



The Capability Models for Steering Execution of the Strategies in the Finnish Universities of Applied Sciences CIO Forum

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Abstract

CIOs of higher education institutions need appropriate IT management tools for gaining digital transformation. Enterprise architecture is a suitable method for managing digital transformation. However, the EA frameworks are complex tools for use, and they need architecture expertise and time to adapt them to achieve their full benefits. This compare case study describes how the Finnish Universities of Applied Sciences CIO forum is utilizing the selected Higher education reference model (HERM) and Business technology (BT) standard and their capability models. An ethnographic approach has enriched this study – the author has used his experiences using the BT standard as an IT secretary general of the CIO forum. In contrast to several EA method and framework studies, there is much less information about the effects of BT standard or HERM on IT management. The study includes some propositions for practitioners to use the capability models in information and knowledge management in the HEI sector and recognize research gaps for future research.

1 Introduction

Gaining digital transformation needs capabilities to manage strategy, business, information, application, and technology domains. Enterprise architecture (EA) is an acknowledged method for steering digital transformation because of its comprehensive approach. However, it is a complex tool that requires expertise to use correctly. Besides this, previous research has shown that EA projects are cumbersome and usually meet several challenges, especially communication and collaboration problems (Rouvari & Pekkola, 2023; Banaeianjahromi & Smolander, 2019).

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Thus, we need easy-to-use frameworks to supervise technology management instead of the holistic EA frameworks as the TOGAF 10 standard (2022) by the Open Group. The Business Technology Forum has created The Business Technology standard (2023) for gaining digital transformation by managing information technology as part of business management. The BT standard includes the models of capability, operating, and roles and responsibilities. On the other higher education institutes have started to utilize the global Higher Education Reference Models HERM, which covers capability, data application, and technology references dedicated to universities and universities of applied sciences (UAS). This single case study in an actual life project (Yin, 2018) describes how the Finnish UAS CIO Forum will use BT standard capability model in technology management and how the forum could use it parallel with the HERM capability model. The researcher uses an ethnographic approach (Randall et al., 2007). He has worked as a lead enterprise architect for several years, especially in Finland's education sector, and has vast experience in IT and strategy work.

There is little or no research on the BT standard nor HERM references in use in technology management. Thus, this study partly covers interesting research gaps and provides academics with empirically based guidelines to understand the importance of easy-to-use capability reference models in technology management in the higher education domain. For practitioners, the author dispenses three propositions to use the BT standard capability model for transformation from technology innovations to technology in business.

The research question is How to use the BT standard capability model in parallel with the HERM capability model in technology management in UAS?

The paper proceeds as follows. First is related literature, then the research method, research settings including research data description, and finally, findings and conclusion.

2 Related Literature

Digital transformation is “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies” (Vial, 2019). Digital transformation has three development phases: the first is digitizing analog items into digital format; the second step is digitalization, i.e., optimizing analogical business services with digital tools and applications for improving productivity and fostering better customer experience; and the third, the most developed phase where organizations can create new digitalized business models (Verhoef et al., 2021). EA is a time-honored and studied method to gain digital transformation by creating new business models in various business areas (e.g., Levina et al., 2020; van de Wetering et al., 2021; Goerzig & Bauernhansl, 2018; Kanin & Drews, 2022).

Various studies have already established that EA problems are multifaceted and often intertwined into complex, intractable problems (Rouvari & Pekkola, 2023). They have been studied vastly in different domains in the public and private sectors (e.g., Kaisler et al., 2005; Ahlemann et al., 2012; Lemmetti & Pekkola, 2012; Löhe & Legner, 2014; Seppänen, 2014; Dang & Pekkola, 2017a). EA projects are, by their very nature, comprehensive for achieving strategic goals, which makes them vulnerable (Dang & Pekkola, 2017b). The EA problems are not technical but usually connect with governance, leadership, management, and even governmental politics (Kaisler et al., 2005; Banaeianjahromi, 2018; Kaisler et al., 2017; Dang & Pekkola, 2017b). Therefore, we need new ways and tools to manage enterprise architecture to resolve leadership problems for executing digital transformation (Kanin & Drews, 2022).

