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**MASTER THESIS**

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# A bridge between UX design and enterprise architecture

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# ABSTRACT

Digital systems have become popular channels to facilitate interactions between *multi service providers* (MSP's) and customers. As these systems enable customers to use services that the MSP offers, MSP's aim for a high user experience of their digital systems. This results into UX designers and enterprise architects collaborating to improve the user experience, using user journey maps as a means to communicate. Though, user journeys are created in many different ways, with different taxonomies. Additionally, the two type of experts are quite different in terms of background and knowledge. As result, user journey maps can be interpreted in different ways and collaborating through user journey maps can become a time-consuming process.

In attempt to align UX designers with enterprise architects and to structure user journeys, this study proposes an extension to Archimate that is focused on the integration with user journeys. The extension, User Journey Extended Archimate (UJEA) is based on a literature review, a case study at a Dutch bank and an expert interview with a customer journey software vendor. UJEA consists of a user journey taxonomy (i), a user journey meta model (ii), a mapping of concepts (iii), a meta model that combines user journeys with Archimate (iv), a graphical notation (v), a new Archimate framework (vi) and a meta model with the allowed relationships between the user journey layer and architecture (vii).

The artefact has been evaluated through technical action research at a Dutch bank, in which two UX designers and three architects applied the artefact on a real case. With this evaluation, we measured the perceived ease of use, perceived usefulness, intention to use, perceived collaboration value, perceived familiarity of concepts and perceived completeness. The evaluation session showed that artefact has great potency in mapping user journeys and aligning UX designers with architects. The results were positive; subjects found it useful, easy to use, intent to use it, saw great potency in terms of collaboration and recognised the concepts. Still, the artefact can be improved by adjusting the allowed links between user journeys and architecture, integrating the artefact with screen designs and adding a couple of extra concepts.

While further validation on the artefact and artefact improvements are recommended for future research, UJEA provides a solid basis for creating user journey maps and integration with enterprise architecture. The strength of the framework lies within the discussions that arise when UX designers and architects link a user journey map to architecture. We hypothesise that the extension is suitable as a universal standard for user journey maps, as well as a means for overview and communication for UX designers and architects.

# ACKNOWLEDGEMENTS

This research project marks the end of my eight months internship at a Dutch bank and three years of studying Business Informatics at Utrecht university. In the beginning of the project I found it difficult to set scope on what I wanted to research. Though, my research gap became clear quickly after talking to colleagues about communication between UX designers and architects, resulting in a clear research project after the first month. In the past three years, the Business informatics gave me an excessive amount of knowledge about business and IT, and it was a great experience to apply this knowledge in practice. Thus, I would like to start thanking all professors of Utrecht University for their time and sharing their knowledge with me through different courses.

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# ABBREVIATIONS

| | |
|---|---|
| **MSP** | Multiservice provider |
| **ContextMSP** | The MSP in the banking domain used observed MSP for problem investigation and treatment validation |
| **UJEA** | User Journey Extended Archimate |
| **UX** | User experience |
| **UJ** | User journey |
| **CJ** | Customer journey |
| **UJM** | User journey map |
| **CJM** | Customer journey map |
| **SST** | Self Service Technology |

# 1 INTRODUCTION

We start the thesis by introducing the topic, problem area, goals and approach. The topic is introduced by providing background (1.1), followed by the problem statement (1.2). Next, we discuss our research question(RQ) and subquestions (SQs) in the Objectives (1.3) and elaborate on the used research method for the thesis (1.4). We finish the introduction with a thesis outline where we discuss the thesis structure.

# 1.1. Background

User journeys have become a frequently used tool to evaluate and design digital experiences (Hobbs & Fenn, 2013). A user journey entails the total *user experience* across a period of time, as the user interacts with a product or service to achieve a goal using a system (Hannington & Martin, 2012; Maguire, 2013). According to ISO 9241, user experience is defined as *a person's perceptions and responses that result from the use of a product, service or system* (Ferreira et al., 2015). However, user experience has been associated with a wide range of meanings (Forlizzy & Battarbee 2004). Sometimes user experience is incorrectly associated with usability. Where usability has a focus on *effectiveness*, *efficiency* and *customer satisfaction*, user experience is focused on emotions and perceptions. Other people associate user experience to customer satisfaction as both concepts focus on emotions. However, customer satisfaction is outcome-oriented and focused on emotions when interactions are finished, user experience is process-oriented and focused on emotions evoked during the interactions (Nenonen et al., 2008; Schmitt, 1999).

By mapping a user journey, user journeys are made explicit: user interactions and experience depicted on a flow diagram (Maguire, 2013). User journey mapping arose due to a merge of Business Process Design, Customer Relationship Management and User-Centered Design. In the beginning, user journey mapping merely entailed empathic explorations of the digital experience, needs-based design and creating interaction models (Hobbs & Fenn, 2013). However, the emergence of multi-channel integration and cross-channel design changed the perception that the mapped journey should solely focus on the user experience of a single system. People realized that a journey of a user can go through different channels (ways to interact), both digital and non-digital. These new journeys became known as customer journeys (Hobbs & Fenn, 2013). User journeys and customer journeys are often confused with one another.

Providing a *visualisation* of interactions and user experience, user journey maps allow organisations to *understand*, *evaluate* and *improve* user experience. User journey maps help service providers and product vendors to actually witness how their services and products are currently experienced in the real world (Nenonen et al., 2008; Hannington & Martin, 2012). The user-centric focus of user journeys allows organisations to understand and respond to the user needs, with the aim to differentiate from competitors and to keep customers loyal (Zomerdijk & Voss, 2010).

## 1.1.1. Contributions

This research has both scientific and practical contributions. As *scientific contributions,* this study provides an investigation of user journey- and customer journey literature in general (i) and a study on the user- and customer journey taxonomy in specific (ii). Additionally, this thesis results in a final user journey taxonomy (iii) and meta-model (iv). The taxonomy and meta model are then used to integrate user journeys into Archimate 3.0, resulting in a new meta model (v). Additional to the meta model, a graphical notation is made (vi) along with a cross-layer meta model (vii) that shows the allowed relationships between user journey and architecture. As *practical contribution*, the artefact aligns UX designers with architects by allowing both fields to communicate through the same model (viii). The artefact provides additional value to the architects by allowing traceability links between user journey- and architecture elements (ix).

## 1.2. Problem Statement

In the process of improving the user experience of a system, both UX designers and architects are involved. Where UX specialists design and adjust web- and app pages and features, architects are redesigning and administrating the corresponding architecture. Communication between the two parties is essential: New UX creations/changes have to be feasible and administrated in the architecture, and adjustments in business services require new corresponding UX designs. Unfortunately, communicating and collaborating with the other field can be difficult and time-consuming: each field has different skills, domain knowledge, education background and produced deliverables. Additionally, both fields use different modelling languages. As result, collaboration between these fields can become a time-consuming process and discourage collaboration. Surprisingly, both fields seem to be familiar to mapping journeys. Where UX designers create user journey maps to improve the digital user experience a system, enterprise architects create customer journey maps to understand and improve the customer experience from a holistic perspective. Using user journey maps to communicate the improvement of user experience could be a solution for the communication issue, ensuring unanimous decisions and mutual understanding (Maguire, 2013; Hobbs & Fenn, 2013). Still, user- and customer journey maps are barely used in the collaboration between UX designers and enterprise architects. Additionally, UX designers and enterprise architects seem to create user journeys in different ways, making it more difficult to understand one another.

> *Summarising the practical perspective*, there is a need to improve communication between UX designers and enterprise architects and make user journey maps universal.

From a literature perspective, research on user journeys seems to be scarce. There is no standardised terminology for both user- and customer journeys (Lankhorst, 2017), and no meta model yet showing the relationships between journey elements. Despite the absence of a fixed vocabulary and meta model, different terminologies have been proposed based on common terms that could help create a universal terminology (Bernard and Andritsos, 2017; Lankhorst, 2017; Norton & Pine, 2013). Next to the absence of a fixed terminology, the difference between user- and customer journeys is difficult to find. Even though there is available literature on customer journeys (unlike user journeys), a literature review on customer journey publications revealed that the lack of common structure and formalization counts for customer journey mapping as well (Følstad et al., 2013). The lack of common terminology and universal notation results in informal and divergent journey maps (Følstad et al., 2013). People find their own way of mapping journeys to fit their needs (Richardson, 2010). However, different informal journey maps create space for different interpretations. Among stakeholders, different interpretations can lead to different expectations and make it difficult to ensure mutual understanding. Establishing universal concepts and rules on user journey mapping could prevent different interpretations- and improve communication among stakeholders (Promeroy & Douvere, 2008; Svendson & Laberge, 2005).

> *Summarising the literature perspective*, there is no universal terminology (set of concepts) and no meta model for user journey maps. Additionally, the differences between user- and customer journeys are unclear and there are no universal rules on how to map user journeys.

# 1.3. Objectives

In the problem statement, we identified a need for research on characterising-, mapping- and supporting user journeys, as well as a need to facilitate the collaboration between UX design and enterprise architecture. In an attempt to solve these gaps, this thesis aims to integrate user journey maps into a common enterprise architecture modelling language: Archimate. The user journey extention of Archimate will form the *artefact* of this thesis. To create such artefact, we start shaping this research project by formulating research questions.

## 1.3.1. Research Questions

To formulate the main research question, both the design problem and the problem statement are used as input. The problem statement from the literature perspective showed a need for a (semi-) formalised way of modelling user journey maps. Additionally, from a practical perspective there is a need to align UX designers with enterprise architects while both fields seem familiar with user journeys. In attempt to fill both gaps at once, we could integrate user journeys into an enterprise architecture language that both parties understand. Thus, we formulate our research question as follows:

**RQ** *What steps and concepts are required to support the integration of user journeys into an enterprise architecture language?*

The research question is answered by three subquestions (SQs). There are two types of subquestions: *Knowledge questions* and *Design questions* (i.e. Design problems). Where *Knowledge questions (KQs)* ask for existing knowledge about the world, d*esign questions (DQs)* address the artefact to solve the design problem.

**SQ1(KQ)** *To what extent is user journey mapping supported and applied?*

To investigate the current literature and practical state of user journey mapping, a literature study, case study and expert interview will be performed. To be able to answer SQ1, the question was subdivided into the following topics: What user journeys are and what type of journeys exist (SQ1.1), elements of a user journey (SQ1.2), methods, notations and visualizations of user journey mapping (SQ1.3) and how user journey maps are applied in practice (SQ1.4). These questions will help to answer SQ1 and provide an overview of existing and missing knowledge that serves as requirements for the artefact.

***SQ1.1.*** *What are user journeys and what types of journeys exist?*
***SQ1.2.*** *What are the elements of a user journey?*
***SQ1.3.*** *What are the current ways for mapping user journeys?*
***SQ1.4.*** *How are user journey maps currently supported and applied in the fields of UX design and enterprise architecture?*

**SQ2(DQ)** *How to create a modelling language that supports both user journeys and enterprise architecture?*

As possible solution to align UX designers with enterprise architects, we aim to integrate user journeys into an enterprise architecture language., we want to know how to create a modelling language that integrates user journeys into an enterprise architecture language. To investigate how to create such language, a requirement list will be created (as result from the problem investigation) that will serve as

input for the artefact, which we from now on call *User Journey Extended Archimate* (UJEA). To design the language and its potential applications, the following subquestions are formulated:

***SQ2.1.*** *What are the required inputs for UJEA?*

***SQ2.2.*** *How to integrate user journeys into Archimate?*

***SQ2.3*** *What are the applications of UJEA and how do they help align UX designers with enterprise architects?*

**SQ3(KQ)** *What are experts' perceptions when validating the user journey integrated architecture language?*

To answer this question, technical action research will be performed at a banking company, in which UX designers and architects apply the artefact to a use case. This session will count as an evaluation session, in which we measure the subject perceptions. To validate the artefact, we aim to measure the *perceived ease of use, perceived usefulness, intention to use, perceived collaboration value, perceived familiarity of concepts* and *perceived completeness*. Along with the perceived completeness, we aim to harvest a set of improvement suggestions for the artefact, to indicate future work.

