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BUSINESS ARCHITECTURE FRAMEWORK FOR DIGITAL TRANSFORMATION ROADMAP CREATION AND EXPECTED OUTCOMES CALIBRATION

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ANNOTATION

The study focuses on discovery and development of the Business Architecture Framework for Digital Transformation Roadmap and expected outcomes' calibration. The topicality is clearly defined within the study theme, meaning that Digital Transformation is the trend already for some time and nowadays very few comprehensive organizational changes happening without implementing of digital solutions. Planning the Digital Transformation concept what will support business transformation is complex and not so obvious task, what could be very challenging for the inexperienced company representatives, that can lead into potential wrong setup of the transformation program itself, as a result will strengthen possibilities of the potential failure.

The study has a goal to develop the tailored Digital Transformation Framework that should address above-mentioned challenges within the transformation program planning and initiating, moreover the Framework should support Digital Transformation program expected outcomes' calibration, as the organizational changes should be planned and initiated with the well-defined expected improvements traceable through the key performance indicators. To achieve the defined goal, there were defined number of tasks, starting from overview and assessment of existing Business and Enterprise Architecture Frameworks, through the detailed research on the company profiles and Digital Transformation programs within those companies. As the results of research, the tailored Framework was created and validated in 5 use-cases.

The study consists of 3 main chapters, the conclusions chapter and lists of used literature sources and references. The introduction highlights the topicality and novelty of the study and detailed analysis of the related literature and other sources, and references review and analysis was done in the first chapter. The first chapter also describes the research phases and executed activities, listing the factual research phase goals, research flow with all executed steps, analysis methods and tools, created statistical analysis models etc. The second chapter shows statistical analysis results and study author's interpretations over them. As this chapter includes 5 interconnected but separated researches with the different populations and selections, research questions etc.; the chapter is divided into 5 subchapters, each is dedicated to the separate research phase. The third chapter dedicated to the Framework creation and approbation.

The study main content is presented on 164 pages, illustrated with 53 figures and 7 tables, there are 31 appendices, the bibliography includes 241 literature items.

Keywords: Digital Transformation, Business Architecture, Enterprise Architecture, Value Drivers, System Applications and Products in Data Processing (SAP).

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INTRODUCTION

How to drive business growth in a world of disruption? This question very regularly has been put in the center of the organizational change strategy towards the business success not only in Latvia or Baltics, but across the globe.

We are living in complex and uncertain times (Sharma et al., 2020, Otero et al., 2020) and nowadays, no one is doubting the Digital Transformation (hereinafter – DT) expediency in order to support business transformation process or to boost agility for the new reality adoption, especially coping with the last Crisis. Nowadays, the challenges have further spurred organizations into action by bringing much closer compelling event for DT acceleration (McKinsey (I), 2020). Here we are not limiting ourselves only with the newest technologies (although the majority of the newer technologies and innovations are already viable and available on the market in the relatively short time after the invention, so the return on investment (hereinafter – ROI) and deployment time is very attractive), when saying DT, but about comprehensive business transformation empowered and boosted by digital technologies. Organizational change triggered and shaped by the widespread diffusion of digital technology and urge to adapting to the constantly changing environment addressing uncertainty, that would be the more precise definition of the DT, moreover it can be classified as continuous change that can be triggered and shaped by episodic bursts, while the latter are inducing further continuous change (Wessel et al., 2021).

Digitalization is making a big difference in business and society. The market is gradually being filled with digital products and services, creating the need to change traditional business models. (Belk, 2013; Prause, 2015; Petrenko et al., 2019). Today, companies are forced to adapt to changes in the global economy and innovative accessibility, whether it is a small or large company, otherwise, the competitor will win, the business partner will find another contractor that is more flexible and adapted to modern business technologies (Panfilova et al., 2020). Companies executing DT and operating in open-minded and agile way ensure increase of their speed of adoption to the changing world (Aghina et al., 2017, Dingsøyr et al., 2012). Several business and scientific studies show that the productivity of non-digital companies is approaching zero, so each of us needs to rethink the existing processes and take a step to increase productivity by recognizing that today's outdated technologies are no longer delivering the expected results (The Conference Board, 2015; Attaran et al., 2019; Pan et al., 2022; Döhring et al., 2021; Otajonov et al., 2021; Du et al., 2022, Hao et al., 2022, Zhong et al., 2022; Mkrtchyan, 2022; Angevine et al., 2021).

There is undeniable evidence of benefits of digitalization and how it influences business strategies across diverse industrial niches. Today, these benefits are recognized across every

industry, that is why its adoption rate in service-based industries such as e-commerce is at 95%. Other industries such as Banking and Finance sector also boast of an adoption rate of 93%, while 92% of enterprises in the healthcare industry have adopted digitalization. The monetary benefits are also reasons why digitalization has been widely embraced by enterprises and, today, 56% of CEOs attribute increased revenues to digitalization. Thus, to remain competitive and profitable in the digital age, integrating digitalization is a concept that no enterprise can overlook (Exor, 2020; McKinsey (II), 2020; European Central Bank, 2018; PWC, 2018; Deloitte, 2018).

Referring to researches of the DT literature, there is widely observed rise in interest of the topic. The number of publications around DT rapidly growing year over year (Hanelta et al., 2021). The wide spread of digital technologies across societies renders DT a strategic imperative for a business transformation across a number of companies (Verhoef et al., 2021).

The European Commission prioritizes Digital Transformation and Digital Transformation Scoreboard part of the Digital Transformation Monitor (hereinafter – DTM). The DTM aims to foster the knowledge base on the state of play and evolution of DT in Europe. The DTM platform provides a monitoring mechanism to examine key trends in DT and offers unique insight into statistics and initiatives to support DT among EU initiatives aimed to measure progress on Digital Transformation in EU countries (European Commission, 2019). The European Commission forecasted that industrial and technological revolution will be one of the key global trends for the decade. Business and society will be transformed by technological breakthroughs (ESPAS, 2015). Organization of Economic Cooperation and Development (hereinafter – OECD) launched "Going Digital" project goal was "to help policymakers better understand the DT that is taking place and create a policy environment that enables their economies and societies to prosper in a world that is increasingly digital and data-driven" (OECD, 2018).

Furthermore, there were observed mayor changes in the enterprise valuations that reflect the shift into digital. Some time ago the most valuable enterprises in Standard and Poor's 500 Index (hereinafter – S&P500) included industrial enterprises specializing on extraction and processing of valuable minerals or enterprises working on finance sector, but then the shift happened towards digital and truly digital companies like Apple, Alphabet, Amazon etc. ousted previous rating leaders (S&P500, 2021).

Companies exploring or designing DT options develop collections of hundreds of business process re-engineering models, numbers of business cases, versions of as-is and to-be enterprise and business architecture, and many more other artifacts that represent the complexity of the change management and complex system of cooperating entities that form an organization.

Moreover, DT term has wide definition and for company's stakeholders, who have no previous experience in transformation program execution, the change exploring or designing exercise seems very complex, what has effect on acceptance of the idea of transformation and digitalization adoption speed.

On the other hand, companies who are running their businesses in old way and exposing themselves as successful businesses where changes are not needed, especially DT, by their own eliminating themselves from the long-term successful operational execution due to lack of strategic view of the market changes that brings Digital economy. The last Crisis hit hard for such businesses and stimulated company management to become more open-minded on business transformation necessity topic using digital tool, as a transformation enabler and booster.

However, to ensure successful DT it's required to follow the Framework what will streamline the transformation preparation and execution process. For such purpose serves Business Architecture Framework (hereinafter – BAF) that is part of Enterprise Architecture (hereinafter – EA). EA concept was introduced by J.A. Zachman in 1987 (Zachman, 1987). Then there were developed several EA Frameworks over the years.

EA is a process of business organization, strategic perspective, information, services, applications, technology, and information technology infrastructures that are integrated and standardized depending on the company's vision, mission, and operational model (Luftman et al., 1993; EPD, 2021). The alignment between business and IT is one of the main concerns what EA is support to address. The Business Architecture (hereinafter – BA) as a part of the EA is intended to keep the business aligned with the technology and as a result of the collaborative work meant to achieve all stakeholders' objectives (Malta et al., 2016). Likewise, the BA supports the decision-making, identifying as a determining factor for the process formalization, the way of thinking and the magnitude of the process (Van den Berg et al., 2016).

BA establishes two stages starting from the actual description of the business (hereinafter – AS-IS), and the desired state of the same (hereinafter – TO-BE) (Behrouz et al., 2016). However, the implementation of a large-scale DT can fail in its great majority due to the complexity of the organizational processes, based on what it is advisable to implement it in an incremental way and focus on the best-practices and transform AS-IS business processes accordingly. There is no generic EA/BA model that can be incorporated in all business, resulting in organizations proposing models adjusted to their needs, and it is represented in the number of research conducted on the subject (Gaona Caceres et al., 2019).

For the execution of the DT of the company, it is necessary to have a clear vision of the organization and the market in which it operates, and clearly defined business strategy that should be in alignment with DT objectives and expected outcomes. However, a key challenge for the stakeholders is the selection of suitable indicators for business objectives what are expected to be achieved by the transformation. Finding precise Key Performance Indicators (hereinafter – KPI) for a given strategic goal is a complex task, since there is a general lack of conceptualization (Roldán-García et al., 2016). This is crucial to make business process evaluation and performance requirements on business processes are specified as KPIs with target values which must be reached in a certain period. (Wannes et al., 2019). When mapping strategy, business goals and KPIs to business processes, it not so obvious to correlate. EA/BA concept needs to be in use to perform a mapping from business goals (priorities) to business processes, registering the associated KPIs (value drivers) (Cherni et al., 2019).

Actuality / Topicality

The European Commission has monitored Member States' progress on digital and published annual Digital Economy and Society Index (hereinafter – DESI) reports since 2014. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing an EU-level analysis in the key digital policy areas (EU - The European Commission, 2021). The reports year-over-year clearly shows prioritization of the DT topics, moreover, Digital technologies have played an important role in the coordinated response to the Crisis at EU level. Therefore, there are no doubts in DT necessity for the companies, as the subject is adopted and there is a "digitalization commitment" at the level of governments of the EU countries.

As the companies will go DT journey, they need to be well-prepared to define the transformation scope, roadmap and expected outcomes. For this, the easy-to-us SAP (*System Applications and Products in Data Processing*) solution tailored Business Architecture Framework for Digital Transformation Roadmap creation and expected outcomes' calibration (SAP Framework, hereinafter SAP-F) need to be used.

Justification of the research

There are number of research done on the digital maturity topic, on DT, on EA and BA, on business KPIs topics etc., however the majority of them are focusing only on one area or calibrating existing Frameworks, that in majority of the cases are quite heavy weighted for the

key-stakeholders for the fast decision-making. Moreover, none of the investigated research covers dedicated SAP solutions as enabler for the DT and there is no research answering the question of how to build a transformation roadmap empowered by SAP solutions, considering business priorities and value drives.

Object and Subject

The study object tightly related to the Digital Transformation definition, meaning that Digital Transformation can be considered as an object, including Digital Transformation methods and technics, Business Architecture and Enterprise Architecture Frameworks, change management activities and company transformation as such.

- *Research object – Digital Transformation of the Company (in broad term).*

The research subject is defined based on the Digital Transformation driving factors for the companies, especially in the change and uncertainty times; e.g., specifically created Digital Transformation roadmap as a part of Business Architecture Framework can serve as a Digital Transformation accelerator for the companies that can lead towards the expected company's transformation outcomes.

- *Research subject – Roadmap for the Digital Transformation.*

Research question

Initiating the research, the author formulated a research question that during the process of research was transformed into the hypothesis. The research question was:

- "*Does the simplified Business Architecture Framework for Digital Transformation, based on SAP solutions, accelerate transformation initiation, and bring more clarity of the company's digitalization process as such?".*

Research hypothesis

The research author has defined the following hypothesis for the study that was formulated/transformed out of the research question:

- *Majority of small and medium segment companies in Latvia before the Crisis had low digital maturity and Crises stimulated companies to start exploration of the Digital Transformation options for their business; and for the majority of such companies' their Digital Transformation will be initiated by the ERP (Enterprise Resource Planning) or/and CRM*

(Client Relationship Management) system implementation, what in any case will require guided approach, meaning framework usage, for the highest chances of success.

Research theses

The research author has defined the following theses for the study:

1. Companies using SAP solutions in their daily operational activities have robust enterprise architecture and very high innovation adoption potential that leads to overall higher resistance for the changes and uncertainty caused or might be caused by the Crisis.
2. Digital Transformation initiation comes from the company's top management; however, the digitalization process in very details is not known, therefore transformation expectations also not defined clearly what can lead into transformation process failure.
3. Execution of the Digital Transformation program by the company's own internal resources and using only internal knowledge increases changes for a program failure, therefore simplified Business Architecture Framework and external digital advisory support is a critical factor for success.

