INNOVATION RESEARCH INTERCHANGE
Accelerating Value Creation

NATIONAL ASSOCIATION OF Manufacturers

IRI 2023 ANNUAL CONFERENCE

May 22–25
Philadelphia, PA

INNOVATION RESEARCH INTERCHANGE
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INNOVATION ROI BEST PRACTICES

IRI 2023 ANNUAL CONFERENCE

BACKGROUND

MAXIMIZING RETURN ON INNOVATION INVESTMENT

Spending more on innovation does not necessarily translate into accelerating sales, market share or profit. Here's how three organizations would remedy this.

Miles P. Drake, Nabil Sakkab and Ronald Jonash

OVERVIEW: "How does the level of business innovation investment really impact company growth and performance?" *This question was put to an Industrial Research Institute panel for discussion at its annual meeting, May 2006. The panelists were also asked to comment on an initial hypothesis presented in* strategy+business *by Alexander Kandybin and Martin Kihn, of Booz Allen Hamilton, that there is no broad correlation between innovation investment and growth. In their responses, panelists from Air Products and Chemicals, Procter & Gamble and The Monitor Group suggest ways to move forward.*

KEY CONCEPTS: *R&D investment, business innovation, return on innovation, metrics.*

Raising Returns on Innovation, ***by Miles Drake***

Return on investment is an ever-growing concern at my company as it is, I'm sure, at many others. Few activities in the corporate world, however, resist the business leader's attempts to gauge return on investment than innovation. Most of what is done under the in tion banner may be scientific, but judgments abo results of those efforts are often more a matter of

Innovation is broader than research and developm course, but for this discussion I shall narrow the s to R&D. Specifically, I shall focus on the followin questions:

- How surprised should we be that there seems little correlation between R&D expenditure (abso relative to sales) and business performance?
- How do we know when we are investing eno R&D?
- Is there an appropriate R&D/sales target business?

In sharing some of our experience at Air Produc Chemicals, I shall draw on internal compan gathered over many years from our portfolio o nesses.

Miles Drake heads the worldwide R&D activities at Air Products and Chemicals, Inc., Allentown, Pennsylvania, as vice president and chief technology officer. He joined Air Products in 1986 as a technology manager, was appointed director of the Corporate Science and Technology Center in 1994, director of Gases and Equipment Group in 1998, and assumed his current position in 2001. He is a Fellow of the Royal Society of Chemistry, a past president of the Industrial Research Institute and the author of over 20 patents. He received a B.S. in chemistry from Cambridge University and a Ph.D. in surface and colloid chemistry from the University of Bristol. **drakemp@airproducts.com**

Nabil Sakkab is senior vice president, Corporate Research and Development, and a member of the Leadership Council at Procter & Gamble Company, headquartered in Cincinnati, Ohio. He assumed his current responsibilities in 2005, after nine years as senior vice president for R&D Fabric & Home Care. He joined P&G in 1974 after receiving his doctorate in ch from the Illinois Institute of Technology and doctorate studies at Texas A&M. He is the au several scientific publications and a co-inven several patents in detergency and toothpaste p tions. **Sakkab.ny@pg.com**

Ronald Jonash is a senior partner of Innovatio agement Inc. (IMI) and of The Monitor Gr Cambridge, Massachusetts. He was prev managing director of the Technology and Inn Management Practice for Arthur D. Little, w worked for 25 years in strategic management of t ogy and innovation. A consultant to many indust is co-author of The Innovation Premium *(Perseus 1999) and author of many articles. He has de economics and engineering systems from Princet versity, where he also received his master's de architecture and design.* **Ronald_Jonash@monitor.com**

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MEASURING THE EFFECTIVENESS OF R&D

R&D metrics continue to be an important topic for measuring the effectiveness of R&D. Practitioners share their issues and recommendations.

Lawrence Schwartz, Roger Miller, Daniel Plummer, and Alan R. Fusfeld

OVERVIEW: *Measuring the effectiveness of R&D has been a perennial challenge. IRI's Research-on-Research working group Measuring the Effectiveness of R&D sought to investigate how managers define R&D effectiveness and what metrics they use to measure it. Via surveys and questionnaires, attendees at IRI meetings revealed that while the three top metrics are unchanged over the past 15 years, there were significant differences in metrics used depending on the industry type. The study also revealed issues with metrics in general and the need for new metrics to meet the changing R&D environment.*

KEY CONCEPTS: *Metrics, Technology value pyramid, Innovation games, R&D effectiveness, Research-on-research groups*

The creation of a set of metrics to measure the effectiveness of R&D has been a major need for research managers for some time. In recent surveys of Industrial Research Institute (IRI) participants, the need for metrics has ranked in the top three for the past three years (Cosner 2010). The enhanced importance of reliable metrics is being driven by several forces: the need to justify the investment in R&D to senior management, the desire to improve efficiency in the use of R&D resources, and the need for a means to estimate the value of the R&D investment for the future growth of the company.

Because R&D tends to be both longer term and more subjective than a sales or manufacturing target, effective metrics must encompass the broad influence R&D has

Lawrence Schwartz is a vice president and principal of Intellectual Assets, Inc., a California-based professional services company linking business decisions and intellectual property. His areas of technical expertise are in materials and sustainability. Previously he was vice president of strategic development for Aurigin Systems. At Raychem (Tyco), he worked for 25 years in all phases of technology management. He holds a PhD in chemistry from the University of Arizona, an MBA from San Jose State University and a BS in chemistry from San Diego State University. **larryschwartz333@aol.com**

Roger Miller is a founding partner of Secor, a strategy consulting firm with offices in Montreal, Toronto, New York, and Paris. He is presently a Distinguished Research Fellow at the Said Business School at Oxford University. He was previously the Jarislowsky Professor of Innovation and Project Management at Ecole Polytechnique in Montreal, Canada. **rmiller@groupesecor.com**

Dan Plummer is the manager of R&D for Sasol North America in Lake Charles, Louisiana, a manufacturer of surfactants, surfactant intermediates, and specialty chemicals. He has 27 years of industrial experience with Sasol North America and its predecessor companies. He has filled roles in product management, sales and marketing, quality development, and global R&D management. Dan received a BA in chemistry from Kenyon College and a PhD in inorganic chemistry from Iowa State University. **dan.plummer@us.sasol.com**

Alan R. Fusfeld is president and CEO of The Fusfeld Group, Inc., a consultancy practice specializing in strategic development and technology management. Formerly, he was the founder of the technology management group of Pugh-Roberts Associates, Inc., where he was also senior vice president and director. His current interests include R&D leadership, strategy for designing the future organization, R&D metrics, and portfolios. He received his B.E.S. degree in mechanics from the Johns Hopkins University and was a member of the Massachusetts Institute of Technology's PhD program in the management of technology. **www.fusfeldgroup.com; afusfeld@aol.com**

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OPTIMIZING ROI OF TIME-TO-MARKET PRACTICES

Here's a model created to measure usage, cost and cost-effectiveness of TTM practices at HP's Personal Workstation Lab.

Susan M. Katz, Robert Casey and Lynda Aiman-Smith

OVERVIEW: *Most managers recognize that time-to-market practices provide benefits for their organizations, but few have considered all available TTM strategies. Further, little research has been done into the advantages and disadvantages of these strategies. Developing a process for and examining the cost effectiveness of TTM can be particularly useful. Measurements of usage and cost derived from organizational experience can be used to calculate the cost effectiveness of TTM practices within any setting. This information can then be used by management to optimize return on investment by achieving TTM with minimal costs. The goal is to create a set of balanced practices that meet the specific needs imposed by industry constraints.*

KEY CONCEPTS: *measuring NPD practices, ROI time-to-market practices, decision-making in NPD.*

In 2001, one of the authors, Robert Casey, a senior program manager at Hewlett-Packard's Personal Workstation Lab (PWL), became convinced that his organization needed to get a better handle on the usage of a variety of time-to-market (TTM) practices (*1*). The workstation market is fiercely competitive, driving firms to compete, in part, on price, thereby diminishing gross margins and heightening cost pressures. However, an equally important factor in this industry is the ability to deliver products "on time."

Developing and delivering products on time is required for business success in many industries, especially high-tech industries characterized by imposed market window schedules (*2*). The personal workstation industry, which designs and delivers powerful computer platforms, exemplifies an industry in which profitability is heavily dependent upon successful TTM execution, and one in which "on time" is defined by a set of powerful industry suppliers—Intel and Microsoft. Within the personal workstation industry, TTM is defined as workstation product announcement coincident with Intel processor

Susan Katz is associate professor of English at North Carolina State University in Raleigh. Her research interests include the connections among workplace writing, organizational socialization, and the development of power. She is the recipient of the IEEE Professional Communication Society Outstanding Paper Award (1999), the NCSU College of Humanities and Social Sciences Outstanding Junior Faculty Award (2001), and the Conference of Southern Graduate Schools Achievement Award for New Scholars in the Humanities and the Arts (2003). She earned her Ph.D. in communication and rhetoric at Rensselaer Polytechnic Institute. **smk@unity.ncsu.edu**

Robert Casey is director of supply chain for Hewlett-Packard's Workstation Global Business Unit in Fort Collins, Colorado. His responsibilities include supply chain strategy and implementation, new product introduction and product data management. He has 17 years experience in the workstation industry in R&D, program management and supply chain management. He earned his master's degree in management of technology from the National Technological University, with thesis research focused on The ROI of Time to Market in the Personal Workstation Industry as referenced in this article. **robert.casey@hp.com**

Lynda Aiman-Smith is associate professor of business management at North Carolina State University in Raleigh. She conducts research on organizational culture, implementing new technology into organizations, and managing technical personnel in high-technology organizations. Her Ph.D. is in organizational behavior and technology management from Purdue University. **lynda_aiman-smith@ncsu.edu**

Preparation of the case upon which this article is based was funded by the Center for Innovation Management Studies (CIMS), North Carolina State University.

ROI is not a new topic for IRI

BACKGROUND

"When working on Meaningfully Unique innovations it's silly to measure ROI - the return when you generate net extra sales and profit margin is obvious."

"I've always been about ROI will figure its self out.

If you make the best thing possible, things will get figured out"

Attitude that this isn't needed for innovation

35+ Years Innovating with Companies in a Wide Range of Industries

Adult Body Cleansers
Adult Candy
Adult Education Services
Adult Skin Care
Advertising
Air Filters
Agriculture
Candies & Confectionary
Car Care Products
Carbonated Soft Drinks
Cat Foods, Snac
Engine Oil Additives
ineering
llment Prog
oreneurs
dable Foa
re
ses
reatme
eanse
isturi
Gov't. Budgeting
Gov't. Services
Services
Lunch Meats
Management
Manufacturing
Online Postage Services
Online Security Systems
Paper & Pulp Processing
Paper Cups, Plates
Pay Phones/Systems
Peanuts and Peanut Butter
Personal Grooming
Pest Control
Pet Foods
Pharmaceuticals
Photographic Equipment
Pickles
Playground Equipment
Pork Products
Boats and Boat Retailing
Bottled Coffee & Teas
Boxed Chocolates
Branding
Burial Caskets
Business Communications
Business Insurance
Business Research Services
Butters and Spreads
Canister Snacks
Cren
Cust
Custo
Dairy
Datak
Decor
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one
Ice Cream and Deserts
Q-Z listed on EurekaRanch.com

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GREG LEMMON

Statistician

EUREKA! RANCH®

INNOVATION ENGINEERING® INSTITUTE

Leading Research and Development Projects for 15 years, Creating Innovations like…

Forecast Fair Market Value of a technology or product.

The **Fair Marker Royalty Rate Simulation** is a proprietary model for predicting the value of an innovation - based on development status, proprietary protection, and meaningful uniqueness. It is used as a starting place for negotiation of licensing fees.

Forecast the sales of a new product. The model was vetted by the National Institute of Standards and Technology (NIST)

The **Business Simulation** is a proprietary model for predicting the value of an innovation - incorporating over 100 factors proven to impact marketplace success.

Predict which ideas will beat competition and generate such a wow that they go viral

Using consumer research surveys, we can predicts a offering's odds of success, the odds that in generates **word of mouth**, and how that impacts the product's diffusion and lifecycle .

Predict the best people to lead innovation

The **Innovation Change Agent Report** assesses teams to identify the best people to lead innovation. Enables companies to assemble a diverse group of employees who are entrepreneurial, optimistic and data grounded.

A teaching method that ensures students learn fast and master innovation & problem solving skills

Cycles to Mastery® is a patented teaching methodology that blends the most progressive teaching methods in a way that can be easily scaled. It ensures that staff "get's it" and the training sticks.

Improving Online Innovation Ideation Sessions, Projects, & Pipeline management

Online Sessions software makes it easy to collaborate to create and capture ideas with over 50 ideation techniques built in. **Innovation Pipeline** software works as your co-pilot to iterate those ideas into successful projects while maintaining alignment to your organization's strategy

Innovation ROI

ROI Simulation Forecast deconstructs innovation pipelines and model investments, timing and returns to aid strategic decision making for investing in company innovation initiatives.

but none my innovation projects had clear, easily calculable ROI

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AGENDA

1. Background & Introduction
2. What to Measure / Estimate
3. Benchmarking Data for Innovation Investments & Returns
4. Relationship Between Investments & Returns
5. Types of Innovation and Investment Strategy
6. Decision Making & Simulating Scenarios
7. What's Next?

2. WHAT

WHAT: DEFINE INNOVATION

INNOVATION ENGINEERING® INSTITUTE

MEANINGFUL

Meaningful

to the Organization,

the Customer,

and to You

AND

UNIQUE

Unique

to the World

It is New & Different.

It Requires Change.

But you have different definitions

WHAT: DEFINE INNOVATION

"New products, process technology, new applications, or markets."

"Innovation is defined by new, breakthrough, game changing ideas, concepts, technologies, capabilities and work efficiencies that address customer needs and align with the organization's strategic alignment."

"Innovation starts with exploratory investigation and ideation and extends through delivery of our product."

"Broadly ... not just new products. Any novel solution is innovation, whether it results in a new product, an improved product, or an improved manufacturing process."

Source: IRI & Eureka! Ranch Webinar Survey - Innovation ROI

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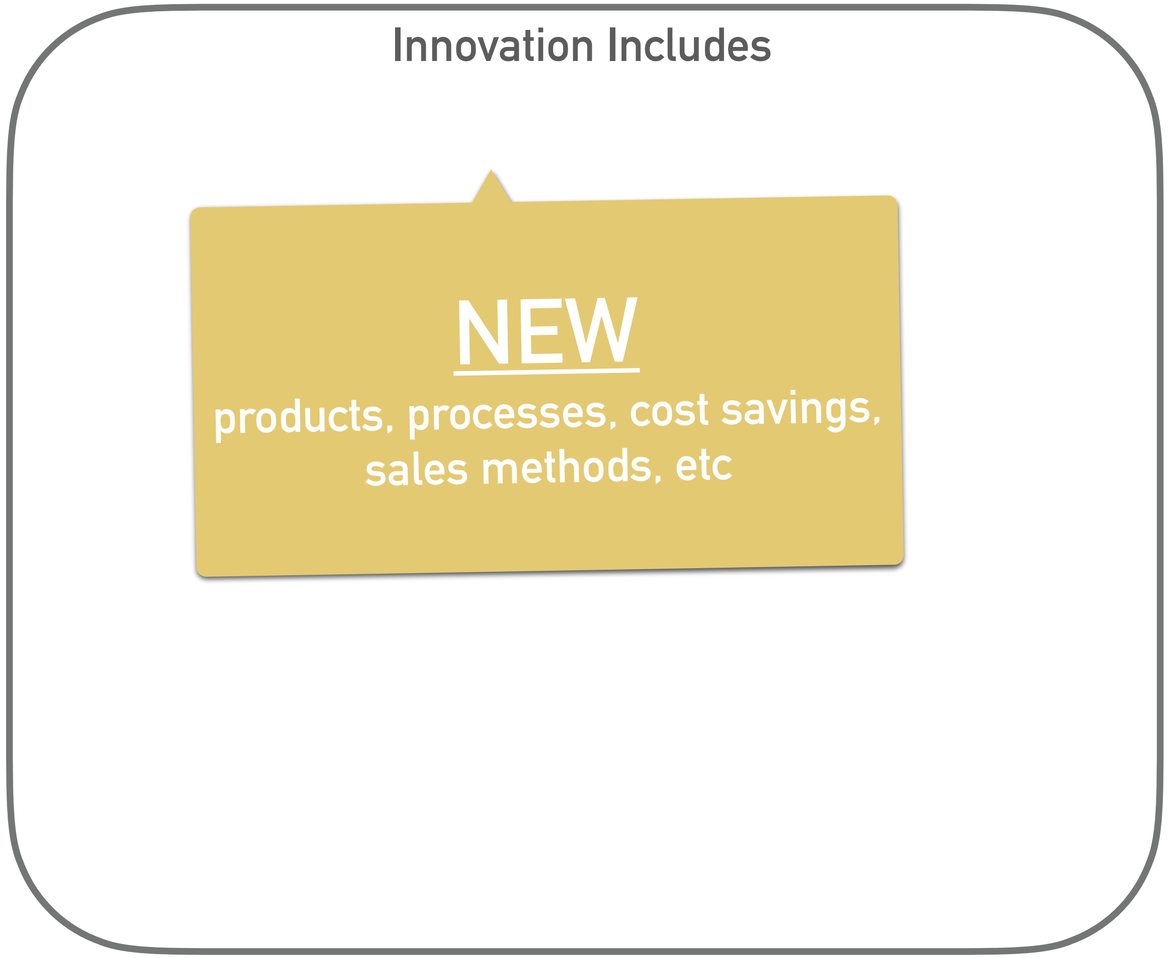
EXERCISE #1 DEFINE INNOVATION

At your organization what counts as innovation?

