



Product Development & Innovation Practice Are Advancing

*Primary Research Findings
Published March 3, 2014*

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June 4, 2014

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

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Abstract

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Research conducted in 2013 shows significant changes occurred during the great recession in the strategies, processes, practices, and techniques that manufacturing companies use to develop new products. Changes are across the board in all areas studied.

Strategies have become slightly more conservative. An increased number of formalized processes now precede product development.

There are an increased number of variations of product development processes.

More companies now openly look to the outside for plug-and-play capabilities, buy them versus make them.

Metrics that have historically measured status have now shifted to be performance oriented; and are focused on revenues and profits. Many of these changes have been evolving for several decades, but the rate of change between 2008 and 2013 is pronounced.

The next generation of management science for competing in a global world appears to be coming of age.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

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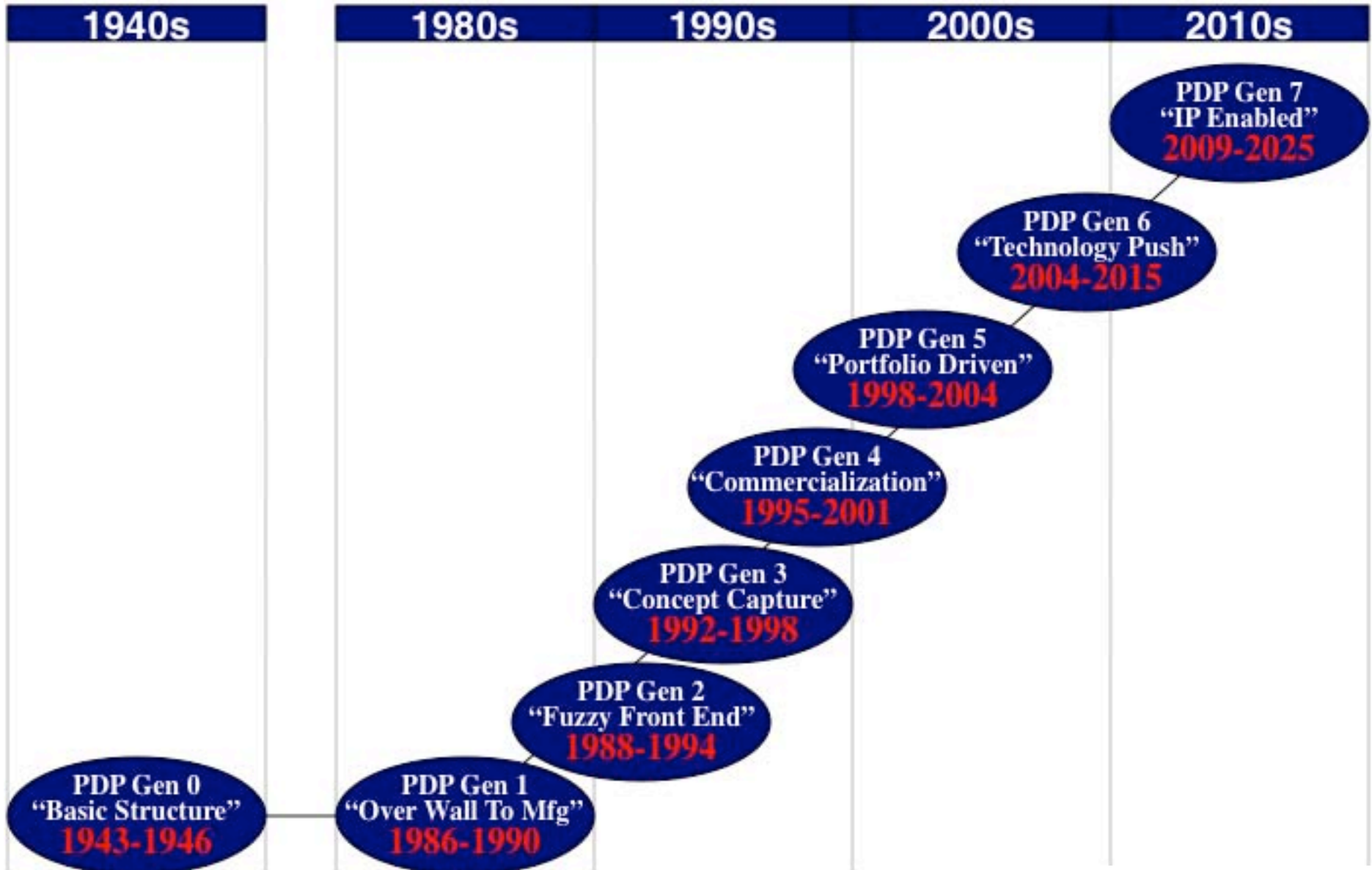


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Research Approach

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Approach: Generations Of Increasing R&D Management Sophistication



PRODUCT DEVELOPMENT & INNOVATION PRACTICES

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Approach: Research Areas



The research focuses on four innovation-related business activities that are generally accepted to be in a period of growth and sophistication; and further integration with each other during the past decade. The research explores process formalization, certain techniques, and metrics in these areas.

R&D-Product Development Operating Environment
Organic Innovation
Open Innovation
Intellectual Property

The final research focus is to reaffirm research GGI has done consistently since 1998. This research initiative examines the industry penetration rates of metrics used by CXOs to measure the overall results of R&D and Product Development in corporations. This is the last question in the questionnaire. Our research has been published by The Economist Group, Business Week, Industry Week, CFO Magazine, and a number of other trade publications. This year, we list 101 aggregate measures of overall performance at the CXO level. Simply check off the individual metrics your company uses. We report the list of metrics in Pareto order based on each metric's level of industry penetration.

CXO Corporate Metrics Practices

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Approach: Research Methodology

11-Pages	STUDY CONDUCTED USING A FAIRLY LARGE QUESTIONNAIRE
18	Selected companies contacted GGI asking to participate
17	GGI made surveys available at public seminars
662	Emails distributed by GGI
2402	Emails distributed by 23 firms or organizations to qualified participants
3099	TOTAL RESEARCH QUESTIONNAIRES DISTRIBUTED
219	Total responses [219/3099 = 7.1% Response Rate]
(4)	Less duplicate responses
(15)	Less incomplete and non-qualifying responses
200	NET GOOD RESPONSES
6.5%	RESPONSE RATE [200/3099]
95%	CONFIDENCE LEVEL is standard across all Margin of Error calculations associated with the response to each question.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Approach: Research Focused On North America

We made a concerted effort to seek respondents from all three countries in North America.

Rather than base the proportional mix on GDP, we thought R&D Spending in each of these countries was a more accurate indicator.

We used the figures that the National Science Foundation assembles annually for R&D spending.

The 2014 NSF "Science and Engineering Indicators" report is based on the 2011 R&D spending by each of these countries.

Table 4-4

International comparisons of gross domestic expenditures on R&D and R&D share of gross domestic product, by region/country/economy: 2011 or most recent year

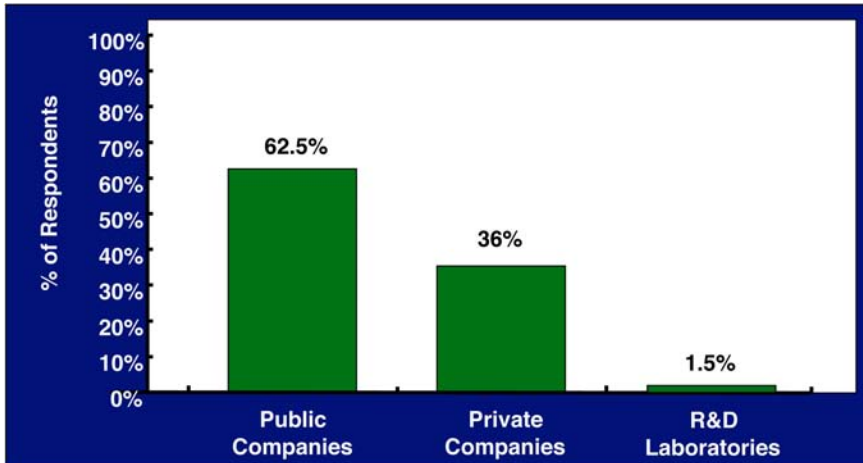
Region/country/economy	GERD (PPP \$millions)	% GERD OF TOTAL	EXACT MIX BASED ON 200 RESPONSE	ACTUAL MIX OF 200 RESPONSE	DEVIATION FROM IDEAL
North America					
United States (2011) ^a	429,143.0	92.96%	185.92	181	- 4
Canada (2011).....	24,289.3	5.26%	10.52	15	+ 4
Mexico (2011)	8,209.4	1.78%	3.56	4	----
TOTAL = 461,641.7					

Source [Black Text On Light Green Inset]: National Science Board, 2014, Science and Engineering Indicators 2014, Arlington VA: National Science Foundation (NSB 14-01).

Source [Blue Text Within Light Green Inset]: Goldense Group, Inc. Response Comparison Versus North American NSF GERD.

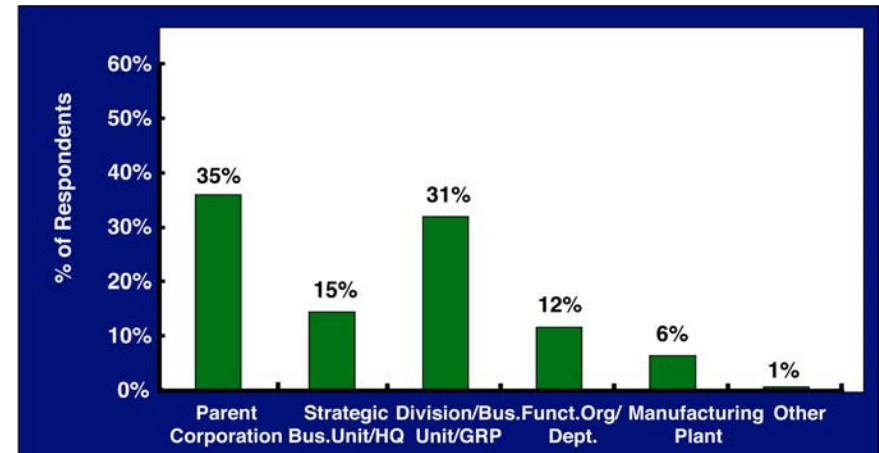
PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Approach: Research Respondent Profile



QUESTION: A2. Is this a public or private company?

Number of Respondents = 200 13PDMS-A2-A2E



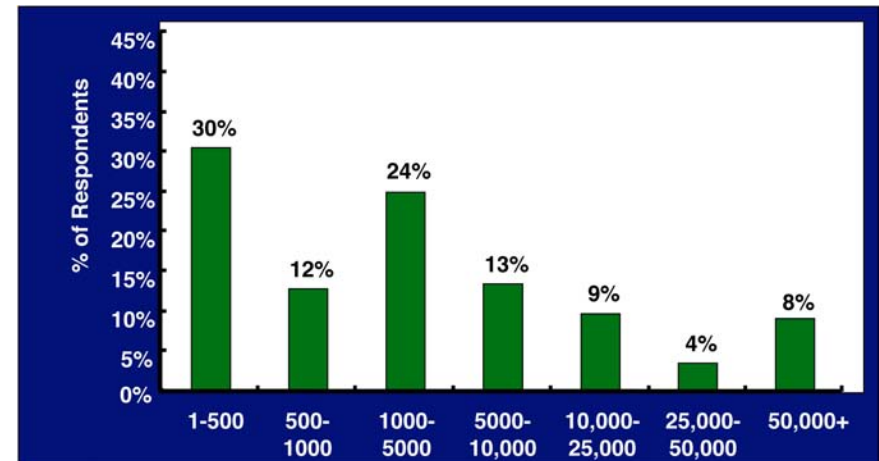
QUESTION: A3. For what type/scope of company or organization are the responses to the questions in this survey? (Check One Box That Best Applies)

Number of Respondents = 200 13PDMS-A3-A2E



QUESTION: A5. Sales revenue over your last full year: (Check One Box That Best Applies)

Number of Respondents = 200 13PDMS-A5-A2E

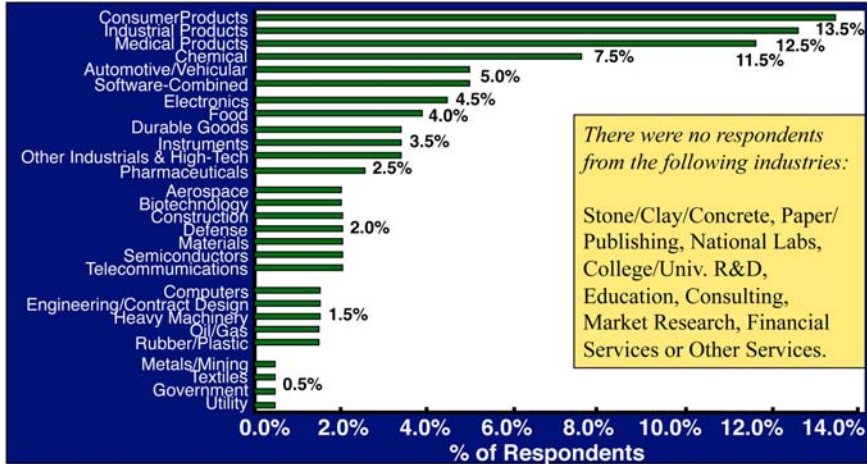


QUESTION: A6. Number of full-time employees: (Check One Box That Best Applies)

Number of Respondents = 199 13PDMS-A6-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

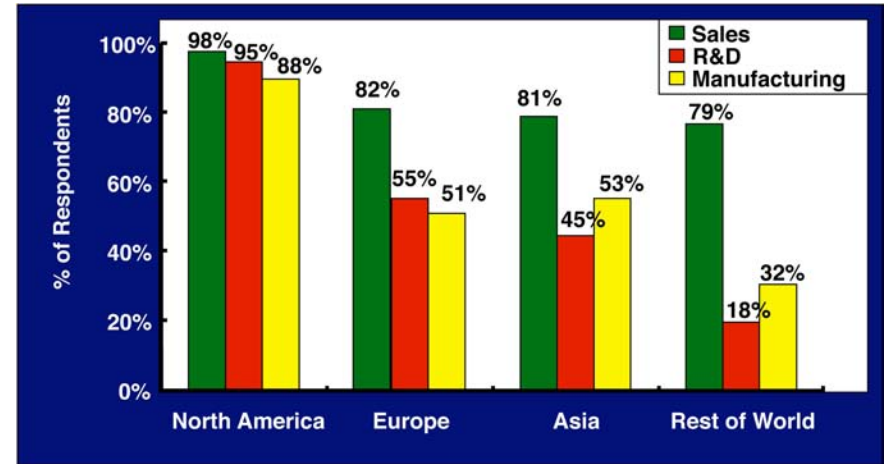
Approach: Research Respondent Profile



QUESTION: A4. Identify your company's industry or service:

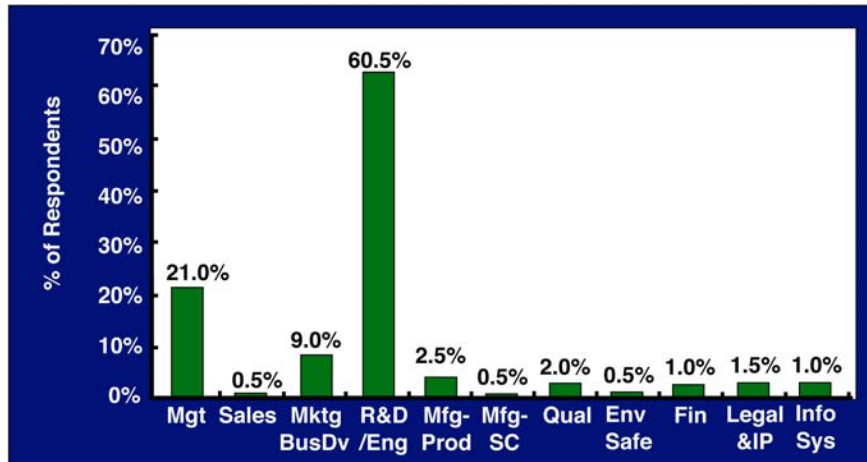
(Check One Box That Best Applies)

