2009
Embedded Market Study
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Methodology

- **Fieldwork**: Web survey conducted from February 5 – 26, 2009

- **Returns**: 1,565 completed surveys 95% +/- 2.5% confidence overall
  - **Sample**:
    - E-mail invitation of subscribers to TechInsights Embedded Brands...
      - *Embedded Systems Design (ESD)*
      - *Embedded Systems Conference (ESC)*
      - *EE Times*
      - *Embedded.com*
      - *Embedded Systems Design Europe*
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Breakout of respondents by TechInsights brand

- Embedded Systems Design Subscribers: 53%
- Embedded Systems Conference attendees: 23%
- embedded.com: 12%
- EETimes: 7%
- ESD Europe: 5%

2009 N=1554
In which region of the world do you reside?

- **US: West Coast**: 24.4%
- **US: MidWest**: 15.3%
- **US: Northeast**: 11.9%
- **US: Mid-Atlantic**: 10.0%
- **US: Southwest**: 7.2%
- **US: Southeast**: 6.0%
- **US: Central Mountain**: 5.4%
- **US: Territories**: 0.5%
- **Europe**: 11.1%
- **Asia (India, SE, East)**: 3.6%
- **Canada**: 1.9%
- **Latin America**: 1.4%
- **Near East**: 0.5%
- **Africa**: 0.4%
- **Australia**: 0.2%

2009 (N = 1,497)
US and Territories = 81%
How many employees does your company have at all locations?

- Under 100: 37%
- 100-499: 16%
- 500-999: 6%
- 1,000-4,999: 13%
- 5,000-9,999: 5%
- 10,000-19,999: 4%
- 20,000 or more: 16%
- Don't know: 2%

2009 N = 1,508
My job function includes:

- Writing firmware/ sw embedded sys: 64%
- Hardware/ software integration: 63%
- Debugging firmware/ software: 63%
- Architecture selection/ spec: 57%
- Firmware/ sw design/ analysis: 51%
- Project management: 49%
- Debugging hardware: 49%
- Prototype testing: 45%
- Firmware/ software testing: 42%
- Device programming: 41%
- System design: 39%
- Designing hw for embedded sys: 35%
- Hardware/ software co-design: 24%
- Board layout/ design: 22%
- Hardware/ software co-verification: 18%
- Connected device design: 9%
- SoC design: 8%
- Other: 3%

2009 N=1507
For what types of applications are your embedded projects developed?

- **Industrial control & automation**: 30% (2009), 26% (2008)
- **Data Comm/Telecom**: 28% (2009), 24% (2008)
- **Consumer electronics**: 24% (2009), 22% (2008)
- **Electronic instruments**: 12% (2009), 16% (2008)
- **Aerospace**: 18% (2009), 15% (2008)
- **Medical**: 15% (2009), 13% (2008)
- **Automotive**: 15% (2009), 15% (2008)
- **Military**: 13% (2009), 15% (2008)
- **Computers and peripherals**: 11% (2009), 12% (2008)
- **Video & imaging**: 9% (2009), 8% (2008)
- **Government & municipal**: 9% (2009), 8% (2008)
- **Security**: 7% (2009), 7% (2008)
- **Power generation and utilities**: 5% (2009), 5% (2008)
- **Audio**: 6% (2009), 5% (2008)
- **Other**: 9% (2009), 9% (2008)
CURRENT EMBEDDED DESIGN ENVIRONMENT
My current embedded project is:

- New to the world; a new project from scratch: 42% (2009), 46% (2008), 39% (2007), 44% (2006), 52% (2005)
- An upgrade or improvement to an earlier or existing project: 58% (2009), 54% (2008), 61% (2007), 56% (2006), 52% (2005)
What does the upgrade or improvement include?

- New or different software features
  - 2009: 78%
  - 2008: 81%
  - 2007: 79%
  - 2006: 75%
- New or different processor
  - 2009: 54%
  - 2008: 55%
  - 2007: 56%
  - 2006: 54%
- New or different system logic
  - 2009: 41%
  - 2008: 39%
  - 2007: 41%
  - 2006: 47%
- New or different analog components
  - 2009: 33%
  - 2008: 36%
  - 2007: 32%
  - 2006: 36%
- New or different operating system
  - 2009: 27%
  - 2008: 28%
  - 2007: 32%
  - 2006: 29%
- Mandatory changes because of discontinued hardware or software
  - 2009: 26%
  - 2008: 22%
  - 2007: 28%
  - 2006: 27%

Base = Those whose current project is an upgrade/improvement
Are any of the following included in your current embedded project?

- Real-time capability: 75% (2009), 74% (2008), 77% (2007), 76% (2006)
- Project rugged/environmentally resistant: 44% (2009), 47% (2008), 43% (2007), 47% (2006)
- Battery-powered: 35% (2009), 33% (2008), 34% (2007), 35% (2006)
How many people are on your embedded project team?

<table>
<thead>
<tr>
<th>Team 2009</th>
<th>13.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Engineer</td>
<td>6.6</td>
</tr>
<tr>
<td>Hardware Engineer</td>
<td>4.3</td>
</tr>
<tr>
<td>Firmware Engineer</td>
<td>2.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team 2008</th>
<th>15.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Engineer</td>
<td>8.1</td>
</tr>
<tr>
<td>Hardware Engineer</td>
<td>4.3</td>
</tr>
<tr>
<td>Firmware Engineer</td>
<td>2.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team 2007</th>
<th>13.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Engineer</td>
<td>6.3</td>
</tr>
<tr>
<td>Hardware Engineer</td>
<td>4.3</td>
</tr>
<tr>
<td>Firmware Engineer</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team 2006</th>
<th>15.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team 2005</td>
<td>13.1</td>
</tr>
</tbody>
</table>
What is your development team’s ratio of total resources (including time/dollars/manpower) spent on software vs. hardware for your embedded projects?