List some things that come to mind inside the box. If something comes to mind that is not innovation, list it outside the box.



Innovation Does Not Include

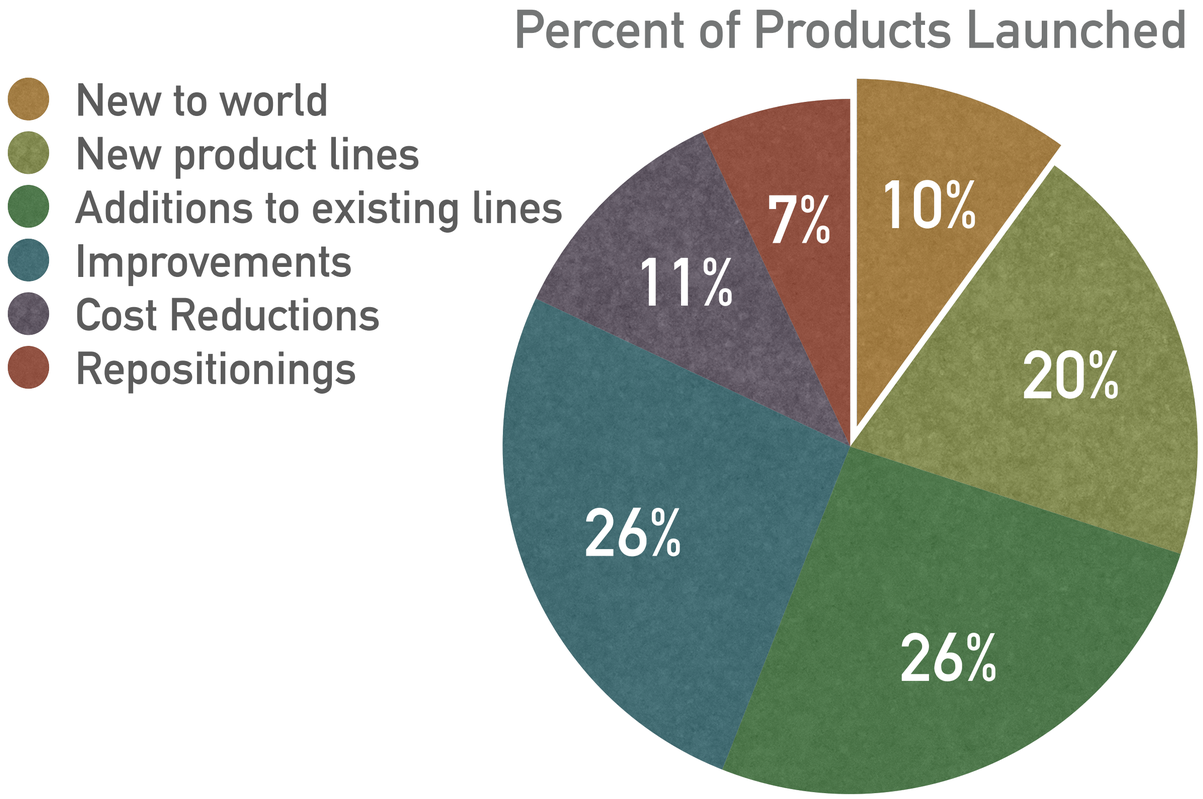
NOT NEW

old products, processes, sales methods, etc
No Change is being made

But how new?

DEFINE INNOVATION: LEVELS OF INNOVATIVENESS FOR NEW OFFERINGS

Not all innovation products and projects have the same level of "newness"



Source: Journal of Product Innovation Management Impact of product innovativeness on performance

WHAT: DEFINE INNOVATION

Our definition for this research project is very inclusive

Source: IRI & Eureka! Ranch Webinar Survey - Innovation ROI

DEFINE INNOVATION

By defining it at the start for your organization, you can reduce the “but thats’s not really innovation” comments

WHAT: INVESTMENT & RETURNS

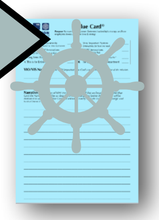
INNOVATION SYSTEM

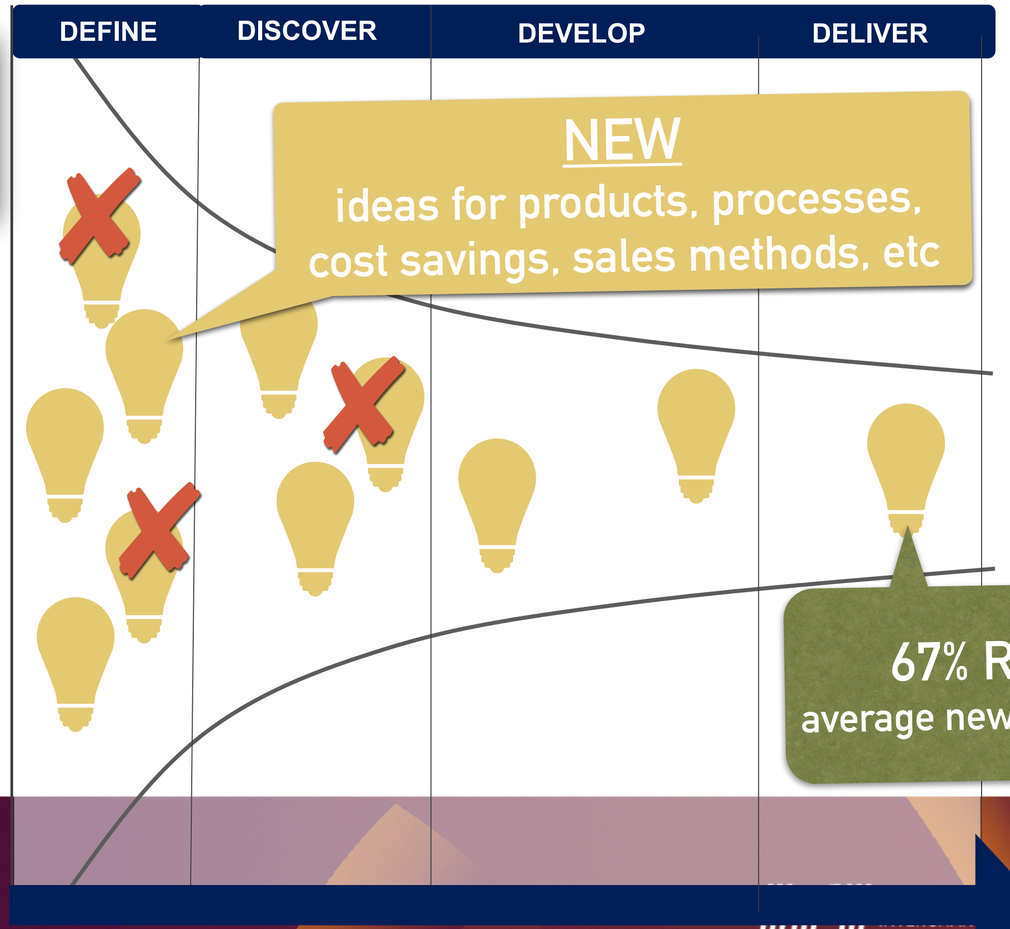
INVESTMENTS

Most Common /Biggest Investments

- R&D Budget
- Marketing Spend
- Mergers & Acquisitions

- Market Research
- Training & Education
- Outside Collaboration & Consultants





RETURNS

Most Common / Biggest Returns

- Revenue and profits from NEW products, services, markets, businesses etc

---

- Cost Savings
- Culture

* *Robert G Cooper Winning at New Products*

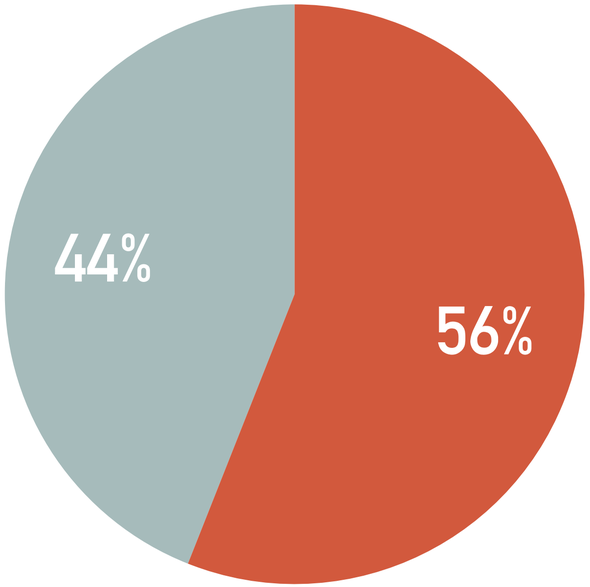
WHAT: INVESTMENT & RETURNS

How much do you invest?

What is the return?

How long does it take?

About half of respondents could or were willing to make estimates



UNCERTAINTY IS NORMAL

WHAT: INVESTMENT & RETURNS

IRI Webinar surveys:

only **25%** of IRI member respondents said

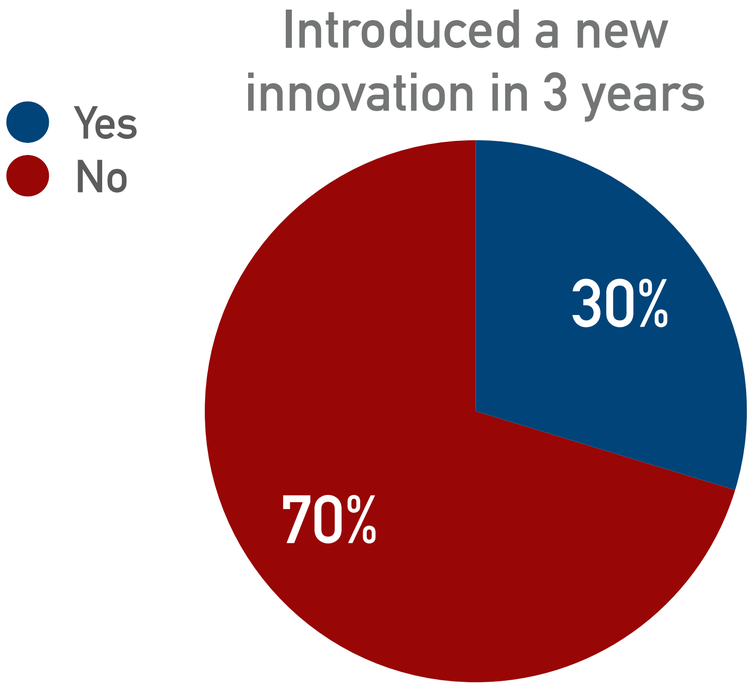
Projects have at least an estimated value for ROI
that we can use to make decisions

UNCERTAINTY IS NORMAL

3. BENCHMARKING DATA

BENCHMARKING DATA: SUCCESS

MOST COMPANIES HAVE NOT INTRODUCED ANY NEW INNOVATION IN 3 YEARS



Only the pharmaceutical, communication equipment, and software industries are above 50%

Source: National Center for Science and Engineering Statistics 2019

3 year range was 2016-18

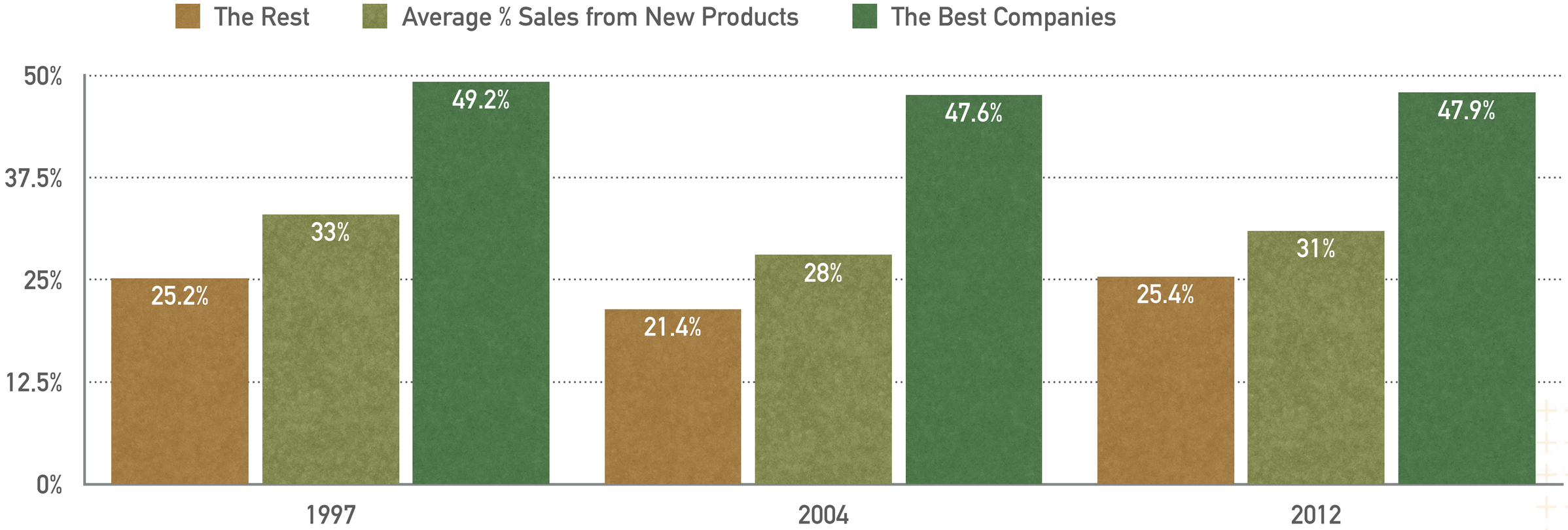
Industry	Product or business process innovation		Product innovation		Business process innovation	
	Percent		Percent		Percent	
	Yes	No	Yes	No	Yes	No
All industries	29.7	70.3	19.1	80.9	19.3	80.7
Manufacturing industries	35.5	64.5	21.6	78.4	26.6	73.4
Food	40.0	60.0	22.6	77.4	29.6	70.4
Beverage and tobacco products	45.9	54.1	29.8	70.2	34.0	66.0
Textile, apparel, and leather products	33.1	66.9	20.9	79.1	23.2	76.8
Wood products	25.4	74.6	14.6	85.4	19.1	80.9
Paper	37.5	62.5	22.0	78.0	29.8	70.2
Printing and related support activities	32.4	67.6	20.1	79.9	23.1	76.9
Petroleum and coal products	30.4	69.6	13.2	86.8	28.0	72.0
Chemicals	41.0	59.0	26.7	73.3	32.7	67.3
Pesticide, fertilizer, and other agricultural chemicals	39.3	60.7	23.8	76.2	33.7	66.3
Pharmaceuticals and medicines	52.1	47.9	35.0	65.0	39.3	60.7
Soap, cleaning compound, and toilet preparation	41.1	58.9	28.0	72.0	32.5	67.5
Other chemicals	37.4	62.6	23.8	76.2	30.4	69.6
Plastics and rubber products	42.3	57.7	27.0	73.0	31.6	68.4
Nonmetallic mineral products	30.0	70.0	18.0	82.0	21.1	78.9
Primary metals	34.3	65.7	13.8	86.2	27.6	72.4
Fabricated metal products	31.0	69.0	15.2	84.8	24.3	75.7
Machinery	39.1	60.9	27.0	73.0	31.4	68.6
Computer and electronic products	48.3	51.7	36.6	63.4	32.1	67.9
Communications equipment	53.1	46.9	43.2	56.8	38.0	62.0
Semiconductor and electronic components	46.0	54.0	29.2	70.8	35.4	64.6
Navigational, measuring, electromedical, and control instruments	49.9	50.1	40.5	59.5	30.1	69.9

BENCHMARKING DATA VS SUCCESS

AVERAGE COMPANY DATA IS USEFUL,
BUT NOT BEST PRACTICE.

