Production Performance Management Testbed

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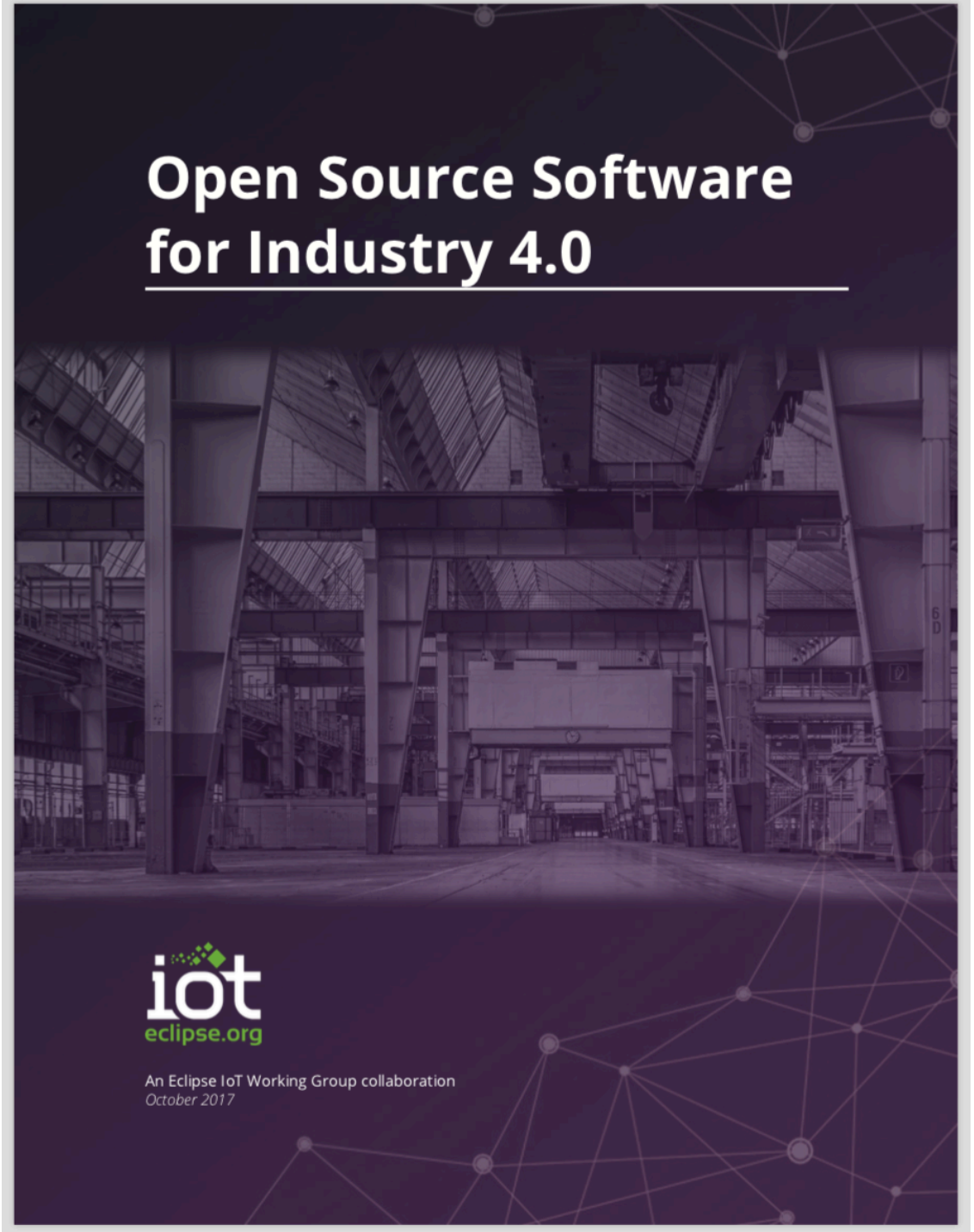
energizing great minds

CONTACT Software

Purpose of testbed (among others): How does Eclipse IoT OSS fit Industrie 4.0/RAMI 4.0?