Number of Respondents = 200 13PDMS-A4-AIS



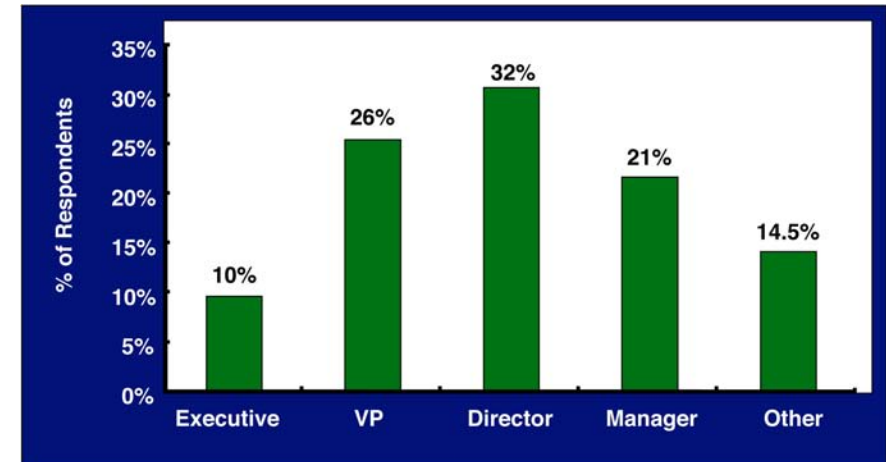
QUESTION: A8. Places the company does business: (Check All Boxes That Apply)

Number of Respondents = 197 13PDMS-A8-A2E



QUESTION: A9. What function do you personally perform in the company: (Check One Box That Best Applies)

Number of Respondents = 200 13PDMS-A9a-A2E



QUESTION: A9. What function do you personally perform in the company: (Check One Box That Best Applies)

Number of Respondents = 200 13PDMS-A9b-AJT



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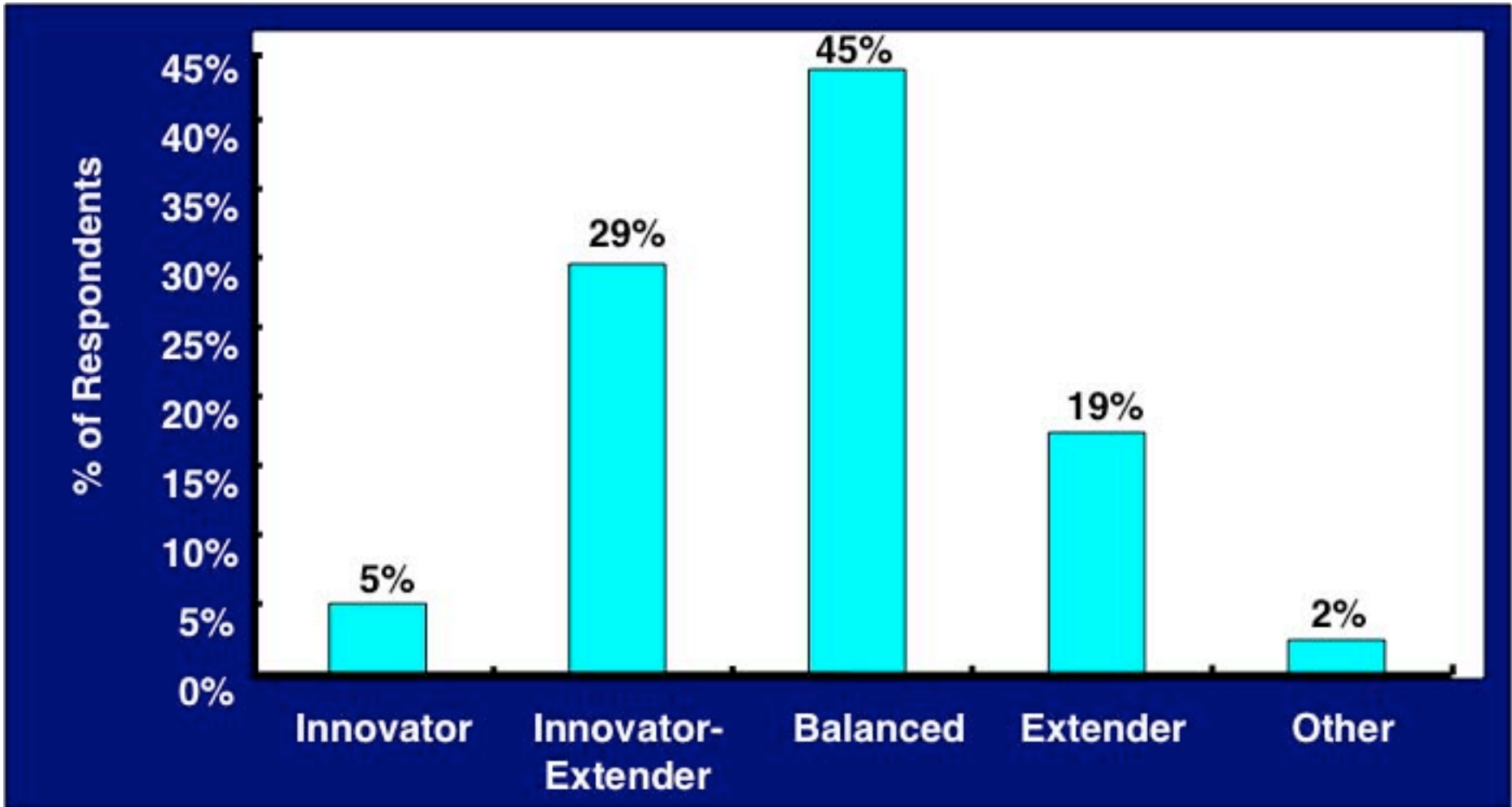
Innovation Strategy

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: Perceived R&D Strategy



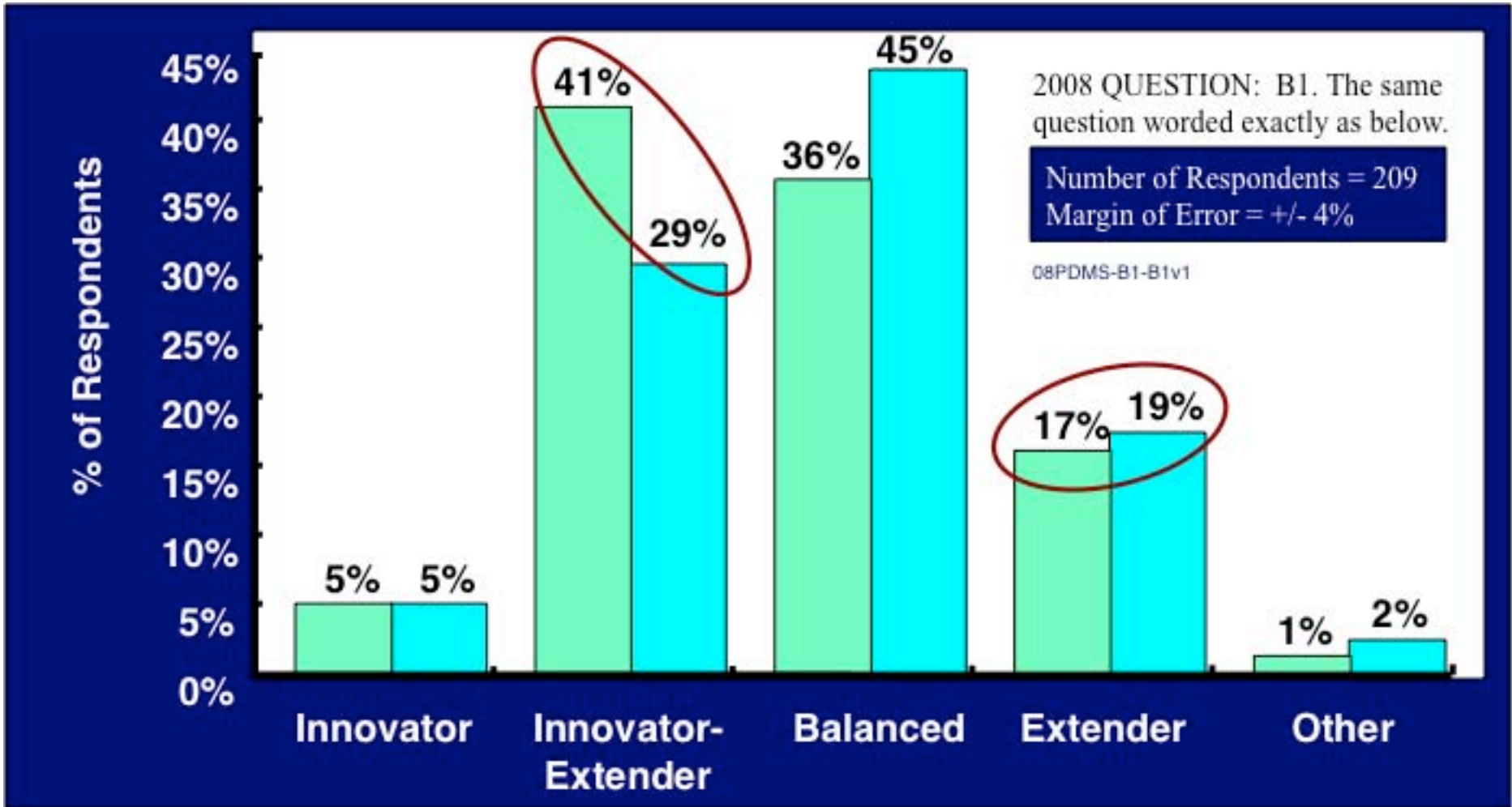
QUESTION: B1. What is your company's fundamental approach to new product creation today? Please reply for what you currently do. Please do not reply as to what your company might do in the future or has done in the past, today's environment is the focus of this research. [Check One Box Only]

Number of Respondents = 198, Margin of Error = +/- 4%

13PDMS-B1-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: Perceived Strategy - Pre-Crash 2008 vs. 2013



QUESTION: B1. What is your company's fundamental approach to new product creation today? Please reply for what you currently do. Please do not reply as to what your company might do in the future or has done in the past, today's environment is the focus of this research. [Check One Box Only]





Number of Respondents = 198, Margin of Error = +/- 4%

13PDMS-B1-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: Portfolio Changes - 1990s vs. 2000s

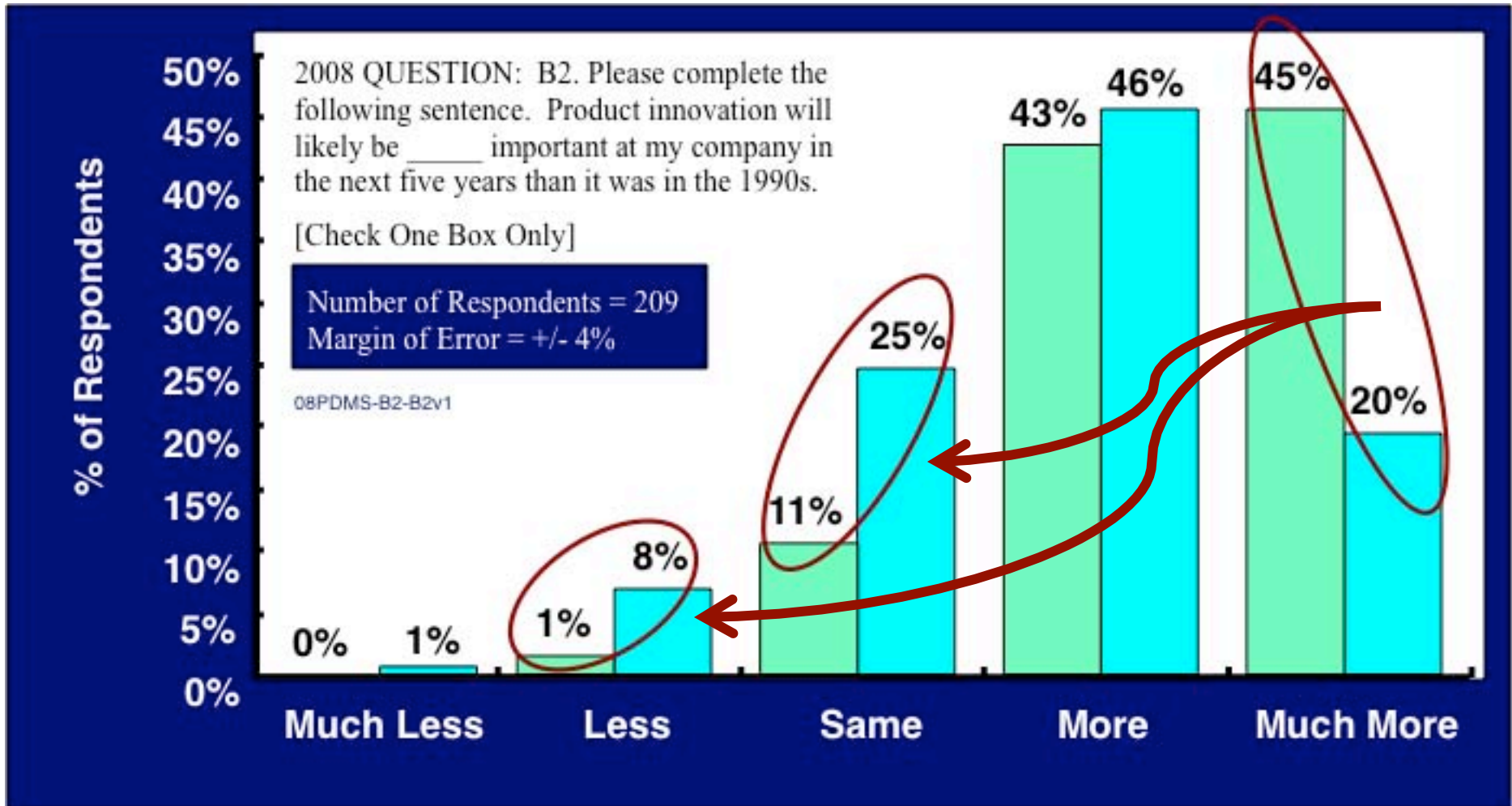
In the Development Portfolios of Companies, the Percentage of New-To-World Products is Down By Almost Half, While Improvements and Modifications to Existing Products Have Nearly Doubled.

