2014 Embedded Market Study
Then, Now: What's Next?

EE Live!

UBM Tech

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Unparalleled Reach & Experience

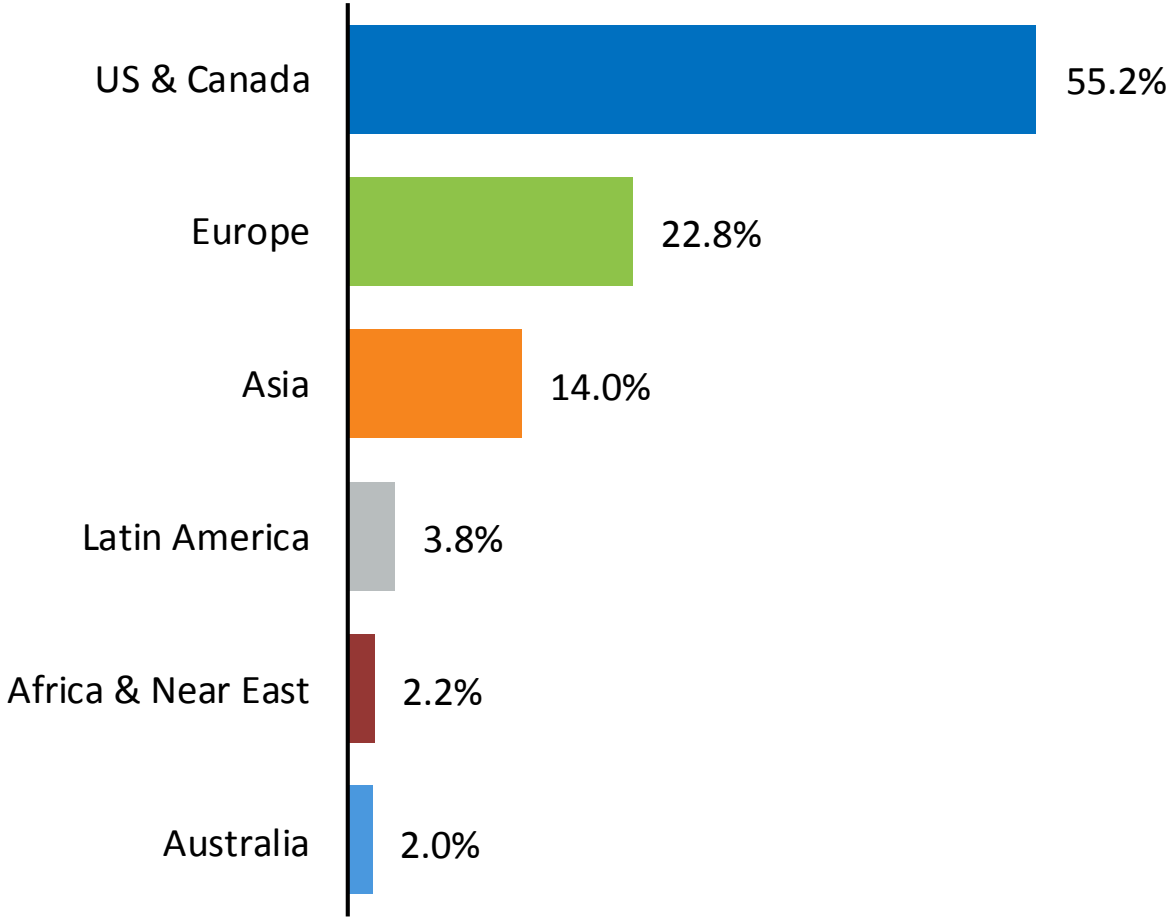
UBM Tech Electronics is the media and marketing services solution for the design engineering and electronics industry.

Our audience of over **2,300,000** are the executives and engineers worldwide who design, develop, and commercialize technology. We provide them with the essentials they need to succeed: news and analysis, design and technology, product data, education, and fun.

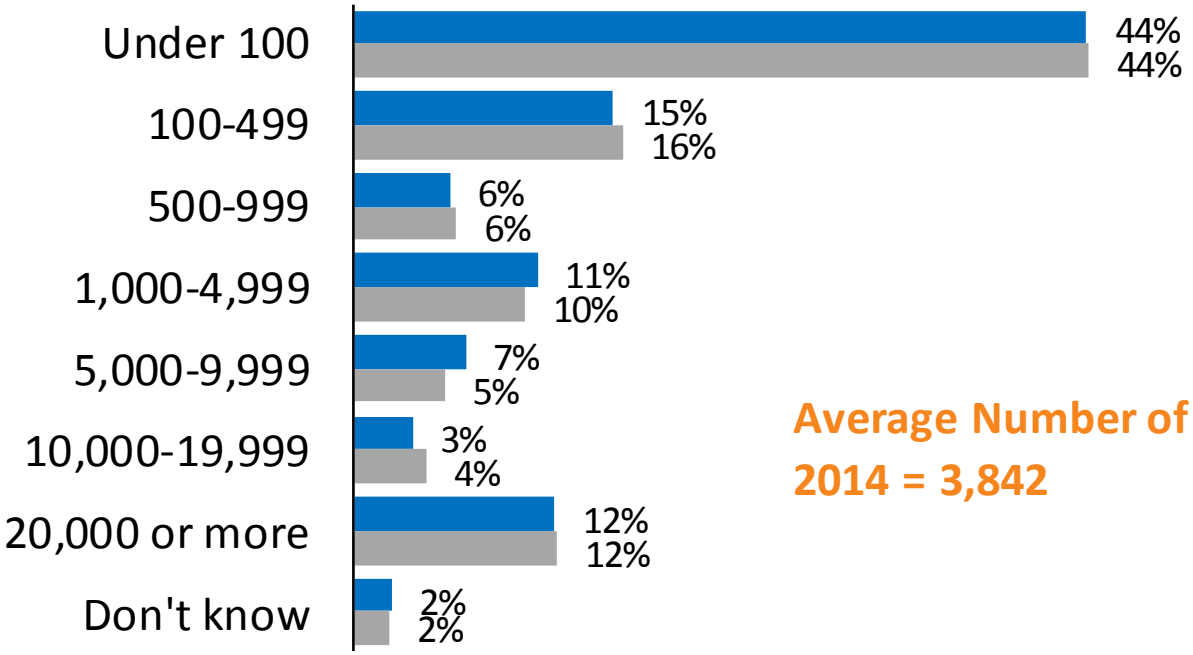
Purpose and Methodology

- **Purpose:** To profile the findings of the 2014 results of UBM Tech's annual comprehensive survey of the embedded systems markets worldwide. Findings include types of technology used, all aspects of the embedded development process, IoT emergence, tools used, work environment, applications, methods/ processes, operating systems used, reasons for using chips and technology, and brands and chips currently used by or being considered by embedded developers. Many questions in this survey are trended over three to five years.
- **Methodology**: A web-based online survey instrument based on the previous year's survey was developed and implemented by independent research company Wilson Research Group from January 18, 2014 to February 21, 2014 by email invitation
- **Sample:** E-mail invitations were sent to subscribers to UBM Tech Embedded Brands with one reminder invitation. Each invitation included a link to the survey.
- **Returns: 2,258** valid respondents for an overall confidence of 95% +/- 2.0%. Confidence for questions with 1000 respondents = +/-3.0%, 400 respondents = +/- 5.0%, this latter is considered a standard for most market research.

In which region of the world do you reside?

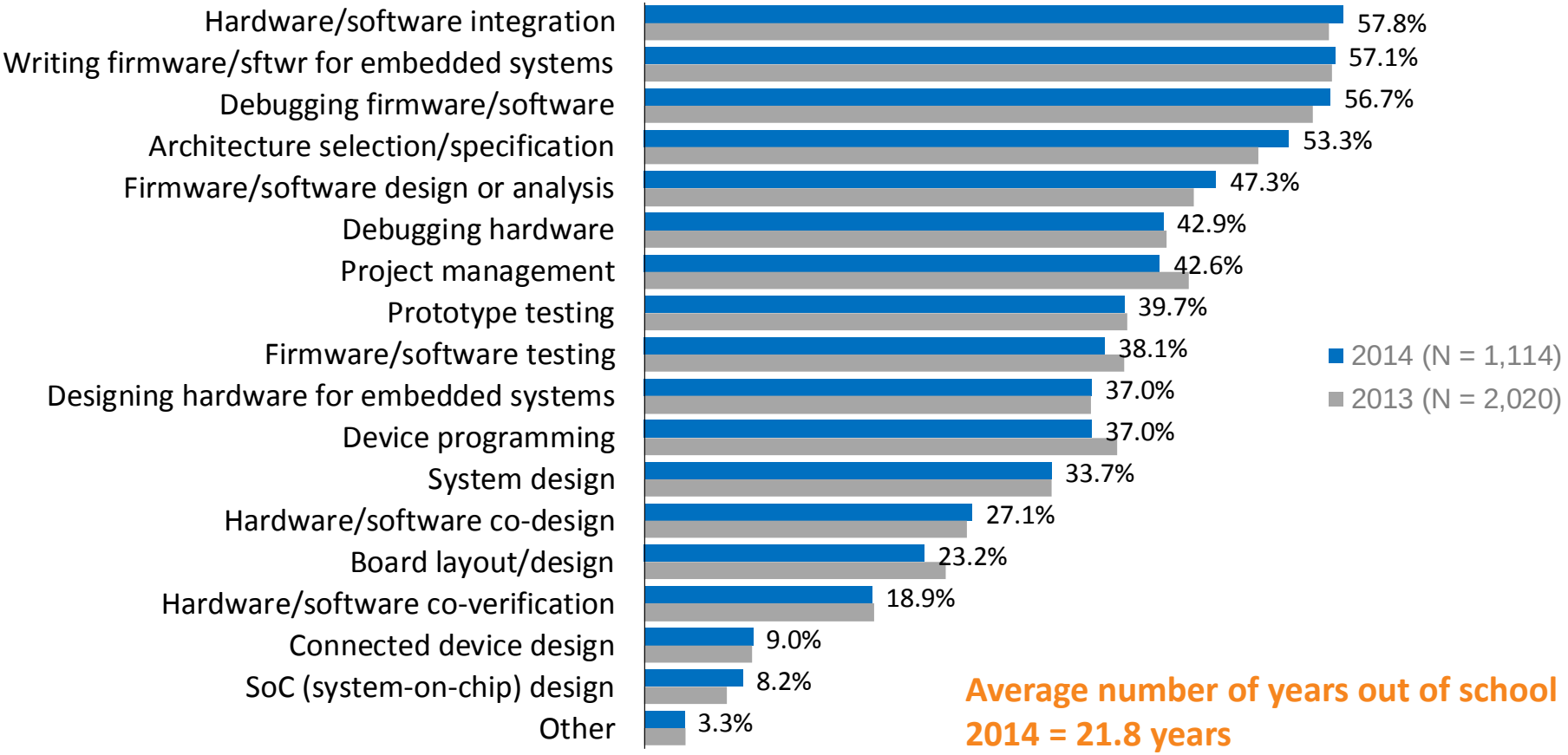


How many employees does your company have at all locations?



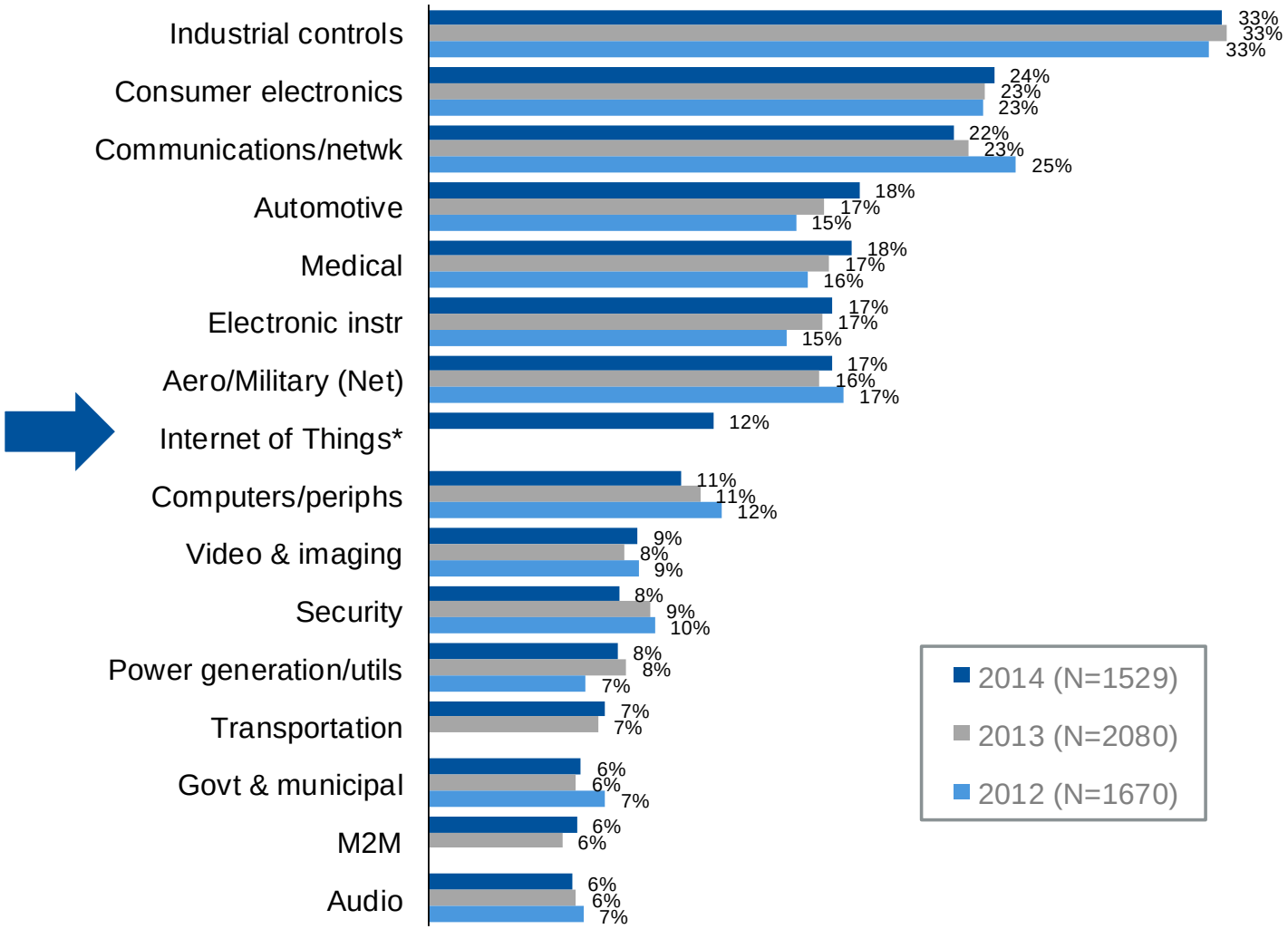
Average Number of Employees:
2014 = 3,842

My job function includes:



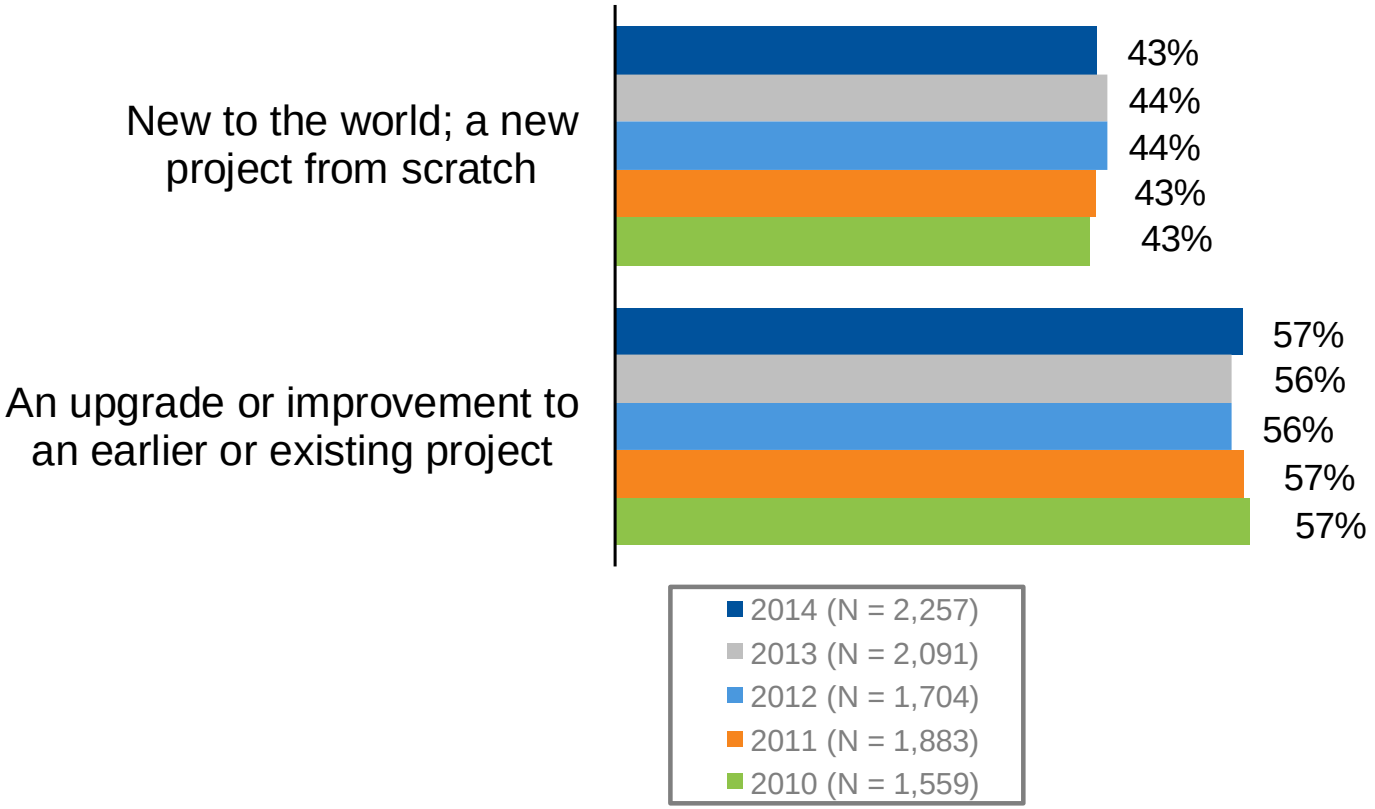
Average number of years out of school :
2014 = 21.8 years
2013 = 19.7 years

For what types of applications are your embedded projects developed?

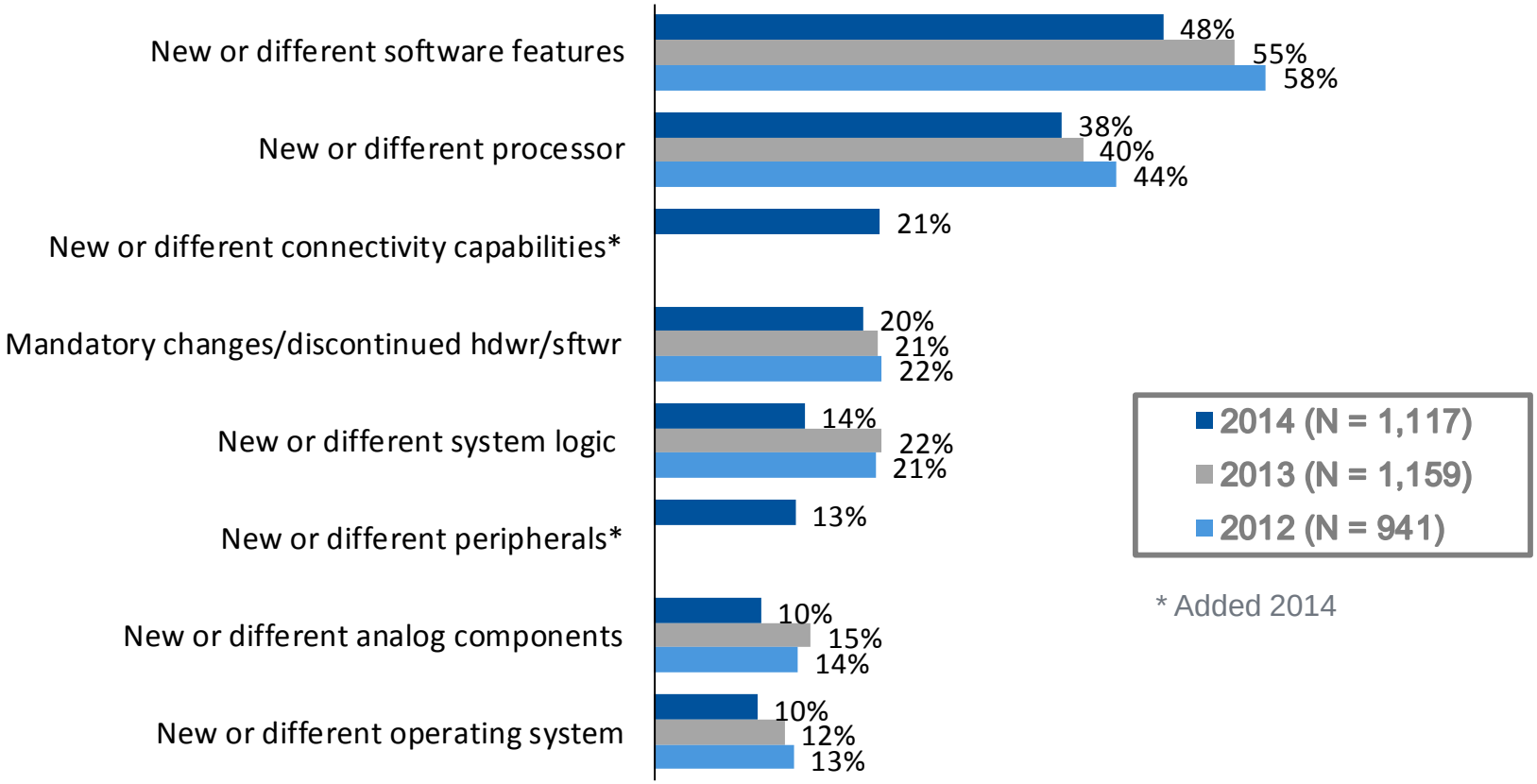


Current Embedded Design Environment

My current embedded project is:

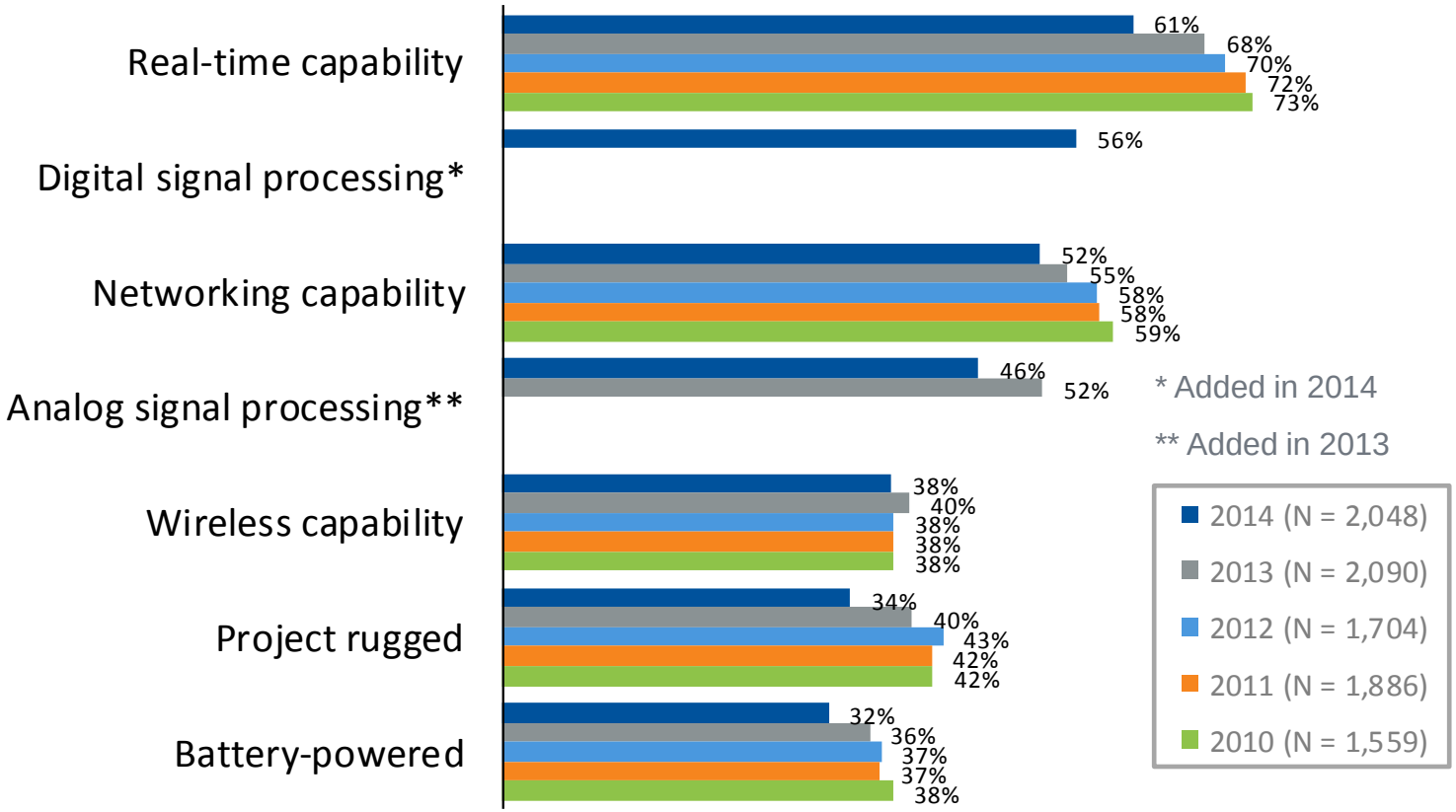


What does the upgrade or improvement include?

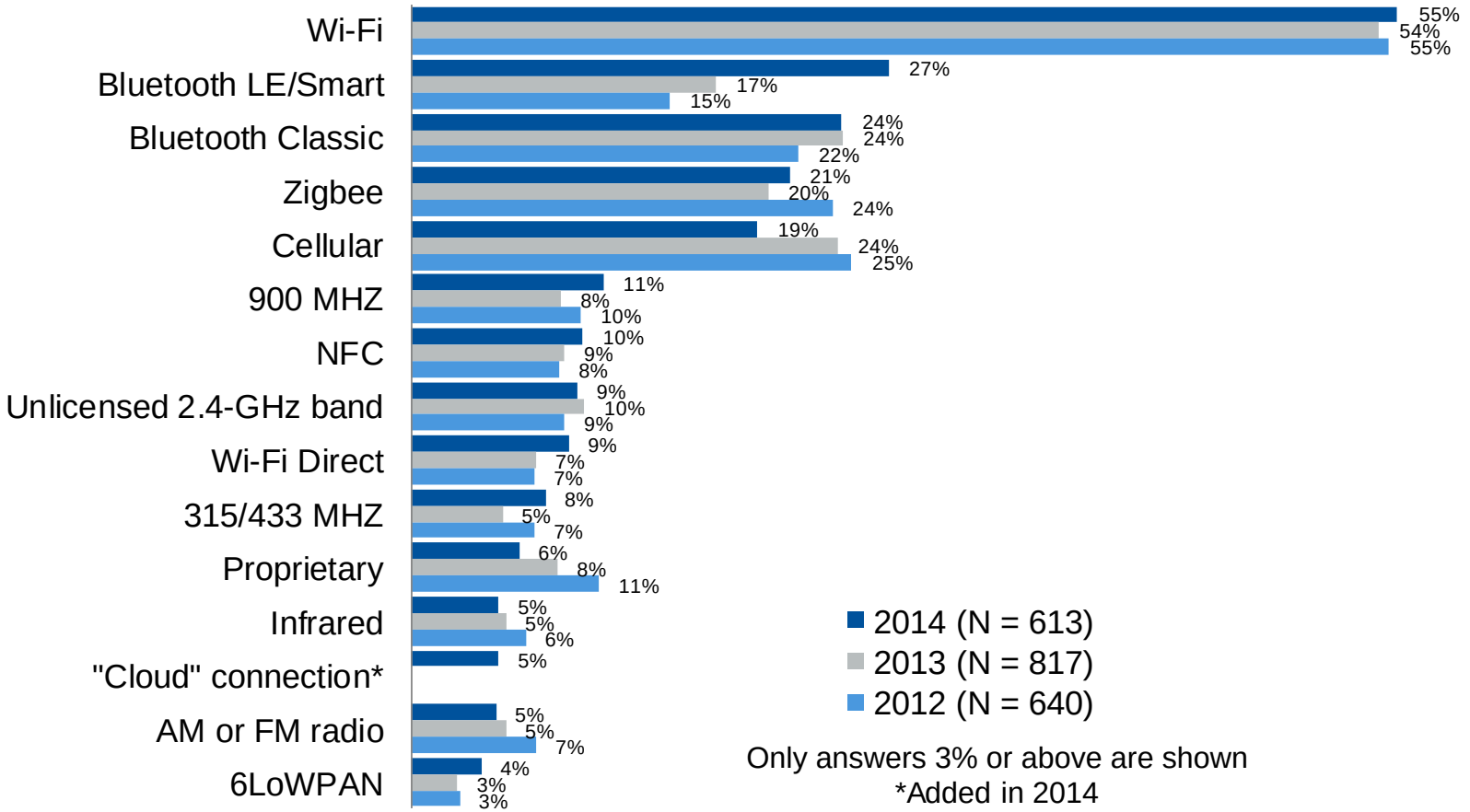


* Added 2014

Which of the following capabilities are included in your current embedded project?



If wireless, what wireless interfaces does your current embedded project include?

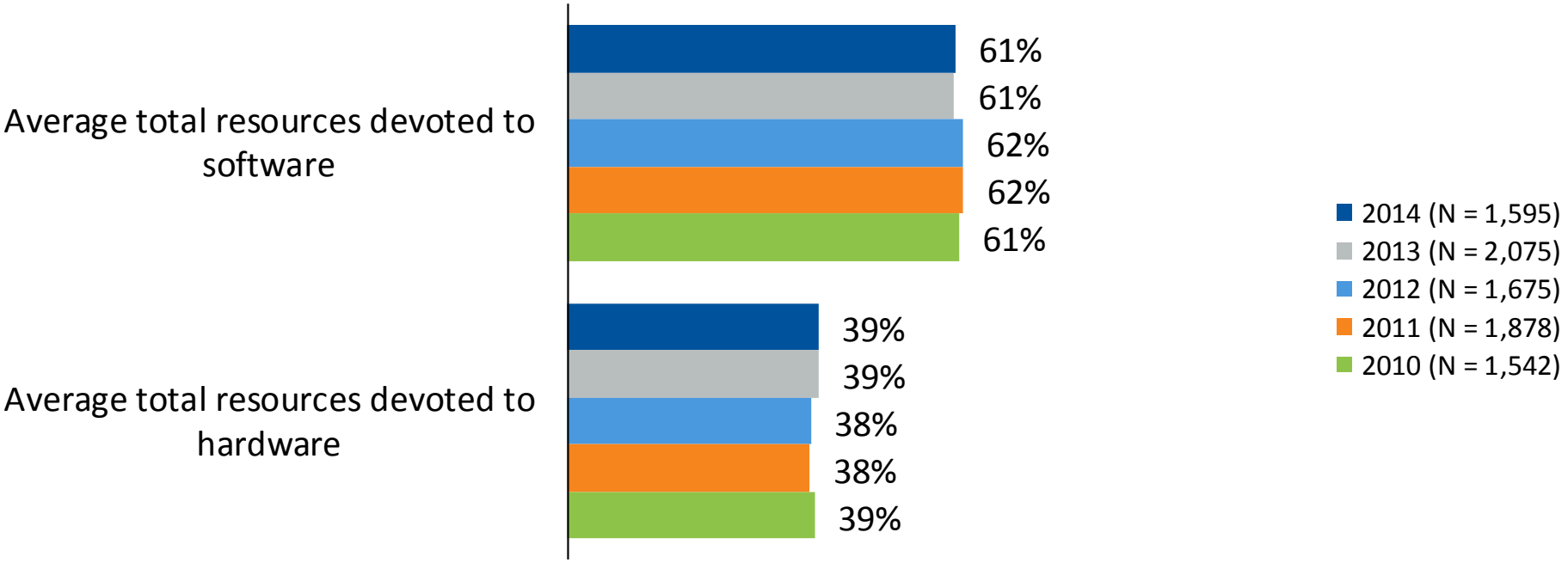


Only answers 3% or above are shown
*Added in 2014

How many people are on your embedded project team?