Research goal

The research shows the Digital Transformation actuality and necessity to optimize the transformations by introducing specially tailored framework, that could enable all Digital Transformation related activities to be structured and effective as soon as the efficiency will be measured. The research author has defined the following goal for the study:

- *The "Business Architecture Framework for the Digital Transformation Roadmap creation and expected outcomes' calibration procedure" need to be created within the study. Achievement of the goal will be supported by new Framework templates, that could be used to accelerate the DT, especially in the transformation initiation stage.*

Research tasks

To achieve the above formulated goal of the study, the research author has defined the following tasks which need to be executed within the study:

1. Review the literature to identify existing Business Architecture Framework/s applicable for the Digital Transformation powered by SAP solutions;
2. Execute multiphase research to:

2.1. Investigate and define the overall digitalization level of small and medium enterprise (hereinafter – SME) segment using deduction and induction research technics;
2.2. Analyze digital maturity level of the companies in the region;
2.3. Execute 360º analysis of digital maturity level of the companies initiating Digital Transformation;
2.4. Define the company profile who is ready for the Digital Transformation;
2.5. Analyze Digital Transformation process as such from the different points of view;
2.6. Validate assumptions and approve (or reject) hypothesis about Digital Transformation roadmap priorities;
2.7. Validate assumptions and approve (or reject) thesis about Enterprise Architecture robustness of the companies running SAP solutions;
2.8. Validate assumptions and approve (or reject) thesis about innovation adoption potential of the companies running SAP solutions;
2.9. Validate assumptions and approve (or reject) hypothesis and thesis about the initiation process of the Digital Transformation;
2.10. Validate assumptions and approve (or reject) thesis about the key-stakeholders lac of detailed vision on the transformation priorities and expected outcomes;
2.11. Validate assumptions about the companies' internal digital competence level;
2.12. Extract and consolidate E2E (hereinafter – end-to-end) processes and business value drivers for each business process;

3. Create theoretical model for Business Architecture Framework for Digital Transformation Roadmap creation and expected outcomes calibration and create the Framework templates to be used by company key-stakeholders with support by external transformation advisory consultants; validate / approbate the developed Framework and define areas for potential further improvements and research.

Research limitations and scope of key assumptions

The study author has defined the following limitations and assumptions for the research:

1. Target market for the research and further Framework usage are Baltics countries (Latvia, Lithuania, Estonia), however theoretical concept of the research not limiting the usage of the Framework only in mentioned counties;

2. All the research done taking into consideration that the Framework in further will be used for transformation programs powered by SAP solutions, however the Framework with minor adjustments potentially can be used also to other non-SAP solutions.

Research methodology and techniques

The author in the study has collected data from diverse industries and companies across Baltics region. Within the study, empirical research was carried out using qualitative and quantitative observation methods. Quantitative research methods were used to gather information through numerical data, to quantify opinions, behaviours, and other defined variables; Qualitative research methods were used to gather non-numerical data, find meanings, opinions, and the underlying reasons from its subjects (Patten, 2016).

The author conducted questionnaire surveys comprising quantitative close-ended questions and qualitative open-ended questions to elicit personal opinion on the predefined research scope. In the surveys were involved relatively large audience to collect needed amount of data for analysis. Based on the collected data, statistical analyses were done (basic descriptive analysis, correlation and clustering analyses). As well, for the qualitative research – interviews were conducted, to be able to analyse case studies and personal experience of the respondents. Case study method was used to find more information through analysing existing transformation cases by gathering empirical evidence for investigation purpose.

As a research approach an inductive, as well as deductive approach were used. Inductive reasoning moved from specific observations to broad generalizations, meaning there were noted various observations from the research cycles were done, and the pattern was extracted out of the observations that led into developing a general concept of conclusions. The opposite way the deduction approach was used, meaning the exploration of existing theory was done, and a generic problem statement was formulated that led to hypothesis formulation followed by data collection to test the hypothesis and toward the decision either the hypothesis can be rejected or it's a true statement. The research was done following the empirical research cycle, meaning that observation, induction, deduction, testing, and evaluation phases were executed.

Research scientific novelty

The novelty of the study refers to developed and formulated Framework that is introduced in the research. The scientific novelty of the research:

- The set of elements introduced in the research, that serves as an input for the Framework formulation and its further usage led to a new knowledge discovery and can be used as a base for the further researches that will not have limitations introduced in particular research.
- The introduced Framework gives new dimensions and points of view for solid standard EA and BA framework (like TOFAG) usage for DT happening today,]. The framework supports fast onboarding of the digitalization team, even if the team has no DT related expertise.

Research practical significance

The business architecture Framework for Digital Transformation Roadmap creation and expected outcomes' calibration (SAP-F) developed within the study has practical implications in Baltic countries and relevant for SME segment companies considering or initiating DT process. The main practical usage aspects are:

- Developed theoretical Framework serves as an input for the further research and as a base for the extended DT model creation powered by any digital solutions;
- Practically developed and created templates for the Framework are and will be used for the DT initiation process as an accelerator;
- The Framework in general contributes to scientific and business progress in the field of applied Digital Transformations as an action for the Global and EU introduced digitalization programs.

Applying the Business Architecture Framework (BAF), introduced in the current research, as a soft guidance and potential accelerator for the transformation should bring measurable benefits, full transparency, and solid track towards evolution for the Intelligent Enterprise (hereinafter – IE), what could open new horizons of the business optimization and potential early diversification to ensure business fiscal success in midterm and long-term sustainability. The Framework also should ensure mitigation of the potential transformation risk factors, especially in change environment and within uncertain circumstances, like recent Crisis.

Research structure and outline

The scope and structure of the study are designed accordingly to the regulatory enactments in force in the State of Latvia.

The object and subject of the research, the goal, purpose, and tasks are considered in the formation of the structure of the study. The study consists of 3 main chapters, conclusion chapter and list of used literature sources and references. The visualization of the entire study structure can be seen in the Appendix 1.

The study author in the introduction and first chapters highlighted the topicality and novelty of the particular study through the related literature and other sources, and references the overview. As the particular study focuses on the number of objects and subjects, like Digital Transformation, SAP, Business and Enterprise Architecture and Architecture Frameworks itself, business Value Drivers or KPI, key-stakeholder behavior during the business transformations etc., the study author has made literature review of all above-mentioned content objects. The literature review highlighted the necessity to prepare specific Framework for dedicated Digital Transformations, where SAP solutions serve as a digital enabler.

The study author in the first chapter substantiated the research phases and executed activities, listing the concrete research phase goals, research flow with all executed steps, analysis methods and tools, created statistical analysis models etc. Overall research for the study consists of 5 phases, where each phase answers one or multiple research questions and validates (approves or rejects) the defined hypothesis, theses and assumptions.

The study author in the second chapter formulated each research phase statistical analysis results and study author's interpretations over them. As this chapter includes 5 interconnected but separate researches with the different populations and selections, research questions etc., the chapter is divided into 5 subchapters, each is dedicated to the separate research phase. Generally, each of the research phases has detailed description on the descriptive analysis results, on the correlation analysis and cluster analysis. Detailed analysis and interpretation of the results directly correlates with the defined hypothesis, theses, assumptions and validates (approves/rejects) it.

The third chapter dedicated to the Framework creation and approbation. The chapter has 2 subchapters, one for the Framework description, second for the Framework approbation. In the description subchapter, the study author defined the main blocks of the Framework, input, and output data, highlighted the Framework correlation with the TOFAG methodology. There were defined also architecture views and the Framework key-elements. All those components are mandatory to be able to use the Framework. Within the chapter the Framework content, flow, logic, and visual design is created. Within the Framework approbation subchapter there are described 5 use-cases how the approbation processes happened.

The study summary and all the discoveries are included into conclusions and recommendations chapter.

Approbation of the Study (Publications and Conference Proceeding)

The approbation of the study was done and will be continued within the following publications and conferences (see below).

Publications

1. Popovs A. (*2022-2023*). SAP Solutions to Respond on Sustainability Driven Digital Transformation. Adoption Readiness. *Management Dynamics in the Knowledge Economy.* In *Publication Process.*
2. Popovs A., Drinke Z. (2022). The Outlook of the Digital Transformation for Sustainability. *International Scientific Conference "Business and Management", 12th International Scientific Conference "Business and Management 2022".* https://doi.org/10.3846/bm.2022.742.
3. Popovs A., Drinke Z. (2021). Optimization potential of the Digital Transformation program in EU top transportation company. *The 21st International Scientific Conference Globalization and its Socio-Economic Consequences 2021. Volume 129*, 50-59. https://doi.org/10.1051/shsconf/202112906009.
4. Popovs A., Drinke Z. (2021). Readiness for Digital Transformation – The Outlook of the Top Baltic Companies; *XXII International Scientific Conference – Artificial Intelligence and Green Thinking 2021. Acta Prosperitatis Volume 12*, 119-136. 2021. https://doi.org/10.37804/1691-6077-2021-12-119-136.

Conferences

1. Popovs A., Drinke Z. (2022). The Outlook of the Digital Transformation for Sustainability. *International Scientific Conference "Business and Management", 12th International Scientific Conference "Business and Management 2022".*
    - *Conference organized by: Vilnius Gediminas Technical University;*
    - *Dates, Place: May 12 – 13, 2022; Sauletekio ave. 11, Vilnius, Lithuania;*
    - *Additional information: http://bm.vgtu.lt/index.php/verslas/index/pages/view/agenda.*
2. Popovs A., Drinke Z. (2021). Optimization potential of the Digital Transformation program in EU top transportation company. *The 21st International Scientific Conference Globalization and its Socio-Economic Consequences 2021.*
    - *Conference organized by: The University of Žilina;*
    - *Dates, Place: October 13 – 14, 2021; Osloboditeľov 131/4, 013 13 Rajecké Teplice, Slovak Republic;*
    - *Additional information: https://globalizacia.com/event/globalizacia-2021/.*

3. Popovs A., Drinke Z. (2021). Readiness for Digital Transformation – The Outlook of the Top Baltic Companies; *XXII International Scientific Conference – Artificial Intelligence and Green Thinking 2021*.
    - *Conference organized by: Turība University;*
    - *Dates, Place: April 21 – 22, 2021; 68 Graudu Street, Riga, Latvia;*
    - *Additional information: https://www.turiba.lv/en/research/scientific-conference/history-of-scientific-conferences/xxii-international-scientific-conference-artificial-intelligence-and-green-thinking.*
4. Popovs A. (2016). SAP projektu jaunas novērtējuma metodikas izstrāde. *RESEARCH and TECHNOLOGY – STEP into the FUTURE.*
    - *Conference organized by: Transport and Telecommunication Institute;*
    - *Dates, Place: April 22, 2016; Lomonosov 1, Riga, Latvia;*
    - *Additional information: https://www.tsi.lv/sites/default/files/editor/science/Conferences/rt_sf_2016_vol11_n1_v4.pdf.*

Approbation of the study continuously happening also outside the scientific community during the business, management, administration, IT etc. community events, conferences, and publications.

1. THEORETICAL ASPECTS OF BUSINESS ARCHITECTURE FOR DIGITAL TRANSFORMATIONS

In the field of Digital Transformation and Business Architectures, supporting the DT process there are a number of significant researches done for a last 10 years, however the most relevant researches happened in last few years (Zimmermann et al., 2021; Hinterhuber et al., 2021; Özen et al., 2020; Zineb et al., 2020; Kuntsman et al., 2019; Firka et al., 2021; Vassar, 2021; Rao, 2021; and others) as there were a number of global events happened, what changed the daily routings over the globe.

Since 2019 global pandemic has had a cascading impact across all the industries pushing some business to a state of near shut down, e.g., many in small retailers, and travel and transportation companies, beauty service provides and others; some businesses were and still in overdrive, e.g., public sector and health care; and did and in process of major adjustments and business model shift, e.g., utilities and consumer products companies. In other words, all the businesses were impacted and have had to adapt to overcome the change and uncertainty by executing Organizational Change Management (hereinafter – OCM) supported by DT (Şimşek et al., 2021).

The Crisis has accelerated the digitalization process that has been evolving and changing the business during the last several decades. Digitalization of the companies have been forced to speed business processes and adapt to the new normal (meaning operations during the pandemic). The companies that completed their digitalization before the pandemic are highly profited during the Crisis period. (Akkaya et al., 2021).

The main phases of disaster and Crisis management are generally known as prevention/mitigation, preparation, response, and recovery (Zdziarski et al., 2020). Decision-makers need to cope with uncertainty caused by the Crisis to prevent any negative effect on the business. To cope with the Crisis OCM process needs to be executed and to eliminate or at least minimize unpredictability of OCM activities, decision makers need to align on expected transformation outcomes. For such activities, Business Architecture Framework can be used.

Global challenges, such as social inequality, resource depletion and waste, and the growing climate crisis, combined with rising stakeholder activism and current or pending legislation has driven sustainability from an optional for execution, to a core business imperative. Sustainable value creation comes along with the Business Transformation what nowadays cannot happen without support by the digitalization, what leads towards the Digital Transformation of the

Enterprise. If to consolidate the Sustainability agenda to be able to link it with the digitalization initiatives, that it can be summarized in 3 main points:

- Meet global obligations. Deep transparency into financial and non-financial data will address regulations proactively and ensure full compliance along with integrated, auditable, and real-time reporting (Carini et al. 2021; Salminen et al., 2021; Öcal et al., 2021).
- Make processes sustainable and gain efficiencies. End-to-end solution portfolio, embedded within the key processes, to address circular business models, assess and reduce carbon footprint, reduce waste, drive social responsibility across the entire value chain (Ciliberto et al., 2021; Viles et al., 2022).
- Create sustainable products, services and business models. Gain a holistic insight into data, processes, regulations and industry specific drivers and differentiators across value chains to create new products, services and solutions that reach additional customers, markets, and segments (Basile et al., 2021; Attanasio et al., 2022).

DT is a part of OCM and need to be in alignment with BAF, in other words, DT can't be just information technology modernization project, because all the company stakeholders need to work together and collaborate to achieve company goals and create environment in which employees can contribute into DT and work with digital business enablers. To realize the full potential of DT, companies going through transformation need to measure the performance improvements on KPI to facilitate learning and make necessary adjustments in the business model and BP (Hinterhuber et al., 2021; Özen et al., 2020; Zineb et al., 2020; Kuntsman et al., 2019).

