

What is a pivot? Explaining when and how entrepreneurial firms decide to make strategic change and pivot

Jacqueline Kirtley¹  | Siobhan O'Mahony²

¹Department of Management, The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania

²Department of Strategy and Innovation, Boston University Questrom School of Business, Boston, Massachusetts

Correspondence

Jacqueline Kirtley, Department of Management, The Wharton School, University of Pennsylvania, 3620 Locust Walk, Philadelphia, PA 19104.

Email: jkirtley@wharton.upenn.edu

Abstract

Research Summary: Most theories of strategic change focus on how large, established firms recognize or fail to recognize the need for strategic change. Little research examines how early-stage entrepreneurs decide when and how to change their strategies. With a longitudinal field study of seven entrepreneurial firms developing innovations in energy and cleantech, we examined 93 strategic decisions at risk for change. We found that decision-makers chose to change their strategies only after new information conflicted with or expanded their beliefs. Furthermore, a pivot, or strategic reorientation, was not achieved with a single decision, but by incrementally exiting or adding strategy elements over time, accumulating into a pivot. We contribute a grounded definition of what constitutes a pivot and explain when and how entrepreneurial firms pivot.

Managerial Summary: The term “pivot” is used extensively by practitioners and scholars alike, yet little is known about when and how entrepreneurial firms actually choose to change their strategies and when that change constitutes a pivot. We find that entrepreneurial firms choose to change their strategies only after receiving new information that conflicts with or expands their beliefs about their firm or uncertainties they face. However, this is more rare than the norm. Rather than make wholesale change with one decision,

firms incrementally exit or add a single element to their strategies. A firm pivots and reorients their strategic direction by reallocating or restructuring the firm's activities, resources, and attention through an accumulated series of decisions to address the on-going stream of problems and opportunities early-stage firms confront.

KEY WORDS

entrepreneurial firm strategy, innovation, pivot, strategic change, technology entrepreneurship

1 | INTRODUCTION

Stewart Butterfield, the boss of Slack, a messaging company, has been wonderfully unlucky in certain ventures. In 2002, he and a band of colleagues created an online-video game called “Game Neverending”. It never took off, but the tools they used to design it turned into Flickr, the web’s first popular photo-sharing website. Yahoo bought it in 2005 for a reported \$35 M. Four years later Mr Butterfield tried to create another online game, called Glitch. It flopped as well. But Mr Butterfield and his team developed an internal messaging system to collaborate on it, which became the basis for Slack. In Silicon Valley, such a change in strategy is called a “pivot”; anywhere else it is called good fortune. (The Economist, 2016: 54).

Slack is a poster child for the term “pivot”—an innovative entrepreneurial technology firm that was founded to build one product, failed, changed its product, collected \$1.2B in funding, and achieved a valuation of \$7.1B and counting (Wilhelm, 2018). With examples like these, it is no wonder that entrepreneurs have embraced the pivot as a strategic action that leverages a firm’s technology innovations, adapts them for new markets, and enables the firm to survive like a phoenix from the ashes. The term pivot entered the entrepreneurial lexicon with the Lean Startup methodology and the work of entrepreneurs such as Ries (2011) and Blank (2013). Since then, entrepreneurs and the popular press have embraced the term pivot to describe nearly any strategic shift made by a firm, a person, or even a government.¹

While the term pivot is widely used, we understand little about when and how entrepreneurial firms choose to make a strategic change or when a strategic change constitutes a pivot. In the Lean Startup methodology, a pivot is a “structural course correction” made after customer feedback violates a firm’s business hypotheses (Ries, 2011: 149). The emerging scholarly literature examining pivots uses the word to denote when an entrepreneurial firm has made a

¹An online search for the term pivot in business magazines and newspapers such as Forbes, Inc., The Economist, and The New York Times returns article titles such as: “Millennial News Site Mic Lays Off 25 Employees In ‘Pivot’ To Video,” “Pivots Are For Leadership—Not Just Strategy,” “Republicans Pivot and Make Comey the Capitol’s Most-Wanted Man,” and “7 Signs You Are Ready For A Work-Life Pivot.”

“radical type of organizational change” (Hampel, Tracey, & Weber, 2019) or a “strategic reorientation” (McDonald & Gao, 2019). Drawing on the literature on strategic change (Agarwal & Helfat, 2009; Gioia, Thomas, Clark, & Chittipeddi, 1994; Rajagopalan & Spreitzer, 1997; van de Ven & Poole, 1995), we define a pivot as a change in a firm’s strategy that reorients the firm’s strategic direction through a reallocation or restructuring of activities, resources, and attention. With this definition, we are agnostic about whether the change is in technology, product, or market (Furr, Cavarretta, & Garg, 2012) but, argue that pivots require a reorientation of the firm’s strategic direction, supported by resource commitments.

While mature firms and even governments can pivot their strategies, pivots are particularly important to informing entrepreneurial firm strategy largely because entrepreneurial firms take action under highly uncertain conditions (Folta, 2007; McMullen & Shepherd, 2006; Townsend, Hunt, McMullen, & Sarasvathy, 2018) with often precarious or contingent funding arrangements (Eckhardt, Shane, & Delmar, 2006). Whereas all firms manage risks, entrepreneurial firms take action to create and capture value, despite their inability to know either the set or the distribution of possible outcomes to their efforts (Knight, 1921). Gans, Stern, and Wu (2019) argue that “the central strategic challenge for an entrepreneur is how to choose [their strategy]” since they face more than one possible strategy to pursue and must choose one without knowing the value of alternative strategies. Packard, Clark, and Klein (2017) consider this to be “absolute uncertainty” where entrepreneurs face unlimited options and the “possible outcomes are unknown and unknowable” (2017: 845). Once entrepreneurs have formed a strategy, they attempt to enact it to find out if it is feasible (Ott, Eisenhardt, & Bingham, 2017); however, this process can generate very “noisy estimates of the value of an idea” (Gans et al., 2019). As they enact their selected strategies, entrepreneurial firms encounter new information that can lead them to question those strategies, but how and when they choose to change their strategies is not well understood.

An emerging literature has begun to examine entrepreneurs’ willingness to make strategic change and how they manage external stakeholders after a pivot. Grimes (2018) found that entrepreneurs who relinquished psychological ownership over their ideas and engaged in collective sensemaking were more open to feedback and to revising those ideas (see also Elsbach & Flynn, 2013). Snihur and Zott (2020) show how founders’ orientation toward novelty could affect a firm’s propensity for business model innovation. In one study, entrepreneurs with business expertise were less willing to test their strategies, but those who did engage in testing were more likely to make use of the learning gained (Leatherbee & Katila, 2018). When entrepreneurs change their strategies, they can incur a legitimacy penalty that can weaken their chances of acquiring external resources vital to their success (Zott & Huy, 2007). McDonald and Gao (2019) explore this dilemma by examining how entrepreneurs communicate strategic changes to relevant constituencies. Entrepreneurs that engaged in anticipating, justifying, and staging a pivot were more likely to retain the support of external audiences than those who did not leverage these practices. Entrepreneurial firms that cultivate user communities who strongly identify with the firm can be threatened by a pivot. Hampel et al. (2019) show how firms used identification reset work to retain the support of key stakeholders. This nascent literature on entrepreneurial pivots has focused on either identifying antecedents to strategic change or exploring how entrepreneurs communicate strategic change to their constituencies after the fact but, as yet, has not explained when and how firms choose to pivot.

Existing theory suggests that mature firms make a strategic change when they perceive a performance gap between their target and expected performance (Cyert & March, 1963; Levitt & March, 1988), often, after a long history of past performance. However, entrepreneurial firms

confront the decision of whether to change their selected strategies without extensive firm history and may need to make sense of either thin or ambiguous data (e.g., Joseph & Gaba, 2015). As Cohen et al. note: “[N]ew ventures have little or no historical performance and often lack a suitable industry peer group, making it difficult to know where to set aspiration levels” (2019: 4). Strategy scholars have traditionally examined how mature firms committed to their existing capabilities, structures, and markets make strategic change to refresh or renew established strategies in response to environmental or competitive pressures (Agarwal & Helfat, 2009; Rajagopalan & Spreitzer, 1997; Williams, Chen, & Agarwal, 2017) such as the introduction of technological innovations developed by others (Christensen, 1997; Gilbert, 2005; Henderson, 1993; Tripsas, 1997; Tripsas & Gavetti, 2000). In contrast, entrepreneurial firms developing novel innovations may learn from a different set of activities such as: enacting a strategy (Gans et al., 2019; Ott et al., 2017) or learning from feedback (Grimes, 2018) gleaned from experimentation or hypothesis testing (Eisenmann, Ries, & Dillard, 2013; Leatherbee & Katila, 2018; Ries, 2011). In other words, a learning-from-doing strategy may be more relevant to entrepreneurial firms than the identification of a performance gap (Ott et al., 2017).

What is needed is research that unpacks the “doing of strategy” at the earliest stages of entrepreneurship to determine when and how entrepreneurial firms choose strategic change. With a longitudinal field study of seven early-stage energy and cleantech hardware firms developing new technology innovations, we examined when entrepreneurial firms facing significant uncertainty both considered and chose strategic change. By examining decisions in which change was considered, we avoided selecting on the change as the dependent variable, which can invite retrospective sensemaking. We interviewed and observed founders and team members regarding decisions that affected the fundamental definition and core processes of their firms to obtain a collected set of strategic decisions that were considered for change in order to treat the decision to select or reject strategic change equally. We analyzed 93 strategic decisions made for each firm.

We found that, in contrast with the notion of pivots as “common, perhaps, the norm” for entrepreneurial firms (Ries, 2011), the firms in our sample rarely pivoted. Only three out of seven firms in our sample experienced a single pivot during our study. When a firm made a decision to change their strategy, they either chose a strategic exit to address a problem or a strategic addition to take advantage of an emergent opportunity, rather than completely reorient the firm’s strategic direction with one decision. These discrete, incremental changes did not produce the type of pivot that Mr Butterfield accomplished when he transitioned his firm from the video game Glitch to the messaging application Slack. Rather than make a pivot with a single decision, firms that pivoted made multiple incremental decisions that accumulated into strategic reorientation over time. Revisiting each firm’s case, we develop a grounded theoretical model to explain the conditions under which entrepreneurial firms pivot. In doing so, we contribute a grounded theoretical explanation of when strategic changes produce a pivot that takes into account the on-going stream of problems and opportunities that early-stage entrepreneurial firms confront as they execute on their planned strategies.

2 | STRATEGIC CHANGE, UNCERTAINTY, AND INNOVATION

Strategic change, strategic renewal, and strategic reorientation are often used interchangeably in regard to established firms (Rajagopalan & Spreitzer, 1997) to describe “the process, content, and outcome of refreshment or replacement of attributes of an organization that have the

potential to substantially affect its long-term prospects" (Agarwal & Helfat, 2009: 282). Research on strategic change typically examines what drives or inhibits mature firms from reorienting or redirecting their strategies in response to shifts in their industry and environment (e.g., Dutton & Duncan, 1987; Kaplan, 2008a; Zajac & Kraatz, 1993). While offering robust explanations for the rigidities, cognitive barriers, and biases that plague mature firms from adopting or executing on strategic changes in a timely fashion (e.g., Barr, Stimpert, & Huff, 1992; Eggers & Park, 2018; Henderson, 1993; Tripsas & Gavetti, 2000), this research may be less relevant to entrepreneurial firms that do not have these rigidities in place. As such, our current understanding of strategic change in entrepreneurial firms faces three limitations.

First, the strategic change literature theorizes that firms are motivated to change when new information illuminates a gap between a firm's target outcome and its expected performance (Cyert & March, 1963; Levitt & March, 1988). However, firms in uncertain contexts can amass volumes of data that elicit conflicting interpretations (Daft & Weick, 1984; Maitlis & Christianson, 2014). Thus, such comparisons may not be clearly determined. Recently, Joseph and Gaba (2015) showed that when performance feedback was ambiguous or inconsistent across multiple sources, decision-making and action was delayed as firms made sense of disparate information. Identifying clear, concrete outcomes to compare a firm's performance in relation to its business environment is not easily done for any firm, but this is particularly true for entrepreneurial firms, which lack a long history of performance to form a basis for comparison (Cohen, Bingham, & Hallen, 2019).

