PTC /AUTOMOTIVE ENGINEERING INTERNATIONAL

Software Development Study

2011

Conducted By

613 Anderson Ave. Cliffside Park, NJ 07010 ▪ (201) 945-6903 ▪ FAX (201) 945-0593 ▪ www.signetresearch.com

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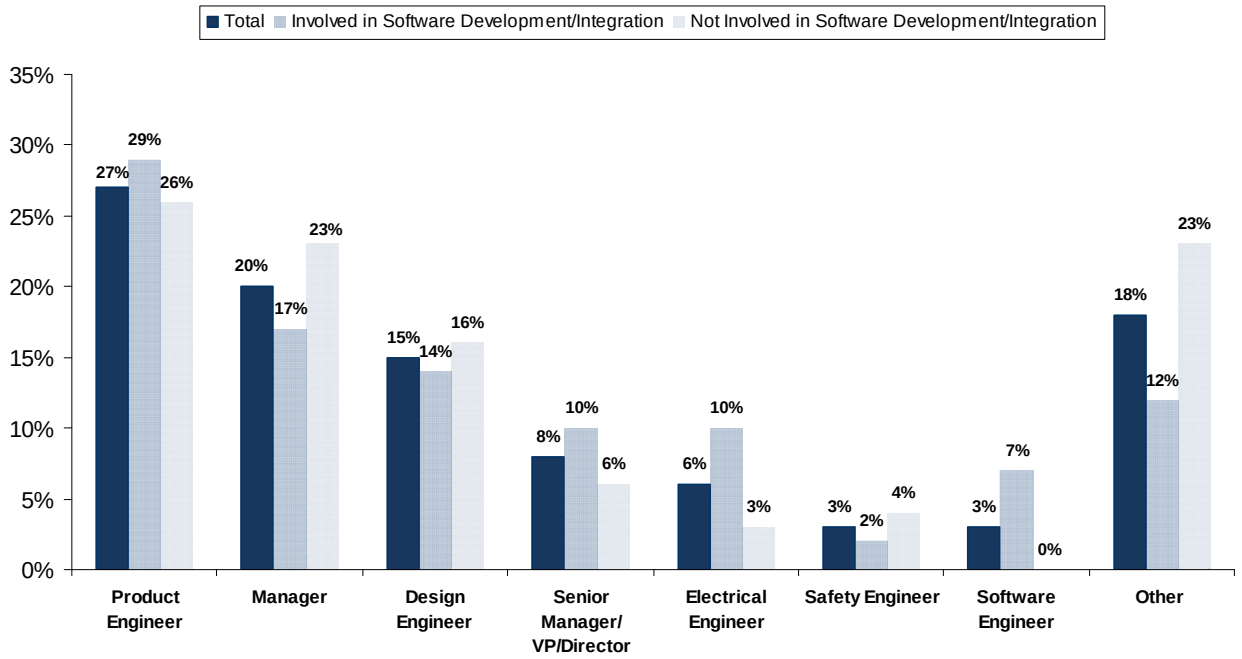
Which of the following best describes your title or job function?



Base=Total Answering (480)

More than one-quarter (27%) of respondents are product engineers, followed by managers, with 20%.

Percentages may not add up due to rounding.

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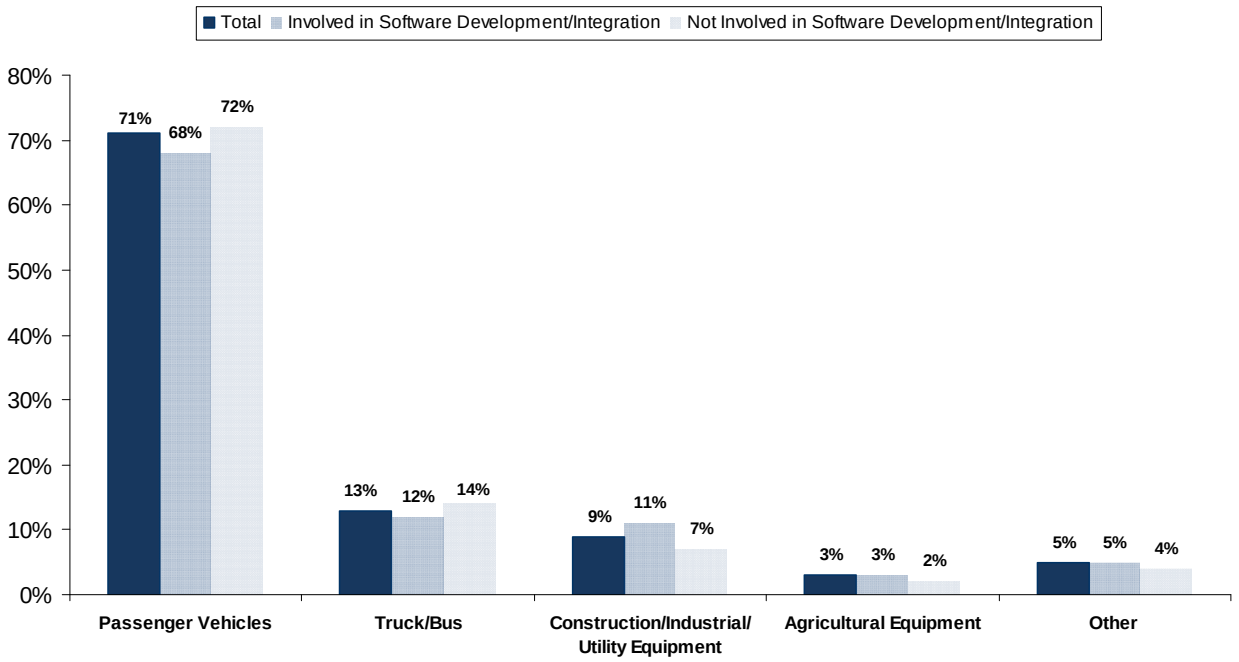
Which of the following best describes the industry where you work?



Base= Total Answering (478)

More than 7 out of 10 (71%) respondents describe the industry where they work as Passenger Vehicles, followed by Truck/Bus, with 13%.

Percentages may not add up due to rounding.

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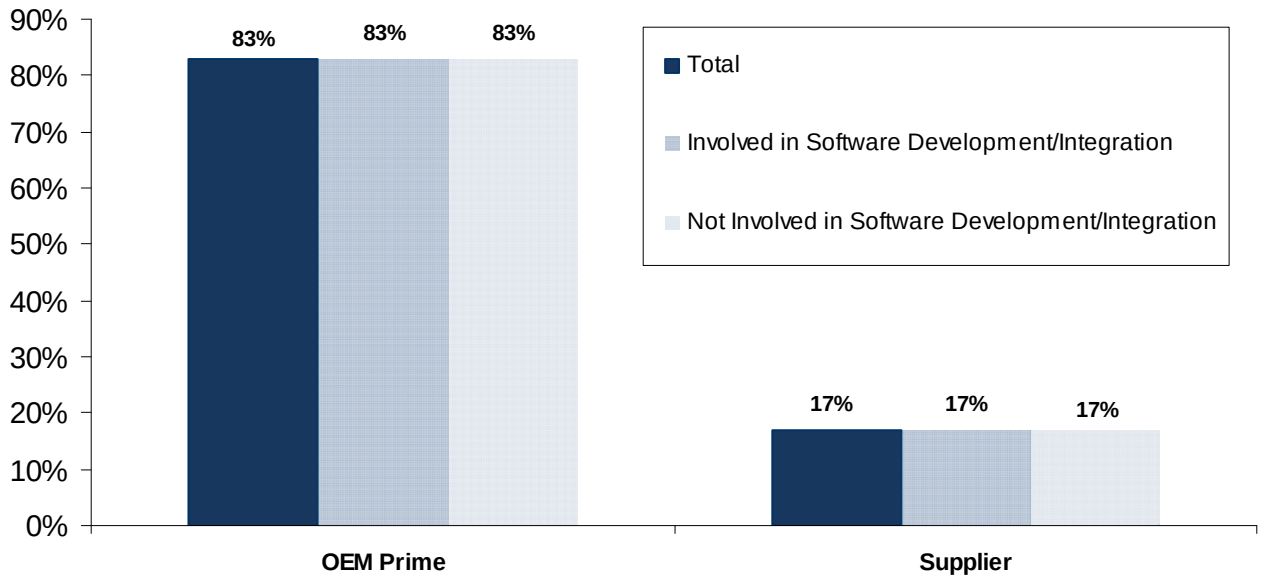
What best describes the type of company you work for?



Base=Total Answering (477)

When asked what best describes the type of company they work for, more than 8 out of 10 (83%) respondents selected OEM Prime, while 17% selected Supplier.

Percentages may not add up due to rounding.

