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

EE Live!

UBM Tech
UBM Tech Electronics’ Brands

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?

- US & Canada: 55.2%
- Europe: 22.8%
- Asia: 14.0%
- Latin America: 3.8%
- Africa & Near East: 2.2%
- Australia: 2.0%
How many employees does your company have at all locations?

- Under 100: 44%
- 100-499: 15%
- 500-999: 6%
- 1,000-4,999: 11%
- 5,000-9,999: 7%
- 10,000-19,999: 3%
- 20,000 or more: 12%
- Don't know: 2%

Average Number of Employees: 2014 = 3,842
My job function includes:

- Hardware/software integration: 57.8%
- Writing firmware/sftwr for embedded systems: 57.1%
- Debugging firmware/software: 56.7%
- Architecture selection/specification: 53.3%
- Firmware/software design or analysis: 47.3%
- Debugging hardware: 42.9%
- Project management: 42.6%
- Prototype testing: 39.7%
- Firmware/software testing: 38.1%
- Designing hardware for embedded systems: 37.0%
- Device programming: 37.0%
- System design: 33.7%
- Hardware/software co-design: 27.1%
- Board layout/design: 23.2%
- Hardware/software co-verification: 18.9%
- Connected device design: 9.0%
- SoC (system-on-chip) design: 8.2%
- Other: 3.3%

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?

- Consumer electronics: 24% (2014 N=1529), 23% (2013 N=2080), 22% (2012 N=1670)
- Communications/netwk: 22% (2014 N=1529), 23% (2013 N=2080), 25% (2012 N=1670)
- Automotive: 18% (2014 N=1529), 17% (2013 N=2080), 17% (2012 N=1670)
- Medical: 18% (2014 N=1529), 18% (2013 N=2080), 17% (2012 N=1670)
- Electronic instr: 17% (2014 N=1529), 16% (2013 N=2080), 15% (2012 N=1670)
- Internet of Things*: 12% (2014 N=1529)
- Computers/perifs: 11% (2014 N=1529), 12% (2013 N=2080), 8% (2012 N=1670)
- Video & imaging: 9% (2014 N=1529), 9% (2013 N=2080), 8% (2012 N=1670)
- Security: 10% (2014 N=1529), 9% (2013 N=2080), 8% (2012 N=1670)
- Power generation/utilis: 8% (2014 N=1529), 8% (2013 N=2080), 7% (2012 N=1670)
- Transportation: 7% (2014 N=1529), 7% (2013 N=2080), 7% (2012 N=1670)
- Govt & municipal: 6% (2014 N=1529), 6% (2013 N=2080), 6% (2012 N=1670)

* Added in 2014

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Current Embedded Design Environment
My current embedded project is:

- **New to the world; a new project from scratch**
  - 2014 (N = 2,257) 43%
  - 2013 (N = 2,091) 44%
  - 2012 (N = 1,704) 44%
  - 2011 (N = 1,883) 43%
  - 2010 (N = 1,559) 43%

- **An upgrade or improvement to an earlier or existing project**
  - 2014 (N = 2,257) 57%
  - 2013 (N = 2,091) 56%
  - 2012 (N = 1,704) 56%
  - 2011 (N = 1,883) 57%
  - 2010 (N = 1,559) 57%
What does the upgrade or improvement include?

- **New or different software features**: 48% (55% in 2014), 38% (40% in 2014), 21% (44% in 2014)
- **New or different processor**: 55% (21% in 2014), 38% (40% in 2014), 20% (22% in 2014)...
- **Mandatory changes/discontinued hwrf/sftwr**: 20% (21% in 2014), 21% (22% in 2014)
- **New or different system logic**: 14% (22% in 2014), 22% (21% in 2014)
- **New or different peripherals**: 13% (14% in 2014)
- **New or different analog components**: 10% (15% in 2014), 10% (14% in 2014)
- **New or different operating system**: 10% (14% in 2014), 12% (13% in 2014)

* Added 2014
Which of the following capabilities are included in your current embedded project?

- Real-time capability
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

- Digital signal processing*
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

- Networking capability
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

- Analog signal processing**
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

- Wireless capability
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

- Project rugged
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

- Battery-powered
  - 2014 (N = 2,048)
  - 2013 (N = 2,090)
  - 2012 (N = 1,704)
  - 2011 (N = 1,886)
  - 2010 (N = 1,559)

* Added in 2014
** Added in 2013
If wireless, what wireless interfaces does your current embedded project include?

<table>
<thead>
<tr>
<th>Interface</th>
<th>2014 (%)</th>
<th>2013 (%)</th>
<th>2012 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wi-Fi</td>
<td>55</td>
<td>54</td>
<td>55</td>
</tr>
<tr>
<td>Bluetooth LE/Smart</td>
<td>27</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Bluetooth Classic</td>
<td>17</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Zigbee</td>
<td>19</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Cellular</td>
<td>11</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>900 MHZ</td>
<td>8</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>NFC</td>
<td>10</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Unlicensed 2.4-GHz band</td>
<td>8</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Wi-Fi Direct</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>315/433 MHZ</td>
<td>7</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Proprietary</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Infrared</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>&quot;Cloud&quot; connection*</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>AM or FM radio</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6LoWPAN</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*Added in 2014

Only answers 3% or above are shown
### How many people are on your embedded project team?

<table>
<thead>
<tr>
<th>Role</th>
<th>Total Team 2014</th>
<th>Total Team 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>NonFirmware Software Engineer</td>
<td>3.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Hardware Engineer</td>
<td>3.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Firmware Engineer</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>QA/Test Engineer</td>
<td>2.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Systems/Integrator</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Other Engineer</td>
<td>1.0</td>
<td>1.5</td>
</tr>
</tbody>
</table>

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

Average total resources devoted to software
- 2014 (N = 1,595): 61%
- 2013 (N = 2,075): 61%
- 2012 (N = 1,675): 62%
- 2011 (N = 1,878): 62%
- 2010 (N = 1,542): 61%

Average total resources devoted to hardware
- 2014 (N = 1,595): 39%
- 2013 (N = 2,075): 39%
- 2012 (N = 1,675): 38%
- 2011 (N = 1,878): 38%
- 2010 (N = 1,542): 39%

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?

- Primarily build our own hardware components: 63%
- Primarily outsource the hardware components (or purchase the components): 37%

2014 (N = 1,594)
Thinking now about the last embedded project you completed (no longer in development), how many months did that project take to finish?

