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**DIGITAL TRANSFORMATION THROUGH ENTERPRISE ARCHITECTURE:
A SYSTEMATIC PORTRAYAL**

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Abstract

This thesis examines the relationship between portrayal of Enterprise Architecture and Digital Transformation. Various cases of Digital Transformation are modelled with an Enterprise Architecture approach. Digital transformation is a concept which does not have a consensus within both industry and academics, and this thesis aims to investigate if enterprise architecture can help organizations, industry, and academia to establish a clear understanding of digital transformation among different stakeholders.

Key words: Enterprise Architecture, Digital Transformation, Digitalization, Digitization, ArchiMate

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1. Introduction

In the era of continuous technological change, digital transformation has emerged as a pivotal force reshaping the strategic, operational, and cultural fabric of organizations across the globe. This phenomenon, characterized by the integration of digital technology into all areas of business, fundamentally alters how organizations function on day-to-day basis and deliver value to customers. Yet, despite its prevalence, digital transformation remains an enigmatic concept, with varying interpretations across industry and academic spheres. This lack of consensus not only muddies the waters of comprehension but also prevents the effective implementation of digital strategies.

This thesis seeks to demystify digital transformation through the prism of Enterprise Architecture (EA), a discipline that provides a structured approach to organizational analysis, design, planning, and implementation. By leveraging EA frameworks and principles, this study endeavors to model various instances of digital transformation, thereby illuminating the intricate dynamics at play. The core objective is to ensure whether enterprise architecture can serve as a “lingua franca”, bridging the conceptual gap among diverse stakeholders and fostering a unified understanding of digital transformation.

To navigate this inquiry, the thesis unfolds across several layers. Initially, it delves into the theoretical building blocks of digital transformation and enterprise architecture, drawing from a rich tapestry of literature to establish foundational concepts. Subsequently, it examines of digital transformation case, modeled through the lens of enterprise architecture. These models serve as analytical tools, providing insights into the operationalization of digital transformation strategies and their alignment with organizational objectives.

In doing so, the research addresses a critical gap in the existing literature, offering clarity and structure to the discourse on digital transformation. It contemplates the role of

enterprise architecture as a catalyst for alignment among the disparate understandings prevalent in industry and academia. Moreover, the thesis proposes a novel framework for depicting digital transformation initiatives, which harmonizes the various facets of an organization's journey toward digitalization.

By exploring the symbiotic relationship between enterprise architecture and digital transformation, this thesis contributes to a more nuanced understanding of how organizations can navigate the complexities of the digital age. It stands as an academic inquiry into a concept that, while widely discussed, is seldom fully understood, and provides a beacon for organizations striving to harness the transformative power of digital technologies.

2. Literature Review

2.1 Enterprise Architecture

Enterprise architecture represents a comprehensive framework – an integrated set of concepts, methodologies, and models employed in crafting and actualizing an organization's structure, operational processes, information systems, and foundational technology. In that regard, Enterprise Architecture is considered the blueprint that offers a holistic picture of an organization (Lankhorst, 2017).

Enterprise architecture captures stable parts of business and technology; however, it is crucial to note that enterprise architecture should be capable of change. As trends change and new technological opportunities arise, enterprise architecture also should be modified accordingly. A robust architecture plays a pivotal role in integrating new initiatives with an organization's existing processes, technological systems, and assets. It also aids in pinpointing the requisite modifications. Therefore, adhering to sound architectural practices is instrumental for a business's capacity to adapt and innovate, as it offers a balance between consistency and adaptability (Lankhorst, 2017)

Different drivers are applicable for enterprise architecture: internal and external. To start with, external drivers mainly include customers, suppliers, other business partners and regulators. On the other hand, internal drivers are also applicable. One of them includes the room for efficiency and optimization in organizations. And as said in “Enterprise at Work”, The efficiency of a system is determined more by the interconnections between its various elements than by the intricate descriptions of each separate element, which emphasizes the importance of enterprise architecture of an organization, specifically when an organization is bigger, hence the importance of alignment within the stakeholders and departments of an organization.

2.2 Digital Transformation

Digital Transformation (DT) has various and diverse definitions, and it is hyped both in academia and practice. (Gong, 2021) However, there is no consensus on what DT is, but a consensus is required to use DT consistently. Not having a unified view of what DT is, there is confusion and complexity of understanding this concept.

Lack of unified definition of DT creates difficulties for executives, especially for CEO, CIO, CDO. Digitalization, a synonym for Digital Transformation, should not be considered as a new phenomenon but more like a building block on the shoulder of the previous information management discipline. Digitalization signifies the rapid evolution within a society propelled by advancements in digital technology, encompassing an array of technologies at various levels of development that are on a path to intersect and give rise to novel innovations. (McAfee, 2009)

In initial interpretations, the term Digital Transformation (DT) was often equated with or inaccurately substituted for the traditional concept of digitization. Digitization essentially involves converting analog data into a digital format—transforming it into binary code of zeros and ones—enabling this data to be managed, processed, and disseminated by computers.

(Gong, 2021) On the other hand, digitalization describes the rapid evolution of society prompted by advances in digital technology. This encompasses a spectrum of technologies at varying developmental phases that are expected to merge and catalyze the creation of new technological innovations. It is also recognized as a sociotechnical process that extends the application of digital conversion methods into wider societal and institutional domains, thereby integrating digital technology into the very foundation of everyday operations.

