



DAB SMART SOLUTIONS - UniPD

DEC 2024 |

Introduction IOT & Services

Marta Tejada –Services & Smart Solutions Business Owner

ABOUT DAB

We are a multinational organization specialized in water movement technologies.

Sustainability, reliability, innovation, are the distinguishing features of our technological solutions. We provide friendly technologies and smart solutions for all our different users.

**1700
PEOPLE**

**6
PRODUCTION
SITES**

**14
SALES
OFFICES**

**430M€
TURNOVER**



**RESIDENTIAL
BUILDING SERVICE**



**COMMERCIAL
BUILDING SERVICE**



**AGRICULTURE
AND IRRIGATION**



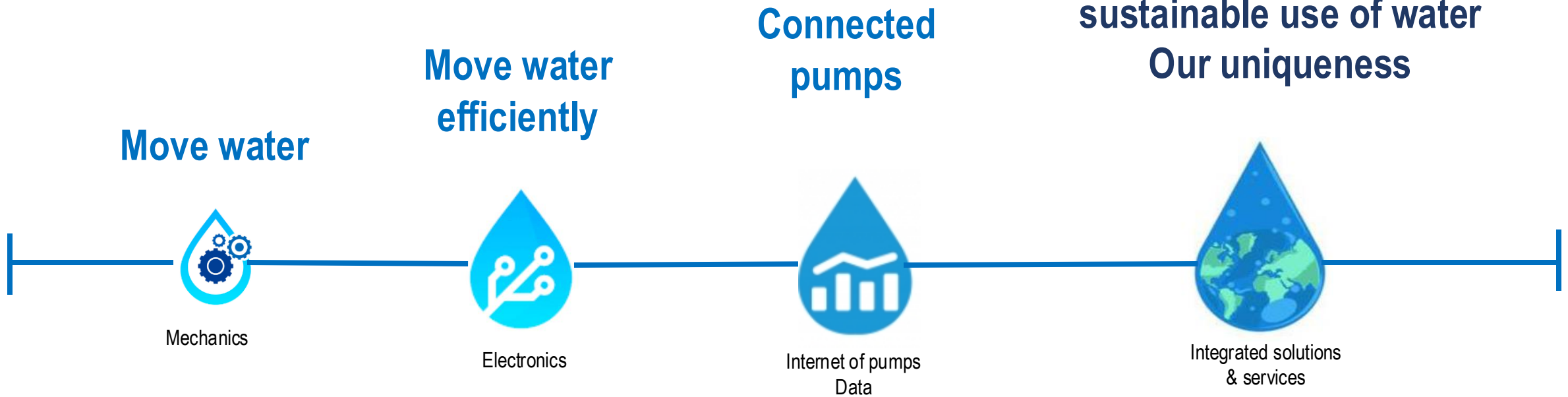
*"We care for the future
by promoting a culture
of growth and innovation
based on people,
technologies and the
environment."*



DAB VISION

MANAGE WATER

Conscious and
sustainable use of water
Our uniqueness



From Internet of Pumps to **Intelligence of Water**

DAB Digital Solutions - Offer Overview

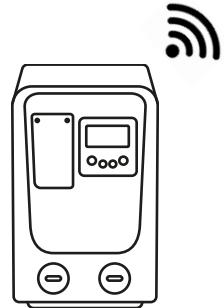
Different Targets, different solutions and benefits



Private users

Smart Solutions - Freemium

Smarter life
Comfort, Savings & Environment care



SMART PUMPS
& SYSTEMS

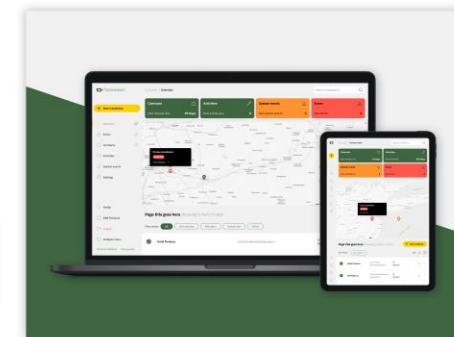


Professional users

Digital Services – Subscription based

Smarter work
All under control, anytime, anywhere.

D+CONNECT



Digital Solutions Figures – November 2024

Customer connected pumps

12.850

Previous month 12150



DAB Live! app downloads

21.600

Previous month 20400



DConnect app downloads

59.600

Previous month 57550



Unique active users

7.700

Second half 2023



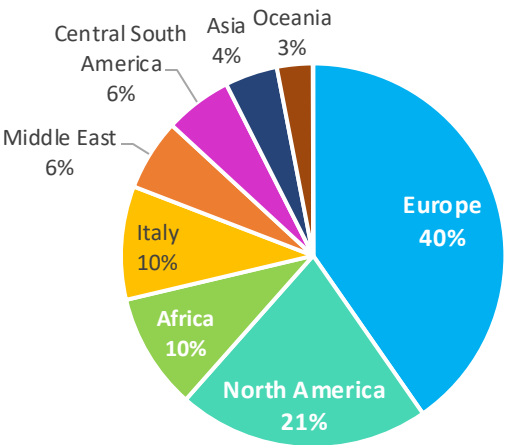
Logins

54.200

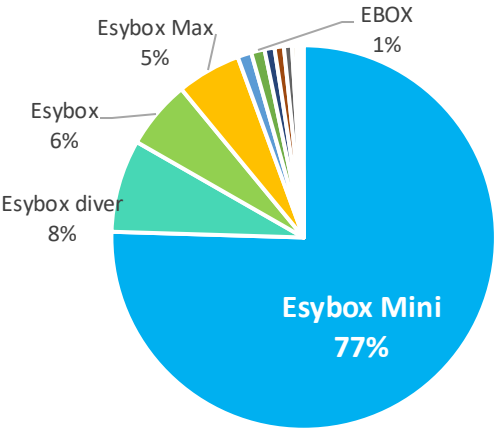
Second half 2023



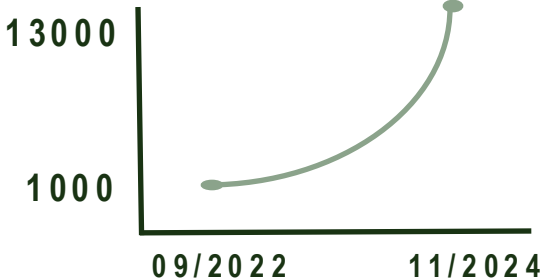
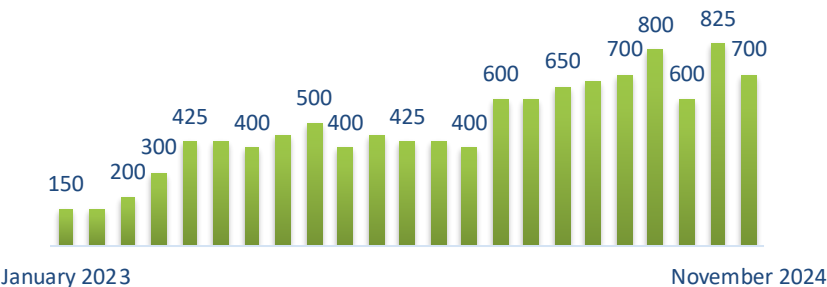
Customers connected pumps by area



Customers connected pumps



Monthly connected pumps



DAB Digital Solutions – Usage and Data Insights



Professional users



Families



53.000

Pump
disable/enable



45.000

Pressure setpoint
Changes (SP)



43.000

Restart
Pressure Changes (RP)



57.000

Power Shower
Activations



17.000

Sleep Mode
Activations



Digital Solutions
Database



770k

Alarms managed



2 Mln

Stored variables



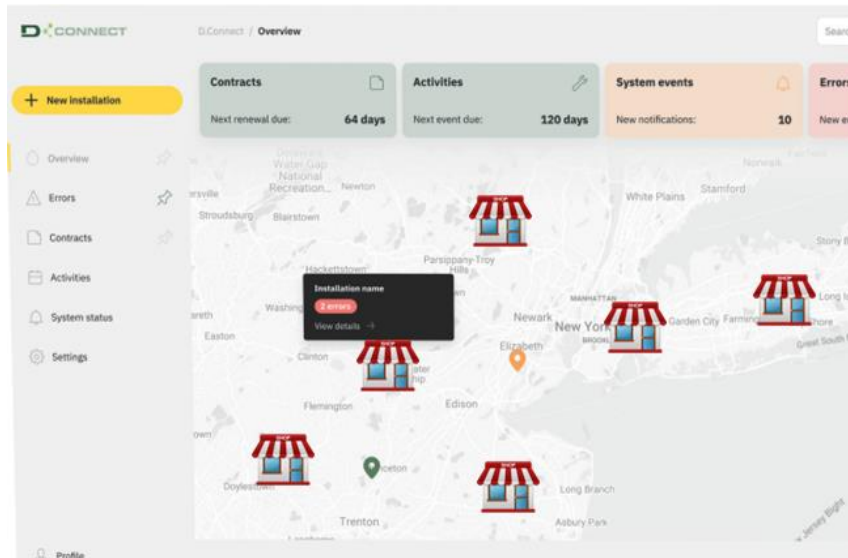


Culligan provides water treatment solutions in the food service application, together with installation and maintenance services as well.

