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Center for Integrated Research

Capital bias

Reducing human error in capital decision-making

Deloitte's Capital Efficiency practice helps organizations make better and faster decisions by assisting them in improving the quality of their capital allocation decisions to enhance robustness, efficiency, and return on investment.

CONTENTS

The balancing act

Whether launching a new product, investing in equipment, or weighing the merits of an acquisition, corporate executives typically rely on their capital planning process to help shape these high-stakes decisions. Shareholders, creditors, and employees alike expect management to take this obligation seriously, and get it right consistently. Firms that excel in capital planning can be amply rewarded, but this is often easier said than done.

A look at the S&P 500 suggests just how difficult it can be to consistently drive positive results. Take one measure, return on invested capital (ROIC). In a Deloitte study, neither the amount of capital expenditures (as a percentage of revenue) nor the growth in capital expenditure demonstrated any kind of meaningful correlation with ROIC.[1] Regardless of industry, individual companies can often have a difficult time maintaining high and steady returns on their investments year over year.

Given such uncertainty in capital allocation results, it may not be surprising that more than 60 percent of finance executives say they are not confident in their organization's ability to optimally allocate capital.[2] After all, many companies are balancing competing priorities, diverse stakeholder interests, and a complex variety of proposals that can make capital allocation decisions even more difficult to execute in practice.

Why is this? On paper it seems practical enough for everyone throughout the organization to be on the same page. In an ideal world, a company establishes the goals and priorities; then, from senior managers to frontline employees, everyone is expected to act in a manner that supports these mandates.

However, behavioral science, and possibly your own experience, suggest it's likely not always that simple. Individuals at any level of an organization may be overly optimistic about certain courses of action, rely too much on specific pieces of information (and people), or simply interpret the objective through too narrow a lens (that may even run counter to other views on how to achieve these goals).

Within the behavioral science field, these are referred to as *cognitive biases* and they exist in many endeavors, not just capital planning. These same biases can explain why we are too optimistic about our retirement portfolios, can rely solely on the opinions of experts in matters of health, and narrowly frame our car buying decisions based on a single attribute, such as fuel efficiency—ignoring safety features, price, and aesthetic design. In the language of the behavioral sciences, these translate into the *optimism bias, expert bias,* and *narrow framing*, respectively.

Though these biases, and many others, are extensively covered within the academic literature and other fields, they are typically not as salient in matters of capital planning.[3] Despite this often lack of coverage, the evidence from our research suggests they may be no less prevalent.

In this article, we dissect which attributes can help us identify these biases. We close with cases from the US Navy and a large telecommunications provider that highlight how they can manifest throughout the capital planning processes.

Choreographing the optimism bias, expert bias, and narrow framing

BIASES can arise throughout many areas of daily life. From how we choose a retirement plan to picking out jams at the grocery store, we often make unconscious, suboptimal decisions.[4] Capital planning decisions may be no different.

From the original Nobel Prize-winning work of psychologists Amos Tversky and Daniel Kahneman to more recent findings, more than 80 different cognitive biases have been identified over the last 40 years.[5] Of these, three common biases seem to stand out as likely to wreak havoc on capital decision-making: the optimism bias, expert bias, and narrow framing.[6] Here's an in-depth look at how they typically work, and how organizations can avoid succumbing to their influence.

The optimism bias: Fueled by overconfidence and uncertainty avoidance

Optimism, while not categorically bad, is often closely tied to overconfidence. Known to minimize uncertainty, overconfidence can lead to perilous outcomes. In his book, *Thinking, Fast and Slow,* Daniel Kahneman recounts a multiyear study involving autopsy results. Physicians surveyed said they were "completely certain" with their diagnosis while the patient was alive, but autopsies contradicted those diagnoses 40 percent of the time.[7]

Another long-term study asked chief financial officers (CFOs) to predict the performance of a stock market index fund, along with their own company's prospects. When asked to give an 80 percent confidence internal (that is, provide a range of possible outcomes they are 80 percent certain results will fall within), only 33 percent of the results actually fell within their estimates—and most miscalculated in an overly optimistic manner.[8] Interestingly, the same CFOs who misjudged the market, misjudged the return on investment (ROI) of their own projects by a similar magnitude.[9] Kahneman explains that people defer to overconfident and optimistic predictions due to our distaste for uncertainty. If the CFOs provided a broader, vaguer estimate, they may fear perceptions that they weren't up to the task. This, in turn, could lead to decision paralysis (that is, the inability or unwillingness to make a decision due to such broad estimates) or could make them appear inept or unqualified to do the job.

