DPTechnics

BlueCherry

With the support of Flanders Investment & Trade

Flanders State of the Art

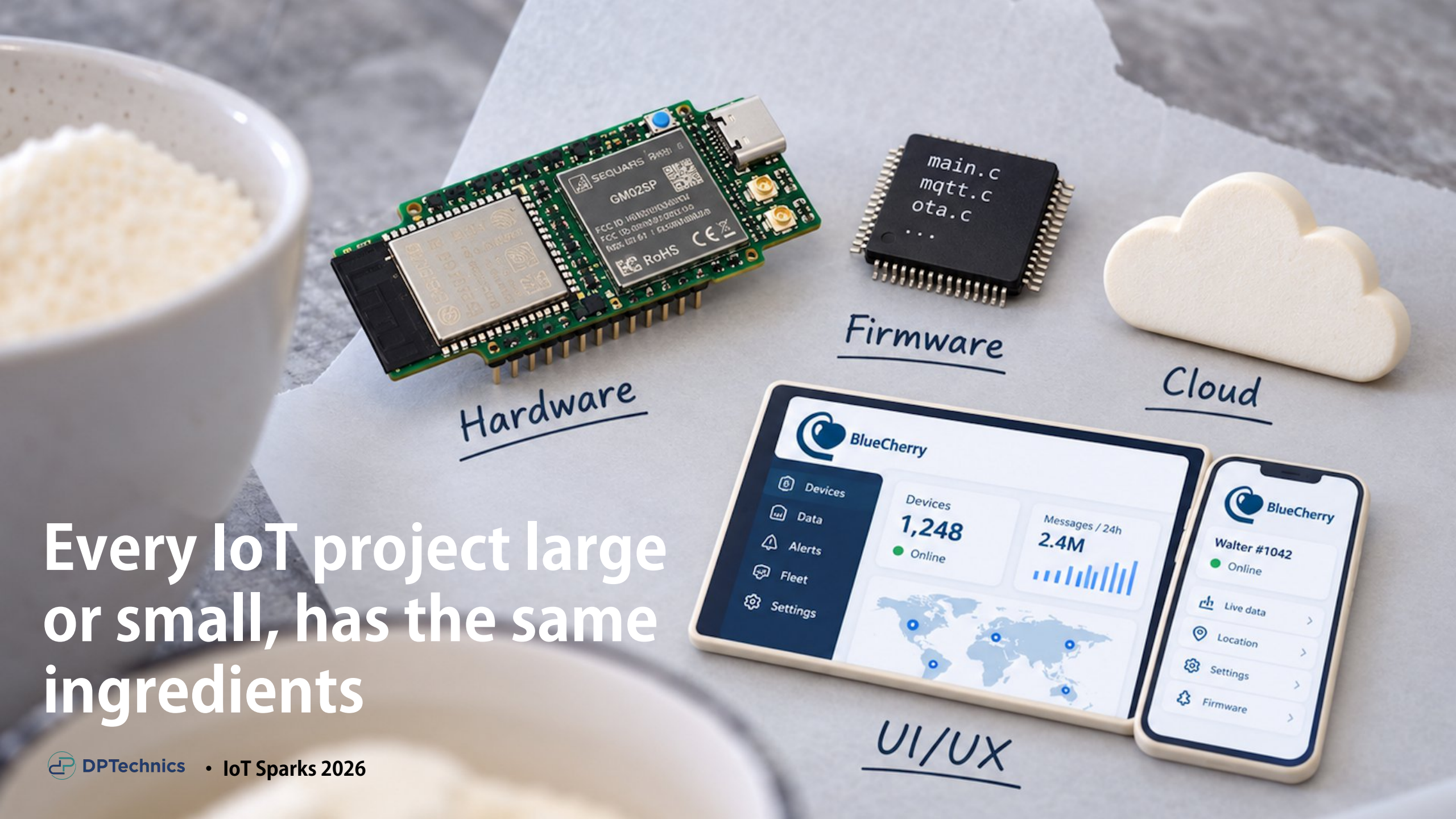
Custom, compliant IoT without the need for high volume