DT can have several benefits, such as improved decision-making (Heilig et al., 2017; Roedder et al., 2016) and creating competitive advantage (Korhonen and Halen, 2017; Schwertner, 2017). Some authors include customer value creation, like optimizing customer needs and experiences (Rogers, 2016) in their definitions, while others exclude it.

There are contradicting ideas about Digital Transformation. Contemporary research presents a spectrum of interpretations regarding Digital Transformation (DT). Some scholars, like Chanas in 2017, suggest DT might entail incremental changes enabled by technology, such as the adoption of a new ERP system. Conversely, other scholars like Janowski (2015), Loebbecke and Picot (2015), and Wang et al. (2018) argue that DT represents a more profound, evolutionary process unfolding over an extended period. The concept is linked to business models by researchers including Berman (2012), Bharadwaj et al. (2013), Gassmann et al. (2014), and Schallmo et al. (2017), and to strategic planning by Bharadwaj et al. (2013), Henriette et al. (2015), Matt et al. (2015), Rogers (2016), and Westerman (2018). Meanwhile, other studies propose that DT should be viewed either as a paradigm or a comprehensive process (Berman, 2012; Janowski, 2015; Wang et al., 2018). Additionally, some researchers position DT in the context of the economic and societal repercussions stemming from digitization and digitalization, as noted by the OECD in 2018.

Certain definition parameters can be used to effectively recognize the definition of things, including DT. Three methods may include: content analysis, conceptual analysis, and conceptualization. Various rules for conceptual definitions may include:

- Concepts should be uniquely defined,
- Should be unambiguous and clear,
- Consistent within the field

While a foundational understanding of digital transformation is established, further elucidation is garnered from a range of secondary sources. According to one perspective, digital transformation encapsulates the integration of digital technology across all facets of a business, fundamentally altering operations and enhancing customer value delivery. Another source articulates digital transformation as the comprehensive restructuring of an organization, aimed at generating value through the consistent and strategic application of technology at scale.

Further insights from a study accessed through Sage Journals suggest that the impetus for digital transformation is often the pervasive forces of globalization, which compel businesses to evolve amidst disruptive changes with wide-ranging environmental, societal, and institutional ramifications. This transformation, necessitated by the competitive landscape, hinges on the efficient amalgamation of digital processes and tools.

Illustratively, the banking sector's adoption of electronic banking services exemplifies digital transformation to secure a competitive edge. Thus, we might consider whether digital transformation can be concisely defined as the strategic implementation of digital tools, processes, and cultural shifts by organizations striving to excel and maintain market leadership.

2.3 Enterprise Architecture Frameworks

Enterprise architecture frameworks comprise a suite of methodologies, blueprints, and instruments utilized by software teams for the strategic development and construction of substantial, enterprise-level application systems. These frameworks are instrumental for

architects, designers, and engineers in grasping the systematic framework and the interconnectivity of components within the system.

The success of the enterprise architecture framework depends on the understanding of each stakeholder and from their viewpoints in the organization. And it includes various principles, such as “transparency” of the models and diagrams or that it should consolidate the architecture of the organization.

There are various established frameworks; and depending on the type of the enterprise architecture the type can be chosen. Some of the standard frameworks included are the Zachman Framework, The Open Group Architectural Framework (TOGAF), Open Agile Architecture (OAA).

2.3.1 TOGAF Framework

TOGAF stands out as a notable standard within the field of architecture, particularly because it is the most comprehensive architectural methodology accessible without cost. Some may argue that TOGAF may have a limited view on architecture principles, however, enterprise architecture should cover all architecture domains which is not only IT. (Greefhorst, 2010)

Architecture vision shows how the new capability will meet the business goals and strategic objectives. TOGAF can be used for enterprise architecture modeling through its comprehensive methodology and set of tools.

2.3.2 ADM

The core of TOGAF is the Architecture Development Method (ADM), a step-by-step approach for developing and managing enterprise architectures. The ADM guides practitioners through the process of creating and evolving architecture artifacts, including models. TOGAF encourages the creation of various architecture models to represent different aspects of the enterprise. These models help stakeholders visualize and understand different layers of the architecture, such as business, data, application, and technology.

In summary, TOGAF provides a comprehensive and systematic approach to enterprise architecture modeling through its ADM, guiding practitioners through the development of various architecture artifacts and models. Therefore, within this thesis, TOGAF is chosen to support the creation of a well-structured and aligned enterprise architecture that contributes to definition of digital transformation.

2.4 Language - ArchiMate Core

ArchiMate is an enterprise architecture modeling language, to show high-level models and depicting relations among different components of an organization. To create blueprints of organizations, architects require a tool and there are various tools in the market. Architecture is a means of communication to involve stakeholders within an enterprise.

For digital transformation as well, architecture is useful for requirement analysis and design of the applications and business processes. It includes three main enterprise layers: business, application (information systems) and technology.

2.4.1 Core Layers

Table 1: Core Layers in ArchiMate

Business Architecture	Business Layer
Information Systems Architecture	Application Layer
Technology Architecture	Technology Layer

These levels delineate an enterprise's services provided to clients, encompassing business processes executed by actors at the Business Level, application services and their implementation at the Application Level, and the technological underpinnings, including processing, storage, communication, hardware, software, equipment, materials, and logistics networks at the Technological Level.

