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## Discovering Strategy: Dealing with Uncertainty by Harnessing Serendipity

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In this paper we propose an approach to help businesses discover a successful, new strategy in response to a shock (such as the Covid pandemic) that has unknown and unpredictable consequences for the future performance of their existing business model. Specifically, we develop a conceptual framework for the discovery process and propose a set of practical tools that managers can use to help their companies begin to deal with the unknown-unknowns that result from a significant shock to their existing business environment. This involves: (1) Looking out for unexpected opportunities and challenges arising after a shock and tracking the effects of your organisation's improvised responses; (2) Consciously suspending your existing beliefs about your business environment and your business; and (3) Catalysing new interactions between an extended ecosystem of diverse partners around your business. We then demonstrate the role for search, experimentation, and strategic agility to refining and implementing the new strategy that follows. We conclude that, despite the role for these traditional approaches to strategy-making in a risky environment, when businesses face a situation so uncertain that possible future scenarios can't be articulated foresight and flexibility alone are not enough. Managers also need to embark on a process that enables them to discover a previously unimagined future strategic path.

Keywords: Strategy; Discovery; Process; Uncertainty; Unknown unknowns; Serendipity; Ecosystems

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## **Discovering Strategy: Dealing with Uncertainty by Harnessing Serendipity**

In this paper we deal with the situation where a business is hit by a shock that has unknown and unpredictable implications for the future performance of your company's existing strategy and business model. We won't attempt to help you predict such a shock, or "black swan" event<sup>1</sup>, because that is almost by definition, impossible. Instead, what we focus on is how you might deal with the aftermath when the implications of the shock for your industry and market are fundamentally uncertain.

Examples of such shocks include the Covid-19 pandemic, the appearance of a potentially revolutionary general-purpose technology (such as artificial intelligence), or a fundamental shift in societal priorities, where the repercussions in your business environment are unknown<sup>2</sup>. In such an environment, managers will face a new set of both "known-unknowns" (things they know they don't know) and "unknown-unknowns" (things they don't know they don't know).<sup>3,4</sup>

It might be clear, for example, that the shock will alter the supply of a particular material (a known), but how severely may be unknown.<sup>5</sup> Or that a digital substitute for an existing product may be offered (a known), but how its value will be perceived by different buyers may be unknown. In these cases, we can deploy well-known risk management techniques: laying out a set of possible future outcomes, testing them if necessary, and estimating the probability that each will occur.

But what if we can't predict which actors in our business environment will alter their behaviour? Will it be the behaviour of consumers, other businesses, shareholders, or governments and regulators? Immediately after the shock hits, these actors themselves often won't know how they will react as the repercussions unfold. Even when

they do respond, it may be impossible to accurately discern the changes in the economic fog of the aftermath, not least because these responses may interact in complex, ways with unpredictable results. And when the responses are discernible, we don't know if these will be temporary, permanent or continue to evolve in unexpected ways. This is the realm of unknown-unknowns, what some have dubbed "unk unks" (a term now in common usage among the aerospace, electrical machinery, and nuclear power project management fraternity).<sup>6</sup>

In a recent article, Ehrig and Foss define unknown-unknowns precisely as: "future contingencies that lack *ex ante* descriptions for some decision makers from whom the contingency is relevant."<sup>7</sup> In the case of a significant shock to the business environment, it is not only businesses that face unknown-unknowns. Consumers, shareholders, governments, and other players will also face repercussions they haven't thought of and behavioural changes they have not yet imagined. The shock of artificial intelligence, for example, has started to hit, but can anyone yet imagine all the ways in which it might impact their business and personal lives?

As a manager faced with such a situation, where you don't know what you don't know, the first step is to discover some of those things that are important but are not yet on your radar, and then find out how these things are changing. If you discover that the behaviour of consumers and their priorities are changing, for example, this will help guide you as to how your value proposition needs to be revised. It could also help If you could discover capabilities, technologies, and resources outside your company, some of which perhaps you weren't even aware of, that turn out to be relevant for delivering that new value proposition. Such a discovery process would enable you to turn unknown-unknowns into known-unknowns. Once you know what to look for, techniques of exploration, such as search and experimentation, guided by risk management, can be

deployed to turn the known-unknowns into knowns. Your new strategy can then take shape. Next, you will need strategic agility: the capability to quickly re-configure your resources, nimbly adapt your organisation structures and processes, and possibly revamp your business model to deliver that new strategy.<sup>8</sup>

In what follows, we develop a conceptual framework for the discovery process and propose a set of practical tools that managers can use to help their companies begin to deal with the unknown-unknowns that result from a significant shock to their existing business environment. We then show the role for search, experimentation, and strategic agility to refining and implementing the new strategy that follows. To combine these processes, companies need to master the ambidexterity necessary to pursue both exploration (search and experimentation) and exploitation (pursuing your current strategy).<sup>9</sup>

This allows us to make three contributions to the existing literature. First, we show how discovering unknown-unknowns that arise after a significant shock to the business environment is different from exploring known-unknowns. We argue that the discovering unknown-unknowns depends on serendipity, while the latter can be explored and understood through search and experimentation. Second, we show how current theories and tools can be extended to help deal with situations where managers face the uncertainty of unknown-unknowns that result from an unpredictable shock to their business environment. Third, we show the roles that established frameworks and tools of search, experimentation, ambidexterity, and strategic agility can play in dealing with this kind of uncertainty.

**Do you face a problem with unknown-unknowns?**

Uncertainty is often confused with high levels of risk<sup>10</sup>. But risk deals with “known-unknowns”<sup>11</sup>. In the context of strategic choice, these are situations where managers have a good idea what the alternative strategy options available to the company in the disrupted market environment look like (or at least you know the alternative strategic directions which you might choose to head in the future). What you don’t know is which of these alternative strategies will afford you future competitive advantage. But with the right kinds of business intelligence, market research, and the right pilot projects and investments in real options, you can turn the known-unknowns into knowns and estimate the probability that any particular strategic direction will lead to success and choose the strategy most likely to deliver.

Uncertainty is different: here you face lots of “unknown-unknowns”. The implications of the shock to your business environment are so extreme, far-reaching, and unpredictable that your future strategic options are unclear (or perhaps unknowable because, as John Maynard Keynes put it, they depend on possible futures for which “There is no scientific basis on which to form any calculable probability whatever. We simply do not know.”; or because we simply don’t know what outcome to try and put a probability on)<sup>12</sup>. As Birkinshaw et al. have pointed out, levels of disruption are often overestimated, and incumbents can be remarkably resilient in dealing with change<sup>13</sup>. With the appearance of a new substitute for your product or service, or even a new technology, for example, it may still be possible to determine how your product or value chain needs to change and your resources and capabilities need to be reconfigured. Watching the rise of Netflix, it was clear to Disney that it needed to create a large-scale streaming service. Launching Disney+ required a great deal of organisational and resource agility. There is still a risk that the assessment of the required shift may be wrong, but organisational

agility will be sufficient to achieve the changes required to have your best chance of rebuilding your competitive advantage.