BENCHMARKING DATA: REVENUE

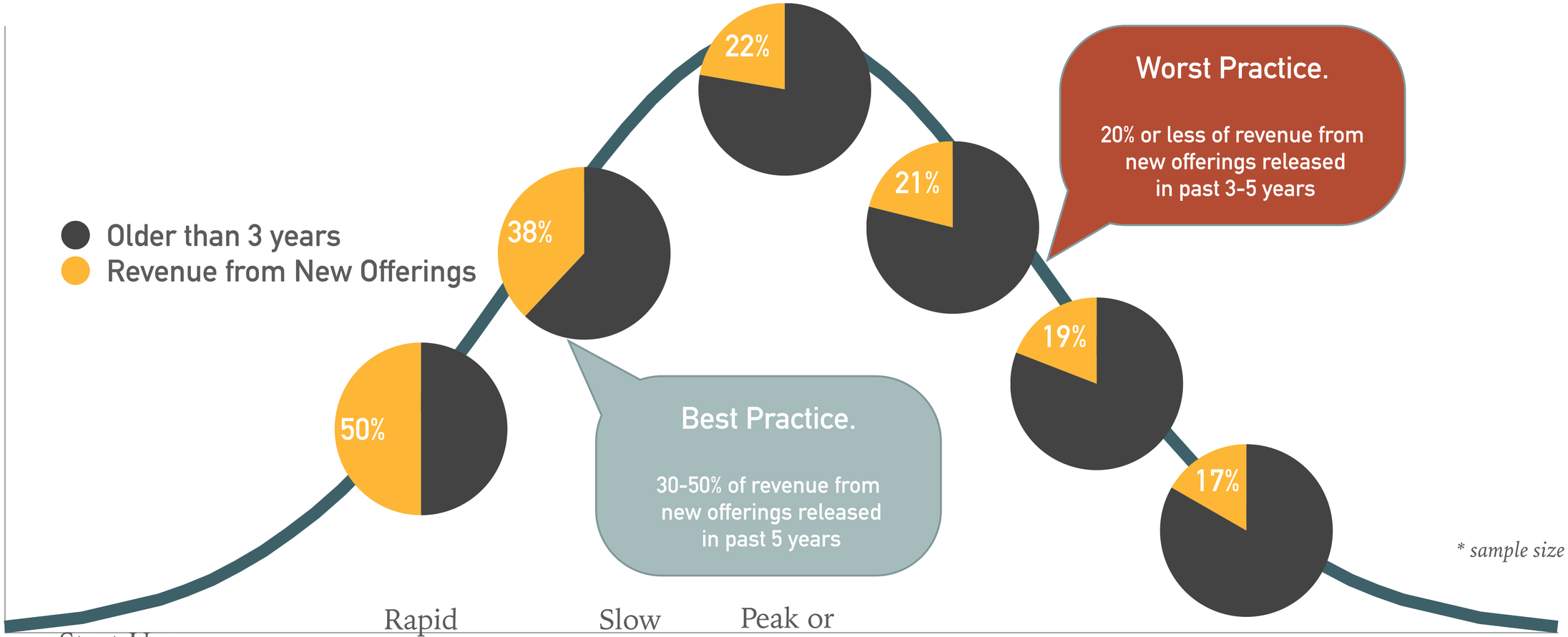
REVENUE FROM NEW PRODUCTS INTRODUCED IN THE PAST 5 YEARS



Best Companies are top 25% overall: Top 3rd of their industry for NPD success and above the mean for sale and profits

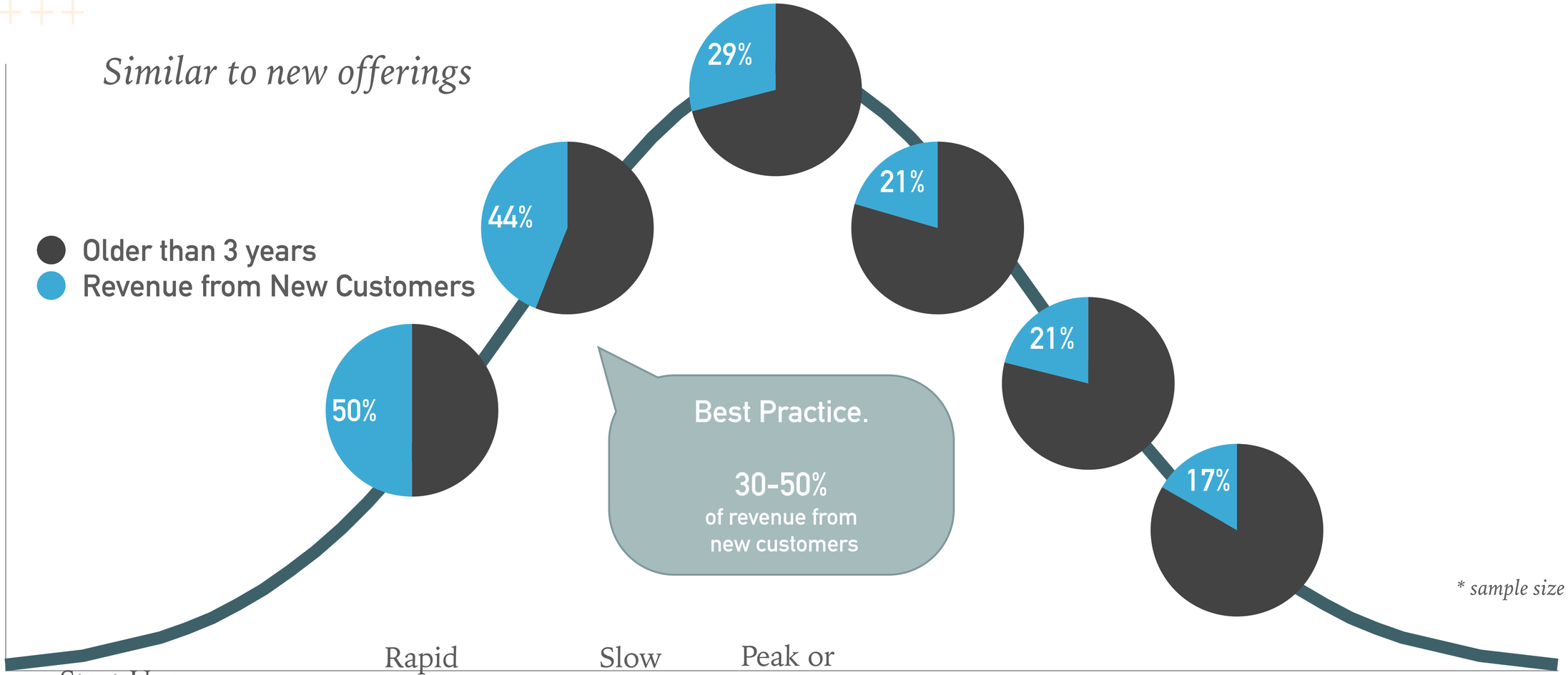
Source: Drivers of NPD Success PDMA Reports 1997-2012

BENCHMARKING DATA: REVENUE



** sample size 90 companies*

BENCHMARKING DATA: CUSTOMERS



** sample size 90 companies*

BENCHMARKING DATA: RETURNS

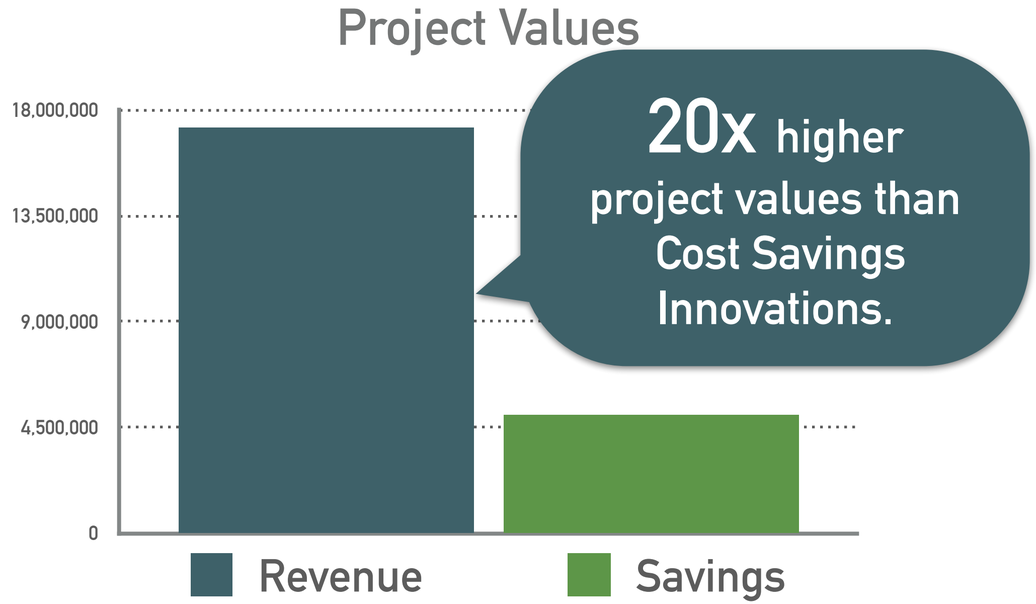
WHAT ABOUT COST SAVINGS AND SYSTEM IMPROVEMENTS?

Innovations that save cost and improve systems provide value to organizations.

Six Sigma Savings

1-5%

of total revenue.



Source: iSixSigma

Jump Start Your Brain Project Management Median Data 74 Companies

INNOVATION RETURNS

Is revenue growing or declining?

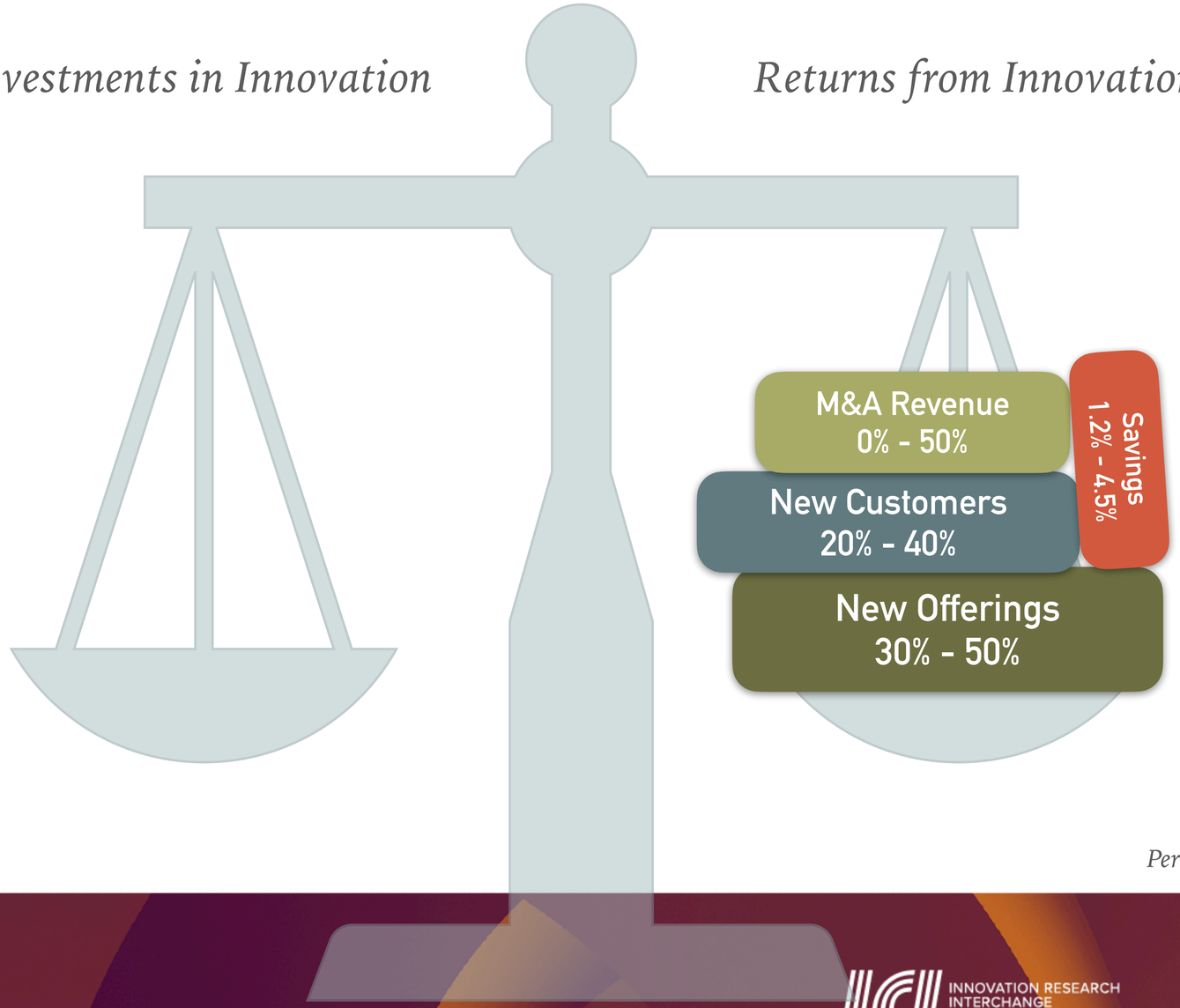
Is 30-50% of your revenue from NEW offerings & customers a reasonable goal?

Are your process improvement innovations delivering significant savings?

BENCHMARKING DATA

Investments in Innovation

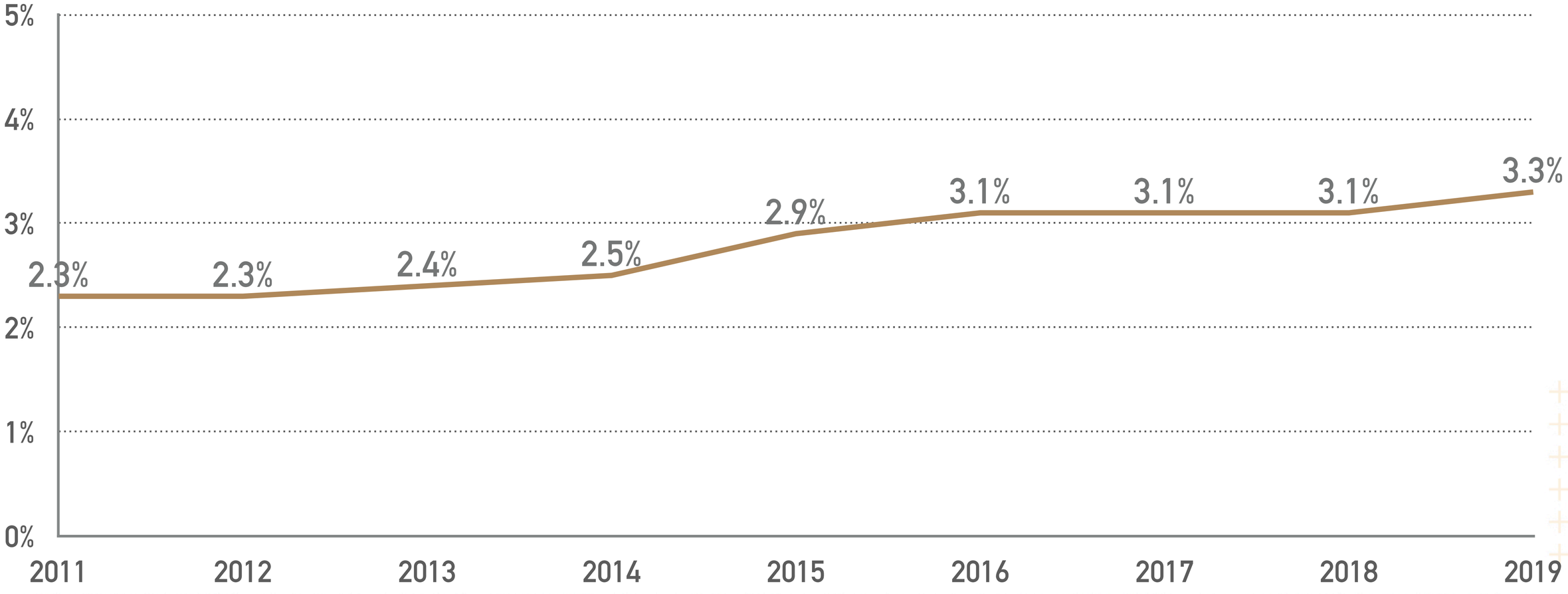
Returns from Innovation



Percentages are percent of revenue

BENCHMARKING DATA: INVESTMENTS

USA: R&D paid for by the company as a percent of their world sales



R&D does not include investments in assets, market research or training

Source: National Science Foundation: April 2022 Business Enterprise Research and Development

BENCHMARKING DATA: INVESTMENTS

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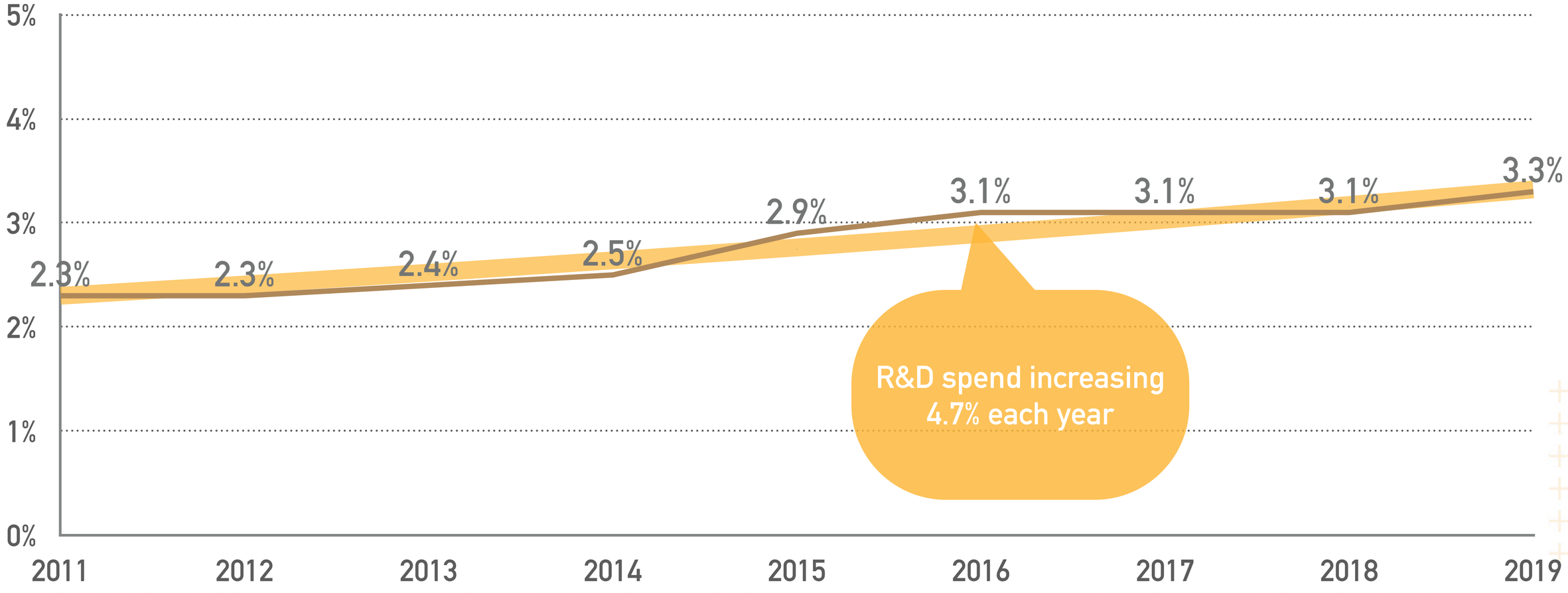

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BENCHMARKING DATA: INVESTMENTS

RESEARCH PRODUCTIVITY DECLINES AT AN AVERAGE RATE OF 5.3 PERCENT PER YEAR

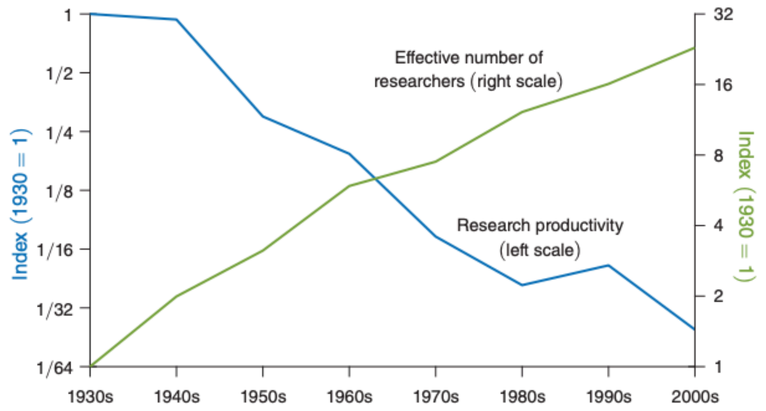


FIGURE 2. AGGREGATE EVIDENCE ON RESEARCH PRODUCTIVITY

Notes: Research productivity is the ratio of idea output, measured as TFP growth, to the effective number of researchers. See Notes to Figure 1 and the online Appendix. Both research productivity and research effort are normalized to the value of 1 in the 1930s.

