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Custom-made electronics

Agenda

Intro E.D.&A.

- Case description
- Challenges during the project: step by step
- Wrap-up
- Q&A

The power to control

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E.D.&A.

Electronics, Development & Assembly

The power to control

- Founded in 1981
- HQ Located in Belgium, Kalmthout (Antwerp)
- Sales office in Bonn, Germany
- 80+ employees
- E.D.&A. develops and produces custom-made electronic controllers for machines and appliances.
  - Industrial market
  - Consumer market

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Case description

Connect water softeners to the Cloud

The power to control

- Connect the water softener to the internet
- Connect this system to a cloud service
- Access for end-users / dealers / suppliers on different levels
- Access by phone/tablet (direct / cloud)
- Predictive maintenance, monitoring, etc.

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Application

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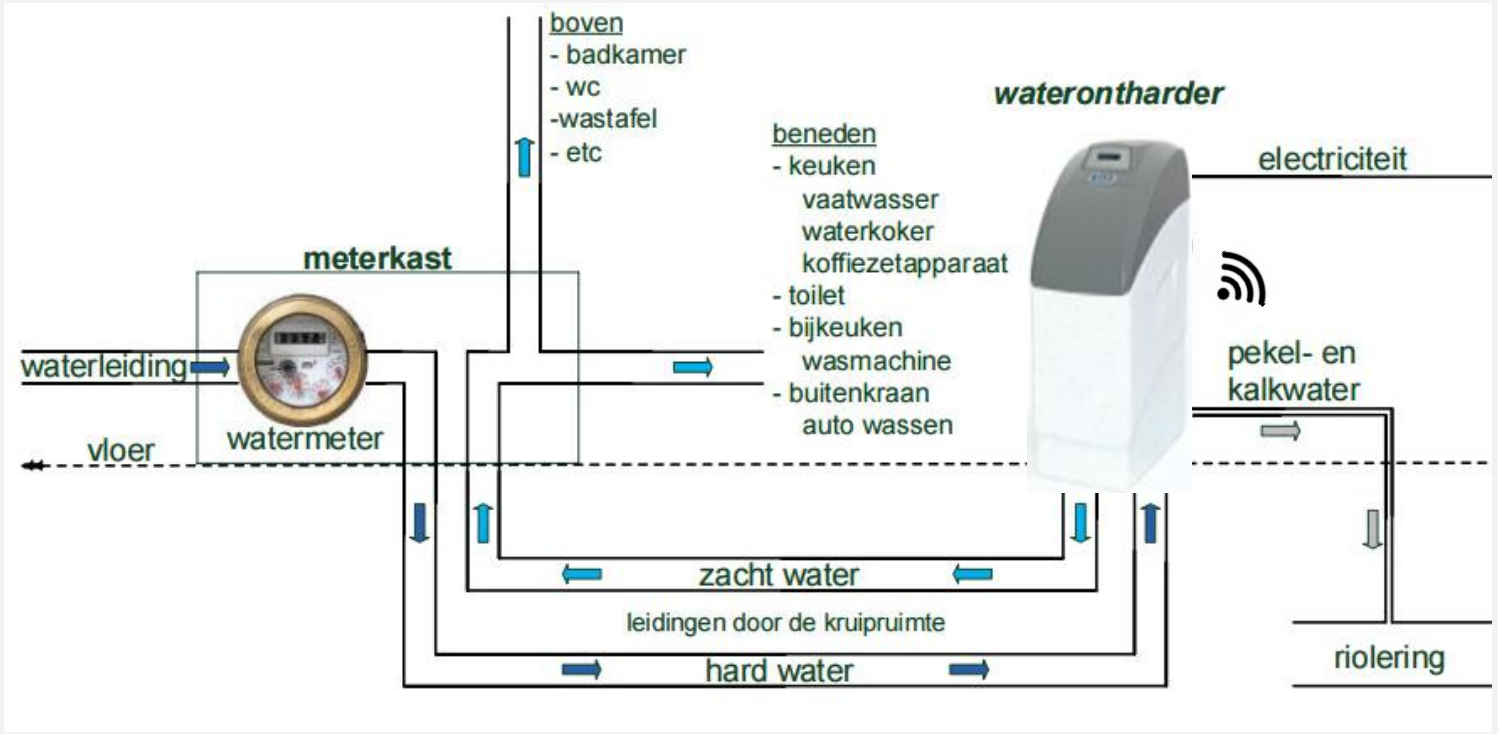

Old situation

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- Water softener is often located in the basement (out of sight)
- Salt supply, status etc. needs to be checked on the device itself
- Maintenance needs to be scheduled manually

In practice: we forget to check the salt level, maintenance in case of a defect?