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Resources Devoted to Software</th>
<th>Total Resources Devoted to Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>62.4%</td>
<td>37.6%</td>
</tr>
<tr>
<td>2008</td>
<td>63.8%</td>
<td>36.2%</td>
</tr>
<tr>
<td>2007</td>
<td>63.8%</td>
<td>36.2%</td>
</tr>
</tbody>
</table>
How long did the last project you completed take to finish?

- **6 months or less**
  - 2009: 30%
  - 2008: 32%
  - 2007: 27%
  - 2006: 30%
  - 2005: 32%

- **7 – 12 months**
  - 2009: 35%
  - 2008: 32%
  - 2007: 34%
  - 2006: 34%
  - 2005: 33%

- **13 – 18 months**
  - 2009: 17%
  - 2008: 17%
  - 2007: 16%
  - 2006: 19%
  - 2005: 15%

- **19 – 24 months**
  - 2009: 10%
  - 2008: 10%
  - 2007: 12%
  - 2006: 11%
  - 2005: 11%

- **24 months or more**
  - 2009: 8%
  - 2008: 9%
  - 2007: 7%
  - 2006: 9%
  - 2005: 10%

*Note: N values vary from year to year.*
Was that project completed . . .

In the last year, 57% of all projects finished late, compared to 53% in the previous year.

Average lateness: 4.4 months
My current embedded project uses . . .
My next embedded project is likely to use . . .

- **SystemC/ "hardware C"**:
  - Currently use 2009: 18%
  - Likely to use 2009: 21%

- **UML**:
  - Currently use 2009: 15%
  - Likely to use 2009: 20%

- **Simulink/ modeling language**:
  - Currently use 2009: 12%
  - Likely to use 2009: 15%

- **HW/ SW codesign/ co-verification tool**:
  - Currently use 2009: 5%
  - Likely to use 2009: 6%

- **None of the above**:
  - Currently use 2009: 59%
  - Likely to use 2009: 53%

+3% potential increase
+5% potential increase
+3% potential increase
My current embedded project is programmed mostly in:

- **C**: 62% (2009), 60% (2008), 63% (2007), 62% (2006), 60% (2005)
- **C++**: 24% (2009), 25% (2008), 22% (2007), 20% (2006), 18% (2005)
- **Assembly language**: 5% (2009), 7% (2008), 8% (2007), 6% (2006), 7% (2005)
- **Java**: 1% (2009), 1% (2008), 2% (2007), 4% (2006), 2% (2005)
- **BASIC**: 1% (2009), 2% (2008), 1% (2007), 3% (2006), 1% (2005)
- **UML, Matlab, or like**: 3% (2009), 3% (2008), 2% (2007), 2% (2006), 2% (2005)
- **LabView**: 5% (2009), 4% (2008), 2% (2007), 1% (2006), 1% (2005)
- **XML**: 1% (2009), 1% (2008), 1% (2007), 1% (2006), 1% (2005)
- **Other**: 6% (2009), 6% (2008), 4% (2007), 2% (2006), 3% (2005)
My next embedded project will likely be programmed mostly in:

- **C**: 59% (2009), 47% (2008), 27% (2007), 22% (2006), 20% (2005)
- **C++**: 57% (2009), 48% (2008), 32% (2007), 24% (2006), 18% (2005)
- **Assembly language**: 6% (2009), 5% (2008), 4% (2007), 2% (2006), 1% (2005)
- **Java**: 5% (2009), 5% (2008), 4% (2007), 2% (2006), 1% (2005)
- **BASIC**: 2% (2009), 2% (2008), 1% (2007), 1% (2006), 0% (2005)
- **UML, MatLab, or like**: 3% (2009), 3% (2008), 2% (2007), 1% (2006), 1% (2005)
- **LabView**: 3% (2009), 2% (2008), 1% (2007), 1% (2006), 0% (2005)
- **XML**: 1% (2009), 1% (2008), 1% (2007), 1% (2006), 0% (2005)
- **Other**: 6% (2009), 6% (2008), 5% (2007), 4% (2006), 3% (2005)
Does your current project reuse code from a previous embedded project?

Note: In 2009 and 2008, 89% reuse code. This is so because 11% of both 2009 and 2008 respondents “Do not reuse code”. In prior years, this question was asked as a single choice question. In 2009, it was changed to multiple choice. Thus, for 2009 “yes” answers do not add to 89%, because some selected multiple “yes” answers. For 2008 “yes” answers do add to 89%.
EMBEDDED DESIGN PROCESS
What percentage of your design time is spent on each of the following stages?

- Developing overall system specs: 15% (2009), 14% (2008), 15% (2007), 15% (2006)
- Conceptual design stage: 11% (2009), 12% (2008), 12% (2007), 13% (2006)
- Detailed design stage: 23% (2009), 22% (2008), 22% (2007), 19% (2006)
- Simulation stage: 8% (2009), 7% (2008), 8% (2007), 9% (2006)
- Prototyping: 6% (2009), 6% (2008), 6% (2007), 13% (2006)
- Sending to production: 6% (2009), 6% (2008), 6% (2007), 6% (2006)
If you could improve one thing about your embedded design activities, what would it be?