2. FRAMEWORK STRUCTURE AND KEY ELEMENTS FOR DIGITAL TRANSFORMATION

A chapter dedicated to analyzing Digital Transformation framework structure and creating a new roadmap framework consists of 5 subsections, each of which contains a specific stage of the research. In overall the research covers all aspects of the companies' DT initiative, meaning, definition of the companies, who are ready for the transformation (research A-PHASE); digital maturity, EA robustness and innovation adoption potential for the companies, who have executed at least some scope of the DT agenda (research B-PHASE); DT process as such from the different point of views (research C-PHASE); internal capabilities of the companies running DT to handle all transformation related activities internally (research D-PHASE); DT priorities, value drivers and DT roadmap (research E-PHASE). As the result of the research, the Business Architecture Framework for Digital Transformation Roadmap creation and expected outcomes' calibration (SAP Framework, hereinafter – SAP-F) was created and validated in 5 transformation cases.

Within the study, empirical research with descriptive research method was carried out using qualitative and quantitative methods. Populations and selections of the overall research and individual research phases were validated and accepted as representative , taking into account error margin, confidence level and response distribution rate.

The research has been divided in 5 phases, where each phase contributes to the Business Framework design (see Appendix 2).

Research A-PHASE is based on the survey data from companies operating on local market (LV) and who belongs to SME sector, and in the last year (2021) have participated in DT virtual events organized by number of transformation advisory organizations, like LIKTA, DIH, BiSmart, SAP and SAP Baltic partners, AHK etc.

- The objectives of the A-PHASE are to analyse and define the level of digitalisation of the SME segment and the level of digital maturity of the SME segment; to examine assumptions about the priorities of the DT Roadmap; define the company profile that is ready for DT.

Research B-PHASE is analysis for companies operating in Baltics countries (LT, LV, EE) and who have implemented or currently implementing SAP system/s.

- The objectives of the B-PHASE are to analyse and determine the level of digital maturity (in addition to the A-PHASE study phase); validate assumptions about EA stability in companies using SAP solutions; validate assumptions about the potential for innovation deployment in companies using SAP solutions.

Research C-PHASE managed with survey and interviews handled with companies going DT journey. Respondents: SAP business partners who are system integrators and working in Baltics region; SAP Customer solution advisory consultants working in Nordics and Baltics region; SAP clients.

- The objectives of the research phase (C-PHASE) – 360° analysis of the level of digital maturity of those companies that initiated DT; analyse and define the DT process as such from different points of view; to examine assumptions about the process of initiating DT; validate assumptions about the unrationalised/unstructured vision of key stakeholders about transformation priorities and expected results after a digital transformation.

Research D-PHASE managed with survey and interviews for selected companies, who are in process of DT to assess digital maturity and internal competence level.

- The objectives of the research phase (D-PHASE) are to analyse and determine the level of digital maturity (in addition to the studies of the previous stages); to validate assumptions about companies' internal levels of digital competence.

Research E-PHASE is analysis of business value drivers and business-End-to-End processes powered by SAP;

- The goal of the research phase (E-PHASE) is to analyse and consolidate integrated processes and business value drivers for each business process.

3. BUSINESS ARCHITECTURE FRAMEWORK

As EA embraces manifold use cases along the complete software lifecycle from software development portfolio planning to operations to implementation, operations, maintenance, and optimization, the research author focuses only of business architecture part to support company key-stakeholders preparation for the DT and their expectation calibration. For the Framework developed within the study, the abbreviation SAP-F will be used.

The overall applicable architecture Framework consists of 3 blocks, with 2 main components within each block. The overall EA can be seen in the Figure 1.

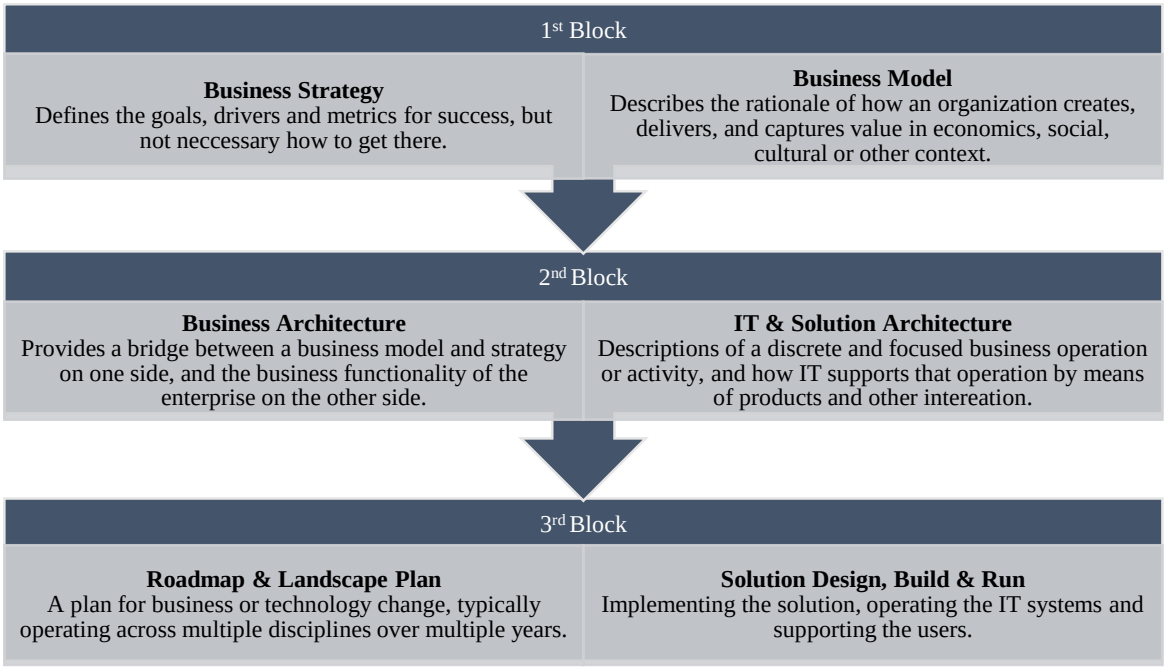

Figure 1. Overall Framework components (created by the study author)

As SAP-F focuses on the calibration of the key-stakeholders expectations and roadmap creation, then not all components from the overall architecture Framework will be used. SAP-F the main domains are:

- BA domain (Figure 1, 2nd block – "Business Architecture"), what covers the design process as well as the structural description of an enterprise in regard to all business aspects of capabilities, processes, information, and organization. The BA domain gives a 360° perspective on a customer value chain.
- Solution Architecture domain (Figure 1, 2nd block – "IT & Solution Architecture"), what describes patterns, references, and concrete approaches, how IT systems can enable an

enterprise's BA. The Solution Architecture domain describes how to support End-to-End value chains with integrated IT solutions.

The Figure 2 below represents the focus areas of SAP-F, meaning how BA architecture and IT and Solution Architecture compliments each other and ensures the essence of the business process to be used to define the potential architecture.

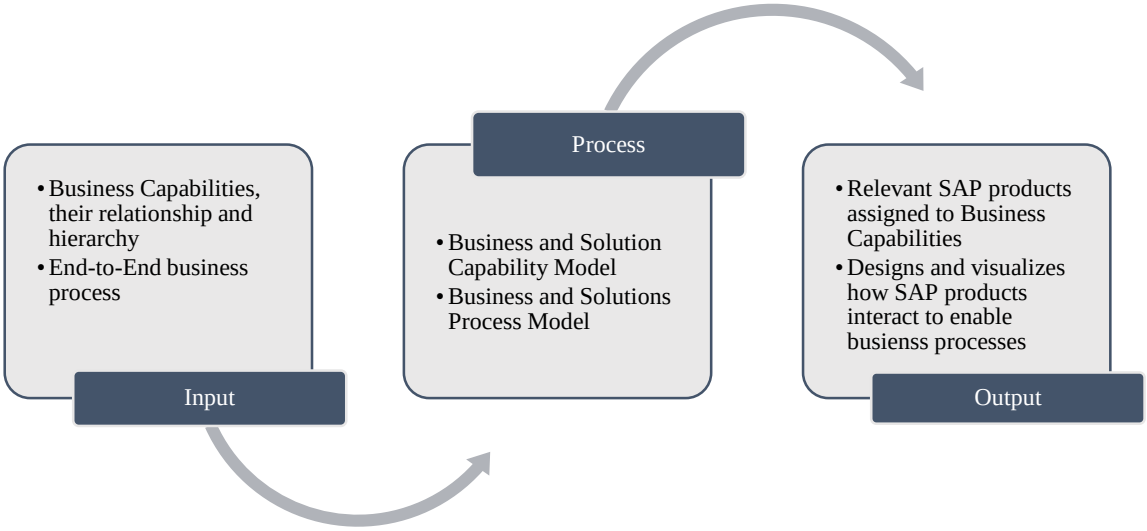

Figure 2. SAP-F focus areas (created by the study author)

Framework Content

Based on the research results and result interpretations within this doctoral thesis, Business Framework for Digital Transformation roadmap creation and Digital Transformation expected outcomes calibration (SAP-F) has been created.

SAP-F divided into 2 parts and each part consist of various steps to be executed. SAP-F supports process of the business priority definition, business process value drivers' selection to be able to calibrate DT expected outcomes. It also refers to the End-to-End business processes to emphasize the business priorities.

- 1st part – "Client" form, meaning that the company who is exploring DT options and working on the transformation roadmap is the client for the external DT advisor.
  - Step #1: provide general information about the company;
  - Step #2: (optional) execute self-assessment using SAP Value Lifecycle Management tool to get benchmarking data and/or business case for DT;
  - Step #3: define business priorities;
  - Step #4: define value drivers;
  - Step #5: define required End-to-End solutions;

- 2nd part – "Advisor" form, meaning that DT advisor (in particular case it is SAP company representative) working on this part.
    - Step #1: validate and adjust business capabilities;
    - Step #2: execute profiling of the company;
    - Step #3: validate roadmap radar;
    - Step #4: validate solution landscape;
    - Step #5: generate roadmap document for the client.

Framework Flow and Logic

The client initiates the process of creating a roadmap, however, it is preferable that an external DT consultant explains to the client the roadmap creation flow and align on the terminology what will be used during the roadmap creation. Such advises and explanations are necessary so that the client has sufficient information about the interdependencies of the objects of the roadmap, which will help minimize potential errors at the execution of the necessary actions, which can lead to suboptimal and even incorrect architecture of the roadmap and solution architecture landscape. The SAP-F flow can be found in Appendix 3.

When a client is on-boarded on the roadmap creation process, the first activity expected from the client side us to enter initial information about the company. The information serves as initial input for the DT advisor to qualify the company for the potential DT. Such qualification is a subjective assessment by the DT advisor, however, for the reference qualification and benchmarking SAP Value Lifecycle Management (hereinafter – SAP VLM) tool can be used. The data is required to enter the first step: "Company Name", "Industry", "Operating Counties", "Employee Count", "Annual Turnover (EUR)", "Expected Business Grow (%)", "Legal Entities (count)", "Company's overall Digital maturity". As is addition, the client can execute SAP Value Lifecycle Management assessment to access company's business process maturity, benchmark themselves with the industry peers and build DT business case.

The next step for the client is to select and define Business Priorities. There are 12 priorities with 6-grade prioritization option. The business priorities are: Product Innovation, Manufacturing, Sourcing and Procurement, Sales and Service, Finance, Supply Chain, Marketing, Human Resources, Database and Data Management, Application Development and Integration, Analytics, Intelligent Technologies. Each business priority includes a set of End-to-End business processes.

The 6-grade scale refers to the 3 DT roadmap phases: Foundation phase, Intelligent Enterprise phase and Platform Exploitation phase; and also refers to SAP LACE (Land – Adopt –

Consume – Expand) operating model, where the first phase is the Land phase, where initial contact with a customer is established. The second phase is Adoption – it encompasses such activities, as implementation and launch of the project, as well as initial adoption of the software. The Consume phase includes numerious engagement activities, e.g., support, customer feedback and references. The Expand phase based on software contract renewals and extensions (SAP SCN, 2021).

The selection of the business priorities filters out and prioritize the following objects – value drivers and End-to-End Solutions. The Framework is designed to keep visible also non-prioritized objects, as client might choose them as well for certain reason.

The next step for the client is to select and prioritize Value Drivers, i.e., define what the company is planning or expecting to achieve with the DT. The Value Drivers were preselected, i.e., sorted in ascending order based on the previously defined Business Priorities. That means, not all Value Drivers are relevant for the certain Business Priority, e.g., Value Driver "Reduce asset maintenance costs" doesn't belong to the Business Priority "Finance" despite the fact, that word "costs" are included into the particular Value Driver definition. However, is client wasn't properly onboarded and as the result of this, not all required Business Priorities were selected, the Framework is not limiting to choose Value Drivers, what belongs to other Business Priorities.

Prioritization happening in the 6-grade scale to be able to validate earlier defined Business Priorities and allocate SAP products and solutions to the appropriate roadmap phase.

When above-described step is executed, the next and final step for the client is to select E2E business processes (solutions) what are in a focus of the company to ensure successful operational model. As well as the Value Drivers, E2E Solutions also are preselected based on the Business Priorities. E2E are tightly linked with the Business Priorities and Value Drivers, therefore prioritization of the E2E is not needed, as prioritization in inherited from other related objects.