Second, examination of strategic change tends to equate change as positive, often assuming that strategic change was the correct and necessary decision, rather than evaluating what prompted decision-makers to select or reject change contemporaneously. For example, Barr et al. (1992) define the alternative to strategic change as strategic decline. This perspective views strategic change as the appropriate reaction to a firm's environment: "a difference in the form, quality, or state over time (van de Ven & Poole, 1995) in an organization's alignment with its external environment" (Rajagopalan & Spreitzer, 1997: 49). With the benefit of hindsight, it is easy to assume that strategic change was the correct choice for the firm at the time and then to examine how firms failed to perceive or act on this information (e.g., Christensen, 1997; Christensen & Bower, 1996). Evaluating the drivers of strategic change contemporaneously is a more difficult task. Furthermore, what prompts strategic change for early stage entrepreneurs may be challenging given the uncertainties that entrepreneurs face (Townsend et al., 2018) and their inability to understand the value of alternative strategies *ex ante* (Gans et al., 2019).

Third, the focus within the strategic change and renewal literature has been on mature and established firms' reaction to exogenous shifts (Dutton & Duncan, 1987) such as changes in regulations (e.g., Barr, 1998), technology (e.g., Christensen, 1997; Gilbert, 2005; Tripsas, 1997), or market preferences (e.g., Zajac & Kraatz, 1993). For example, studies have examined why a focal firm did or did not change its strategy in the face of new innovations made by competitors (e.g., Bower & Christensen, 1995; Gilbert, 2005; Tripsas, 1997). While important to explaining what triggers strategic change in mature firms, this research does not explain how entrepreneurial firms developing new innovations make decisions about strategic change. When developing new innovations, both entrepreneurial and mature firms engage in experimentation and hypothesis testing (Andries, Debackere, & van Looy, 2013; Dyer, Gregersen, & Christensen, 2008; Thomke, 1997), where new discoveries may prompt consideration of strategic change prior to obtaining information on firm performance.

Agarwal et al. argue that experimentation is a "consistent and reoccurring feature" when entrepreneurs are converting new scientific and technical knowledge to launch new industries

(Agarwal et al., 2017: 297) and there is some preliminary evidence that entrepreneurs who experiment either perform better or exit early (Camuffo, Cordova, Gambardella, & Spina, 2019). In the context of entrepreneurs, the choice to change strategy may not be a reaction to the innovations of others, but triggered by discoveries revealed in the process of transforming scientific and technical discoveries that existed only in the lab into a commercial product (e.g., Hargadon & Douglas, 2001; Maggitti, Smith, & Katila, 2013). For example, after Raytheon engineer Perry Spencer figured out why candy bars melted in his pocket while he worked with the microwave magnetron, Raytheon expanded its strategy from being a WWII era military electronics supplier to creating a civilian food appliance division, eventually introducing microwave popcorn to the world (Ackerman, 2016).

Fundamentally, the challenge for entrepreneurial firms deciding when to change their strategies is not about renewing or evolving a previously successful strategy, as with Lycos (Gavetti & Rivkin, 2007), Merrill Lynch (Gavetti & Menon, 2016), or Vanguard (Siggelkow, 2002) but about whether and how to change a strategy that is formed (e.g., Ott et al., 2017) but untested. At this early stage, entrepreneurs have formed a strategy and have begun to enact it by allocating and structuring activities, resources, and attention. However, they are still discovering which elements of their planned strategy will or will not work when put into action. For example, if an entrepreneur discovers, through engagement with potential customers, that a particular innovation will perform better as an enterprise product than a consumer product, this discovery may prompt the entrepreneur to question the selected strategy. Gavetti and Rivkin argue, that, at this stage, entrepreneurial firms are flexible in that “the cognition of the top management team has not yet been embodied in activities, routines and structures” (Gavetti & Rivkin, 2007: 434). Thus, entrepreneurs should be “plastic” and able to adapt to changing conditions as they learn if their planned strategy will work when put into practice. However, little empirical research examines this early stage of strategy evolution.

Entrepreneurial firms with newly formed strategies will experiment and test their product and market hypotheses; however, all are not likely to be confirmed. As with any innovation process, entrepreneurial strategy search and development is an iterative process (Maggitti et al., 2013). Through this process, entrepreneurial firms may identify new information that triggers consideration of strategic change before they can identify that a gap in performance exists. Understanding this granular process is not easy, as the artifacts and measures traditionally used to examine when and how established firms make strategic changes, such as annual reports, budget breakdowns, historical records, and the creation of new formal roles and titles (e.g., Gavetti & Menon, 2016; Kaplan, 2008a; Romanelli & Tushman, 1994) may not yet exist or be publicly available.

To examine when and how early-stage entrepreneurial firms developing new technology innovations decide to make strategic change, we need to contemporaneously examine the stream of decisions made by entrepreneurial firms (Mintzberg, 1978) in their earliest stages of enacting a strategy. Rather than selecting on strategic change, we need an approach that identifies strategic decisions at risk for change in order to treat the possibility of stasis and change equally. Only by doing so can we develop an understanding of the conditions that prompt decision-makers to either select or reject strategic change.

3 | RESEARCH METHODS

We used a longitudinal, qualitative field study to examine the triggers to strategic decisions at seven early stage entrepreneurial firms developing hardware in the energy and cleantech sector

and traced the ensuing choices. Qualitative field methods are appropriate for this study as they allow for in-depth investigation of a phenomenon whose boundaries are not clearly evident in advance (Bettis, Gambardella, Helfat, & Mitchell, 2015; Eisenhardt & Graebner, 2007; Langley, 1999). Longitudinal, contemporaneous field research can provide a collected set of choices managers face without *ex ante* filtering (Van de Ven, 1992). We investigated the events that prompted strategic decision-making and traced when decision-makers selected or rejected strategic change. We probed entrepreneurs and their teams about strategic decisions—those recently made and those under consideration—that informants deemed to be “impactful” to the strategy of the firm. By examining decision-making for a collected set of decisions at risk for strategic change, we identified when firms considered and rejected strategic change as well as when firms opted to change their strategies. We then analyzed the types of strategic change selected by each firm to understand the conditions that produced a pivot or strategic reorientation.

3.1 | Research setting: energy and cleantech hardware

To understand how and why entrepreneurial firms choose strategic change under conditions of uncertainty, we focused on the energy and cleantech sector. Energy and cleantech technologies often require significant capital and long development cycles that can be extended by industry regulation or politics (e.g., Guo, 2014). Recent high-profile failures involving federal loans have hurt the reputation of the sector in the eyes of investors and decreased their willingness to participate (Hargadon & Kenney, 2012; Mowery, Nelson, & Martin, 2010), increasing uncertainty as to whether funding will be available to reach the next milestone (e.g., Gompers, 1995). New entrants in energy and cleantech aim to either replace existing technologies, supplant mature firms, or create new product categories that may not be immediately understandable to external audiences (e.g., Navis & Glynn, 2010; Pinch & Bijker, 1984; Rao, 1994) or generate uncertain market demand (Grodal, Gotsopoulos, & Suarez, 2015). Thus, all firms in this context face heightened uncertainty as new information about technology, regulations, and financial resources throughout the sector are subject to constant change.

3.2 | Theoretically driven sample design

We used a theoretical rather than representative sampling approach. We selected seven entrepreneurial firms pioneering new hardware technology in the energy and cleantech sector based on characteristics that provided the opportunity to extend relationships and logic among constructs (Glaser & Strauss, 1967; Patton, 2002). Firms were selected into the sample based on three criteria. First, entrepreneurial hardware firms were theoretically desirable as they are understudied relative to software firms. Second, we chose firms that were presales at the time of entry into the study as sales to represent a contractual commitment in a product's form, features, market, pricing, and supply chain that are difficult to reverse (Gans et al., 2019). By selecting entrepreneurial hardware firms prior to committing to customers, we were able to gauge entrepreneurial strategy in a nascent stage, increasing the opportunity to observe strategic shifts. Third, each firm employed at least three people at the time of entry into the study. Additional staff requires organizational structure and resources. Teams of three or more members not only indicate that the entrepreneur has escalated from a lone inventor to a business

venture, but also provide more vantages into strategic decision-making as the presence of others requires the founding entrepreneur to articulate strategic goals and decisions explicitly to the team.

The seven-firm sample was compiled through introductions made by the researchers' university network of entrepreneurs. All firms were located in the Boston metropolitan area at the time of entry to the study. Founders were approached by email or in person and asked to participate in a field-based research study on how entrepreneurial firms in energy and cleantech technology industries navigate strategic change. Additionally, they were told that each firm would be kept unidentifiable in the presentation and publication of the research. To this end, the firm and informant names presented are pseudonyms and details about the technologies and products under development are disguised. All seven firms were founded to commercialize novel hardware technologies and create new markets or replace existing technologies. This sample of firms founded between 2007 and 2013 includes a variety of technologies within the energy and cleantech sector such as power generation and storage (Coulomb, Farad, Gauss); energy efficiency improvements of electrical systems (Joule, Ohm); and pollution control (Ergon, Hartree). All firm founders had educations and backgrounds in engineering: three had prior startup experience and four were recent graduates. Table 1 provides an overview of the firms at the entry to this study.

3.3 | Data collection

The first author conducted 82 semi-structured interviews during which entrepreneurial founders and team members detailed strategic decisions that affected their firms' strategies. We interviewed founders, the top management team, board members, engineers, investors, and other advisors involved in strategic decisions at each firm. Introductory interviews began with the informant generating a list of strategic decisions impactful for the firm. We consider

TABLE 1 Sample firm descriptives

Firm	Founded	Team	Cleantech area	Innovation in	Founder experience
Coulomb	2009	4 ^a	Power generation	Manufacturing process	Two engineering consultants and one engineering professor
Ergon	2010	8	Pollution control	Chemical process	Two serial entrepreneur engineers
Farad	2013	4	Power storage	New application of known science	Two former CTOs from related industry startups
Gauss	2011	4 ^a	Power generation	New application of known science	Two engineering students
Hartree	2007	15	Pollution control	Chemical process	One experienced engineer entrepreneur
Joule	2011	7	Energy efficiency	Product design	Two engineering graduates
Ohm	2010	10 ^a	Energy efficiency	Application of new science	Three engineering graduates and one MBA

^aAdditional advisors, interns, consultants, or university lab graduate students not otherwise included in this count.

strategic decisions to be related “to the long-term prospects of the company” and have a “critical influence on its success or failure” (Agarwal & Helfat, 2009: 281). During initial interviews, informants were asked to discuss as many impactful strategic decisions as time allowed. Follow-up interviews explored how previously identified strategic decisions evolved as well as new strategic decisions that had since emerged. Interviews averaged 70 min in length and all interviews were recorded and transcribed. Interviews were conducted over a 1- to 3-year period (depending on entry to the study) to capture the evolution of firm strategy while decisions and recollections were contemporary. Firms entered the study at different times between the second quarter of 2012 and the first quarter of 2015. Two firms (Gauss and Ohm) entered the study a year earlier than other firms as a pilot to test the research design. We augmented interview data with 48 onsite observations coinciding with interviews held at the firms’ offices and 69 internal and external documents, including board presentations, articles about the firms and the founders, and stakeholder communications provided by informants to confirm the timing of key events. Table 2 summarizes the field data collected by source of information at each firm over time.

3.4 | Data analysis

Data analysis was a five-phase inductive and iterative theory-building process. In the first phase, we identified 147 strategic decisions from the interview data pooled across all seven firms. For example, in several interviews, informants from Coulomb discussed whether to target venture capital investment. We coded this as one strategic decision. Since our goal was to examine decisions in which strategic change was considered, rather than strategy formation, we excluded 46 decisions made as part of founding the firm and forming the initial strategy, which could therefore not be considered at risk for change. Thus, decisions made during strategy formation were not included in the data analyzed. Of the remaining 101 strategic decisions at risk for change, eight were still under consideration at the conclusion of data collection and thus excluded from analyses. The 93 strategic decisions completed across the seven firms during the time of study represent the collected set of completed strategic decisions and constitute the pooled data set for this study (e.g., Bechky & O’Mahony, 2016).