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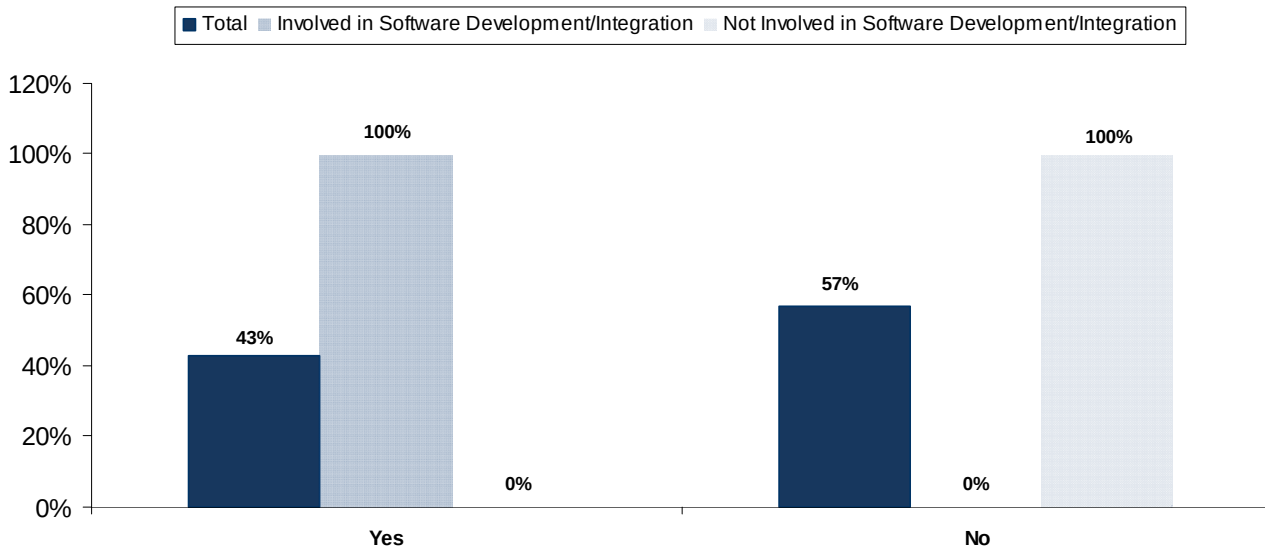
Are you in any way involved, either as an individual or as part of a group or committee, in the development or integration of software for the product your company produces?



Base=Total Answering (480)

43% of respondents are involved in the development or integration of software for the product their company produces, while 57% are not involved.

Percentages may not add up due to rounding.

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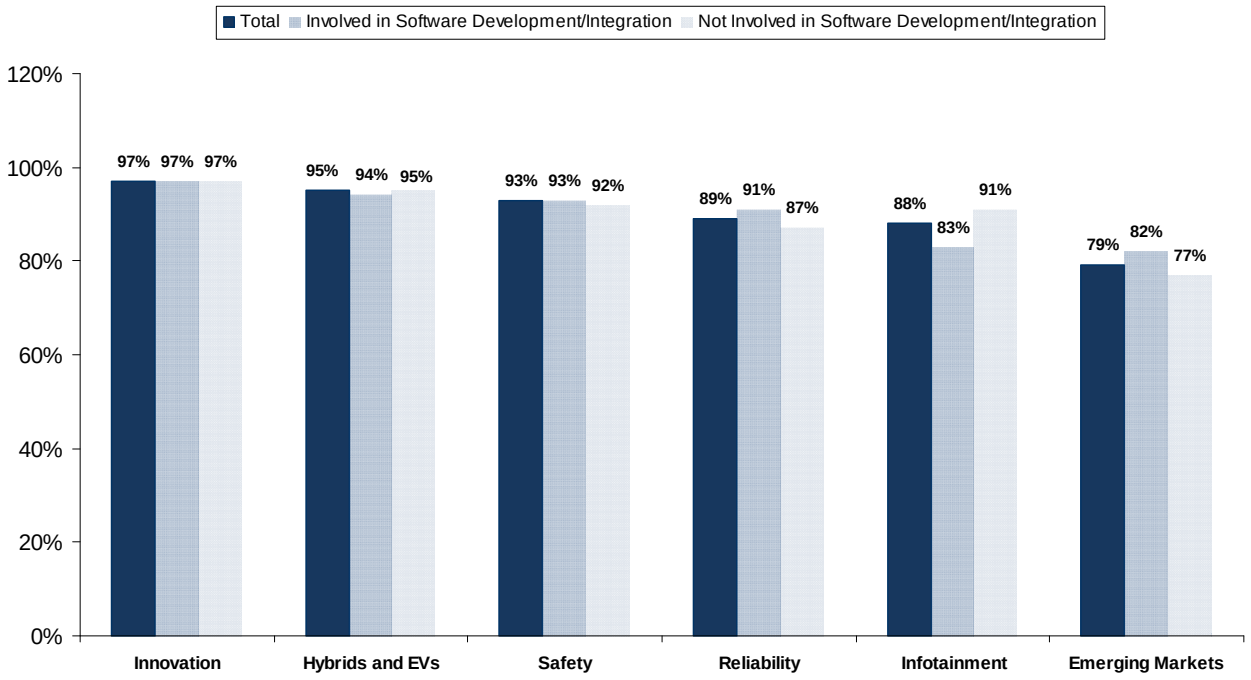
In your opinion, how important of a role does software play in each of the following areas?

Summary
Very Important/Important (Net)



Base=Total Answering per Area

When asked to rate the importance of software in a variety of areas, the top 3 areas chosen by respondents were Innovation, Hybrids and EVs, and Safety, with 97%, 95%, and 93%, respectively.

Percentages may not add up due to rounding.

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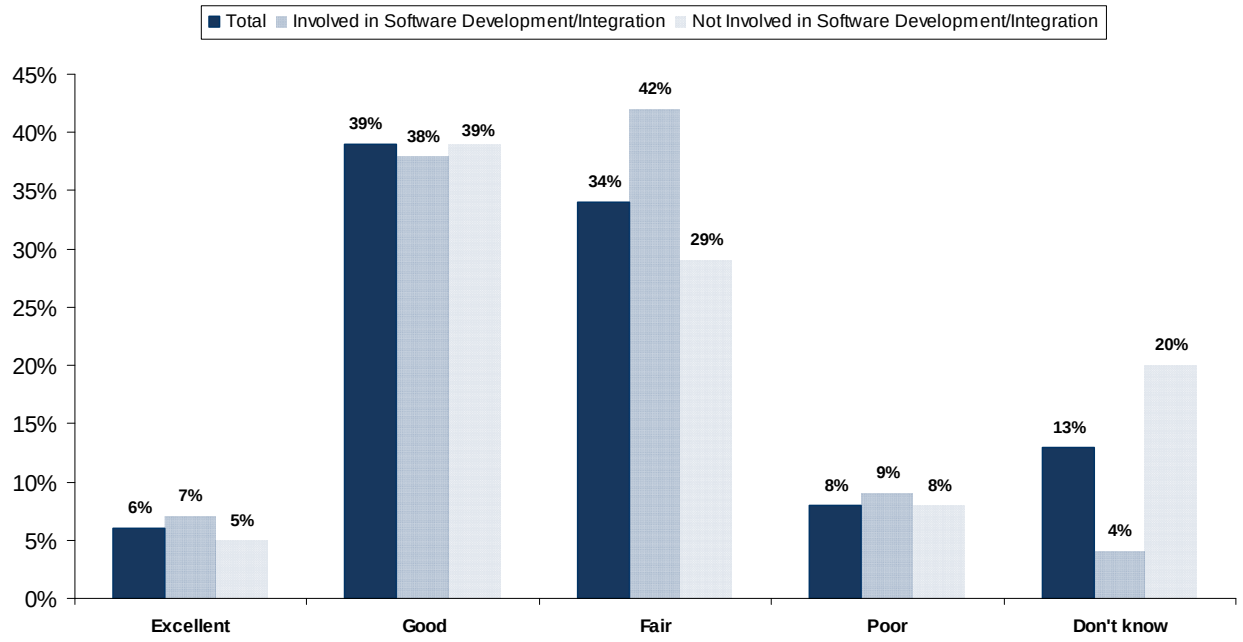
How would you rate the current level of traceability across data repositories and the entire product lifecycle?



Base=Total Answering (478)

Excellent/Good (Net)
Total: 45%
Involved: 45%
Not Involved: 44%

When asked to rate the current level of traceability across data repositories and the entire product lifecycle, 45% of respondents rated it as Excellent or Good.

Percentages may not add up due to rounding.

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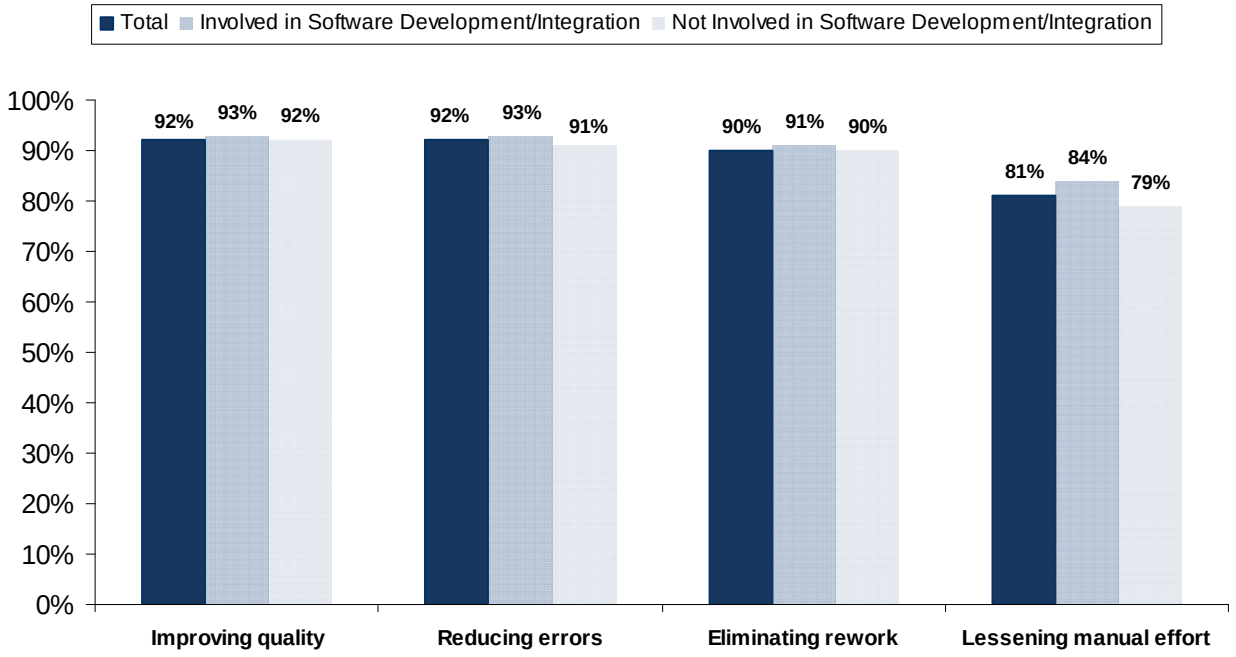
In your opinion, how important of a role will traceability play in each of the following areas for your organization?

