

2017
EMBEDDED SYSTEMS
SAFETY & SECURITY
SURVEY

March 23, 2017
Andrew Girson, CEO
@barrgroup

B& BARR
group
The Embedded Systems Experts



ABOUT BARR GROUP

*Mission: "Help as many people as possible build SAFER,
MORE RELIABLE and MORE SECURE embedded systems."*

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The Embedded Systems Experts
<http://www.barrgroup.com>

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WEBINAR FORMAT

Overview and methodology

Respondent demographics

Analysis

- Industry snapshot
- Safety findings
- Security findings

Prize winner announcement

Q&A

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SURVEY GOALS

Barr Group's third annual market survey

- To deepen industry knowledge of trends and practices
- To help improve the embedded systems industry

Deep dive on safety/reliability and security

- Thus a supplement to existing broad market surveys
Similar demographics, but less "vendor" focused

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SURVEY METHODOLOGY

Brief ~5-minute web-based survey

- Open Jan 10 to Feb 3, 2017
- Accessible via specific URL

Nearly 200,000 targeted email invitations sent
Link promotion on Twitter, LinkedIn, website, etc.



Prize drawing incentive

- Saleae USB logic analyzer (2 @ \$219 retail)
- Amazon.com gift card (3 @ \$25)

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WORLDWIDE RESPONSE

Completed: 2,022



US & Canada	50%
Europe	27%
Asia	14%
Rest of World	9%

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QUALIFICATION OF RESPONDENTS

Disqualifications based on

- No paid years of design experience (147)
- Not directly involved in designs (80)
- Vague current project details (69)

Qualified active professional engineers: 1,726!

- Study repeatability 95%
- Margin of error +/- 2.4%

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(SOME) PARTICIPATING ORGANIZATIONS

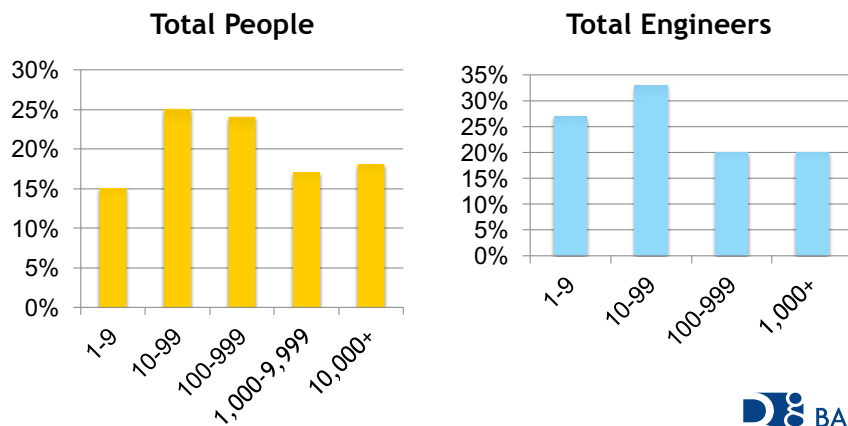
Agilent * Alcatel * Ametek * Apple * Aquatron Robotics
 Battelle * Bayer Healthcare * Beta Bionics * Borg Warner * Bosch
 Calsense * Carrier * Cisco * Continental Automotive * Cruzio
 Daimler * Dolby * Eaton * Echostar * Fluke * Ford * Fresenius Medical
 Garmin * Goodyear * Graco * Grundfos * Harman * Harris * Honeywell
 Hughes * IBM * Intel * JHU-APL * John Deere * Keysight * L-3 Communications
 Landis+Gyr * Lenovo * Lincoln Electric * Lockheed Martin * Lutron
 MED-EL * Medtronic * Mitre * Motorola * NCR * NDI Medical * Netapp
 Northrup Grumman * Omron * Orthoscan * Overhead Door * Philips * Phyttec
 Qualcomm * Renesas * Rockwell * Rockwell Collins * Schneider Electric
 Schonstedt * Sciex * Seagate * Shlumberger * SnapOn * Spirent * Stryker
 Teledyne * Thales * Thermo Fisher * Texas Instruments * Toshiba
 Tyco * Visteon * Wavetronix * Whirlpool * Xerox * Zebra