In the second phase, we used open coding to identify what stimulated (Mintzberg, Raisinghani, & Théorêt, 1976) or triggered strategic decision-making. Drawing upon Sonenshein (2009), we identified triggers as information that prompted a new strategy question and catalyzed firm decision-makers to consider strategic change. A trigger might introduce new information or an alternative strategy not previously considered without necessarily implying a performance gap. Increasingly, scholars recognize that sensemaking is critical to managers’ recognition of the need for strategic change (Barr et al., 1992; Gioia & Thomas, 1996; Kaplan, 2008b). In our case, triggers stimulated decision-makers to question the firm’s current strategy and consider strategic change. To account for varying perspectives, we coded triggers three ways. First, we coded triggers by the substantive nature of the information introduced to the decision-maker, such as technology, market, financing, supply chain, or organizational activities. Second, inspired by Gersick (1988) and Kaplan and Orlitzkowsky (2013), we coded triggers temporally by the development phase or milestone, capturing when triggers to a decision appeared during the innovation process. Third, drawing on research about the antecedents (Fiss & Zajac, 2006) or catalysts of strategic change (Gilbert, 2005; Jackson & Dutton, 1988), we coded whether triggers presented either a problem or an opportunity, from the shared view of

TABLE 2 Firm data descriptives

Firm	Period in study	Months in study	Number of interviews	Interviewees	Observations	Documents
Coulomb	Q3 2013–Q4 2014	16	10	CEO, Co-founder Lead Engineer, Co-founder Adviser, Co-founder Project Lead	7	4
Ergon	Q1 2014–Q4 2014	9	5	CEO, Co-founder Co-founder	4	1
Farad	Q3 2013–Q1 2015	17	5	President, Co-founder Finance lead, Co-founder	4	3
Gauss	Q2 2012–Q3 2014	29	19	CEO, Co-founder Chief Engineer, Co-founder EIR & COO Adviser, Temporary CTO Consultant	13	36
Hartree	Q1 2014–Q4 2014	11	8	CEO, Founder VP of Bus Dev Project Engineer Technical Manager	4	4
Joule	Q3 2013–Q1 2015	16	10	CEO, Co-founder Dir of Product Development Investor	8	4
Ohm	Q2 2012–Q4 2014	26	25	CEO, Co-founder CTO, Co-founder VP of Sales & Marketing Program Manager Dir of Ops, Co-founder Dir of IC Development Principal Engineer Senior Principal Engineer Program Manager (new)	8	17
Total			82		48	69

the firm's decision-makers. A problem trigger introduced information that posed a potential loss or unfavorable impact to the firm that could decrease the firm's value or increase the likelihood of failure. In line with Gavetti and Menon's definition of an opportunity as "a course of action that supports positive NPV" (Gavetti & Menon, 2016: 209), an opportunity trigger introduced information with the potential for gain or a favorable impact that could increase the value of the firm, its products, or its chances of success. Although we recognize that people may differ on whether they perceive new information as presenting an opportunity or a problem, in our setting, we did not identify cases where entrepreneurial teams disagreed as to whether a trigger presented a problem or an opportunity.

In the third phase, we coded how decision-makers confronted the strategy question posed by the new information that triggered decision-making. Then, we assessed whether decision-makers decided to change their firm's strategy for each of the 93 completed decisions. For each strategic decision, we identified the strategy question prompted by the trigger as well as the

options considered by decision-makers. A decision was coded as “at risk” for strategic change when at least one option under consideration involved strategic change. Unlike definitions of strategic renewal (Barr et al., 1992), we did not assume a priori whether strategic change was necessary. Rather, we coded a decision to make a strategic change as a decision-maker’s explicit choice to deviate from the firm’s current strategy without judgment by the researcher as to whether a change was needed. Following Romanelli and Tushman (1994), Boeker (1997), and Cui, Calantone, and Griffith (2011), we operationalized a strategic change as a decision to change at least one element of a firm’s existing strategy (e.g., a change in product line, market breadth, or partnering strategy). We considered firms to reject strategic change if they did not adjust their existing products, activities, resources, or attention (e.g., Ocasio, 1997) or made only slight adjustments to reinforce their current strategy.

To understand not just when firms made strategic change but how firms changed their strategies, we coded the 21 strategic change choices made and identified two types of changes: Strategic exits and strategic additions. A strategic exit occurred when a firm chose to discontinue a current product without replacement. For example, after realizing they could not fit their demonstration prototype into its required packaging, let alone the suitcase the CEO was taking to the industry’s annual convention, Joule gave up on that market and canceled their only product, leaving the firm with a hole in their strategy. As this study took place before customer commitments were in place, exiting a product incurred only one strategic change without concomitant changes in other areas. A strategic addition occurred when a firm added a new value proposition or set of activities not previously included in the strategy. For example, Hartree acquired their only competitor when this firm lost its investors, unexpectedly adding new designs to Hartree’s product portfolio before Hartree’s own products were ready for commercial production. Six out of seven firms chose strategic additions and three out of seven firms selected strategic exits during the time of study. Only one firm, Ergon, made no strategic changes.

In the fourth phase, we mapped different types of triggers with strategic decisions. We used tables (Miles & Huberman, 1994) to identify patterns between decision triggers and strategic decisions. We found no patterns based on the substantive content (technical, market, financing, etc.) or the timing of decision triggers. Ultimately, we did find a pattern based on the perceived favorability (problems or opportunities) of decision triggers. To better understand this pattern, we returned to the data and examined the collected set of strategy options and the statements made by decision-makers about the information and beliefs they considered during each firm’s strategic decision-making process. We defined a belief as an assertion or conviction that an unverified statement is or will be true (McMullen & Shepherd, 2006).

In the fifth and final phase of analysis, following the logic of Mintzberg (1978), we traced each firm’s strategy through their pattern of strategic decisions by creating timelines of each firm’s decisions. The strategic additions and exits we observed, individually, did not constitute a pivot or strategic reorientation. By mapping accumulative patterns of strategy exits and additions, we developed a grounded understanding of when and how strategy decisions either did or did not accumulate into a strategic reorientation or pivot over the period of study. Building on the literature on strategic change (Agarwal & Helfat, 2009; Gioia et al., 1994; Rajagopalan & Spreitzer, 1997; van de Ven & Poole, 1995), we then defined a pivot as a change in a firm’s strategy that reorients the firm’s strategic direction through a reallocation or restructuring of activities, resources, and attention. From this analysis, we contribute a grounded theoretical framework to explain when and how entrepreneurial firms make strategic changes that produce pivots.

4 | WHEN FIRMS DECIDE TO CHANGE THEIR STRATEGIES

When confronted with information triggers that prompted a new strategy question, decision-makers considered strategic change. In these moments, entrepreneurs began to question their commitment to their current strategy—indicating some degree of receptivity to change (e.g., Gavetti & Rivkin, 2007). All firms encountered two types of triggers during the time of study: Problems and opportunities. Most often, decision-makers retained their beliefs without altering their strategies and rejected the option to make a strategic change. Only about one-fifth of the time did decision-makers choose a strategic change. When decision-makers chose strategic change, they either found their beliefs in conflict with a problem trigger and chose a strategic exit or embraced an opportunity trigger, expanded their beliefs and chose a strategic addition. Despite the fact that six out of seven firms chose to make a strategic change at least once during the period of study, only three firms ultimately pivoted. However, a pivot did not occur as the product of one decision. When firm decision-makers chose to make a strategic change, they changed one element of their strategy at a time, but not the overall strategy. When pivots did occur, they unfolded through an accumulation of incremental strategic decisions, independently triggered by either problems or opportunities.

4.1 | When is a firm's strategy at risk for change?

As might be expected with entrepreneurial firms developing new technical innovations, the firms in our study continuously identified new information about their technology, market, financing, or industry. When a team encountered new information that aligned with or confirmed their expectations, the firm continued with its activities unaffected. When new information stimulated decision-makers to question their current strategy, they were prompted to engage in strategic decision-making. In these moments, decision-makers considered strategy change. Triggers that prompted strategy questions varied in the favorability of the potential impact on the firm, as seen in Table 3. Some firms experienced more triggers than others, but because they were working on different technologies, we cannot draw conclusions from these differences. A trigger's content could refer to a firm's technology, such as when Joule's prototype literally exploded on the lab bench and prompted the team to question whether they should continue developing that product. A trigger's content could also refer to a firm's target market, such as when Ergon was invited by a potential partner to begin sales in a new country, prompting Ergon's CEO to question whether they should expand internationally. A trigger's content most commonly related to financial needs or potential funding sources, such as when Ohm's low bank balance prompted the board to question whether the firm should take on venture debt. Triggers could also stem from organizational activities such as when a miscommunication within Gauss' leadership triggered a question about quarterly and annual personnel and firm target metrics. Finally, new supply chain information could also trigger strategic decisions such as when Coulomb's conversations with potential investors from across their industry prompted the team to question where in the industry's value chain Coulomb should position itself.

From the perspective of our informants, the information presented by a trigger could pose either a problem or an opportunity for the firm's current strategy. A problem trigger introduced information that posed an unfavorable potential impact on the firm, with the possibility to decrease the firm's value or resources or to increase the likelihood of failure. For example, an

TABLE 3 Strategic decision-making triggers by firm

Type of trigger	Coulomb	Ergon	Farad	Gauss	Hartree	Joule	Ohm	Total
<i>Content</i>								
Technology								
Market		1		3		11	8	23
Financing	2		3	5	1	6	3	17
Supply chain	4		3	5	4	5	6	30
Organizational activities	1		4	2		3	5	7
				3	2			16
<i>Favorability</i>								
Problem	1		3	2	8	1	10	17
Opportunity	5		9	1	10	6	15	51
<i>Total triggers</i>	6		12	3	18	7	25	93

industrial engineer talking with Joule's R&D team at a conference booth educated the team about how their target market makes purchase decisions based on one performance indicator: the indicator that Joule's product lagged by a factor of 1,000. As the engineer walked away, Joule's R&D team asked themselves a new strategy question the team had not previously considered: Could Joule still serve this industry customer given their underperformance on this valued dimension? An opportunity trigger introduced information with the potential for a favorable impact that could increase the value of the firm, its product, or its chances of success. For example, when Ergon's CEO discovered that, once installed, their product would always be connected to the internet, he realized that Ergon could collect "big data" about their customer and monetize it, but only if they developed their own software. Ergon's CEO then began questioning whether to develop this software or rely on their manufacturing partner's pre-existing software tools, as originally planned. All firms experienced both problems and opportunities that prompted decision-makers to question their strategies and engage in decision-making that considered strategic change, as seen in Table 4. While all firms experienced both types of triggers, not all firms chose to change their strategies after encountering a trigger.

4.2 | When do firms choose strategic change?

By examining the set of 93 strategic decisions at risk for change, we were able to determine when firms considered strategic change and when firms chose to either select or reject strategic change. While some firms considered strategic change in as few as three decisions (Farad), other firms considered strategic change as many as 25 times (Joule)—often working on multiple decisions simultaneously without knowing how all decisions in play would be resolved. While firms considered strategic change as an option in each of the 93 decisions examined, predominantly decision-makers chose not to change their strategies, as seen in Table 5. In 72 decisions, where decision-makers considered change, they chose to maintain their strategies and rejected the option to make a strategic change despite the new information the trigger presented. In only 21 decisions, after firms experienced a trigger that conflicted with or altered their beliefs, did

TABLE 4 Problem and opportunity triggers prompt strategy questions

Firms	Problem	Strategy question	Opportunity	Strategy question
Coulomb	"I got to detailed diligence with a group of investors that all looked very good. Then finally the final word came down from everyone and they said, 'we love what you're doing, but you're too far from revenue.'"	<i>If equity investors won't invest in us until the product is fully developed, how are we going to pay for product development?</i>	"There are a number of scale-up financing opportunities in the EU. Also, Germany and Sweden have specific opportunities. Germany is chasing us right now. They're very eager to help us open up an office over there."	<i>Do we open an office in Germany?</i>
Ergon	"All the [US] angels that had interest in cleantech were ganged up already... they said, 'we don't want to invest in two companies in the [same industry].'"	<i>Where should we look for our initial funding if angel funding is not available?</i>	"We just had a big decision today whether we want to open an office in Houston. We're being sort of courted by the state of New York, who really wants us to open with New York as our headquarters."	<i>Do we stay with our original strategy to open an office in Houston or do we open an office in New York?</i>
Farad	"There's plenty of money available from commercial [firms] for demo projects. There is a lot of money—But not in cleantech."	<i>How do we fund the construction of our pilot demonstration in cleantech?</i>	"We ended up in the middle of the buffalos with the buffalo stampeding right around the car... the person standing next to me was the president of the [university]... and the next thing you know I've got a meeting with his staff about one of the industrial applications."	<i>Do we open an office in a new state to get access to this particular regional and university funding?</i>
Gauss	"We were on the verge of going out to [customers] to look at some sites that we could deploy at. The [product] isn't even running yet...I believe him when he says, 'I think it should run.' It doesn't run."	<i>Do we continue to use our novel technology or should we use a similar off-the-shelf product?</i>	"We discovered up there that there's a surprising market... the challenge is that the Board of Directors does not want us to go on a tangent. That would be a distraction."	<i>How can we tap into this market without spending a lot of resources on market development?</i>

(Continues)

TABLE 4 (Continued)

Firms	Problem	Strategy question	Opportunity	Strategy question
Hartree	“We’re ultimately going to need a lot of money to do this...the commercialization process will take X number of months once we get private funding”	<i>After funding our technology R&D through grants, where can we get private funds to develop a commercial product?</i>	“I got a call from some guy out of the blue. He said, ‘hey, we’d like to get to know you.’ I immediately started Googling who the heck they were, because I didn’t know them, and realized that they were a really big company.”	<i>How can we get value from a relationship with this mature firm when their interests are not fully aligned with what we are actually working on?</i>
Joule	“The day before it was time to go [to the industry tradeshow], I tried to pack [the prototype] into its suitcase and I could not get it in the suitcase.”	<i>Do we redesign the product so that it fits the desired size requirements or should we scrap it and start over?</i>	“[A demo for the founder of our target customer] ended with him saying, ‘Here’s my card. Seriously email me. I believe that it may be in the best interest of [us], and of course you guys, if we put [your product] in [ours].’”	<i>How do we turn this enthusiasm for our new technology into a contract for products that fit their timeline and requirements?</i>
Ohm	“A number of folks [in the industry] were like: ‘Yeah, this a problem, but it is going to be a really hard market for you guys to break into, and there is a lot of well-funded companies that are quite a bit ahead of you.’”	<i>If the market is crowded, do we keep targeting this product for our first market or pick another product?</i>	“Now that people are seeing the news and reading the articles and stuff, we’re getting a lot of inbound requests [for other applications of the technology]... ‘can you guys do that?’ We’re getting a lot of inbounds in other areas.”	<i>What should our next market be and when should we begin product and market development for it?</i>

they choose a strategic change. Because strategic change was actively considered in these decision-making processes, we can rule out the likelihood that decision-makers were not aware of the possibility of strategic change. Thus, firms that rejected strategic change did not do so because of a failure to identify or perceive other strategy options.

