PRODUCT HEALTH

Smart, Connected and Healthy Batteries

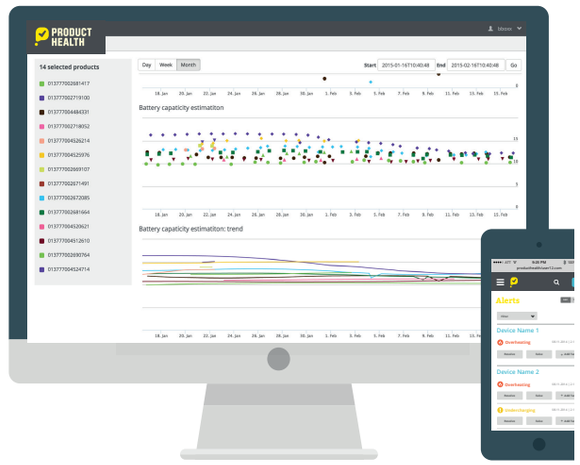
Monitoring & Analytics

Tamara.Giltsoff@ProductHealth.com

InterSolar: BSW Off-grid Power Forum,
June 2015. Tweet: @producthealth

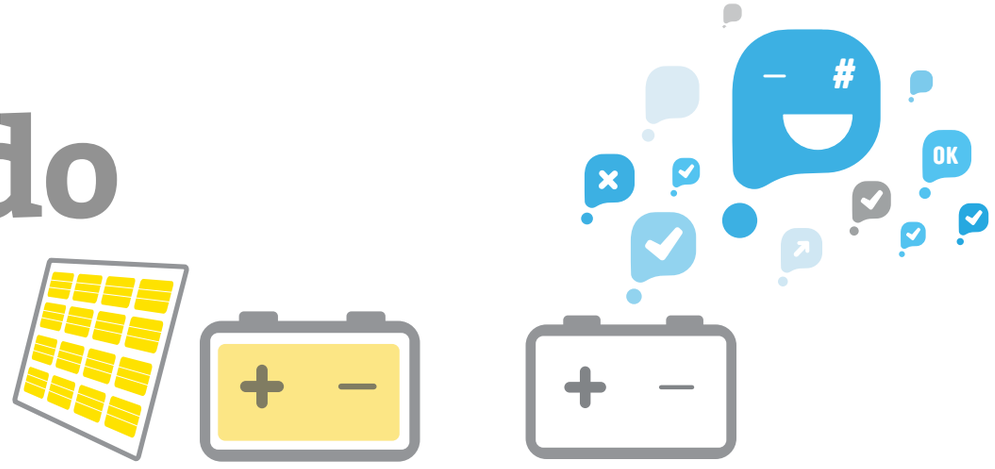
Who we are

PRODUCT HEALTH



www.producthealth.com

What we do



PRODUCT HEALTH

We sell **actionable battery intelligence** as a low-cost service to manufacturers, installers and owners