2.4.2 Layering Framework

The 'Serving Connection' concept illustrates how components within a specific layer receive support from services provided by other layers, while the 'Realization Link'

emphasizes how elements within a subordinate layer can embody similar elements found in superior layers.

2.4.3 Core ArchiMate Framework Elements

In the context of ArchiMate, it is essential to note that the color scheme employed represents different architectural layers: yellow signifies the Business Layer, blue represents the Application Layer, and green designates the Technology Layer.

2.4.4 Viewpoints in ArchiMate

ArchiMate, as an open and standardized modeling language for enterprise architecture, provides a set of predefined viewpoints that are commonly used to address specific concerns or aspects of an enterprise architecture. While ArchiMate does provide predefined viewpoints, it is also flexible, allowing practitioners to define custom viewpoints tailored to their specific needs. This flexibility is important because different organizations may have unique concerns that are not fully addressed by the predefined viewpoints. This is particularly useful when organizations have unique concerns or when additional detail is required beyond what the predefined viewpoints offer.

In the following, digital transformation will be separated into building blocks and according to main components, various viewpoints will be used to portray digital transformation. When approaching digital transformation with ArchiMate, it is beneficial to use a combination of viewpoints to provide a comprehensive understanding of the transformation process from different perspectives, such as business, motivation, and technology & implementation extensions in ArchiMate.

For this thesis on digital transformation, **three viewpoints** are particularly relevant:

- 1) **Capability Viewpoint:** Highlights what the organization can do, mapping capabilities to strategic goals.

- 2) **Motivation Viewpoint:** Focuses on the rationale behind the transformation, detailing drivers, and desired outcomes.
- 3) **Value Stream Viewpoint:** Elucidates the value delivered through transformation, connecting activities and resources to value creation.

These perspectives are crucial as they collectively reveal the why, what, and value of digital transformation, providing a clear understanding of its impact on the organization.

2.4.5 Metamodels via ArchiMate

A metamodel is a model that defines the structure and semantics of other models. In simpler terms, it is a model that describes the elements, relationships, and constraints that can exist in a particular modeling language. Metamodels serve as a framework for creating and interpreting models within a specific domain.

Metamodeling can be defined the analysis, construction of, constraints, models, and theories that is beneficial for modeling or a cause. It can be used to represent input and output relations, and, in this thesis, it will be used to model digital transformation as enterprise architecture.

To sum up, to analyze relationship between digital transformation and enterprise architecture, a metamodel will be defined using collection of concepts – the building blocks – that can be considered as parts of digital transformation. Following this metamodel, it will be investigated whether a company fits in this metamodel. It is important to note that, there is no one-size-fits-all model in terms of enterprise architectures, as the organizations grow, the quantity of EA artifacts may also increase. (Pattij, 2022)

3. Research Design

The choice of research methodology is a critical component of a study, and selecting an appropriate methodological approach is crucial for the success of the research. In the field of Information Systems, research methodologies can be grouped into various disciplines,

including technology, management, political science, and strategic planning. Employing the right research methodology is essential for fulfilling the primary objectives of the research.

It includes qualitative and quantitative approaches. Qualitative approach is interpretive whereas quantitative approach includes interpretation of numerical values. In this paper, design research methodology will be used, which will be explained in the following parts.

Design science research methodology is prominently used in information systems research, it is of importance in creation of successful artifacts. It includes six steps – which includes: **problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication.** (Peppers, 2008) Design science research focuses on information science – where it differs from natural sciences where not solely explaining how things are– but design sciences focus on how things should be designed. It is used to build artifacts, as such as this paper intends to where digital transformation will be modelled as in enterprise architecture as an artifact. In short, it is more of a prescriptive method rather than a descriptive method, where the goal of this methodology is to build and create, rather than explain and investigate current situation. Thus, it is one of the reasons why this methodology will be used in the solution, even though it is not dominantly present in information systems domain yet.

Design research includes various principles: such as the artifact should address a problem and the quality, utility of the artifact must be evaluated. (Peppers, 2008) The process of design research includes the following main activities according to (Peppers, 2008) DSRM processes are evaluated in three stages: it should be consistent, provide a nominal process for research and lastly, it should provide a mental model for the research outputs.

For this thesis, problem identification and motivation are referred as research motivation and question. Design and development will include the development of metamodels for digital transformation, demonstration will include a real business case scenario demonstration of the

metamodels and evaluation of the models. The demonstration will be actualized on a real-life company based in Turkey called, Mega-Farma.

3.1 Research Motivation

Digital transformation has emerged as an imperative undertaking for organizations seeking to maintain competitive advantage in today's rapidly evolving business landscape. The term itself has garnered substantial attention, becoming a prominent theme within contemporary corporate discourse. Nevertheless, there exists a notable disparity in its interpretation, with a universally accepted definition remaining elusive.

This thesis posits that the integration of digital transformation initiatives within the framework of enterprise architecture offers a potential resolution to this ambiguity. By employing enterprise architecture to construct comprehensive models, the intricate web of domain interactions pivotal to digital transformation can be clarified. The application of enterprise architecture principles, articulated through the ArchiMate modeling language, promises to enhance organizational strategies for digital adaptation. Such a unified approach fosters coherence across various organizational strata and stakeholder groups, thereby dispelling the obscurity surrounding digital transformation terminology.

3.2 Research Question

Main research question of this paper is “How Digital Transformation can be integrated within Enterprise Architecture using ArchiMate?”