Meet Walter



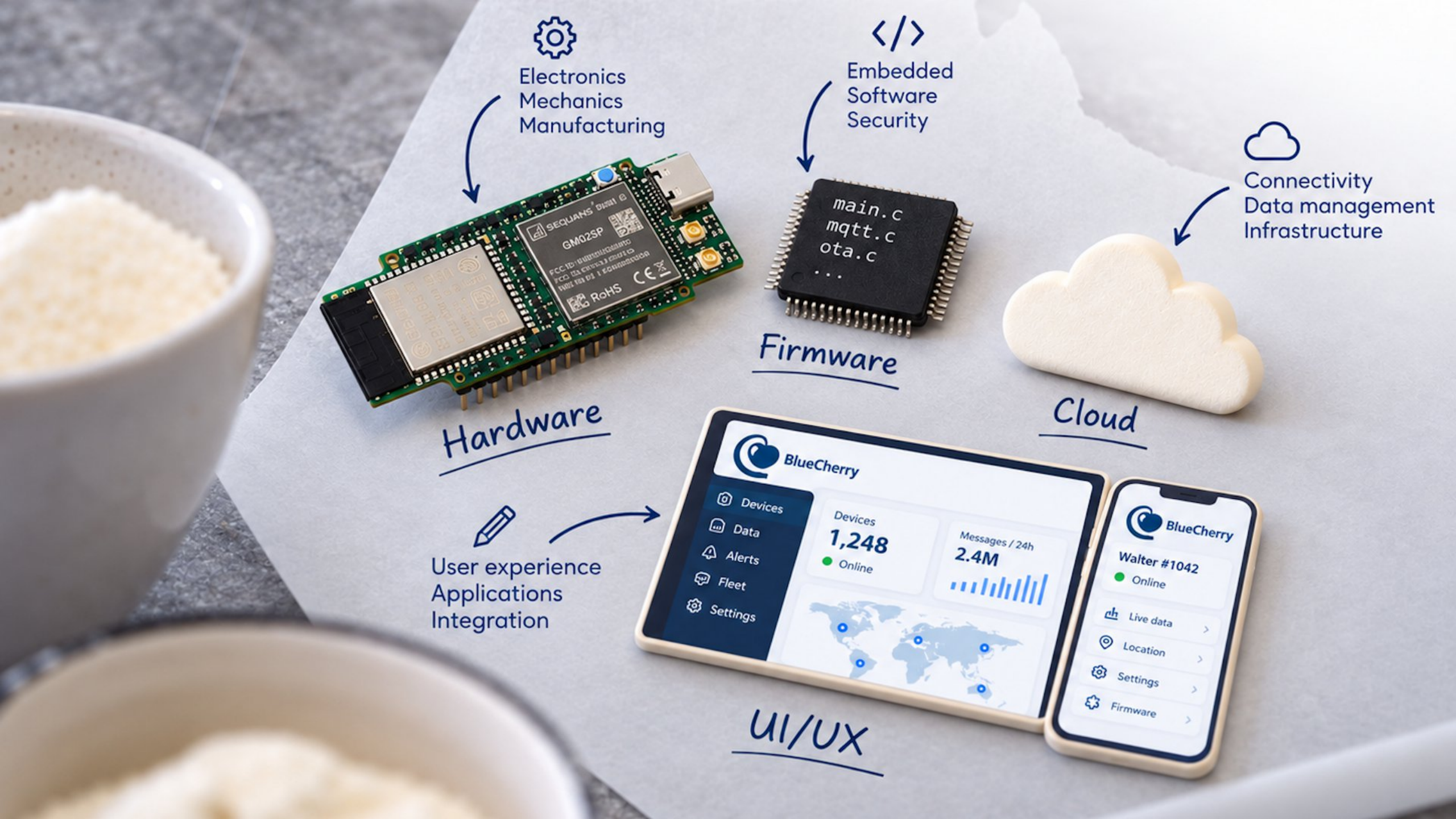
Daan Pape • CEO & Co-Founder

IoT Sparks 2026 • 7 October • Palau de les Arts, Valencia



Every IoT project large or small, has the same ingredients

DPTechnics • IoT Sparks 2026


Electronics
Mechanics
Manufacturing
Embedded
Software
Security
Connectivity
Data management
Infrastructure
SEQUANS
GM02SP
RoHS
main.c
mqtt.c
ota.c
...
Firmware
Hardware
Cloud
User experience
Applications
Integration
BlueCherry
Devices
Data
Alerts
Fleet
Settings
Devices
1,248
Online
Messages / 24h
2.4M
BlueCherry
Walter #1042
Online
Live data
Location
Settings
Firmware
UI/UX



When you cook, you must prepare

FULLY CUSTOM IOT BUILDING BLOCKS



OPTION 1 • FULLY CUSTOM

Complex PCB design

Low level firmware

Cloud backend

Lengthy certification

Security and CRA

Carrier board design

Business level firmware

Use existing cloud

Inherit certification

Build upon security foundation



The hardware

RF DESIGN

ANALOG DESIGN

DC-DC POWER

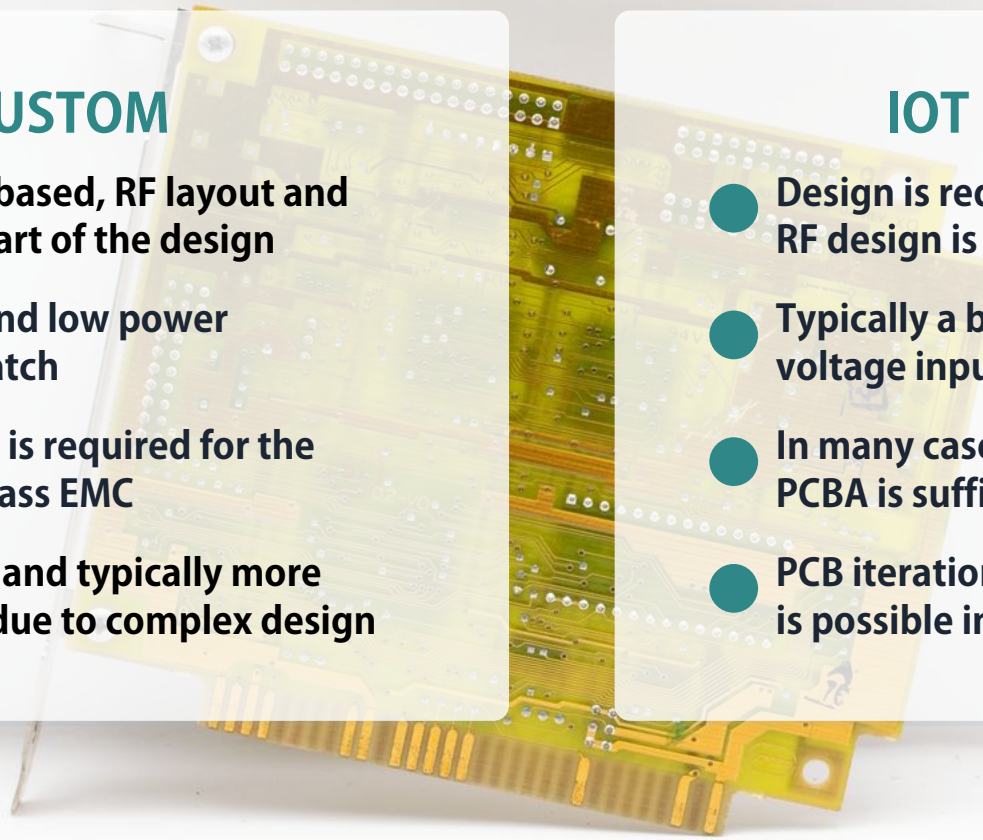
HIGH-SPEED DIGITAL



Hardware is hard

FULLY CUSTOM

- Chip-down or module based, RF layout and antenna matching is part of the design
- Power supply layout and low power optimization from scratch
- Typically a 4-layer PCB is required for the complete product to pass EMC
- Longer iteration times and typically more iterations are needed due to complex design



IOT BUILDING BLOCK

- Design is reduced to custom carrier board, no RF design is needed or allowed
- Typically a battery charging circuit or high voltage input circuit.
- In many cases a 2-layer PCB with single-sided PCBA is sufficient for the use-case
- PCB iteration times are short and in-house PCB is possible in many cases

The firmware

DRIVERS

RESILIENCE

SECURITY

COMMUNICATION



Firmware is the beating heart of your product

FULLY CUSTOM

- Integrate or write drivers, adapt open source libraries to the specifics of your hardware
- Think about low level reset and watchdog behavior (boot-loops, reconnect spamming, ...)
- Implement protocol handlers on top of the frameworks (Zephyr, FreeRTOS, bare-metal?).
- The business logic is typically only a smaller part of the work that needs to be done.

IOT BUILDING BLOCK

- Only write drivers for specific peripheral on the carrier board. No complex AT or comm. drivers
- The libraries handle automatic reconnect, network stack setup, ...
- Use the high-level protocols, no need to implement them.
- Focus on the business logic

The cloud



DATA INGRESS

API ACCESS

OTA UPDATES

OWNERSHIP MANAGEMENT

The cloud is where the magic happens

(~~FULLY~~) CUSTOM

- Build the data-ingress yourself with one or more managed services
- Build device identity, provisioning, ownership and fleet overview yourself
- Design a signed, staged OTA pipeline for application and modem firmware
- Business logic is typically spread between various subsystems/providers.

