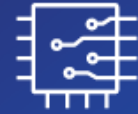




Expertise



Advanced
Technology



Competencies



Funding

Digitising Europe's Industry Together

Technical offer Webinar

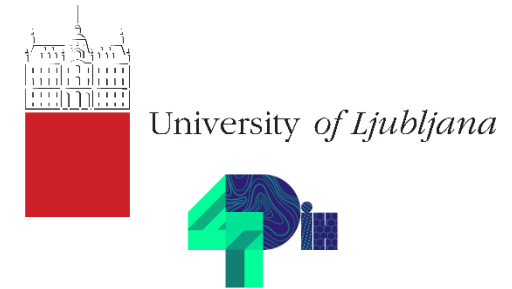
24/03/2020



Innovative
Solutions



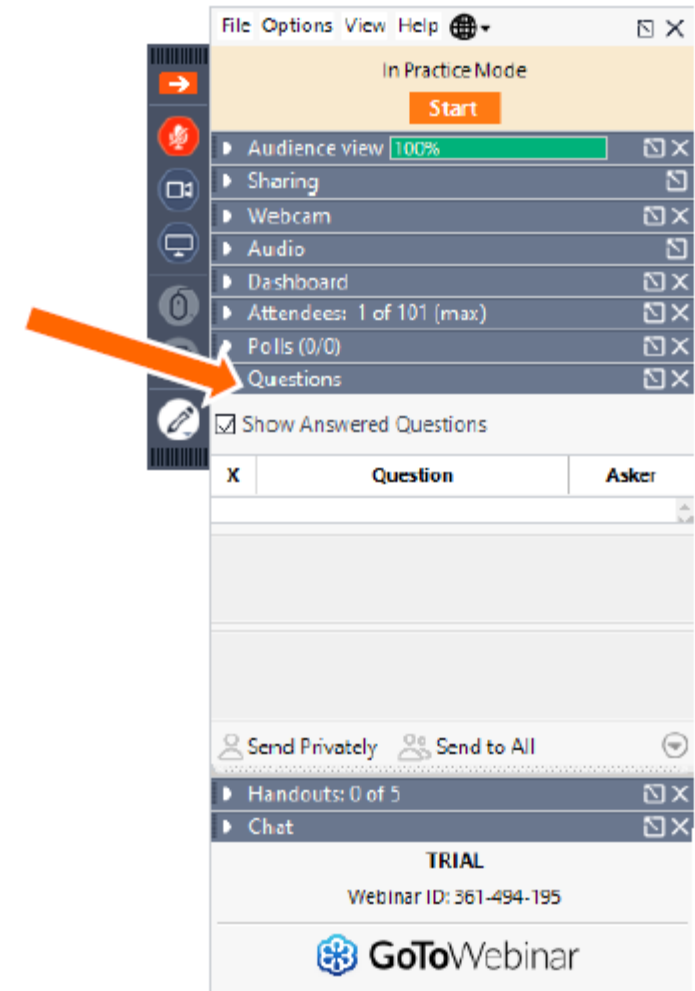
Welcome



Before we start

- This webinar will be recorded & published
- During the webinar you can use the question box to ask all your questions, we will answer them during the Q&A session at the end
- After the webinar, the slides will be available for download on the Digifed website :

<https://digifed.org/>



What is DigiFed?

DigiFed is a EU funded innovation action on the H2020 programme

Drive innovation across European SMEs via large scale adoption of Cyber Physical Systems (CPS) & embedded Systems

12 Partners from 9 European Countries

Duration: 3 years, 01 January 2020 to 31 December 22,

Cascade Funding: € 3.9 million in direct support for SMEs and MidCaps



DigiFed offer :



“Application Experiment” projects

- 55k€ Funding to carry out Digital product / service demonstrators
- Technical expertise & innovation management expertise

2 types of Application Experiments

- SINGLE: a company has the idea of an innovation, clear market vision, need technical support to validate the concept and partners up with a DigiFed member (up to 55 k€)
- TWIN: two companies partner up: the first one has the idea of an innovation and technical support is provided by the second company (up to 110k€, 55k€ each)

DigiFed Open Calls

40 projects will be funded

3 open calls for projects

- 1st call : opened 17/03/2020 and closes on 09/06/2020 at 5pm.

What happens next :

- Evaluation committee in june/july
- Confirmation of the selection by European commission in July
- Notification of selection 4 & 5 of August
- Contract signature & kick off of the experiment in september



Apply to one of
3 rounds of
open calls

www.digifed.org
for more info

How to apply ?

- All information available on the website at <https://digifed.org/explore/>
- 1st step : register on the website
- Then submit 2 files before the 9th of June, 5pm :
 - 1 written proposal, technical oriented
→ 10 pages document
 - 1 recorded pitch, business oriented.
→ 5 minutes video



Criteria to be eligible

- **To submit on time**
- **To submit a cross-border proposal**
 - 2 organisations from different countries
- **Company profile:**
 - Start-up / SME / Mid-cap
 - Required resources for implementation
 - Agree to sign the standard contract if selected
 - Based in EU member state or EU associated country*

(https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf)

FAQ : UK entities remain eligible for grants and procurement procedures as if the UK was a member state for the entirety of the Horizon 2020 framework programme and previous framework programmes. This also applies for to financial support to third parties according to Article 204 FR (cascading grants), and applies for the duration of H2020 projects.

Funding conditions

- 70% of the budget (declared costs)
- Max of 55 k€ per company per project
- Max of 100 k€ per company if DigiFed multiple projects
- Max of 100 k€ FSTP funding per company under SAE and I4MS (H2020)

As per European Commission's rules, financial support will not be awarded for work previously or currently funded under any other (Regional, National or EU) programme.