Communication and collaboration problems usually intertwine with the management and governance challenges in EA projects. Earlier studies have shown that communication and collaboration are prominent root causes for other EA problems (e.g., Banaeianjahromi & Smolander, 2019). From an academic perspective, EA problems are challenging to mitigate because they seem

context-specific (Gong & Janssen, 2019; Ylinen & Pekkola, 2020). Kotusev and Kurnia (2021) noticed that communication problems could be improved, especially between the decision-makers and other stakeholders.

Almeida et al. (2020) have shown that the interoperability capability model is critical in communication and collaboration in the public administration sector. Besides the HEI's dedicated capability models and interoperability capability model, HEIs have been recommended using innovation capability models (Fatemeh et al., 2023) and improve digital service ecosystems, especially data management and open data management by ecosystem capability models (Immonen et al., 2018). The Higher Education Reference Model, HERM, is in use in a couple of Finnish higher education institutions, and for example, German HEIs have used it to present the status of digitization in German HEIs (von der Heyde, 2023). However, academic studies on HERM are rare, but, e.g., von der Heyde and Hartmann have studied student life cycle and value streams in higher education via the HERM research lens (2023). In addition, there are some non-academic general introductions to HERM (e.g., Nauwerck et al., 2022). The research gap in BT standard utilizing studies is even more significant. The research gaps and communication and management problems in EA projects motivate this paper.

3 Research Method and Research Settings

This single case study leans on participatory observation. I studied my working environment, the Finnish UAS CIO Forum. Thus, I have an ethnographic approach to information systems and information and knowledge management research. My research data includes:

- The Strategy of The Rectors' Conference of Finnish Universities of Applied Sciences Arene (in Finnish)
- The Development Programme of Finnish UAS AAPA CIO Forum (in Finnish)
- Annual Action Plan 2024 of Finnish UAS CIO Forum (in Finnish, unpublished)
- Business Technology Standard Capability Model
- Higher Education Capability Reference model, HERM 2

AAPA CIO Forum wrote The Development Programme in 2023 to help implement the Arene strategy by enabling technology management and providing technology as business services. The AAPA CIO Forum made The Annual Action Plan for operative technology management. AAPA used the BT standard capability model utilizing technology management in these documents.

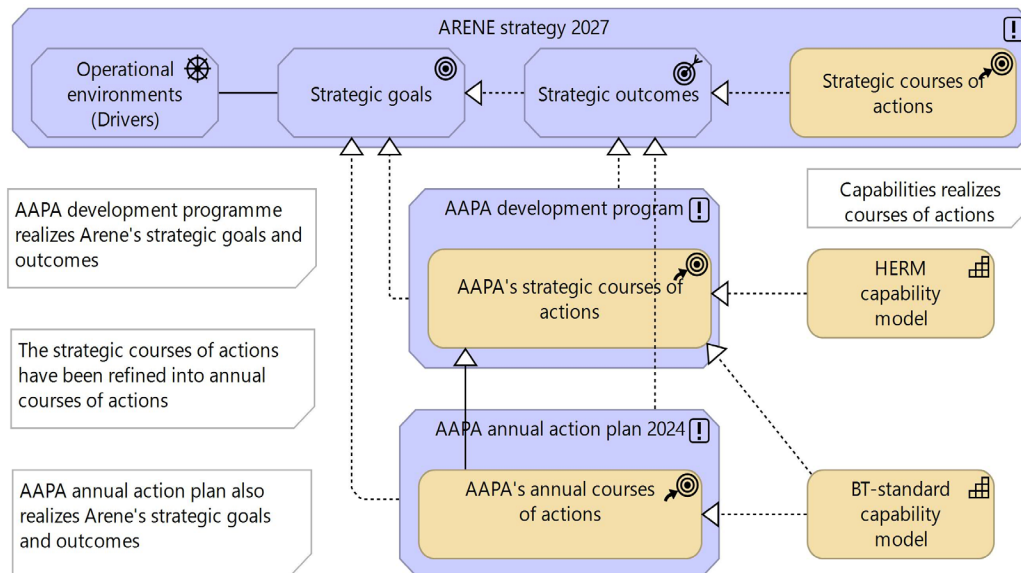


Figure 1. The metamodel of AAPA strategy management

Figure 1 describes structurally the relationships between the artifacts and elements used in the study. The AAPA development program and its strategic courses of action realize the strategic goals and outcomes of the Arene strategy. The AAPA annual action plan 2024 and AAPA's annual courses of action also realize the Arene strategy goals and outcomes. AAPA's annual courses of action are specializations of AAPA's strategic courses of action. In AAPA, strategy management uses the BT standard capability model. We have selected capabilities we need to acquire or develop to realize the strategic and annual courses of action.

