2020 IoT Developer Survey
Key Findings

October 2020

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Executive Summary

- In 2020, **Agriculture** has emerged as the leading industry focus area for **26%** of respondents
- **Security (39%)**, **Connectivity (27%)** and **Data Collection & Analytics (26%)** are still the top three concerns for IoT developers in 2020
- **Artificial Intelligence (30%)** was the most frequently selected edge computing workload
- **Privacy is a growing concern selected by 23% of respondents**, as awareness of the issues increases among organizations and consumers alike

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Executive Summary (Continued)

- **Communication Security (43%)** and **Data Encryption at rest (41%)** are the most widely used techniques for securing IoT solutions again this year
- **Distributed Ledgers** have gained momentum as a way to secure IoT solutions
- **Java** is the most widely used programming language at the **Edge (20%)** and in the **Cloud (24%)**
- In 2020, the IoT Middleware market is dominated by **AWS IoT (35%)**, **Microsoft Azure IoT (31%)**, and **Google Cloud IoT Platform (30%)**
- **Amazon AWS** with 40% (+6% in 2020), **Microsoft Azure** with 31% (+8% in 2020), and **Google Cloud Platform** with 26% (+6% in 2020) keep dominating the public IoT and Cloud Platforms in 2020

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Introduction

The objective of the survey is to provide **essential insights about the IoT industry landscape, the challenges IoT developers are facing, and the opportunities for enterprise IoT stakeholders in the IoT open source ecosystem**. For the first time, the survey probes respondents about their use of edge computing, which will help influence the roadmap of the Eclipse Edge Native Working Group. From May 28 until July 10, **1652 individuals participated in the 2020 edition of the survey**.

The survey was heavily promoted on social media, on iot.eclipse.org, edgenative.eclipse.org, sparkplug.eclipse.org, on various IoT (developer) websites, in newsletters, blogs, LinkedIn groups, and it was shared with members of the Eclipse IoT, Edge Native, Sparkplug, and Tangle EE Working Groups, as well as Industrial Internet of Things (IIoT) influencers.

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Survey Partners

Thank you for sharing the survey with your communities!

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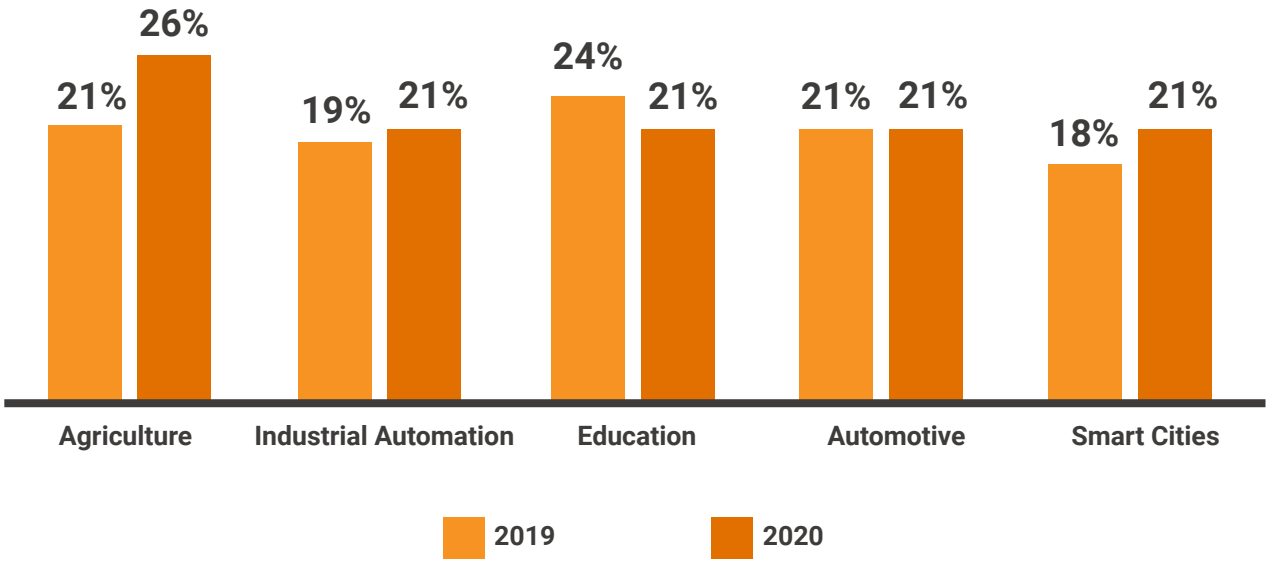
KEY FINDING 1.1

Key Industry Focus Areas



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KEY FINDING 1.2

Smart Agriculture is growing

- Agriculture leaps into **first place (from 21% in 2019 to 26% in 2020) for industry focus areas**. The growth of smart farming reflects the rise in adoption of IoT-based solutions to increase yields, lower costs, reduce waste, among other driving factors.

- Industrial Automation, Education, Automotive, Connected / Smart cities are tied at **#2 (21% each)**.

- There is less interest in home automation **(from 22% in 2019 to 19% in 2020)**. Consumers may have been burned by providers who abruptly discontinued their products and services (or suddenly started charging for them when previously free).