Upcoming important dates

Event	Date
Launch of the first open call	17/03/2020
Bootcamps programme (might be online)	To be defined
Closing of the first open call – Application Deadline	09/06/2020 5pm
Notification of selection to all companies	04 - 05/08/2020

Future Networks Lab

- **Function:** Digital Catapult's Future Networks Lab has been created to support the adoption of IoT, LPWAN and 5G technologies.
- **Principle:**
 - Lab based network access to a variety of IoT network technologies including LoRaWAN, SigFox, NB-IoT and LTE-M as well as 5G
 - Access to a larger outdoor LoRaWAN test network in London, Northern Ireland and in other parts of the UK
 - Access to a 5G test network in Brighton as well as other live networks through operator relationships in the UK
 - Access to expertise and equipment for evaluating energy consumption

- Access to expertise and environments for performance evaluation of future network protocols
- **Uniqueness:**
 - Only lab that combines access to these network testbeds
 - Unique partnerships of Digital Catapult, BT, PTC, IBM, ServiceNow, Semtech, Siemens and Texas Instruments

Maturity/TRL:

- Technology Readiness Level



Applications:

- Benchmarking of a solution/product with respect to other products/solutions on the market
- Identification of product improvements and support for product roadmaps



AI Compute, Machine Learning and AI Ethics Capability.

- **Function:** Artificial Intelligence and Machine learning can enable new services and innovations. However, smaller and medium AI startups often lack the resources to test their solutions at large scale. By offering access to compute resources, either cloud based or physical machines at our offices, Digital Catapult can help to alleviate this issue.
- **Principle:**
 - Time and support on internal infrastructure (access to two DGX1 servers)
 - Ethics Support
 - Combined AI/IoT Technical support
 - Access to cloud credits/vouchers
- **Uniqueness:**
 - In AI specific solutions, Digital Catapult already supported over 70 startups across multiple industries
 - Access to resources provided by Google, Nvidia, AWS

- **Maturity/TRL:**

- Technology Readiness Level



- **Applications:**

- Support early stage AI startups to bring new products to market in an ethical and efficient way
- Access to compute for resource constrained startups/smaller SMEs
- AI ethics advice for startups, smaller and larger SMEs

STM32



STM32 keeps on releasing creativity

- **Function:**
- The Brain of Many IoT and IIoT Applications
- Complete Portfolio to Cover all Market Needs
 - 15 product series / More than 50 product lines
 - 5 product series / More than 50 product lines

Maturity/TRL:

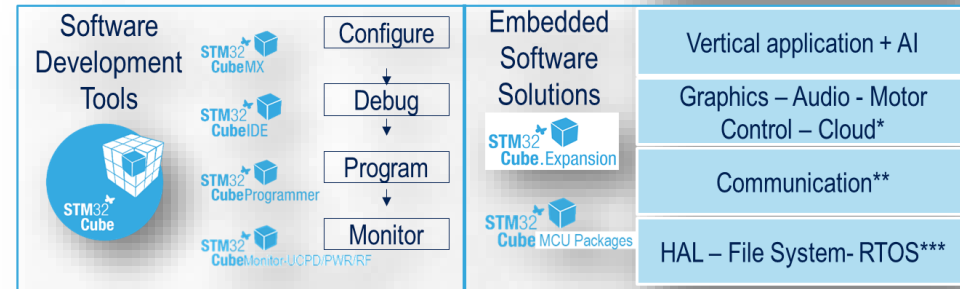
- Technology Readiness Level



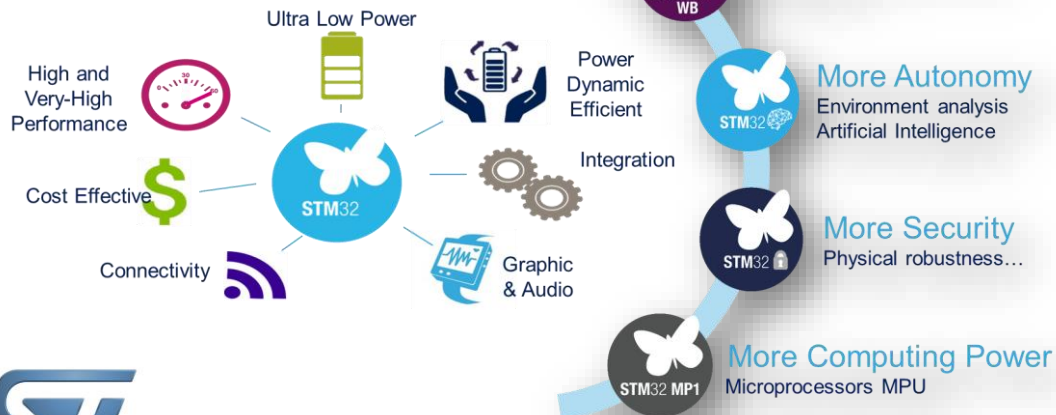
- **Applications: Smart Industry, Smart City, Smart Home, Smart Things**