4 Data Analysis and Observation

In this section, I describe how the AAPA CIO forum has made the development program 2024-2030 and the annual action plan 2024 by using the BT standard capability model as a guidance tool. The forum wrote the development program, which helps implement Arene's three strategic goals through 13 business technology-oriented strategic courses of action. Then I utilized the HERM capability model to identify the needed capabilities for realizing the strategic courses of action. I compared the HERM and BT capability models. Moreover, I chose the HERM model because it is intended for the higher education domain. Furthermore, the 13 strategic courses of action have an educational approach, even though they are technically oriented actions. However, I also used some BT capabilities and self-created a few dedicated capabilities to complete the capability gaps.

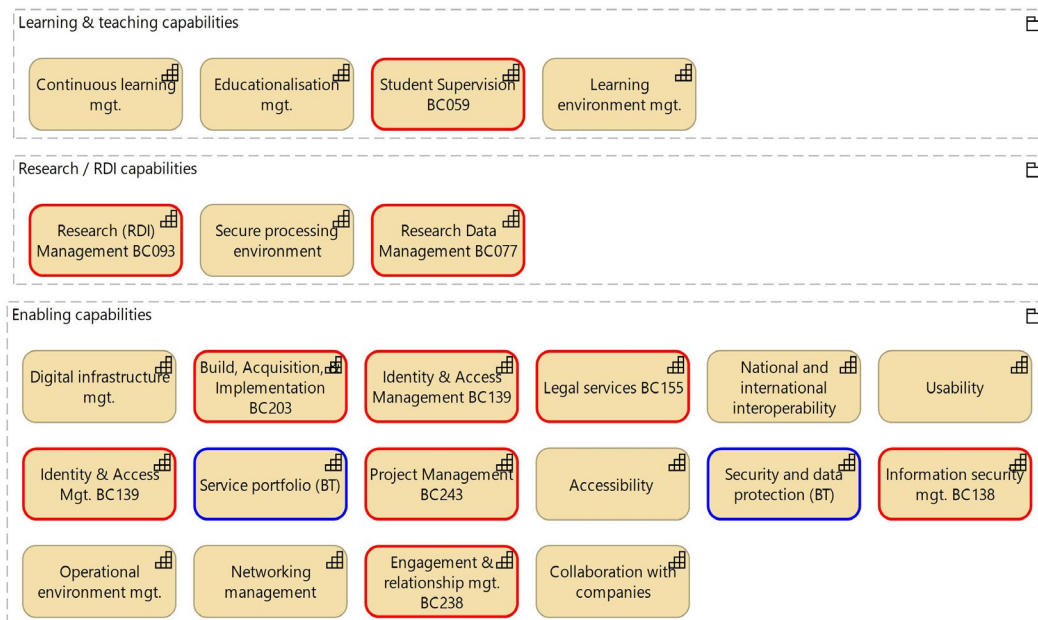


Figure 2. The AAPA development program capability map. The HERM capabilities are marked with red outline, BT capabilities with blue outline, and AAPA dedicated capabilities are in default design.

Next, we wrote the AAPA action plan 2024 derived from the development program using the BT standard capability model. The AAPA CIO Forum decided to use the BT standard, an information technology management framework with a dedicated capability model to gain digital transformation. The BT standard capability model defines five management disciplines and refines 28 capabilities for managing information technology. The disciplines are 1) strategy and governance, 2) sourcing and optimization, 3) development, 4) services, and 5) demand, which intersect with the other four disciplines. The demand discipline refines the capabilities needed to transform strategies on annual plans, and the other four management disciplines define the capabilities to transform plans into capabilities and benefits, respectively (Business Technology Forum, 2023).