After a dramatic shock that potentially up-ends the business environment, however, what the “new normal” will look like afterwards is often fundamentally uncertain. Because the various actors in the business environment, such as consumers, suppliers, and regulators, may adjust their behaviours, the unknown-unknowns are emergent and therefore, as Feduzi and Runde note, cannot be transformed into known-unknowns even if it were possible to amass and process all information there was to know at that point.<sup>14</sup> Agility – usually defined as the “capacity to react quickly to rapidly changing circumstances”<sup>15</sup> – can help you respond. But alone, it can’t answer to the question that precedes agile change: “What are the important future changes that I don’t know that I don’t know?” and hence *how* your company’s strategy should respond?

Think about the problem you face after a shock such as the Covid-19 pandemic, or a wide-ranging digital revolution including widespread use of artificial intelligence, robotics, virtual and augmented reality, and the Internet of Things, or societal revolutions that we have seen after major wars. In these cases where many, unknown aspects of your business environment may change in unpredictable ways, so that even the factors that future strategy will need to respond to are often unknown. The shock to the business environment is so uncertain that it is not only your company, but also your customers, suppliers, consumers, influencers, and even governments and regulators don’t know how their behaviours or strategies can, or should, respond. The problem is not that we suffer from myopia or are a prisoner of our own orthodoxies; nor is it that we don’t know what others (such as locals in a foreign market) already know; nor that we have false knowns (things we think are correct but turn out not to be). The challenge we seek to address is

the situation after a shock when nobody knows what will happen and if, and how, they will react.

Using a series of case examples we will show how, by harnessing serendipity, you can discover unexpected opportunities to adapt to, or shape your future market. Even when you have discovered these new opportunities, your understanding of these opportunities will probably still be hazy. The factors that will influence how consumers or competitors will react to a particular new offering, for example, still remain unknown. Likewise, your grasp of the capabilities that may help to deliver the new value proposition or execute the new business model may well include things you have not even thought of. But if the discovery process works effectively, you can convert a world of unknown-unknowns to a set of known-unknowns that you can explore. In other words, you will know the aspects of customer behaviour you need to understand and the new capabilities you need to look for. Then, existing tools for search and experimentation can help you fill in these remaining gaps in your knowledge and manage the risks of expectations that turn out to be false. And ambidexterity and agility can help pivot your strategy and reconfigure your organisation to deliver reliably and efficiently what is required.

### **Why do we need serendipity when faced with unknown-unknowns?**

To see why serendipity is key in the process of discovering a viable, new strategy when faced with unknown-unknowns, consider the countless cases of scientific breakthroughs that have their roots in serendipity that led researchers down a new path of investigation and eventual success. The classic case is that of penicillin, the first true antibiotic, discovered by Alexander Fleming, Professor of Bacteriology at St. Mary's Hospital in London in 1928. Fleming had been conducting experiments aimed at understanding the behaviour of *Staphylococcus*, bacteria that causes boils, sore throats, and abscesses.

His work growing colonies of Staphylococcus was paused when he went away on an August holiday break. Returning on September 3, he began to sort through petri dishes he had left unattended in the laboratory and noticed something unusual on one dish. It was dotted with Staphylococcus colonies, except for an area where mould was growing. Most researchers might have dismissed this as a failed experiment. But Fleming's scientific experience helped him realise an emergent opportunity to pursue a completely new line of investigation, something he hadn't even considered, had arisen. Instead of simply discarding the contaminated dish, he realised that the mould must have had secreted something that inhibited bacterial growth. He had discovered something that had been an unknown-unknown, but now looked like an important opportunity.

Despite this unexpected, serendipitous insight, there were still many known-unknowns: which bacteria would the mould inhibit? What was the active ingredient? How could it be purified? What concentrations would be required for a dose to be effective? None the less, after the publication of Fleming's results in 1929, a new avenue of potentially transformative research had opened up. It took years of further research work, led by Howard Florey, Ernst Chain and their colleagues at Oxford University and others to turn penicillin from a laboratory curiosity into a life-saving drug. It was not until 1941 that a 43-year-old policeman, suffering a life-threatening infection, was the first recipient of a purified penicillin injection and made a remarkable recovery within days (although he later died when supplies of the new drug ran out)<sup>16</sup>.

You can't discover unknown-unknowns without serendipity for the simple reason that, by definition, you don't know what things to look for and where to look for them. No amount of exploration will enable you to effectively anticipate consumer behaviours that may arise in the aftermath of a shock that no one has experienced before, nor imagined, especially where these new behaviours are influenced by the as yet unknown responses



by your company, your competitors, and other players. Nor can you identify the new capabilities needed to satisfy requirements that no one has yet thought of. Search isn't an option when you don't know what you are looking for; nor is experimentation because you don't have hypotheses about what unknowns to test. Discoveries of unknown-unknowns come as surprises and therefore, by definition, require serendipitous events.

The key difference between the challenge of a shock that produces unknown-unknowns and one that can be solved by search and experimentation (because you know where to look and what to look for) is well illustrated by comparing Fleming's serendipitous discovery, with Thomas Edison's innovations that led to the cheap and efficient incandescent light bulb. Long before Edison lodged his patents in 1879 and 1880 and began commercializing his incandescent light bulb, British inventors had demonstrated that electric light was possible with the arc lamp. In 1835, the first constant electric light was demonstrated, and scientists around the world started tinkering with the filament and the bulb's atmosphere (an inert gas to reduce oxidation of the filament). But despite their efforts, the early bulbs had extremely short lifespans, were too expensive to produce, or used too much energy.

When Edison and his research team in Menlo Park, New Jersey, came onto the scene, they didn't need serendipity like Fleming's surprising impact of a mould secretion in a neglected petri dish, because Edison knew exactly what he was looking for to make the light bulb viable: a more efficient filament and atmosphere that would virtually eliminate oxidation. Edison faced some known (and well-defined), unknowns. He was, therefore, able to solve the problem with sheer resources and persistence. So, he tested carbonised filaments made from almost every plant imaginable, including baywood, boxwood, hickory, cedar, flax, bamboo, cotton thread, and different kinds of paper spirals. "Before I got through," he recalled, "I tested no fewer than 6,000 vegetable growths, and

ransacked the world for the most suitable filament material." He also experimented with how to create a better vacuum pump to remove almost all the air from the glass bulb and so forestall oxidization. Eventually the team came up with a light bulb design that was not only sufficiently bright but would last 1,200 hours.