4.2.1 | Rejecting strategic change

Even when confronting new information triggers that stimulated questions about their firm's strategy, most of the time decision-makers at all seven firms chose not to change their strategies

TABLE 5 Strategic decisions at risk for change

		No strategic change	Strategic change	
		<i>Farad strategy question:</i> Should we build a prototype for marketing to investors?	<i>Ohm strategy question:</i> Should we add a new product to enter a new market?	
		<i>No change decision:</i> "We did think about building what I would call a 'toy'. I could be wrong about a ton of things. I just think that [building a prototype] would have been a waste of money."	<i>Change decision:</i> "We sit down probably the same day with everyone and say 'we could probably do this [new market] thing... we could build a [technologically better] version'...so, we went after it"	
Firms		—John Ash, Farad Co-founder	—Al Marcone, Ohm CTO	Total
<i>No pivot</i>	Coulomb	5	1	6
	Ergon	12		12
	Farad	2	1	3
	Hartree	5	2	7
<i>Pivot</i>	Gauss	11	7	18
	Joule	19	6	25
	Ohm	18	4	22
Total		72	21	93

(72/93). We considered firms to have rejected strategic change when they made no or only very small adjustments to their strategies after considering change. Firms rejected changing their strategies when considering both problems and opportunities. For example, as Ohm transitioned between developing design prototypes and developing a manufacturable product for their first B2B customer, the R&D team identified a technology problem: Their current design could not meet their customer's newly revised size requirements. Ohm questioned whether to change their market strategy and launch first elsewhere, but then rejected that option, instead opting to develop a solution that fit the customer's size requirements and continued with the market launch they believed to be optimal.

In some cases, when firms chose to reject strategic change, they accepted the potential negative impact the problem trigger presented. Ergon faced a supply chain problem when they learned that Henry, their U.S. manufacturing and distribution partner, had not begun the integration work necessary to sell their product. CEO Tad David questioned whether to wait, find a different partner, or build manufacturing and distribution capability internally. Waiting could mean months without sales or progress. While an alternative partner might reach the market sooner, no competitor had Henry's technological or market knowledge and reputation, and Ergon's current team had no manufacturing and distribution capabilities. David continued to believe that partnerships provided speed and savings, and decided that waiting for Henry was the best choice regardless of the delay this posed for Ergon. As David stated:

We always tell ourselves we have the option to transition in-house down the road if we want to. We still say that to ourselves. I'd be hard-stretched to imagine a situation where we'd want to do that. You would only want to bring in-house something where you have a differentiating core competency. If a subcontractor can do it

anyway then what's the point of me replicating that in-house? What strategic advantage does that give me?

While Ergon's team considered strategic change, they continued to believe that partnering with Henry was optimal, even if it meant temporarily shutting their doors. After making this decision, Ergon's management team identified how long they could wait before having to "hunker down, send all our employees home, or half of them home, and just preserve our cash." Luckily, Henry stepped up within a few months and Ergon was back on track.

While in some cases firms whole-heartedly declined opportunities, in other cases firms found ways to use an opportunity to reinforce their current strategy without making strategic change. These firms addressed the question posed by the trigger, but maintained their prior beliefs and used the opportunity to improve the potential of the existing strategy. In 2014, a government agency announced a multi-million dollar grant tailored to Coulomb's product, but the grant required applicants to submit proposals with several partners collaborating across the value chain. CEO Jim Allen questioned whether funding the firm through grant money was worth bringing other firms onto a development project that could give those firms partial ownership of Coulomb's unique intellectual property, or worse the chance to steal it. The Coulomb team believed that they would eventually need to work with other firms across the value chain; however, they also believed that they needed to secure their intellectual property to retain the firm's value to potential investors. CEO Allen maintained both of these beliefs throughout his decision-making process and ultimately arrived at a solution that rejected strategic change. Instead of submitting a grant proposal for technology development involving several partners, Allen proposed a "paper study" that would collate technical requirements across the value chain and detail the costs and savings to each firm:

This [grant] project is the detailed design of the [whole] operation—the reason we pulled in a bunch of partners. Right now, it's a technical economic exercise for everybody, but at the end of the day, we want everyone to have written down their scope and the price they want to do it for, and have everyone else agree: "That sounds good, we can do that."

With this solution, Allen decided against a change that would involve sharing intellectual property development and instead used the grant to collect detailed information and market Coulomb's new manufacturing process to potential customers and suppliers. By rescoping their grant proposal, Allen reinforced Coulomb's existing strategy, maintaining control over their intellectual property while acquiring partners and gaining more information in the process. At these firms, decision-makers did not reject strategic change because of cognitive bias or lack of awareness of the potential for strategic change. Rather, they actively engaged with the problems and opportunities at hand, considered the impact on their planned strategy, and deliberately chose not to change their strategies.

4.2.2 | Choosing strategic change

Six out of seven firms chose strategic change in 21 of the 93 strategic decisions where strategic change was considered. In these cases, when decision-makers found that new information conflicted with or expanded the beliefs they held about their firms, their technologies, or their

strategies, they opted to change some element of the firm's strategy. For example, in 2012, Ohm added a new product to their strategy after identifying an opportunity trigger: An internal development project revealed the potential for a new product not previously considered. When they founded the firm, Ohm's engineering team believed that their technology could only be commercially manufactured as a microchip as it required a very small form factor. After CTO Al Marcone grew concerned that their microchip product would not be ready for customer and funder demonstrations by the deadline needed to support a new funding round, he built a non-microchip prototype from "discretes."² Ohm's engineers previously did not think this was possible as microchips are typically orders of magnitude smaller and faster than discretes. CEO Cam Fahey described how the new prototype built from discretes triggered the team to question whether to change their strategy and develop a second commercial product based on discretes rather than a microchip design:

Al said, "I think we might be able to take it to production in discretes." The only reason he was able to be pretty confident about that is because we had built something in discretes in the form factor. We are trying to squeeze everything into the little tiny space. Prior to having this [working prototype], there were people on the team who thought it was impossible to make it out of discretes in the form factor.

When the team saw Marcone's discretes prototype in action, they realized a discretes product could be manufactured quicker than the microchip product with the same features and size, although at a higher cost. The strategy question they wrestled with was: Should they split their small engineering team and limited resources in two to develop two products simultaneously?

Before the CTO built the discretes prototype, the Ohm team had believed that: "our microchip technology is going to change the world." While decision-makers wrestled with whether to change Ohm's strategy by adding a second product using the discretes design, the team expanded their belief about their core technology, shifting their language from "our microchip technology" to "our core technology." This new language demonstrated a broader understanding of the firm's core value proposition, which did not depend on a microchip design, and thus gave the team the freedom to explore an additional, niche market for a discretes product. With this expansion in their beliefs, Ohm's decision-makers opted to change the firm's strategy by adding a second development program before completing their original microchip product.

As these examples illustrate, the entrepreneurial firms in our study that chose strategic change did not do so to renew a formerly successful strategy or as a means to respond to competitive pressures from others. Rather, they chose to change their strategies after new information conflicted with or expanded the beliefs they held about their firms, their technologies, or their strategies.

4.3 | How do firms change their strategies?

The six firms that did choose to change their strategies chose to either exit or add a new element to their firm's strategy rather than make a complete strategic reorientation, as seen in Table 6.

²Electronic circuits can be built either by connecting a set of discrete electronic components (also referred to as "discretes") on a circuit board or by integrating a set of tiny transistors into a microchip. Microchips must be printed by a semiconductor fabrication plant and require several months to produce. While many electronic circuits can be produced in either form, some behave differently when produced as a microchip or discrete components.

TABLE 6 Types of strategic change decisions

	Strategic exit	Strategic addition	
Firms	<i>Joule strategy question:</i> Do we redesign the product so that it fits the desired size requirements or should we scrap it and start over? <i>Strategic exit decision:</i> “This thing is dead. Let’s re-strategize when you get back. We’re going to need to do something completely different.”		<i>Hartree strategy question:</i> Should we acquire one of the four firms that have asked us to acquire them? <i>Strategic add decision:</i> “The integration of the technology of both companies will take place over the next 12 months and result in a [product] with outstanding performance to meet exacting standards.”
<i>No pivot</i>	Coulomb	1	1
	Ergon	0	
	Farad	1	1
	Hartree	2	2
<i>Pivot</i>	Gauss	1	6
	Joule	2	4
	Ohm	2	2
<i>Total</i>		5	16
			Total
			21

The type of strategic change firms chose depended on the favorability of the new information that triggered decision-making. Strategic exits were triggered only by problems while strategic additions were triggered only by opportunities. In 5 out of 21 cases, after decision-makers found their beliefs to be in conflict with a problem trigger, they chose to make a strategic exit, exiting one key element of their current strategy. In 16 out of 21 cases of strategic change, decision-makers embraced an opportunity trigger, expanding their beliefs and the language they used to describe their firm, technology, or strategy, and chose to add an element to the current strategy.

4.3.1 | Strategic exits

Firms chose a strategic exit only after confronting a problem that conflicted with the beliefs underpinning their current strategy. For example, the Joule team’s belief that their “portable” product was ready for initial sales was contradicted by the harsh truth that they could not fit it into the CEO’s suitcase for the annual industry conference. In our sample of seven firms, three firms chose a strategic exit: Gauss, Joule, and Ohm, with Joule and Ohm each making two exits. In these five cases, decision-makers accepted that the new information presented by a problem trigger conflicted with their beliefs about their current strategy and opted to make a strategic exit by discontinuing the product involved—even when they did not know what would replace that product. In four of the five instances where firms chose a strategic exit, they went several weeks or months without a defined replacement product, leaving a significant gap in their strategies.

After accepting that a problem conflicted with their beliefs, Joule, Gauss, and Ohm each chose to discontinue their only products. The Gauss team believed that their technology would

create the most financial and environmental value if it was sold as a new part integrated into a system already on the market. After the head of business development at the market leader for those systems told Gauss CEO Gail “we just don’t care about [that product],” Gail absorbed this new information as conflicting with that belief. Gail questioned whether Gauss could continue with this product and subsequently decided to discontinue their only product without knowing what would replace it.

Joule’s co-founders believed that with 3D printing, they could produce very low cost, “game-changing” products with a short production cycle. In the spring of 2014, they impressed their dream customer who placed an order for 500 units to be delivered by October. Seven months later, however, the team and Joule engineer Sean Aalto realized that they would not be able to deliver on time and meet the expectations of their dream customer:

Everything was so tight to the point where if we don’t talk to a manufacturer this week we’re not going to make it. We went on for about two weeks just by the skin of somehow managing to do all the things that are absolutely necessary just in time where we still had maybe a little bit of belief that it could be done. All of a sudden, we didn’t.

The news that manufacturing costs were rising and delivery would not be on time conflicted with Joule’s belief that their development process was low cost and fast. Joule’s customer had a specific annual product cycle, and October was the only delivery option until the following year. The team began to question whether they could deliver the product this year, and if not, could they survive until next year to deliver it then? In late August, CEO Oscar Mata let their dream customers know they would not be able to deliver the order. Knowing that they could not sustain the firm financially if Joule had no other customers until the following October, Mata and his team decided to discontinue their only product and, as Mata described it, take a break:

What we decided to do was to take a 1-week content break, or a product break, and focus purely on operational structure and process. We reorganized our office space. We reorganized our prototype space. We redid the file management system. We redid the management structure and moved over to an Agile Scrum system... It was cathartic.

