
# IoT Bootcamp

5th May, 2020

Digital Catapult, Ikerlan, University of Ljubljana, ST-I, ST-FR

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 864266.

# Welcome

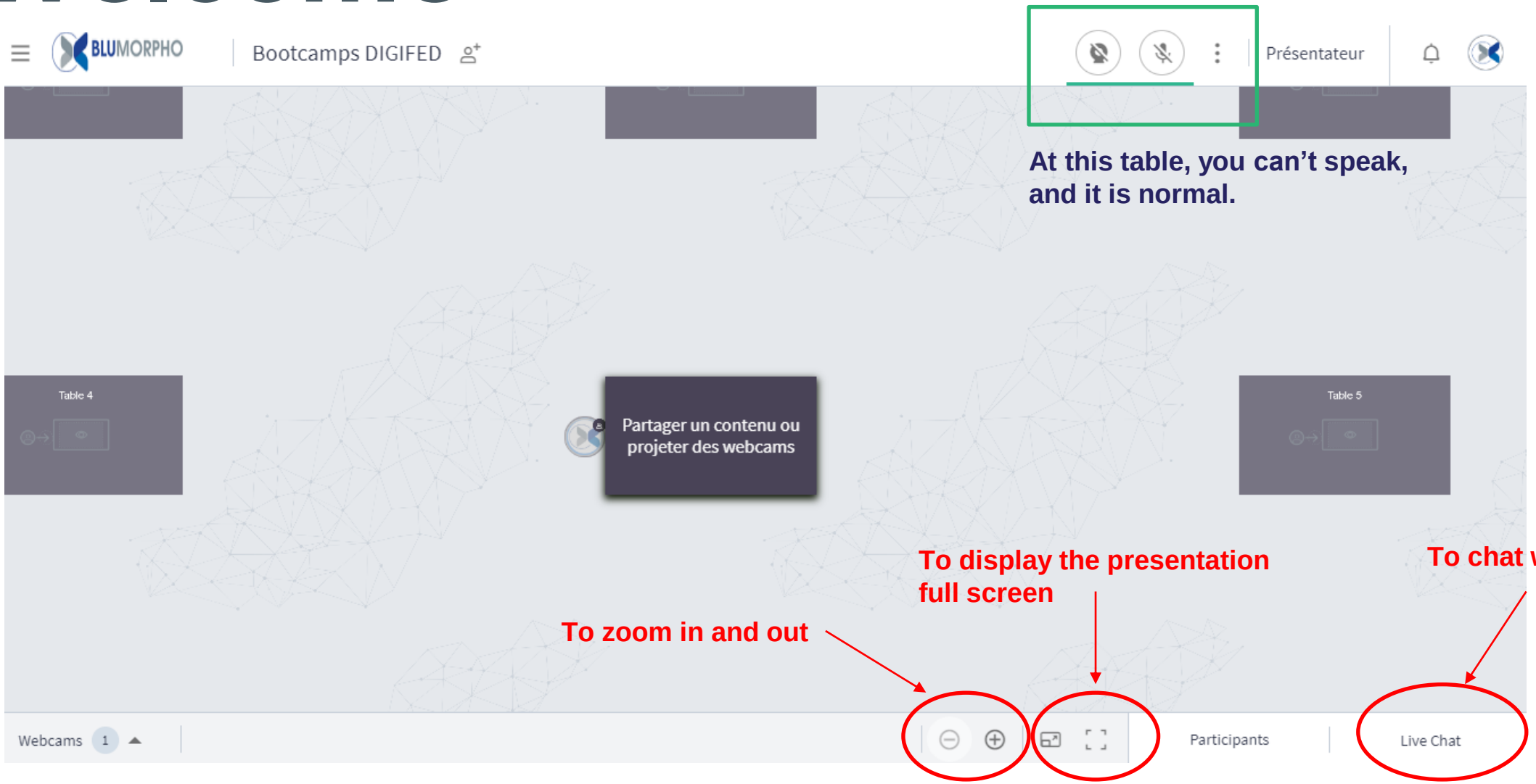

CATAPULT
Digital


University of Ljubljana


BLUMORPHO


ikerlan
MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE

# Welcome


BLUMORPHO
Bootcamps DIGIFED
Présentateur
At this table, you can't speak, and it is normal.
Table 4
Partager un contenu ou projeter des webcams
Table 5
To display the presentation full screen
To zoom in and out
To chat with us
Webcams 1
Participants
Live Chat

# Agenda

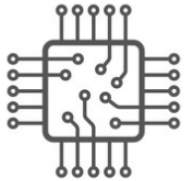
- **Introduction, objectives and agenda** (5 minutes)
- **How to use IoT capabilities as part of your project while leveraging DigiFed Partners to maximise your proposal scores**: Excellence, Impact, Implementation Quality (60 minutes)
  - Digital Catapult
  - University of Ljubljana
  - Ikerlan
  - ST (Fr, I)
- **Open floor discussion with Q&A** (55 minutes)

# The IoT Technical Offerings

## Networks Communication & testbeds

**Digital Catapult**: Future Networks Lab
**Uni. Ljubljana**: PP Drone
**Uni. Ljubljana**: QMON

## Electronics Microcontrollers



**Ikerlan:** Dependable Embedded Systems
**ST Microelectronics**: STM32
**Uni. Ljubljana**: Colibri IoT

## Simulation & Benchmarking

**AVL:** Integrated and Open Development Platform
**Digital Catapult**: IoT Benchmarking
**BME:** LEdsBeSmart
**BME:** Versatile Reliability Tester

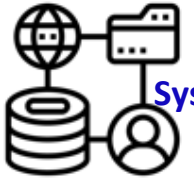
## Cyber Security

**CEA:** Secure Boot for trusted IoT Platform
**CEA:** Secure Configuration of IoT system-Depl-IoT
**CEA**: Security Assessment for an ICT Product Prototype
**Ikerlan:** Industrial cybersecurity
**Uni. Ljubljana:** SwEther

## AI Big data

**Digital Catapult**: AI Compute, Machine Learning and AI Ethics
**Uni. Ljubljana**: Percipio

## Systems of systems



**CEA:** Sigma Fusion
**Ikerlan**: HW and communication systems
**Ikerlan:** ICT
**ST Microelectronics:** Physical Digital Transformation
**Uni. Ljubljana:** RMON
**Uni. Ljubljana:** IMON
**Uni. Ljubljana**: Cloud DevOps+consultation
**Uni. Ljubljana**: Designing effective digital solutions with stakeholders.