Summary
Very Important/Important (Net)



Base=Total Answering per Area

When asked to rate the importance of traceability in a variety of areas, the top 3 areas chosen by respondents were Improving quality, Reducing errors, and Eliminating rework, with 92%, 92%, and 90%, respectively.

Percentages may not add up due to rounding.

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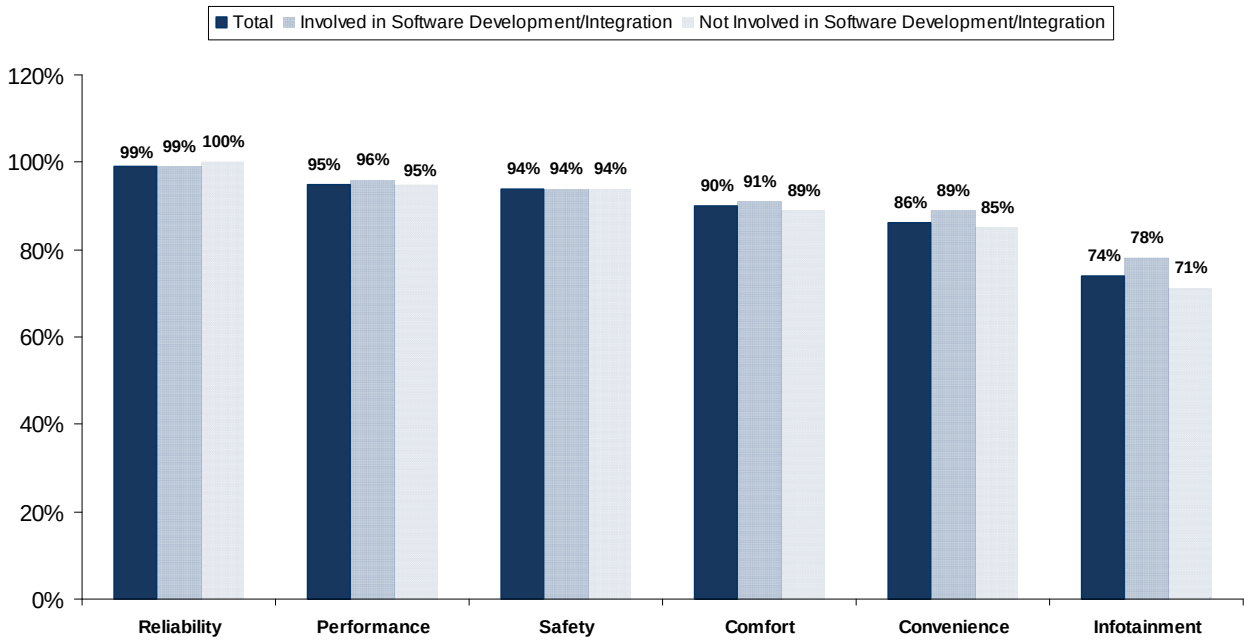
In your opinion, how important are each of the following with regard to perception of product quality?

Summary
Very Important/Important (Net)



Base=Total Answering per Area

When asked to rate the importance of various factors affecting their perception of product quality, the top 3 areas chosen by respondents were Reliability, Performance, and Safety with 99%, 95%, and 94%, respectively.

Percentages may not add up due to rounding.

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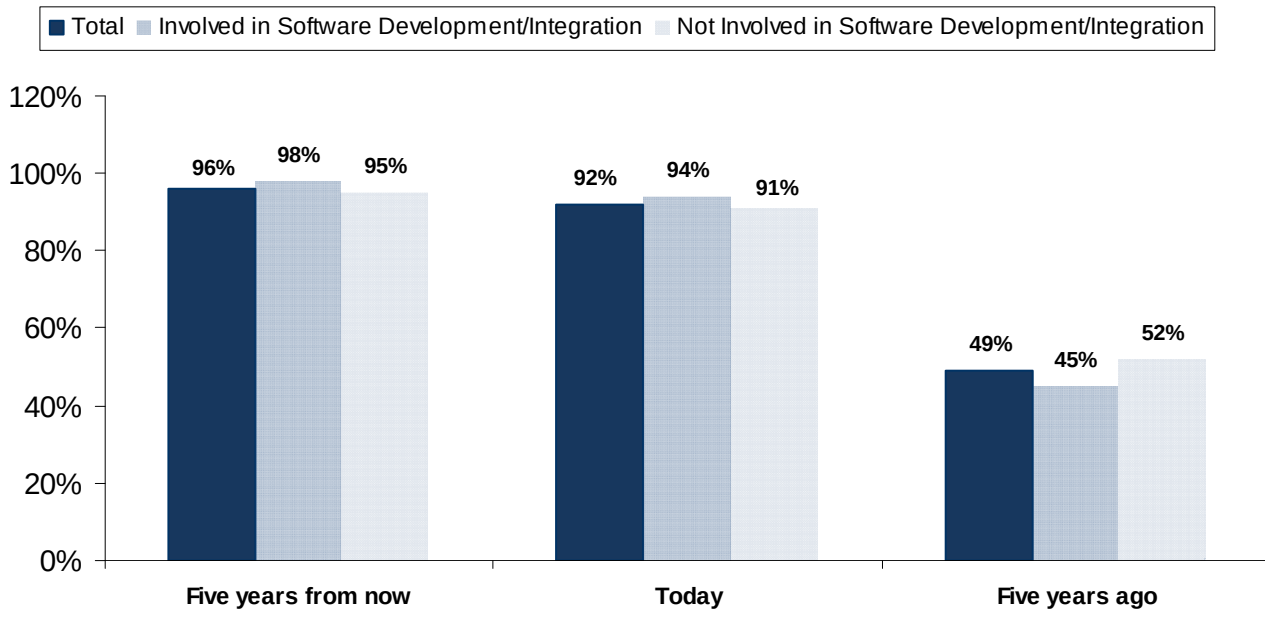
For each time period, how would you describe the level of collaboration between software groups, who may use different tools, within your organization?

Summary
Great deal of collaboration/ Some collaboration (Net)



Base=Total Answering per Time Period

More than 9 out of 10 (92%) respondents agree there is at least some deal of collaboration between software groups, who may use different tools, within their organization today. Based on the data, collaboration has and will continue to increase.

Percentages may not add up due to rounding.

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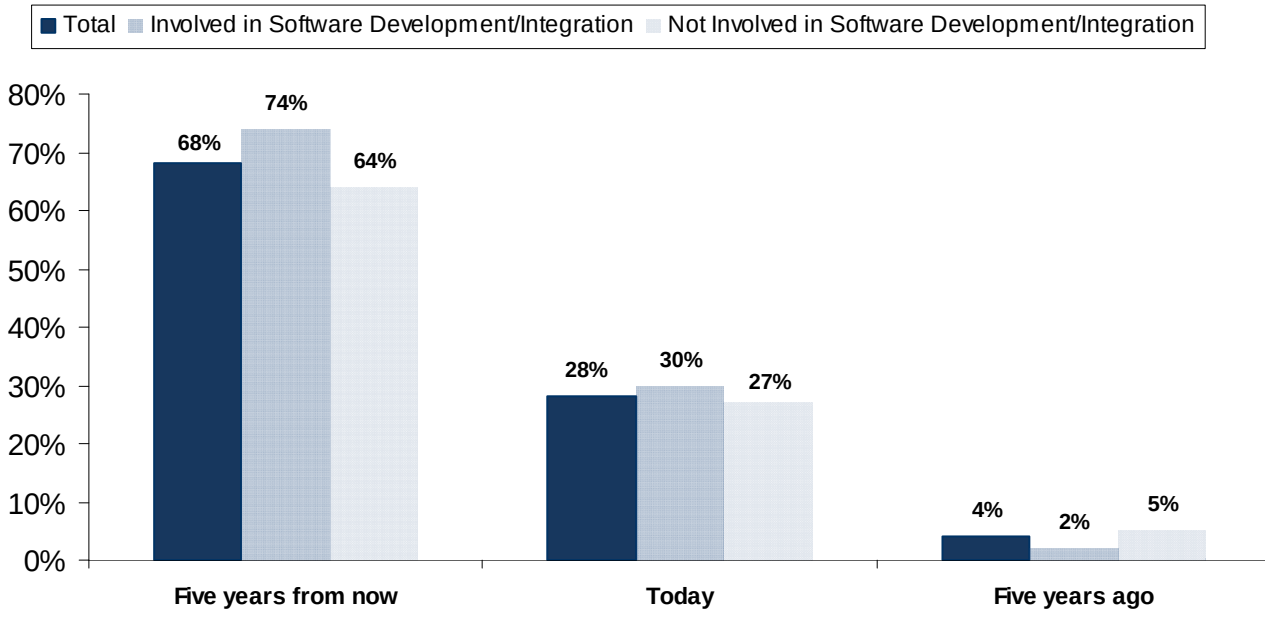
For each time period, how would you describe the level of collaboration between software groups, who may use different tools, within your organization?

Summary
Great deal of collaboration



Base=Total Answering per Time Period

When asked about the changes in degree of collaboration within a 10 year period, the percentage of respondents who indicated "Great deal of collaboration" increased from 4% five years ago, to 28% today, to 68% five years from now.

Percentages may not add up due to rounding.