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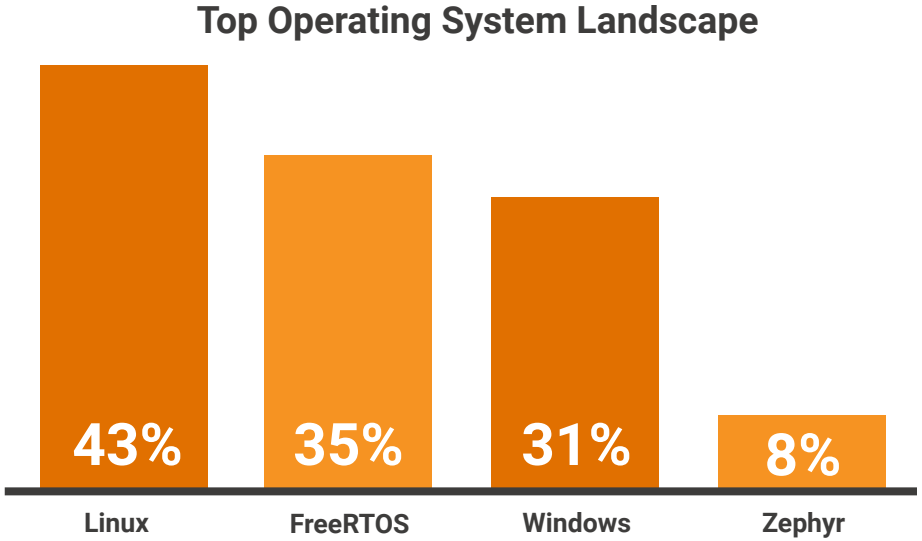
KEY FINDING 2

It's a Linux and FreeRTOS World

- **Linux (43%)**, **FreeRTOS (35%)** and **Windows (31%)** are the top OSes for constrained devices and edge nodes
- **Windows** usage grows from **20% in 2019** to **31% in 2020** - probably driven by Azure IoT
- Surge by **Zephyr (from 3% in 2019 to 8% in 2020)**



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KEY FINDING 3

Top Edge Computing Workloads

Artificial Intelligence
30%

Control Logic
29%

Data Exchange
27%

Sensor Fusion
27%

Artificial Intelligence (30%) was the most frequently selected edge computing workload in the survey. **Control Logic (29%)**, **Data exchange between multiple nodes (27%)** and **Sensor fusion (Data aggregation and filtering) (27%)** followed.

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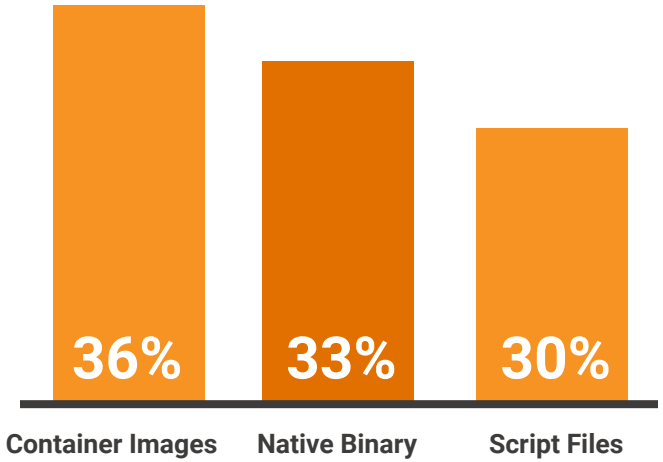
KEY FINDING 4

Top Edge Computing Artifacts for IoT Solutions 2020



Container images (36%), native binary (33%), and **script files (30%)** are the leading edge computing artifacts for IoT solutions in 2020. The high percentage for native binary is an indication that they own the edge.

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KEY FINDING 5

Top Ways for Deploying Artifacts of IoT and Edge Computing Solutions 2020

Cloud-managed over the air updates
48%

Locally-managed over the air updates
42%

Network Cable
38%

Cloud-managed over the air updates (48%), **locally-managed over the air updates (42%),** and **network cable (38%)** are ranked top ways for deploying artifacts for IoT and edge computing solutions.

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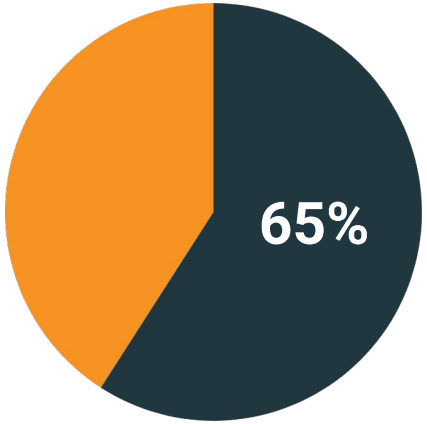
KEY FINDING 6

IoT is Synonymous with Open Source



65% of respondents either experiment with, use or contribute to open source projects.