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New situation

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- Water softener is still on the same location
- The water softener is now able to communicate to the outside world, and is also able to receive commands, etc.:

  - To the outside: salt is almost empty, 'I need maintenance', error, etc.)

  - From the outside: status update, salt level, software updates, etc.

Result: less failures and always soft water cause less headache ;-)

Impact on the HW of the water softener

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- Is the controller strong enough, Flash & Ram size?
- Is internet access possible & available (and how) : WiFi, BLE, Lora, or?
- Communication interfaces without direct internet access?
- Communication speed?
- Is there a GDPR risk?

Hardware solution for this case:

- Redesign of the current hardware: MCU, Flash, RAM, WiFi module, etc.
- Integration of a previous designed WiFi module (because of residential use)
- Sufficient computing power / memory footprint

Software (embedded)

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- Does the current software allow easy integration? Internet access
  - Superloop vs RTOS
  - Stand-by situation: Can I wake up the system remotely?
  - Has the IOT SW module access to all parameters?
  - Which are the security levels?
  - Data risk (GDPR risks, etc.)
- Software libraries?
  - Open source or commercial SW blocks , existing module etc.
  - Which protocol? REST (Stateless), MQTT (event based)
  - Security
  - Implementation within the SW development tool
  - API?

Development cycle

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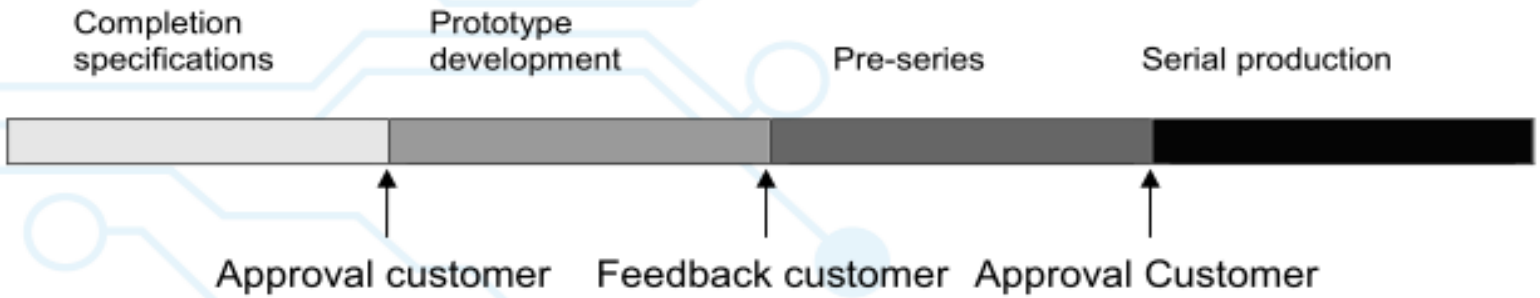
1. Completion phase of the specifications
1. Prototype development
2. Pre-series
3. Serial production