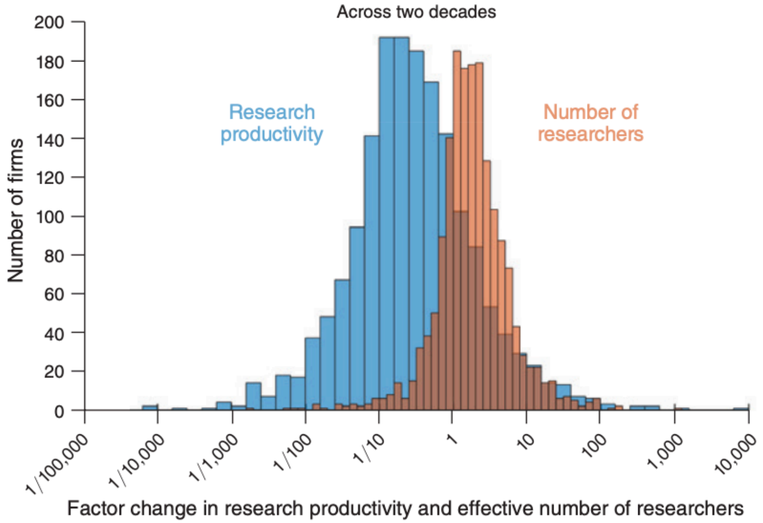


FIGURE 10. COMPUSTAT DISTRIBUTIONS, SALES REVENUE (TWO DECADES)

"Have to double research efforts every 13 years just to maintain the same overall rate of economic growth."

Are Ideas Getting Harder to Find? By Nicholas Bloom, Charles I. Jones, John Van Reenen, and Michael Webb merican Economic Review 2020 110(4): 1104–1144

BENCHMARKING DATA: INVESTMENTS

Innovation Ecosystems

	Innovation Ranking	R&D Expenditure as a % of Revenue
Apple	1	5%
Amazon	2	13%
Alphabet	3	15%
Microsoft	4	14%
Tesla	5	12%
Samsung	6	7%
Facebook	7	19%
GE	8	4%
Intel	9	21%
Netflix	10	9%
Toyota	>10	4%
Ford	>10	5%
Volkswagen	>10	6%
Nokia	>10	21%
Merck	>10	25%

Source: Strategy + Business

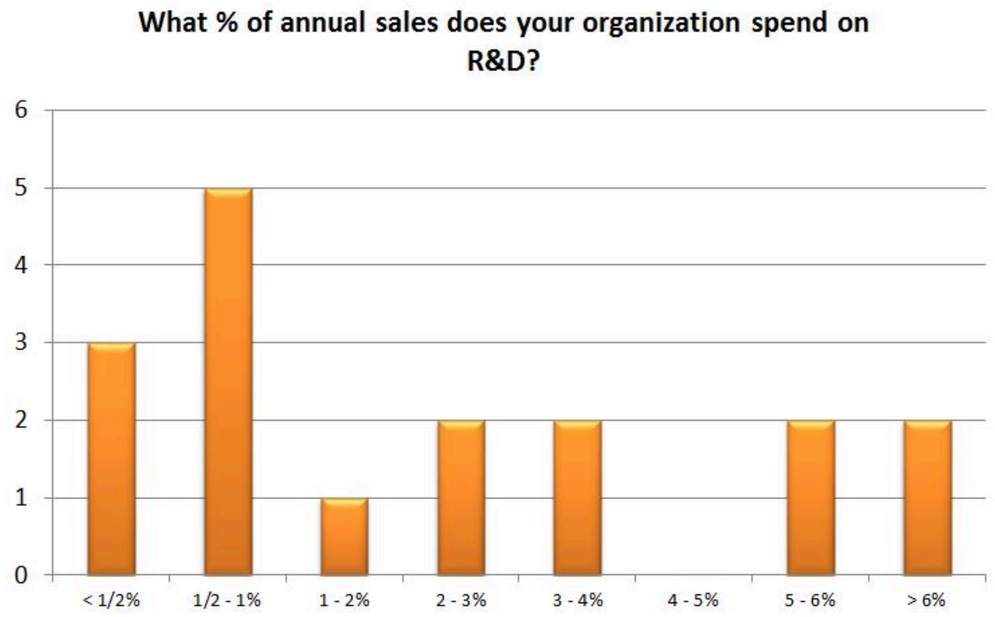
The highest ranked companies spend

4-25%

Source: 2019 Strategy + Business: innovation versus R&D spending

BENCHMARKING DATA: INVESTMENTS

IRI Companies spend less



Source: https://www.iriweb.org/resources/community-forum-for-every-dollar-of-rd-spend-how-many-dollars-does-your-company-expect-to-return/

R&D SPEND AS A PERCENT OF SALES – INDUSTRY

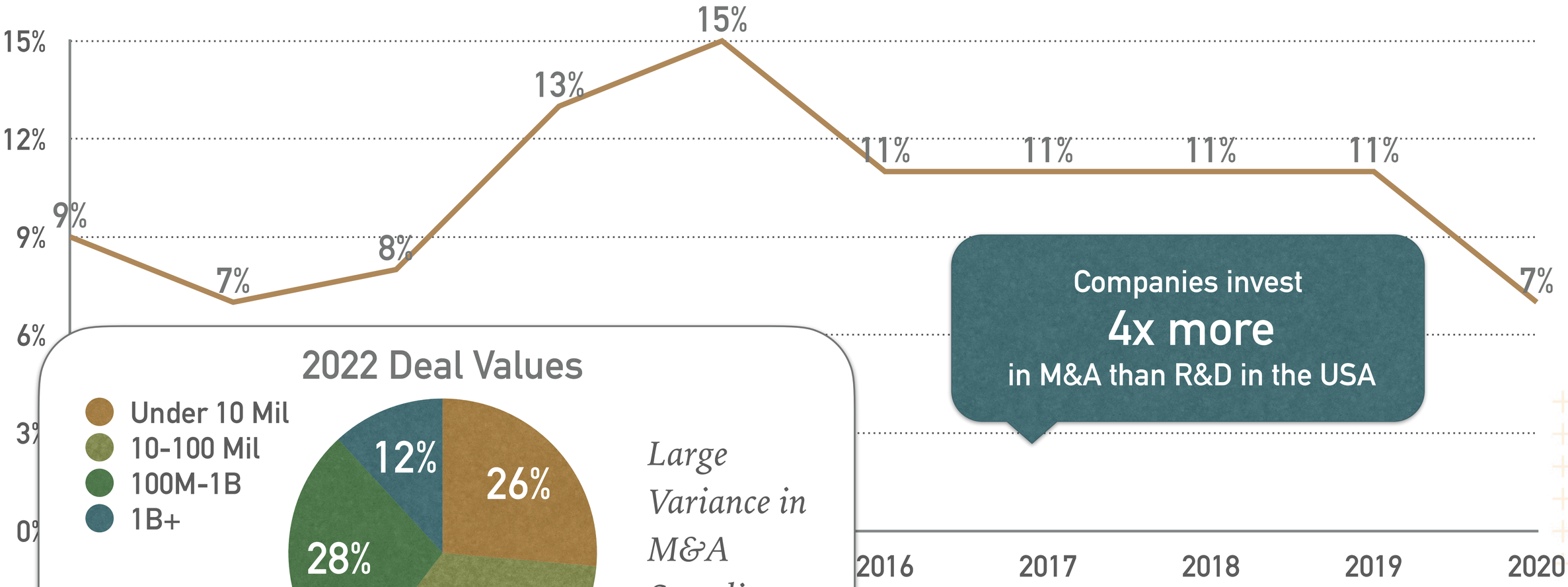
Source: National Science Foundation: Business Enterprise Research and Development
Data from 2019, published in 2022

Industry	R&D Spends as % of Sales
Research and Development Services	45%
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	22.96%
Photographic and photocopying equipment manufacturing	19.38%
Couriers, messengers, and express delivery services	14.26%
Cloud computing applications and Internet-based software services	12.77%
Digital cameras manufacturing	12.27%
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	11.09%
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	10.77%
Telephone apparatus manufacturing, including routers, modems, and gateways	10.69%
Software publishers (except Internet)e	10.45%
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturingc	10.06%
Guided missiles, space vehicles, and related parts manufacturing	9.93%
Semiconductor machinery manufacturing	9.70%
Data processing, hosting, and related servicese	9.17%
In vitro diagnostic substances manufacturingc	8.29%
Computer systems design and related servicese	8.24%
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	8.07%
Audio and video equipment manufacturing	7.97%

Industry	R&D Spends as % of Sales
Semiconductor and other electronic components manufacturing	7.68%
Rental and leasing services	7.42%
Aircraft manufacturing	7.40%
Professional, scientific, and technical services (not listed elsewhere)	7.14%
Radio, television, and wireless communication equipment manufacturing	6.97%
Legal, accounting, tax preparation, bookkeeping, and payroll services	6.69%
Medical and diagnostic laboratories	6.39%
Management, scientific, and technical consulting services	4.91%
Medical equipment and supplies manufacturing	4.90%
Measuring and control instruments manufacturing (not listed elsewhere)	4.57%
Computers and peripheral equipment manufacturing and magnetic and optical mediad	4.39%
Aircraft engine and engine parts manufacturing	3.88%
Administrative and support services	3.67%
Industrial machinery manufacturing (except semiconductor machinery)	3.64%
Lessors of nonfinancial intangible assets, including patent licensing	3.53%
Military armored vehicle, tank, and tank components manufacturing	3.51%
Architectural, engineering, and related services	3.51%
Motorcycle, bicycle, and parts manufacturing	3.34%
Clay and glass products manufacturing	3.33%
All business activities	3.31%

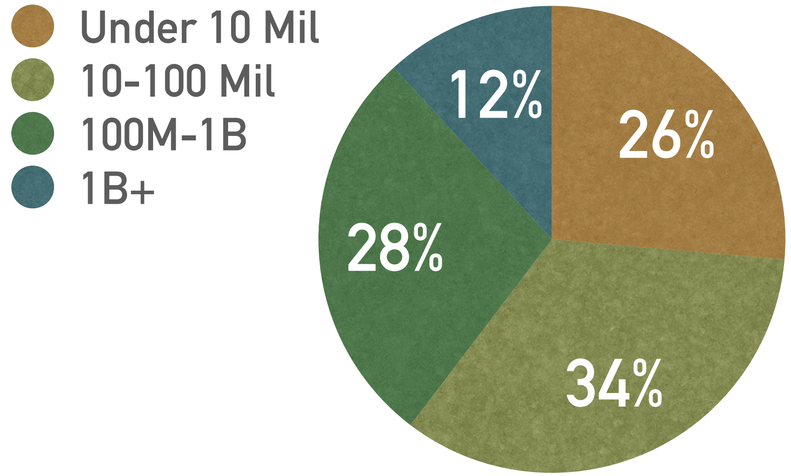
BENCHMARKING DATA: INVESTMENTS

USA: Mergers & Acquisitions (M&A) as Percent of Total Revenue



Companies invest
4x more
in M&A than R&D in the USA

2022 Deal Values



Large Variance in M&A Spending

IR 2023 | CONFERENCE

INNOVATION RESEARCH INTERCHANGE
Accelerating Value Creation

NATIONAL ASSOCIATION OF Manufacturers

Source: Mergers & Acquisitions United States from the Institute for Mergers, Acquisitions, and Alliances (IMAA).

BENCHMARKING DATA: INVESTMENTS

MARKETING SPEND AS A PERCENT OF SALES

Average spend as percent of revenue

B2B	B2C
2-5%	5-10%

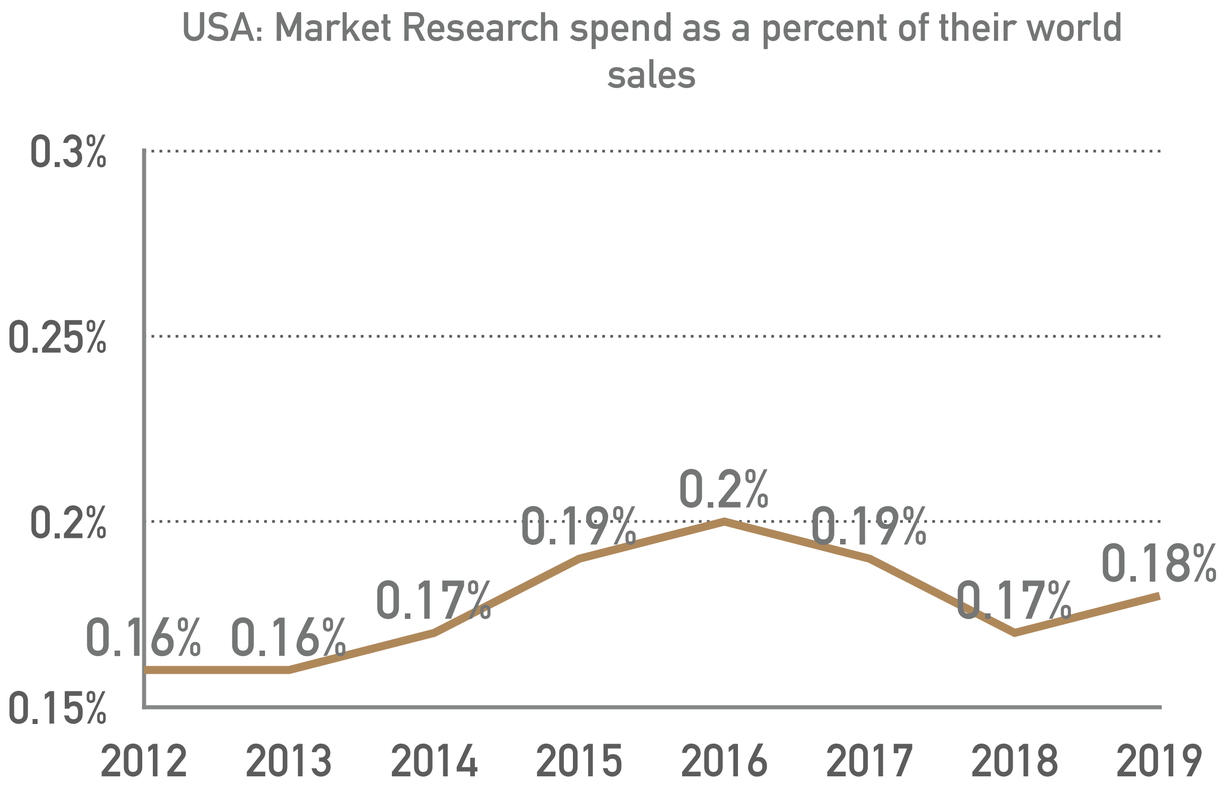
Some marketing gets spent on advertising older offerings, but is still a significant investment in innovation

Marketing could cost more than R&D

Source: National Science Foundation: Business Enterprise Research and Development

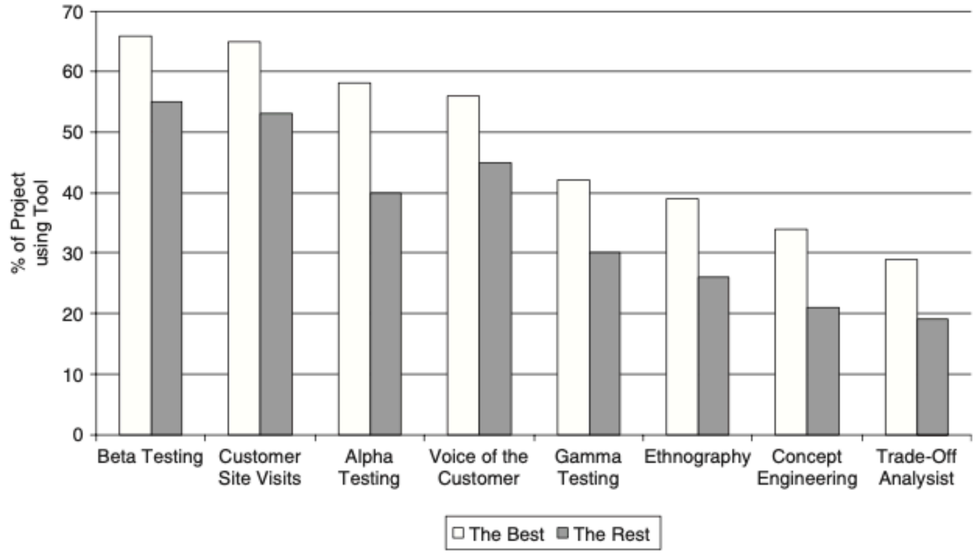
BENCHMARKING DATA: INVESTMENTS

Market research spending is an order of magnitude less than R&D spending



Source: National Science Foundation: April 2022 Business Enterprise Research and Development

But a critical driver for the success of new products.