TYPE	1990s	2000s	% CHANGE
New-to-the-world, new-to-market innovations	20.4%	11.5%	-43.7% 
New product lines	38.8%	27.1%	-30.1% 
Additions to existing product line	20.4%	24.7%	+20.8% 
Improvements & modifications to existing products	20.4%	36.7%	+80.1% 

Source: Robert G. Cooper, "Creating Bold Innovation in Mature Markets - Reference Paper #46," Product Development Institute, 1425 Osprey Drive, Suite 201, Ancaster Business Park, Ancaster, Ontario, Canada, July 2013, Page 31, Exhibit 1: Development Portfolios, Then and Now.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: Perceived Approach - Pre-Crash 2008 vs. 2013



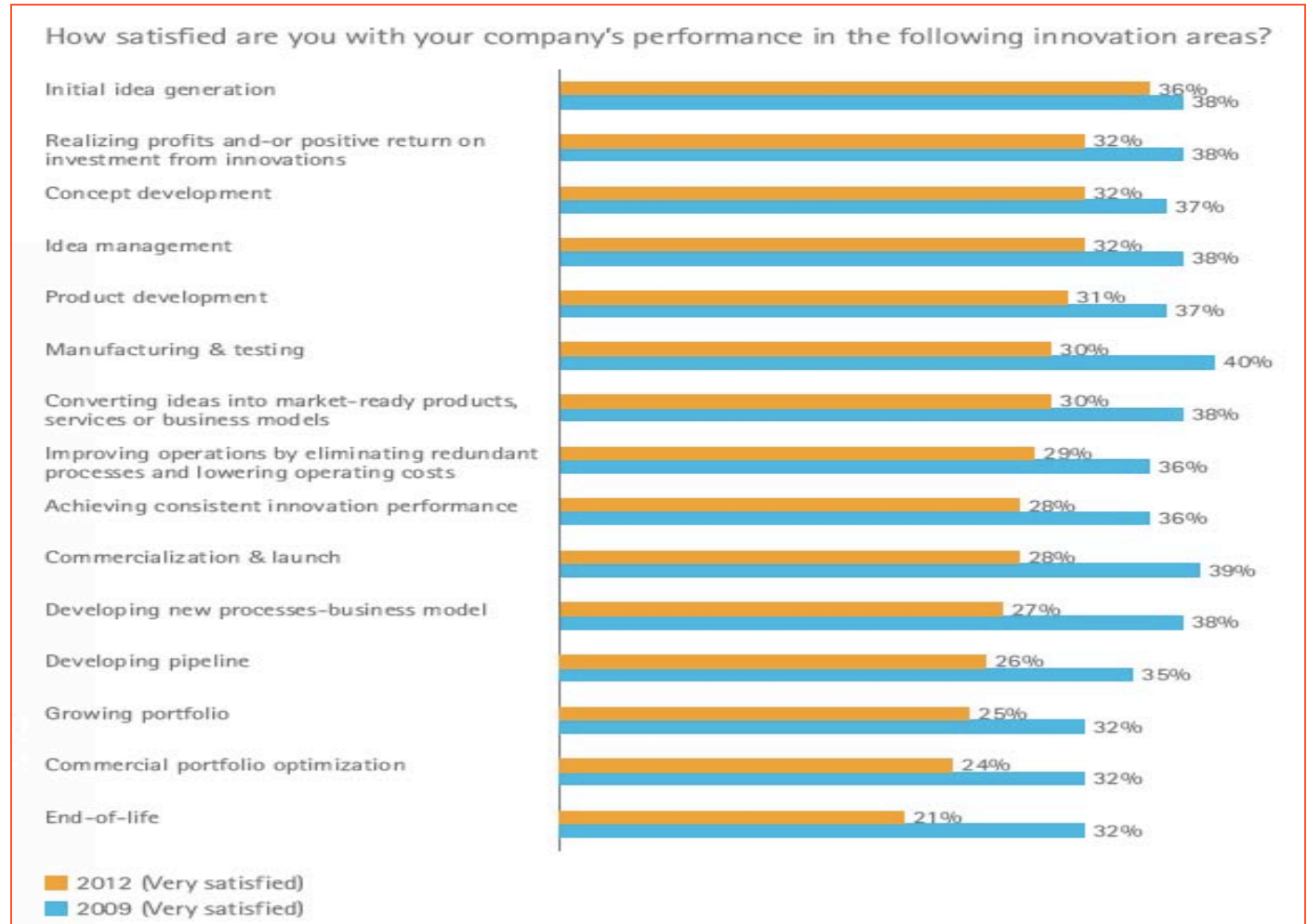
QUESTION: B2. Please complete the following sentence. Since 2008, "Organic R&D" [innovation/invention from within the company] has become _____ important at my company. [Check One Box Only]

Number of Respondents = 199, Margin of Error = +/- 4%

13PDMS-B2-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

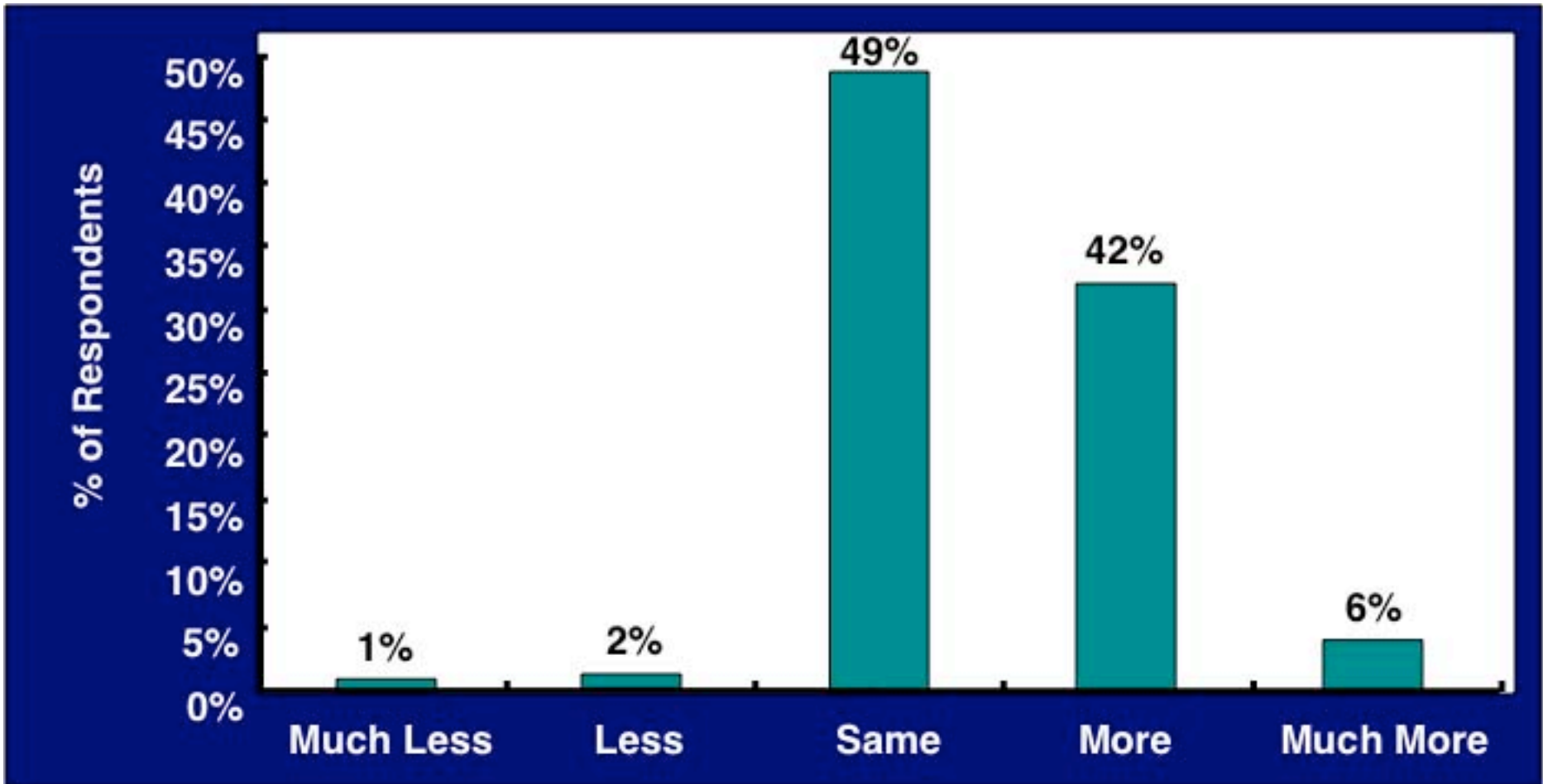
Innovation Strategy: Innovation Satisfaction - 2009 vs. 2012



Source: Wouter Koetzler and Adi Alon, "Why "Low Risk" Innovation is Costly: Overcoming the Perils of Renovation and Invention," Accenture, 161 North Clark Street, Chicago, IL, USA, May 2013, Page 6, Figure 7: Companies are Seeking to Innovate but are Increasingly Less Satisfied with the Results.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: OI Activity



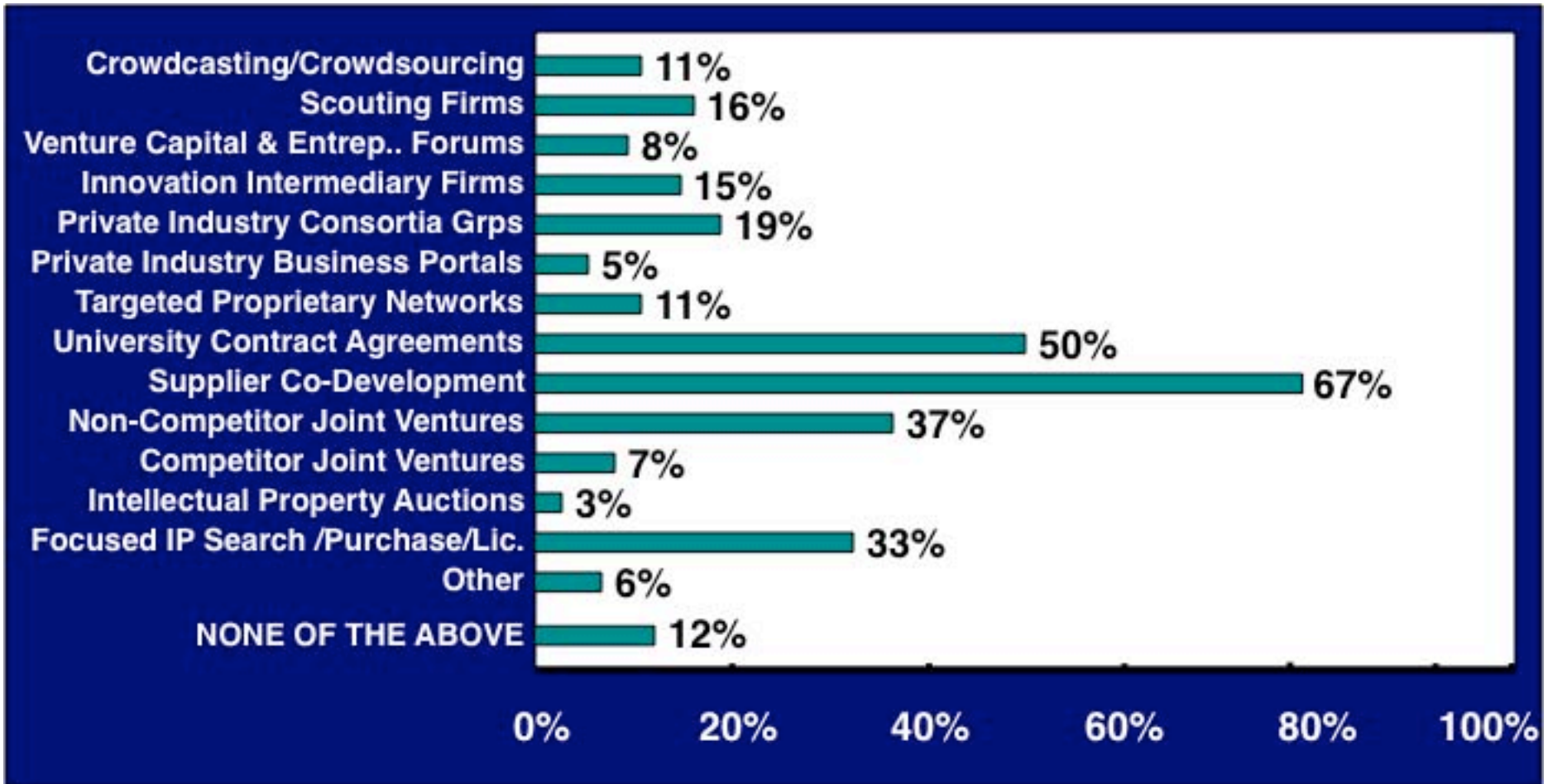
QUESTION: D1. The term "Open Innovation," acquiring or collaborating on innovations and inventions with external organizations, has now been in the nomenclature of corporations for a number of years. Please indicate the degree to which your company utilizes Open Innovation techniques compared to what it did in 2008. [Check One Box Only]

Number of Respondents = 197, Margin of Error = +/- 4%

13PDMS-D1-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: OI Approaches - Inbound



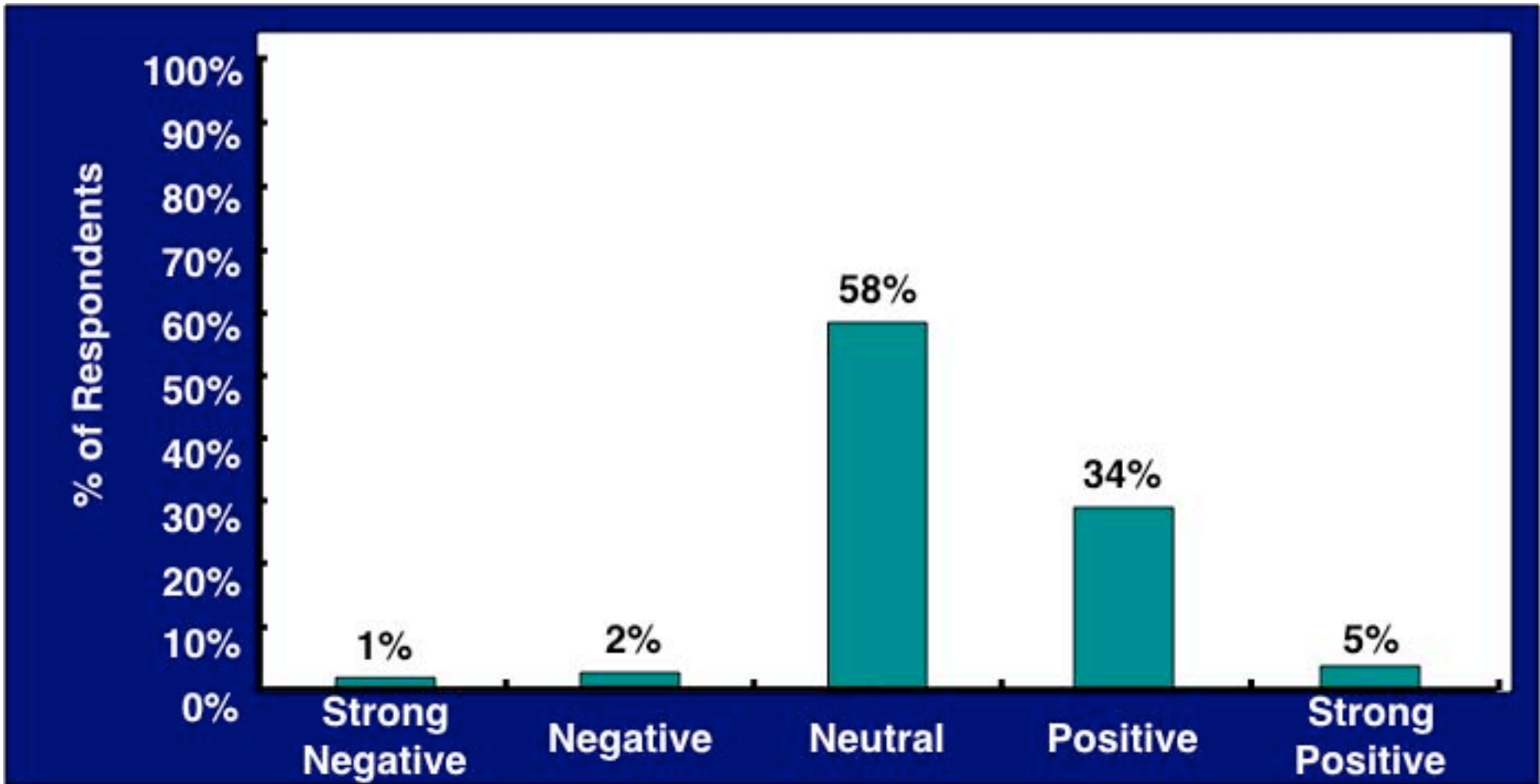
QUESTION: D4a. My company now utilizes the following Open Innovation approaches to acquire capabilities.
[Check All That Apply]

Number of Respondents = 194, Margin of Error = +/- 3%

13PDMS-D4a-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: OI Impact



QUESTION: D3. My company believes that Open Innovation has had a _____ impact on the overall financial performance of the company. [Check One Box Only]