Along the execution of the steps by the client and advisor, there is a hyperlink to the detailed description of the methodology concept and theoretical base for roadmap creation activities. Therefore, in case of any of the steps are not fully clear, always can read relevant section of the Framework documentation.

When client done with his steps, the next steps should be executed by the DT advisor. And the first step for the advisor is to define Business Capabilities what are supporting Business Priorities, E2E Solutions, and selected Value Drivers. Business Capabilities are preselected based on the previously executed steps, however the Framework is not limiting to select non-prioritized capabilities, as there could be a need for them based on the subjective opinion of the DT advisor.

Business Capabilities are tightly linked to other objects; therefore, priorities and interdependencies are inherited to be able to create the roadmap.

The next step for the DT advisor is to execute profiling (classification) of the client. The profiling is needed to calibrate the potential roadmap. Profiling methods and process in described in A-PHASE research. If DT advisor would like to skip the profiling step, it's possible, but then manual entry of the profiling cluster is necessary. When this step is done, the roadmap will be generated, and the DT advisor can evaluate and adjust it if necessary.

The Roadmap Radar is automatically generated, based on the previously chosen Business Priorities, Value Drivers, E2E Solution and Business Capabilities and priorities of all the objects. Roadmap Radar is structured according to the SAP methodology and has 3 phases:

- **Foundation phase** – in this phase, the foundation is built to address immediate needs and challenges of the company and ensure sustainable growth and digital solution scalability. During the foundation phase company raises its digital maturity and overcome most critical phases of the organizational change management: shock, denial, frustration, depression (Lukianov et al., 2020);
- **Intelligent Enterprise phase** – solutions are deployed to enable the integrated enterprise that use data to feed their intelligence, i.e., integrating data and processes, building flexible value chains, innovating with industry best practices, providing our customers with the ability to understand and act on their customer, partner, and employee sentiment, and how to manage their environmental impact – to grow more resilient, more profitable, and more sustainable (SAP, 2021; SAP BP, 2021);
- **Platform Exploitation phase** – within this phase, company has ability to obtain all newest technologies in agile and fast way, meaning that company by using technologies becomes a front-runner and has strong influence in the market.

The solutions are located on the Roadmap Radar accordingly the priorities and referring to SAP optimal industry solution architecture roadmaps. The DT advisor is able to restructure the roadmap and change priorities by his opinion.

The Landscape view gives the consolidated view on the SAP solutions to be used to ensure DT of the company. This information is important for potential DT budget definition and further detailed technical architecture definition activities. The DT advisor is able to make changes in the Landscape if necessary.

When all steps are executed, the final report can be generated, what includes all information from the described steps and overall recommendations for the DT process.

Framework Design

The visual design of the Framework was created to demonstrate potential capabilities of the developed Framework. Below are listed all the screens of the Framework and short description of each screen:

- 1st Screen (Appendix 4) – general information about the company; short description about the SAP Value Lifecycle Manager tool and hyperlink to it; hyperlink to the Framework methodology description;
- 2nd Screen (Appendix 5) – the Framework methodology description;
- 3rd Screen (Appendix 6) – Business Priority definition and description of chosen elements;
- 4th Screen (Appendix 7) – Value Drivers definition and description of chosen elements;
- 5th Screen (Appendix 8) – End-to-End Solutions definition and description of chosen elements;
- 6th Screen (Appendix 9) – Business Capability definition and description of chosen elements;
- 7th Screen (Appendix 10) – Customer Profiling definition and description of profiling results;
- 8th Screen (Appendix 11) – Roadmap Radar and description of chosen elements;
- 9th Screen (Appendix 12) – SAP Solutions Landscape and description of chosen elements.

Framework Approbation

The Framework approbation processes included 5 use-cases from different industries, with different DT scope, with different DT expected outcomes. The overall process of the approbation can be seen in the Figure 5.

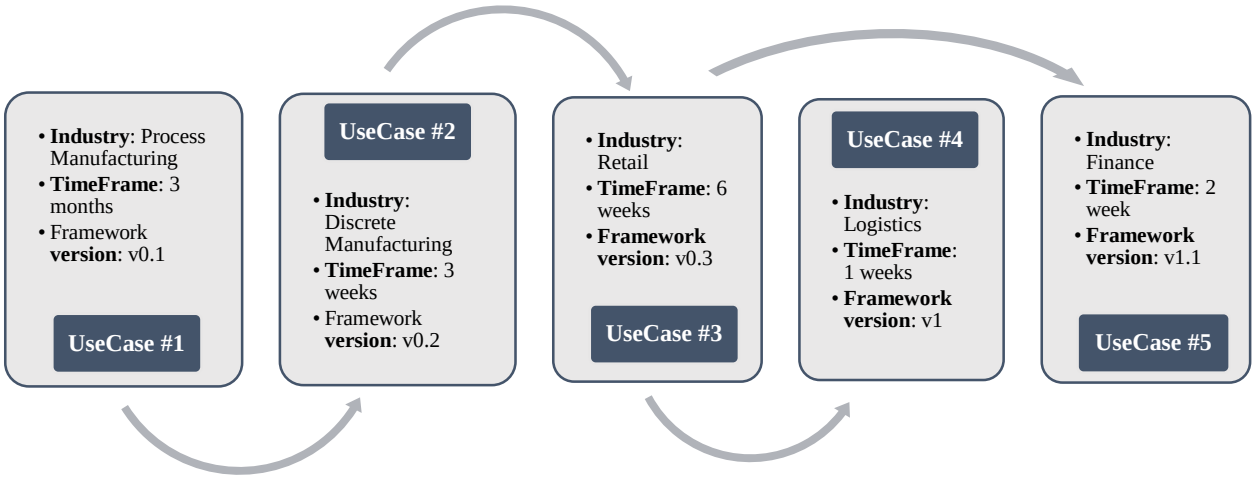

Figure 3. Framework Approbation Flow (created by the study author)

During the approbation process in each use case there were executed number of activities what led to the DT roadmap creation and list of recommended adjustments to the Framework, what were implemented in the next versions.

CONCLUSIONS AND RECOMMENDATIONS

The study examined various aspects of the Digital Transformation and supportive methodologies, methods, and frameworks; as well as companies, who are pretending to the business transformations. The paper argued that company's readiness for change and understanding of the transformation process activities towards the new way of executing the business processes is a key to ensure continue to grow and competitiveness. Digital Transformation success could be well served through an understanding and facilitating the integrated End-to-End business process management and transformation approach. Modern business conditions force the idea of moving organizations to a Digital Transformation of activity for survival and optimization of key indicators in the context of the developing digital economy.

To enable the Digital Transformation, it's required to follow the certain logic and process, otherwise the transformation might become overwhelming to the company what will lead to the transformation failure and digital solutions itself will not give any advantages to the company if the overall organizational change process will not be managed properly. Exactly for controlled change management, Business Architecture frameworks can be used.

To answer the main research question, validate defined hypothesis, theses and assumptions (approves/rejects) and reach the research goal, the study author has executed a number of tasks and the outcomes (conclusions) of those activities are listed below.

- The **literature review** gave clear picture, that there are number of Business and Enterprise Architecture Frameworks widely used, however there are none specifically dedicated for certain IT solutions (in particular case – SAP solutions). In general, the existing Frameworks are in use already now in various Digital Transformation programs and projects, but those require a lot of adjustments and tailoring, what can be done only by subject-matter experts in both topics – Digital Transformation and SAP solutions. For Digital Transformation planning and initiation, the simplified and tailored Framework version is desirable to have, as there are clearly identifiable benefits of using such, like time to value, as doing nothing, instead of initiating transformation, usually costs significantly to the company, and recognition of such costs come with the delay.
- **Multiphase research** process brought overall understanding on digitalization level of SME segment; on digital maturity level of the companies in the region; on the company's profile definition process to prioritize and scope Digital Transformation activities; on the Digital Transformation process as such and related and supportive Frameworks what can be used as the transformation accelerator. Through the multiphase research there were validated defined

hypothesis, theses and assumptions (approves/rejects) and consolidate all data required for the new tailored Framework creation.

- As the following step, the theoretical model for **Business Architecture Framework** for Digital Transformation Roadmap creation and expected outcomes' calibration was created, what was supported by the Framework visualization activities, i.e., by the Framework template creation what can be used by company key-stakeholders with support by external transformation advisory consultants to accelerate the Digital Transformation process especially at the initiation phase.
- The developed **Framework was validated** in 5 different use cases and all recommendations formulated as the use-case outcome were implemented to ensure the Framework usability.
- There were defined number of key assumptions and areas for potential improvements and further research, as the scope of particular study limited the research scope.

There was formulated the hypothesis what was validated thought the research and the conclusion of the hypothesis's validation process is formulated below.

- **Hypothesis** – *"Majority of small and medium segment companies in Latvia before the Crisis had low digital maturity and Crises stimulated companies to start exploration of the Digital Transformation options for their business; and for the majority of such companies' their Digital Transformation will be initiated by the ERP (Enterprise Resource Planning) or/and CRM (Client Relationship Management) system implementation, what in any case will require guided approach, meaning framework usage, for the highest chances of success".*

The hypothesis was approved by the executed research and there are clearly trackable digital priorities for the companies defined in area of the ERP and CRM. As research results showed, the primary needs for the company's lies in area of regulatory compliance management, where non-compliance might lead into serious consequences, even to the forced termination of any business activities until the non-compliance will be resolved. To ensure business activity compliance, ERP system is used as a primary tool, as main compliance regulations are in the area of company finance, and finance data usually are consolidated and prepared for submission to responsible authorities within the system. The requirements for CRM system is not so obvious as for ERP, but anyway very trackable. The companies need to manage their sales process properly, what ensures their survival in competitive environment and such management could happen in CRM system.

- **Thesis #1** – *"Companies using SAP solutions in their daily operational activities have robust enterprise architecture and very high innovation adoption potential, what leads to overall higher resistance for the changes and uncertainty caused or might be caused by the Crisis"*.

The thesis was approved partially. In general, the statement isn't wrong, meaning that companies went or going through the Digital Transformation and using SAP solutions have spent time to structure their IT landscape and refer it to the business transformation activities, what led to the overall EA robustness. However, this thesis needs to be validated with more definite research, where it will be compared to companies using SAP solutions, and companies not using any digital solutions, and companies using non-SAP solutions. Therefore, this thesis is considered as partially approved and is defined as further potential research question.

- **Thesis #2** – *"Digital Transformation initiation comes from the company's top management; however, the digitalization process in very details is not known, therefore transformation expectations also not defined clearly what can lead into transformation process failure"*.

The research results showed that the Digital Transformations in most cases are initiated by the company's top management, moreover, such initiatives born after changes in the management, meaning, new employees are joining company for the top positions and bringing their previous experience into company. The transformation initiatives are usually formulated on a high level and all transformation consequences and related activities are not defined at this stage, what usually can lead to the false expectations of the Digital Transformation as such. Moreover, the justification of the transformations mostly done very formally, meaning, that Digital Transformation process has very many moving parts what cannot be evaluated properly and be used as a working tool to track the transformation process and defined expectation achievements. Some companies limiting themselves with the transformation business case creation, what focuses in majority on the financial KPIs, like project budget, TCO, ROI and few more financial KPI, what can be relatively easy measured throughout the execution of the transformation program. As the conclusion, the thesis is confirmed fully with the study.

- **Thesis #3** – *"Execution of the Digital Transformation program by the company's own internal resources and using only internal knowledge increases changes for a program failure, therefore simplified Business Architecture Framework and external digital advisory support is a critical factor for success"*.

The thesis was approved within the study, as the company going through its first comprehensive Digital Transformation has not enough experienced to manage all components

internally, moreover it is very costly to hire experts on-side to cover internal competence gaps. External advisors, who are specializing on the Digital Transformations bringing all required competence to ensure successful transformation execution, however the external advisor don't know company's business processes with all nuances as good as company's representatives, therefore the collaboration between internal and external experts is highly required to ensure successful Digital Transformation execution for the company.

The validation of the defined hypothesis, theses and assumptions (approves/rejects) and execution of the subsequent tasks defined for the study, the study author was able to complete the main **goal of the study**, i.e., develop the Business Architecture Framework for the Digital Transformation Roadmap creation and expected outcomes' calibration, what was supported by the created Framework templates, what could be used to accelerate the Digital Transformation process, especially in the transformation initiation states. The Framework focuses on the definition of the business priorities for the transformation and listing the End-to-End business processes should be affected and improved by the transformation. The Framework also allows calibrating business expectations from the Digital Transformation, by defining the value drives appropriate to the chosen business priorities. The Framework give as the outcome provides the Digital Transformation roadmap and potential IT landscape view.

To answer on the **research question** – *"Does the simplified BAF for DT based on SAP solutions accelerates transformation initiation and brings more clarity of the company's digitalization process as such?"*, there were executed 5 validation cycles of the developed Framework. The feedback received from all involved parties in each validation cycle approved the reasonability of the Framework usage, as it bring more clarity on the Transformation Planning and initiation process.

Initially there were defined research **limitations** and key **assumptions** to have more addressed focus of the research but leave potential for the wider interpretations and usage of the research results in the potentially further studies. The key limitations were applied were regarding the research region, i.e., target market for the research and further Framework usage are Baltics countries (Latvia, Lithuania, Estonia), and regarding the IT solutions serving as a Digital Transformation enabler, i.e., all the research done taking into consideration that the Framework will be created and used for transformation programs powered by SAP solutions. By the study author opinion, with the minor adjustments the Framework can be used outside the Baltics region, however adoption of the Framework to non-SAP solutions will require much more effort.