Source: PDMA Research - updated best practices 2009

BENCHMARKING DATA:

TRAINING SPEND AS A PERCENT OF SALES

All training accounts for

0.7% to 3%

of revenue

$1,500

per learner

Source: National Science Foundation: Business Enterprise Research and Development

Popular Training Topics

1. Leadership Development
2. Women in Leadership
3. Diversity in Leadership
4. Emotional Intelligence (EQ)
5. Communicating & Leading Across Generational Barriers
6. Communicating & Leading Across Virtual Teams
7. Effective Communication
8. Building & Cultivating Trust
9. Building Effective Teams
10. Team Communication
11. Team Collaboration
12. Employee Engagement
13. Employee Accountability & Ownership
14. Assessment-Based Trainings (i.e. DiSC, Kolbe®, etc.)
15. Diversity & Cultural Awareness
16. Unconscious Bias
17. Effective Writing Skills
18. Problem Solving
19. Innovation
20. Unlocking Entrepreneurial Spirit
21. Unlocking Innate Creativity
22. Strategic Thinking
23. Strategic Planning
24. Decision Making
25. Project Management
26. Change Management
27. Time Management & Productivity
28. Getting the Right Things Done
29. Dealing with Conflict
30. Workplace Etiquette

BENCHMARKING DATA: INVESTMENTS

TRAINING ROI

Only 12% of training impacts business

But applied innovation training has impacts of

3x to over 200x

the cost of training.

INNOVATION ENGINEERING® INSTITUTE

Source: Innovation Fundamentals Training Direct ROI

How Innovation Training can result in direct and measurable value to an organization.

BENCHMARKING DATA: INVESTMENTS

TRAINING ROI

"The ROI conversation is almost laughable because it's so much higher than anything we've paid out"

"with the traditional process, the products would have eventually come to market in some form anyway, I think using the new process, we improve the product and de-risk them at the same time, and got them to market sooner."

"The investment is so low compared to what the ROI can be, that I chuckle when I think about it."

Eric Seibold Permatex Innovation Manager

INNOVATION ENGINEERING® INSTITUTE

Source: Innovation Engineering Webinar Quote "Discover Hidden Funding to Make Your Team Innovative"

BENCHMARKING DATA: INVESTMENTS

EXTERNAL HELP: INNOVATION MANAGEMENT & CONSULTING SERVICES

0 to .05% of revenue

Super small investment compared to the rest, but the industry is growing indicating companies are investing more in outside help.

The Innovation Management Market grew at a rate of 12.6% per year from 2015 to 2021, culminating in a market worth US$ 1 Billion in 2021.

Source: Future Market Insights: Innovation Management market

INNOVATION INVESTMENTS

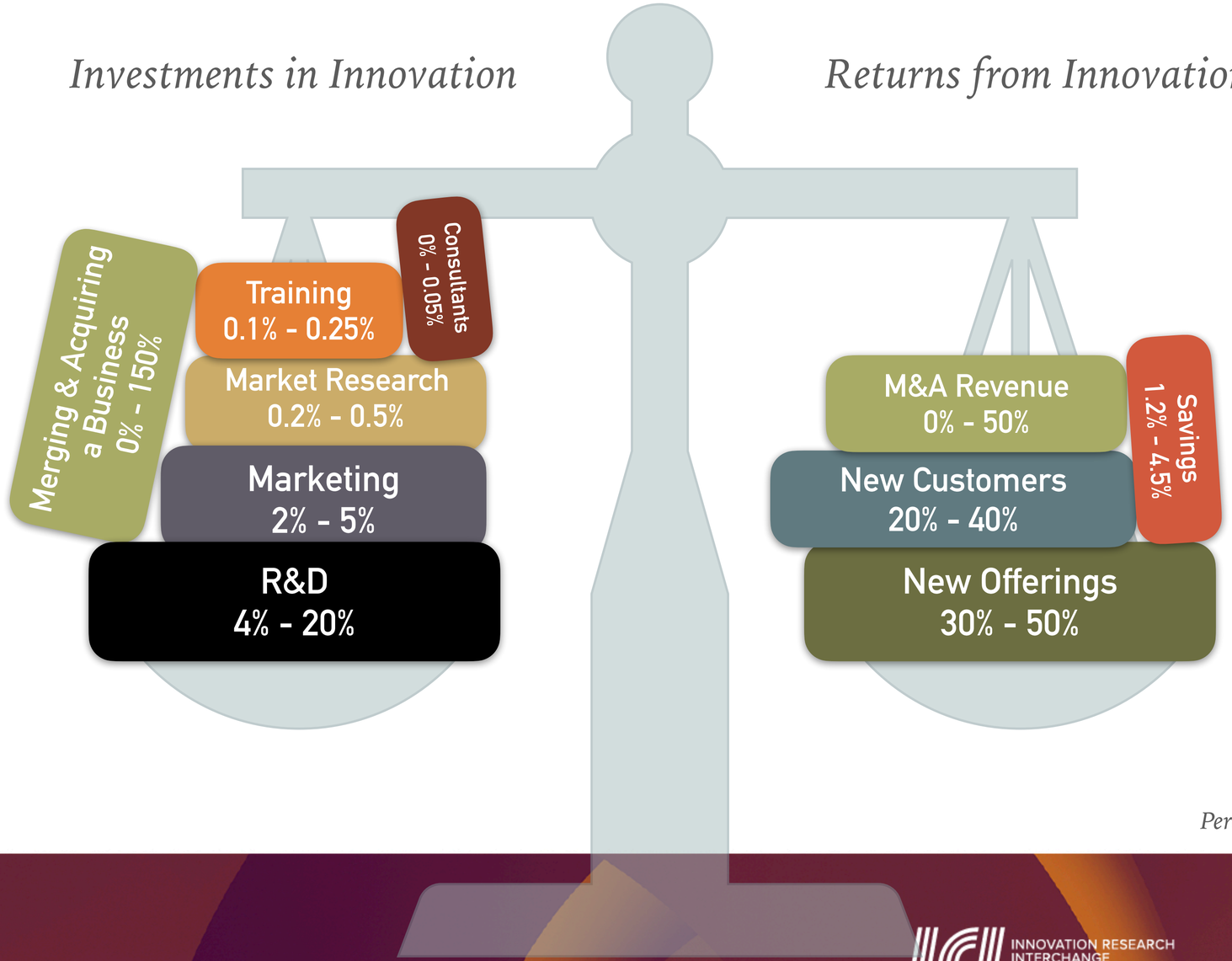
How does your R&D spending compare and is it growing?

Does your organization have enough marketing support for innovations?

Does your organization have funds for innovation training, market research or outside help?

4. RELATIONSHIP BETWEEN INVESTMENTS AND RETURNS

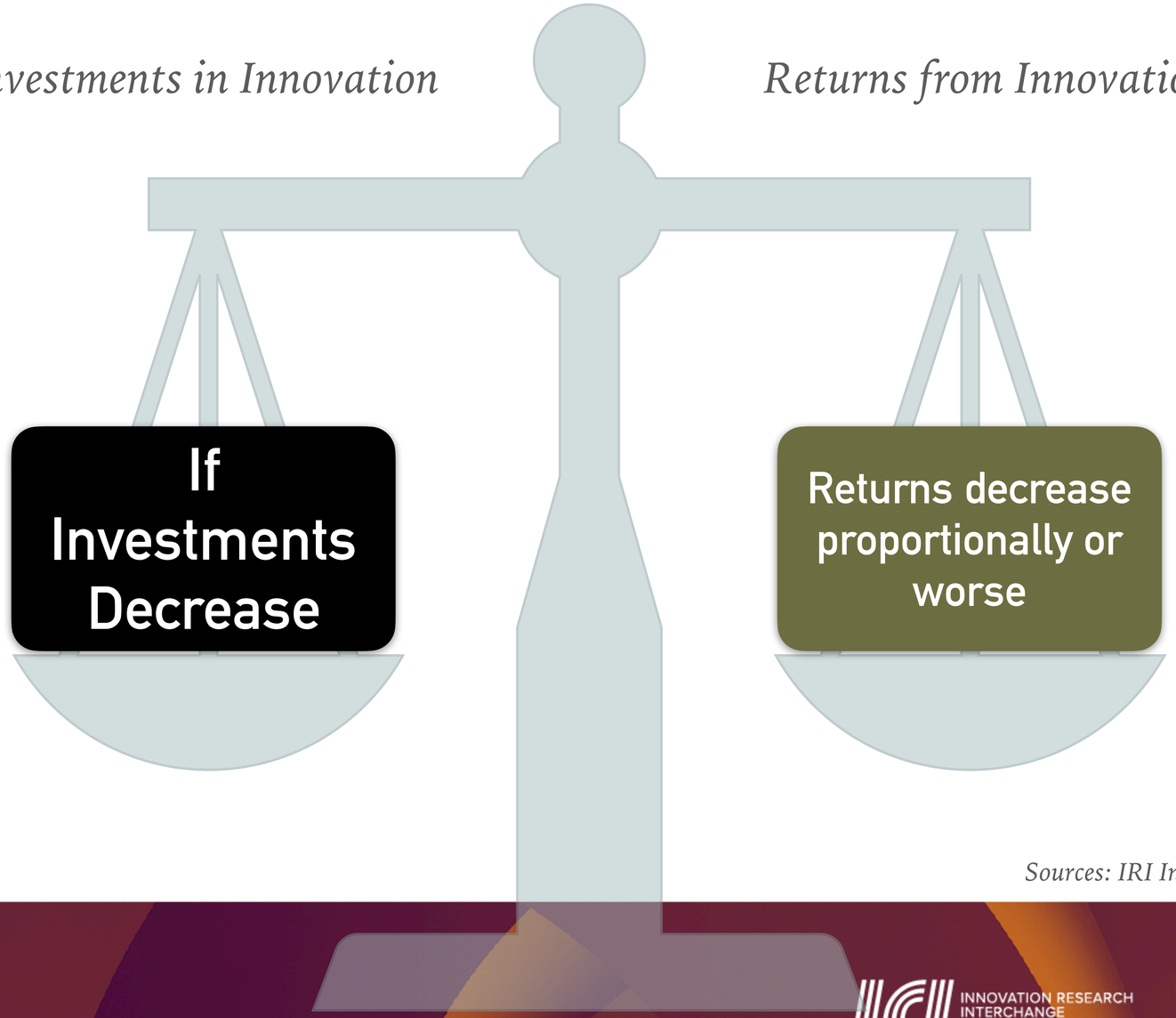
BENCHMARKING DATA



Percentages are percent of revenue

INVESTMENT DRIVES RETURNS

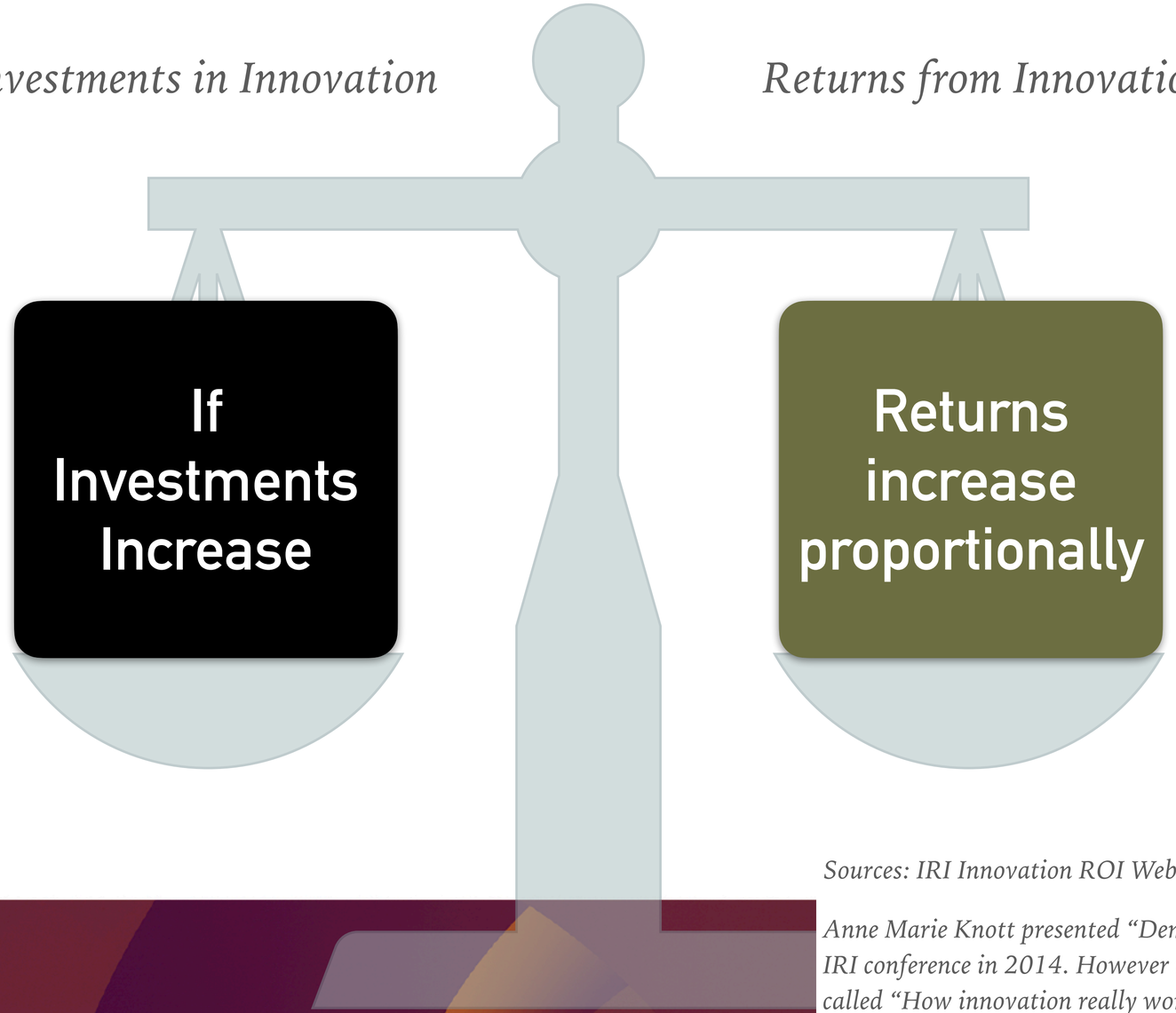
100% OF SURVEY RESPONDENTS SAID . . .



Sources: IRI Innovation ROI Webinar Survey with Eureka! Ranch

INVESTMENT DRIVES RETURNS

100% OF SURVEY RESPONDENTS SAID…



"On average for internal R&D a 1% increase in R&D gets you 0.1% increase in revenues."