> Most people accept that overconfidence and optimism exist. It is far more difficult, however, to identify these behaviors *while they are happening*.

Most people accept that overconfidence and optimism exist. It is far more difficult, however, to identify these behaviors *while they are happening*. Here are two methods to consider using to determine if excessive optimism is setting in within your organization:

Take a survey of past performance. Like the CFO study, compare past projections to reality. If the estimates systematically proved more optimistic than reality, there may be evidence of excessive optimism. But make sure you avoid letting hindsight dictate this analysis too much. In the case of individual performance, for example, if a manager did exceedingly well in the past, leaders should not assume he or she will achieve the same level of performance in the future. (We will cover this more in our discussion on expert bias).

Focus on data, not just narratives, to make decisions. When we have little information to go on, it can be easier to manufacture a coherent, overly positive story to fill in the blanks. But those decisions rarely end up to be solid ones. In professional sports, many have cited "intangibles" as the reason they picked a player to be on their team—only to regret the decision shortly down the road when the data suggests these intangible characteristics aren't leading to tangible victories. When data is scarce or ambiguous, it can be easier for the mind to form a more confident narrative based upon anecdotal evidence. But stories shouldn't be enough to go on when making big decisions, such as multimillion-dollar capital decisions.

The expert bias: What happens when we rely upon the "expert"?

Often, we are guiltiest of believing and acting upon overly optimistic views when they derive from "experts." This could be your company's lead software engineer, the vice president of sales who knows "what the customer really wants," or even the CEO. When we simply accept an expert's opinion or even our own, vs. seeking out additional information from a variety of sources, we fall victim to the expert bias.

How bad can it get? In many cases, the experts can prove to be no better at making predictions than random chance would be. In his book, *Expert Political Judgment*, Philip Tetlock analyzed more than 20 years of political pundits' predictions on a variety of policy and economic outcomes.[10] When tracked (but not necessarily held accountable), these experts performed about as well as they would had they randomly guessed. Even more disturbing, with greater fame usually comes greater inaccuracy—a stark illustration of how people value confidence over uncertainty.

One could argue that there is a big difference between heeding the advice of a TV personality and an analyst who is augmenting their predictions with data. For the most part, we would likely agree, but following even the best expert can also be dangerous.[11] Just because someone was the most accurate in the past does not mean we should *only* rely on his or her opinions going forward.

How bad can it get? In many cases, the experts can prove to be no better at making predictions than random chance would be.

Illustrating this point, one study asked MBA students to predict six economic indicators by either relying solely on the most accurate economist based on past performance or an average of three to six well-respected economists' forecasts.[12] While 80 percent of the students chose to rely on the single

top performer, the average estimates routinely performed better. This showed that when making decisions, relying on a number of informed opinions can be better than chasing a top expert's past performance.

These studies, along with the conversation on optimism suggest two things: First, a display of confidence does not necessarily translate into better results. Instead, it may signal a degree of ignorance (or arrogance). Second, a good group of people making a decision usually outweighs relying on the "best" person to make the decision.

Narrow framing: Narrow perspectives lead to wide miscalculations

Another common, potentially perilous behavior people often exhibit when making decisions is engaging in *narrow framing*. Here, people isolate problems, regardless of how broadly defined, into smaller, individual decisions. So rather than aggregating decisions into a portfolio of interdependent choices, they tackle them individually. At face value, this may sound intuitive. In practice, though, it can lead to the mismanagement of risk and an isolated view of problems.

Consider this hypothetical question from Tversky and Kahneman:[13]

Which would you prefer?

(A) A guaranteed $240 reward or

(B) A 25 percent chance to win a $1,000 reward with a 75 percent chance to win $0.

In this case, more than 80 percent of respondents chose the sure $240. Though, simple utility maximization would suggest that option B has a higher expected value of $250 (25 percent x $1,000 = $250).