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COMPANY SIZES REPRESENTED

Responses: 1,726



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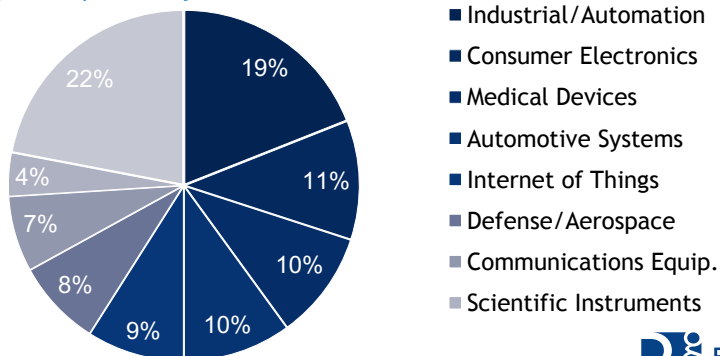


PRODUCT CATEGORIES

"your current project"

Responses: 1,726

"answer all questions about a single embedded systems design project you are personally involved with"

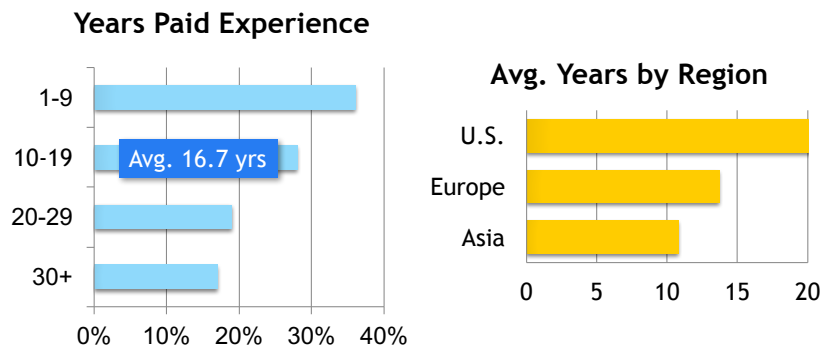


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QUALIFIED RESPONDENT EXPERIENCE

Responses: 1,726

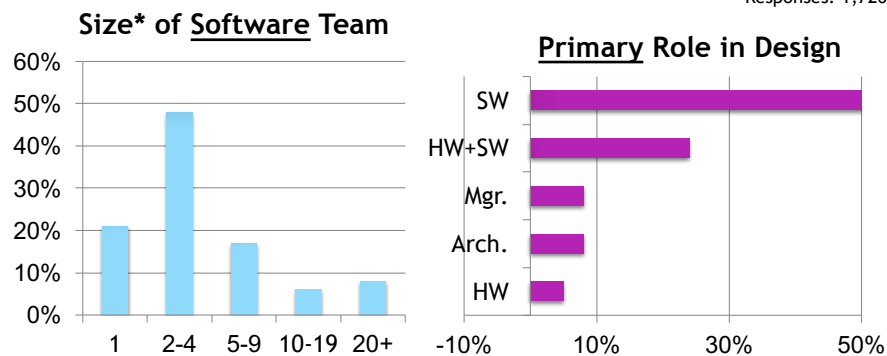


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TEAM SIZES AND RESPONDENT ROLES

Responses: 1,726

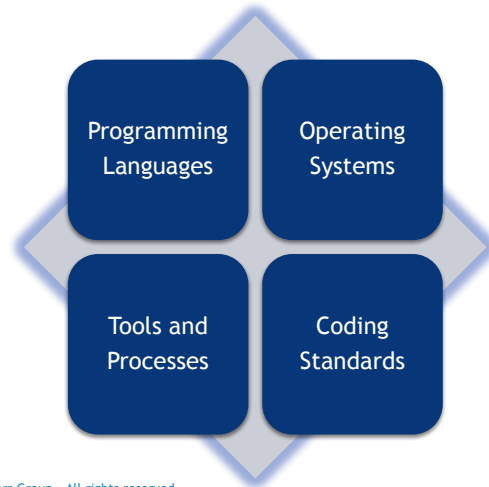


* "At peak effort, how many people will be involved in writing embedded software for your current project?"

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INDUSTRY SNAPSHOT



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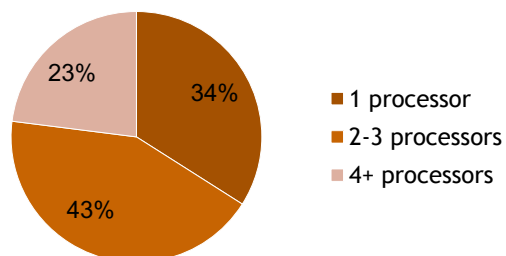
NUMBER OF PROCESSORS

“(including microcontrollers and cores)”