After their break, Mata went back to networking with investors and potential customers across several different markets to do more thorough customer research and select a new product market that could fill the gap in their strategy. In each case when firms chose a strategic exit, they made that choice without knowing what would fill the hole in their strategy.

Ohm also encountered problems that conflicted with their beliefs, and, in one case, was lucky to have a second product in place when they chose a strategic exit and discontinued their primary product. In 2013, Ohm had two products: (a) a microchip component to be sold as a mass-market product and (b) a non-microchip product to be sold in a niche market. Three years after its founding, Ohm still did not know how much R&D time would be required to develop a manufacturable microchip design for the mass market and the management team demanded a revised development schedule from the engineers. When the engineers estimated that the microchip design would take another 2 years to produce, Ohm’s CEO and CTO began to question whether they should even continue developing this product for the mass market. Ohm had believed that a high visibility, mass-market product introduction would make the

firm synonymous with the new technology before another firm could introduce a comparable product and they had built their fundraising pitch around that narrative. Launching their niche product first conflicted with their belief that a mass-market product was the best way to introduce their new technology to the world. CTO Marcone described how they chose a strategic exit:

I came to the conclusion that it didn't make sense to continue to invest in this other [the mass market microchip] project unless it could be proven to some reasonable degree that there was a chance to make it work on a reasonable timeline. I didn't think that was going to happen. I also didn't see what else we could do...I don't remember exactly if I walked straight from [the timeline meeting] to [the CEO]. But in a very short period of time, yes, we started talking about it: "Look, this is crazy. Here's what they [engineers] are telling me. It obviously doesn't make sense." She said, "Yes, it doesn't make sense. We already missed the market. We can't miss it by two more years."

Facing a two-year delay, Marcone accepted that the microchip product would not be the high-visibility, mass-market product Ohm believed would best attract investors. Either Ohm introduced their technology to the world with their non-microchip niche-market product or they would run out of money before they could launch their mass-market microchip product. Ohm decided to discontinue its microchip product even though this choice erased the high-visibility product story that the firm had used to acquire their funding thus far. After this decision, Ohm still had one niche-market product to launch, but now faced a significant gap in their strategy: They would need to create a new narrative before their next funding round.

After decision-makers at these three firms encountered problems that conflicted with their beliefs, they chose a strategic exit. Unlike the "trimming" of strategy elements done at mature firms like Vanguard (Siggelkow, 2002), when entrepreneurial firms in our study made a strategic exit, this decision left a gap in their strategies with no backup or alternative strategy to fill this gap. In other words, having a strategy gap did not in itself trigger a subsequent strategic decision. When strategic exits happened, the entrepreneurial teams in our study continued to work on fundraising, technology, and market development until they acquired new information in the form of an opportunity that triggered a new strategy question.

4.3.2 | Strategic additions

Six firms chose to make a strategic addition after facing an unanticipated opportunity trigger, either adopting a new value proposition for their technology or adding new activities for the firm. When they chose a strategic addition, firm decision-makers' beliefs expanded, as evidenced by changes in their language, and they added to their firms' strategies in ways that fit with this new language. For example, when Farad realized they could affordably get contract consulting from not only the co-founder who had recently taken a day job but also from other engineers at his new firm, CEO Dale Marek shifted from talking about maintaining their "A player" engineers to "us being able to use [A player engineers]" who work elsewhere. The change in Marek's language revealed a change in his beliefs about how Farad would tap into the best human capital. Marek decided to expand Farad's strategy to include partner alliances rather than rely solely on internal engineering staff.

Five firms discovered new value propositions for their technologies either through continued technology development or through interactions with customers or partners. In the course of developing their technology, the firms identified new use cases and target markets beyond what the founders had originally known about their technology and its potential applications. As they executed on their strategies, potential partners, investors, suppliers, and other stakeholders engaged with these firms, introducing new ideas to expand the usage of their technology. On a long drive between customer sites, one potential customer introduced Gauss to a new use for their technology. As they chatted in the truck, this customer mentioned how a weather pattern brought the entire industry to a standstill for several days that year. Gauss's consultant, David Baker, described how this casual conversation uncovered an unmet market need that provided Gauss with a new value proposition:

“How long did the [stoppage] last?” He said, “A good eight or ten days.” I said, “What do you do?” He said, “They had these [special products].”... I said, “Okay. Are there that many [of them] out here?” He said, “No. There’s a shortage of them.” [CEO Gail] says... “Well, not anymore.”

This customer revealed that there was a significant, motivated market for a product that could address this shortage with a high willingness to pay. Gauss's engineering team considered this customer's story alongside the knowledge that two-thirds of the design of their current product could be applied to solve this problem. After this conversation in the truck, the Gauss team expanded their beliefs about their product. Whereas before they spoke about a single product, after this conversation they referred to their existing product as a platform of three “modules” that could be reconfigured into multiple products to address different customer needs. With this expanded belief, Gauss' decision-makers questioned whether they should take the first two modules of their three-module platform and create a new product for this new market. Having expanded their beliefs about the product, Gail and his team chose a strategic addition, adding a second product to the firm's product portfolio.

Opportunities did not only trigger product changes. In four cases, firms opted to add new elements to their organizational structure. Quite unexpectedly, four firms approached Hartree's CEO Norman Beck and asked to be acquired. Beck had not planned to be “an uncapitalized company thinking about acquiring other companies that are sometimes many times our size.” Beck questioned whether any of these acquisition opportunities could add value to Hartree. Since its founding, Beck had described Hartree's strategy in terms of three products: one near-, one mid-, and one long-term. Beck believed the firm “need[ed] three legs to every stool in order to maintain [revenue] stability” and described the firm's growth through the timeline of its products as the three legs of their strategy. As he considered what acquiring another firm could add to Hartree's three stool legs, Beck began to expand his beliefs and shifted his language to be about near- and long-term business: “What we have is the promise of long-term revenues and this big upside. What a lot of these companies don't have is that. A lot of these companies have this on-going, near-term business.” During decision-making, Beck shifted from talking about products to talking about business, as his beliefs expanded from viewing the firm as a portfolio of products along a timeline to viewing the firm as a business concerned with managing revenue over time. With this broader perspective, Beck could now see value in what could be gained from an acquisition: Current business assets such as direct customer knowledge, industry relationships, and financial inputs that Hartree did not yet have. With this change in beliefs and language, Beck decided to make a strategic addition and acquire one of the four firms.

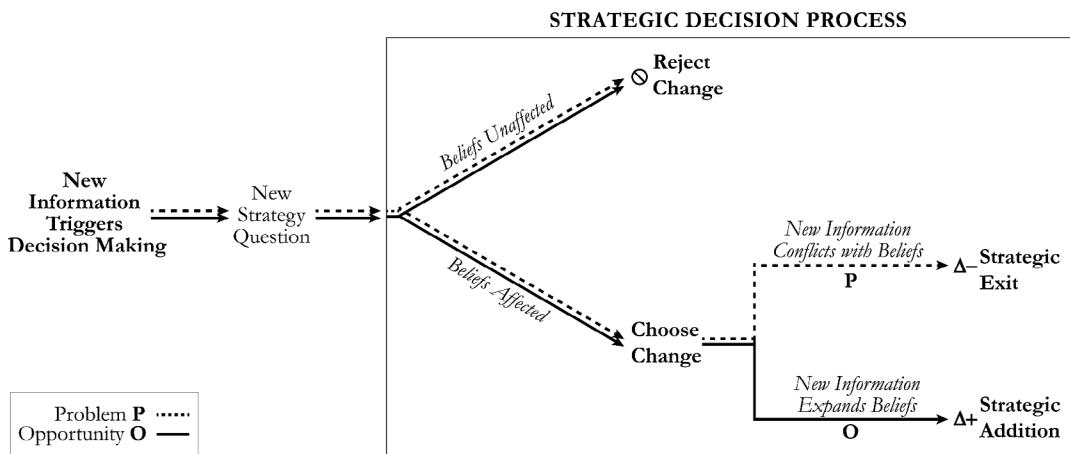


FIGURE 1 Explaining when firms choose strategic change

Figure 1 shows how new information triggers strategic decision-making by prompting a strategy question that raised the potential for strategic change. When decision-makers' beliefs were unaffected by a trigger, they rejected the option to change their strategies. Decision-makers only chose to change their strategies after the beliefs underlying that strategy were affected by new information. Decision-makers affected by a problem trigger accepted that the new information conflicted with their beliefs and chose a strategic exit without identifying a replacement strategy. When decision-makers' beliefs were affected by an unanticipated opportunity, they expanded their beliefs and made a strategic addition, adding a new element to their strategy.

In sum, we found that the type of strategic change selected depended on the relationship between the favorability of the new information that triggered decision-making and the decision-makers' beliefs about their firm's strategy. But not all strategic changes produced a pivot. By analyzing each firm's pattern of decision-making over time, we assessed how and when decisions about strategic change accumulated into a pivot and reoriented the firms' strategy.

5 | WHEN DOES STRATEGIC CHANGE BECOME A PIVOT?

When entrepreneurial firms chose to change their strategies, they changed only one element in their strategies at a time, but this occurred within the context of multiple, independently triggered decisions. They did not, in one decision, opt for a complete strategic reorientation through the reallocation or restructuring of activities, resources, and attention. Firm strategies evolved as decision-makers made strategy exits and additions after new information acquired during the process of developing new innovations triggered strategic decision-making. When firms chose to make a strategic exit, they left a significant gap in their strategies, which was left unaddressed until decision-makers confronted a new opportunity and opted to make a strategic addition that could address this strategy gap. When firms chose to make a strategic addition, they did not inherently redefine the direction of the firm with one decision. Firms that pivoted did so through the gradual accumulation of multiple strategic decisions over time, adding and exiting elements to their strategy, rather than reorienting the firm's strategy with one decision.

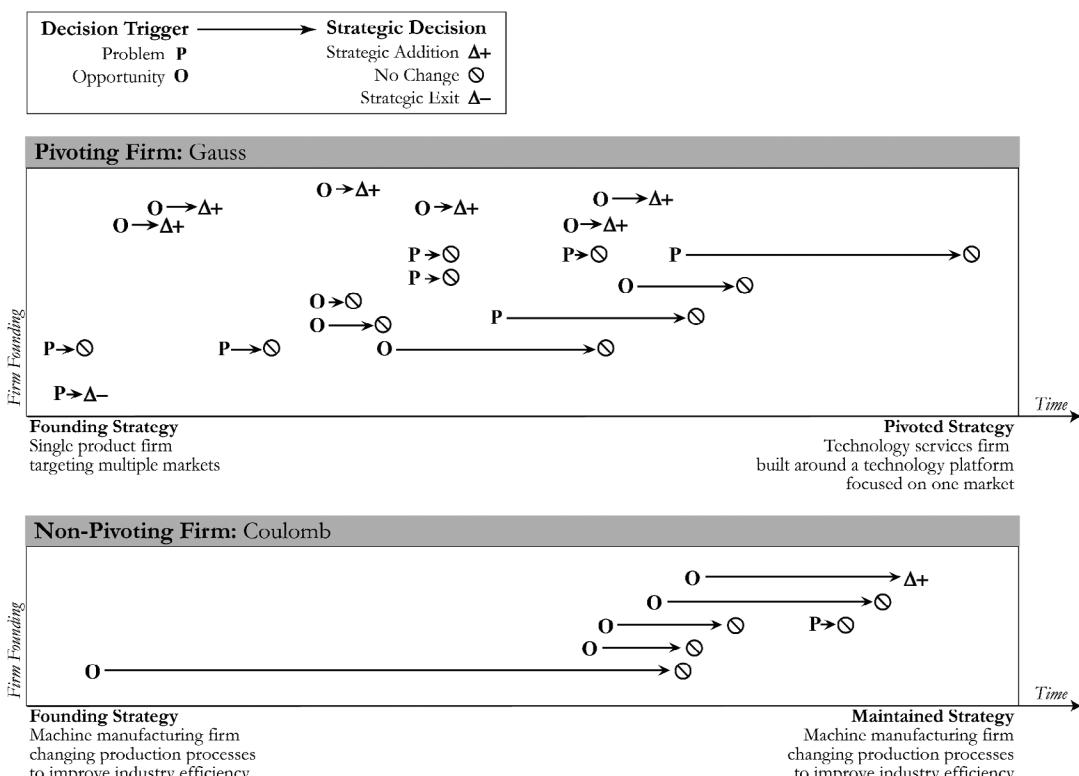


FIGURE 2 Explaining how pivots emerge through an accumulative stream of strategic decisions

While six of the seven firms in our study chose to make at least one strategic change, only three firms (Gauss, Ohm, and Joule) pivoted and relocated resources to change the strategic direction of the firm. In our sample, all firms who pivoted made both strategic exits and additions, while non-pivoting firms only made additions. Figure 2 compares the stream of decisions in two firms, one that pivoted (Gauss) and one that did not (Coulomb), to show how strategic decisions accumulated over time.

