

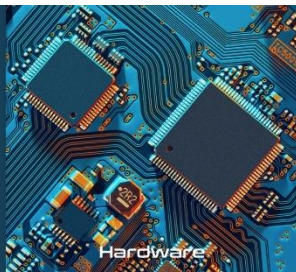
# Industrial IoT – What's next?

Jay Nagdeo

European IoT Solutions Architect



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Hardware



Software



Test & Measurement



Engineering



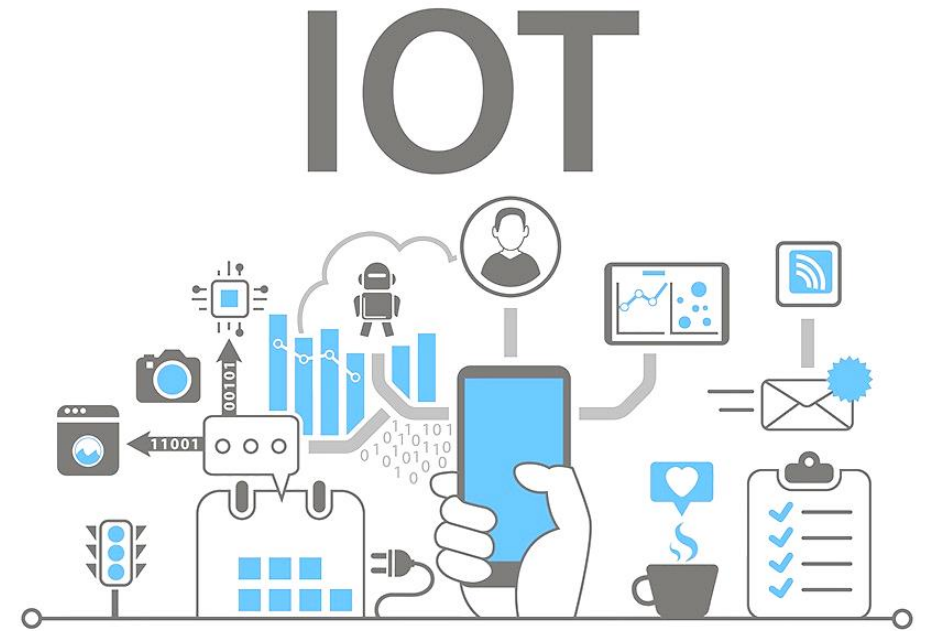
Research & Development

Het ontwerpen van  
innovatieve elektronica

Woensdag 19 april 2023  
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# Agenda

- IoT Market
- Typical IoT Solution
- IoT Product Requirements
- IoT Product Development Team
- IoT Product Development Costs
- IoT Product Development Challenges
- Solution?



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# IOT



# IoT Market

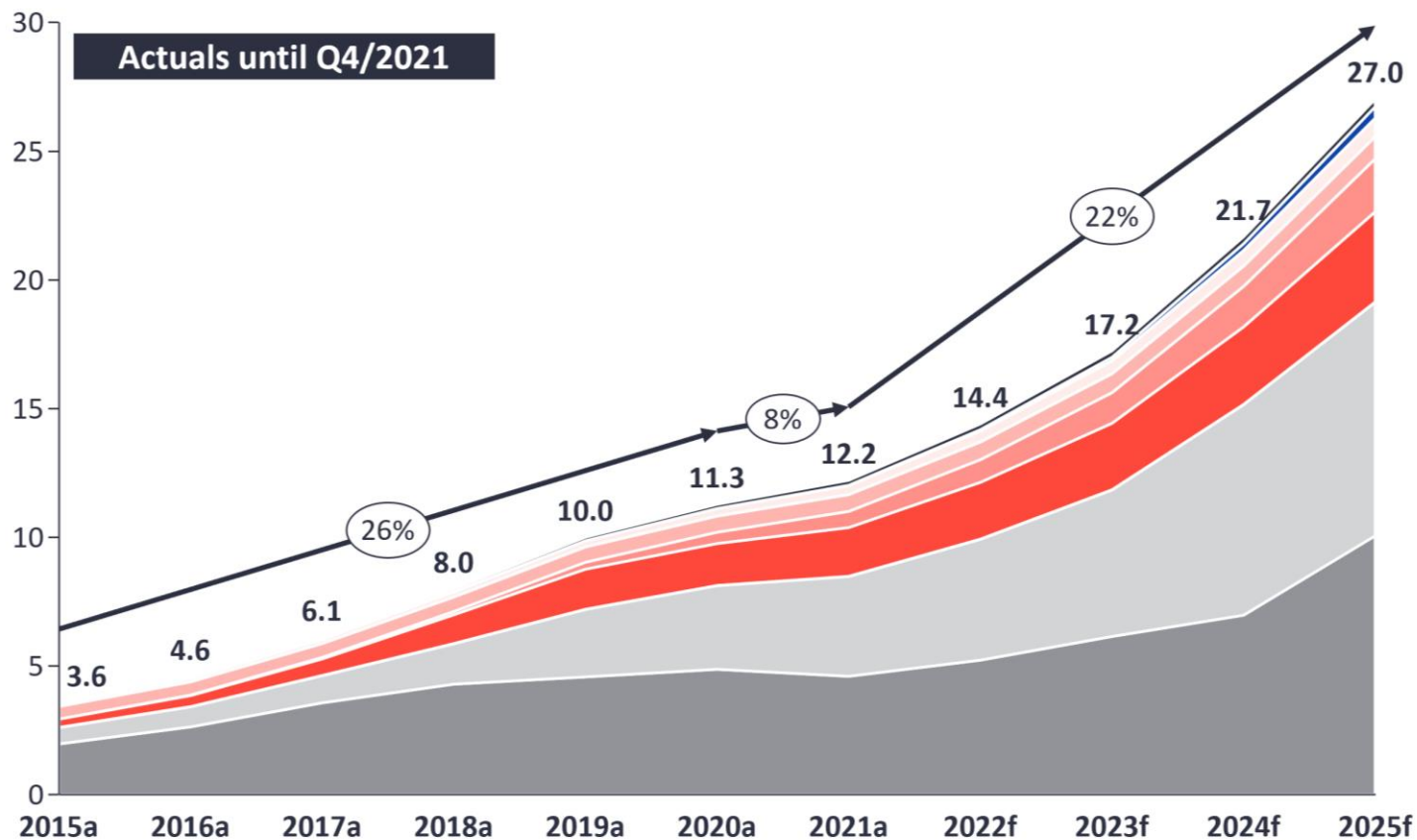
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# Global IoT Market Forecast [in billion connected IoT devices]