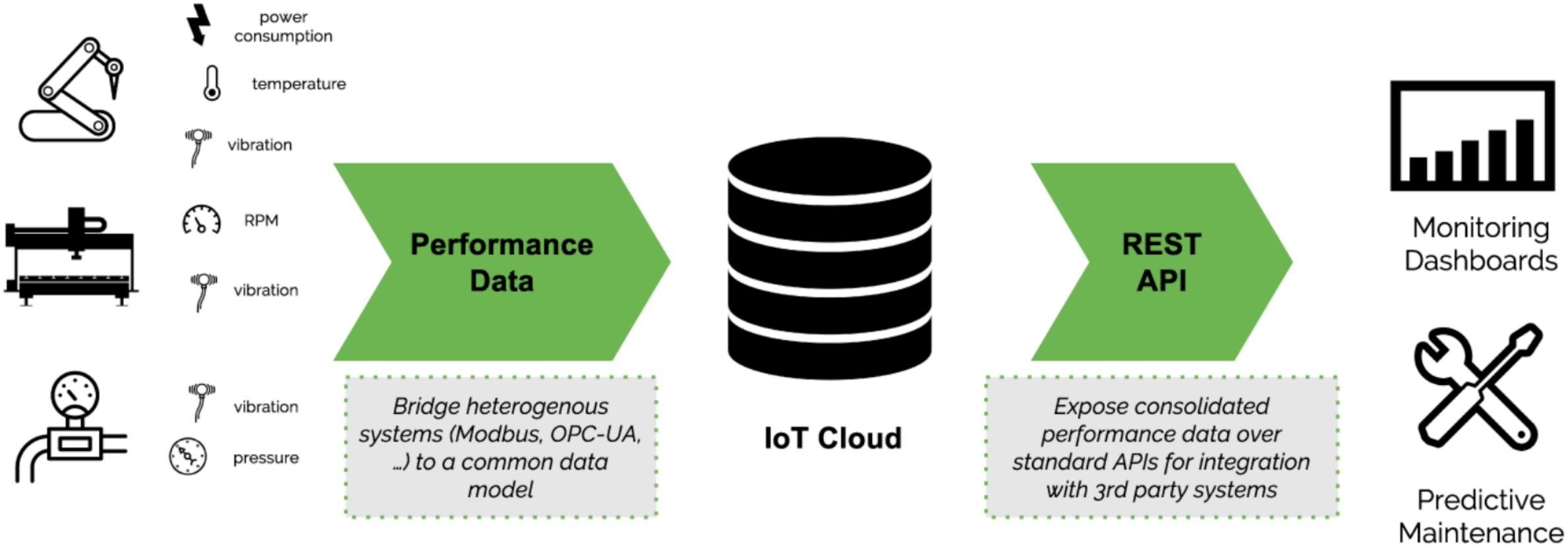


Production Performance Management

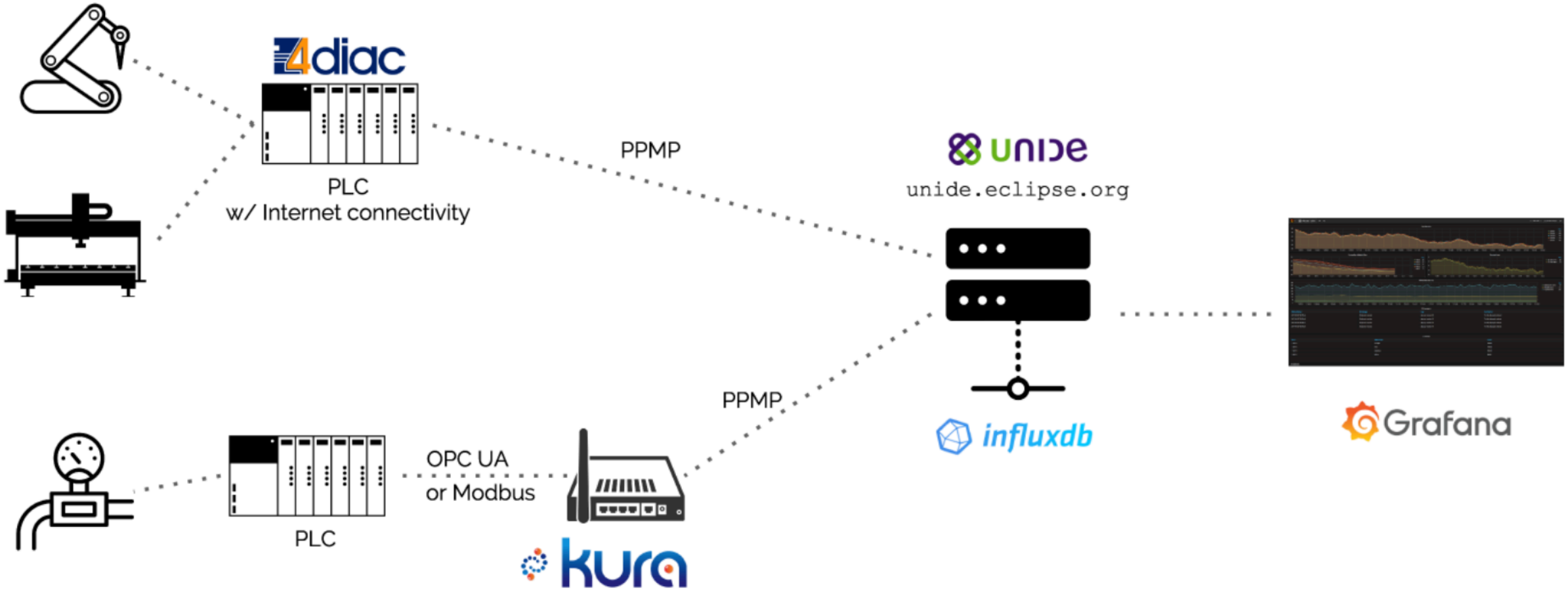
Light-weight …

- Condition Monitoring
- Predictive Maintenance

Production Performance Management



Architectural Overview



Public Relations

- Launched last Thursday: PRs from Eclipse and participants
- Some interest from Industrie 4.0 community
- Some press coverage

Heise-Foren: Einloggen | Registrieren

heise online