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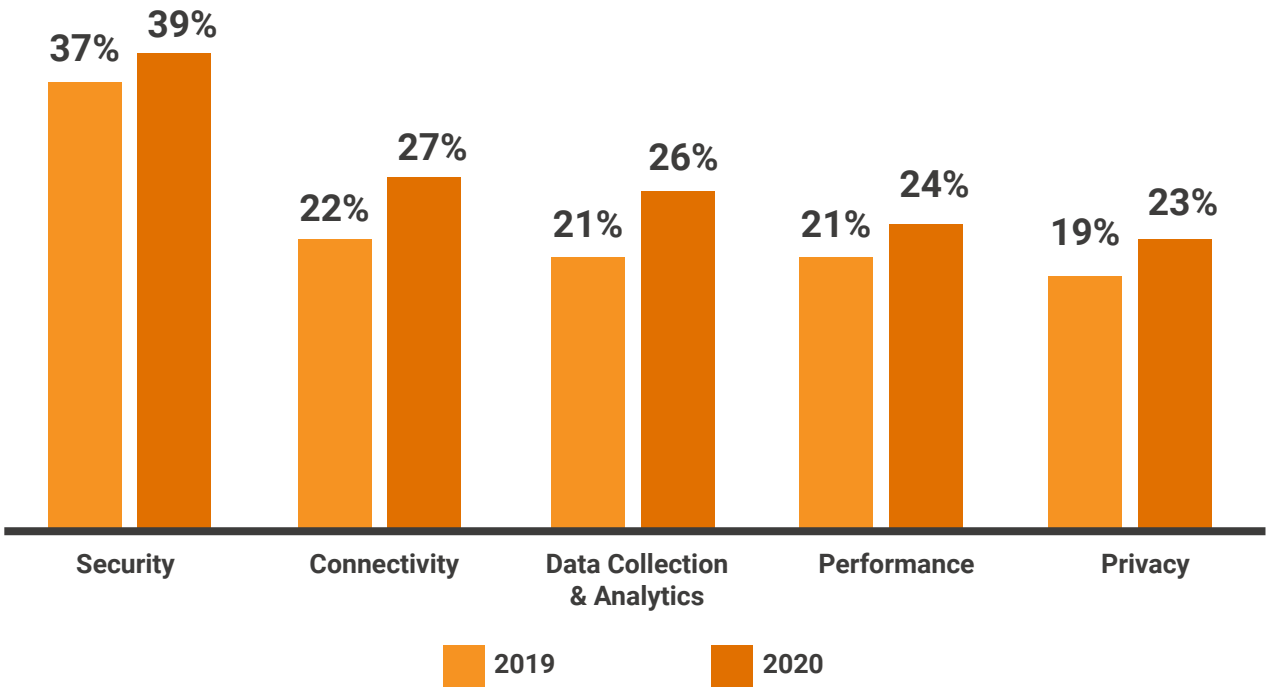
KEY FINDING 7.1

The Top Concerns for IoT Developers



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KEY FINDING 7.2

- **Security (39%)**, **Connectivity (27%)** and **Data Collection & analytics (26%)** are still the top three in 2020

- Significant increase for connectivity means that figuring out the right connectivity solution for the use case is tricky

- The growing interest of IoT Developers in Data Collection & Analytics can be linked to the rise of **privacy**. Although analytics tools are mature, it is difficult to determine how to collect and manage data in accordance with regulations while protecting the customer privacy. Operational technology specialists fear that sending raw telemetry streams outside of the corporate firewall could compromise industrial secrets

- **Performance as #4 (24%)** shows that the market is getting past PoCs and initial deployments and focusing on optimizing production systems for user experience and to deliver business value, among other reasons

- **Privacy as #5** is on the rise **(from 18.75% in 2019 to 23% in 2020)** as awareness of the issues grows among organizations and consumers alike

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KEY FINDING 8.1

Programming Languages: The Usual Suspects Strike Again

- **C, C++, Java, Python** and **JavaScript** dominate the IoT space, as they dominate the rest of the IT market.

C (20%) is number one for **constrained devices.**

Java (20%) is number one at the Edge and in the **Cloud (24%)**.

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KEY FINDING 8.2

Programming Languages: Top 4 by Tier

IoT Constrained Device	IoT Gateway/Edge Node	IoT Cloud
1. C - 20%	1. Java- 20%	1. Java - 24%
2. Java - 19%	2. Python - 17%	2. Python - 17%
3. C++ - 15%	3. C - 13%	3. Javascript - 16%
4. Python - 10%	4. C++ - 12%	4. C++ - 8%

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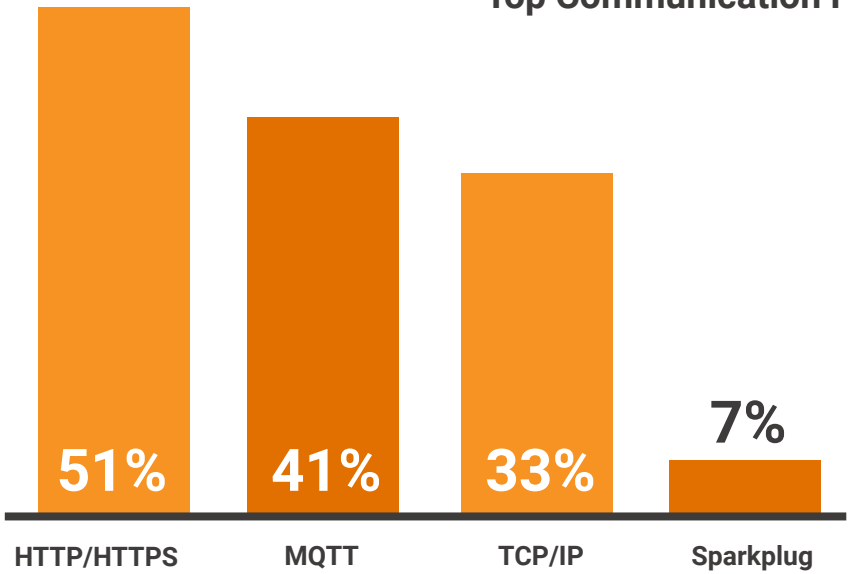
KEY FINDING 9

Top Communication Protocols in 2020



- Are dominated by **HTTP/HTTPS (51%)**, **MQTT (41%)**, and **TCP/IP (33%)**
- **Eclipse Sparkplug** has significant traction **(7%)**.