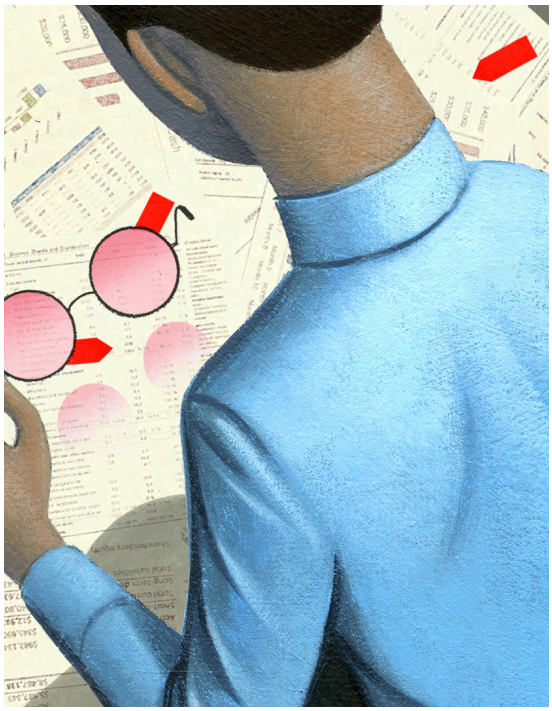
They offer another hypothetical question involving losses:

Which would you prefer?

(C) A sure loss of $750 or

(D) A 75 percent chance to lose $1,000 with a 25 percent chance to lose nothing.

When a clear loss is at stake, 87 percent preferred option D, even though both options offered the same expected value of losing $750. Reframing the problem as a loss led to more risk-seeking behavior than the first example. So why explore these dry hypotheticals? It shows that in some cases, people are risk-averse ("Give me the sure $240") and in others, they are risk-seeking. ("I would rather have



a 25 percent chance to lose nothing than definitely lose $750.")

If these risks are not weighed and measured as a total portfolio, our views and preferences may vary as well. In another essay, Daniel Kahneman and Dan Lovallo describe the dangers of narrow framing in a corporate scenario.[14] Picture a company with two groups submitting capital planning proposals: one group is in a bad position and has to choose between a guaranteed loss or the high likelihood of an even larger loss. Now consider a different group in the same company. This group has done well historically and can stay the course and make the same amount of money or take a marginal risk to make even more. If looked at in isolation, the company

will most likely be risk-seeking for the first group and risk-averse for the second. Instead, this organization would be better off aggregating both groups' options and analyzing the problem set as a portfolio of risk—rather than one of isolation.

With this in mind, it is clear that many different factors can influence our frame of view in isolation. Like the chasing the expert discussion, it's feasible a high performer who submits a capital project proposal with excessive risk factors could be given too much leeway because of his or her status.

Alternatively, hindsight can lead decision makers to view a new project too skeptically—even if it originated from a sound strategy. A study of NBA game strategies suggests that little information can be gleaned from narrow wins or losses in individual basketball games. Despite this information, after a close loss, NBA coaches are much more likely to overhaul their entire strategy.[15] So it's important to note that, when examining choices in isolation, people can be influenced by any number of external factors that may or may not be relevant.

Kahneman and Lovallo assert that the best way to mitigate narrow framing is twofold: First, organizations should utilize a process that groups together problems that, on the surface, may appear to be different. Second, this process must also include an evaluation element and use quality metrics that properly align with the organization's goals.[16]

Now that we have a better sense of how biases work, we can explore how to mitigate them in capital decision-making. The following two real-life examples will explore how it could work during two key process steps: planning and prioritization. For the planning stage, we illustrate how the US Navy conducted their top-down planning and target-setting to avoid narrow framing when field managers developed capital requests. The second case features a large telecommunications provider that improved its prioritization process by pooling expert opinion and mitigating the effects of excessive optimism.

Mitigating biases in planning: The US Navy

IN 2008, only 1 percent of the Navy's energy consumption came from renewable resources such as solar, wind, and biofuels.[17] To address this, the Department of the Navy (DON) set aggressive energy goals that included having "50 percent of DON energy consumption come from alternative sources" by 2020.[18]

Switching to alternative sources of energy would increase the Navy's energy security and independence. More alternative energy would offer the DON the means to protect and produce enough energy to sustain daily operations, along with the ability to operate autonomously if a supply disruption were to occur.