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News ▾ Rubriken ▾ Blogs ▾ Podcast Videos Konferenzen Termine

heise Developer > 7-Tage-News > 10/2017 > Eclipse Foundation nimmt zweite IoT-Testumgebung in Betrieb

Eclipse Foundation nimmt zweite IoT-Testumgebung in Betrieb

20.10.2017 17:21 Uhr – Matthias Parbel vorlesen

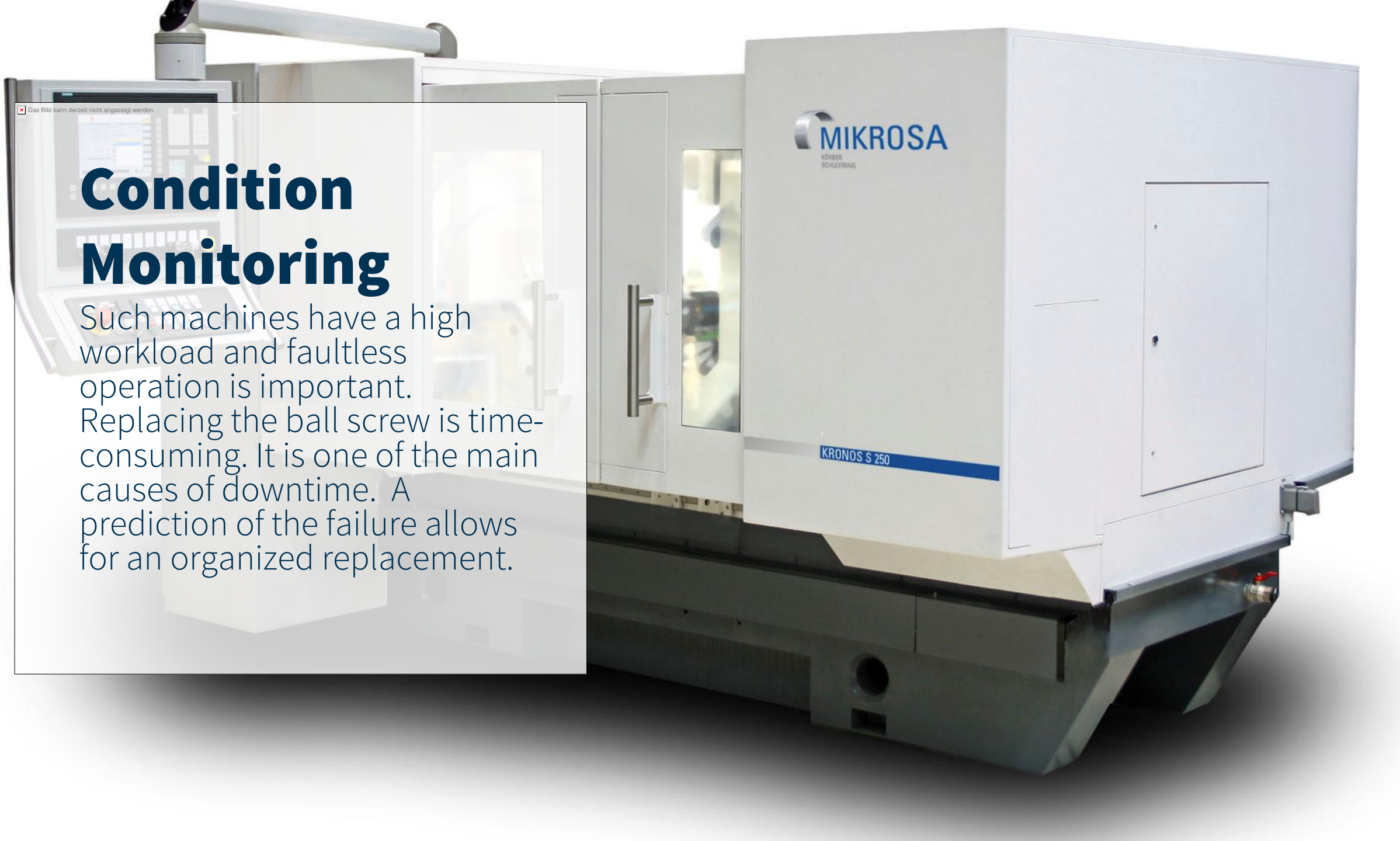
Als Teil des Eclipse Unide-Projektes hat die Foundation eine neue IoT-Testumgebung eingerichtet, die sich dem Production Performance Management Protocol (PPMP) widmet.

