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Research Article

Productizing methods and tools for innovation management and entrepreneurship: a process proposal

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Abstract

Management Methods and Tools (MaTs) are artifacts that assist decision-makers in organizations and have a unique role in innovation and technology-based entrepreneurship. Such a context is characterized by uncertainties and risks that make processes complex and dynamic. The positive impact of adopting MaTs in organizations is well documented in the literature. However, MaTs for innovation and entrepreneurship constitute a myriad of options today, and managers often face the tricky challenge of selecting MaTs properly and implementing them in fruitful ways. In this context, productizing MaTs emerges as a promising path. Productization is the process of analyzing a need, defining, and combining elements to obtain something replicable and understandable, which can be adopted as a "product". Guided by the Design Science Research (DSR) methodology, this article develops and discusses a proposal for the productization of MaTs for innovation and entrepreneurship. The study is based on the actual demand of a research network focused on developing and applying MaTs by innovation intermediaries, such as technology parks. The proposed process advances the agenda of disseminating MaTs to potential adopters, fostering more informed applications and positive organizational impacts. It also contributes to the emerging debate on the productization of MaTs from an academic perspective in contexts of high uncertainty and risk, characteristic of innovative companies.

Keywords: productization, management methods and tools, innovation, entrepreneurship.

1. Introduction

Management Methods and Tools (MaTs) can be defined as a means of assistance for organizations to achieve specific objectives (Brady et al., 1997). They are crucial to facilitating innovation management processes and increasing the success rate in product development (Mortara et al., 2014). Additionally, they help translate theoretical concepts for managers who use MaTs to analyze and explain external or internal conditions for strategic decision-making (Vuorinen et al., 2017). Especially in technology-based innovation and entrepreneurship, where the constant presence of uncertainties and risks makes processes complex and dynamic, MaTs play a significant role in boosting organizational performance (Oliveira et al., 2022; Souza et al., 2022).

In line with Morais et al. (2020), it is worth noting that the PMD – Product Management & Development review and community has a long tradition of investigating, proposing, and applying MaTs in innovative contexts. A non-exhaustive list includes Cheng (2002) with a Quality Function Deployment (QFD) implementation guide; Benedictis et al. (2004), who studied MaTs for modeling the product development process; Oliveira et al. (2009), with an application of Roadmapping in startups; Carvalho & Mello (2011) that investigated Scrum for product development; and Cunha et al. (2013) offering a case of information management MaTs supporting the product development process. In turn, Bagno et al. (2015) analyzed tools for diagnosing innovation in organizations, while Marques et al. (2015) dug into practical real cases of MaTs for product and product-service systems development. In the service field, Inácio & Neves (2018) studied a specific tool applied to product development companies. Bagno et al. (2016, 2020) and Bianchi et al. (2017) focused on the MaTs proposition for automotive companies. Leopoldino et al. (2016) offered a systematic review of creativity techniques, while Piccirillo et al. (2018) developed a bibliometric analysis on the application of the Design Structure Matrix (DSM) in project management. Yet, Campese et al. (2019) studied the empathy map method; Oliveira et al. (2019) discussed MaTs and other new approaches applied to the fuzzy front end of innovation. Melo Filho et al. (2021) revisit QFD and other combined MaTs to propose a new approach for academic spin-off development, while Souza et al. (2022) propose a process model integrated with a set of MaTs to support the development of digital startups. Finally, Teixeira et al. (2023) combine distinct MaTs to elaborate a strategy framework for an academic technology center.

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The association of applying MaTs with higher innovation performance is highly recognized in the literature (c.f., Souza et al., 2022). However, the connection between the specific needs of an organization and the search, selection, understanding, and application/implementation of MaTs is a challenge that faces the growing complexity given by the myriad of management tools and techniques provided by scholars, managers, and consultants, who are constantly developing new ways to support businesses (Mortara et al., 2014). With an increasing number of MaTs available, each with its particularities in terms of business level of analysis, central purpose, technical constraints, underpinning assumptions, and so forth, familiarity and ease of use become critical factors in the choice and adoption of MaTs by managers in organizational practice (Jarzabkowski & Kaplan, 2015).

