

# Essential Aspects of Capability Pre-Analysis

Georgios Koutsopoulos

*Department of Computer and Systems Sciences, Stockholm University, Stockholm, Sweden*

## Abstract

In the continuously and rapidly evolving operational landscape of modern organizations, capabilities are a valuable conceptual asset. Capability thinking and management facilitates the analysis of the value produced by an organization. As a result, capability management plays an essential role in assessing and enhancing an organization's capabilities to align with dynamic contextual factors and internal needs. Within capability management, a variety of analysis types exists, focusing on different ways to explore and examine capability improvement potentials, like mapping, modeling, and maturity assessment, with several specific approaches associated to each type. However, existing approaches for capability analysis often focus on single perspectives while omitting to provide support for the capability aspects that need to be taken into consideration before the initiation of the analysis. This study aims to explore the potentials for the development of a framework for pre-analyzing capabilities, which can holistically add value to all types of capability analysis. A set of essential capability aspects, such as discovery, demarcation, size, and ownership, that need to be identified and clarified before the initiation of an analysis are suggested towards the development of a generic capability pre-analysis framework.

## Keywords

Capability, Capability analysis, Capability thinking, Pre-analysis, Requirement, Demarcation, Methodological framework

## 1. Introduction

Organizational strategy has strong connections with capabilities and change [1], resulting in a constant need to be adjusted as a response to organizational dynamism. Organizational capabilities, both as a conceptual framework and as a practical approach, are steadily becoming more prominent as a means to document, plan, design, and analyze organizational aspects [2], both from a strategic and an operational perspective. Capability thinking is an organizational mindset [2] that has drawn rising interest, both from the academia and industry [3].

Capability thinking exists in a lot of forms of analysis, which are expressed in different formats, templates, and approaches. A few examples include capability mapping [4, 5], capability modeling [2, 6], capability maturity assessment [7], or capability canvas [8]. This is a potential result of the nature of the concept, for which there is no universal consensus, in terms of definition and understanding [9]. Apart from the multitude of various definitions for the concept of capability that exist in the literature and often result in confusing inconsistencies [9], and the multitude of typologies used for classifying capabilities [10], the interpretations of these definitions and typologies are equally varying, especially if the plethora of capability management approaches is taken into consideration. These conditions often result in the challenging problem of properly framing and demarcating organizational capabilities during an analysis.

This problem is also associated to the lack of methodological support for efficient capability framing and demarcation during or before the analysis. Despite the vital role that capability management plays in organizational change, regardless of ensuring evolution or survival [11], pre-analyzing and clarifying capabilities is often omitted. This issue is potentially derived from the fact that existing approaches for capability management most often focus on approach-specific phases and activities. Therefore, the motivation behind this study is dual. The aim is to treat this problem as an opportunity, not only to

---

*Companion Proceedings of the 17th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modeling Forum, M4S, FACETE, AEM, Tools and Demos co-located with PoEM 2024, Stockholm, Sweden, December 3-5, 2024*

✉ georgios@dsv.su.se (G. Koutsopoulos)

ORCID 0000-0003-2511-9086 (G. Koutsopoulos)



© 2024 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

support the pre-analysis phase of the existing approaches, but also to do it in a non approach-specific way, as a means to establish common ground among the existing approaches. For this reason this study explores the potentials of developing a unified framework that integrates all aspects of capability, with a particular emphasis on the pre-analysis phase, a step which is often overlooked.

For this reason, a comprehensive literature review, combined with the author's experience in the domain, have been used to identify a set of essential aspects for capability pre-analysis, which reflect on specific activities that can precede an actual analysis, regardless of the approach. This set can establish the foundations for the development of a capability pre-analysis framework, and for this reason, they can be used as input for a future requirements specification for the envisioned framework. With the use of the term pre-analysis, this paper refers to activities associate with the preparation for capability analysis, if we consider it a step before the actual analysis, or initiation, in case the preparatory phase is considered as an innate part of the analysis of organizational capabilities.

Therefore, to summarize, the aim of this paper is *to explore and suggest a set of essential aspects and activities for the pre-analysis of organizational capabilities*, which can also be treated as preliminary requirements for a methodological framework.