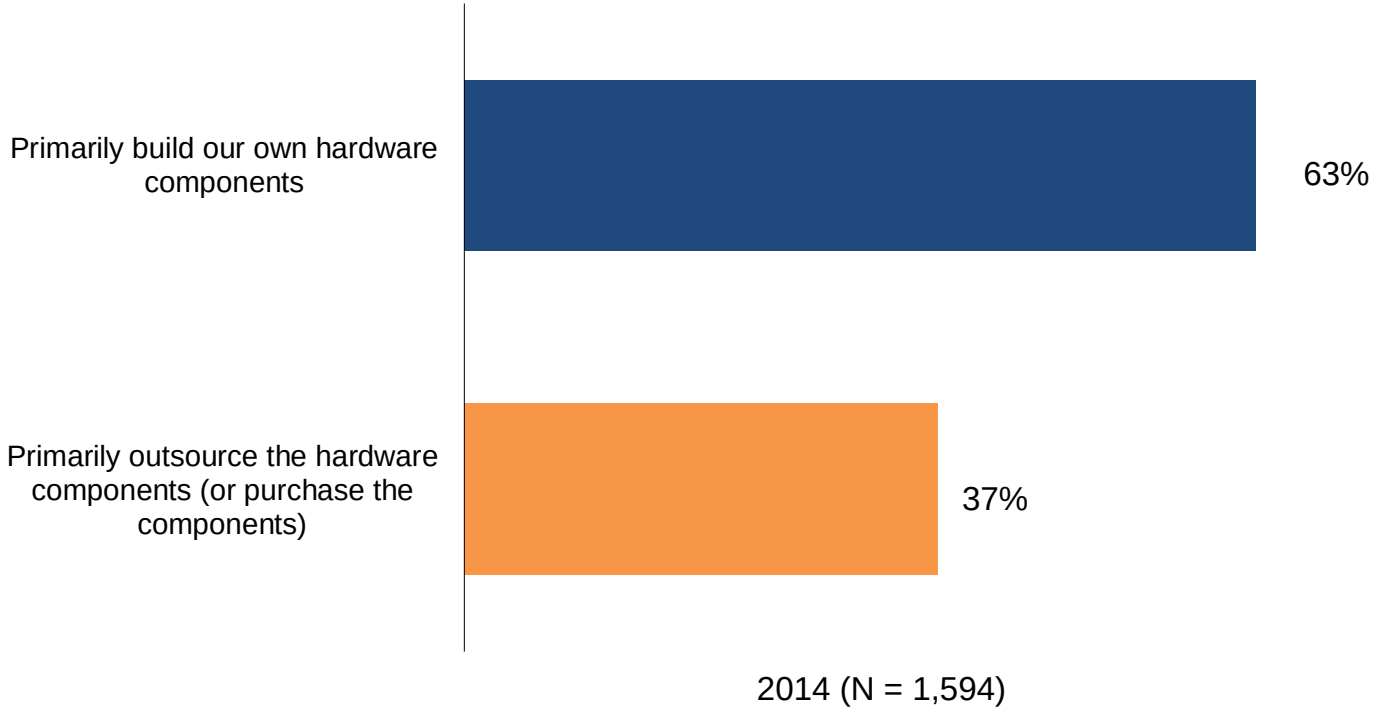
Total Team 2014 =	14.0
- NonFirmware Software Engineer =	3.5
- Hardware Engineer =	3.0
- Firmware Engineer =	2.9
- QA/Test Engineer =	2.1
- Systems/Integrator =	1.4
- Other Engineer =	1.0
Total Team 2013 =	14.6
- Software Engineer =	4.0
- Hardware Engineer =	2.9
- Firmware Engineer =	2.7
- QA/Test Engineer =	2.0
- Systems/Integrator =	1.5
- Other Engineer =	1.5

What is your development team's ratio of total resources (including time/dollars/manpower) spent on software vs. hardware for your embedded projects?

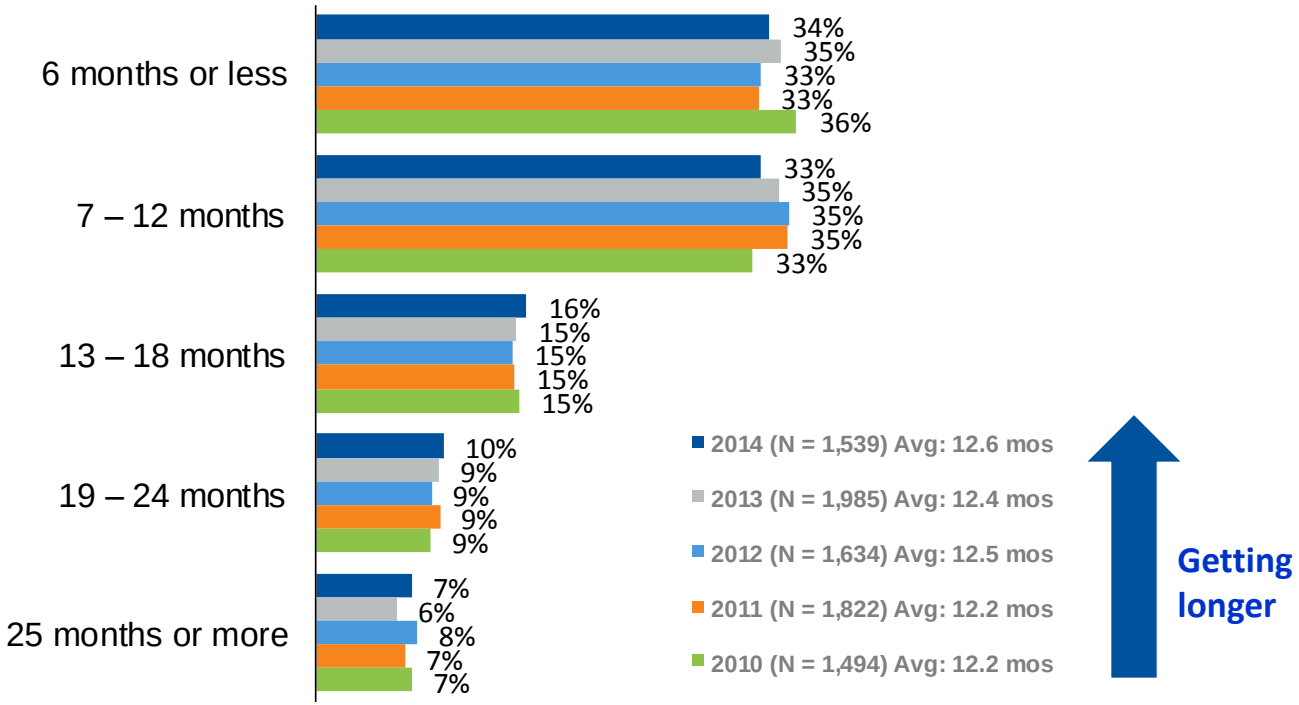


Note: Respondents averaged working on 2.0 projects at the same time.

Do you primarily build your own hardware or do you primarily outsource your hardware requirements?

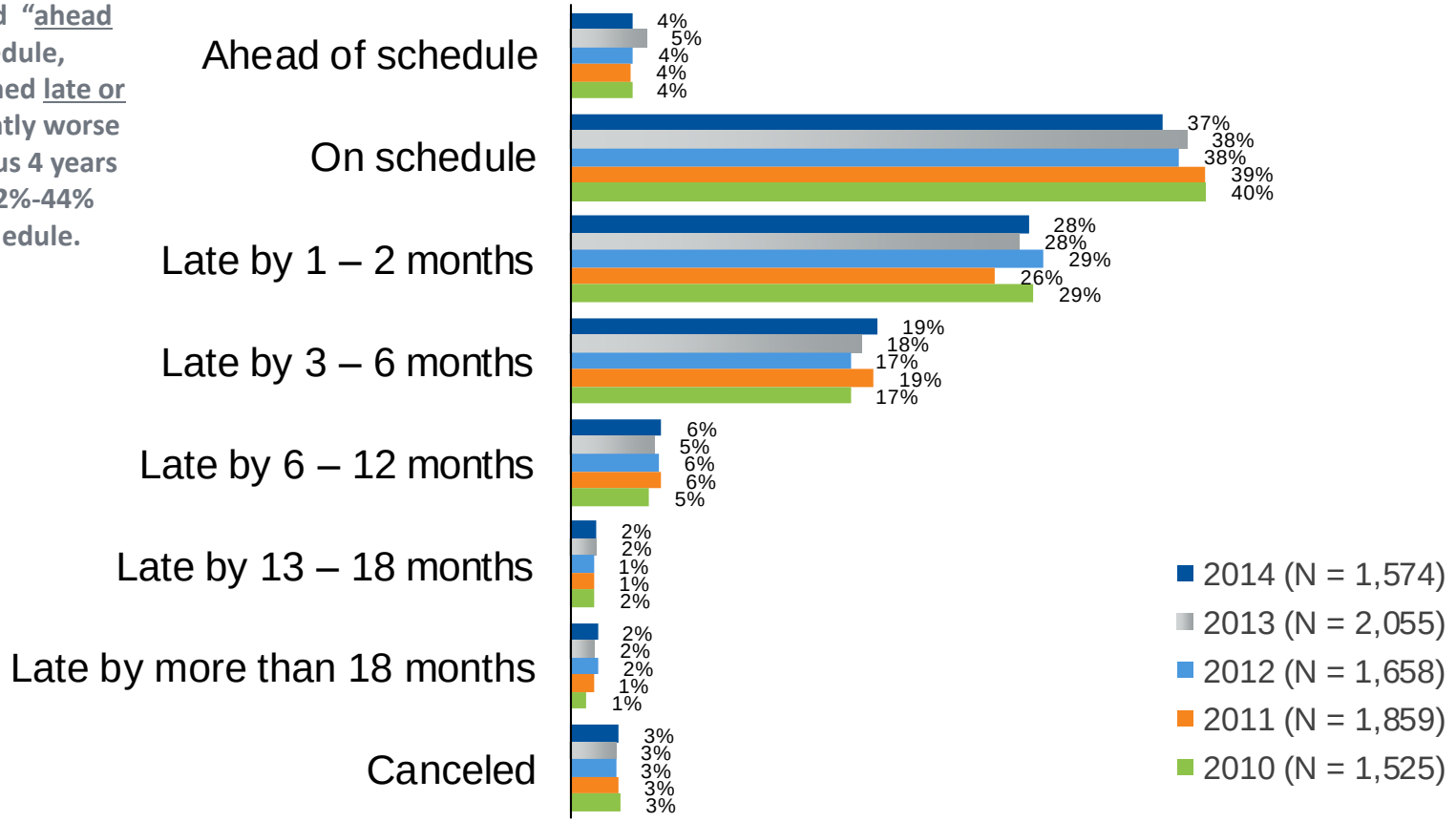


Thinking now about the last embedded project you completed (no longer in development), how many months did that project take to finish?

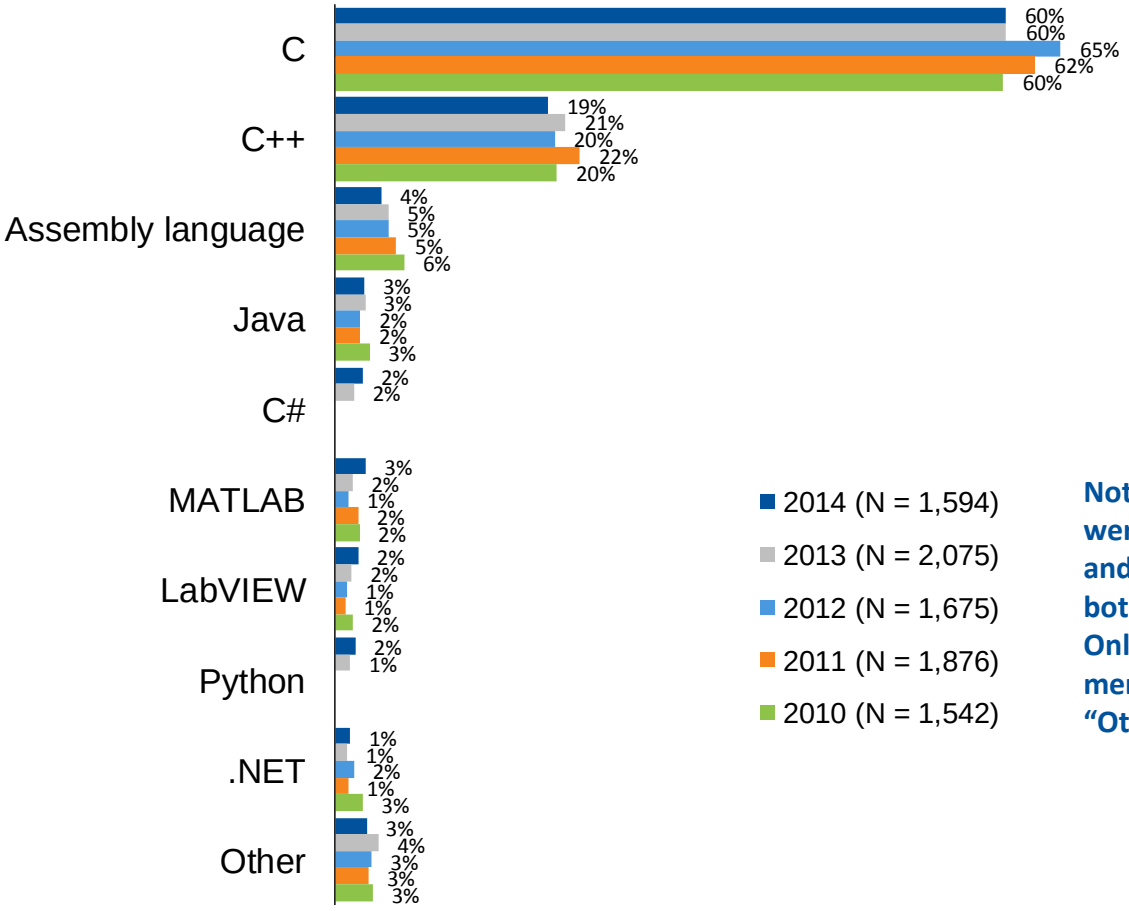


Was that project completed . . .

In 2014, 41% of all projects finished "ahead of" or "on" schedule, and 59% finished late or cancelled – slightly worse than the previous 4 years that averaged 42%-44% on/ahead of schedule.

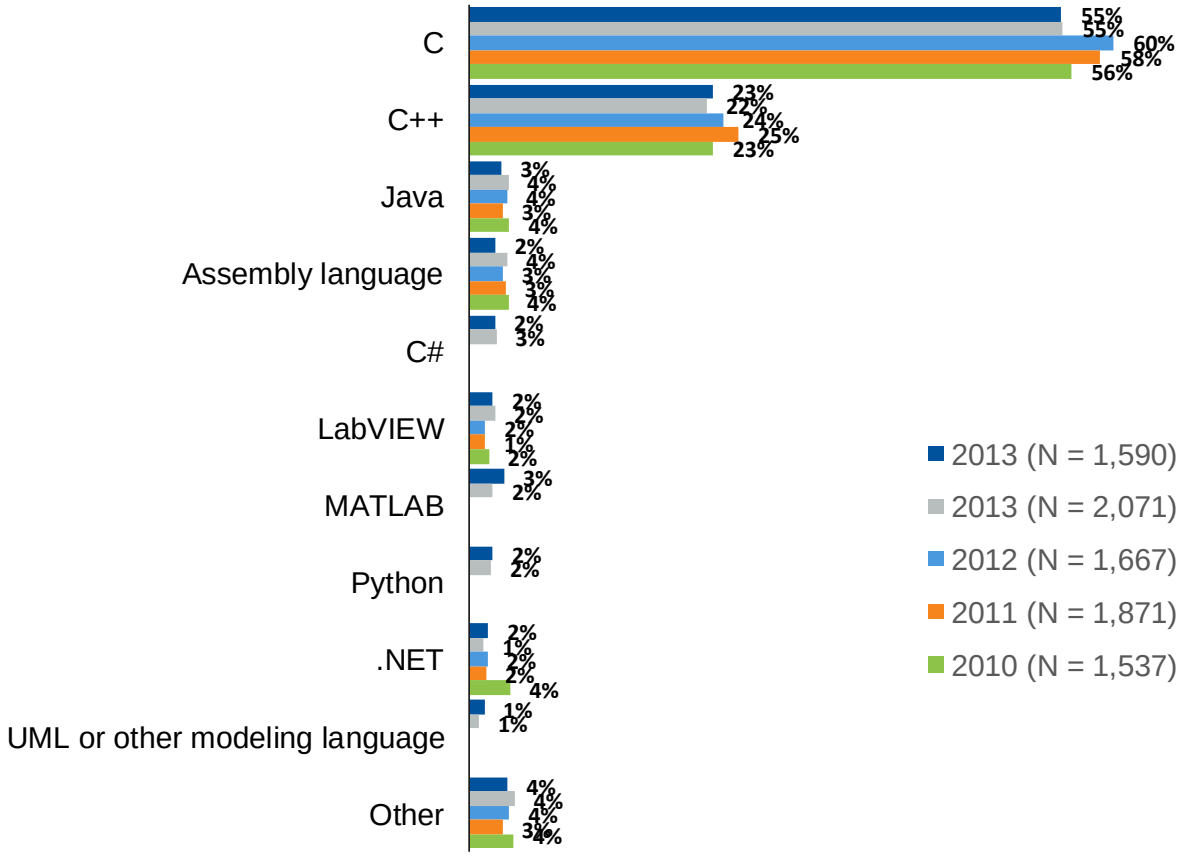


My current embedded project is programmed mostly in:



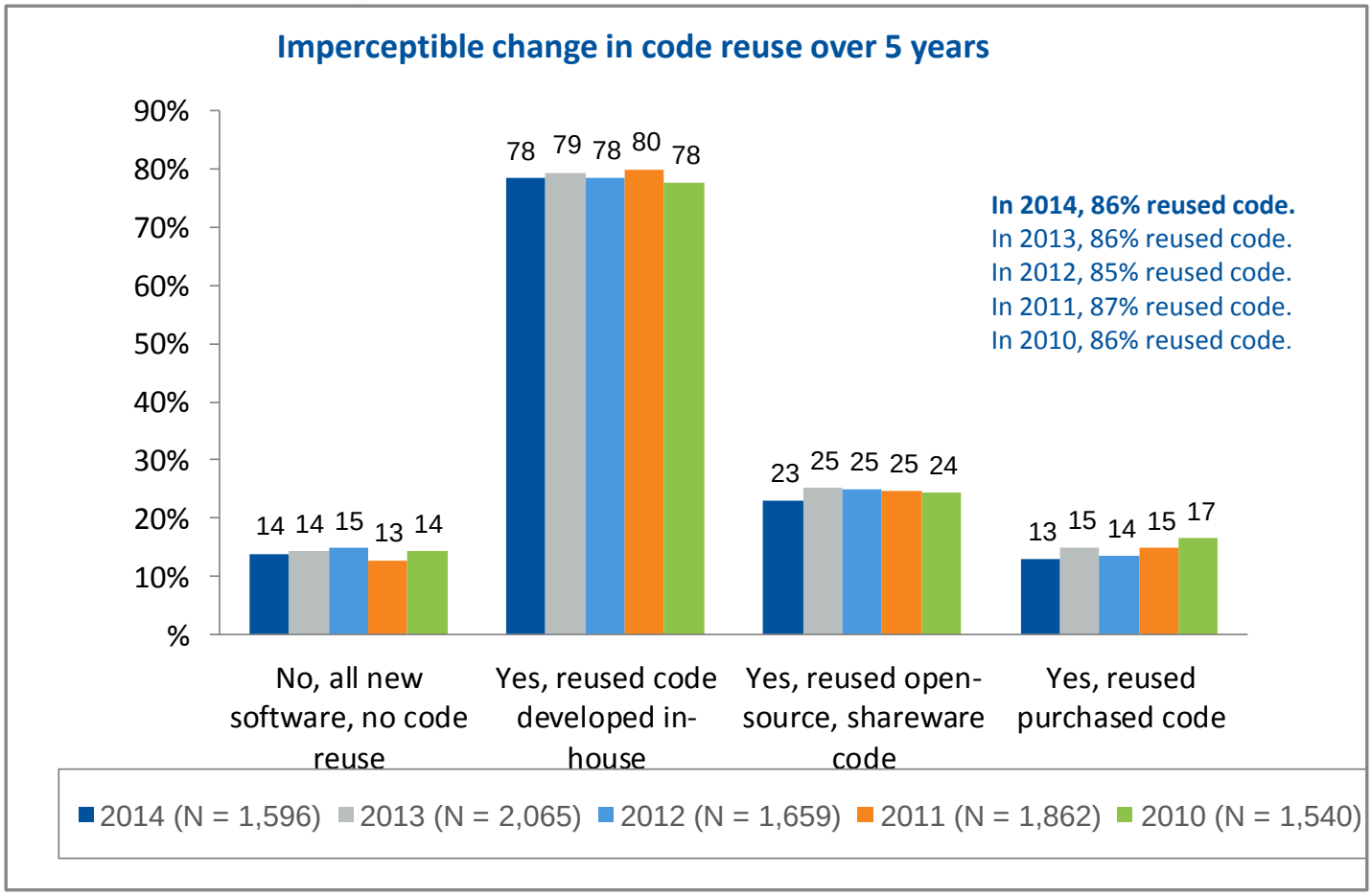
Note: C#, Python and Ada were added in 2013. Ada and UML were under 1% in both 2013 and 2014. Only 1 language is mentioned 5 times in the "Other" category – Verilog.

My next embedded project will likely be programmed mostly in:



Note: C#, Python and Ada were added in 2013. Ada was under 1%.
No other language is mentioned more than 6 times in the "Other" category

Does your current project reuse code from a previous embedded project?

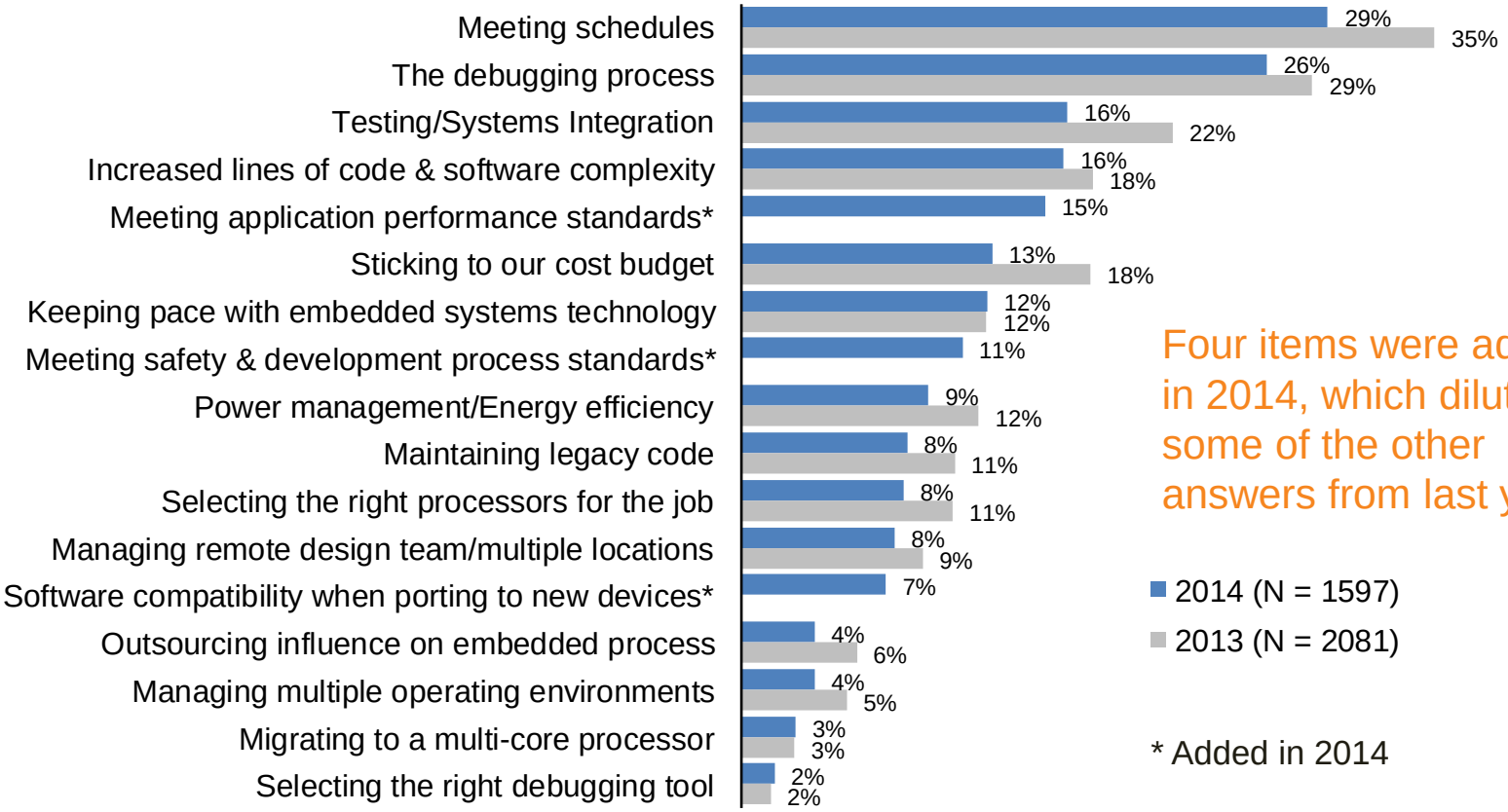


Current Embedded Design Environment: Key Takeaways

- Trend toward **smaller teams**
- Slow but steady trend toward **longer development cycles**
  - 12.6 months average in 2014 vs. 12.2 months average in 2010
- **Meeting deadlines** getting more and more difficult
  - "On schedule" project completion trending downward
  - 41% in 2014 while previous 4 years 42-44% for "Ahead of" or "On schedule"
- **No upstarts** in terms of programming languages
- **High** (86%) and **steady reuse of code** is expected to continue. Reused "purchased" code is declining.

Embedded Design Process

Which of the following challenges are your own or your embedded design team's greatest concerns regarding your current embedded systems development?



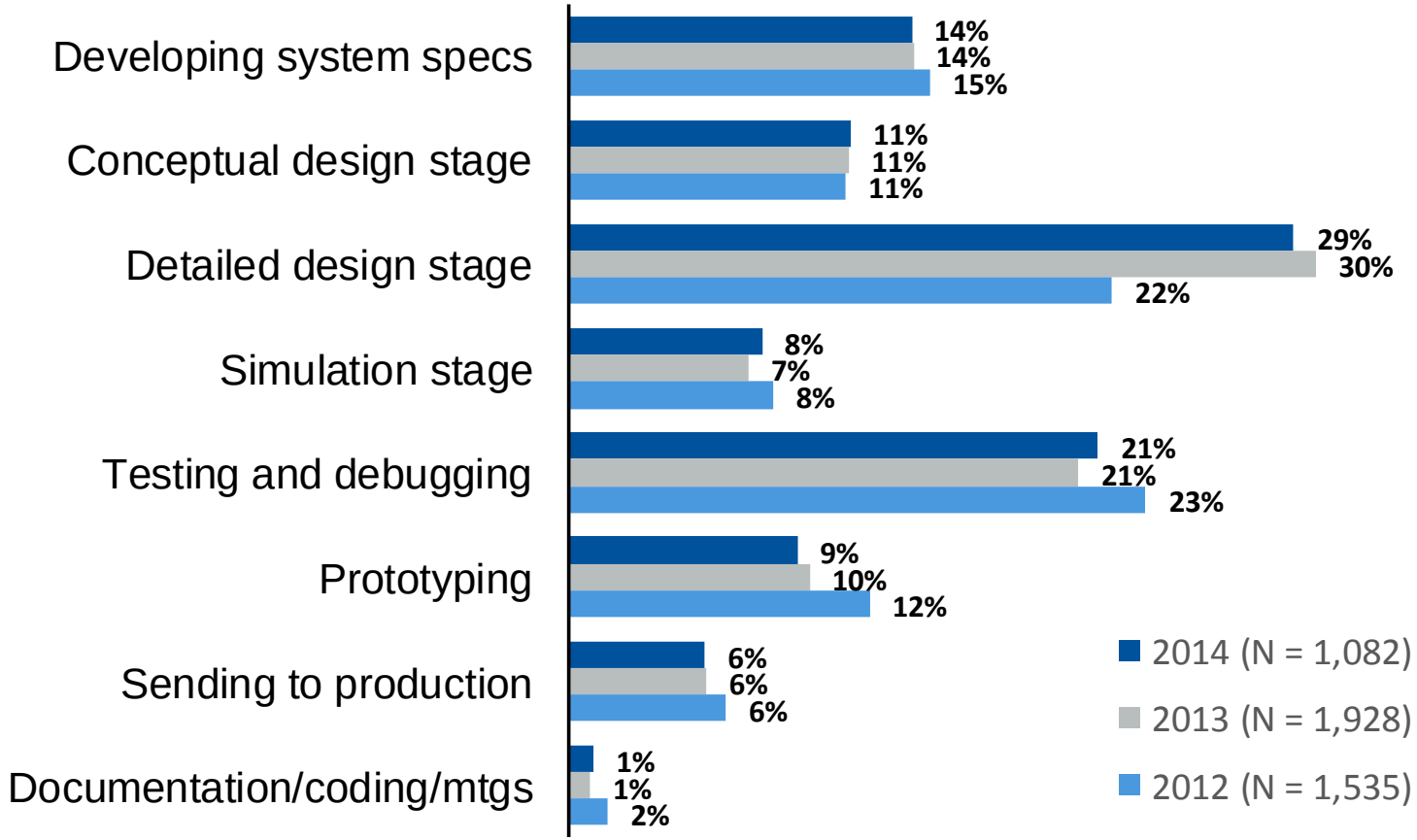
Four items were added in 2014, which diluted some of the other answers from last year.