PREDICT THE HEALTH OF BATTERIES

- Assess state of health
- Predict lifetime
- Proactively maintain

MANAGE & CONTROL POWER REMOTELY

- Reduce / increase power
- Optimise charge
- Prevent misuse

LEARN HOW POWER IS BEING USED

- Pre-empt customer needs
- Upsell or upgrade
- Test products

An end-to-end **Smart Battery** Solution

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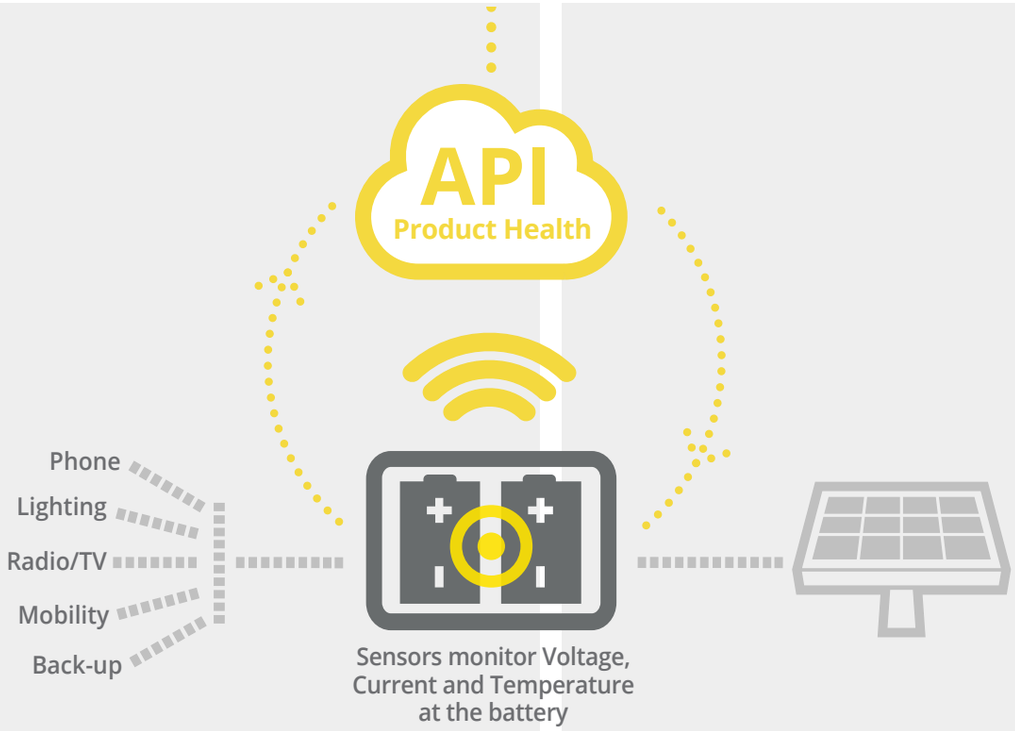
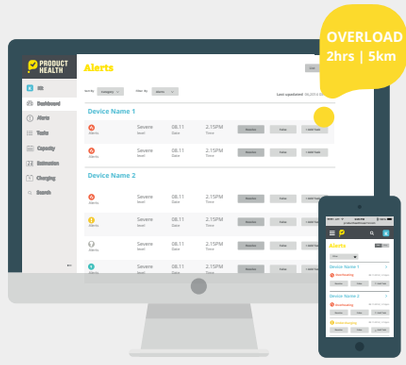
Monitoring Kit Battery Sensor + Comms Hub	Time Series Database in the Cloud	Data Analytics	Access to the battery intelligence	Alerts & Notifications

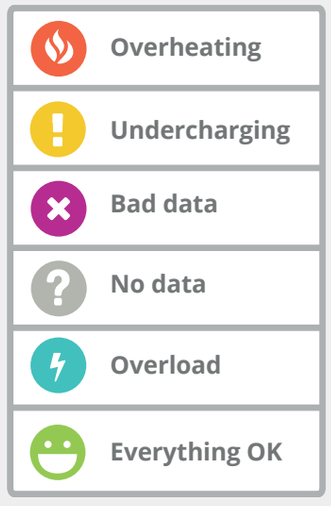


Battery intelligence

1. Actual and predicted battery health:
   - State of charge
   - Battery capacity estimation
   - Over heating
   - High voltage
2. Anomaly detection
3. Usage classification & user segmentation
4. Device detection



Product Health Dashboard and API



HOW DO WE WORK WITH YOU?

UNIT PRICE	FREE	UNIT FEE	FREE	FREE
Install the low-cost plug-and-play **Monitoring Kit** for single or multiple batteries	Store your product data at Product Health **time series database**	Access the **intelligence** for a low-cost monthly per unit monitored fee	Choose how to view the raw and analysed data	Configure and run alerts on the data