Anne Marie Knott

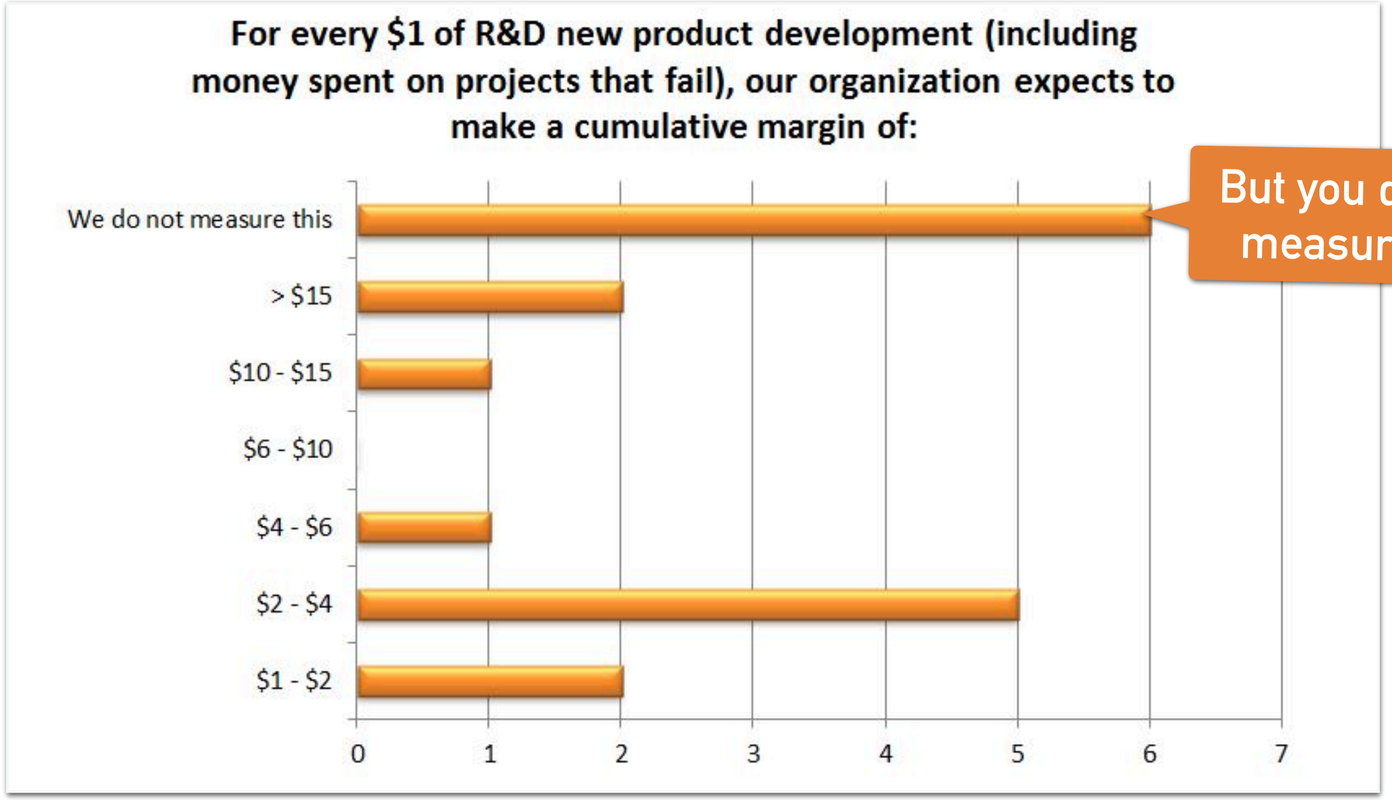
Professor teaching strategy and innovation at Washington University at St. Louis

Sources: IRI Innovation ROI Webinar Survey with Eureka! Ranch

Anne Marie Knott presented "Demonstrating and Improving the Value of R&D"at the IRI conference in 2014. However used quote is from a more recent podcast and book called "How innovation really works"

https://www.iriweb.org/resources/community-forum-for-every-dollar-of-rd-spend-how-many-dollars-does-your-company-expect-to-return/

INVESTMENT DRIVES RETURNS



Sources: IRI Webinar Survey
https://www.iriweb.org/resources/community-forum-for-every-dollar-of-rd-spend-how-many-dollars-does-your-company-expect-to-return/

INVESTMENT DRIVES SPEED

"The development of the Moderna vaccine at warp speed has taught us that given unlimited resources, time-to-market can be cut dramatically."

Robert G Cooper
Accelerating innovation: Some lessons from the pandemic

moderna

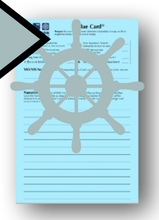
*Moderna received **$2.5 billion** in funding from the U.S. government (Clouse, 2020).*

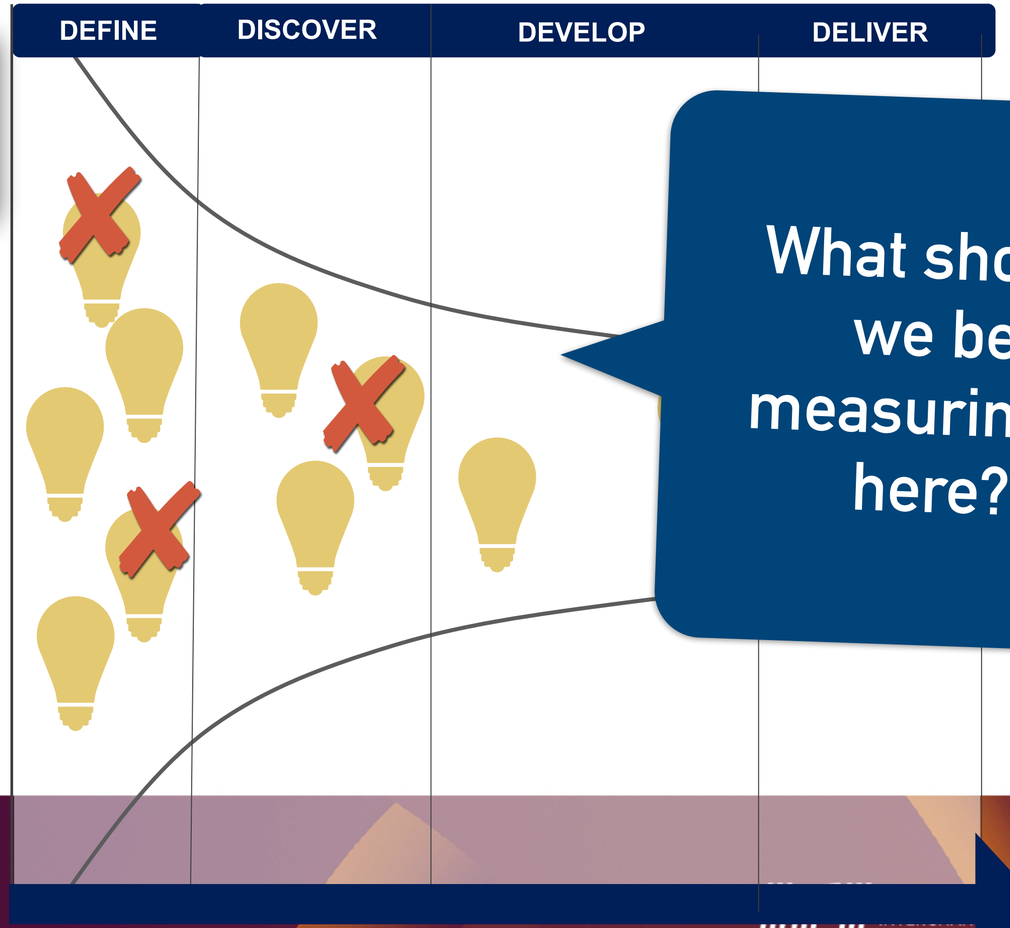
Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8014561/

DEPENDS ON THE SYSTEM OR PIPELINE

INNOVATION SYSTEM

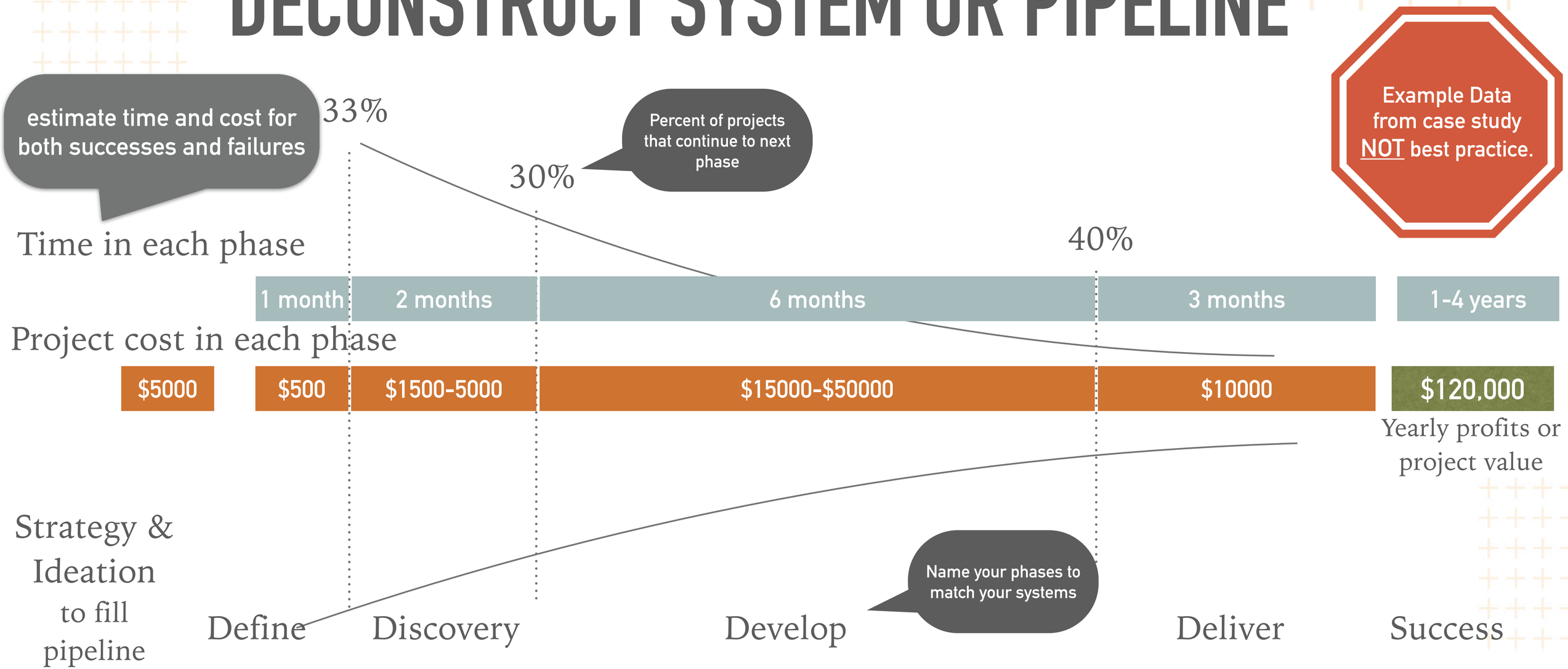
INVESTMENTS





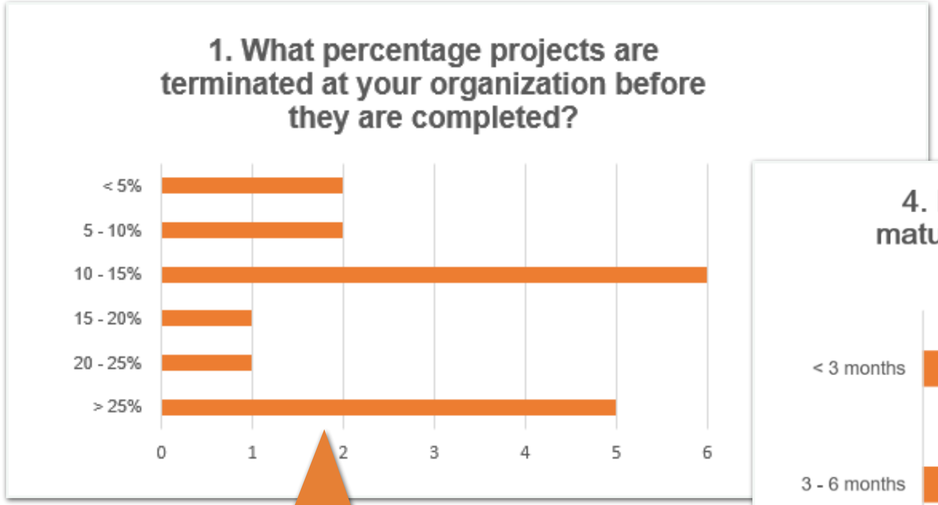
RETURNS

DECONSTRUCT SYSTEM OR PIPELINE

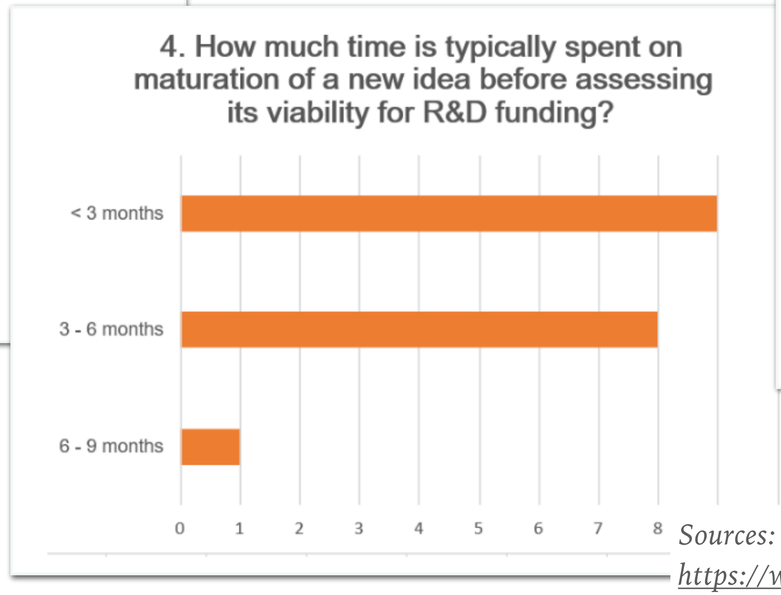


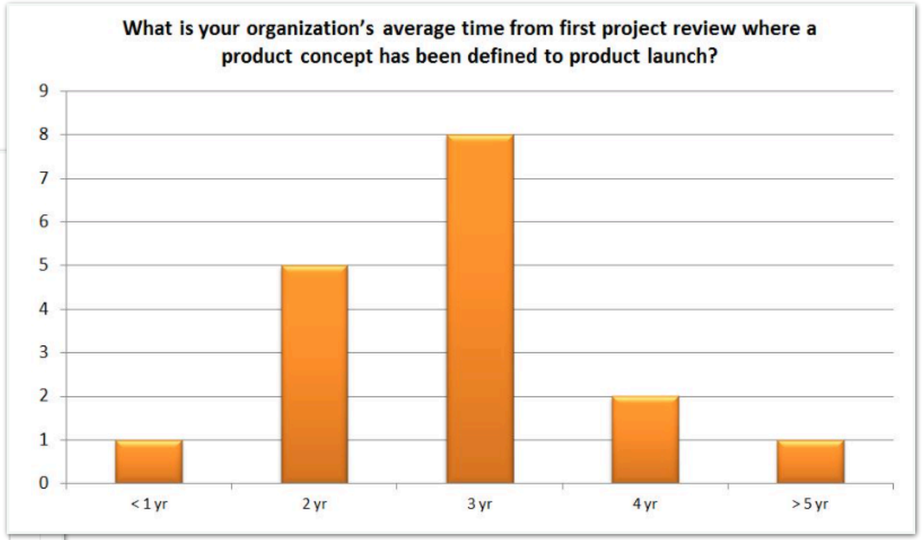
DECONSTRUCT SYSTEM OR PIPELINE

IRI COMMUNITY FORUM DATA:



You have much lower termination rates than my data.





Sources: IRI Webinar Survey
https://www.iriweb.org/resources/community-forum-how-do-you-measure-the-quality-of-an-idea/

https://www.iriweb.org/resources/community-forum-tell-us-about-your-termination-metrics/

INNOVATION PIPELINE

What does your system look like? (number of stages, ideas in each stage)

What is the typical time and cost for a project in each stage?

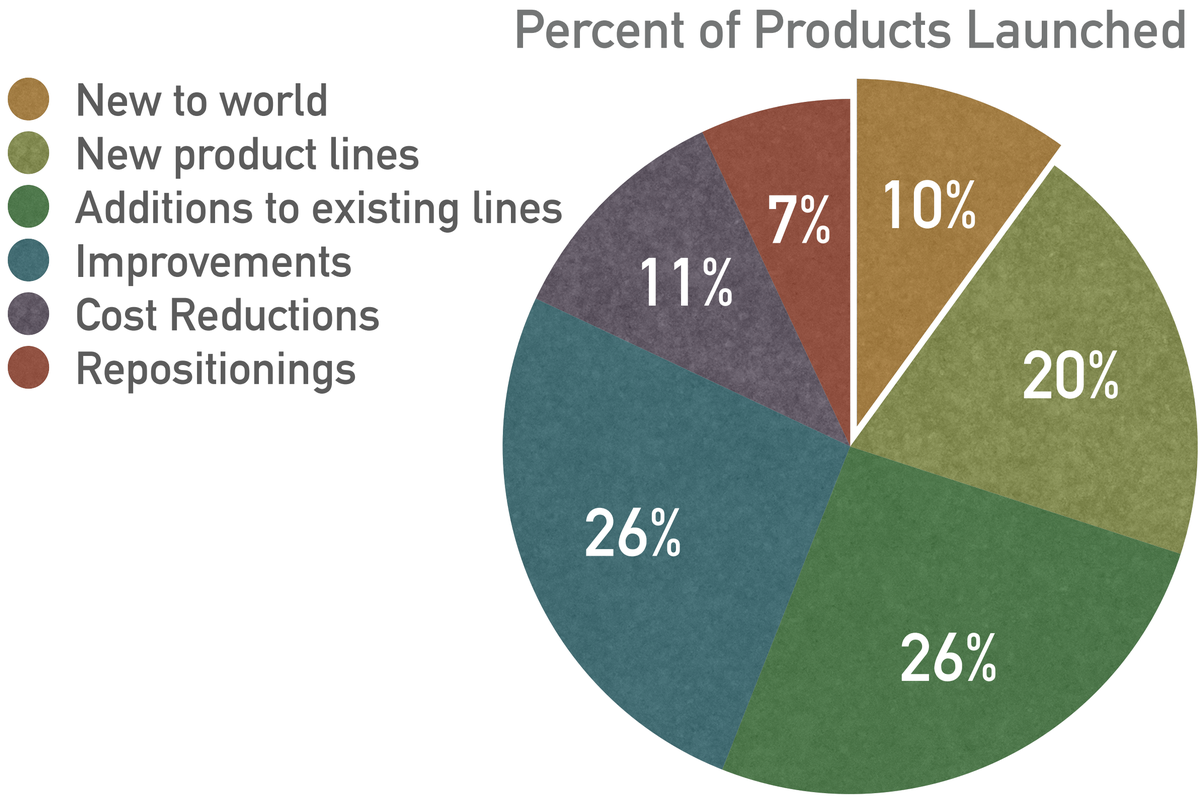
Does it feel predictable or random?