Responses: 1,726

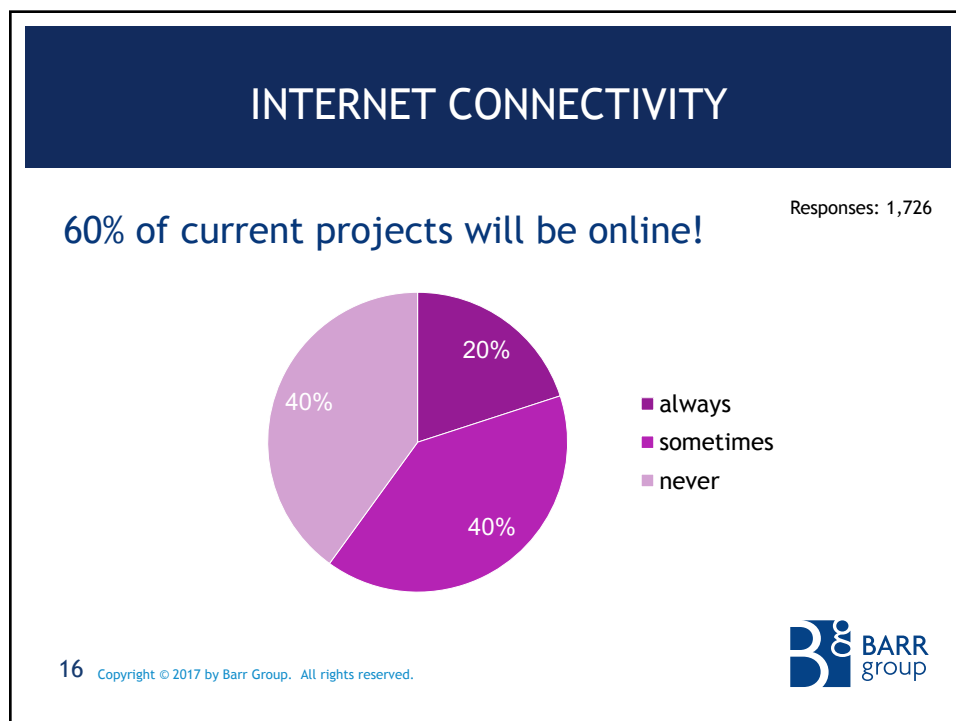
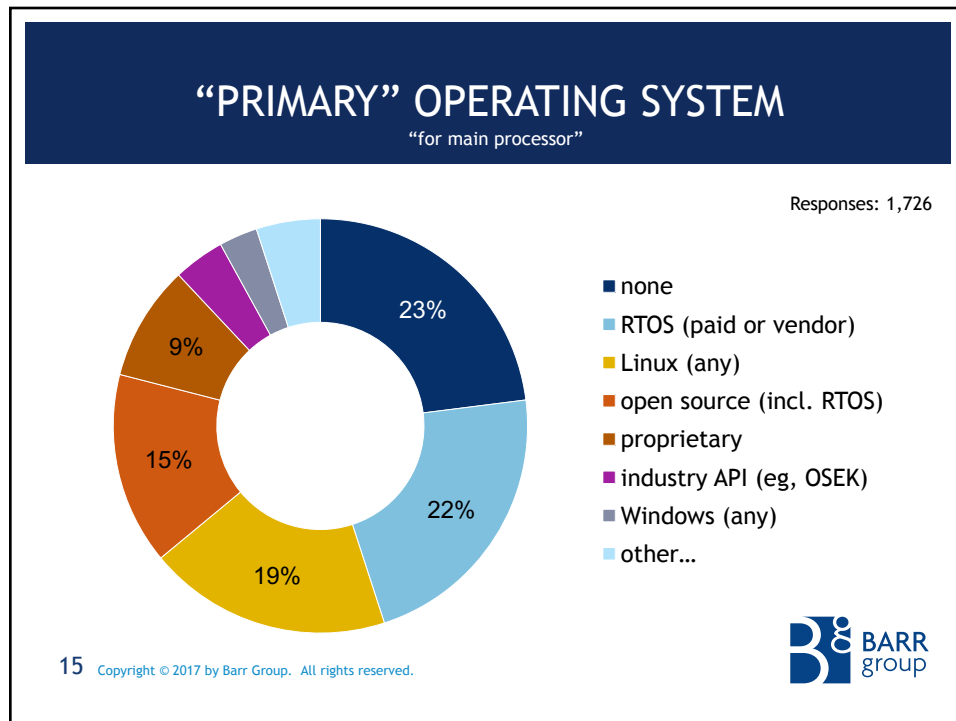
Just 34% of current designs have 1 ...

Another 23% now have 4+ processors!