Given the many options of MaT for innovation and entrepreneurship with ambiguities about their characteristics, potentials, and limitations (often inadequately addressed by publications that promote them), it is necessary to delve into the processes and means that facilitate the communication of MaTs' proposals, applications, and relevant characteristics of each MaT to ease the choice and use by practitioners. Notably, in innovation-promoting environments such as technology parks that concentrate intense science and technology-focused companies and other innovative organizations, these challenges are as latent as they are central to the development of businesses and the associated ecosystem. In such a context, the productization of MaT emerges as a promising path.

In general terms, productizing can be understood as the process of analyzing a need, defining, and combining elements to obtain something replicable and understandable as a result (Harkonen et al., 2017). Productization aims to introduce characteristics similar to those of a product (notably those related to tangibility) into elements that lack such characteristics.

The service literature stands out as an area where the productization debate has been more extensively studied and discussed as a specific type of service innovation that seeks to systematize and formalize both the content and the process of services (Valtakoski & Järvi, 2016). The benefits of service productization include reducing overlap in work and increasing service quality (Harkonen, 2021), facilitating internal and external understanding of service offerings (Valminen & Toivonen, 2012), which is of central importance to foster the sale and purchase of services (Jaakkola, 2011). These results can be obtained through systematization, standardization, and tangibilization of service offerings (Harkonen et al., 2017; Lehtonen et al., 2015).

MaTs for innovation and entrepreneurship are management technologies that carry several characteristics similar to those of professional services. This is so because they inherently consist of condensed knowledge elements used in organizational practices to assist decision-making and the disciplined conduction of various processes. A productization perspective can significantly enrich the MaTs' design and adaptation to ease their diffusion and ensure adequate organizational applications. Interestingly, although entrepreneurship, innovation management, and new product development fields have long been leveraged by the use of MaTs, the MaTs themselves are rarely dealt with as innovative artifacts subject to a systematized approach to reach the needs of a desired audience efficiently.

Characteristics and challenges such as low tangibility in the value proposition and difficulty in communicating clearly with practitioners (in the case of services, the clients) about the scope of application and best practices, for instance, are present in both the professional services and MaTs contexts. Thus, although the productization of MaTs is an incipient discussion, the debate on productization in the services literature provides essential references for this discussion. These references are promising points of departure for developing a proposal to productize MaTs for innovation and entrepreneurship. As such, a path to address the problems presented to contribute to greater tangibilization and clarity in communicating the objectives, scope, and limitations of MaTs can be delineated.

The central objective of the present study is to explore the concepts of productization, methods, and tools and, based on the contributions of the literature on service productization, to propose a process for the productization of MaTs, particularly those that focus on innovation and entrepreneurship. The research environment is a technology park, which served as a living lab for the development and application of MaTs and the process of MaT productizing.

The topics are organized as follows: Section 2 is the literature review, which explores the debate on service productization (as the closest available analogy for MaTs productization) and the overall landscape of MaTs for innovation and entrepreneurship. In section 3, we present the research methodology, which followed the guidelines of Design Science Research. The process proposal for MaT productization unfolds in section 4, as well as its complementary artifacts and a discussion on the implications and challenges of application. Finally, section 5 concludes the study, highlighting its main contributions and limitations and proposing paths for the future.

2. Literature review

2.1. Service productization

While a product typically acquires an autonomous physical existence after being produced, ensuring a high degree of tangibility, a service, in general, is intangible and lacks externality, constituting an act or set of processes executed by a service provider on behalf of the customer (Gallouj & Weinstein, 1997; Gadrey & Gallouj, 1998).

The productization of services has been a central research topic for decades (Valminen & Toivonen, 2012). Its benefits, including reducing work overlap and increasing service quality (Harkonen, 2021), facilitating internal and external understanding of service offerings (Valminen & Toivonen, 2012), are observed in companies. In this context, productization can be understood as a specific type of service innovation that seeks to systematize and formalize both the content and the process of services (Valtakoski & Järvi, 2016). Productization can also be discussed in terms of organizational learning and as a process of converting tacit knowledge into explicit knowledge (Valtakoski & Järvi, 2016).

In general, among the main objectives of productization is to address some of the typical inefficiencies of services, such as the difficulty for clients and employees to perceive the intangible offers that constitute the service, as well as the lack of standardization of services, while keeping customer satisfaction at the center of organizational goals (Elia et al., 2019). To achieve this goal, companies employ strategies such as standardization, tangibilization, and systematization of service offerings (Valminen & Toivonen, 2012; Jaakkola, 2011; Elia et al., 2019; Lehtonen et al., 2015; Harkonen et al., 2017).