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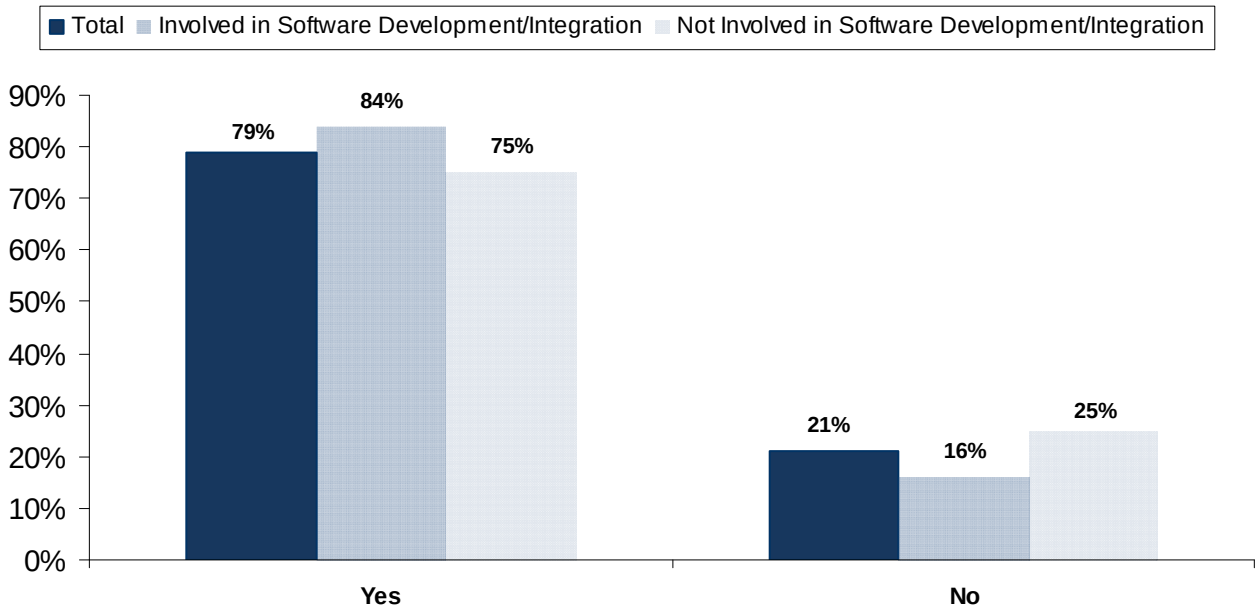
Is this a bigger problem when collaborating with external software groups?



Base=Total Answering (451)

79% of respondents believe collaboration between software groups, who may use different tools, is a bigger problem when collaborating with external software groups.

Percentages may not add up due to rounding.

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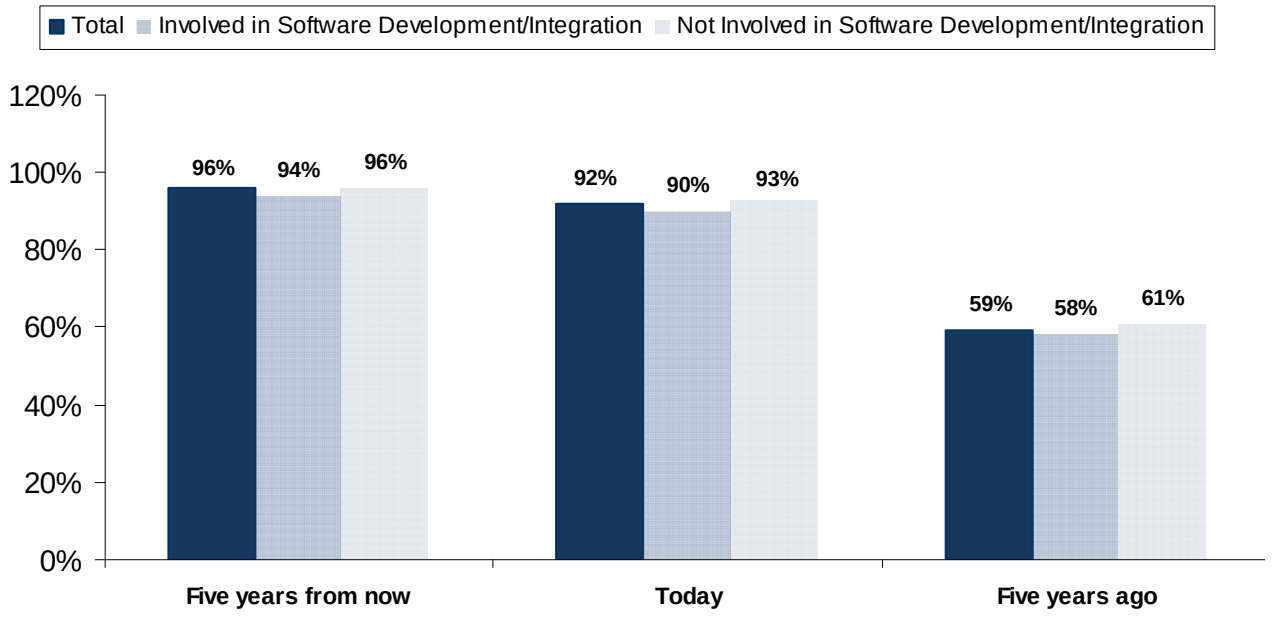
For each time period, how would you rate the level of visibility into product status across your organization?

Summary
Great/Some visibility (Net)



Base=Total Answering per Time Period

More than 9 out of 10 (92%) respondents agree there is at least some visibility into product status across their organization today. Based on the data, visibility into product status has and will continue to increase.

Percentages may not add up due to rounding.

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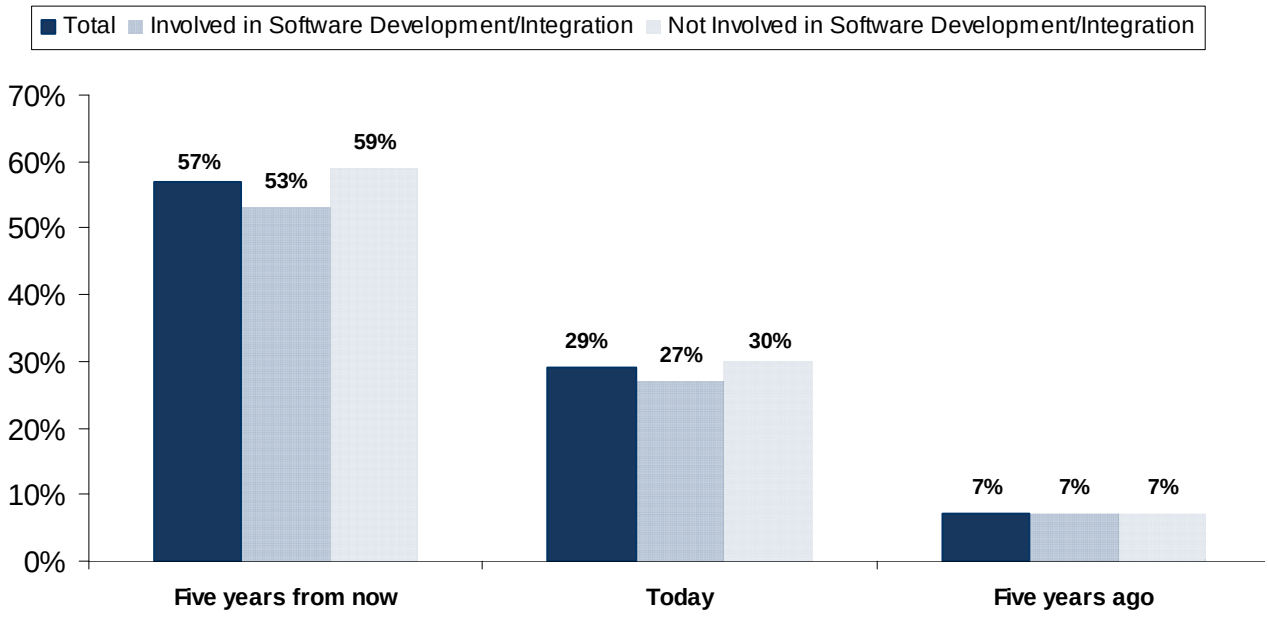
For each time period, how would you rate the level of visibility into product status across your organization?

Summary
Great visibility



Base=Total Answering per Time Period

When asked about the changes in the level of visibility within a 10 year period, the percentage of respondents who indicated "Great visibility" increased from 7% five years ago, to 29% today, to 57% five years from now.

Percentages may not add up due to rounding.

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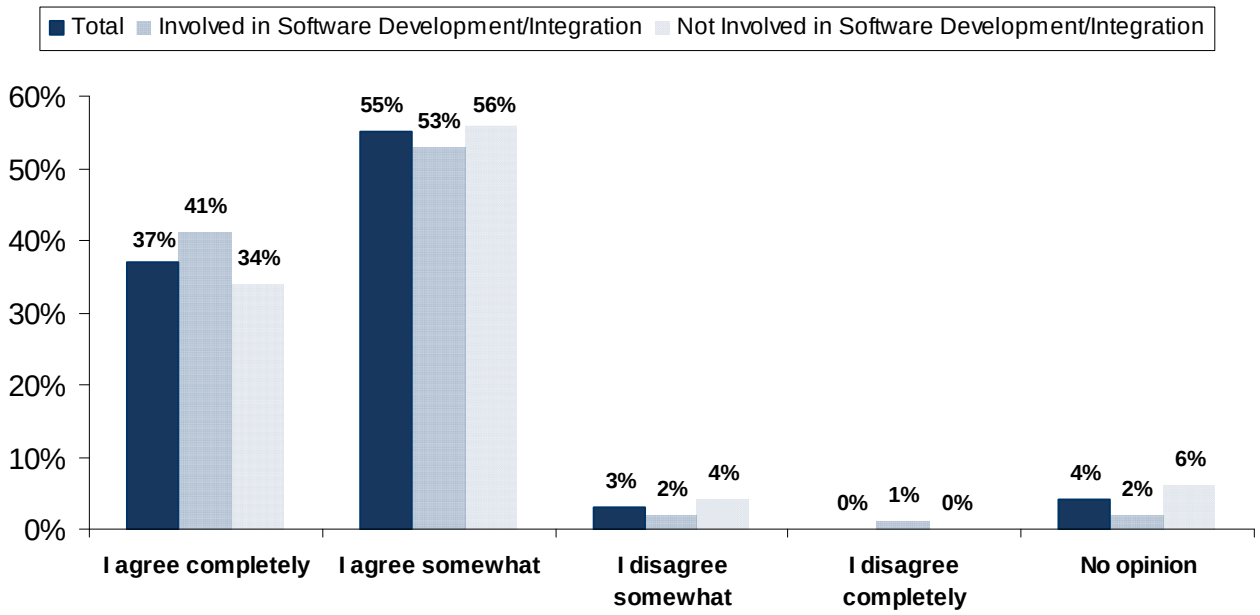
To what extent do you agree with the following statement:

Reuse of development assets leads to improved quality and productivity.