IOT BUILDING BLOCK

- Typically a solution which is tightly integrated with the embedded framework that you chose
- Devices are provisioned, identified and managed out of the box
- OTA is part of the embedded library that comes with the platform solution
- The business logic connects to single API and is more concentrated



The UI/UX

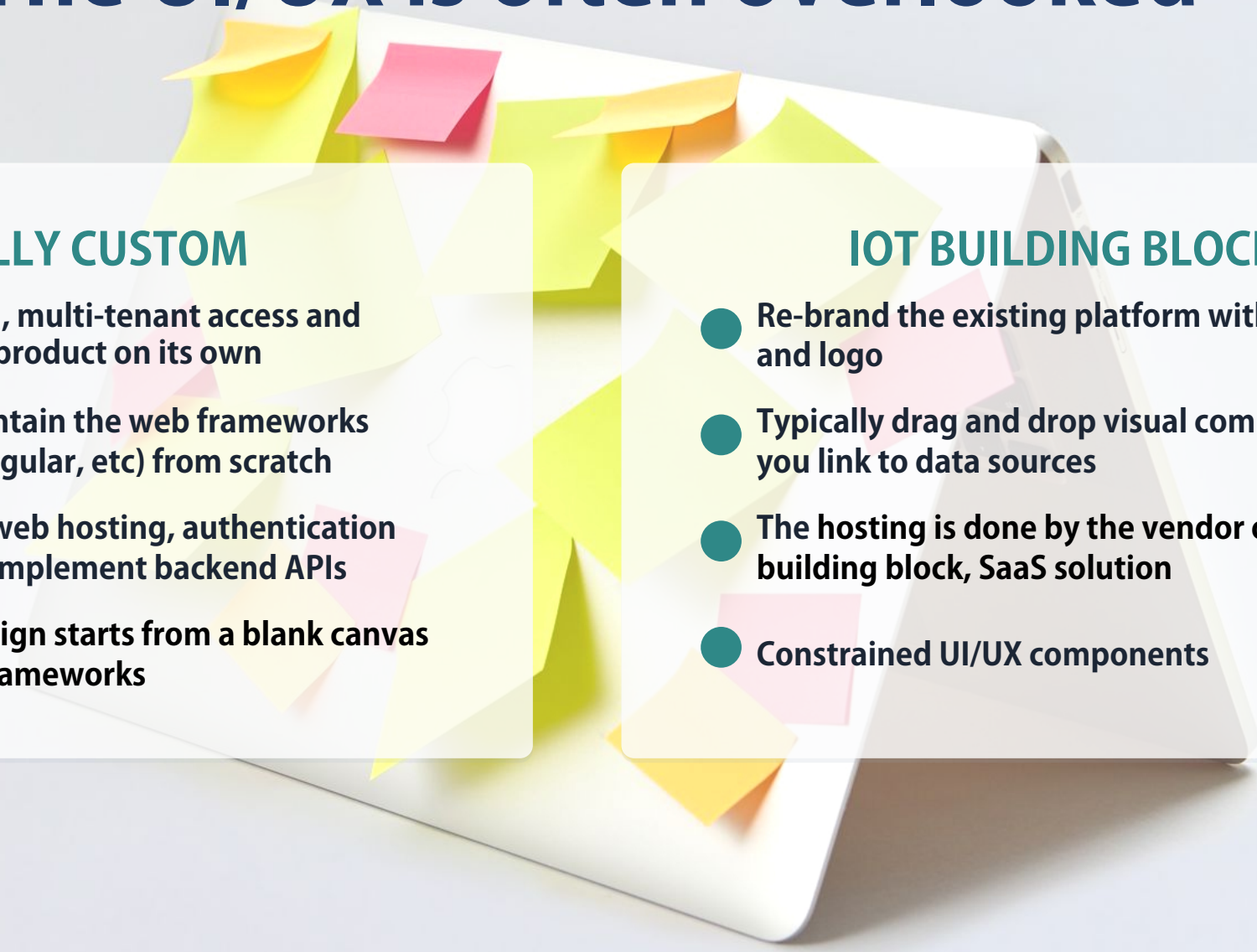
DASHBOARDS

ALERTS

BRAND IDENTITY

BROWSER OR NATIVE

The UI/UX is often overlooked



FULLY CUSTOM

- Accounts, login, multi-tenant access and permissions: a product on its own
- Setup and maintain the web frameworks (React, Vue, Angular, etc) from scratch
- Configure the web hosting, authentication methods, and implement backend APIs
- The UX and design starts from a blank canvas or with some frameworks

IOT BUILDING BLOCK

- Re-brand the existing platform with your colors and logo
- Typically drag and drop visual components that you link to data sources
- The hosting is done by the vendor of the building block, SaaS solution
- Constrained UI/UX components