Maintenance activities are currently managed through fixed periodical visits for ordinary maintenance and on site calls in case of issues.

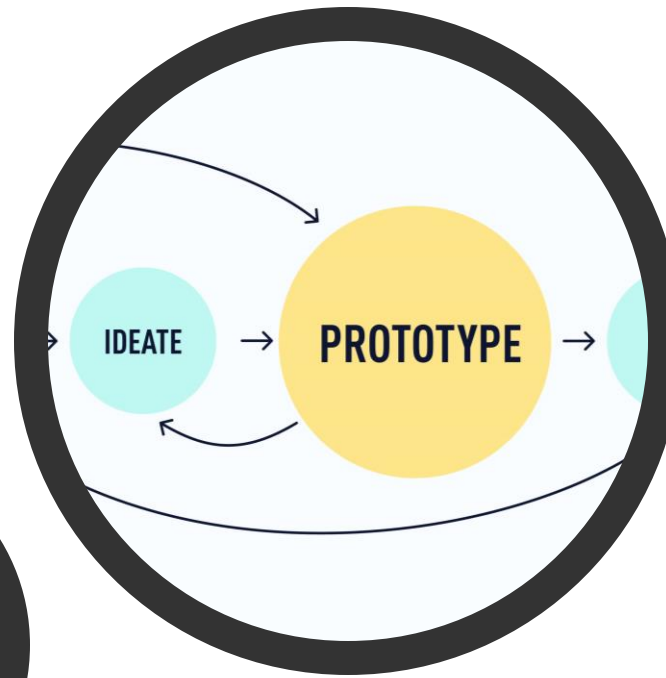
The introduction of DAB solutions allows to bring maintenance to a new optimized level

Morning! We've detected a malfunction over last night. Technician is on the way to restore the situation



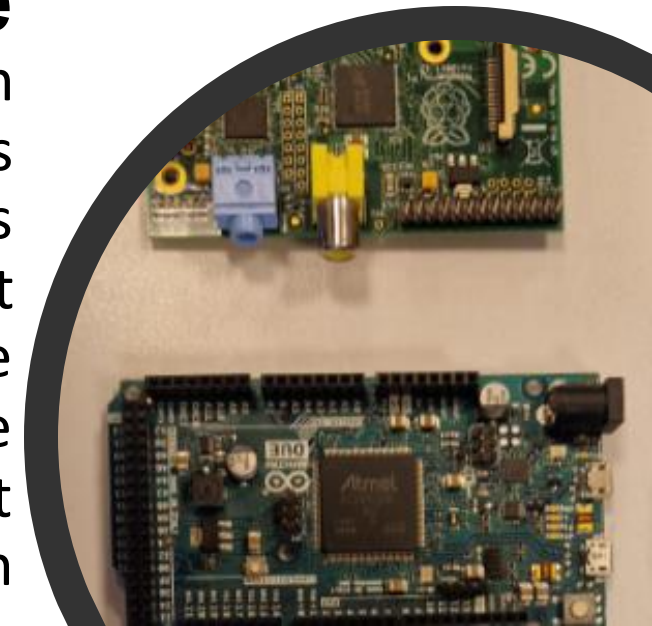
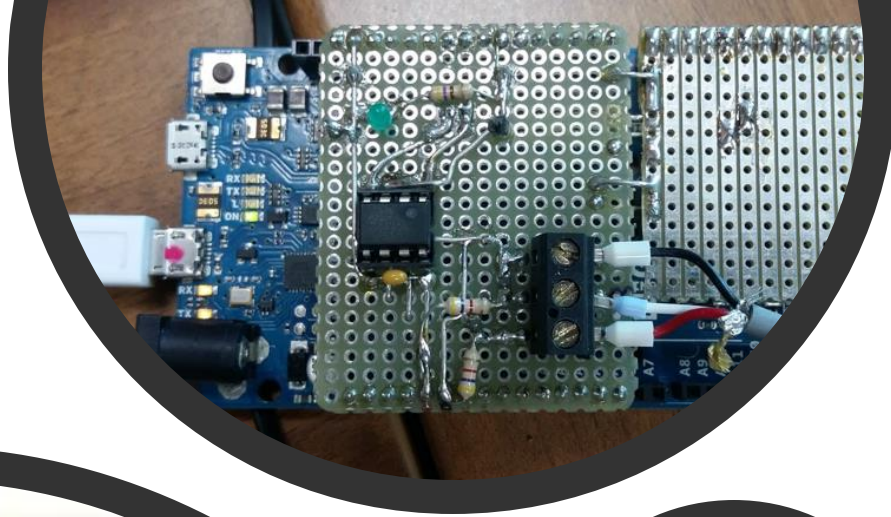
The Evolution of IoT Projects & System Overview

