Qt Group

WHITEPAPER

RESEARCH

Designing for Embedded

Insights From 420 Embedded UI/UX Designers

IN COLLABORATION WITH:

B2B International
a dentsu company

What's inside

This report presents findings from a global survey of 420 UI/UX designers working on embedded applications across six industries and three major world regions. It is intended as a reference for anyone who designs, leads, or supports design work in embedded product development.

1. Introduction & key findings

Half of the top ten issues reported in automotive are related to infotainment, and frustration with touchscreens is increasing as more automakers shift more functions to screens.

Source:
J.D. Power ↗

1.1 There's a UX gap in embedded devices today. And it is not a hardware problem.

Users today carry a supercomputer in their pocket. The smartphone has established a new standard for what an interface should feel like: instant, smooth, intuitive, and beautiful.

They increasingly expect that same high-quality experience from every screen they interact with, whether it's in their leisure time (car dashboards, washing machine displays, etc.) or at work (control panels of medical devices, industrial machine displays, etc.).

That expectation is not being met.

According to J.D. Power's 2025 U.S. Initial Quality Study, for example, infotainment remains the most problematic vehicle category, ranking highest among issues reported by new vehicle owners. Similarly, in consumer electronics, the disconnect between what a device promises and what its interface delivers is a consistent theme in product reviews and return rates.

The hardware isn't at fault. Processors are fast enough. Screens are sharp enough. The ideas are present: UI/UX designers are creative, skilled, and deeply motivated to build great experiences.

The bottleneck is the tooling. Designers working on embedded systems are doing so with tools borrowed from adjacent fields, such as those built for web, mobile, and image editing, and they are making up for gaps with code, workarounds, AI, and considerable effort. Every compromise made along the way appears in the product, in the experience that reaches the user.

This report highlights that gap. It is based on a global survey of 420 UI/UX designers for embedded systems across six industries and three regions worldwide, conducted by B2B International on behalf of **Qt Group** in 2025.

The findings reveal a profession navigating real tension: between creativity and constraints, between the tools they have and the tools they need, and between a fast-moving AI landscape and workflows that are still largely manual.

1.2 KEY FINDINGS

6/10 WANT A DIFFERENT DESIGN TOOL

Most designers feel their current toolset isn't suited for their workflow. Yet 17% of those seeking alternatives cannot describe what that new tool would look like.

95% REPORT MEANINGFUL CHALLENGES

Almost every respondent mentioned at least one major challenge, with the top three being creative inspiration, time pressure, and brief clarity.

63% ALREADY USE AI IN THEIR WORKFLOWS

Embedded UI/UX designers increasingly turn to AI to address their most common challenges, but the use of AI is not yet transformative for the profession and the field.

2.
Who are UI/ UX designers for embedded systems?

2.1 A global, cross-industry profession without a common title

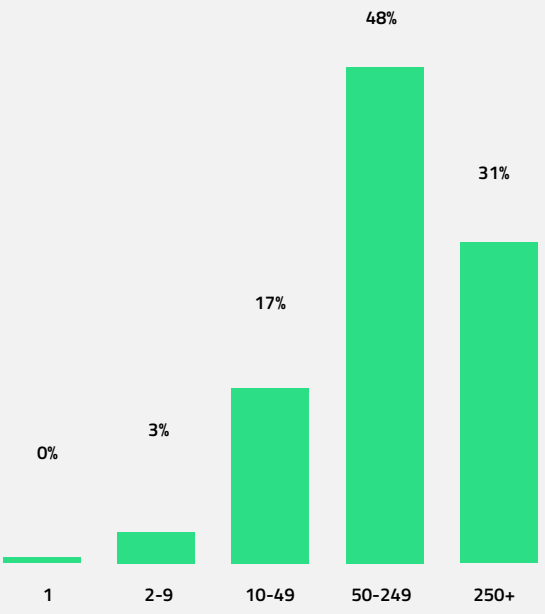
The 420 professionals surveyed come from six industries and three global regions, with 140 respondents each from the Americas, EMEA, and APAC.

Although their job titles vary widely, from product designer and UI designer to embedded UI specialist and systems designer, what unites them is a shared goal: **designing user interfaces that will run on embedded hardware,** ranging from industrial vehicles and medical devices to consumer electronics and aerospace systems.