Coulomb faced five opportunities and one problem that, cumulatively, triggered six decisions at risk for strategic change during the firm's first six years. Although they made one strategic addition (to add a steppingstone product), the firm never pivoted. When Coulomb was founded, they were a manufacturing company developing a machine that would enact a new production process to improve efficiency in power generation and storage. Six years later, that still held true after considering and rejecting strategic change five times. After several years of deliberation about their position in their value chain, Coulomb did not change their beliefs about how value could be captured in their industry and opted not to change their product strategy or position in the value chain. Coulomb also opted not to open a second office in Europe to take advantage of EU-based funding opportunities but persisted in their grant-based funding. They continued to believe that equity investors would not fund their product development and strategically scoped grant proposals to maintain complete ownership of their intellectual property, which they believed to be their most important asset.

Coulomb did make one strategic addition, to add the above-mentioned steppingstone product, but, in doing so, did not redirect the firm or its resources to produce a pivot. When a

potential customer stated interest in a version of the product that could be dropped into the customer's current operations without the system-wide changes of Coulomb's full innovation, CEO Jim Allen was prompted to question whether to change Coulomb's product strategy and consider two versions of the product rather than one. While considering the question, Allen's beliefs about the role of customers in the development process expanded, and he chose to make a strategic addition. Coulomb would create a drop-in version of their product as a stepping stone product, which could earn revenue as they gained customer feedback and provided technical data that would inform further product development. While this strategic addition broadened Coulomb's strategy from a single product to a product portfolio, it did not change the firm's strategic direction. Instead, it reinforced their strategy in several ways. First, it helped customers gain trust with their technology without investing in large-scale system change. Second, it helped Coulomb gain customer feedback earlier in their development process. Third, Coulomb could now earn revenue earlier to help fund further technical development without seeking new funding sources. Thus, the steppingstone product reinforced Coulomb's existing strategy. Firms like Coulomb made choices to change their strategies, but those decisions reinforced their existing strategy rather than reorienting or pivoting it.

In contrast, Gauss did pivot and reorient their strategy through an accumulation of 18 strategic decisions, including one strategic exit and six strategic additions, as depicted in Figure 2. Early on, Gauss discontinued their only product after learning that their ideal first customer had no willingness to pay for Gauss's product. This strategic exit temporarily eliminated activities related to product development and the firm spent the next six months with a strategic gap and no defined product. During that time, the team continued developing its technology by acquiring funding and engaging in market research activities. Eventually, in a conversation with another entrepreneur, Gauss's CEO learned about the maintenance and energy needs of a market they had not previously considered, prompting a strategy question that resulted in a strategic addition: a product that would improve their customers' overall operational efficiency instead of just the efficiency of the product itself. While this new product altered some of Gauss's activities, a greater shift came two decisions later when a conversation on a drive between customer sites triggered a separate decision to consider strategic change. This time, Gauss expanded their beliefs about their product from a single product to a platform enabling multiple technology solutions and decided to add a second product to what they now envisioned as an expandable portfolio of services for one target market.

After seven strategic change decisions that produced one strategic exit and six additions, Gauss had pivoted from a firm with one product that they planned to introduce across multiple markets into a technology services platform focused on a single market. In the firm's first blog post in 2013, they described themselves as a product firm building a "mass market" technology product with instructions "analogous to the ones found among IKEA furniture... A product that is good enough for most and great for those who really need what we want to make." After their accumulated stream of strategic decisions, their February 2015 post described how the firm provided a "solution built around [their core] technology." Since the technology was unusual to their target market they would now "offer training and certification programs that teach you how to integrate [it] in a variety of [one market's] products." Over three years and 18 strategy decisions, they had pivoted from a single product firm to one that offered services based upon a portfolio of products that rested upon a common platform. With this series of decisions, they changed their strategy, activities, resources, and attention.

With analysis at both the decision level and the cumulative stream of decisions made, we show that a pivot was not produced with a single decision to change the firm from one strategy to another, but rather the product of multiple independently triggered decisions that unfold over time. A firm pivots by exiting and adding elements to a strategy one at a time, eventually producing a cumulative reallocation or restructuring of activities, resources, and attention. Our informants used the term only to refer to a strategy transition in retrospect. This suggests that, for the entrepreneurial firms we studied, a pivot was not a single decision to change strategic orientation, but rather a way to make sense of the difference between two phases in the evolution of the firm's strategy.

6 | DISCUSSION

Entrepreneurial firms developing novel technology innovations are often praised for having pivoted their strategies, but the term pivot is inconsistently defined and the practice is not well understood. This may be because while there is a nascent scholarly literature examining the antecedents to and communication of strategic change in entrepreneurial firms (e.g., Grimes, 2018; Hampel et al., 2019; McDonald & Gao, 2019), most research on strategic change has focused on established firms (Agarwal & Helfat, 2009; Rajagopalan & Spreitzer, 1997). The choice to make a strategic change is theorized to result from perception of a performance gap (Cyert & March, 1963; Levitt & March, 1988), but there are limitations in applying this explanation to early-stage entrepreneurial firms whose context is defined by uncertainty (Folta, 2007). This is true for several reasons. First, easily comparable discrete performance data is not always available or easily discernible for any firm (Joseph & Gaba, 2015) and second, early-stage entrepreneurial firms have yet to produce a trajectory of performance data to allow such comparison (Cohen et al., 2019). Third, extant explanations of strategic change are often reactive, focusing on why firms do or do not change in response to the innovations of others (Christensen, 1997; Henderson, 1993; Tripsas & Gavetti, 2000), without understanding how decisions about strategic change emerge from the information produced by a firm's own innovation process. Without understanding how entrepreneurs receive and act on new information as they innovate, we cannot explain how strategies evolve at this early stage.

Through a longitudinal field study of seven early-stage energy and cleantech hardware firms developing technology innovations, we examined the conditions that led entrepreneurs to select strategic change when confronting 93 strategic decisions at risk for change. In doing so, we explain when and how entrepreneurial firms pivot their strategies. All but one firm made strategic changes, but these changes did not necessarily produce a pivot or reorientation of the firm's strategy. This understanding is more consistent with emergent rather than planned views of strategy (Mintzberg & Waters, 1985). Building on the scholarly literature on strategic change (Agarwal & Helfat, 2009; Gioia et al., 1994; Rajagopalan & Spreitzer, 1997; van de Ven & Poole, 1995), we offer a definition of a pivot as a change in a firm's strategy that reorients the firm's strategic direction through a reallocation or restructuring of activities, resources, and attention. With analysis at both the micro decision level and the meso stream of decisions made over time, we contribute a grounded theoretical understanding of when entrepreneurial firms choose to change their strategies and when these changes produce a pivot, which is important to both the strategic change and entrepreneurship literatures.

6.1 | What is a pivot? How firms make strategic reorientations

The term pivot implies a single choice to spin like a basketball player, keeping one foot planted while changing the direction the firm is facing—as if Stewart Butterfield spun around from an online-video game to Flickr in one swift move. Furthermore, stories of entrepreneurs like Butterfield who are serial, successful pivots imply such actions are the norm for entrepreneurial firms. Yet, in our study, we found that pivots were not accomplished with one sweeping strategic decision or single catalyzing event, but rather through the accumulation of a series of decisions to either exit or add elements to the strategy over time. This history may be forgotten in the tales entrepreneurs tell from the field. Our grounded explanation aligns with prior research on strategic switch-backs or dynamic commercialization strategies (Marx & Hsu, 2015), where entrepreneurs make a series of small changes to reach an intended strategy. We also found that, after considering a strategic change decision, the entrepreneurial firms we studied most often chose not to change. This finding aligns with prior research that shows that entrepreneurs can be passionate to the point of persistence (Cardon, Wincent, Singh, & Drnovsek, 2009), identify strongly with the products they develop (Elsbach & Flynn, 2013) or resist change (Grimes, 2018). The disconnect between the assumption that entrepreneurial firms pivot often, in one sweeping spin, and our findings highlights the need for continued research that bridges practitioner stories with empirical examination of the decision processes at entrepreneurial firms. Future research into strategic change should account for how research methods and data aggregation can obscure the many decisions involved in producing strategic change and reorientation.

Pivoting firms (Gauss, Joule, and Ohm) made both strategic additions and strategic exits; while firms that did not pivot (Coulomb, Farad, and Hartree) made only strategic additions. Future research should examine whether both additions and exits are necessary to produce a pivot. Perhaps the strategic gaps created by exits free resources to pave the way for more substantive strategic reorientation (Helfat & Eisenhardt, 2004). Existing conceptions of strategy or identity (Grimes, 2018) may need to be dismantled to create the slack resources (March, 1994) needed to allow reinvention to occur. As suggested by the quote at the beginning of this article, pivot stories told by entrepreneurs and in the popular press often focus on the strategic exit: Each of the games in Stewart Butterfield's case was a strategic exit. However, given our small sample, we cannot rule out the possibility that a pivot could happen without a strategic exit. For example, at founding, Google earned revenue providing search capabilities to other firms through licenses for online search tools or by installing intranet search hardware at the firm (Levy, 2011). With the introduction of AdWords in 2000, Google made a strategic addition that began their reorientation from selling search products to becoming the advertising giant they are today. Yet the firm continued to license online search tools and did not discontinue their hardware search product line until 2017 (Google, 2019). Further research should examine whether a firm can pivot through an accumulation of strategic additions without the slack resources freed by strategic exits or the deep pockets present at Google.

6.2 | When and how firms choose strategic change

Strategy scholars have examined when, in the face of environmental shifts, firms make or fail to make strategic change and reorient their strategies (Agarwal & Helfat, 2009; Rajagopalan & Spreitzer, 1997). However, this research has been limited by selecting strategic change as the

outcome of interest. In examining only those contexts where not changing is a failure of either enactment or perception of the environment (e.g., Barr et al., 1992; Christensen, 1997), the conditions under which a firm can reasonably reject strategic change are not typically considered. By identifying the triggers to decision-making as well as the decisions where change was considered, we give equal attention to both stasis and change. Examining the collected set of decisions triggered by both problems and opportunities, we find that the entrepreneurial firms we studied rejected more often than they selected strategic change.

This study focused on the decision to make strategic change and did not address whether firms successfully executed on strategic change. There are two perspectives in the literature on whether favorable or unfavorable conditions catalyze successfully executed strategic change. Jackson and Dutton (1988) found that firms were more likely to enact strategic change in response to problems or threats. However, Gilbert (2005) found that while threats were strong catalysts for the decision to make a strategic change, firms needed to transition from a threat to an opportunity mindset to successfully execute on strategic change. In contrast with both of these findings, three-quarters of the decisions choosing strategic change in our study were triggered by opportunities, not by threats. It is possible that the longitudinal nature of our data collection allowed us a vantage to identify opportunities to change not typically observed in prior research designs.

One way to reconcile our findings with Gilbert (2005) is to consider the unit of analysis. Gilbert observed a firm transition from a perceived threat that initiated strategic change to an opportunity mindset as a condition for successfully executing strategic change. Our research suggests an alternative interpretation. What he might have observed was a series of decisions first involving a problem leading to a strategic exit and later followed by an opportunity leading to a strategic addition. Only after the completion of both decisions would Gilbert have observed a successful, firm-level strategic change. While our study focuses on how and when entrepreneurial firms chose to make strategic change, our finding that strategic additions and strategic exits can be decoupled may not be limited to the entrepreneurial context. Future research could examine strategic decision-making at a more granular level at established firms to determine if a series of incremental decisions, when viewed in aggregate, are later reframed as a single decision to make strategic change. For example, Karim, Carroll, and Long (2016) show that firms acquiring new business units chose to postpone restructuring when industry conditions were turbulent. This suggests that the decoupling of strategic addition and exit decisions we observed may not be unique to entrepreneurial firms and that decisions as to whether to add or exit strategy elements may not always coincide in any firm.