## 1.4. Research Method

In this research, we follow the method of Design Science from Wieringa (2014). This method is created to solve a problem by creating an artefact. In this research, we will use the Design Science Cycle for creating User Journey Extended Archimate. The Design Science Cycle contains five phases: *Problem Investigation* (1), *Treatment Design* (2), *Treatment Validation* (3), *Treatment Implementation* (4) and *Implementation Evaluation* (5). For the sake of feasibility and due to limited time, we will only execute the first three phases of the Design Science Cycle. To show how the Design cycle is applied to this thesis, the first three phases, along with their goals and outputs, are shown in Figure 1.

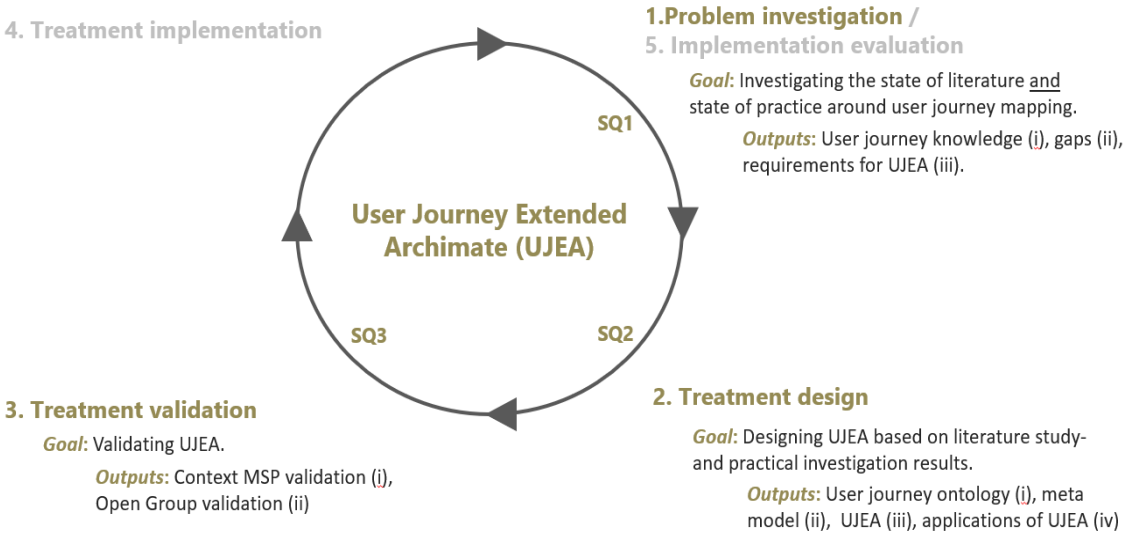



Figure 1: Design cycle (Wieringa, 2014) for User Journey Extended Archimate

The Problem investigation phase serves to examine the current and missing knowledge of user journeys. This results in an overview of existing and missing knowledge, as well as a list of requirements for our Artefact. In the Treatment design phase, we will use the Problem investigation results to create our artefact: User Journey Extended Archimate, an extension of Archimate 3.0 with user journey concepts. To create a user journey extension of Archimate, we need the following prerequisites: A fixed set of user journey terms and a user journey meta model. These prerequisites are also in our Treatment design phase as they do not exist yet. When the artefact is created, we start the Treatment Validation phase in which we validate the artefact in practice.

# 1.5. Thesis Outline

To define how our thesis is structured, we include our thesis objectives and Design cycle phases into our thesis outline. Here we discuss the phases as introduced in the Research Method (1.4) into more detail. We start the thesis with an introduction (Chapter 1), discussing the problem statement, objectives, research method and outline. After the introduction, the thesis is structured as depicted in Figure 2.

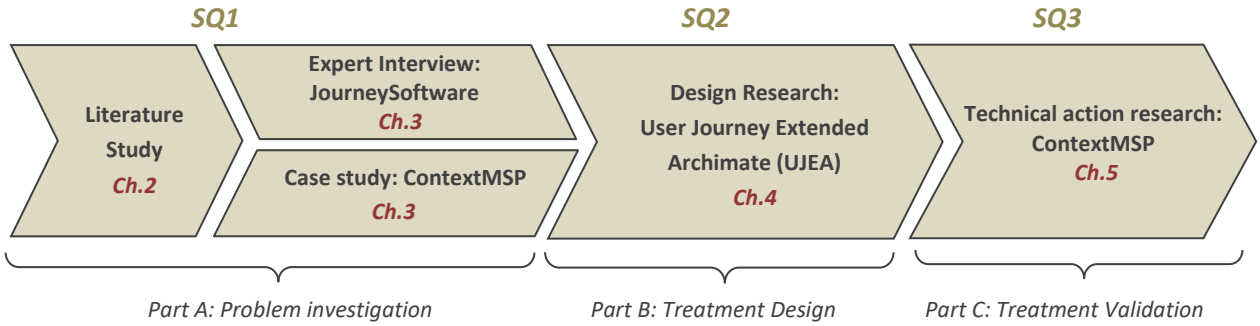



Figure 2: Thesis outline

The Problem investigation phase consists of A literature study (Chapter 2), an in-depth interview with JourneySoftware (Chapter 3) and a case study at ContextMSP (Chapter 3). These chapters serve to give insight into the current ways to support user journey mapping (SQ1). Next, we start to create our artefact in the Treatment design phase (Chapter 4). Doing this, we create a way to support a user journey integrated architecture (SQ2). At last, we will evaluate UJEA by performing technical action research at ContextMSP (Chapter 5), to gather stakeholder opinions on UJEA (SQ3). We finish the thesis with a conclusion (Chapter 6) in which we also discuss limitations and future work regarding the thesis. Different techniques can be used for the Design Cycle phases. In the following sections, each phase is discussed individually with respect to the chosen research techniques for this thesis.

## 1.5.1. Part A: Problem investigation

For the problem investigation, we use *triangulation* by using three different research techniques: *a literature review*, an *expert interview* and a *case study* at ContextMSP. With a clear view of existing literature and missing literature, complemented by a practical view from the case study and interview, we create an *initial requirement list* for the User Journey Extended Archimate.

**Literature Study** A literature review will be conducted to explore the existing literature on user journeys. Additionally, we will explore the literature on customer journeys, as they are related to user journeys and are significantly more described in the literature (Følstad et al. 2013; Lemon & Verhoef, 2016).

**Expert Interview** An interview with a customer journey software company in the Netherlands is performed. The interview serves to get a practical view on how user- and customer journey maps are applied, what terminology and notation are used, and to identify the current state of tool support.

**Case study** Next to the literature study, a case study of an MSP in the banking sector will be done. A case study provides a way to observe and investigate phenomena (user journey practice) in their context (Yin, 2009, Robson, 2002; Runeson & Höst, 2009). The case study will be an *exploratory case study* used for *Theory Building* (Yin, 2003; Yin, 2011), to compare and complement the literature results and requirement list for our artefact with practical results. Doing a case study after a literature study helps to scope the case study, as the gathered knowledge helps to select what is relevant to study (Yin, 2011).

### 1.5.2. Part B: Treatment Design

**Design Research** As mentioned in our Research method (1.4), we use the Design Science Cycle of Wieringa (2014) to investigate the problem (Part A), design the User Journey Extended Archimate (Part B) and validate this artefact (Part C). Before designing the artefact, its prerequisites should be finished first: a user journey taxonomy (i), and a user journey metamodel (ii). When both are finished, a meta-model and notation of User Journey Extended Archimate can be created.

### 1.5.3. Part C: Treatment Validation

**Technical action research** To validate the artefact, we will perform technical action research at a banking company. A proof of concept of the artefact will be realised and which UX designers and enterprise architects will apply to a real banking case. The UX designers will create a user journey while the architects create the corresponding architecture, where after the two fields will collaborate to connect the user journey to the architecture. For validating the artefact, we measure the following stakeholder perceptions: *perceived ease of use, perceived usefulness, intention to use, perceived collaboration value, perceived familiarity of concepts* and *perceived completeness.* Different measurement techniques will be used to gather the data about stakeholder perceptions. After these assignments, a post-it session (i) will be held, a questionnaire on completeness (ii) will be filled in and a focus group (iii) will be held. Additionally, during the evaluation session, behaviour will be observed (iv), resulting in a total of four measurement techniques for gathering data.

# PART A
# PROBLEM INVESTIGATION

# 2 LITERATURE STUDY

As discussed in the problem statement (1.2), there is a need for clarity on the characteristics and concepts of user journeys, and support to map user journeys. In this chapter, we examine the existing knowledge in the literature by doing a literature study. Simultaneously, the introduced gaps in the problem statement become defined in more detail and are taken into account as requirements for our Treatment Design. With the literature study we aim to (partly) answer SQ1: *To what extend are user journeys supported and applied?*. We start with user journey characteristics and context (2.1), followed by discussing frameworks and methods to support user journey mapping (2.2). Next, we examine the available concepts (2.3) as a first step towards defining our taxonomy required for the artefact. At last, we discuss and evaluate several notations and visualisations (2.4), resulting in several requirements for our artefact. We finish the literature study with a summary of results (2.5).

# 2.1. User journeys

In this section, we examine what a user journey entails, defining user journeys, clarifying the types and characteristics, examining how user journeys are applied in practice and what techniques are used to create user journeys.

## 2.1.1. User journey

Defining user journeys is a difficult task, as researchers have different perceptions on user journeys and literature on the topic is scarce. Some researchers describe user journeys as simple user scenario's (André et al., 2007; Chamberlain et al. 2006). User journeys are however more than just user scenarios. They entail moments of interaction and are a means to measure *user experience*: the emotions, perceptions and feelings that result from the use of a product or service (Nenonen et al., 2008; Ferreira et al., 2015). A more accurate definition comes from Hannington & Martin (2012), who includes user experience in the definition, defining the user journey as: "*The total story about an individual's actions, feelings and perceptions across a period of time, as he or she interacts with a product or service*". While this definition is more accurate, it is still incomplete. Maguire (2013) stated that user journeys are *"the steps a user takes to reach a goal with the current system"*, adding two essential parts: a goal and the condition that the interaction takes place through a system. Hence, we combine the definitions of Nenonen et al. (2008), Hannington & Martin (2012) and Maguire (2013) to create our own definition of a user journey: *The total user experience (emotions, perceptions and feelings) across a period of time, as the user interacts with a product or service to achieve a goal using a system.*

By *mapping* the user journey, the journey is documented as a flow diagram (Bernard & Andritsos,2017). A *user journey map* contains an ordered set of interactions between user and service provider called *touchpoints,* along with the *user experience* across these touchpoints (Halvorsrud et al., 2016). Each journey map is based on a *Persona*. A persona is a semi-fictional representation of an ideal customer or user that is based on market research and customer data (Kusinitz, 2014). A persona contains a description of the user goal and characteristics and is used to define a user of a specific user journey (Hannington & Martin, 2012). In Figure 3, related components of user journeys are shown, along with the scope of user journey maps (coloured in yellow).