Fabrizio Lovino – IOT & Smart Solutions Manager

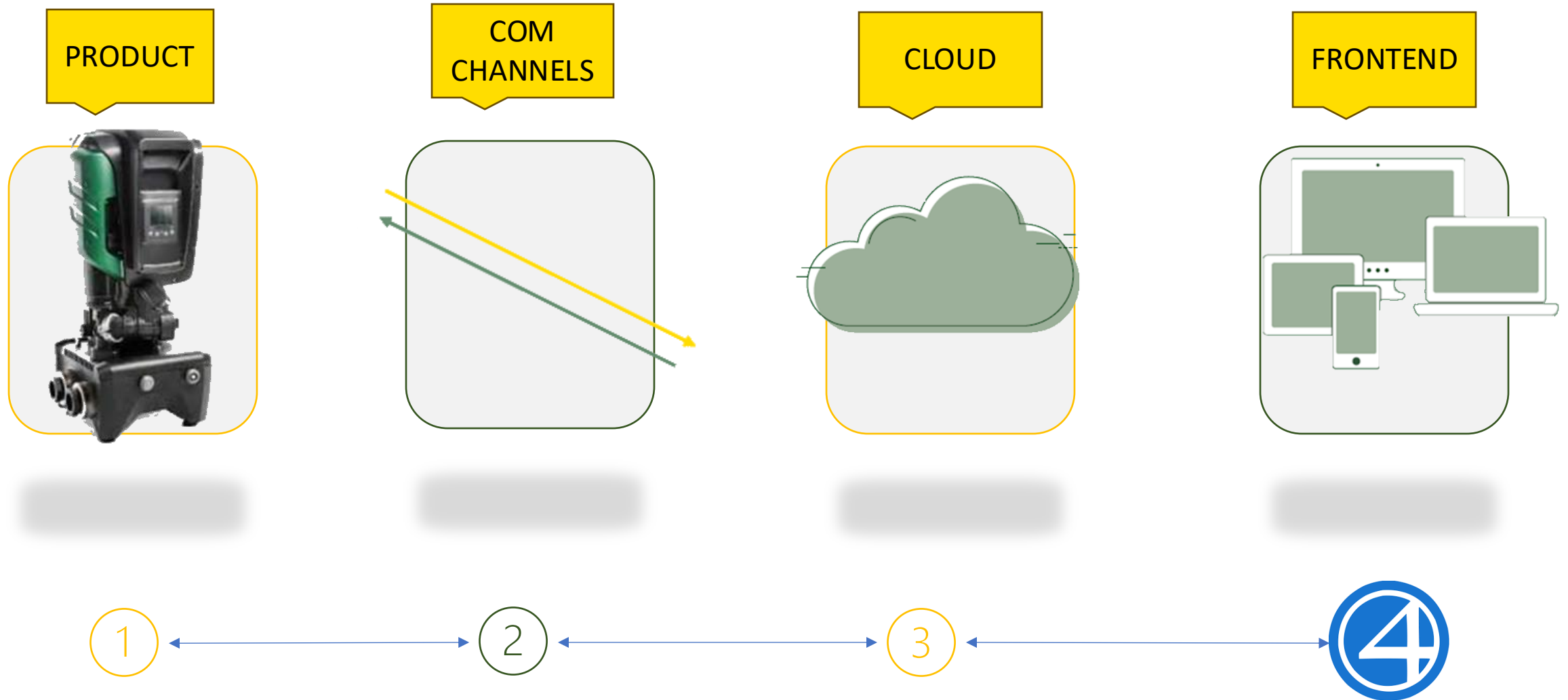


From Idea to Prototype

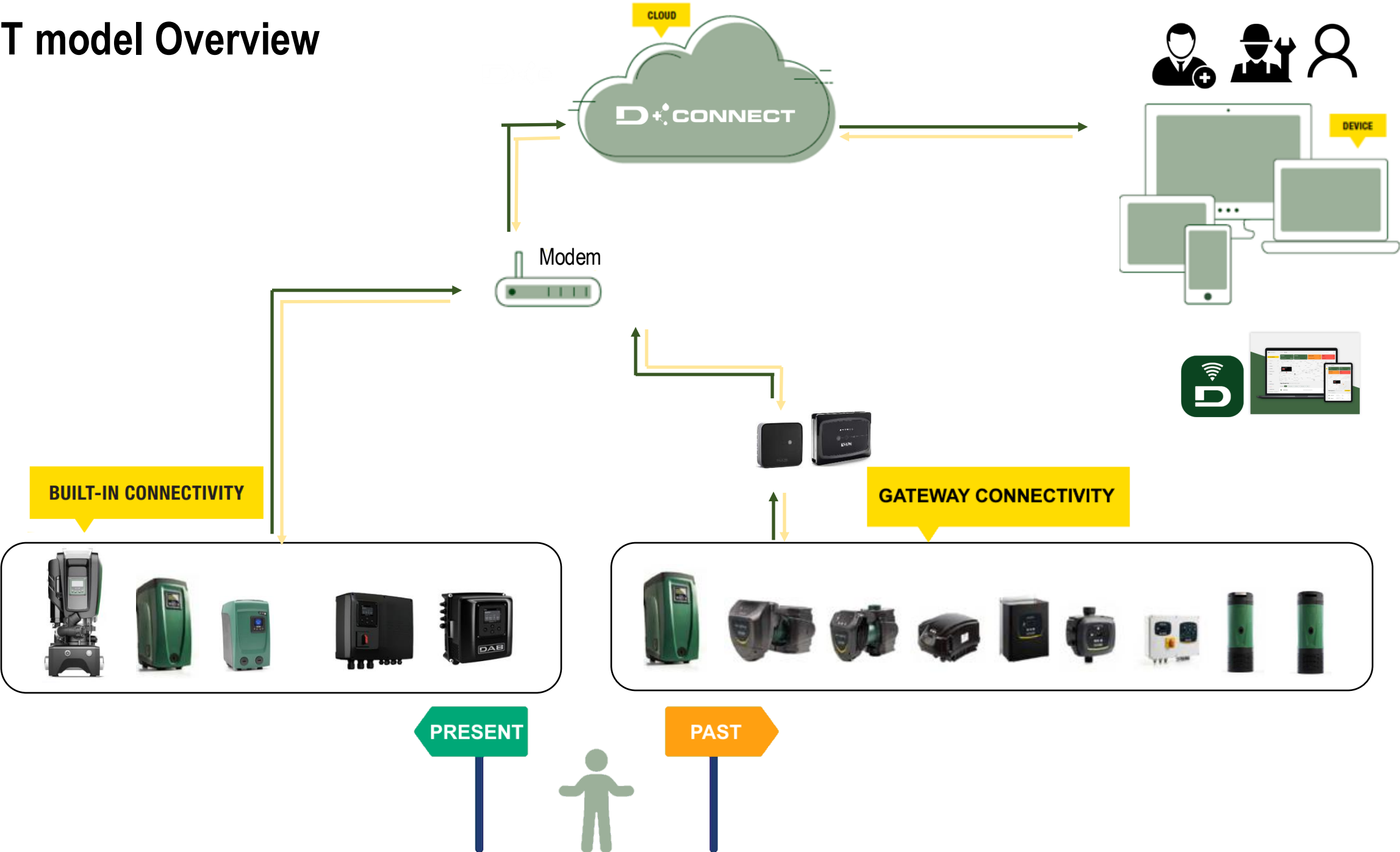
- Step 1: Identifying the Problem
- Step 2: Choosing Development Tools
- Step 3: Leveraging Existing Solutions
- Step 4: Developing the Proof-of-Concept
Software and Hardware
- Step 5: Testing and Validating the Prototype
- Step 6: Iteration and Refinement
- Step 7: Industrialization