User Application

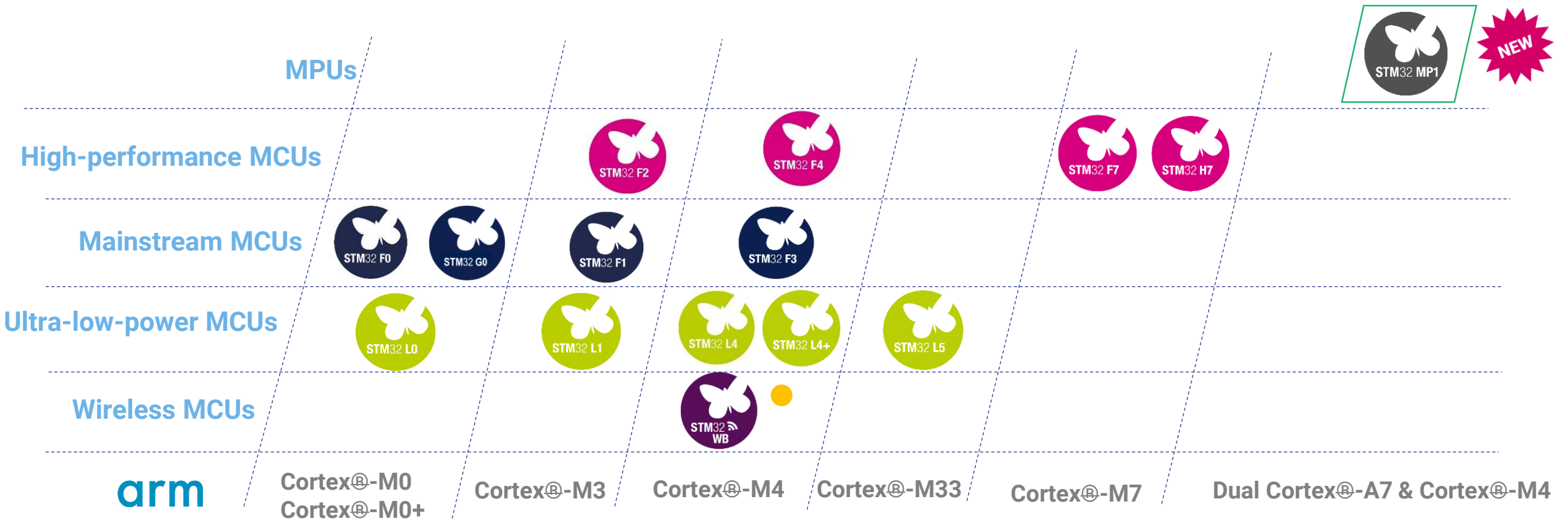


Uniqueness



Current STM32 Offer for DIGIFED

15 product series / More than 50 product lines

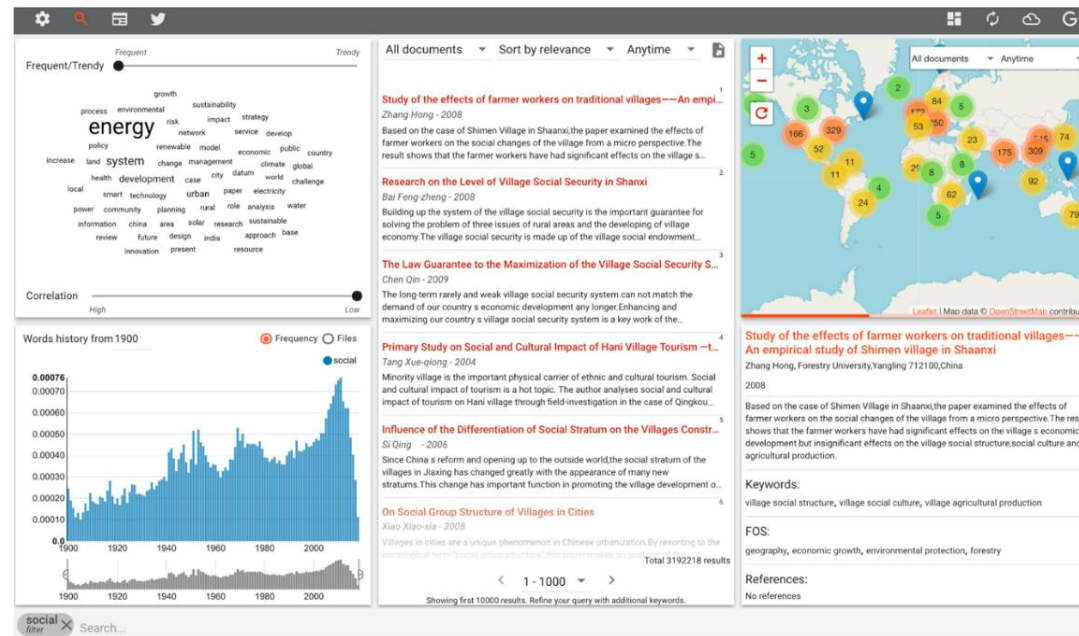


percipio<BigData> analytics tool

- **Function:** Big Data Analytics Tool: „Find the (un)known unknowns and discover new insights!“
- **Principle:**
 - Context selection
 - Correlation and trends dashboard
- **Key Performances:**
 - Sources
 - 250M tech and sci articles
 - Patents
 - Web and social media

Maturity/TRL:

- Technology Readiness Level



SWETHER - Electrical switch with 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

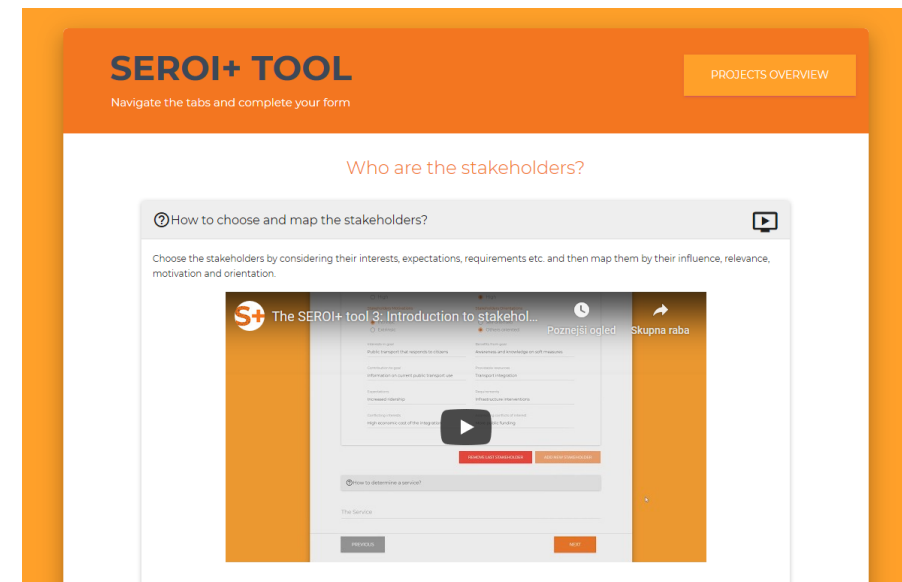


Designing effective digital solutions with stakeholders

- **Function:** Methodology and tool, co-creating service
- **Principle:**
 - SEROI+ methodology combines socio-economic and environmental return on investment (SEROI) assessment with open innovation (OI):
 - Planning
 - Stakeholder engagement
 - Co-creation
 - Assessment