From concept to product

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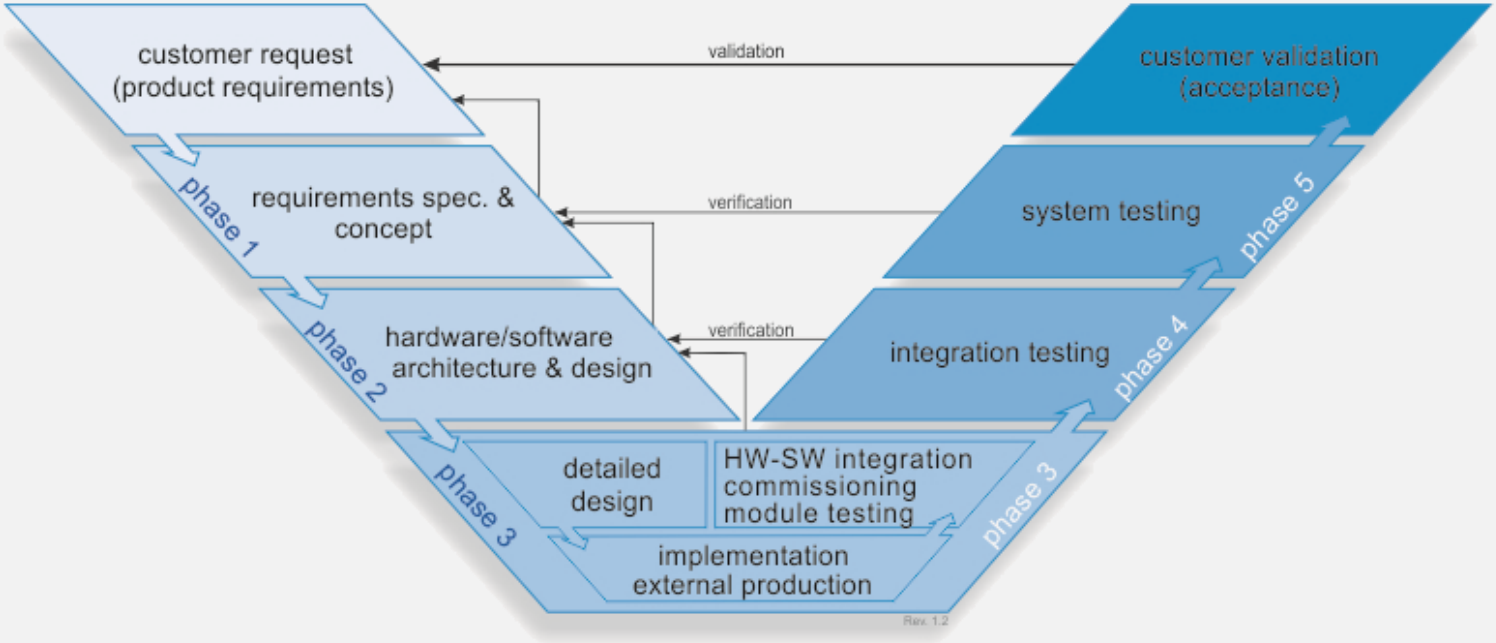
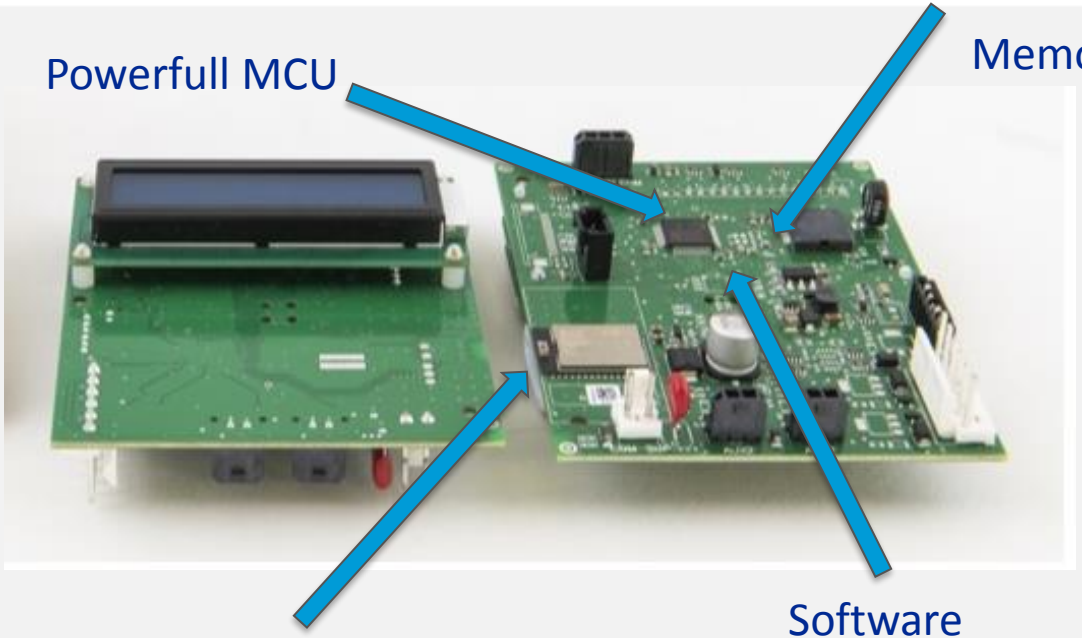


Access enabled device



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The Cloud !

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- The Cloud: who, what, where, how to get started, why
- Many suppliers, which one is the best fit and why?
- What are my goals?
- Access for end-user / supplier / dealer
- Do they all have different access rights?
- Data <> device
- Read data?
- Write data?
- Control device?
- Remote software updates?

The Cloud

Getting started (1/2)

- Where to find the correct partner who fits my needs?
- Do we speak the same language?
  - Technical synchronization
- Standard blocks / dashboards (pros / cons)
- Business models
  - Flexibility
  - Scalability
  - Etc.