Service

Battery data analytics

Time series database

in the Cloud

Alerts functionality

Dashboard

Raw battery data

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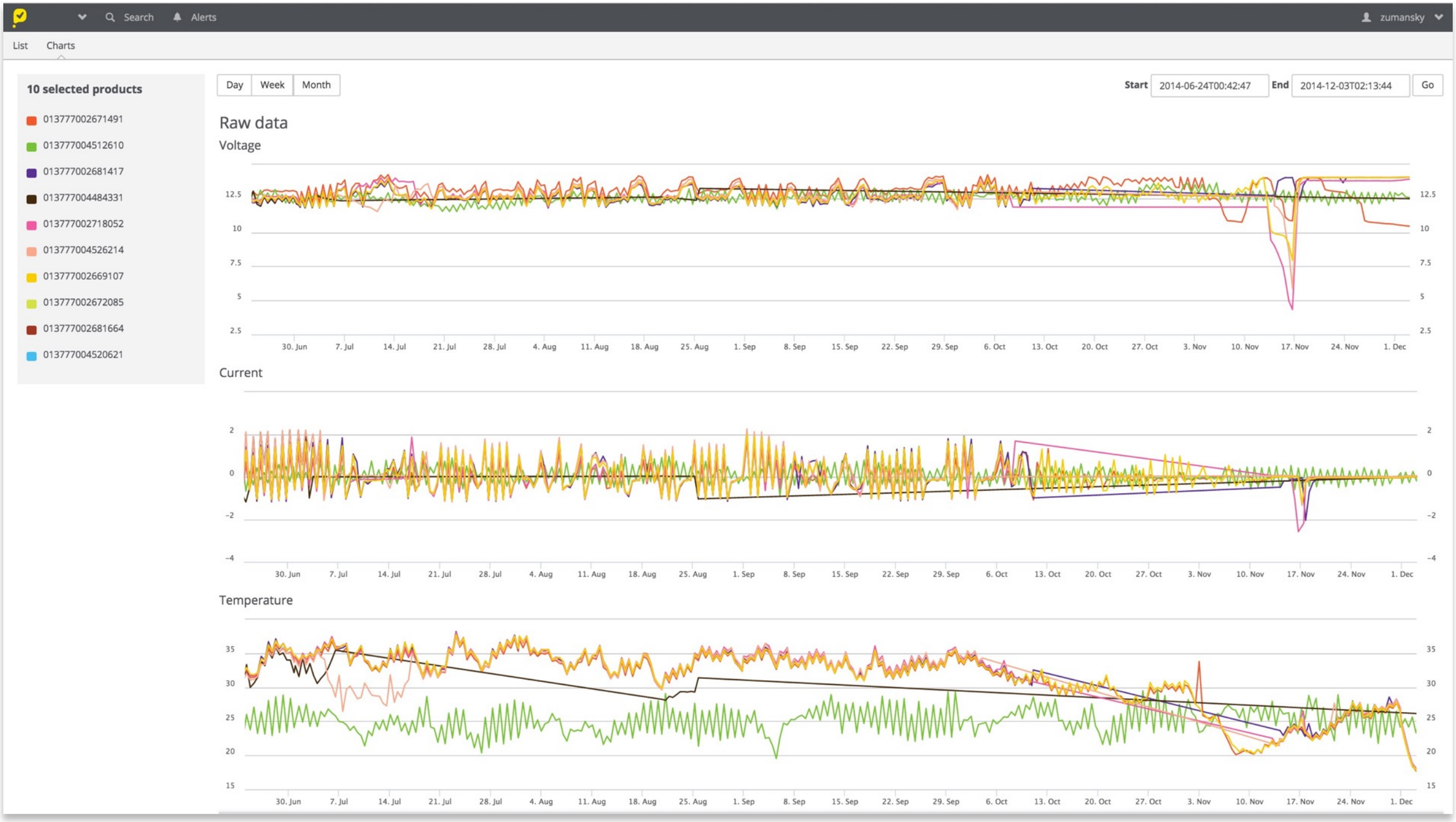
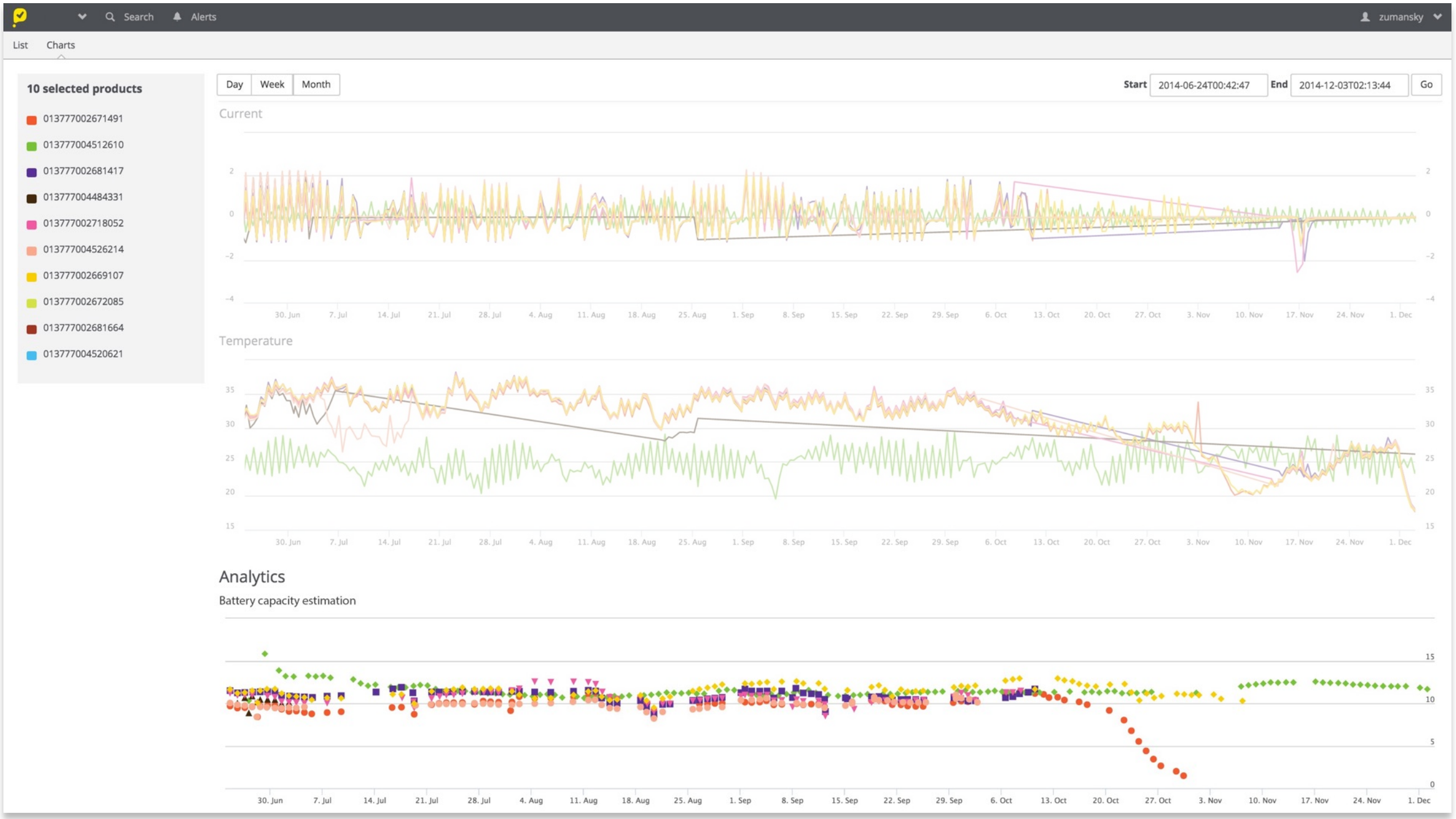