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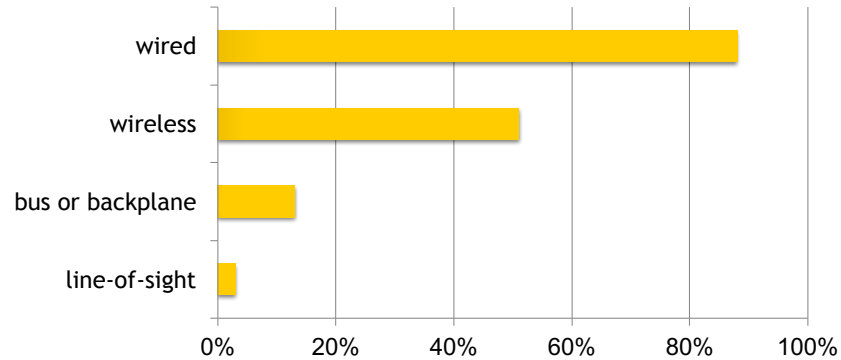




TYPES OF EXTERNAL INTERFACES

“(select all that apply)”

Responses: 1,726

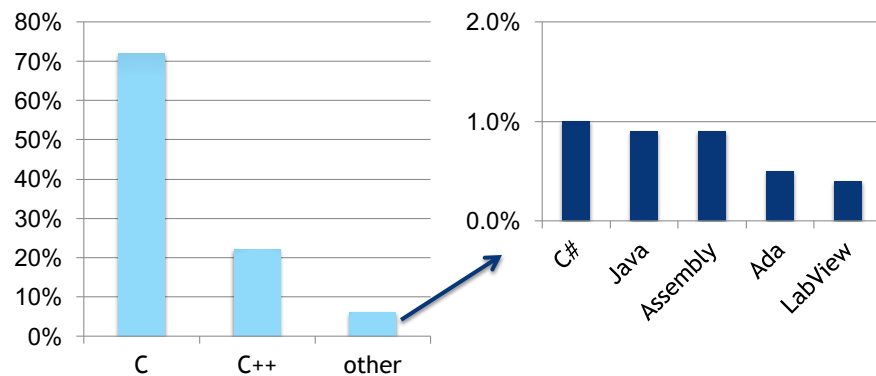


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“PRIMARY” PROGRAMMING LANGUAGE

Responses: 1,726

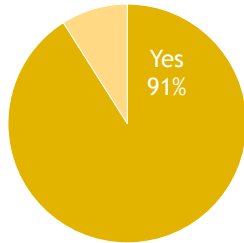
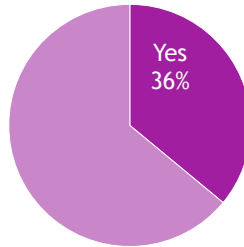
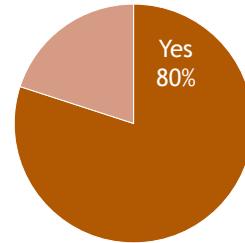


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SOFTWARE DEVELOPMENT PRACTICES

Responses: 1,726

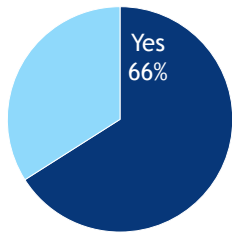
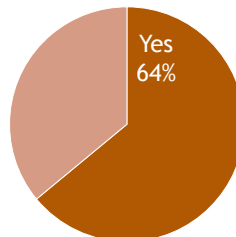
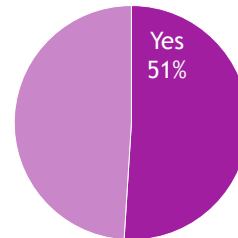
Version Control**Test-Driven Development****Defect Tracking**

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SOFTWARE DEVELOPMENT PRACTICES

Responses: 1,726

Coding Standards**Code Reviews****Static Analysis**

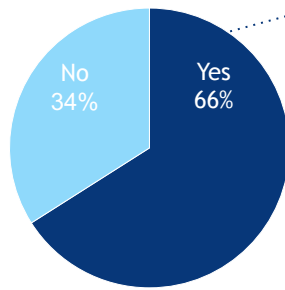
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CODING STANDARDS

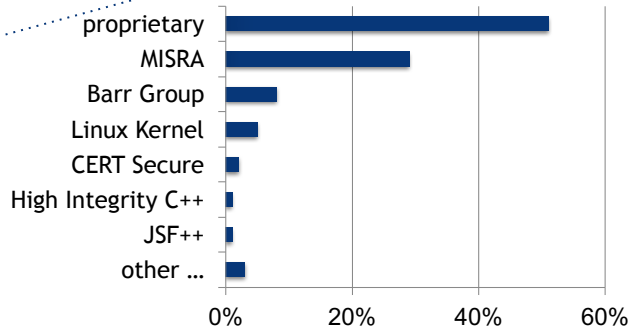
Responses: 1,726

Written Standard?