Subtasks must be followed to answer this question more thoroughly:

1. What are the main viewpoints to display DT in EA?
2. What are the main components of DT and how the metamodel should be?
3. How metamodel can be expanded to real-life company?
4. How creation of EA benefit understanding of DT?

4. Modelling Digital Transformation with ArchiMate

4.1 Main Components of Digital Transformation

Digital transformation is a complex and a multifaceted process and consists of different building blocks that serves as the foundation of the transformation effort. It may include some of the essential concepts as below, and they are interrelated and work in conjunction to drive digital transformation, which indicates it would make sense to portray digital transformation in ArchiMate, where one can show interacting components efficiently within an organization.

1. **Digital Technologies:**

Digital technologies are the core components that would enable digital transformation, which include cloud computing, big data analytics, artificial intelligence, Internet of Things (IoT), blockchain, and other emerging technologies – which are used to create new solutions and enhance the current processes.

2. **Process Optimization:** Process optimization is one of the goals of digital transformation, so in this sense it may fit in to the motivation view of ArchiMate. Companies and organizations aim to eliminate manual work, automate routine tasks, improve bottlenecks and in conclusion, improve workflow efficiency.

3. **Innovation and New Business Models:** One of the possible outcomes an organization may strive for may include innovation of their products, services, or business models. The main objective could either be creation of new revenue streams or recreation of the existing ones with more digital focus.

4. **Leadership and Vision:** Effective leadership and vision is required for guiding and driving digital transformation initiatives. Leaders, such as a CEO or CFO needs to set a clear vision, allocate resources, and ensure enforcement of alignment of the transformation goals.

5. **Cybersecurity and Compliance:** As well as digital technologies is a building block of digital transformation, it also accelerates the importance and the emphasis on cybersecurity and compliance as well.
6. **Agility and Flexibility:** Agility and flexibility of the organizations are also one of the end-goal of the digital transformation for the organizations as well. Also being one of the goals of the digital transformation, it is a driver and characteristic of it too. Digital technologies that are adopted must be open to agility and flexibility, as well the mindset of the people.
7. **Measurement and KPIs:** A key performance indicator (KPI) is the measurable outcome of an initiative, and it is vital to measure the progress and success of the digital transformation initiatives.

The building blocks above mentioned work interrelated for digital transformation within an organization. However, the mixes of building blocks may vary between different organizations and even over time due to the nature of digital transformation, where it is an ongoing process – where organizations also must continually adapt and evolve in response. Nevertheless, there might be changes over time and in between organizations, there are prominent building blocks and portrayal of digital transformation is essential in a metamodel where there might be minor differences.

Table 2: Proposed relationships for conceptual models (Metamodels)

Concept 1	Concept 2	ArchiMate Relationship	Meaning and Motivation
Digital Technologies	Innovation and New Business	Serving	Digital technology components help to serve the business service, which in this case is the innovation and new business.
Leadership and Vision	Innovation and New Business	Influence	Leadership and vision are associated, and both influences the value of a company, where it creates innovation and new business.
Innovation and New Business	Agility and Flexibility	Influence	Innovation and new business influence an organization's agility and flexibility.

Agility and Flexibility	Stakeholder	Influence	Agility and flexibility of an organization has a direct impact on the stakeholders of a company.
Digital Technologies	Measurement and KPIs	Realization	Digital technologies help organization with the realization of measurement and KPIs.
Digital Technologies	Process Optimization	Serving	Digital technologies serve process optimization within organizations.
Measurement and KPIs	Cybersecurity and Compliance	Serving	Measurement and KPIs are crucial elements within an organization that serves cybersecurity and compliance practices.
Cybersecurity and Compliance	Agility and Flexibility	Realization	Cybersecurity and compliance realization of agility and flexibility of organizations.
Innovation and New Business	Outcome	Realization	Innovation and new business help realization of the desire outcomes, which can differ from stakeholder to stakeholder.
Outcome	Leadership and Vision	Association	Outcome is associated to leadership and vision.
Leadership and Vision	Business Actor	Association	Leadership and vision are associated to business actor.

4.2 Metamodels

1) Capability Viewpoint

In ArchiMate, a modeling language for enterprise architecture, the capability viewpoint focuses on what an organization can do. It is essentially a high-level view of the abilities an organization possesses to achieve its goals and deliver value. These capabilities are abstract and enduring properties of an organization and are distinct from the processes or functions that might change more frequently.

This viewpoint helps organizations to align their strategic intent with their execution by mapping out the key capabilities required to execute their strategy. It also allows for the identification of redundancies or gaps in organizational capabilities, providing a strategic tool for planning improvements or transformations within the business.

By examining capabilities, an organization can determine how well equipped it is to respond to changes in the environment, to leverage new opportunities, or to address challenge.

