



Roadmapping: (Missed) opportunities to overcome strategic challenges



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Abstract Firms face various critical challenges when pursuing a coherent course of action that seeks to create value for the long term. They are required to balance myopic and hyperopic behavior. They must ensure coordination, adopt a holistic view of various functional perspectives, and foster commitment among key decision makers. They need to develop a credible and compelling line of reasoning that employees understand and can act on. Adopting the perspective of roadmapping as a strategy tool, this article advances the argument that roadmapping is especially suitable in helping firms to surmount these three critical strategic challenges. This article distills three core features of the roadmap: graphical representation, multi-disciplinary integration, and scaling. It then reviews the three critical strategic challenges and shows how roadmapping can help to overcome each of these. Following this explanation, the article describes ten key principles for effective strategic roadmapping that support firms in obtaining the strategic benefits promised. The article concludes with additional insights for practice with the intent of encouraging further exploitation of roadmapping's potential.

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1. Roadmapping: Toward increased insights

The cartographer is both a scientist and an artist. He must have a thorough knowledge of his subject and model, the Earth. In representing it in different ways, he must omit

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more or less, according to the scale and purpose of his map. This means that he must have the ability to generalize intelligently and to make a correct selection of the essential features to be shown. These features are represented by lines, patterns, and colors, the effective use of which requires more than knowledge of the subject—it requires artistic judgment.

— Erwin Raisz (1948, p. xiv)

Cartographer Erwin Raisz pinpointed the two fundamental activities required to make an effective map: obtaining a deep understanding of the information to be conveyed and employing artistic skill to communicate the message visually. The synthesis of both activities produces an instrument that depicts the earth's surface with various patterns and features scaled down to a comprehensible size and facilitates tasks such as informing people and supporting decision-making.

The map—more specifically, a *roadmap* showing one or more possible routes to be followed to reach a destination—has increasingly found its way into business and nonprofit organizations over recent decades (Carvalho et al., 2013; Kerr et al., 2012; Phaal & Muller, 2009). After its early adoption by communication technology firm Motorola in the 1980s (Willyard & McClees, 1987), the tool gradually migrated to other technology-driven firms and has now been widely adopted by all manner of firms, sector agencies, and governments (Carvalho et al., 2013; Kerr et al., 2012; Phaal & Muller, 2009). Simonse et al. (2015, p. 910) defined a roadmap as a “(1) a visual portrait, which provides an (2) outline of the market, product, and technology plans, with elements that (3) are plotted on a timeline.” Roadmapping as an activity involves mapping (innovation) elements to a timeline, a time-pacing strategy, and a synchronizing dialogue. In the text that follows, we use the terms roadmap and roadmapping interchangeably.

Roadmapping is seen as a flexible tool (Kappel, 2001; Phaal et al., 2004) with many affordances and claimed benefits for strategy development, innovation (Carvalho et al., 2013; Kerr et al., 2012; Phaal & Muller, 2009), and detailed business operation planning (Cheng et al., 2016). In this article, we advance the argument that roadmapping is particularly suitable for use as a strategy tool since it can help to surmount three major strategic challenges firms face: (1) the challenge of achieving intertemporal strategic decisions, (2) the challenge of realizing coherent strategic decisions, and (3) the challenge of obtaining clear

strategic decisions. We trust this argument leads to an increased understanding of roadmapping and much-needed insight into its potential value (Carvalho et al., 2013; Kappel, 2001; Simonse et al., 2015) while laying the groundwork for determining implications for practice. In particular, we endeavor to demonstrate how firms can apply roadmapping to overcome the three critical strategic challenges. We intend to achieve this in three steps: (1) we conceptualize a roadmap as a strategy tool and break it down into its core features; (2) review the strategy literature and link the proposed value of a roadmap's core features to the strategic challenges identified; and (3) explain ten key principles for roadmapping and discuss additional barriers that should be removed to achieve roadmapping's full strategic potential.

2. Conceptualizing the roadmap

Economic environments are rapidly changing and increasingly uncertain, complex, and ambiguous (Bennett & Lemoine, 2014). Prior research has advanced the notion that firms face challenging business contexts resulting from increasingly intense international competition, an ever-evolving and highly demanding market, rapidly changing and potentially disruptive (digital) technologies, shortening product life cycles, and a myriad of other factors and their interplay (e.g., Wheelwright & Clark, 1992; Wiggins & Ruefli, 2005). Consequently, surviving and prospering over time has become harder: Firms need to continuously renew themselves to maintain a fit with their changing environment—or even try to shape it in their favor—and manage their innovations strategically to sustain their survival and prosperity (D'Aveni et al., 2010; Murmann, 2013).