Primary Basis

Subset: 1,115

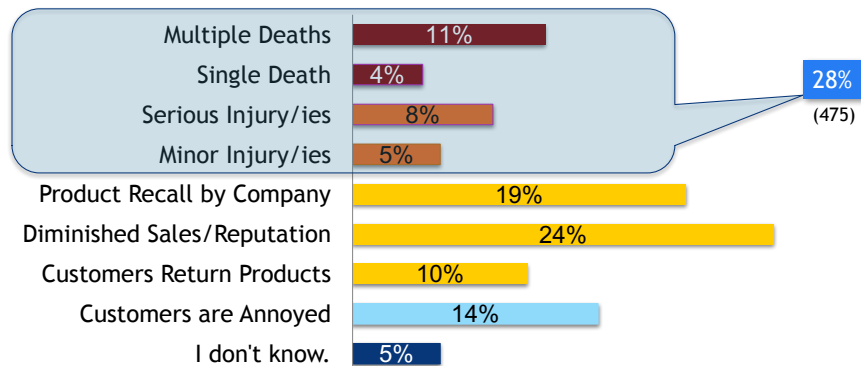


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SAFETY FINDINGS

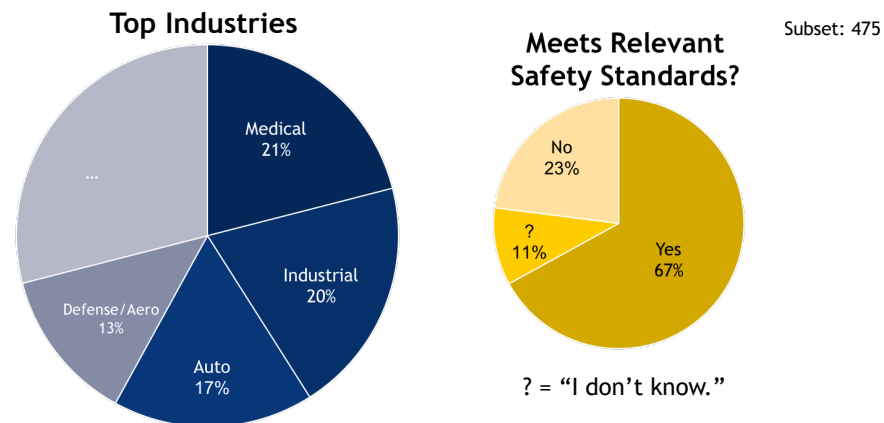
Responses: 1,726



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WHERE ARE THE DANGEROUS DESIGNS?



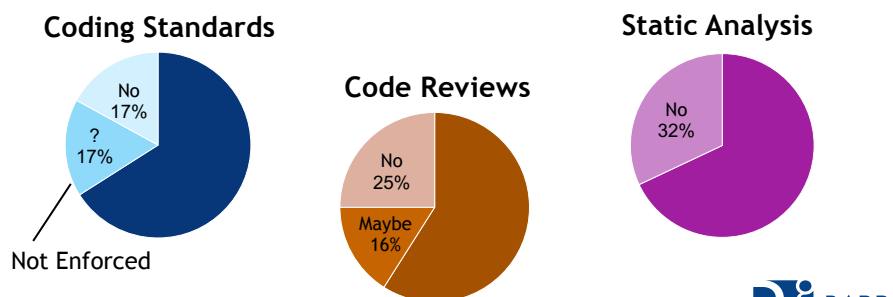
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SAFETY FINDING #1: INSUFFICIENT PROCESS

Safety depends upon high quality software Subset: 475

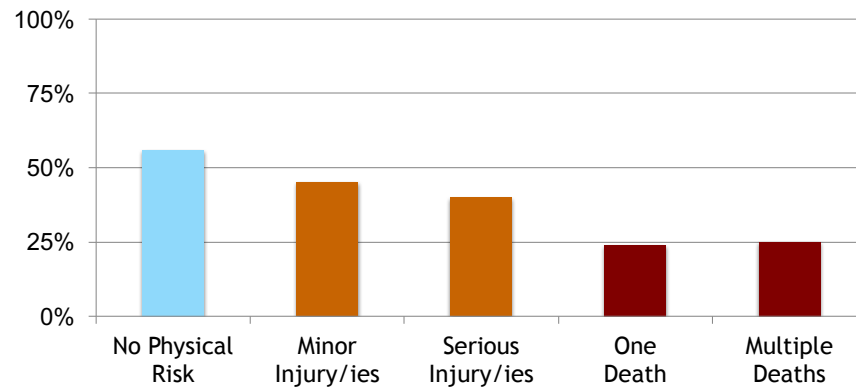
■ Risk of injury: why aren't best practices universal?