- Bosch SI – Unide, XDK integration (here), Backend incl. Grafana, Influx, integration with Bosch PPM
- Contact – Use case „Grinding Machine“ and data sets, integration with Elements for IoT
- Eurotech – Integration of PPMP with Kura Wires (cool)
- Fortiss – Integration of PPMP with 4DIAC (PLC Dev Tool)
- Influx –Time-series Database (future integration with InfluxData‘s cloud)

- **COME AND JOIN US** (Hackday on Wed)

What is available now?

- Webpage: https://iot.eclipse.org/testbeds/production-performance-management/
- Repo (datasets, use case, Kura PPMP support): https://github.com/eclipselabs/eclipseiot-testbed-productionperformancemanagement
- Unide (PPMP) server, REST API, Influx TSDB, Grafana Dashboard http://unide.eclipse.org/
- Upcoming: tutorials for using with commercial offerings like Bosch PPM and CONTACT Elements for IoT



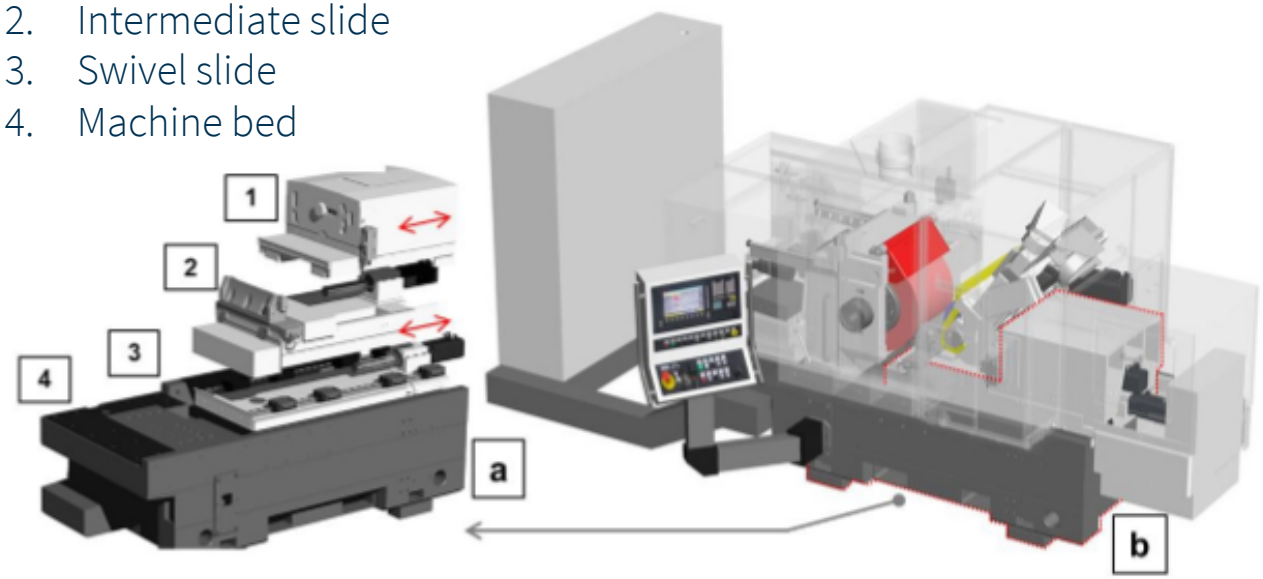
Condition Monitoring

Such machines have a high workload and faultless operation is important. Replacing the ball screw is time-consuming. It is one of the main causes of downtime. A prediction of the failure allows for an organized replacement.

Grinding Machine

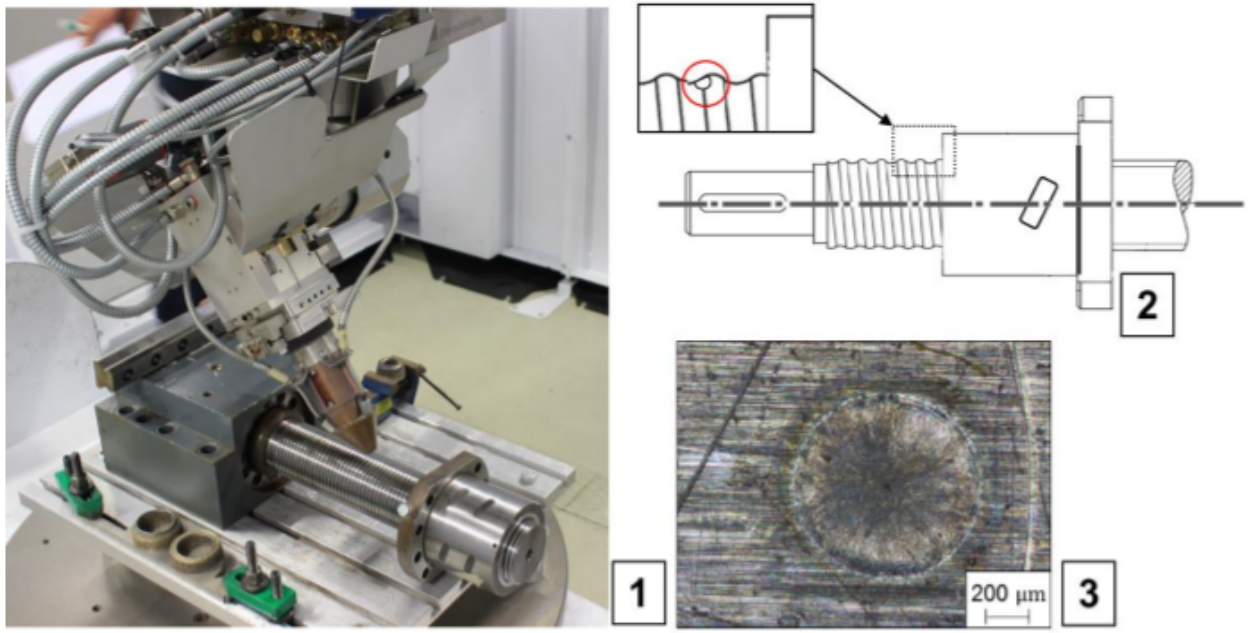
- A grinding machine is a device used to remove material from a cylindrical workpiece.
- There is as well one (or two) ballscrews that push the wheels together.
- The ballscrew is a linear actuator that is responsible for the relative position of the wheels to each other.
- Minimal damage to the ball screw can cause long downtimes.

1. Top slide
2. Intermediate slide
3. Swivel slide
4. Machine bed

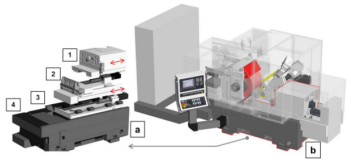


What and how is it measured?