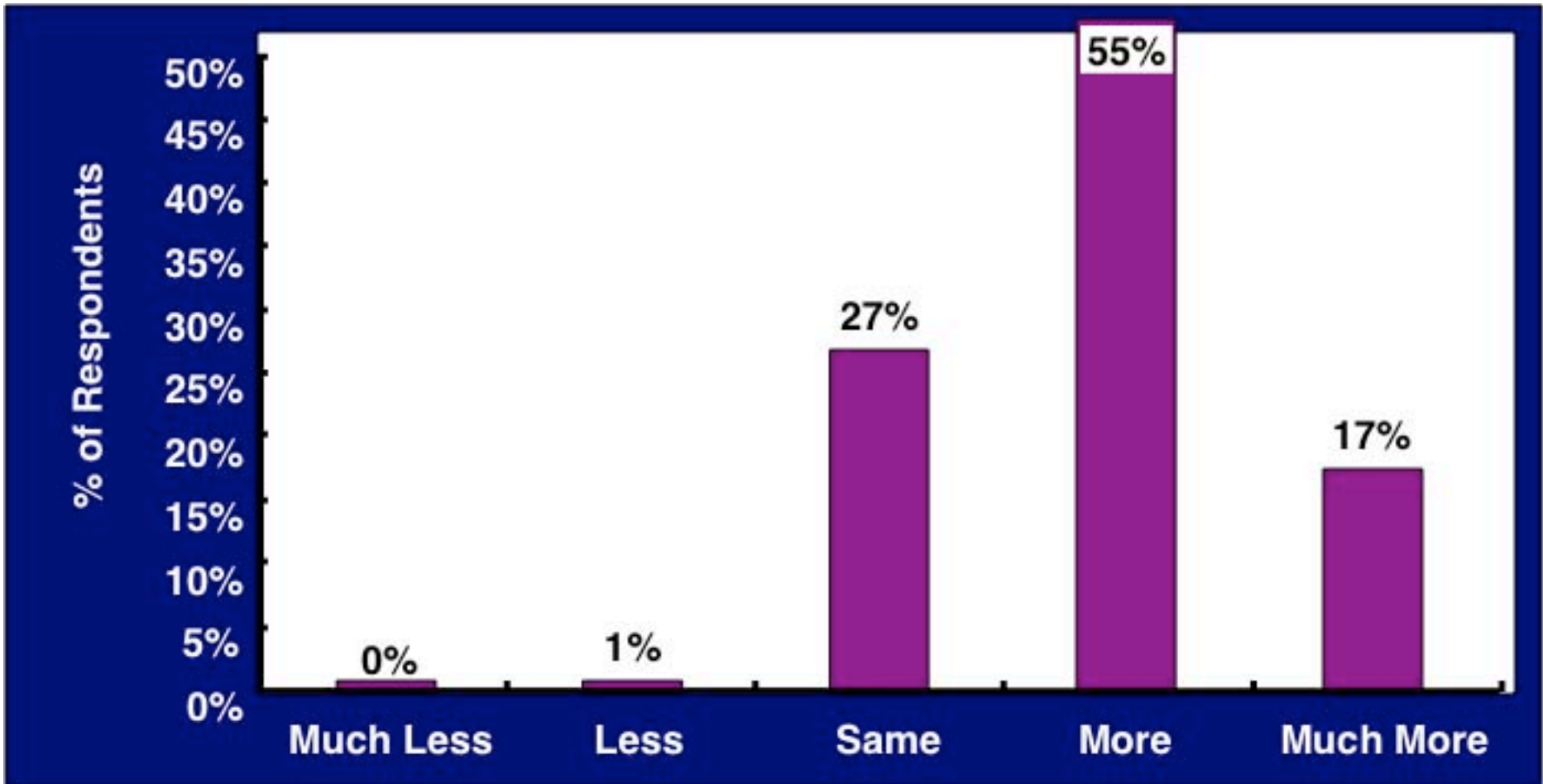
Number of Respondents = 193, Margin of Error = +/- 5%

13PDMS-D3-A2E

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: IP Activity



QUESTION: E1. Recognizing that Intellectual Property has been in the nomenclature of corporations for centuries, please indicate the degree to which IP will be more important in the next five years than it was in 2008? [Check One Box Only]

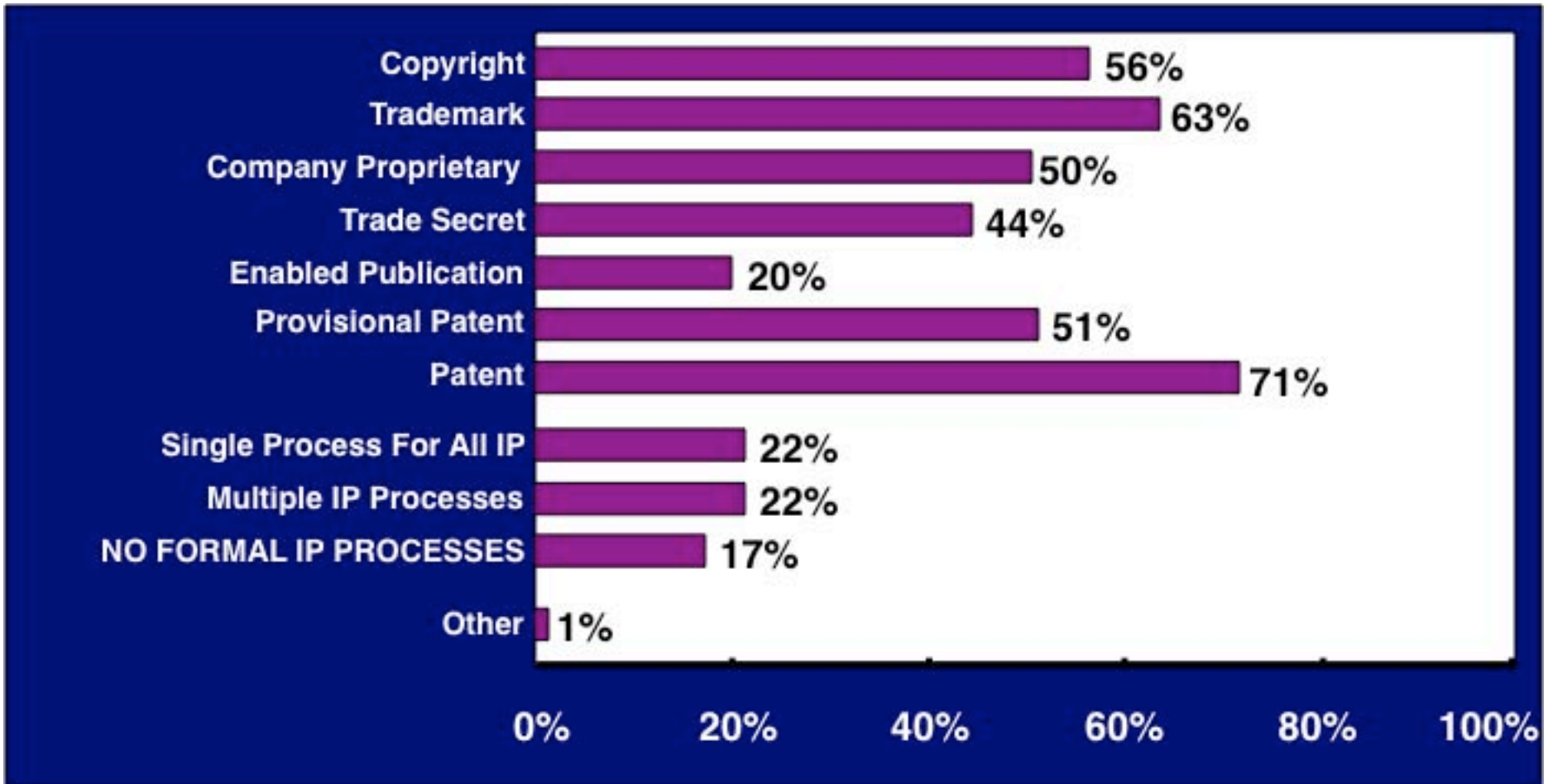
Number of Respondents = 191, Margin of Error = +/- 5%

13PDMS-E1-A2E

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: IP Protection & Registration Processes



QUESTION: E4. Excluding "Product Development Processes" and "Open Innovation Processes," please indicate the type(s) of IP for which your company maintains a "documented process" or "documented guidelines" for protection and/or registration. [Check All That Apply]

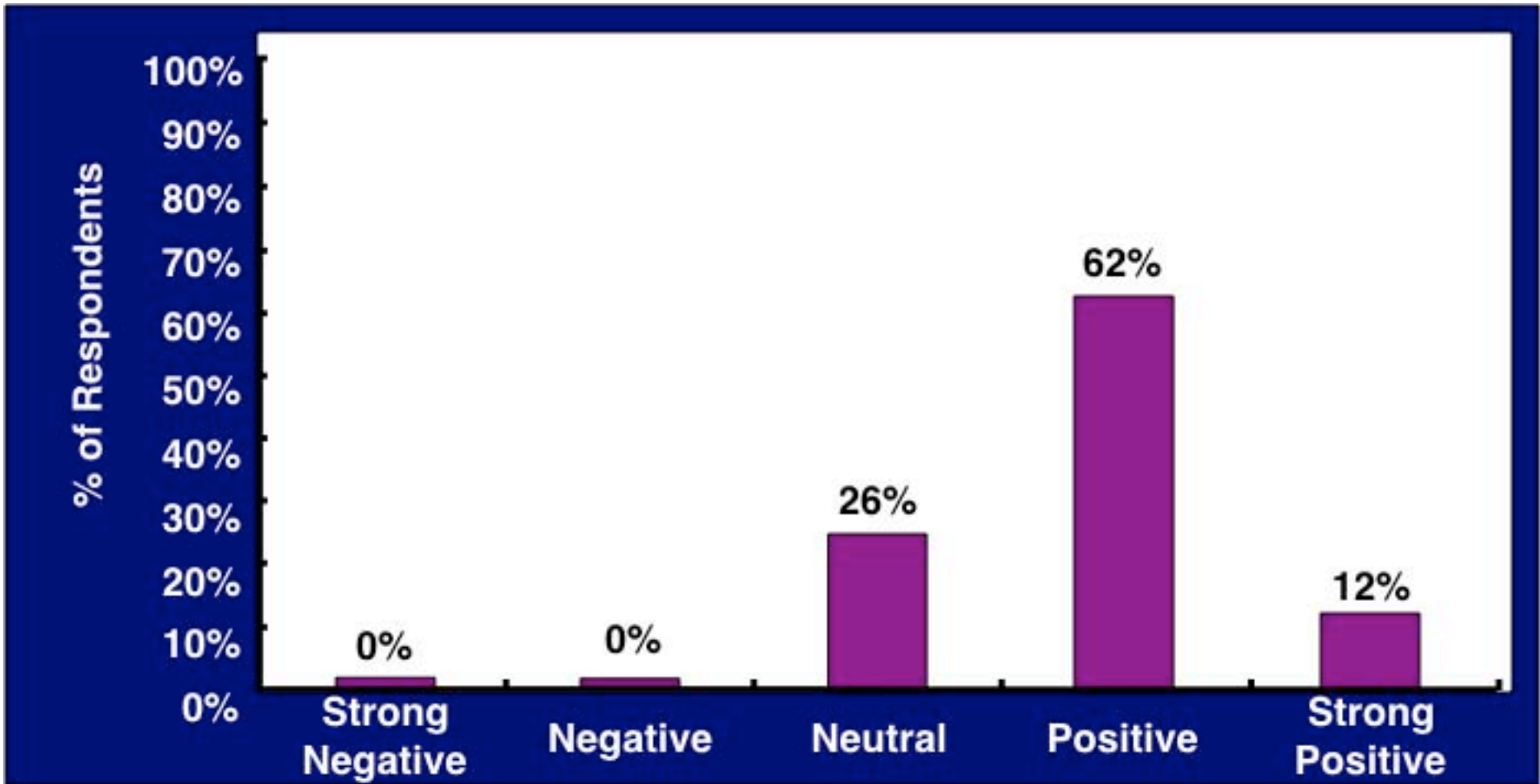
Number of Respondents = 192, Margin of Error = +/- 2%

13PDMS-E4-A2E

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Innovation Strategy: IP Impact



QUESTION: E3. My company believes that our Intellectual Property initiatives have had a _____ impact on the overall financial performance of the company. [Check One Box Only]

Number of Respondents = 192, Margin of Error = +/- 5%

13PDMS-E3-A2E



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Roadmap, Portfolio, Pipeline & Commercialization Control

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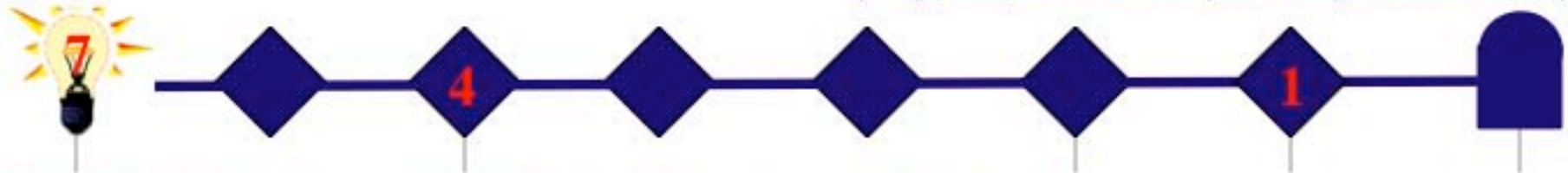
PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Sigma-Level Pipeline Control That Maximizes Business Value

CONCEPT DEFINITION DESIGN DEVELOP LAUNCH COMMERCIALIZE SUPPORT

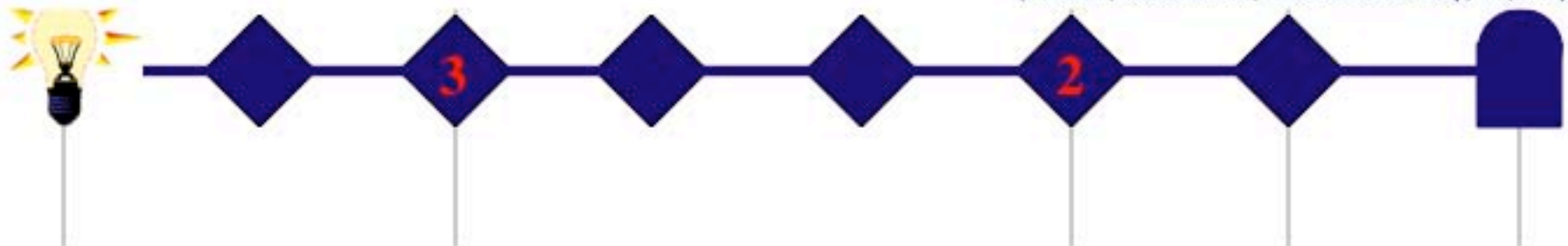
SOURCE: A. Griffin, Drivers of NPD Success: The 1997 PDMA Report

(Chicago, Illinois, USA: Product Development & Management Association, 1997)

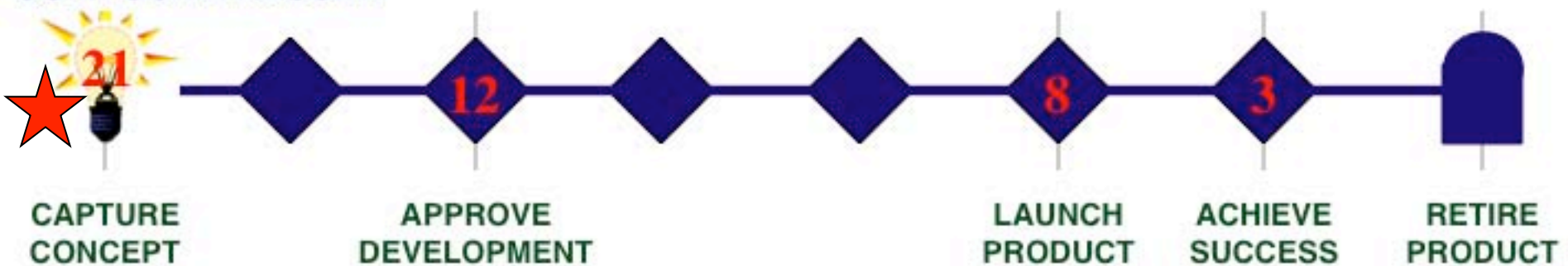


SOURCE: B. Goldense, 2000 Product Development Metrics Survey

(Needham, Massachusetts, USA: Goldense Group, Inc., 2000)