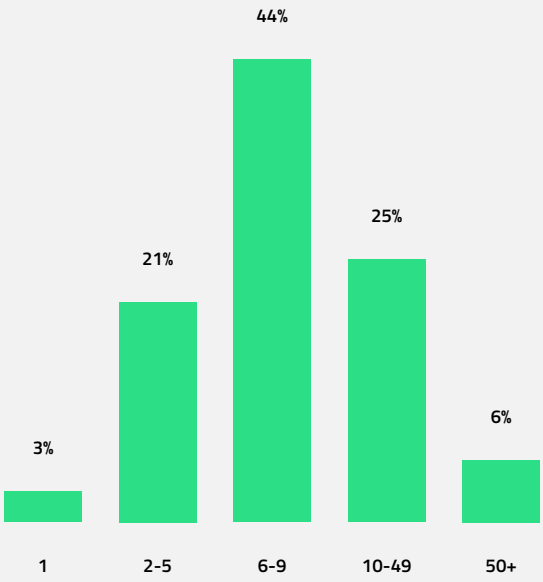
Most UI/UX designers for embedded systems work in-house (70%) for medium to large organizations. Most operate in design teams of between 6 and 9 people (44%), and nearly all work across both microcontroller (MCU) and microprocessor (MPU) platforms simultaneously (80%).

81% are the sole decision-makers for tool selection and purchasing, meaning they evaluate tools independently and do not rely heavily on peer recommendations or vendor trials. An additional 18% influence or advise on tools decisions. In practice, every respondent in the survey has a meaningful influence on the tools their team uses.

NUMBER OF EMPLOYEES



NUMBER OF DESIGNERS IN TEAM



Team context: **44%** of respondents work in design teams of 6–9 people, and **65%** work in teams of 2–9. Small enough to feel the impact of the wrong tool acutely; large enough that tool decisions shape the whole team's output.

2.2 Designers by formation, constrained by context

Embedded UI/UX designers are designers first. Their most common job titles - product designer (33%), web designer (30%), and UI designer (27%) - signal a design-led identity. Yet their daily reality is shaped by constraints that standard design education rarely addresses: hardware capabilities, memory limits, cross-regional compliance, and the need to translate abstract briefs into interfaces that must work reliably on low-power, resource-constrained devices.

This tension between a design-oriented identity and an engineering-heavy context is a defining characteristic of the profession. It might also help explain why designers use coding not to create designs, but to compensate for the deficiencies of their tools.

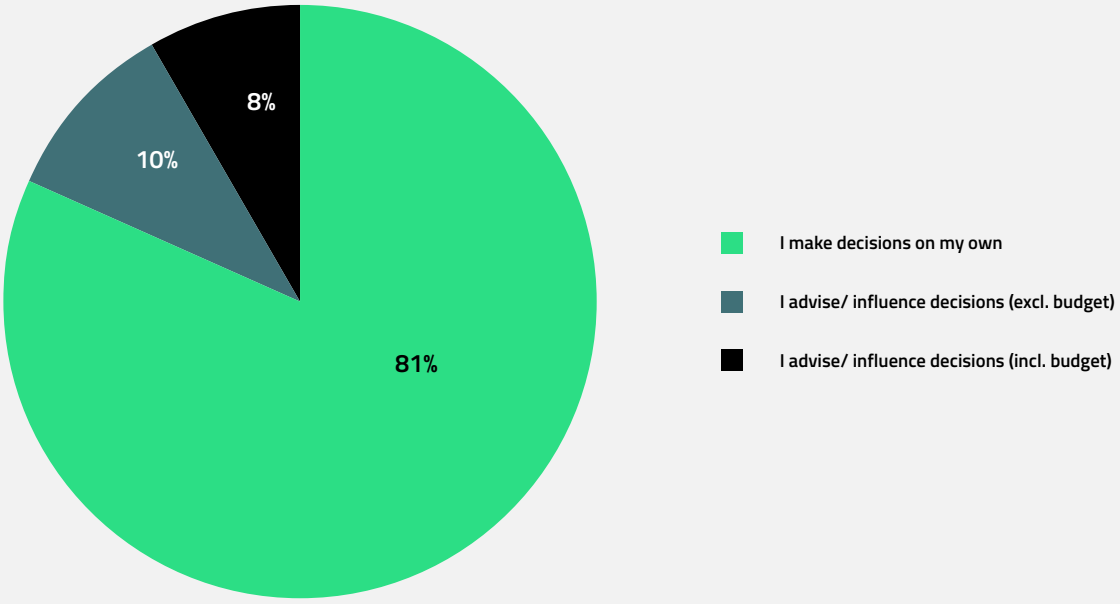
Windows OS dominates the working environment (82% globally, rising to 91% in EMEA), while **Linux** usage is notably higher in EMEA (38%), a reflection of the technically-oriented ecosystem in which many of these designers operate.

QUESTION:

TO WHAT EXTENT ARE YOU INVOLVED IN DECISIONS ON THE SELECTION AND PURCHASE OF DESIGN TOOLS?

80%
DESIGN FOR BOTH MCU & MPU PLATFORMS

70%
IN IN-HOUSE ROLES
(VS. 30% CONSULTANTS/ CONTRACTORS)



3. Main challenges

3.1 Creativity, time, and clarity: a universal tension

With 95% of respondents citing at least one meaningful challenge, difficulty is not the exception for embedded UI/UX designers. It is the baseline condition. The top three challenges are remarkably consistent across regions and industries.