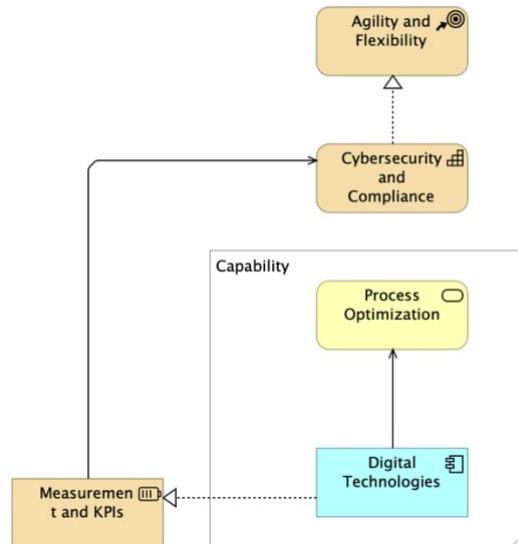


Figure 1: Capability Viewpoint Metamodel for Digital Transformation

2) Motivation View (Goals View)

The motivational perspective, or objectives perspective, is utilized to articulate the significance of a demand and the necessity for change. This viewpoint enables the modeling of essential influencers and fundamental reasons that underpin a demand, addressing the questions of who is involved, why the change is required, and what the change entails. Where relevant,

a value proposition can be linked to the motivational perspective to underscore its importance. Below is shown a motivation metamodel for digital transformation.



Figure 2: Motivation Viewpoint Metamodel for Digital Transformation

3) Value Stream View

This perspective outlines the process through which customer value is generated in accordance with the business model. It clarifies the function and significance of each capability (and associated resources) and the specific value enhancement provided by each one.

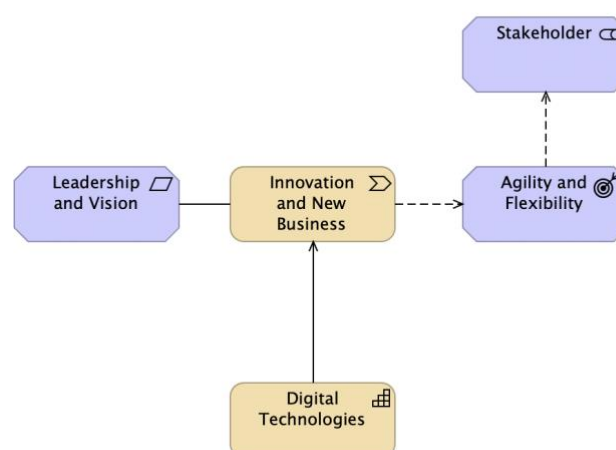


Figure 3: Value Stream Viewpoint Metamodel for Digital Transformation

5.Validation

In the analysis of models that are created of digital transformation in ArchiMate, a model quality management framework that was proposed by Daniel L. Moody and Graeme G. Shanks will be used to validate the quality of the models. Data model quality can be assessed based on **product quality** or **process quality**. The traditional methods of evaluation approach focus more on product quality. One of the possible ways of assessing the quality of data models includes creating a list of desirable properties in a data model. (Moody's, 2001)

Quality factors includes the following: **completeness, simplicity, flexibility, integration, understandability** and **implementability**. To design an effective system, it is important to include and satisfy the relevant stakeholders in the design process. Key stakeholders include the business users, data analysts, and data administrators. (Moody's, 2001)

However, to validate enterprise architecture as one of information systems design method has been an issue in the past as well. In this field, sub-field of IS, since it does not include a theory, a hypothesis, or data. Validation of quality factors can be considered, based on three qualities including: sufficiency, necessity, and independence.

5.1 Validation of Metamodels

In the domain of enterprise architecture, the utilization of various viewpoints is essential for comprehending and managing the complexities of digital transformation. The **value stream, motivation, and capability** viewpoints each provide unique insights that are particularly relevant and beneficial in guiding digital transformation efforts.

Validation of metamodels is performed on an organization based in Turkey, İstanbul, where the main line of business includes sales and marketing of the OTC drugs (Over-the counter drugs) and is dependent on its digital transformation strategy. Capability, motivation, and value stream viewpoints are modelled using previously used metamodels as artifacts, to

validate and elaborate the usefulness of ArchiMate while portraying digital transformation and to estimate the advantage. These metamodels were validated by doing various interviews with the stakeholders within the company.

Mega-Farma plans on undergoing a digital transformation in order reach its goals as to reach agility and flexibility, using its capability of market presence in Turkey. It has a relatively strong resource of sales and marketing team, and aims to establish portal, ERP application and CRM transformation within company to utilize its capability and increase its effectiveness for agility and flexibility.