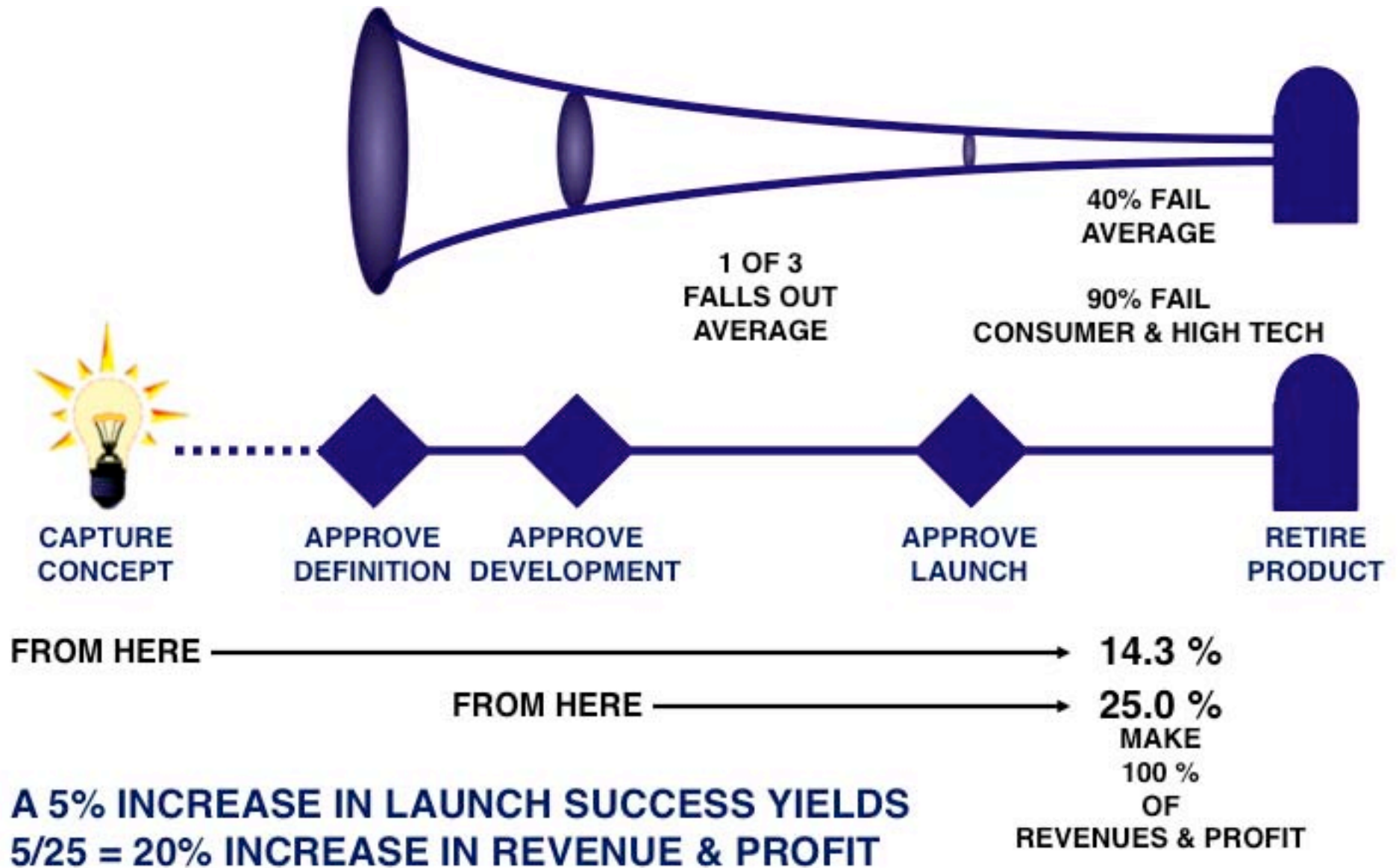


COMPOSITE RESULT:



PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Sigma-Level Pipeline Control That Maximizes Business Value



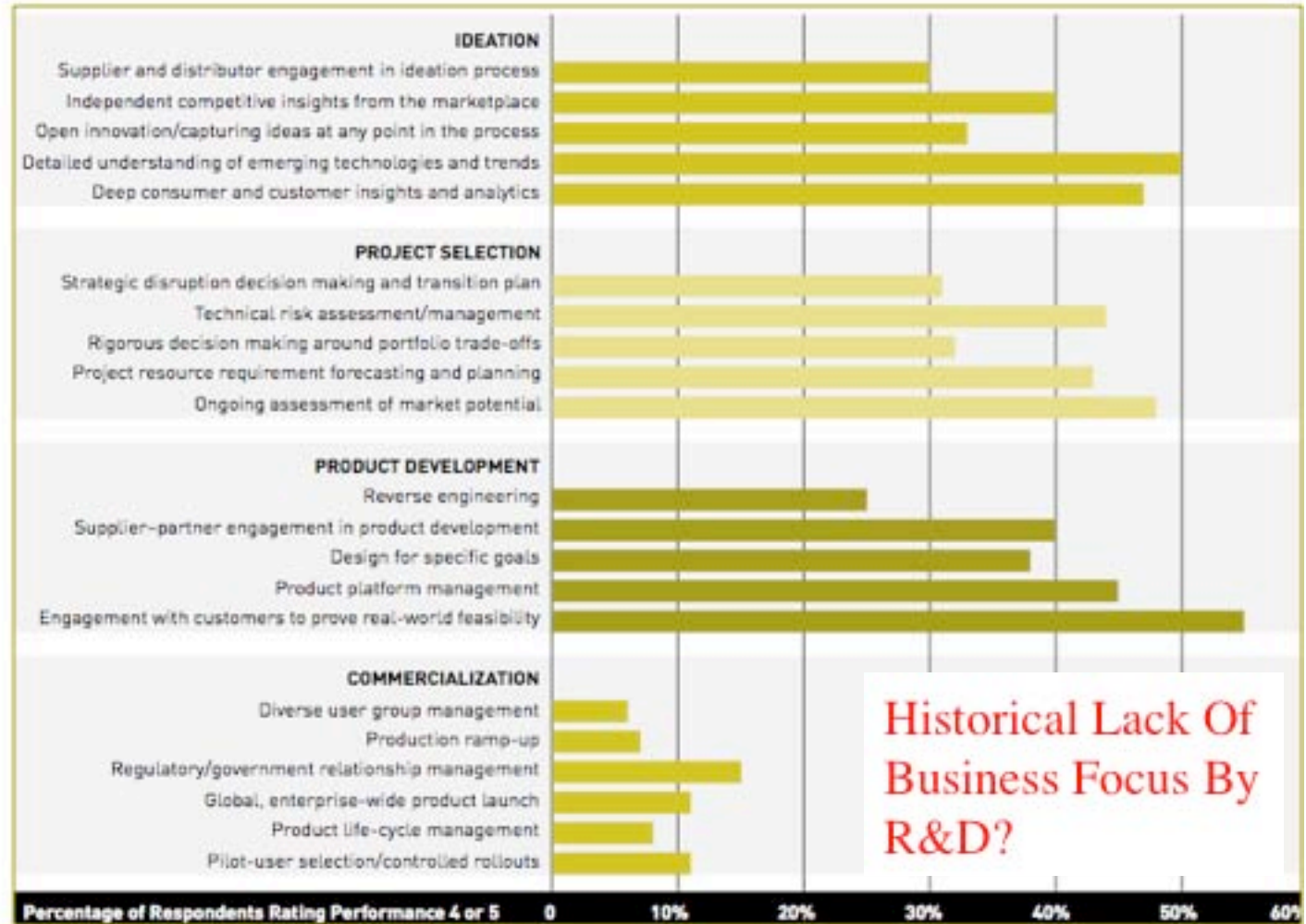
PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Commercialization Success Continues To Lag

Respondents were asked to rate their companies' performance on critical capabilities on a scale of 1 to 5.

At the ideation, project selection, and product development stage of the innovation process, companies gave themselves generally good marks.

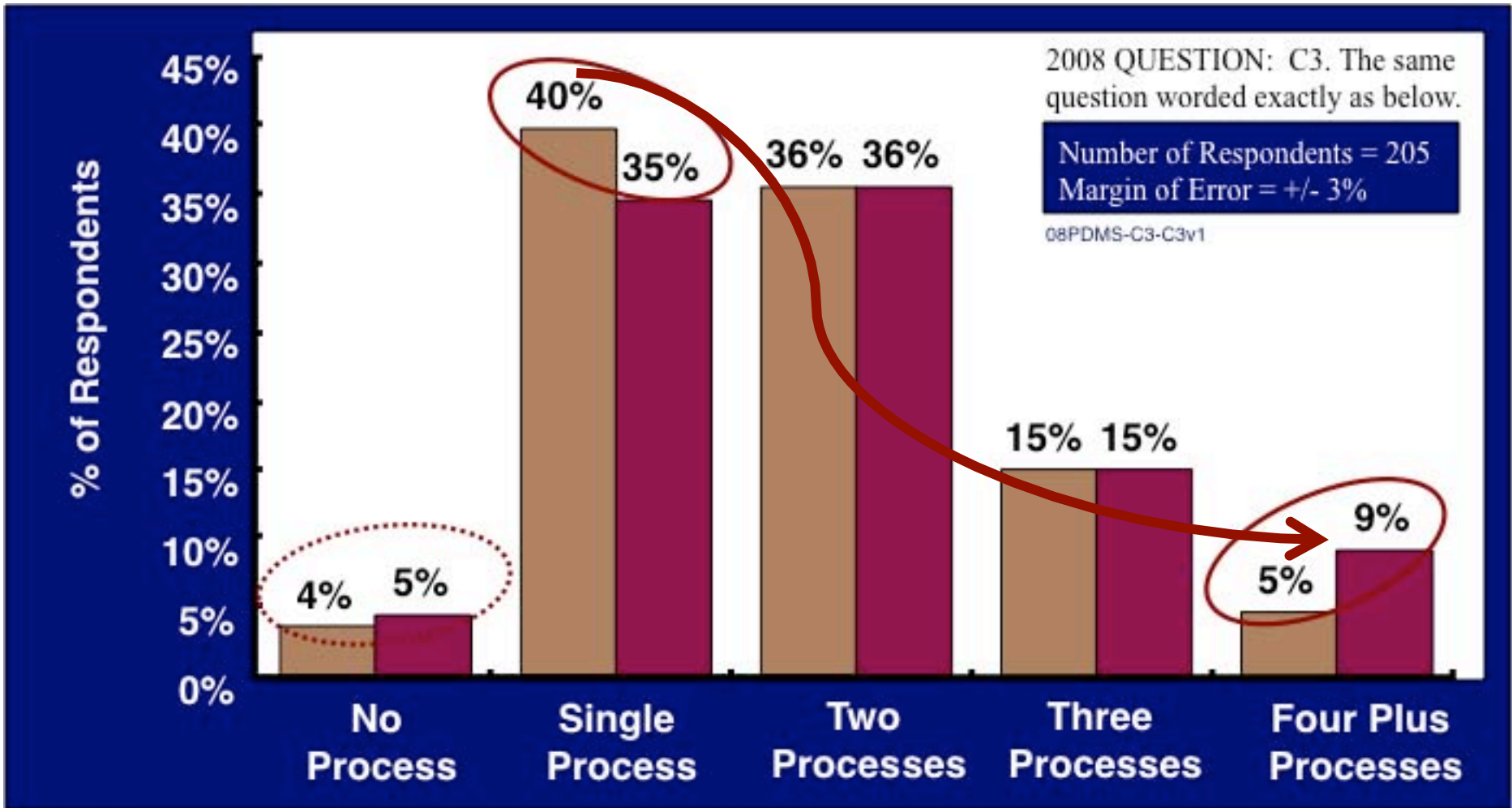
The survey, however, revealed a general shortcoming at the commercialization stage, where companies agreed that their efforts were falling apart.



Source: Barry Jaruzelski and Kevin Dehoff, "The Global Innovation 1000: How The Top Innovators Keep Winning", Booz & Company Inc., 101 Park Avenue, 20th Floor, New York, New York, 10178, USA, Issue 61, Winter 2010, Page 11, Exhibit 10: Innovator's Performance On Critical Capabilities.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Product Development Processes - PreCrash 2008 vs. 2013



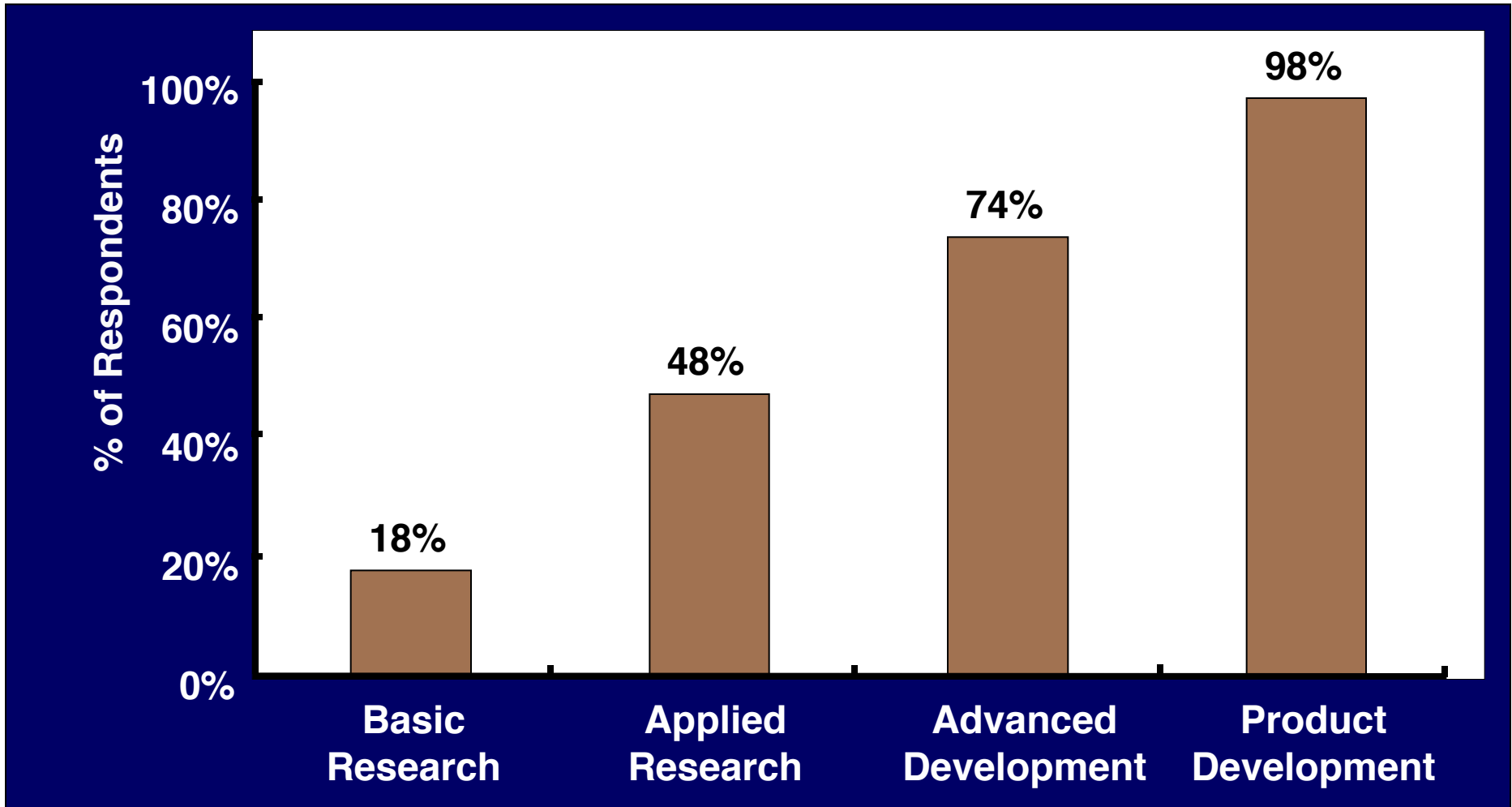
QUESTION: C3. Not considering "Basic Research," "Applied Research," or "Advanced Development" in your reply, please indicate the number of documented processes or variants of an overall documented process that your company utilizes for "Product Development." [Check One Box Only]

Number of Respondents = 197, Margin of Error = +/- 4%

13PDMS-C3-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Historical Product Development Mix Changed Rapidly After 2004



QUESTION: C1. Without disclosing any indications of emphasis or percentages of R&D investment and without regard as to whether the company accomplishes the type of R&D internally/organically or externally/open or both, please indicate the type(s) of R&D in which your company engages. [Check All That Apply]