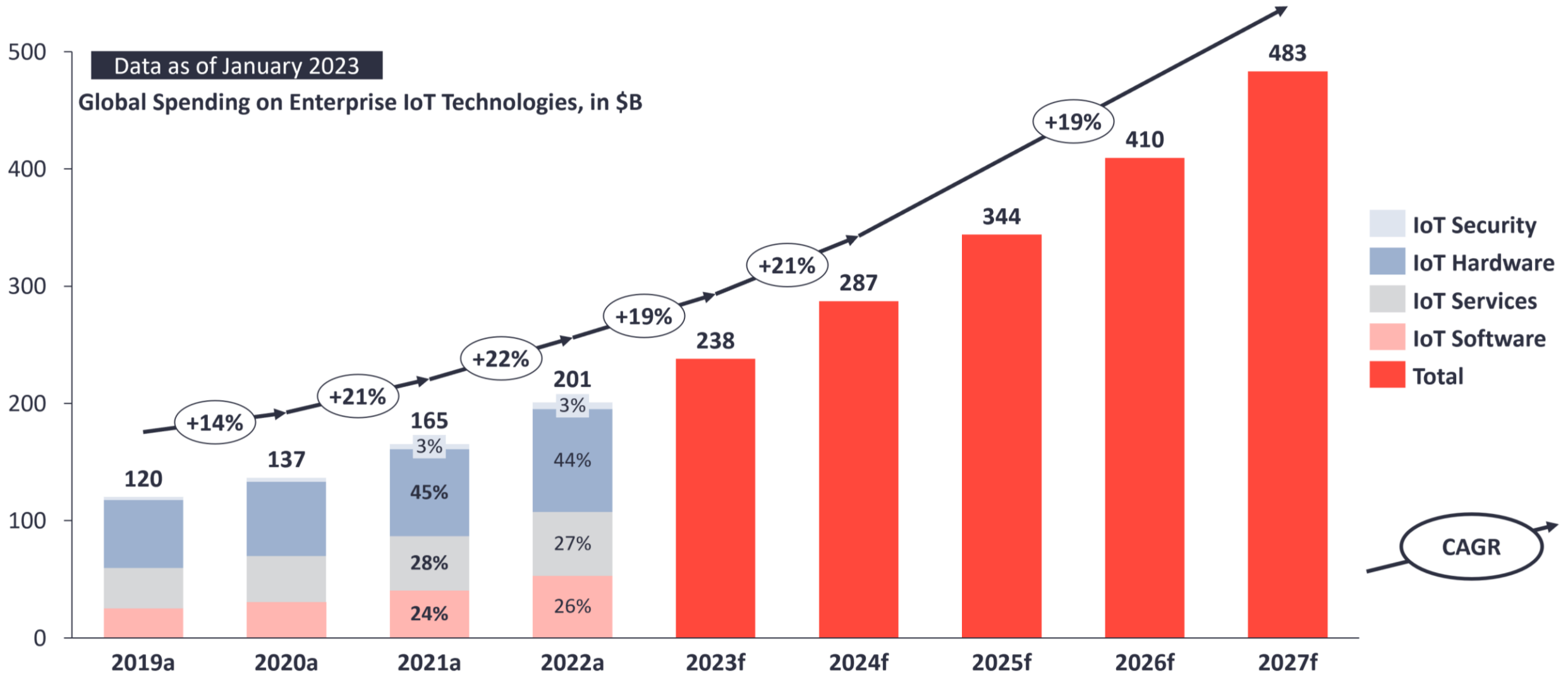
Number of global active IoT Connections (installed base) in Bn



CONNECTIVITY TYPE	CAGR 20-21	CAGR 21-25
Wireless Neighborhood Area Networks (WNAN)	17%	11%
5G IoT	-	159%
Other	22%	20%
Wired IoT	4%	7%
LPWA	42%	34%
Legacy Cellular (2G/3G/4G)	16%	17%
Wireless Local Area Networks (WLAN)	19%	24%
Wireless Personal Area Networks (WPAN)	-6%	22%