One of the primary objectives of service productization is the tangibilization of the service, which is related to how well services and their subjacent processes are understood internally and externally (Harkonen et al., 2017). Making services more tangible helps reduce the customer's perception of risk when purchasing professional services due to their abstract nature and the inclusion of product-like features to form a service offering that conceptualizes the service as an object beyond the set of processes leading to an outcome (Grönroos, 2020).

Although the types of services offered by organizations have numerous variations in contexts, goals, and approaches, Wirtz et al. (2021) note that the main dimensions regarding inherent challenges common to various types of services are their intangibility and lack of comprehensibility, absence of standardization, low formalization, systematization, repeatability, configuration, and modularization.

Figure 1 illustrates the nature of a successful productized service, resulting in a systematized, tangibilized, and formalized offering. It considers customer orientation, productization practices, and techniques (blueprinting, modularization, and customer benefit assessments, among others), consisting of well-documented service processes with internal visibility in the company. The service elements include the core, additional, and support elements with customer visibility (Harkonen et al., 2017).

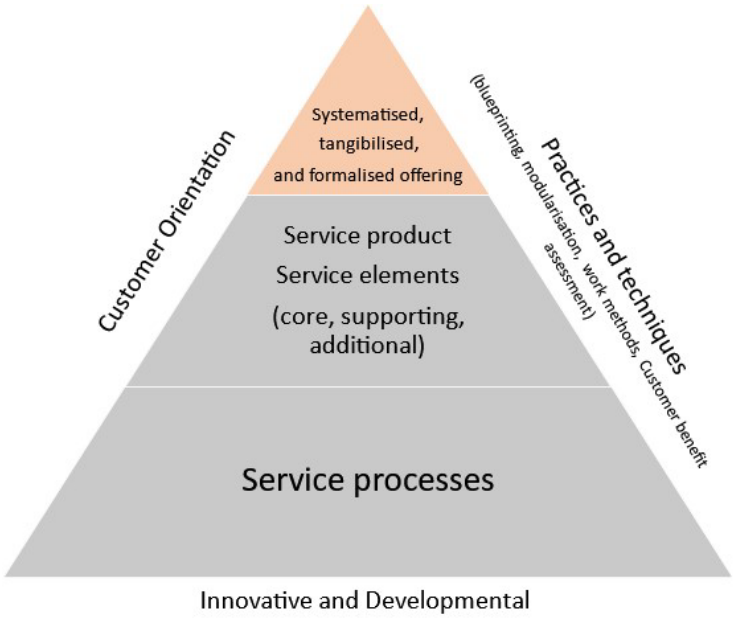

Figure 1. Nature of the productized service. Adapted from Harkonen et al. (2017).

2.2. Management methods and tools (MaTs) for innovation and entrepreneurship

Although it is challenging to converge on a precise definition of what constitutes a management method or tool (Brady et al., 1997), these form a crucial part of the technology present in organizations, considered as a specific type of knowledge (Phaal et al., 2004). Regarding objectives, MaTs are increasingly utilized artifacts to assist decision-makers in business data analysis, leading to improved processes, products, and services, ultimately resulting in superior performance and achieving specific organizational goals (Brady et al., 1997; Wright et al., 2013). Some MaTs, such as BMC (Business Model Canvas), Roadmapping, and QFD (Quality Function Deployment), constitute broadly recognized, powerful and practical forms to support entrepreneurs and organizations in strategic and innovative efforts. These efforts include developing products, new businesses, and new markets (Cheng, 2003; Melo Filho et al., 2021; Kerr & Phaal, 2022).

MaTs are generally seen as technological artifacts that aid the management process, connecting and adapting theoretical knowledge for practical use (Jarzabkowski & Wilson, 2006). Considering the speed and ease with which new ideas and management approaches spread in the business environment and recognizing the relevance and use of these artifacts in various types of organizations (e.g., companies, technology centers, universities, and technology parks), it is essential not only to understand how MaTs are developed, tested, and made available (Whittington, 2004; Jarzabkowski & Kaplan, 2015) but also to identify the criteria and motivations that lead practitioners to choose specific MaTs among the myriad of options available to assist them in their organizational decision-making processes.