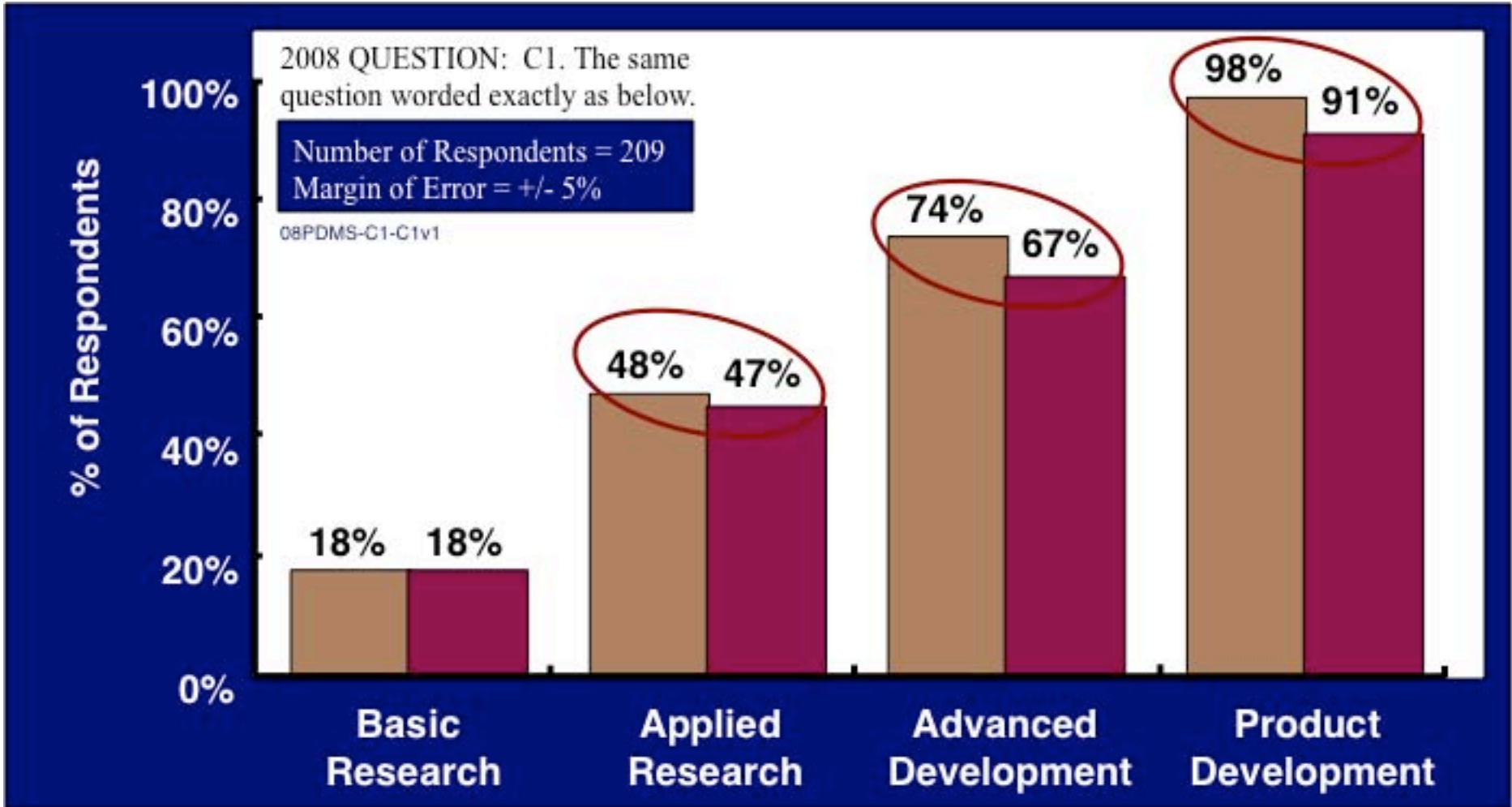
Number of Respondents = 209, Margin of Error = +/- 5%

08PDMS-C1-C1v1

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Historical Product Development Mix Stabilized Between 2008-2013



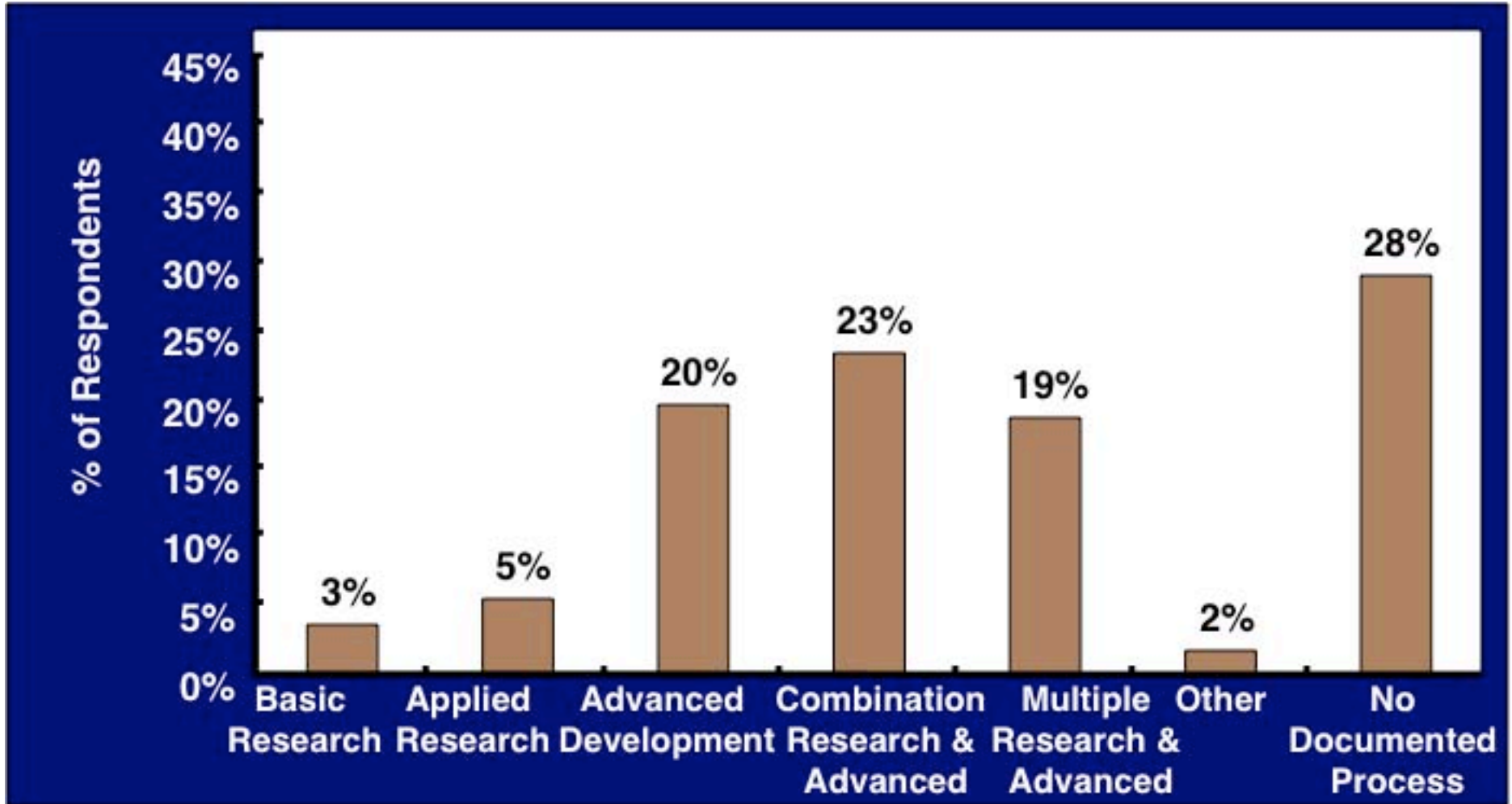
QUESTION: C1. Without disclosing any indications of emphasis or percentages of R&D investment and without regard as to whether the company accomplishes the type of R&D internally/organically or externally/open or both, please indicate the type(s) of R&D in which your company engages. [Check All That Apply]

Number of Respondents = 194, Margin of Error = +/- 6%

13PDMS-C1-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Pre-Product Development Oversight Changed Rapidly After 2004



QUESTION: C2. Excluding “Product Development Processes,” please indicate the type(s) of R&D for which your company maintains a “documented process” or “documented guidelines.” [Check All That Apply]

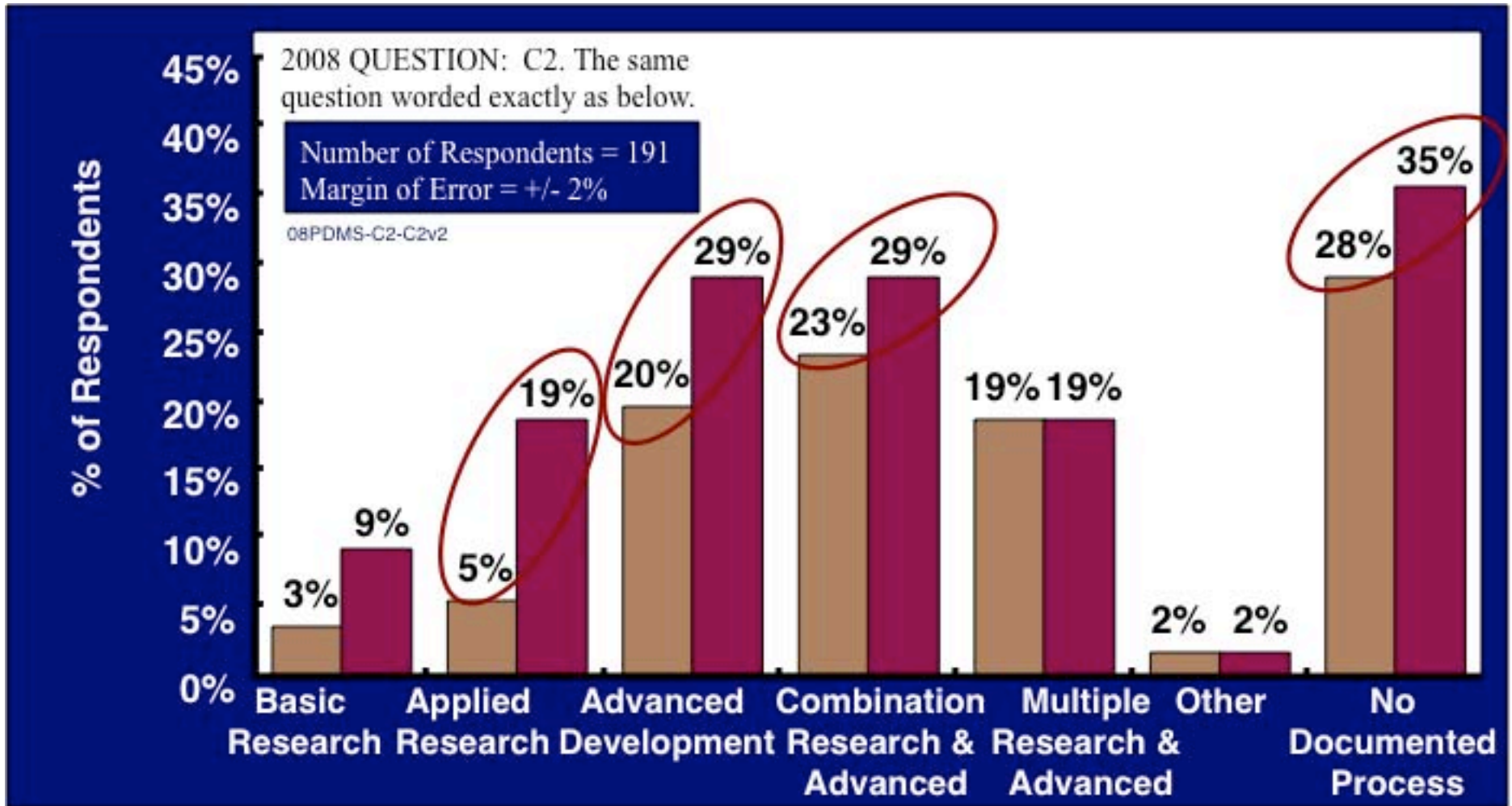
Number of Respondents = 191, Margin of Error = +/- 2%

08PDMS-C2-C2v2

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Pre-Product Development Oversight Continues To Grow 2008-2013



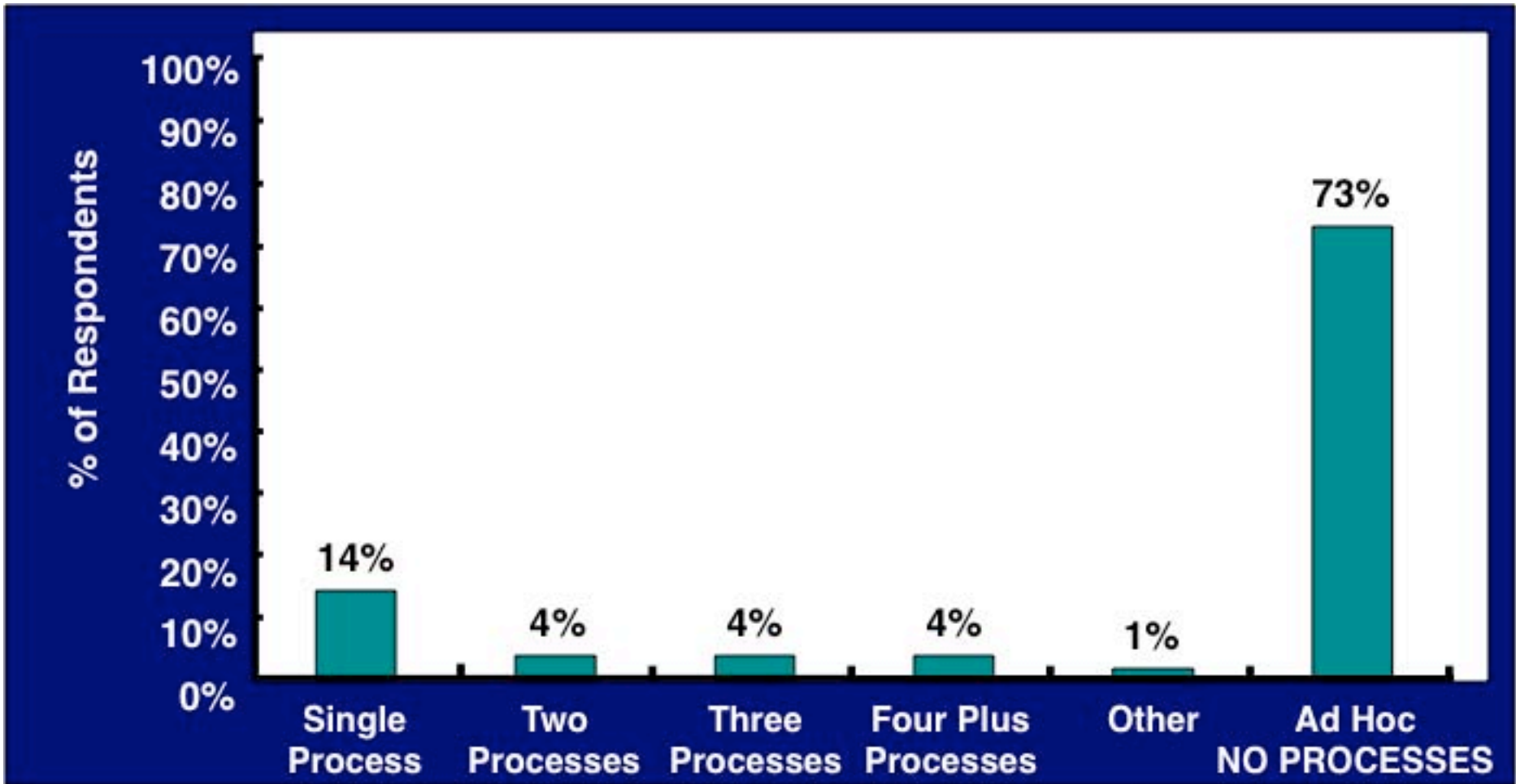
QUESTION: C2. Excluding "Product Development Processes," please indicate the type(s) of R&D for which your company maintains a "documented process" or "documented guidelines." [Check All That Apply]

Number of Respondents = 196, Margin of Error = +/- 2%

13PDMS-C2-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: OI Processes Will Grow