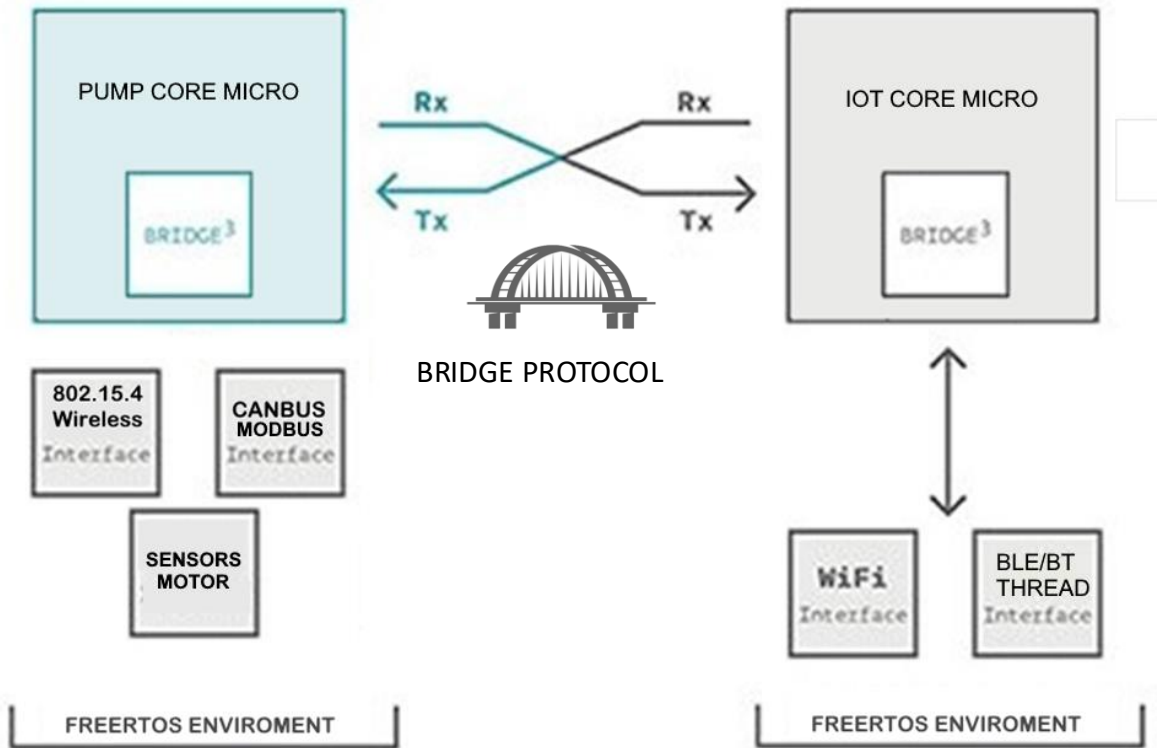
Major Components of IOT offer



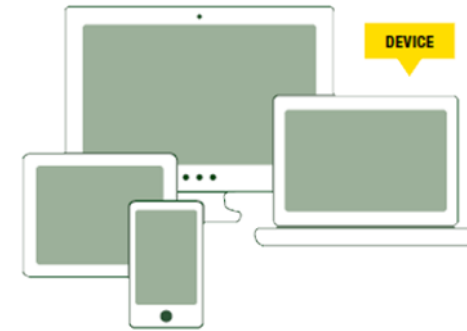
IOT model Overview



The Product: Built-in IOT Model



WEBSOCKET
RESTAPI
BLE GATT



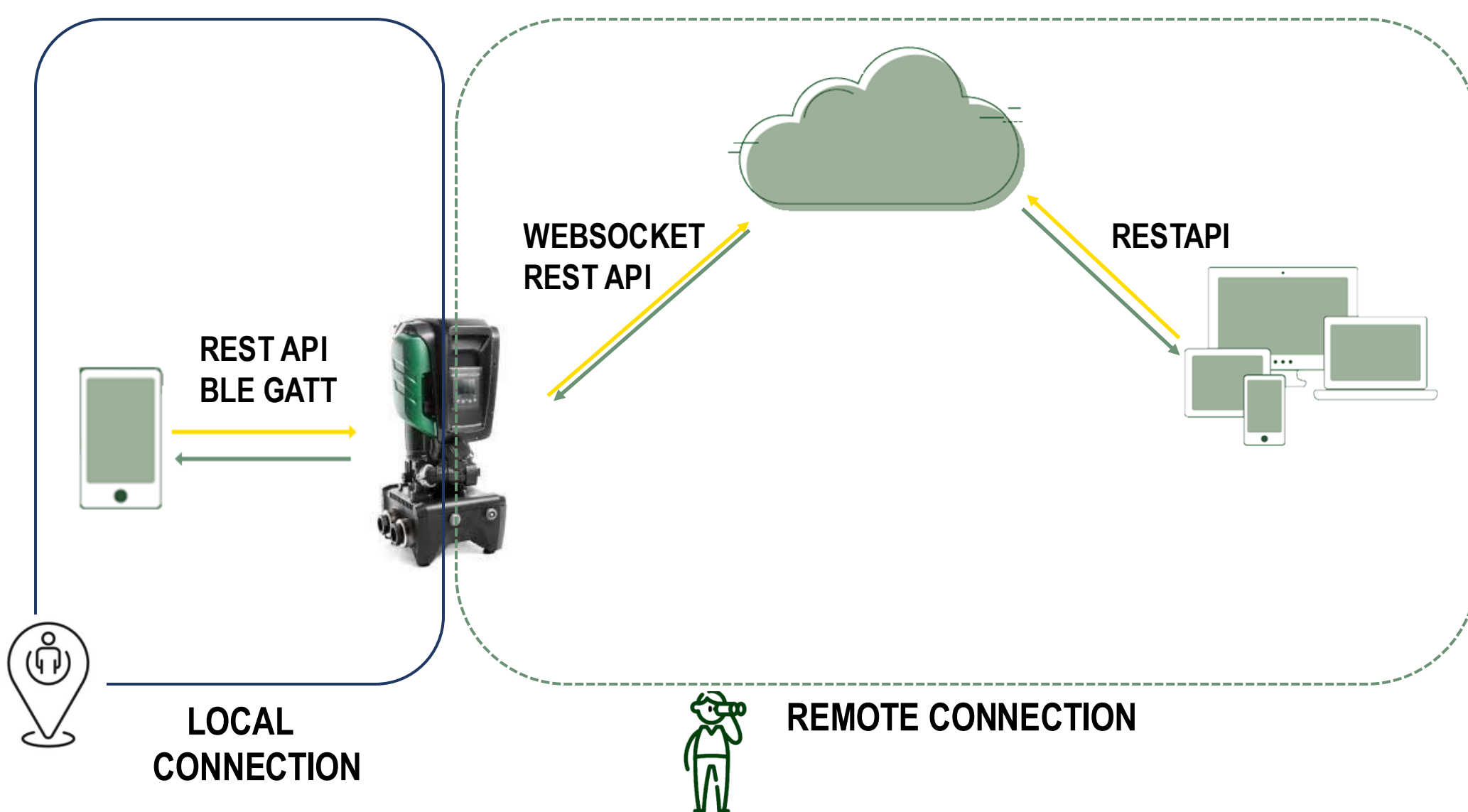
WebAPP & APP:
Remote control +
graphs, reports
& Rules/Trigger

PRODUCT



The Com Channels: Built-in IOT Communication Model

COM
CHANNELS



The Cloud: DConnect Cloud Architecture



GERMANY

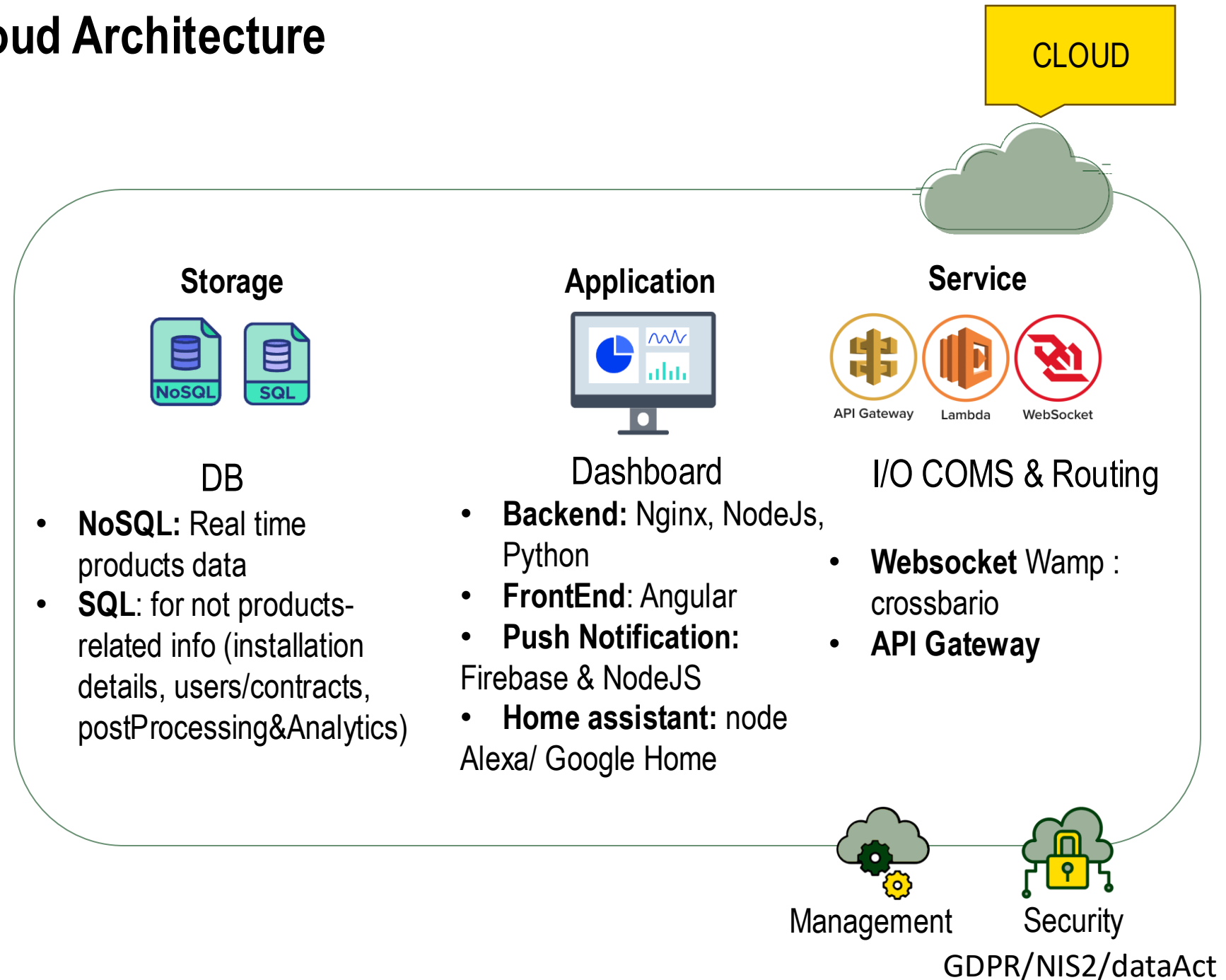
Nuremberg &
Falkenstein

CHINA

Qingdao

Total 16 Nodes

- 13 DB cluster
- 3 nodes for microservices
 - Dashboard
 - API for mobile application
 - IoT data ingestion
 - IoT device manager
 - App Push notification gw
 - Rule engine
 - Error detector



The Frontend: Mobile and Web Frontends for IoT Management

FRONTEND

Mobile Apps (Android & iOS)

Purpose:

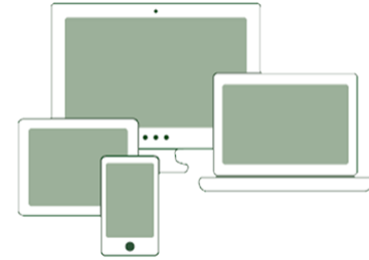
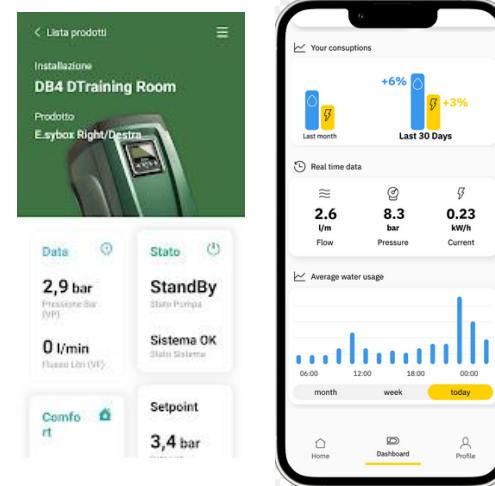
- Enable on-the-go monitoring and control.
- Provide real-time notifications and status updates.