- **Debugging tools**
  - 2009: 30%
  - 2008: 32%
  - 2007: 33%
  - 2006: 31%

- **Schedule**
  - 2009: 18%
  - 2008: 17%
  - 2007: 16%
  - 2006: 11%

- **Programming tools**
  - 2009: 22%
  - 2008: 22%
  - 2007: 22%
  - 2006: 22%

- **Engineering team***
  - 2009: 8%

- **Interfaces**
  - 2009: 9%
  - 2008: 8%
  - 2007: 7%

- **Microprocessor**
  - 2009: 7%
  - 2008: 7%
  - 2007: 6%

- **Other hardware**
  - 2009: 8%
  - 2008: 6%
  - 2007: 5%

- **Operating system***
  - 2009: 6%

- **IDE***
  - 2009: 4%

*Notes: "Engineering team" was added in 2009, and "Operating System" and "IDE" were added in 2007. Engineering team improvements could be made by adding more engineers, hiring higher quality personnel, improving coordination, improving communication, getting better leadership, better training, etc.
In general, what sources of information do you consult to research your embedded design decisions?

(Only top 14 are displayed.)

- Vendor/mfr. websites: 86%
- Colleagues: 60%
- Industry publication websites: 56%
- Print publications: 49%
- Whitepapers*: 39%
- Conferences and trade shows: 34%
- Webinars/net seminars: 24%
- Distributor websites*: 22%
- Industry newsletters: 22%
- In-person seminars: 22%
- Catalogs and brochures: 14%
- Blogs*: 6%
- Social networks*: 4%
Thinking about the next year, what areas will be your greatest technology challenges? (Managers only)

- Integrating new technology or tools: 25% (2009) vs. 19% (2008)
- Software tools: 17% (2009) vs. 19% (2008)
- Building higher quality development process: 16% (2009) vs. 15% (2008)
- Building "on-time" development process: 14% (2009) vs. 19% (2008)
- Improving the debugging process: 12% (2009) vs. 10% (2008)
- Size, mix, type of the development team: 10% (2009) vs. 12% (2008)
- More profitable development process: 11% (2009) vs. 11% (2008)
- Processors: 10% (2009) vs. 10% (2008)
- Changing enterprise approach to development: 7% (2009) vs. 9% (2008)
- Programmable logic: 7% (2009) vs. 9% (2008)
- Building enterprise development process: 4% (2009) vs. 5% (2008)
- Buses/interconnects: 4% (2009) vs. 4% (2008)
- Maintaining security*: 3% (2009) vs. 3% (2008)
- Hardware tools: 2% (2009) vs. 2% (2008)
- Building quality training program: 2% (2009) vs. 2% (2008)
- IDE*: 1% (2009) vs. 1% (2008)

*Note: Maintaining security was added in 2009, and IDE broken out from RTOS.
Which of the following are your favorite/most important software/hardware tools?
### Which of the following conferences have you attended in the last two years, and which do you plan to attend in the next year?

<table>
<thead>
<tr>
<th>Conference</th>
<th>Have Attended</th>
<th>Plan to Attend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded Systems Conference (Silicon Valley)</td>
<td>37%</td>
<td>38%</td>
</tr>
<tr>
<td>Embedded Systems Conference (Boston)</td>
<td>22%</td>
<td>26% +4%</td>
</tr>
<tr>
<td>ARM Developers Conference</td>
<td>13%</td>
<td>18% +5%</td>
</tr>
<tr>
<td>Real Time Computer Show (RTC)</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>TI Dev Conference</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Freescale Tech Forum</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>DesignCon</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Intel Developer Forum</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>DAC</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Linux World</td>
<td>6%</td>
<td>10% +4%</td>
</tr>
<tr>
<td>Embedded Systems Show (UK)</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Software Development</td>
<td>5%</td>
<td>9% +4%</td>
</tr>
<tr>
<td>Microsoft Embedded Developers Conf.</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>CeBIT</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Embedded World (Nuremberg)</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>Microchip MASTers Conference</td>
<td>4%</td>
<td>8% +4%</td>
</tr>
<tr>
<td>Electronica/Productronica</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Microprocessor Forum</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Embedded Linux Expo and Conference (ELEC)</td>
<td>4%</td>
<td>9% +5%</td>
</tr>
<tr>
<td>SAE</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Java One</td>
<td>2%</td>
<td>5% +4%</td>
</tr>
<tr>
<td>Networld+Interop (Las Vegas)</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Convergence: Transportation Electronics</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Embedded Systems Conference (India)</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Eclipse World</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td>IIC(China)</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Embedded Systems Technology (Japan)</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Other (specify below*)</td>
<td>7%</td>
<td>5%</td>
</tr>
</tbody>
</table>

2009 (N = 784)                                           2009 (N = 785)
Looking ahead over the next 2–5 years, select the areas below that you think will see the most dramatic changes?

- Chip technology: 53% (2009), 51% (2008)
- Global markets: 42% (2009), 34% (2008)
- The design/development process: 34% (2009), 34% (2008)
- Speed to markets: 39% (2009), 31% (2008)
- Outsourcing (domestic & overseas)*: 30% (2009), 30% (2008)
- Size and type of development teams: 29% (2009), 19% (2008)
- The competitive embedded market place: 24% (2009), 21% (2008)
- Chip applications (vertical markets): 22% (2009), 23% (2008)
- Embedded systems research and theory: 18% (2009), 15% (2008)
- Professionalism and standards: 13% (2009), 10% (2008)
- Career training/education: 12% (2009), 12% (2008)
- Other changes: 2% (2009), 2% (2008)

*Note: Outsourcing was added in 2009
What are the most effective ways that you systematically or formally maintain, educate, and advance your professional skills?

