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
- 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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