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NON-USE OF STATIC ANALYSIS VS. RISK



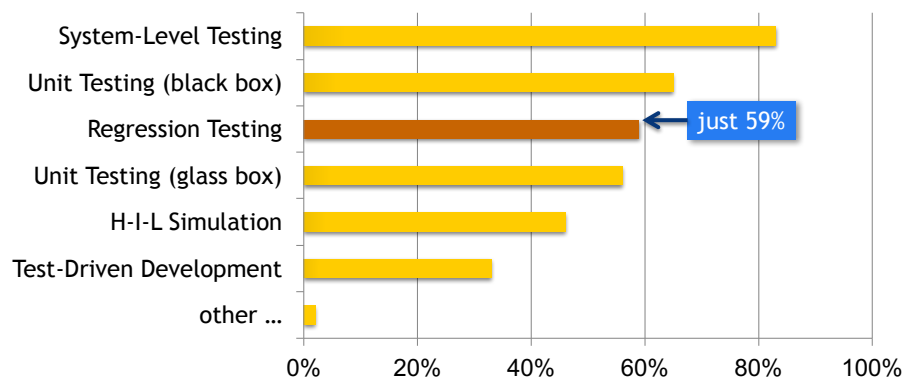
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TEST PLANS

“(select all that apply)”

Subset: 475



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RISK SHOULD DICTATE PROCESS

Safety, like justice, must be seen to be present...

- Written “safety case” analysis

The graver the risk, the greater the needs

- Worst-case risk → “Safety Integrity Level” → process
(e.g., MISRA-SW requires code “review” at SIL2+ and “automated static analysis” at SIL3+)

System/software reliability must be “baked in”

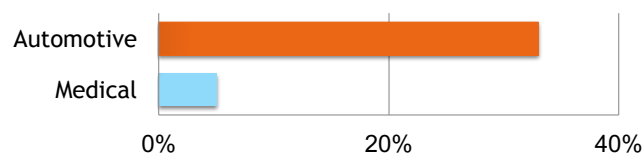
- Safety can’t be a “bolt on” feature

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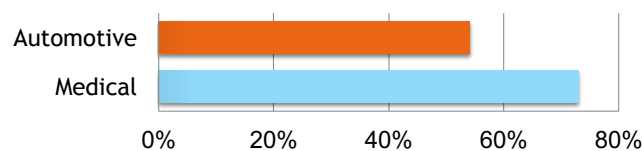


SAFETY FINDING #2: MISSING STANDARDS

Auto industry much more apt to risk multiple lives:



Yet much less likely to follow a safety standard:



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THE SAFETY LANDSCAPE

Voluntary Standards vs. Regulation and Oversight



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WHERE WE'RE HEADED...

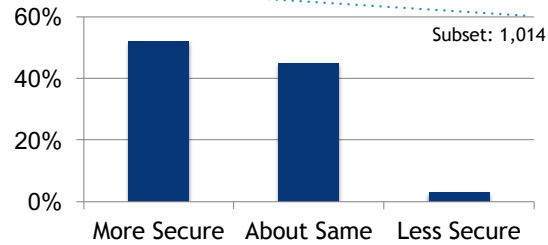
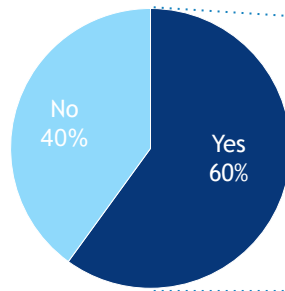
Google's code driving Toyota's code...



SECURITY FINDINGS

Responses: 1,726

Security Required?