Base=Total Answering (468)

Agree completely/somewhat (Net)
Total: 92%
Involved: 94%
Not Involved: 90%

More than 9 out of 10 (92%) respondents agree somewhat or completely that reuse of development assets leads to improved quality and productivity.

Percentages may not add up due to rounding.

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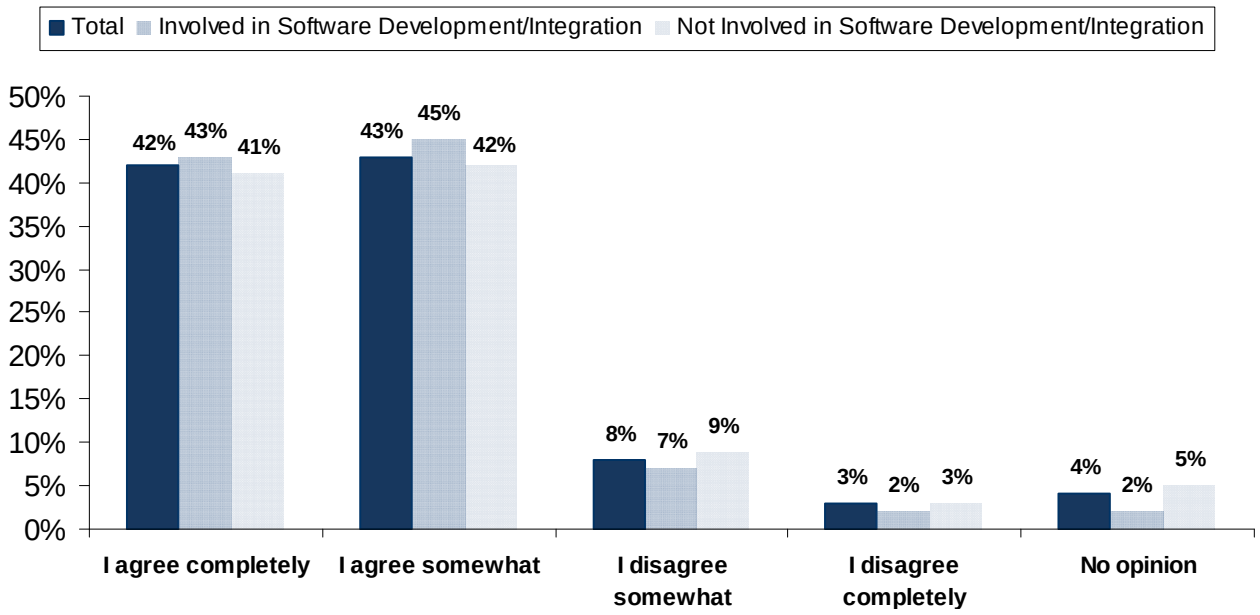
To what extent do you agree with the following statement:

Reuse can have a negative impact on quality and productivity when not properly implemented.



Base=Total Answering (469)

Agree completely/somewhat (Net)
Total: 85%
Involved: 88%
Not Involved: 83%

85% of respondents agree somewhat or completely that reuse can have a negative impact on quality and productivity when not properly implemented.

Percentages may not add up due to rounding.

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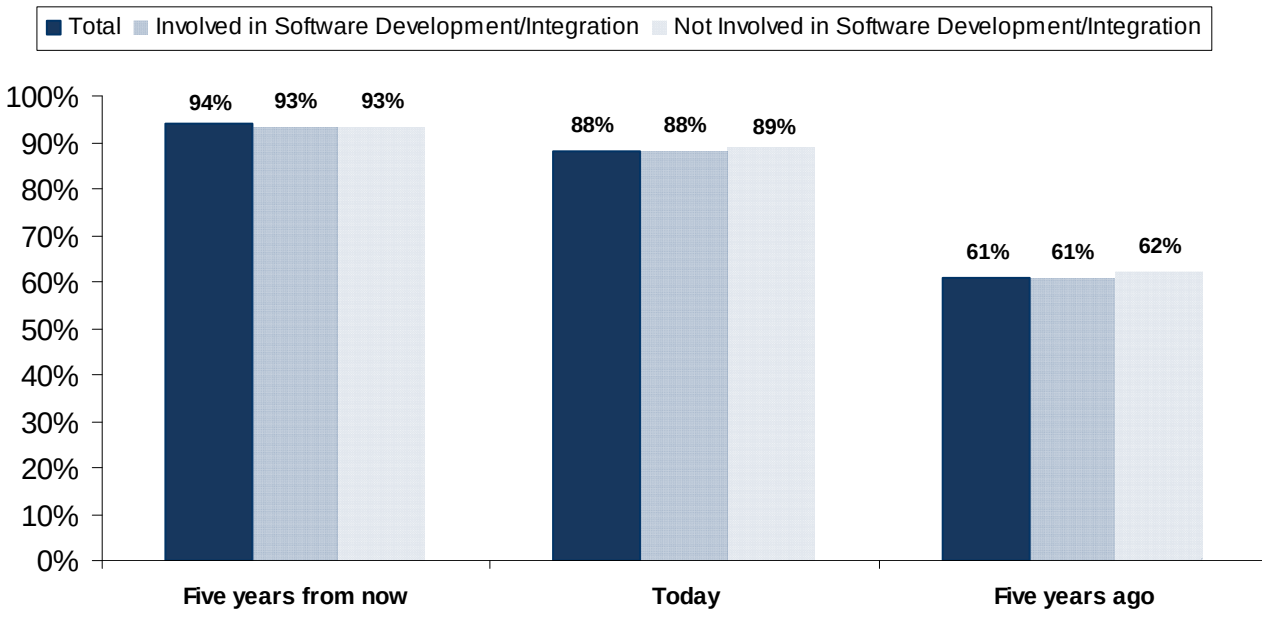
For each time period, how would you rate the level of reuse of development assets?

Summary
Great deal of reuse/ Some reuse (Net)



Base=Total Answering per Time Period

Almost than 9 out of 10 (88%) respondents agree there is at least some reuse of development assets today. Based on the data, reuse of development assets has and will continue to increase.

Percentages may not add up due to rounding.

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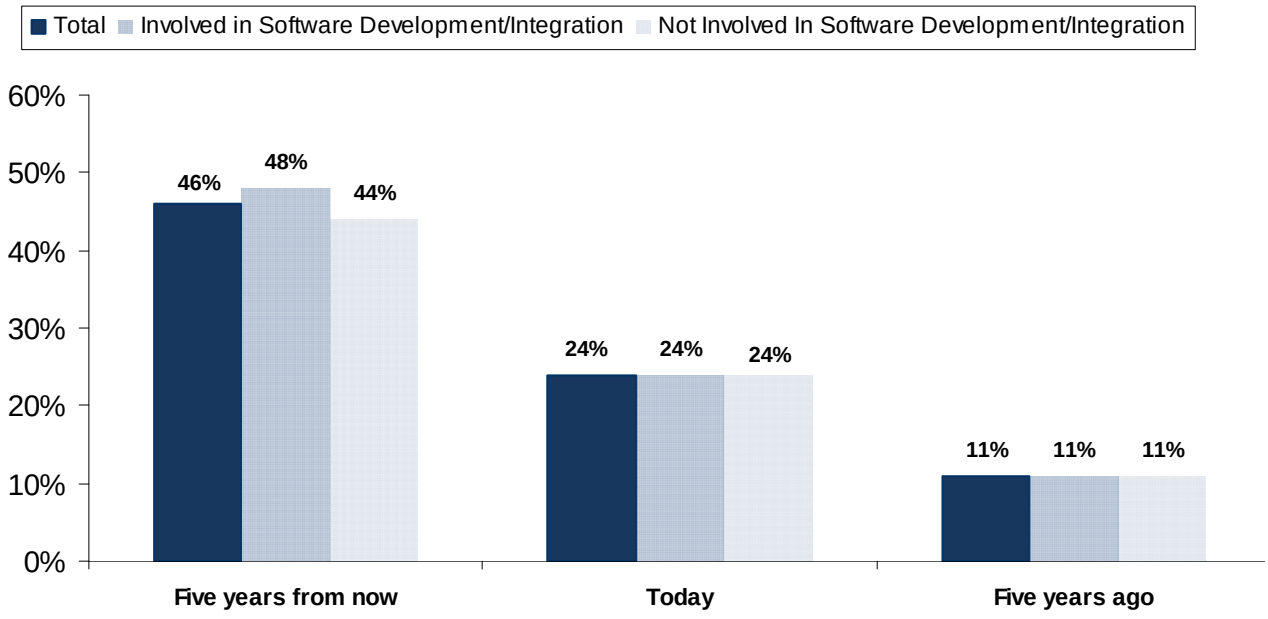
For each time period, how would you rate the level of reuse of development assets?