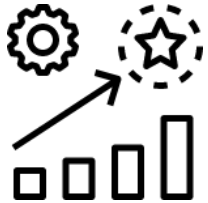
## Business partnerships

**Blumorpho:** 42k corporate contacts.
**Minalogic:**Mina Smart, Grenoble Innovation for Advanced New Technologies
**Steinbeis-Europe-Zentrum:** open Innovation

## Fundraising

**Blumorpho:** Investment readiness
**Blumorpho:** Investor days
**Digital Catapult:** Showcase Events

## Business development



**Blumorpho**: Business canvas
**Minalogic:**Business development support

# Digital Catapult

**Dr. Ramona Marfievici | Senior IoT Engineer**

**Dr. Michael Setton, MIET | IoT Technologist**

# From electrons to Clouds….and customers



We can provide advice and support wrt:

## Hardware

- Local buses: I2C vs SPI
- Modules, SiP, SOC
- Sensors
- Low power modes and sequencing
- Crypto ICs/AI processors

## Communications

- LoraWAN gateways configuration and loan
- FUOTA
- Industrial legacy protocols (Modbus)
- Heterogeneous networks
- Platform integration: getting data from TTN

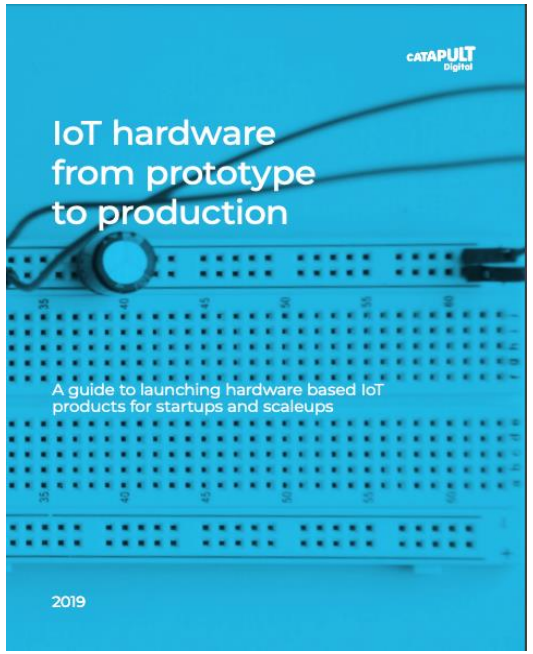
## Other success factors

- UI/UX
- Dashboard design
- Adding intelligence
- Partnerships
- Hardware as a Service business model

# Getting from TRL3 to pre-production

Report making your journey to production faster and less risky.

Download it here:
https://bit.ly/3avHmZg




**Why are connected products different and more difficult?**

- Asking the right questions at the different stages of your project
- Realistic budgets
- Design to cost – Design for manufacturing
- IP protection

**A tangible IoT solution with measurable innovation-based ROI**

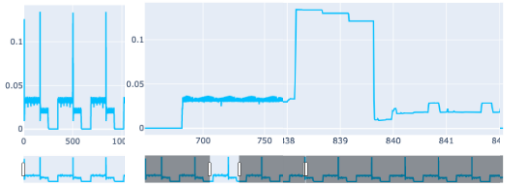
**A roadmap for the route to scale deployment to address your business needs**

CATAPULT Digital

# IoT Benchmarking: tests

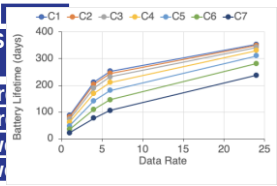
## Power consumption laboratory tests

- Current/power consumption measurements
- Active/inactive states of a device
- Report: peak current, current/power per state
- Battery lifetime estimation for specific application/use-case



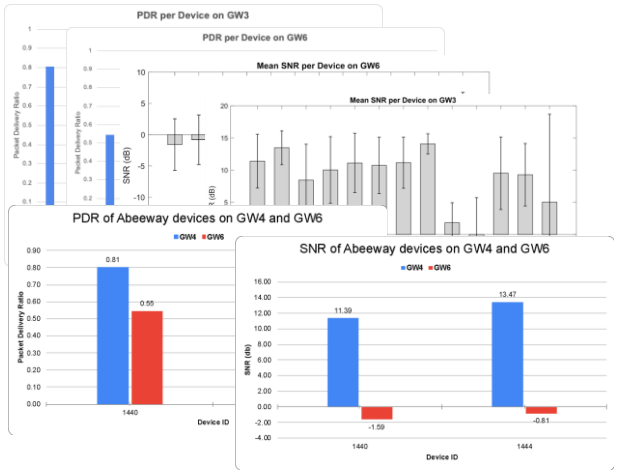
| Global Data | Value | Unit |
|---|---|---|
| Current avg | 34.25 | mA |
| Current max | | |
| Power avg | | |
| Power max | | |
| Battery lifetime | | |

| Data | Value | | | | |
|---|---|---|---|---|---|
| | TX | RX | Idle | Sleep | GPS |
| Current | Cur | Cur | Cur | Curre | Curr |
| Current | Cur | Cur | Cur | Curre | Curr |
| Power | Pov | Pov | Pow | Power | Pow |
| Power | Pov | Pov | Pow | Power | Pow |




## Communication performance tests

- Connectivity assessment indoor/outdoor
- Test different antenna orientations, heights from ground, communication and application parameters
- Report reliability, accuracy, and others (e.g., RSSI, SNR)




## Device characterization

- Configurability, programmability
- I/O capabilities, built in sensing capabilities
- Mechanical properties
- Usability