The implications of these two contrasting experiences for our current problem are clear: when you know the likely changes you need to look for after a shock to the business environment you can find a viable, new strategy through the right kinds of search and experimentation; but when it is unclear what the repercussions of the shock will be, and who will change their behaviours, and how, then you need serendipity to point you in an unexpected new strategic direction that you may choose to explore or pursue. This essential role of serendipity when faced with unknown-unknowns has been highlighted by the findings of a growing body of literature investigating the conditions for scientific discovery and their impact on research policy.<sup>17</sup>

Previous research into strategic innovation also confirms the need for an element of the unexpected in the process of effective strategic response when faced with unknowns. Reeves, Goodson, and Whittaker, suggest companies adopt a process for "anomaly-based innovation", that harnesses "weak signals that are in some way surprising but not entirely clear in scope or import."<sup>18</sup> Fink, Reeves, and Palma, meanwhile, et al. acknowledge the key role of serendipity in strategies for rapid innovation.<sup>19</sup> Yet, survey research suggests only one in four executives actually adapt to unforeseeable events when these happen or seizes an unexpected opportunity to shape an industry to their advantage.<sup>20</sup> One reason is probably that most people equate serendipity with luck. But contrary to this popular perception, the likelihood of your strategy getting a boost from serendipity isn't just dumb luck because you can improve your chances of encountering serendipity by seeking it out.

## Seeking out serendipity

Seeking out serendipity and instituting a process to recognise the potential of an unexpected event, and develop associated opportunities, can play a critical role in strategy discovery. We use the word “discovery” to convey the idea that discovering a new strategy is tantamount to finding something for the first time, or something that had not been known before<sup>21</sup> (in our case because after a shock hits the business environment with unknown consequences, the viable new business strategies are unknowable). This is different from “exploration”, which is “to investigate, study, or analyse”<sup>22</sup> and implies you know where and what to analyse after the shock hits (which often you don’t, because the number of possible reactions by all of the different actors in your businesses environment is almost infinite).

Coined by Horace Walpole in 1754 to describe a “happy accident”, “serendipity”, meanwhile, is the “accidental *discovery* of something valuable”<sup>23</sup> (our italics). Robert Merton, whose life-long investigations into the sociology of science revealed the role serendipity played in scientific discovery<sup>24</sup>, alongside his interest in how intended social actions often have unintended consequences. He argued, as early as 1938, that scientific discovery is too often “presented in a rigorously logical and ‘scientific’ fashion ... and not in the order in which the theory or law was derived.”<sup>25</sup> and concluded that the reality of scientific discovery involves “observing an unanticipated, anomalous and strategic datum which becomes the occasion for developing a new theory or for extending an existing theory”<sup>26</sup>, a process formalised by Yaqub in 2018<sup>27</sup>. Denrell, Fang & Winter link this to strategy, arguing that: “The challenge of strategy is the challenge of assessing the opportunities that open to an idiosyncratically positioned actor in a changing environment.”<sup>28</sup> But how does a company achieve an advantageous position to encounter, and then recognise, potentially valuable serendipity?

By definition, of course, we cannot trigger a specific serendipitous event.<sup>29</sup> But it is equally obvious that if you spent your business life confined to a small, empty room, you wouldn't likely encounter much, if any, serendipity.<sup>30</sup> As Denrell, Fang & Winter put it: "While good luck may befall the inert or lazy, serendipitous discovery occurs only in the course of an energetic quest – a quest in which lucky discoveries of an unanticipated kind can be recognized through alertness and then flexibly exploited."<sup>31</sup>

We have observed three ways in which your company can increase the odds of a serendipitous discovery in the wake of an external shock: (1) By looking out for unexpected opportunities and challenges arising in your operations after a shock and tracking the effects of your organisation's improvised responses; (2) By consciously suspending your existing beliefs about your business environment and your business; and (3) By catalysing new interactions between an extended ecosystem of diverse partners around your business.

As we lay out below, initiatives that improve your chances of encountering valuable serendipity can point the way forward through the fog of uncertainty. They represent the first step in creating an engine of strategy discovery that enables you to identify new sources of customer value and routes to competitive advantage in the face of high levels of uncertainty. Once these potential new sources of value and advantage are identified, then our understanding of them can be refined through search and experimentation, and a new strategy can take shape. To realise this new strategy, the nimbleness and flexibility associated with strategic agility will then be required.

#### *Looking for serendipity in your operations' responses to unforeseen events*

When hit with a substantial shock to the business environment, your operational staff will often be forced to improvise to deal with the new challenges that established

processes and procedures can no longer handle. Some of these improvisations and “work arounds” will contain serendipitous opportunities in the form of unexpected directions your future strategy may take. To discover these strategic opportunities, unknown to you, which serendipity throws up, you need to be looking for them with the right mindset. De Rond suggests that this relies on creativity in recombining events as well as the practical judgment to deduce ‘correct pairs’ of events to generate a surprisingly effective plot.<sup>32</sup>

The events leading up to an important shift in strategy and business model at the successful Swedish furniture retailer IKEA provide a good example. Even a decade after IKEA was founded, Sweden was still feeling the societal and economic repercussions of the shock of World War II, including the increasing industrialisation and urbanisation of the country. By the early 1960s these shifts had gathered pace and were creating a new class of consumers who might behave differently from the extended families and close-knit communities common in rural areas who prized individual pieces of furniture and often handed them down between the generations. The new, nuclear families being established in the cities had to deal with empty, often modern, minimalist, apartments and make them liveable quickly. How their furniture buying behaviours would respond to these new challenges included many unknown-unknowns (even to themselves, given that they now faced a scenario that had not experienced before in an unfamiliar environment).

Amidst this uncertainty, IKEA opened its first retail store in Stockholm in 1965. But the store’s success soon outstripped its capacity, resulting in ever-longer queues of customers. The local manager’s improvised solution was to open the retail store’s warehouse and let the customers pick for themselves the products they wanted.