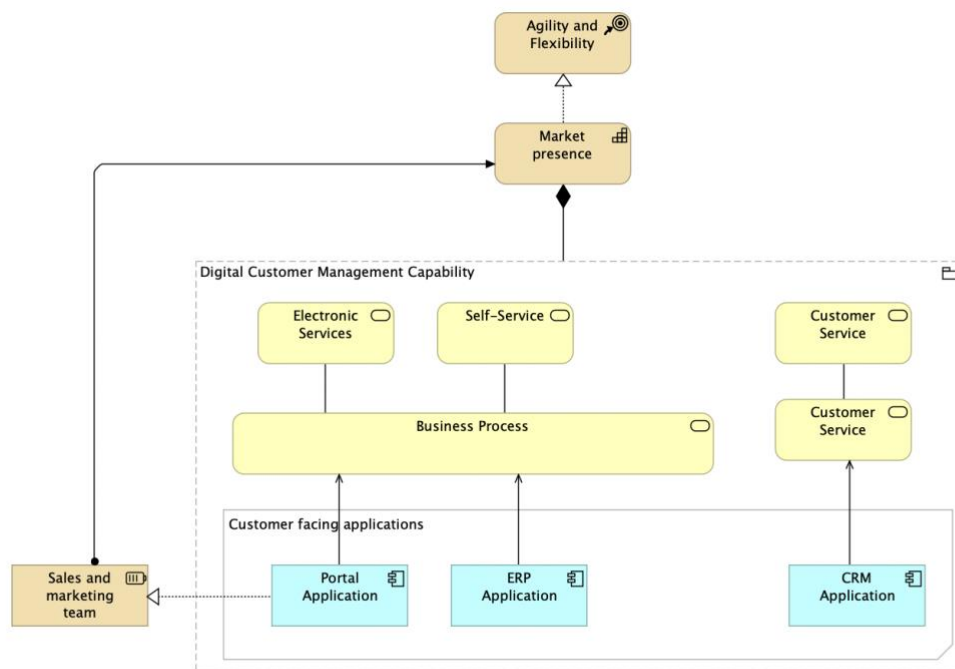


Figure 4: Capability Map Viewpoint for Mega-Farma

The Motivation extension in ArchiMate allows you to model various motivational aspects, including drivers, goals, and principles. It's beneficial for capturing the motivations behind digital transformation initiatives.

While validating the metamodels previously modelled, in this motivation extension various stakeholders in management positions were interviewed. To create customer value, the drivers, goals, outcomes, and the requirements by each C-Level executive was portrayed using ArchiMate as a tool, in order to create more holistic and unified understanding of motivation of digital transformation within the company.

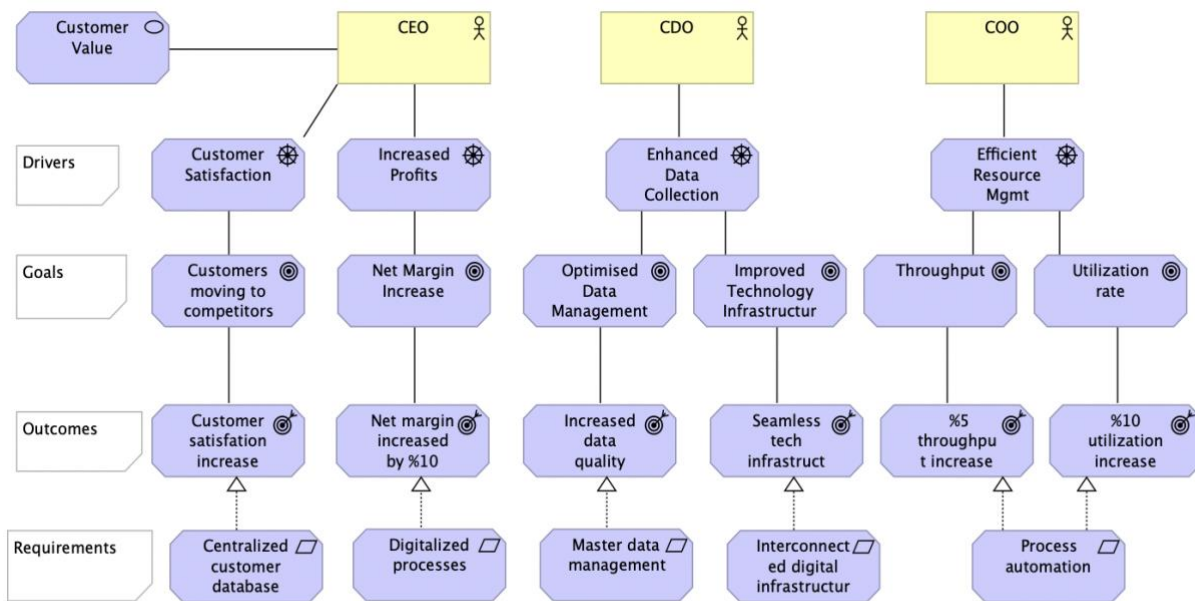


Figure 5: Motivation Viewpoint for Digital Transformation for Mega-Farma

As explained previously, value stream viewpoint defines how value is created for the customers according to the business model. This makes it visible what is the role and meaning of each capability (related resources) and what is the actual value – add of each capability.

Within this organization where the metamodels were validated, similar approach was taken, however this time interview was demonstrated with the IT managers within the organization. To understand if the metamodel could be applicable in terms of this organization, leadership, and vision, intended innovations and desired outcomes were asked. Digital technologies related to this process were portrayed, which in this case included the ERP system, CRM system and an analytics software.

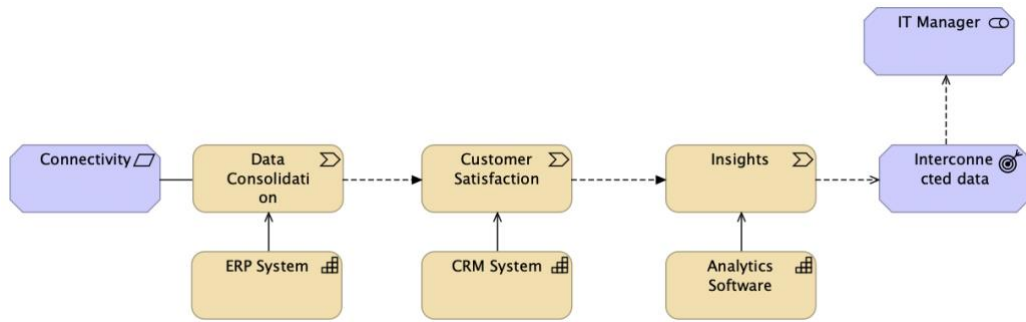


Figure 6: Value Stream Viewpoint for Digital Transformation for Mega-Farma

6.Conclusion

To sum up, the metamodels created for digital transformation using ArchiMate to create a systematic portrayal of what digital transformation was validated by a real-life company called Mega-Farma, to establish a consensus on the values it brings to an organization, the motivation of the stakeholders, as well as the current capabilities of an organization.