Summary
Great deal of reuse



Base=Total Answering per Time Period

When asked about the changes in the level of reuse of development assets within a 10 year period, the percentage of respondents who indicated "Great deal of reuse" increased from 11% five years ago, to 24% today, to 46% five years from now.

Percentages may not add up due to rounding.

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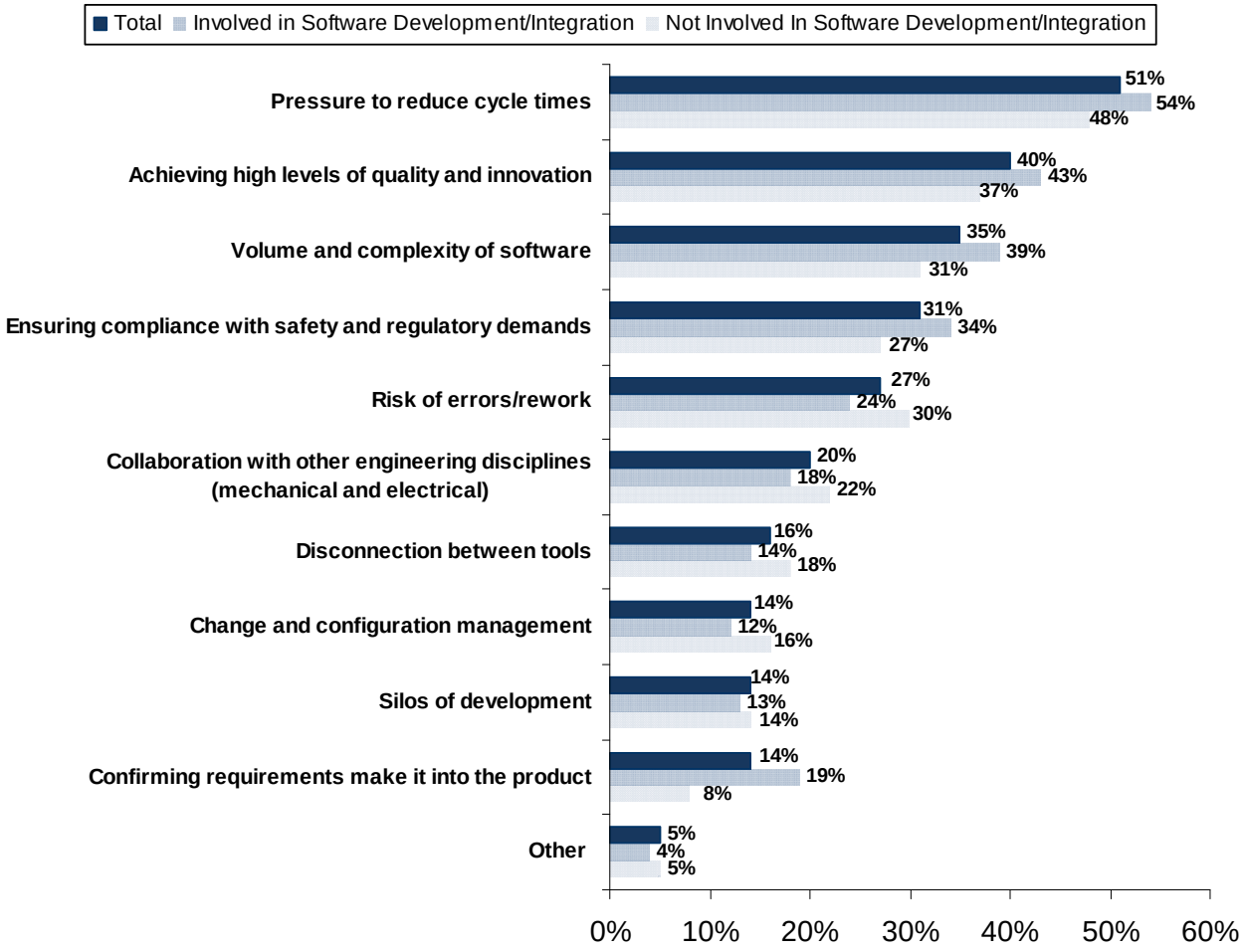
Please select the THREE most important challenges currently being faced in your software development work. (Please check THREE only.)



Base=Total Answering (450)
Multiple Responses Permitted

Respondents indicate pressure to reduce cycle times, achieving high levels of quality and innovation, and volume and complexity of software to be the top 3 most important challenges currently being faced in their software development work, with 51%, 40%, and 35%, respectively.

Percentages may not add up due to rounding.

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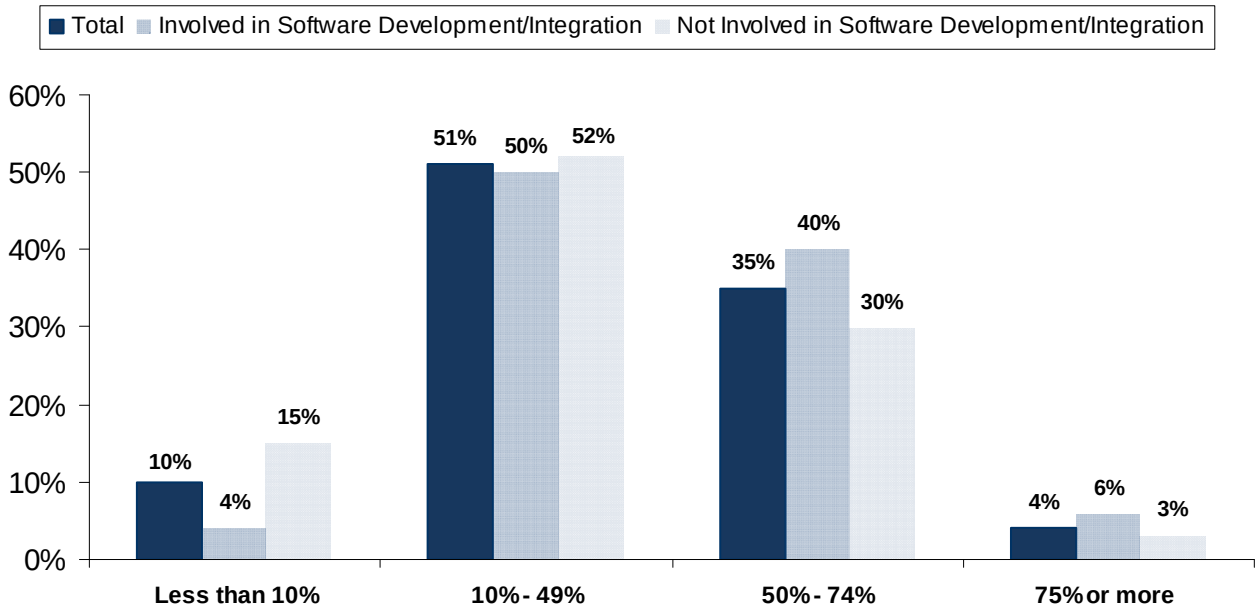
What percentage of new product features and innovation for your products is delivered through software as compared with mechanical and electrical components?



Base=Total Answering (457)

Mean
Total: 41%
Involved: 45%
Not Involved: 37%

On average, respondents report 41% of new product features and innovation for their products is delivered through software as compared with mechanical and electrical components.

Percentages may not add up due to rounding.

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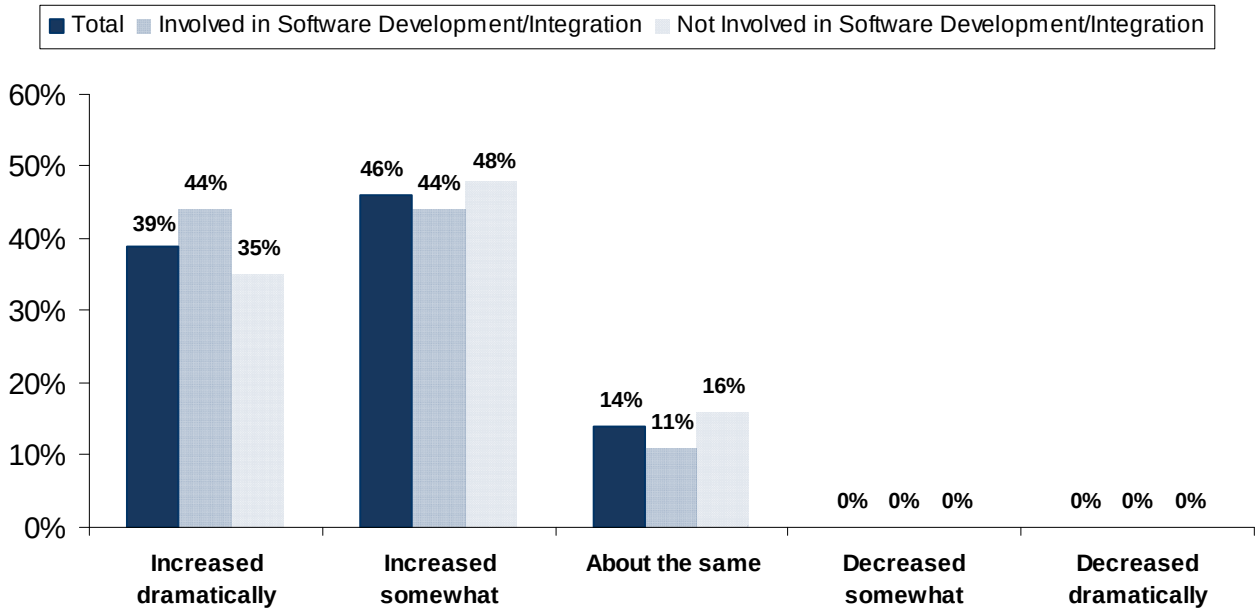
How has this changed over the past several years?