Key Features:

- Access device metrics anytime, anywhere.
- Trigger immediate actions (e.g., turning a device on/off).
- Simple, intuitive interfaces for quick navigation.

Tech Features:

- Xamarin, Swift, Kotlin, React



Web App Dashboard

Purpose:

- Centralized management and in-depth visualization from office PCs.

Key Features:

- Interactive charts for data trends and analysis.
- Rule creation for automated alerts and actions (e.g., threshold anomalies).
- Manage multiple installations simultaneously.

Tech Features:

- AngularJs, Node



Seamless Ecosystem

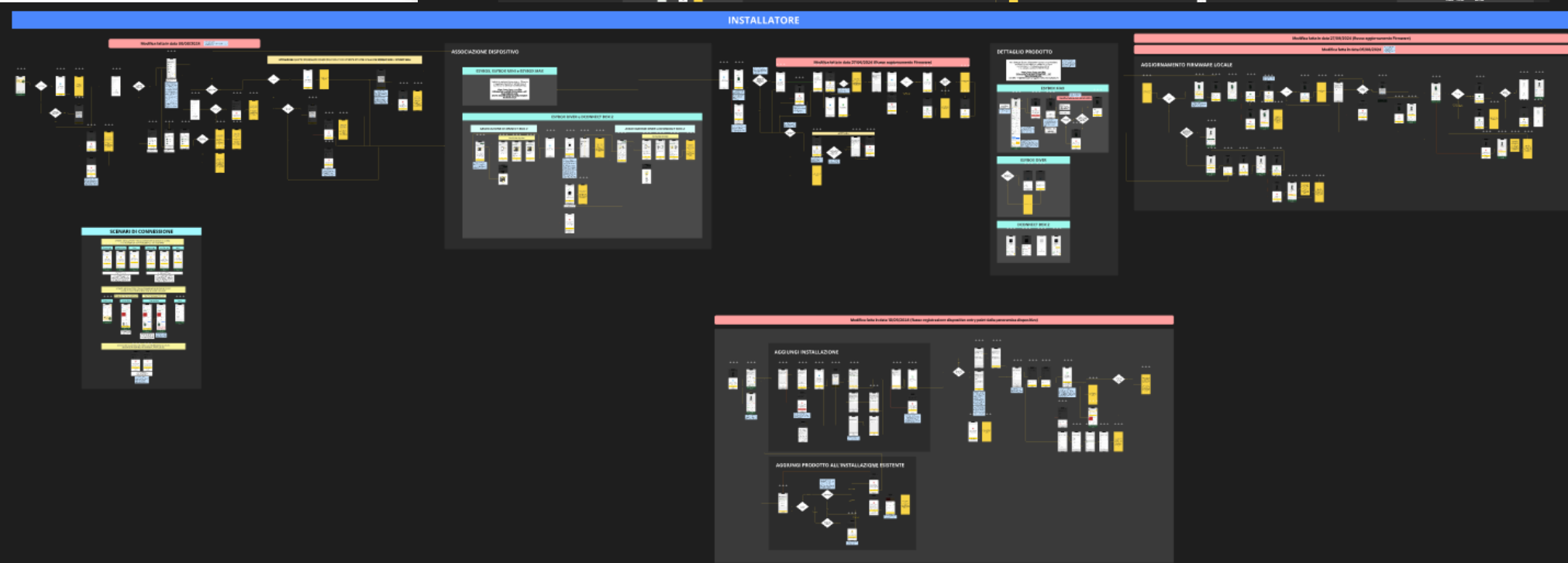
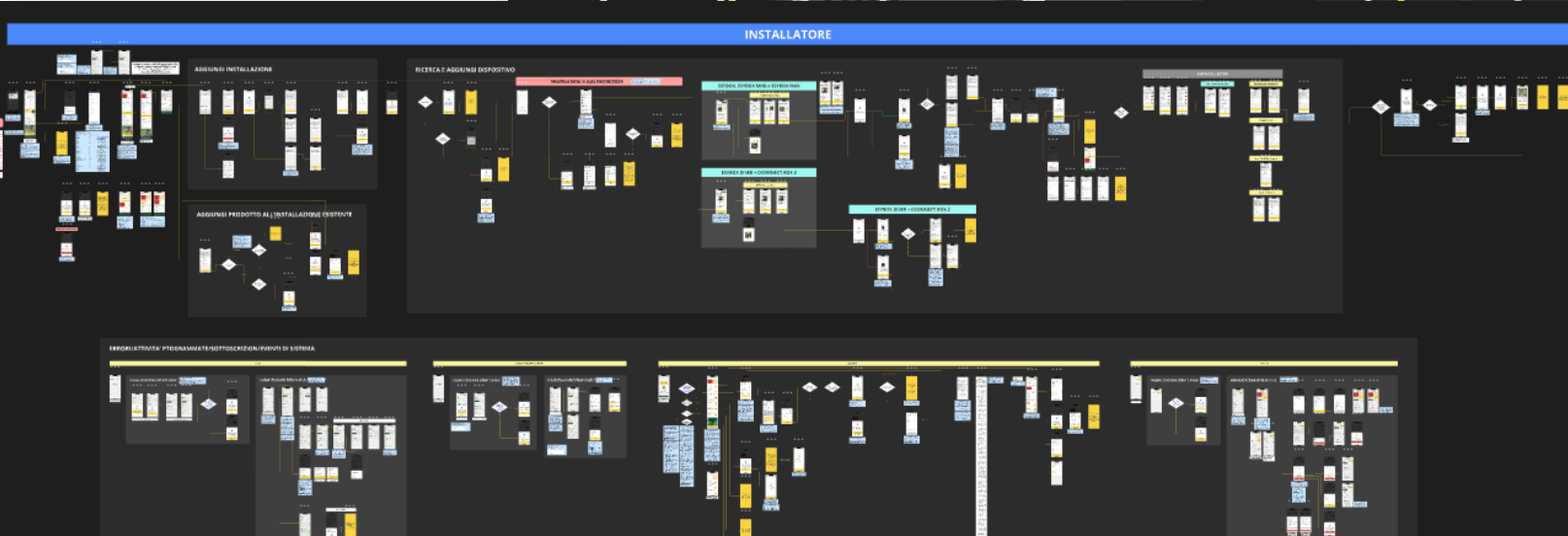
•Cross-Platform Consistency:

- Unified user experience across mobile and web interfaces.

•Real-Time Updates:

- Synchronization ensures all Platforms display the latest data.

Frontend: the invisible layer



Development & Skills: the invisible layer



Language & tech

•Firmware development

- C / C++
- Python
- Markdown
- Docker

•Cloud development

- Javascript / Handlebars / SQL / CQL (Cassandra query language)
- Typescript / SCSS / HTML / Angular
- Docker / NodeJS / Firebase