Surprisingly, customers showed no hesitation or dissatisfaction in adopting this new, if radical, arrangement. IKEA’s founder, Ingvar Kamprad, became aware of the until

then unknown-unknown that the productive retail space of an IKEA store might be dramatically extended to include the adjacent industrial warehouse, traditionally hidden from view and where customers were barred from entry. This would reduce labour costs, and increasing overall productivity. IKEA's customers discovered, also serendipitously, that they would value the opportunity to gain speed and convenience in exchange for reduced service and comfort, even if it required them to pick and handle large, heavy packages – a trade-off that no furniture retailer had yet offered them.

While IKEA was looking for growth by opening a new store and exploiting its existing business strategy, it found something even more valuable: the novel and unforeseen possibility of changing its business model in a way that delivered more value to customers while also benefitting its profitability. Serendipity was at work, revealing the potential for a new strategic direction based on creating the “open warehouse” that is now a feature of most IKEA stores. This also gelled perfectly with Ingvar Kamprad's ever-present intent of pursuing lower costs without loss of customer value. It is an example of the more general principle that Pina e Cunha, Rego, Clegg, & Lindsay, note that “When employees are conscious of the ‘bigger organizational picture’, their local observations of unexpected events may be framed as serendipitous discoveries and thus acted upon.”<sup>33</sup>

It still took a period of subsequent search and experimentation to work out how the idea of an open warehouse at IKEA could be reliably and consistently implemented in practice. This included experimenting with different flat pack designs and alternative packaging to ensure it would be convenient to handle the items with a warehouse trolley, how to signpost the warehouse so customers could navigate the warehouse to find the items they wanted, and so on.

The control systems in most companies are designed to treat unexpected variations such as the improvisation that happened at IKEA as negative deviations from the norm or lack of compliance, leading to corrections aimed at preventing recurrence. Such a mindset and systems are unlikely to flag the potential of serendipitous events, but instead suppress them. In fact, they discourage any reporting of surprises. But to deal with strategy making in the face of unknown-unknowns, exactly what is needed is the ability to recognise the unexpected outcomes of serendipitous interactions across boundaries of the organisation as a signal of potential new opportunities.

#### *Suspending your existing beliefs about the business environment*

You are also more likely to recognise the potential of serendipitous events that happen after an environmental shock if you are able to suspend your existing beliefs, or what you think you know and have *learned during periods of relative market stability*. These include your implicit, and often unconscious assumptions about key relationships between the business environment and your business model. The story of how Advanced RISC Machines (ARM) came up with its first break-through product is a good example of how suspending your existing beliefs can help you recognise the potential of a serendipitous event when it happens. ARM is hardly a household name, but its RISC (Reduced Instruction Set Computing) chip designs are to be found in over 95% of all smartphones in the world, including Apple, Huawei, Samsung, and Xiaomi.

During its first years, ARM had got going by supplying the market for small, cheap computers used in schools, by participating in a UK Government initiative conducted in conjunction with the BBC and the Acorn computer company designed to introduce the next generation of British youngsters to the potential of the then emerging computing technologies. By economising on the number of instructions, ARM's RISC chips were both

smaller in size and cheaper to produce than the general-purpose microprocessors companies like Intel were bringing to the market.

In the early 1990s, the business environment of microprocessors was hit by a shock – albeit one with positive potential – when a potential mass market for digital handheld, mobile devices began to emerge. The implications of this rapid rise of mobile devices for chip designers and fabricators were very unclear. ARM thought it saw a growing opportunity for its simple, cheap chips, assuming mobile phone makers would need to lower costs and economise on space to reduce the size of the phones and unlock the mass market. So, it decided to assist the pitch of one of its existing designs alongside its customer and chip fabricator, Texas Instruments (TI), to Nokia, then a leader in mobile phones.

Nokia pointed out a long list of deficiencies with the offering, most importantly that the ARM chip design used too much power. Many would have regarded this first meeting as an unmitigated disaster. But ARM realised it had discovered something it had neither known, nor expected: that Nokia's key problem wasn't how to reduce the size or cost of the chip, but how to cut its power consumption and the associated amount of heat it generated.

Instead of walking away in despondency, ARM proposed forming a partnership with Nokia to work out how its RISC chip architecture could be redesigned to cut the power it consumed. For its part, Nokia recognised no one in the market could deliver a chip with the performance they required and that the solution to this challenge was far from being known. The initial rejection by Nokia turned out to be serendipitous by enabling ARM to discover an unknown-unknown in an emerging new application: that minimising chip power consumption was the key to unlocking demand. This new insight, in turn, led it to begin working closely with a new partner who, as an original equipment



manufacturer, was ARM's customer's customer (two steps removed in the value chain), not only its direct customers, such as TI or Taiwan Semiconductor Manufacturing Company. Having discovered an unknown-unknown it was able to launch a set of experiments in conjunction with partners to understand how to redesign its architectures to achieve dramatically reduced power consumption and re-configure its resources and organisation processes to deliver such designs.

ARM's subsequent recognition that it could benefit from working with partners several steps removed in the value chain, with which it had not interacted directly in the past, led to a profound shift in strategy. Over time, through search, experimentation, and agile reconfiguration of its organisation, ARM was able to craft a systematic set of policies and processes to lead a global ecosystem of diverse partners, each with specific capabilities, and to foster novel interactions between partners that supported innovation in its business. This ecosystem included an array of chip fabricators, software developers, providers of electronic design automation tools, and training companies who co-invested and co-innovated by working with each other as well as with ARM. None of this would have happened if ARM had stuck to its initial belief that customers for digital, mobile devices valued only low cost and space optimisation in RISC chips – forged in its experience of designing chips for low-price desktop computers – and not embraced the serendipitous discovery from its early encounter with Nokia that, in fact, achieving low power consumption was the key to conquer the emerging mobile phone market.

#### *Developing your business ecosystem as a source of serendipity*

ARM's experience described above also demonstrates a third way to increase the chances of encountering potentially valuable serendipity in the aftermath of a significant shock to your business environment: to catalyse new types of interactions with an increasingly

diverse partner ecosystem around your business. This is likely to be particularly useful in opening a route to the serendipitous discovery of new possibilities for innovation.<sup>34</sup>

To increase the likelihood of surfacing valuable serendipity you need to conceive of your company's ecosystem as much more than a set of bilateral alliances or a "hub and spoke" structure which you control. Success in seeking out serendipity requires that you take steps to attract a more diverse set partners, possibly from different industries, to join the ecosystem, to promote connections between those partners that would otherwise not occur, and to launch initiatives to improve the quality of those connections. This is because serendipitous opportunities to discover unknown-unknowns and create new sources of competitive advantage are more likely to arise when hitherto separate capabilities and knowledge within your own organisation and those within new partners, including lead users, are connected in new ways. Capabilities or knowledge that have not interacted earlier because they were isolated by boundaries between companies, by geographical distance, by technological incompatibility, or simply by tradition. This begins with attracting new partners with diverse capabilities and experience and igniting new interactions with and between them.