- **Maturity/TRL:**

- Technology Readiness Level

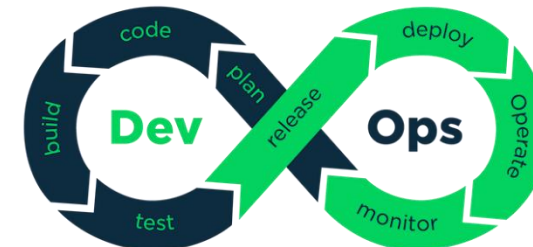
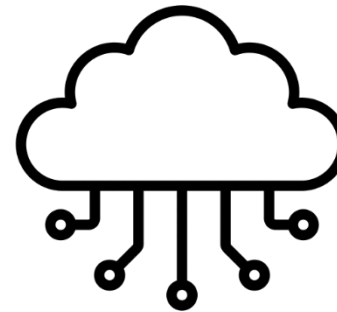


Cloud DevOps Design & consultation service

- **Function:** Cloud technology consulting
- **Principle:**
 - Automation Design
 - Custom implementation
 - business models:
 - SaaS
 - Massively scalable IoT platforms
 - Business intelligence automation
 - software development contexts
 - Software Development Life-Cycles

- **Maturity/TRL:**

- Technology Readiness Level



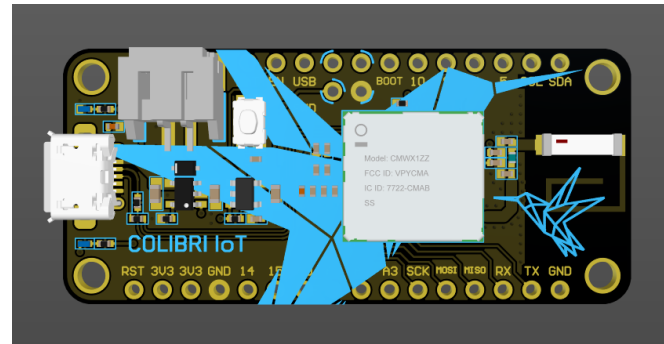
University of Ljubljana
Faculty of Electrical Engineering

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



COLIBRI IOT

Open-Source STEM Platform

www.colibri.st

Made in SLOVENIA



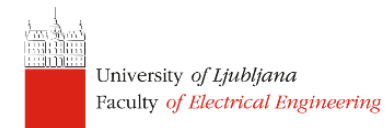
University of Ljubljana
Faculty of Electrical Engineering

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

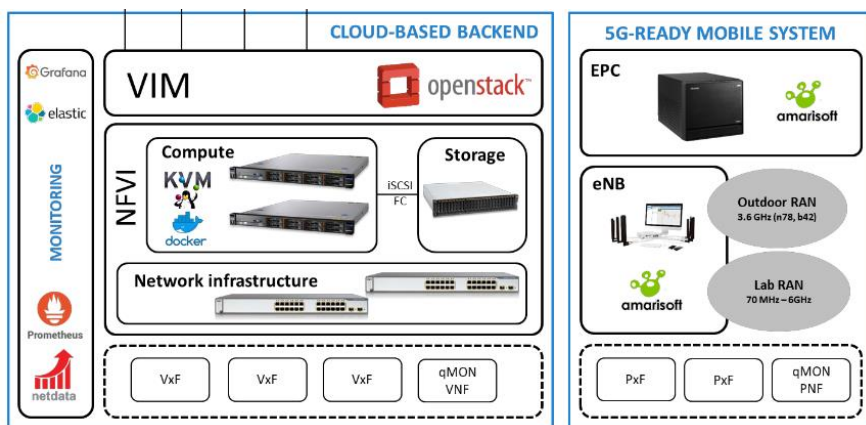


PPDRone – 5G training and experimentation facility

- **Function:** Portable 5G communications training node
- **Principle:**
 - Get real-world & hands-on experience with 5G technologies
 - Build basic and advanced 5G expertise
 - Run 5G experiments

- **Maturity/TRL:**

- Technology Readiness Level

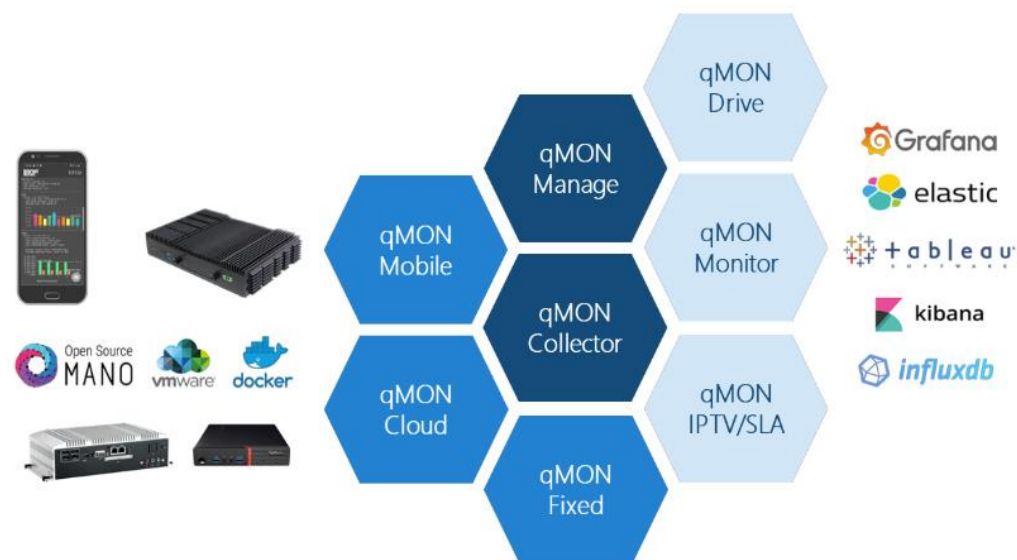


qMON – Quality Monitoring System

- **Function:** A powerful and affordable solution to deliver the next generation of quality assurance in telco environments
- **Principle:**
 - Centralized cloud-based device management
 - Centralized KPI collector deployed on site or in the cloud
 - Network agents for active user and services emulation
 - Real-time monitoring and advanced cloud-based analytics