- **Vendor white papers**: 40% (2009) vs. 38% (2008)
- **Vendor webinars**: 30% (2009) vs. 39% (2008)
- **Vendor conferences**: 27% (2009) vs. 26% (2008)
- **Books**: 27% (2009) vs. 26% (2008)
- **Media co. webinars**: 21% (2009) vs. 25% (2008)
- **Private company professional dev. courses**: 25% (2009) vs. 30% (2008)
- **Online/CD special skills training courses**: 24% (2009) vs. 22% (2008)
- **University professional dev. courses**: 24% (2009) vs. 22% (2008)
- **Vendor on-site seminars**: 21% (2009) vs. 24% (2008)
- **Media co. conferences seminars**: 17% (2009) vs. 23% (2008)
- **Professional assoc conference seminars**: 15% (2009) vs. 19% (2008)
- **Professional assoc webinars**: 13% (2009) vs. 10% (2008)

2009 respondents spent an average of 10 days per year on career training.
OPERATING SYSTEMS
Does your current embedded project use an operating system, RTOS, kernel, software executive, or scheduler of any kind?

Almost no changes in usage of RTOS, kernels, execs, schedulers over past 4 years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>2008</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>2007</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>2006</td>
<td>71%</td>
<td>29%</td>
</tr>
</tbody>
</table>

2009 (N = 1,546)  2008 (N = 1,080)  2007 (N = 966)  2006 (N = 1,023)
If current embedded project does not use an operating system, RTOS, kernel, software executive, or scheduler of any kind, why not?

- Current project doesn’t need it:
  - 2009 (N = 434) 80%
  - 2008 (N = 314) 81%
  - 2007 (N = 284) 78%
  - 2006 (N = 287) 86%

- Operating system uses too much memory:
  - 2009 (N = 434) 12%
  - 2008 (N = 314) 13%
  - 2007 (N = 284) 14%
  - 2006 (N = 287) 14%

- Operating system requires too much processor power:
  - 2009 (N = 434) 11%
  - 2008 (N = 314) 9%
  - 2007 (N = 284) 13%
  - 2006 (N = 287) 15%

- Operating system is too expensive:
  - 2009 (N = 434) 10%
  - 2008 (N = 314) 8%
  - 2007 (N = 284) 10%
  - 2006 (N = 287) 10%
### My current embedded project uses:
My next embedded project will likely use:

<table>
<thead>
<tr>
<th>Operating System currently used</th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
<th>2006</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial OS</td>
<td>47</td>
<td>49</td>
<td>47</td>
<td>51</td>
<td>55</td>
</tr>
<tr>
<td>Open-source OS without commercial support</td>
<td>27</td>
<td>19</td>
<td>22</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Internally developed or in-house OS*</td>
<td>26</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Commercial distribution of an open-source OS</td>
<td>14</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial OS</td>
<td>34</td>
<td>37</td>
<td>41</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>Open-source OS without commercial support</td>
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<td>26</td>
<td>27</td>
<td>19</td>
<td>34</td>
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<tr>
<td>Internally developed or in-house OS</td>
<td>26</td>
<td>23</td>
<td>15</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Commercial distribution of an open-source OS</td>
<td>13</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>*</td>
</tr>
</tbody>
</table>

*(N = 1,110) (N = 764) (N = 676) (N = 727) (N = 1,303)*

*Note: The increase in currently used “Internally developed” in 2009 is mostly due to converting this question to a multiple choice question in 2009. In prior years this was a single choice question, not allowing for multiple OS choices.

Red = Trending down
Green = Trending up
Which factors most influenced your decision to use a commercial operating system?

<table>
<thead>
<tr>
<th>Factor</th>
<th>2009 (N = 672)</th>
<th>2008 (N = 520)</th>
<th>2007 (N = 325)</th>
<th>2006 (N = 447)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-time capability</td>
<td>48%</td>
<td>47%</td>
<td>59%</td>
<td>58%</td>
</tr>
<tr>
<td>Overall cost</td>
<td>40%</td>
<td>41%</td>
<td>48%</td>
<td>46%</td>
</tr>
<tr>
<td>Technical support</td>
<td>39%</td>
<td>41%</td>
<td>50%</td>
<td>43%</td>
</tr>
<tr>
<td>Processor or hardware compatibility</td>
<td>33%</td>
<td>38%</td>
<td>43%</td>
<td>58%</td>
</tr>
<tr>
<td>Good software tools</td>
<td>36%</td>
<td>39%</td>
<td>48%</td>
<td>49%</td>
</tr>
<tr>
<td>Documentation</td>
<td>31%</td>
<td>32%</td>
<td>40%</td>
<td>43%</td>
</tr>
<tr>
<td>Royalty-free</td>
<td>25%</td>
<td>29%</td>
<td>28%</td>
<td>28%</td>
</tr>
<tr>
<td>Networking capability</td>
<td>22%</td>
<td>25%</td>
<td>29%</td>
<td>28%</td>
</tr>
<tr>
<td>Supplier's reputation</td>
<td>34%</td>
<td>28%</td>
<td>34%</td>
<td>25%</td>
</tr>
<tr>
<td>Code size/memory usage</td>
<td>22%</td>
<td>26%</td>
<td>26%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Base = Those who currently use a “Commercial” or “Commercial distribution of open source” OS
What are your reasons for not using a commercial operating system?