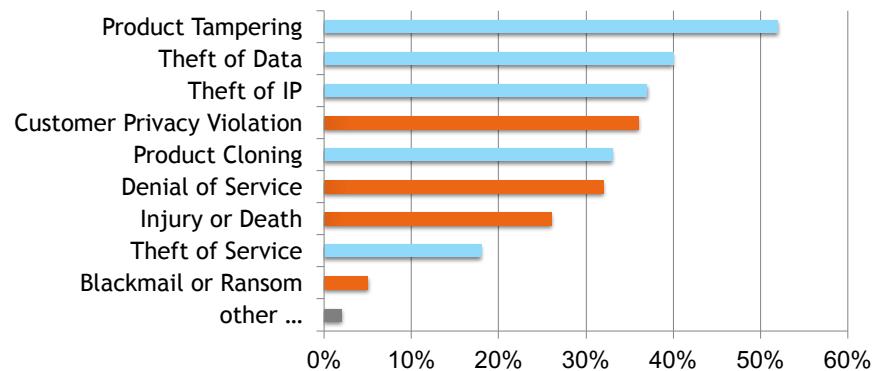
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“PRIMARY SECURITY CONCERNS”

“(select all that apply)”

Subset: 1,014

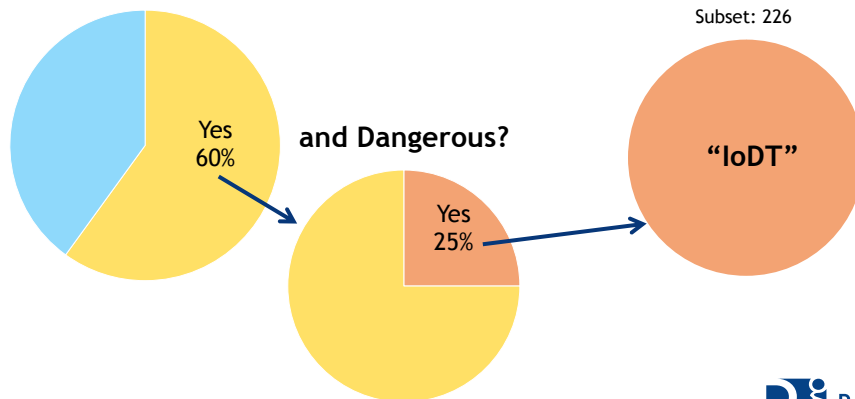


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THE INTERNET OF DANGEROUS THINGS

On the Internet?



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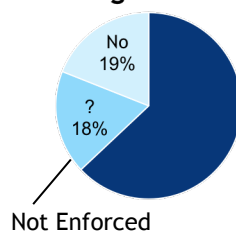


SECURITY FINDING #1: LOW HANGING FRUIT

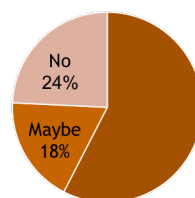
Security depends in part on reliability, yet
“luck” is too often the only process step...