XX% = CAGR

# Enterprise IoT market 2019–2027

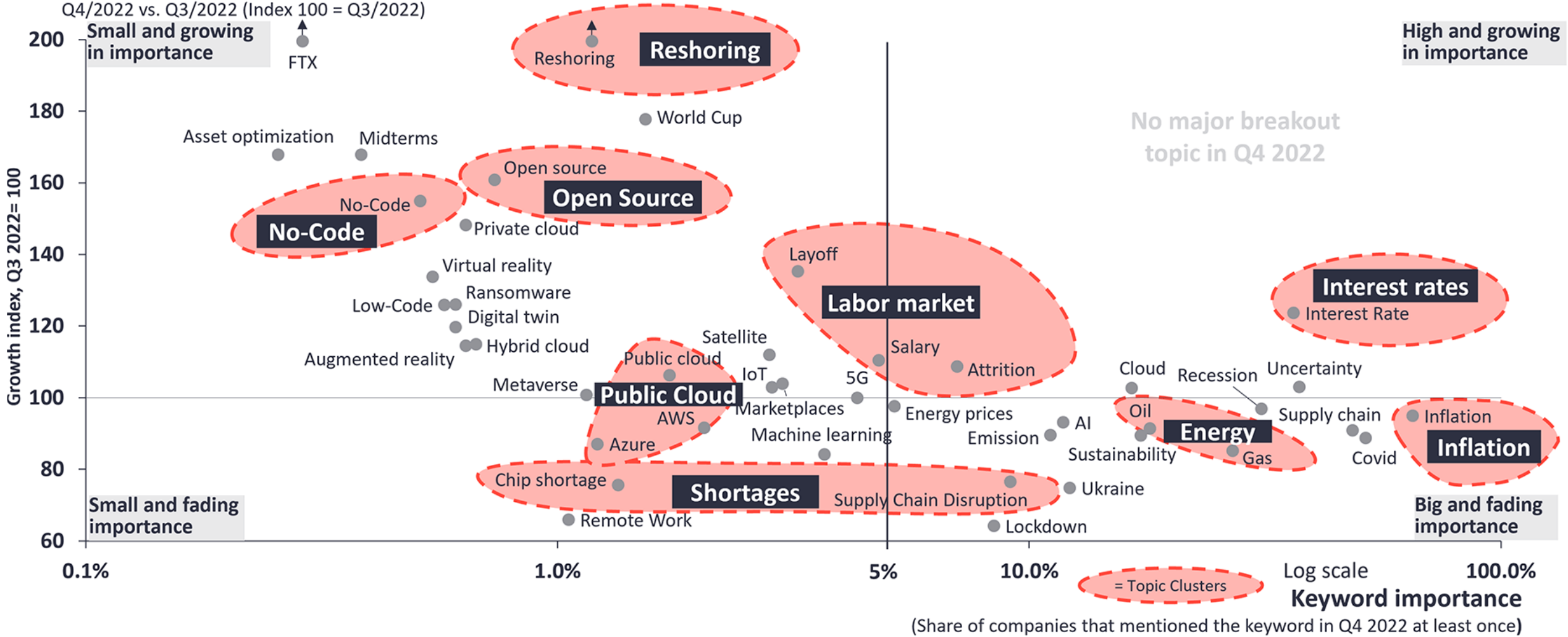




# What CEOs talked about in Q4/2022 (vs. Q3/2022)

## Keyword growth

Q4/2022 vs. Q3/2022 (Index 100 = Q3/2022)



# Where is IoT going?



Growth in the number of connected devices



Increased adoption of 5G technology



Emergence of Edge Computing



Advancements in Embedded AI and ML



Focus on security and privacy

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# IOT



## Typical IoT Solution

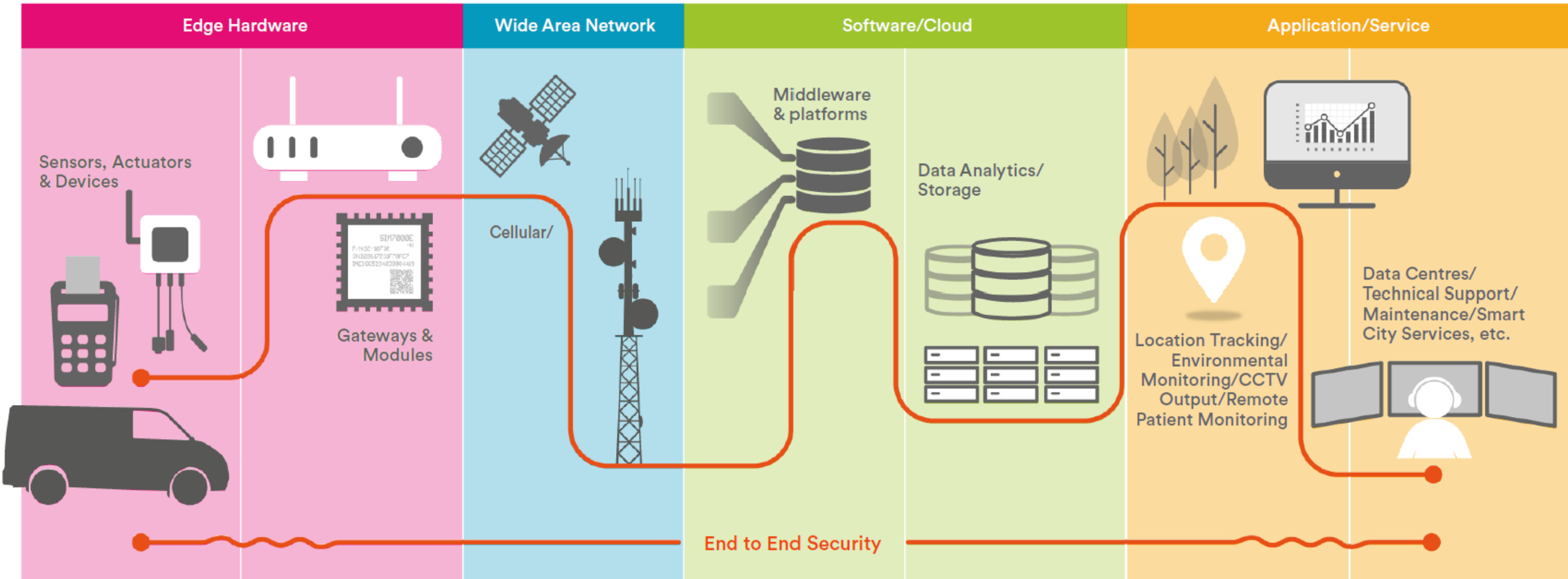
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# Typical IoT Solution



# IOT



## IoT Product Requirements

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# Requirements?

Connectivity

Scalability

Interoperability

Security

User  
Experience

Device  
management

Reliability

Energy  
Efficiency

Cost-  
effectiveness

Certifications

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# IoT Security: What needs to be Secured

## Secure Boot & Firmware

Private PKI signing infrastructure  
Highly secure & 3rd party owned RootCA vault  
Mutually authenticated SA and Servers  
Signing keys used only once  
Logged and capped signing operations

## Secure Device Mgmt

Factory pre-provisioned keys (zero touch prov.)  
Automated uncapped key rotations  
Cryptographically secure device identities  
Secure DM plane LWM2M + DTLS 1.2

## Secure Edge to Cloud

Factory pre-provisioned keys (zero touch prov.)  
Automated uncapped key rotations  
Mutual cloud and device authentication  
Cryptographically secure device identities  
Secure Data plane LWM2M + DTLS 1.2