If more investment was fueling the pipeline would there be more returns?

5. TYPES OF INNOVATION AND INVESTMENT STRATEGY

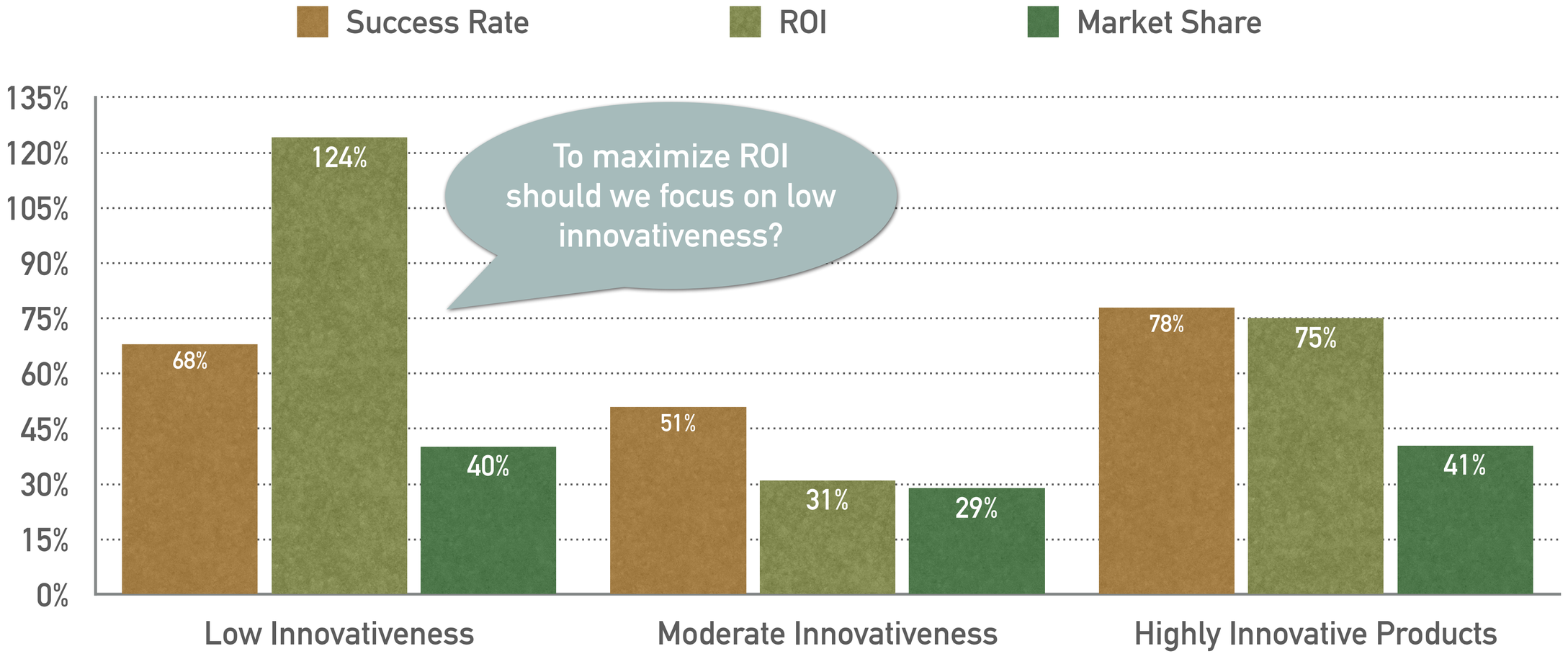
DEFINE INNOVATION: LEVELS OF INNOVATIVENESS FOR NEW OFFERINGS

Not all innovation products and projects have the same level of "newness"



Source: Journal of Product Innovation Management Impact of product innovativeness on performance

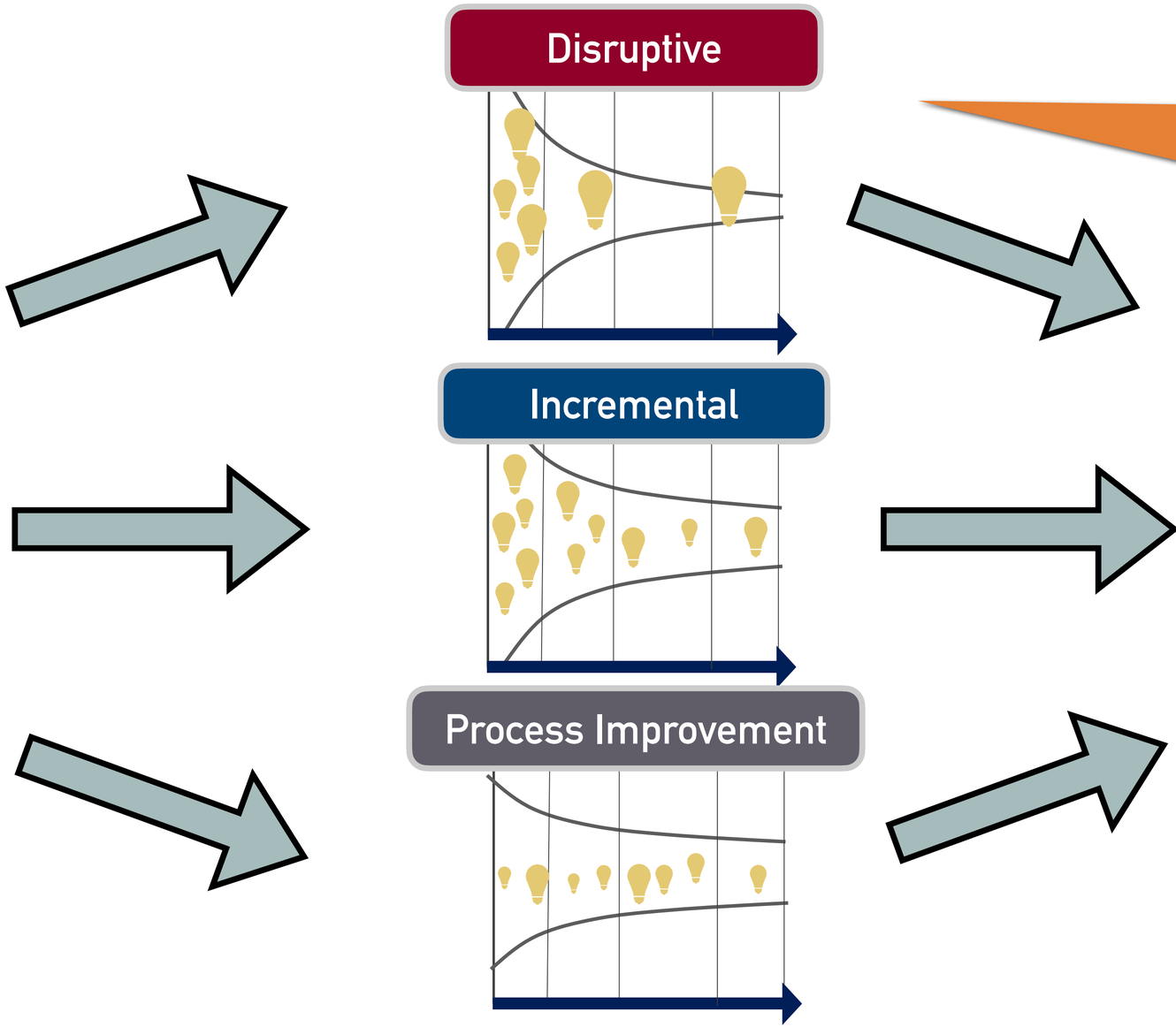
LEVELS OF INNOVATIVENESS FOR NEW OFFERINGS



Source: Journal of Product Innovation Management Impact of product innovativeness on performance

ROI IS IMPACTED BY THE TYPE OF INNOVATION, SO DECONSTRUCT BASED ON YOUR ORGANIZATION

INVESTMENTS



RETURNS

Each system has very different

Failure Rates,
Cost,
Time &
Project Value

Examples of different types of innovation, Best practice is to create your own.

ROI IS IMPACTED BY THE TYPE OF INNOVATION, SO DECONSTRUCT BASED ON YOUR ORGANIZATION

EXAMPLES FROM IRI COMPANIES:

Newness:

- Cost Savings
- Process Improvement
- Adjacent
- Incremental
- Disruptive
- Price Improvements
- Reactive
- Core
- Breakthrough

Type:

- New Services
- New Products
- Technology or IP

Time:

- Short Term
- Long Term

Less Innovative ⟷ More Innovative

Your focus tends to be on this side of less risk, more ROI

Sources: IRI Conference 2022 - Innovation ROI Workshop

HOW SHOULD WE DIVID OUR FOCUS AND INVESTMENTS?

BUSINESS GROWTH STYLE QUESTION:

Please assign 100 points across the three business growth styles to indicate how your organization approaches new ideas.
Please consider the relative focus your company has on the following business growth styles:

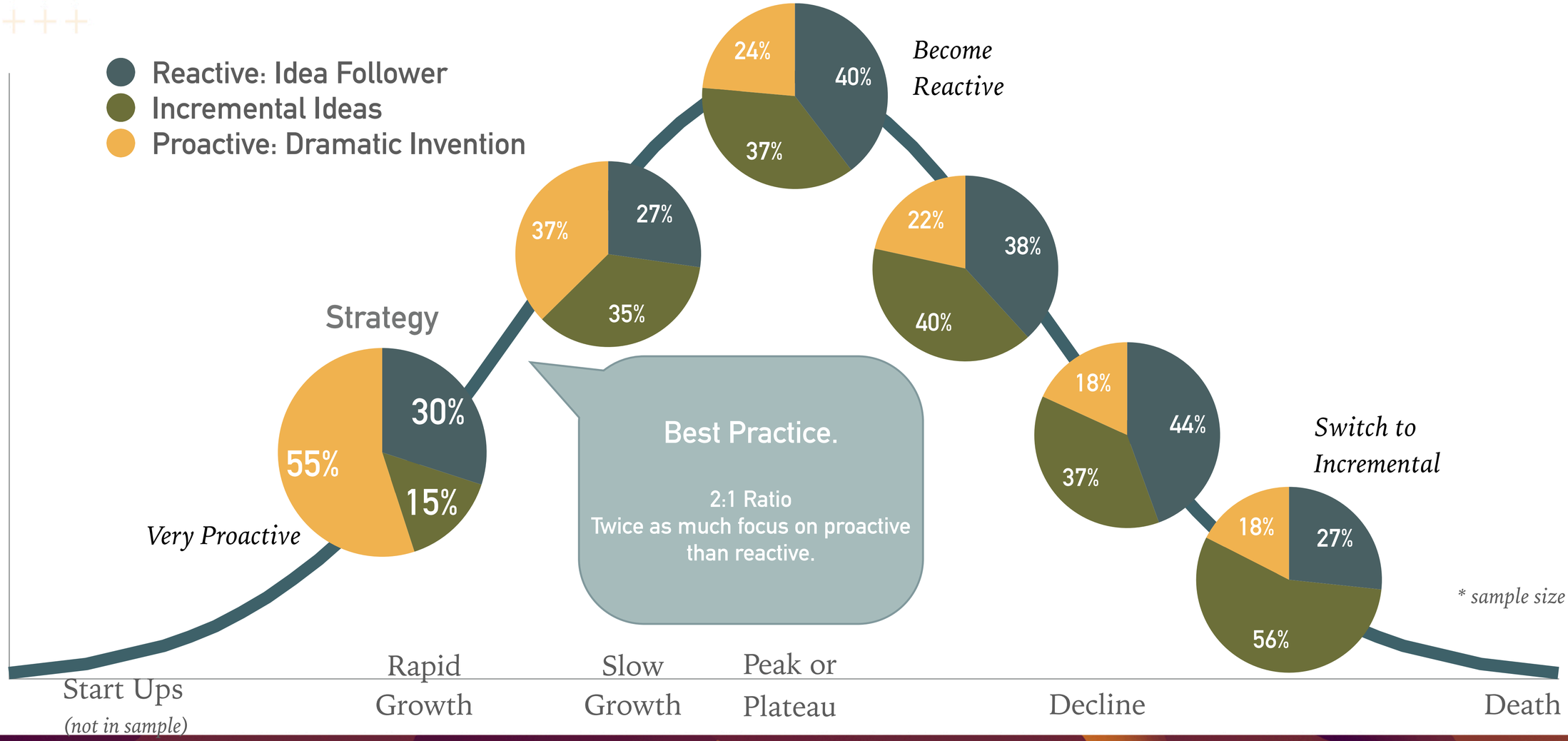
Business Growth Style #1: Idea Follower
We prefer to copy what others have proven to be successful.

Business Growth Style #2: Incremental Ideas
We constantly seek to make incremental improvements to our products/services.

Business Growth Style #3: Dramatic Invention
We prefer to lead our marketplace creating radically new ideas, categories & customer opportunities.

100

STRATEGY FOR GROWTH



INNOVATION TYPES

What are the different types of innovation?

What is the relative focus or investment in each type?

Does investment match strategy?

6. DECISION MAKING & SIMULATING SCENARIOS

DECISION MAKING FOR IDEAS

When it comes to picking which innovation projects to stop versus which to invest more in, which statements are true?

0%

We pick projects that have the best ROI, highest returns or fastest returns

25%

We pick projects that have the lowest risk

100%

We pick projects with the most support from our leadership

Sources: IRI Innovation ROI Webinar Survey with Eureka! Ranch

DECISION MAKING

“When it comes time to make a decision

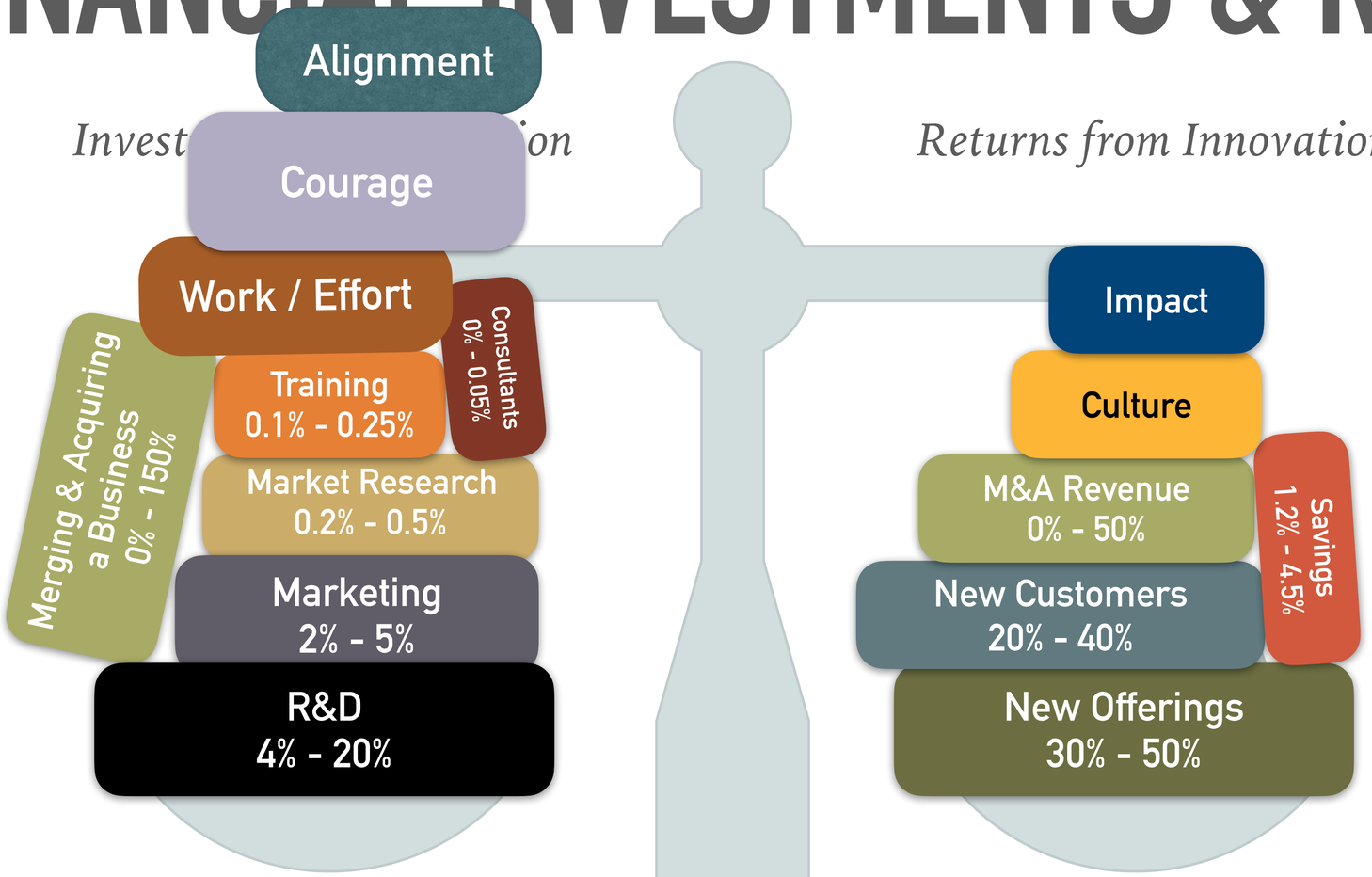
on which strategy to pick or project to accelerate, rarely is it just about the numbers.