- **Current solution works fine**
  - 2009 (N = 862) 59%
  - 2008 (N = 491) 51%
  - 2007 (N = 235) 50%
  - 2006 (N = 268) 61%

- **Commercial alternatives too expensive**
  - 2009 (N = 862) 41%
  - 2008 (N = 491) 42%
  - 2007 (N = 235) 45%
  - 2006 (N = 268) 50%

- **Avoid reliance on commercial supplier**
  - 2009 (N = 862) 30%
  - 2008 (N = 491) 33%
  - 2007 (N = 235) 38%
  - 2006 (N = 268) 34%

- **No need for multitasking**
  - 2009 (N = 862) 16%
  - 2008 (N = 491) 15%
  - 2007 (N = 235) 14%
  - 2006 (N = 268) 13%

- **Commercial alternatives use too much memory**
  - 2009 (N = 862) 16%
  - 2008 (N = 491) 19%
  - 2007 (N = 235) 19%
  - 2006 (N = 268) 14%

- **Incompatible with existing SW apps or drivers**
  - 2009 (N = 862) 15%
  - 2008 (N = 491) 14%
  - 2007 (N = 235) 15%
  - 2006 (N = 268) 21%

- **Too much trouble to learn commercial alternative**
  - 2009 (N = 862) 9%
  - 2008 (N = 491) 12%
  - 2007 (N = 235) 13%
  - 2006 (N = 268) 14%

- **Commercial alternatives lack an features I need**
  - 2009 (N = 862) 9%
  - 2008 (N = 491) 11%
  - 2007 (N = 235) 13%
  - 2006 (N = 268) 15%

- **Other**
  - 2009 (N = 862) 4%
  - 2008 (N = 491) 8%
  - 2007 (N = 235) 12%
  - 2006 (N = 268) 16%

Base = Those who do not currently use a “Commercial” or “Commercial distribution of open source” OS
Who were the greatest influences on the choice of operating system?

- Software engineering staff: 40% (2009), 32% (2008), 30% (2007)
- Software engineering manager: 22% (2009), 33% (2008), 32% (2007)
- Group decision within engineering: 37% (2009), 33% (2008), 36% (2007)
- Same OS as previous project: 32% (2009), 33% (2008), 32% (2007)
- Corporate management: 29% (2009), 32% (2008), 29% (2007)
- Hardware engineering staff: 19% (2009), 15% (2008), 13% (2007)
- Systems engineering staff: 14% (2009), 13% (2008), 13% (2007)
- Outside infl./customer/standards: 14% (2009), 14% (2008), 14% (2007)
- Systems engineering manager: 13% (2009), 13% (2008), 14% (2007)
- Hardware engineering manager: 12% (2009), 13% (2008), 10% (2007)
- Marketing manager or department: 6% (2009), 6% (2008), 4% (2007)
- Purchasing manager or department: 4% (2009), 6% (2008), 6% (2007)
Did you use the same operating system, RTOS, or kernel as in your previous project?

Yes, used the same operating system, RTOS, or kernel as in previous project:
- 2005 (N = 1,601): 62%
- 2007 (N = 664): 60%
- 2008 (N = 759): 65%
- 2009 (N = 1,501): 63%

No, did not use the same operating system, RTOS, or kernel as in previous project:
- 2005 (N = 1,601): 37%
- 2007 (N = 664): 40%
- 2008 (N = 759): 35%
- 2009 (N = 1,501): 56%
Why did you use the same operating system?

- Happy with current one, no reason to switch
- Wanted to maintain software compatibility
- Wanted to maintain the same tools or software
- Wanted to make use of expertise/familiarity
- Switching OS too expensive/time-consuming
- Not my choice/operating system chosen for me
- Happy with supplier
- No other suitable alternatives available

Base = Those who are using the same operating system as in previous project

- 2009 (N = 943)
- 2008 (N = 487)
- 2007 (N = 405)
- 2006 (N = 616)
Why did you switch operating systems?

- Hardware or processor changed
- Not my choice/operating system chosen for me
- New operating system had better features
- New operating system had better growth path
- New operating system had better SW/dev tools
- New operating system is cheaper
- Previous operating system too slow
- Unhappy with previous operating system supplier
- Previous operating system no longer available

Base = Those who did not use the same operating system as in previous project

2009 (N = 530)
2008 (N = 261)
2007 (N = 262)
2006 (N = 334)
Please select ALL of the operating systems you are currently using.

- Wind River (VxWorks) - 18% (2009) / 21% (2008)
- Inhouse/ custom - 14% (2009) / 19% (2008)
- Microsoft (Windows CE) - 12% (2009) / 14% (2008)
- Microsoft (XP Embedded) - 12% (2009) / 14% (2008)
- Debian (Linux) - 9% (2009) / 9% (2008)
- Micrium (uCOS) - 9% (2009) / 9% (2008)
- Red Hat (IXLinux) - 8% (2009) / 7% (2008)
- Green Hills (Integrity) - 7% (2009) / 6% (2008)
- Texas Instruments (DSP/ BIOS) - 6% (2009) / 7% (2008)
- Mentor Graphics (Nucleus) - 6% (2009) / 6% (2008)
- Keil (RTX) - 5% (2009) / 5% (2008)
- MontaVista (MV Linux) - 4% (2009) / 7% (2008)
- QNX (QNX) - 4% (2009) / 5% (2008)
- QNX (Neutrino) - 4% (2009) / 5% (2008)
- eCos - 3% (2009) / 4% (2008)
- Express Logic (ThreadX) - 3% (2009) / 3% (2008)
- LynuxWorks (LynxOS) - 3% (2009) / 3% (2008)
- Wind River (pSOS) - 3% (2009) / 2% (2008)
- CMX (RTX/ EmbOS) - 3% (2009) / 2% (2008)
- Wind River (Platform neLinux) - 2% (2009) / 2% (2008)
- OSEK (Metrowerks OSEK turbo) - 2% (2009) / 1% (2008)
- Symbian (EPOC) - 2% (2009) / 2% (2008)
- LynuxWorks (BlueCat) - 2% (2009) / 1% (2008)
- Quadros (RDIQ) - 1% (2009) / 1% (2008)
- OSE systems (OSE) - 1% (2009) / 1% (2008)
- KADAK (AMX) - 1% (2009) / 1% (2008)