To deal with these high-demand contexts, anticipate technology and product developments, and communicate and coordinate activities across their organizations, technology firms such as Motorola and Philips adopted roadmapping. As Willyard and McClees (1987) contended, roadmapping enabled Motorola to review its product direction, technology timing, and thus its priorities while balancing various functional and temporal perspectives. Indeed, as Groenveld (1997, p. 49) argued in the case of product development at Philips, roadmapping allows a firm to take a long-term view and to recognize far in advance “how to serve important markets with the right products at the right time and to improve the cross-functional processes required for new product creation.” As a result, he continued, firms achieve

a better competitive edge via improved time to market and time to money. Since then, many firms, sector agencies, and governmental bodies have applied roadmapping for a range of different reasons and purposes (Carvalho et al., 2013; Kerr et al., 2012; Phaal & Muller, 2009). As an initial and valuable contribution, Simonse et al. (2015) concluded, based on practices at twelve leading firms, that roadmapping either improves the timing of new product introductions when it is used in individual organizations or promotes innovation synergy when it is used in a network of industry partners.

Nevertheless, the view taken in these prior studies on the value of roadmapping is largely a narrow one: a tactical or operational view in which attention is focused on (the time to market of) a system, product (family), or component. We propose to take a broader view of the value to be gained and adopt the perspective of roadmapping as a strategy tool, an artifact that codifies knowledge about strategy making and employs a structured approach that helps to interpret, justify, and develop a strategy using graphical representation (Jarzabkowski & Kaplan, 2015). Here, it should be noted that scholars such as Wheelwright and Clark (1992) and Kerr et al. (2012) have already proposed that the (road)map can help to achieve strategic value but only when it is approached from a strategic point of view and when too strong

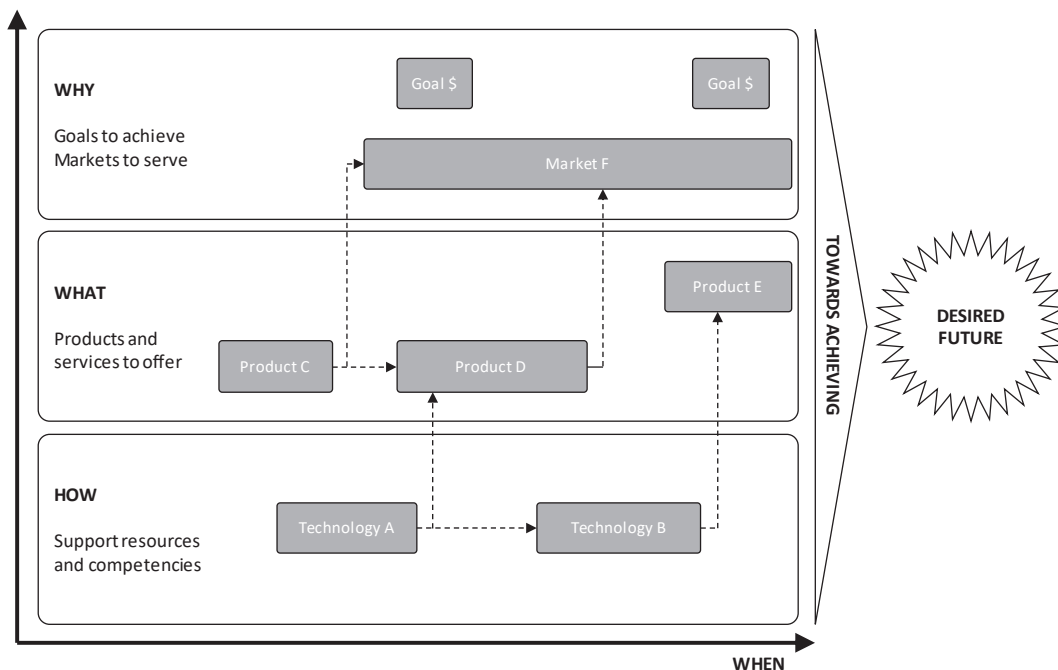
a focus on the details is eschewed. In short, we will demonstrate that roadmapping holds considerable promise to use as a strategy tool.

A schematic representation of a roadmap is displayed in Figure 1. In order to theoretically deduce the strategic value that can be derived from it, we take the broad view and begin with Raisz's (1948) description of a map. Phaal and Muller (2009), for example, have already argued that a roadmap links messages about know-why (external and internal drivers), know-what (offerings to customers), and know-how (resources and competencies) questions, which embraces a broader array of information than the market, product, and technology perspectives identified by Simonse et al. (2015).

Thus, to paraphrase Raisz (1948): A map depicts the earth's surface with various patterns and features, scaled down to a comprehensible size. This description allows us to conceptualize a roadmap, and roadmapping as an activity, by deducing three core features:

1. A map depicts, implying that it is a *graphical representation* of something. In the case of a roadmap, it graphically displays a firm's strategy.
2. A map has various patterns and features, meaning that it is based on *multidisciplinary*

Figure 1. Schematic roadmap layout



integration. In terms of a roadmap as a strategy tool, we deem this to involve orchestrating and linking inputs from diverse backgrounds and perspectives, mainly through the involvement of various relevant actors. In the case of a roadmap, multidisciplinary content is typically shown through linked items in know-why, know-what, and know-how layers on the vertical axis of the graphical representation.