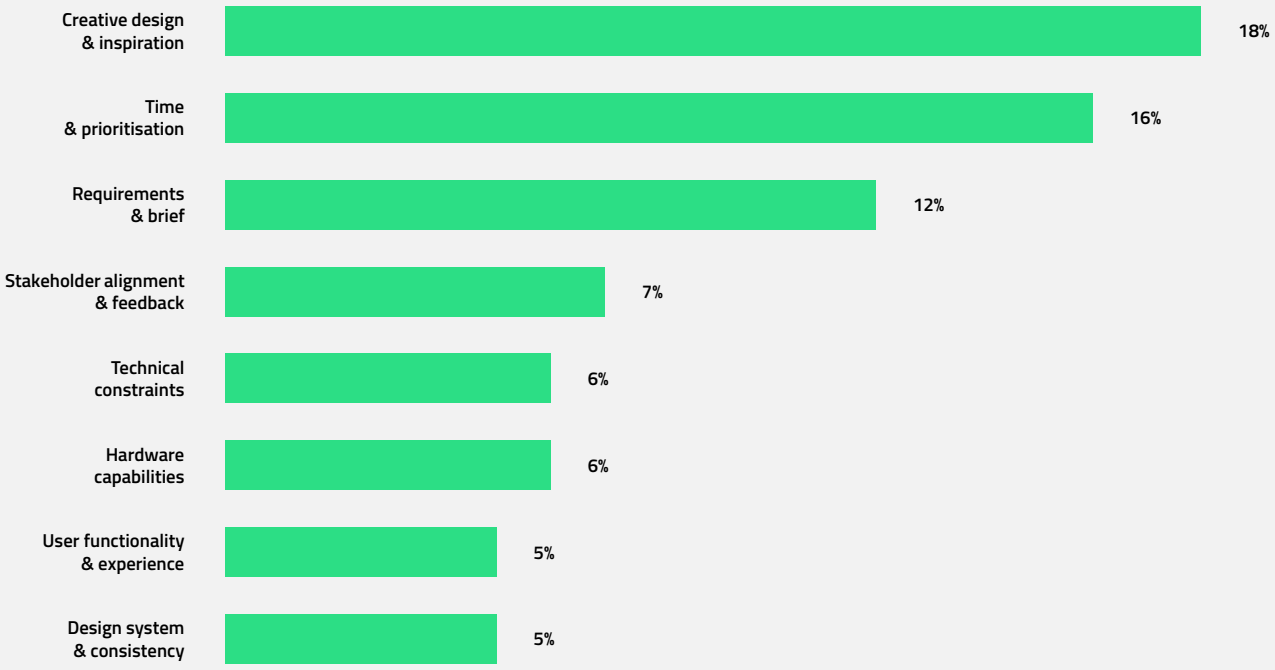
- **Creative design and inspiration (18%)** - Finding meaningful inspiration while balancing innovation with practical hardware constraints and delivery deadlines.
- **Time and prioritisation (16%)** - Repetitive, time-consuming tasks compete with higher-value creative work, a cycle that compromises design quality.
- **Requirements and brief clarity (12%)** - Abstract, vague briefs are difficult to translate into practical, hardware-specific designs that satisfy all stakeholders.

The Aerospace & Defense sector and EMEA-based embedded UI/UX designers report time and prioritization challenges at significantly higher rates than the global average, suggesting that a heavily regulated environment amplifies the pressure.

Designers who work as consultants and contractors, on the other hand, face significantly greater challenges with design systems and consistency, highlighting the difficulty of maintaining control over the design vision as external contributors.

QUESTION:

WHAT IS YOUR MAIN CHALLENGE WITH YOUR DESIGN TASKS? PLEASE DESCRIBE IN A FEW WORDS.



The UX Collective, in their **State of UX 2025 report,** found that designers spend increasingly less time on design and a growing share of their energy on stakeholder alignment. For embedded UI/UX designers, that friction seems compounded by hardware constraints that general-purpose tools like Adobe Photoshop or Figma were never built to handle.