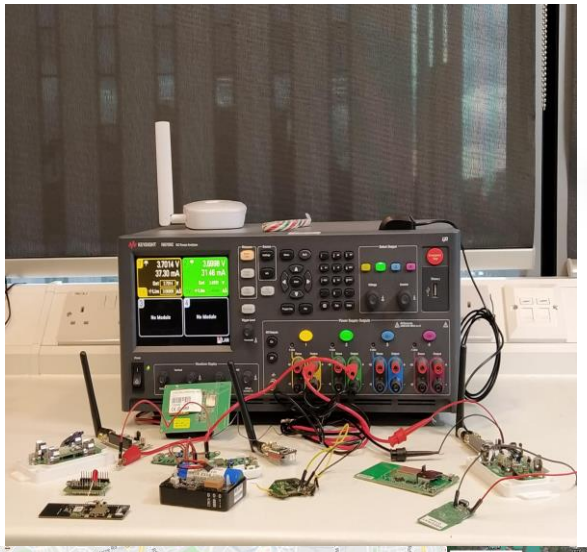
# IoT Benchmarking: assets

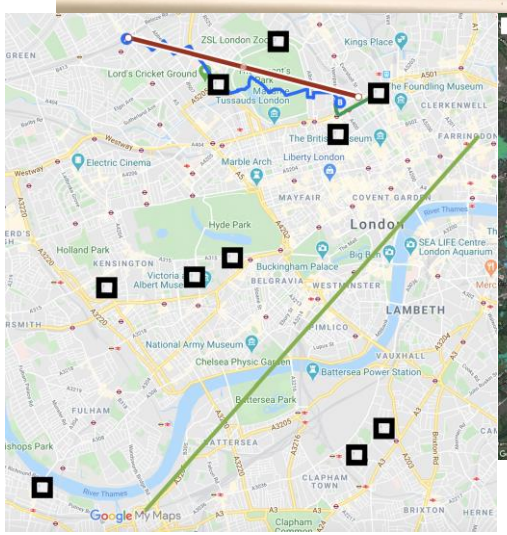
Keysight N6705C DC power analyzer
Redwood 5020A LoRaWAN tester
RSC Step Attenuator

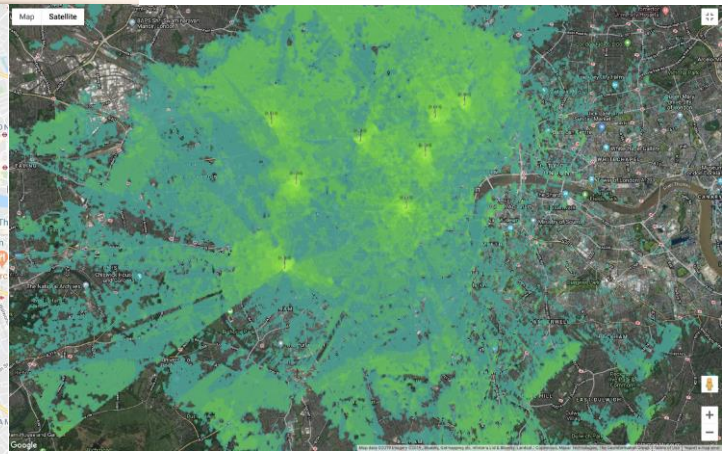
Infrastructure: LoRaWAN, Sigfox (&NB-IoT), BLE

11 LoRaWAN GWs geolocation testbed in London

Expertise
- short-range: 802.15.4, BLE, RFID, NFC, WuR
- long-range: LoRa, LoRaWAN, Sigfox, NB-IoT
- multi-radio platforms
- testing and benchmarking methodology
- test plans and reports



# Writing convincing IoT project proposals

Read Section 5.3 Evaluation and score carefully !

EXCELLENCE IMPACT QUALITY BUSINESS CASE

- Remember that projects are for up to 12 months **only,** add Gantt charts , make sure you plan for prototype building (component lead times…), measurements against initial objectives/metrics during pilot and second version based on pilot results.

- Show progression through TRL levels over time. Might include plan for BOM optimisation, design to cost, pre-certification for example.

- Add a risk mitigation table. Pilots rarely go without hiccups (to setup and to run), so be realistic and think about what might cause deviations from original plan,
e.g., network/communications, Cloud setup, etc.

- Be realistic about timeframes (Add contingency factor) and remember that it will also take time/manpower to get familiar with platforms and more importantly write the deliverables.

# University of Ljubljana

**Jure Trilar | Researcher and project developer**

# IoT technologies overview

University *of Ljubljana*
Faculty *of Electrical Engineering*

internet INSTITUTE

| | |
|---|---|
| Electrical switch with Ethereum support | *Prototype supporting interesting use-cases* |
| Colibri IoT prototyping platform | *Open source platform* |
| iMon – Intervention Monitoring System | *IoT in specific scenarios* |
| rMon – IoT Sensing Automation System | *Industrial IoT* |

# SWETHER - Electrical switch wih Ethereum support

- **Function**: IoT-Blockchain Prototyping kit
- **Principle:**
  - End-to-end prototype kit
  - Control electrical switch via blockchain transactions
- **Application cases:**
  - charging of electric vehicles,
  - arbitrary control of IoT devices,
  - device-to-device transactions and interactions.