Base=Total Answering (457)

Increased dramatically/somewhat (Net)
Total: 85%
Involved: 88%
Not Involved: 83%

85% of respondents indicate the frequency of delivering new product features and innovation for their products through software as compared with mechanical and electrical components has increased, while 39% indicate that it increased dramatically over the past several years.

Percentages may not add up due to rounding.

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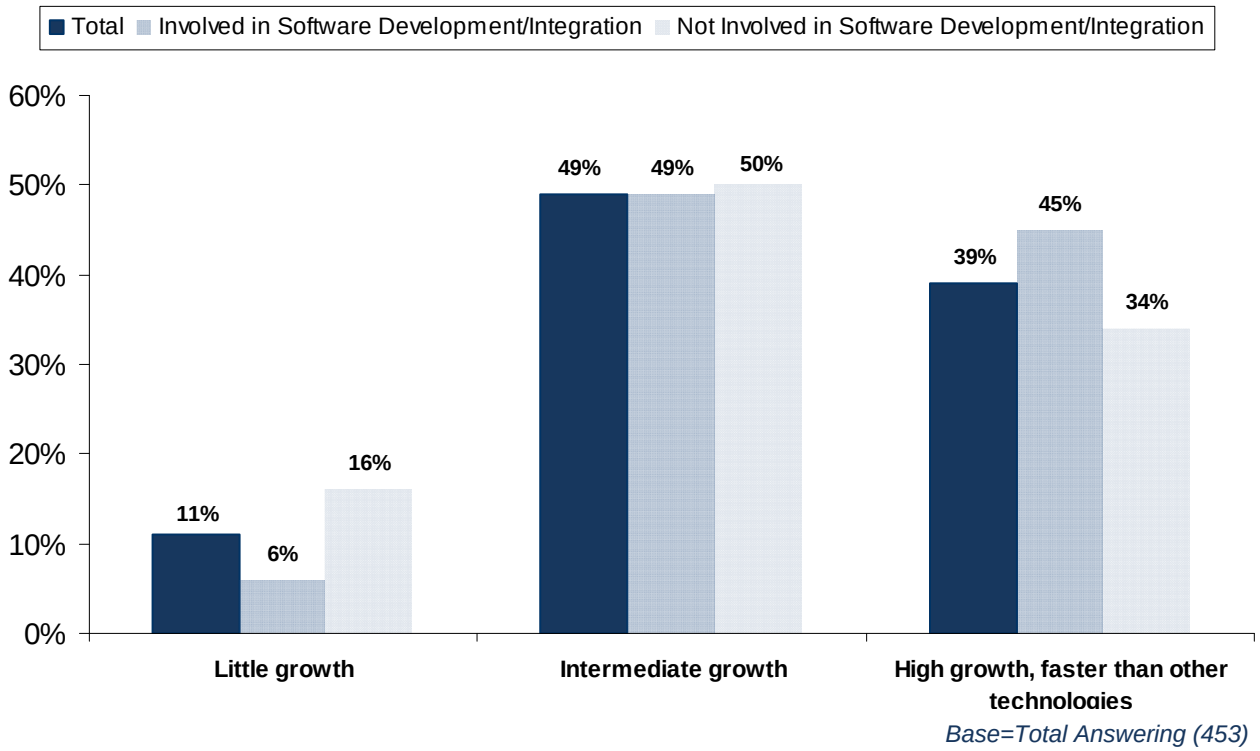
How fast is software content in your products growing?



Almost 4 out of 10 (39%) respondents indicate high growth in software content in their products, faster than other technologies, while 88% indicate intermediate or high growth.

Percentages may not add up due to rounding.

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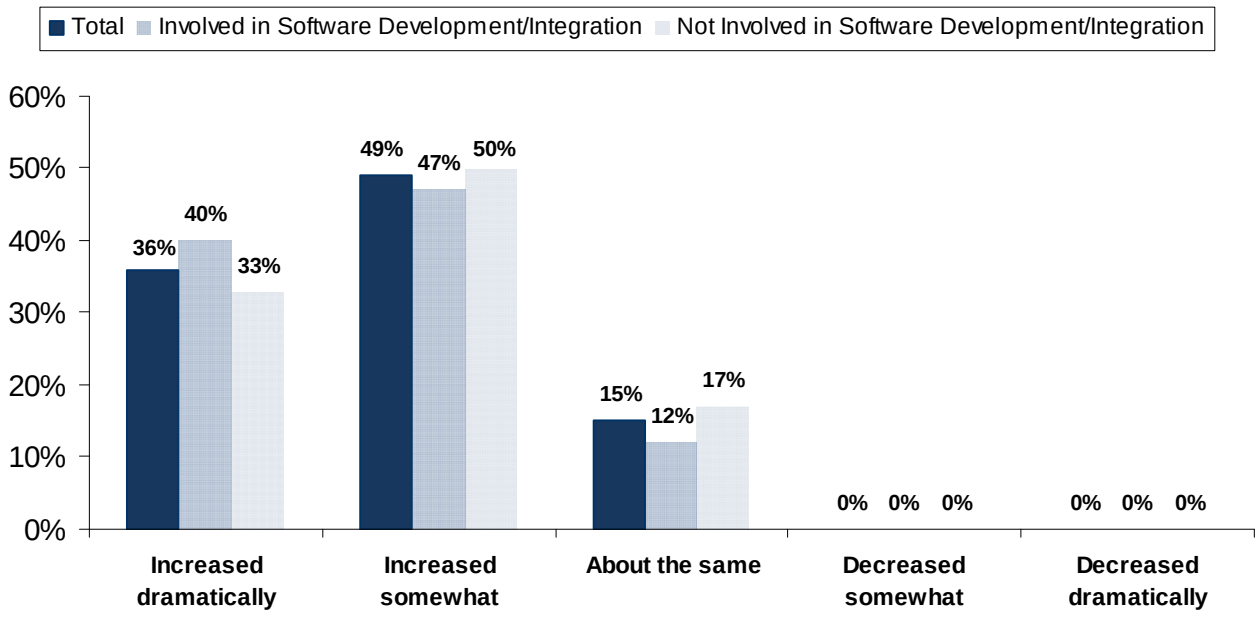
How had this changed over the last several years?



Base=Total Answering (455)

Increased dramatically/somewhat (Net)
Total: 85%
Involved: 87%
Not Involved: 83%

85% of respondents indicate growth of software content in their products has increased over the last several years, while more than one-third (36%) indicate it increased dramatically.

Percentages may not add up due to rounding.

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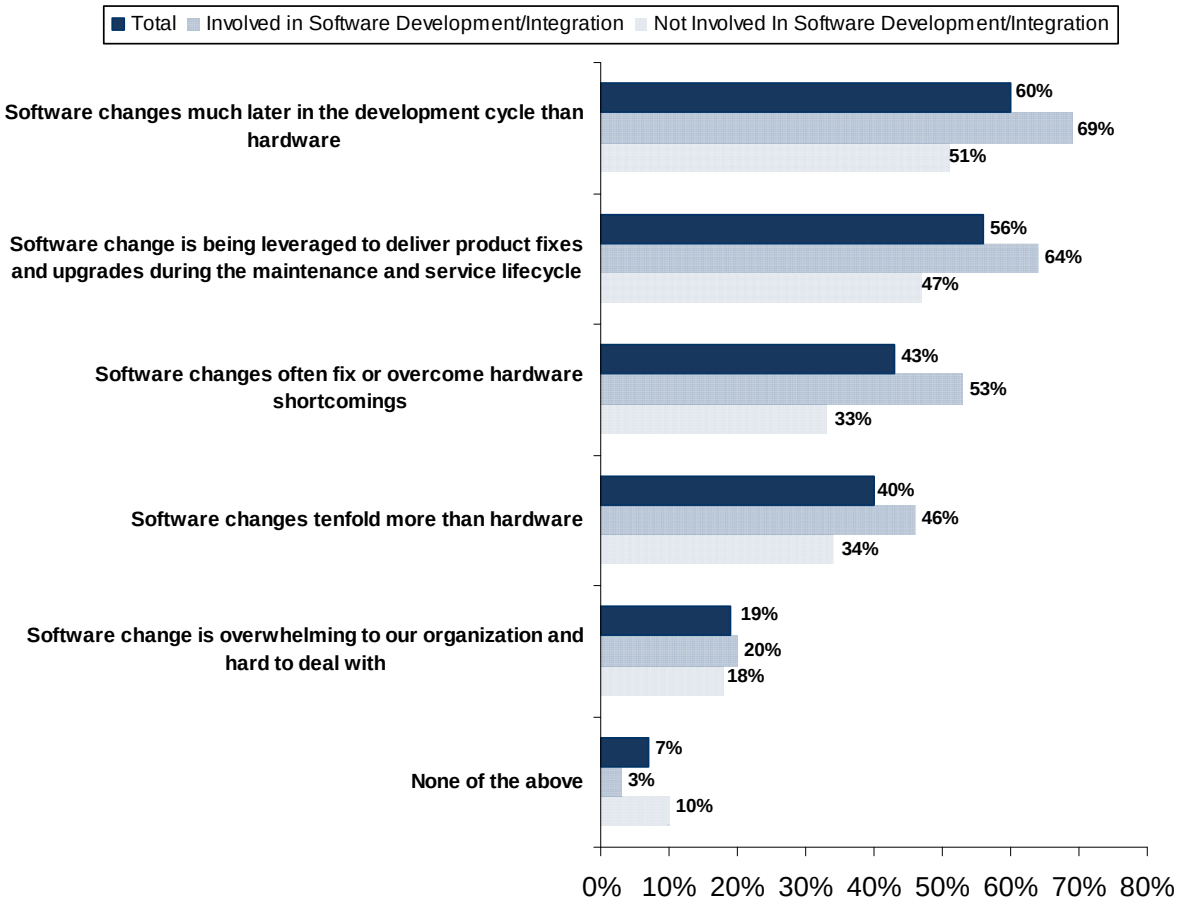
Please check the statements below pertaining to the change of software relative to hardware that you agree with. (Please check ALL that apply.)