A good example is the health care IT solution ecosystem, athenahealth Inc., which illustrates how the chances of valuable serendipity can be enhanced through new interactions between partners in a diverse ecosystem. The company started out as Athena Women's Health, a traditional obstetrics clinic and the practice soon expanded to more than a dozen clinics spread across California. Despite their initial success, Athena faced a problem common to medical practices: being paid. To address this issue, they developed a web-based billing system to track patients, handle medical billing, and carry out insurance eligibility checks. The first piece of serendipity struck when the founders approached potential venture capital investors about funding the growth of the business.

To their surprise, the venture capitalists expressed more interest in backing the software than the Athena's medical practice. The discovery of the hitherto unknown-unknown that their own specialist software could be the basis of a business in its own right led them to launch athenahealth, a healthcare IT company to explore and develop the idea.

The new company began by pitching AthenaCollector, a cloud-based billing and practice-management software. Over the next decade, athenahealth experimented with adding more functions to the software, such as options for maintaining patient records, communicating with patients electronically, processing insurance claims, as well as handling billing and reimbursements generating annual revenues of almost \$250 million.

Although many of these experiments proved successful, when the founders looked at the potential of the healthcare market, they realised they were still only scratching the surface. They realised that the limited capabilities within their own company presented a bottleneck to unlocking that potential. So, they began to take steps to develop an ecosystem of partners that would bring in new capabilities and knowledge from different businesses. The company launched an initiative called "More Disruption Please" to attract in many new, diverse partners offering specific functionalities and bringing distinctive capabilities and knowledge and promote more interaction between them. This was followed by the creation of an accelerator designed to attract start-ups with well-developed products and connect these with other ecosystem partners. Encouraging diverse partners to collaborate forged serendipitous combinations that opened the way to the creation of an array of innovative solutions for athenahealth Inc.'s client base helping its revenues surpass \$1.2 billion. What athenahealth Inc. successfully achieved was to create new linkages and types of interactions between their partners that increased the possibility of serendipity.

Likewise, ARM's ecosystem – which emerged from the shift in strategic direction stimulated by the serendipitous result of the interaction with Nokia described earlier – brought together, directly and indirectly, semiconductor fabricators and tool developers, including knowledge from competitors and users in different industries that had never been combined before.

### **Following up on surprises**

In addition to seeking out serendipity, discovering the opportunities surfaced also requires the right mindset and skills: welcoming surprises, instead of treating them as vexing displays of ignorance or irritating deviation to a plan, and a high level of understanding the business. That's because it is not enough to encounter serendipity, you also need to recognise the potential of the unknown-unknowns you have discovered. The first plastic (celluloid), for example, was discovered by the British chemist and metallurgist Alexander Parkes in 1856, after observing that a solid residue remained after evaporation of the solvent from photographic collodion. The commercial potential of this discovery was only understood, however, when businesspeople recognized that it could serve as a substitute for the expensive ivory then used to make billiard balls.

The examples of different ways of encountering the unexpected we discussed above all underline the fact that to recognise the strategic potential of a serendipitous event requires responding to surprises in novel, and perhaps unintuitive, ways – especially when suffering what might look like a failure. Instead of retreating to your corporate base and attempting to “solve the problem”, it is necessary to ask the question: “What is this unexpected event telling us about what we don't know and about the potential, new strategic opportunities we could not have imagined before?”.

Tapping into the possibilities for serendipity to help discover both the changing attributes potential customers value that they can't know and the viable sources of competitive advantage that we can't know when facing absolute uncertainty in the pursuit of strategic renewal, requires instituting a process within your company both to seeking out situations where serendipity is more likely to strike and to recognise the strategic potential that arises from re-interpreting and building upon the revealed unknown-unknowns. We now detail what such a process, or "discovery engine" could look like.

### **From serendipity to a new strategy**

Faced with unknown-unknowns in your business environment, where every unexpected, serendipitous interaction might contain the seeds of a viable breakthrough shift in your company's strategy, how can we work out which of the many potential new paths to explore? Discovering strategy doesn't mean simply letting your new strategy emerge. Recall, for example, that the scientist Alexander Fleming had a clear intended strategy: he was exploiting his prior knowledge and skills to research the unknown behaviour of a harmful bacteria, using the lab tools and techniques he had available at the time. He decided that the unintended, serendipitous discovery that occurred was worthwhile pursuing because it fitted within the boundaries set by the first principles of science in his domain.

Likewise, your company has a *raison d'être*. It starts with an outline of the playing field and broad objectives defined by shareholders and often codified in the articles of association. Founders or influential chief executives often then sharpen that definition. For Ingvar Kamprad of IKEA it was to: "offer a wide range of well-designed, functional home furnishing products at prices so low that as many people as possible will be able to

afford them”<sup>35</sup>. For Jack Ma at Alibaba, it was to bring e-commerce to the emerging market economy in his home country, China. At ARM it was to become the *de facto* global standard for RISC chips. Such a sharp and explicit *raison d’être* provides a powerful filter for appraising whether the possibilities highlighted by a serendipitous event are likely to help achieve your company’s purpose. There may be other ever-present rules next to the company’s *raison d’être*. Ingvar Kamprad of IKEA added, for example, that “In Scandinavia, people should perceive our basic range as typically IKEA. Elsewhere, they should perceive it as typically Swedish.”<sup>36</sup>

The *raison d’être* of a company transcends significant market shocks and a highly uncertain future. One of IKEA principles makes this point clear: “Our basic policy of serving the many people can never be changed.”<sup>37</sup> This constitutes the foundation from which you can build an engine to discover a strategy that will give you a competitive edge in the face of an extremely uncertain future business environment. Here are the next steps.

*Step 1: Improve your chances of encountering potentially valuable serendipity*

As we have detailed above, this starts with looking out for unexpected opportunities and challenges arising from the responses to unforeseen events in your operations, consciously suspending your existing beliefs about your business environment, and catalysing new interactions between an extended ecosystem of diverse partners around your business.<sup>38</sup> Once you have established the conditions for identifying a flow of potentially useful surprises, you need to screen them for those that look as if they fit your company’s *raison d’être*. Do they suggest the potential to turn the current strategy in a new direction? Might they open up fundamentally different ways paths for your company

to move forward while nudging its emerging business environment in a favourable direction?