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KEY FINDING 10

Top Connectivity Protocols in 2020

WiFi
44%

Ethernet
39%

Cellular (LTE, 4G, 5G, etc)
37%

Bluetooth/Bluetooth Smart
37%

Top Connectivity Protocols in 2020 are **WiFi (44%)**, **Ethernet (39%)**, **Cellular (LTE, 4G, 5G, etc)** and **Bluetooth/Bluetooth Smart** with equally **37%**.

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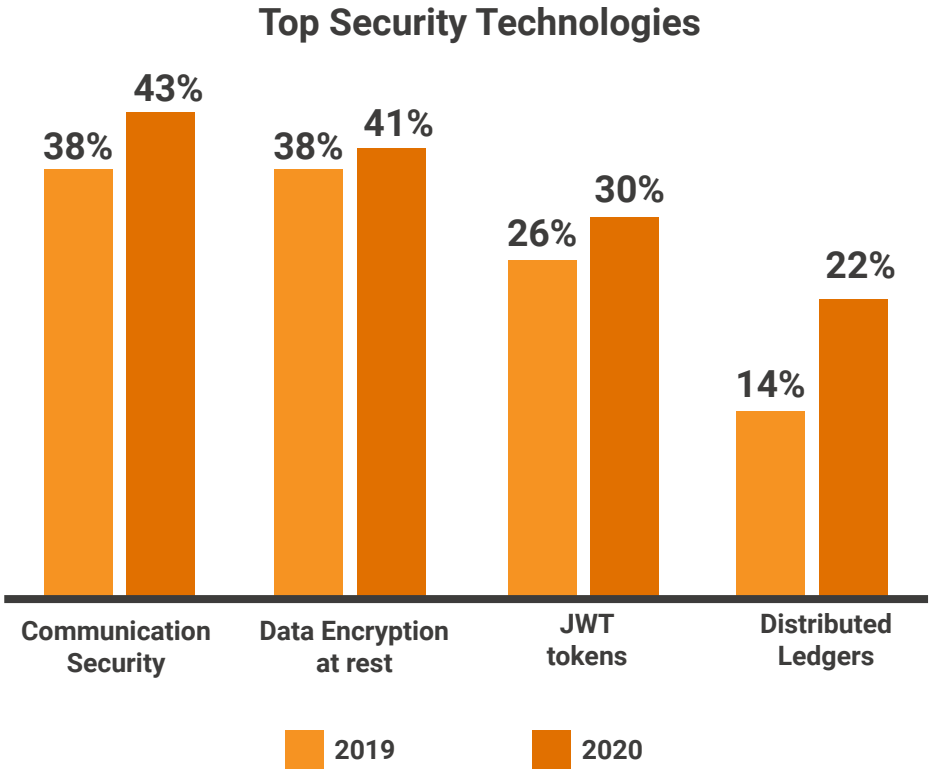
KEY FINDING 11



- **Communication Security (43%, +5% in 2020)** and **Data Encryption at rest (41%, +3% in 2020)** are the most widely used techniques again this year.
- **JWT tokens** are popular for authentication **(30%, +4% in 2020)**. They are easier to deploy in integration scenarios while OAuth is more targeted at human-centric scenarios.
- **Distributed Ledgers** grew to **22% in 2020 (as opposed to 14% in 2019)**. This demonstrates the relevance of the Eclipse TangleEE Working Group to the market.

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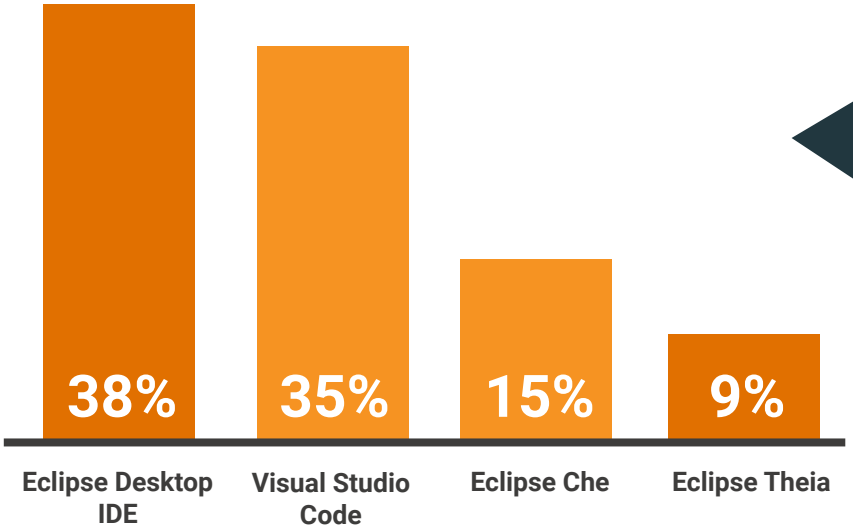
KEY FINDING 12

Development Tools: Rise of the Cloud-based IDEs



Top IDEs or text editors **Eclipse Desktop IDE** (eg. Eclipse JDT, Eclipse CDT) - **38%**, **Visual Studio Code (35%)**, and Notepad++ are still dominant in 2020.