The annual action plan includes 20 courses of action plus selected capabilities for realizing them. We grouped both into the five management disciplines (Fig. 3). Our idea was to use the maximal and effective BT standard capability model; thus, we guide the technology management with the framework and do not use other capability models or dedicated capabilities in the task. We made the descriptions for the courses of action and created quantitative and qualitative meters to indicate the execution of the actions. The BT standard's comprehensive definitions of the capabilities relieved our task.

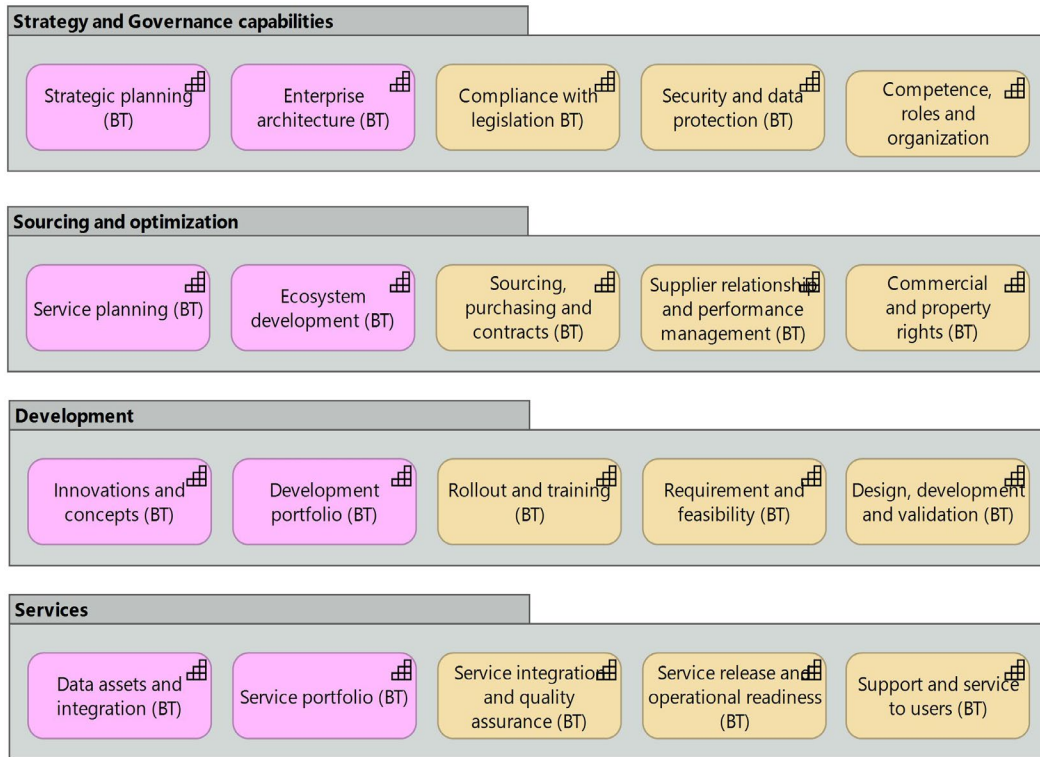


Figure 3. Capabilities for annual courses of action. The capabilities have been grouped into the five BT capability model management disciplines. The demand discipline is intersecting; thus, the demanding capabilities have been marked with the pink fill colour.

Next, is shown an example of how the AAPA development program and AAPA annual action plan implement Arene's strategy by realizing technology business-based courses of action and capabilities (Fig. 4). The example covers one of the three strategic goals: "The RDI activities of UAS are strongly recognized and funded internationally and nationally." Two strategic outcomes will realize the goal, and to realize the outcomes, AAPA has created five strategic courses of action. We have identified ten needed strategic capabilities to realize the strategic courses of action. We derived the 2024 courses of action from the strategic courses of action, but they are realizing Arene's strategic outcomes with the strategic course of action. We identified five needed capabilities for realizing the annual courses of action. In the task, we relied only on the BT capability model in identifying them because we wanted to utilize the capability model as rigorously as possible.