The value stream viewpoint elucidates the sequence of activities that an organization undertakes to deliver a product or service to its customers. In the context of digital transformation, this viewpoint allows organizations to identify opportunities for optimization and innovation, ensuring that each step adds value and is aligned with digital objectives. It serves as a blueprint for reimagining processes through a digital lens, enabling the identification of potential efficiencies and enhancements that can be realized through the adoption of digital technologies.

The motivation viewpoint articulates the strategic rationale behind digital transformation initiatives. It encompasses the vision, goals, drivers, and desired outcomes that propel the organization's digital journey. By mapping out these motivational factors, an enterprise can align its digital transformation strategy with its overarching objectives, ensuring that every technological investment and innovation is purpose-driven and contributes to the achievement of the organization's ambitions. This alignment is critical for securing stakeholder buy-in and for providing a clear direction for the transformative journey.

The capability viewpoint provides a framework for assessing and developing the competencies and business functions necessary to support digital transformation. It facilitates a structured approach to determining the current state of organizational capabilities, identifying gaps, and planning for the development of new competencies required in a digital ecosystem. By focusing on capabilities, organizations can prioritize the skills, processes, and technological infrastructures needed to navigate digital disruption effectively.

Ultimately, this thesis posits that the judicious application of ArchiMate can lead to a more profound and shared understanding of digital transformation initiatives. Through its comprehensive framework and the deliberate expansion into various viewpoints, stakeholders are better equipped to engage with, contribute to, and drive the digital transformation efforts that are increasingly critical to organizational success in this rapidly evolving digital era.

In summary, the integration of value stream, motivation, and capability viewpoints equips an organization with a robust, multi-faceted approach to digital transformation. It allows for a comprehensive analysis that aligns strategic intentions with operational execution and capability development, which is paramount for a successful transformation in the digital age.

7.Limitations and Future Research Opportunities

Despite the thorough methods used, we recognize that this research might have some limitations in scope. The findings and conclusions drawn herein are based predominantly on a singular project and have been validated through a limited selection of sample companies. Such constraints may impact the breadth of applicability and generalizability of the study's outcomes.

Furthermore, while these viewpoints offer a solid foundation for understanding digital transformation, the potential to enhance stakeholder comprehension does not end here. The implementation viewpoint, among others, can extend this foundational understanding by providing a more granular look at the practical aspects of executing digital strategies. This

expanded perspective facilitates a deeper appreciation of the tactical steps necessary to bring about digital change, encompassing the deployment of technology, the orchestration of processes, and the mobilization of resources.

Considering this, the research portrays a trajectory for future scholarly inquiry. There exists a fertile ground for subsequent investigations to expand upon the preliminary findings of this study. Future endeavors could aim to extend the generalizability of the proposed models across a more diverse and expansive array of business environments and contexts, thereby enhancing the robustness and applicability of the digital transformation framework established herein. In future research endeavors, it would be prudent to undertake a detailed investigation of additional viewpoints, including the Implementation and Migration Viewpoint as well as the Technology & Deployment Viewpoint. Such an inquiry would enhance our understanding of the intricate dynamics involved in the digital transformation process within organizational structures.