Eclipse Cloud Development tools have great momentum! **Eclipse Che** grows significantly **(+6% in 2020)** while **Eclipse Theia** reaches **9%.**

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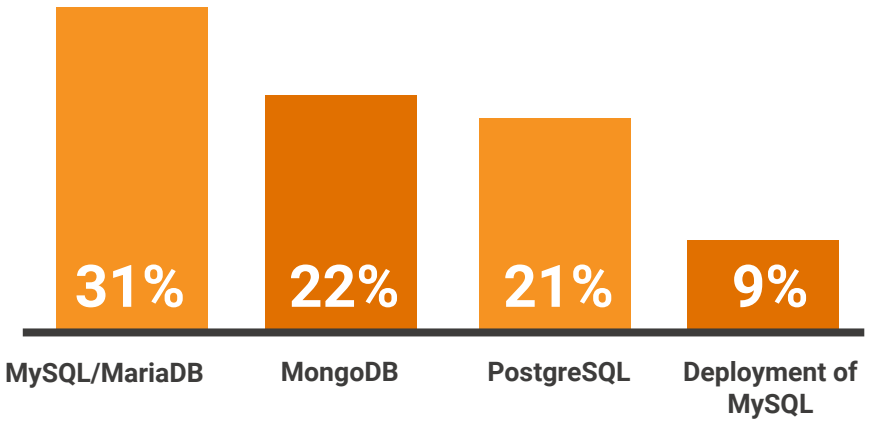
KEY FINDING 13

Open Source Databases Rule IoT



- **MySQL/MariaDB (31%)**, **MongoDB (22%)**, and **PostgreSQL (21%)** are prevailing as top Database Technologies in 2020
- The deployment of **MySQL** has decreased from 2019 (40%) with **9%**
- Only **4%** of respondents stated they rely on a **proprietary database**

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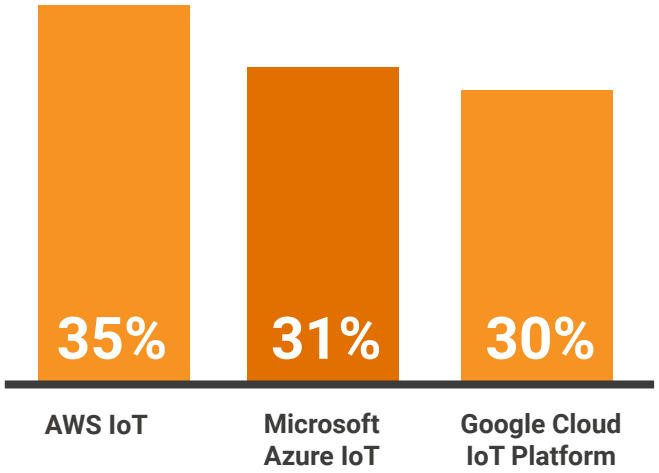
KEY FINDING 14

IoT Middleware: The Race is Still Young



- In 2020, the top IoT Middleware are dominated by **AWS IoT (35%), Microsoft Azure IoT (31%),** and **Google Cloud IoT Platform (30%)**
- The market is much more competitive than in public cloud platforms, with the leaders packed within 5% of each other.
- The diversity in responses shows this specific market segment is still young and competitive.

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KEY FINDING 15

Public Cloud and IoT: The Big Three Cement their Lead

AWS
40%

Azure
31%

Google Cloud Platform
26%

Amazon AWS with **40%** (+6% in 2020), **Microsoft Azure** with **31%** (+8% in 2020), and **Google Cloud Platform** with **26%** (+6% in 2020) keep dominating the public IoT and Cloud Platforms in 2020.

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KEY FINDING 16

Top Organizations Relevant for IoT Strategies

Apache Software Foundation	Eclipse IoT	Linux Foundation	IEEE
51%	49%	49%	41%

Apache Software Foundation (51%), Eclipse IoT/Eclipse Foundation (49%), Linux Foundation (49%), and **IEEE (41%)** are the top organizations developers consider relevant for IoT strategies.