The literature on management methods and tools emphasizes the importance of features that facilitate self-application, including guidance and clarification about the recommended ways of usage (Phaal et al., 2018). Figure 2 presents a classic template of a Roadmap. By turn, Figure 3 illustrates a self-facilitated template for the fulfillment of the Roadmap, including guidance and information that foster the understanding of the tool, reducing the need for an intermediary's knowledge during the roadmapping process.

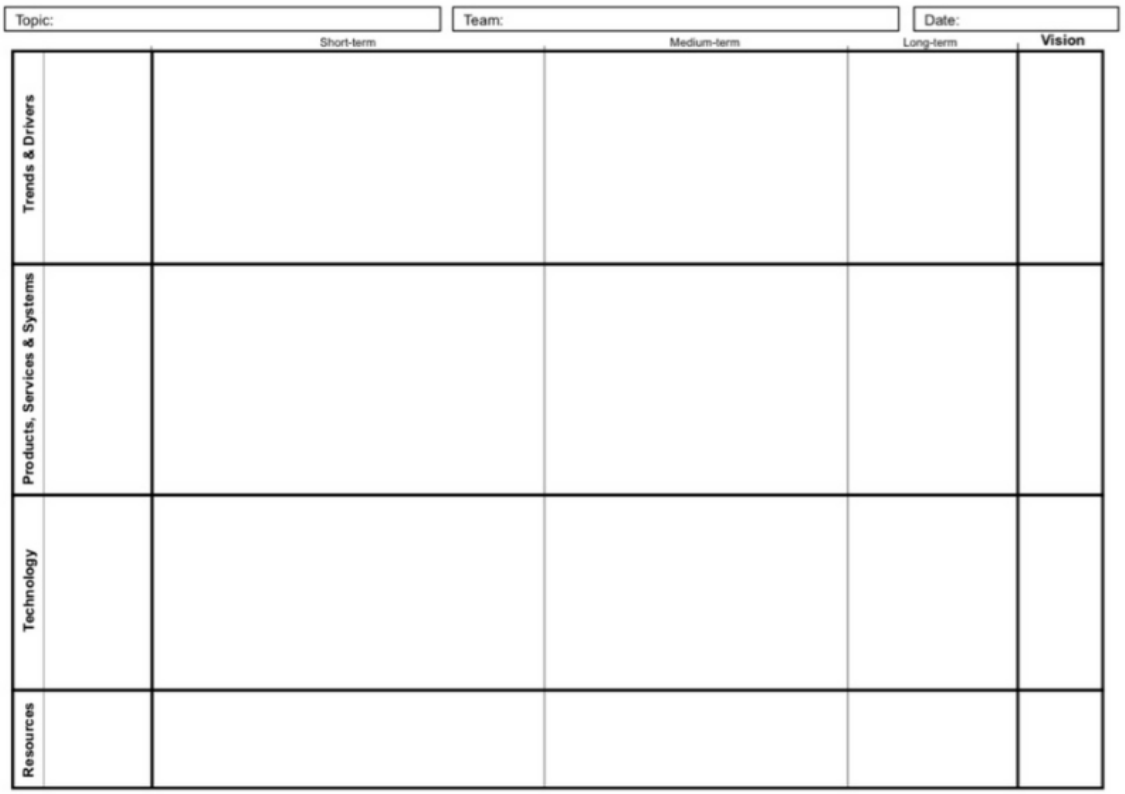

Figure 2. "Classic" roadmap workshop template (Phaal et al., 2018).