## Application Security

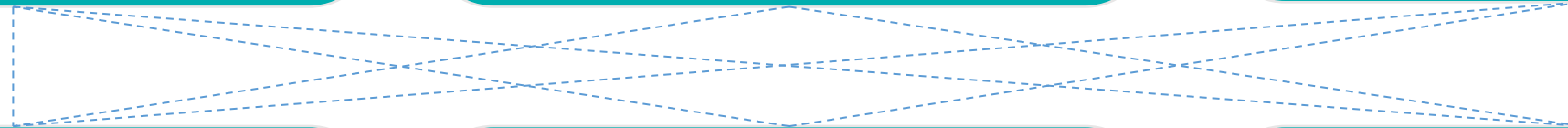
Sandboxing  
Secure Storage / TrustZone  
Zero touch Application Security

## Secure Connectivity

3GPP standard authentication and ciphering  
Embedded Sim  
Joint eSim and hardware authentication  
Private APNs  
Firewall & VPN

## Secure Firmware Updates

Private PKI for FOTA updates  
Built-in FOTA SecBoot protected  
Time limited signatures  
Update daemon protected by Secure Boot  
Offline/local updates based on signed software  
Zero touch FOTA/SOTA



# IOT



## IoT Product Development Team

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# IoT Project

Project Manager & IoT Architect

## Others

QA Testers  
Cyber-security expert

## Cloud

Cloud API Developers  
Cloud Infrastructure Dev  
Cloud Data Management Dev  
UI/UX developers  
Mobile/Web Apps Developer

## Software

Embedded SW Engineer IoT Engineer

## Hardware

Embedded HW Engineer Mechanical Engineer

Staff Shortage!  
Expensive!!

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# IOT



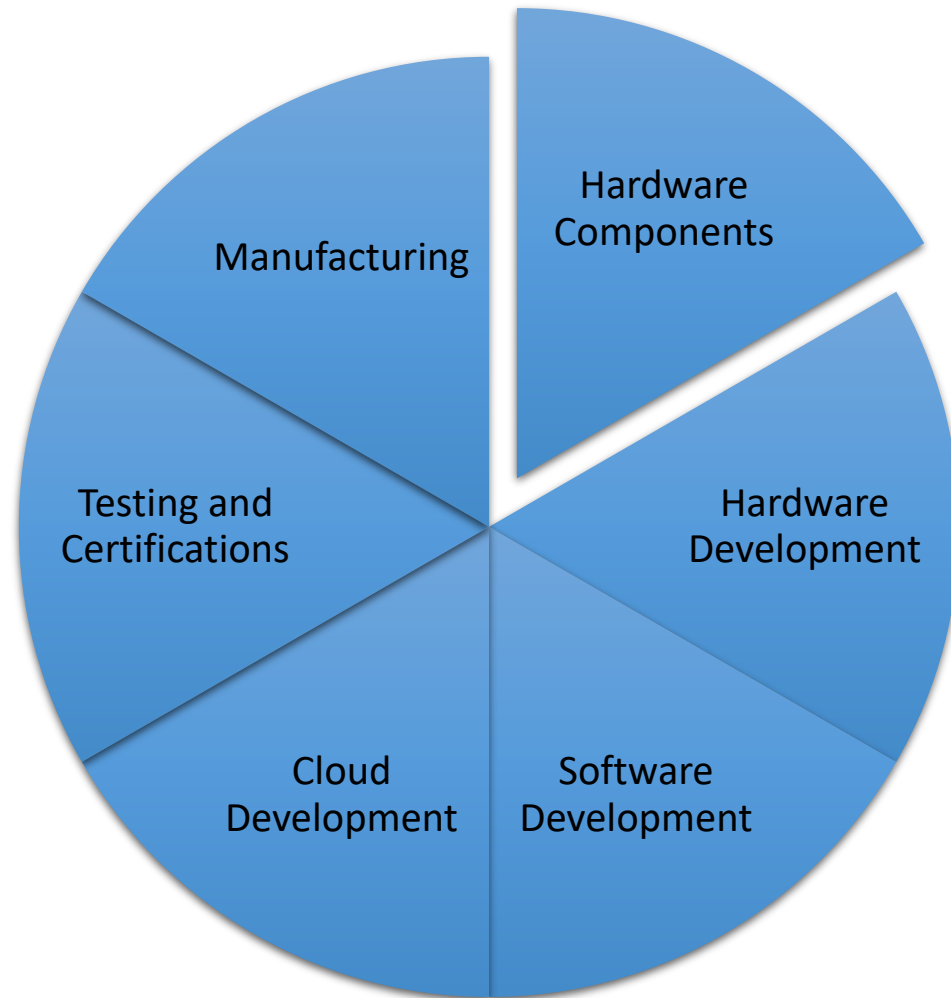
## IoT Product Development Costs

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# IoT product development costs



# IOT



# Challenges

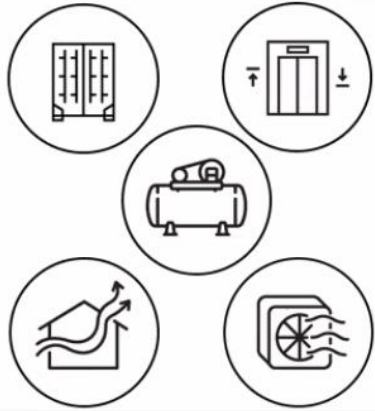
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# Integrating IoT Assets to the cloud can be Complex!

## CONNECTED EDGE



## IOT SOLUTION



## CLOUD



## TECHNICAL & OPERATIONAL CHALLENGES



### IoT Stack Expertise

- ✓ Protocols (LWM2M, CoAP/CBOR)
- ✓ Data Management and Efficiency
- ✓ Flexible Cloud Integration



### Device/Embedded Expertise

- ✓ Interfaces & Protocols to connect to Asset
- ✓ Edge App development & reporting logic
- ✓ Device certification



### Cybersecurity

- ✓ Key Provisioning & Rotation
- ✓ Encryption (DTLS 1.2)
- ✓ Private APNs/VPN



### Telecom Expertise

- ✓ Connectivity and Subscription Management
- ✓ Manage Service & Coverage disruptions
- ✓ Select most accurate networks



### System & Cloud Integration

- ✓ End-to-End integration (APIs)
- ✓ Test, validation,
- ✓ Maintenance



### Operation & Support

- ✓ Fleet Management & FOTA
- ✓ GNOC operation center
- ✓ 24/7 Troubleshooting



### Pricing Model

- ✓ Predictable
- ✓ Include: Cellular, Security, Edge-to-Cloud API calls, Maintenance