Base: Currently using an operating system

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

Wind River (VxWorks) 16%
Micrium (uCOS) 14%
Microsoft (Windows CE) 13%
Microsoft (XP Embedded) 12%
Debian (Linux) 11%
Red Hat (IX Linux) 9%
Inhouse/ custom 9%
Green Hills (Integrity) 9%
TI (DSP/ BIOS) 8%
QNX (QNX) 8%
Keil (RTX) 7%
MontaVista (MV Linux) 6%
eCos 6%
QNX (Neutrino) 5%
Mentor Graphics (Nucleus) 5%
LynuxWorks (LynxOS) 4%
Express Logic (ThreadX) 4%
Wind River (Platform neLinux) 4%
CMX (RTX/ EmbOS) 4%
Metrowerks (OSEK/ turbo) 2%
LynuxWorks (BlueCat) 2%
TimeSys (Linux/ RT) 2%
Symbian (EPOC) 1%
Wind River (pSOS) 2%
Quadros (RDiG) 2%
FSMLabs (RTLinux) 3%
Are you considering using embedded Linux?

- Yes, using it now: 25% (2009), 23% (2008), 21% (2007)
- Yes, likely to use it in next 6 months (soon): 6% (2009), 5% (2008), 6% (2007)
- Yes, likely to use in next 12 months: 21% (2009), 20% (2008), 25% (2007)
- No, not interested in using it: 49% (2009), 52% (2008), 48% (2007)
Why are you interested in embedded Linux?

- **Low cost**
  - 2009: 73%
  - 2008: 67%
  - 2007: 67%

- **Adaptability/extensibility**
  - 2009: 58%
  - 2008: 57%
  - 2007: 56%

- **Built-in drivers/network protocols**
  - 2009: 41%
  - 2008: 38%

- **Control of features/migration**
  - 2009: 37%
  - 2008: 41%
  - 2007: 37%

- **Performance**
  - 2009: 34%
  - 2008: 31%
  - 2007: 37%

- **Avoid commercial alternatives**
  - 2009: 34%
  - 2008: 31%
  - 2007: 33%

- **Memory requirements**
  - 2009: 19%
  - 2008: 15%
  - 2007: 22%

*Note: Answer added in 2008

*Base = Those who use or are considering using Linux*
Why are you **not** interested in embedded Linux?

- **Incompatible w/ existing software, apps, drivers**
  - 2009: 38%
  - 2008: 41%
  - 2007: 42%

- **Memory usage**
  - 2009: 21%
  - 2008: 20%
  - 2007: 22%

- **Performance or real-time capability**
  - 2009: 20%
  - 2008: 22%
  - 2007: 25%

- **Support**
  - 2009: 19%
  - 2008: 18%
  - 2007: 19%

- **Legal ambiguity**
  - 2009: 14%
  - 2008: 13%
  - 2007: 16%

- **Development tools**
  - 2009: 12%
  - 2008: 12%
  - 2007: 15%

- **Cost**
  - 2009: 8%
  - 2008: 5%
  - 2007: 6%

- **Other**
  - 2009: 29%
  - 2008: 28%
  - 2007: 26%

*Other responses 2009:
- No need: 23%
- Unfamiliarity: 12%
- Too big/complex: 11%
MICROPROCESSORS
Who were the greatest influences on the choice of the processor for your current project?

- HW engineering staff
- Group decision in engineering
- SW engineering staff
- HW engineering mgr.
- Same processor as prev. project
- SW engineering mgr.
- Systems engineering staff
- Corporate mgmt.
- Systems engineering mgr.
- Outside infl./ customer/ standards
- Marketing mgr. or dept.
- Purchasing mgr. or dept.
- Other (please specify)
My current embedded project contains:

- A single microprocessor/microcontroller: 50% (2009), 52% (2008), 53% (2007), 56% (2006)
- 6–10 processors/microcontrollers: 3% (2009), 4% (2008), 5% (2007), 4% (2006)
- >10 processors/microcontrollers: 4% (2009), 6% (2008), 5% (2007), 3% (2006)
Does your multiple-processor embedded project contain . . .

- Multiple different processor chips: 67% (2009), 61% (2008), 64% (2007), 68% (2006)
- Multiple identical processor chips: 23% (2009), 30% (2008), 27% (2007), 26% (2006)
- Single chip with multiple identical processor cores: 7% (2009), 6% (2008), 4% (2007), 4% (2006)
- Single chip with multiple different processor cores: 4% (2009), 4% (2008), 5% (2007), 2% (2006)

Base: Those who use multiple microprocessor/microcontrollers for current project
My current embedded project's main processor is a:

- 8-bit processor: 16% (2009), 13% (2008), 16% (2007), 18% (2006)
- 16-bit processor: 17% (2009), 19% (2008), 18% (2007), 19% (2006)
- 32-bit processor: 60% (2009), 58% (2008), 61% (2007), 54% (2006)
- 64-bit processor: 6% (2009), 7% (2008), 6% (2007), 4% (2006)
- Don't know: 1% (2009), 3% (2008), 1% (2007), 2% (2006)
My current embedded project's **main processor clock rate** is:

- **Under 10 MHz**: 8%
- **10 – 99 MHz (Net)**: 39%
- **10 - 24 MHz**: 15%
- **25 - 49 MHz**: 15%
- **50 - 99 MHz**: 15%
- **100 – 249 MHz**: 17%
- **250 – 499 MHz**: 14%
- **500 – 749 MHz**: 8%
- **750 MHz – 1 GHz**: 5%
- **Above 1 GHz**: 7%

In 2009, 10–99 MHz was broken into three categories for greater granularity.
Did you use the same processor as in your previous embedded project?