2014 (N = 1597)

2013 (N = 2081)

* Added in 2014

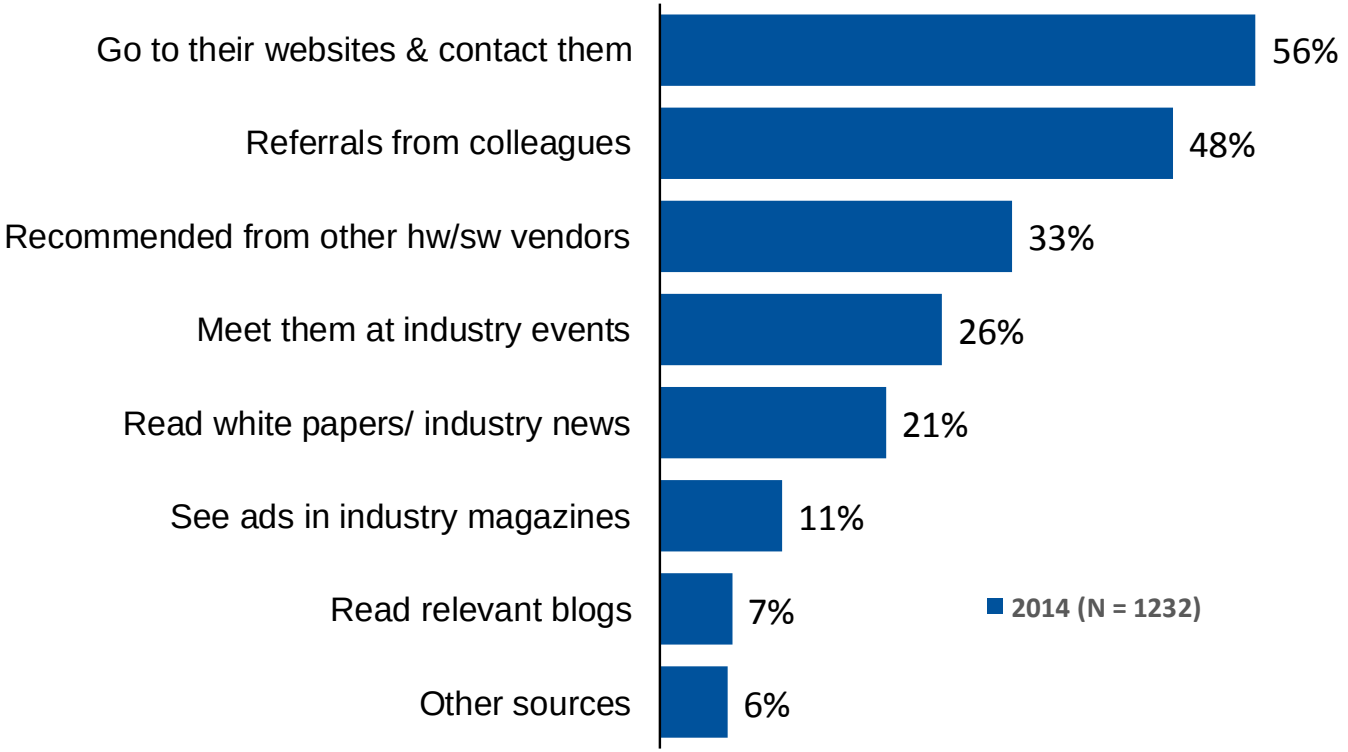
What percentage of your design time is spent on each of the following stages?



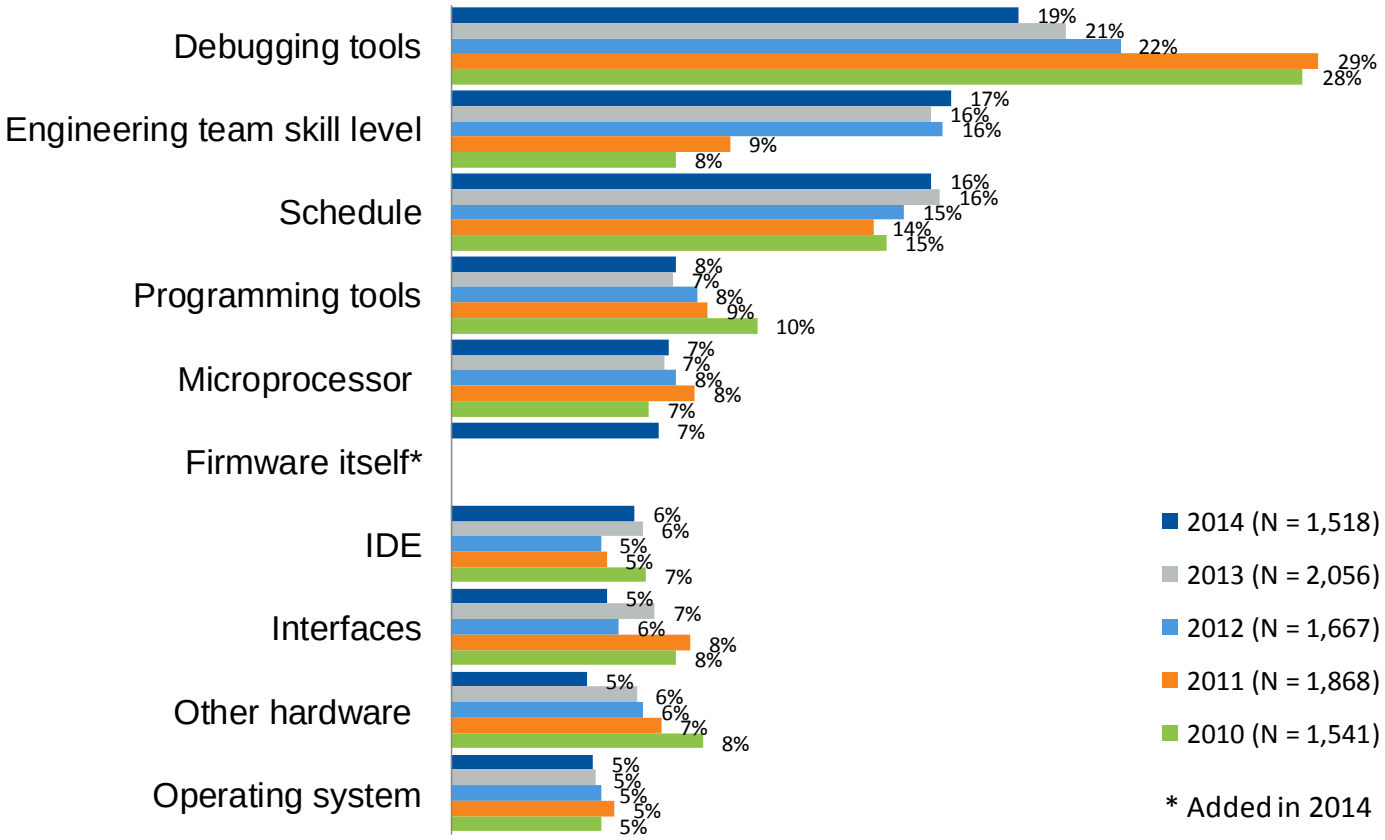
How many external vendors do you work with on your design?

On average 3.0 vendors

How do you typically find and evaluate partners to work with?

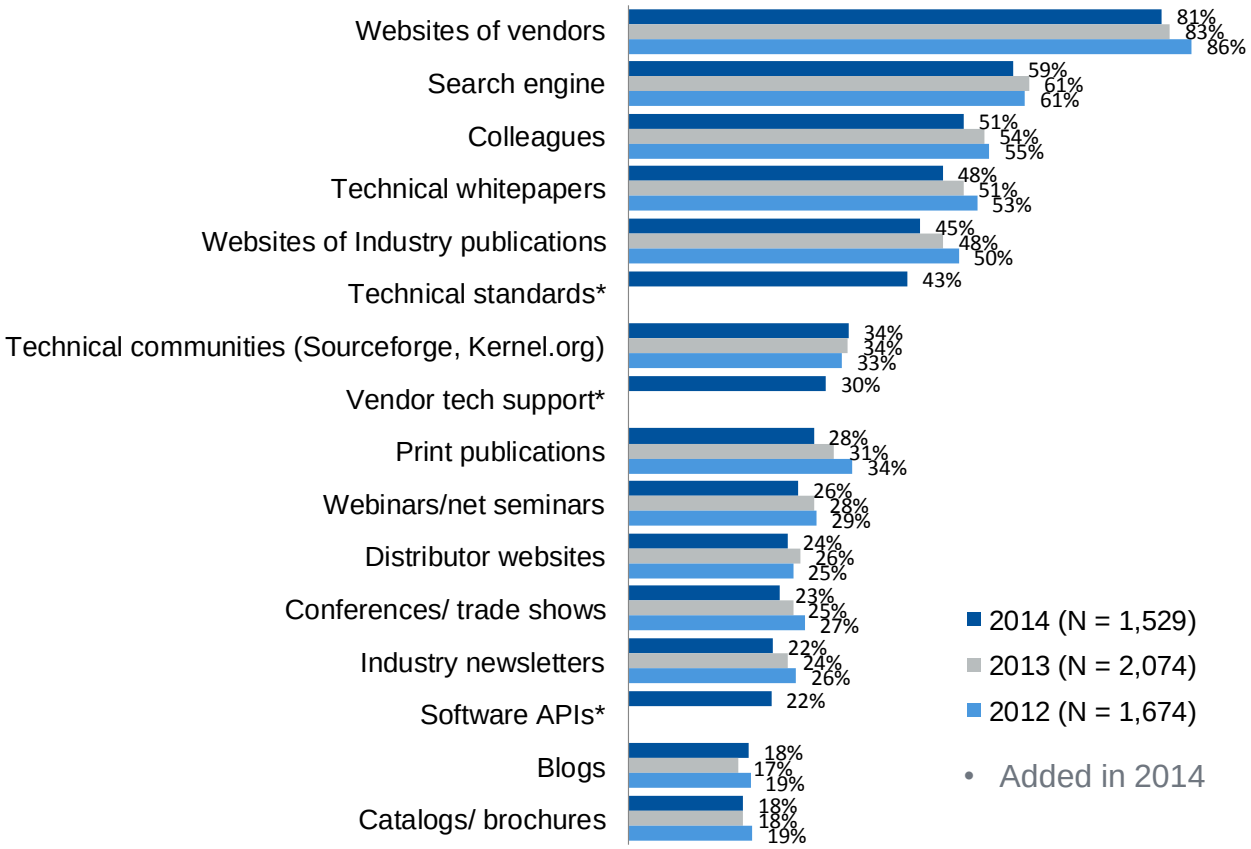


If you could improve one thing about your embedded design activities, what would it be?



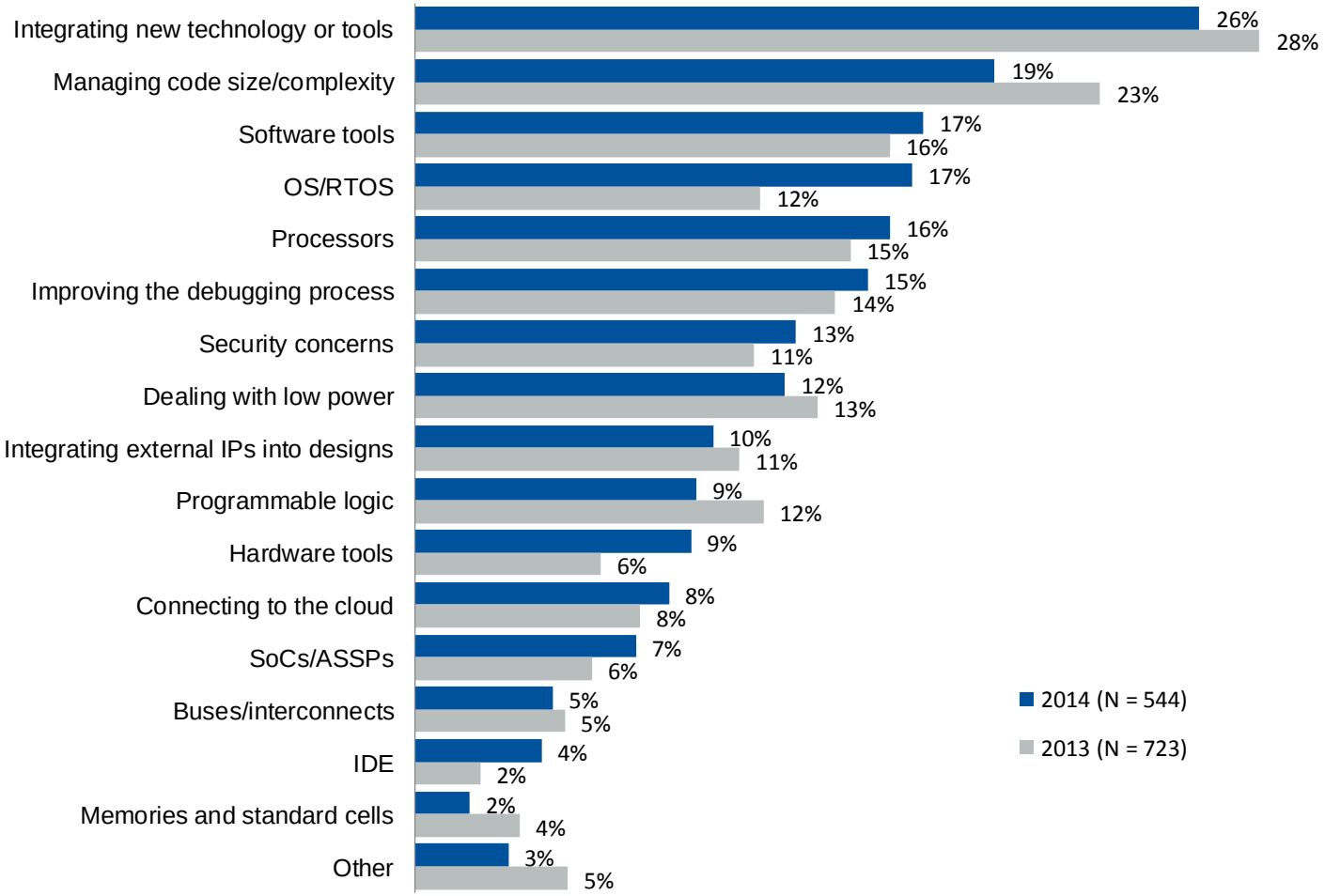
In general, what sources of information do you consult to research your embedded design decisions?

Top 16 Sources

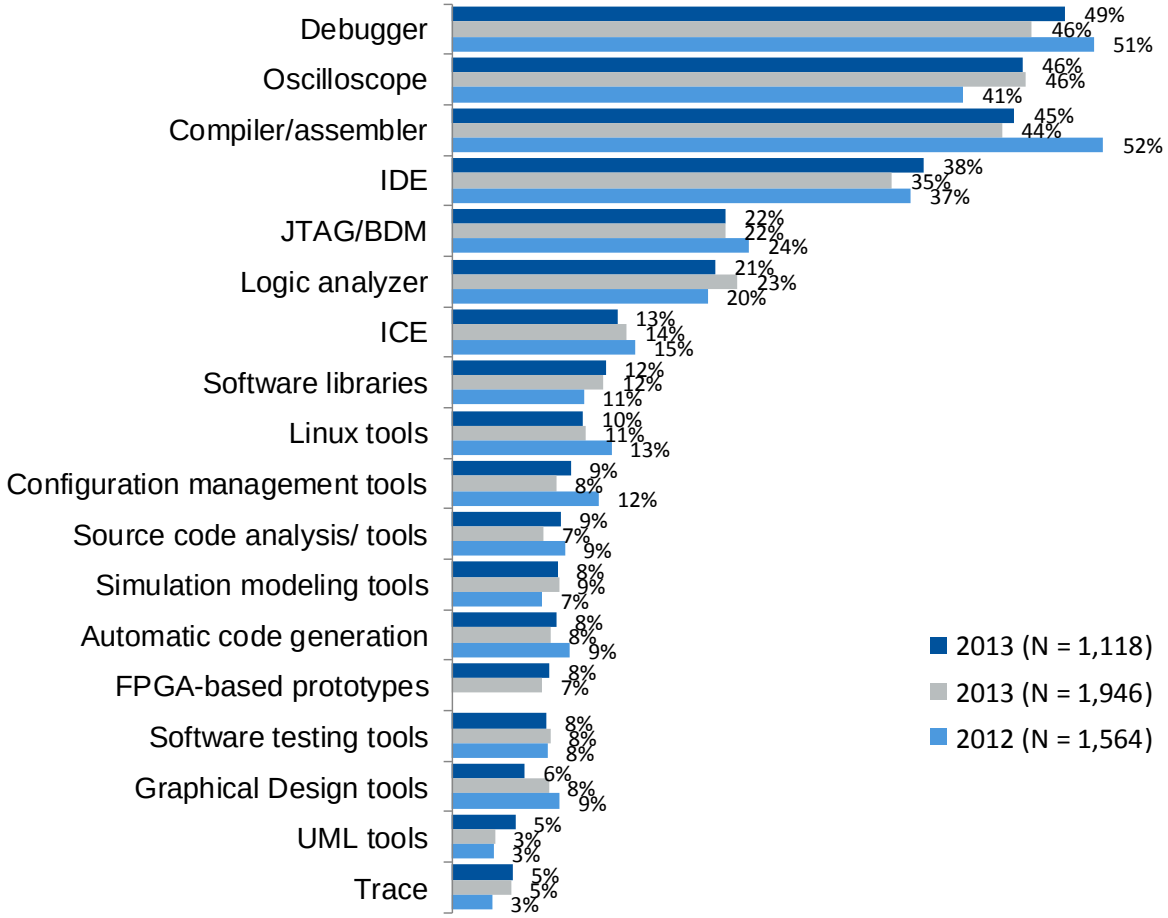


Thinking about the next year, what areas will be your greatest technology challenges?

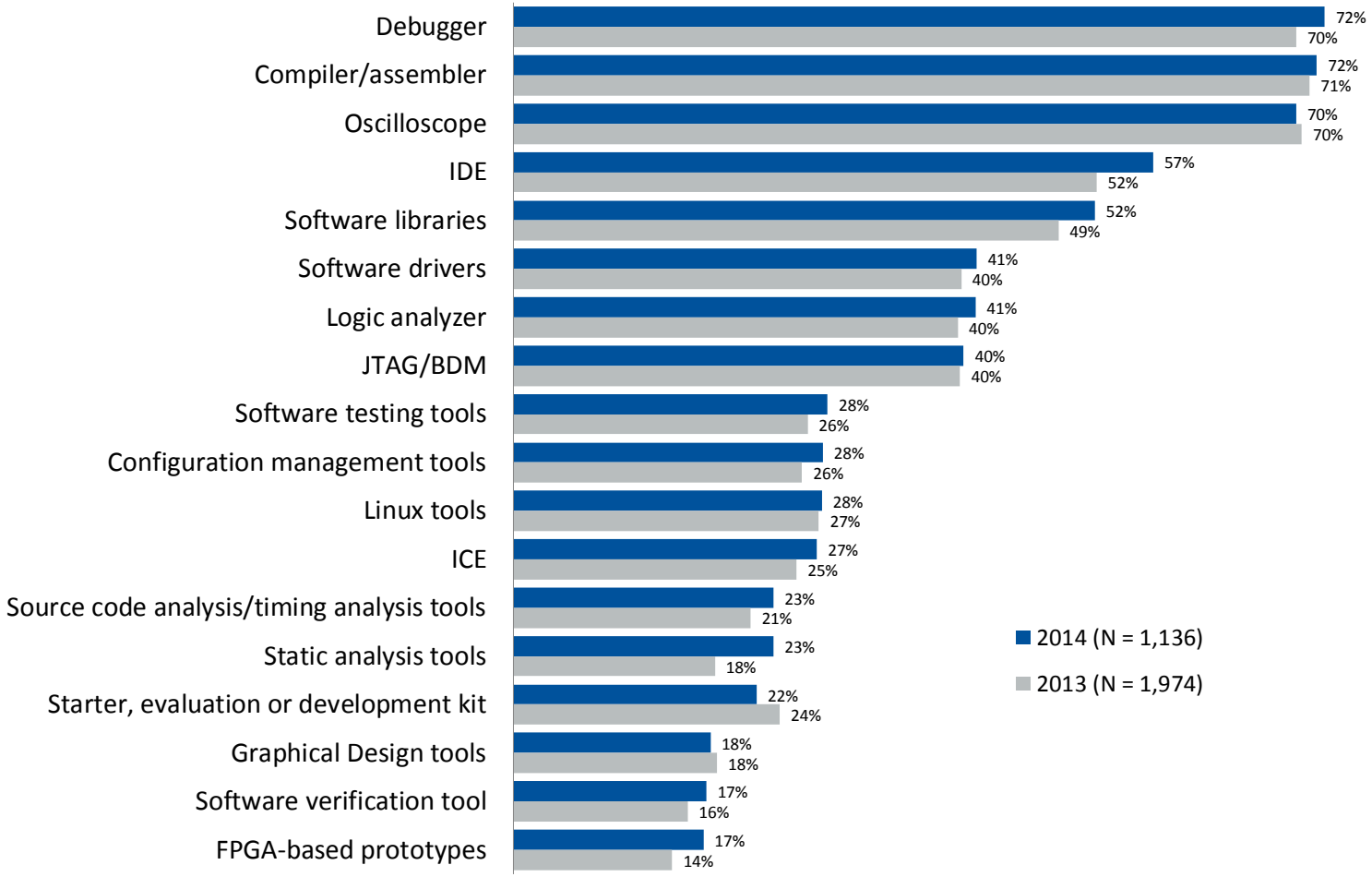
Managers Only



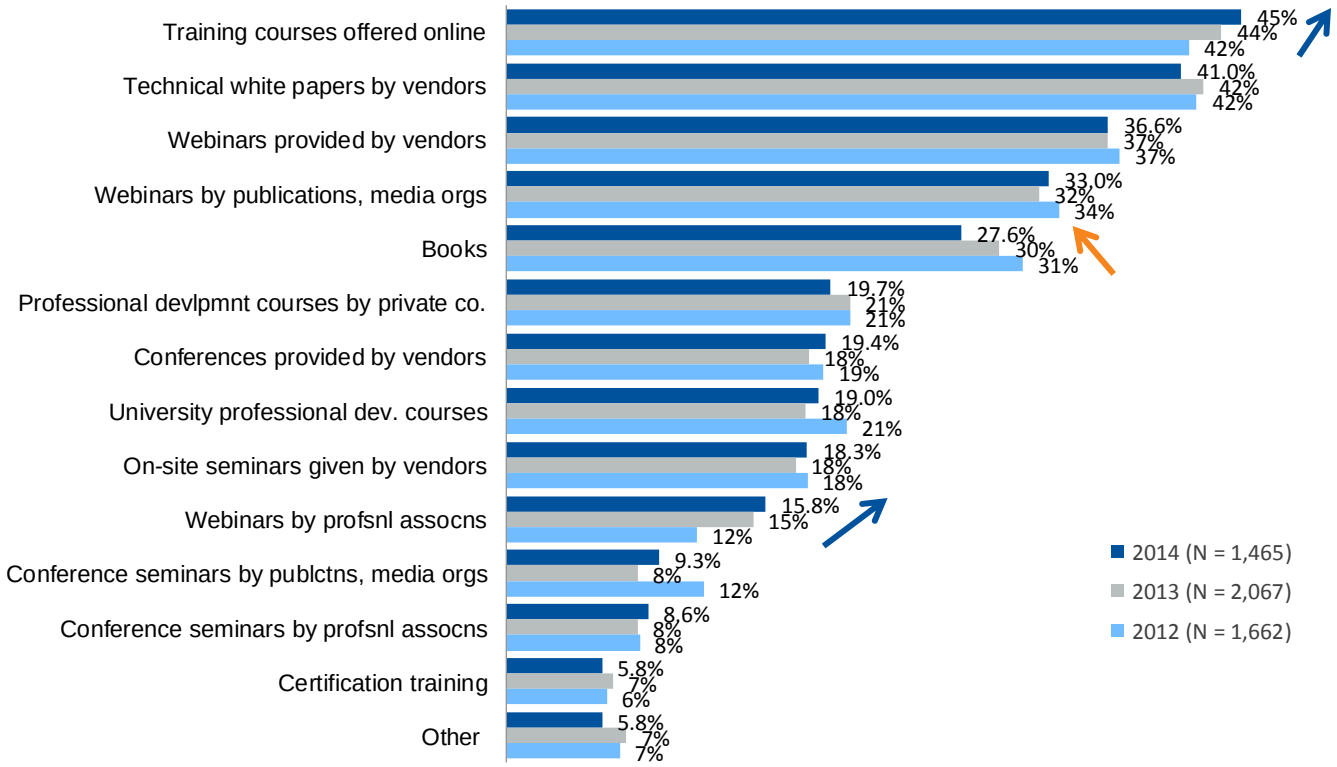
Which of the following are your favorite/most important software/hardware tools? (Top 18 shown)



Which of the following software/hardware tools do you currently use? Only showing tools used by 17% or more.



What are the most effective ways that you systematically or formally maintain, educate, and advance your professional skills?



Other Related Demographics	2014	2013
Average days per year spent on career training	9.2	9.0
Average number of years out of school	21.6	19.7
Hours per week spent reading technical pubs	5.2	4.8
Books read in full or in substantial part per year	3.9	3.9

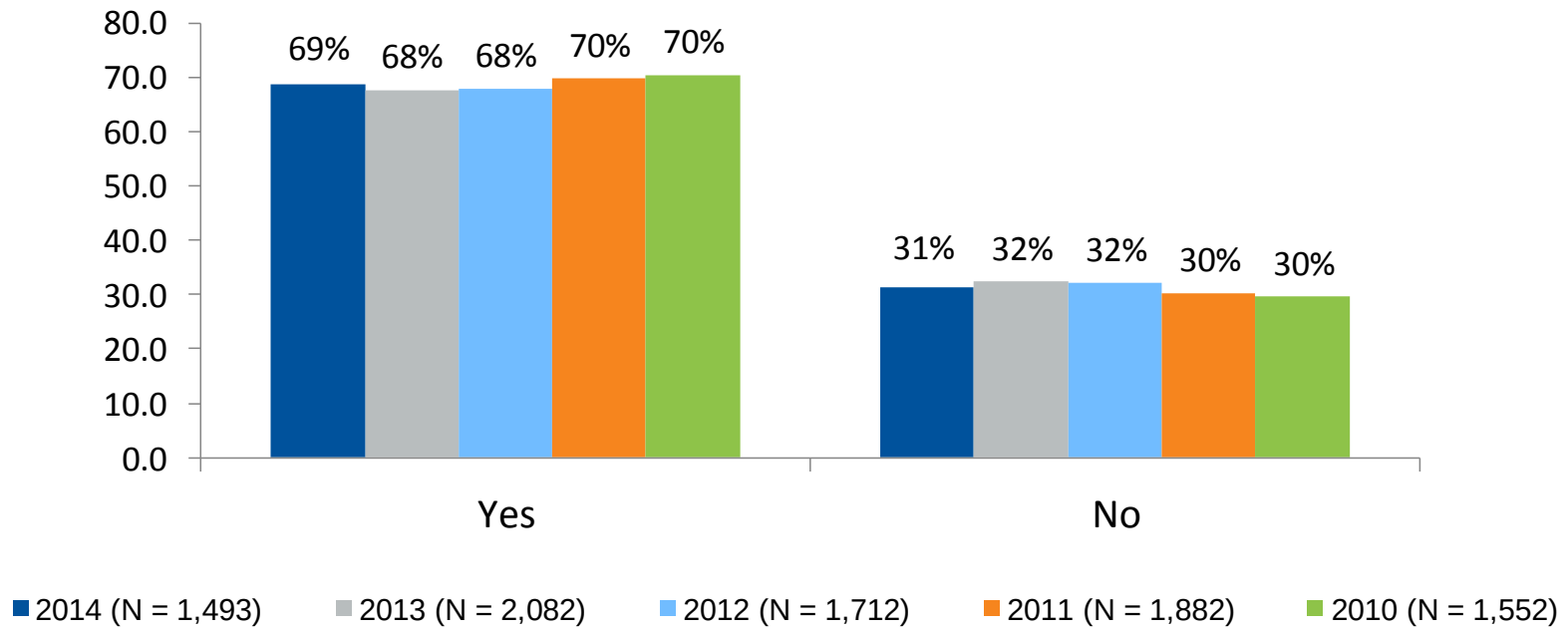
Embedded Design Process: Key Takeaways

- **Meeting schedules** remains the premier challenge for development with the **debugging process** is not far behind.
- **Time devoted to debugging** is second only to "**detailed design stage**". Newly added **"meeting performance standards"** ranks 5th.
- Design projects average **3 external vendors**, and these vendors are found largely through **referrals** and **web research**.
- **Engineering team skill** and **scheduling** increased in concern with debugging and programming tools decreasing in concern across improving embedded design activities over the last five years.
- **Vendor websites** continue to be extremely important to developers as sources of information, while newly-added technical standards, vendor technical support forums, and software APIs, show strength.
- **Integrating new technology** and **managing code size** are the number 1 and 2 technology challenges. OS/RTOS challenges have risen significantly from 12% in 2012-13 to 17% in 2014.
- **Top five** ways to **maintain professional skills** over last three years have been very consistent: training courses offered online; technical/white papers; webinars by vendors; webinars by media orgs. Online training courses and webinars from professional associations are steadily increasing over the last three years.

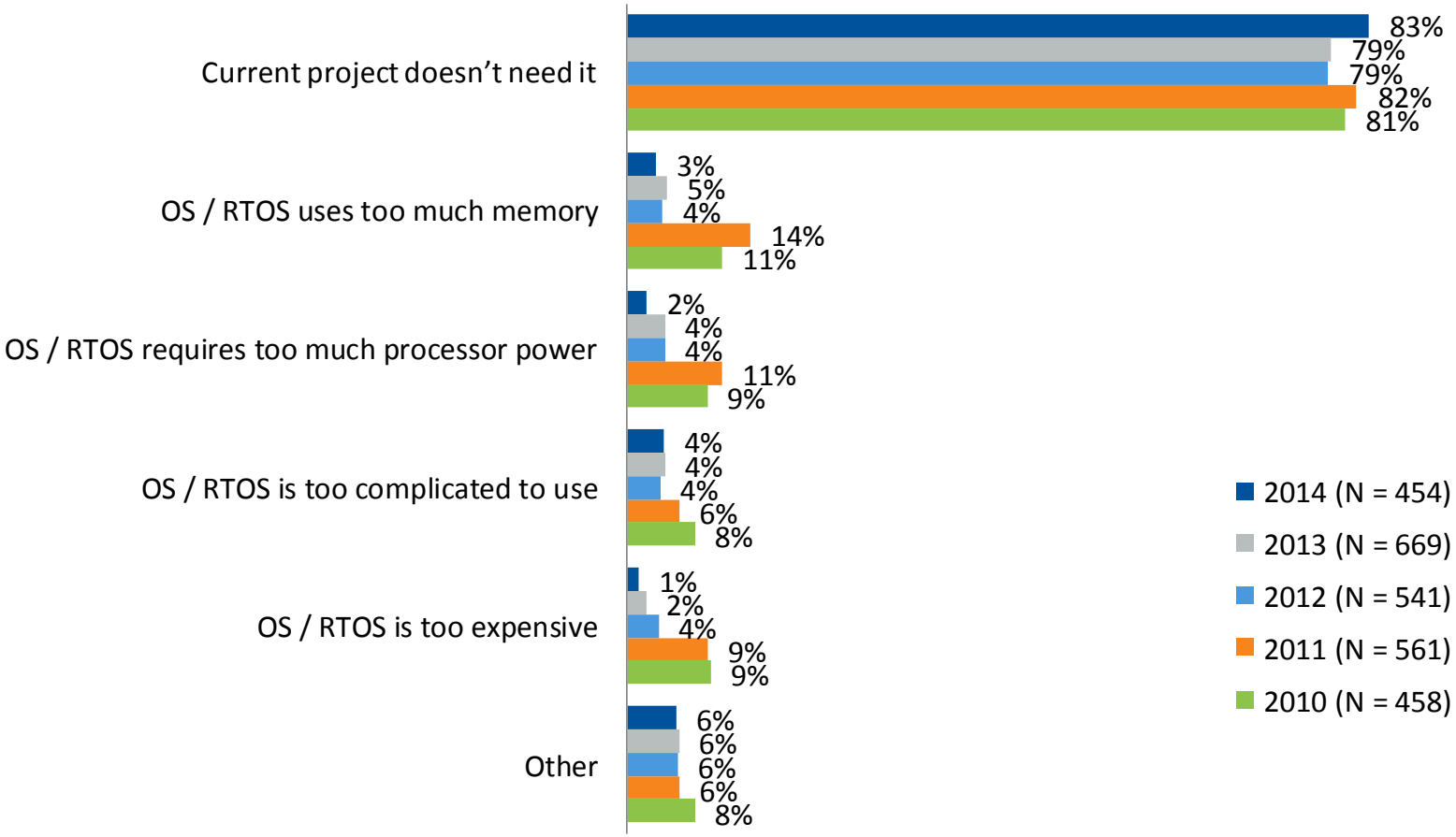
Operating Systems

Does your current embedded project use an operating system, RTOS, kernel, software executive, or scheduler of any kind?