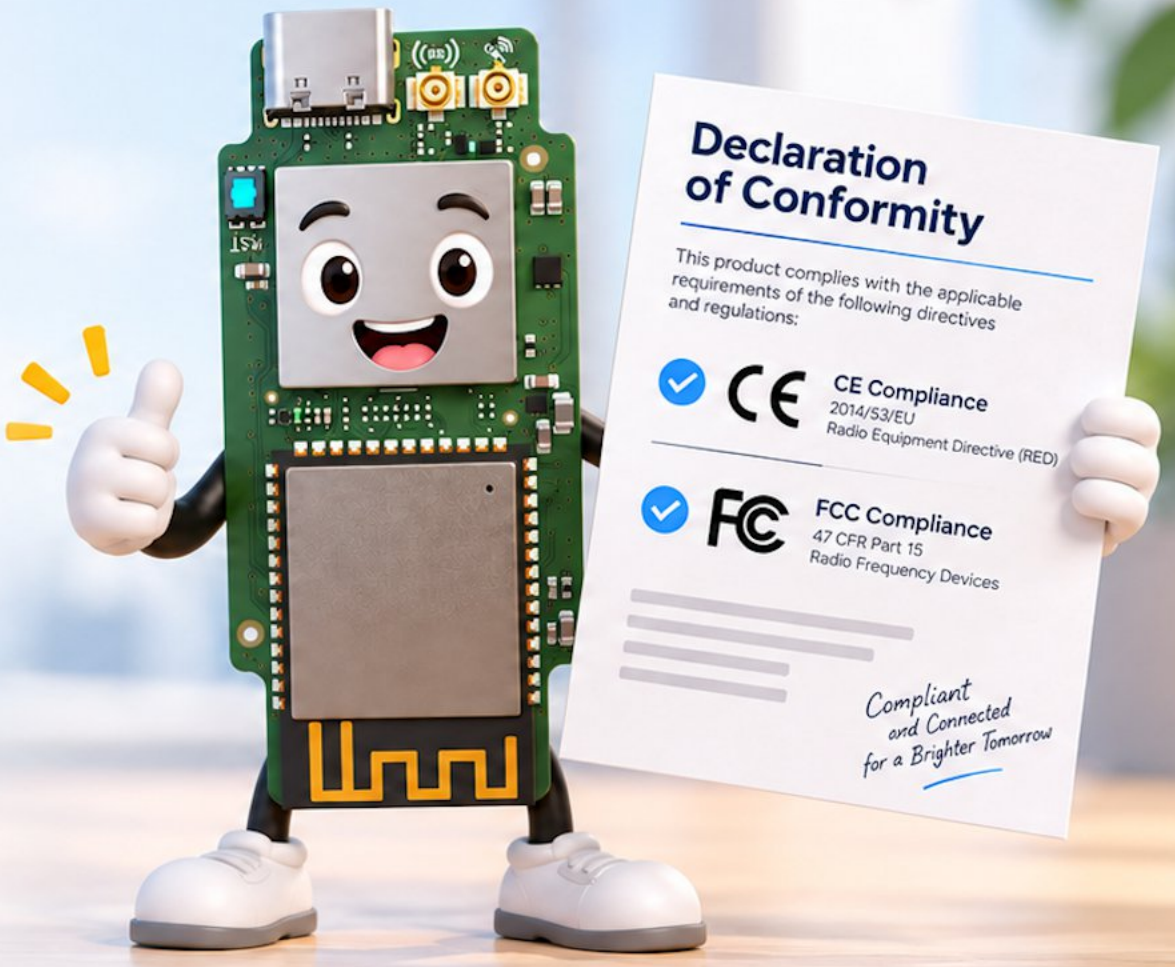
Testing and certification

USER TEST GROUP

PRE-COMPLIANCE

NOTIFIED BODY/TCB

MAINTENANCE



The final stretch is the hardest

FULLY CUSTOM

- Extensive testing and notified body required in most cases (chip down design)
- Limited test result inheritance possible
- As chip-down design is complex manufacturer support through FAE is more complex
- Combining multiple intended radiators is very complex from a testing standpoint

IOT BUILDING BLOCK

- Minimal testing, pre-compliance can be enough for EU.
- Inheritance from test results of modules and formally supported (contains FCC ID)
- Less variables in the design means less debugging in the case of a compliance issue
- A multi-radio building block allows you do design carrier boards without extra radio

Custom or building blocks is no longer a capability question. It's a volume question.

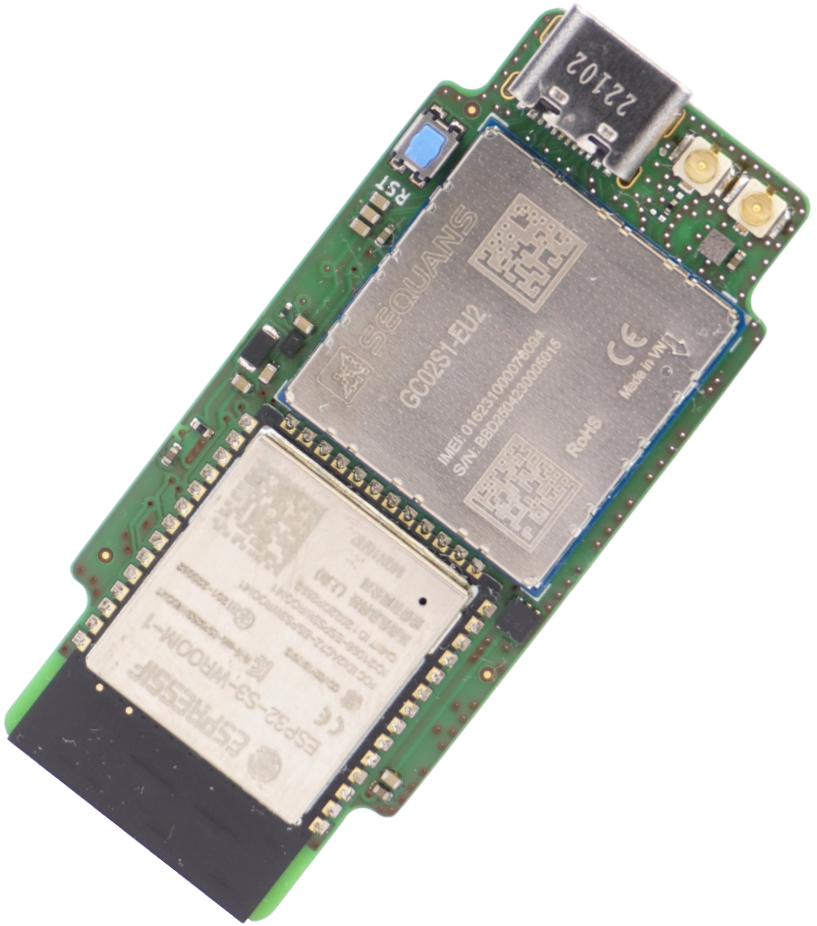


Meet Walter, your new best friend



RADIOS	LTE-M • NB-IoT • GNSS • WiFi • BLE
DEEP SLEEP	9.8 µA for the whole module
CERTIFICATIONS	CE • FCC • ISED • RCM • UKCA
OPEN	Schematics published under GPLv3
SOFTWARE	ESP-IDF • Arduino • MicroPython • Zephyr • Toit
AVAILABILITY	Mouser, RS, TinyTronics, GoTronic, Antratek, Core, DNC
SOURCE	Designed and manufactured in Belgium