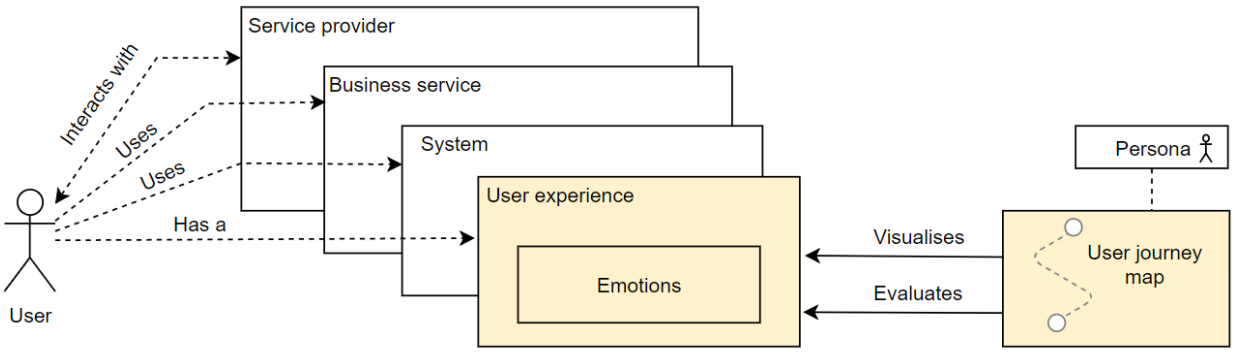



Figure 3: Related components of user journey maps (UJ scope in yellow)

### 2.1.2. User journey mapping in practice

Providing a *visualisation* of interactions and user experience, user journey maps allow organisations to *understand*, *evaluate* and *improve* user experience (Hannington & Martin, 2012). User journey maps help service providers and product vendors see how their services and products are currently experienced in the real world (Nenonen et al., 2008; Hannington & Martin, 2012). Due to the user-centric view, organisations can actually witness how a user completes a task, and how he/she felt during this process. User journey mapping is applied across different fields, including UX design (i), Enterprise architecture (ii) and marketing (iii). Each field aims to achieve its own goals by applying user journeys.

**UX design (i)** applies user journey mapping to capture UX requirements and evaluate UX designs. It is mostly applied in agile development of UX design, along with other techniques such as user wish lists, scenario's, persona's, user stories and UX requirement lists (Maguire, 2013). A typical example of a UX driven product design is the Philips wake-up light. By comparing the process and experience of waking up by an alarm clock to waking up by the sunrise (i.e. by comparing journeys), designers found that people experience the latter a lot more pleasantly. Using this information, designers created a wake-up light that focuses on the experience of waking up, rather than just its practical usage to get people out of bed. To test the benefit, they compared the user journey of the wake-up light to the user journey of an alarm clock (Hassenzahl, 2013).

**Enterprise architecture (ii)** applies customer journey maps to the practice of *service design* and connect it with underlying architecture(Hobbs & Fenn, 2013). Customer journeys have the potential to streamline and simplify services to make them most effective to users, increasing revenue, lowering costs and enhancing user satisfaction (Andrewsl & Eade, 2013; Rawson, Duncan, & Jones, 2013). Service design has become user-centred; involving actual user behaviour in the context of where services are used, helping users refining and creating services (Marquez and Downey, 2015). Due to the fast-growing practice of service design and customer journey mapping being the most commonly used technique for it, service design is seen as the biggest contributor to increasing utilization of customer journey maps. (Clatworthy, 2011; Hobbs & Fenn, 2013). To exemplify, we look at how Walt Disney World used customer journeys in their service design. The company designed its theme park around its concept called Guest Experience cycle. The cycle describes a visit to the theme park as an emotional journey that customers can go through instead of a collection of rollercoaster rides. Using this customer journey map as design and evaluation material seemed to work very well. Multiple design and consulting agencies started to use this concept to evaluate experience-centric services and design new ones (Zomerdijk & Voss, 2010).

**Marketing (iii)** Marketing started adopting a focus on user experience rather early, seeing customer purchases as a purchase of enjoyable experiences with a product/service, rather than just buying and using a product/service (Pine & Gillmore, 1998). The focus on user experience has nowadays evolved into a competition to become a market leader by making services customer-centred. Service provider markets these days have been transformed into customer-centred competitions, resulting in service quality, customer-perceived value and customer satisfaction becoming some of the key success factors for gaining competitive advantage (Vargo & Lusch, 2004; Hu et al., 2009). Hence, marketing created models of customer decisions and experiences to guide customers towards the purchase of a product of service (Fetherstonhaugh, 2010). This model had many names, like *marketing funnel*, *decision funnel*, *path-to-purchase model*, and is seen as the former version of user-and customer journey maps. Nowadays, these purchase experience models go by the name of *buyer journeys* (Lemon & Verhoef, 2016).

As each field fulfils its own goals with user journey mapping, it sounds like each field gives user journeys its own purpose. However, whether it is applied to design services, create UX designs, or to become customer-centered, the purpose remains the same: understanding, evaluating and improving the user experience.

### 2.1.3. Customer journey

The difference between user journeys and customer journeys is difficult to find in the literature. Some researchers do not even distinct the two journeys, and just speak of experience journeys or journey maps (Howard, 2014). To identify the difference, we rehearse our user journey definition: *The total story about an individual's actions, feelings and perceptions across a period of time, as he or she interacts with a product or service to achieve a goal, by using a system*. In this definition, the system serves as a *channel*: a medium for users and service providers to interact with one another (Sousa & Voss, 2006). A channel can be an app, website, e-mail, telephone, face to face conversation etc., and can be either digital or human-served. What characterizes user journeys most, is the last part of the definition: *by using a system.* One can only speak of user journeys when a journey is single-channel (i), which happens to be a system as well (ii).

Customer journeys on the other hand, are a more thoroughly described concept in the literature than user journeys. Surprisingly, customer journeys originate from user journeys. Research found that customer experience was formed across each moment of interaction, through multiple channels (Sousa & Voss, 2006). This insight led to the emergence of multi-channel integration, cross-channel design and human-centered design (Brown, 2008; Resmini, 2011; Lusch & Vargo, 2006), which eventually resulted in extending user journeys by including multiple channels. By including different channels into the journey map, a journey can include the full business value-chain and the total service ecology in which users operate i.e. the *customer experience*. This broader version of user journeys became known *customer journeys* (Hobbs & Fenn, 2013).

To clarify the scope and related elements of customer journey maps related to user journey maps, a representation is shown Figure 4. For this overview, we use Figure 3 of section 2.1.1 and extend it by adding Customer experience and Customer journey maps. The scope of the Customer journey map is again highlighted in yellow, just like in Figure 3.

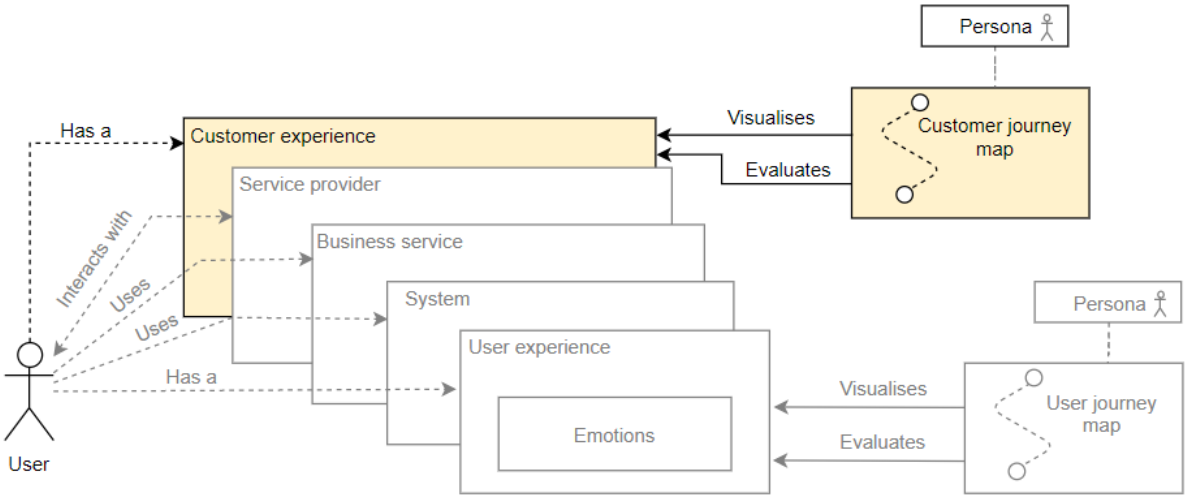



Figure 4: Related elements of the Customer journey map (CJ scope in yellow)

As been said, customer journeys and customer experience include a wider scope than User journeys, tending to include the whole business-value chain. Due to their holistic scope, Customer journey maps can incorporate the experience of potential customers with a service provider before even interacting with it. For example, the first engagement with a service provider could be a recommendation from a friend. This example shows that Customer experience and Customer journey maps include more than just interactions with a service provider. Hence, customer experience is modelled as a container of Service provider.

Where user journeys show detailed, *low-level* representations of interactions and user experience of a single system, customer journeys show a *high-level* overview. As high-level representations, customer journeys tend to include multiple user stages while user journeys tend to focus on one single stage. A *Stage* is a labelled time frame that encompasses several touchpoints, used to make journeys more manageable (Schmitt, 2003). Some researchers use the pre-purchase-, purchase- and post-purchase phases as stages, while others prefer more detailed stages like dividing the pre-purchase phase into information search, first engagement, decision process, purchase. Stages are however seen as optional, as some user- and customer journeys do not even use stages at all (Bernard & Andritsos, 2017). Some distinct the two journeys by stating that user journeys focus on the *digital experience*, where customer journeys examine the *holistic, full experience* (Paluch, 2017). To summarise, Table 1 represents an overview of the differences between user- and customer journeys.

Table 1: Key differences between user- and customer journeys

| User journey | Customer journey |
|---|---|
| Single channel | Multi-channel |
| Channel must be a system | Channels do not have to be systems |
| Measures user experience | Measures customer experience |
| Low-level | High-level |
| Tends to focus on one stage | Tends to include multiple stages |
| Digital experience | Hollistic experience |

When practitioners need to decide whether to use customer journey- or user journey maps, whether it is used in the context of UX design, service design or marketing, one should check which channels are used within the service. Exclusive usage of a single channel (D1), which appears to be a system (D2) can serve as a rule of thumb for applying user journeys maps instead of customer journey maps. To help to decide which journey to use, a decision process is shown in Figure 5. The decision process for user journey maps (the conditions of a user journey) are yellow colored.

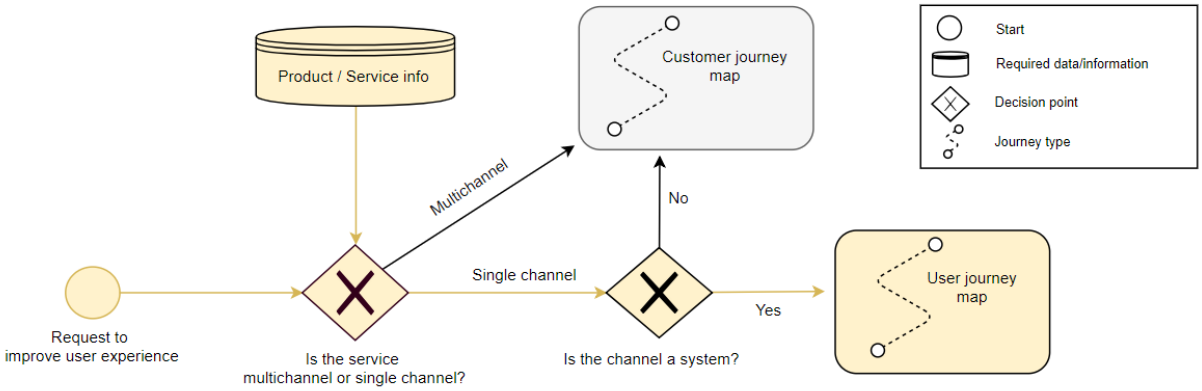



Figure 5: Decision process for choosing what journey map to create

Right now, the customer journey is more commonly described in research and more commonly mapped in practice than user journeys. Service providers prefer to include multi-channel services and focus on the bigger picture, rather than user experience of a single system. However, this could change in the future.