Actionable battery intelligence



Dashboard

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demo Search Alerts demo

producthealth/demo

375
Systems

PROJECT STATISTICS

STATE OF HEALTH

13 active 0 historic

	Main Down	01/22/2015
	Failed	01/22/2015
	Overheating	01/23/2015
	Overheating	01/24/2015
	50% Charge	01/22/2015
	40% Charge	01/22/2015
	Failed	01/23/2015
	Failing	01/22/2015
	Connection Loss	01/22/2015
	Failing	01/22/2015
	Connection Loss	01/22/2015
	Failed	01/22/2015
	50% Charge	01/22/2015

ALERT NOTIFICATIONS

GEOLOCATED SYSTEMS

Analytics pipeline

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Predicted lifetime
Battery in use
Remaining power
Usage segmentation
Device detection

Hardware

Smart Battery (integrated)

The plug-and-play Monitoring Kit

Smart Batteries

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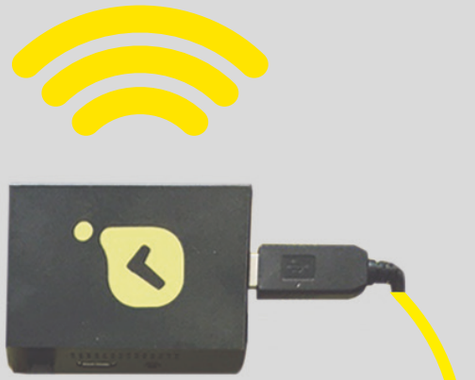
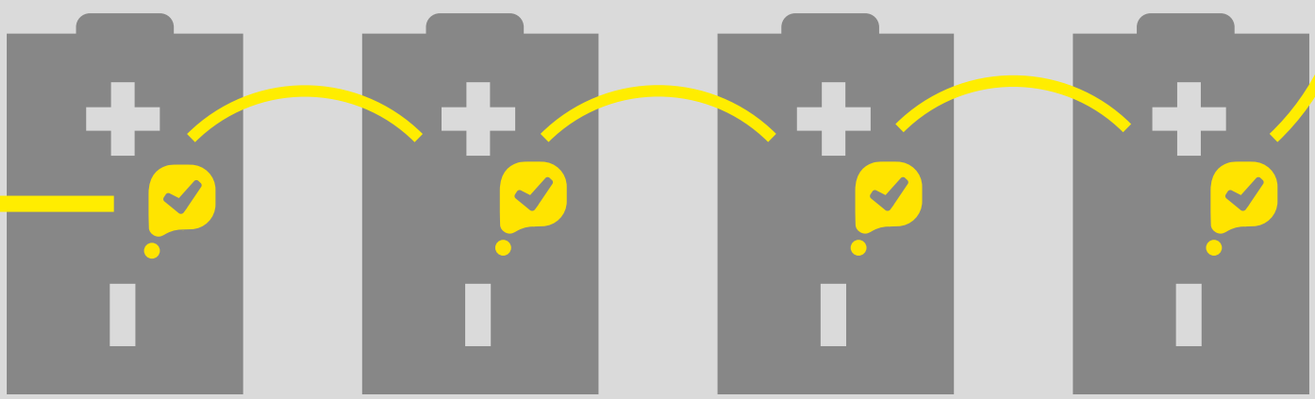
Talk to Product Health about working with us to make your batteries Smart, Connected and Healthy!

The **Comms Hub** collects and processes Battery Sensor data and then uploads it to the Product Health Service in the Cloud



The **Battery Sensors** measure voltage, current and temperature on the installed battery



Battery Sensor:

Max voltage: 48V

Max current: depends on shunt

Comms: RS485 Modbus

Comms Hub:

Local comms: RS485 Modbus

Remote comms: GSM, Wifi

Memory: 256MB

Data filtering

Connecting batteries to the **Product Health Service**

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Battery Sensors are daisy chained using Modbus