Source:
The UX Collective ↗

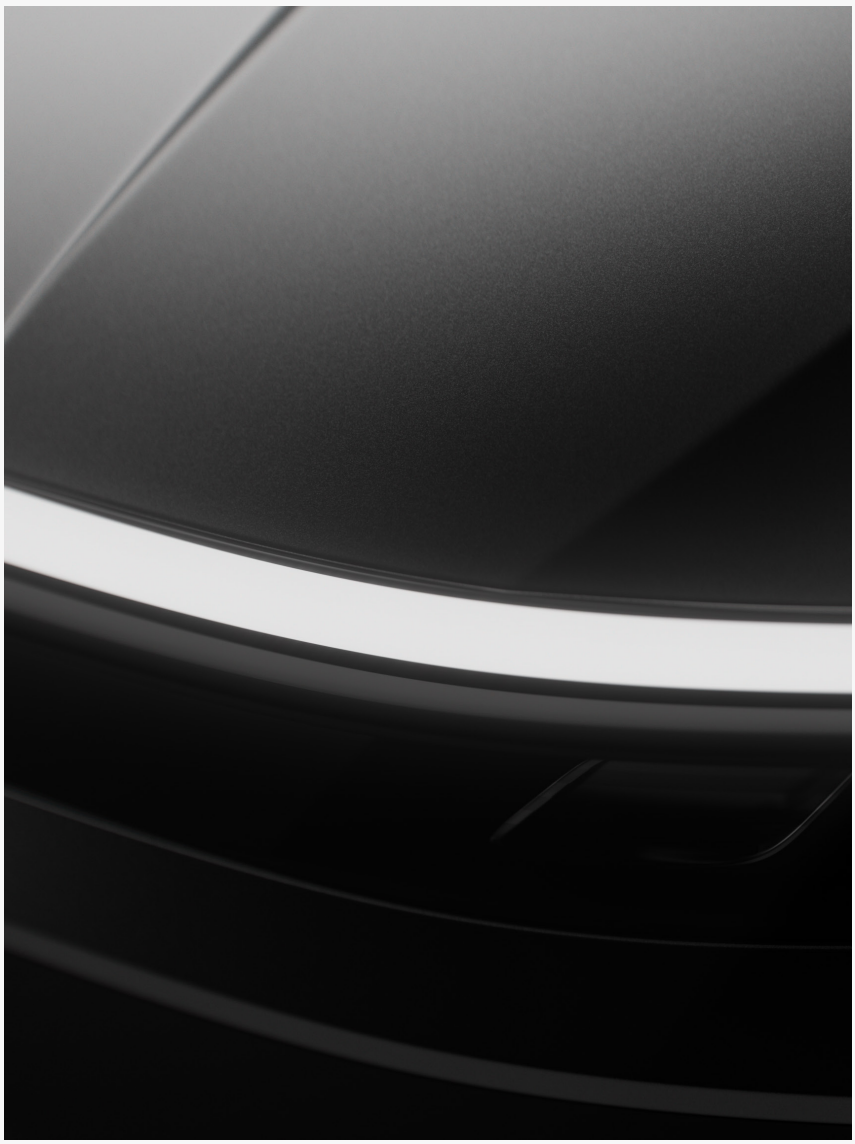
3.2 Code as a coping mechanism

One of the most revealing findings of this research is how embedded UI/UX designers use coding. They do not code to create designs or prepare their designs for the target hardware; **they code because their tools fall short.**

> "When a design tool lacks a specific feature, I can quickly piece together a solution using my programming skills; it's very flexible and convenient."
> **— Director, Medical Devices, China**

This is significant. It means that part of every designer's workday is spent compensating for a gap that a purpose-built tool should fill. Time spent on workarounds is time not spent on improving design quality. And design quality is exactly what end users notice and complain about when it's lacking.

This highlights a structural gap: the most common tools in this area were not designed for embedded workflows. Designers are capable of bridging this gap with code, but doing so takes time and effort that could be better spent on improving design quality.



3.3 HOW EMBEDDED UI/UX DESIGNERS USE CODE

AUTOMATION & EFFICIENCY

Code automates the repetitive tasks that slow down design and resolves compatibility issues between platforms, freeing up time for higher-value work.

CUSTOMISATION & PLUG-INS

Designers build their own plug-ins to tailor tools to their embedded context, creating more platform-appropriate and refined results.

OVERCOMING TOOL LIMITATIONS

Code allows designers to add missing functionality and create features that are too complex or hardware-specific for general-purpose design tools. It can also automate the repetitive tasks built into those tools.

4. Tools & decision criteria

On average, designers use two tools to complete their work but would prefer to keep everything in one. This desire for consolidation reflects a well-documented productivity cost: according to Forrester (2024), professionals lose up to **23%** of their weekly time toggling between disconnected applications.

Source:
Celoxis ↗

4.1 Borrowed tools for a discipline that deserves its own

Despite the highly specialized nature of their work, embedded UI/UX designers primarily depend on tools built for the general design market.

Adobe products are the most mentioned in their productivity suites (35% unprompted), followed by **Figma** (27%). These are powerful tools, but they lack awareness of hardware constraints, MCU/MPU platform compatibility, memory budgets, or the physical deployment environment of an embedded device.