Rather, in the decision moment they often feel fear of making the wrong choice. To resolve this fear they they move from making a logical decision to an emotional decision based on what ‘feels right’ and then the numbers as their ‘rational’ justification.”

-Doug Hall

Eureka! Ranch Founder

NON-FINANCIAL INVESTMENTS & RETURNS



Percentages are percent of revenue

DECISION MAKING

Idea decisions are more focused on avoiding cost, investment, and risk than maximizing the opportunity.

Leadership can change this behavior

Strategic alignment is used to pick ideas.

They care what experts and leaders think

Market opportunity and odds of success are lowest

Implementing the Best Ideas: Uniting Ideation with Business Strategy

Top 5 Criteria Customers Reported for Selecting Winning Ideas

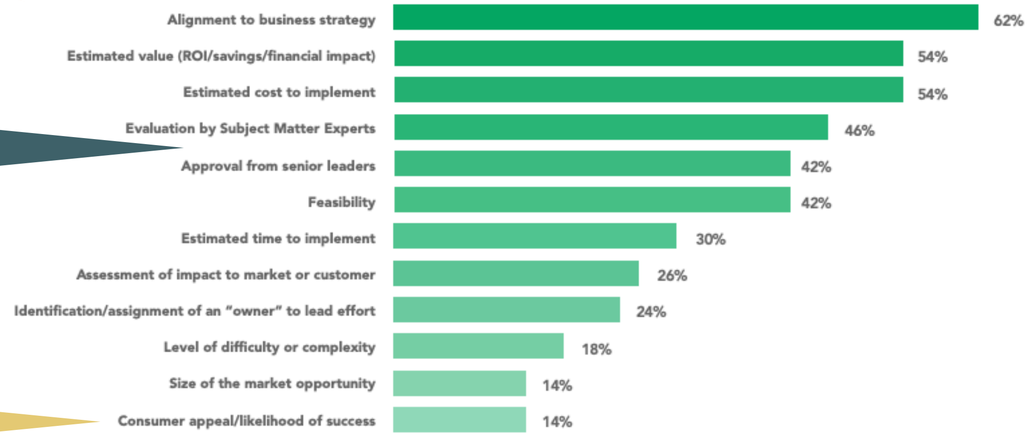
1. Alignment to business strategy
2. Estimated value (ROI/savings/financial impact)
3. Estimated cost to implement
4. Evaluation by subject matter experts
5. Approval by senior leaders

You've got ideas. Lots of ideas. Lots of exceptional ideas. But collecting winning ideas is not enough. To drive success, you need to marry ideation with strategy, implementation, and tracking. It's in the implementation stage – perhaps more so than any other – that there are significant opportunities for improvement.

Not surprisingly, survey respondents this year reported that "Alignment to Business Strategy" remains their number one criteria to pick winning ideas. This is a great approach, because if the winning idea doesn't satisfy a strategic need, it makes no sense to use limited resources to implement the idea. It's far more impactful to run a challenge tied directly to a strategic imperative and show employees how their valuable ideas can directly influence the bottom line. When strategy drives the crowdsourcing program, organizations see results.

Interesting to note, "Evaluation by Subject Matter Experts" in 2019 displaced feasibility as the fourth most selected criteria, highlighting the interest in ensuring the people closest to work are influencing the decisions on what to action.

What are the most important criteria your company uses to identify the top crowdsourced ideas on which a challenge sponsor will take further action? (Select up to 5)



INNOVATION ROI CALCULATOR

	A	B	C	D	E	F
1	Make estimates for the following					
2		Estimates				
3	Annual Revenue	$ 10,000,000,000				
4	Total Number of Employees	20000				
7	R&D or Innovation Budget (max spend allowed)	$ 1,300,000,000				
8						
9	Split Investment into Pipelines	100%				
10	Disruptive	23%				
11	Incremental	32%				
12	Reactive / low risk	37%				
13	Process Improvement	9%				
14						
15	**Disruptive**					
16	Phase	Time (weeks)	Cost for failure	Cost for success	Percent success (move to next phase)	Revenue
17	Yearly Exploratory Research	12		$ 20,000,000		
18	Yearly Product Line Planning	7.54		$ 150,000		
19	Yearly Project Strategy Development	6.65		$ 175,000		
20	Idea/Concept Generation	6.62	$ 10,000	$ 10,000	100%	
21	Idea Screening	3.85	$ 10,000	$ 10,000	65%	
22	Business Analysis	6.34	$ 125,000	$ 125,000	69%	
23	Design & Development	28.45	$ 4,000,000	$ 7,000,000	78%	
24	Test and Validation	12.89	$ 150,000	$ 150,000	71%	
25	Manufacturing Development	14.07	$ 1,000,000	$ 8,500,000	80%	
26	Commercialization	15.26	$ 1,500,000	$ 1,500,000	75%	
27	Success	113.6559842				$ 250,000,000
28						
29						
30						
31						
32	Results					
44						
45		Profit	Invest	ROI		
46	Disruptive	$ 74,892,823.10	$ 73,456,348	2%		
47	Incremental	$ 162,206,495.20	$ 150,952,081	7%		
48	Reactive / low risk	$ 336,334,289.93	$ 310,275,454	8%		
49	Process Improvement	$ 73,729,906.71	$ 64,197,535	15%		
50	**Total**	**$ 647,163,514.94**	**$ 598,881,417**	**8%**		
51						
52	Innovation ROI	8%				
53	Estimated Percent Revenue from new in 5 years	29%				

The numbers are wrong, but they are useful

Example Data

NOT best practice.

Using Benchmarking Data
Large B2B Company

Source: Innovation practices of B2B manufacturers and service providers https://pure.rug.nl/ws/portalfiles/portal/77079345/1_s2.0_S0019850117306831_main.pdf

Results match expectations

Early prototype in excel:

INNOVATION ROI SIMULATIONS

WHAT RESULTS IN HIGHER ROI?

Shipping more innovations

Shipping bigger ideas at the sam

Stop failing projects early

Increase speed

Decrease Cost

Less Risk

Process Improvements

MAXIMIZING RETURN ON INNOVATION INVESTMENT

Spending more on innovation does not necessarily translate into accelerating sales, market share or profit. Here's how three organizations would remedy this.

Miles P. Drake, Nabil Sakkab and Ronald Jonash

OVERVIEW: "How does the level of business innovation investment really impact company growth and performance?" *This question was put to an Industrial Research Institute panel for discussion at its annual meeting, May 2006. The panelists were also asked to comment on an initial hypothesis presented in strategy + business by Alexander Kandybin and Martin Kihn, of Booz Allen Hamilton, that there is no broad correlation between innovation investment and growth. In their responses, panelists from Air Products and Chemicals, Procter & Gamble and The Monitor Group suggest ways to move forward.*

KEY CONCEPTS: *R&D investment, business innovation, return on innovation, metrics.*

Raising Returns on Innovation, *by Miles Drake*

Return on investment is an ever-growing concern at my company as it is, I'm sure, at many others. Few activities in the corporate world, however, resist the business leader's attempts to gauge return on investment more than innovation. Most of what is done under the innovation banner may be scientific, but judgments about the results of those efforts are often more a matter of faith.

Innovation is broader than research and development, of course, but for this discussion I shall narrow the subject to R&D. Specifically, I shall focus on the following three questions:

- How surprised should we be that there seems to be little correlation between R&D expenditure (absolute or relative to sales) and business performance?
- How do we know when we are investing enough in R&D?
- Is there an appropriate R&D/sales target for a business?

In sharing some of our experience at Air Products and Chemicals, I shall draw on internal company data gathered over many years from our portfolio of businesses.

Miles Drake heads the worldwide R&D activities at Air Products and Chemicals, Inc., Allentown, Pennsylvania, as vice president and chief technology officer. He joined Air Products in 1986 as a technology manager, was appointed director of the Corporate Science and Technology Center in 1994, director of Gases and Equipment Group in 1998, and assumed his current position in 2001. He is a Fellow of the Royal Society of Chemistry, a past president of the Industrial Research Institute and the author of over 20 patents. He received a B.S. in chemistry from Cambridge University and a Ph.D. in surface and colloid chemistry from the University of Bristol. **drakemp@airproducts.com**

Nabil Sakkab is senior vice president, Corporate Research and Development, and a member of the Leadership Council at Procter & Gamble Company, headquartered in Cincinnati, Ohio. He assumed his current responsibilities in 2005, after ... years as senior vice ... Core. He joined P&G in 1974 after receiving his doctorate in chemistry from the Illinois Institute of Technology and postdoctorate studies at Texas A&M. He is the author of several scientific publications and a co-inventor on several patents in detergency and toothpaste preparations. **Sakkab.ny@pg.com**

Ronald Jonash is a senior partner of Innovation Management Inc. (IMI) and of The Monitor Group, in Cambridge, Massachusetts. He was previously managing director of the Technology and Innovation Management Practice for Arthur D. Little, where he worked for 25 years in strategic management of technology and innovation. A consultant to many industries, he is co-author of The Innovation Premium *(Perseus Books, 1999) and author of many articles. He has degrees in economics and engineering systems from Princeton University, where he also received his master's degree in architecture and design.* **Ronald_Jonash@monitor.com**

Measure what matters– the generation of new operating income and creation of robust business growth over time.

WHAT RESULTS IN HIGHER NEW PROFITS?

Shipping more innovations

Shipping bigger ideas

Stop failing projects early

Increase speed

Increase Value

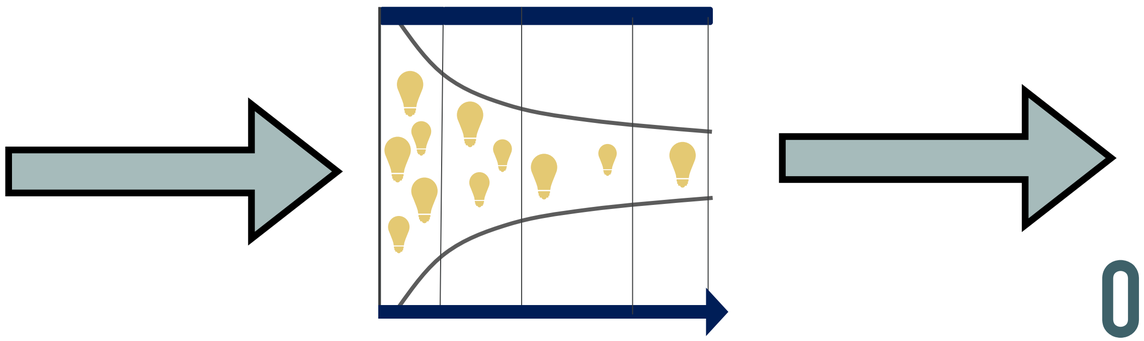
More Risk

New Products, Services, and Markets

INNOVATION ROI SIMULATIONS

ALSO WORK THE OTHER DIRECTION

INVESTMENTS



WHAT IT TAKES TO REACH **30%–50%** OF REVENUE FROM NEW OFFERINGS?

Do we have enough funding?	3% is not enough
Are we investing properly?	Too risk-adverse
Is the system working well enough?	We need to filter projects better
Is it even possible?	People, Time, Market size, Strategy, Constraints

DECISION MAKING

Would a calculator or simulation help decision making?

What drives decisions?

What changes are realistic?

7. WHAT'S NEXT

WHAT'S NEXT

We are going to finish a research paper that will be available to IRI members with all the insights shared today.

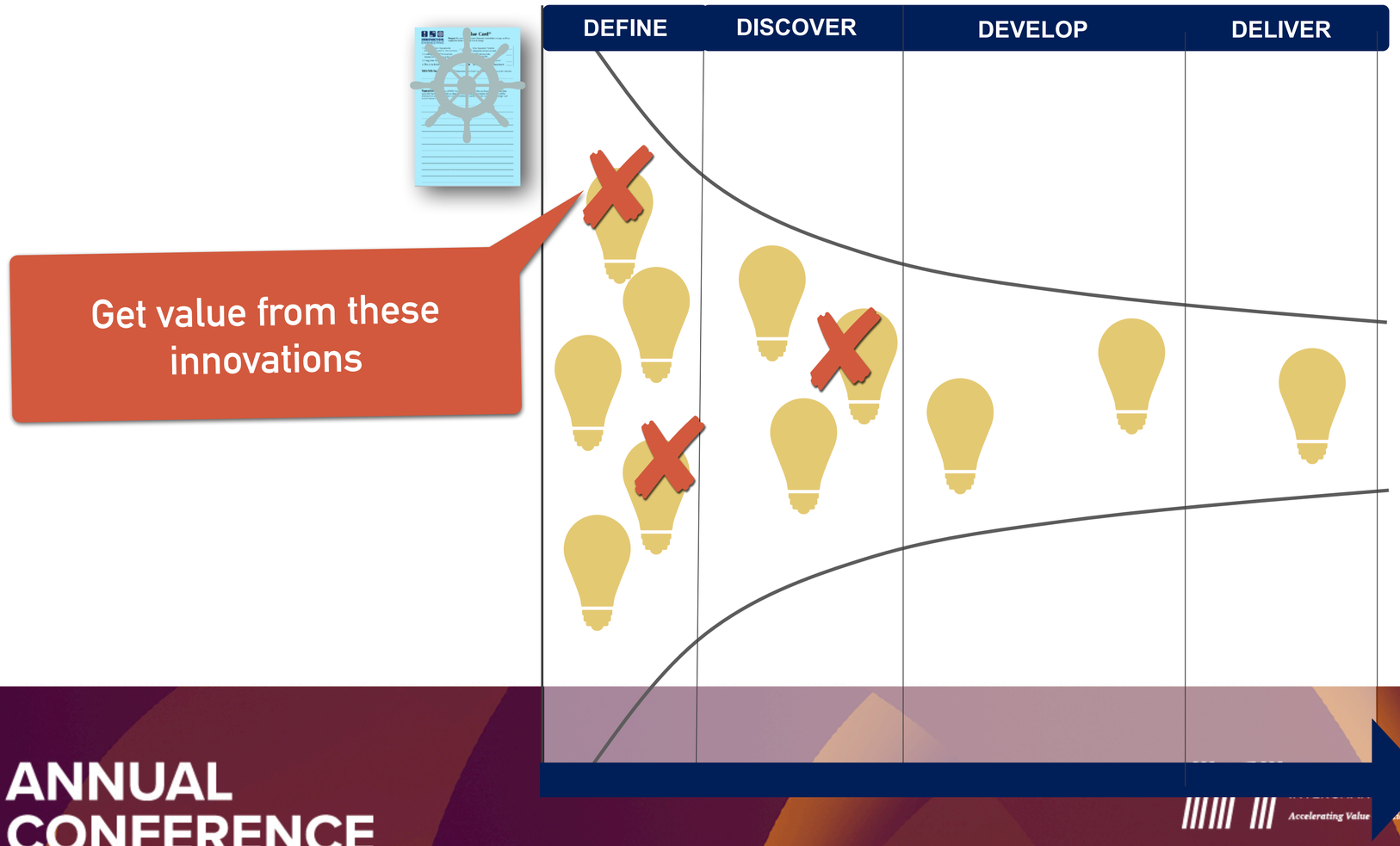
Outside of this project, my next related efforts include:

1. Learn or develop ways to improve decision making
   i. Simulator / Calculator Tools
   ii. Leadership Workshops
   iii. Project Forecasts
   iv. Courage and Culture

2. Tackle the problem of not getting value from innovation.

WHAT'S NEXT

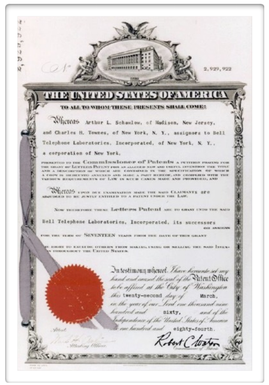
INNOVATION SYSTEM



WHAT'S NEXT

One way it might work is to

Existing Patent Portfolio



Start with patents, because there is something novel and they have sunken cost

Create new ideas and markets

Inside and outside of existing industries and business models

Decision Research

Sales Forecast

ROI

Fair Market Royalty Rate

Leveraging AI to create and evaluate ideas

Decision

Invest in Patent/Idea

License for $

Abandon Patent/Idea

WHAT'S NEXT

Connect on LinkedIn

greg@EurekaRanch.com

https://www.linkedin.com/in/glemmon/

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