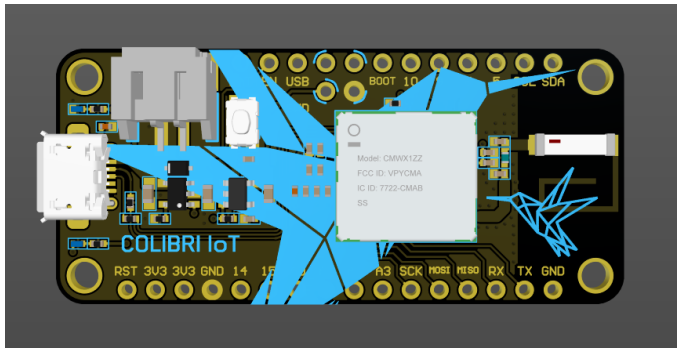
- **Maturity/TRL:**
  - Technology Readiness Level
  - 1 2 3 4 5 6 7 8 9


University of Ljubljana
Faculty of Electrical Engineering

swether
electric switch with ethereum blockchain support
www.ltfe.org/swether

# Colibri IoT prototyping

- **Function**: Open IoT sensor platform and implementation consulting
- **Principle:**
  - For Students and Teachers
  - Community Dashboard
  - Arduino based( w/ LoRaWAN) + extensions
- **Cases:**
  - Smart City,
  - Smart Agriculture,
  - Smart Industry…
- **Maturity/TRL:**
  - Technology Readiness Level
  - 1 2 3 4 5 6 7 8 9




COLIBRI IOT

Open-Source STEM Platform

www.colibri.st

Made in SLOVENIA

University *of Ljubljana*
Faculty *of Electrical Engineering*

# iMON – Intervention Monitoring System

- **Function:** Critical communications in public safety
- **Principle:**
  - Real-Time Common Operational Picture(RT-COP)
  - IoT-supported intervention management tools
  - On-site sensing, tracking and reporting
  - Real-time video transmission from the field (apps, drones)
  - Filed/infrastructure surveillance with drones
  - Survivable, scalable and robust communications from the field
  - Compact portable/in-vehicle5G-ready(in-a-box) communications node
  - Real-time and advanced analytics
- **Maturity/TRL:**
  - Technology Readiness Level
  - 1 2 3 4 5 6 7 8 9

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Faculty of Electrical Engineering

Internet INSTITUTE

# rMON – IoT Sensing Automation System

- **Function**: Automated measurements of distributed IoT-based systems
- **Principle:**
  - Autonomous gateway and system operation with zero data loss
  - High-availability based on distributed measurement output streaming
  - Centralised cloud-based management with GIS support
- **Key Performances:**
  - Ruggedized design for industrial and outdoor environment
  - Modular IoT gateway capabilities (WiFi, 2G, 3G, 4G, 5G, NB-IoT, Ethernet)
- **Uniqueness:**
  - Over-the-Air control of IoT gateways and sensor deployments
  - Real-time analytics and KPI visulisation

- **Maturity/TRL:**
  - Technology Readiness Level
  - 1 2 3 4 5 6 7 8 9

University of Ljubljana
Faculty of Electrical Engineering

internet INSTITUTE

# Ikerlan

Ruano Jesus Miguel

# IKERLAN **KONNEKT**

## YOUR 360º SOLUTIONS FOR INDUSTRIAL DIGITIZATION

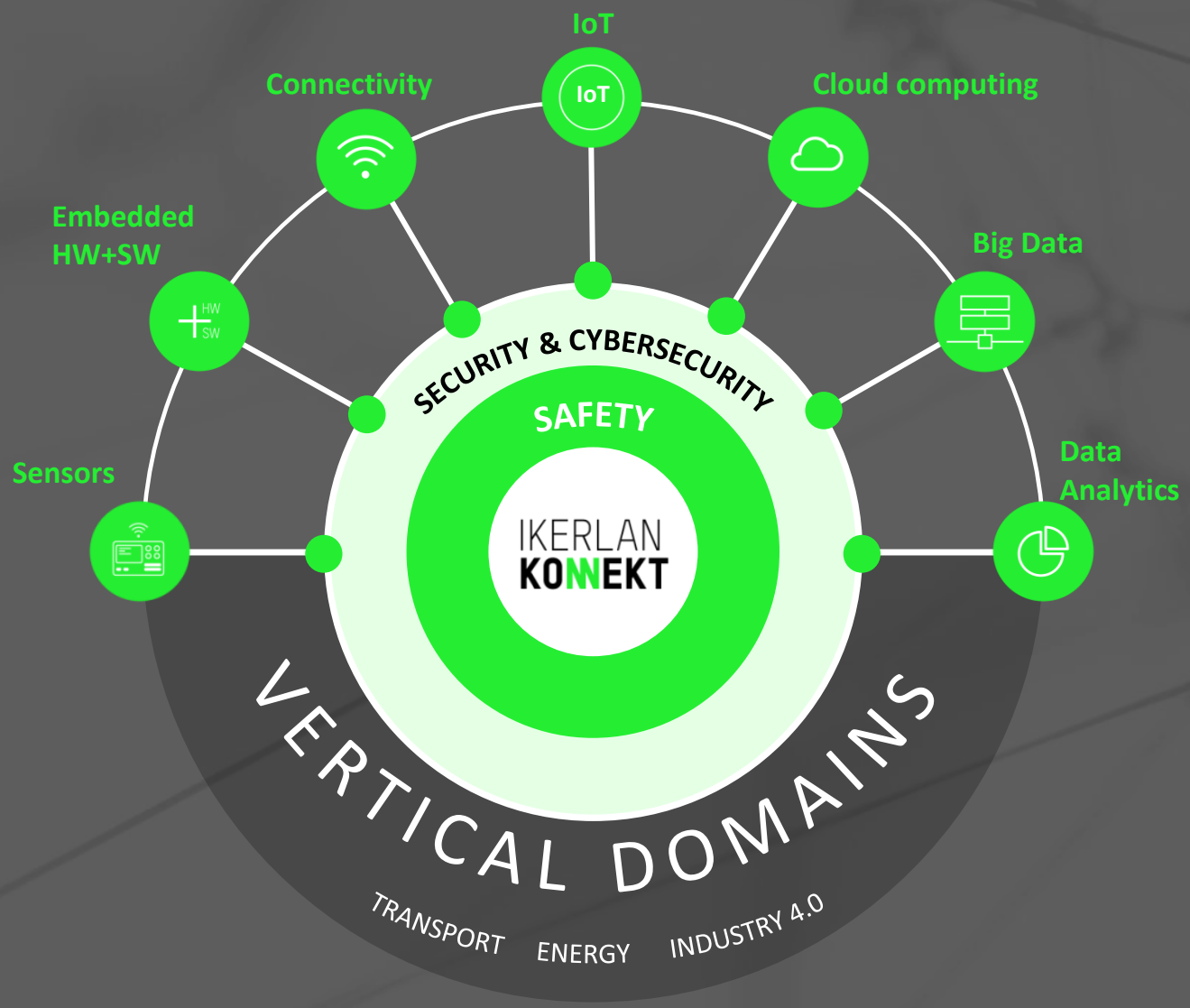
**IKERLAN.**
WHERE TECHNOLOGY
IS AN ATTITUDE

IKERLAN KONNEKT

# WHAT IS IKERLAN KONNEKT?

IKERLAN KONNEKT is a family of digitalisation solutions that adapts to the specific needs of each company. It covers all the necessary elements to be able to offer you a Digital Platform, integrating elements of own development and third-party applications that adapt to your business strategy of digitalisation.