The string current is measured through a **shunt**

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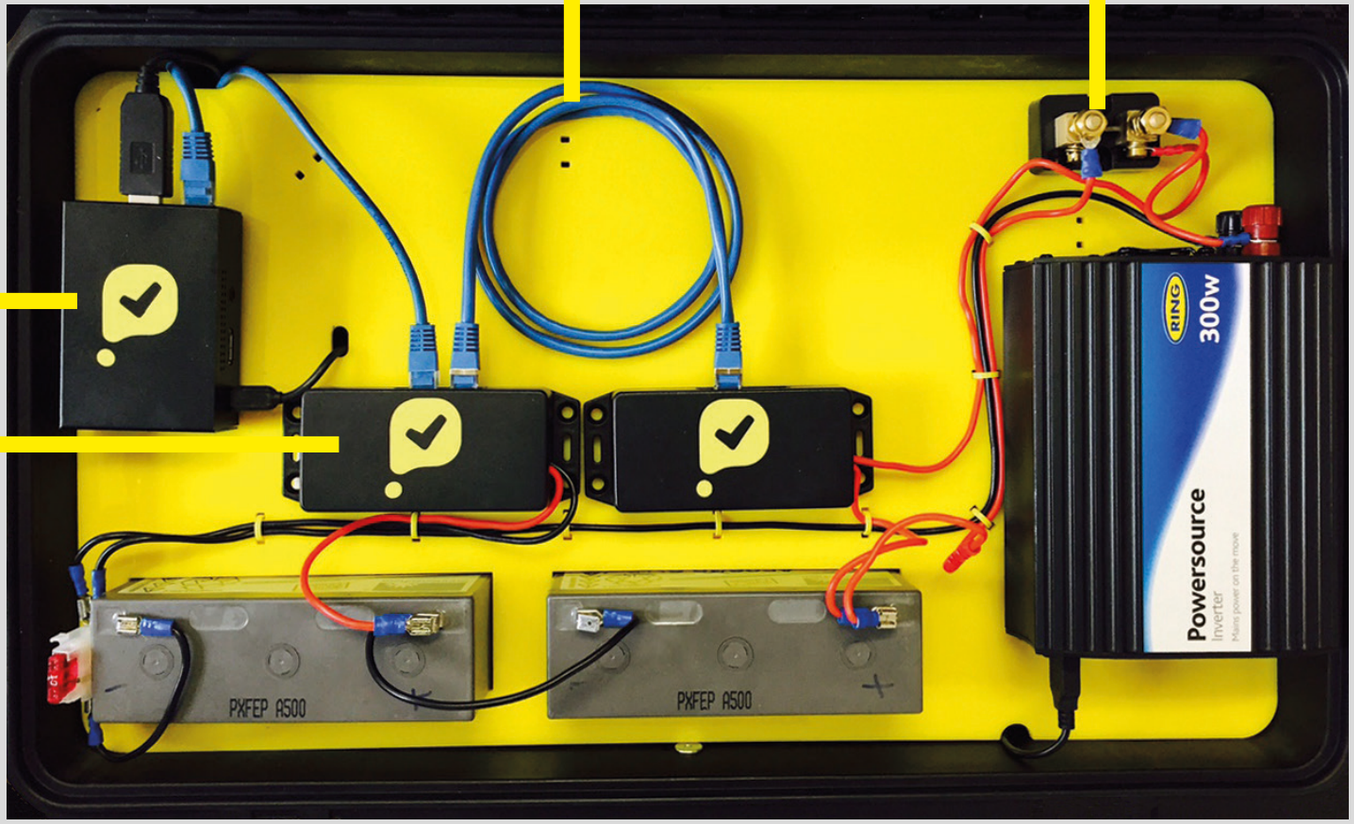

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The Monitoring Kit
Connecting batteries to the Product Health Service

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Sector focus

Market opportunity and our current sector focus

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Stationary Lead-Acid and Li-Ion for: Off-grid (SHS, Mini-grid and Off-grid projects), Energy Storage, Telco, UPS (emerging markets) and smart cities

The problems we are solving

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1. Maintenance and failure is expensive

- Batteries fail (faults with the battery and batteries wrongly used)
- Batteries reach the end of their life (some ahead of others)
- Service call-outs are impossible to qualify
- Battery use is hard to evaluate
- Market is shifting from product to service

2. Business models depend on performance

- Repayments, service fees and contracts depend on batteries working

3. Business models that depend on remote control

- Asset needs protecting
- Finance must be de-risked

BBOXX case study

1,500 units monitored Sub-Saharan Africa

Pre-emptive maintenance

We started here

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BBOXX

UNIVERSITY OF OXFORD

Energy & Power Group (EPG) in the Department of Engineering Science and the Department of Machine Learning

BBOXX – smart solar

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1.3 billion without access to grid power (set to grow in line with population growth)

Design, manufacture, distribution and financing of Solar Home Systems distributed across Sub Saharan Africa and Asia

BBOXX

The brief and lessons learned

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– Remotely control power

– Know how batteries are being used

– Know how batteries are performing

– Predict failure or end-of-life

– Offer ‘smart service’ to customers

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Thank you!

www.producthealth.com

Me: tamara.giltsoff@producthealth.com
CTO: emeka.mosanya@producthealth.com