# IOT



# Solution?

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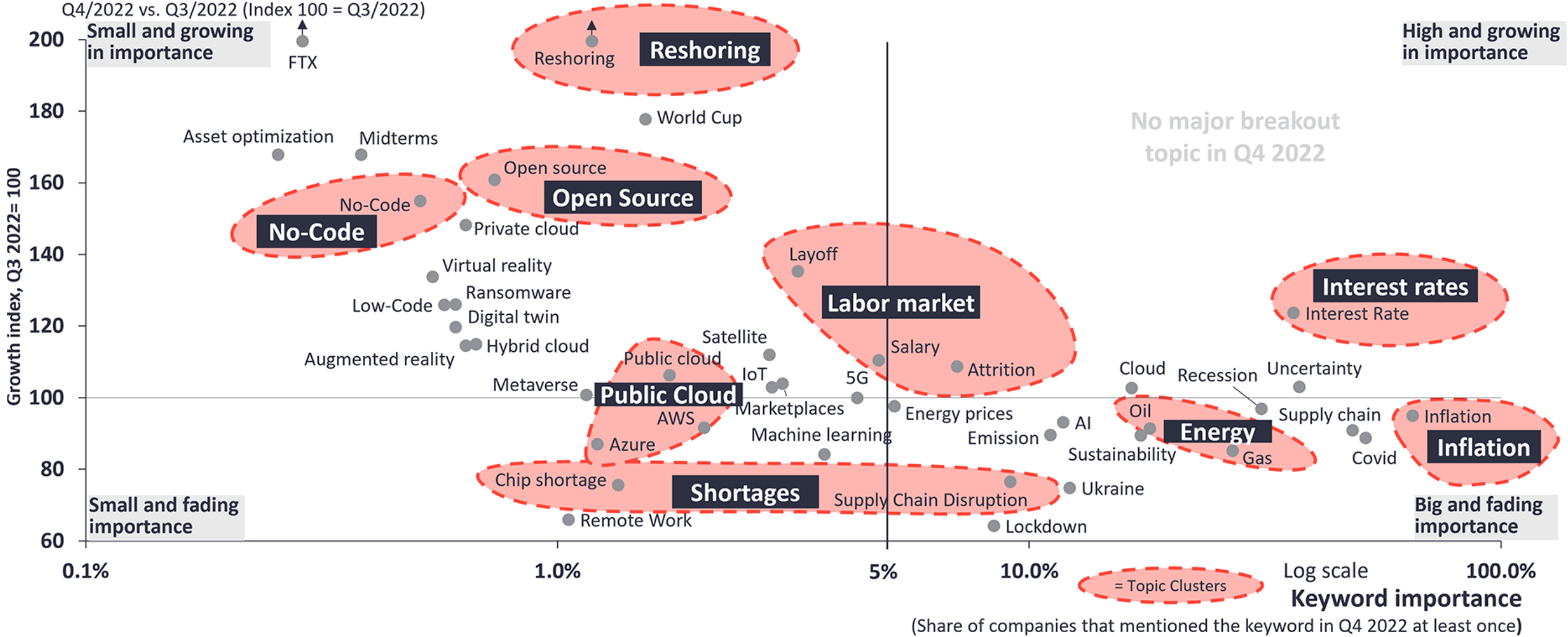
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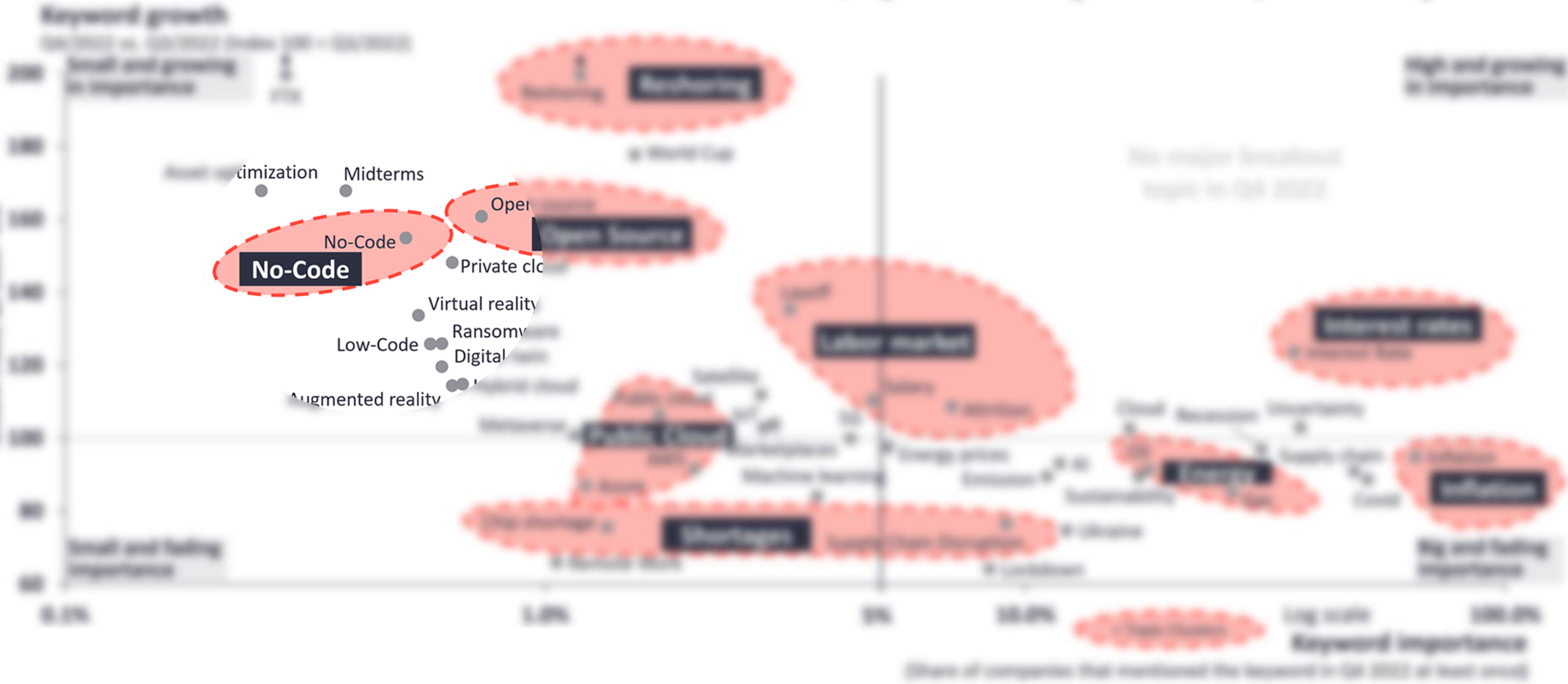
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# What CEOs talked about in Q4/2022 (vs. Q3/2022)