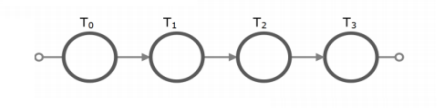
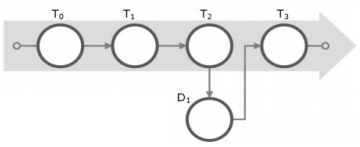
**The increase of digital services** Due to the growth of digital service, there is an increasing need for evaluation of digital services. Instead of the holistic experience customer journey maps provide, user journey maps have a focus on digital experience (as we saw in Table 1) and are therefore the better option for of experience in digital services (Paluch, 2017). A big influencing factor to the growth of digital services is *Self-service technology* (SST). SSTs are technologic channels that allow users to use a service independent of additional channels or employee involvement, like a website, app, ATM, chatbot, soda- or coffee dispenser etc. SST is an emerging development thanks to the growing customer-centred service design (Edvardsson & Gustafsson; Meuter et al., 2000), and changes the way customers interact with service providers, transforming services into *e-services*. As digital self-service is growing, the possibility exists that user journeys are becoming more frequently researched and applied in the future.

### 2.1.4. Actual- and Planned User Journey

The user journey map as discussed to this point is created by the service provider, specific to a persona, and show the optimal or expected path for a particular service. These user journey maps are called *planned user journeys*. As much as the MSP wants to provide their services with the easiest- and fastest way, deviations in a user journey are a common problem in service delivery. *Deviations* are touchpoints where the path takes a different route as planned (Halvorsrud et al., 2016). Deviations are only modelled in user journey maps that are based on measured, real user behaviour. These user journeys are called *actual user journeys*. To further characterize user journeys, we examine both types of user journeys into more detail below.

Planned- and actual user journey maps are different in a variety of aspects. Where planned user journey maps are designed by the service provider (top-down), actual user journey maps are shaped by user behavior (bottom-up). Planned journey maps are a quite static, based on strategy and market research on the customer and shows how a journey should be or how a journey is experienced over a period of time. Actual user journeys on the other hand are more dymanic: user behavior and experience are measured and visualized in real-time and can thus change any minute. Additionally, planned user journeys serve as service blueprints; they represent what an organization plans for their customer (Zomerdijk & Voss, 2010; Halvorsrud et al., 2016). These service blueprints serve to shape the to-be situation and can therefore be used as a roadmap to get there. To summarize the differences, Table 2 shows an overview of the differences between planned- and actual User Journeys**.** In this thesis, we only will focus on **planned user journeys** as they are static, which is the same case for enterprise architecture modelling languages.

Table 2: Planned User Journey (a) vs Actual User Journey (b)

| Planned user journeys | Actual user journeys |
|---|---|
|  |  |
| No deviations | Can deviate from planned journey |
| Shaped by the service provider (top-down) | Shaped by users (Bottom-up) |
| Based on strategy, market research | Based on real-time measured user behavior |
| Static | Dynamic |
| Describes to-be situation/Hypothetical | Describes as-is situation |

In the current literature, user journey maps and customer journey maps tend to represent *planned user journeys rather* than the service process as experienced by individual customers. (Crosier and Handford, 2012; Trischler and Zehrer, 2012). Actual journeys are more difficult to create as it requires accurate user behaviour data and analysis, while planned user journeys are created by service providers themselves. Only recently, support for creating actual user journeys is being studied, like applying process mining to event logs of user behaviour (Bernard & Andritsos, 2017). This approach will be later discussed in section 2.2.1. (User journey frameworks).

Deviations in the service delivery process can lead to user frustrations, as users like to be in control in a sense that the whole process of a service centres around them (Schneider & Bowen, 1999). To improve the user experience of a service, deviations are seen as touchpoints that require improvement. To identify improvements, actual user journeys are compared to planned user journeys (Hannington & Martin, 2012; Halvorsrud et al., 2016). Gartner supports this practice, stating that organisations should adopt user- and customer journey mapping into their daily practice in order to successfully bridge the gap between expectations and experiences (Bernard & Andritsos, 2017; Olding et al., 2015).

### 2.1.5. Collecting data for mapping user journeys

For creating user journeys and corresponding persona's gathering data about user behaviour is essential. Only with sufficient and accurate data can practitioners create compelling narratives that reflect people's needs, feelings, and perceptions at product interactions (Hannington & Martin, 2012). User journeys are based on both market research and real data about existing customers (Kusinitz 2014). For collecting qualitative data for user journeys, one can use *diary studies* (participants recording their own behaviour and experience in a log), *interviews* and a *software walkthrough* (Hobbs & Fenn, 2013). To gather quantitative data on user experience, one could use *questionnaires* and service *process data* from *back-end systems* (like event logs). For analyzing back-end system data, one could analyze the data manually to identify patterns (Halvorsrud et al., 2016) or apply *process mining* for automatically identifying behaviour patterns (Bernard & Andritsos, 2017). An overview of the data collection techniques for user journeys is made in Table 3.

Table 3: Overview of user journey data collection techniques

| Data & Collection techniques | |
|---|---|
| Type of data | Techniques |
| **Qualitative data** | • Diary study<br>• Interview<br>• Software walkthrough |
| **Quantitative data** | • Questionnaires<br>• Retrieving process data from back-end systems and analyzing it with<br>  ○ Traditional analysis<br>  ○ Applying Process mining |

# 2.2. Frameworks and Methods

In this section, we examine existing methods and frameworks that support user journeys, to further examine the current ways to support user journeys (SQ1). With the notations part, we also gather requirements for our artefact by evaluating existing notations. As user journey literature is limited, the literature on customer journey support is also examined.

## 2.2.1. Frameworks

In this section, we look at frameworks for user journeys that show how elements or concepts related to user-/customer journeys should be structured or managed. Although there is not a specific framework for user journeys, there are frameworks for customer journeys and a framework for creating personas, that could be applied to user journeys.

### Process mining CJM framework.

Bernard and Andritsos (2017) created a *framework* that enables the comparison of actual- and planned customer journeys by applying process mining to create actual journey maps. Process mining is the practice of deriving user behaviour patterns from event logs (Van der Aalst, 2016). Providing a means to discover actual user behaviour, process mining becomes a big enabler for the creation of actual customer journeys, and the comparison to planned customer journeys. Simultaneously, introducing process mining into customer journeys allows the benefits and opportunities of data analytics to be applied to customer journeys as well. The framework is shown in Figure 6 below.

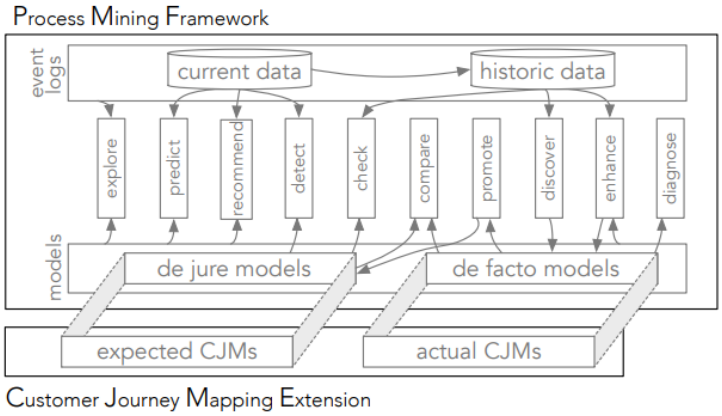



Figure 6: Process mining CJM framework (Bernard and Andritsos, 2017)

### Maturity Model

The Customer Journey Maturity model of Halvorsrud and Kvale (2017) can be used to become more customer oriented. The pyramid summarizes three stages in transforming a company towards a customer-centric operation: The Awareness- (stage 1), Overview- (stage 2) and Analysis stage (stage 3). The maturity model is shown in Figure 7.

1. *Awareness stage*: Entails that customer journey practice is still basic. In this stage, customer journey knowledge and fundamental *concepts* (touchpoints, journeys) are introduced and customer journeys are mainly used by *early adopters* (UX designers). Additionally, a *company-wide toolbox* and *unifying language* starts to from throughout the organization and journeys establish

*new organizational collaborations* as they start to go beyond the borders of organizational departments.

2. *Overview stage*: the next maturity level, is characterized by mapping *planned journeys* and *assigning responsibilities* based on these journeys. In this stage, customer journey knowledge and practice are shared and adopted *across the organization* and gaps and deviations in *service performance* are revealed.

3. *Analysis stage*: In this final stage, the analysis of *actual journeys* is frequently used, and key journeys are monitored (real time). The company proactively detects failures in the early stages and the service organization is aligned with key customer journeys for optimal service delivery.

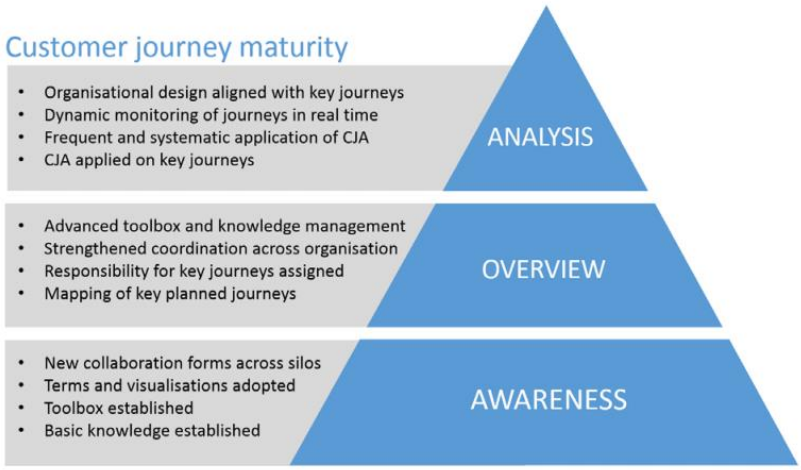



Figure 7: Customer journey maturity model (Halvorsrud & Kvale, 2017)

The maturity model shows what practices belong to what stage. This way, the model can be used by organizations to assess their current customer journey maturity level, as well as showing the steps to take to become more advanced in customer journey practice. If we would apply this maturity model to the current state of *literature* around user- and customer journeys, it would not come further than the awareness phase: there is no final list of concepts or a (unifying) language described in the literature.

### Empathy map

In section 2.1.1., we discovered that user journeys are made along with persona's that contain the goal(s) and characteristics of the user. A common technique to create persona's in a structured way is using the Empathy Map (EM). The aim of this method is to create a degree of empathy with the user, helping organisations to have a better understanding of their users. There are many different versions of the Empathy Map components. In this section, we elaborate on the most recent template from Ferreira et al. (2015). They adjusted the EM template of Bland (2012), moving the focus from environmental factors towards the emotions and thoughts of the user, which makes the EM more applicable for user journey mapping. The EM template of Ferreira et al. is shown in Figure 8. The EM template comes along with a set of questions (Osterwalder & Pigneur, 2013) that guides how to fill in the fields.