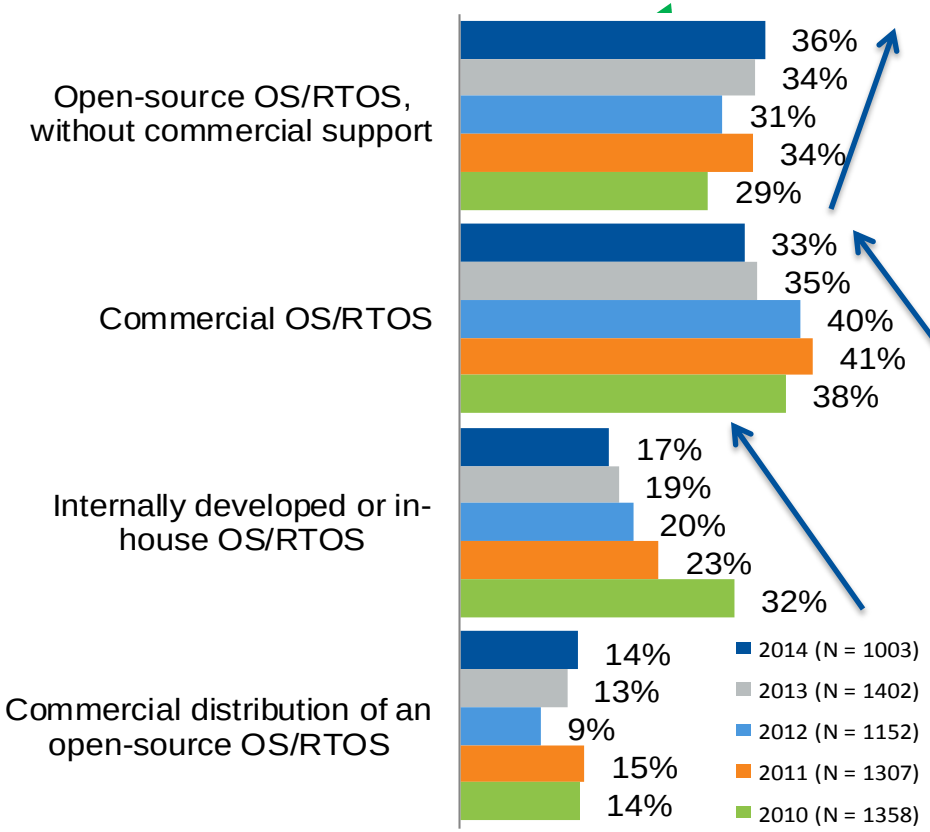
Hardly any change in usage of RTOS, kernels, execs, schedulers over past 5 years



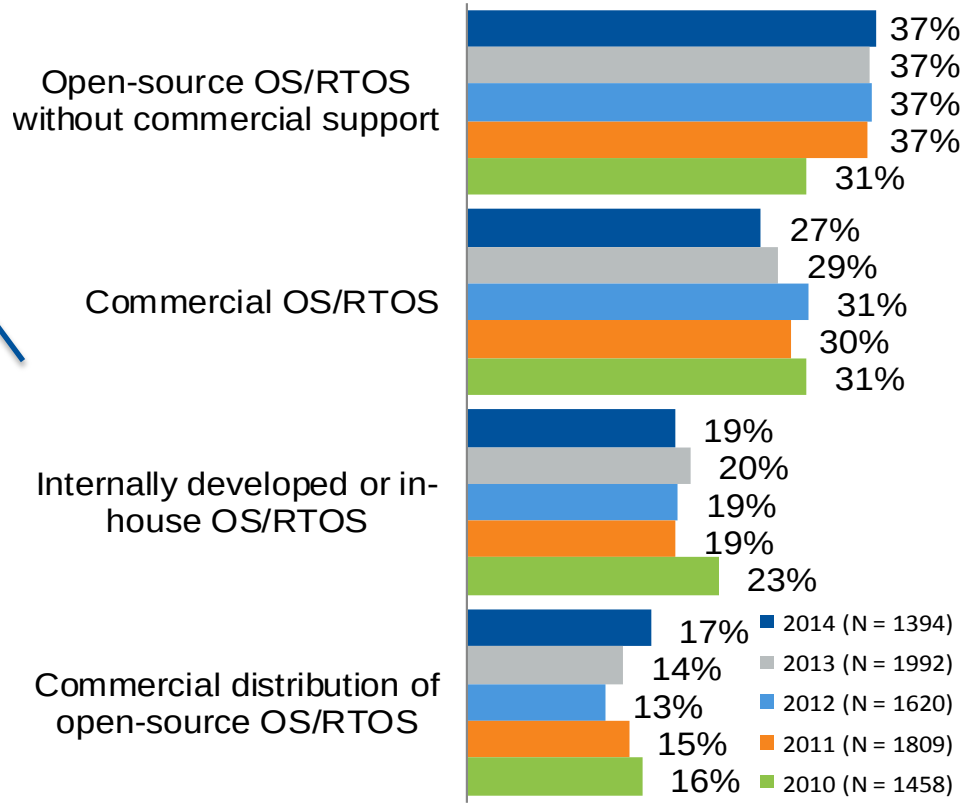
If current embedded project does not use an operating system, RTOS, kernel, software executive, or scheduler of any kind, why not?



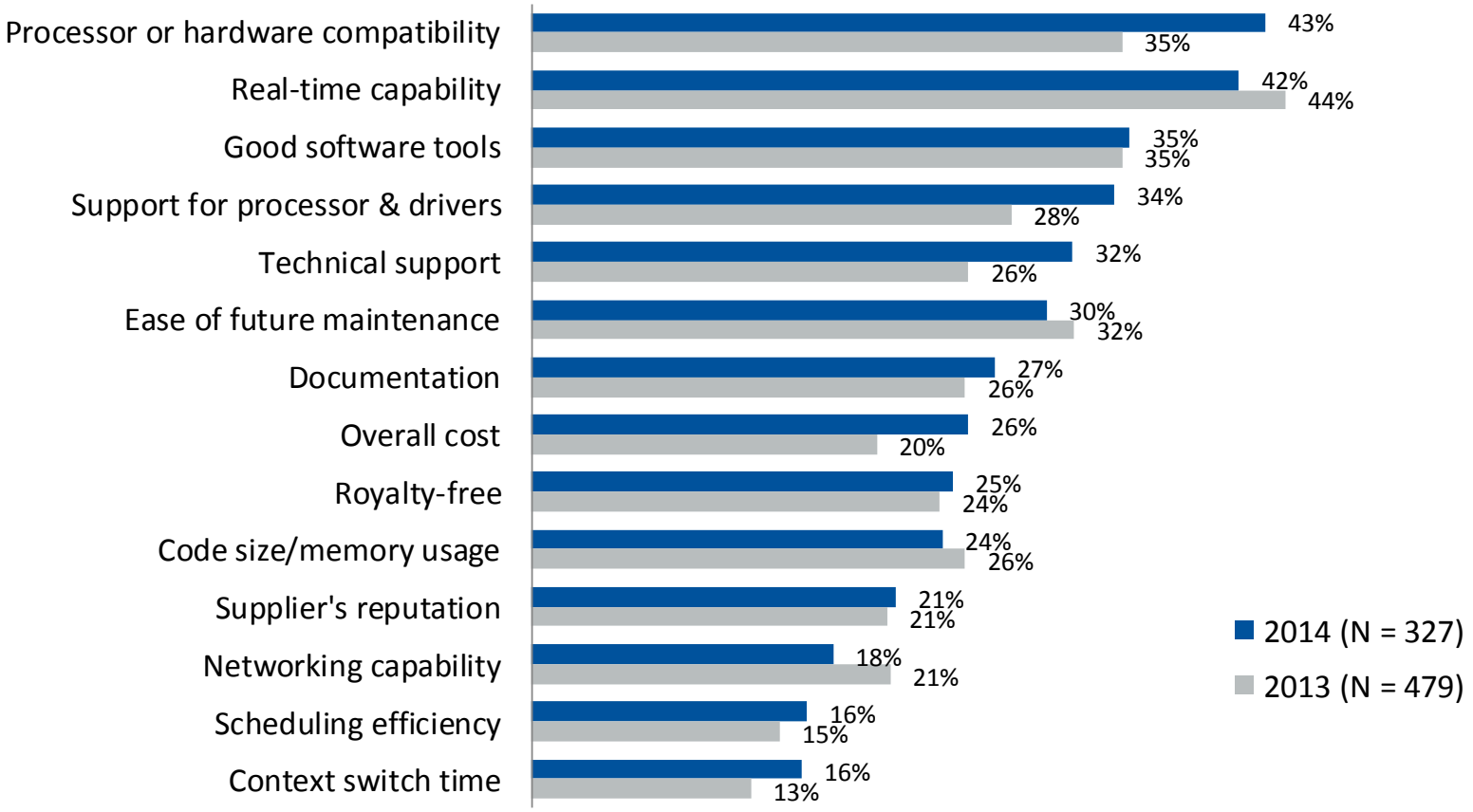
My current embedded project uses:



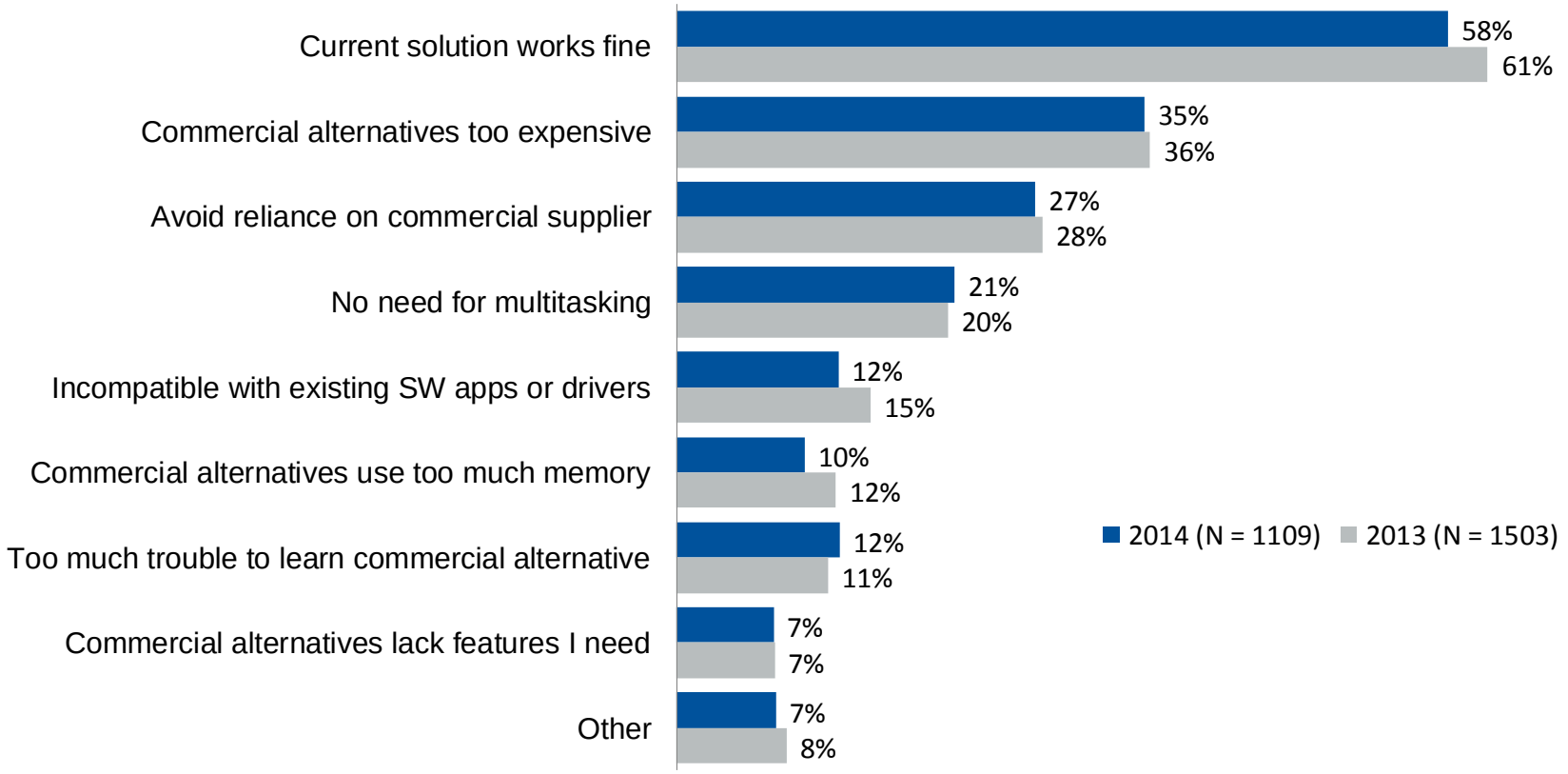
My next embedded project will likely use:



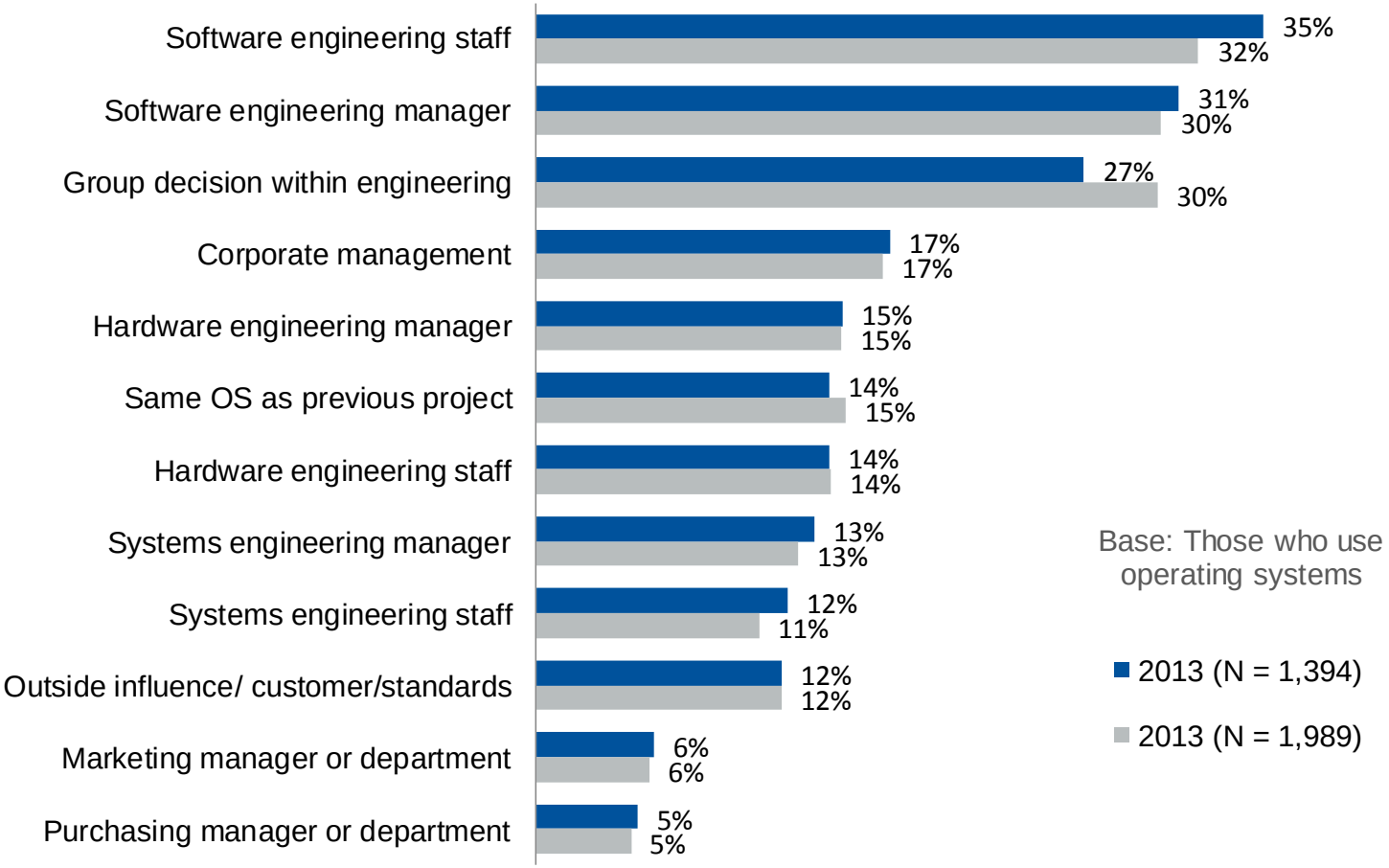
Which factors most influenced your decision to use a commercial operating system? (Top 14 choices.)



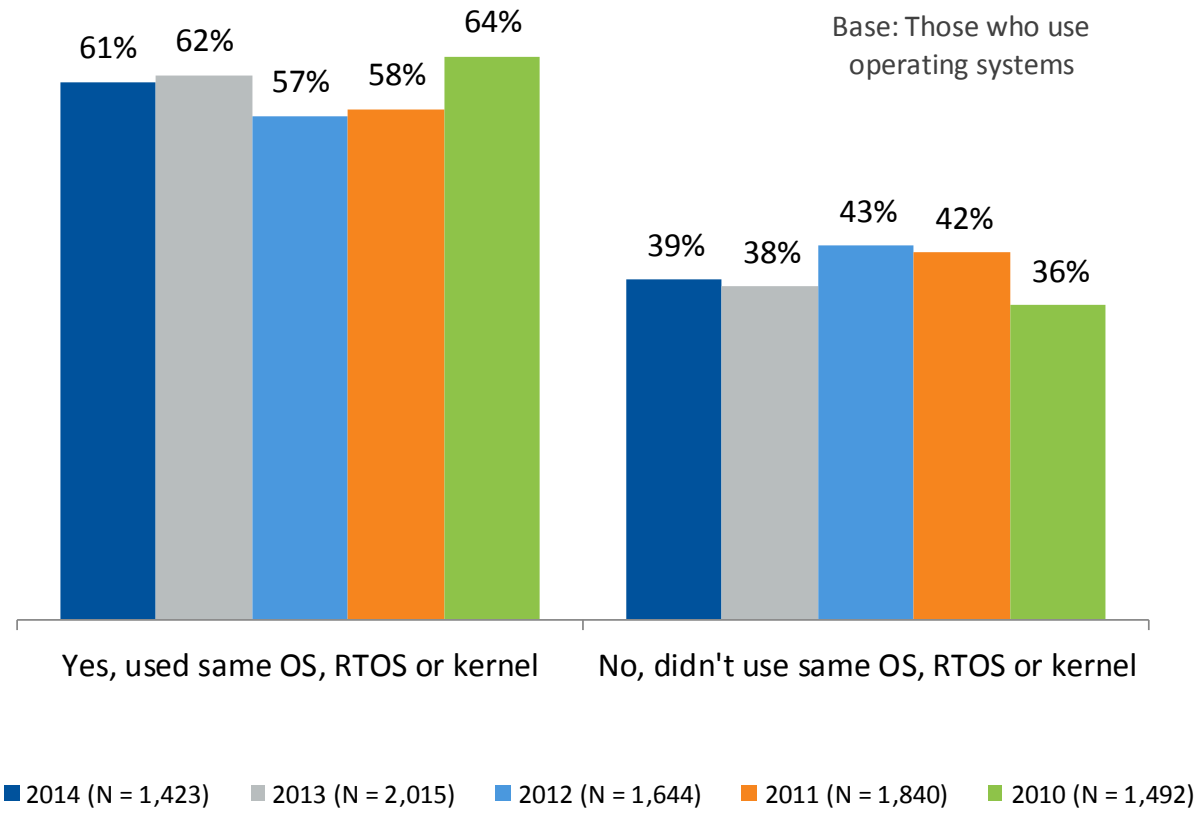
What are your reasons for not using a commercial operating system?



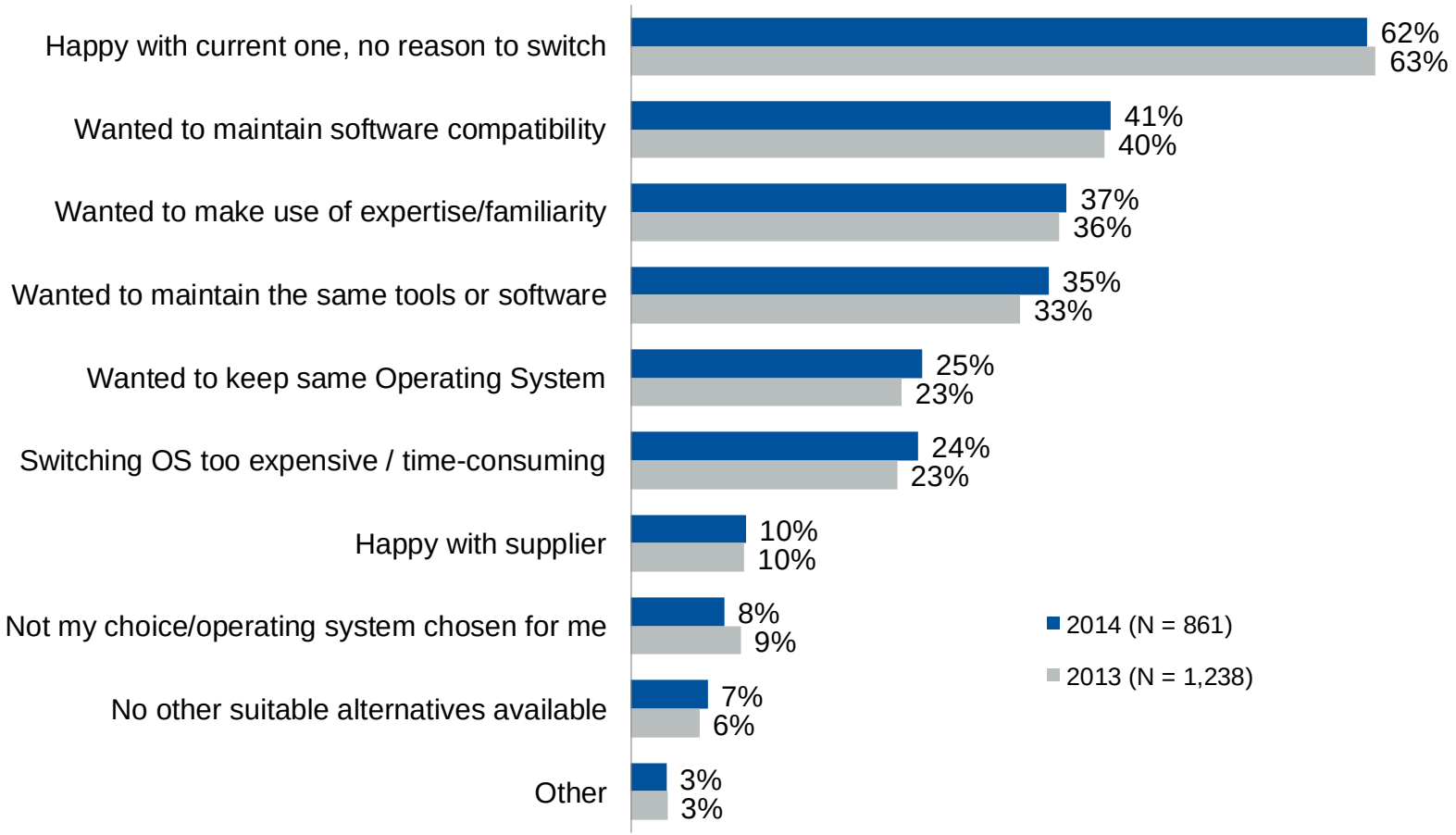
Who were the greatest influences on the choice of operating system?



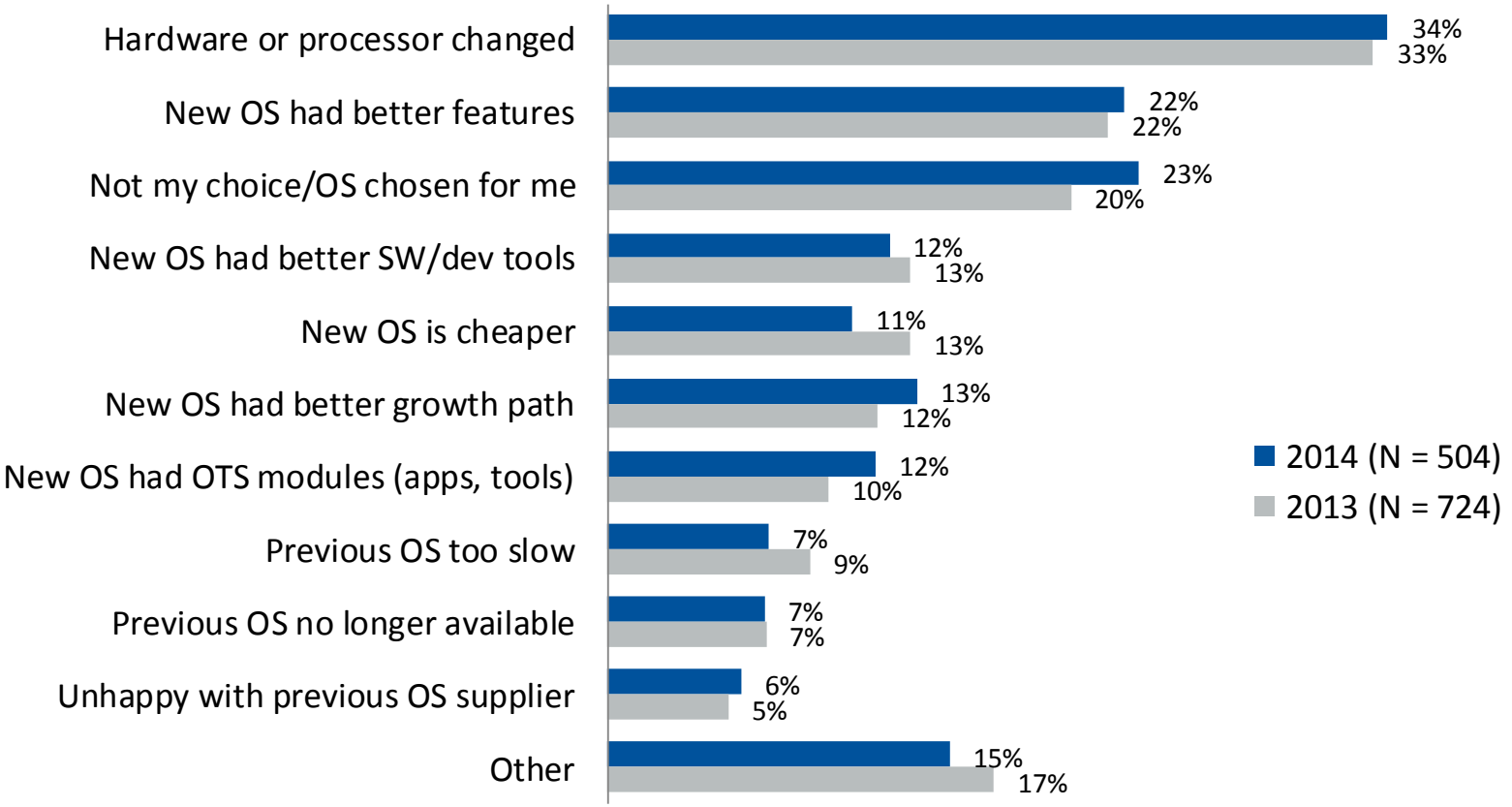
Did you use the same operating system, RTOS, or kernel as in your previous project?



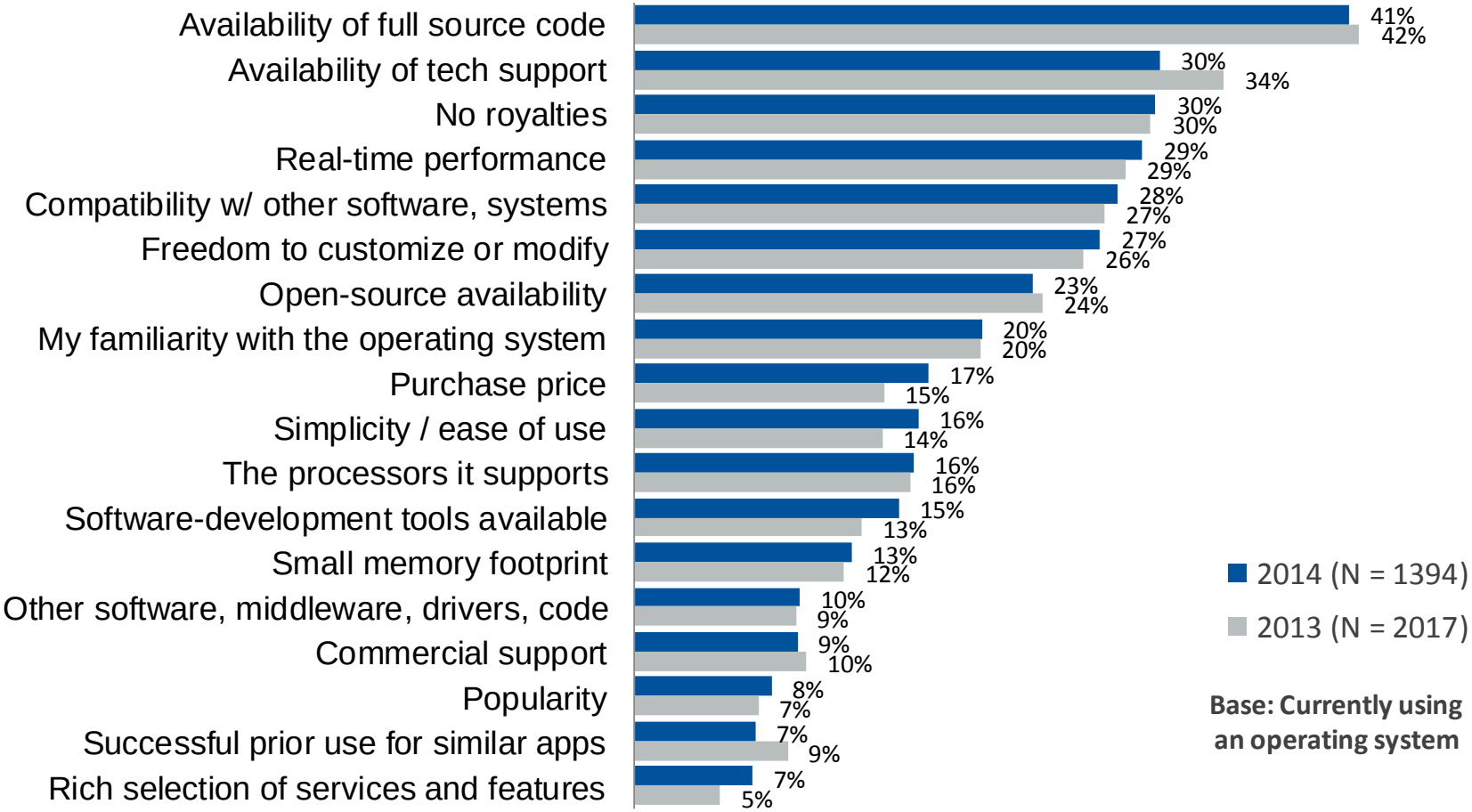
Why did you use the same operating system?