- One of the possible indicators of the condition of the ballscrew is the vibration, since different levels of deterioration result in different profiles of vibration
- The measurement data are recorded with a LIS3DH MEMS (acceleration sensor) and a Raspberry Pi
- Then, once we have classfied or labeled raw data, we can calculate different statistical characteristics and then use them to train a Machine Learning Classification Algorithm



Solution



Grinding Machine 1 - n

PPMP Message

Gateway

PPMP Message

Back-End

CONTACT Elements for IoT

Unide

Via HTTP or MQTT, a **PMPP measurement message** is sent from the grinding machines to the gateway with acceleration values.

```
{ "device": {
   "deviceID": "device-001"},
  "measurements": [
   {"ts": "2017-10-04T17:17:16.025000+02:00",
    "series": {
     "$_time": [
      0],
     "x": [
      -11.7744],
     "y": [
      -0.941952],
     "z": [
      0.470976 ]}}],
  "content-spec": "urn:spec://eclipse.org/unide/
measurement-message#v2“ }
```

The **gateway** receives the data from the individual machines and **analyzes** it. The results are in turn sent via HTTP/MQTT as a **PMPP message**.

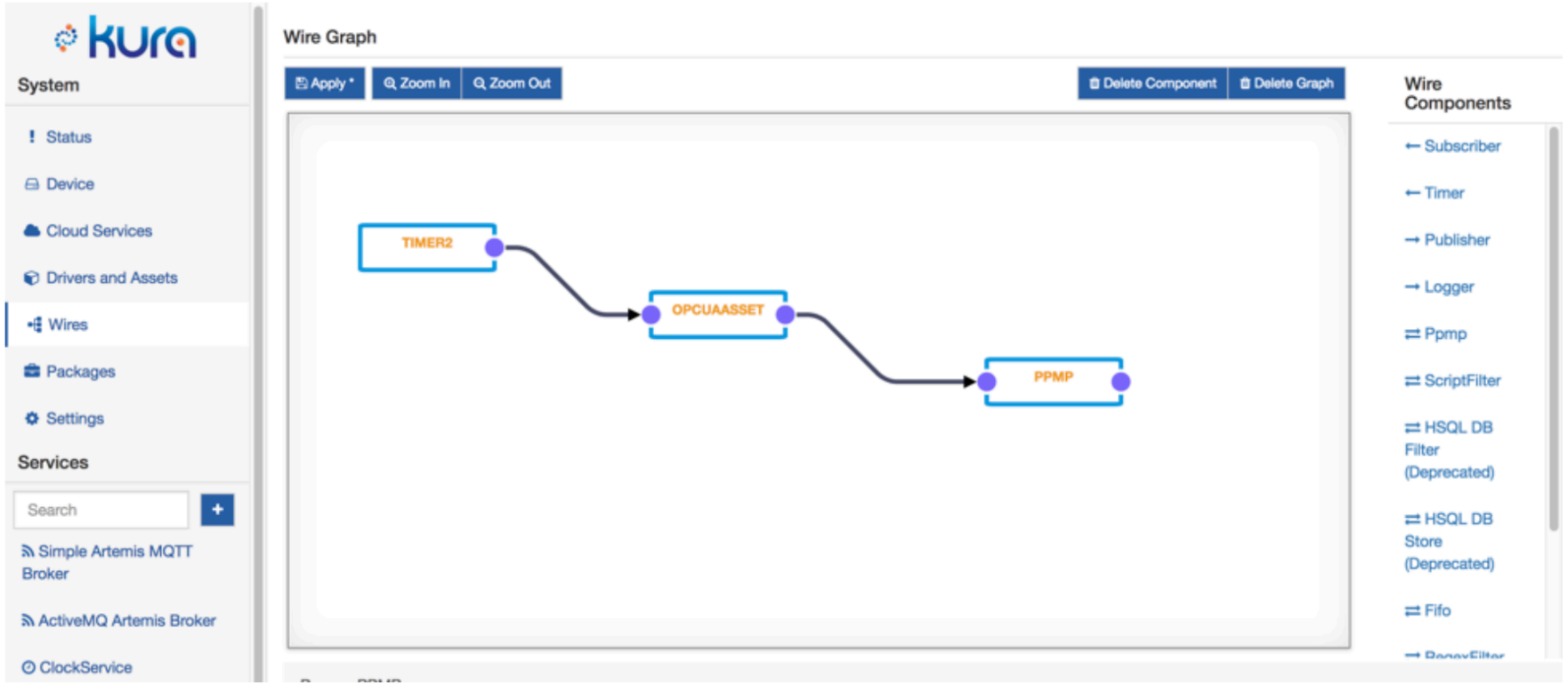
```
{"device": {
   "deviceID": "device-001"},
  "measurements": [{
    "result": "OK",
    "ts": "2017-10-04T17:17:16.025000+02:00",
    "series": {
     "$_time": [
      0],
     "rms.x": [
      11.465432911031082],
     [……..……]
     ]}}],
  "content-spec": "urn:spec://eclipse.org/unide/
  measurement-message#v2"}
```