IKERLAN KONNEKT solutions have already been successfully implemented in a dozen of industrial applications in sectors as demanding as equipment, transportation or energy.




# A FOCUS ON DIGITAL PERSONALISATION

Industrial digitalisation requires a whole chain of technologies that allow you to capture, send and process the information of your products / services (from the sensor to the cloud) in a totally secure way, so that only you can access, modify and extract value from your data.

Your business is different from others and you have individual needs. This is why you need a different and adapted technological solution. Only a specialist in EICT technologies (Electronics, Information and Communication) as IKERLAN can offer you the solution you need, thanks to its more than 150 specialized engineers.

# TECHNOLOGIAL SPECIALISATION

IKERLAN KONNEKT

## IoT

IoT and IIoT systems over short and long-range networks in licensed frequency bands and LPWAN technologies in non-licensed bands.

## Connectivity

Wireless solutions for industrial applications and distributed control in real time.

## Cloud computing

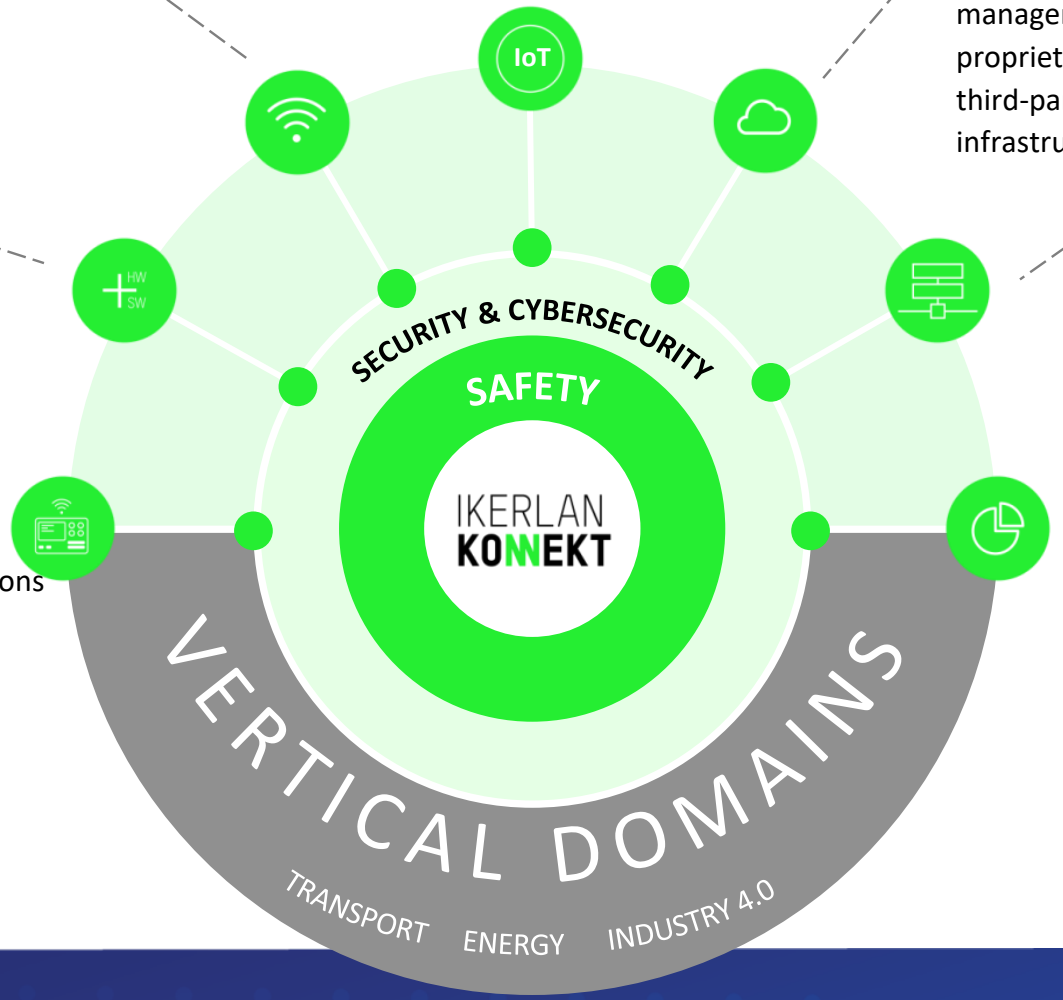
Definition and management of proprietary, hybrid or third-party infrastructure.

## Embedded HW+SW

Embedded systems with functional, non-functional and extra-functional requirements (security, safety).

## Big Data

Ingest management and control of massive data flow, streaming and batch management, backend and frontend applications.




## Sensors

Capture systems for extreme conditions (hostile environments and difficult accessibility) and low consumption.