Walter Cat 1 bis, regular LTE with a single antenna



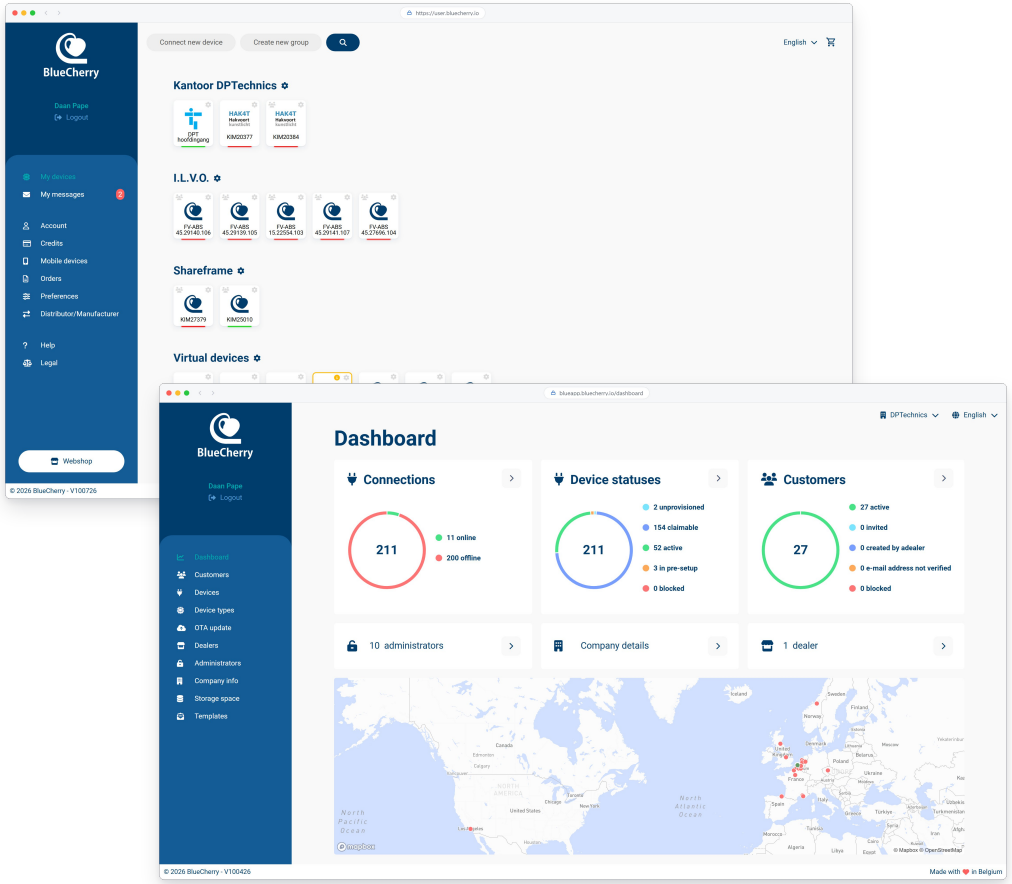
RADIOS	LTE Cat 1 bis • GNSS • WiFi • BLE
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CERTIFICATIONS	CE • FCC • ISED • RCM • UKCA
OPEN	Schematics published under GPLv3
SOFTWARE	ESP-IDF • Arduino • MicroPython • Zephyr • Toit
AVAILABILITY	Beta testing in Q4 2026, general availibilty Q1 2027
SOURCE	Designed and manufactured in Belgium

Walter Feels, give senses to Walter



POWER	2.5V - 26V MPPT input
DEEP SLEEP	70 µA for the whole board with Walter installed
BATTERY SUPPORT	LiFePO4, Li-Ion (1 - 9 cells), Lead (3/6/12 cells)
OPEN	KiCAD project published under GPLv3
CONNECTIVITY	RS232, RS485, CAN-BUS, SDI-12, I2C
SENSORS	TEMPERATURE, HUMIDITY, BAR. PRESSURE, 6-DoF, (CO2)
STORAGE	SD-card slot

BlueCherry.io, Connect. Everything. Anywhere.



DEVICE TYPES	Full and lite devices
FOCUS	Device management and communication
PROTOCOLS	Full: BlueCherry, Lite: CoAP + DTLS V1.2/3, MQTT
BASIS	Built in-house, not a wrapper on top of hyperscaler
HOSTING	Own servers in Europe with emergency VPS cluster
STATISTICS	Processing 3M+ events every 24h
ADAPTIBILITY	Every interface can be white-labeled

CrocWatch 3000: the IoT crocodile detector





Specifications

BLE for pond sensors

Cellular cloud connectivity

MPPT battery charger

8-bit DVP cam interface

Expected 500pcs/year

CrocWatch 3000: the hardware

FULLY CUSTOM

- ESP32-S3 module + modem module + RF tracing and antenna connectors
- MPPT DC-DC buck-boost layout with battery monitor IC
- 4-layer PCB required for RF trace routing (co-planar waveguide or microstrip).
- We expect at least two re-spins

IOT BUILDING BLOCK

- Custom carrier board for Walter
- MPPT DC-DC copied from Walter Feels
- 2-layer PCB is sufficient
- Maybe 1 re-spin after testing



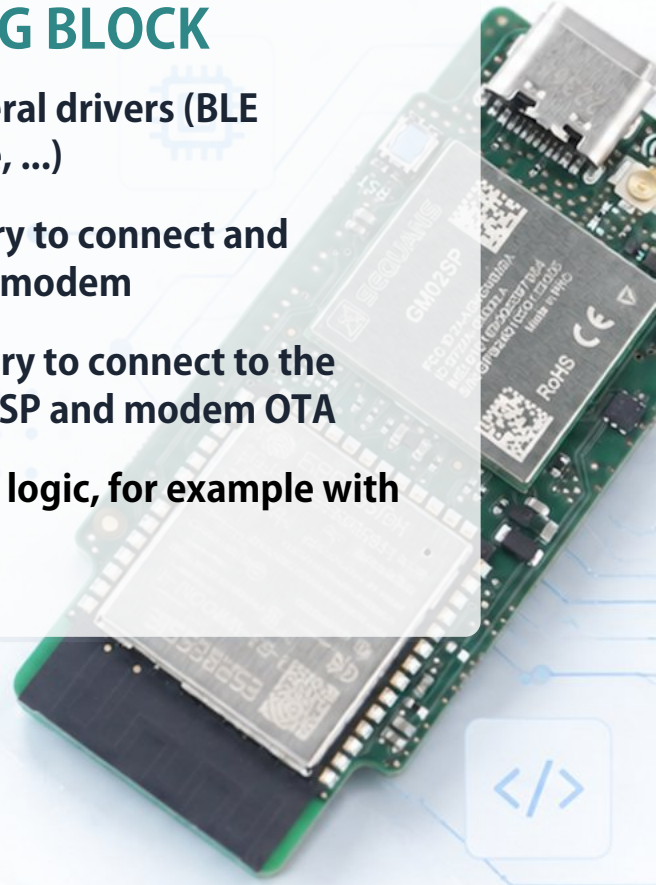
CrocWatch 3000: the firmware

FULLY CUSTOM

- Implement drivers for the modem and peripherals (BLE parsing, camera capture, ...)
- Configure IP-stack and protocol stack and make it resilient against bad behaving networks
- Implement your custom cloud interface SDK, OTA update path and modem update path
- Implement the business logic, for example with TensorFlow Lite

IOT BUILDING BLOCK

- Implement only peripheral drivers (BLE parsing, camera capture, ...)
- Use WalterModem library to connect and offload protocols to the modem
- Use the BlueCherry library to connect to the cloud and make use of ESP and modem OTA
- Implement the business logic, for example with TensorFlow Lite



CrocWatch 3000: the cloud

FULLY CUSTOM

- Setup mutual TLS MQTT broker and build device provisioning
- Build data storage, chicken authentication and registration, back-up infra, notification pipeline
- Implement your custom cloud interface SDK, OTA update path and modem update path
- Build business logic and device APIs on top of the various other services.