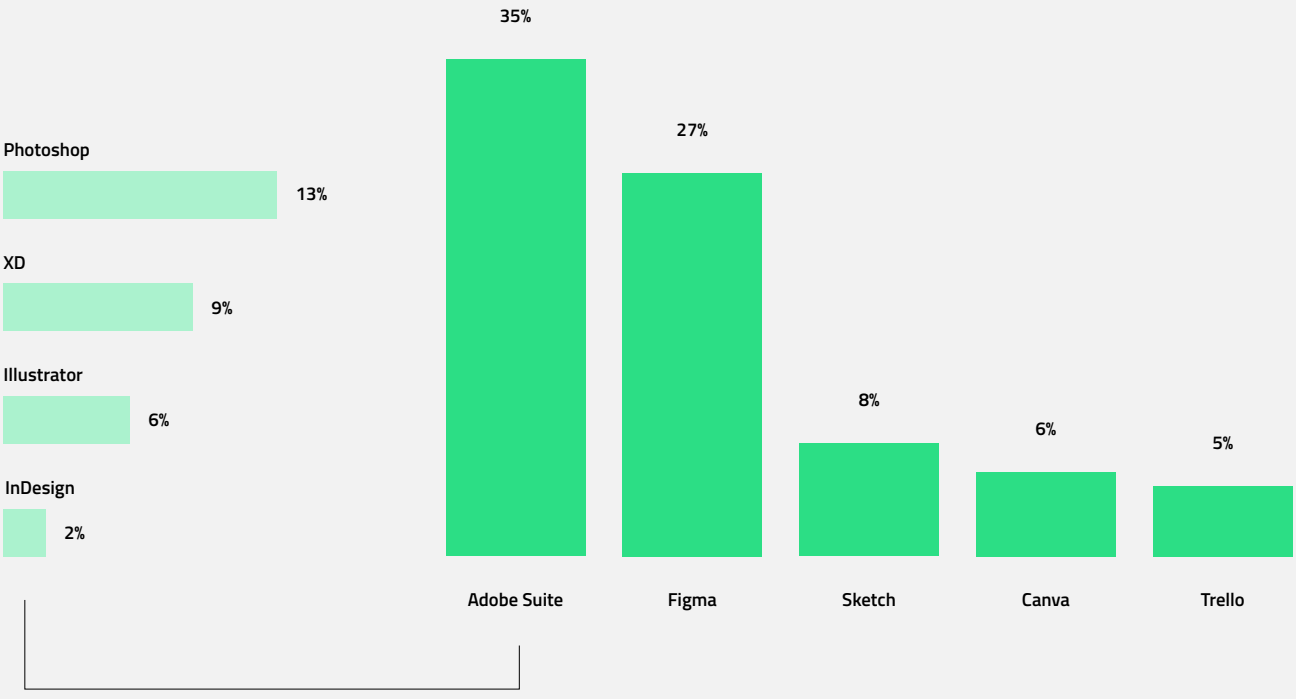
Adobe Photoshop – the most mentioned **Adobe** tool – is an image editing application, while **Adobe XD** – the second most mentioned -, once positioned as a UX tool, stopped development in 2023. **Figma** was designed for web and mobile interfaces.

The situation is similar when UX/UI designers for embedded systems are prompted with a list of tool names and are asked which ones they know and use.

In this case, **Adobe** reaches 61% awareness and 58% total usage; **Figma** reaches 47% awareness and 43% total usage. Among embedded-specific tools, **Qt Group / Qt Design Studio** reaches 29% prompted awareness and 24% total usage.

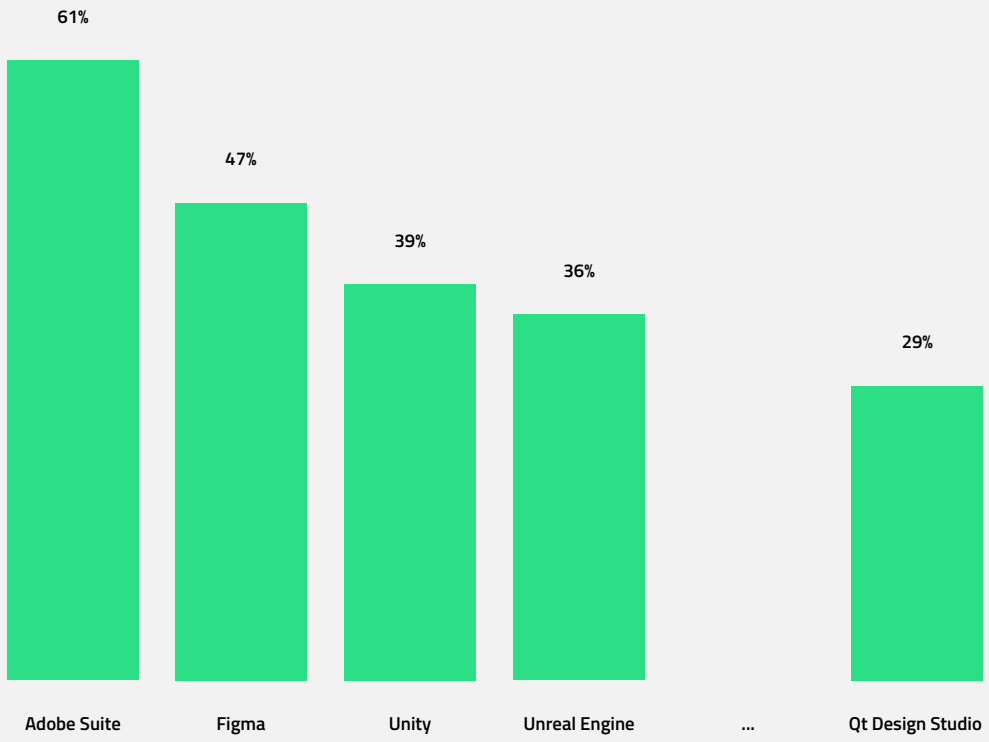
QUESTION:

WHAT APPLICATIONS ARE PART OF YOUR PRODUCTIVITY SUITE AS A DESIGNER?



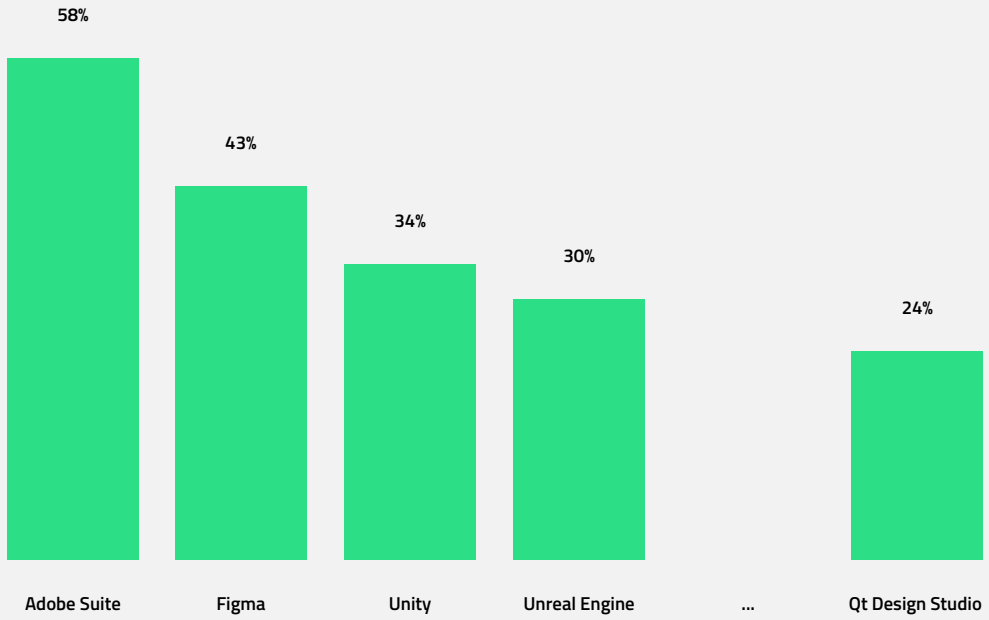
QUESTION:

WHICH OF THE FOLLOWING BRANDS / DESIGN TOOLS ARE YOU AWARE OF?



QUESTION:

OF THE BRANDS / DESIGN TOOLS THAT YOU ARE AWARE OF, WHICH HAVE YOU USED?



The desire for embedded software compatibility (40%) also explains why respondents use coding the way they do: current dominant tools were not made for their workflow. Embedded UX/UI designers are not only looking for better design tools; they want tools that understand the target hardware and fit into the embedded applications workflow.

4.2 What actually drives tool selection

We have observed that UX/UI designers for embedded systems hold significant decision-making power when choosing the tools they use. But what criteria do they focus on when making these decisions?

Respondents consider an average of four different factors. The three criteria that stand out significantly above the rest are:

- **Easy to use and good onboarding experience (43%)**
- **Collaboration capabilities with other users (40%)**
- **Designs innately compatible with the embedded software (40%)**

Notably, peer recommendations (22%), free trials (22%), and native language support (23%) ranked among the least influential factors. This may reflect independence in decision-making, but it could also indicate that things like free trials and native language support are considered basic standards and hence do not serve as differentiators.