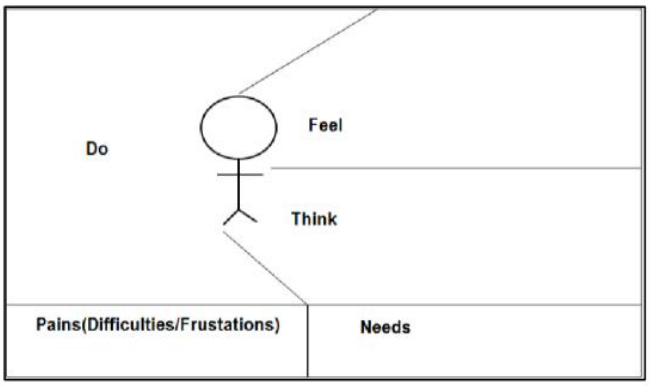



Figure 8 : Empathy map template (Ferreira et al., 2015)

The template consists of five categories: Do (i), Feel (ii), Think (iii), Pains (iv) and Needs (v).

| | |
|---|---|
| *Do:* | Information about how the user behaves in public, includes preferences, social behaviour, hobbies, friends, idols. |
| *Feel*: | The emotions of the user; how the user feels and what lately bothers to the user. |
| *Think*: | Thoughts and ideas of the user; what things the user finds important. |
| *Pains*: | What frustrates, disturbs or scares the user. |
| *Needs*: | What makes the user happy or has to be changed to become happy. |

## 2.2.2. Methods

Here we investigate the current *methods* and *approaches* for user journeys, which provide more specific guidance compared to frameworks. We characterize methods and approaches as specific steps to follow, for which approaches are less specific than methods. Until now, there are no publications on how to create user journeys or to compare actual- and planned user journeys. However, several customer journey methods and approaches exist that could be applied to single-channel user journeys.

### Customer Experience-driven Process Management

Signavio BPM software released an *approach* that combines process management with customer experience, called *Experience-driven process management* (Kampik, 2018). The approach allows shaping business processes with customer journeys. The approach starts with a shaping a persona (step 1) along with the 'current state' customer journey based on real behaviour i.e. the *actual customer journey* (step 2). Next, the touchpoints of the customer journey are linked to the business processes of the service provider (step 3). What follows, is the actual customer journey being reshaped into an ideal, *planned customer journey* with disregard to internal stakeholders (step 4). As a final step, both journeys are compared, identifying touchpoints to improve along with the business processes linked to the touchpoints (step 5). As the Experience-driven process management approach starts with process starts with the actual-user journey based on real user behaviour, this approach can be seen as a *bottom-up* approach. To clarify, we made a model that visualises the steps and outputs of this method, shown in Figure 9.

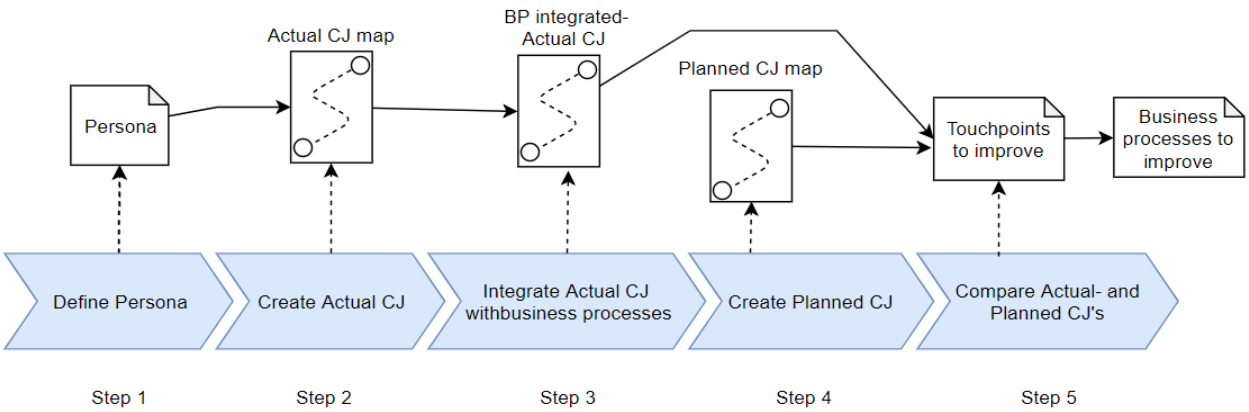



Figure 9: Visualisation of Customer Experience-driven Process Management

### Customer Journey Analysis (CJA)

Halvorsrud et al. (2016) created a *method* CJA that discloses the gap between the planned and actual service delivery, called the *Customer Journey Analysis* (CJA). The procedure provides an empirical investigation of individual service experiences for multichannel services and can be used as a tool for service improvement. An overview of the Customer Journey Analysis is shown in Figure 10.

The CJA starts with defining the problem area and setting the scope on a specific service (phase 1), followed by the creation of planned journeys (phase 2). Next, user data is collected, and actual journeys are formed (phase 3) and compared to actual journeys (phase 4). At a final step, the touchpoint improvements are presented as follow-up procedures (phase 5). A year later, Halvorsrud and Kvale (2017) published a set of guidelines that entail detailed instructions on how to follow the CJA method, including goals for each phase, a set of steps to follow and even what data collection techniques to use. As this procedure starts with scope identification and planned journeys, the CJA can be seen as a *top-down approach*.

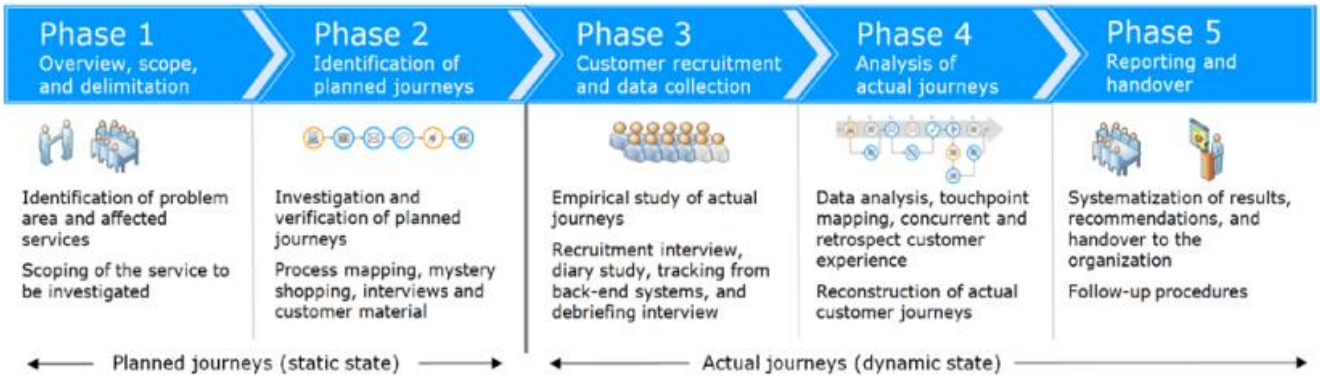



Figure 10: Customer Journey Analysis (CJA) method (Halvorsrud et al., 2016)

# 2.3. User journey concepts

Until today, a standardised vocabulary for customer journeys remains absent (Lankhorst, 2017), which also counts for user journeys. In this section, we study the variety of available concepts in the literature, since a set of user journey concepts is a prerequisite for our artefact. The established concepts of this section will be compared to used concepts in practice in order to establish our final set of concepts for our artefact.

## 2.3.1. Approach

For defining the list of all user journey concepts, we follow the process depicted in Figure 11. One problem when examining user journey concepts, is that literature is difficult to find, with only two publications shortly mentioning some user journey elements (Hannington & Martin, 2012; Hobbs & Fenn, 2013). Despite customer journeys being multi-channel and high-level focused compared to single-channel low-level user journeys, the concepts seem to be rather similar. This allows us to use customer journey literature to complement the absence of user journey literature.

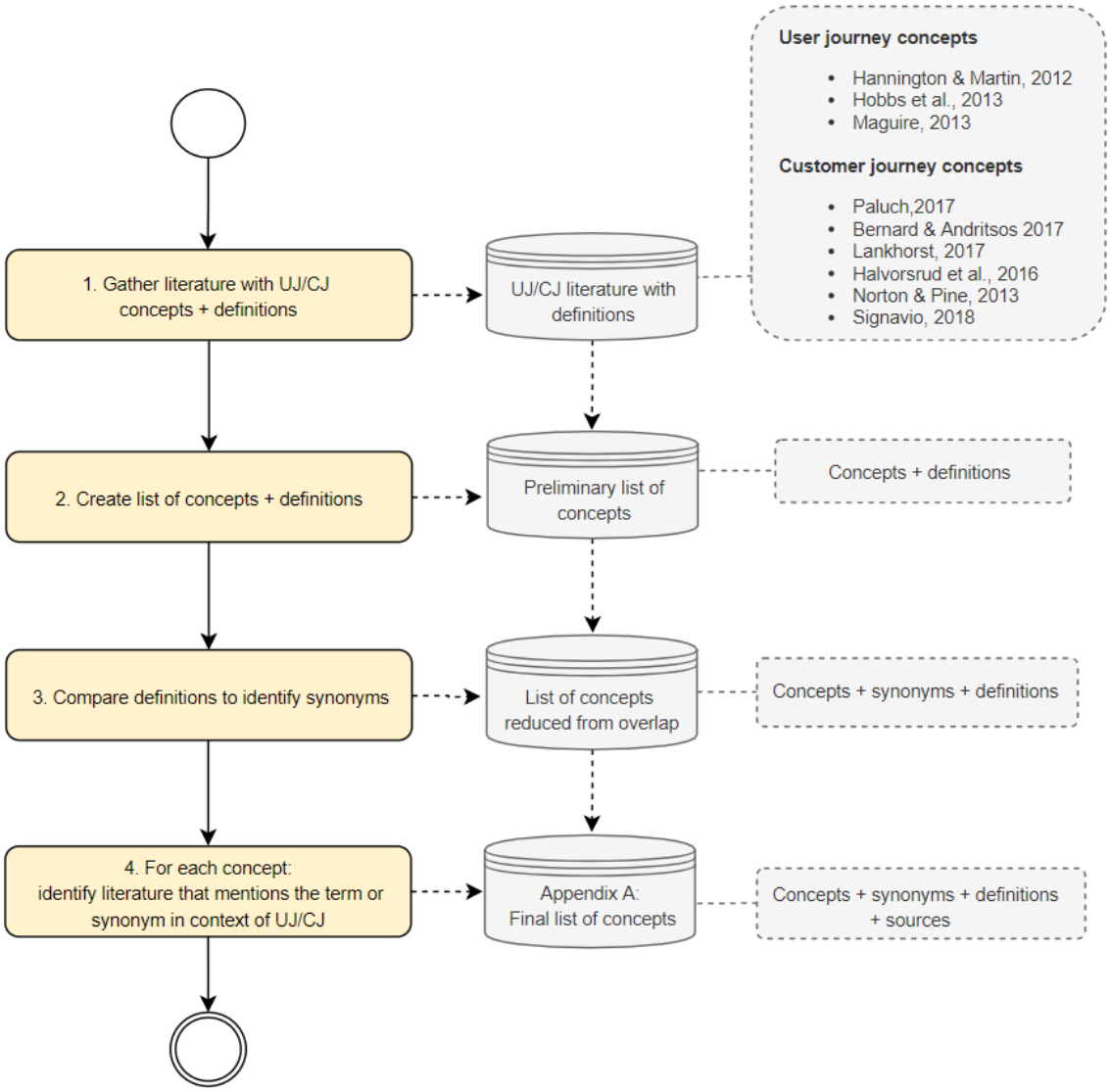



Figure 11: Approach for the study of customer/user journey concepts

We start the study of concepts by gathering literature on user/customer journeys that *contain concepts* and *definitions* (step 1). For this, we used the search strings of Table 33 in Appendix A. Making these concepts and definitions explicit with a table (step 2), we create our preliminary list of concepts. Next, we reduce overlap by comparing definitions and place those as *synonyms* of concepts (step 3). As a final step, we identify literature that *mentions* our concepts or synonyms *in the context of user/customer journeys* (Step 4). This step serves as initial recognition/validation of concepts, prior to the validation of these concepts in the Practical Investigation. The search strings used for this step can be found in Table 34 in Appendix A. The output of our study of concepts can also be found in Appendix A and takes form as two tables: *General concepts* (Table 35) and *Journey specific elements* (Table 36). In the following two sections, we elaborate on these results.