- **Maturity/TRL:**

- Technology Readiness Level



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



Information and Communication Technologies



IoT & Digital Platforms



Data Analytics & Artificial Intelligence



- **Short-range IoT connectivity:**
 - BLE, ZigBee, NFC, UWB, WiFi.
- **Long-range connectivity:**
 - *Non-licensed bands:* LoRa, Sigfox.
 - *Licensed bands:* 2G/3G/4G (NB-IoT, LTE-M) and towards 5G.
- **IoT / IIoT protocols and interoperability:**
 - MQTT, CoAP, DDS, LwM2M, AMQP, Websocket, NodeRed, etc.
- **Indoor** (UWB, BLE) **and outdoor** (GPS, GNSS, cellular) **location**
- **Intelligence of Things:**
 - IA + ML on edge nodes.

- **Smart Digital Platforms:**
 - Highly scalable.
 - Public, private and hybrid cloud architectures.
- **Artificial Intelligence and Data Analysis:**
 - Predictive maintenance.
 - Data Lakes for Data Analytics.
- **Data interpretability and AI-algorithms:**
 - Smart Digital Platforms
- **Smart Interaction with data platforms :**
 - Natural interaction with data (chatbots, etc.).
- **Development of platforms based on micro-services and “serverless”**

Dependable Embedded Systems

- **Function:** Development of dependable systems by experts on **safe software** engineering and **real-time electronics**
- **Principle:**
 - Embedded Systems development certified up to SIL4
 - Software development and virtualization for real-time control
 - Automated Testing and Validation (HiL)
 - Artificial vision for embedded safety
- **Key Performances:**
 - +20 years experience on electronic and safe embedded systems development
 - Safety Certified methodology (TÜV)
- **Uniqueness:**
 - +10 Functional Safety Engineers
 - 1 Functional Safety Expert (unique in Spain)
 - Referential on the development of advanced and safe functionality executed in complex chips (SoC, multicore, GPUs)

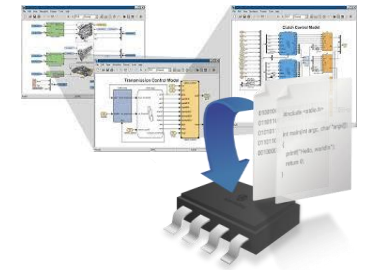
Maturity/TRL:

- Technology Readiness Level



Applications:

- Development of software for control-units on transport (e.g., traction, elevation)
- Development and validation of up to SIL4 certified applications (e.g., railway signaling)
- Virtualization of applications and plants (e.g., an elevation system)



HW and Communication Systems



HARDWARE SYSTEMS (HWS)

- **HW** developments:
 - **Sensorization** solutions
 - **Low consumption electronics**
 - **Signal conditioning**
- **SW** developments
 - **System software** (operating system, drivers)
 - **FPGA** and programmable logic
- **Integration** and assembly
 - Electronic cards mounting (**PCB assembly**)
 - **Extreme** conditions / hostile environments
- **Non functional** developments
 - **Standards** compliance
 - **Tests** and troubleshooting (**EMC**, electrical security, environmental)

COMMUNICATION SYSTEMS (KOS)

- **Industrial connectivity**
 - **Wireless & Wired** solutions for embedded systems
 - **Wired**
- **Real-time communications**
 - Applied to **industrial** control and sensorization
- **Antennas**
 - Design, simulation and characterization
- **Verification and validation**
 - Wireless communication systems

Industrial Cybersecurity

- **Function:** Protection of embedded electronic systems and digital platforms (from sensors to cloud)
- **Principle:**
 - Secure Product Development
 - Cybersecurity Evaluation
 - Industrial IoT Cybersecure Communications
 - Cybersecure Cloud and User Interfaces
- **Key Performances:**
 - Security Life-Cycle and Certification
 - Trust Technologies based on Distributed Ledger Technologies
- **Uniqueness:**
 - Certified methodologies and addressing compliance with product cybersecurity standards
 - Cybersecurity solutions covering the entire value chain: from the sensor, the electronics, the embedded software, the connectivity solution, the processing and data ingestion platform, to the analytics and its advanced display

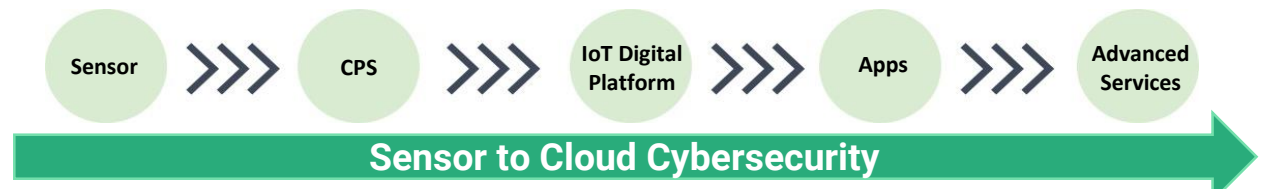
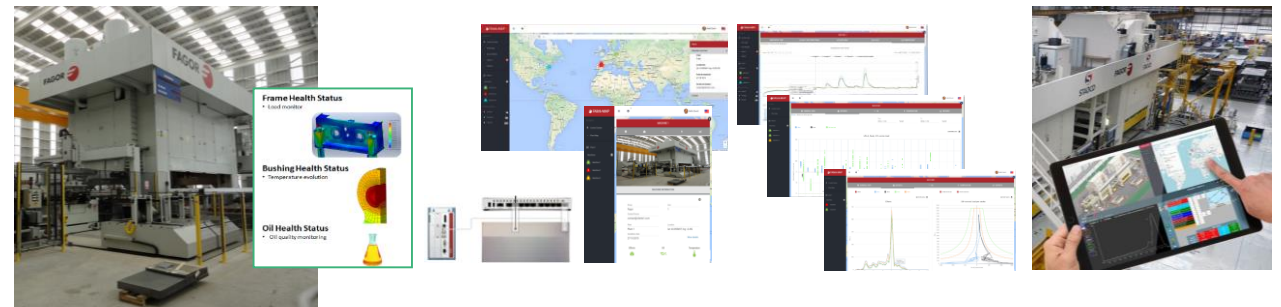
- **Maturity/TRL:**