3. A map has a scale and, thus, making a map involves *scaling* based on knowledge of distances and how items are ordered. More specifically, in a strategic context, scaling is associated with time as time plays a role as an explicit or an implicit measure of the sequence of activities, the timing of activities relative to other activities, and the effort activities require. In the case of a roadmap, the distance and order of items typically are shown on the horizontal dimension of the graphical representation.

This conceptualization offers a good place to begin theorizing about the value that roadmapping can bring as a strategy tool. The three core features of a roadmap, we will argue, help to overcome three critical challenges that firms face when formulating and implementing their strategy.

3. How roadmapping surmounts three strategic challenges

Based on the work of various authors (e.g., Comi & Whyte, 2018; Hambrick & Frederickson, 2001; Mintzberg, 1978), we define *strategy* as the realization of a coherent course of action by which a firm creates value for the long term. There is an overlap between this definition of strategy and our conceptualization of a roadmap. Indeed, achieving a coherent course of action requires orchestrating multidisciplinary content; elaborating a course of action to create long-term value requires time aspects such as the required effort and sequence of activities to be known; and realizing this course of action may benefit from displaying it graphically.

In reviewing the strategy literature, we identified three well-documented strategic challenges, each of which matches a component of this strategy definition: the challenge of achieving intertemporal strategic decisions, the challenge of realizing coherent strategic decisions, and the challenge of obtaining clear strategic decisions. Below, we review these three critical strategic

challenges, and we set forth how roadmapping helps to surmount them.

3.1. Intertemporal strategic decisions

The demands for short-term survival and prosperity may differ significantly from the demands for long-term survival and prosperity (Flammer & Bansal, 2017; Levinthal & March, 1993; March, 2006). In specific terms, for short-term survival and prosperity, firms need to emphasize the search for superior, exploitative strategic options that increase performance given the prevailing economic environment; for long-term survival and prosperity, firms need to anticipate a changing landscape, generate explorative strategic options, and formulate preparatory actions that allow access to future gains (March, 1991, 2006). Nevertheless, firms are habitually weak at balancing short-term and long-term orientations. On the one hand, firms typically suffer from myopia, in which they continuously focus attention on current and short-term gains at the expense of long-term direction setting and investment. On the other hand, firms may be hyperopic, where they focus attention mainly on foresightful activities while running the risk of over-emphasizing the long term and failing to give attention to current and short-term concerns. Both myopia and hyperopia are detrimental to a firm's performance as well as its chances of long-term survival and prosperity (e.g., Burt et al., 2015; Laverty, 1996; Levinthal & March, 1993). Hence, the challenge for firms is to invest in superior short-term options, to finance explorative long-term options, to make sure that these options are logically connected with consideration given to intertemporal trade-offs, and to ensure that the timing and sequence of actions are fitting (Kaplan & Orlikowski, 2013; Mosakowski & Earley, 2000; Slawinski & Bansal, 2015; Wheelwright & Clark, 1992). Technology-driven firms, which need a long-term perspective and early investment for their technologies to mature (Ford, 1988; Itami & Numagami, 1992), would especially benefit from such intertemporal strategic decision-making. They need to plan for the future and make timely investments in preparatory activities.

A roadmap and, in particular, its core feature of scaling can assist firms in overcoming the challenge of achieving intertemporal strategic decision-making. Inherently, the roadmap includes a time-scale on its horizontal axis, thereby graphically pinpointing the temporal location of activities and showing other dimensions of time that play a crucial role in strategies (Ancona et al., 2001; Hambrick &

Frederickson, 2001). In this sense, a roadmap functions as a temporal boundary object that makes time concrete and visible, allowing temporal coordination through rendering a narrative from past to future, and ensuring that people know the final destination and the route to reach it (Yakura, 2002). The roadmap, therefore, helps its creators to focus attention on various time frames and to forge connections between the future and the present in order to motivate behavior (Ancona et al., 2001; Kunisch et al., 2017). That is to say, the roadmap draws on the resources and competencies that are currently in place, focuses attention on present and short-term priorities while exploiting established wisdom, but—through its multiyear timescale—encourages the envisioning of a desired future that guides progress as well as the recognition of possible paths linking this future picture to the present business. In this regard, the roadmap helps firms to manage the tension between myopia and hyperopia: it includes a short-term and a long-term orientation, but neither is likely to prevail because of a roadmap's connection between both orientations.