## Data Analytics

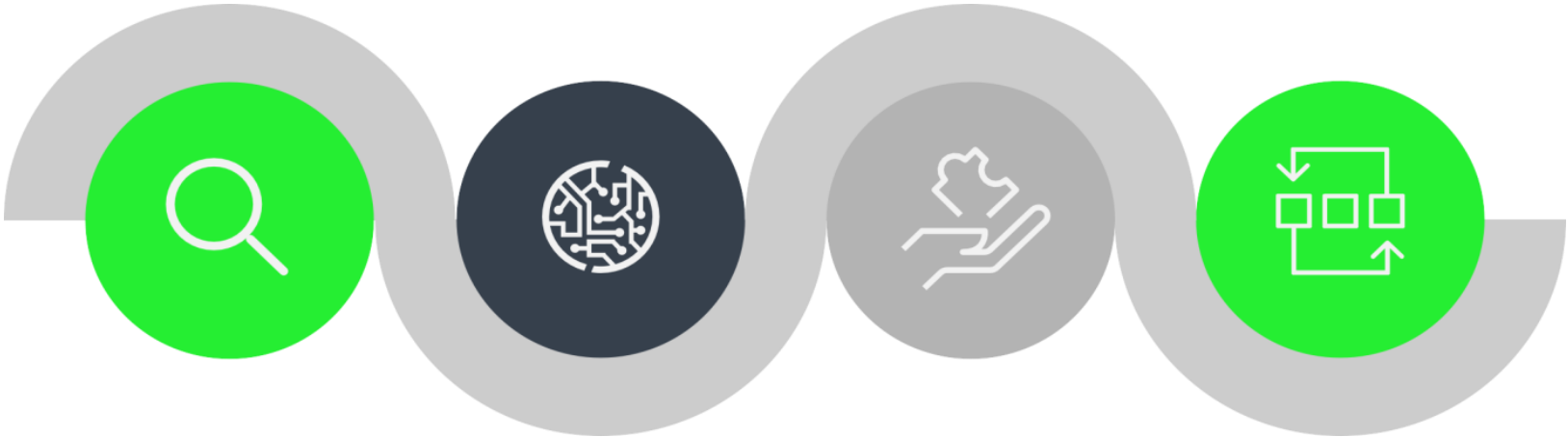
Descriptive analytic based on verification of heuristic rules and data mining techniques. Predictive analytics based on statistical models and prediction techniques.

IKERLAN KONNEKT

# IKERLAN KONNEKT: THE SOLUTION THAT ADAPTS TO YOU.

–

Your company needs a specific digitalisation process, exclusive for it, that respects its particularities and its ability to address the transformation. That's why, based on IKERLAN KONNEKT, we developed for you an absolutely optimal solution thanks to:



**WE ANALYSE AND UNDERSTAND YOUR PARTICULAR NEEDS. "MULTISECTORAL KNOWLEDGE"**

**WE ARE EICT TECHNOLOGIES SPECIALISTS, COVERING ALL THE TECHNOLOGICAL VALUE CHAIN**

**THE BEST SOLUTION FOR YOU: "COMBINING OWN AND THIRD PARTY DEVELOPMENTS"**

**INTEROPERATATIONAL SCALABLE OT/IT CONVERGENCE**

IKERLAN KONNEKT

# ADVANTAGES OF IKERLAN KONNEKT

## INTEROPERABILITY

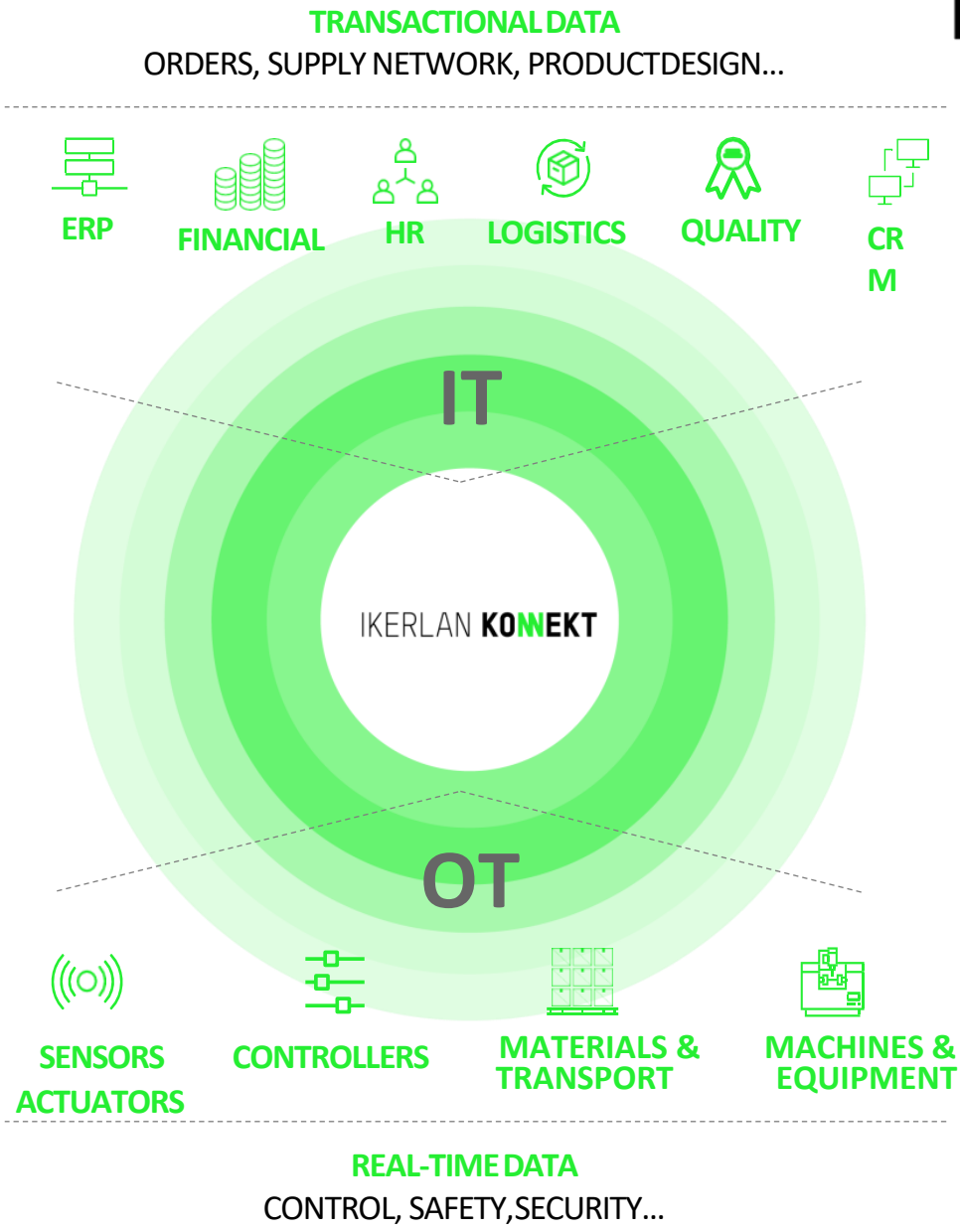
Designed for your product to be related to other products and integrated into the processes and digital platforms of your clients, guaranteeing interoperability and scalability.