The rest of the paper is structured as follows. Section 2 provides an overview of organizational capabilities and the main types of capability analysis approaches, Section 3 briefly explains the methodological decision involved in this study, Section 4 presents the essential aspects of capabilities that need to be taken into consideration for developing a framework, along with the activities that address them. Section 5 discusses the outcome of the study and potential future directions, and Section 6 provides concluding remarks.

## 2. Background

This section provides a brief description of the main concepts involved in this study, that is the organizational capabilities and the most popular ways to analyze them.

Defined as a combination of resources and behaviors configured to provide the capacity and ability to achieve a specific goal within a given context, capability is closely tied to key business concepts such as actors, goals, processes, resources, and context [2]. Beyond integrating these essential elements, the true value of capability lies in its role as the critical link in business and IT transformation. It serves as a foundational element for change management, strategic planning, and impact analysis [12], making it indispensable for organizations navigating complex, dynamic environments.

Capability thinking has been applied across several domains in conjunction with Enterprise Modeling [2, 13], Requirements Engineering [14], Risk Management [15], Enterprise Architecture [16, 17, 18], and Change management [19].

Most of these approaches involve visualization attributes, with the primary focus being on an enterprise's ability and capacity to deliver value, achieve its goals, and maintain long-term functionality. The significance of capabilities lies in their ability to provide a holistic view of the organization by encompassing several key aspects, including goals, business services, processes, actors, and the external environment. Especially when it concerns Enterprise Modeling, various approaches have been utilized to represent organizational capabilities in various ways, including stand-alone modeling approaches such like Value Delivery Modeling Language (VDML) [13] and Capability-Driven Development (CDD) [2].

Several Enterprise Architecture (EA) frameworks also incorporate the concept of capabilities and offer dedicated capability viewpoints. Notable examples include frameworks like the Department of Defense Architecture Framework (DoDAF) [18], the NATO Architecture Framework (NAF) [16], the Ministry of Defence Architecture Framework (MODAF) [20], and Archimate [21]. Additionally, research has contributed to advancing capability modeling by either adapting existing modeling methods, such as *i\** [22] or earlier [4] and contemporary [5] Capability Mapping approaches, or by introducing new notations, such as CODEK [19], which are designed to capture how capabilities evolve or can be modified in dynamic environments, and KYKLOS [23], which is a domain-specific method for modeling

changing capabilities.

### 3. Methodology

The aim of this study is to explore and suggest a set of essential aspects and activities for the pre-analysis of organizational capabilities, that can be treated as a set of preliminary requirements for a methodological framework. More specifically, the paper does not aim to elicit a detailed specification of requirements, but aspires to identify the most important requirement areas, on a high level. A thorough literature review has been performed to conduct research on capability pre-analysis. This method was chosen to provide a comprehensive understanding of the current state of research on capability management and pre-analysis, while identifying gaps in the literature.

The literature review focused on sources related to the management of organizational capabilities. Key search terms included:

*"capability management," "pre-analysis," "capability demarcation," "capability model" "capability map"*.

The initial sources enabled using a snowballing technique via their references. In addition, the author's experience in the field facilitated the identification of valuable sources from the industry, like for example [12]. The selection process required relevance to capability management and emphasized sources that offered both theoretical insights and practical applications, enabling a thorough and balanced review of capability pre-analysis.

An essential delimitation of this study is that it aspires to motivate the areas around capability management that can be addressed by a future framework, optimized for a pre-analysis phase, or in other words for initiating and preparing for capability analysis, but it does not aim to suggest any specific solutions.

### 4. Pre-analysis aspects and activities

Before capabilities can be effectively managed, they must first be discovered, thoroughly understood, and clearly demarcated. This process, which can be referred to as capability pre-analysis, is crucial because it serves as the foundation for more in-depth capability management and strategic alignment. This section will present these essential aspects and the activities that can address them.

The pre-analysis phase involves identifying, categorizing, and setting boundaries around organizational capabilities. This is necessary for ensuring that capabilities are recognized as distinct from resources, competencies, and routines and are aligned with the organization's strategic goals. Of course, the value produced by realizing an organizational capability is a core factor in these activities. Pre-analysis also addresses operational challenges, such as determining the appropriate size of a capability and establishing ownership, especially in complex ecosystems where capabilities may be shared across multiple organizations or organizational units. In essence, this stage of capability management allows organizations to clarify the structure and scope of their capabilities.