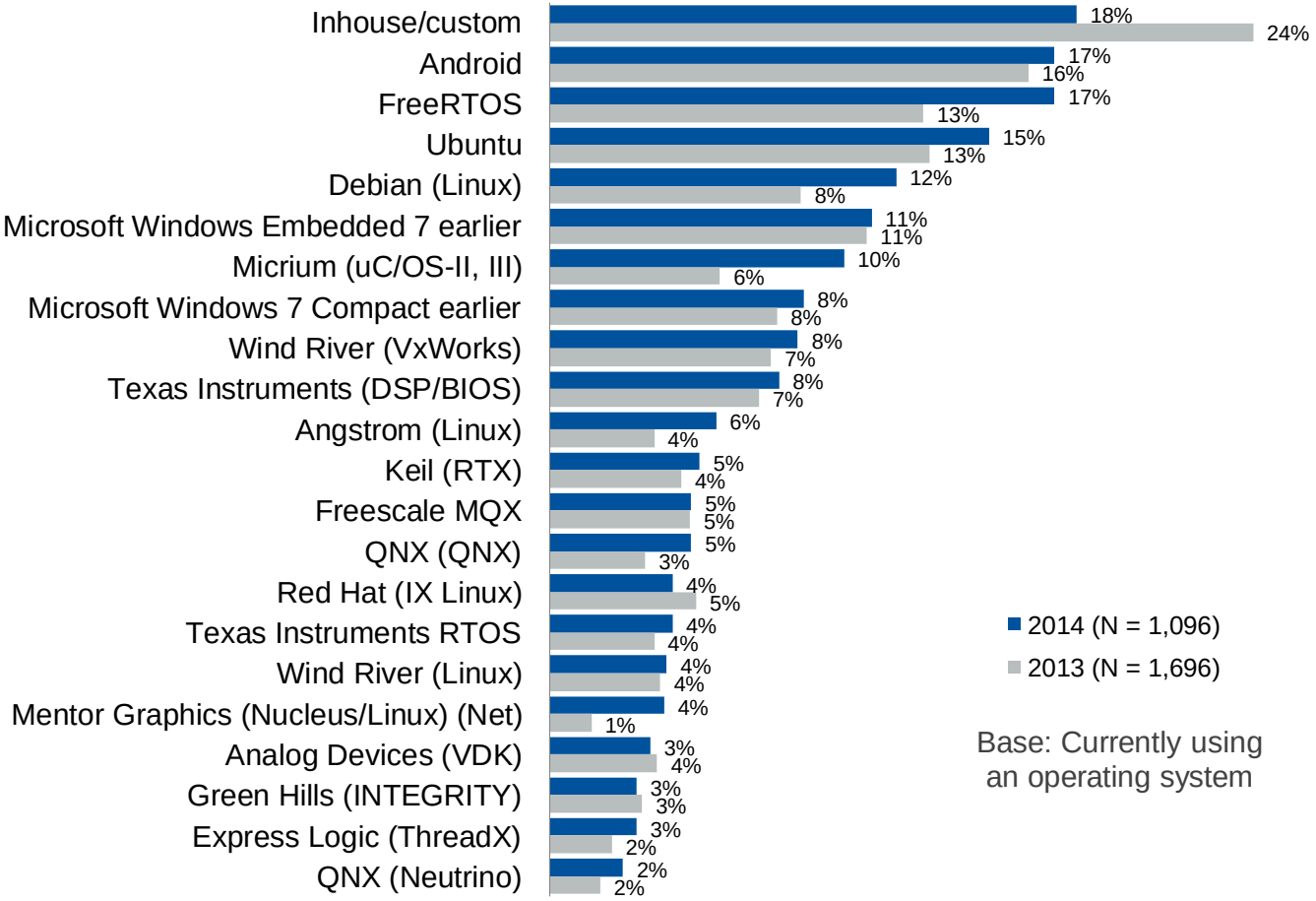
Why did you switch operating systems?



What are the most important factors in choosing an operating system?

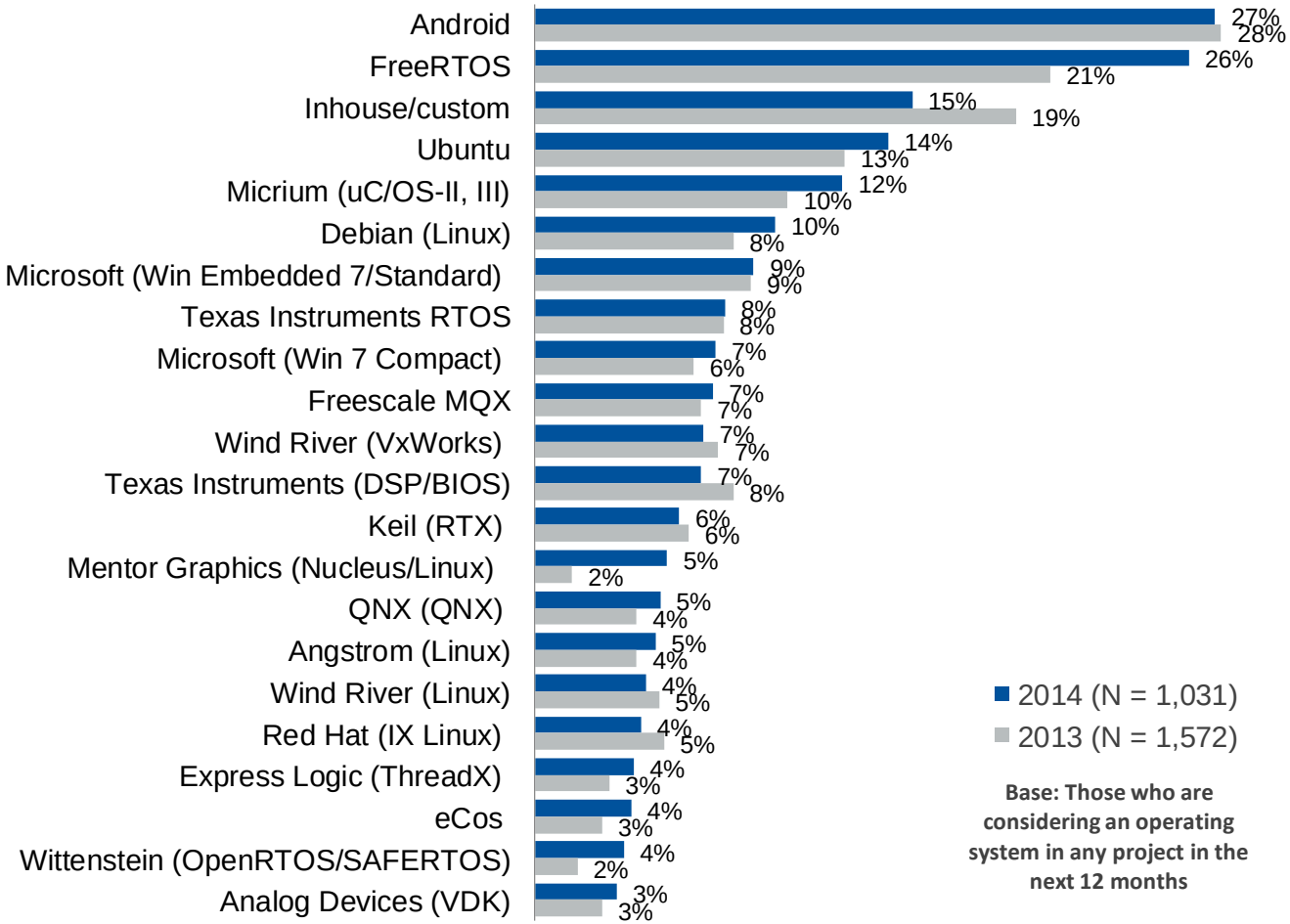


Please select ALL of the operating systems you are currently using.



Base: Currently using an operating system

Please select ALL of the operating systems you are considering using in the next 12 months.



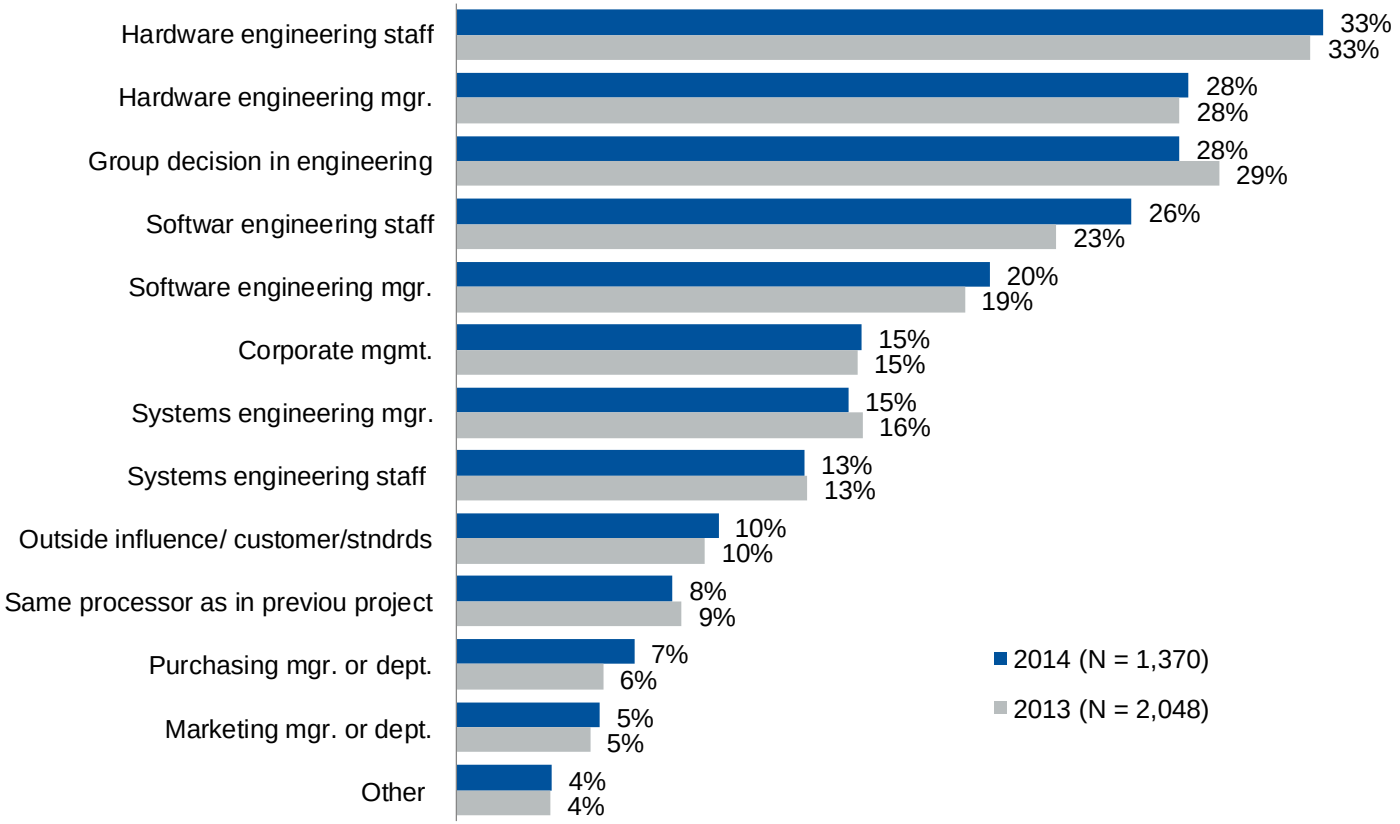
Base: Those who are considering an operating system in any project in the next 12 months

Operating Systems: Key Takeaways

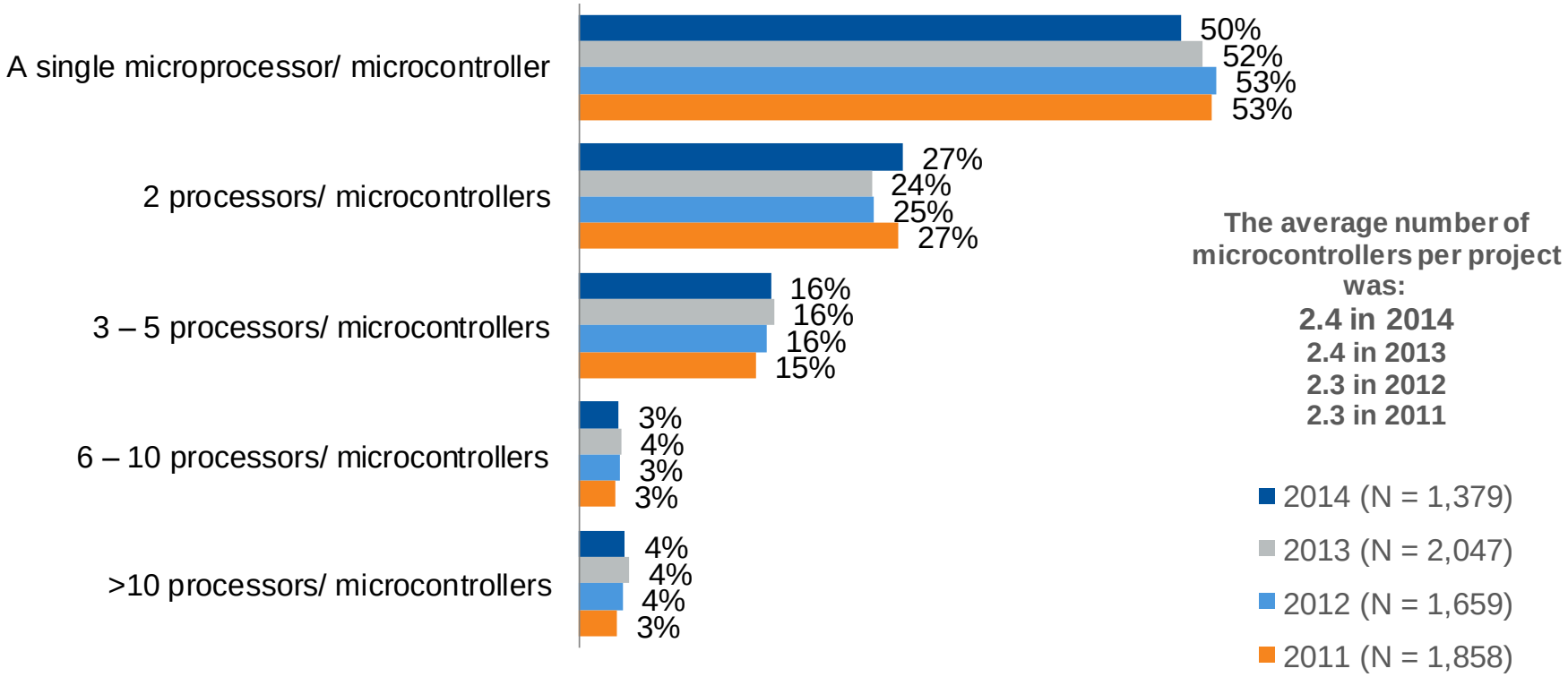
- Current usage trending toward **open source**, up from 29% in 2010 to 36% in 2014.
- First time **open source OSes** has outpaced commercial OSes; 38% in 2010 to 33% in 2014.
  - Main reasons are: no need for multitasking, cost and not having to rely on a commercial supplier
- **SW engineering staff** and their **managers** are the decision makers on choosing an operating system
- **No switching:** Using the same OS, RTOS or kernel from the previous project occurs at the rate of about 6 out of 10 projects.
- Downward trend in use of **in-house/custom OSes** reflects the five year downward trend seen earlier in the usage of In-house/custom solutions.
- **Android** is the number one OS under consideration. 5% gain in Free RTOS from 21% in 2013 to 26% in 2014 is a contender for the #1 position for 2015.

Microprocessors

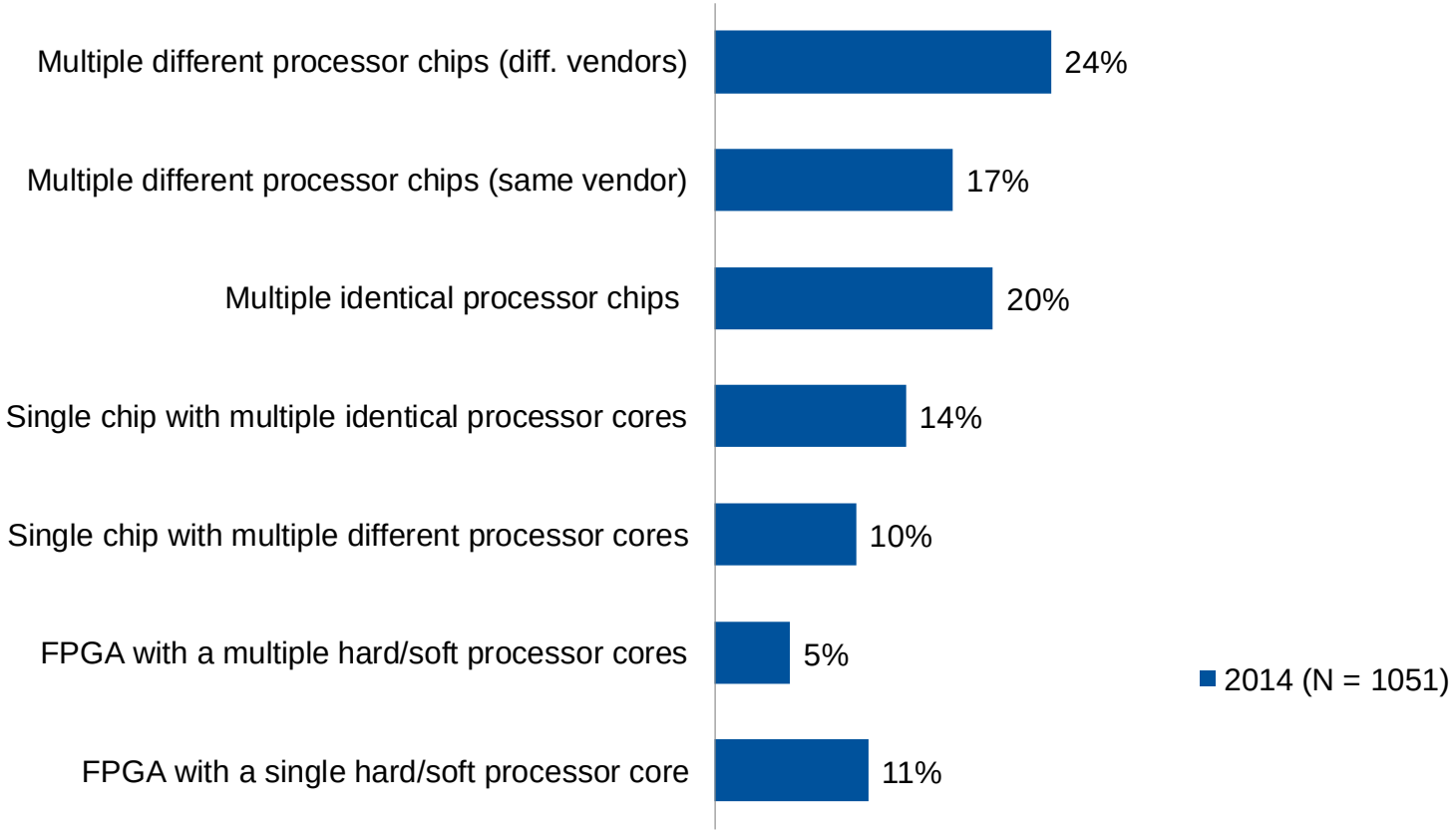
Who were the greatest influences on the choice of the processor for your current project?



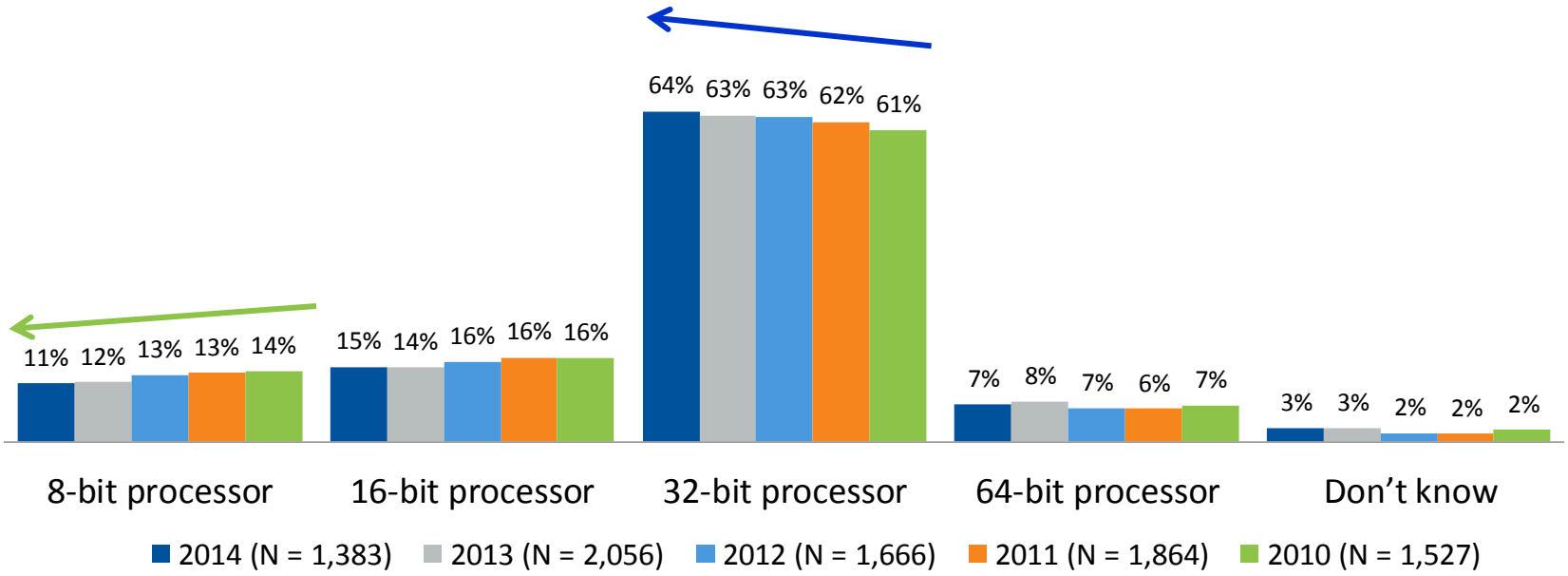
My current embedded project contains:



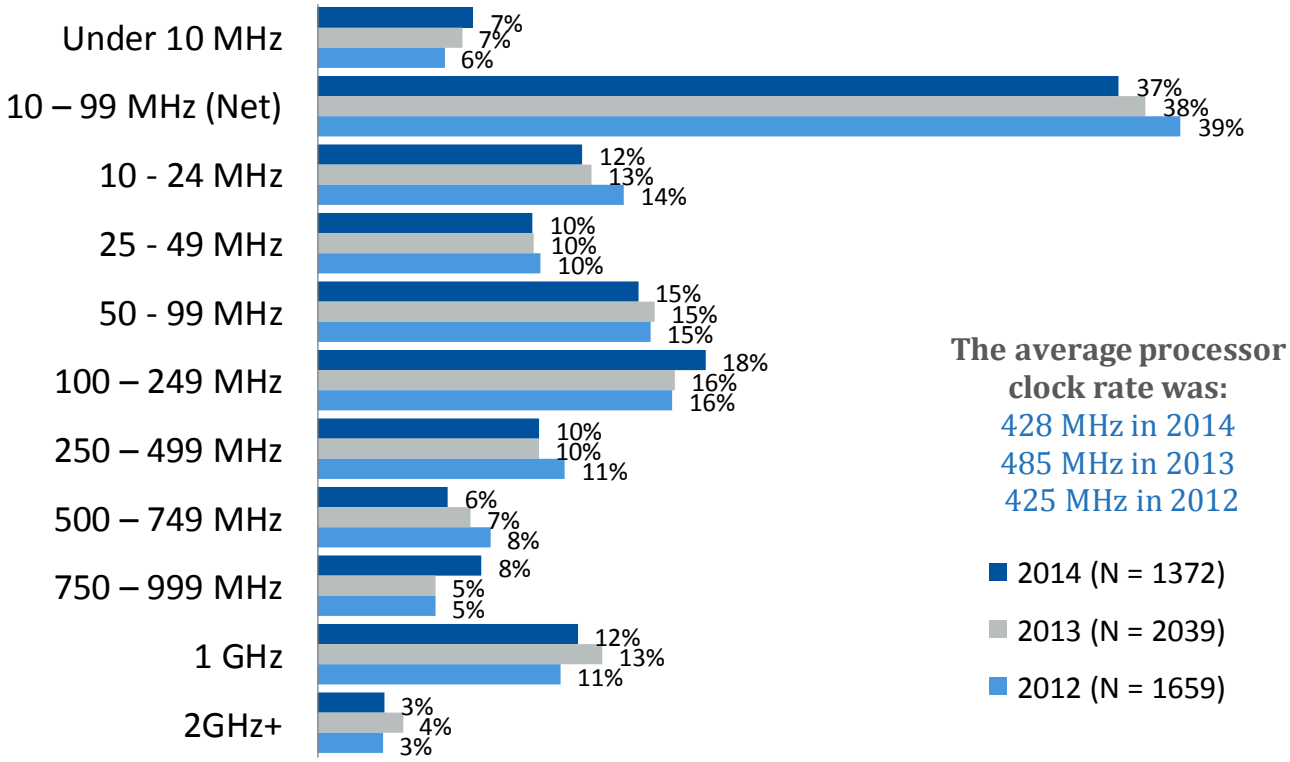
Does your embedded project contain . . .



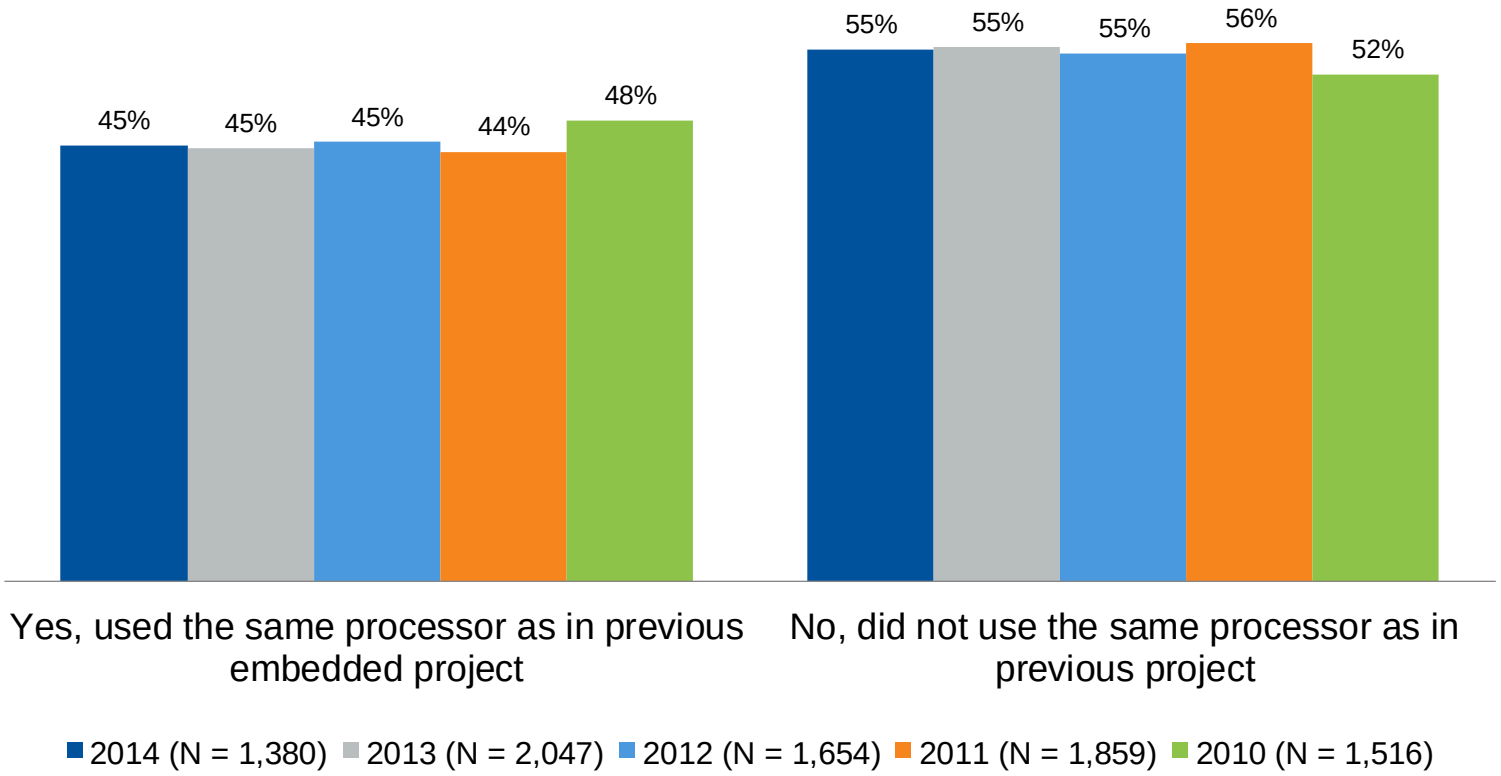
My current embedded project's main processor is a:



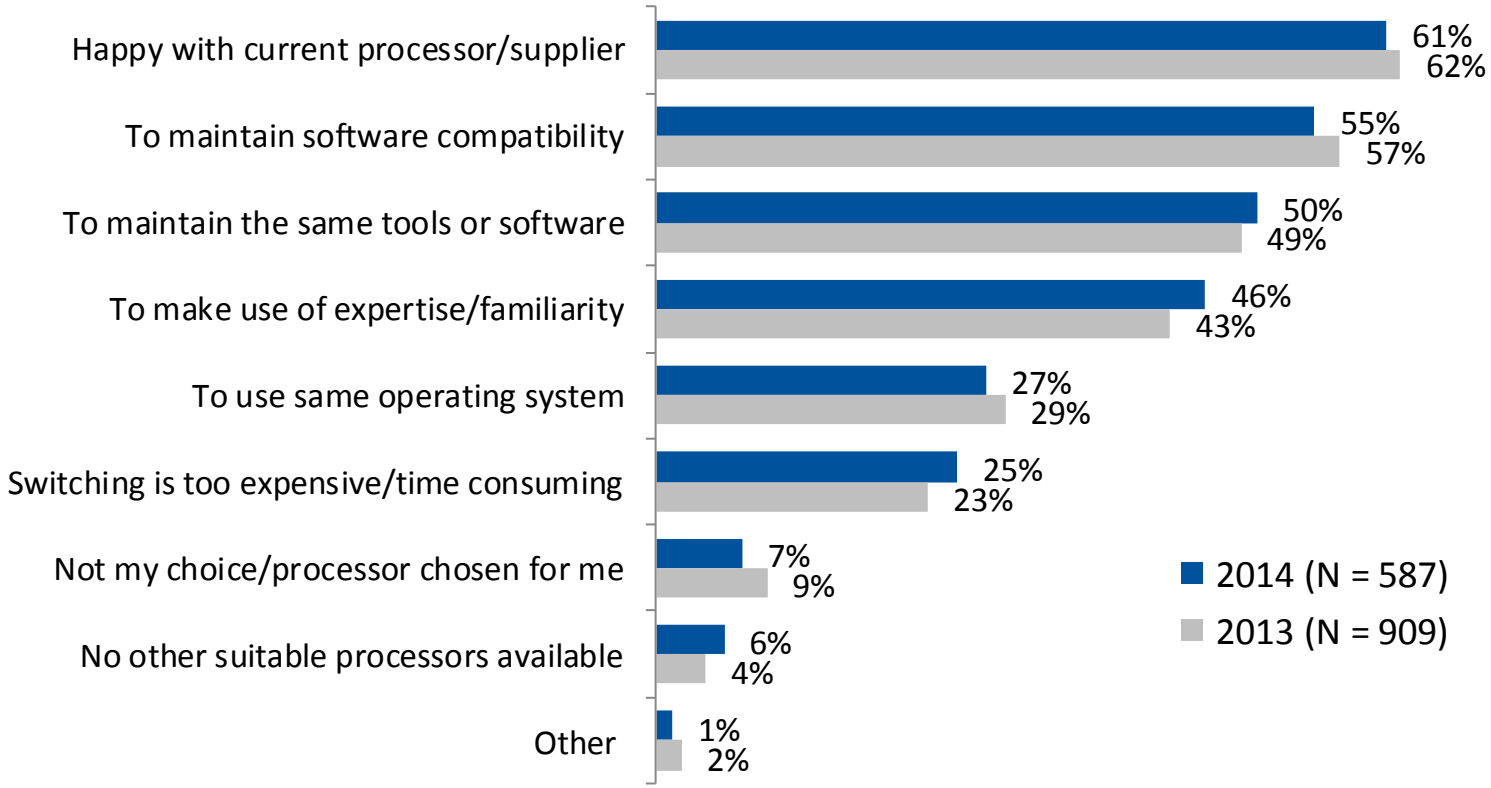
My current embedded project's main processor clock rate is:



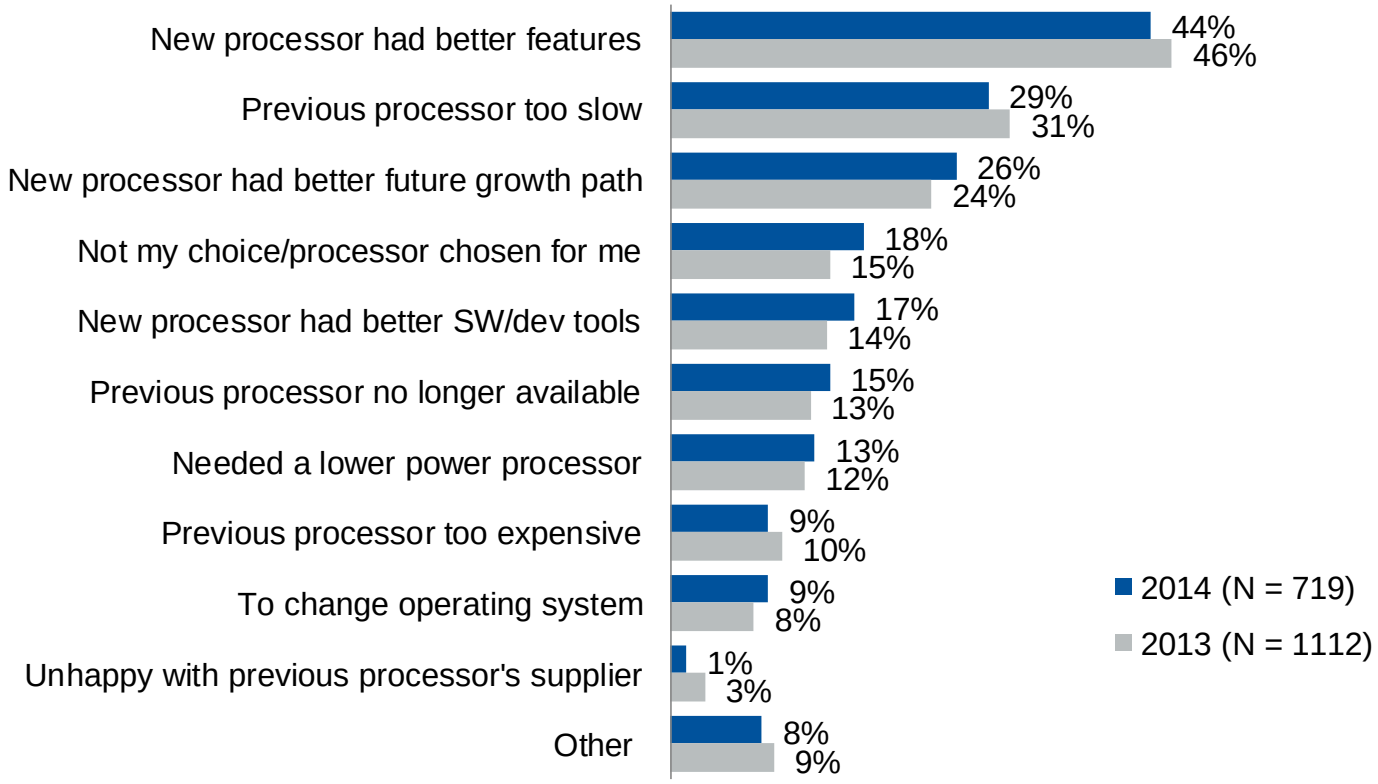
Did you use the same processor as in your previous embedded project?



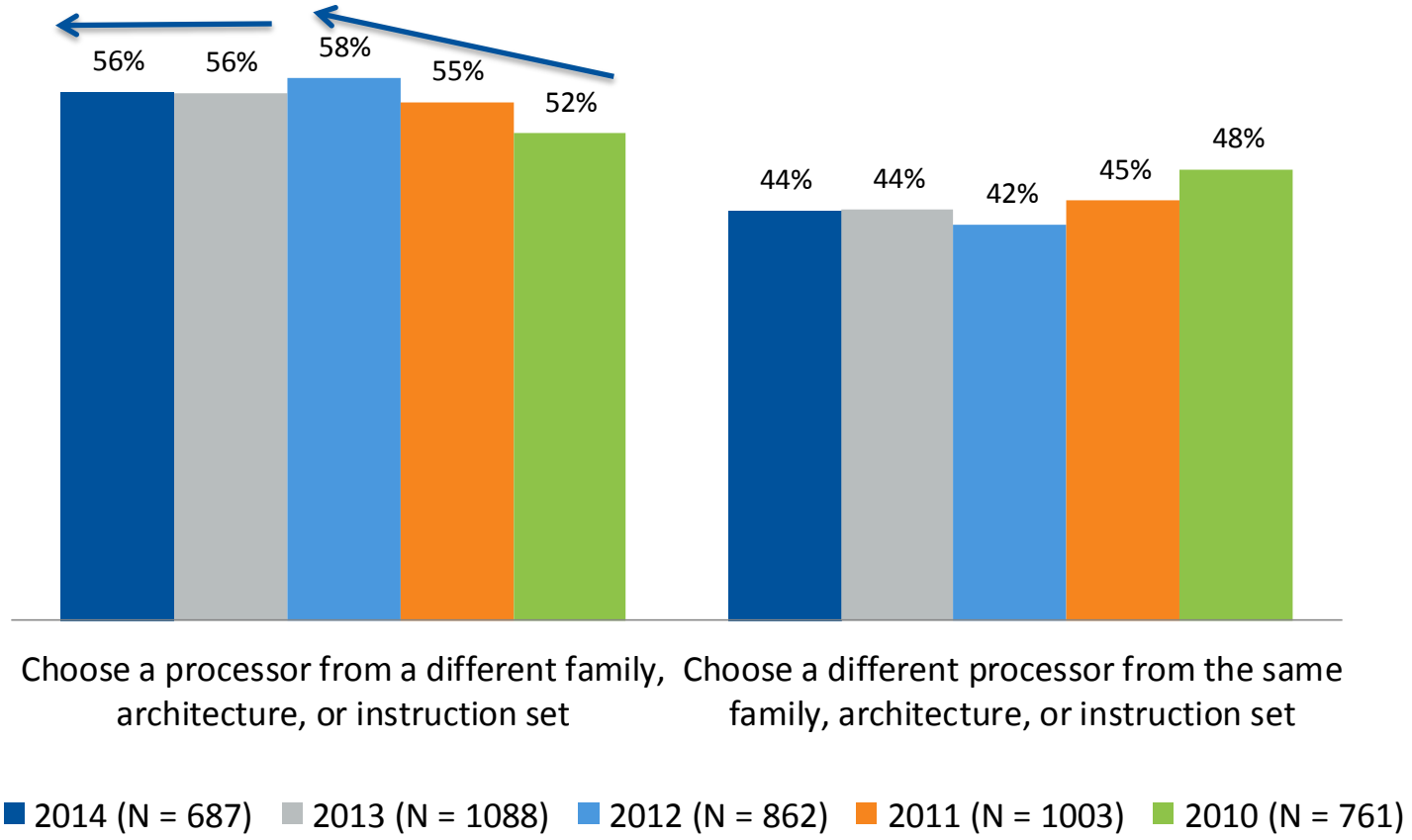
Why did you use the same processor?



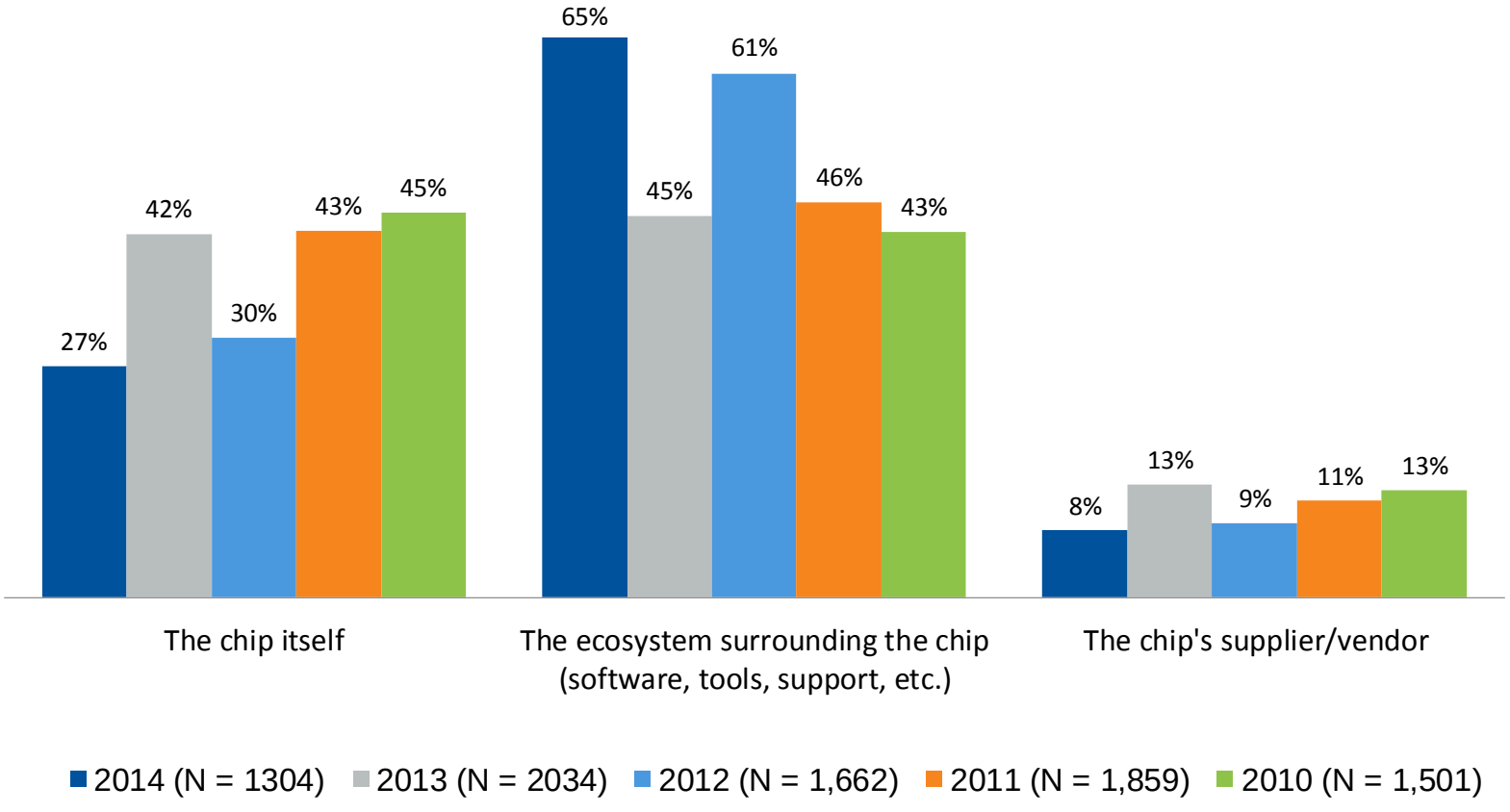
What were your reasons for switching processors?



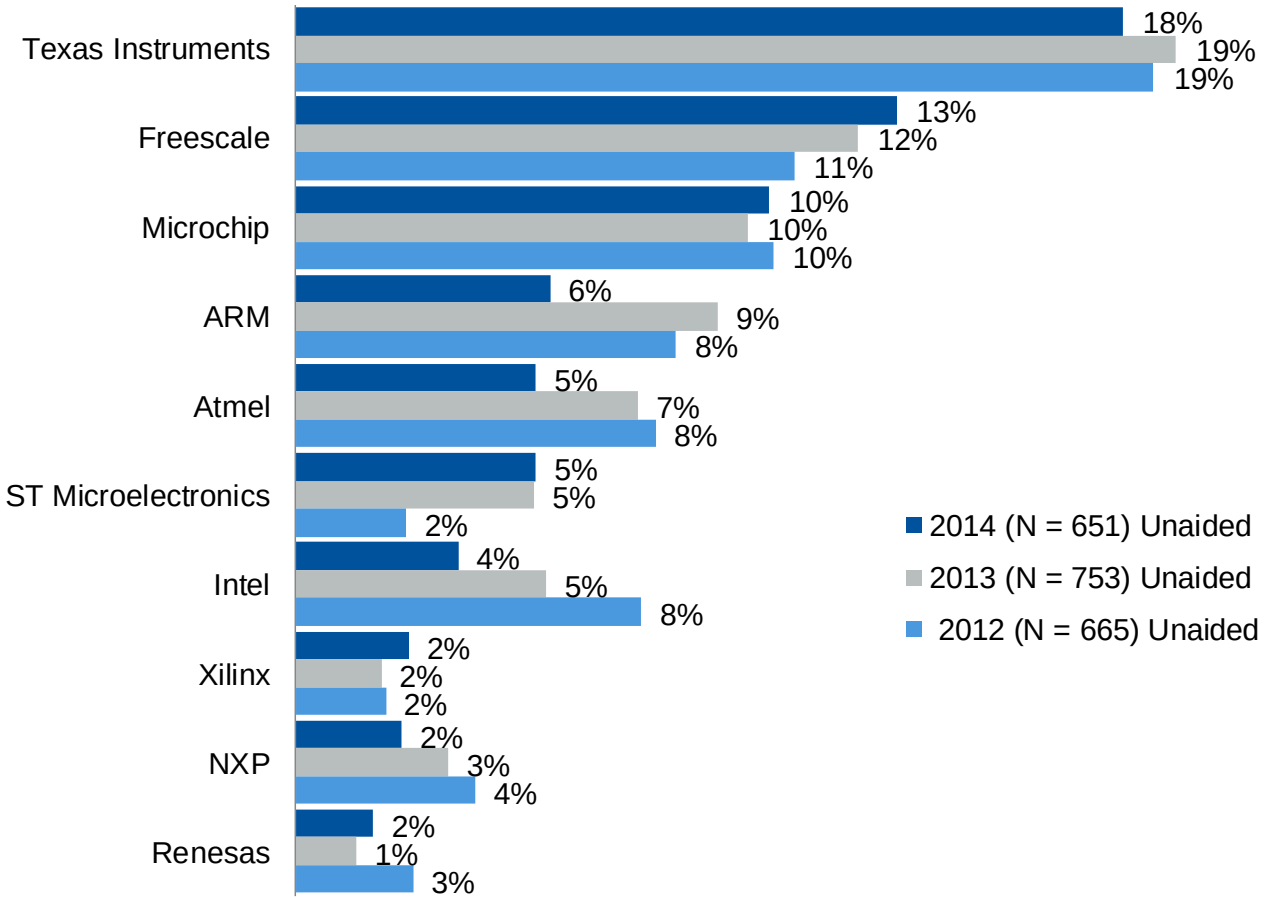
Did you . . .



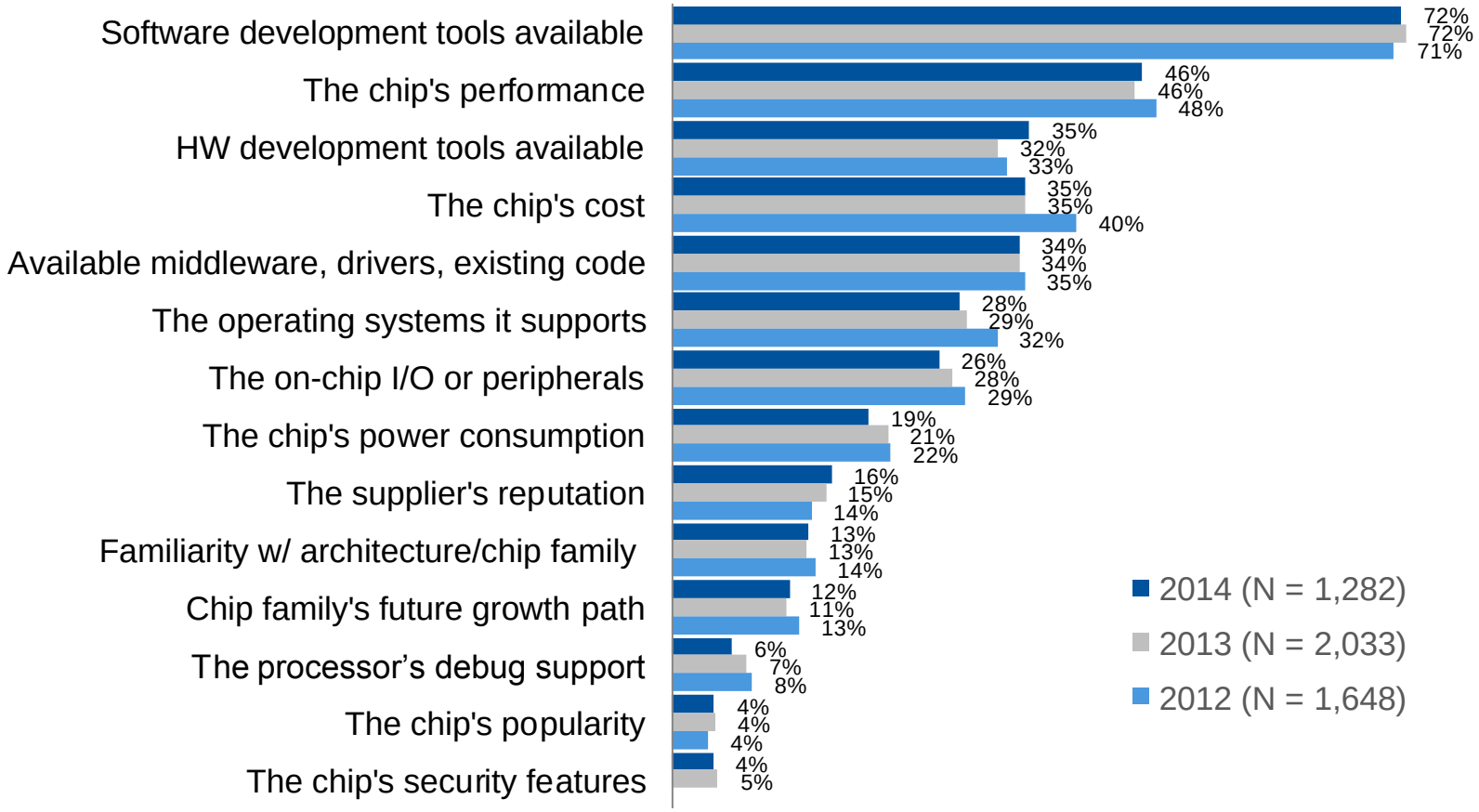
What's most important when choosing a microprocessor?



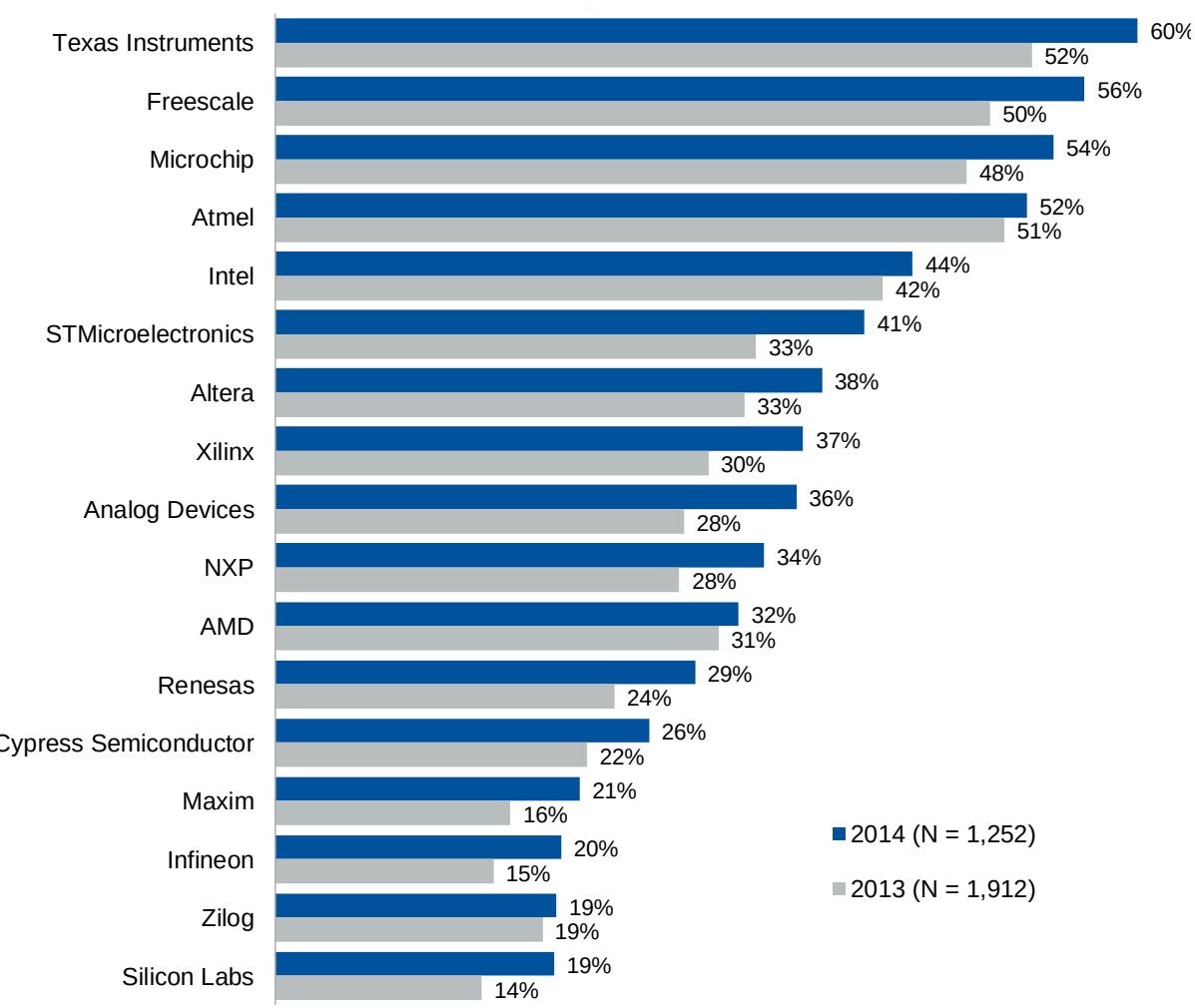
Which vendor that has the best ecosystem for your needs. (Unaided Open End)

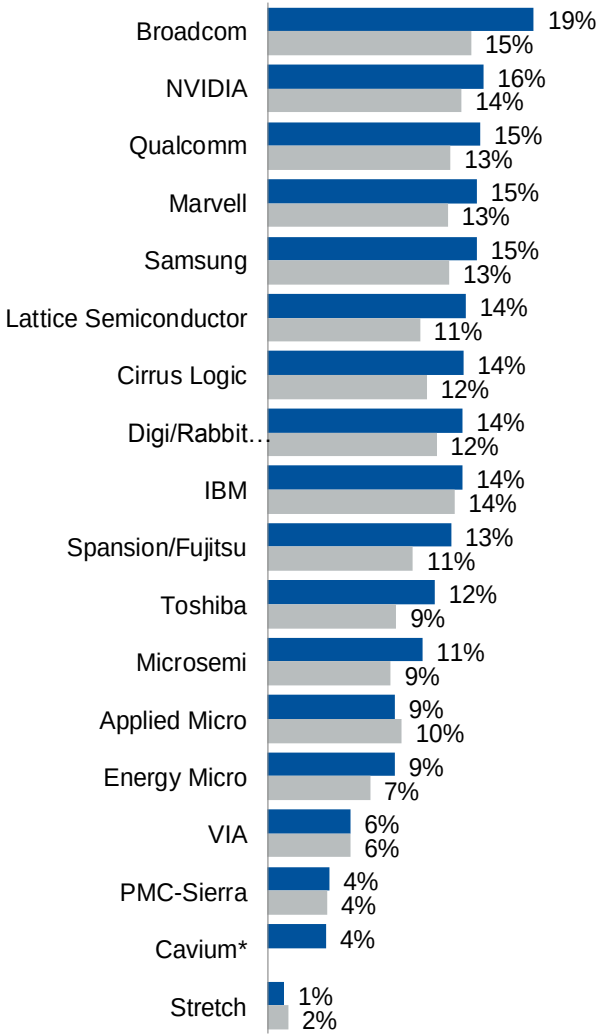


What are the most important factors in choosing a processor?



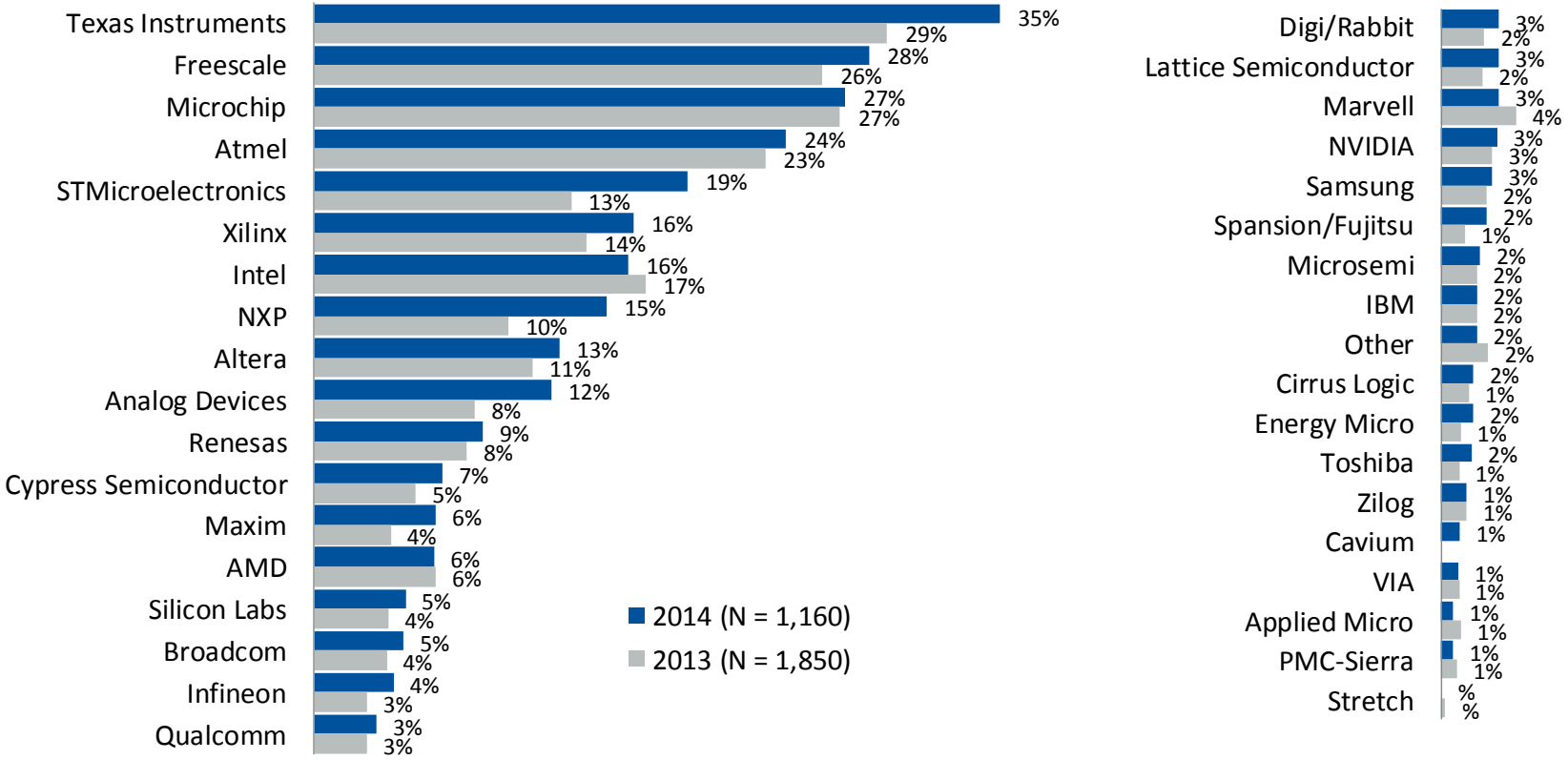
Please select the processor vendors you are familiar with.