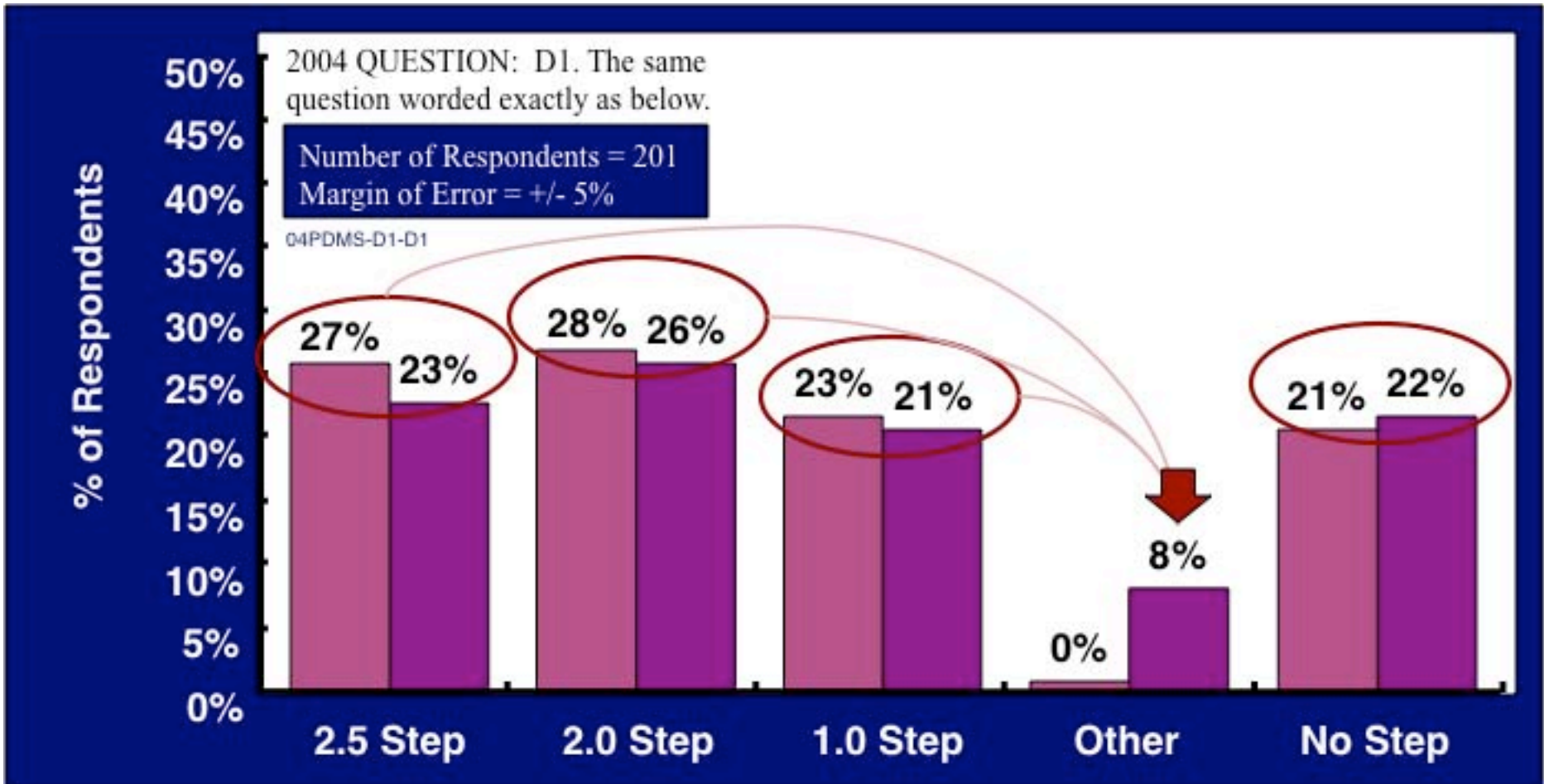
QUESTION: D5. Excluding all "Applied Research," "Advanced Development," and "Product Development" processes identified in the previous Section C of this survey, please indicate the nature of any separately documented "Open Innovation [OI]" processes for which your company maintains either a "documented process" or "documented guidelines." [Check One Box Only]

Number of Respondents = 191, Margin of Error = +/- 3%

13PDMS-D5-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: IP Processes Will Grow



QUESTION: E6. How many times does the company review a given Design or Utility Provisional Patent or Patent proposal before finally making a business decision to either formally approve or formally reject the registration of the IP?
 [Check One Box Only]

Number of Respondents = 187, Margin of Error = +/- 6%

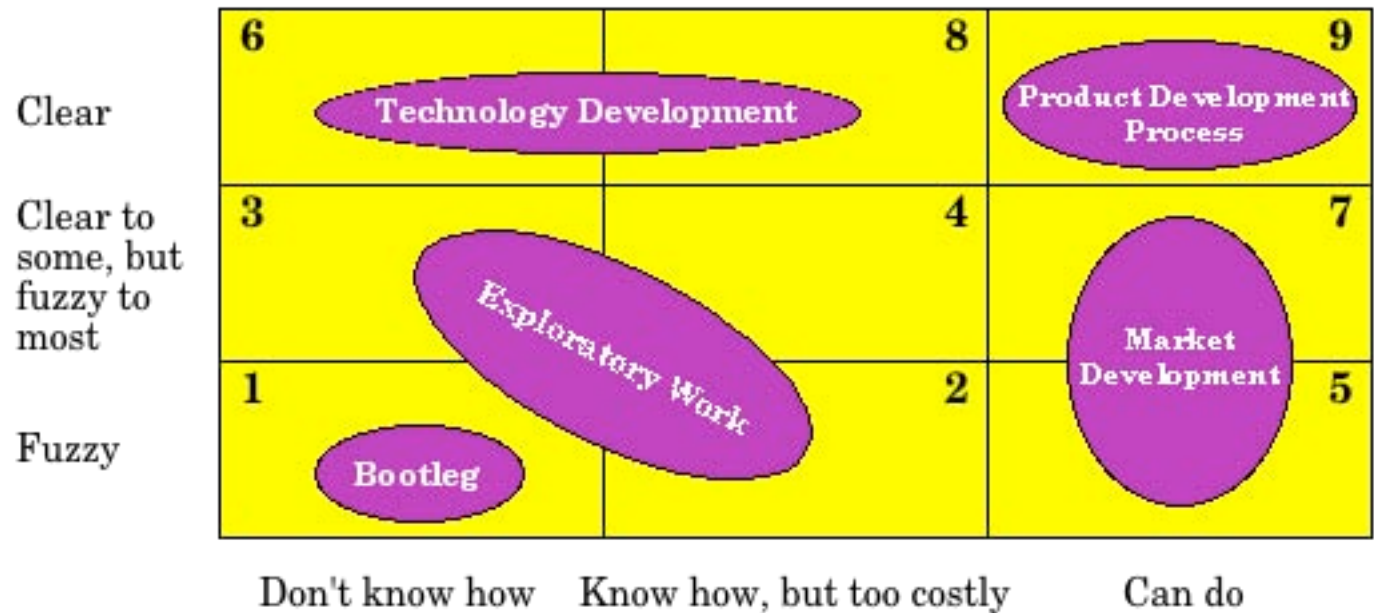
13PDMS-E6-A2E

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Market Development Is The Great Untouched

Key technology management processes may be linked together through a consistent framework.

**CUSTOMER
ABILITY TO UNDERSTAND**

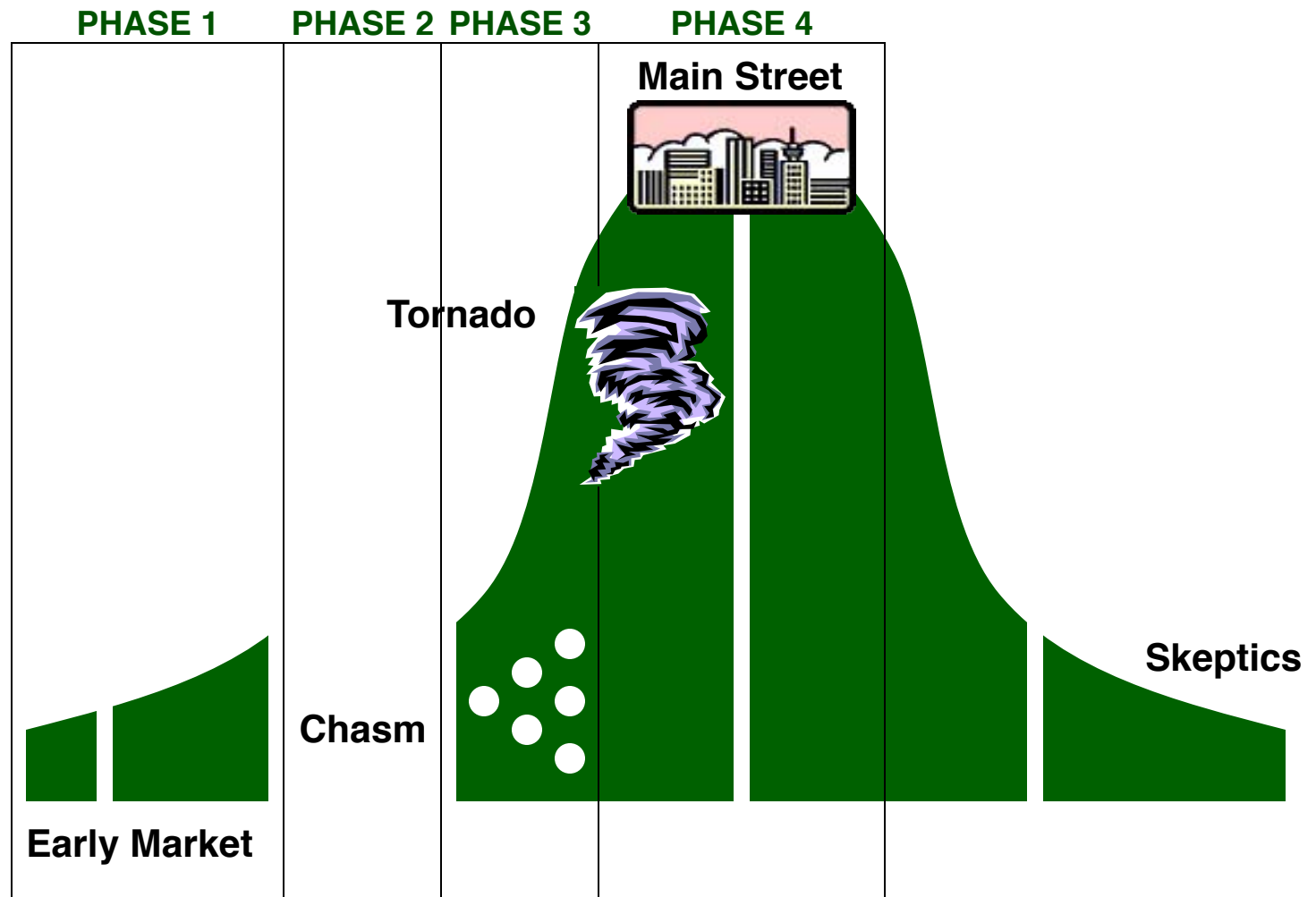


**OUR
ABILITY TO UNDERSTAND**

Source: Barry Siadat, "Technology Delivers Challenges at W.R. Grace," Research-Technology Management, Copyright 1996. Industrial Research Institute, Inc., October 1996, pages 36-43, Figure 11

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

RPPC Control: Market Development Enables Crossing The Chasm



Source: Geoffrey A. Moore, Chasm Group, "Living On The Fault Line: Managing For Shareholder Value In The Age Of The Internet.," Harper Business, HarperCollins Publishers Inc., New York, New York, Copyright 2000 by Geoffrey A. Moore, Page 143. Copyright © 2014 Goldense Group, Inc. All Rights Reserved.



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State-Of-The-Industry R&D Metrics

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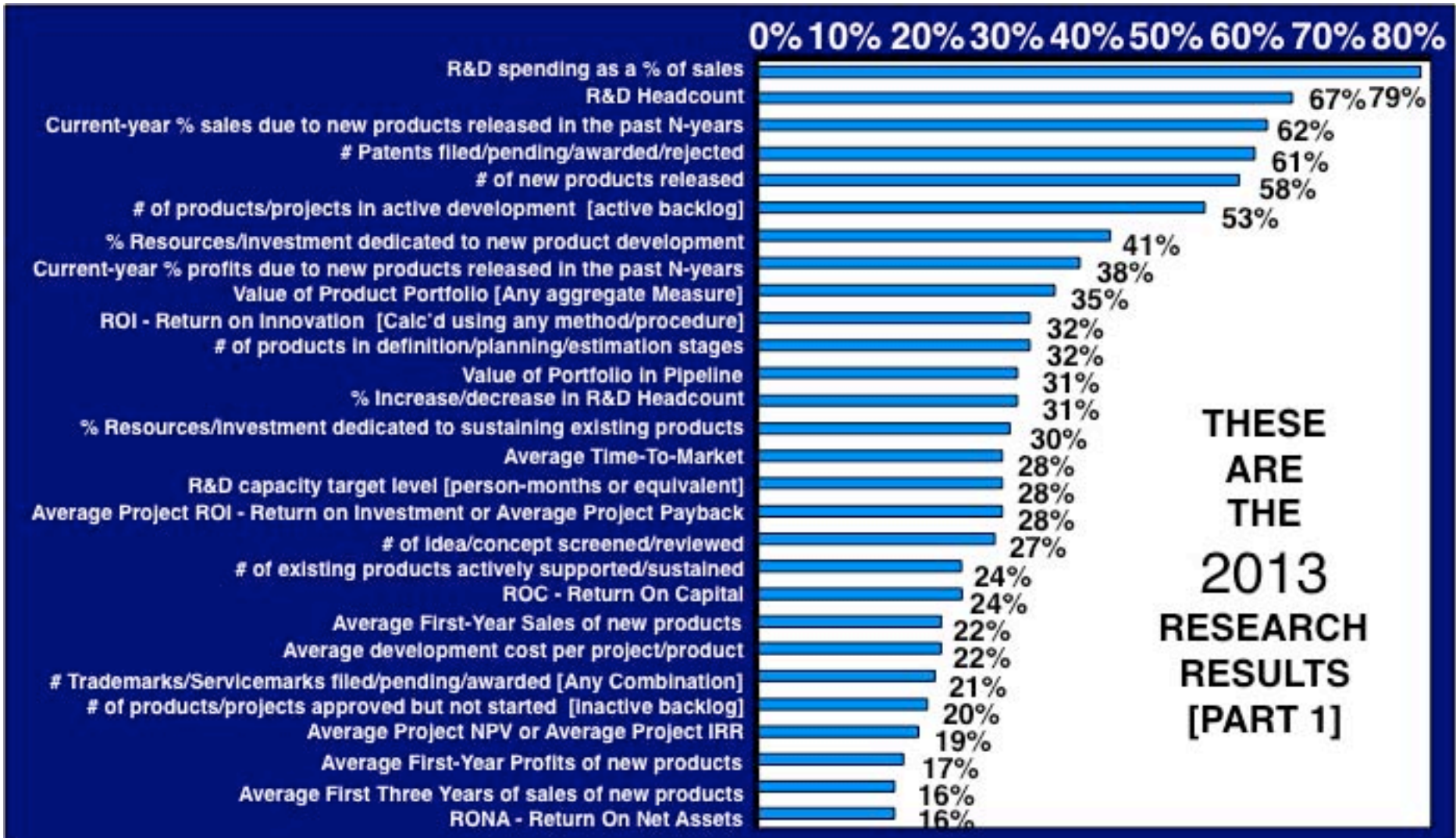
State-Of-The-Industry R&D Metrics: Growth & Penetration Changes 1998-2013

% COMPANIES USING	NUMBER OF METRICS USED					
	1998	2000	2002	2004	2008	2013
> 70 %	1	0	0	1	1	1
> 60 %	3	1	1	3	3	4
> 50 %	5	3	2	5	5	6
> 40 %	8	3	7	7	7	7
> 30 %	11	4	10	15	14	14
> 20 %	16	9	15	28	23	24
> 10 %	24	19	28	47	54	56
NUMBER OF METRICS TO CHOOSE FROM	33	48	60	75	88	101

SOURCE: 1998, 2000, 2002, 2004, 2008, 2013 "GGI Product Development Metrics Survey," Section F, Goldense Group, Inc., Needham, MA.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: NAM Top Metrics Used Across Industries



THESE
ARE
THE
2013
RESEARCH
RESULTS
[PART 1]

QUESTION: F1. Which of the following R&D metrics are "in use" at your company: (Check all that apply).