## 2.3.2. General concepts

When analysing the general concepts from Table 35 (Appendix A), we see that all general concepts have already been identified in the previous sections. We started our literature study by defining *user journeys* and found that *customer journeys* are multi-channel user journeys with a broader scope. *Buyer journeys* are a special type of customer journeys, that entails the customer road towards the moment of purchase (pre-purchase phase). By *mapping* journeys, journeys are tracked and made explicit on a flow-chart. The explicit journey is called the *user/customer journey map*. At last, a journey map is documented along with a *scenario* that contains the user/customer steps and a *persona* that represents the characteristics and goals of a user/customer.

## 2.3.3. Specific elements of the journey map

When analysing the elements of one specific user- or customer journey in Table 36 (Appendix A), we see that user journeys can have many different elements. Some journey specific concepts have already been discussed while others are new. In this section, we shortly summarize the discussed elements, introduce new elements, and present an overview of the elements and their relationships.

*Touchpoints*, *channels* and *experience* seem to be the most common elements within a journey. We identified touchpoints as moments of interaction between user/customer and service provider, that is enabled through a communication medium (channel), while simultaneously showing user/customer emotions(experience) for each channel. Two other elements that have been discussed, are *stages* and *deviations*. We identified a stage as a container of touchpoints to show a certain timeframe (like the pre-purchase, purchase or post-purchase phase), and discussed deviations in the context of actual- and planned journeys, showing actual journeys can differ from planned journeys. Additional elements found in Table 36 are defined as follows:

| | |
|---|---|
| *Moment of truth:* | Decision points that can make or break the success of the journey. It can be a simple decision or a hard decision that is experienced as a barrier (Signavio, 2018). |
| *Breakpoint:* | Moment where the journey stops (Hobbs & Fenn, 2013). |
| *Initiator:* | Initiator of a touchpoint, can be a customer/user, service provider or subcontractor (Halvorsrud et al., 2016). |
| *Trigger:* | Trigger of the customer journey, either an idea or demand (Signavio, 2018). |
| *Goal*: | The thing what the customer aims to achieve, such as obtaining a loan in a banking context, this is the final touchpoint of a service (Signavio, 2018). |
| *Time:* | Time when a touchpoint is encountered by the customer (Halvorsrud et al., 2016). |

*Timeline:* Duration of the journey from the starting touchpoint to the final touchpoint. The timeline can be depicted by actual time or ordering touchpoints by giving them numbers (Bernard & Andritsos 2017).

*Trace:* Content that emerges as a result of a touchpoint (Halvorsrud et al., 2016).

*Note:* Comments that contain important textual information about the journey map (Signavio, 2018).

*Opportunity:* Touchpoint to improve (Lankhorst, 2017).

*Lens:* Grouping touchpoints to a certain context or domain, while excluding the other touchpoints (Bernard & Andritsos 2017).

### 2.3.4. Recognition of concepts in the literature

The general concepts, Journey specific concepts, synonyms and the number of literature sources we found that mention the concept in the context of CJ/UJ is shown in Table 4.

Table 4: General and journey specific UJ/CJ concepts and their recognition in the literature.

| General UJ/CJ concepts | | | Journey specific concepts | | |
|---|---|---|---|---|---|
| **Concept** | **Synonym(s)** | **#Literature recognition** | **Concept** | **Synonym(s)** | **#Literature recognition** |
| **User journey** | User experience journey | 7 | **Touchpoint** | Service encounter, Communication channel, Contact point, Service event, Service moment | 11 |
| **Customer journey** | Customer experience journey | > 50 | **Moment of truth** | Key moment | 2 |
| **Buyer journey** | Decision funnel | 1 | **Deviation** | | 3 |
| **Mapping** | Journey mapping | 1 | **Breakpoint** | Drop-off | 1 |
| **User journey map** | User experience journey, User journey map | 5 | **Initiator** | | 2 |
| **Customer journey map** | | > 50 | **Trigger** | Start, starting point | 1 |
| **Buyer journey map** | Decision funnel, path-to-purchase model | 1 | **Goal** | Outcome | 2 |
| **Journey concept** | | 1 | **Time** | | 2 |
| **Planned journey** | Expected journey, Ideal journey, Retrospective Maps | 5 | **Timeline** | | 1 |
| **Actual journey** | Prospective Maps | 4 | **Stage** | | 6 |
| **Scenario** | | 6 | **Channel** | Customer channel, Service interface | 11 |
| **Persona** | | 7 | **Trace** | | 1 |
| | | | **Experience** | Feeling | 11 |
| | | | **Note** | Banner, Text | 1 |
| | | | **Opportunity** | Improvement | 1 |
| | | | **Lens** | | 1 |

A prominent result in Table 4, is that customer journeys and customer journey maps are mentioned in more than 50 papers in the context of UJ/CJ. This number was derived from Følstad et al. (2013), who made an overview of reviewed customer journey mappers, resulting in a total of 54 papers in 2012 already. The number of literature sources mentioning the concept is relatively large when compared to user journey literature sources but does give a representative image of the available literature proportions: there is indeed more existing literature about customer journeys than there is about user journeys. Though, it would be logical that the former language (user journeys) would have more publications.

A possible reason could be that companies prefer to focus on multi-channel services rather than focusing on a specific system. Another reason could be that people wrongly use the term customer journey in the context of a single system. Differences between the journeys are hard to find in the literature as well, making the latter reason quite plausible. Although there is *no guarantee* that this list contains all sources that mention the concepts in the context of CJ/UJ, it does provide us with a relative indication of popular concepts, and a basis of concepts to compare with concepts used by practitioners. This comparison will be done in part 3: Practical Investigation.

# 2.4. Notations and visualizations

Just like Until today, there is no common terminology or universal notation for user journeys. Organisations find their own ways of mapping user- and customer journeys that fits their needs, resulting in informal and diverging notations (Følstad et al., 2013; Richardson, 2010). Here we examine some user- and customer journey maps to identify commonalities and gather ideas for our own notation, developed in our Treatment Design later.

As been said, many user- and customer journeys are depicted in informal ways. In Figure 12, an informal example customer journey map is shown. The icons and pictures used in the journey map are creatively made, but it is hard to identify the touchpoints and channels. Although this is a typical example of how informal journey maps can be, the *stages* are depicted clearly on top of the journey map.

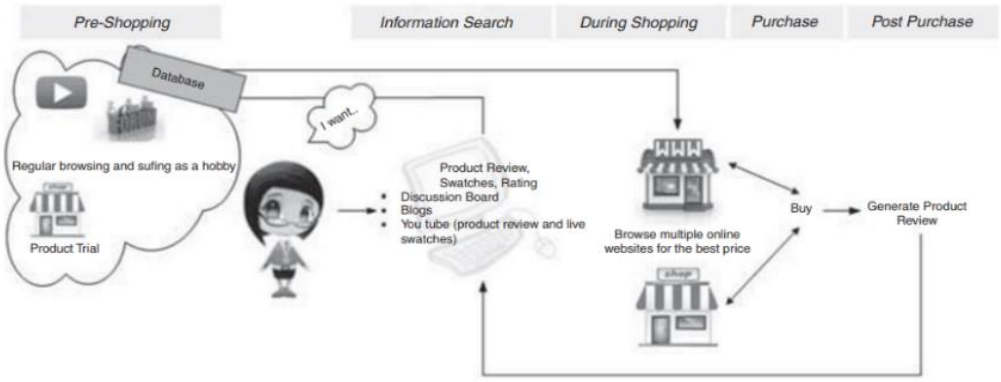
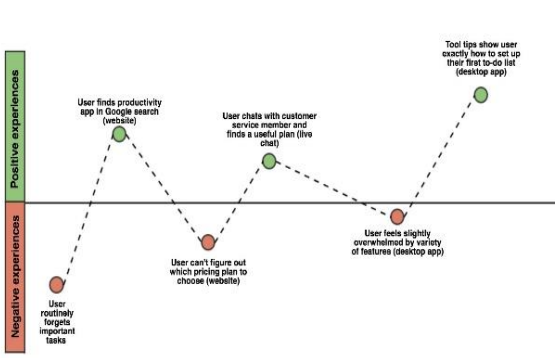
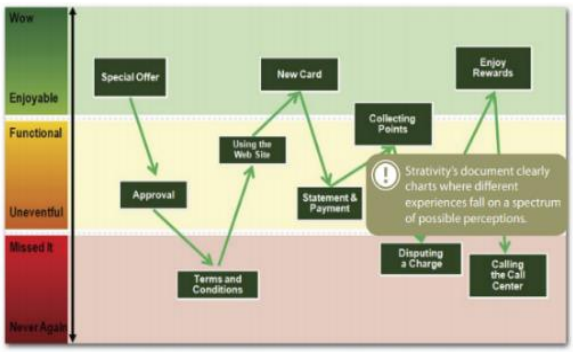
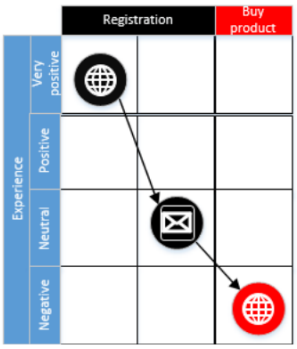



Figure 12: Informal CJM example (Wolny & Charoensuksai, 2014)

Although journeys seem to be mapped in different ways, there are still some commonalities. Lankhorst (2017) stated that journey maps are typically depicted on a graph that shows *touchpoints* in a process on the *horizontal axis,* while depicting *experience* on the *vertical axis*. In Figure 13, three journey maps are shown that follow this common structure described by Lankhorst (2017). When further analysing these journey map examples, we see that the two examples on the left also use colours to depict experience: depicting *negative* experience in *red*, *neutral* experience in *yellow* and *positive* experience in *green*. According to several studies on human perceptions, these colours are indeed associated with the corresponding emotions (Naz & Helen, 2004; Elliot & Aarts, 2011). The example of Kaytes (2019) also coloured the touchpoints accordingly.