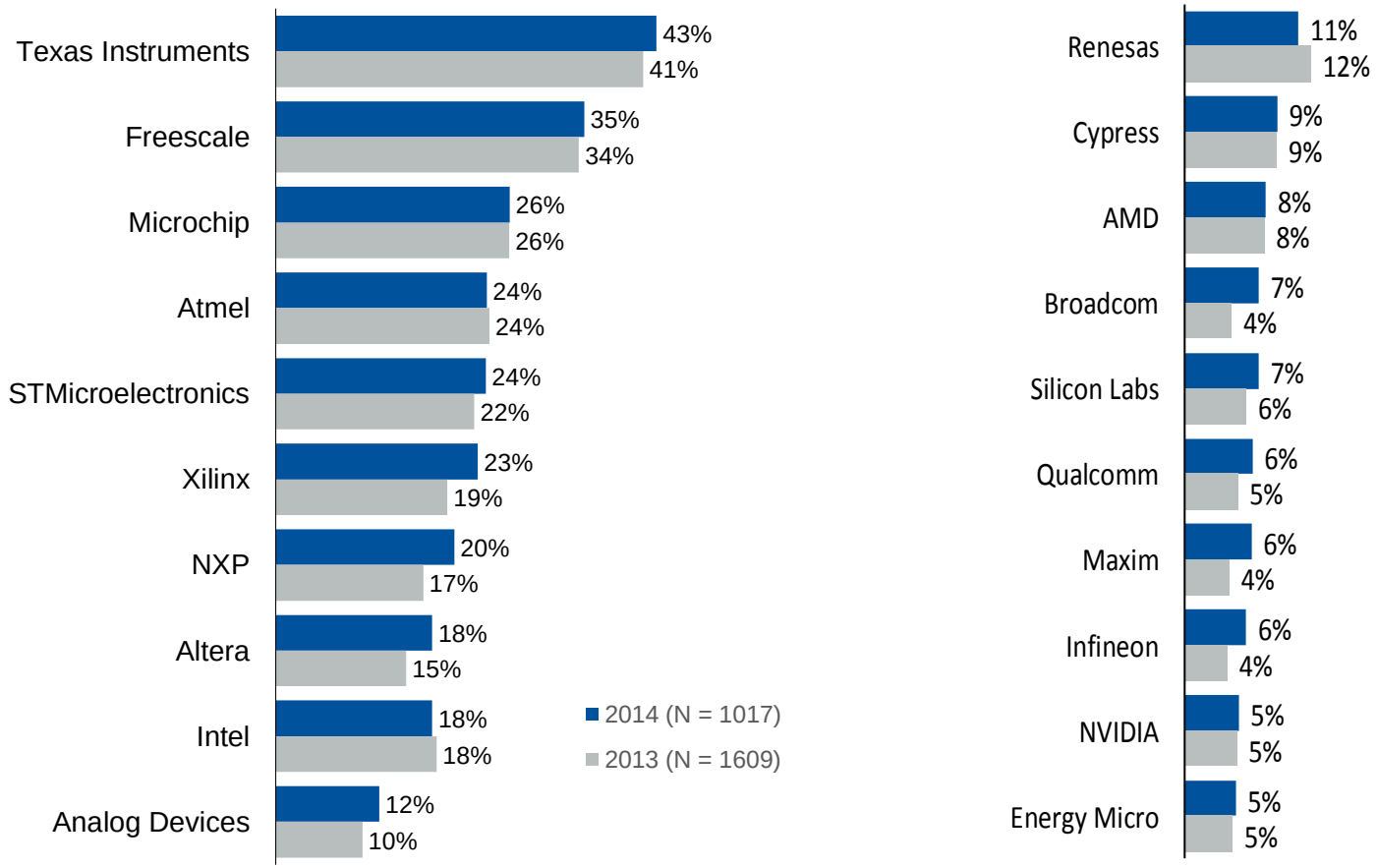
- Added in 2014

Please select the processor vendors you are currently using.

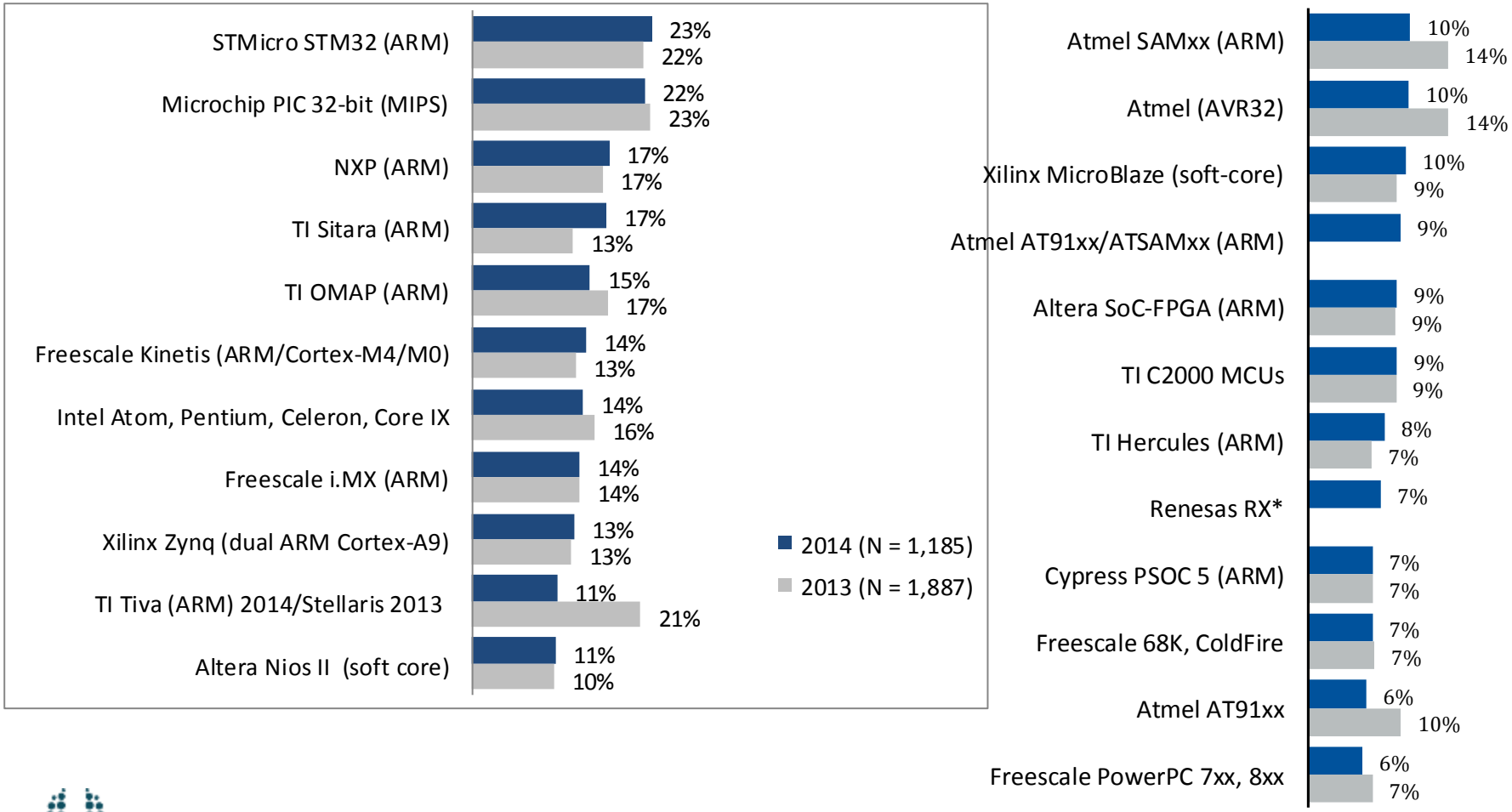


- Added in 2014

Please select the processor vendors you are considering using on your next project. (Top 20)

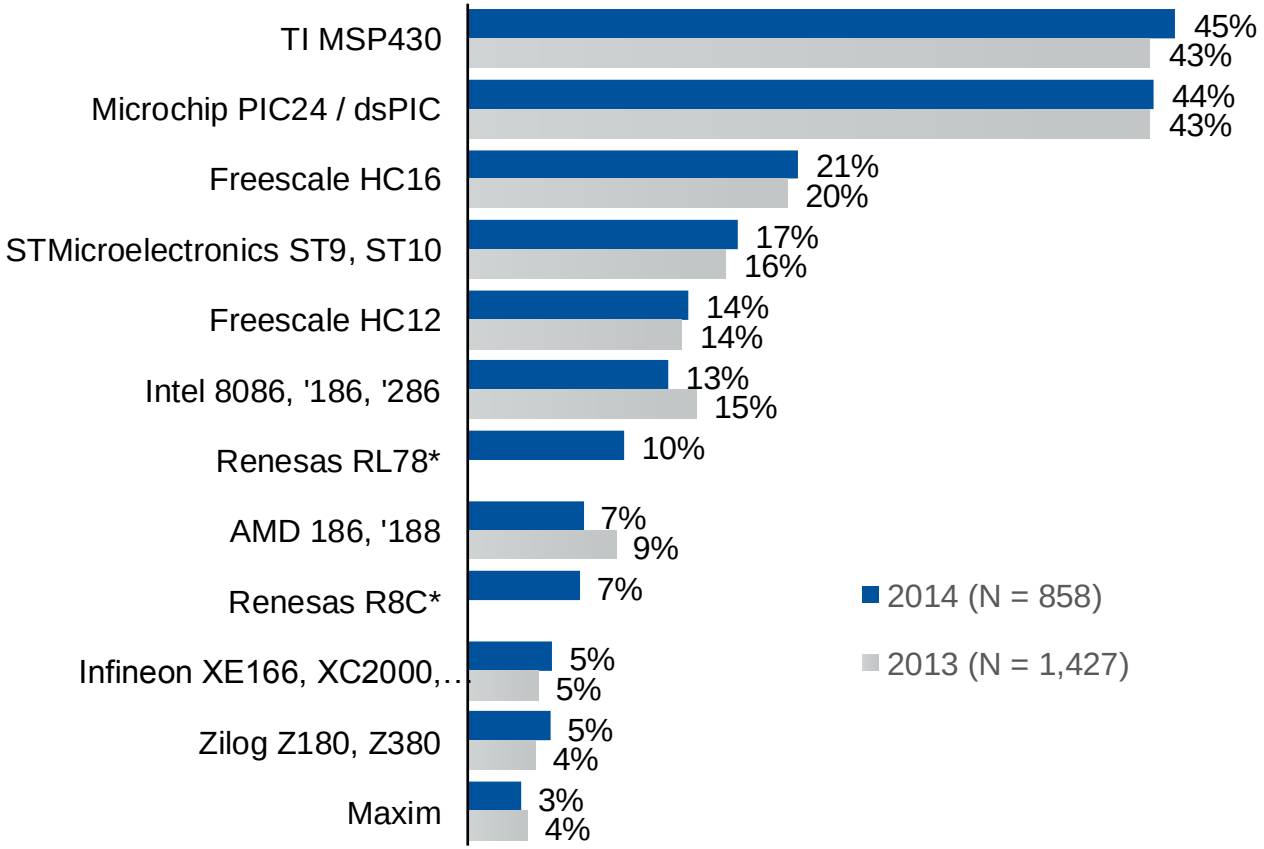


Which of the following 32-bit chip families would you consider for your next embedded project? (Top 24)



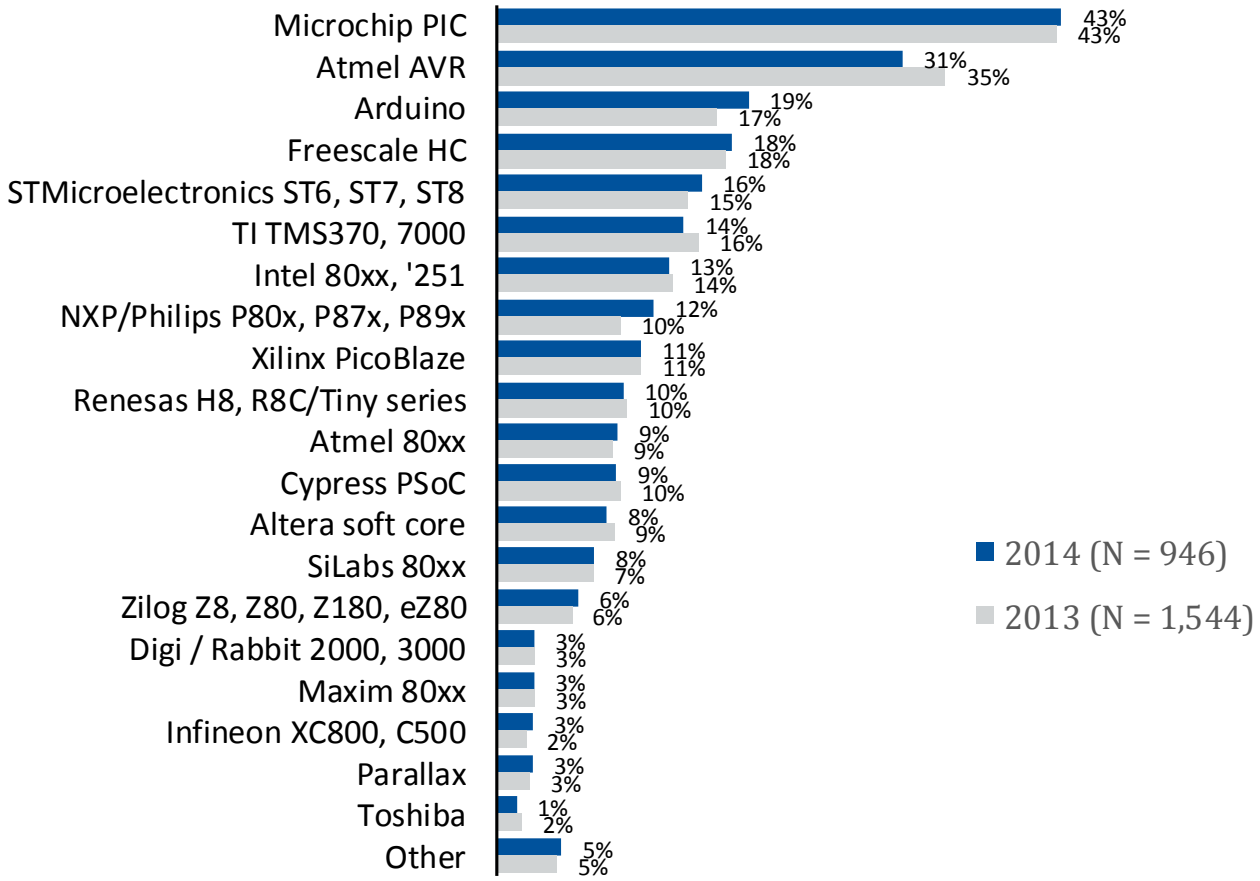
- Added in 2014

Which of the following 16-bit chip families would you consider for your next embedded project?

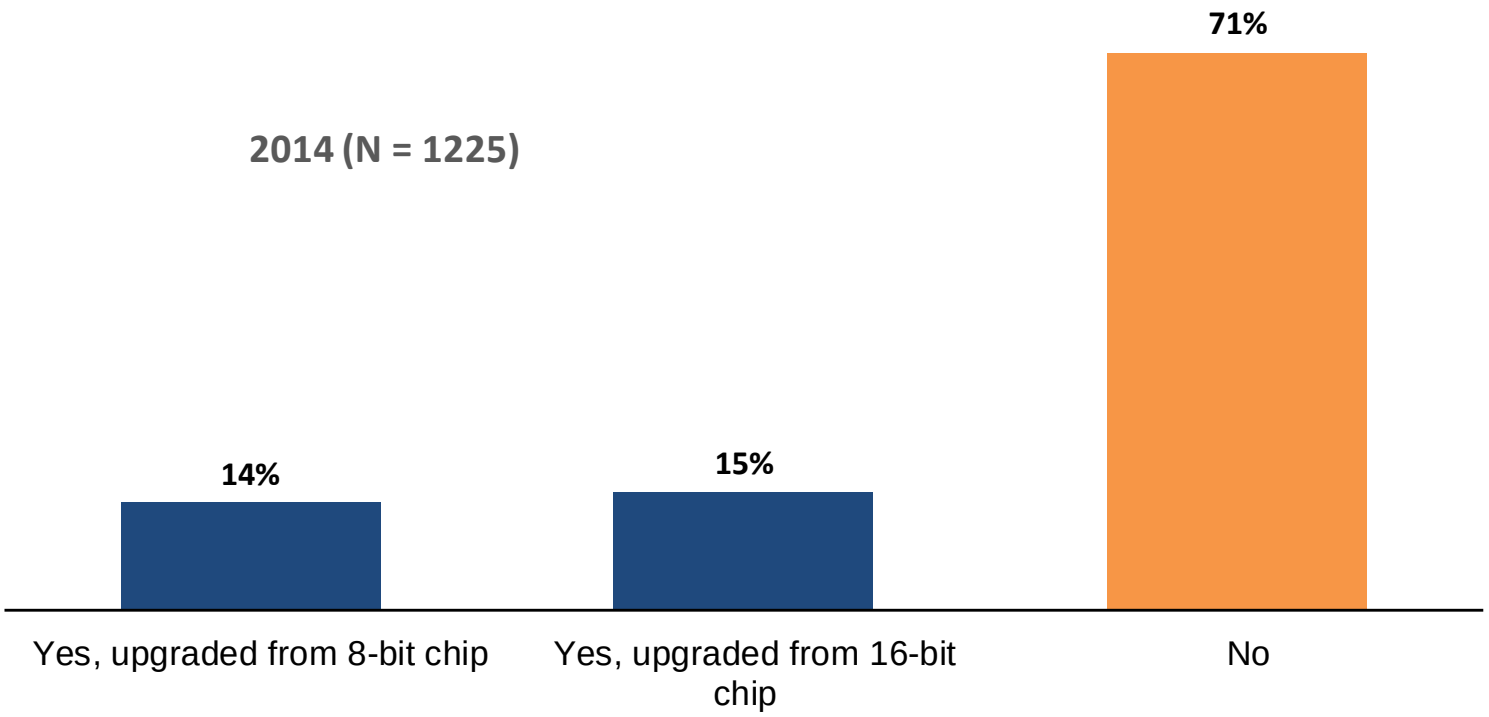


- Added in 2014

Which of the following 8-bit chip families would you consider for your next embedded project?



Have you upgraded from an 8-bit or 16-bit chip to a 32-bit design in the last 12 months?

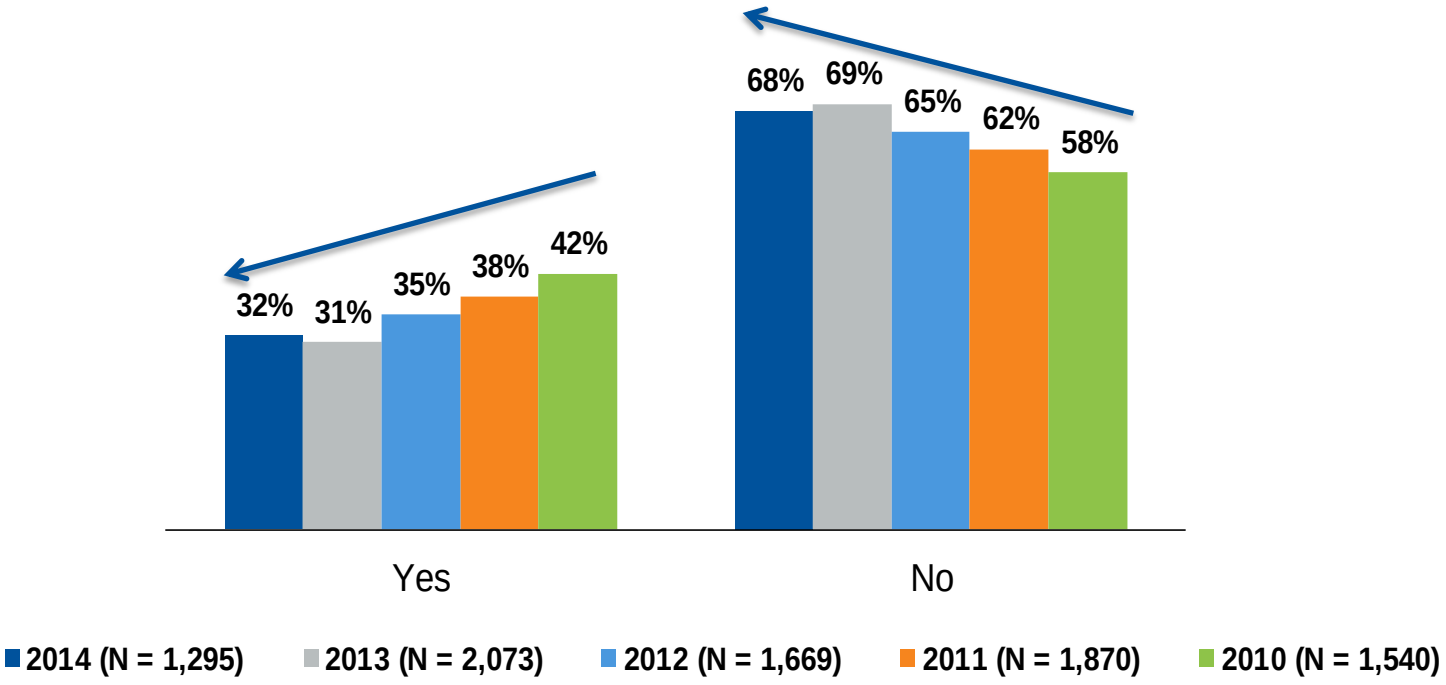


Microprocessors: Key Takeaways

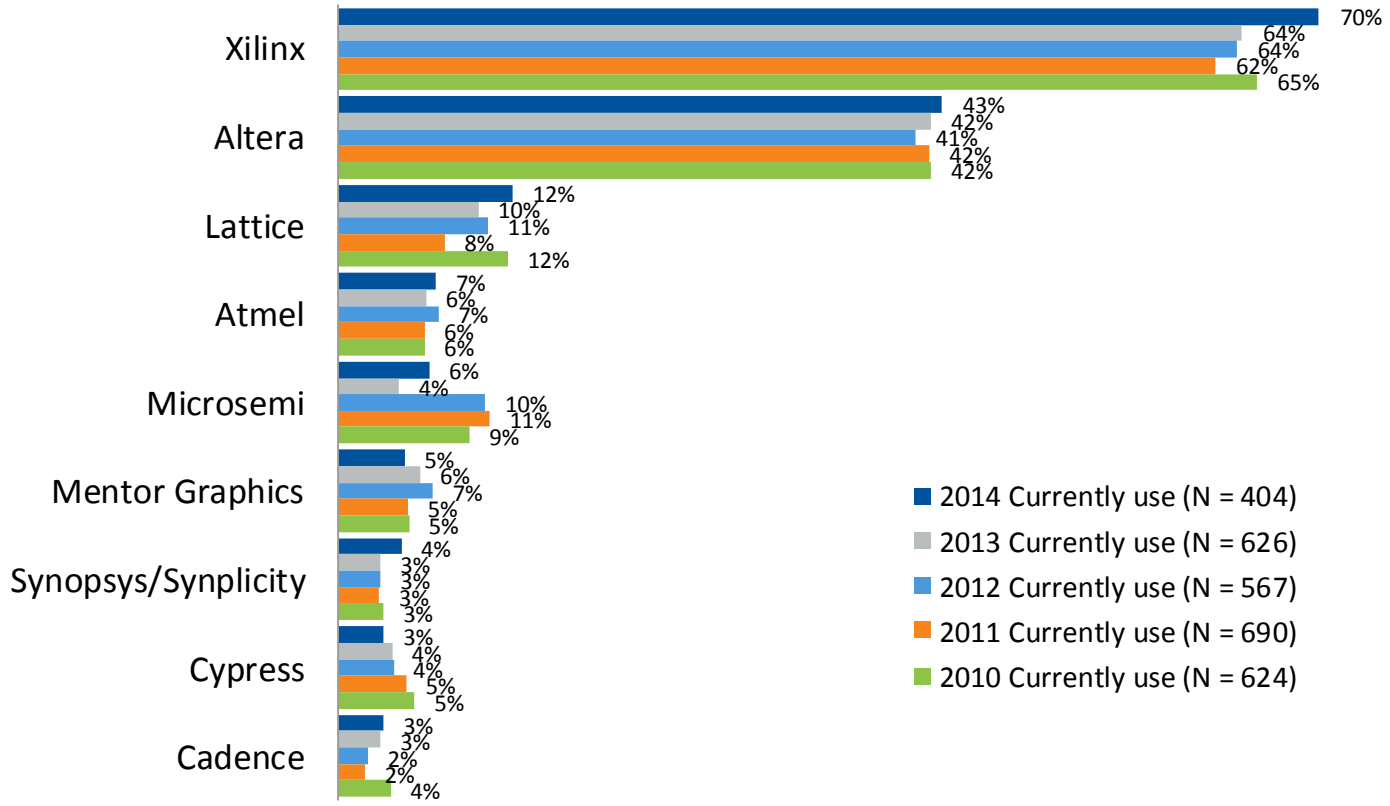
- Whereas software engineers dominate decisions regarding OSes, **hardware engineers** and their **managers** dominate decisions regarding the choice of processors.
- The **average number of processors/microcontrollers** per project is **2.4; h**alf of all projects use just one processor.
- **Slow** and **steady increase** of **32-bit chips** with the same decline of 8-bit chips.
- **Same processors** are used project to project; the rationale is: maintaining software compatibility and using the same tools achieves efficiency.
- The decision to **switch processors** is driven by **better features (#1)**, speed/performance and future growth.
- The **ecosystem** surrounding the chip itself leads in most important when choosing a microprocessor over the chip itself and the chips supplier/vendor.
- **ARM** is in **three** of the **top 5** positions for 32-bit chip families considered for next embedded project.
- Just under **3 in 10** projects have been ungraded from 8/16-bit chips to 32-bit chips.

FPGAs, Memory, LCDs

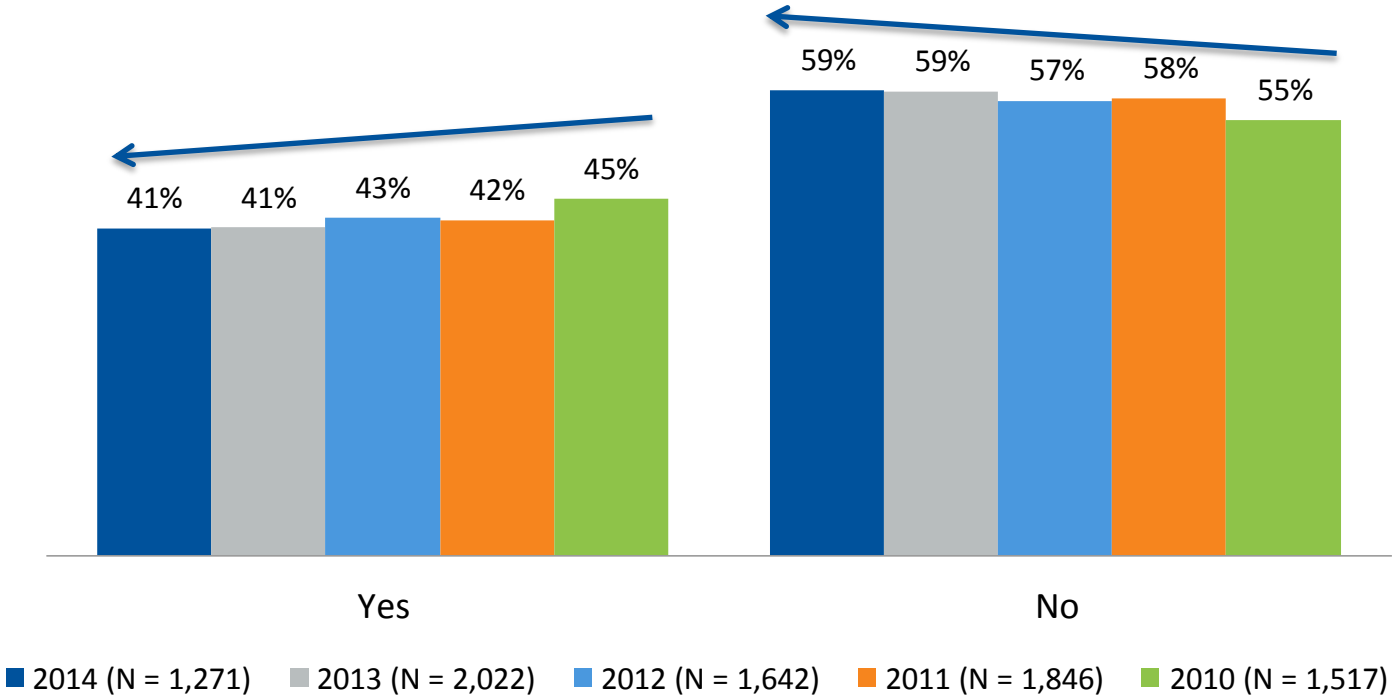
Does your current embedded project contain FPGAs/programmable logic?



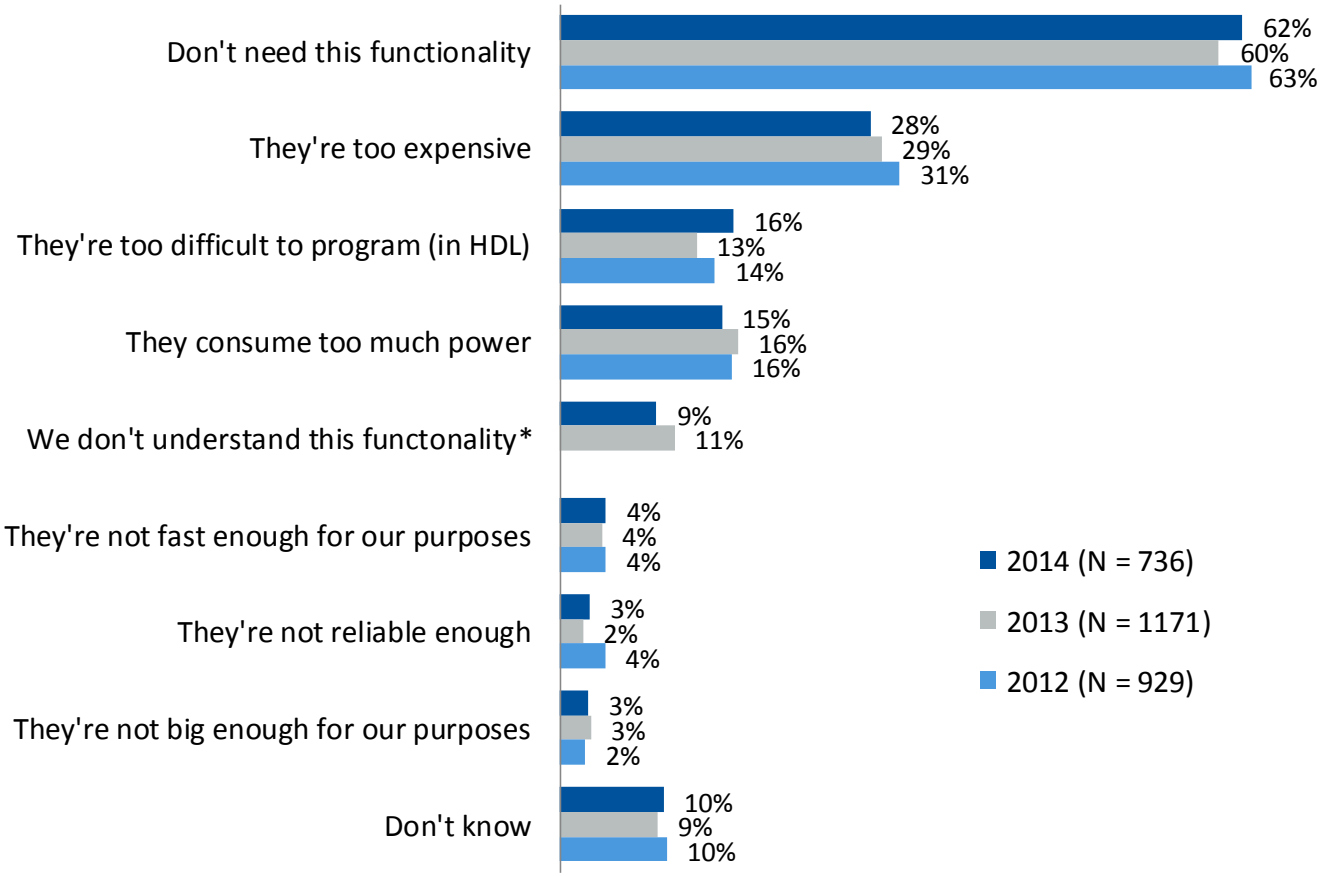
Which of the following vendors does your current embedded projects use for FPGAs?