•Mobile app

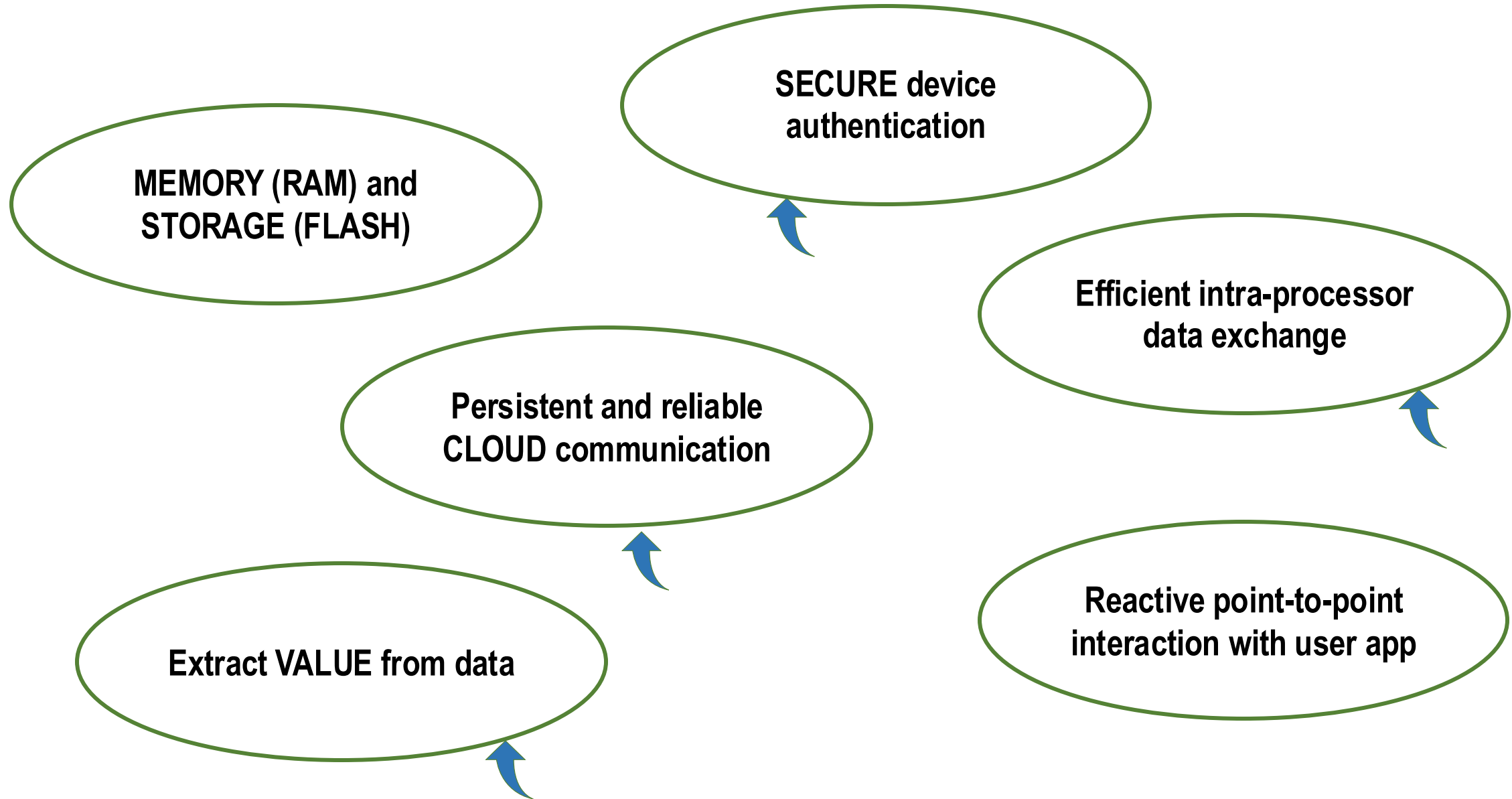
- Xamarin (.net framework) / React Native (Javascript)/ Swift / Kotlin

Technical Deep Dive

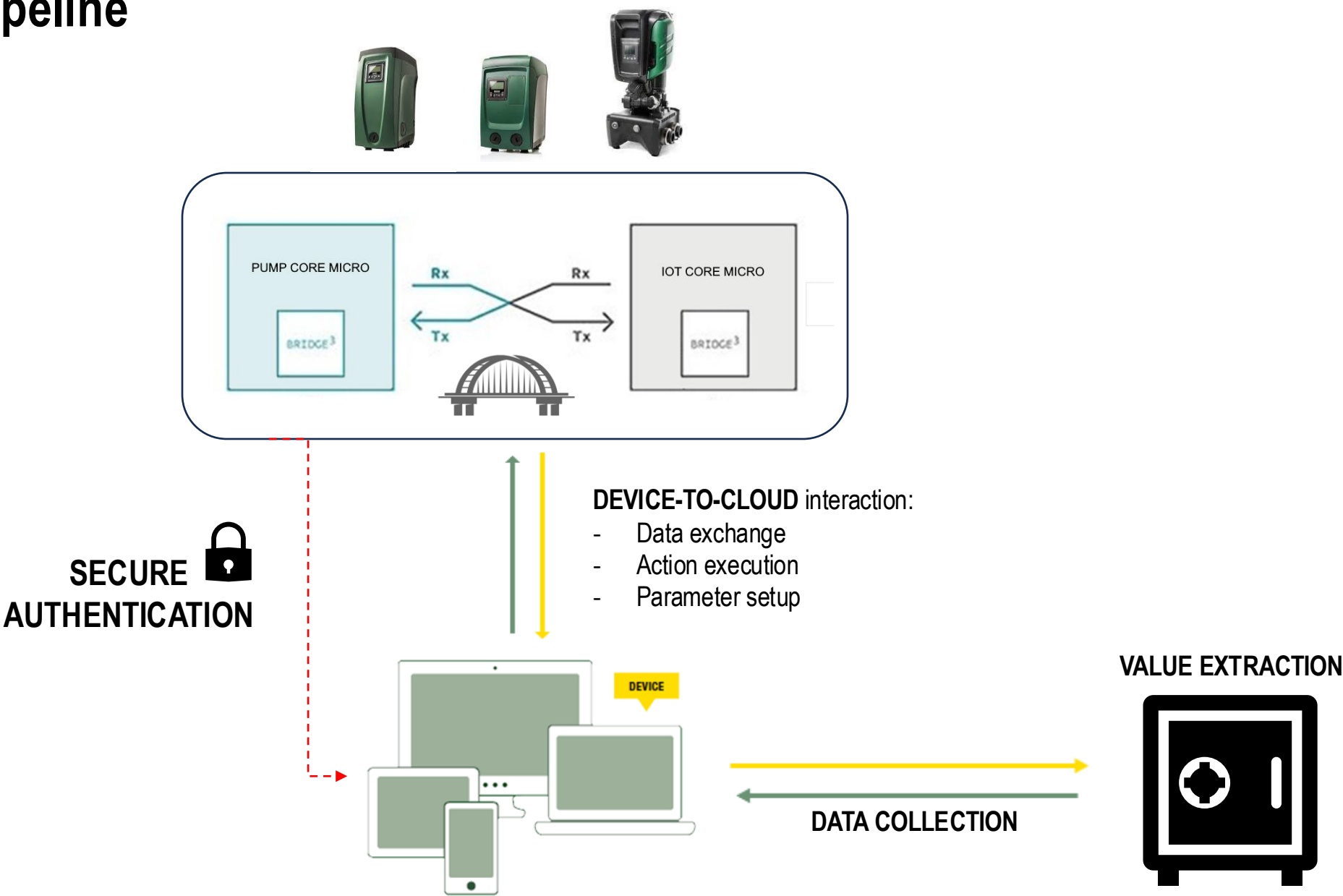
Matteo Drago – IOT Engineer



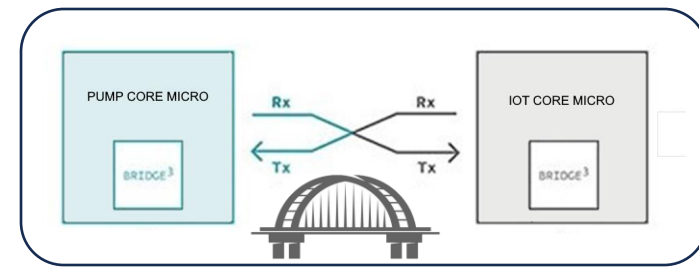
Technical challenges



Simplified pipeline

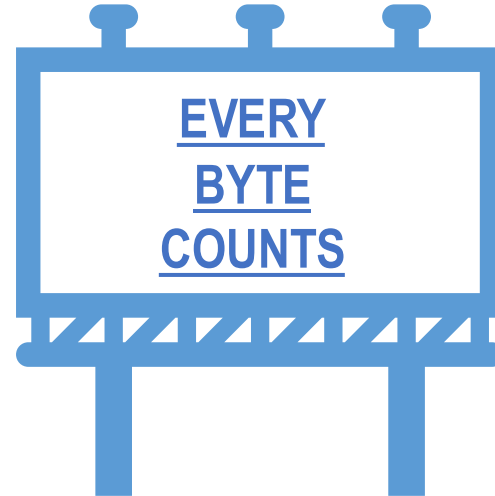


Inter-Processor Communication: The Bridge Protocol



BOOTLOADER: needs to comply with **maker's** communication protocol

APPLICATION: we can agree on rules/protocols/strategies that are **optimal for our own use case**