#### 4.1. Capability discovery and identification

In today's fast-paced and highly competitive business environment, the ability to identify and manage organizational capabilities effectively has become a key determinant of success. With the term capability discovery, we refer to the activity of identifying the full range of capabilities that exist within an organization. This process is critical in the pre-analysis phase, as it lays the foundation for subsequent capability management efforts. However, capability discovery is not a straightforward task, as capabilities are often intangible and may overlap with other organizational processes. Pre-analysis must involve a comprehensive audit of the organization's resources and competencies to ensure

that all relevant capabilities are identified, appropriately categorized, and potential associations and dependencies among them are also identified.

One of the key challenges in capability discovery is determining the boundaries of each capability, particularly when capabilities share resources across different departments or organizations. For example, an organization may have a capability in supply chain management, but this capability may draw on resources from multiple departments, including procurement, logistics, and IT. In such cases, pre-analysis must carefully delineate the boundaries of the capability to ensure that it is clearly defined and distinct from other organizational functions.

#### **4.1.1. Example 1: Manufacturing Sector**

In a global manufacturing organization, capability discovery might involve mapping out capabilities across various functions such as production, supply chain, and customer support. For example, the organization may discover that its core capabilities in lean manufacturing and supply chain optimization are more advanced than initially recognized. By using process audits and employee interviews during pre-analysis, the company identifies hidden capabilities such as an informal but effective problem-solving culture on the factory floor, which had previously gone unnoticed.

#### **4.1.2. Example 2: Technology Sector**

In a tech company, capability discovery may involve the identification of capabilities related to software development, innovation, and data management. During pre-analysis, the organization may discover that its product development capability is highly efficient due to an integrated approach to agile methodologies and cross-functional collaboration. This discovery enables the company to further refine this capability for launching new products.

### **4.2. Capability demarcation**

One of the most critical components of capability pre-analysis is the demarcation of organizational capabilities. Demarcation involves establishing clear boundaries around what constitutes a capability, ensuring that it is distinct from other constructs such as resources, processes and routines, or abilities and competencies [24, 25]. This is essential for a well-structured analysis of capabilities, allowing organizations to avoid confusion and inefficiencies in their capability management processes.

From a theoretical perspective, the Resource-Based View (RBV) [26] of the organization has contributed significantly to the understanding of capability demarcation. According to the RBV, capabilities are bundles of resources and competencies that are unique to the organization and provide a source of sustained competitive advantage [27]. However, demarcating capabilities from the resources that support them is a necessary step in capability pre-analysis, ensuring that organizations can assess the effectiveness of their capabilities beyond their resource base. Earlier research exists where capabilities were considered types of resources [28]. This highlights the importance of demarcation during the pre-analysis phase, as organizations must have a clear distinction between capabilities and resources that comprise them.

#### **4.2.1. Common points of misunderstanding**

A critical component of capability pre-analysis is ensuring that capabilities are clearly differentiated from other organizational constructs. This is important because capabilities are often misunderstood or conflated with resources, processes, and abilities, which can complicate capability management efforts and lead to sub-optimal outcomes.

- **Capabilities vs. Resources:** Resources are the organization's tangible and intangible assets, such as financial capital, patents, technology, and human talent [27]. Capabilities, on the other hand, refer to the organization's ability to use these resources effectively in pursuit of strategic goals.

For example, while a company may possess advanced technological resources, its capability lies in how effectively it can leverage this technology to drive innovation, improve efficiency, or enter new markets. Pre-analysis requires organizations to differentiate between the resources they own and the capabilities they develop to deploy those resources strategically. The difference has also been emphasized in [25].