# IOT

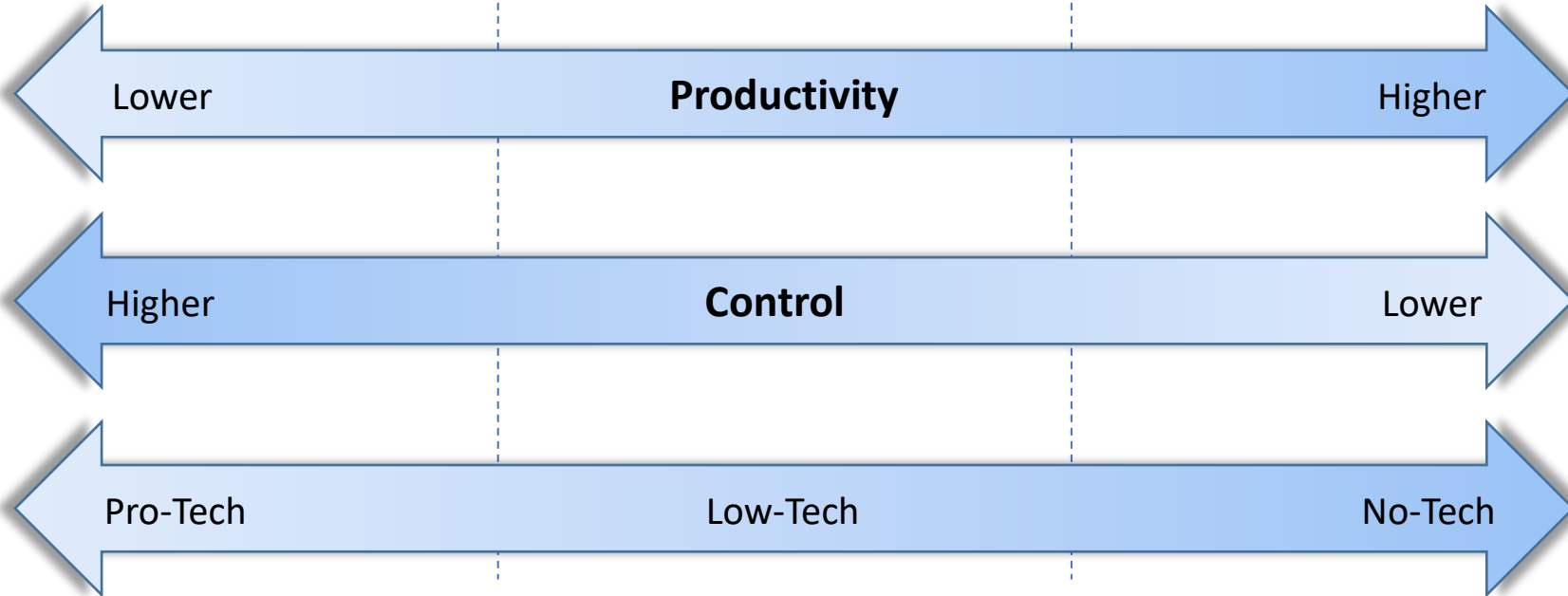
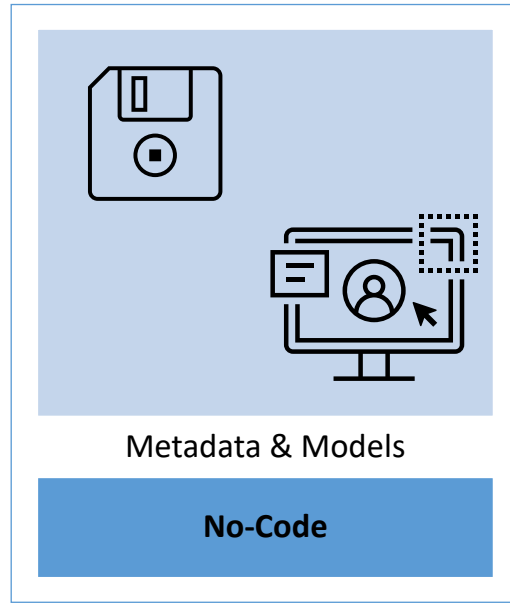
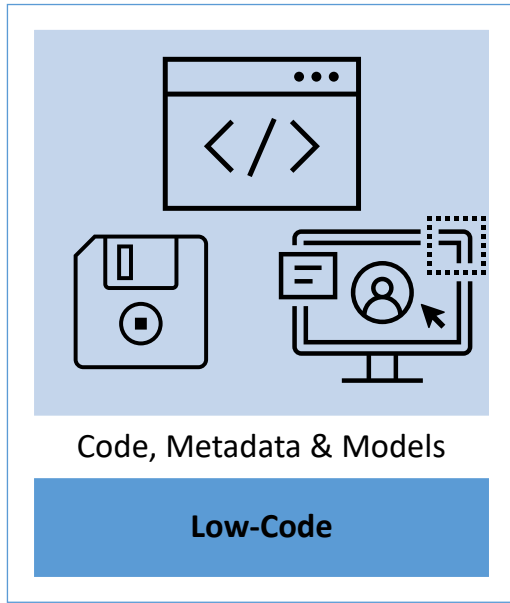
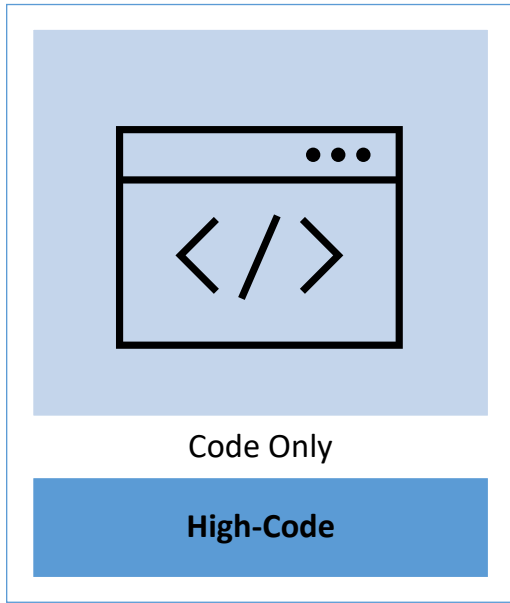