Conclusions

By the study process, the author came to the following **conclusions**:

1. Nowadays most comprehensive organizational changes happening together with digital tool implementation what enables the business transformation; therefore, Digital Transformation is mandatory point in organizational change agenda *(interpretation of the results of literature research).*
2. To be able to achieve sustainability goals, companies need to go ensure organizational change management process supported by the guided and accordingly planned multiphase Digital Transformation, what should be executed following the created roadmap *(interpretation of the results of literature research).*
3. The alignment between business transformation and digital solutions supporting the transformation is one of the main challenges what Business and Enterprise Architecture are support to address, therefore, usage of the Business Architecture Frameworks during the Digital Transformation is the key for preventing transformation failure *(interpretation of the results of literature research).*
4. Ability of different Business Architecture Frameworks sometimes might lead into confusion from the company's representatives initiating Digital Transformation, and external experience advisor support is required to manage the transformation initiation process, Therefore, it's reasonable to have tailored simplified Framework for Digital Transformations, where core components are known, like solution Vendor (in particular case SAP), transformation will happen in phases, digital enablers need to be tightly linked with the business priorities etc (*interpretation of the results of literature research and research phases A, C, D*).
5. All business expectations from the Digital Transformation should be formulated through the precise KPIs, as only by measuring the progress, can get the clear picture of the degree of achievement of the set goals (*interpretation of the results of literature research and research phases C, E*).
6. The investigation of the compelling event during the Digital Transformation roadmap creation is very important, as it gives wider picture on customer assumptions on the expected outcomes. Based on this information, the decision on expectation calibration scope and approach can be taken (*interpretation of the results of literature research and research phase C*).
7. The crisis stimulated companies to start exploring digital transformation opportunities for their business and thus contributed to the growth of digital maturity (*interpretation of the results of literature research and research phases A, D*).

8. Top management is more digitally mature, than other employees in the company, therefore clear communication of the Digital Transformation goals and upcoming activities, and role of all employees in these activities, is crucial for successful transformation execution (*interpretation of the results of research phase C*).
9. Digital Transformation initiation requires company's employee on-boarding activities, however based on the research done (primarily C-PHASE), the most efficient onboarding activity is participation in the Digital Transformation project / program itself, therefore, it's required to evaluate onboarding activity time-to-value indicator to choose the appropriate on-boarding activity scope for particular case (*interpretation of the results of research phase C*).
10. Most of the companies starting their Digital Transformation journey from the ERP and CRM system implementation and focusing primarily on the legal compliance requirements (*interpretation of the results of research phases A, C*).
11. An ERP system is very important for the control of the business processes, and process transparency; using ERP system the company can clearly articulate its process data to all its employees and stakeholders, process transparency and cohesion in the human layer of the business increases – creating significant increases in energy flow and self-driving process optimization (*interpretation of the results of literature research and research phases A, C, D*).
12. Companies using SAP solutions in their daily operational activities in overall have higher resistance for the changes and uncertainty caused or might be caused by the Crisis, as they core business processes are formulated and predictable to certain degree, and companies can react on the changes using data-driven decision-making approach (*interpretation of the results of research phase B*).
13. Companies using SAP solutions have relatively high innovation potential due to most of the prerequisites for such fulfilled by the availability of SAP solutions in the company. Also, the digital maturity for the companies using SAP solutions also high, even though many companies still using on-premise SAP solutions running on older database and technology platform versions (*interpretation of the results of research phase B*).
14. Nowadays, companies in average have more positive digital experience than negative, what enables further development of the Digital Transformation topics within the company and reduce potential push-back from the company's representatives (*interpretation of the results of research phases A, C*).
15. One of the first necessary steps in the process of Digital Transformation is the classification of the company to determine the company profile, which will help to define the most optimal

stages of transformation and the priorities of digital enablers (*interpretation of the results of research phase C*).

16. In most of the cases, the business plan to justify the Digital Transformation, is created very formally, i.e., it is not serving as a control tool, but just to "sell" the initiative to the top management and kick-off the transformation project or program. It's happening due to large number of moving parts and general unpredictability of the Digital Transformation, only if it's not typical project with predefined scope (*interpretation of the results of research phase C*).
17. It's very important to have external consultants supporting the Digital Transformation of the company, who will act as digital advisors, i.e., will guide the customer through the number of various digital instruments, technics etc (*interpretation of the results of literature research and research phase E, and roadmap creation activities).*
18. Companies' internal competence level way to be improved, the business demand for the internal competences to support the Digital Transformations relatively high and the demand for the certain skills for the business process management is higher than the demand on pure technical knowledge of the edge technologies (*interpretation of the results of research phase C*).

Recommendations

As the Baltic counties, as part of EU, working on setup of DT programs and related funding processes, the DT roadmap is a required prerequisite for the companies to apply for DT program and pretend to the EU funds, the study author defines the recommendation to responsible institutions (like LIKTA (LV), LINPRA (LT), TIR (EE)) and related Digital Transformation advisors and partners. The main recommendations:

1. For the Digital maturity tests, what is a prerequisite for further DT program setup, it's recommended to use publicly available benchmarking tools what were created by leading digital advisory companies, like SAP (SAP VLM tool) and if detailed maturity assessment is needed to classify company in more detailed level and be able to define company's starting positions more precise, SAP-F can be used;
    - *Addressed to: DT responsible and supportive institutions and companies initiating DT.*
2. It is highly recommended to use the Framework developed within the study to create Digital Transformation Roadmap in guided way, what will accelerate the procedure and reduce human factor errors what might occur during creation DT roadmap from the scratch;
    - *Addressed to: DT responsible and supportive institutions and companies initiating DT.*

3. To define DT success criteria (aka KPIs) and calibrate the expected outcomes, it's recommended to use SAP-F to find appropriate measurable KPIs relevant for the defined DT priorities;
    - *Addressed to: DT responsible and supportive and companies initiating DT.*
4. It's recommended to build DT roadmaps and initiate DT programs and projects with reference to the Best Practices and avoid blueprinting phase to describe further state (to-be) as a copy of today's state (as-is);
    - *Addressed to: companies initiating DT and DT advisors.*
5. To estimate potential DT program / project costs related to the software licensing part, it's recommended to use SAP-F as exact SAP products will be listed in the result of execution and these products are directly linked to software cost components.
    - *Addressed to: companies initiating DT with SAP products as the main digital enabler.*

As the study contains comprehensive research on the Digital Transformation area, the author puts forward additional recommendations what are logically follows out of content of the study and study discoveries:

6. It's recommended to raise the digital awareness level for all company's employees, what will stimulate the shift for the digital mindset, what will be resulted in low resistance against the Digital Transformation initiatives in the company.
    - *Addressed to: all SME segment companies.*
7. Digital awareness for the employees at the initial stages need to be focused on the shift towards the process efficiency and repetitive work taking over by digital solutions, what could free-up additional human-intelligent capacities, what can be dedicated for more complex intellectual tasks within the company.
    - *Addressed to: all SME segment companies' management.*
8. Referring to the shift to digital economy on a global level, it's recommended to become a part of digital business network (primary supply-chain digital network) even if the company is operating with one region, but has plans to grow. To become a part of digital business network, companies need to find and sign to most appropriate digital platform, like SAP LBN (logistics business network), or Ariba (purchasing and procurement network) etc.
    - *Addressed to: all SME segment companies.*
9. Working or initiating organizational change management with Digital Transformation component, it's recommended to refer to the Best Practices in the industry to keep processes as standard as possible, what will result into faster ROI for the transformation of the company.
    - *Addressed to: all SME segment companies.*

10. The Digital Transformations in the company need to be under the business responsibility and control, i.e. the digital initiatives can't be fully IT department initiative and responsibility, as the outcome of the transformation will have direct effect on the business. IT needs to ensure technical and functional realization and necessary alignments between main stakeholders in context of the scope of Digital Transformation program or project.
    - *Addressed to: all SME segment companies' management.*
11. Digital Transformation strategy in the company need to be aligned with the business vision and strategy to have very precise expectation management for the Digital Transformation program or project.
    - *Addressed to: all SME segment companies' management initiating DT.*
12. Building the Digital Transformation roadmap, companies need to take into consideration growing demand for the sustainable business models and compliance to ESG regulation and recommendations. Moreover, the "Sustainability push" can serve as enabler for the comprehensive Digital Transformation initiation in the company.
    - *Addressed to: all DT advisors and executives in the company.*
13. As there are number of Business Architecture and Enterprise Architecture frameworks exists what can be used for the organizational change management and Digital Transformation, it's recommended to use subject-matter expert advice on the framework to use in particular case, as every transformation has own specific goals and certain setup of stakeholders, what might affect the efficiency of the chosen approach based on the framework. I.e. initial explore phase is required to decide on the most efficient model to be used, in case if SAP-F framework will not be chosen.
    - *Addressed to: all SME segment companies' management initiating DT.*
14. If the goal of the company to become an Intelligent Enterprise after the Digital Transformation, then precise definition of expected transformation outcomes is required. However, as far the Intelligent Enterprise as a concept not yet described in measurable indicators, i.e. there is no possible to assess the company and by the results define if company became the Intelligent Enterprise or not – it's more a self-definition exercise based on the overall digitalization maturity and digitalization level in the company, therefore expectation management before the transformation start is highly recommended.
    - *Addressed to: all SME segment companies' management initiating DT.*
15. As the relevance and use of KPIs usually differs across the phases of Digital Transformation, the primary focus of the company need to be directed on overall outcome-related metrics like

ROI, profitability and revenue growth, however specific process-related and other KPIs can be defined on later stages, when the scope of the transformation phases will be defined and fixed.

   - *Addressed to: all SME segment companies' management initiating DT.*

16. Digital Transformation need to be phased, as large scope of transformation together with digital maturity gap in the company can lead into transformation failure. Moreover, focus on the edge-technologies as a part of Digital Transformation could follow after the digital base will be established, e.g. ERP system be implemented to cover at least will basic business processes in simple way.
    - *Addressed to: all SME segment companies' management initiating DT.*
17. When a company is initiating Digital Transformations and have low digital maturity and very fragmented IT architecture, it's highly recommended to choose comprehensive solutions with wide range (business-processes) of coverage, as that way company will get integrated environment with guided and secure transformation path. And only if a company is very digitally mature and has solid and up-to-date IT landscape, it's worth to look on best-of-breed niche solutions to address very specific requirements.
    - *Addressed to: all SME segment companies' management initiating DT and DT external advisors.*
18. As in Digital Transformation programs and projects at least 3 parties are involved – company, Digital Transformation advisors and consultants, software vendor, it's recommended to have alignment sessions between all the parties even before initiate the project (i.e. as follow-up for Digital Transformation roadmap creation) to synchronize Digital Transformation expectations, scope, phases, technologies, responsibilities, potential timeline, costs etc.
19. *Addressed to: all involved in DT initiative.*

Potential future research areas

- Research on the Digital Marketing solutions and other individual solutions as a contributor for the Digital Transformation initiative and assess its role as the digital enabler of the company's organizational change.
- Research on the Enterprise and Business Architecture robustness in comparison, where it will be compared to companies using SAP solutions, and companies not using any digital solutions, and companies using non-SAP solutions.
- Research on required Digital Transformation on-boarding activity time-to-value indicator evaluation to choose the appropriate on-boarding activity scope for particular transformation case.

- Research on potential extensions of the developed Framework to be applicable for other geographical regions outside the Baltic countries.
- Research on potential extensions of the developed Framework to be applicable for Digital Transformation initiatives, where digital enabler can be other non-SAP solutions.
- Research on potential Framework improvements and roadmap creation activity automation, based on the machine learning algorithms.