## SCALABILITY

Designed to respond to fleets or parks of growing connected equipment, maintaining the quality and the capacity of management and storage of the data derived from them.

## OT/IT CONVERGENCE

Able to optimally integrate IT technologies, oriented to data computing, with OT technologies, oriented to the monitoring and control of industrial processes and equipment.



Industrial experiences

# ALSTOM

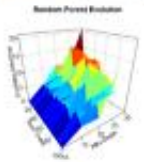
## ENERGY SECTOR

Digital platform in the cloud for multiparking from SCADA info.

Real-time big data volume consumption.

Real-time turbine damage prediction algorithm.

Real-time calculation of operation and maintenance indicators (OEE).

Industrial experiences

# FAGOR ARRASATE

## INDUSTRIAL EQUIPMENT SECTOR

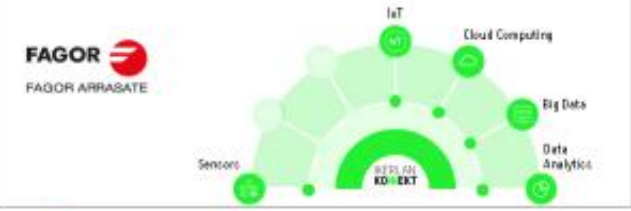
IoT digital platform for industrial services.

Real-time data input from presses around the world.

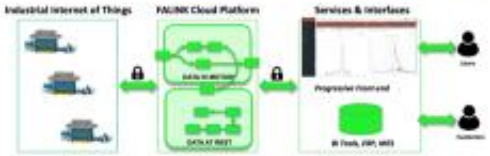
Calculation of relevant indicators.

Algorithms for advanced press monitoring (hits curve, consumption curve, etc.).

Platform with multi-business technology base (automotive, steel, appliances...).








Industrial experiences

# ORONA

## ELEVATION / VERTICAL TRANSPORTATION SECTOR

Digital Platforms oriented to the exploitation of the conservation business.

Sensorization in critical elements (CBM: Condition Based Monitoring).

Structural monitoring.

Industry 4.0 oriented Cyber Physical Systems.

Cybersecure connectivity systems IoT/IIoT.

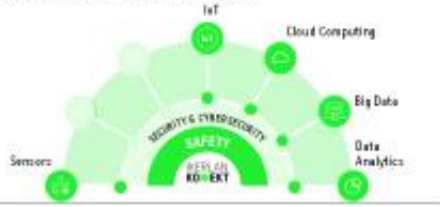
Intelectual property and communications protection (security + cybersec)

Predictive maintenance.

Products and services integration in the cloud.

Fleet of 500,000 lifts worldwide (50,000 with teleservice)

Orona








Industrial experiences

# ULMA

## LOGISTICS SECTOR

Digital platform for fleets of automatic warehouses. Multi-business deployment, multi-warehouse.

Focus on advanced services (SAT and logistics.) Real-time processing up to 100,000 events/sec.

ULMA Handling Systems


# IKERLAN KONNEKT

## YOUR 360º SOLUTIONS FOR INDUSTRIAL DIGITIZATION

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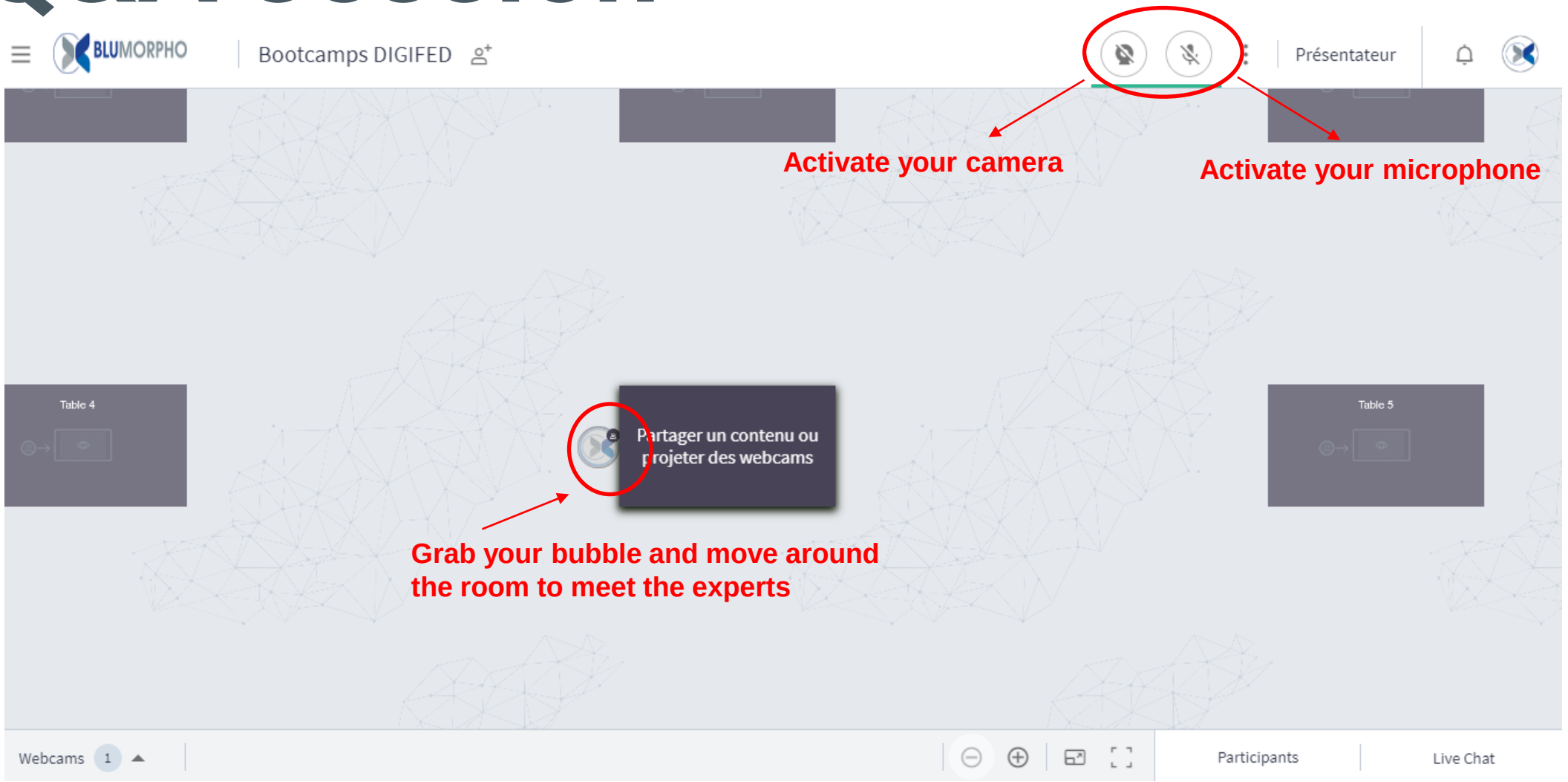
IS AN ATTITUDE