## IoT No/Low-Code Platforms

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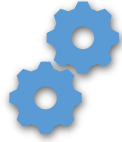
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# Benefits



Faster  
development



Increased  
automation



Lower costs



Design agility



Simpler data  
integration



Greater privacy  
and security



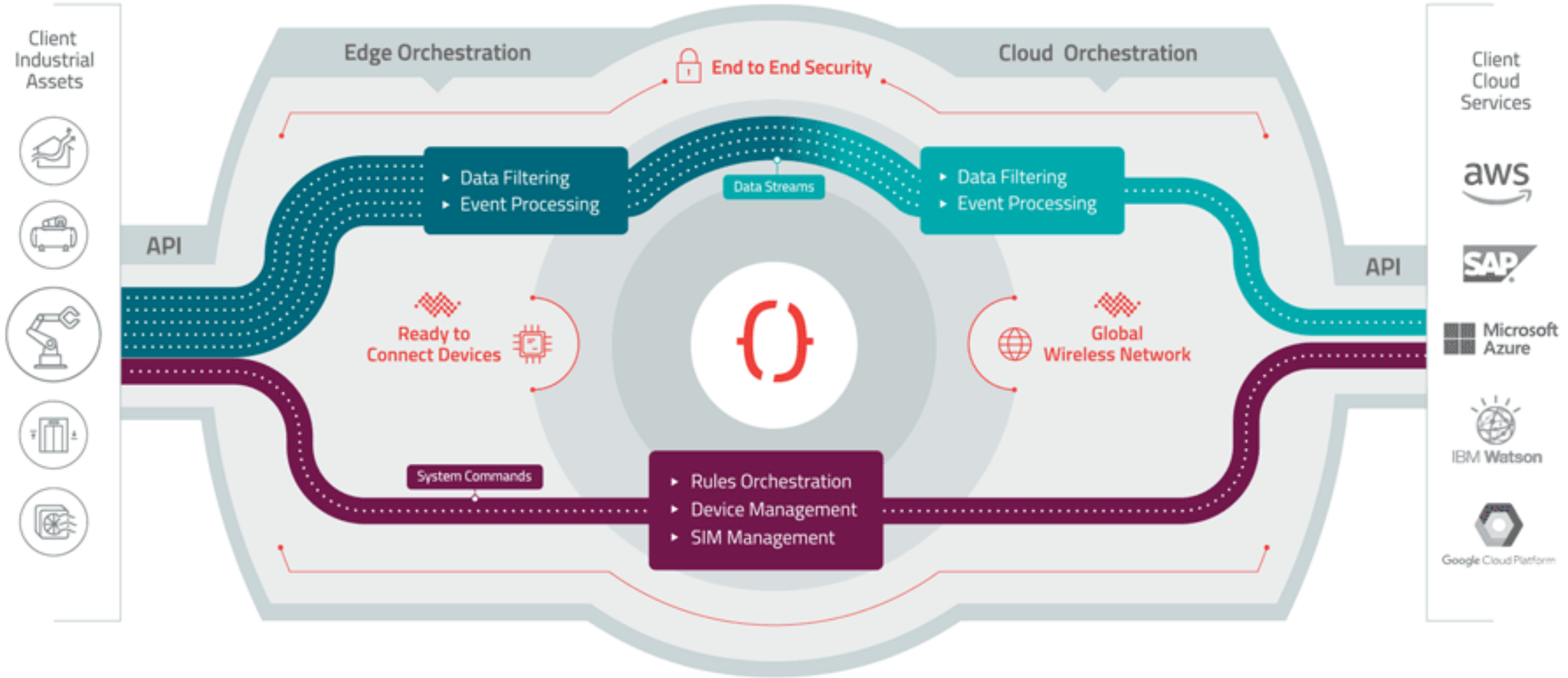
Leveraging existing  
technologies

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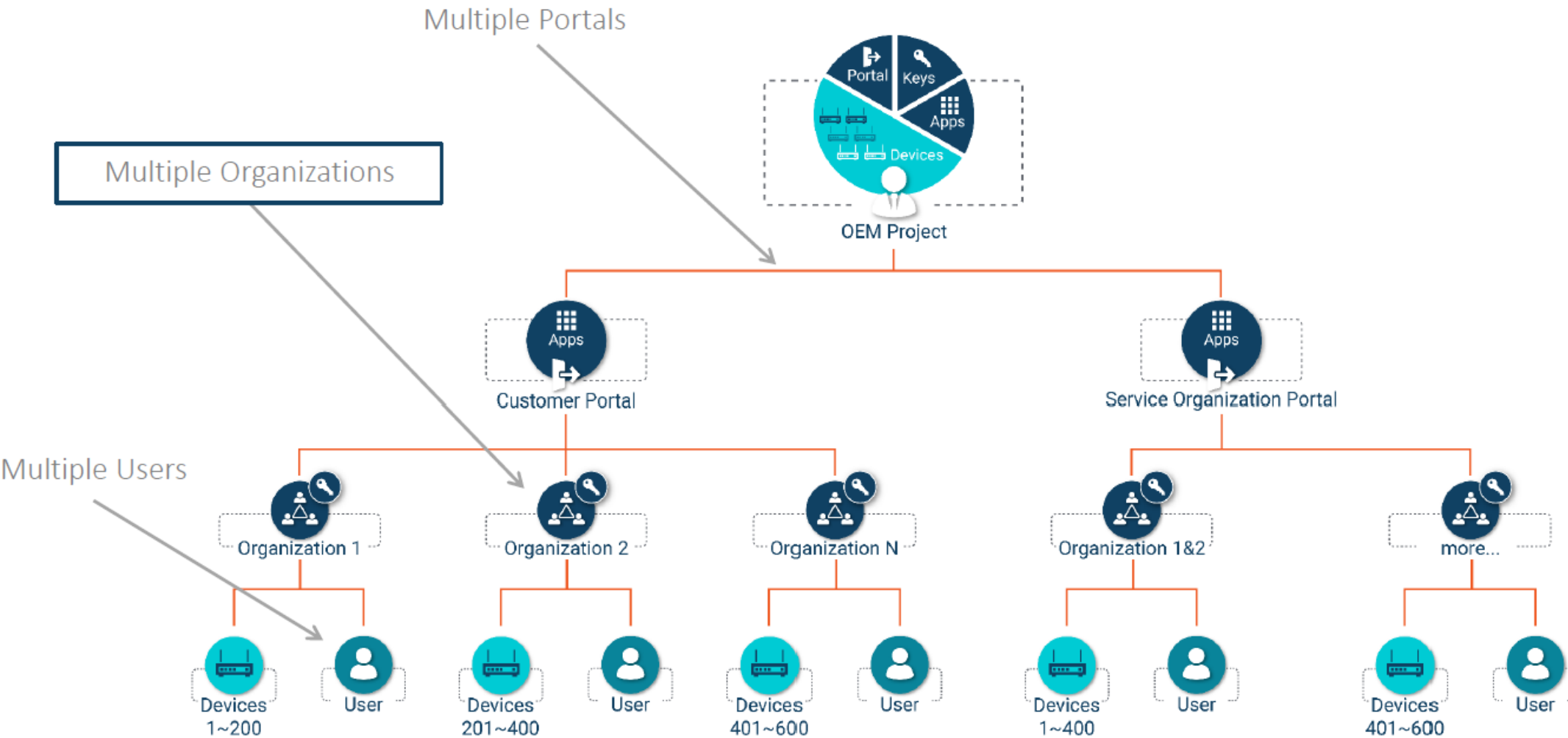
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# Architecture



# Multi-tenant Device Management



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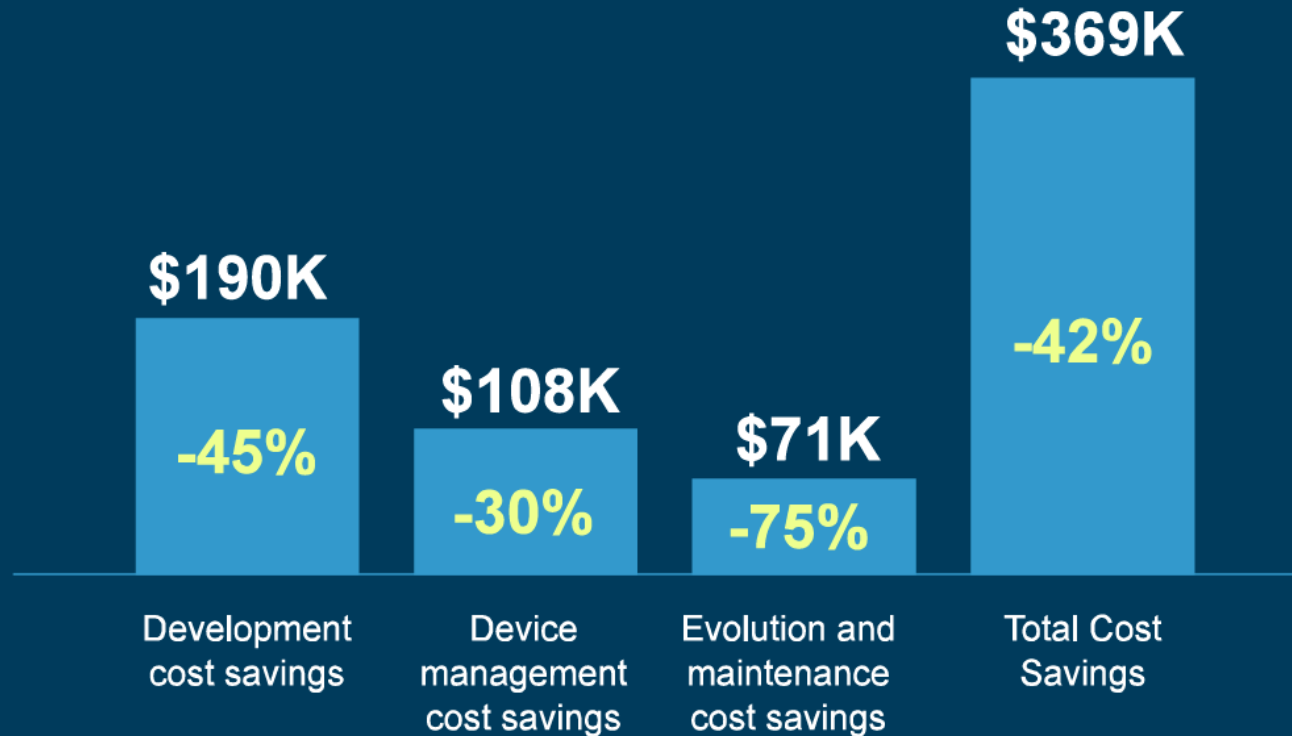
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## SUMMARY OF COST SAVINGS

Three-year risk-adjusted (case based on deployment of 14k devices)



BEFORE OCTAVE

**21 months**

On average it took 21 months to commercialize an internally developed solution and commercialize the service



WITH OCTAVE

**12 months**

By using the Octave platform, clients could launch their service 9 months earlier



# Environmental Sensor Octave Demo

The goal of this demo is to showcase the new ways of enabling & implementing IoT to save on product development costs and shorten the time-to-market using Low-code/No-code cloud and hardware platforms.



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# Thank you

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Website: [www.acalbfi.com](http://www.acalbfi.com)



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