DATA ON TRANSIT



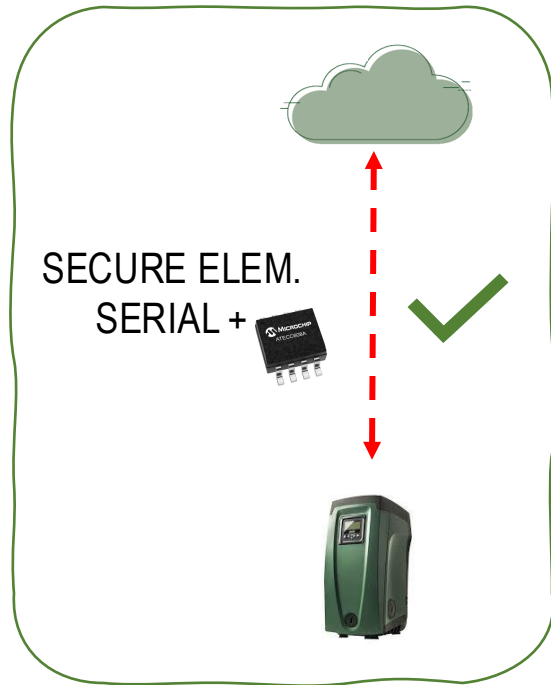
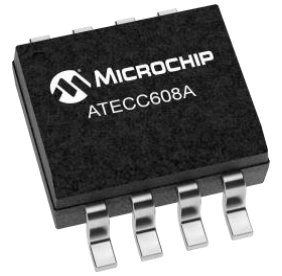
MAIN DESIGN GOALS

- **Avoid bottlenecks:** time is everything, but memory too
- **MODULARITY:** no refactor/redesign for every new product
- **SCALABILITY:** flexible enough to be adapted in case of new user requests or hardware constraints

Data Security: Secure Element

Enabler of cryptographic features and security protection

🔥 Anti-tampering technology 🔥

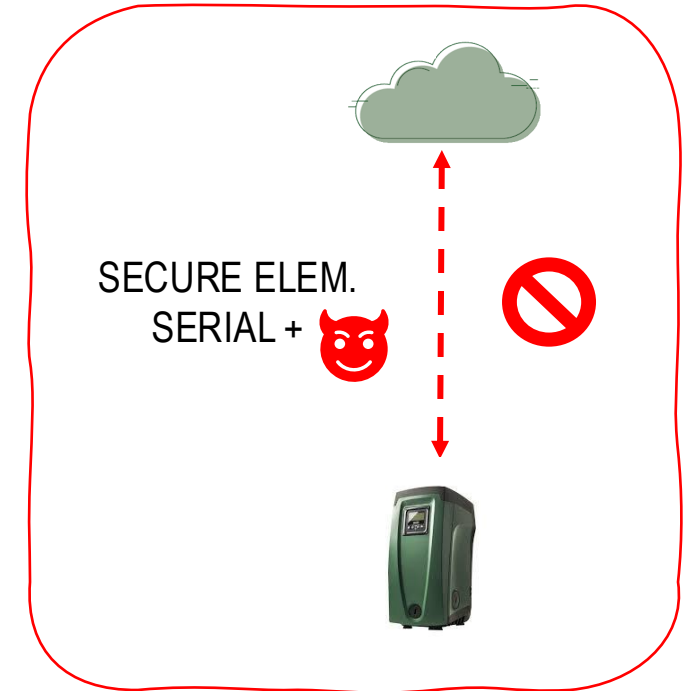


When is this validated?

First contact with server 

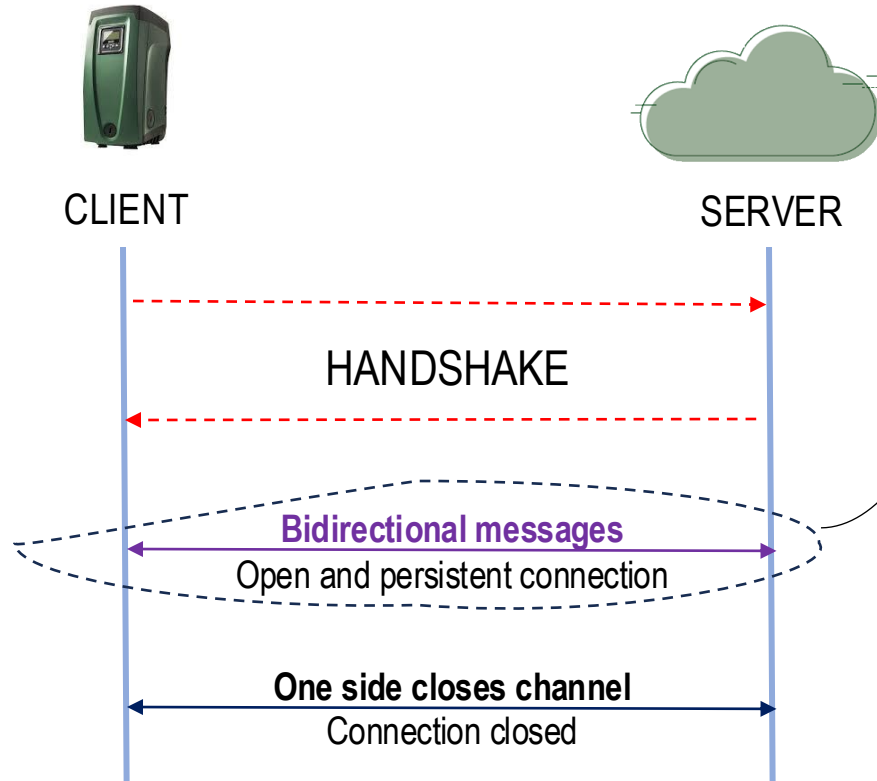
Periodic verification during the day 

At every pump restart 



Fast and Persistent Communication: WebSocket

WebSocket	HTTP
Transport Layer (TCP/TLS)	
Network Layer (IP)	
Link Layer (MAC)	
Physical Layer	



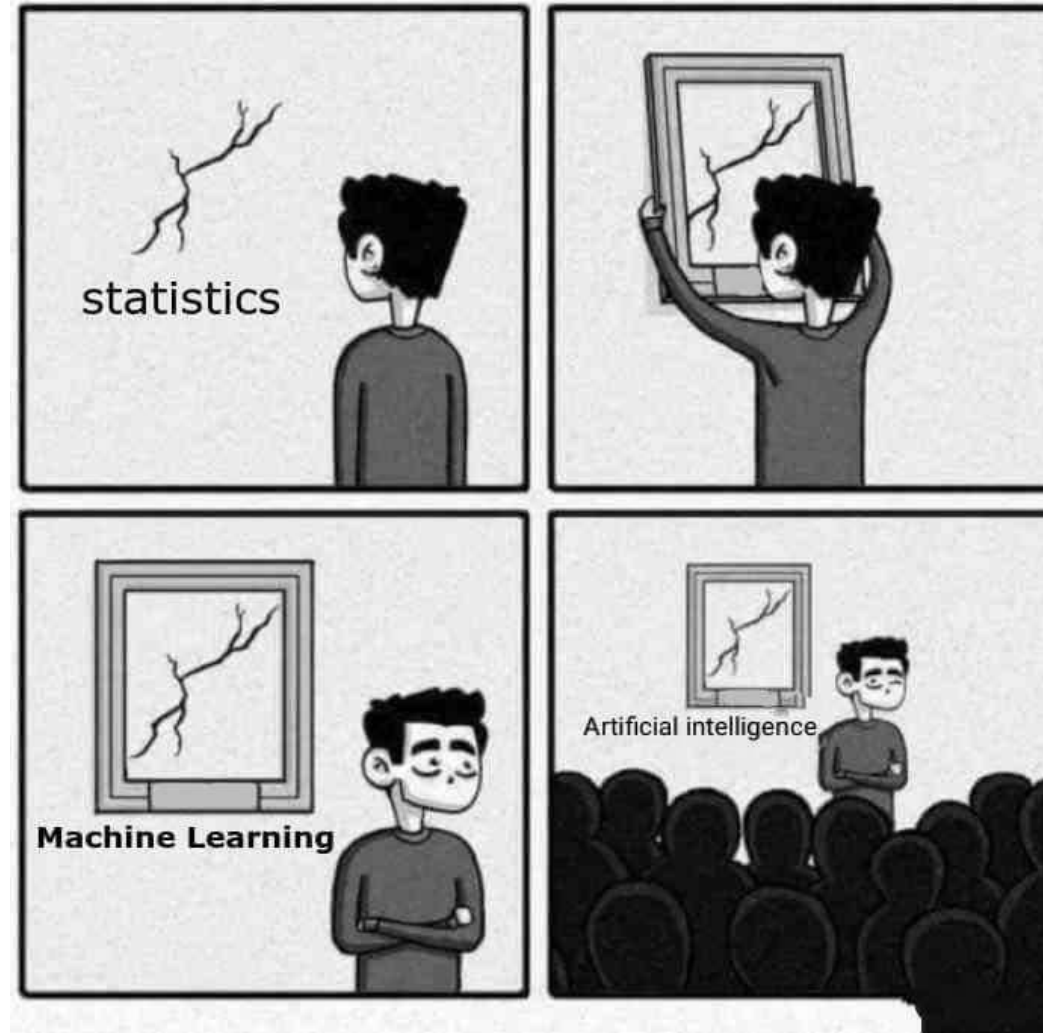
Better resource usage thanks to Websocket - no overhead for each POST
We adapted the technology to work on limited resources (e.g., 200KB RAM!!)