*Step 2: When you encounter something unexpected, first ask “how come?” and then “why now?”*

When you encounter something unexpected or you notice a surprising solution or outcome, or a potential new partner is attracted, ask how it came about. This a key step in figuring out if it was the serendipitous discovery of an unknown-unknown. This question also begins to reveal the dynamics at work in the business environment. Following up with the question of “why now” helps you understand if the unexpected outcome signals what is emerging out there in your business environment in the aftermath of a shock, such what consumers are now coming to value or what new sources of competitive advantage might be opening up. It therefore puts you on the road to discovering a superior strategy, despite the considerable uncertainty that remains. It was just such a change in strategic direction that we saw ARM take after its first encounter with Nokia.

*Step 3: Launch a programme of search and experimentation*

Executive decisions are now required: assessing the known-unknowns that serendipity has helped you identify, you now need to choose a course. You still face the risk of choosing a path that eventually leads nowhere, but at least the fog of uncertainty has started to clear, you have identified some alternative ways forward worth exploring.

In order to choose among these alternative future paths you have now recognised, some authors recommend reliance on search, which involves combing the market environment for information as to whether a particular opportunity to create value and

competitive advantage exists.<sup>39</sup> Several authors, such as Stiglitz<sup>1</sup>, have suggested that those with low search costs will have an advantage in using this approach because the benefit of the information they obtain needs to outweigh the cost incurred. It will also reward those with superior capabilities in processing information.<sup>40</sup>

McDonald and Eisenhardt, meanwhile, argue that in such situations, strategy innovators should specify the basic elements of their new business strategy (such as a product they think some customers will find superior and the resources required to deliver it) but leave other elements undefined.<sup>41</sup> In the case of managers faced with unknown-unknowns we argue that these basic elements need to come from seeking out serendipity. McDonald and Eisenhardt then recommend conducting a set of experiments to test alternatives. Citing the example of PayPal, they report that the company: “committed to an open, stand-alone web-based model available to all and learned from testing that ease of use was more critical to users than tight antifraud controls.”<sup>42</sup> In the context of what they call discovery-based planning for new ventures, McGrath & MacMillan, suggest articulating the company’s assumptions about what are effectively its known-unknowns and then test these assumptions to enhance their understanding as a strategic venture unfolds.<sup>43</sup> Dattée, Alexy & E. Autio, meanwhile, argue that once a company has a “proto vision” that provides guidance to help deal with “an unbounded range of potential value propositions” it can create an ecosystem of partners who, through a process of iterative search and experimentation can narrow down the range of future possibilities to converge on a viable future strategy.<sup>44</sup>

Thinking through the right first strategic step in response to a serendipitous discovery event is critical. Alibaba’s first step in response to its surprise that on-line customers wanted to know the geographic location of sellers (which Alibaba’s managers had thought would be irrelevant in a digital transaction) was to enable channels to build



trust between buyers and sellers by providing sellers' addresses and introducing a chat function for them to communicate directly, without the mediation of Alibaba. This led Alibaba to search for other ways in which it could help build more trust between buyers and sellers. A series of experiments eventually led Alibaba to the discovery that holding customers' payments in secure escrow until they had confirmed that the order had arrived and they were happy with the goods, before releasing the funds to sellers – something that resulted in a blossoming of their e-commerce volumes. In ARM's case, it leveraged its ecosystem of partners to access capabilities and knowledge that, following its initial serendipitous discovery it now understood that it needed but did not have access to, pursuing what has been termed in the literature “network innovation” and “network ambidexterity”.<sup>45</sup> In the case of the OEMs, resulted in ARM stationing senior partner managers full time in their customer's customers' organisations. In other cases, where only simpler information rather than complex knowledge needed to be exchanged between partners to enable innovation, ARM established on-line communities to promote easy interaction.

Search and experimentation also played an important role at IKEA once each key unknown-unknown was successively discovered. More recently, for example, once they understood that the ecommerce revolution would increase the likelihood that its customers would use ikea.com instead of visiting its large stores, IKEA initiated experiments ranging from testing new store display formats and down-town locations combined with delivery services through to adding augmented reality tools that allow a customer to see what selected of its catalogue items would look like in their homes. It has also launched an EverydayExperiments.com to enable potential customers to explore new ways of living at home; new services to businesses such as restaurateurs and hoteliers that include interior design, financing, installation and maintenance of furniture

and other equipment; and an initiative to buy back its furniture. All of these initiatives have been implemented while IKEA continues to exploit its existing strategy, exhibiting its capability for organisational ambidexterity.

#### *Step 4: Develop and deploy your capabilities for strategic agility*

As your new strategic direction takes shape, your existing resources will need to be dynamically re-configured, and most probably new capabilities acquired and integrated to pivot and deliver that new strategy. Here, strategic agility is required. The roots of the concept of agility as applied to business can be traced back to work on improving the flexibility of manufacturing lines, including rapid changeovers between production of different car models, which became an important focus in the late 1970's and 1980s, especially in Japan in the aftermath of the 1973 oil crisis.<sup>46</sup>

Managers' interest in agility was subsequently reignited via a very different context, the process of software development, with the publication of the "Manifesto for Agile Software Development" in 2001<sup>47</sup>. The "values" and "principles" in the Agile Manifesto were subsequently adopted and extended by practitioners and scholars to include structures, such as the "agile organisation"<sup>48</sup>, building dynamic capabilities<sup>49</sup>, a solution for "competing demands"<sup>50</sup>, and tensions created by "conflicting dualities"<sup>51</sup> although it was recognised that unless carefully applied agile processes could prove detrimental to learning and innovation in large-scale projects.<sup>52</sup> Agility was thus extended to include flexibility and ambidexterity.<sup>53</sup> Of course, increased organisational agility is not necessarily positive in its own right. As Teece, Petraf and Leih have pointed out, managers need to calibrate the required level of organizational agility, deliver it cost effectively, and relate it to strategy.<sup>54</sup>

Strategic agility generally refers to the capability to achieve step changes quickly and nimbly across a broad front. It is relevant where the new strategic opportunities a company discovers as a result of seeking out serendipity, and subsequently refined by search and experimentation, requires its capabilities, resource base, and organisational processes to be reconfigured in order to exploit the new strategic direction and where speed of change is essential to re-establishing its competitive advantage.