- **6 months or less**
  - 2014: 34%
  - 2013: 35%
  - 2012: 33%
  - 2011: 33%
  - 2010: 36%

- **7 – 12 months**
  - 2014: 35%
  - 2013: 35%
  - 2012: 35%
  - 2011: 35%
  - 2010: 33%

- **13 – 18 months**
  - 2014: 16%
  - 2013: 15%
  - 2012: 15%
  - 2011: 15%
  - 2010: 15%

- **19 – 24 months**
  - 2014: 10%
  - 2013: 9%
  - 2012: 9%
  - 2011: 9%
  - 2010: 9%

- **25 months or more**
  - 2014: 7%
  - 2013: 6%
  - 2012: 8%
  - 2011: 7%
  - 2010: 7%

**Average Completion Times:**
- **2014 (N = 1,539)** Avg: 12.6 mos
- **2013 (N = 1,985)** Avg: 12.4 mos
- **2012 (N = 1,634)** Avg: 12.5 mos
- **2011 (N = 1,822)** Avg: 12.2 mos
- **2010 (N = 1,494)** Avg: 12.2 mos
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.

Was that project completed . . .

<table>
<thead>
<tr>
<th>Status</th>
<th>2014 (N = 1,574)</th>
<th>2013 (N = 2,055)</th>
<th>2012 (N = 1,658)</th>
<th>2011 (N = 1,859)</th>
<th>2010 (N = 1,525)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahead of schedule</td>
<td>4%</td>
<td>5%</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>On schedule</td>
<td>37%</td>
<td>38%</td>
<td>39%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Late by 1 – 2 months</td>
<td>28%</td>
<td>28%</td>
<td>29%</td>
<td>29%</td>
<td>30%</td>
</tr>
<tr>
<td>Late by 3 – 6 months</td>
<td>13%</td>
<td>18%</td>
<td>17%</td>
<td>19%</td>
<td>20%</td>
</tr>
<tr>
<td>Late by 6 – 12 months</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Late by 13 – 18 months</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Late by more than 18 months</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Canceled</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>
My current embedded project is programmed mostly in:

- **C**: 60% (2014), 60% (2013), 60% (2012), 60% (2011), 60% (2010)
- **C++**: 21% (2014), 20% (2013), 22% (2012), 20% (2011), 20% (2010)
- **Assembly language**: 5% (2014), 6% (2013), 5% (2012), 6% (2011), 6% (2010)
- **Python**: 1% (2014), 1% (2013), 1% (2012), 1% (2011), 1% (2010)
- **.NET**: 1% (2014), 1% (2013), 1% (2012), 1% (2011), 1% (2010)

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:

- **C**: 55% in 2013 (N = 1,590), 58% in 2012 (N = 1,667), 60% in 2011 (N = 1,871), 55% in 2010 (N = 1,537)
- **C++**: 22% in 2013 (N = 1,590), 24% in 2012 (N = 1,667), 24% in 2011 (N = 1,871), 23% in 2010 (N = 1,537)
- **Java**: 4% in 2013 (N = 1,590), 4% in 2012 (N = 1,667), 4% in 2011 (N = 1,871), 4% in 2010 (N = 1,537)
- **Assembly language**: 3% in 2013 (N = 1,590), 3% in 2012 (N = 1,667), 3% in 2011 (N = 1,871), 3% in 2010 (N = 1,537)
- **C#**: 3% in 2013 (N = 1,590), 3% in 2012 (N = 1,667), 3% in 2011 (N = 1,871), 3% in 2010 (N = 1,537)
- **LabVIEW**: 2% in 2013 (N = 1,590), 2% in 2012 (N = 1,667), 2% in 2011 (N = 1,871), 2% in 2010 (N = 1,537)
- **MATLAB**: 2% in 2013 (N = 1,590), 2% in 2012 (N = 1,667), 2% in 2011 (N = 1,871), 2% in 2010 (N = 1,537)
- **Python**: 2% in 2013 (N = 1,590), 2% in 2012 (N = 1,667), 2% in 2011 (N = 1,871), 2% in 2010 (N = 1,537)
- **.NET**: 4% in 2013 (N = 1,590), 4% in 2012 (N = 1,667), 4% in 2011 (N = 1,871), 4% in 2010 (N = 1,537)
- **UML or other modeling language**: 1% in 2013 (N = 1,590), 1% in 2012 (N = 1,667), 1% in 2011 (N = 1,871), 1% in 2010 (N = 1,537)
- **Other**: 4% in 2013 (N = 1,590), 4% in 2012 (N = 1,667), 4% in 2011 (N = 1,871), 4% in 2010 (N = 1,537)

**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?

Imperceptible change in code reuse over 5 years

- In 2014, 86% reused code.
- In 2013, 86% reused code.
- In 2012, 85% reused code.
- In 2011, 87% reused code.
- In 2010, 86% reused code.
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?

- Meeting schedules
- The debugging process
- Testing/Systems Integration
- Increased lines of code & software complexity
- Meeting application performance standards*
- Sticking to our cost budget
- Keeping pace with embedded systems technology
- Meeting safety & development process standards*
- Power management/Energy efficiency
- Maintaining legacy code
- Selecting the right processors for the job
- Managing remote design team/multiple locations
- Software compatibility when porting to new devices*
- Outsourcing influence on embedded process
- Managing multiple operating environments
- Migrating to a multi-core processor
- Selecting the right debugging tool

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?

- Developing system specs: 14% (2014), 15% (2013), 14% (2012)
- Conceptual design stage: 11% (2014), 11% (2013), 11% (2012)
- Detailed design stage: 29% (2014), 30% (2013), 22% (2012)
- Simulation stage: 8% (2014), 7% (2013), 8% (2012)
- Prototyping: 10% (2014), 9% (2013), 12% (2012)
- Sending to production: 6% (2014), 6% (2013), 6% (2012)
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?

- Go to their websites & contact them: 56%
- Referrals from colleagues: 48%
- Recommended from other hw/sw vendors: 33%
- Meet them at industry events: 26%
- Read white papers/industry news: 21%
- See ads in industry magazines: 11%
- Read relevant blogs: 7%
- Other sources: 6%

2014 (N = 1232)
If you could improve one thing about your embedded design activities, what would it be?