Number of Respondents = 189, Margin of Error = +/- 6%

13PDMS-F1-MDB

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: NAM Industry Metrics Changes 2008-2013

PreCrash 2008	2013
R&D spending as a % of sales	R&D spending as a % of sales
# Patents filed/pending/awarded/rejected	R&D Headcount
Total R&D Headcount	Current-year % sales due to new products released in the past N-years
Current-year % sales due to new products released in the past N-years	# Patents filed/pending/awarded/rejected
# of new products released	# of new products released
# of products/projects in active development [active backlog]	# of products/projects in active development [active backlog]
% Resources/Investment dedicated to new product development	% Resources/Investment dedicated to new product development
# of products in definition/planning/estimation stages	Current-year % profits due to new products released in the past N-years
Average Project ROI - Return On Investment or Average Project Payback	Value of Product Portfolio
% Increase/decrease in R&D headcount	ROI - Return on Innovation
% Resources/Investment dedicated to sustaining existing products	# of products in definition/planning/estimation stages
Current-year % profits due to new products released in the past N-years	Value of Portfolio in Pipeline
Value of Product Portfolio	% Increase/decrease in R&D Headcount
Average Time to Market	% Resources/Investment dedicated to sustaining existing products
# of existing products actively supported/sustained	Average Time-To-Market
Average Project NPV or Average Project IRR	R&D capacity target level
Value of Portfolio in Pipeline	Average Project ROI - Return on Investment or Average Project Payback
# of products/projects approved but not started [inactive backlog]	# of Idea/concept screened/reviewed
ROI - Return On Innovation	# of existing products actively supported/sustained
Average First-Year Sales of new products	ROC - Return On Capital
Average development cost per project/product	Average First-Year Sales of new products
# of Idea/concept screened/reviewed	Average development cost per project/product
R&D capacity target level	# Trademarks/Serviceemarks filed/pending/awarded [Any Combination]
Average First Three Years of Sales of new products	# of products/projects approved but not started [inactive backlog]
Average First-Year Profits of new products	Average Project NPV or Average Project IRR
Total licenses granted and/or acquired	Average First-Year Profits of new products
NPV Efficiency – New Product Sales NPV/Spending	Average First Three Years of sales of new products
% of new products/projects approved/rejected	RONA - Return On Net Assets

QUESTION: F1. Which of the following R&D metrics are "in use" at your company: (Check all that apply).

Respondents = 189 in 2013 and 204 in 2008.

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: Return On Innovation [ROI]

Also Called “PBT Group,” Profit Before Tax.



$$\text{ROI} = \frac{\left[\begin{array}{c} \text{Cumulative N-Year Net Profits} \\ \text{From New Products} \end{array} \right]}{\left[\begin{array}{c} \text{Cumulative N-Year Expenditures} \\ \text{On New Products} \end{array} \right]}$$

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: Return On Innovation [ROI] - Adapted

Adaptation Example #1

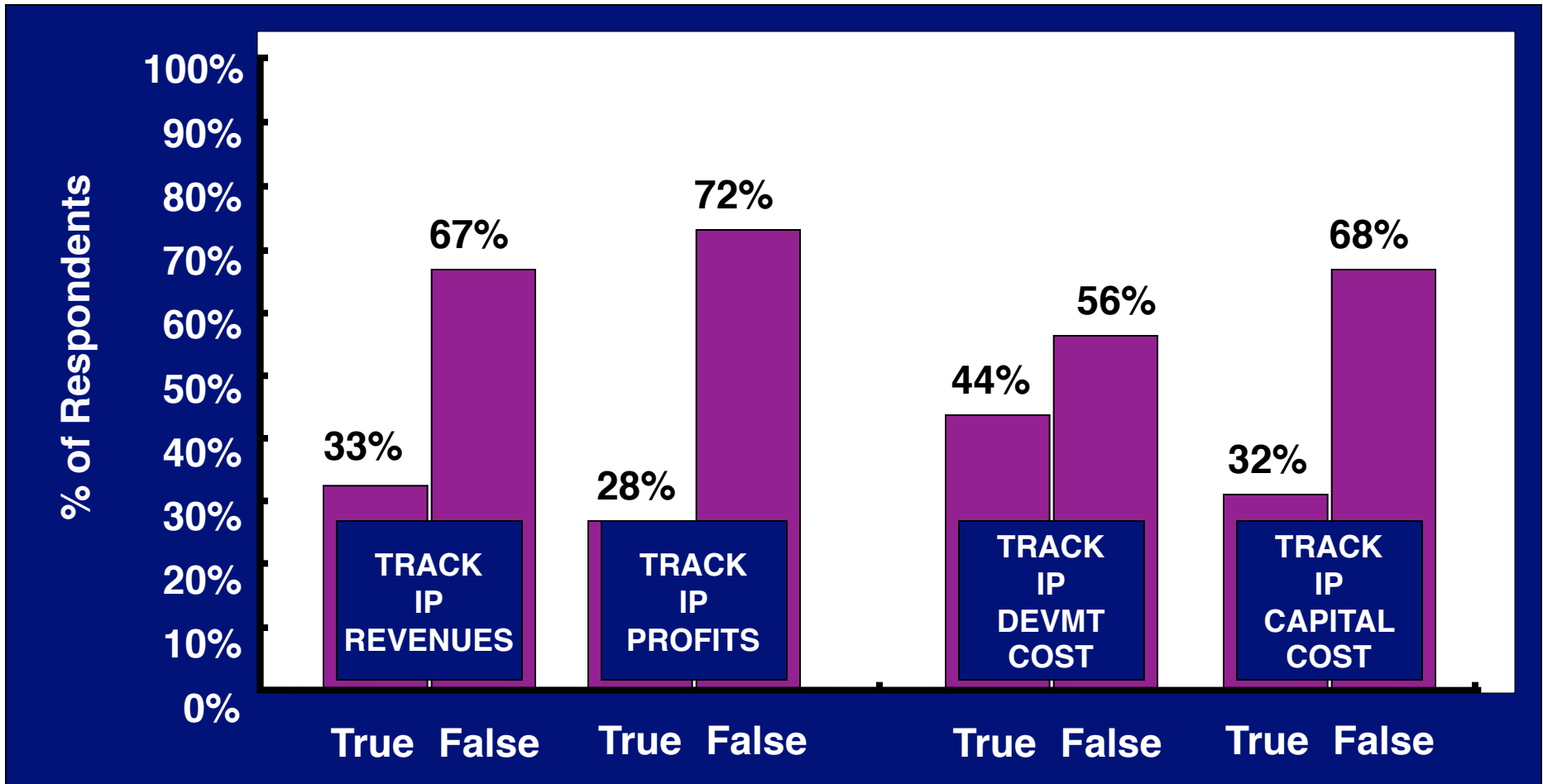
Also Called "PBT Group," Profit Before Tax.



$$\text{ADROI} = \frac{\left[\begin{array}{c} \text{Cumulative N-Year Net Profits} \\ \text{From New Products} \\ \text{Containing Advanced Development Content} \end{array} \right]}{\left[\begin{array}{c} \text{Cumulative N-Year Expenditures} \\ \text{On Advanced Development} \\ \text{For New Products} \end{array} \right]}$$

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: More IP Metrics Are Coming



QUESTION: E2. My company separately tracks, or breaks out as an analysis, the financial results of Intellectual Property initiatives. [True or False]

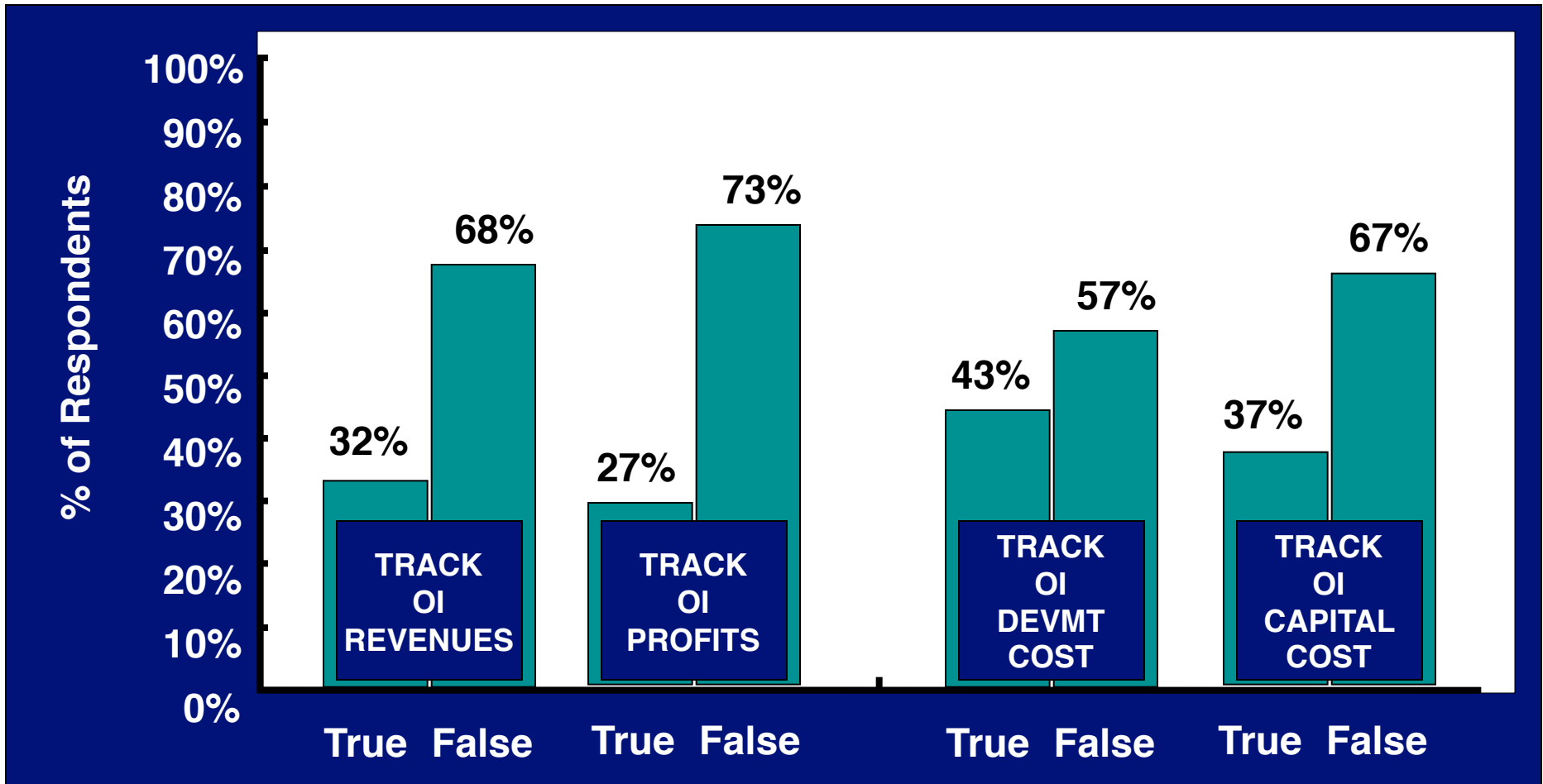
Number of Respondents = 189, Margin of Error = +/- 7%

13PDMS-E2-A2E

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: More IP Metrics Are Coming



QUESTION: D2. My company separately tracks, or breaks out as an analysis, the financial results of Open Innovation initiatives. [True or False]

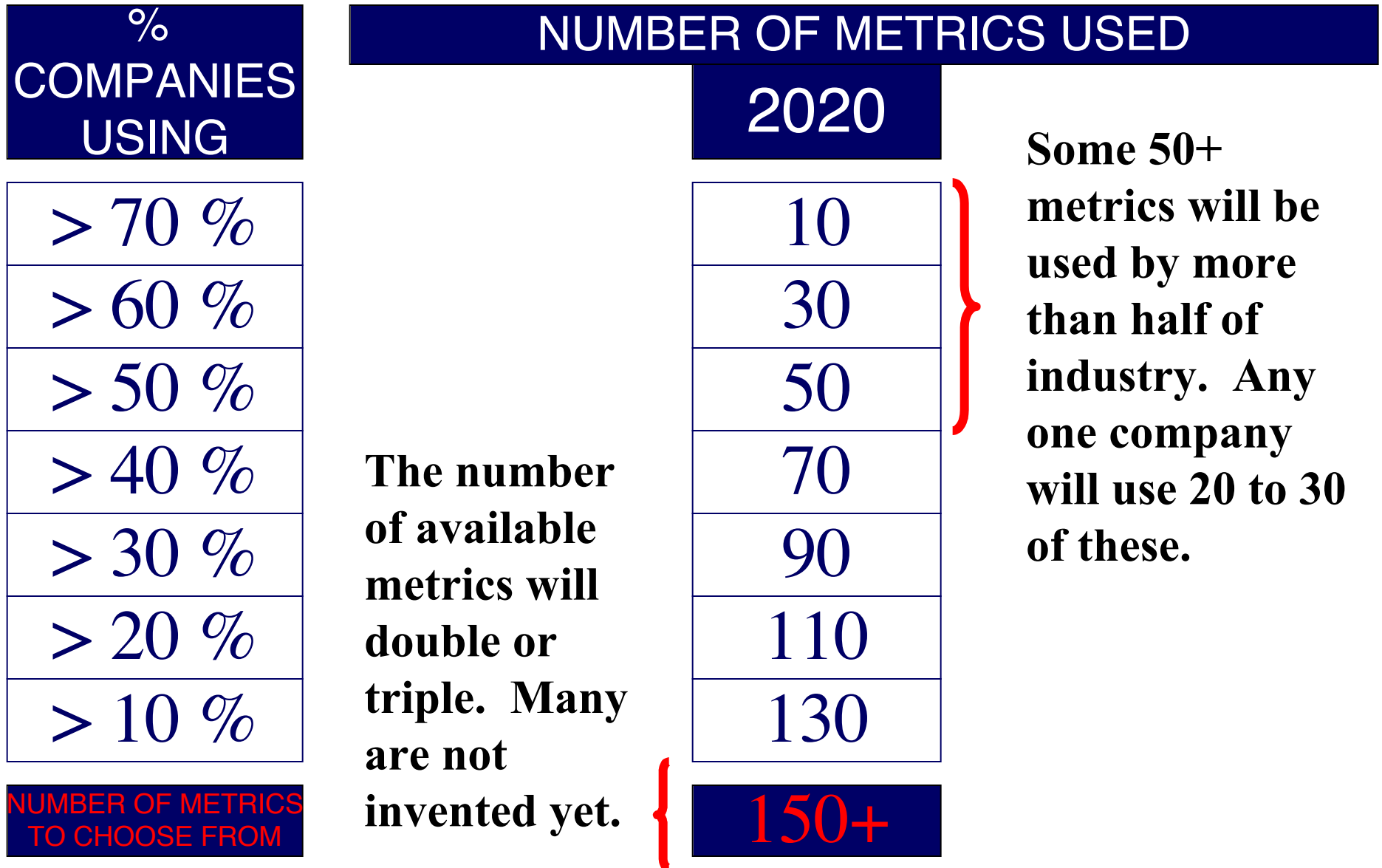
Number of Respondents = 193, Margin of Error = +/- 7%

13PDMS-D2-A2E

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PRODUCT DEVELOPMENT & INNOVATION PRACTICES

State-Of-The-Industry R&D Metrics: Growth & Penetration Will Continue





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Summary

PRODUCT DEVELOPMENT & INNOVATION PRACTICES

Summary: Advancing Practices

Operating Environment

Product portfolios have become steadily more conservative the past 15 years and became even more so after the great recession. The Platform-Derivative strategy, which has longer returns, fell back as Balanced and Extender strategies dominated portfolio philosophies. Advanced development and innovation processes are coming of age; while the number of product development processes now seemingly exceed what a competent professional can remember.

Organic Innovation

The pop for innovation appears to be settling into a new elevated normal, approaching a business-as-usual state of practice.

Open Innovation

Open innovation is building steadily. This is consistent with the "opening of companies" since benchmarking first broke barriers in the late 1980s. Globalization, alliances, ventures, and makers have all contributed to a shift in NIH make vs. buy attitude. Nascent industries are emerging to service the demand. Generation 6, "Tech-Push," is also heading towards business-as-usual.

Intellectual Property

Intellectual property is steadily becoming more pervasive. It is a longer journey due to legal and government involvement. It is not a "free market" evolutionary path. IP, licensing, and related measures are growing in corporate focus and in day-to-day decision making.

CXO Metrics

There is a clear shift to R&D metrics that measure business results during the past five years, unprecedented in its nature. The level of thinking is elevated to management issues such as capacity, R&D vitality, portfolio, pipeline, aggregate returns, and looking at capital measures alongside revenue measures. The number of "general use" industry metrics has tripled in fifteen years and are headed to triple again in the next 15 years as computer processing power reduces the cost of a metric.

Approximately 1/3 of the findings of GGI's 2014 Research were shared at the BDI DFMA 2014 Conference.

The complete GGI report, 138 pages, is available for \$966. GGI's "MR52c" comes with a Corporate License enabling access for all employees.

END

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