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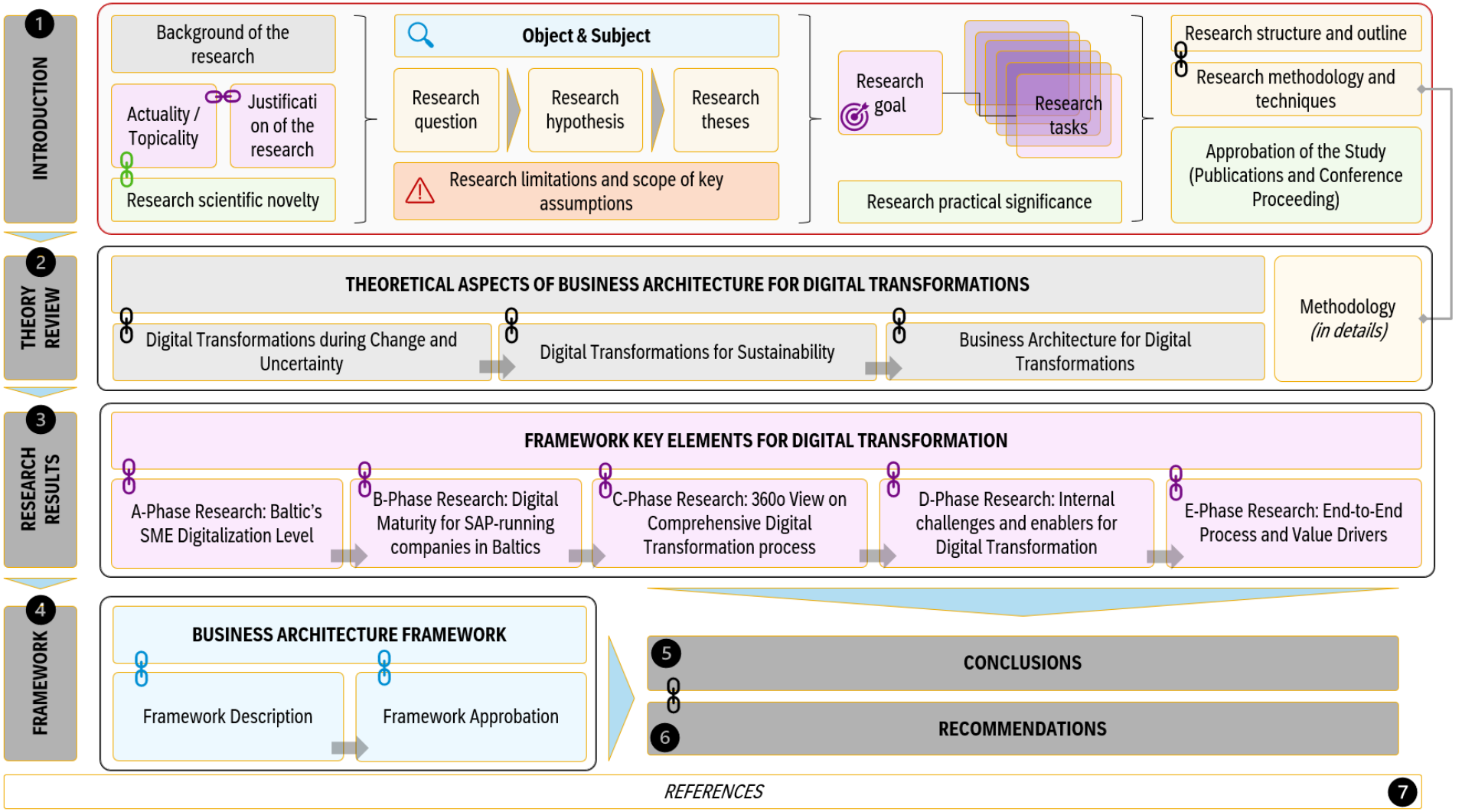
APPENDIXES

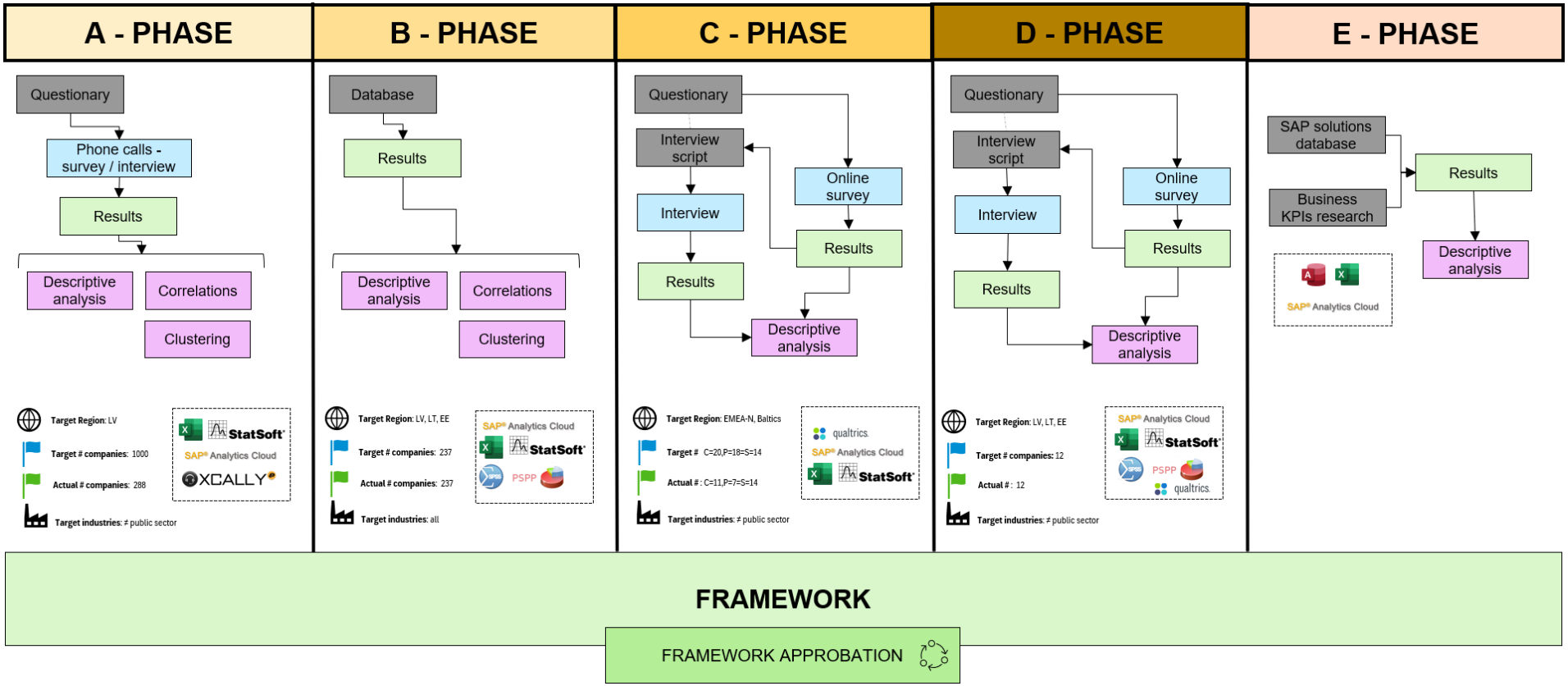
APPENDIX 1

Visualization of the entire research (created by the study author)



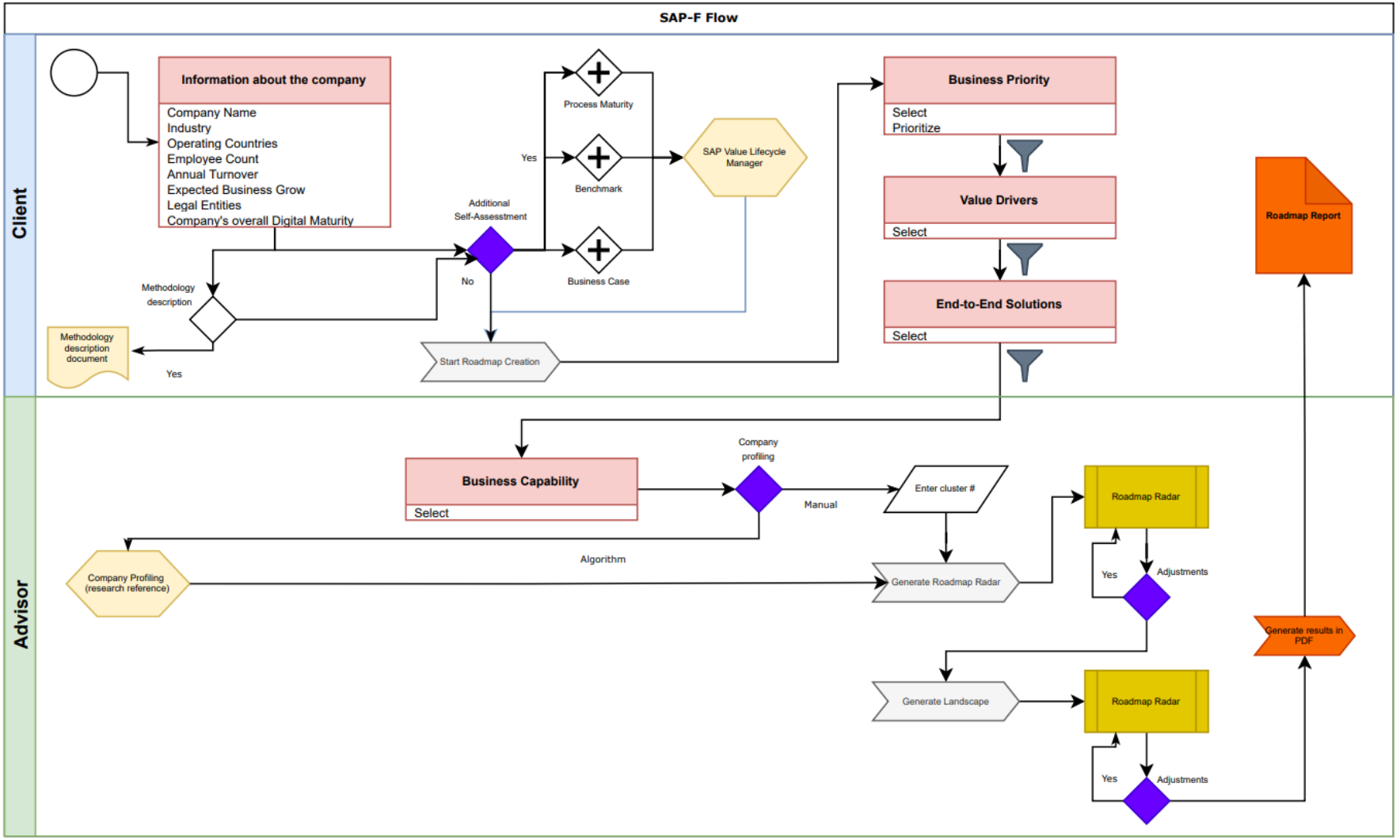
APPENDIX 2

Research Framework (created by the study author)



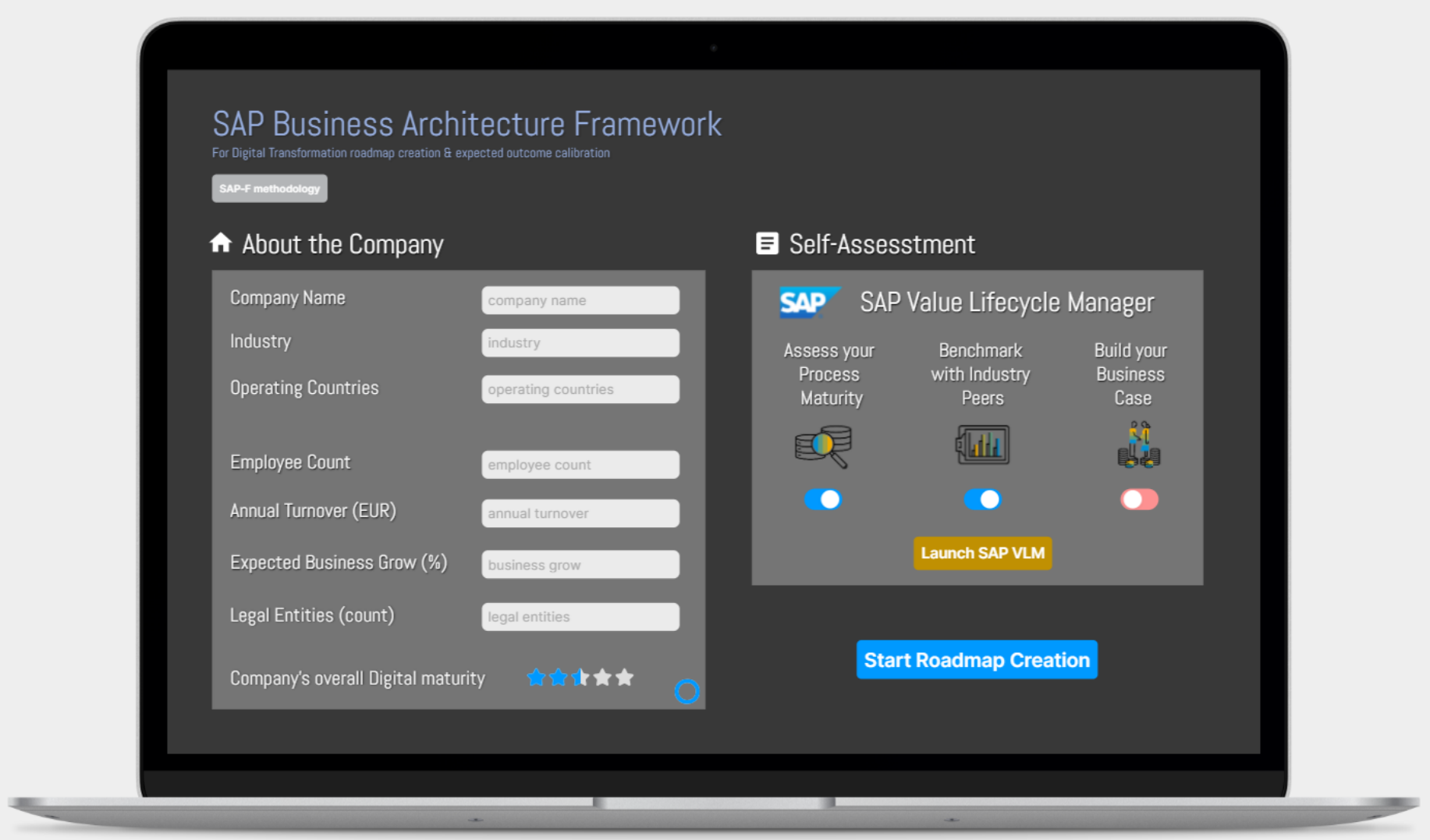
APPENDIX 3

SAP-F flow (created by the study author)