<table>
<thead>
<tr>
<th>Component</th>
<th>2014 (N = 1,518)</th>
<th>2013 (N = 2,056)</th>
<th>2012 (N = 1,667)</th>
<th>2011 (N = 1,868)</th>
<th>2010 (N = 1,541)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debugging tools</td>
<td>19%</td>
<td>21%</td>
<td>22%</td>
<td>28%</td>
<td>29%</td>
</tr>
<tr>
<td>Engineering team skill level</td>
<td>17%</td>
<td>16%</td>
<td>16%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>Schedule</td>
<td>8%</td>
<td>15%</td>
<td>16%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>Programming tools</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Microprocessor</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Firmware itself*</td>
<td>7%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>IDE</td>
<td>6%</td>
<td>6%</td>
<td>7%</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Interfaces</td>
<td>5%</td>
<td>7%</td>
<td>6%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Other hardware</td>
<td>5%</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Operating system</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

* Added in 2014
In general, what sources of information do you consult to research your embedded design decisions?

**Top 16 Sources**

7. Technical communities (Sourceforge, Kernel.org) - 34% (2014) - 33% (2013) - 31% (2012)
8. Vendor tech support* - 30% (2014)
14. Software APIs* - 22% (2014)

* Added in 2014

- 2014 (N = 1,529)
- 2013 (N = 2,074)
- 2012 (N = 1,674)
Thinking about the next year, what areas will be your greatest technology challenges?

Managers Only

- Integrating new technology or tools: 2014 (26%), 2013 (28%)
- Managing code size/complexity: 2014 (19%), 2013 (23%)
- Software tools: 2014 (17%), 2013 (17%)
- OS/RTOS: 2014 (12%), 2013 (17%)
- Processors: 2014 (15%), 2013 (16%)
- Improving the debugging process: 2014 (15%), 2013 (14%)
- Security concerns: 2014 (13%), 2013 (11%)
- Dealing with low power: 2014 (12%), 2013 (13%)
- Integrating external IPs into designs: 2014 (10%), 2013 (11%)
- Programmable logic: 2014 (9%), 2013 (11%)
- Hardware tools: 2014 (6%), 2013 (12%)
- Connecting to the cloud: 2014 (8%), 2013 (8%)
- SoCs/ASSPs: 2014 (8%), 2013 (7%)
- Buses/interconnects: 2014 (5%), 2013 (6%)
- IDE: 2014 (4%), 2013 (2%)
- Memories and standard cells: 2014 (2%), 2013 (4%)
- Other: 2014 (3%), 2013 (5%)

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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?

<table>
<thead>
<tr>
<th>Activity</th>
<th>2014 (N = 1,465)</th>
<th>2013 (N = 2,067)</th>
<th>2012 (N = 1,662)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training courses offered online</td>
<td>45%</td>
<td>42%</td>
<td>42%</td>
</tr>
<tr>
<td>Technical white papers by vendors</td>
<td>41.0%</td>
<td>41.0%</td>
<td>42%</td>
</tr>
<tr>
<td>Webinars provided by vendors</td>
<td>36.6%</td>
<td>37%</td>
<td>42%</td>
</tr>
<tr>
<td>Webinars by publications, media orgs</td>
<td>33.0%</td>
<td>32%</td>
<td>34%</td>
</tr>
<tr>
<td>Books</td>
<td>27.6%</td>
<td>27.6%</td>
<td>30%</td>
</tr>
<tr>
<td>Professional development courses by private co.</td>
<td>30%</td>
<td>30%</td>
<td>31%</td>
</tr>
<tr>
<td>Conferences provided by vendors</td>
<td>18%</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>University professional development courses</td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>On-site seminars given by vendors</td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Webinars by professional associations</td>
<td>15.8%</td>
<td>15.8%</td>
<td>18%</td>
</tr>
<tr>
<td>Conference seminars by publications, media orgs</td>
<td>12%</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>Conference seminars by professional associations</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Certification training</td>
<td>5.8%</td>
<td>5.8%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Other Related Demographics

<table>
<thead>
<tr>
<th>Demographic</th>
<th>2014</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average days per year spent on career training</td>
<td>9.2</td>
<td>9.0</td>
</tr>
<tr>
<td>Average number of years out of school</td>
<td>21.6</td>
<td>19.7</td>
</tr>
<tr>
<td>Hours per week spent reading technical pubs</td>
<td>5.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Books read in full or in substantial part per year</td>
<td>3.9</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Embedded Design Process: Key Takeaways

- **Meeting schedules** remains the premier challenge for development with the debugging process 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**

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 (N = 1,493)</td>
<td>69%</td>
<td>31%</td>
</tr>
<tr>
<td>2013 (N = 2,082)</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>2012 (N = 1,712)</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>2011 (N = 1,882)</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>2010 (N = 1,552)</td>
<td>70%</td>
<td>30%</td>
</tr>
</tbody>
</table>
If current embedded project does not use an operating system, RTOS, kernel, software executive, or scheduler of any kind, why not?

- OS / RTOS is too complicated to use: 8% (2014), 4% (2013), 4% (2012), 6% (2011), 8% (2010)
- OS / RTOS is too expensive: 9% (2014), 9% (2013), 2% (2012), 9% (2011), 9% (2010)
My current embedded project uses:  

- **Open-source OS/RTOS, without commercial support**: 36% in 2014, 34% in 2013, 31% in 2012, 35% in 2011, 34% in 2010.
- **Commercial OS/RTOS**: 33% in 2014, 35% in 2013, 40% in 2012, 41% in 2011, 38% in 2010.
- **Internally developed or in-house OS/RTOS**: 17% in 2014, 19% in 2013, 20% in 2012, 19% in 2011, 23% in 2010.
- **Commercial distribution of an open-source OS/RTOS**: 14% in 2014, 13% in 2013, 9% in 2012, 15% in 2011, 14% in 2010.

My next embedded project will likely use:  

- **Open-source OS/RTOS, without commercial support**: 37% in 2014, 37% in 2013, 37% in 2012, 37% in 2011, 37% in 2010.
- **Commercial OS/RTOS**: 27% in 2014, 29% in 2013, 31% in 2012, 30% in 2011, 31% in 2010.
- **Internally developed or in-house OS/RTOS**: 19% in 2014, 20% in 2013, 20% in 2012, 19% in 2011, 23% in 2010.
- **Commercial distribution of an open-source OS/RTOS**: 17% in 2014, 14% in 2013, 13% in 2012, 14% in 2011, 16% in 2010.
Which factors most influenced your decision to use a commercial operating system?
(Top 14 choices.)