IOT BUILDING BLOCK

- Register device in BlueCherry and use ZTP for provisioning
- Messages arrive in CoAP and get delivered to business logic in MQTT and PostgreSQL DB
- Device OTA and modem firmware update implemented via the same CoAP data channel
- Implement business logic in bring-your-own-code docker container

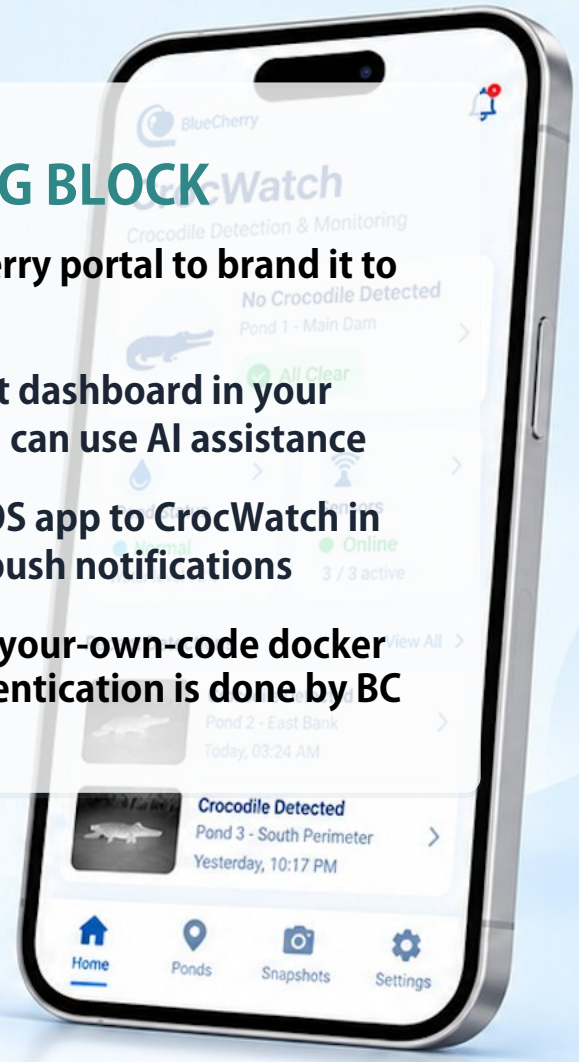
CrocWatch 3000: the UI/UX

FULLY CUSTOM

- Build the boilerplate: registration, login, device claim, ...
- Implement a mobile first dashboard in your favorite framework, you can use AI assistance
- Build an android/iOS app and setup native push notification pipeline
- Host the UI and implement the chicken authentication

IOT BUILDING BLOCK

- White-label the BlueCherry portal to brand it to CrocWatch
- Implement a mobile first dashboard in your favorite framework, you can use AI assistance
- Re-brand the android/iOS app to CrocWatch in order to receive native push notifications
- Host the UI in the bring-your-own-code docker container, chicken authentication is done by BC



CrocWatch 3000: test and certify



FULLY CUSTOM

- Field test when the custom board works, restart with every rework
- The co-located radio requires a full radio and EMC test campaign
- A notified body is highly recommended for EU and a TCB is required for USA market access
- Continuous CRA monitoring for the complete stack

IOT BUILDING BLOCK

- Field test firmware with Walter Feels and in later stage with custom carrier board
- EMC and spurious emissions test covers everything, can be done in pre-compliance
- Use FCC ID from Walter and use the measurement reports from Walter
- Depend on WalterModem SBOM and BlueCherry SBOM monitoring

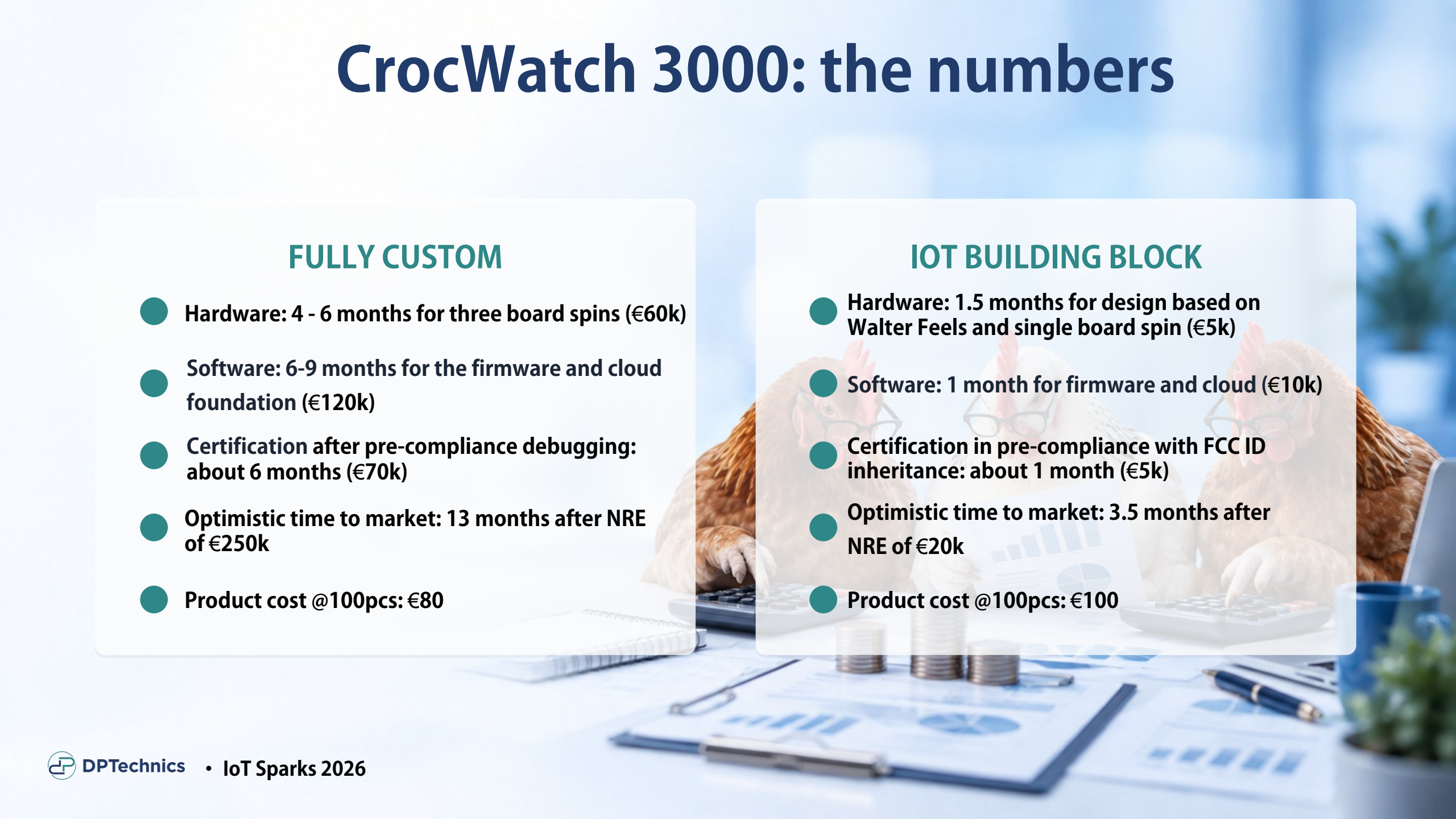
CrocWatch 3000: the numbers

FULLY CUSTOM

- Hardware: 4 - 6 months for three board spins (€60k)
- Software: 6-9 months for the firmware and cloud foundation (€120k)
- Certification after pre-compliance debugging: about 6 months (€70k)
- Optimistic time to market: 13 months after NRE of €250k
- Product cost @100pcs: €80