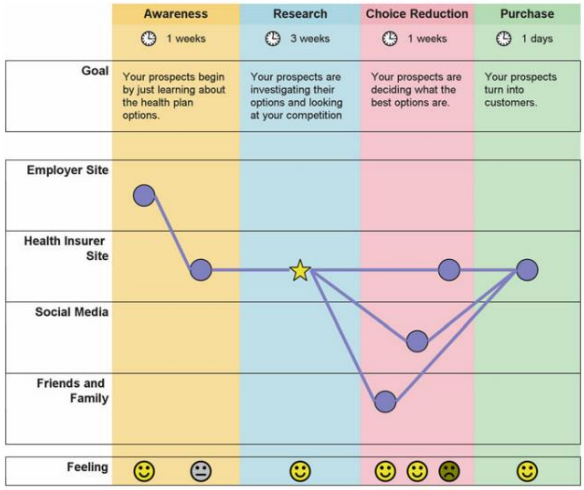



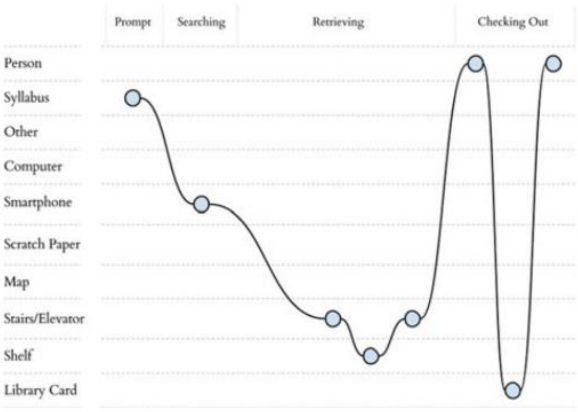

*Source: (Kaytes, 2019)* *Source: (Temkin, 2010)* *Source: (Bestebreurtje, 2018)*

Figure 13: Journey maps with experience on Y-axis and touchpoints on X-axis

Additionally, we see that the examples of Kaytes (2019) and Tempkin (2010) use natural language to explain touchpoints, while the example of Bestebreurtje (2018) does not. On the other hand, Bestebreurtje implements two other elements that are not used by Kaytes and Tempkin: *stages* and *channels*. The stages are also depicted on the top Y-axis and the channels are presented with icons on the touchpoints. Additionally, Bestebreurtje gave the touchpoints the same colours as the corresponding stages.

Next to the common structure, Lankhorst (2017) identified that additional information is often shown in various ways. He mentions that *swimlanes* are often used to depict *channels* and *emoticons* are used to show *feelings* of customers. The following two example journey maps in Figure 14 show how swimlanes are used to depict channels.




*Source: (Lankhorst, 2017)* *Source: (Marquez et al., 2015)*

Figure 14: Journey maps with swimlanes to depict channels

Further examining these examples, we see that Lankhorst (2017) used emoticons for each touchpoint to depict experience and that both examples depict stages (phases) on the top Y-axis. Additionally, Lankhorst presents the customers' *goal* for each stage. He has also given colors to the stages, but in this case not as experience associations, but to clarify the different phases.

Looking at the customer journey map created by LEGO in Figure 15, we see the use of *emoticons* to depict *experience* on each *touchpoint*. This time, the journey is depicted in a circle. In the middle of the circle, we see the name of the customer journey and the corresponding *persona*. Additionally, the legend presents two additional elements: Make or break moments (*Moment of truth*) and *Information points.* The information points indicate that information is required at that touchpoint and appears to be a new element.

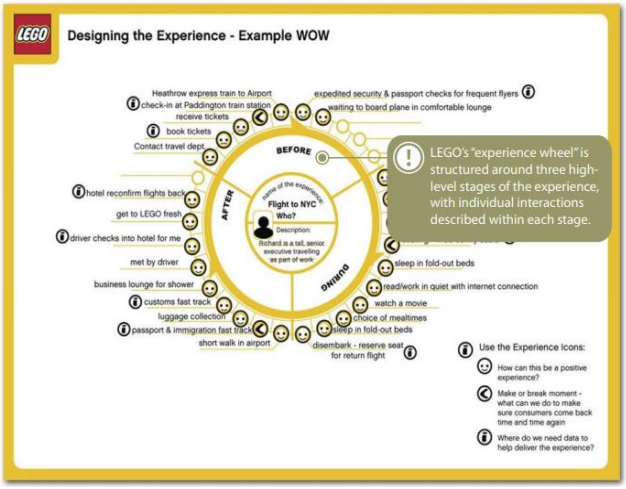



Figure 15: CJM in circle format (Temkin, 2010)

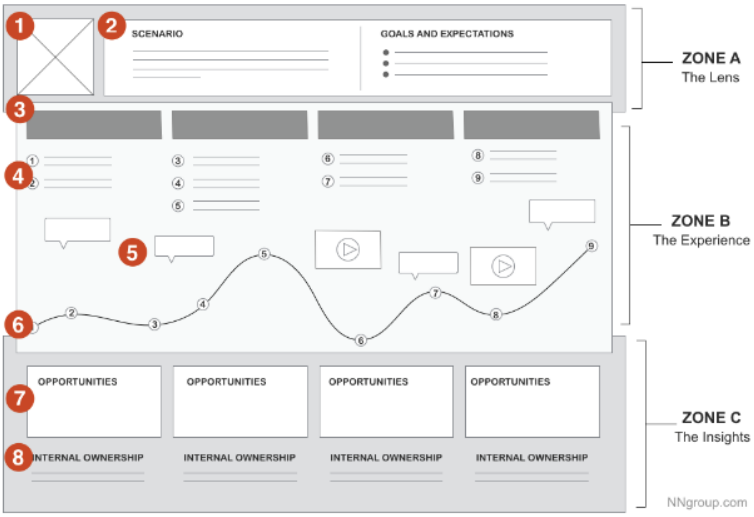



Figure 16: CJM in grid format *(Nielsen Norman Group, 2019)*

Others use more like a grid format, made of different blocks to highlight areas (Figure 16). In the example of Nielsen Norman Group (2019), a customer journey format is presented. They differentiate three areas: The *Lens*, the *experience* and the *insights.* The lens contains the *persona (1)* and the *scenario (2)*. The experience(ii) contains the *phases (3), actions (4), thoughts (5)* and *emotions depicted on touchpoints (6).* At last, in the bottom grid, the insights contain *the opportunities (7)* and *internal ownership* (8); who the opportunities are assigned to. Internal Ownership seems to be a new element compared to our established terminology in section 2.2.

At last, Signavio implemented their customer journey notation into a tool, shown in Figure 17. They created an avatar of the *persona* and placed the avatar on each *touchpoint*. The *experience* is mapped in natural language on each touchpoint, along with avatar gestures that represent the emotions. Additionally, the begin and endpoint of the journey are visible, and the channels are depicted with pictures aside each touchpoint.

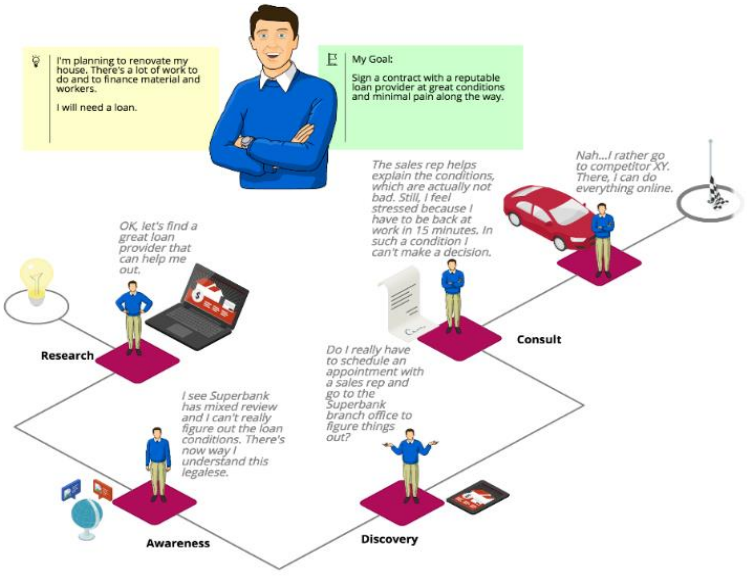



Figure 17: Signavio's customer journey map (Kampik, 2018)

# 2.5. Summary - Literature study

In this chapter, we examined the existing literature on user journeys and customer journeys to find out to what extend user journey maps are supported and applied (SQ1). To answer SQ1, the question was subdivided into examining what user journeys are and what types of journeys exist (SQ1.1), user journey elements (SQ1.2), the current ways for mapping journeys (SQ1.3) and investigating the status of user journey mapping in the fields of UX design and enterprise architecture (SQ1.4).

***SQ 1.1 & SQ 1.4.*** We started the literature study by examining user journeys and types of journeys in section 2.1. We defined user journeys as "*The total user experience (emotions, perceptions and feelings) across a period of time, as the user interacts with a product or service to achieve a goal using a system"* and found that there are two types of journeys: user- and customer journeys. User journeys seem to differ from customer journeys by being *single channel* and focused on the *digital experience* of a *system*. Comparing the literature status of both journey types, literature on user journeys seems *scarce*, while literature on customer journeys is *rather extensive*. Although the scarcity on user journey literature could make this research project more difficult, the gap provides additional motivation for this research and encourages to keep going.

Other findings regarding the types of journeys, is that a journey can be subdivided into planned journeys and actual journeys. The planned journey is the ideal journey designed by the service provider itself, whereas the actual journey is the 'real' journey, based on measured user behaviour. Next to the type of journeys, we explored the fields of practice. We found that, according to the literature, user journeys are only used in UX design, and customer journeys are used in enterprise architecture and marketing.

***SQ 1.2*** In subsection 2.3, we examined the available concepts and their definitions in context of both user- and customer journeys. We started by exploring literature on concepts and definitions on user- and customer journeys and enlisted all found concepts. Then, redundancy was removed from the list and each concept was explored individually in context of user- and customer journeys, to see how well the concept is recognised as a first step of concept validation. As result, we created a list of *General concepts* and a list of *Journey specific elements* (Appendix A), from which a summary is presented in Table 5.

Table 5: Summary of concepts

| Lists of UJ/CJ concepts | |
|---|---|
| **General concepts** | **Journey specific concepts** |
| • User journey<br>• Customer journey<br>• Buyer journey<br>• Mapping<br>• User journey map<br>• Customer journey map<br>• Buyer journey map<br>• Journey concept<br>• Planned journey<br>• Actual journey<br>• Scenario<br>• Persona | • Touchpoint<br>• Moment of truth<br>• Deviation<br>• Breakpoint<br>• Initiator<br>• Trigger<br>• Goal<br>• Time<br>• Timeline<br>• Stage<br>• Channel<br>• Trace<br>• Experience<br>• Note<br>• Opportunity<br>• Lens |

The study of concepts showed that *literature on user journeys is scarce* and there is *no clear list of user journey elements*. As solution, we included customer journey elements to the list of concepts, resulting in a holistic view on all possible concepts. This still does not answer SQ1.2; we still need to select a subset from the list. For example, one could question whether channel should be kept as journey specific element as user journeys are always focused on one specific channel. Thus, we validate/filter the list of journey specific elements in practice (next Chapter). Creating a sub selection this way provides us with the rationalised/validated set of user journey elements that we need for our artefact.

***SQ 1.3*** Investigating the ways for mapping user journeys, there was little literature on mapping user journeys. Hence, we also examined ways to map customer journeys that can be applied to user journeys. We saw that there are a few frameworks and methods for user- and customer journeys (discussed in subsection 2.2). There appears to be a framework on applying to create actual journeys, a maturity model to evaluate customer journey practice in a company, and an empathy map to create a persona in a structured way. As methods, there appears to be a top-down approach to create planned journeys, and a bottom-up approach for shaping business processes by comparing planned journeys to actual journeys.

In subsection 2.4, we examined existing user- and customer journey examples. We saw that journey maps *take many different forms* which acknowledges the introduced issue in the problem statement that everyone is mapping journeys their own way. Though, there were similarities among some journey maps. Many had activities or touchpoints with a flow that connects them, going from left to right. We saw that emotions and channels are often mapped on the Y-axis and that stages are commonly mapped on top of the journey. Emotions or channels seem to be presented often on the Y-axis with swim lanes. In the treatment design (Chapter 4), we will continue to evaluate these visualisations with stakeholders to further identify requirements for the notation of our artefact.