- Technology Readiness Level



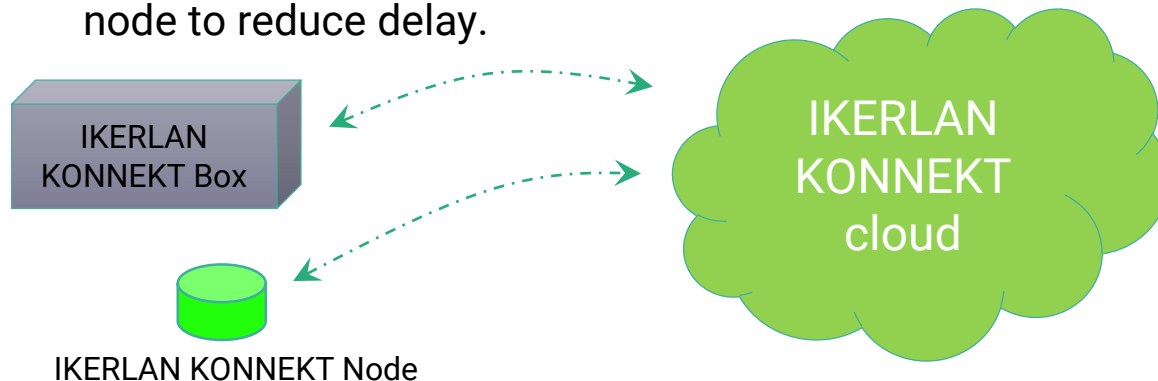
- **Applications:**

- Cybersecure embedded systems evaluation and development
- End-to-End Industrial IoT cybersecure communications
- Cybersecure digital platforms for CPS monitoring and



AI-powered Digital Platforms

- **Function:** Digital Platform to provide tools to develop AI-powered fog/edge-to-cloud solutions.
- **Principle :**
 - Fog/Edge-to-cloud dynamic architectures.
 - AI-powered Digital platform scenario.
 - Microservices oriented edge devices architecture.
- **Uniqueness:**
 - **Artificial Intelligence** → fog-to-cloud architecture.
 - **Microservices based architecture** → Deployment of AI-models to the edge.
 - **Edge computing** → Early analytics in the edge node to reduce delay.



- **Maturity:**



- Heterogenous cloud architecture (private, public and hybrid).
- Smart Data Lakes provisioning.
- Microservice-oriented service deployment.
- **Key performances:**
 - AI-powered Digital Platform.
 - Data Lake provision for Data analytics.
 - AI-powered predictive techniques.
- **Applications:**
 - Industry 4.0 & Smart Factories.
 - Smart Cities.
 - Smart Living and Ageing Well.
 - Smart Mobility.
 - Smart Buildings.
 - Etc.

AUTONOMOUS WIRELESS SENSOR NODE

- **Function:** detect temperature and acceleration events, wireless data transmission, energized by harvester
- **Principle :**
 - Several transducers for sensing
 - Indoor photovoltaic cells (off-the-shelf)
- **Uniqueness:**
 - **Zero power** → sense & harvest at the same time
 - **High processing capabilities** → no need of radiator and can be flexible
 - **Robust and synchronized** communications



- **Maturity:**



- Complete prototype (with RF) is working
 - Miniaturization in progress
 - Additional sensing and optimization in progress
- **Key performances:**
 - Sensing data local processing
 - Wireless robust coms (BLE, TDMA based)
 - Up to +-16us accuracy
 - **Applications:**
 - Smart logistics, smart factory: impact and temperature measurements
 - Industrial environment Indoor sensing

Safe and real-time software upon commercial HW

- **Function:** embed real-time and non-real time software on safety certified context.
- **Principle :**
 - Selection of multicore commercial HW
 - Integration of an embedded hypervisor
 - Software development based on modeling
 - Safety concept based on industrial machinery standard (ISO13489)
- **Uniqueness:**
 - Affordable cutting-edge HW
 - Simplification of complex SW development
 - Safety cognizant

- **Maturity:**



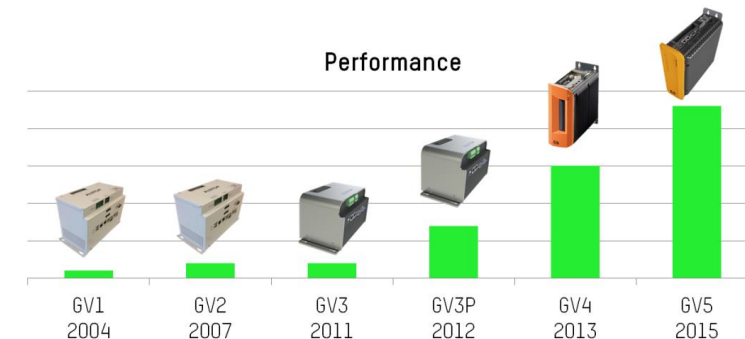
- Integrated in product

- **Key performances:**

- Safety up to PL-D level (SIL-2)
- x1,5 performance

- **Applications:**

- Wind-turbine control
- Operation monitorization
- Local recording of key variables