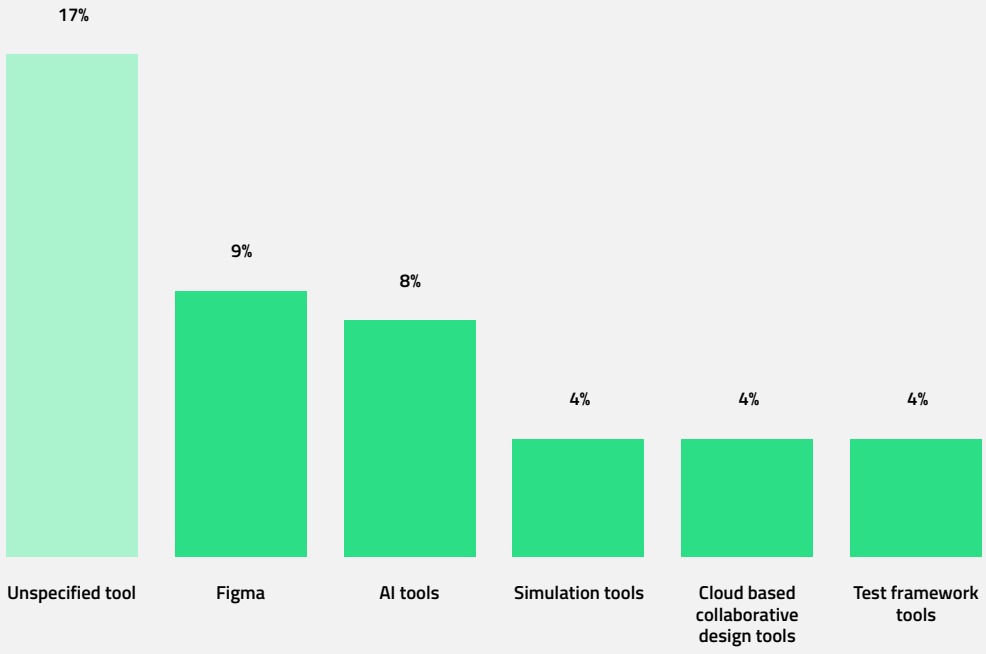
The tool gap: what they want but don't have

Interestingly, 59% of respondents said they would benefit from at least one additional tool. AI tools are mentioned among those, but the largest single category was "unspecified tool" (17%), suggesting a genuine market gap: many designers cannot name what they need because no existing tool fits the description.

QUESTION:

WHAT TOOL WOULD YOU LIKE BUT YOU DO NOT HAVE ACCESS TO?

There is a lack of clarity on what tools embedded UI/UX designers would like to use. They cannot name what they need because such a tool does not exist.



5. How AI fits in the workflow

This finding is consistent with **Nielsen Norman Group's** 2025 assessment that AI tools are most useful in focused, well-scoped applications, and that the best AI design tools are those that do one thing well rather than attempting to replace the end-to-end design process.

Source:
Nielsen Norman Group ↗

5.2 AI is present, but not yet transformative

63% of embedded UI/UX designers are already using AI as part of their design work, a clear majority. However, the way they are using it reveals a more nuanced story. AI is being applied to three main areas:

- **Ideation and creative inspiration (23%) - AI used for color and layout suggestions, content creation, and as a creative sparring partner during the blank canvas stage.**
- **Automation and workflow efficiency (17%) - Automating repetitive tasks, quickly generating multiple design variants, and improving overall workflow speed.**
- **Research, analysis, and insight generation (12%) - Summarizing information, analyzing user feedback, and scanning market trends and competitor products to guide design decisions.**