Furthermore, roadmapping's core feature of scaling—by fleshing out when certain items of a strategy should be performed and how they should be positioned over time compared to other items—helps to ensure that the right products or competencies are in place at the right time (Hambrick & Frederickson, 2001). Prior research has emphasized that the sequence, duration, speed, and timing of activities should be carefully coordinated and matched to that of other activities within and outside an organization to ensure progress. Putting items of a strategy on a roadmap allows firms to carefully determine the precise timing an activity is undertaken in the context of the required temporal arrangement, the resources available, the urgency of activities, industry developments, and the ability to shape an industry (Ancona et al., 2001; Kunisch et al., 2017; Mosakowski & Earley, 2000). Thus, we suggest that a roadmap assists in obtaining a logical connection between activities and ensuring that the right activities are performed at the right time. Combined with its ability to balance the tension between myopia and hyperopia, we contend that a roadmap can help to overcome the challenge of reaching intertemporal strategic decisions.

3.2. Coherent strategic decisions

A firm consists of a collection of functions and persons, each performing discrete tasks and requiring coordination and a holistic view to

ensure effective strategic decision-making. Firms should consider and align the activities of various functional disciplines—such as technology, marketing, finance, human resources, and information technology—to ensure that their strategies are effective (Itami & Numagami, 1992; Kaplan & Norton, 2005; Wheelwright & Clark, 1992). For example, as Itami and Numagami (1992) reasoned in the case of technology, the current strategy capitalizes on current technology, the current strategy cultivates future technology, and the current technology drives cognition of future strategy. However, as Wheelwright and Clark (1992) concluded, such integration of various perspectives and strategies is often lacking to the detriment of performance.

In addition to orchestrating the input of various functional disciplines, Tsoukas (1996, p. 22) posited that the key to effective strategic management is “coordinating purposeful individuals, whose actions stem from applying their unique interpretations to the local circumstances confronting them.” Therefore, behavior that is in line with the intentions of a strategy depends on the level of understanding of and commitment to the goals and priorities of the firm on the part of these individuals; their absence is a major obstacle to achieving success (e.g., Floyd & Wooldridge, 1992; Giles, 1991; Ketokivi & Castañer, 2004; Noble, 1999). Hence, the challenge for firms is to compile a coherent story with elements that complement and reinforce each other to achieve strategies that are well-conceived and supported, contain synergies, and are hard to imitate—thus providing immense value (Hambrick & Frederickson, 2001).

A roadmap—in specific terms, its core feature of multidisciplinary integration—can help to surmount the challenge of realizing a coherent strategy. The creation of a roadmap requires insights to be combined from the know-why (external and internal drivers), know-what (products and services to offer), and know-how (resources and competencies such as technologies) dimensions of knowledge. The roadmap itself promotes a holistic view of strategy-making by incorporating and aligning various perspectives, ensuring that key elements of a strategy are considered and well-conceived (Kim et al., 2018). While it is true that some individuals have the necessary capabilities to perform this task, multidisciplinary integration typically requires the active involvement of various individuals with diverse backgrounds and viewpoints (Grant, 1996; Tsoukas, 1996). In particular, a multidisciplinary team approach creates the capacity to build on

diverse sources of knowledge that are dispersed across a firm or even beyond the boundaries of a firm when external parties are included (West & Bogers, 2014). For medium-complex and cross-functional problems—characteristic for organizational contexts such as strategy formation—teams have the “ability to build on solutions proposed by individuals with different functional backgrounds, which enables the collocated team members to acquire a holistic perspective of the problem and to find superior performance solutions” (Kavadias & Sommer, 2009, p. 1908). In addition, the holistic perspective and the multiple views across an organization allow for the identification of platform potential “among a firm’s offerings, target markets, and the process for creating and delivering offerings” (Halman et al., 2003, p. 150). Specifically, this may foster the identification of shared technologies, subsystems, production assets, and linkages that otherwise may be overlooked, resulting in synergies that improve alignment, increase efficiency, and shift organizational priorities (Halman et al., 2003; Meyer et al., 2018; Thomas et al., 2014). A practical example of platform identification includes Volkswagen’s platform-based approach to product development in which a set of standardized subsystems and interfaces—such as the front axle, the paddle box, and their interfaces—are shared across a collection of products that are launched over time and in different market segments. This not only pertains to the multibillion-dollar MQB platform (Modularer Querbaukasten) launched in 2012 but also the more recent MEB platform (Modularer E-Antriebs-Baukasten) for their electric vehicles, which are being used to launch a wide diversity of car models of Audi, SEAT, Skoda, and Volkswagen at increased speed and reduced cost. Identifying platform potential can be a strategic weapon, but it requires balancing current and future market needs across multiple offerings as well as technological inputs.