The entrepreneurial firms we studied faced significant uncertainty and relied upon beliefs about the firm, the technology, and the market as placeholders for missing or uncertain information. They based their strategies upon those beliefs, without knowing when these beliefs would be updated. With the data available, we cannot determine why some triggers affected decision-makers' beliefs while others did not. One explanation is that entrepreneurs differed in their willingness to update their beliefs when engaging with external stakeholders. All the entrepreneurial firms we studied proactively engaged with customers, suppliers, and partners and, in doing so, discovered new information about their environment and the interdependencies with other firms in their value chain. Adner and Kapoor argue that "innovating firms often depend on the efforts of other innovators in its environment" (Adner & Kapoor, 2010: 306), which was certainly the case in our study. In this regard, some of the firms we studied may have operated with a wide lens (Adner, 2013) and were willing to learn from the problems or opportunities they discovered through casual interactions. Although there is extensive

research on formal alliances (Baum, Calabrese, & Silverman, 2000; Burns, Barney, Angus, & Herrick, 2016; Ozcan & Eisenhardt, 2009; Rindova, Yeow, Martins, & Faraj, 2012; Rothaermel, 2002; Rothaermel & Boeker, 2008), future research might more explicitly consider how informal interactions between entrepreneurs and external stakeholders shape the identification of both problems and opportunities that shape the evolution of entrepreneurial strategy.

An alternative explanation for why some triggers affected decision-makers' beliefs while others did not is that decision-makers varied in their willingness to update their beliefs based on their identity. For example, in a study of entrepreneurs entering the nascent air taxi industry, Zuzul and Tripsas (2020) found that entrepreneurs' commitment to their identity contributed to venture inertia rather than to venture flexibility. Founders whose identities prioritized revolution reacted to new information by reinforcing their commitments, producing inertia rather than strategic change. Founders whose identities prioritized experimentation were open to revising their expectations of their firm and the industry.

As we focused on tracing contemporaneous observable behaviors, we do not have the benefit of hindsight nor history and cannot address the role of cognitive bias in explaining people's willingness to expand or update their beliefs. Gavetti and Rivkin (2007) propose that entrepreneurial firms executing on nascent strategies should be plastic, pliable, and responsive to changes in their environment, as they are not committed to existing activities, routines, and structures. Yet, despite the fact that our sample was pre-sales and thus free from such commitments, not all entrepreneurs in our study demonstrated this plasticity. Future research could examine what triggers are more likely to lead decision-makers to expand their beliefs. We studied entrepreneurs operating without the benefit of a structured program to prompt them to articulate or test their assumptions about their business model or strategy (e.g., Cohen et al., 2019; Grimes, 2018; Leatherbee & Katila, 2018). In settings where entrepreneurs are explicitly mentored to seek feedback from external stakeholders and asked to reevaluate how new information challenges the beliefs or assumptions underlying their strategies, our results might differ.

6.3 | Strategy enactment and opportunities

Identifying and assessing founding business opportunities are core topics within entrepreneurship research (Busenitz et al., 2003; Shane & Venkataraman, 2000; Sorenson, 2018; Sorenson & Stuart, 2008). Entrepreneurial action is initiated when knowledge about a founding opportunity and belief in one's ability to capture it grow in relationship to some willingness to bear uncertainty (McMullen & Shepherd, 2006). However, the literature's attention to the role of opportunities tends to start and stop at firm founding (Shepherd, Williams, & Patzelt, 2015). This conception not only puts an artificially linear structure on the entrepreneurial process, but also ignores the ways in which opportunities identified after founding can shape the evolution of firm strategy. Beyond the founding opportunity, our firms faced an ongoing stream of unanticipated opportunities that triggered consideration of strategic change with the potential to reorient the firm's strategy. Every firm that pivoted in our study made a strategic addition triggered by an unanticipated opportunity not associated with the founding opportunity. However, in order for post-founding opportunities to emerge, firms had to be engaged in executing on their selected strategy. In other words, the doing of strategy was a catalyst for strategy evolution: Only by enacting their strategies and executing on their beliefs about the founding opportunity, could entrepreneurs discover where new problems and opportunities lay. This finding

elaborates on Gavetti and Menon's (2016) proposition that an opportunity is more likely to be spotted when a firm has existing subsystems in place or is "almost there."

The ongoing stream of opportunities entrepreneurial firms encounter differs from the founding opportunity as they occur in a context where the entrepreneur already has a team and an infrastructure in place to take advantage of them (Denrell, Fang, & Winter, 2003; Gavetti & Menon, 2016). Given that, the entrepreneur will not evaluate emerging opportunities with the same calculus for entrepreneurial action as with the founding opportunity, but in relation to the current activities and strategy. Our finding that early-stage entrepreneurial firms are more likely to change in response to opportunities than problems and that accumulation of those changes can result in a strategy pivot highlights the significant role post-founding opportunities can play in the evolution of a firm's strategy. Further research would do well to explore how the ongoing stream of opportunities entrepreneurial firms encounter post founding reveals new alternatives and how these options affect long-term strategy evolution and, ultimately, firm success.

ACKNOWLEDGEMENTS

We thank Mary Tripsas, Fernando Suarez, Rosemarie Ziedonis, Stine Grodal, Rebecca Karp, and the Kauffman Emerging Scholars Conference, CCC, AOM, the SMS Tel-Aviv Special Conference on Startup and Restart Strategies, the Darden and Cambridge Judge Entrepreneurship and Innovation Research Conference, INFORMS/Organization Science Dissertation Proposal Competition, and the Charles River Distinguished Speaker and Doctoral Student Conference for their thoughtful discussion and comments. We gratefully acknowledge the financial support of the Kauffman Foundation, Boston University and research support from Kelley Burke.

ORCID

Jacqueline Kirtley  <https://orcid.org/0000-0002-1855-7398>

REFERENCES

- Ackerman, E. (2016). A brief history of the microwave oven. *IEEE Spectrum* (September 30, 2016). Retrieved from: <https://spectrum.ieee.org/tech-history/space-age/a-brief-history-of-the-microwave-oven>.
- Adner, R. (2013). *The wide lens: What successful innovators see that others miss*. New York: Portfolio Penguin.
- Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, 31 (3), 306–333.
- Agarwal, R., & Helfat, C. E. (2009). Strategic renewal of organizations. *Organization Science*, 20(2), 281–293. <https://doi.org/10.1287/orsc.1090.0423>
- Agarwal, R., Moeen, M., & Shah, S. K. (2017). Athena's birth: Triggers, actors, and actions preceding industry inception. *Strategic Entrepreneurship Journal*, 11(3), 287–305. <https://doi.org/10.1002/sej.1259>
- Andries, P., Debackere, K., & van Looy, B. (2013). Simultaneous experimentation as a learning strategy: Business model development under uncertainty. *Strategic Entrepreneurship Journal*, 7(4), 288–310. <https://doi.org/10.1002/sej.1170>
- Barr, P. S. (1998). Adapting to unfamiliar environmental events: A look at the evolution of interpretation and its role in strategic change. *Organization Science*, 9(6), 644–669. <https://doi.org/10.1287/orsc.9.6.644>
- Barr, P. S., Stimpert, J. L., & Huff, A. S. (1992). Cognitive change, strategic action, and organizational renewal. *Strategic Management Journal*, 13(S1), 15–36. <https://doi.org/10.1002/smj.4250131004>
- Baum, J. A. C., Calabrese, T., & Silverman, B. S. (2000). Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology. *Strategic Management Journal*, 21(3), 267–294.
- Bechky, B. A., & O'Mahony, S. (2016). Leveraging comparative field data for theory generation. In K. D. Elsbach & R. M. Kramer (Eds.), *Handbook of qualitative organizational research: Innovative pathways and methods* (pp. 168–176). New York: Routledge.

- Bettis, R. A., Gambardella, A., Helfat, C., & Mitchell, W. (2015). Qualitative empirical research in strategic management. *Strategic Management Journal*, 36(5), 637–639. <https://doi.org/10.1002/smj.2317>
- Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review*, 91(5), 63–72.
- Boeker, W. (1997). Strategic change: The influence of managerial characteristics and organizational growth. *Academy of Management Journal*, 40(1), 152–170. <https://doi.org/10.2307/257024>
- Bower, J. L., & Christensen, C. M. (1995). Disruptive technologies: Catching the wave. *Harvard Business Review*, 73(1), 43–53.
- Burns, B. L., Barney, J. B., Angus, R. W., & Herrick, H. N. (2016). Enrolling stakeholders under conditions of risk and uncertainty. *Strategic Entrepreneurship Journal*, 10(1), 97–106. <https://doi.org/10.1002/sej.1209>
- Busenitz, L. W., West, G. P., Shepherd, D., Nelson, T., Chandler, G. N., & Zacharakis, A. (2003). Entrepreneurship research in emergence: Past trends and future directions. *Journal of Management*, 29(3), 285–308. https://doi.org/10.1016/s0149-2063_03_00013-8
- Camuffo, A., Cordova, A., Gambardella, A., & Spina, C. (2019). A scientific approach to entrepreneurial decision making: Evidence from a randomized control trial. *Management Science*.
- Cardon, M. S., Wincent, J., Singh, J., & Drnovsek, M. (2009). The nature and experience of entrepreneurial passion. *Academy of Management Review*, 34(3), 511–532. <https://doi.org/10.5465/amr.2009.40633190>
- Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, MA: Harvard Business School Press.
- Christensen, C. M., & Bower, J. L. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal*, 17(3), 197–218. <https://doi.org/10.2307/2486845>
- Cohen, S. L., Bingham, C. B., & Hallen, B. L. (2019). The role of accelerator designs in mitigating bounded rationality in new ventures. *Administrative Science Quarterly*, 64(4), 810–854. <https://doi.org/10.1177/0001839218782131>
- Cui, A. S., Calantone, R. J., & Griffith, D. A. (2011). Strategic change and termination of interfirm partnerships. *Strategic Management Journal*, 32(4), 402–423. <https://doi.org/10.1002/smj.881>
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. *Academy of Management Review*, 9(2), 284–295. <https://doi.org/10.5465/amr.1984.4277657>
- Denrell, J., Fang, C., & Winter, S. G. (2003). The economics of strategic opportunity. *Strategic Management Journal*, 24(10), 977–990. <https://doi.org/10.1002/smj.341>
- Dutton, J. E., & Duncan, R. B. (1987). The creation of momentum for change through the process of strategic issue diagnosis. *Strategic Management Journal*, 8(3), 279–295.
- Dyer, J. H., Gregersen, H. B., & Christensen, C. (2008). Entrepreneur behaviors, opportunity recognition, and the origins of innovative ventures. *Strategic Entrepreneurship Journal*, 2(4), 317–338. <https://doi.org/10.1002/sej.59>
- Eckhardt, J. T., Shane, S., & Delmar, F. (2006). Multistage selection and the financing of new ventures. *Management Science*, 52(2), 220–232. <https://doi.org/10.1287/mnsc.1050.0478>
- Eggers, J. P., & Park, K. F. (2018). Incumbent adaptation to technological change: The past, present, and future of research on heterogeneous incumbent response. *Academy of Management Annals*, 12(1), 357–389.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25–32. <https://doi.org/10.5465/amj.2007.24160888>
- Eisenmann, T., Ries, E., & Dillard, S. (2013). *Hypothesis-driven entrepreneurship: The lean startup*. Brighton, MA: Harvard Business School Publishing.
- Elsbach, K. D., & Flynn, F. J. (2013). Creative collaboration and the self-concept: A study of toy designers. *Journal of Management Studies*, 50(4), 515–544. <https://doi.org/10.1111/joms.12024>
- Fiss, P. C., & Zajac, E. J. (2006). The symbolic management of strategic change: Sense giving via framing and decoupling. *Academy of Management Journal*, 49(6), 1173–1193. <https://doi.org/10.5465/amj.2006.23478255>
- Folta, T. B. (2007). Uncertainty rules the day. *Strategic Entrepreneurship Journal*, 1(1–2), 97–99. <https://doi.org/10.1002/sej.7>
- Furr, N. R., Cavarretta, F., & Garg, S. (2012). Who changes course? The role of domain knowledge and novel framing in making technology changes. *Strategic Entrepreneurship Journal*, 6(3), 236–256. <https://doi.org/10.1002/sej.1137>