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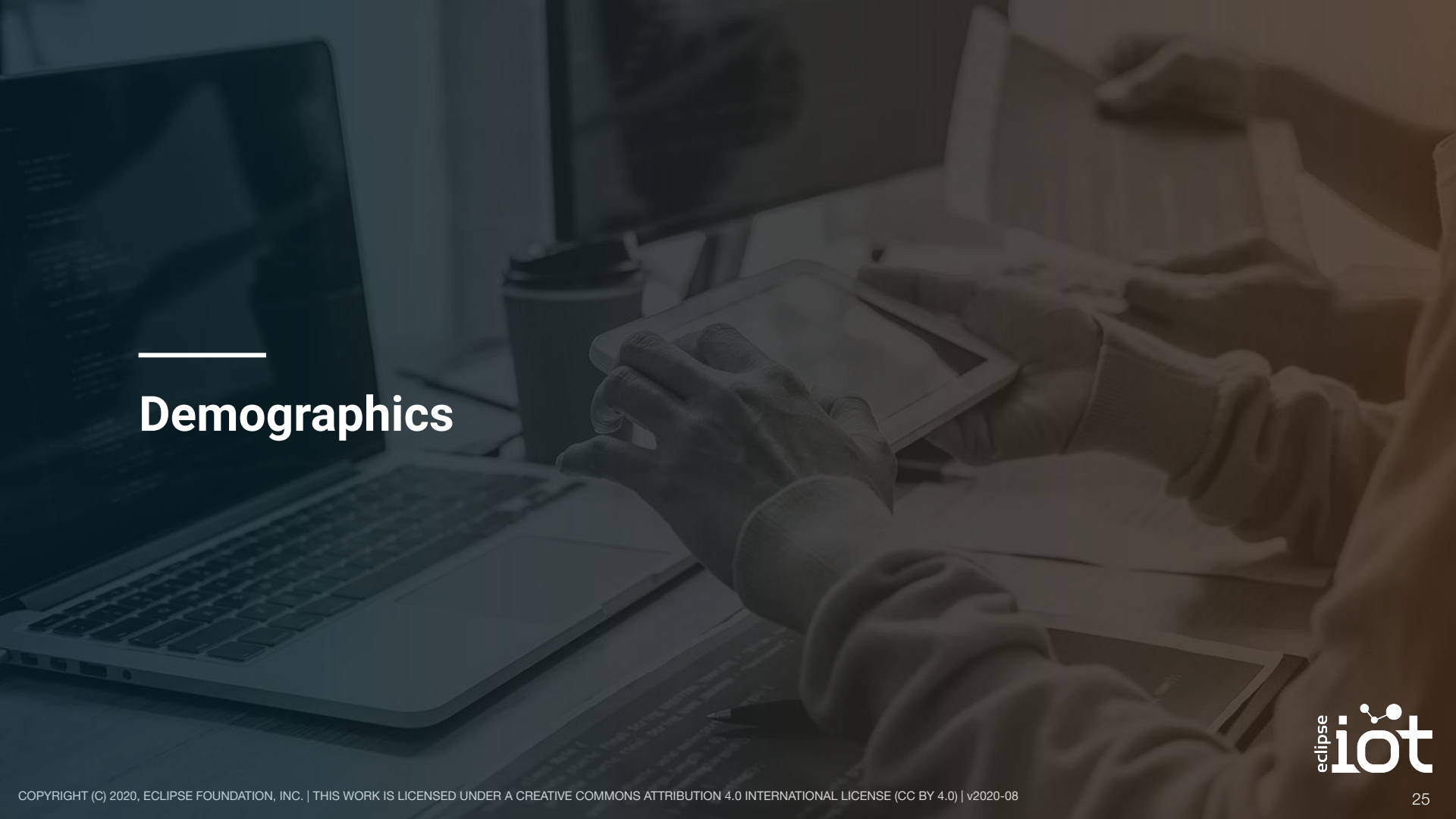

Demographics

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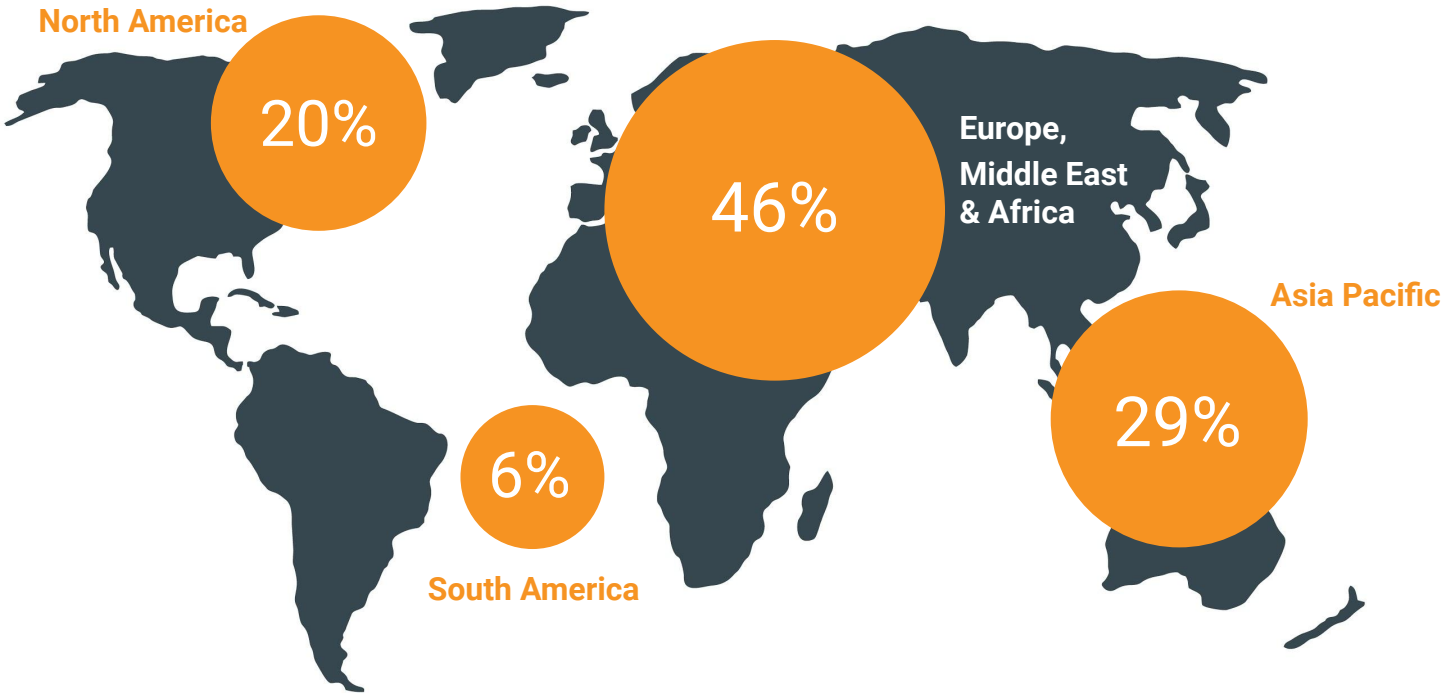
Regions

What region are you located in?