- **Capabilities vs. Abilities/competencies:** Competencies are the specialized skills or knowledge areas that contribute to an organization's overall capabilities. For instance, an organization might have a core competency in product development, which supports its broader capability of innovation. Pre-analysis must clarify the distinction between competencies (specific areas of expertise) and capabilities (they integrate these competencies into broader strategic functions). This distinction ensures that capabilities are managed at the appropriate level of analysis, allowing organizations to focus on broader strategic processes rather than isolated skill sets. In addition, capabilities are considered contextual, while the abilities/competencies are not, and this can be clarified by considering that capabilities are expressing potentials.
- **Capabilities vs. Processes/Routines:** Processes and routines refer to the standardized and repetitive patterns of behavior that guide an organization's day-to-day operations. Capabilities go beyond routines by incorporating the organization's ability to reconfigure these routines in response to changes in the environment. For example, an organization may have a routine for managing customer orders, but its capability lies in its ability to adapt this routine to handle fluctuations in demand or changes in customer preferences. Pre-analysis requires organizations to differentiate between operational routines and strategic capabilities, ensuring that capabilities are adaptable and responsive to external pressures.

### **4.3. Capability size and scaling**

Determining the appropriate size of a capability is a critical aspect of pre-analysis. The level of granularity applied during capability identification can significantly influence capability management outcomes. Overly broad capabilities may dilute focus, while too narrow a focus may miss the broader strategic relevance.

#### **4.3.1. Example 1: Financial Services**

In the financial services industry, a bank may examine its digital payment capability. Initially, this capability may be viewed as a single entity. However, upon closer inspection during pre-analysis, the bank recognizes that the capability can be broken down into smaller components such as mobile banking, online transfers, and contactless payments. By scaling down the capability into "smaller" capabilities, the bank can better manage and improve specific areas, like mobile app security and user experience.

#### **4.3.2. Example 2: Retail Sector**

A retail organization undergoing pre-analysis might recognize that its logistics capability spans several areas, including inventory management, distribution networks, and supplier relationships. By decomposing the logistics capability into smaller, manageable components, the retailer can assess each area's performance and identify which sub-capabilities need further investment, such as improving last-mile delivery to better meet customer expectations.

### **4.4. Capability ownership**

Establishing clear ownership of capabilities is essential for effective capability management. Capability ownership refers to assigning responsibility for maintaining and improving specific capabilities, ensuring alignment with organizational goals.



The issue of capability ownership is a critical aspect of capability management, particularly in modern organizations that operate within complex ecosystems [29]. In cases where capabilities are shared across unclear organizational boundaries, such as in inter-organizational collaborations, there is often no clear or standardized method for delineating ownership or defining the boundaries of shared capabilities. This challenge becomes even more pronounced in complex ecosystems involving numerous stakeholders and overlapping resources. Future research in capability management must address key questions, such as whether the capabilities of individual organizations should be considered part of the broader ecosystem's capabilities and whether these ecosystem capabilities can be treated as single entities or require further decomposition for more accurate analysis.

#### **4.4.1. Example 1: Automotive Industry**

In a large automotive company, capability ownership might be divided between departments. For instance, the supply chain capability could be jointly owned by procurement, logistics, and manufacturing departments. However, during pre-analysis, it may become clear that overlapping ownership leads to inefficiencies. To resolve this, the organization assigns a single senior manager as the capability owner who coordinates across departments to streamline the supply chain and ensure it is optimized for the company's evolving needs.

#### **4.4.2. Example 2: Healthcare Sector**

In a hospital system, pre-analysis might reveal that the capability for patient care is fragmented, with different departments, such as emergency services, outpatient clinics, and specialty care, each responsible for a segment. To improve patient outcomes, the hospital decides to assign a central owner to the overall patient care capability, with clear boundaries for collaboration across departments, ensuring a holistic and efficient approach to healthcare delivery.

## **5. Discussion**

Capability pre-analysis can play a foundational role in an organization's ability to manage its resources and competencies effectively. By addressing the set of essential capability aspects and activities that have been suggested in this study, organizations can better align their capabilities with strategic objectives, thereby improving operational efficiency and competitiveness. The insights that can be gathered from pre-analysis provide organizations with actionable intelligence that can be used to optimize processes, allocate resources more effectively, and identify areas for innovation and improvement.

By including the suggested pre-analysis aspects and activities, the envisioned framework aims to ensure a comprehensive understanding of capabilities, leading to more accurate and actionable insights in subsequent analysis phases. This study contributes to the field by promoting and motivating a comprehensive unified approach that supports all forms of capability management and analysis, enabling organizations to effectively assess, adapt, and evolve their capabilities in response to changing conditions.