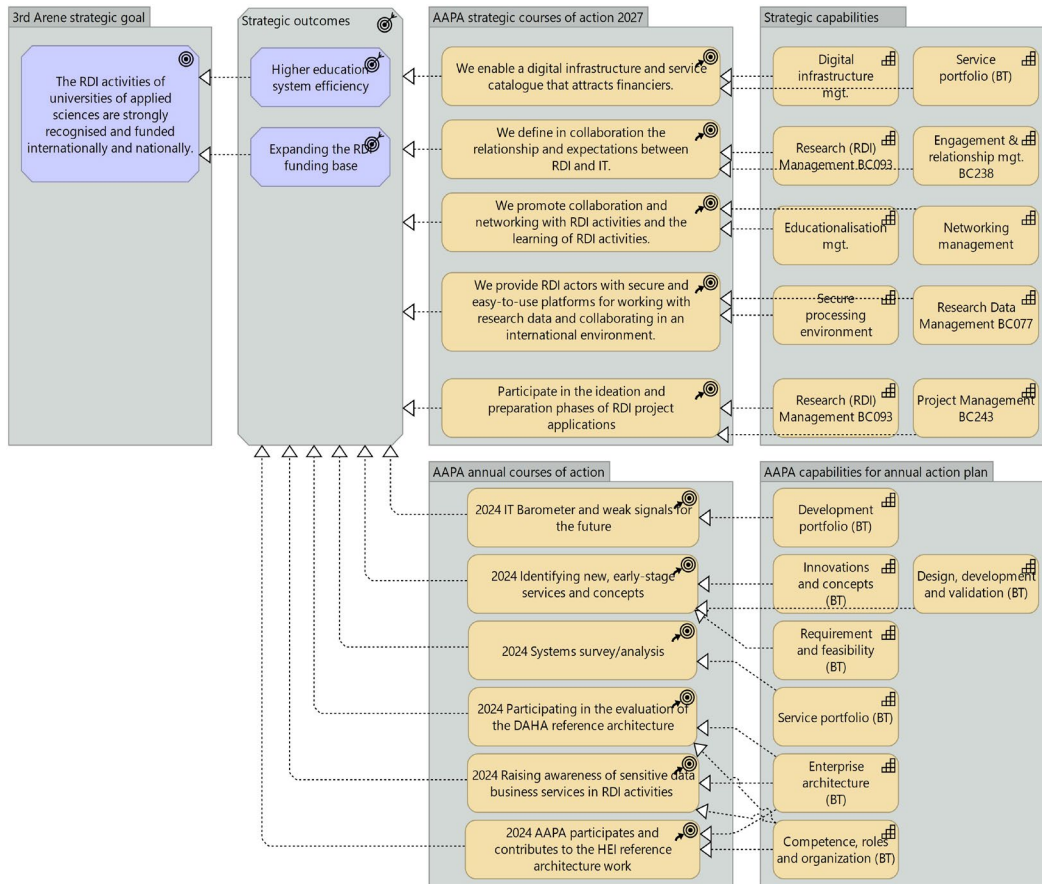


Figure 4. An example of how the strategic courses of action and capabilities and the annual courses of action and capabilities realize one of Arene’s strategic goals.

5 Discussion

The AAPA development program capability map includes 23 items, of which 10 inherit descent from the HERM model, two from the BT model, and 11 are self-created. For example, continuous learning as such does not include either capability taxonomies. The HERM seems to be focused on graduate education: on the one hand, the capabilities have been defined in such a way that they do not limit continuous learning, but on the other hand, they do not support the execution of continuous learning. However, the Finnish Ministries of Education and Culture and Economic Affairs and Employment and Finnish HEIs have put considerable resources into continuous learning strategies, new business models, and business services. Thus, continuous learning is a paradigm shift in education. The continuous learning business models probably will not be based on the current degree education funding models but will need models based on private funding, arguing the need for new continuous learning capabilities.

As mentioned in the literature review, communication and collaboration problems are distributed and critical and have been identified as root causes of other EA and IT project problems (e.g., Banaeianjahromi & Smolander, 2019). However, the HERM does not use that wording, but semantically very near it is engagement & relationship management capability and its child capabilities:

relationship management, outreach management, engagement management, and extension management. Semantically they are not identical, but we preferred the HERM wording for interoperability reasons. Besides engagement and relationship management, we self-created collaboration with company capability. In Arene's strategy research, development, and innovation, collaboration is a crucial outcome; thus, we need to focus on developing the specified capability, and previous studies have demonstrated that communication and collaboration are threshold resources in EA projects (Rouvari & Pekkola, 2024). Besides this, Rouvari and Pekkola propose to address communication and collaboration in risk management and mitigate it with a communication plan and collaboration model (2024).