There's typically no question to the merits of the Navy decreasing its energy reliance on others. But consider those tasked with making the capital requests during the planning stage. In 2009, the Navy Installations Command organized its capital planning process to align its maintenance spending with the new energy goals.

Typically, capital requests sent to the Navy Installations Command were framed through the scope of need and cost. For instance, if someone wanted to request a new roof for a building, they would have to consider the cost and provide justification for the need to replace it. In addition, the Installations Command was weighing anywhere from 400 to 600 capital requests a year (approximately $1 billion in annual funding requests).

Now, what if someone requests not only to replace the roof but also to install solar panels? How does this request compare to another asking to replace a dying furnace with a new, more expensive, energy-efficient one?

Given the many variables and the broad set of maintenance requests, how could the Navy establish an appropriate framework to minimize bias?

In the past, they used a very common scoring method: They would organize the request into tiers. A "top" tier demonstrated high value in pursuing a project while a "bottom" tier showed little value. By not linking to specific, observable metrics, this tier system lacked specificity and kindled an environment for biases and inefficiency to grow. Field managers had to develop business cases using their own metrics or expertise, while project managers would make requests based on a local view and not on the bigger picture requirements of the organization. The Navy realized it needed a new method to achieve better results.

What does "better" look like?

The Navy decided it needed a better universal success metric than a tiered system—a reliable way to compare the furnace with the solar roof requests. To combat narrow framing, according to Kahneman and Lovallo, an organization needs a way to group together requests that appear superficially different.

The new frame of reference needed to incorporate costs and energy efficiency. Under the current program, it was like asking someone if they preferred a safe car or a fuel-efficient one. Intuitively, we know people are rarely holistically in one category or the other, so why should capital requests lean completely on one feature as well?

To make the decision process more fluid, the DON agreed that reducing carbon pounds con-

sumed adequately represented the energy goals metric. Further, all requests had a dollar value assigned. By developing a more complete framing metric combining these two parameters, all proposals could be translated into carbon pounds reduced per dollar. This decreased the reliance on the best narrative or some moving target of achievable outcomes.

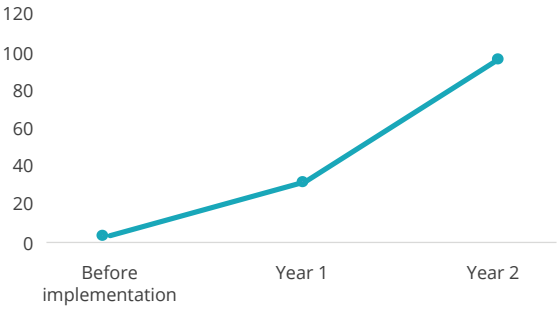
Secondly, the Navy used this metric to create an expected "break-even" point for each maintenance project.[19] Utilizing these new metrics, project managers were better able to develop energy proposals and leaders had an easier frame to compare a diverse portfolio of requests.

To measure the efficacy of the new proposal process, the Navy first ran through the prior year's projects to see how they would have looked under the new planning process. Had they used the new methodology, the finance team would have seen that the accepted projects would return an average of only 84 percent of the costs of the projects and reduce four carbon pounds for every dollar spent.

Once everyone was able to reframe the proposals to align with the Navy's goals, performance substantially increased. After the first year, 32 pounds of carbon were reduced for every dollar spent while returning savings of 224 percent to cost. By year two, these numbers increased to 97 pounds of carbon reductions per dollar, a savings of 316 percent (see figure 1).

Figure 1. Carbon pounds saved per dollar

The Navy's use of a universal metric for energy goals increased its performance significantly



Source: Deloitte Consulting LLP.

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Through better optimization of their portfolio and improved alignment of proposals from managers, the DON seems to overcome narrow framing and experienced growth in both financial and strategic goals. According to the DON, defining and implementing a metrics-based value framework resulted in more aligned project proposals, improved decision-making in capital planning, and a significantly more impactful energy management strategy.

> The new frame of reference needed to incorporate costs and energy efficiency. Under the current program, it was like asking someone if they preferred a safe car or a fuel-efficient one.

Prioritization: Leveling the playing field

IN 2014, one telecommunications company's multibillion-dollar capital budget took a page straight out of Michael Lewis's bestseller, *Moneyball: The Art of Winning an Unfair Game*. At this company, the prioritization process that determined which project proposals were approved or denied started as an "unfair game." The expert bias was allowed to run rampant. Because this firm's success largely depended upon the technology that fueled its service offering, senior management empowered its engineers to drive the capital spending process.