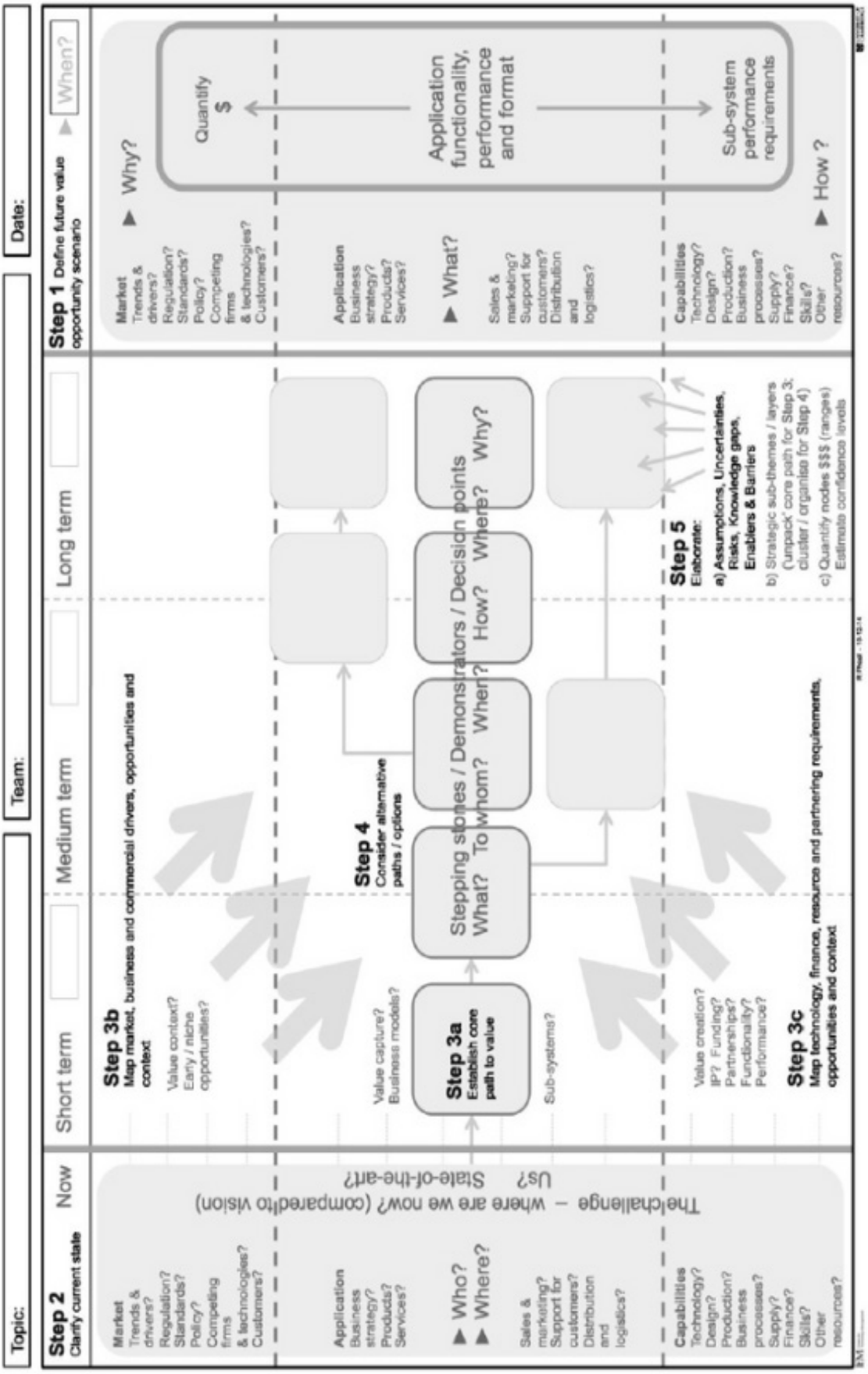

Figure 3. "self-facilitating" roadmap workshop template (Phaal et al., 2018).

3. Methodology

This study comes from a real-world demand raised by LabMIn - Laboratory of Innovation Methodologies, a Brazilian research network coordinated by the Belo Horizonte Technology Park (BH-TEC). LabMIn focuses on developing management technologies to support innovation and entrepreneurship efforts in innovation-promoting environments, such as tech parks, incubators, and so forth. As part of a whole set of LabMIn's work fronts, the productization of MaTs aims to delineate approaches to developing, communicating, and providing management methods and tools suitable for the context of the environments associated with the research network's nature and purposes.

This study takes assumptions and recommendations from Design Science Research (DSR), which is aligned with the objective of developing a solution (management artifact) with some degree of generalization within a well-defined current condition in business practice (Van Aken & Berends, 2018). In our context, BH-TEC and its associated companies constitute a living lab propitious for developing and applying proposals and collecting results and perceptions from practitioners.

The proposal of a process for the productization of MaTs has been developed by the NTQI team (Technology Center for Quality and Innovation / UFMG), consisting of four individuals (one professor, two postgraduates, and one undergraduate student) in constant interaction with other network members. At the time of the preparation of this text, the development of the proposal had involved 13 months of work, consisting of weekly meetings lasting 2.5 hours for the presentation and discussion of theory, proposition and development of design parameters for the productization process, presentation of a complementary artifact, four pilot MaTs workshops, and follow-up meetings with workshop participants to assess perceptions regarding the application of productized MaTs in their real contexts.