- Yes, used the same processor as in previous embedded project: 48% (2009), 48% (2008), 42% (2007), 50% (2006), 50% (2005)
- No, did not use the same processor as in previous project: 52% (2009), 52% (2008), 59% (2007), 50% (2006), 53% (2005)
Why did you use the same processor?

- Happy with current processor/supplier
  - 2009: 59%, 60%, 59%, 62%
  - 2008: 55%, 56%, 55%, 65%
  - 2007: 51%, 49%, 54%, 59%
  - 2006: 46%, 46%, 46%

- To maintain software compatibility
  - 2009: 59%, 60%, 59%, 62%
  - 2008: 55%, 56%, 55%, 65%
  - 2007: 51%, 49%, 54%, 59%
  - 2006: 46%, 46%, 46%

- To maintain the same tools or software
  - 2009: 41%, 41%, 41%, 41%
  - 2008: 46%, 46%, 46%, 46%
  - 2007: 46%, 46%, 46%, 46%
  - 2006: 46%, 46%, 46%

- To make use of expertise/familiarity
  - 2009: 27%, 29%, 27%, 34%
  - 2008: 22%, 24%, 22%, 24%
  - 2007: 21%, 21%, 21%, 21%
  - 2006: 21%, 21%, 21%

- Switching is too expensive/time-consuming
  - 2009: 12%, 12%, 12%, 12%
  - 2008: 12%, 12%, 12%, 12%
  - 2007: 10%, 10%, 10%, 10%
  - 2006: 14%, 14%, 14%

- Not my choice/processor chosen for me
  - 2009: 4%, 6%, 5%, 6%
  - 2008: 6%, 6%, 6%, 6%
  - 2007: 6%, 6%, 6%, 6%
  - 2006: 6%, 6%, 6%

- No other suitable processors available
  - 2009: 4%, 6%, 5%, 6%
  - 2008: 6%, 6%, 6%, 6%
  - 2007: 6%, 6%, 6%, 6%
  - 2006: 6%, 6%, 6%

Base = Those who are currently using the same processor as in previous project.
What were your reasons for switching processors?

- New processor had better features
- Previous processor too slow
- New processor had better future growth path
- Not my choice, processor chosen for me
- New processor had better SW/ dev tools
- Previous processor no longer available
- Previous processor too expensive
- Previous processor didn’t meet thermal/ power req.
- Unhappy with previous processor’s supplier

Base = Those who did not use the same processor as in previous project
Did you . . .

- Choose a processor from a different family, architecture, or instruction set:
  - 2009 (N = 768): 57%
  - 2008 (N = 534): 54%
  - 2007 (N = 517): 59%
  - 2006 (N = 448): 56%

- Choose a different processor from the same family, architecture, or instruction set:
  - 2009 (N = 768): 43%
  - 2008 (N = 534): 46%
  - 2007 (N = 517): 41%
  - 2006 (N = 448): 44%

Base = Those who did not use the same processor as in previous project.
What’s most important when choosing a microprocessor?

- The chip itself:
  - 2009: 48%
  - 2008: 36%
  - 2007: 34%

- The ecosystem surrounding the chip (software, tools, support, etc.):
  - 2009: 57%
  - 2008: 59%
  - 2007: 58%

- The chip’s supplier/vendor:
  - 2009: 10%
  - 2008: 7%
  - 2007: 8%
If you selected "ecosystem," please write in which vendor has the best ecosystem for your needs. (Please write in only one vendor.)

- Freescale: 10%
- ARM: 9%
- Microchip: 9%
- Texas: 7%
- Atmel: 6%
- Intel: 6%
- Wind River: 3%
- Green Hills: 3%
- Keil: 2%
- IAR: 2%
- Xilinx: 2%
- Altera: 2%
- Microsoft: 2%
- Open: 2%
- Renesas: 2%
- Rabbit: 1%
- STMicro: 1%

2009 (N = 508) Unaided
What are the most important factors in choosing a processor?

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

Survey results:
- **2009 (N=1,521)**
- **2008 (N=1,056)**
- **2007 (N=932)**
- **2006 (N=896)**
Please select the processor vendors you are currently using.

- ARM (any vendor)
- Freescale
- Microchip
- Atmel
- Texas Instruments
- Intel
- Xilinx
- PowerPC
- Altera
- Philips/NXP
- AMD
- Analog Devices
- STMicro
- Renesas
- Cypress
- Silicon Labs
- Infineon
- MIPS
- Rabbit Semiconductor
- Dallas Semi/Maxim
- IBM
- Zilog
- National Semiconductor
- Actel
- AMCC
- Luminary Micro
- NEC
- Marvell
- Cirrus Logic
- Samsung
- Fujitsu
- Toshiba
- LSI Logic
- Sharp
- IDT
- ARC
- Oki Semiconductor
- Other (specify)
Please select the processor vendors you are considering using on your next project.