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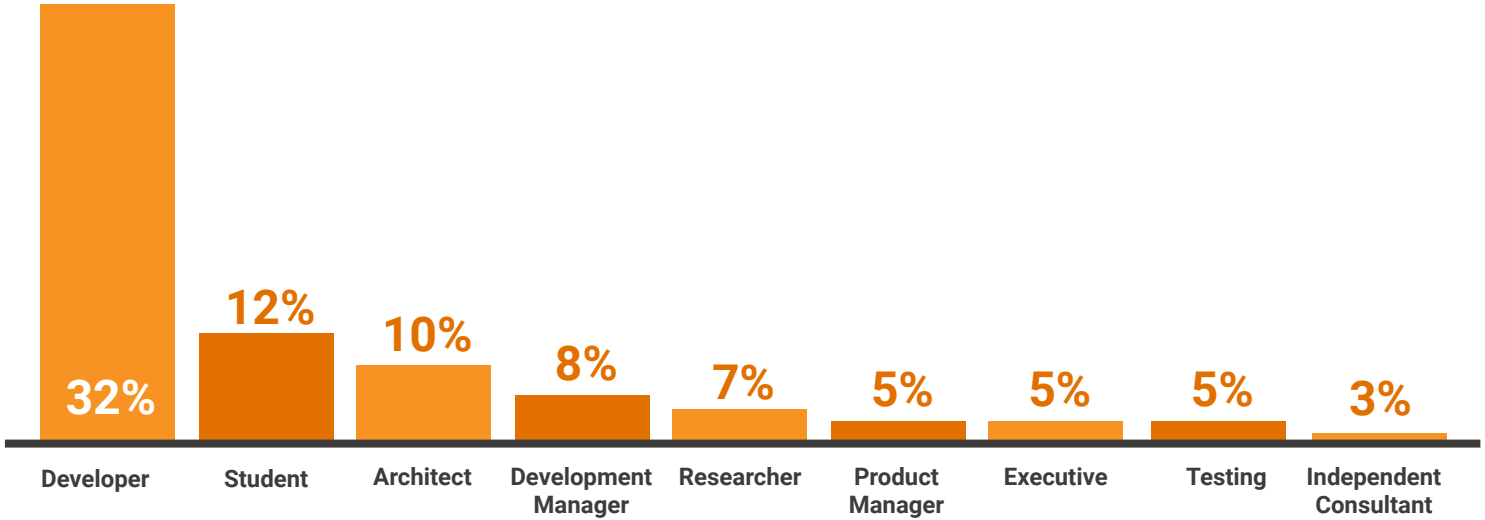
Roles

What best describes your role?



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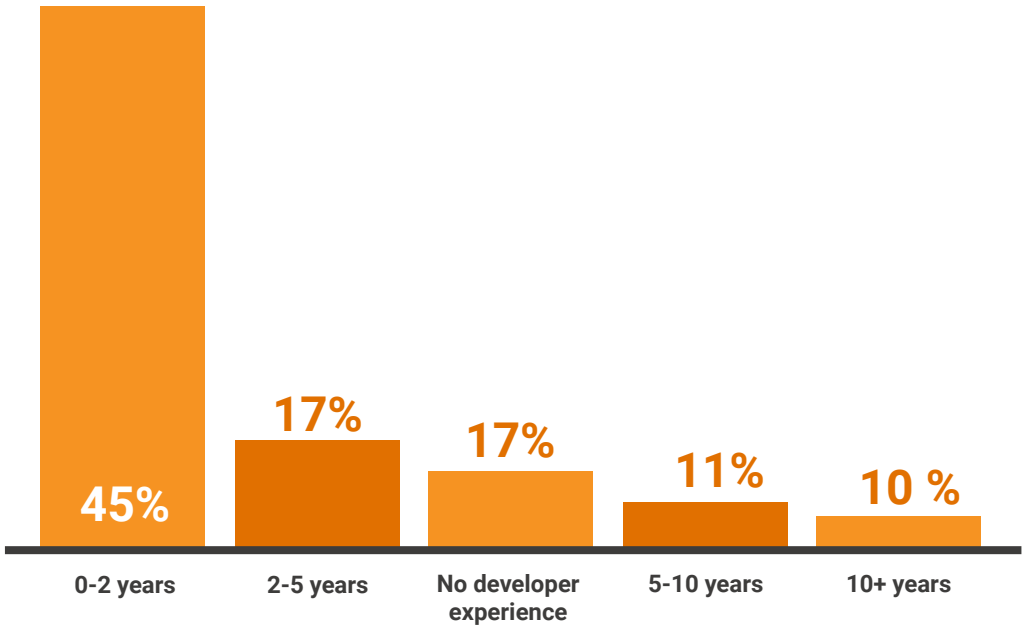
Experience

How much experience do you have developing IoT solutions?



IoT is attracting new developer interest - **45%** of our survey respondents have **0-2 years of IoT experience**. This means there are a lot of newcomers in the domain. Over 20% of respondents have 5 years of experience or more, which reflects the continuing maturation and growth of the IoT market.