4. Process for MaT productization

Considering the advancements in the study and validation of service productization and the challenges of development, diffusion and adoption of management MaTs, it is possible to observe similarities between the provision and communication of MaTs and the service offering concerning the difficulty in clear communication of value and intangibility. Thus, we propose that the productization of MaTs should contribute to (i) Improve communication of a MaT's application, scope, and limitations; (ii) Assist both MaT specialists and developers, as well as managers of organizations and innovation-promoting environments in terms of communication, adoption, and standardization of MaTs; (iii) Assist in the selection of MaTs in organizational contexts; and (iv) Facilitate the connection between MaT specialists and practitioners.

The proposed productization process focuses on articulating a MaT with other elements that complement it and add characteristics that make it more tangible. By providing such a process, in addition to artifacts that facilitate understanding, application, and increased perception of value, the productization of Methods and Tools can contribute to companies and practitioners knowing, understanding, and using MaTs more objectively, productively, modularly, and tailored to the needs of their business. Figure 4 illustrates the stages outlined in the proposed process, which includes the development of artifacts (described in the next topic) and actions. Such actions comprise contacting the MaT specialist (step 1) for alignment on the process, drafting the technical description (step 2) performed by the specialist using the LabMIn standard form, creating the guide (step 3) including text creation by the specialist and formatting and layout by LabMIn, approval of artifacts (step 4) by the LabMIn team, review of elements not approved in step 4 (step 5) by the specialist; creation of the pitch video by the specialist (step 6), definition of the training program (step 7), and creation of training elements (step 8) by the specialist, definition of the MaT package (step 9) performed by LabMIn to determine the configurations and conditions of artifact availability (including which artifacts will be made available together and which will be provided as optional and on-demand, for example), and finally, the LabMIn content release (step 10). The following subtopics explain the process and its assumptions in more detail.

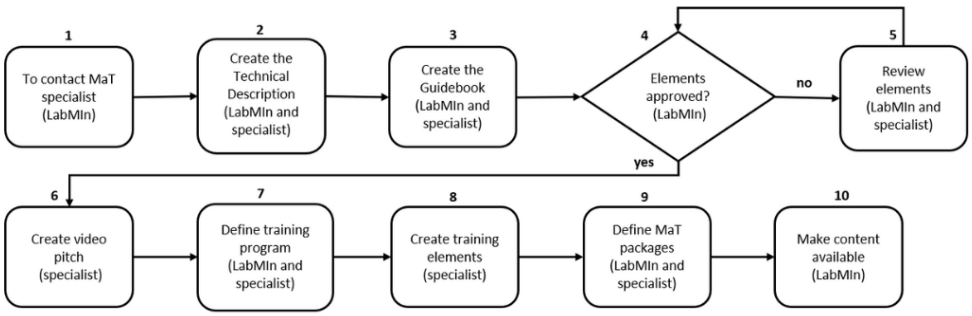

Figure 4. Proposed process for MaT productization.

4.1. Proposition of complementary artifacts

Several artifacts were proposed, encompassing standardized, modularized elements requiring minimal interaction between the provider (LabMIn or the specialist(s) of each MaT) and the potential practitioner. The artifacts aim to enhance clarity in communicating the MaT, its scope, and complexity, and provide various levels of a gradual understanding of the MaT.

Some branding characteristics were considered to connect the productized MaT to institutions associated with its development and provision, such as universities and consulting companies. The intent is to ensure the desired tangibility of the MaT and its underlying value/legitimacy (Jaakkola, 2011; Wirtz et al., 2021) by leveraging the recognition of the authority and credibility of the organizations. The proposal includes elements for communicating the MaT's value and content at different levels, according to the needs and context of the organization:

I. Textual and graphical elements with basic and essential information for the practitioner's initial contact with that MaT.

II. Audiovisual elements with different levels of depth, including practical information for application and understanding.

III. Modular and diverse training (mainly short training options) for deepening and focusing on a specific application.

IV. Communication channel with experts or institutions of reference in the development or application of the MaT.

4.2. Creation of the artifacts

Within the established process, the participation of a reference expert for each MaT plays an essential role in constructing support artifacts that serve as a matrix for creating other elements of the productized MaT structure.