LEDbeSmart

- **Function:** complex testing, modelling and simulation methodology for LED luminaires to achieve reduced power consumption and improved reliability
- **Principle:**
 - Constant light output (CLO) control realized through multi-domain, embedded digital twin of the LED luminaire
 - Temperature compensation of the LEDs' driving current
 - CPS approach in the implementation: luminaires with communications & "self-awareness" (sensors + edge computing)
- **Key Performances:**
 - **Predicted annual power saving: ~8%**
 - With pre-compensation for LED ageing total power saving further reduced over the entire product lifetime
- **Uniqueness:**
 - CLO control scheme based on the LEDs' actual multi-domain characteristics
 - Prepared for future predictive maintenance approaches

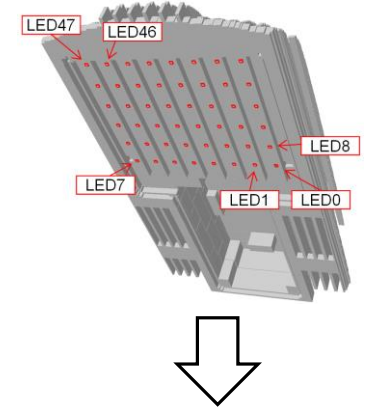
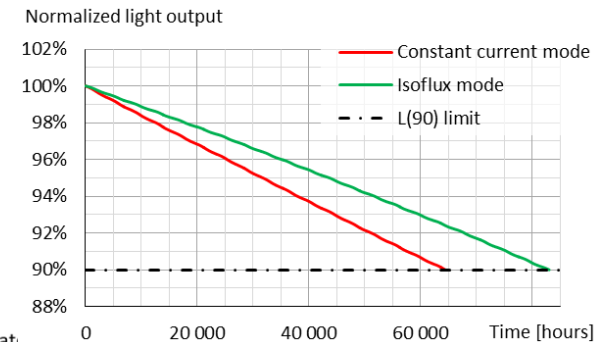
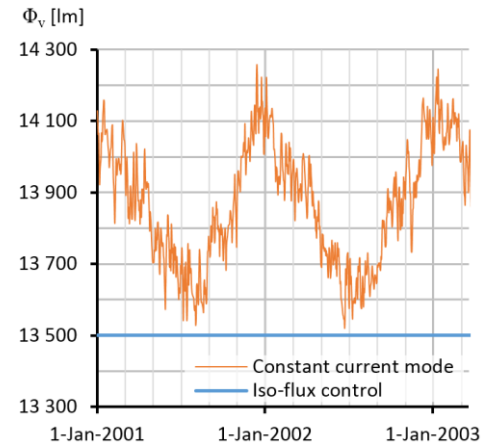
Maturity/TRL:

- Technology Readiness Level



Applications:

- LED based streetlighting / tunnel lighting
- Methodology can be adapted to other LED lighting applications such as automotive headlights