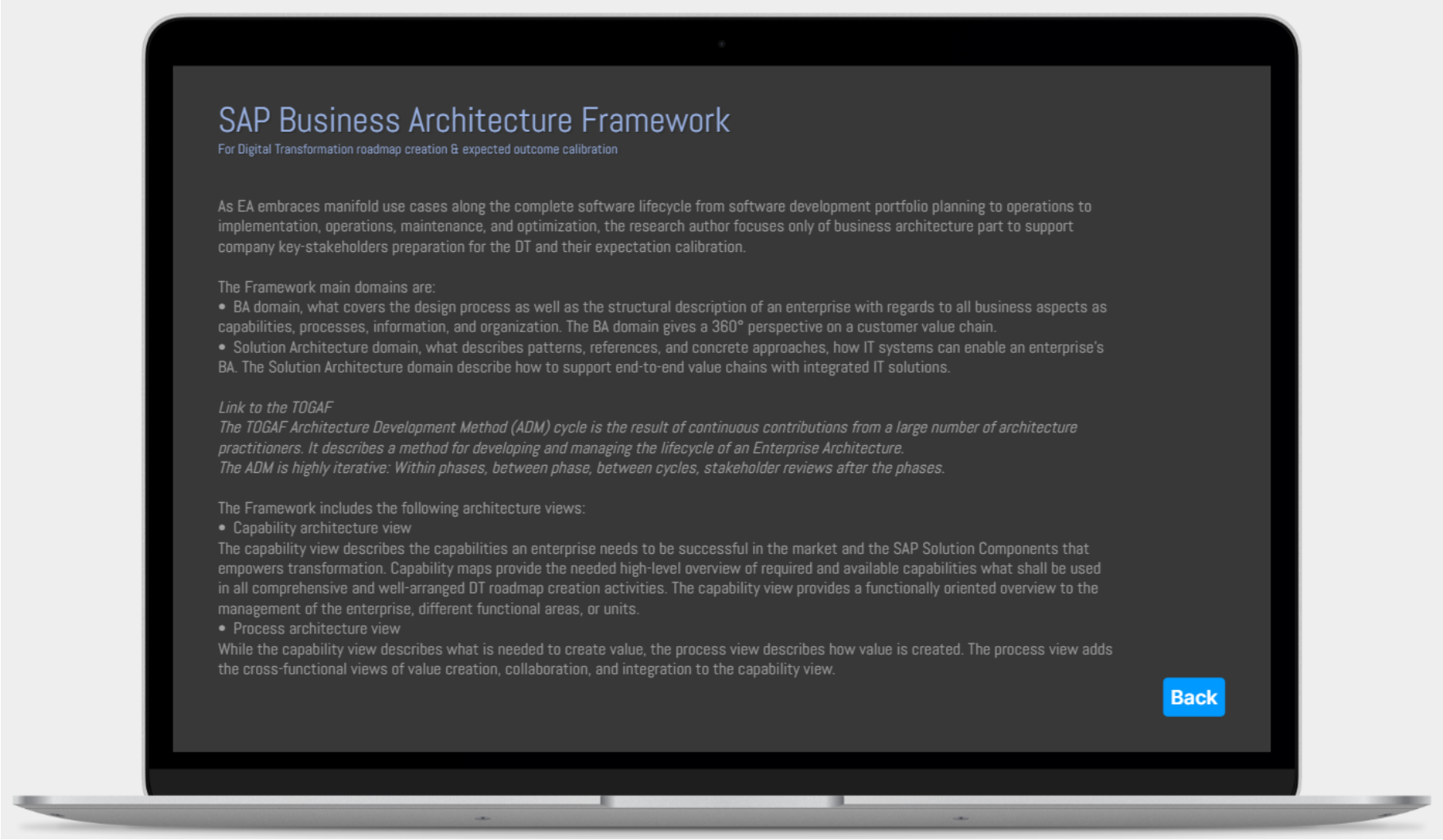
APPENDIX 4

SAP-F Design: screen #1 (created by the study author)



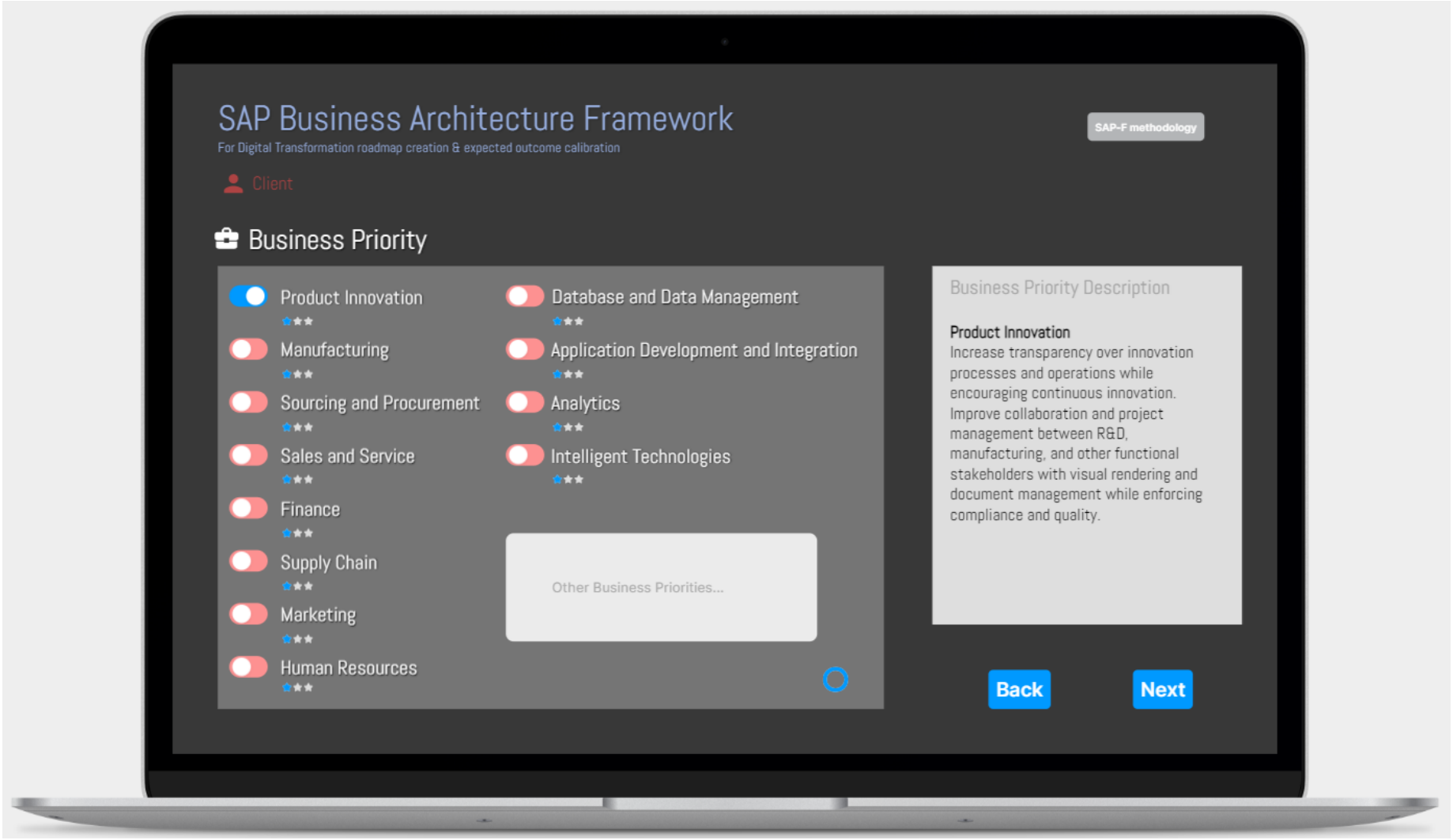
APPENDIX 5

SAP-F Design: screen #2 (created by the study author)



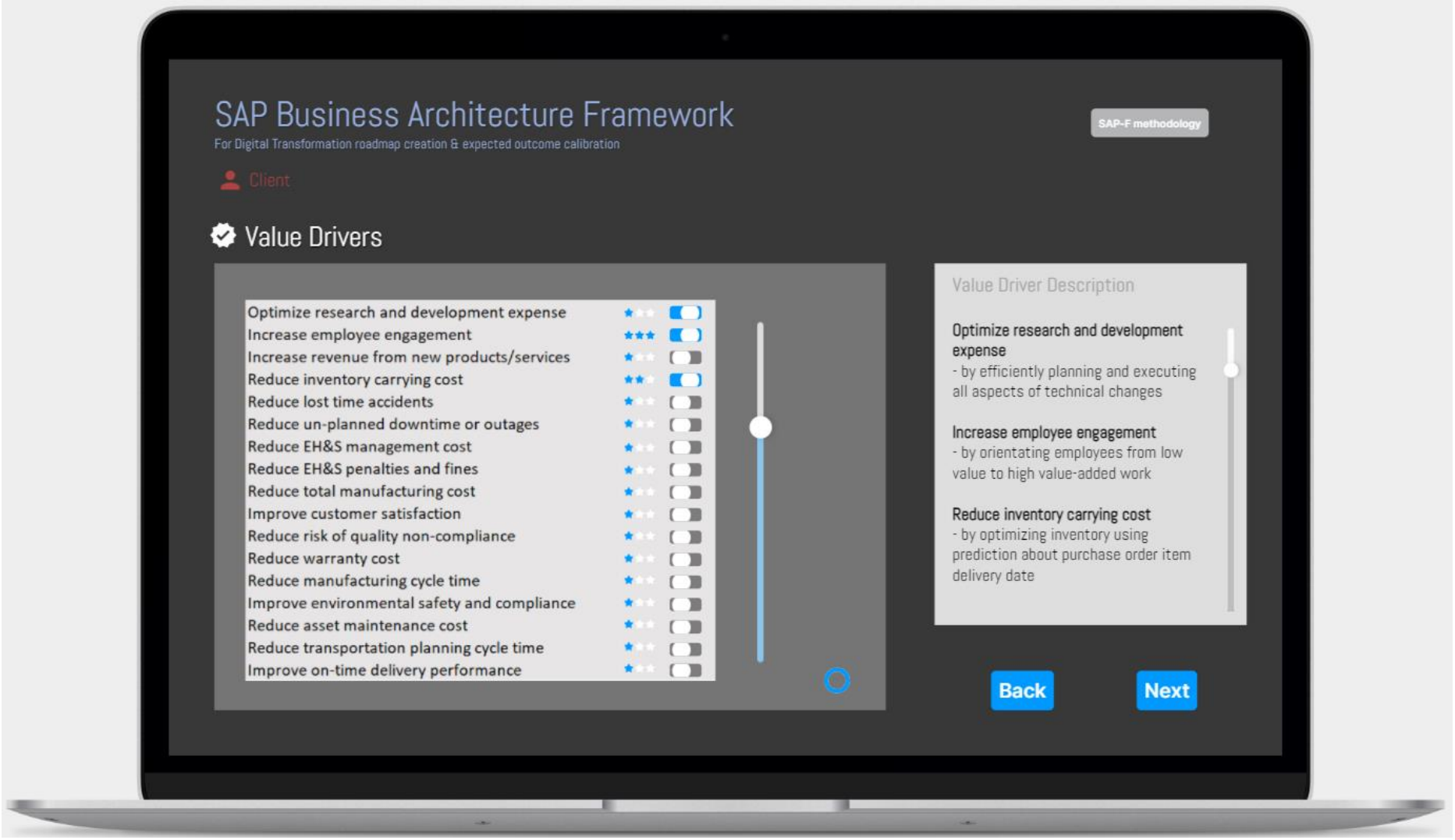
APPENDIX 6

SAP-F Design: screen #3 (created by the study author)



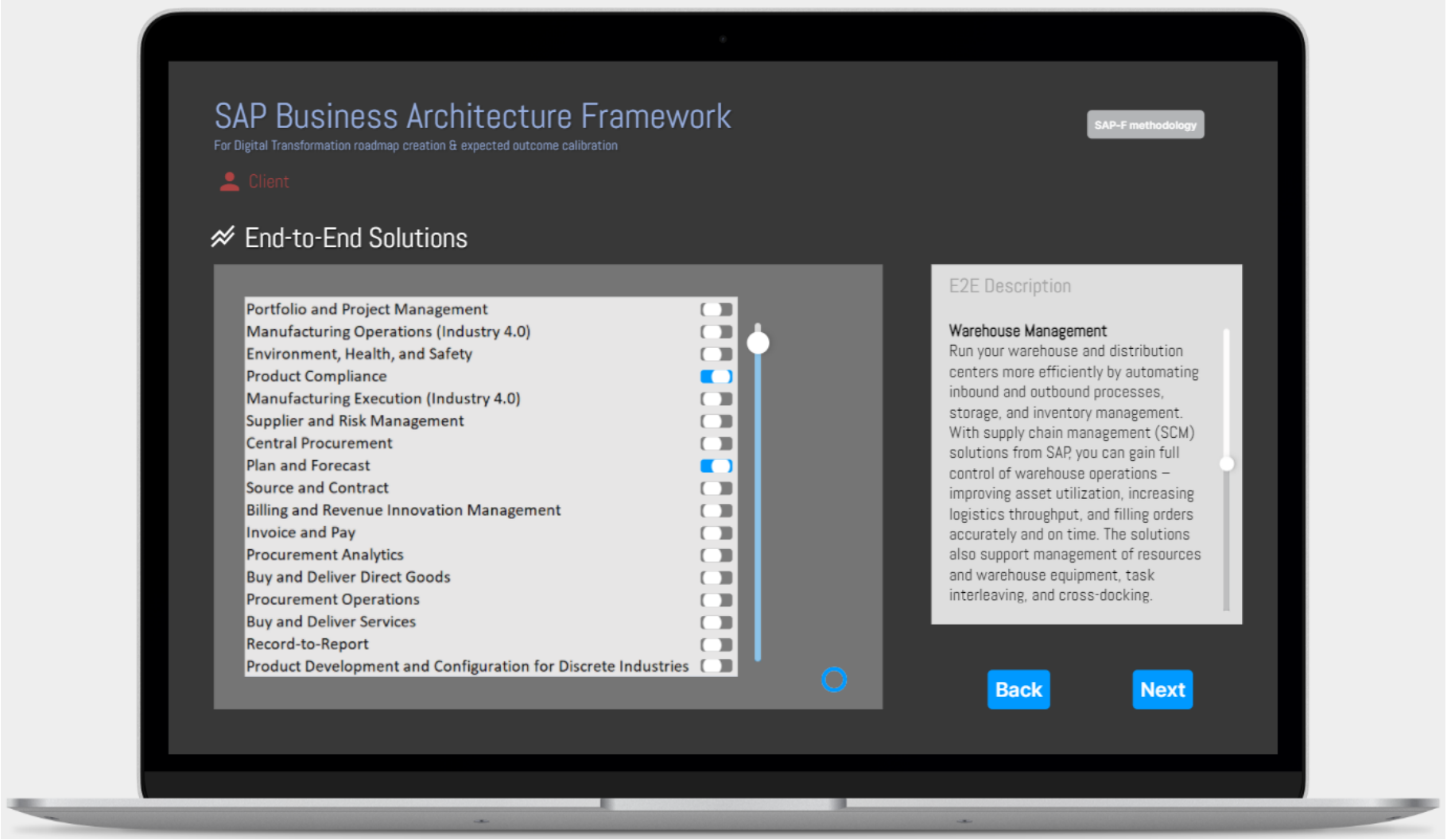
APPENDIX 7

SAP-F Design: screen #4 (created by the study author)