Subset: 226

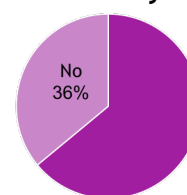
Coding Standards



Code Reviews

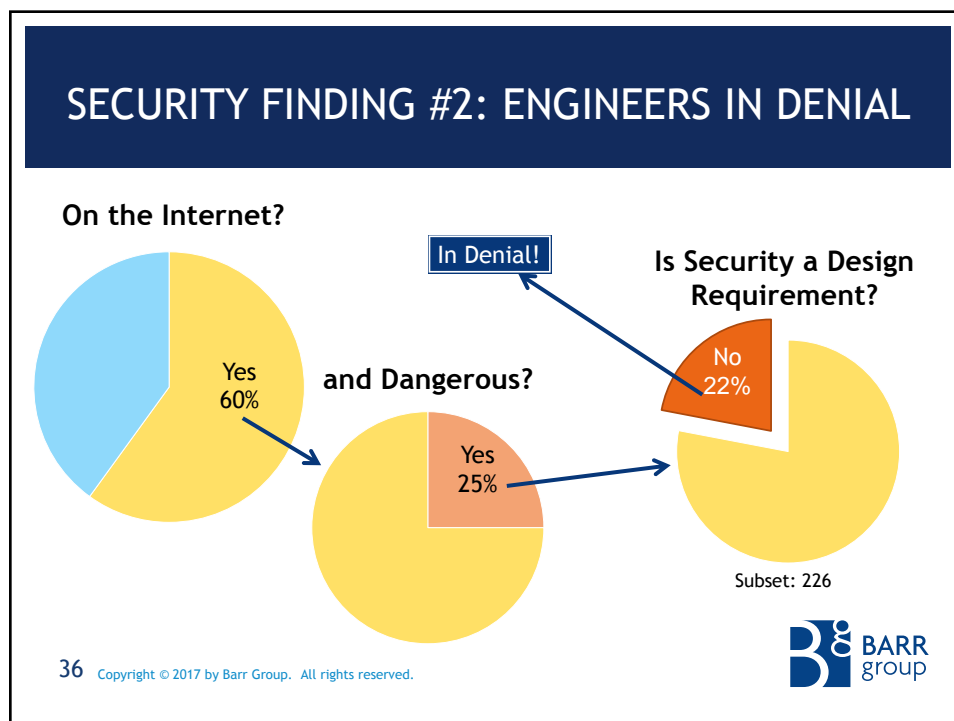
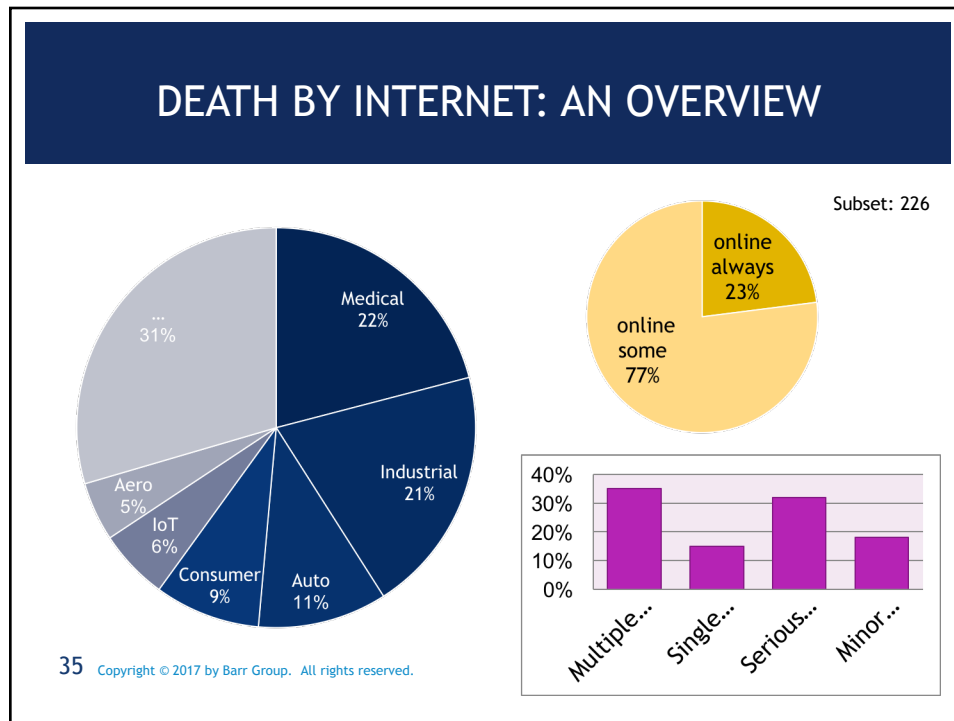


Static Analysis



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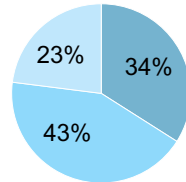


SECURITY FINDING #3: NO EASY SOLUTIONS

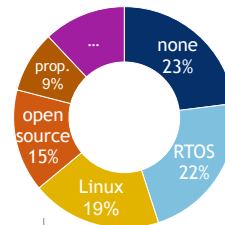
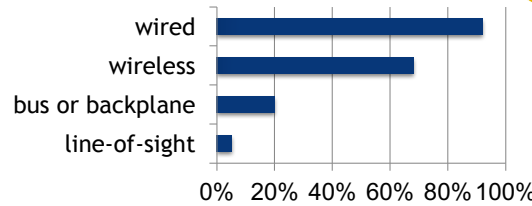
Every embedded design is unique

■ Security solutions market: inefficient

Responses: 1,726



- 1 processor
- 2-3 processors
- 4+ processors



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WINNERS OF OUR PRIZE DRAWINGS



Prize	Name	Location
Saleae Logic 8	Ismael	Spain
Saleae Logic 8	Daniel	United States
Amazon Gift Card (€25)	Stefan	Germany
Amazon Gift Card (\$25)	Dave	United States
Amazon Gift Card (\$25)	Cody	United States

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QUESTION & ANSWER

We'll now answer questions from attendees...



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THANK YOU FOR JOINING US!

Note: This webinar is a summary of key findings

- Written report available as free PDF (see website)
- Raw survey data available for license (contact us)

Upcoming public training events

- *Best Practices for Designing Safe & Secure Systems*
- *Embedded Security/Android/Software Boot Camps*
- Several courses in Munich, Germany

<http://barrgroup.com/training-calendar>

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