- Processor or hardware compatibility: 43% (2014) vs. 42% (2013)
- Real-time capability: 44% (2014) vs. 43% (2013)
- Good software tools: 35% (2014) vs. 35% (2013)
- Support for processor & drivers: 34% (2014) vs. 28% (2013)
- Technical support: 32% (2014) vs. 30% (2013)
- Ease of future maintenance: 32% (2014) vs. 30% (2013)
- Documentation: 27% (2014) vs. 26% (2013)
- Overall cost: 26% (2014) vs. 26% (2013)
- Royalty-free: 25% (2014) vs. 24% (2013)
- Code size/memory usage: 24% (2014) vs. 26% (2013)
- Supplier's reputation: 21% (2014) vs. 21% (2013)
- Networking capability: 21% (2014) vs. 18% (2013)
- Scheduling efficiency: 16% (2014) vs. 15% (2013)
- Context switch time: 16% (2014) vs. 16% (2013)
What are your reasons for **not** using a commercial operating system?

<table>
<thead>
<tr>
<th>Reason</th>
<th>2014 (N = 1109)</th>
<th>2013 (N = 1503)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current solution works fine</td>
<td>58%</td>
<td>61%</td>
</tr>
<tr>
<td>Commercial alternatives too expensive</td>
<td>35%</td>
<td>36%</td>
</tr>
<tr>
<td>Avoid reliance on commercial supplier</td>
<td>27%</td>
<td>28%</td>
</tr>
<tr>
<td>No need for multitasking</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td>Incompatible with existing SW apps or drivers</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>Commercial alternatives use too much memory</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>Too much trouble to learn commercial alternative</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Commercial alternatives lack features I need</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
<td>8%</td>
</tr>
</tbody>
</table>
Who were the greatest influences on the choice of operating system?

- Software engineering staff: 32% in 2013 (N = 1,394), 35% in 2013 (N = 1,989)
- Software engineering manager: 31% in 2013 (N = 1,394), 30% in 2013 (N = 1,989)
- Group decision within engineering: 27% in 2013 (N = 1,394), 30% in 2013 (N = 1,989)
- Corporate management: 17% in 2013 (N = 1,394), 17% in 2013 (N = 1,989)
- Hardware engineering manager: 15% in 2013 (N = 1,394), 15% in 2013 (N = 1,989)
- Same OS as previous project: 14% in 2013 (N = 1,394), 15% in 2013 (N = 1,989)
- Hardware engineering staff: 14% in 2013 (N = 1,394), 14% in 2013 (N = 1,989)
- Systems engineering manager: 13% in 2013 (N = 1,394), 13% in 2013 (N = 1,989)
- Systems engineering staff: 12% in 2013 (N = 1,394), 11% in 2013 (N = 1,989)
- Outside influence/customer/standards: 12% in 2013 (N = 1,394), 12% in 2013 (N = 1,989)
- Marketing manager or department: 6% in 2013 (N = 1,394), 6% in 2013 (N = 1,989)
- Purchasing manager or department: 5% in 2013 (N = 1,394), 5% in 2013 (N = 1,989)

Base: Those who use operating systems.

- 2013 (N = 1,394)
- 2013 (N = 1,989)
Did you use the same operating system, RTOS, or kernel as in your previous project?

Base: Those who use operating systems

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes, used same OS, RTOS or kernel</th>
<th>No, didn't use same OS, RTOS or kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 (N = 1,423)</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>2013 (N = 2,015)</td>
<td>62%</td>
<td>38%</td>
</tr>
<tr>
<td>2012 (N = 1,644)</td>
<td>57%</td>
<td>43%</td>
</tr>
<tr>
<td>2011 (N = 1,840)</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>2010 (N = 1,492)</td>
<td>64%</td>
<td>36%</td>
</tr>
</tbody>
</table>
Why did you use the same operating system?

<table>
<thead>
<tr>
<th>Reason</th>
<th>2014 (N = 861)</th>
<th>2013 (N = 1,238)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy with current one, no reason to switch</td>
<td>62%</td>
<td>63%</td>
</tr>
<tr>
<td>Wanted to maintain software compatibility</td>
<td>41%</td>
<td>40%</td>
</tr>
<tr>
<td>Wanted to make use of expertise/familiarity</td>
<td>37%</td>
<td>36%</td>
</tr>
<tr>
<td>Wanted to maintain the same tools or software</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>Wanted to keep same Operating System</td>
<td>25%</td>
<td>23%</td>
</tr>
<tr>
<td>Switching OS too expensive / time-consuming</td>
<td>24%</td>
<td>23%</td>
</tr>
<tr>
<td>Happy with supplier</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Not my choice/operating system chosen for me</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>No other suitable alternatives available</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Base = Those who are using the same operating system as in previous project
Why did you switch operating systems?

- Hardware or processor changed: 34% (2014) vs. 33% (2013)
- New OS had better features: 22% (2014) vs. 22% (2013)
- Not my choice/OS chosen for me: 23% (2014) vs. 20% (2013)
- New OS had better SW/dev tools: 12% (2014) vs. 13% (2013)
- New OS is cheaper: 11% (2014) vs. 13% (2013)
- New OS had better growth path: 12% (2014) vs. 13% (2013)
- New OS had OTS modules (apps, tools): 12% (2014) vs. 10% (2013)
- Previous OS too slow: 9% (2014) vs. 7% (2013)
- Previous OS no longer available: 7% (2014) vs. 7% (2013)
- Unhappy with previous OS supplier: 6% (2014) vs. 5% (2013)
- Other: 15% (2014) vs. 17% (2013)
What are the most important factors in choosing an operating system?