The Cloud

Getting started (2/2)

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- Start from scratch (DIY)
  - Azure
  - Amazon
  - Ruby on Rails
  - Etc.

- Action plan
  - Script because of lessons learned
  - Iterative process

The Cloud for water softener

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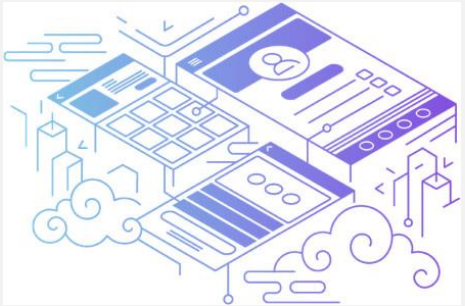
- Cloud based on ruby on rails
  - Open source web application framework
  - Cloud dashboard for dealers, suppliers, etc.: statistics, alarms, etc.
  - Runs on AWS (Azure or other platforms are also possible)
  - More flexible but also more initial work
  - AWS-host for China, Heroku (on top of AWS) for rest of the world
    - Heroku= an additional layer to ease configuration and maintenance
  - US partner of this client has already used RoR
- E.D.&A. worked very close with RoR implementer
- Iterative process with short communication lines



App

Something completely different

- IOS /Android vxx.yy (pro/con)
  - + Notifications in app
  - - IOS / Android OS updates
  - Play Store / App store certification
- Web interface (pro/con)
  - + runs on most Explorers
  - - screen sizes
  - - no in app notifications
- Functionality
- User Interface Experience (UIX): time-consuming (colours, buttons, etc.)

Apps

Technical remarks, etc.

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- All through the cloud or also direct via WiFi, BLE, ap-Mode, etc.?
- API (REST, MQTT or any other protocol)
- Security
- Google Play / Apple store
  - Certification process
- Version control
  - OS updates might push app update

Decisions in this case

Which and why?

- Android / Apple app Play Store
- Direct link via AP mode
- Security with custom encryption (AES128 algorithm)
- Notifications in app
- Special features
  - Holiday mode
  - Leakage detection

Project management

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Project management

Who takes control?

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- 1 central project management team
- Total of 3 or 4 partners
  - Customer (who is the owner)
  - HW/SW supplier: mainly the best overview
  - App builder
  - Cloud provider (+APP?)

Pitfalls for an IoT project

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- Specifications
- Time-to-market
- WiFi / modem modules (SW Libraries)
- Legacy old hardware compatibility
- Connection with existing networks (ICT, etc.)

Overview

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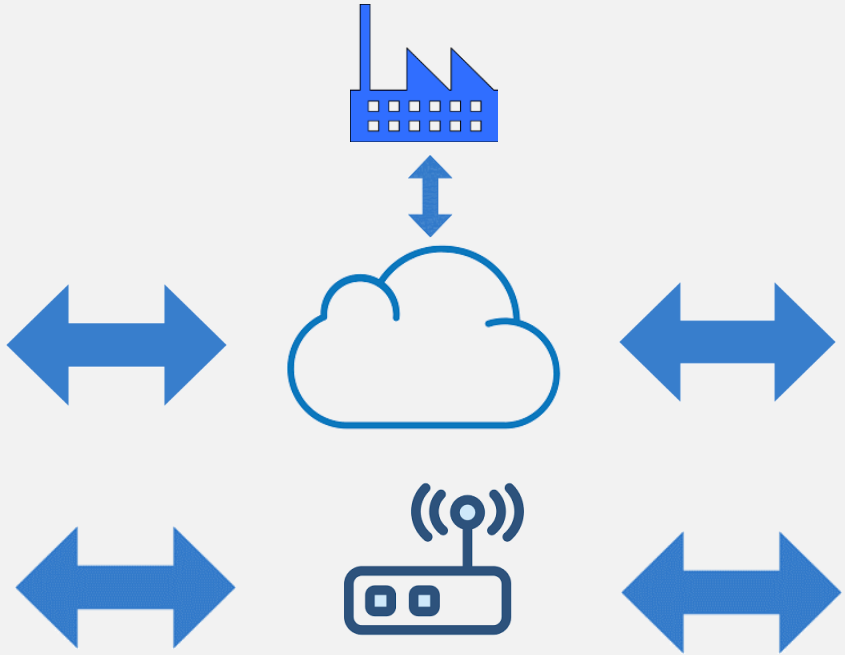

Contact information

The power to control

- E-mail: info@edna.eu
- Office Belgium: +32 3 620 18 18
- Office Germany: +49 228 3040 1072