Interoperability capabilities are missing in the HERM model; thus, we have self-created the national and international interoperability capabilities enabling integration with service ecosystems in the education domain. Interoperability capabilities cover legal, organizational, semantic, and technical layers based on The European Interoperability Framework (2017) Thus, this case study shows that the HERM and BT capability models cannot cover all the needed capabilities. Therefore, architects need to supplement selected HERM and BT capabilities with self-identified capabilities in their own organization's capability map. The HERM model is dedicated to the higher education sector; thus, it fulfills our needs better than the BT standard capability model. However, another finding that stands out from the study is that the HERM is static taxonomy, and it must be enriched with specialized capabilities like continuous learning in this case. On the one hand, the HERM enables inter-organizational functions and collaboration but does not endorse HEIs' differentiation or support target state planning enough.

BT standard's capabilities will realize the AAPA 2024 annual action plan and its courses of action. Its universal capability model can guide AAPA's technology business, but we need more HEI sector-specific capabilities to achieve our strategic goals. The weakness of the BT capability model has been solved by using the HERM capabilities to realize the AAPA development program's courses of action and annual courses of action have been connected with them (Fig. 1). This case study shows that BT standard capabilities are easy to utilize. The example (Fig. 4) describes how the development portfolio capability realizes IT barometry and weak signals course of action by maintaining a list of portfolio-level development initiatives and their status, how the service portfolio capability provides visibility in the status of UAS application and technology services by realizing yearly Finnish HEI's system survey, and how enterprise architecture and competence, roles and organization capabilities will be used to realize three annual courses of action. We used 20 of the total 28 BT standard capabilities in the annual action plan. All demand discipline capabilities are in use, but for example, financial planning and control capability in sourcing and optimization discipline is not in the AAPA annual action plan capability map but is implicitly in use; for example, AAPA budget monitoring and budget monitoring development tasks. All BT standard capabilities are valuable for us, but in 2024, we are focusing on developing the selected 20.

This study leads to three propositions for practitioners to help use capability models for steering information and knowledge management.

Proposition 1: Utilize domain-specific capability models, in this case, the HERM capability model but reinforce it with other capability models such as ecosystem (Immonen et al., 2018), interoperability (Almeida et al., 2020), innovation (Fatemeh et al., 2023), and business technology capability models.

Proposition 2: Ensure interoperability in all architecture domains (legal, organizational, semantic, and technology), and prepare to use interoperability capability models to complete your capability model. Interoperability is critical in collaboration between organizations (Almeida et al., 2020).

Proposition 3: Ensure the organization's capability map includes communication and collaboration capabilities – the core capability to gain digital transformation (Rouvari & Pekkola, 2024).

6 Conclusion

This paper set out to assess the feasibility of using the HERM and BT standard capability models in IT management in the Finnish UAS CIO forum. The study confirmed that the HERM model meets its objectives, i.e., it describes and communicates well the higher education domain-specific capabilities needed and to be developed, but it can be challenging to use it to describe the target state of new strategic issues. The study also shows that the BT standards universal management capability model is eligible for IT management support but requires its domain-specific capabilities. These findings suggest that enterprise architecture practitioners could enrich both models with other capability taxonomies, e.g., interoperability models, and use self-created strategic and other differentiating capabilities. There is, therefore, a definite need for the three propositions provided here.

This study has some limitations. First, because of its ethnographic approach, I acquiesced to only one research dataset in one project, which may need to be narrower for information systems and information and knowledge management research fields. Second, the study focused only on the HERM and BT models and ignored other capability models and taxonomies. Based on the literature reviews and provided propositions, future studies should determine the roles of ecosystem, interoperability, and innovation capability models in the higher education sector's technology management. Also, BT standard's roles and responsibilities model in identifying actors' roles and operating model defining values streams in technology management are intriguing ones that could be usefully explored in further research.

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