IOT BUILDING BLOCK

- Hardware: 1.5 months for design based on Walter Feels and single board spin (€5k)
- Software: 1 month for firmware and cloud (€10k)
- Certification in pre-compliance with FCC ID inheritance: about 1 month (€5k)
- Optimistic time to market: 3.5 months after NRE of €20k
- Product cost @100pcs: €100



CrocWatch 3000: unit price with NRE

FULLY CUSTOM

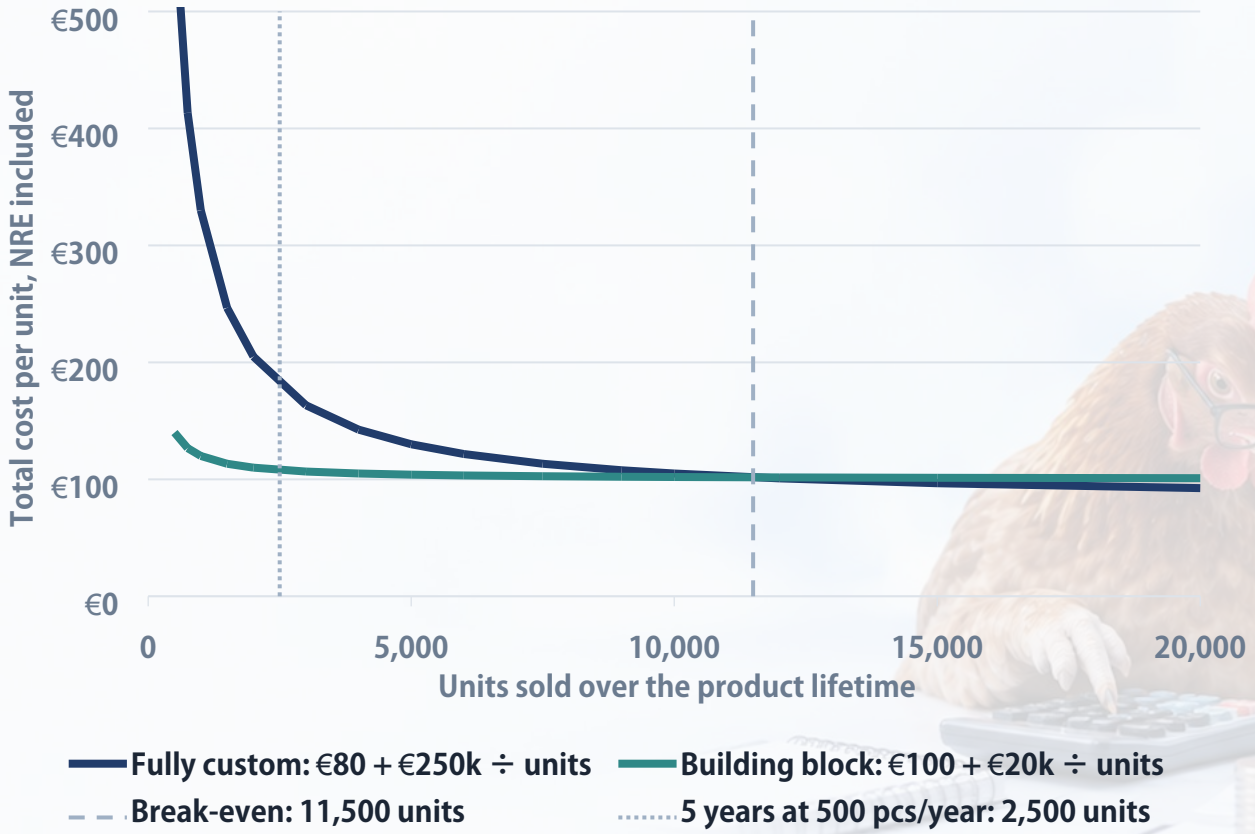
- 100 units: €80 + €250k ÷ 100 = €2580
- 500 units: €80 + €250k ÷ 500 = €580
- 1k units: €80 + €250k ÷ 1k = €330
- 5k units: €80 + €250k ÷ 5k = €130
- 10k units: €80 + €250k ÷ 10k = €105

IOT BUILDING BLOCK

- 100 units: €100 + €20k ÷ 100 = €300
- 500 units: €100 + €20k ÷ 500 = €140
- 1k units: €100 + €20k ÷ 1k = €120
- 5k units: €100 + €20k ÷ 5k = €104
- 10k units: €100 + €20k ÷ 10k = €102



The break-even: 11,500 units



11,500 units

€230k less NRE divided by €20 more per unit. Below this, the building block is simply cheaper.

23 years

to get there at the expected 500 pieces a year. CrocWatch will be redesigned long before.

€20

the most a fully custom design can ever save per unit, however many you sell.