- Availability of full source code
- Availability of tech support
- No royalties
- Real-time performance
- Compatibility w/ other software, systems
- Freedom to customize or modify
- Open-source availability
- My familiarity with the operating system
- Purchase price
- Simplicity / ease of use
- The processors it supports
- Software-development tools available
- Small memory footprint
- Other software, middleware, drivers, code
- Commercial support
- Popularity
- Successful prior use for similar apps
- Rich selection of services and features

Base: Currently using an operating system

2014 (N = 1394)

2013 (N = 2017)
Please select ALL of the operating systems you are currently using.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>2014 (N = 1,096)</th>
<th>2013 (N = 1,696)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhouse/custom</td>
<td>24%</td>
<td>16%</td>
</tr>
<tr>
<td>Android</td>
<td>18%</td>
<td>17%</td>
</tr>
<tr>
<td>FreeRTOS</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>Ubuntu</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Debian (Linux)</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Microsoft Windows Embedded 7 earlier</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Micrium (uC/OS-II, III)</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Microsoft Windows 7 Compact earlier</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Wind River (VxWorks)</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Texas Instruments (DSP/BIOS)</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Angstrom (Linux)</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Keil (RTX)</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Freescale MQX</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>QNX (QNX)</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Red Hat (IX Linux)</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Texas Instruments RTOS</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Wind River (Linux)</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Mentor Graphics (Nucleus/Linux) (Net)</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Analog Devices (VDK)</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Green Hills (INTEGRITY)</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Express Logic (ThreadX)</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>QNX (Neutrino)</td>
<td>2%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Base: Currently using an operating system
Please select ALL of the operating systems you are considering using in the next 12 months.

- **Android**: 27% (2014) 28% (2013)
- **FreeRTOS**: 26% (2014) 26% (2013)
- **Inhouse/custom**: 15% (2014) 19% (2013)
- **Ubuntu**: 12% (2014) 14% (2013)
- **Micrium (uC/OS-II, III)**: 10% (2014) 12% (2013)
- **Debian (Linux)**: 8% (2014) 10% (2013)
- **Microsoft (Win Embedded 7/Standard)**: 9% (2014) 9% (2013)
- **Texas Instruments RTOS**: 8% (2014) 7% (2013)
- **Microsoft (Win 7 Compact)**: 7% (2014) 6% (2013)
- **Freescale MQX**: 6% (2014) 7% (2013)
- **Wind River (VxWorks)**: 7% (2014) 7% (2013)
- **Texas Instruments (DSP/BIOS)**: 7% (2014) 8% (2013)
- **Keil (RTX)**: 6% (2014) 6% (2013)
- **Mentor Graphics (Nucleus/Linux)**: 5% (2014) 2% (2013)
- **QNX (QNX)**: 5% (2014) 4% (2013)
- **Angstrom (Linux)**: 5% (2014) 4% (2013)
- **Wind River (Linux)**: 5% (2014) 4% (2013)
- **Red Hat (IX Linux)**: 4% (2014) 5% (2013)
- **Express Logic (ThreadX)**: 4% (2014) 3% (2013)
- **eCos**: 4% (2014) 3% (2013)
- **Wittenstein (OpenRTOS/SAFERTOS)**: 4% (2014) 2% (2013)
- **Analog Devices (VDK)**: 3% (2014) 4% (2013)

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?

- **Hardware engineering staff**: 33%
- **Hardware engineering mgr.**: 28%
- **Group decision in engineering**: 28%
- **Software engineering staff**: 26%
- **Software engineering mgr.**: 23%
- **Corporate mgmt.**: 20%
- **Systems engineering mgr.**: 19%
- **Systems engineering staff**: 19%
- **Outside influence/customer/standards**: 13%
- **Same processor as in previous project**: 13%
- **Purchasing mgr. or dept.**: 10%
- **Marketing mgr. or dept.**: 9%
- **Other**: 4%

2014 (N = 1,370)

2013 (N = 2,048)
My current embedded project contains:

- **A single microprocessor/ microcontroller**
  - 2014 (N = 1,379): 50%
  - 2013 (N = 2,047): 52%
  - 2012 (N = 1,659): 53%
  - 2011 (N = 1,858): 53%
- **2 processors/ microcontrollers**
  - 2014 (N = 1,379): 27%
  - 2013 (N = 2,047): 25%
  - 2012 (N = 1,659): 24%
  - 2011 (N = 1,858): 27%
- **3 – 5 processors/ microcontrollers**
  - 2014 (N = 1,379): 16%
  - 2013 (N = 2,047): 16%
  - 2012 (N = 1,659): 16%
  - 2011 (N = 1,858): 15%
- **6 – 10 processors/ microcontrollers**
  - 2014 (N = 1,379): 3%
  - 2013 (N = 2,047): 3%
  - 2012 (N = 1,659): 3%
  - 2011 (N = 1,858): 3%
- **>10 processors/ microcontrollers**
  - 2014 (N = 1,379): 4%
  - 2013 (N = 2,047): 4%
  - 2012 (N = 1,659): 4%
  - 2011 (N = 1,858): 3%

The average number of microcontrollers per project was:
- 2.4 in 2014
- 2.4 in 2013
- 2.3 in 2012
- 2.3 in 2011
Does your embedded project contain . . .

- Multiple different processor chips (diff. vendors): 24%
- Multiple different processor chips (same vendor): 17%
- Multiple identical processor chips: 20%
- Single chip with multiple identical processor cores: 14%
- Single chip with multiple different processor cores: 10%
- FPGA with a multiple hard/soft processor cores: 5%
- FPGA with a single hard/soft processor core: 11%

2014 (N = 1051)
My current embedded project's main processor is a:
My current embedded project's main processor clock rate is:

- Under 10 MHz: 7%
- 10 – 99 MHz (Net): 37%
- 10 - 24 MHz: 12%
- 25 - 49 MHz: 10%
- 50 - 99 MHz: 15%
- 100 – 249 MHz: 18%
- 250 – 499 MHz: 16%
- 500 – 749 MHz: 16%
- 750 – 999 MHz: 13%
- 1 GHz: 11%
- 2GHz+: 3%

The average processor clock rate was:
- 428 MHz in 2014
- 485 MHz in 2013
- 425 MHz in 2012
Did you use the same processor as in your previous embedded project?

Yes, used the same processor as in previous embedded project

- 2014 (N = 1,380)
- 2013 (N = 2,047)
- 2012 (N = 1,654)
- 2011 (N = 1,859)
- 2010 (N = 1,516)

No, did not use the same processor as in previous project

- 2014 (N = 1,380)
- 2013 (N = 2,047)
- 2012 (N = 1,654)
- 2011 (N = 1,859)
- 2010 (N = 1,516)
Why did you use the same processor?