While this paper has provided an initial overview of the essential aspects of capability pre-analysis, several areas warrant further exploration and analysis. Future research should explore the development of new tools and frameworks for capability pre-analysis. For example, frameworks that help organizations identify and manage shared capabilities in supply chain ecosystems, where capabilities are often distributed across multiple organizations, provides a challenging application context.

Additionally, there is a need for more empirical studies that assess the impact of pre-analysis on the success of capability modeling and mapping efforts across different industries. These studies could provide valuable insights into how pre-analysis practices vary across industries and how they contribute to the overall effectiveness of different capability management types. For instance, future research could explore the role of pre-analysis in industries such as healthcare, where capabilities related to patient care and service delivery are critical to the organization's success and the performance requirements are

hard. And in case, where, capability mapping is significantly benefited by pre-analyzing the capabilities, while capability modeling is not, new research paths will emerge in order to investigate the reasons behind such deviations and differences in the results.

The additional benefit that has been mentioned earlier in the paper but is worth discussing more here, is the potential for establishing common ground among the different and varying approaches for capability management, along with their respective communities. A common methodological framework for the identification, framing, demarcation, and management of a capability's boundaries, has the potential to reduce, if not mitigate, the theoretical and philosophical gaps among the various capability management approaches, which are also one of the most important factors for the diversity that exists in the definitions of the concept. It can also serve as the starting point for a high-level approach that encompasses common attributes of every capability management type, in other words, bringing along the best of each world. Of course, this is not an omissions that strictly needs to be addressed, however, it may be an opportunity worth following. Even the establishment of a commonly accepted terminology has the potentials to boost capability management, as a research area, by enabling and promoting the collaboration and co-evolution of diverse perspectives.

Therefore, with this study, we aim to promote and motivate the development of a unified comprehensive methodological framework for effective capability management. The vision is not to replace the existing approaches with a new one, on the contrary, the aim is to bridge the theoretical gaps among all the approaches via operational integration, following a bottom-up approach, since the diversity in definitions and interpretations, which follows a top-down approach, is one of the factors that led to the plethora of definitions, interpretations, and approaches.

## 6. Conclusions

In this paper, we have outlined the essential aspects and activities of capability pre-analysis, emphasizing the importance of clear demarcation, discovery, and operational boundaries, in terms of size, scaling, and ownership. Effective pre-analysis has the potential to improve the activities that ensure that capabilities are properly identified, correctly sized, and aligned with organizational strategy. This foundational work bears value for optimizing capability management and enhancing strategic performance in general, when capability thinking is involved. Future research and practice should continue to focus on refining pre-analysis methods to adapt to increasingly complex organizational environments. As the organizational environments continue to evolve and operate in a dynamic manner, capability pre-analysis will remain a critical component of successful capability management and organizational change and strategy.

## References

- [1] P. Hoverstadt, L. Loh, *Patterns of strategy*, Routledge, Taylor & Francis Group, London ; New York, 2017.
- [2] K. Sandkuhl, J. Stirna (Eds.), *Capability Management in Digital Enterprises*, Springer International Publishing, Cham, 2018. URL: <http://link.springer.com/10.1007/978-3-319-90424-5>. doi:10.1007/978-3-319-90424-5.
- [3] M. Wißotzki, *Capability Management Guide*, Springer Fachmedien Wiesbaden, Wiesbaden, 2018. URL: <http://link.springer.com/10.1007/978-3-658-19233-4>. doi:10.1007/978-3-658-19233-4.
- [4] D. Beimborn, S. F. Martin, U. Homann, *Capability-oriented modeling of the firm*, Amalfi, Italy, 2005.
- [5] J. Van Riel, G. Poels, A Method for Developing Generic Capability Maps: A Design Science Study in the Professional Sport Industry, *Business & Information Systems Engineering* 65 (2023) 403–424. URL: <https://link.springer.com/10.1007/s12599-023-00793-z>. doi:10.1007/s12599-023-00793-z.
- [6] P. Loucopoulos, E. Kavakli, D. Anagnostopoulos, G. Dimitrakopoulos, *Capability-oriented Analysis and Design for Collaborative Systems: An example from the Doha 2022 World Cup Games*, in: *Proceedings of the 2018 10th International Conference on Computer and Automation Engineering*