APPENDIX 8

SAP-F Design: screen #5 (created by the study author)



APPENDIX 9

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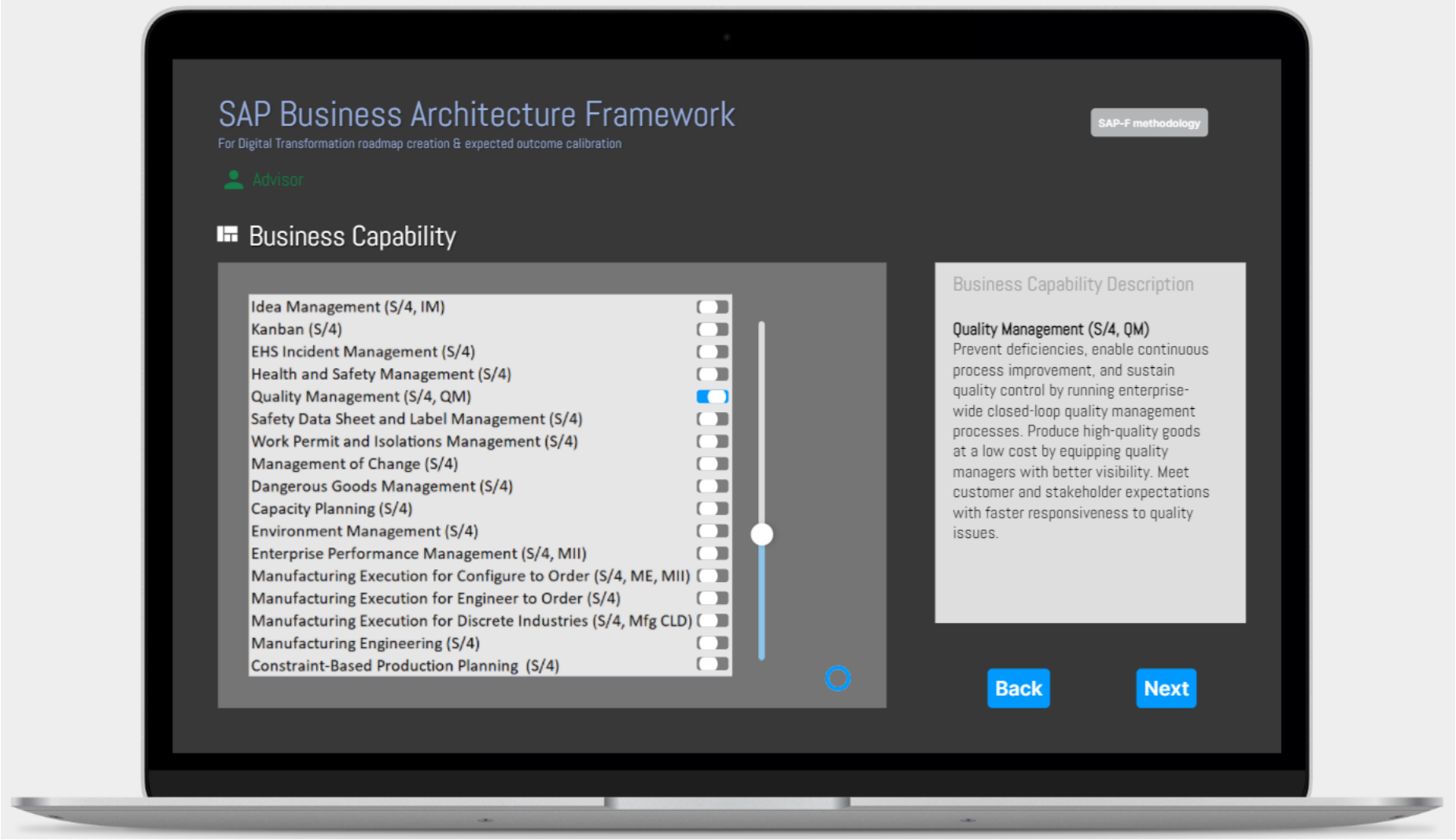
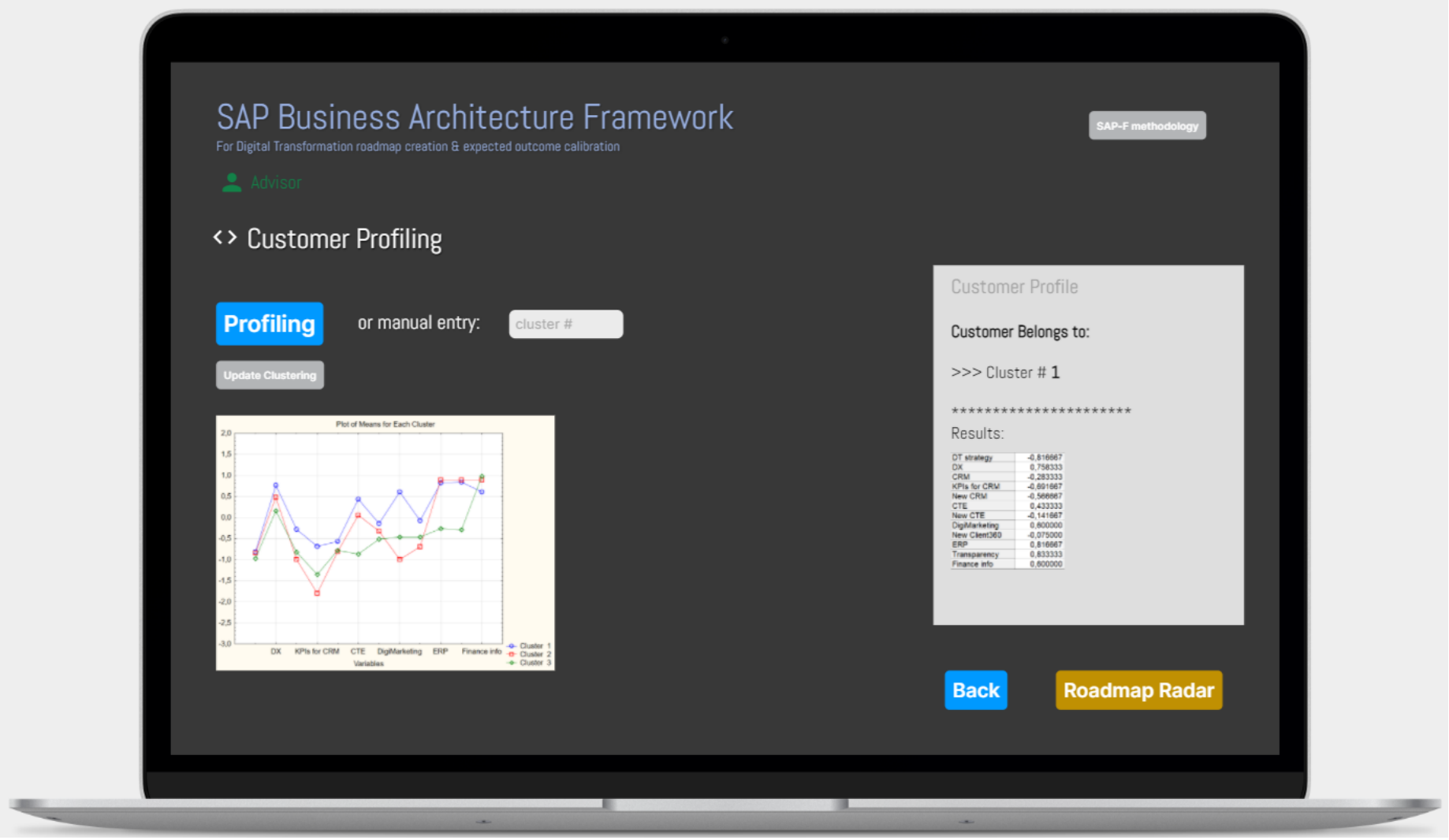


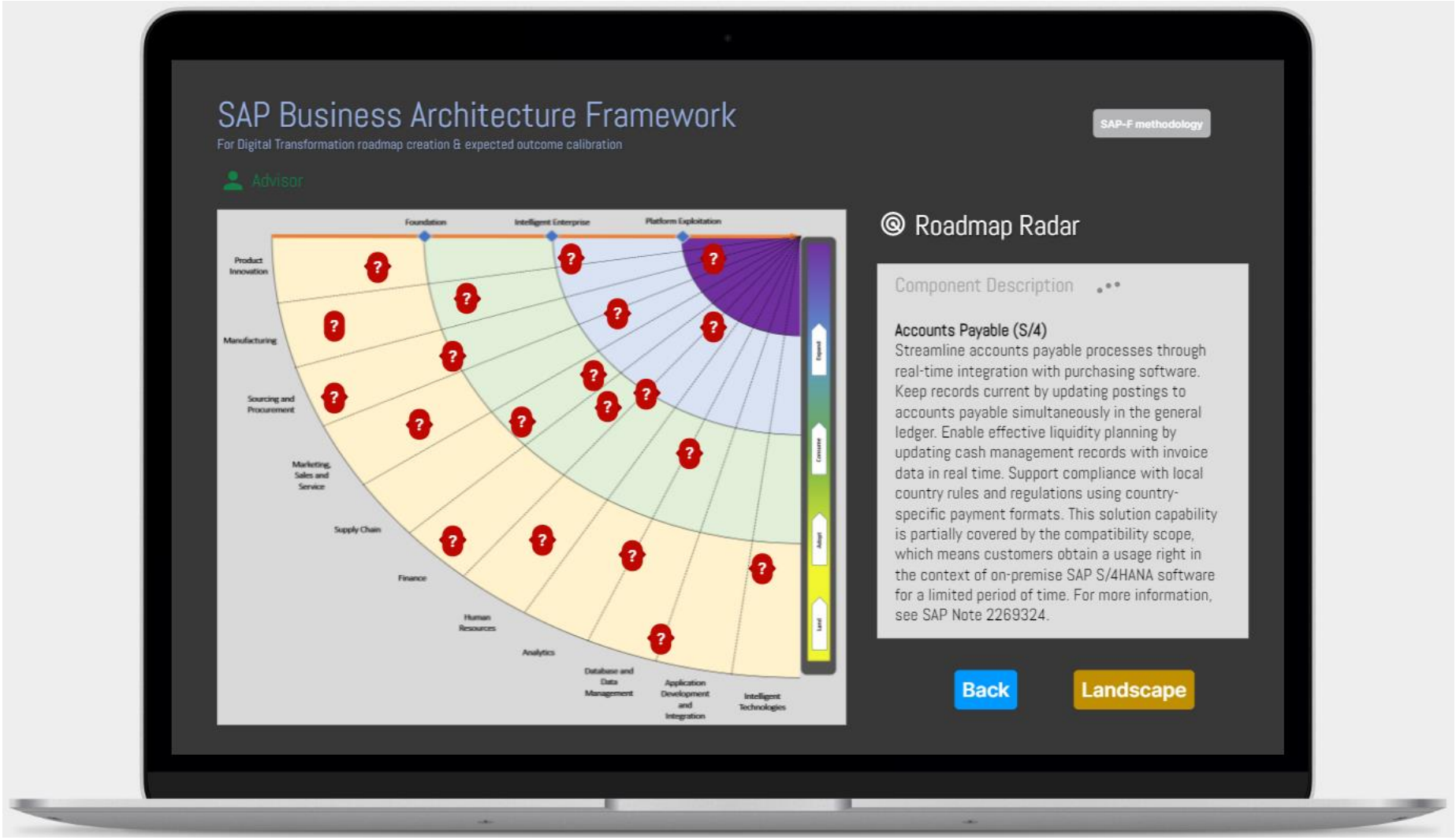
APPENDIX 10

SAP-F Design: screen #7 (created by the study author)



APPENDIX 11

SAP-F Design: screen #8 (created by the study author)



APPENDIX 12

SAP-F Design: screen #9 (created by the study author)