Thus, we posit that a roadmap helps to overcome the challenge of obtaining a coherent strategy: Its core feature of multidisciplinary integration enables the creation of high-quality strategies with elements that complement and reinforce each other. Moreover, by involving various individuals with diverse backgrounds, roadmapping helps to attain a coherent course of action once a roadmap has been created. Its collaborative process promotes increased understanding of and commitment to the formulated strategy (Floyd & Wooldridge, 1992; Ketokivi & Castañer, 2004). This deep involvement—providing input to the roadmap, engaging in discussions,

making proposals, reviewing alternatives, negotiating, and reaching compromises across management levels and functional disciplines—improves shared understanding and motivation, and prevents individuals from embarking on activities that pull in opposite directions (Floyd & Wooldridge, 1992; Jarzabkowski & Balogun, 2009). In this respect, the roadmap should be considered a boundary object (Carlile, 2002, 2004; Ewenstein & Whyte, 2009): it has different implications and interpretations across a firm’s functional disciplines and individuals whilst being stable enough to communicate meaning and coordinate actions. Therefore, we suggest that a roadmap can help to overcome the challenge of executing a coherent strategy, both during and after its creation.

3.3. Clear strategic decisions

Strategic discourse is aimed at bringing others to fresh understandings and novel actions by highlighting, juxtaposing, and linking information so that an imagined future for an organization is envisioned. Effective strategic discourse demands the development of a credible and compelling line of reasoning that employees are readily able to understand, remember, and act on so that the organization’s strategy can be suitably enacted (Barry & Elmes, 1997; Meyer et al., 2013). However, a lack of knowledge or understanding of a firm’s strategy on the part of its employees has been seen as one of the main reasons for the often-reported gap between expectations for a strategy and its performance in reality (Beer & Eisenstat, 2000; Giles, 1991; Hrebiniak, 2006; Noble, 1999). Namely, strategies are often vague and highly abstract statements—objectives, budgets, and wish lists—that are difficult for employees to transform into action since they find it hard to pinpoint those actions that should be prioritized (Giles, 1991; Mankins & Steele, 2005). Hence, the challenge for a firm is to ensure that its strategy is communicated clearly — that is, simple, unambiguous, and in a format with which its employees can work — so that they know not only the priorities to focus on but also the logic behind those priorities (Beer & Eisenstat, 2000; Giles, 1991; Mankins & Steele, 2005).

A roadmap—more precisely, its core feature of graphical representation—can help to surmount the aforementioned challenge of clearly informing people, changing their minds, and triggering action. Prior research has found that visual artifacts such as pictures, photographs, drawings, paintings, and maps are performative in different ways compared to other forms of communication.

Notably, they convey knowledge in a manner that verbal text cannot match (Meyer et al., 2013; Moriarty, 1996). First, visual artifacts present knowledge in a holistic, immediate, and memorable way whereas, in verbal text, the message is linear and sequentially arranged, revealing its meaning piece by piece over time. Second, visual artifacts can transfer knowledge on a level of objectivity, accuracy, completeness, and detail that verbal text cannot equal. Finally, visual artifacts can express identities and values by using colors, shapes, and other visual attributes. Consequently, previous research has suggested that visual information is processed and retrieved better and more quickly than verbal information (Kernbach et al., 2015; Meyer et al., 2013), improves understanding of complex and contentious information (Cummings & Angwin, 2011; Knight et al., 2018), increases awareness of strategy and coordination between people, and enhances their motivation (Eppler & Platts, 2009; Kernbach et al., 2015). Knight et al. (2018), in line with Barry and Elmes (1997), explored the visual mechanisms employed to achieve this value. They found that visual depiction allows for objectivity and a focus on important elements, that the juxtaposition of various items of information enables the easy depiction of relational linkages and complexity, and that salience offers the ability to highlight important elements or priorities. In conclusion, a roadmap, by graphically displaying and detailing the strategy while juxtaposing and linking key items from various functional perspectives on a timeline, helps to overcome the challenge of achieving clear strategic decisions. It offers a holistic, simplified, and memorable message about the strategy, and it guides employees' behavior by identifying what actions to take, emphasizing the importance and priority of these actions, and revealing the logic behind them.

The role of a roadmap in supporting clear strategic decisions goes beyond bringing knowledge across and generating actions; it can also assist in achieving clear strategies through the very process of its creation (Ewenstein & Whyte, 2009). In this process, a roadmap—as a visual artifact—can constantly focus attention on missing elements, raising questions about the quality and form of the artifact, and stimulating further development, especially in a context where multifunctional teams are involved. Visual artifacts are relevant in different ways to different persons, are interpreted variously by these people, and carry different implications for them. This stimulates a constant process of eliciting, creating, structuring, linking, sharing, evaluating, and discussing

interpretations, knowledge, and elements of the visual artifact, which leads to defining, redefining, and ultimately enhancing both the visual artifact and its underlying strategy (Eppler & Platts, 2009; Ewenstein & Whyte, 2009; Knight et al., 2018; Paroutis et al., 2015). For example, visual artifacts can assist in uncovering interdependencies among strategic elements (Eppler & Platts, 2009). For this reason, we contend that a roadmap can help to surmount the challenge of achieving a clear strategy, during both its creation and its dissemination.