Will your next embedded project likely contain FPGAs/programmable logic?

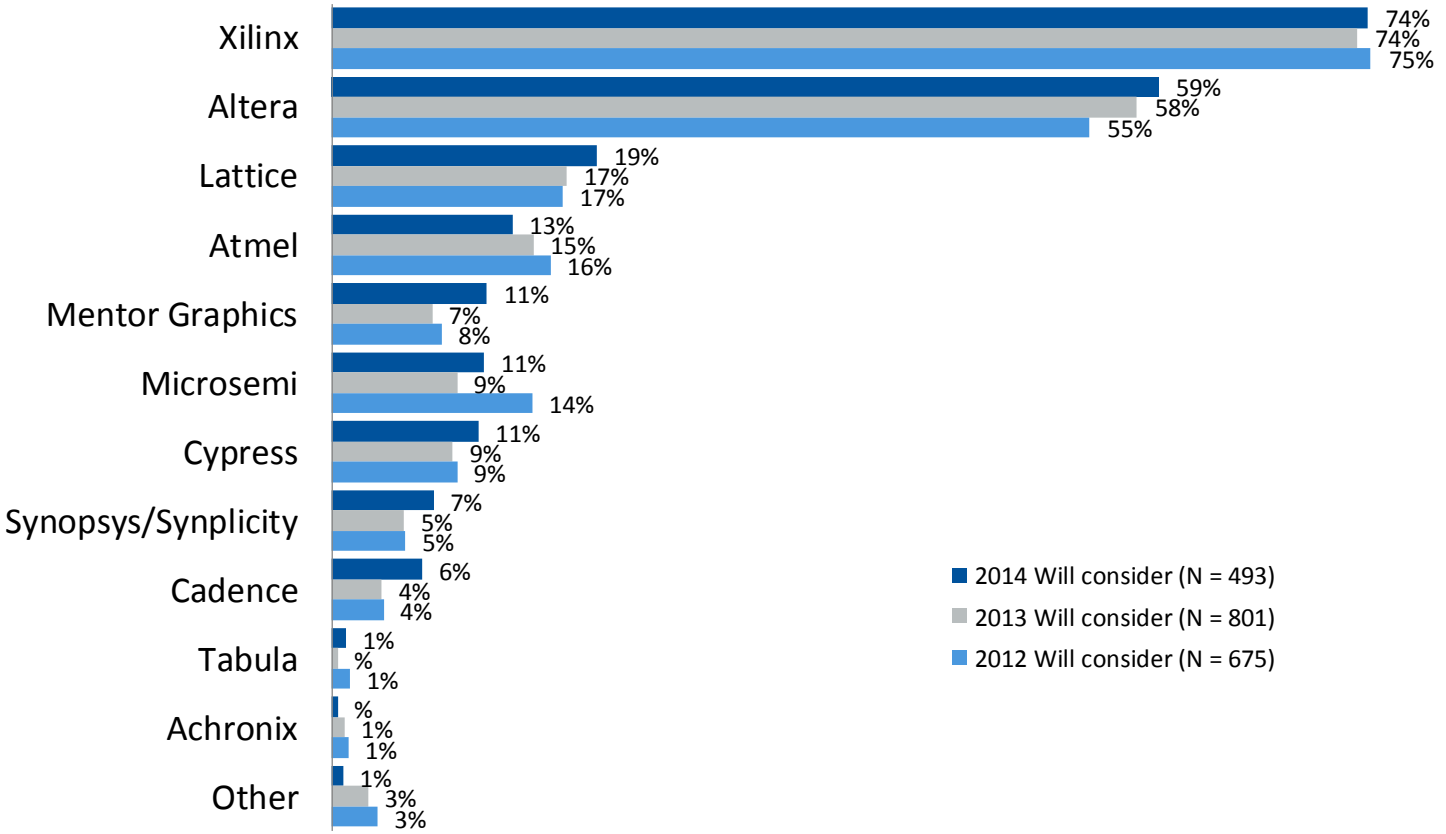


Why won't your next project include customizable chips?

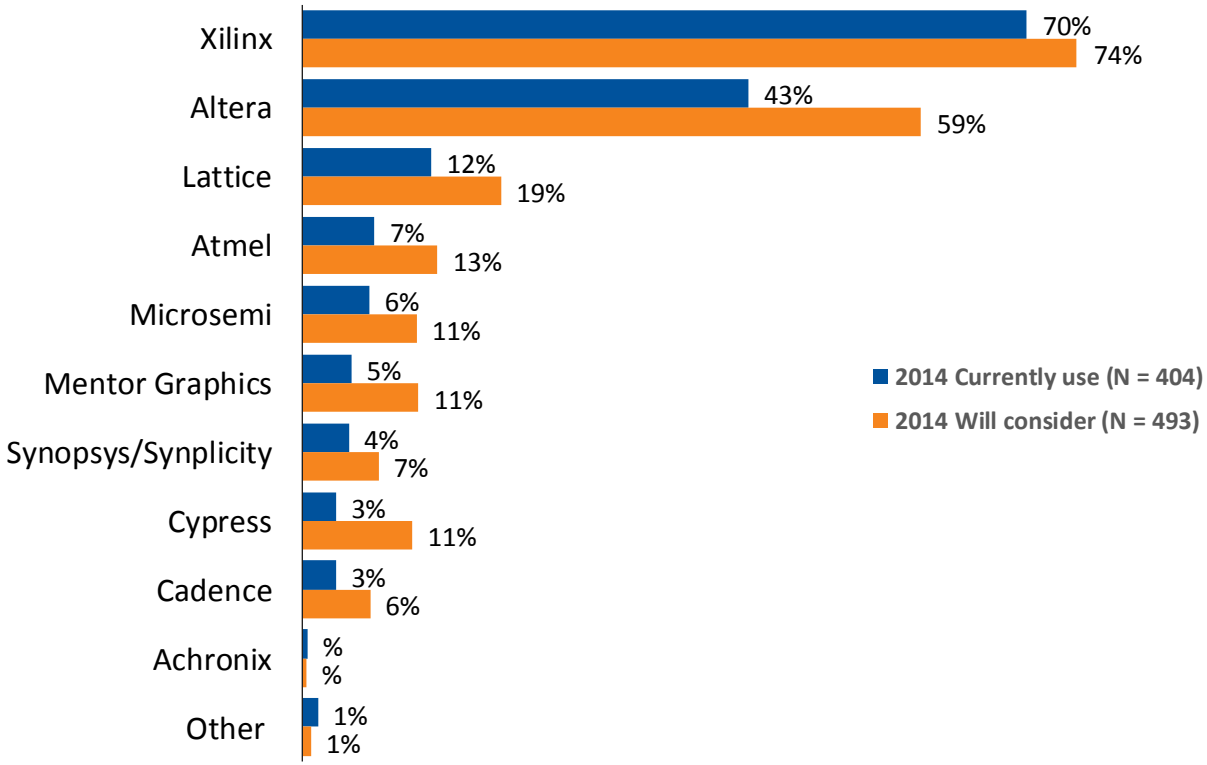


- Added in 2013

If yes, which of the following vendors will you consider in your next embedded project for FPGAs?



For 2014 only -- which of the following vendors does your current embedded projects use for FPGAs, and which will you consider in your next embedded project?

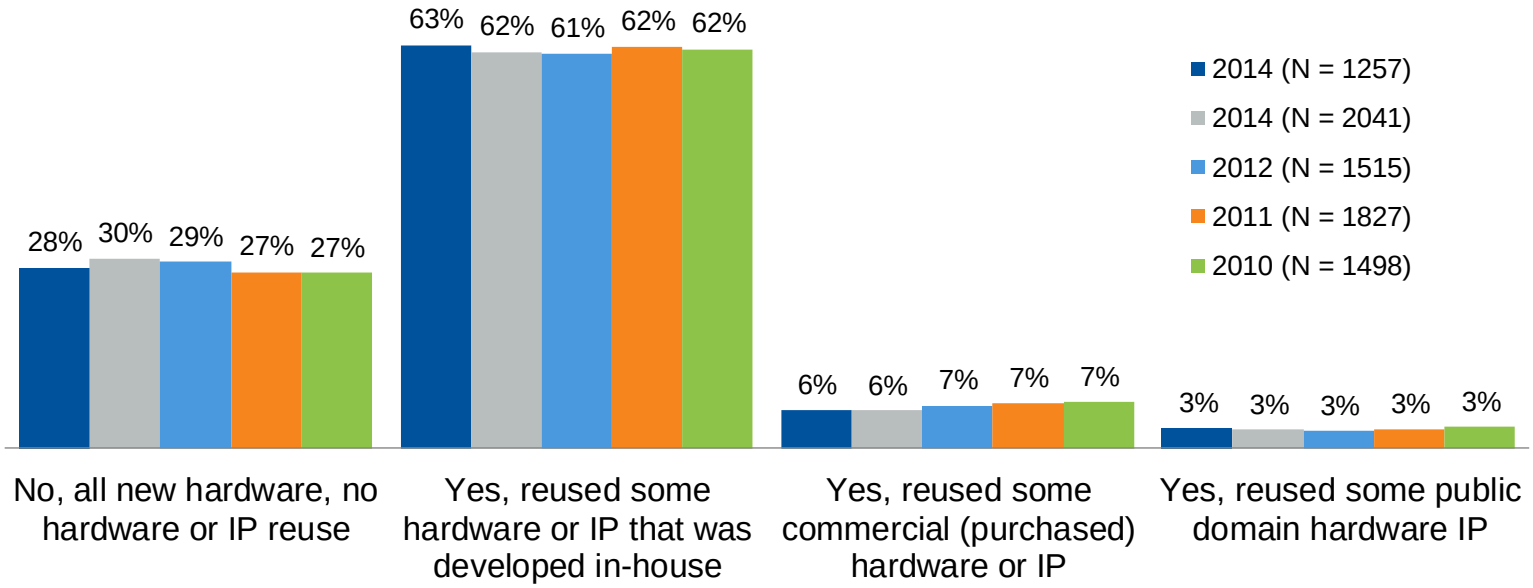


FPGAs, Memory, LCDs: Key Takeaways

- FPGA usage is trending **steadily downward** from 45% six years ago to 31% last year, rising very slightly this year to 32%. May indicate a **bottoming** or a **pause** in the trend downwards.
- There is a **gradual decline** of FPGAs/programmable logic usage in upcoming embedded projects: 60% said “yes” in 2005, down to 41% in 2014.
- **Not needing the functionality**, **cost** and **difficulty programming** are the main reasons for not using customizable chips/FPGAs.

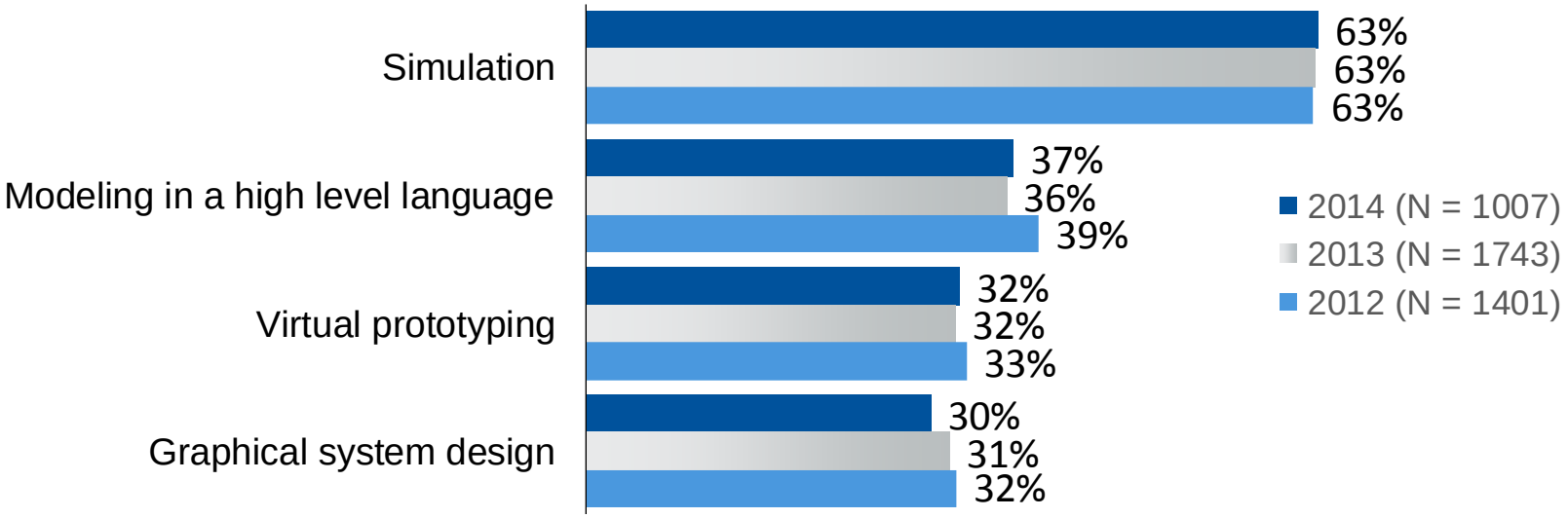
Hardware IPs, System Level Design & Use of GUIs

Does your current embedded project reuse hardware or hardware IP from a previous project?

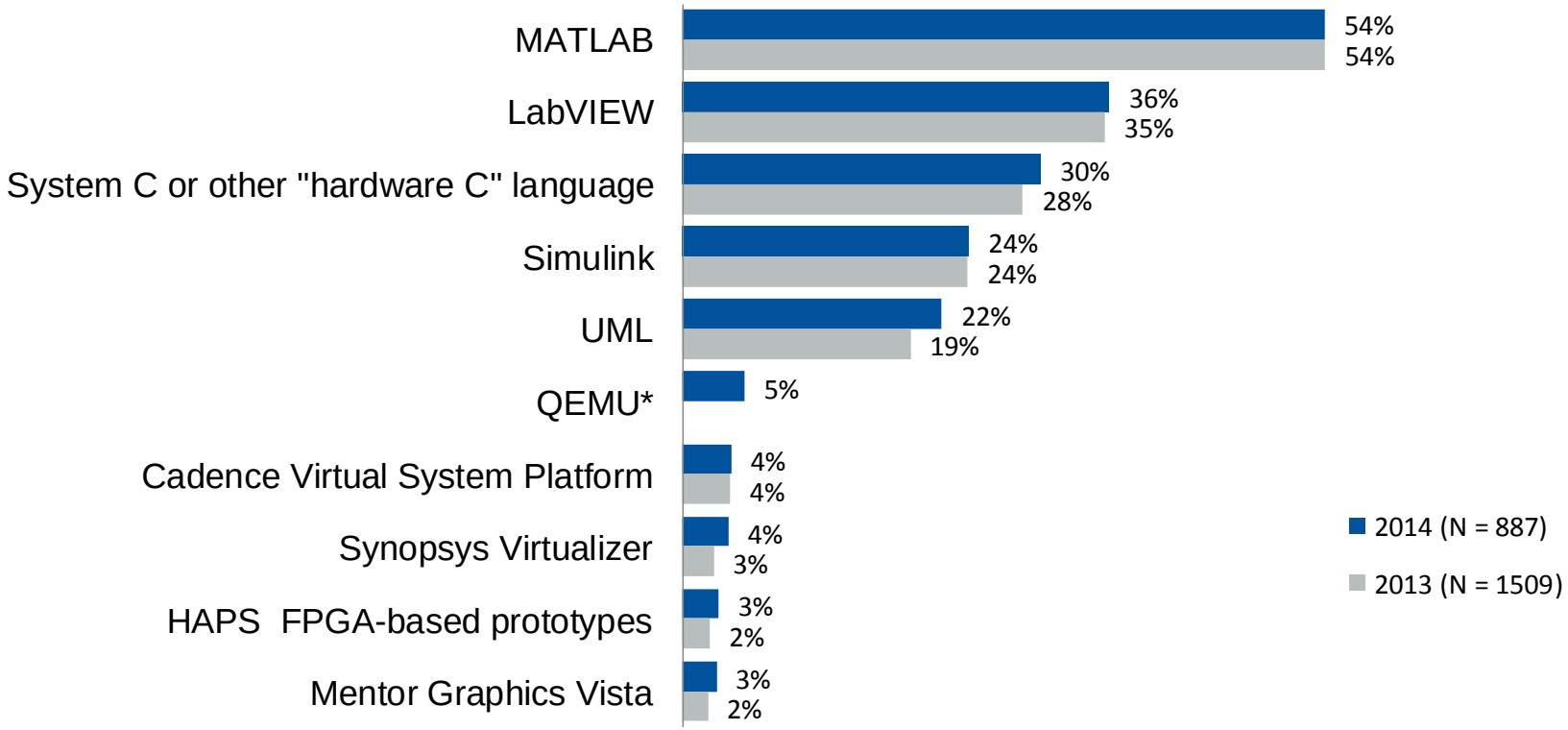


Seven in ten embedded developers **reuse** hardware or hardware IP and have been doing so for the last five years.

Which of the following design techniques will become more important to your designs in the future?

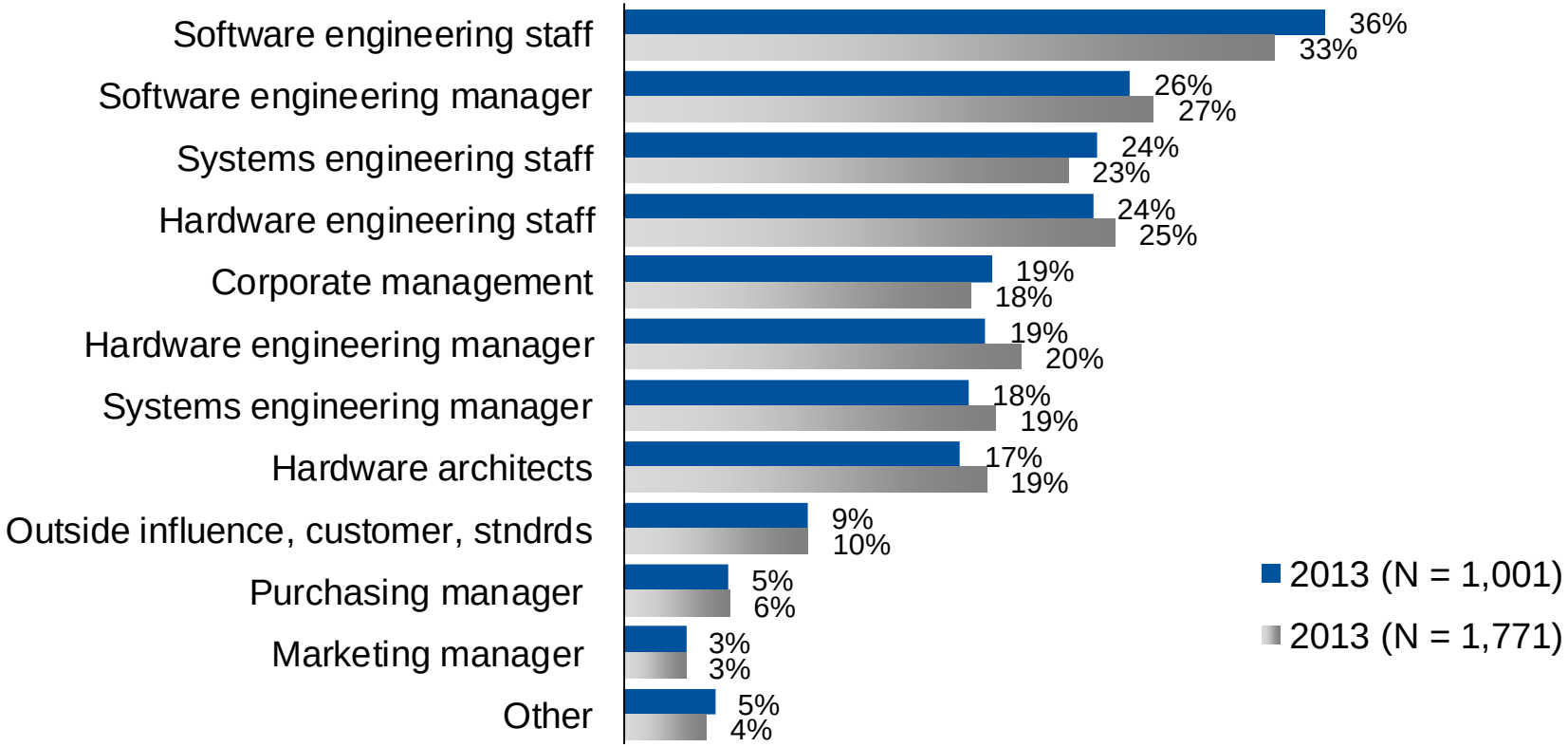


What system level design tools do you or your organization currently use?

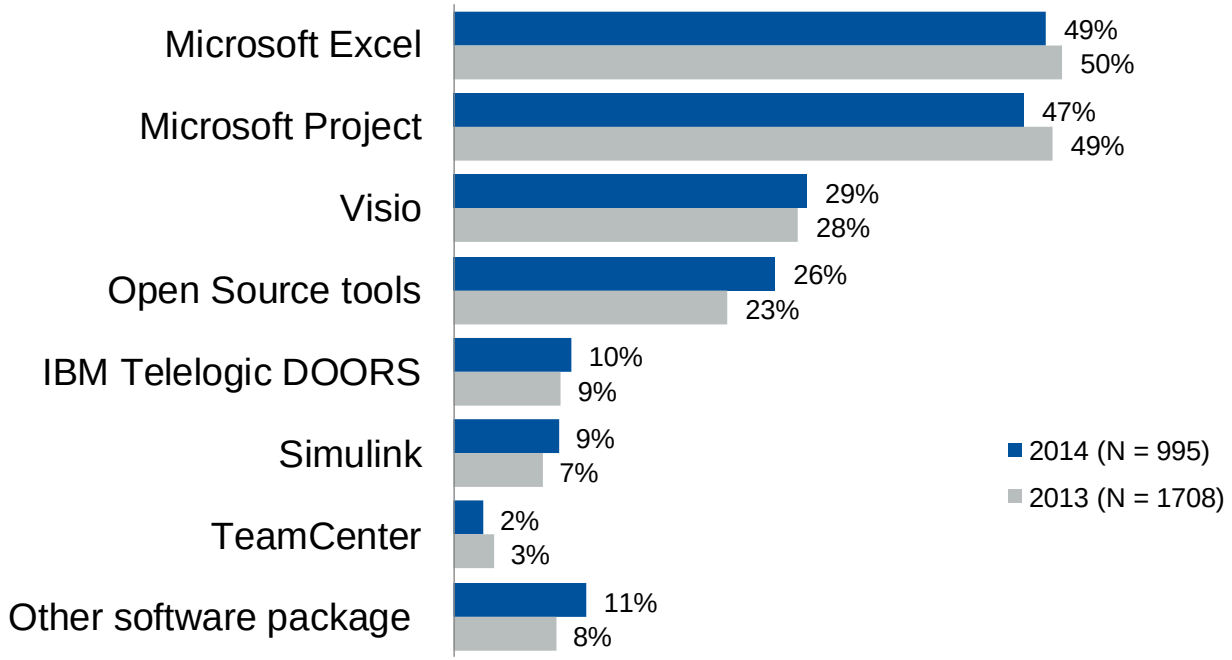


- Added in 2014

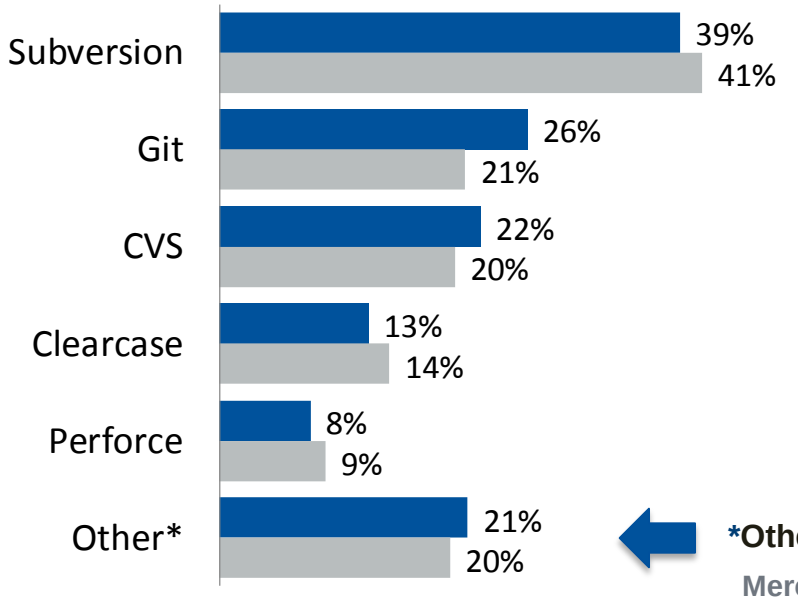
Who were the three greatest influencers on the choice of the system-level tools for your current project?



Which of the following project management software packages do you currently use?

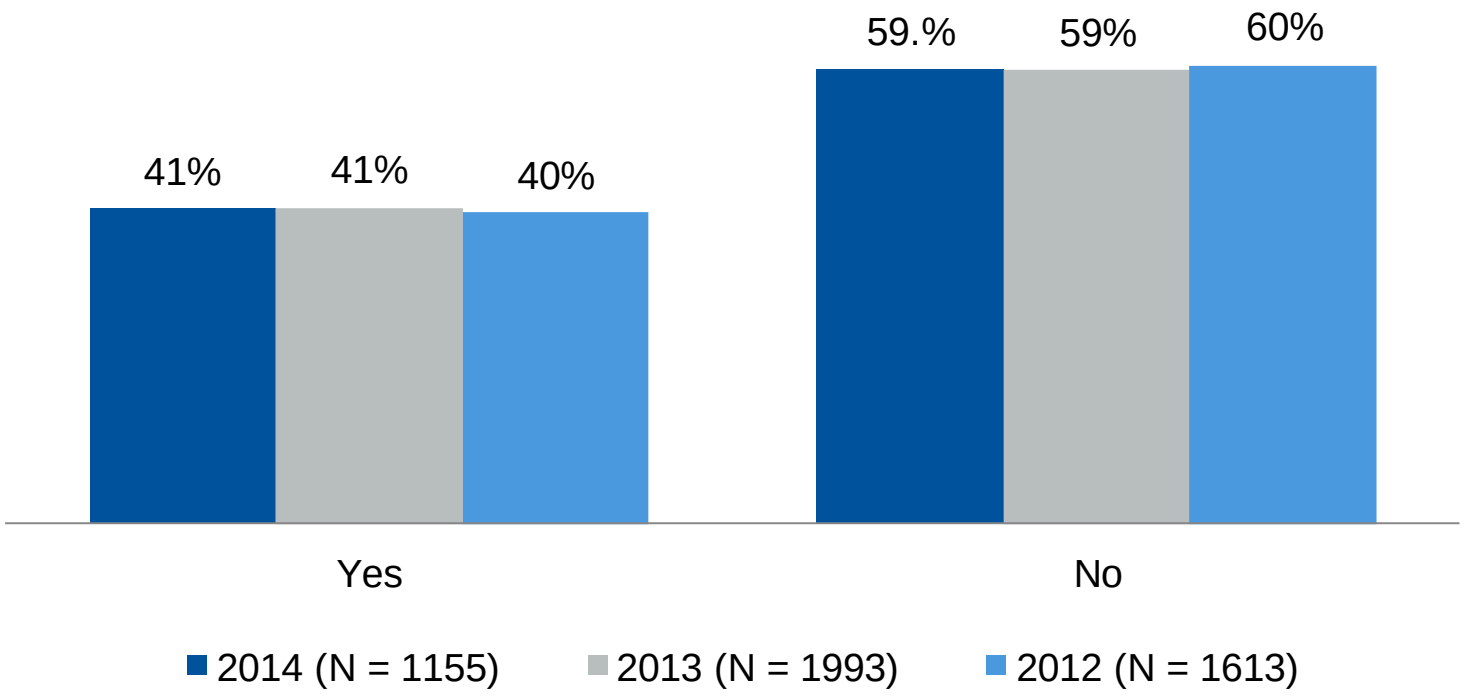


Which of the following Version Control software systems do you currently use?

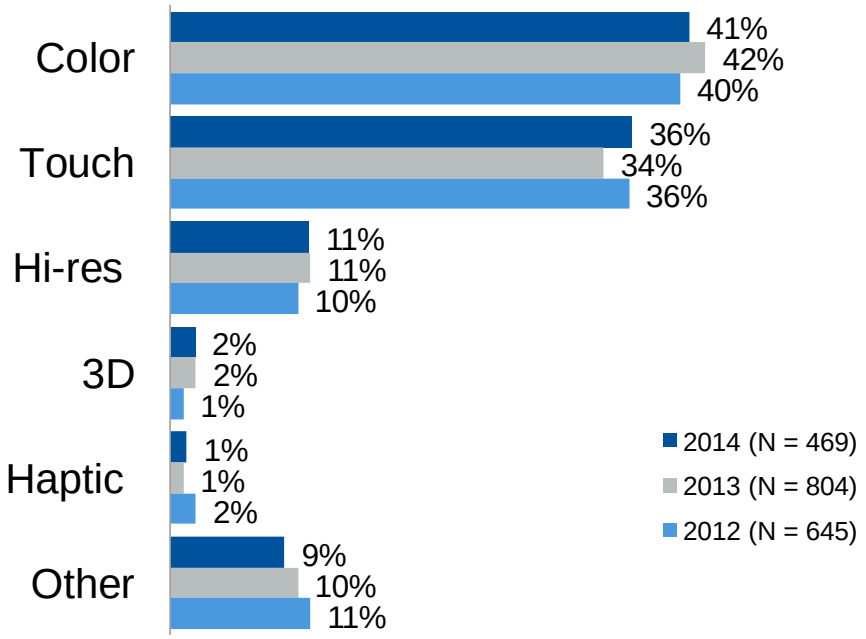


*Other Mentions	# of Mentions
Mercurial	26
Visual SourceSafe	17
MKS	12
Microsoft TFS	11
In house	9
Tortoise SVN	8
IBM CM Synergy	7
PVCS	7
Serena Dimension	7

Does your current design use a graphical user interface?



What type of graphical user interface is it?



Hardware IPs, System Level Design & Use of GUIs: Key Takeaways

- A little more than **7 in 10** respondents **reuse** hardware or hardware IP from previous projects. This reuse pattern has remained stable for 5 years.
- **Three** of the top **four influencers** of system-level tools are **staff engineers**.
- Embedded projects are managed mostly by **Microsoft Excel** and **Microsoft Project.**
- Although down a bit, **Subversion** maintains its lead in **version control software**, but Git and CVS gain.

THANK YOU.

For permission to use this research or to learn more please contact:

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felicia.hamerman@ubm.com

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