Monthly cloud cost

SERVER HARDWARE

DATACENTER COSTS

DEVOPS

PORTAL AND API DEVELOPMENT



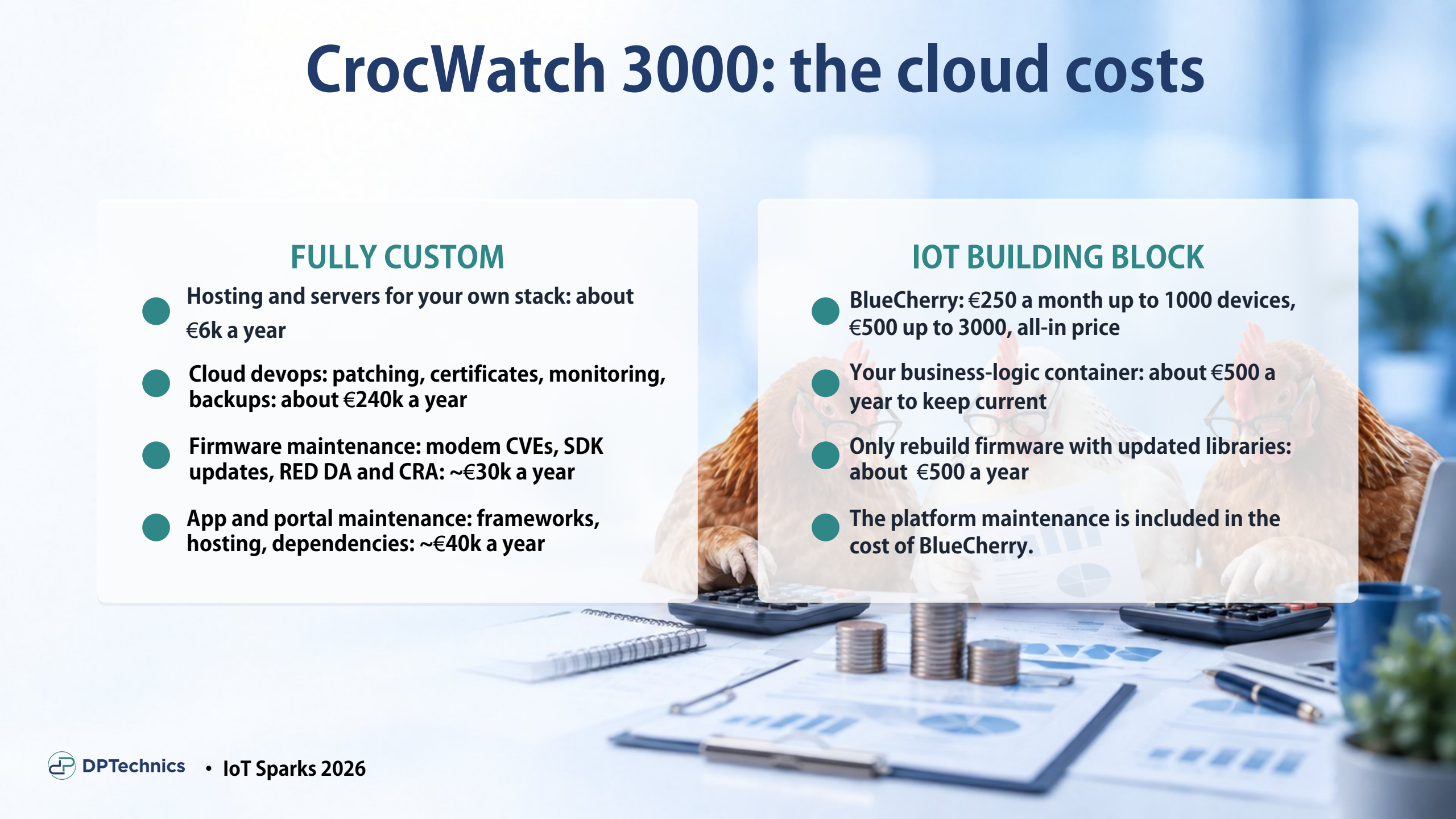
CrocWatch 3000: the cloud costs

FULLY CUSTOM

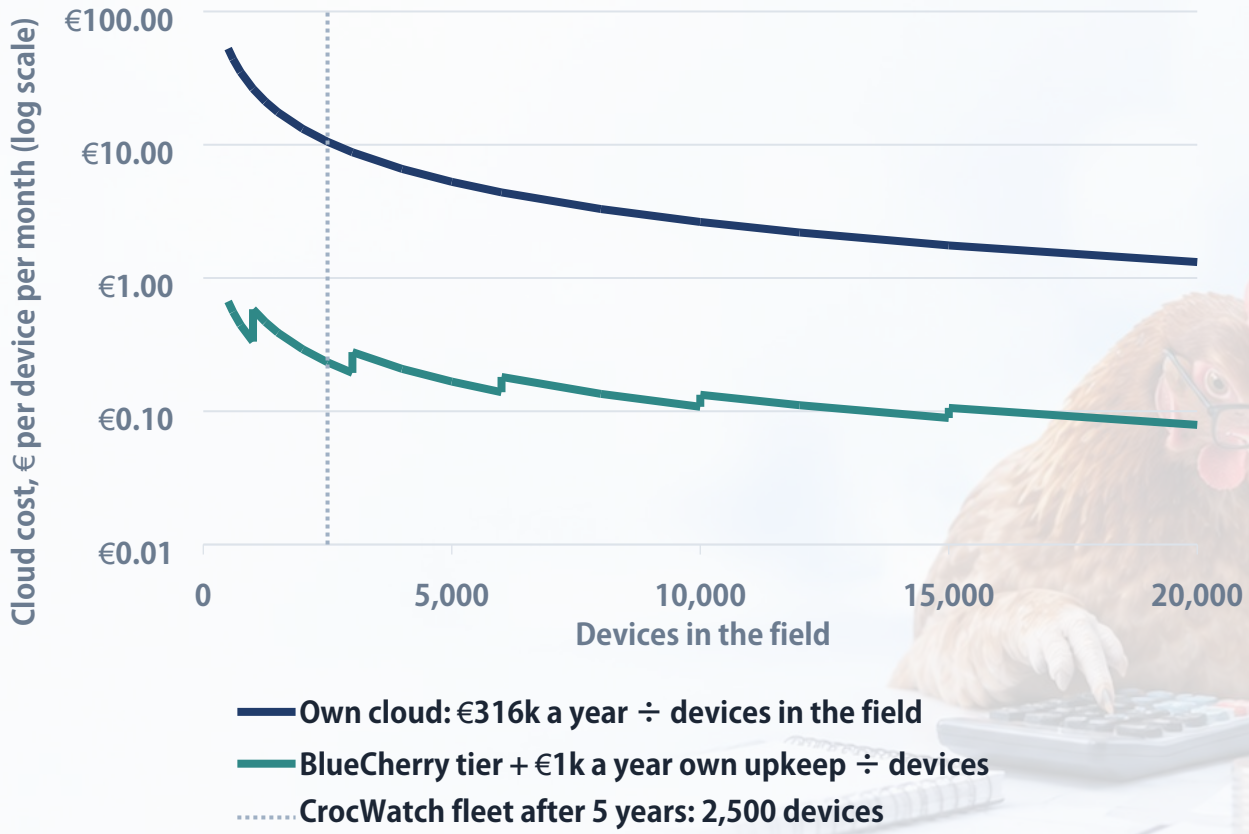
- Hosting and servers for your own stack: about €6k a year
- Cloud devops: patching, certificates, monitoring, backups: about €240k a year
- Firmware maintenance: modem CVEs, SDK updates, RED DA and CRA: ~€30k a year
- App and portal maintenance: frameworks, hosting, dependencies: ~€40k a year

IOT BUILDING BLOCK

- BlueCherry: €250 a month up to 1000 devices, €500 up to 3000, all-in price
- Your business-logic container: about €500 a year to keep current
- Only rebuild firmware with updated libraries: about €500 a year
- The platform maintenance is included in the cost of BlueCherry.



Cloud only: cost per device per month



€316k a year

for your own cloud before the first device connects. Hosting, devops, firmware and portal upkeep.

45× more

at 2,500 devices: €10.53 per device per month for your own cloud, €0.23 on BlueCherry, upkeep included.

No crossover

At 20,000 devices it is still €1.32 against €0.08. The fixed bill never shrinks; the tier price barely grows.

Key takeaway

In very large volumes custom hardware can be more economical if you can afford the longer TTM.

Building an IoT cloud for a single device type is never the right answer.



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BlueCherry

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