- ICCAE 2018, ACM Press, Brisbane, Australia, 2018, pp. 185–189. URL: <http://dl.acm.org/citation.cfm?doid=3192975.3192998>. doi:10.1145/3192975.3192998.
- [7] M. C. Paulk, C. V. Weber, B. Curtis, M. B. Chrissis (Eds.), *The capability maturity model: guidelines for improving the software process*, The SEI series in software engineering, Addison-Wesley Pub. Co, Reading, Mass, 1995.
- [8] G. Koutsopoulos, *Compass: A Canvas for Changing Capabilities*, in: T. Clark, S. Zschaler, B. Barn, K. Sandkuhl (Eds.), *Proceedings of the Forum at Practice of Enterprise Modeling 2022 (PoEM-Forum 2022)*, volume 3327 of *CEUR Workshop Proceedings*, CEUR-WS.org, London, United Kingdom, 2023, pp. 66–80. URL: <https://ceur-ws.org/Vol-3327/paper07.pdf>.
- [9] G. Koutsopoulos, *Modeling Organizational Potentials Using the Dynamic Nature of Capabilities*, in: *Joint Proceedings of the BIR 2018 Short Papers, Workshops and Doctoral Consortium*, volume 2218, CEUR-WS.org, Stockholm, Sweden, 2018, pp. 387–398. URL: <http://ceur-ws.org/Vol-2218/paper39.pdf>.
- [10] G. Koutsopoulos, *A synthesis of diverse organizational capability typologies and classifications*, in: T. P. Sales, D. Aveiro, M. M. Mandelburger, H. Proper, A. Koschmider, G. Poels, J. Van Riel, R. F. Calhau (Eds.), *Companion Proceedings of the 16th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modeling and the 13th Enterprise Design and Engineering Working Conference: BES, DTE, FACETE, Tools & Demos, Forum, EDEN Doctoral Consortium*, volume 3645, CEUR-WS.org, Vienna, Austria, 2024. URL: <https://ceur-ws.org/Vol-3645/facete3.pdf>.
- [11] N. Zimmermann, *Dynamics of Drivers of Organizational Change*, 1. ed ed., Gabler, Wiesbaden, 2011. URL: <http://link.springer.com/10.1007/978-3-8349-6811-1>. doi:10.1007/978-3-8349-6811-1.
- [12] W. Ulrich, M. Rosen, *The Business Capability Map: The "Rosetta stone" of Business/IT Alignment*, Cutter Consortium, *Enterprise Architecture* 14 (2011).
- [13] Object Management Group (OMG), *Value Delivery Modeling Language v.1.1*, 2018. URL: <https://www.omg.org/spec/VDML/1.1>.
- [14] P. Loucopoulos, E. Kavakli, N. Chechina, *Requirements Engineering for Cyber Physical Production Systems*, in: P. Giorgini, B. Weber (Eds.), *Advanced Information Systems Engineering*, volume 11483, Springer International Publishing, Cham, 2019, pp. 276–291. URL: [http://link.springer.com/10.1007/978-3-030-21290-2\\_18](http://link.springer.com/10.1007/978-3-030-21290-2_18). doi:10.1007/978-3-030-21290-2\_18.
- [15] M. Arena, G. Azzone, E. Cagno, G. Ferretti, E. Prunotto, A. Silvestri, P. Trucco, *Integrated Risk Management through dynamic capabilities within project-based organizations: The Company Dynamic Response Map*, *Risk Management* 15 (2013) 50–77. URL: <http://link.springer.com/10.1057/rm.2012.12>. doi:10.1057/rm.2012.12.
- [16] NATO, *NATO Architecture Framework v.4*, 2018. URL: [https://www.nato.int/nato\\_static\\_fl2014/assets/pdf/pdf\\_2018\\_08/20180801\\_180801-ac322-d\\_2018\\_0002\\_naf\\_final.pdf](https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_08/20180801_180801-ac322-d_2018_0002_naf_final.pdf).
- [17] MODAF ontological data exchange mechanism (MODEM), 2012. URL: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/63980/20130117\\_MODAF\\_MODEM.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/63980/20130117_MODAF_MODEM.pdf).
- [18] USA Department of Defense, *Department of Defense Architecture Framework 2.02*, 2009. URL: <https://dodcio.defense.gov/Library/DoD-Architecture-Framework/>.
- [19] P. Loucopoulos, E. Kavakli, *Capability Oriented Enterprise Knowledge Modeling: The CODEK Approach*, in: D. Karagiannis, H. C. Mayr, J. Mylopoulos (Eds.), *Domain-Specific Conceptual Modeling*, Springer International Publishing, Cham, 2016, pp. 197–215. URL: [http://link.springer.com/10.1007/978-3-319-39417-6\\_9](http://link.springer.com/10.1007/978-3-319-39417-6_9). doi:10.1007/978-3-319-39417-6\_9.
- [20] UK Ministry of Defence, *Ministry of Defence Architecture Framework V1.2.004*, 2010. URL: <https://www.gov.uk/guidance/mod-architecture-framework>.
- [21] The Open Group, *Archimate 3.0.1. Specification*, 2017. URL: <https://publications.opengroup.org/i162>.
- [22] M. H. Danesh, E. Yu, *Modeling Enterprise Capabilities with i\*: Reasoning on Alternatives*, in: W. van der Aalst, J. Mylopoulos, M. Rosemann, M. J. Shaw, C. Szyperski, L. Iliadis, M. Papazoglou, K. Pohl (Eds.), *Advanced Information Systems Engineering Workshops*, volume 178, Springer International Publishing, Cham, 2014, pp. 112–123. URL: <http://link.springer.com/10.1007/>