Strategic agility will be critical to enable incumbents retain or regain their competitive advantage in the aftermath of a major shock to their business environment in three instances. First, where first-mover advantages, or at least “fast follower” strategies are a source of competitive advantage after the shock.<sup>55</sup> Second, where the external shock results in the company facing new, disruptive competitors.<sup>56</sup> Third, where the shock brings about a swarm of new start-ups. With a large number of entrepreneurs testing out new offerings and new business models, a few are likely to hit upon a successful formula that they can rapidly evolve and scale up by drawing in new resources, including now widely available venture capital funding, to quickly become formidable competitors. In response, incumbents will need strategic agility to renew their strategies rapidly in fundamental ways, to successfully compete in the future and deliver improved performance<sup>57</sup>.

There is now a large and sophisticated body of literature on how companies can develop the capabilities necessary for strategic agility, including in the context of adapting to different international business environments.<sup>58</sup> These findings point the way for how incumbent companies can implement a new strategy, discovered by seeking out serendipity, search, and experimentation as we describe above, to deal with the challenges and opportunities resulting from a significant shock to their business environment. They include numerous managerial recommendations for organisation

design and leadership approaches that can foster strategic agility.<sup>59</sup> Doz and Kosonen emphasise the importance of resource fluidity (mobilising and redeploying resources rapidly and efficiently) and leadership unity (making tough collective decisions that stick and get implemented) as key capabilities an organisation needs to build to enable strategic agility.<sup>60</sup> Doz has since detailed some of the managerial and decision-making mindsets and behaviours required to build these capabilities including systemic thinking, getting managers to encourage adaptation rather than simply imposing control and adherence, and introducing collective measurements and rewards for the top management team.<sup>61</sup> Other authors have highlighted the role of investments in intangible assets (such as employee training, information technology, and re-branding) to enable resource fluidity.<sup>62</sup> In some cases the new strategy will need to be piloted and incubated in a separate unit, possibly requiring the new capabilities and cultures that have been pioneered to be carefully re-integrated into the main business in order to achieve scale.<sup>63</sup>

### **Iterating the discovery process**

This strategy discovery-agility process we have described in the four steps above is inherently dynamic: it evolves through successive iterations over a potentially long period of time. At any particular juncture, some eventualities remain unforeseen, unknown, and unknowable. The objective is the steady conversion of “unknowns” to “knowns.”<sup>64</sup> With each turn of the discovery engine, you observe new, unexpected clues as to where future customer value and competitive advantage lie. These discoveries result in a new strategic direction taking shape. Alibaba, for example, began its business-consumer e-commerce activities acting a principal, buying from sellers and retailing to consumers. As the number and range of sellers grew, however, started to receive complaints that the sellers were unable to properly differentiate themselves while

Alibaba acted as an intermediary. Instead, they wanted to represent themselves on the site with their own storefronts. This led Alibaba to a new strategy that involved limiting its own activities and concentrate on providing the “platform” through which e-commerce could flow and take a commission for connecting buyer and seller. As its sellers’ marketing became ever-more varied and sophisticated, combining entertainment and celebrity influencers with sales initiatives, Alibaba realised that it needed to back off further and focus on becoming a provider of e-commerce infrastructure services for all e-commerce market participants. Its strategy of acting as an “ecosystem enabler”, which proved key to its future success, was born as a result and continues to evolve in response to recent shocks newly hitting the Chinese digital business environment.

This iterative process of discovering and then realising a fundamentally new strategic direction when faced with unknown-unknowns generally starts with following steps one through three outlined above with the objective of seeking out serendipity after a shock to your business environment, recognising the implications of the serendipitous opportunities, followed an exploration programme of search and experimentation to refine the strategy by filling in the unknowns that were previously discovered. You then need to deploy, or build and exploit, the capabilities of strategic agility to re-configure your resources and organisational structure and processes consistent with delivering on the new strategy.

For managers, this means pursuing a process of strategic renewal that goes beyond strategy as resource allocation described by pioneering researchers such as Bower<sup>65</sup> and Burgelman<sup>66</sup> to embrace both strategy discovery, by seeking out serendipity, followed by search and experimentation, and dynamic resource allocation through agility. While the strategy itself cannot be planned in the traditional sense, nor is it purely “emergent” as described by Mintzberg<sup>67</sup>. Instead, it is a purposeful process of

discovering how market participants are evolving their behaviours in response to a major shock as the repercussions reverberate, often over a period of years. As such, it is not a strategic repositioning accomplished in a short timeframe, but an extended evolution of your strategy down a new path as the market digests and adjusts to the implications of the shock.

Equally, because black swans or transformational shocks occur only relatively rarely, we don't recommend attempting the leap to try and become "antifragile" as proposed by Tsoukas<sup>68</sup> and Taleb.<sup>69</sup> Such an organisation, even if capable of continuous strategic renewal while thriving in the face of unexpected shocks, would likely carry heavy costs which make it uncompetitive versus companies whose stakeholders accept the risk of fragility, and even possible financial ruin, in exchange for greater efficiency<sup>70</sup>. Moreover, creating an organisation that is receptive to uncertainty, with a well-developed learning orientation that can engage in "responsible improvisation"<sup>71</sup> still leaves unresolved the fundamental question of how to discover the new sources of customer value and competitive advantage that are unknown to all market participants following a far-reaching market shock. You cannot "learn" what customers will value in the new era or how suppliers, partners, competitors, shareholders, or governments will behave in the new era for the simple reason that following a significant shock to the environment, these things are unknown to them as well.

## **Conclusion**

In this research we have sought to show how managers can tackle unknown-unknowns (factors that they neither realise are important or haven't even imagined are relevant) that arise after a significant shock to the business environment. This process begins by seeking out serendipity: looking out for surprises in your operations' responses to

unforeseen events, consciously suspending your existing beliefs about your business environment, and catalysing new interactions between an extended ecosystem of diverse partners around your business. When you succeed in discovering something unexpected and surprising, instead of treating it as an outlier or a failure, try to understand what shifts in the market caused it and what implications they might have for your company's future strategy. Then ask yourself where alternative responses to the serendipitous event might lead your strategy in the future. Now that you know what to look for, refine these alternatives through search and experimentation to alight upon a new strategy that looks viable, a process that may require organisational ambidexterity. Once such a new strategy is identified, it can be implemented by deploying capabilities for strategic agility.

Iterating this discovery and implementation process as your industry and market adjusts to immediate or longer-term repercussions of the initial shock allows you to dynamically allocate your resources to, and evolve, a new strategic direction to renew your competitiveness. It helps you handle unknown-unknowns by interacting with existing or potential customers, suppliers, partners, users, and regulators as they work out how to adjust themselves to their own unknown-unknowns, sharing in their unexpected insights and, in part, nudging their responses. Faced with a major shock to the business environment and the fundamental uncertainty it brings in its wake, foresight and flexibility alone are not enough. You need to embark on a process of discovering your future strategic path as well.