We delineated Models of artifacts for application to some previously selected MaTs, intended to serve as pilots for use in companies associated with the tech park. The initially defined artifacts follow:

i. Technical Description (Step 2) – The technical description aims to highlight the critical information and characteristics of the MaT, serving as the initial contact for potential users with it. Elaborating such a description is up to the specialist, who fills out a standardized cloud-based form that automatically feeds a visual template, ensuring design standardization. It includes basic information about purpose and application, examples of visual representation of the MaT (when applicable), estimated information on the MaT's complexity (in terms of understanding, application, and need for external support), and an indication of the MaT's affinity to the types of organizations, considering the typical members of the technology park: startups / academic spin-offs, academic technology centers, or R&D unit of established companies - see Figure 5 (Bagno et al., 2019; Silva Júnior et al., 2023);

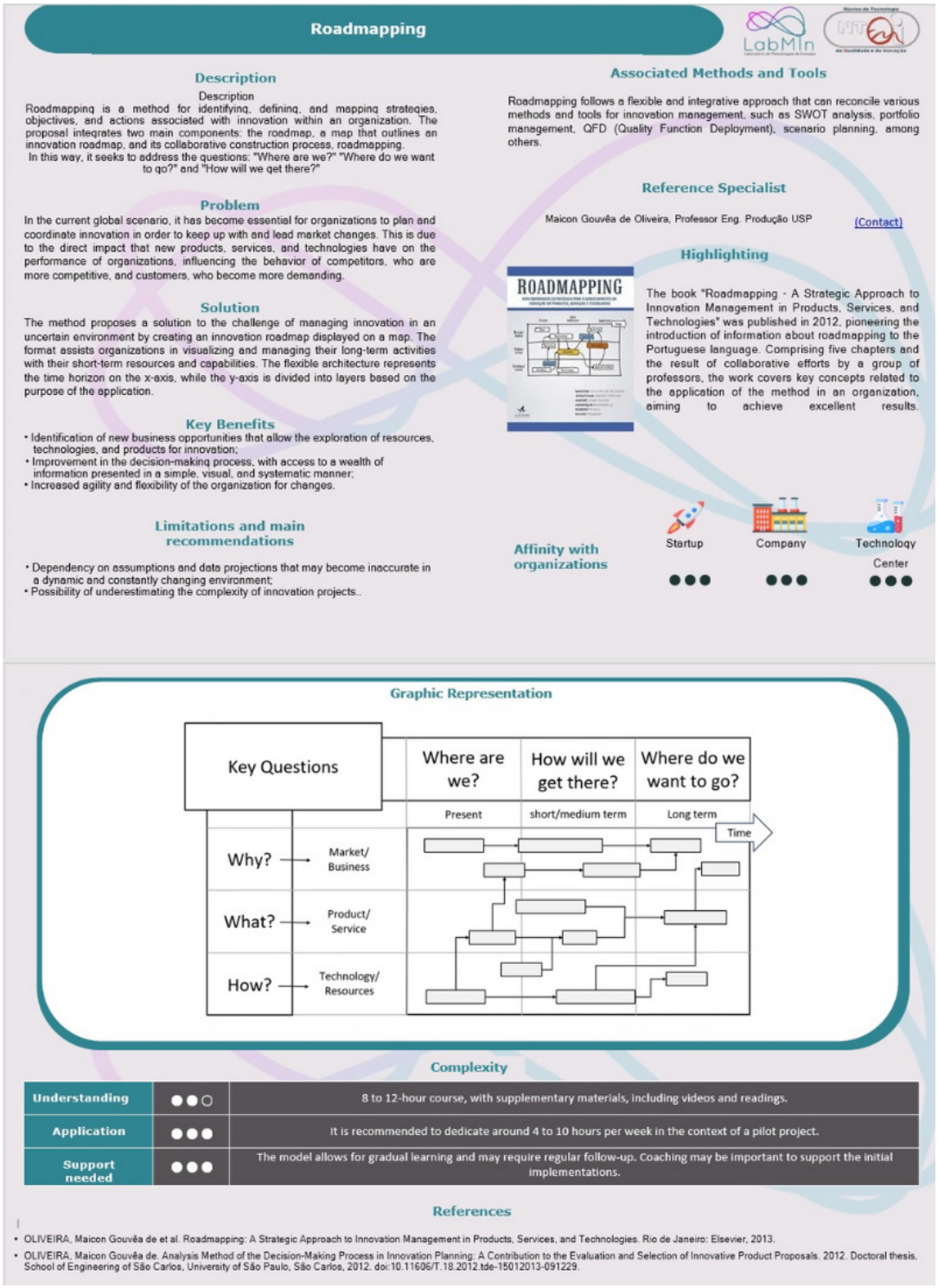

Figure 5. Roadmapping technical description.