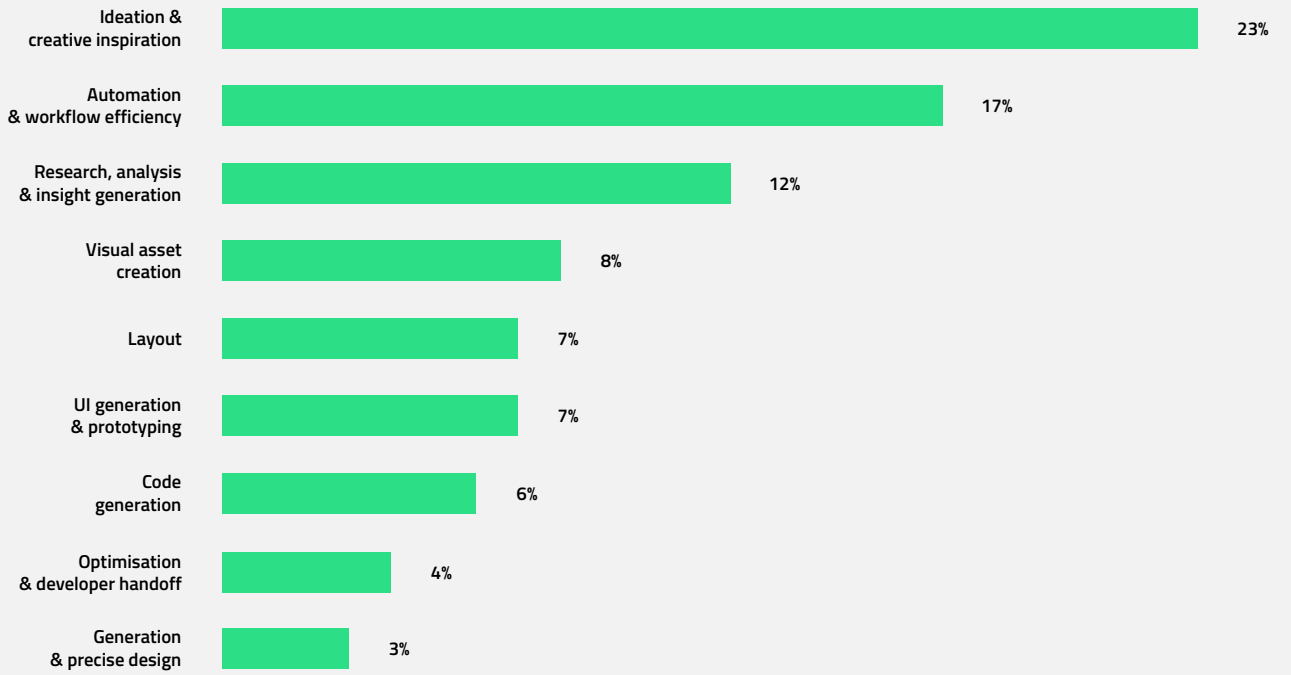
This pattern is revealing. Designers are increasingly turning to AI to address the common challenges they face: creative blocks and time constraints. AI is being used as a spark for inspiration and as a tool to ease the burden of repetitive tasks, not as a substitute for design judgment.

QUESTION:

HOW ARE YOU LEVERAGING AI AS A PART OF YOUR DESIGN WORK?

63%
ALREADY USE AI IN THEIR DESIGN WORK

23%
USE IT FOR IDEATION AND INSPIRATION



6. Conclusion

Consumers today expect their car's infotainment, their electric oven display, and the industrial terminal they use at work to feel as immediate and intuitive as their phone. The hardware can deliver it. The question is whether a fragmented design process can too.

Source:
Embedded Computing ↗

6.1 The UX gap in embedded devices is a tooling problem

This research presents a consistent picture. UI/UX designers for embedded systems are skilled, self-motivated professionals working within a workflow that their tools were not built to support.

This supports the idea that the gap between the user experience people expect from embedded devices and the one they actually get is not due to hardware limitations, a lack of design talent, or insufficient creative ambition. Instead, it results from a missing link in the design process: a tool built specifically for the reality of embedded development.

Three themes run through every section of this report:

The UX gap is a tooling gap.
UX/UI designers for embedded applications rely on tools borrowed from other design fields, which makes delivering exceptional user experiences challenging.

Embedded compatibility is a primary requirement.
40% of designers consider it a top decision factor. Not because it's just a nice feature, but because it's the gap they are already bridging manually every day.

AI serves as a helpful co-pilot, not a substitute.
Designers are using AI practically, for inspiration and efficiency, while maintaining full creative and technical control of their work.

6.2 How this research was conducted

This report is based on primary market research conducted by B2B International on behalf of Qt Group between September and December 2025, combined with Qt Group's own user research conducted during the same period.

The quantitative research consisted of a 15-minute online survey distributed in seven languages: English, German, French, Spanish, Japanese, Chinese, and Korean. All participants were recruited and screened by the B2B International team.

To qualify, respondents were required to identify as designers, to spend a minimum of 20% of their working time on design activities, and to specifically include designing user interfaces for embedded screens as part of their role.

Sample profile
420 respondents across three equal regional groups:

- **Americas (140):** USA and Canada
- **EMEA (140):** UK, Germany, France, Spain, Denmark, Finland, Italy, Norway, Sweden
- **APAC (140):** India, Japan, China, Korea, Taiwan

Industries covered

- **Medical Devices (75)**
- **Industrial Automation (75)**
- **Consumer Electronics (75)**
- **Industrial Vehicles (75)**
- **Automotive (75)**
- **Aerospace & Defence (45*)**
  ***Lower base reflects overall size of the Aerospace & Defence industry.**

About **Qt Group**

Qt Group (Nasdaq Helsinki: QTCOM) is a global software company, trusted by industry leaders and over 1.5 million developers worldwide to create applications and smart devices that users love. We help our customers increase productivity through the entire product development journey: from UI design to software development, optimizing embedded systems, and quality management. Our customers are in more than 70 different industries in over 180 countries. Qt Group employs some 1100 people, and its net sales in 2025 were 216.3 MEUR. To learn more, visit **www.qt.io.**