- Happy with current processor/supplier: 61% (2014) vs. 62% (2013)
- To maintain software compatibility: 55% (2014) vs. 57% (2013)
- To maintain the same tools or software: 50% (2014) vs. 49% (2013)
- To make use of expertise/familiarity: 46% (2014) vs. 43% (2013)
- To use same operating system: 27% (2014) vs. 29% (2013)
- Switching is too expensive/time consuming: 25% (2014) vs. 23% (2013)
- Not my choice/processor chosen for me: 9% (2014) vs. 9% (2013)
- No other suitable processors available: 6% (2014) vs. 4% (2013)
- Other: 1% (2014) vs. 2% (2013)

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What were your reasons for switching processors?

- New processor had better features: 44% (46% in 2013)
- Previous processor too slow: 29% (31% in 2013)
- New processor had better future growth path: 26% (24% in 2013)
- Not my choice/processor chosen for me: 18% (15% in 2013)
- New processor had better SW/dev tools: 17% (14% in 2013)
- Previous processor no longer available: 15% (13% in 2013)
- Needed a lower power processor: 13% (12% in 2013)
- Previous processor too expensive: 9% (10% in 2013)
- To change operating system: 9% (8% in 2013)
- Unhappy with previous processor's supplier: 1% (3% in 2013)
- Other: 8% (9% in 2013)
Did you . . .

Choose a processor from a different family, architecture, or instruction set

Choose a different processor from the same family, architecture, or instruction set

- 2014 (N = 687)
- 2013 (N = 1088)
- 2012 (N = 862)
- 2011 (N = 1003)
- 2010 (N = 761)
What’s most important when choosing a microprocessor?

- The chip itself
- The ecosystem surrounding the chip (software, tools, support, etc.)
- The chip's supplier/vendor

<table>
<thead>
<tr>
<th></th>
<th>2014 (N = 1304)</th>
<th>2013 (N = 2034)</th>
<th>2012 (N = 1,662)</th>
<th>2011 (N = 1,859)</th>
<th>2010 (N = 1,501)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The chip itself</td>
<td>27%</td>
<td>30%</td>
<td>43%</td>
<td>45%</td>
<td>42%</td>
</tr>
<tr>
<td>The ecosystem</td>
<td>42%</td>
<td>43%</td>
<td>45%</td>
<td>45%</td>
<td>46%</td>
</tr>
<tr>
<td>The chip's supplier/vendor</td>
<td>43%</td>
<td>46%</td>
<td>43%</td>
<td>13%</td>
<td>13%</td>
</tr>
</tbody>
</table>
### Which vendor that has the best ecosystem for your needs.

(Unaided Open End)

<table>
<thead>
<tr>
<th>Vendor</th>
<th>2014 (Unaided N = 651)</th>
<th>2013 (Unaided N = 753)</th>
<th>2012 (Unaided N = 665)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas Instruments</td>
<td>18%</td>
<td>19%</td>
<td>19%</td>
</tr>
<tr>
<td>Freescale</td>
<td>13%</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Microchip</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>ARM</td>
<td>6%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Atmel</td>
<td>5%</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>ST Microelectronics</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Intel</td>
<td>2%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Xilinx</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>NXP</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Renesas</td>
<td>1%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>
What are the most important factors in choosing a processor?

- Software development tools available
- The chip's performance
- HW development tools available
- The chip's cost
- Available middleware, drivers, existing code
- The operating systems it supports
- The on-chip I/O or peripherals
- The chip's power consumption
- The supplier's reputation
- Familiarity w/ architecture/chip family
- Chip family's future growth path
- The processor's debug support
- The chip's popularity
- The chip's security features

2014 (N = 1,282)
2013 (N = 2,033)
2012 (N = 1,648)
Please select the processor vendors you are familiar with.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>2014 (N = 1,252)</th>
<th>2013 (N = 1,912)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas Instruments</td>
<td>60%</td>
<td>52%</td>
</tr>
<tr>
<td>Freescale</td>
<td>56%</td>
<td>50%</td>
</tr>
<tr>
<td>Microchip</td>
<td>54%</td>
<td>48%</td>
</tr>
<tr>
<td>Atmel</td>
<td>52%</td>
<td>52%</td>
</tr>
<tr>
<td>Intel</td>
<td>51%</td>
<td>44%</td>
</tr>
<tr>
<td>STMicroelectronics</td>
<td>42%</td>
<td>33%</td>
</tr>
<tr>
<td>Altera</td>
<td>38%</td>
<td>33%</td>
</tr>
<tr>
<td>Xilinx</td>
<td>37%</td>
<td>30%</td>
</tr>
<tr>
<td>Analog Devices</td>
<td>36%</td>
<td>28%</td>
</tr>
<tr>
<td>NXP</td>
<td>34%</td>
<td>28%</td>
</tr>
<tr>
<td>AMD</td>
<td>32%</td>
<td>28%</td>
</tr>
<tr>
<td>Renesas</td>
<td>31%</td>
<td>29%</td>
</tr>
<tr>
<td>Cypress Semiconductor</td>
<td>26%</td>
<td>22%</td>
</tr>
<tr>
<td>Maxim</td>
<td>21%</td>
<td>16%</td>
</tr>
<tr>
<td>Infineon</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>Zilog</td>
<td>19%</td>
<td>19%</td>
</tr>
<tr>
<td>Silicon Labs</td>
<td>19%</td>
<td>14%</td>
</tr>
</tbody>
</table>

- Added in 2014
Please select the processor vendors you are currently using.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>2014 (N = 1,160)</th>
<th>2013 (N = 1,850)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>35%</td>
<td>29%</td>
</tr>
<tr>
<td>Freescale</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>Microchip</td>
<td>27%</td>
<td>24%</td>
</tr>
<tr>
<td>Atmel</td>
<td>24%</td>
<td>20%</td>
</tr>
<tr>
<td>STMicroelectronics</td>
<td>19%</td>
<td>16%</td>
</tr>
<tr>
<td>Xilinx</td>
<td>16%</td>
<td>14%</td>
</tr>
<tr>
<td>Intel</td>
<td>16%</td>
<td>14%</td>
</tr>
<tr>
<td>NXP</td>
<td>15%</td>
<td>17%</td>
</tr>
<tr>
<td>Altera</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>Analog Devices</td>
<td>11%</td>
<td>9%</td>
</tr>
<tr>
<td>Renesas</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>Cypress Semiconductor</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Maxim</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>AMD</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Silicon Labs</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Broadcom</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Infineon</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Qualcomm</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

- Added in 2014
Please select the processor vendors you are considering using on your next project. (Top 20)