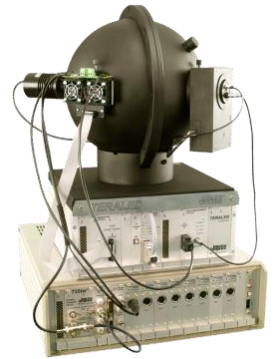


```
*THERMAL NET (N-port model)
.SUBCKT THNET LED0 LED1 ..
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*** LED0
Rth_LED0_0 LED0 0 27.9011
Rth_LED0_LED1 LED0 LED1 22
Rth_LED0_LED2 LED0 LED2 42
...
Rth_LED0_LED47 LED0 LED47 47
*** LED1
Rth_LED1_0 LED1 0 32.3491
Rth_LED1_LED2 LED1 LED2 25
Rth_LED1_LED3 LED1 LED3 48
...
Rth_LED46_LED47 LED46 LED47 47
Rth_LED47_0 LED47 0 48.9854
.ENDS THNET
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LEDbeSmart - methodology

LEDs tested according to the latest LED testing standards and recommendations (CIE, JEDEC)

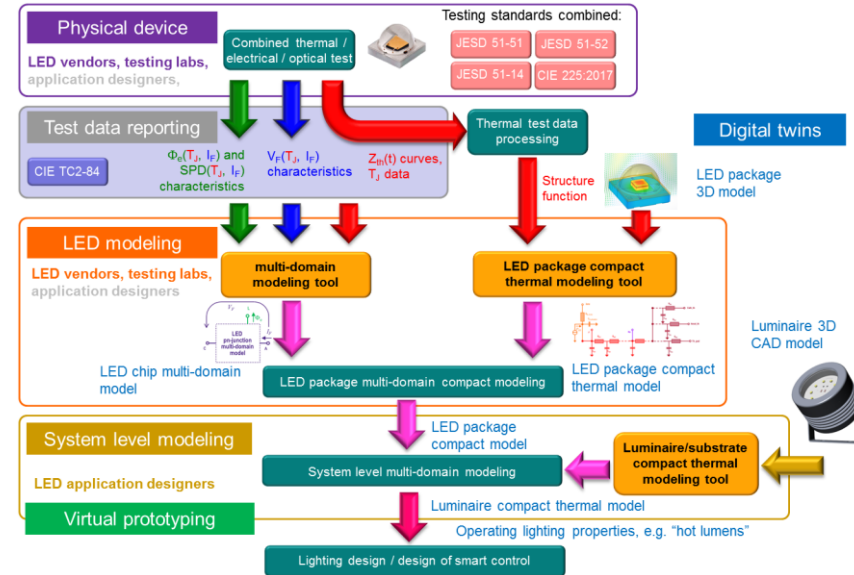


• **Principle:**

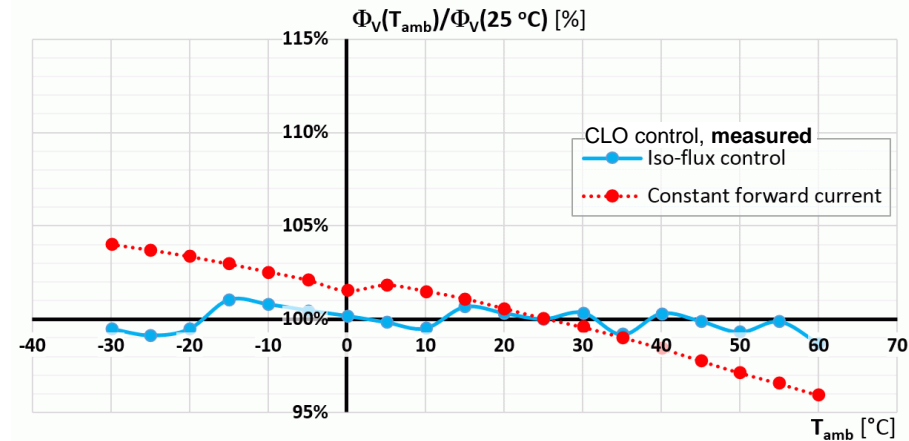
- Virtual prototyping using the Delphi4LED Industry 4.0 workflow
- Customer provides BME with LEDs to measure/characterize and model → LEDs' multi-domain digital twins for system level simulation
- Customer provides BME with luminaires' MCAD models → luminaires' system level compact thermal model for system level simulation
- BME performs luminaires' system level simulation to identify the $I_F(T_{amb})$ function that assures constant luminous flux output

• **Implementation:**

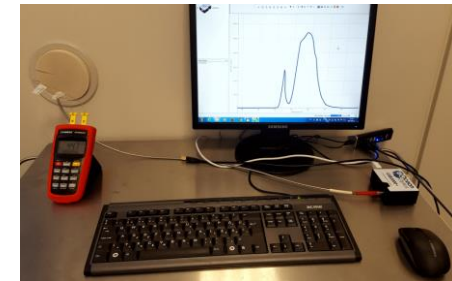
- BME and customer decide how to implement the in the actual luminaire the $I_F(T_{amb})$ function that assures constant luminous flux output
- Customer implements the corresponding embedded luminaire model
- BME provides test facilities to check the implementation



Relative Luminous flux vs. ambient temperature



Temperature dependence of luminaires' total light output tested in a climate chamber



Versatile Reliability Tester

- **Function:** The reliability test environment integrates a set of appropriate hardware and software components built around the de facto industry standard T3Ster equipment of Mentor Graphics. This versatile system monitors the electric, thermal and even optical parameters of the device under test during freely customizable test sequences.

- **Principle:**

- Power/temperature cycling
- In-situ thermal transient measurements and structure function analysis of the DUTs during cycling
- Options to measure other performance indicators of DUTs

- **Guidelines:**

- Environmental and endurance test methods for semiconductor devices: https://home.jeita.or.jp/tsc/std-pdf/ED-4701_100.pdf

- Whitepaper on an application:

G. Hantos, J. Hegedüs, M. Rencz and A. Poppe, ", **Aging tendencies of power MOSFETs — A reliability testing method combined with thermal performance monitoring**", The 22nd International Workshop on Thermal Investigations of ICs and Systems (THERMINIC), Budapest, 2016, pp. 220-223.

<https://doi.org/10.1109/THERMINIC.2016.7749055>

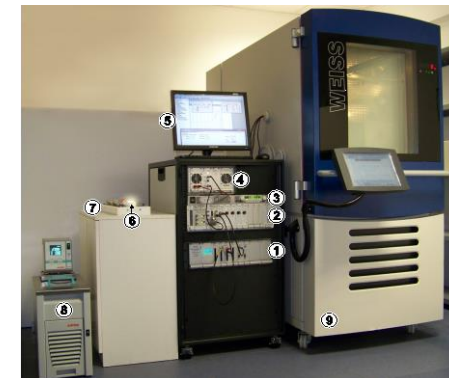
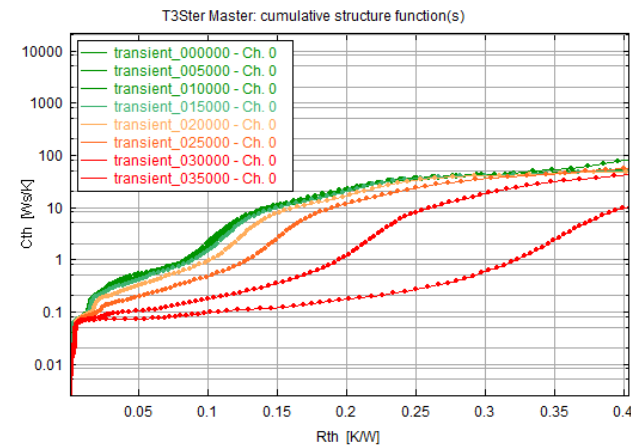
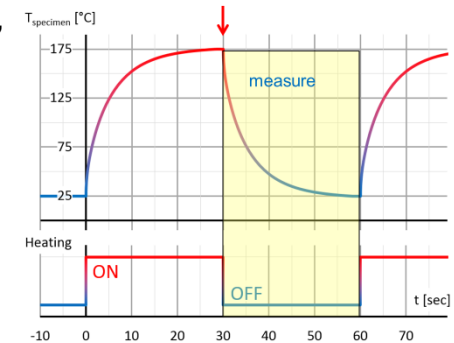
- **Maturity/TRL:**

- Technology Readiness Level



- **Applications:**

- Cycling and structural integrity test of RF modules, sensors, PSUs, drivers, LEDs, FETs
- LED luminaires' thermal assessment
- When designed properly, applicable to certain reliability assessment of DigiFED demonstration systems



#UnitedAgainstCovid19 action

- Support the fight against Covid-19
- Open call with no limitations : [here](#)
- All solutions will be assessed by Health Authorities
- Become a partner and promote the voluntary action
 - Social medias publications : [Twitter](#) and [LinkedIn](#)

- Lots of application sectors :

Handwashing solutions – Robotics solutions for disinfection – Community to keep the social link – Oxygenation – Machine learning and AI – Health Monitoring – Home Healthcare – Medication Management - Diagnosis – Medtech – Healthtech... all solutions will be considered.





Q&A SESSION

Time for you to ask your questions