4. Key principles for effective strategic roadmapping

Firms need to carefully design their approach to roadmapping if they do not want to lose some of the benefits the tool offers in surmounting the three strategic challenges discussed previously. In support, this section offers ten key principles to assist firms in organizing their roadmapping processes while aiming to obtain the strategic benefits promised. Figure 2 summarizes these key principles graphically.¹

4.1. The roadmap is a visual used throughout the strategy process

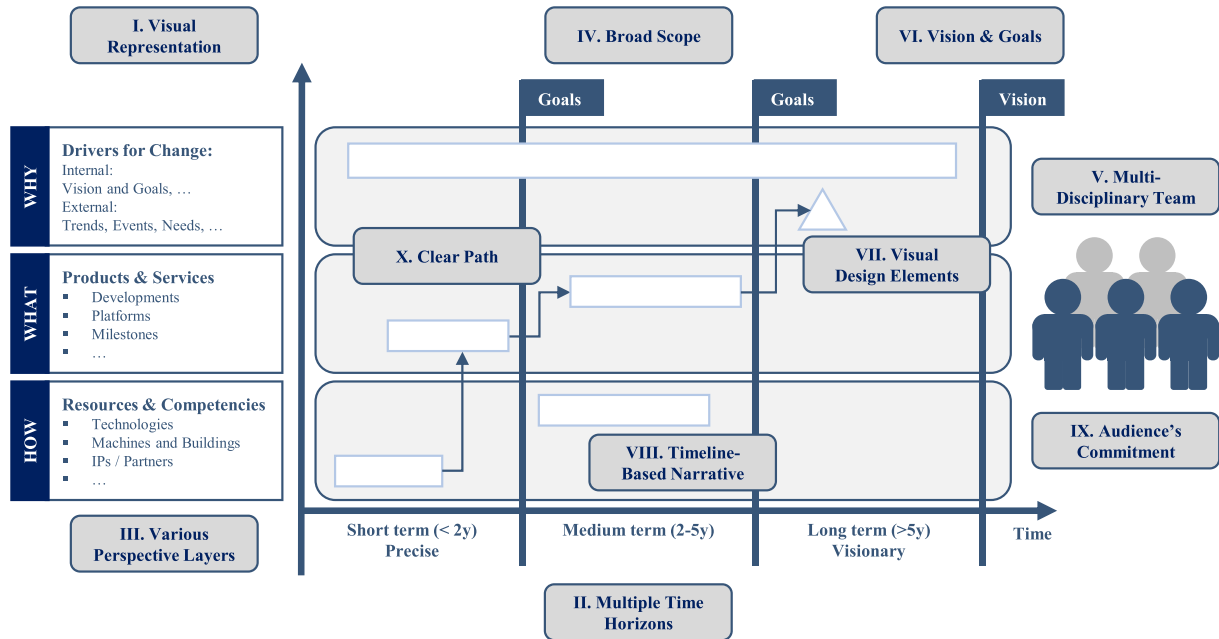
Roadmaps are visual artifacts that feature short textual descriptions. They are not just tables, bullet lists, or plain texts. Firms should use the visual to create and communicate their strategy. It is vital to manage the tension between using a simple visual graph to convey important elements of a strategy and devising a comprehensive storyline and stimulating the roadmap's creators to devise better strategies. Interactive software tools can be very helpful to ensure a holistic, orderly, and understandable message about the strategy. For example, they can provide a zoom function to switch between broad and detailed views of the roadmap.

4.2. The roadmap connects the short term and the long term

If firms are driven solely by short-term customer demands in their current economic environment, they will inevitably fail. Firms must also ensure

¹ The ten key principles are based on theory, experience, and lessons learned from a multiple case study in which roadmapping's application in practice was explored in ten firms that are leading in their industries.

Figure 2. A visual summary of the 10 key principles for effective strategic roadmapping



that they anticipate explorative developments beyond the short term and formulate the preparatory actions required. Therefore, roadmaps must include short-term, medium-term, and long-term horizons, with the short term being more detailed than the longer term.

4.3. The roadmap consists of various perspective layers

Roadmaps should explicitly incorporate and align multiple perspectives, covering why, what, and how, typically the markets to serve and the internal drivers for change, the offerings to customers, and the resources and competencies required. Firms should avoid narrow-scope roadmaps with a sole focus on products that do not connect to other perspectives. In short, all important elements of the strategy should be considered in detail to ensure that strategies are effective.