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Appendix

A. Digital Transformation

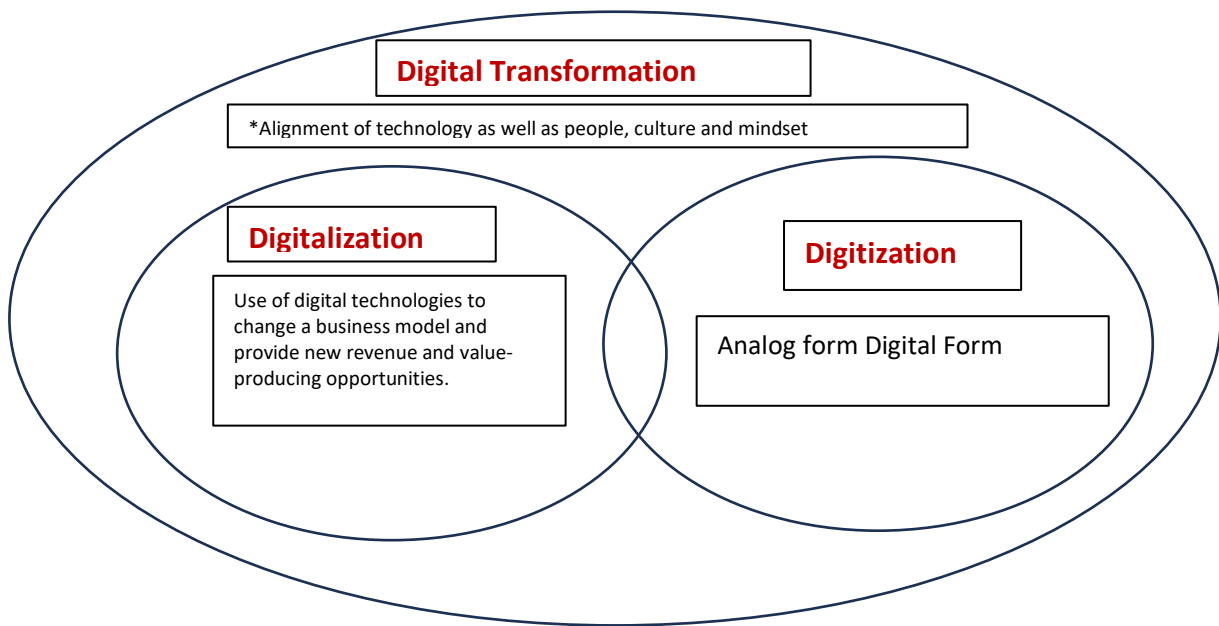


Figure 7: Digital transformation Venn diagram

B. ArchiMate

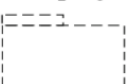
Association 	The <i>association</i> models a relation between objects that is not covered by another, more specific relationship.
Access 	The <i>access</i> relation models the access of behavioural concepts to business or data objects.
Used by 	The <i>used by</i> relation models the use of services by processes, functions, or interactions and the access to interfaces by roles, components, or collaborations.
Realisation 	The <i>realisation</i> relation links a logical entity with a more concrete entity that realises it.
Specialisation 	The <i>specialisation</i> relation indicates that an object is a specialisation of another object.
Assignment 	The <i>assignment</i> relation links units of behaviour with active elements (e.g., roles, components) that perform them, roles with actors that fulfil them, or artifacts that are deployed on nodes.
Aggregation 	The <i>aggregation</i> relation indicates that an object groups a number of other objects.
Composition 	The <i>composition</i> relation indicates that an object consists of a number of other objects.
Grouping 	The <i>grouping</i> relation indicates that objects belong together based on some common characteristic.

Figure 8: Relations in Enterprise Architecture. Source: (Lankhorst, 2017)

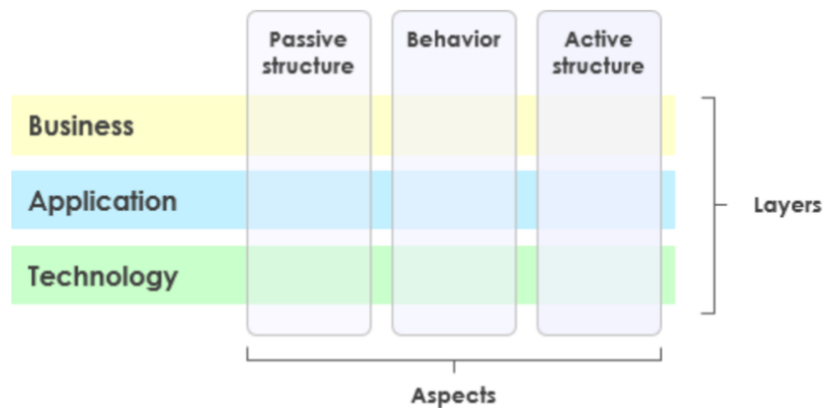


Figure 9: Aspects of Elements of ArchiMate

Active Components: Illustrates the concrete entities such as business entities, software components, and devices that exhibit distinct activities.

Functional Dynamics: Depicts the activities such as processes, tasks, occurrences, and offerings executed by the entities.

Static Elements: Refers to the items or data upon which the activities are carried out.

	Structural Concepts				Behavioral Concepts				Informational Concepts	
Business	Business actor		Business role		Business process		Business service		Representation	Product
	Business collaboration		Business interface		Business function		Business event		Meaning	Contract
	Location		Business object		Business interaction				Value	
Application	Application component		Application collaboration		Application function		Application interaction			
	Application interface		Data object		Application service					
Technology	Node		Device		Infrastructure function		Infrastructure service		Artifact	
	Network		System software							
	Communication path		Infrastructure interface							

Figure 10: Core ArchiMate Elements

C. List of Acronyms

Table 3: List of Acronyms

EA – Enterprise Architecture
TOGAF – The Open Group Architecture Framework
DT – Digital Transformation
CRM – Customer Relationship Management
ERP – Enterprise Resource Planning
ADM - Architecture Development Method

D. TOGAF

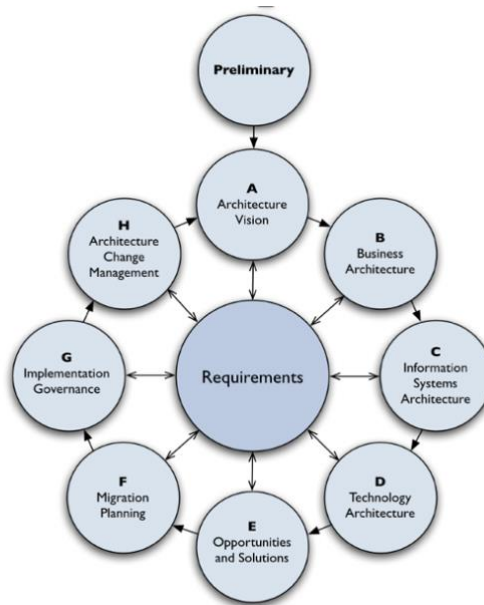


Figure 11: Structured framework for enterprise architecture. Source: (Greefhorst, 2010)