ii. Guidebook (Step 3) – The guidebook is a more informative element than the technical description, serving as an intermediate step for consultation before the potential adopter decides to explore more detailed references, typically books, theses/dissertations, and scientific articles, or even more extensive audiovisual sources that may be offered in a foreign language. Its attractive design favors the fundamental understanding of the MaT and motivates the generation of interest in its application by stimulating the perception of reliability using graphic elements. The guidebook should provide the main ideas of the MaT, such as its history and first cases, the path to implement, implementation methods, and possibilities of integration with other MaTs. Again, the specialist elaborates on the guidebook's basic content while the LabMIn team works on the layout and other visual elements;

iii. Video Pitch (Step 6) – The informative video pitch (~2 minutes) is based on the same information and dimensions of the technical description. This video offers audiovisual communication of the MaT's characteristics to enhance and complement communication about the objectives, main features/limitations, and other relevant information of the MaT;

iv. Training (Steps 7 and 8) – A pre-established training format that considers the level of complexity, target audience, and available support levels for the MaT. While training elements may vary from one MaT to another, the idea is to maintain a set of standardized or parameterizable elements. In terms of duration and presentation templates, the goal is to get concision and focus as much as possible, enabling participants to perform, through a final exercise, a simplified yet meaningful experience applied to the actual case of their organization. This approach enhances the modular character of the MaT, attracting and being accessible to practitioners with various levels of familiarity with the contents, allowing them to distinguish the depth of understanding that best suits their needs and know how to seek additional support (from the specialist or reference institution, and through applied advisory or consulting services wherever necessary).

5. Conclusion

This study aimed to propose a process for the productization of Management Methods and Tools (MaTs) for Innovation and Entrepreneurship based on the genuine demand of a research network focused on developing and applying MaTs in innovation-promoting environments. In addition to outlining the stages, the proposal includes supporting artifacts, course structure, and interaction with MaT specialists.

Following Design Science Research guidelines, this study was conducted within a context with specific coordination and management characteristics (BH-TEC / LabMIn). Thus, it is important to recognize that the final proposal is not a general solution, since a one-size-fits-all approach to productizing MaTs may not adequately address the unique needs and contexts of individual organizations. Hence, our contribution considers the nuances and dynamics typical of tech parks in their role as innovation intermediaries for resident organizations. Also, the scope and particular objectives of the LabMIn network highly shaped the final proposal. Therefore, although our study represents a convenient starting point, designing a productization process in other contexts may require different approaches and rethinking some considerations.

The wide range of available MaTs may hinder decision-making by overwhelming managers with too many options to choose from. Therefore, as the central contribution, the proposed process aims to advance the diffusion agenda of MaTs among potential adopters, decoding the underlying knowledge and pointing towards more informed and fruitful applications. Better communication of MaTs regarding application scope and limitations can pave this path. Furthermore, this study aligns with an approach of taking MaTs as managerial technologies subject to a customer-oriented development process. The productization process also contributes to standardizing the availability of MaTs, facilitating the development process for organizations that act as promoters of innovation - especially tech parks, where the systematization of innovation processes is crucial.

From an academic perspective, the goal is to advance the nascent debate on the productization of MaTs, especially in contexts of high uncertainty and risk, characteristic of the dynamics of innovative companies. In these contexts, phenomena such as management fads and contextual misfits tend to impact organizations' experiences with MaTs negatively.

The following steps involve implementing additional applications of the productized MaTs, considering the lessons learned and insights gained from pilot applications. Additionally, implementing a digital platform for disseminating MaTs and connected services/resources related to LabMIn is in sight. Feedback from these experiences will contribute to refining the proposal in light of DSR guidelines. This study also opens opportunities for expansion into other innovation-promoting environments and for the discussion of managing portfolios of productized MaTs.

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