4.4. The roadmap has a sufficiently broad scope

Roadmaps are relatively easy to create at the level of projects or individual products, but they only unleash their full potential value as a strategy tool if a broader, more comprehensive, scope is adopted. Roadmaps at the level of multiple products, business units, and the firm not only

improve the overview of and alignment across activities but also create the ability to achieve platform potential and synergies that can create efficiency, shift priorities, and even lead to investment in directions that otherwise would not be feasible.

4.5. The roadmap is created by a multidisciplinary team

Roadmaps benefit from being created by multidisciplinary teams that exploit the diverse knowledge of their members, create superior quality roadmaps, and increase the chances of successfully implementing the strategy. Team members may have a background in, for example, R&D, product management, marketing, and supply-chain management.

4.6. The roadmap is driven by a future vision and intermediate goals

The starting point of a roadmap should be long-term direction setting by means of a challenging and inspiring vision. The vision offers a clear picture of where the firm will be heading, motivates behavior and investment, and prevents nearsightedness. In addition, setting intermediate goals over multiple time frames supports the firm in effectuating the transformation required.

4.7. The roadmap uses various visual design elements to elucidate aspects of the strategy

Visual design elements are important in conveying the roadmap's key messages lucidly. They can include colors to show the importance of various activities and how they are linked, bars to mark activities and occurrences with a duration, and symbols to spotlight events and milestones. Connecting lines between these shapes show the developmental path, denoting output/input connections and the timing required. In essence, roadmapping and visualization skills go hand in hand.

4.8. The roadmap forges a temporal, timeline-based narrative

Pinpointing the temporal location of activities on a timeline and showing other dimensions of time are elements that are inherent to successful roadmapping. Not only should firms display the timing, duration, and speed of an activity but they must also coordinate these dimensions with those of other activities and set priorities. Firms should forge a storyline across time frames, giving consideration to intertemporal trade-offs and ensuring that the sequence and timing of activities are right so that the offerings required are in place and are consistent with the available resources, the firm's long-term goals, and the external demands placed on the firm.

4.9. The roadmap secures commitment from the audience affected

Informing employees, changing their minds, and triggering actions that are in line with the strategy is vital for firm performance. Therefore, the content of the roadmap should be explained to employees, and they should have continuous access to it. If a firm fears that it cannot keep its secrets secure, it may vary the level of detail in the roadmap items that it shares with its employees.

4.10. The roadmap forges a clear path toward the future with activities that are tailored to each other

Firms need to ensure that their strategies are prescriptive and focused, clearly indicating the priorities that should be focused on. The aim is to create a coherent story that breaks down the future vision into concrete steps for today. To this end, adhering to the previous nine principles is a

prerequisite. Above all, it requires strategic thinking, tailoring activities, and making choices among alternatives to create value. In doing so, a firm should select and adjust strategic options so they fit together seamlessly, balancing aspects such as time horizons, risk levels, and the resources and competencies available.

5. Removing roadblocks and bringing roadmapping forward

Roadmapping is certainly not a panacea, though. The tool itself has some weak spots, while the success of its application is highly dependent on a myriad of factors. That is to say, strategy tools alone are not the answer to specific challenges. Rather, they are "parts of complex organizational processes" (Jarzabkowski & Kaplan, 2015, p. 538) where their affordances can be of great help, but where they interact with many personal, organizational, and contextual aspects in producing outcomes (Burgelman et al., 2018; Hutzschenreuter & Kleindienst, 2006; Jarzabkowski & Kaplan, 2015). Firms should be aware of potential roadblocks that may limit the strategic benefits achieved from roadmapping. Below, we review the key roadblocks that need to be recognized and surmounted or, at least, mitigated. In short, these roadblocks are roadmapping-specific, organizational, and contextual in nature.

5.1. Roadmapping roadblocks: Crafting a roadmap requires considerable effort and skills

All strategy tools have their downsides, and roadmapping is no different. In general, the adoption and successful application of a strategy tool are associated with individuals' familiarity with the tool and its ease of use. Strategy tools that are widely known and relatively simple to use—for example, because they are part of business school curricula (Jarratt & Stiles, 2010; Jarzabkowski et al., 2013)—or tools that require no specific competency to understand and apply are more easily selected, applied, supported, and institutionalized than those that are less accessible, even if these are better applicable to the challenges at hand (Jarzabkowski & Kaplan, 2015).