<table>
<thead>
<tr>
<th>Vendor</th>
<th>2014 (N = 1017)</th>
<th>2013 (N = 1609)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas Instruments</td>
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<td>41%</td>
</tr>
<tr>
<td>Freescale</td>
<td>35%</td>
<td>34%</td>
</tr>
<tr>
<td>Microchip</td>
<td>26%</td>
<td>24%</td>
</tr>
<tr>
<td>Atmel</td>
<td>24%</td>
<td>22%</td>
</tr>
<tr>
<td>STMicroelectronics</td>
<td>24%</td>
<td>22%</td>
</tr>
<tr>
<td>Xilinx</td>
<td>23%</td>
<td>19%</td>
</tr>
<tr>
<td>NXP</td>
<td>20%</td>
<td>17%</td>
</tr>
<tr>
<td>Altera</td>
<td>18%</td>
<td>15%</td>
</tr>
<tr>
<td>Intel</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Analog Devices</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Renesas</td>
<td>11%</td>
<td>12%</td>
</tr>
<tr>
<td>Cypress</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>AMD</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Broadcom</td>
<td>7%</td>
<td>4%</td>
</tr>
<tr>
<td>Silicon Labs</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Qualcomm</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Maxim</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Infineon</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>NVIDIA</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Energy Micro</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

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

(Top 24)

<table>
<thead>
<tr>
<th>Chip Family</th>
<th>2014 (%)</th>
<th>2013 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STMicro STM32 (ARM)</td>
<td>23%</td>
<td>22%</td>
</tr>
<tr>
<td>Microchip PIC 32-bit (MIPS)</td>
<td>22%</td>
<td>23%</td>
</tr>
<tr>
<td>NXP (ARM)</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>TI Sitara (ARM)</td>
<td>13%</td>
<td>17%</td>
</tr>
<tr>
<td>TI OMAP (ARM)</td>
<td>15%</td>
<td>17%</td>
</tr>
<tr>
<td>Freescale Kinetis (ARM/Cortex-M4/M0)</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Intel Atom, Pentium, Celeron, Core IX</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>Freescale i.MX (ARM)</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Xilinx Zynq (dual ARM Cortex-A9)</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>TI Tiva (ARM) 2014/Stellaris 2013</td>
<td>11%</td>
<td>21%</td>
</tr>
<tr>
<td>Altera Nios II (soft core)</td>
<td>11%</td>
<td>10%</td>
</tr>
<tr>
<td>Atmel SAMxx (ARM)</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Atmel (AVR32)</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Xilinx MicroBlaze (soft-core)</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Atmel AT91xx/ATSAMxx (ARM)</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Altera SoC-FPGA (ARM)</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>TI C2000 MCUs</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>TI Hercules (ARM)</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Renesas RX*</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Cypress PSOC 5 (ARM)</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Freescale 68K, ColdFire</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Atmel AT91xx</td>
<td>6%</td>
<td>10%</td>
</tr>
<tr>
<td>Freescale PowerPC 7xx, 8xx</td>
<td>6%</td>
<td>7%</td>
</tr>
</tbody>
</table>

*Added in 2014*
Which of the following 16-bit chip families would you consider for your next embedded project?

- TI MSP430: 45% (2014), 43% (2013)
- Freescale HC16: 21% (2014), 20% (2013)
- STMicroelectronics ST9, ST10: 17% (2014), 16% (2013)
- Freescale HC12: 14% (2014), 14% (2013)
- Renesas RL78*: 10% (2014)
- AMD 186, '188: 7% (2014), 9% (2013)
- Renesas R8C*: 7% (2014)
- Infineon XE166, XC2000,…: 5% (2014), 5% (2013)
- Zilog Z180, Z380: 5% (2014), 4% (2013)
- Maxim: 3% (2014), 4% (2013)

*Added 2014

- Added in 2014
Which of the following **8-bit** chip families would you consider for your **next** embedded project?

<table>
<thead>
<tr>
<th>Chip Family</th>
<th>2014 (%)</th>
<th>2013 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microchip PIC</td>
<td>43%</td>
<td>43%</td>
</tr>
<tr>
<td>Atmel AVR</td>
<td>31%</td>
<td>35%</td>
</tr>
<tr>
<td>Arduino</td>
<td>17%</td>
<td>19%</td>
</tr>
<tr>
<td>Freescale HC</td>
<td>19%</td>
<td>18%</td>
</tr>
<tr>
<td>STMicroelectronics ST6, ST7, ST8</td>
<td>15%</td>
<td>16%</td>
</tr>
<tr>
<td>TI TMS370, 7000</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>Intel 80xx, '251</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>NXP/Philips P80x, P87x, P89x</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Xilinx PicoBlaze</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Renesas H8, R8C/Tiny series</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Atmel 80xx</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Cypress PSoC</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Altera soft core</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>SiLabs 80xx</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Zilog Z8, Z80, Z180, eZ80</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Digi / Rabbit 2000, 3000</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Maxim 80xx</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Infineon XC800, C500</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Parallax</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Toshiba</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Have you upgraded from an 8-bit or 16-bit chip to a 32-bit design in the last 12 months?

- Yes, upgraded from 8-bit chip: 14%
- Yes, upgraded from 16-bit chip: 15%
- No: 71%

2014 (N = 1225)
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**; half 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 upgraded from 8/16-bit chips to 32-bit chips.
FPGAs, Memory, LCDs
Does your current embedded project contain FPGAs/programmable logic?

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>32%</td>
<td>68%</td>
</tr>
<tr>
<td>2013</td>
<td>31%</td>
<td>69%</td>
</tr>
<tr>
<td>2012</td>
<td>35%</td>
<td>65%</td>
</tr>
<tr>
<td>2011</td>
<td>38%</td>
<td>62%</td>
</tr>
<tr>
<td>2010</td>
<td>42%</td>
<td>58%</td>
</tr>
</tbody>
</table>

2014 (N = 1,295) 2013 (N = 2,073) 2012 (N = 1,669) 2011 (N = 1,870) 2010 (N = 1,540)
Which of the following vendors does your current embedded projects use for FPGAs?