# ST (Fr, I)

Antonio Lionetto & Marcello Coppola

# Introduction to the Q&A session

# Q&A session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Présentateur
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Activate your microphone
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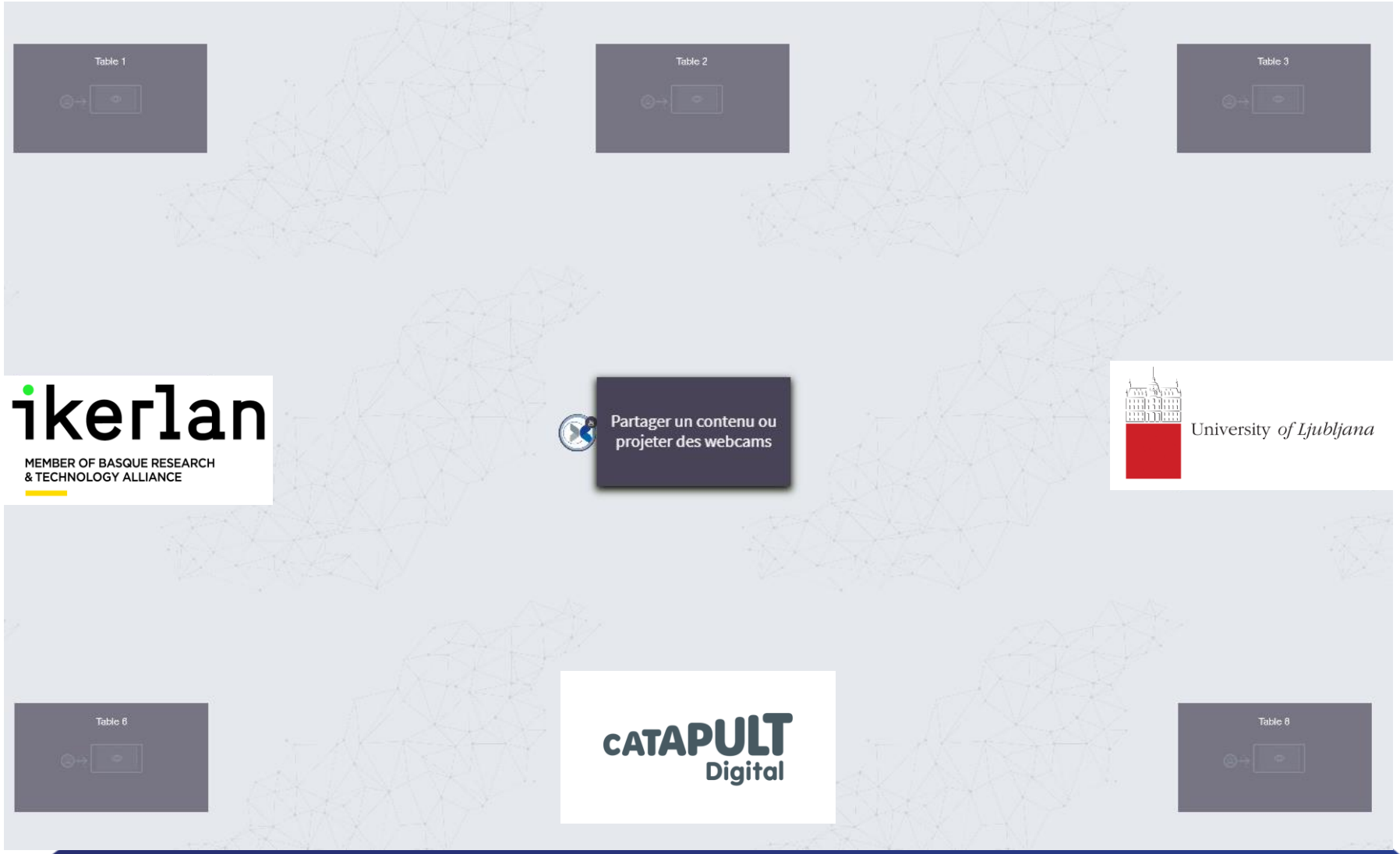
Table 5
Grab your bubble and move around the room to meet the experts
Webcams 1
Participants
Live Chat

# Q&A session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& TECHNOLOGY ALLIANCE
Partager un contenu ou
projeter des webcams
University of Ljubljana
Table 6
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Table 8