Roadmapping may be faced with such issues (Carvalho et al., 2013). A key realization for firms should be that developing a high-quality roadmap, as with any strategy, is intrinsically a demanding task. Creating the roadmap, ensuring its

implementation, and keeping it up to date demand a considerable amount of effort, time, and resources; a one-off, half-day workshop is unlikely to be sufficient. Roadmapping can also come across as a complex task. In particular, performing analyses, generating and evaluating strategic options, forging a coherent strategy, and creating a clear visual are activities that benefit greatly from awareness about roadmapping, competence in applying the tool, and astute analytic, strategic, creative, and visualization skills. Software solutions may help to ease roadmap creation and dissemination but tailoring them to a firm's specific context requires expertise in applying the tool as well (Jarzabkowski & Kaplan, 2015). Yet inevitably, firms will find that not all persons are equally suited to perform the task. Indeed, firms generally suffer from insufficient roadmapping expertise and awareness, which is also evidenced by the tool's absence on the list of tools frequently taught in business schools (Jarzabkowski et al., 2013). Firms may know about the tool, recognize its potential strategic value, and adopt it willingly, but typically they will lack profound methodological knowledge and expertise. The quality of the roadmaps created and the embedding of the tool in the organization may be compromised if firms fail to recognize and surmount these roadmapping-specific roadblocks.

5.2. Organizational roadblocks: Roadmapping requires proper organizational conditions

In line with the reasoning of Jarzabkowski and Kaplan (2015, p. 551), introducing roadmapping neither removes "the politics or emotions of strategy making" nor does it exclude broader organizational aspects from influencing strategy formulation and implementation. Indeed, crafting a strategy and ensuring its implementation is inherently a social process that depends greatly on the organizational context at play, and prior research has outlined many influencing factors (e.g., Burgelman et al., 2018; Hutzschenreuter & Kleindienst, 2006). Roadmapping may help to alleviate some key issues, but it will not eliminate them.

Notably, the individuals and teams involved in creating and implementing the roadmap are the key determinants of the strategy that will be realized (Hutzschenreuter & Kleindienst, 2006). In this process, (top) managers or employees may vigorously promote particular views over others, withhold information to justify favored courses of action, misuse their power, refuse to participate,

block collaboration among disciplines, or show a lack of commitment to agreements, either because they feel that it serves the firm's interests or because it supports their own agendas (e.g., Jarzabkowski & Kaplan, 2015; Noble, 1999). While such behavior is not necessarily detrimental to the quality of the strategy that ultimately is implemented, firms should be aware that these processes and practices do occur and may impair the value they obtain from strategic roadmapping.

Moreover, organizational processes, routines, and cultures can impact strategy outcomes (Ocasio, 1997), while, similarly, the absence of standardized processes and procedures may act as a major barrier to effective strategic roadmapping (e.g., Carvalho et al., 2013). Concerning the latter, if roadmap creation and implementation are not supervised and well structured—including clarity on the steps to take, their timing, the actors that should be involved, and their responsibilities—the processes followed and the outcomes achieved may differ over time and will likely depend on the persons involved. In these cases, firms may find it hard to achieve the strategic value of roadmapping on an ongoing basis. Alternatively, by way of illustrating the potential impact of broader organizational aspects, we observed that the existing culture, structures, and procedures (e.g., an emphasis on pressing customer demands and feedback, working on tight schedules and deadlines, or a prevailing system of rewards that force managers and employees to adopt this type of behavior; Hrebiniak, 2006) may cause a persistent short-term focus where firms become too readily immersed in the short-term demands of the day-to-day business. Such behavior can be detrimental to the value of roadmapping, and it can put a firm's future survival and prosperity at risk.

5.3. Contextual roadblocks: Roadmapping requires an ability to anticipate and shape critical changes in a firm's economic context

Taking a long-term perspective requires firms to anticipate a context that is likely different from their current strategic context, yet the precise nature of the changes needed is typically unknown. In consequence, firms are exposed to great risks: they often display a bias favoring exploitation of current activities, potentially misunderstand their future business environment, plan their future activities based on these insights, favor committing to plans once they are created, and run the risk of preparing for the wrong future business context and failing to anticipate

discontinuous change (e.g., Bennett & Lemoine, 2014; Grant, 2003; March, 2006). Firms, therefore, should be aware that their business environment may change in unexpected ways, that the ultimate value they derive from strategic roadmapping depends greatly on the specific future business environment that materializes, and that their ongoing survival and prosperity hinges on their ability to anticipate, manage, and shape the critical changes in this environment. In support, scenario analysis and its exploration of multiple states of the future external environment can offer considerable benefit (Schoemaker, 1993; Siebelink et al., 2016), but its application and combination with roadmapping are sophisticated and require firms to exercise a broader and more advanced set of skills and expertise.

6. Concluding remarks

In this article, we positioned the roadmap as an organizational artifact and argued that it has affordances that make it especially fit for use as a strategy tool. We introduced and conceptualized roadmapping, demonstrated that the tool is likely to prove a valuable asset in surmounting three critical strategic challenges that many firms face, and described key principles for strategic roadmapping and barriers that must be mitigated to support firms going forward with their strategy formulation and implementation. In short, we posit that the strategic value of a roadmap is found in realizing clear, coherent, and intertemporal strategic decisions, and we caution firms not to think too lightheartedly about applying roadmapping if they want to attain its full value as a strategy tool.

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