- Atmel: 2014 - 5%, 2013 - 6%, 2012 - 6%, 2011 - 6%, 2010 - 5%
- Microsemi: 2014 - 12%, 2013 - 12%, 2012 - 11%, 2011 - 10%, 2010 - 9%
- Synopsys/Synplicity: 2014 - 3%, 2013 - 3%, 2012 - 3%, 2011 - 3%, 2010 - 3%
- Cypress: 2014 - 5%, 2013 - 5%, 2012 - 5%, 2011 - 5%, 2010 - 5%
- Cadence: 2014 - 3%, 2013 - 3%, 2012 - 3%, 2011 - 3%, 2010 - 2%
Will your **next** embedded project likely contain FPGAs/programmable logic?

- **Yes**
  - 41% (2014, N = 1,271)
  - 41% (2013, N = 2,022)
  - 43% (2012, N = 1,642)
  - 42% (2011, N = 1,846)
  - 45% (2010, N = 1,517)

- **No**
  - 59% (2014, N = 1,271)
  - 59% (2013, N = 2,022)
  - 57% (2012, N = 1,642)
  - 58% (2011, N = 1,846)
  - 55% (2010, N = 1,517)
Why won’t your next project include customizable chips?

- Don't need this functionality: 62% (2014), 60% (2013), 63% (2012)
- They're too expensive: 28% (2014), 29% (2013), 31% (2012)
- They're too difficult to program (in HDL): 16% (2014), 13% (2013), 14% (2012)
- They consume too much power: 15% (2014), 16% (2013), 16% (2012)
- We don't understand this functionality*: 9% (2014), 11% (2013)
- They're not fast enough for our purposes: 4% (2014), 4% (2013), 4% (2012)
- They're not reliable enough: 3% (2014), 2% (2013), 4% (2012)
- They're not big enough for our purposes: 3% (2014), 3% (2013), 2% (2012)
- Don't know: 10% (2014), 9% (2013), 10% (2012)

* Added in 2013

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

- Xilinx: 74% (2014), 75% (2013), 75% (2012)
- Microsemi: 9% (2014), 9% (2013), 9% (2012)
- Cypress: 11% (2014), 14% (2013)
- Synopsys/Synplicity: 7% (2014), 5% (2013), 7% (2012)
- Cadence: 4% (2014), 6% (2013)
- Tabula: 1% (2014), 1% (2013)
- Achronix: 1% (2014), 1% (2013)
- Other: 3% (2014), 3% (2013)
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?

- Xilinx: 70% (Currently use), 74% (Will consider)
- Altera: 43% (Currently use), 59% (Will consider)
- Lattice: 12% (Currently use), 19% (Will consider)
- Atmel: 7% (Currently use), 13% (Will consider)
- Microsemi: 6% (Currently use), 11% (Will consider)
- Mentor Graphics: 5% (Currently use), 11% (Will consider)
- Synopsys/Synplicity: 4% (Currently use), 7% (Will consider)
- Cypress: 3% (Currently use), 11% (Will consider)
- Cadence: 3% (Currently use), 6% (Will consider)
- Achronix: % (Currently use), % (Will consider)
- Other: 1% (Currently use), 1% (Will consider)
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?

- Simulation: 63% (2014), 63% (2013), 63% (2012)
- Virtual prototyping: 32% (2014), 32% (2013), 33% (2012)
- Graphical system design: 30% (2014), 31% (2013), 32% (2012)

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

- MATLAB: 54% (2014) vs. 36% (2013)
- LabVIEW: 36% (2014) vs. 35% (2013)
- System C or other "hardware C" language: 30% (2014) vs. 28% (2013)
- Simulink: 24% (2014) vs. 24% (2013)
- UML: 22% (2014) vs. 19% (2013)
- QEMU*: 5% (2014)
- Cadence Virtual System Platform: 4% (2014) vs. 4% (2013)
- Synopsys Virtualizer: 4% (2014) vs. 3% (2013)
- HAPS FPGA-based prototypes: 3% (2014) vs. 2% (2013)
- Mentor Graphics Vista: 3% (2014) vs. 2% (2013)

* Added in 2014
Who were the three greatest influencers on the choice of the system-level tools for your current project?

- Software engineering staff: 36% (2014), 33% (2013)
- Software engineering manager: 26% (2014), 27% (2013)
- Systems engineering staff: 24% (2014), 23% (2013)
- Systems engineering manager: 19% (2014), 20% (2013)
- Corporate management: 19% (2014), 18% (2013)
- Hardware engineering staff: 24% (2014), 25% (2013)
- Hardware engineering manager: 19% (2014), 19% (2013)
- Hardware architects: 17% (2014), 19% (2013)
- Outside influence, customer, standards: 9% (2014), 10% (2013)
- Purchasing manager: 5% (2014), 6% (2013)
- Marketing manager: 3% (2014), 3% (2013)
- Other: 5% (2014), 4% (2013)
Which of the following project management software packages do you currently use?

- Microsoft Excel: 49% (2014), 50% (2013)
- Microsoft Project: 47% (2014), 49% (2013)
- Visio: 29% (2014), 28% (2013)
- Open Source tools: 26% (2014), 23% (2013)
- IBM Telelogic DOORS: 10% (2014), 9% (2013)
- Simulink: 9% (2014), 7% (2013)
- TeamCenter: 2% (2014), 3% (2013)
- Other software package: 11% (2014), 8% (2013)
Which of the following Version Control software systems do you currently use?

<table>
<thead>
<tr>
<th>Software</th>
<th>2014 (N = 961)</th>
<th>2013 (N = 1,660)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subversion</td>
<td>39%</td>
<td>41%</td>
</tr>
<tr>
<td>Git</td>
<td>26%</td>
<td>21%</td>
</tr>
<tr>
<td>CVS</td>
<td>22%</td>
<td>20%</td>
</tr>
<tr>
<td>Clearcase</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>Perforce</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>Other*</td>
<td>21%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Other 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?

- Yes: 41% (2014), 41% (2013), 40% (2012)
- No: 59% (2014), 59% (2013), 60% (2012)
What type of graphical user interface is it?

- **Color**: 41% (2014), 42% (2013), 40% (2012)
- **Touch**: 36% (2014), 34% (2013), 36% (2012)
- **Hi-res**: 11% (2014), 11% (2013), 10% (2012)
- **3D**: 2% (2014), 2% (2013), 1% (2012)
- **Haptic**: 1% (2014), 1% (2013), 2% (2012)
- **Other**: 9% (2014), 10% (2013), 11% (2012)
Hardware IPs, System Level Design & Use of GUls: 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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