978-3-319-07869-4\_10. doi:10.1007/978-3-319-07869-4\_10.

- [23] G. Koutsopoulos, M. Henkel, J. Stirna, Modeling the Phenomenon of Capability Change: The KYKLOS Method, in: D. Karagiannis, M. Lee, K. Hinkelmann, W. Utz (Eds.), *Domain-Specific Conceptual Modeling*, Springer International Publishing, Cham, 2022, pp. 265–288. URL: [https://link.springer.com/10.1007/978-3-030-93547-4\\_12](https://link.springer.com/10.1007/978-3-030-93547-4_12). doi:10.1007/978-3-030-93547-4\_12.
- [24] S. G. Winter, Understanding dynamic capabilities, *Strategic Management Journal* 24 (2003) 991–995. URL: <http://doi.wiley.com/10.1002/smj.318>. doi:10.1002/smj.318.
- [25] A. W. Tell, What Capability Is Not, in: B. Johansson, B. Andersson, N. Holmberg (Eds.), *Perspectives in Business Informatics Research*, volume 194, Springer International Publishing, Cham, 2014, pp. 128–142. URL: [http://link.springer.com/10.1007/978-3-319-11370-8\\_10](http://link.springer.com/10.1007/978-3-319-11370-8_10). doi:10.1007/978-3-319-11370-8\_10.
- [26] C. E. Helfat, M. A. Peteraf, The dynamic resource-based view: capability lifecycles, *Strategic Management Journal* 24 (2003) 997–1010. URL: <http://doi.wiley.com/10.1002/smj.332>. doi:10.1002/smj.332.
- [27] J. Barney, Firm Resources and Sustained Competitive Advantage, *Journal of Management* 17 (1991) 99–120. URL: <https://journals.sagepub.com/doi/10.1177/014920639101700108>. doi:10.1177/014920639101700108.
- [28] R. Makadok, Toward a synthesis of the resource-based and dynamic-capability views of rent creation, *Strategic Management Journal* 22 (2001) 387–401. URL: <http://doi.wiley.com/10.1002/smj.158>. doi:10.1002/smj.158.
- [29] C. H. Tsai, J. Zdravkovic, J. Stirna, Capability Management of Digital Business Ecosystems – A Case of Resilience Modeling in the Healthcare Domain, in: N. Herbaut, M. La Rosa (Eds.), *Advanced Information Systems Engineering*, volume 386, Springer International Publishing, Cham, 2020, pp. 126–137. URL: [https://link.springer.com/10.1007/978-3-030-58135-0\\_11](https://link.springer.com/10.1007/978-3-030-58135-0_11). doi:10.1007/978-3-030-58135-0\_11, series Title: *Lecture Notes in Business Information Processing*.