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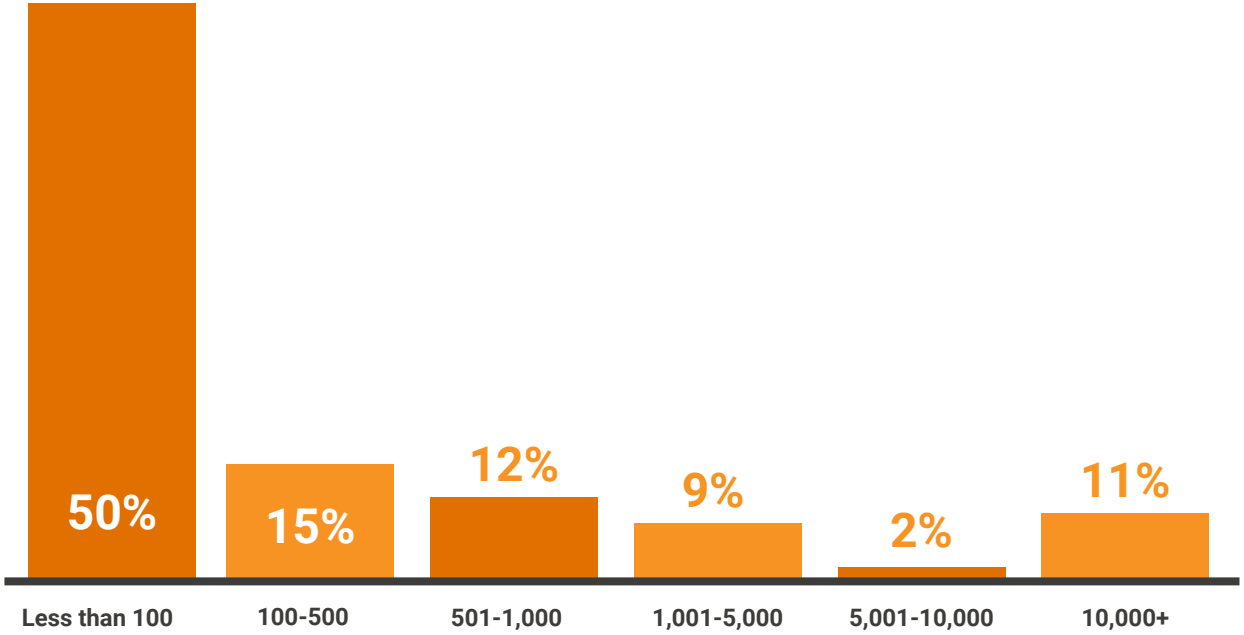
Employees

How large is the organization you work for?



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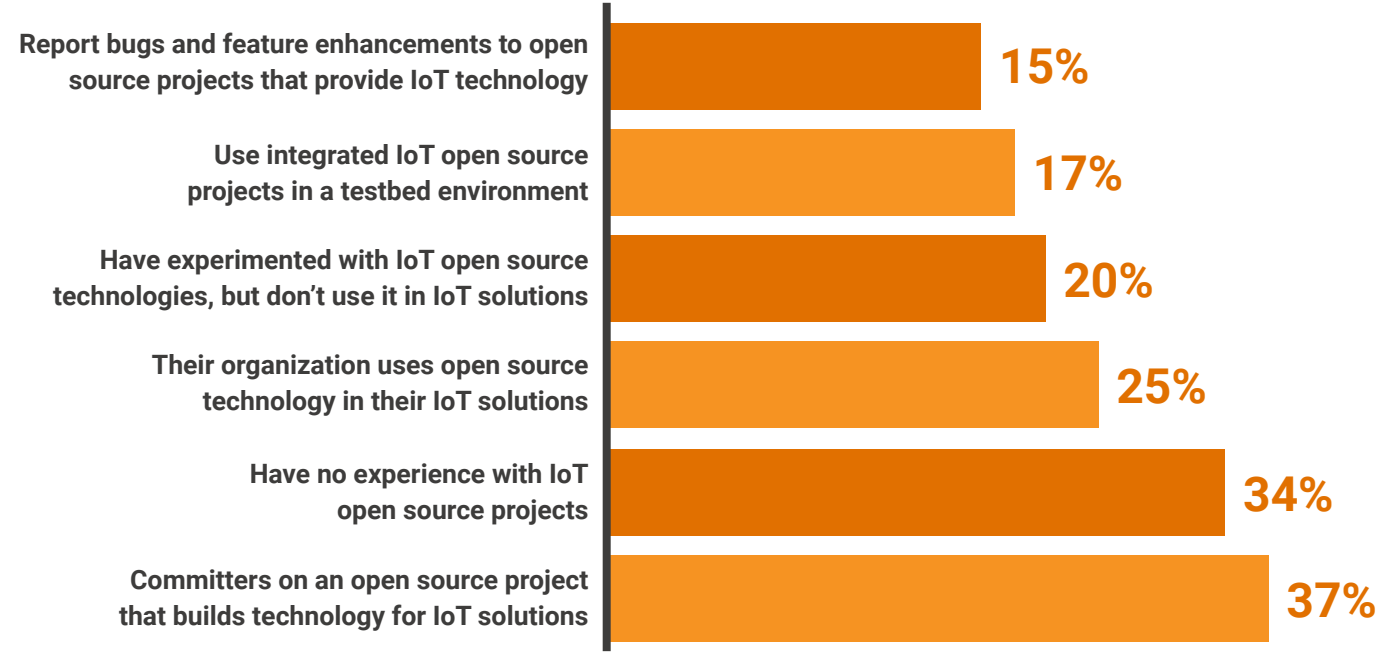
Project Participation

Which of the following statements best describe your open source project participation?



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