Tango Brainstorming

Tango Meeting @ ELI Beamlines in Dolní Břežany (Czech Republic) 2018
IF we ignore new technology ... 

THEN this could happen ...
This is an interactive session!

Please add your comments here

https://goo.gl/D6UZBZ
Top 10 Technology Buzzwords for 2018

- Mobile First
- Self-Service Analytics
- Microservice Architecture
- Digital Detox / Digital Productivity
- Artificial Intelligence
- Blockchain
- Internet of Things
- Quantum Computing
- Dark Data
- Serverless Architecture

https://www.datapine.com/blog/technology-buzzwords/
Internet of Things (IoT)

What can Tango controls learn from IoT?
IoT platforms

An **IoT** platform is a form of middleware that sits between the layers of IoT devices and **IoT gateways** (and thus data) on one hand and applications, which it enables to build, on the other (hence why IoT platforms are also called Application Enablement Platforms or AEPs).

*(source: i-scoop.eu)*
IoT platforms

IoT platforms have their roots in, among others; the need to manage, monitor, store, translate, secure and analyze IoT data; the enablement of applications; IoT device management; the bridging of gaps as a result of the lack of standards and interoperability in IoT; connectivity and integration; security, firmware updates and subscriber and access management; visualization and interfacing with applications, users and developers

(source: i-scoop.eu)
Large number of IoT platforms
Well-known IoT platforms

Amazon (AWS IoT), AT&T (AT&T IoT Platform), Bosch (Bosch IoT Suite), Ericsson (Application Platform for IoT), Gemalto (SensorLogic), HPE (HPE Universal IoT Platform), IBM (Watson IoT Platform), Microsoft (Azure: Stream Analytics, IoT Hub, IoT Suite), PTC (ThingWorx Technology Platform), SAP (SAP HANA Cloud Platform for the Internet of Things), relayr and Software AG (Cumulocity IoT)

(source: i-scoop.eu)
Eclipse Hono provides remote service interfaces for connecting large numbers of IoT devices to a back end and interacting with them in a uniform way regardless of the device communication protocol.
3 layered control system and IoT differences
Tango control system and IoT differences
What can Tango Controls learn from IoT

- **Main difference is IoT concentrates on the device data and data analytics**

- **Proposal: collaborate on a data analytics platform (on HDB++)**

- **Proposal: add more security**

- **Question: do we need to connect Tango to AMQP, ... ?**

Tango Device Model is more mature has more features than most IoT solutions
IoT Protocols

What can Tango controls learn from IoT protocols?
MQTT - M2M protocol

MQTT excels in scenarios where reliable message delivery is crucial for an application but a reliable network connection is not necessarily available, e.g. mobile networks.

Proposal: develop a Tango broker for MQTT protocol
What can Tango controls learn from IoT tools?
Node RED - a visual tool for wiring the Internet of Things

Node-RED is a web flow based development tool developed originally by IBM for wiring together hardware devices, APIs and online services as part of the Internet of Things
Node-RED - a visual tool for wiring Tango controls Devices

Node-RED is written in node.js. Best way to interface Node RED to Tango is via the REST api or TangoJS

Challenge: develop a Node-RED module to call the Tango REST API or TangoJS
Connecting Tango Controls to AWS IoT

Tango Device Model is more mature has more features than most IoT solutions
What can Tango controls learn from Docker containers?
Dockerize everything?
Dockerize everything?

- **Docker images simplify deployment and protect from Operating System upgrades** (who hasn’t experienced Debian / Ubuntu / RedHat 6, 7, 8, 9, 10, ... hell!)

- **Proposal**: store docker images for device servers on Dockerhub and make them available from the classes catalogue

- **Idea**: replace Linux with smaller operating system e.g. snap

- **Feature request**: fix zmq event port on command line
Using Docker enables Kubernetes ...

**Idea:** manage a Tango control system with Kubernetes and Docker
Digital Twins

Digital twins are a dynamic software model of a physical thing or system (Gartner)
Digital Twin

Tango Controls and Digital Twins

Many sites have Tango simulator device servers (SKA-ZA, ALBA, ESRF, ...)

Proposal: document how to setup a digital twin / system using Tango simlib (SKA-ZA)
Serverless is ... executing functions instead of servers
Tango Serverless

Serverless exists as Python servers e.g. PyPlc
Tango Serverless

Do we need a generic serverless solution?
What about security?
Blockchain

How can Tango profit from Blockchain?
Blockchain and IoT security

Figure 9. Structure of the IoT blockchain network
Blockchain and Tango security

Proposal: implement Tango security using a lightweight version of Blockchain
Voice Control

How can Tango make use of Voice Control?
Voice Control

Is the Future for User Interfaces
Voice Control

Idea: interface Echo (or other) device to Tango for voice control
Industry 4.0

Industry 4.0 is the evolution to cyber-physical systems, representing the fourth industrial revolution on the road to an end-to-end value chain with Industrial IoT and decentralized intelligence in manufacturing, production, logistics and the industry.
Opportunity for Tango controls

By 2018, only 30 percent of manufacturers investing in digital transformation will be able to maximize the outcome; the rest are held back by outdated business models and technology (IDC)
RAMI 4.0

The 3-dimensional RAMI 4.0 model shows that the production object must be tracked across its entire life cycle.
SCADA will disappear

There are very few arguments for SCADA which continue to remain relevant in the scope of overall IoT and technology evolutions on the long run.
SCADA role

Idea: provide Panic alarm handler as part of Tango “out-of-the-box” with web interface

An important part of most SCADA implementations is alarm handling. The system monitors whether certain alarm conditions are satisfied, to determine when an alarm event has occurred.
GitHub - acquired by Microsoft

Should we move to self hosting e.g. using gitlab?

When?
Requiem for GitHub

Since its birth in 2008, GitHub redefined how software developers worked together. The firm was famous for several reasons: it had no middle management, it had a strong remote working culture, it made exactly what we needed, no more or less, and it was always profitable. These are interrelated. Today, GitHub has 500 employees, is valued at $2bn, and I think it is dying. Here is why.

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Update
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YOUR IDEAS ...