- Gans, J. S., Stern, S., & Wu, J. (2019). Foundations of entrepreneurial strategy. *Strategic Management Journal*, 40(5), 736–756. <https://doi.org/10.1002/smj.3010>
- Gavetti, G., & Menon, A. (2016). Evolution cum agency: Toward a model of strategic foresight. *Strategy Science*, 1(3), 207–233. <https://doi.org/10.1287/stsc.2016.0018>
- Gavetti, G., & Rivkin, J. W. (2007). On the origin of strategy: Action and cognition over time. *Organization Science*, 18(3), 420–439.
- Gersick, C. J. G. (1988). Time and transition in work teams: Toward a new model of group development. *The Academy of Management Journal*, 31(1), 9–41.
- Gilbert, C. G. (2005). Unbundling the structure of inertia: Resource versus routine rigidity. *Academy of Management Journal*, 48(5), 741–763. <https://doi.org/10.5465/amj.2005.18803920>
- Gioia, D. A., & Thomas, J. B. (1996). Identity, image, and issue interpretation: Sensemaking during strategic change in academia. *Administrative Science Quarterly*, 41(3), 370–403.
- Gioia, D. A., Thomas, J. B., Clark, S. M., & Chittipeddi, K. (1994). Symbolism and strategic change in academia: The dynamics of sensemaking and influence. *Organization Science*, 5(3), 363–383.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research*. Chicago: Aldine Pub. Co.
- Gompers, P. A. (1995). Optimal investment, monitoring, and the staging of venture capital. *The Journal of Finance*, 50(5), 1461–1489.
- Google. (2019). Google search appliance end of life. *Google Help*. Retrieved from <https://support.google.com/gsa/answer/7528111?hl=en>.
- Grimes, M. G. (2018). The pivot: How founders respond to feedback through idea and identity work. *Academy of Management Journal*, 61(5), 1692–1717. <https://doi.org/10.5465/amj.2015.0823>
- Grodal, S., Gotsopoulos, A., & Suarez, F. F. (2015). The coevolution of technologies and categories during industry emergence. *Academy of Management Review*, 40(3), 423–445. <https://doi.org/10.5465/amr.2013.0359>
- Guo, T. Z. (2014). How does a nascent industry project navigate the regulatory structure? The cape wind project. Boston University Doctoral Working Paper.
- Hampel, C. E., Tracey, P., & Weber, K. (2019). The art of the pivot: How new ventures manage identification relationships with stakeholders as they change direction. *Academy of Management Journal*. <https://doi.org/10.5465/amj.2017.0460>
- Hargadon, A. B., & Douglas, Y. (2001). When innovations meet institutions: Edison and the design of the electric light. *Administrative Science Quarterly*, 46(3), 476–501.
- Hargadon, A. B., & Kenney, M. (2012). Misguided policy? Following venture capital into clean technology. *California Management Review*, 54(2), 118–139. <https://doi.org/10.1525/cmr.2012.54.2.118>
- Helfat, C. E., & Eisenhardt, K. M. (2004). Inter-temporal economies of scope, organizational modularity, and the dynamics of diversification. *Strategic Management Journal*, 25(13), 1217–1232. <https://doi.org/10.1002/smj.427>
- Henderson, R. (1993). Underinvestment and incompetence as responses to radical innovation: Evidence from the photolithographic alignment equipment industry. *RAND Journal of Economics*, 24(2), 248–270.
- Jackson, S. E., & Dutton, J. E. (1988). Discerning threats and opportunities. *Administrative Science Quarterly*, 33(3), 370–387. <https://doi.org/10.2307/2392714>
- Joseph, J., & Gaba, V. (2015). The fog of feedback: Ambiguity and firm responses to multiple aspiration levels. *Strategic Management Journal*, 36(13), 1960–1978. <https://doi.org/10.1002/smj.2333>
- Kaplan, S. (2008a). Cognition, capabilities, and incentives: Assessing firm response to the fiber-optic revolution. *Academy of Management Journal*, 51(4), 672–695. <https://doi.org/10.5465/amj.2008.33665141>
- Kaplan, S. (2008b). Framing contests: Strategy making under uncertainty. *Organization Science*, 19(5), 729–752.
- Kaplan, S., & Orlikowski, W. J. (2013). Temporal work in strategy making. *Organization Science*, 24(4), 965–995. <https://doi.org/10.1287/orsc.1120.0792>
- Karim, S., Carroll, T. N., & Long, C. P. (2016). Delaying change: Examining how industry and managerial turbulence impact structural realignment. *Academy of Management Journal*, 59(3), 791–817. <https://doi.org/10.5465/amj.2012.0409>
- Knight, F. H. (1921). *Risk, uncertainty and profit*. Boston and New York: Houghton Mifflin Company.
- Langley, A. (1999). Strategies for theorizing from process data. *The Academy Management Review*, 24, 691–710.

- Leatherbee, M., & Katila, R. (2018). Stay the course or pivot? Team composition, hypothesis testing, and early-stage business models. Working Paper.
- Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology*, 14, 319–340.
- Levy, S. (2011). *In the plex: How google thinks, works, and shapes our lives*. New York, NY: Simon & Schuster.
- Maggitti, P. G., Smith, K. G., & Katila, R. (2013). The complex search process of invention. *Research Policy*, 42(1), 90–100. <https://doi.org/10.1016/j.respol.2012.04.020>
- Maitlis, S., & Christianson, M. (2014). Sensemaking in organizations: Taking stock and moving forward. *Academy of Management Annals*, 8(1), 57–125. <https://doi.org/10.1080/19416520.2014.873177>
- March, J. G. (1994). *Primer on decision making: How decisions happen*. New York, NY: Free Press.
- Marx, M., & Hsu, D. H. (2015). Strategic switchbacks: Dynamic commercialization strategies for technology entrepreneurs. *Research Policy*, 44(10), 1815–1826. <https://doi.org/10.1016/j.respol.2015.06.016>
- McDonald, R., & Gao, C. (2019). Pivoting isn't enough: Managing strategic reorientation in new ventures. *Organization Science*, 30(6), 1289–1318.
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, 31(1), 132–152.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Mintzberg, H. (1978). Patterns in strategy formation. *Management Science*, 24(9), 934–948.
- Mintzberg, H., Raisinghani, D., & Théorêt, A. (1976). The structure of ‘unstructured’ decision processes. *Administrative Science Quarterly*, 21(2), 246–275.
- Mintzberg, H., & Waters, J. A. (1985). Of strategies, deliberate and emergent. *Strategic Management Journal*, 6 (3), 257–272.
- Mowery, D. C., Nelson, R. R., & Martin, B. R. (2010). Technology policy and global warming: Why new policy models are needed (or why putting new wine in old bottles won’t work). *Research Policy*, 39(8), 1011–1023. <https://doi.org/10.1016/j.respol.2010.05.008>
- Navis, C., & Glynn, M. A. (2010). How new market categories emerge: Temporal dynamics of legitimacy, identity, and entrepreneurship in satellite radio, 1990–2005. *Administrative Science Quarterly*, 55(3), 439–471.
- Ocasio, W. (1997). Towards an attention-based view of the firm. *Strategic Management Journal*, 18, 187–206.
- Ott, T. E., Eisenhardt, K. M., & Bingham, C. B. (2017). Strategy formation in entrepreneurial settings: Past insights and future directions. *Strategic Entrepreneurship Journal*, 11(3), 306–325. <https://doi.org/10.1002/sej.1257>
- Ozcan, P., & Eisenhardt, K. M. (2009). Origin of alliance portfolios: Entrepreneurs, network strategies, and firm performance. *Academy of Management Journal*, 52(2), 246–279.
- Packard, M. D., Clark, B. B., & Klein, P. G. (2017). Uncertainty types and transitions in the entrepreneurial process. *Organization Science*, 28(5), 840–856. <https://doi.org/10.1287/orsc.2017.1143>
- Patton, M. Q. (2002). *Purposeful sampling Qualitative research & evaluation methods* (2nd ed., pp. 230–244). Thousand Oaks, CA: SAGE Publications.
- Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science*, 14(3), 399–441. <https://doi.org/10.1177/030631284014003004>
- Rajagopalan, N., & Spreitzer, G. M. (1997). Toward a theory of strategic change: A multi-lens perspective and integrative framework. *Academy of Management Review*, 22(1), 48–79. <https://doi.org/10.2307/259224>
- Rao, H. (1994). The social construction of reputation: Certification contests, legitimization, and the survival of organizations in the American automobile industry: 1895–1912. *Strategic Management Journal*, 15, 29–44.
- Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. New York: Crown Business.
- Rindova, V. P., Yeow, A., Martins, L. L., & Faraj, S. (2012). Partnering portfolios, value-creation logics, and growth trajectories: A comparison of Yahoo and Google (1995 to 2007). *Strategic Entrepreneurship Journal*, 6 (2), 133–151. <https://doi.org/10.1002/sej.1131>
- Romanelli, E., & Tushman, M. L. (1994). Organizational transformation as punctuated equilibrium: An empirical test. *Academy of Management Journal*, 37(5), 1141–1166.
- Rothaermel, F. (2002). Technological discontinuities and interfirm cooperation: What determines a startup’s attractiveness as alliance partner? *IEEE Transactions on Engineering Management*, 49(4), 388–397. <https://doi.org/10.1109/TEM.2002.806725>

- Rothaermel, F. T., & Boeker, W. (2008). Old technology meets new technology: Complementarities, similarities, and alliance formation. *Strategic Management Journal*, 29(1), 47–77. <https://doi.org/10.1002/smj.634>
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), 217–226. <https://doi.org/10.5465/amr.2000.2791611>
- Shepherd, D. A., Williams, T., & Patzelt, H. (2015). Thinking about entrepreneurial decision making: Review and research agenda. *Journal of Management*, 41(1), 11–46. <https://doi.org/10.1177/0149206314541153>
- Siggelkow, N. (2002). Evolution toward fit. *Administrative Science Quarterly*, 47(1), 125–159. <https://doi.org/10.2307/3094893>
- Snhir, Y., & Zott, C. (2020). The genesis and metamorphosis of novelty imprints: How business model innovation emerges in young ventures. *Academy of Management Journal*. <https://doi.org/10.5465/amj.2017.0706>
- Sonenschein, S. (2009). Emergence of ethical issues during strategic change implementation. *Organization Science*, 20(1), 223–239. <https://doi.org/10.1287/orsc.1080.0364>
- Sorenson, O. (2018). Social networks and the geography of entrepreneurship. *Small Business Economics*, 51(3), 527–537. <https://doi.org/10.1007/s11187-018-0076-7>
- Sorenson, O., & Stuart, T. E. (2008). Entrepreneurship: A field of dreams? *Academy of Management Annals*, 2(1), 517–543. <https://doi.org/10.5465/1941652082211669>
- The Economist. (May 14, 2016). The slack generation; office communication. *The Economist*, 419, 54–57.
- Thomke, S. H. (1997). The role of flexibility in the development of new products: An empirical study. *Research Policy*, 26(1), 105–119. [https://doi.org/10.1016/S0048-7333\(96\)00918-3](https://doi.org/10.1016/S0048-7333(96)00918-3)
- Townsend, D., Hunt, R., McMullen, J. S., & Sarasvathy, S. (2018). Uncertainty, knowledge problems, and entrepreneurial action. *Academy of Management Annals*, 12(2), 659–687. <https://doi.org/10.5465/annals.2016.0109>
- Tripsas, M. (1997). Unraveling the process of creative destruction: Complementary assets and incumbent survival in the typesetter industry. *Strategic Management Journal*, 18(s 1), 119–142.
- Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*, 21(10/11), 1147–1161.
- van de Ven, A. H. (1992). Suggestions for studying strategy process: A research note. *Strategic Management Journal*, 13(S1), 169–188. <https://doi.org/10.1002/smj.4250131013>
- van de Ven, A. H., & Poole, M. S. (1995). Explaining development and change in organizations. *Academy of Management Review*, 20(3), 510–540.
- Wilhelm, A. (August 21, 2018). Slack raises \$427m series h pushing its valuation over \$7.1b. *Crunchbase News*. Retrieved from <https://news.crunchbase.com/news/slack-raises-427m-series-h-pushing-its-valuation-over-7-1b.>
- Williams, C., Chen, P.-L., & Agarwal, R. (2017). Rookies and seasoned recruits: How experience in different levels, firms, and industries shapes strategic renewal in top management. *Strategic Management Journal*, 38 (7), 1391–1415. <https://doi.org/10.1002/smj.2562>
- Zajac, E. J., & Kraatz, M. S. (1993). A diametric forces model of strategic change: Assessing the antecedents and consequences of restructuring in the higher education industry. *Strategic Management Journal*, 14, 83–102.
- Zott, C., & Huy, Q. N. (2007). How entrepreneurs use symbolic management to acquire resources. *Administrative Science Quarterly*, 52(1), 70–105.
- Zuzul, T., & Tripsas, M. (2020). Start-up inertia versus flexibility: The role of founder identity in a nascent industry. *Administrative Science Quarterly*. <https://doi.org/10.1177/0001839219843486>

How to cite this article: Kirtley J, O'Mahony S. What is a pivot? Explaining when and how entrepreneurial firms decide to make strategic change and pivot. *Strat Mgmt J*. 2023;44:197–230. <https://doi.org/10.1002/smj.3131>