Those involved with the prioritization process observed that the engineers, through "gold-plated" business cases, routinely received their wish lists of projects, while other departments learned to accept this preferential treatment.

Identifying the expert and optimism biases

Many elements led to the manifestation of the expert bias and excessive optimism at this company. Fueled by historical successes, the technology division built up a reputation as a "winning bet." This led to an increase in reliance on engineers that before long, turned the capital spending process into a technology-dominated exercise. Simultaneously, proposals from other departments, such as marketing and finance, were increasingly crowded out. Meanwhile, as the overreliance on experts increased, the need for data-backed validation decreased.

But then, the telecommunications market quickly changed. Excessive optimism and the overreliance on experts blinded the organization to changing industry trends such as the commoditization of wireless networks. Now, new market pressures transformed into shareholder pressures. Suddenly, the organization was expected to cut its capital budget by 20 percent compared to plan.

Leveling the playing field of the "unfair game"

In *Moneyball*, Lewis chronicled how the Oakland A's were able to circumvent baseball scouts' anecdotal recommendations (that is, their expert bias). Instead they relied on unbiased data models to achieve one of the best records in all of baseball—despite having one of the lowest payrolls in the league. The CFO of the telecommunications company sought similar outcomes within his capital budgeting process; he had to find a way to cut 20 percent while avoiding shareholder value destruction. Like the Oakland A's, he knew they needed to manage these biases by better managing their data insights capabilities.

Similar to the case with the Navy, the communications company used an inclusive approach to developing the decision criteria. Specifically, they implemented a risk-adjusted benefit-to-cost metric to quantify all investment proposals. Instead of simply relying on the opinions of experts, this new system attempted to capture their insights and convert them from opinion into unbiased, data-driven recommendations. For instance, while estimating traditional project costs was familiar to managers, it was more challenging to measure and compare the value of diverse investments such as network projects and maintenance projects. To estimate the value of network expenditures, they considered the

population density of the area and the lifetime capital spend and operating costs to determine an average unit value for each local region. To evaluate the impact of criticality for maintenance projects, they estimated the potential lost revenue, percentage of subscribers affected, and the likely timing of disruptions.

But making more data-driven decisions is not always enough. It is often important to communicate these insights in a manner that is easy for decision makers to interpret.[20] For this reason, the data was aggregated into a portfolio optimization tool, and a data visualization dashboard was overlaid on top of this portfolio engine. In an easily comprehended graphic, management could now easily see how each project ranked, which facilitated a more transparent conversation among a broader range of decision makers, thereby minimizing the expert bias, and the reliance on heuristics (referred to as "mental rules of thumb").

With an agreed-upon framework and effective portfolio tools, decision makers had more constructive and efficient conversations to arrive at their ultimate funding decisions. Consequently, management was able to reach consensus faster and reduce their budget by the board-targeted 20 percent.

In addition, shortly after launching the prioritization process, newly freed up capital was deployed to finance a strategic acquisition.

Stripping away your own organization's biases

No matter the organization, biases will likely influence the capital decision-making process if left unchecked. It seems natural to avoid uncertainty in favor of excessive optimism (especially if we are the ones making the prediction). Even if we are not making the decision, we frequently put too much weight on our experts' shoulders. And with high-dollar, high-risk decisions, we frequently try to make the decision easier on ourselves by narrowly framing the problem through a less holistic lens.

Thankfully, there are a number of ways you can use behavioral science techniques to prevent these cognitive biases from negatively impacting high-stakes decisions. (See figure 2 for a review). When assessing your own capital decision-making process, consider asking yourself:

- **How are we submitting proposals?** To avoid narrow framing and the expert bias, consider seeking capital spending proposals from a diverse set of employees and departments. By broadening your portfolio of submissions, you can decrease the likelihood of only seeing the world through a single lens.
- **How are we assessing proposals?** Consider replacing catchy narratives with coherent, consistent metrics. Doing so could level the playing field across (hopefully) a broad set of proposals and reduce much of the noise throughout the decision-making process.