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<sup>1</sup> N. N. Taleb, *The Black Swan: The Impact of the Highly Improbable*. (New York: Random House, 2007).

<sup>2</sup> By 'business environment' we mean the environment around the company's industry and market, also known as the 'general environment', comprising all the physical, social, political, economic, and technological factors that may impact the business of the firm; the company's industry and market, also known as the firm's 'task environment', comprises its competitors, suppliers, buyers/customers, regulators, and other relevant stakeholders (L. J. Bourgeois III, "Strategy and Environment: A conceptual integration", *Academy of Management Review*, 5/1, (1980):25-39.). We use the expression 'business environment' to signify that it may impact not just the company's business, but potentially all other businesses, including substitutes, complementors, suppliers' suppliers, customer's customers, and so on.

<sup>3</sup> C. H. Loch, M. E. Solt, and E. M. Bailey, "Diagnosing Unforeseeable Uncertainty in a New Venture", *Journal of Product Innovation Management*, 25 (2008):28-46.

<sup>4</sup> Faulkner, Feduzi and Runde underline this distinction: "a known-unknown is a gap in knowledge that an individual knows about and is aware of at the relevant time, while an unknown-unknown is a gap in knowledge that an individual is not aware of at that time, either because they do not know about that gap in knowledge or because, despite knowing of it, they are unaware of it." (P. Faulkner, A. Feduzi, and J. Runde, "Unknowns, Black Swans and the risk/uncertainty distinction", *Cambridge Journal of Economics*, 41/5 (2017):1279-1302.)

<sup>5</sup> There may, of course, also be "false knowns" – things you think you know, but that turn out to be wrong.

<sup>6</sup> C. H. Loch, M. E. Solt, and E. M. Bailey, "Diagnosing Unforeseeable Uncertainty in a New Venture", *Journal of Product Innovation Management*, 25 (2008):28-46.

<sup>7</sup> T. Ehrig and N. Foss, "Unknown Unknowns and the Treatment of Firm-Level Adaptation in Strategic Management Research", *Strategic Management Review*: 3/1 (2022):1-24.

<sup>8</sup> J. L. Brown and N. M. Agnew, "Corporate Agility", *Business Horizons*, 25/2 (1982):29-33.

<sup>9</sup> J. Birkinshaw and K. Gupta, "Clarifying the distinctive contribution of ambidexterity to the field of organization studies". *Academy of Management Perspectives*. 27/4 (2013):287–298.

<sup>10</sup> F. Knight, *Risk, Uncertainty, and Profit* (Boston MA: Hart, Schaffner and Marx; Houghton Mifflin, 1921).

<sup>11</sup> K. A. Bryan, D. Ryall and B. C. Schipper, op. cit.



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<sup>12</sup> J. M. Keynes, "The General Theory of Employment", *Quarterly Journal of Economics*, 51/2 (1937):209-223.

<sup>13</sup> J. Birkinshaw, "How Incumbents Survive and Thrive", *Harvard Business Review*, 100/1 (2022):36-42.

<sup>14</sup> A Feduzi, J. Runde, "Uncovering unknown unknowns: Towards a Baconian approach to management decision-making", *Organizational Behavior and Human Decision Processes*, 124 (2014):268-283.

<sup>15</sup> Y. Doz and M. Kosonen, *Fast Strategy: How Strategic Agility Will Help You Stay Ahead of the Game* (London: Wharton School Press, 2008); Y. Doz and M. Kosonen, "Embedding Strategic Agility: A Leadership Agenda for Accelerating Business Model Renewal," *Long Range Planning*, 43/2-3 (2010):370-382.

<sup>16</sup> The Alexander Fleming Laboratory Museum, *The Discovery and Development of Penicillin: 1928-1945* (London, UK: Royal Society of Chemistry, and Washington D.C.: American Chemical Society, 1999).

<sup>17</sup> See, for example, P. Andriani and R. Kaminska, "Exploring the dynamics of novelty production through exaptation: a historical analysis of coal tar-based innovations", *Research Policy*, 50 (2021): 104171; O. Yaqub, "Serendipity: Towards a taxonomy and a theory", *Research Policy*, 47 (2018):169-179.

<sup>18</sup> M. Reeves, B. Goodson, and K. Whittaker, "The power of anomaly", *Harvard Business Review*, 99/4 (2021):94-101, elaborated in M. Reeves and J. Fuller, *The Imagination Machine: How to Spark New Ideas and Create Your Company's Future* (Boston, MA: Harvard Business School Press, 2021.)

<sup>19</sup> T. M. A. Fink, M. Reeves, R. Palma, and S. R. Farr, "Serendipity and strategy in rapid innovation", *Nature Communications*, 8/2002 (2017).

<sup>20</sup> M. Reeves, C. Love, and P. Tillmanns. "Your Strategy Needs a Strategy", *Harvard Business Review*, 90/9 (2012):76-83.

<sup>21</sup> <https://dictionary.cambridge.org/dictionary/english/discover> (last accessed April 11, 2022)

<sup>22</sup> <https://www.merriam-webster.com/dictionary/explore> (last accessed April 11, 2022)

<sup>23</sup> M. Pina e Cunha, S. Clegg, S. Mendonça, "On serendipity and organizing", *European Management Journal*, 28 (2010):219-330.

<sup>24</sup> R. K. Merton and E. Barber, *The Travels and Adventures of Serendipity: A study in sociological semantics and the sociology of science*. (Princeton: Princeton University Press, 2004) – manuscript originally written in 1958.

<sup>25</sup> J. L. Shulman, quoting Robert Merton (1938), in R. K. Merton and E. Barber, op. cit., XXII



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<sup>55</sup> C. Markides and P. Geroski, *Fast Second: How Smart Companies Bypass Radical Innovation to Enter and Dominate New Markets* (San Francisco: Jossey-Bass, 2005).

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<sup>63</sup> P. Junni, R. M. Sarala, S. Y. Tarba, and Y. Weber, "The role of strategic agility in acquisitions." *British Journal of Management*, 26/4 (2015):596-616.

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<sup>69</sup> N.N. Taleb, *Antifragile*. (London: Allen Lane, 2012).

<sup>70</sup> It is, of course, a different matter entirely to promote “antifragility” in systems that must exhibit a fail-safe performance.

<sup>71</sup> Tsoukas (2018), op. cit., 51.