The backend is **flexibly selectable**. For Example the Unide Testbed and CONTACT Elements for IoT solutions have been implemented. Other backends can also be used.

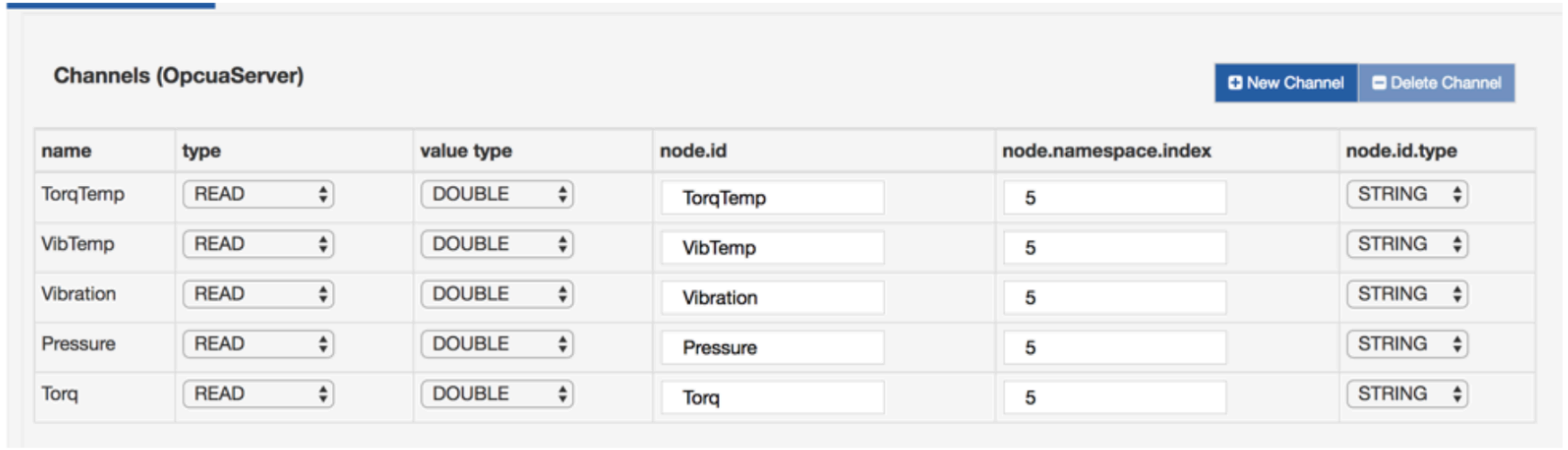
DEMO

Kura Wires

Support for bridging OPC to PPMP.



- Select the Driver and add channels for the measurements that will be sent to the PPMP component



name	type	value type	node.id	node.namespace.index	node.id.type
TorqTemp	READ	DOUBLE	TorqTemp	5	STRING
VibTemp	READ	DOUBLE	VibTemp	5	STRING
Vibration	READ	DOUBLE	Vibration	5	STRING
Pressure	READ	DOUBLE	Pressure	5	STRING
Torq	READ	DOUBLE	Torq	5	STRING

Next Steps

- Add more end-to-end use case(s), including actual manufacturing processes and – optimally – “real“ hardware
- Enable interested parties to reproduce using their own systems (documentation, packaging, …)
- Recruit more vendors (HW, SW)
- Show testbed at trade shows
- Integrate Milo (feeding data to OPC Test Server), RedHat?
- Integrate with other Eclipse IoT projects?

Thanks!