A financial decision is typically fueled less by the underlying capital and more by the people tasked with driving the decision. With this in mind, before you choose *where* to spend your capital, you should determine *how* you want to make those decisions.

Figure 2. A summary of capital decision biases

Capital decision bias	What it typically looks like	How to possibly address it
Optimism bias	• Overconfidence in estimates • Narrow range of prediction • Opting for narratives over data points	• Track predictions against reality • Remove anecdotal "proof points" from the decision-making process
Expert bias	• Relying on a single decision maker • "Chasing" a person's or group's past performance	• Pool recommendations from a diverse set of qualified individuals • Do not chase past performance
Narrow framing	• Focusing on a single attribute to make the decision	• Determine a portfolio of relevant metrics • Make capital decisions in aggregate rather than on a case-by-case basis

Source: Deloitte Consulting LLP.

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ENDNOTES

1. Deloitte conducted an analysis of the S&P companies over a 20-year period and found no meaningful correlation between capex as a percentage of revenue and ROIC. Nor was there a meaningful correlation between growth in capex as a percentage of revenue and ROIC.

2. Over 60 percent of finance executives surveyed "are not confident" in their organization's ability to make optimal capital allocation decisions: Deloitte webcast, "Capital expenditure planning: A structured, portfolio approach," May 23, 2013, 1,280 respondents; Deloitte webcast, "Energy management: How an effective strategy can improve your budget and drive value," July 27, 2011.

3. Kenneth A. Kriz, "Cognitive biases in capital budgeting," Wichita State University, accessed May 2, 2017.

4. Ruth Schmidt, *Frozen: Using behavioral design to overcome decision-making paralysis*, Deloitte University Press, October 7, 2016.

5. Timothy Murphy and Mark Cotteleer, *Behavioral strategy to combat choice overload: A framework for managers,* Deloitte University Press, December 10, 2015.

6. We should note that many other biases can manifest throughout the capital planning process. We chose these three because we have found them to be especially prevalent in our own work. However, if you want to learn about more biases that can develop throughout the process, we recommend exploring Buster Benson's "Cognitive bias cheat sheet," Better Humans, September 1, 2016.

7. Daniel Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus & Giroux, 2011).

8. Noted in Derek M. Pankratz and Michael A. Roberto's "Crossing the mental Rubicon: Don't let decisiveness backfire," *Deloitte Review* 18, January 25, 2016. The original cited study is Itzhak Ben-David, John Graham, and Campbell Harvey, "Managerial miscalibration," *Quarterly Journal of Economics* 128, no. 4 (2013): pp. 1,547–84.

9. Putting a point of emphasis on the optimism bias, CFOs who also had a chance to revise based on past performance would lower their "worst case" scenario estimates in the face of poor performance but would hold steady on their "best case" scenario. This means they would be willing to expand their confidence ban but not minimize their optimism.

10. Philip E. Tetlock, *Expert Political Judgment: How Good Is It? How Can We Know?* (Princeton, NJ: Princeton University Press, 2006).

11. Reid Hastie and Cass Sunstein, *Wiser: Getting Beyond Groupthink to Make Groups Smarter* (Boston: Harvard Business School Publishing, 2015).

12. Albert E. Mannes, Jack B. Soll, and Richard P. Larrick, "The wisdom of small crowds," The Wharton School, University of Pennsylvania.

13. Amos Tversky and Daniel Kahneman, "Rational choice and framing of decisions," *Journal of Business 59,* no.4 (1986).

14. Daniel Kahneman and Dan Lovallo, "Timid choices and bold forecasts: A cognitive perspective on risk taking," *Management Science 39*, no. 1 (1993).

15. Lars Lefgren, Brennan Platt, and Joseph Price, "Sticking with what (barely) worked: A test of outcome bias," *Management Science 61*, no. 5 (2014).

16. Ibid.

17. United States Department of the Navy, "Department of the Navy's energy program for security and independence," October 2010.

18. Ibid.

19. The break-even point was determined on a present value, time-adjusted metric. Initially, the portfolio was not netting a positive ROI at four pounds of carbon emissions reduced per dollar spent. After instituting the new methodology, the portfolio nearly doubled the necessary ROI.

20. Jim Guszcza, Harvey Lewis, and Peter Evans-Greenwood, "Cognitive collaboration: Why humans and computers think better together," *Deloitte Review* 20, January 23, 2017.

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