2009 (N = 1293)

- ARM (any vendor): 43%
- Freescale: 36%
- Texas Instruments: 30%
- Microchip: 29%
- Atmel: 24%
- Intel: 21%
- Xilinx: 18%
- PowerPC: 16%
- Altera: 14%
- Philips/NXP: 11%
- STMicro: 11%
- Analog Devices: 10%
- Renesas: 10%
- Cypress: 9%
- AMD: 8%
- Silicon Labs: 8%
- Luminary Micro: 6%
- MIPS: 6%
- Actel: 6%
- Infineon: 6%
- Dallas Semi/Maxim: 6%

2008 (N = 843)

- Rabbit Semiconductor: 4%
- Zilog: 3%
- IBM: 3%
- National Semiconductor: 4%
- NEC: 3%
- Marvell: 3%
- AMCC: 3%
- Samsung: 3%
- Fujitsu: 3%
- Cirrus Logic: 2%
- LSI Logic: 2%
- Sharp: 2%
- Toshiba: 2%
- ARC: 1%
- Oki Semiconductor: 1%
- PMC-Sierra: 1%
- Tensilica: 1%
- Agere: 1%
- IDT: 1%
- Stretch: 1%
- Other (specify): 2%
Which of the following 32-bit chip families would you consider for your next embedded project?

Note: New families were added in 2009 in all cases where 2008 gold bar graph does not appear.
Which of the following 16-bit chip families would you consider for your next embedded project?

- TI MSP430: 33% (2009), 37% (2008)
- Microchip PIC24: 37% (2009), 37% (2008)
- Microchip dsPIC: 25% (2009), 27% (2008)
- Freescale HC16: 24% (2009), 27% (2008)
- Freescale HC12: 20% (2009), 22% (2008)
- Renesas H8/300H, H8S, H8S/2000, M16C: 12% (2009), 12% (2008)
- STMicro ST9, ST10: 11% (2009), 12% (2008)
- AMD 186, '188: 10% (2009), 13% (2008)
- Zilog Z180, Z380: 8% (2009), 6% (2008)
- NXP/Philips 8051XA: 7% (2009), 9% (2008)
- Maxim: 4% (2009)
- Other: 6% (2009), 7% (2008)

* Note that Microchip PIC24 and dsPIC were not separated in previous surveys, hence 2008 data does not apply.
Which of the following 8-bit chip families would you consider for your next embedded project?
Which of the following **DSP** chip families would you consider for your **next** embedded project?

- **Analog Devices Blackfin**
- **Microchip dsPIC**
- **TI 'C6000***
- **TI OMAP**
- **TI 'C5000***
- **TI 'C2000***
- Freescale 563xx, 566xx, 568xx, 96xxx
- **TI 'C3x, 'C8x**
- **Analog Devices SHARC**
- **Analog Devices TigerSHARC**
- **Analog Devices ADSP-21xx**
- Freescale StarCore 7ox, 8ox
- **Other**

**2009 (N = 981)**

- 31%
- 22%
- 24%
- 23%
- 18%
- 22%
- 18%
- 19%
- 17%
- 16%
- 12%
- 8%

**2008 (N = 685)**

- 32%
- 28%
- 28%
- 23%
- 20%
- 18%
- 19%
- 17%
- 16%
- 14%
- 10%
- 8%
FPGAs AND CUSTOM LOGIC
Does your current embedded project contain FPGAs/programmable logic?

No 55%

Yes 45%

2009 (N = 1,536)
If yes, which of the following vendors does your current embedded projects use for FPGAs, and which will you consider in your next embedded project?

- **Xilinx**: 76% (Currently use) 67% (Will consider)
- **Altera**: 54% (Currently use) 41% (Will consider)
- **Lattice**: 18% (Currently use) 11% (Will consider)
- **Actel**: 19% (Currently use) 9% (Will consider)
- **Oxygen**: 10% (Currently use) 5% (Will consider)
- **Quicklogic**: 14% (Currently use) 3% (Will consider)
- **Atmel**: 14% (Currently use) 7% (Will consider)
- **Mentor Graphics**: 5% (Currently use) 4% (Will consider)
- **Synplicity**: 9% (Currently use) 3% (Will consider)
- **CADENCE**: 3% (Currently use) 2% (Will consider)
- **Other**: 2% (Currently use) 2% (Will consider)

Note: This chart is not historical, rather it points to the future. “Will consider in the next embedded project” shows substantial increases across the board over “current usage”. But actual increases in usage will likely be smaller than shown.
Will your next embedded project likely contain FPGAs/programmable logic?

- Yes: 50% (2009), 48% (2008), 57% (2007), 57% (2006)
- No: 51% (2009), 52% (2008), 43% (2007), 43% (2006)
Why won’t your next project include customizable chips?

- Don’t need this functionality: 68%
- They’re too expensive: 21%
- They consume too much power: 12%
- They’re too difficult to use: 8%
- They’re not fast enough for our purposes: 2%
- They’re not big enough for our purposes: 1%
- They’re not reliable enough: 1%
- Don’t know: 13%

Base = Those who will not be using customizable chips.
OUTSOURCING
Have you personally been involved in embedded development projects that have been partially or completely **outsourced**?

**In 2009, 19% of those outsourcing, outsourced BOTH inside and outside.**
To what region did you outsource?

- **India**: 64% (2009), 51% (2008), 47% (2007)
- **China**: 33% (2009), 13% (2008), 11% (2007)
- **Western Europe**: 16% (2009), 12% (2008), 18% (2007)
- **Eastern Europe**: 8% (2009), 6% (2008), 14% (2007)
- **Southeast Asia**: 8% (2009), 6% (2008), 6% (2007)
- **Japan**: 1% (2009), 6% (2008), 6% (2007)
- **Korea**: 1% (2009), 3% (2008), 1% (2007)
- **Near East**: 2% (2009)
- **Other**: 9% (2009), 6% (2008), 9% (2007)

Base = Any who outsourced outside the U.S.
2009
*Embedded Market Study*