Base=Total Answering (450)
Multiple Responses Permitted

60% of respondents believe software changes much later in the development cycle than hardware, 56% believe software change is being leveraged to deliver product fixes and upgrades during the maintenance and service lifecycle, and 43% believe software changes often fix or overcome hardware shortcomings.

Percentages may not add up due to rounding.

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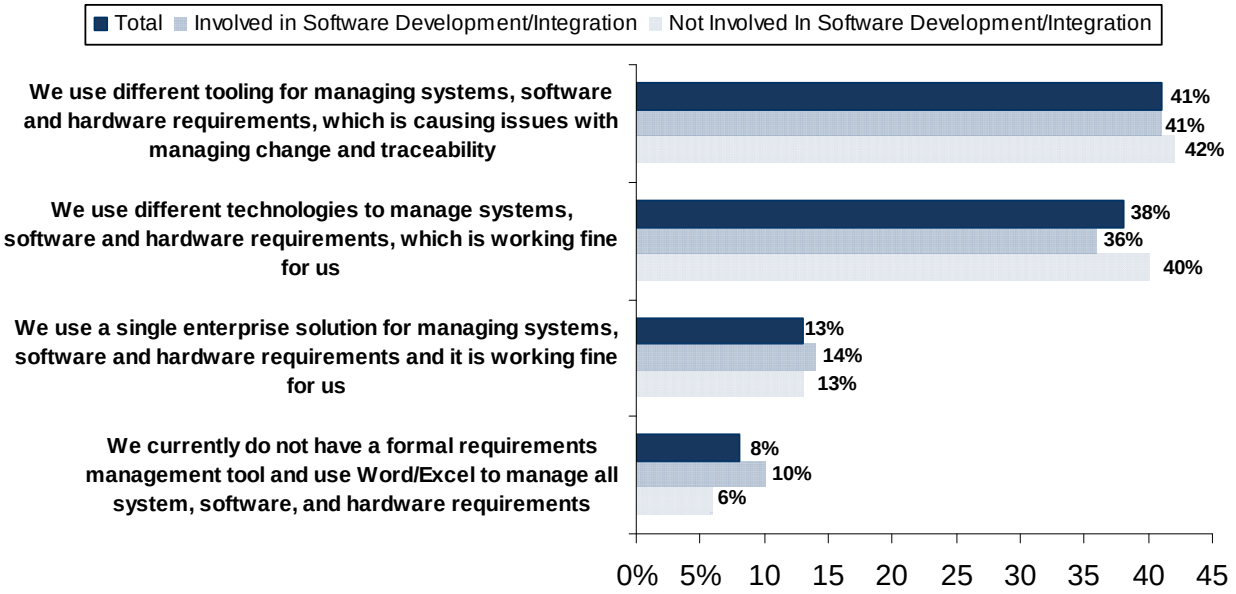
Please select the answer that best describes your current requirements management practices.



Base=Total Answering (432)

41% of respondents indicate they use different tooling for managing systems, software and hardware requirements, which is causing issues with managing change and traceability, while 38% indicate they use different technologies to manage systems, software and hardware requirements, which is working fine for them.

Percentages may not add up due to rounding.

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September 8, 2011

TO WHOM IT MAY CONCERN:

The following report provides the results of a survey recently conducted for *MKS, a PTC Company* and *Automotive Engineering International* magazine, by Signet Research, Inc., an independent research company. The objective of the study was to evaluate how software changes the face of product delivery into the market.

An email was broadcast on August 16, 2011 to a sample of 10,219 *AEI* subscribers, determined to be qualified engineers in the automotive and off-highway industry, asking them to click on a URL and participate in a survey. To encourage response, participants were offered a chance to win a $200 gift card. One additional email was broadcast to non-respondents on August 26, 2011 to encourage response.

There were 3,159 undelivered emails so that the net effective mailing was 7,060. By the closing date of August 30, 484 returns had been received for a 6.9%* response rate. The base used is total answering each question.

The findings of this survey may be accepted as accurate, at a 95% confidence level, within a sampling tolerance of approximately +/- 4.5%.

The questionnaire used in this survey is included at the end of this report.

Sincerely,

Joanna S. Zanopoulo
President

*Response rate is a minimum calculated based on known undeliverables. True response rate may be higher due to an undetermined number of possible undeliverables, which current technology does not account for.

MKS - Software Development Study 2011

1. Which of the following best describes your title or job function?

- ❍ Design Engineer
- ❍ Electrical Engineer
- ❍ Product Engineer
- ❍ Safety Engineer
- ❍ Software Engineer
- ❍ Manager
- ❍ Senior Manager/VP/Director
- ❍ Purchasing
- ❍ Other (please specify): _____

2. Which of the following best describes the industry where you work?

- ❍ Automotive- passenger vehicle
- ❍ Commercial vehicle
- ❍ Aerospace

3. What best describes the type of company you work for?

- ❍ OEM Prime
- ❍ Supplier

4. Are you in any way involved, either as an individual or as part of a group or committee, in the development or integration of software for the product your company produces?

- ❍ Yes
- ❍ No

5. How important of a role will software play in each of the following areas?

	Very Important	Important	Somewhat Important	Not at all Important
Emerging markets	❍	❍	❍	❍
Hybrids and EVs	❍	❍	❍	❍
Innovation	❍	❍	❍	❍
Safety	❍	❍	❍	❍
Reliability	❍	❍	❍	❍
Infotainment	❍	❍	❍	❍

6. How would you rate the current level of traceability across repositories?

- ❍ Excellent
- ❍ Good
- ❍ Fair
- ❍ Poor

7. How important of a role will traceability play in each of the following areas in the near future?

	Very Important	Important	Somewhat Important	Not at all Important
Reducing errors	❍	❍	❍	❍
Eliminating rework	❍	❍	❍	❍
Improving quality	❍	❍	❍	❍
Lessening manual effort	❍	❍	❍	❍

8. Please rate the following facets in terms of perception of product quality?

	Very Important	Important	Somewhat Important	Not at all Important
Safety	❍	❍	❍	❍
Reliability	❍	❍	❍	❍
Comfort	❍	❍	❍	❍
Convenience	❍	❍	❍	❍
Performance	❍	❍	❍	❍
Infotainment	❍	❍	❍	❍

9. For each time period, how would you rate the level of collaboration between software tools?

	Great deal of collaboration	Some collaboration	Neutral	Little collaboration	No collaboration
Five years ago	❍	❍	❍	❍	❍
Today	❍	❍	❍	❍	❍
Five years from now	❍	❍	❍	❍	❍

10. For each time period, how would you rate the level visibility into product status across an organization?

	Great visibility	Some visibility	Neutral	Little visibility	No visibility
Five years ago	❍	❍	❍	❍	❍
Today	❍	❍	❍	❍	❍
Five years from now	❍	❍	❍	❍	❍

11. To what extent do you agree with the following statement:

Reuse of development assets leads to improved quality and productivity.

❍ I agree completely
❍ I agree somewhat
❍ I neither agree nor disagree
❍ I disagree somewhat
❍ I disagree completely

12. To what extent do you agree with the following statement:

Reuse can have a negative impact on quality and productivity when not properly implemented.

❍ I agree completely
❍ I agree somewhat
❍ I neither agree nor disagree
❍ I disagree somewhat
❍ I disagree completely

13. For each time period, how would you rate the level of reuse of development assets?

	Great deal of reuse	Some reuse	Neutral	Little reuse	No reuse
Five years ago	❍	❍	❍	❍	❍
Today	❍	❍	❍	❍	❍
Five years from now	❍	❍	❍	❍	❍

14. Please select the <u>TWO</u> most important challenges currently being faced in your development work. (Please check <u>TWO</u> only.)

❑ Pressure to reduce cycle times
❑ Ensuring compliance with safety and regulatory demands
❑ Achieving high levels of quality and innovation
❑ Volume and complexity of software
❑ Risk of errors/rework
❑ Disconnection between tools
❑ Silos of development
❑ Other (please specify) _____

15. What percentage of new product features and innovation for your products is delivered through software as compared with mechanical and electrical components?

❍ Less than 10%
❍ 10% - 49%
❍ 50% - 74%
❍ 75% or more (please specify) _____

16. How fast is software content in your products growing?

❍ Little growth
❍ Intermediate growth
❍ High growth, faster than other technologies

17. Please check the statements below pertaining to the change of software relative to hardware that you agree with. (Please check ALL that apply.)

❑ Software changes tenfold more than hardware
❑ Software changes much later in the development cycle than hardware
❑ Software change is being leveraged to deliver product fixes and upgrades during the maintenance and service lifecycle
❑ Software changes often fix or overcome hardware shortcomings
❑ Software change is overwhelming to our organization and hard to deal with
❑ None of the above

18. Please select the answer that best describes your current requirements management practices.

❍ We use different technologies to manage systems, software and hardware requirements, which is working fine for us
❍ We use different tooling for managing systems, software and hardware requirements, which is causing issues with managing change and traceability
❍ We use a single enterprise solution for managing systems, software and hardware requirements
❍ We currently do not have a formal requirements management tool and use Word/Excel to manage all system, software, and hardware requirements

19. Please fill out the following for processing purposes and to notify you if you are a winner of the $200 Gift Card. All responses are confidential and used only in composite with others to provide an overall picture.

Name: _____
Email: _____
Phone: _____

Thank you for participating in our survey.