Remember **Gateway-Grandpa**?

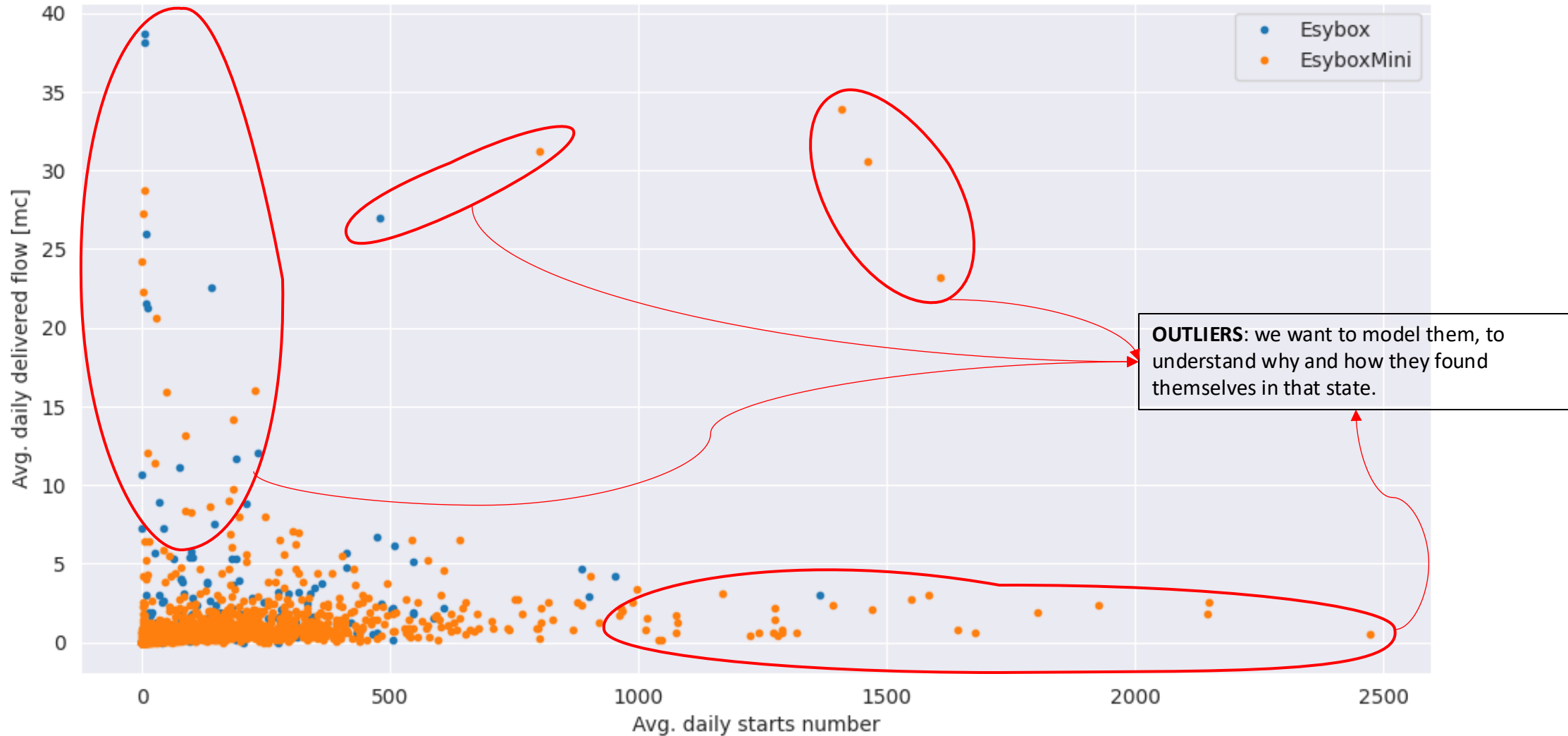
We needed an iterative, step-by-step evolution: Websocket allowed for an out-of-the-box solution!

Data Transformation: Turning Raw Data into Insights



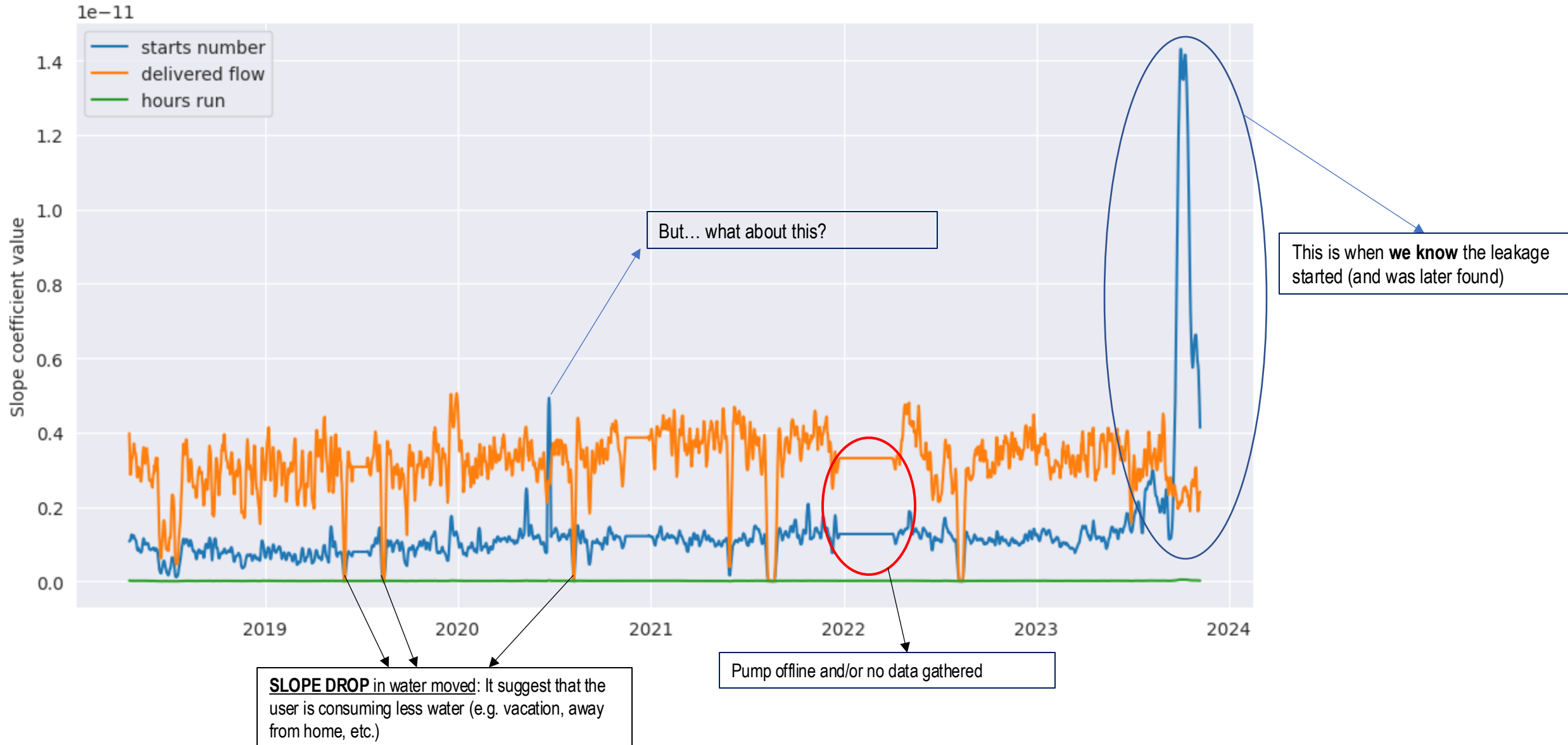
**original comic by sandserif*

Data Transformation: Turning Raw Data into Insights



Data Transformation: Turning Raw Data into Insights

- Rolling linear regression on a **1 week time window**, with a delta of **1 day**.
- Coefficient corresponds to the **curve slope** in that time interval



Conclusion & QA

Recap & Conclusion



1

**Strategies for
Scaling a business**

2

Ideation and Validation

3

**Start Small, Think Big: The
Power of Iteration and
Collaboration**

4

**Development and Launch
flexibility, balance, and
adaptation are critical**



WE WANT TO HEAR YOUR VOICE!



SCAN ME!



www.dabpumps.com



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