The paragraphs above seem to answer what user journeys are and what types exist (SQ1.1), what elements a user journey can have (SQ1.2) and the current ways of mapping journeys (SQ1.3). and what fields are using user/customer journeys (SQ1.4). This is however insufficient to answer our SQ1: *To what extend is user journey mapping supported and applied.* We only examined these subtopics from a literature perspective Hence, we will perform a Practical Investigation in the next chapter to complement the results of SQ1.1, SQ1.2, SQ1.3 and SQ1.4.

# 3

# PRACTICAL INVESTIGATION

In chapter 2 we investigated existing and missing knowledge in the literature of user journeys for creating our artefact. We explored the differences between user journeys and customer journeys and between planned user journeys and actual user journeys. In this thesis, we will focus on **planned user journeys**. To get a more complete view on what extend user journeys are supported and applied (SQ1), we also investigate the practice of user journey mapping. The practical investigation consists of two parts: An expert interview with an actual customer journey software vendor (3.1), and a case study at ContextMSP: A multiservice provider in the banking sector (3.2). Although this thesis is scoped on user journeys, we found in the literature that customer journeys are more frequently used, and many practitioners seem not even aware of the difference between the two journeys. Hence, we investigate both user- and customer journey in practice.

# 3.1. Expert interview: JourneySoftware

In this section, we investigate the customer journey practice at a customer journey software vendor. The *main objective* is to complement and compare the literature results with practical insights from a customer journey software vendor. This helps us in the process of *theory building,* as we gather new requirements or support for existing requirements for our artefact. The software vendor possibly has a different perspective on user-/customer journey mapping compared to the literature, has insight in what fields their software is used and has created its own customer journey taxonomy and notation. Due to privacy regulations, this software is anonymised as JourneySoftware. Several topics that were covered in our literature review were; user journey characteristics and types of journeys (SQ1.1), user journey elements (SQ1.2), how user journeys are visualised (SQ1.3) and applied in practice (SQ1.4). Based on these topics, the following *Interview Research Questions (IRQs)* were formulated:

***IRQ1.*** *What types of journeys does JourneySoftware recognise and support?*
***IRQ2.*** *How does JourneySoftware support journeys and improve user experience?*
***IRQ3.*** *What are the applications and fields of practice of JourneySoftware?*
***IRQ4.*** *What concepts are used/recognised by JourneySoftware?*
***IRQ5.*** *What notation is used by JourneySoftware?*

To answer the research questions above, 12 questions were formulated. The interview protocol, along with the answers, can be found in Appendix C. We analysed the results as followed. During the interview, the answers of the interviewee were directly noted and summarized. After the interview, the answers were checked by the interviewee if the answers were correct and complete. There are memo's available of the conversations (just to be certain), but they were unnecessary. For future research, these recordings could be of use (please contact the author in case of interest).

## 3.1.1. JourneySoftware

JourneySoftware is a tool that allows organisations to create, analyse and optimize *actual customer journeys*. That said, JourneySoftware has a broader focus than user journeys and does not include planned journeys. However, clients often seem to desire both planned- and actual customer journey practice. To satisfy clients, the implementation of JourneySoftware is often combined with an additional, external planned customer journey tool. Instead of understanding, evaluating and improving *user experience*, the main goal of user journey mapping according to our literature study, JourneySoftware aims to improve *engagement.* Where user experience sets focus on how customers feel when going through a process, engagement is more focused at continuously working on the relationship with a customer, triggering customers to become a customer or remain a loyal customer.

## 3.1.2. Creating and navigating actual journeys

The journeys created of JourneySoftware are based on actual customer behaviour data (like where customers click on a website) derived from backbone systems. JourneySoftware monitors each individual customer behaviour. However, the mapped actual customer journeys do not visualise the behaviour of one single journey but captures multiple customers and uses personas to classify customer types. Covering multiple customer journeys provides an overview and creates the opportunity to manage journeys.

JourneySoftware does not blindly map all behaviour data, but filters on predefined contextual factors. The factors are derived from existing documentation of the client, about their customer flows (preferably planned customer journeys). By recognising a context in actual customer behaviour, the journey and

customer goal can be derived from existing documentation or previous behaviour patterns. Knowing the planned journey and goal of an actual journey, business service decisions can be suggested to assist customers in their journey. To suggest service decisions, JourneySoftware uses process mining to map user behaviour and identify bottlenecks. Next, JourneySoftware applies AI to suggest a business service at the bottleneck, a decision based on the knowledge that was derived from earlier behaviour. The company labels this practice as *Journey based decisioning:* improving journeys by applying knowledge from previous journeys (using AI). The interviewee added that AI driven journey improvement is not yet frequently applied in practice. He argued that due to novelty of deep learning, there is a need for additional research on this topic. Additionally, he added the adoption rate of AI usage is low as people like to stay in control themselves.

### 3.1.3. Omnichannel journeys

Instead of supporting multi-channel customer journeys, JourneySoftware supports *Omnichannel* journeys. According to the interviewee, omnichannel goes "one step further" than multichannel journeys. Where multichannel entails that services can be used through different channels, omnichannel entails *synchronous, coördinated* use through different channels. With omnichannel services, a customer can switch from channel to channel and continue the service process or conversation where it stopped. For example, a customer could stop their conversation with a chatbot (channel A) and continue the conversation with a customer service employee (channel B) from the point it ended. To clarify the role of JourneySoftware in the support of omnichannel services, an (abstract) drawing was made by the interviewee, on which we added annotations that summarize the corresponding explanation. The drawing, combined with the annotations, is shown in Figure 18.

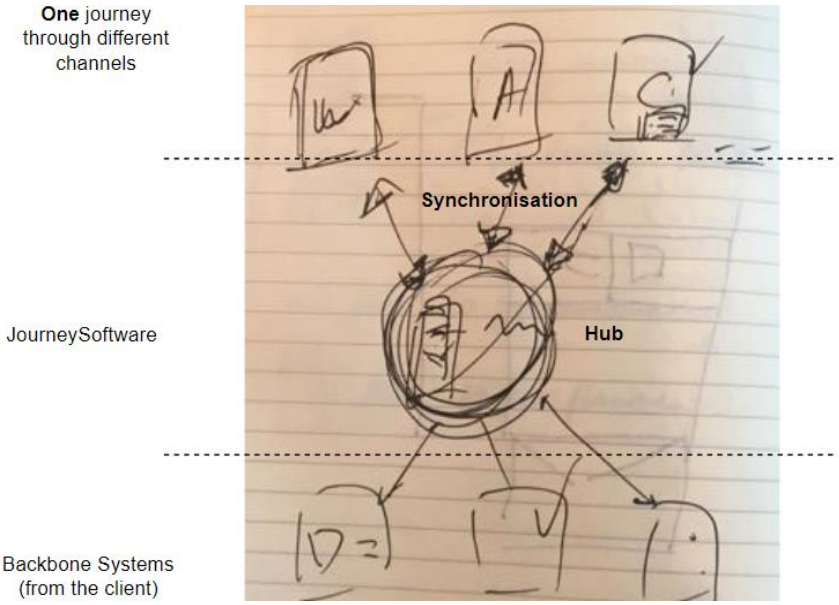



Figure 18: JourneySoftware as a Hub-spoke

The *top layer* shows the different channels a journey can go through. Each individual journey is tracked through an individual ID. By using the ID, JourneySoftware synchronises journeys across different channels, done in the *middle layer*. To synchronise journeys across channels, JourneySoftware has to be integrated with the client's software that supports/enables these channels. These backbone systems are shown in the *bottom layer.* As JourneySoftware tracks individual journeys across channels (top layer) while communicating with the software that supports these channels (bottom layer), JourneySoftware is seen as a Hub.

### 3.1.4. Practical value & usage

In our literature study, we identified three main applications of user journey mapping: developing or improving a service or product (i), optimization of journeys (ii) and understanding potential customers to make them customers (*buyer journey*) (iii). The interviewee recognised these practical uses, but added that many customers also apply their software for the sake of:

1. *Keeping customers (post-purchase phase).* Keeping customers loyal is an important application. Satisfied customers can make their children or friends become customers as well, becoming an ambassador and playing a role in the buyer journey themselves.
2. *Cross-selling or up-selling.* Where cross-selling is getting current customers to use more products/services, up-selling is focused on getting current customers to use more expensive and extensive products/services.
3. *Internal optimisation*. This concerns the processes within a company, streamlining internal processes.

Next to the applications, the fields of practice were also discussed. In the literature study, we identified UX design (i), Enterprise architecture (ii) and Marketing (iii) as fields of practice in terms of user journey mapping. The interviewee only recognised *Marketing* as one of the main fields of practice and mentions he misses *customer services* as a big field of practice; helping the customer with a problem or question.

### 3.1.5. Used concepts

The customer journey elements of JourneySoftware have also been discussed to get an impression of what terms are used in practice. Although this seems like a validation of our literature-based concepts, this checklist merely serves as an overview of the popular/common concepts that we later consider in the evaluation of the initial requirements list of our artefact. To identify the concepts used by JourneySoftware, the concepts from our literature study (Appendix A) were provided to the interviewee. The interviewee then read all concepts and definitions and checked the boxes of each concept that corresponds to their concepts (Appendix B). The results are shown in Table 6 below.

Table 6: Journeysoftware Concepts used compared to literature

| Expert interview: JourneySoftware | | | |
|---|---|---|---|
| **General concepts** | **Concept used and applied** | **Journey specific concepts** | **Concept used and applied** |
| **User journey** | | **Touchpoint** | * |
| **Customer journey** | X | **Moment of truth** | X |
| **Buyer journey** | X | **Deviation** | |
| **Mapping** | | **Breakpoint** | X |
| **User journey map** | | **Initiator** | |
| **Customer journey map** | X | **Trigger** | X |
| **Buyer journey map** | | **Goal** | X |
| **Journey concept** | | **Time** | X |
| **Planned journey** | ** | **Timeline** | X |
| **Actual journey** | X | **Stage** | X |
| **Scenario** | | **Channel** | X |
| **Persona** | X | **Trace** | |
| | | **Experience** | X |
| | | **Note** | |
| | | **Opportunity** | X |
| | | **Lens** | |

** Used, but with different semantics*

*** Recognised but not implemented in JourneySoftware*

Although JourneySoftware uses *Touchpoint* as a concept, it does not mean the same as our definition. Instead of an interaction between customer and service provider, JourneySoftware uses touchpoint to indicate instances of channels. To clarify, they identify websites as a channel, but specific websites (website A, website B) as touchpoints. Additional to the concepts in Table 6, JourneySoftware adds *Proposition* and *Activity type* as concepts. JourneySoftware defines proposition as a product or service the customer is interested in, which equals the Goal concept from our literature study. Activity type entails what the customer is doing (like calculating mortgage costs on a website). Activity here corresponds to our touchpoint concept, meaning this could be a synonym for Touchpoint.

### 3.1.6. Used visualisation and notation

During the interview, the interviewee showed an actual customer journey example. A screenshot of this example can be found in Appendix B. The elements of the notation (Appendix B) were discussed and the interviewee showed how these elements are implemented in the example. To create an overview of the implemented concepts, we mapped the elements onto the notation. The result of this mapping can be found in Figure 19 below.


Figure 19: JourneySoftware screenshot with mapped concepts

The visible concepts are proposition *(*the *goal* of the customer), *stages, channels, touchpoints* and *activities.* The journey is visualised from left to right, stages are placed on top of the journey, while channels and specific channels (called Touchpoints by JourneySoftware) are modelled with swimming lanes. At last, experience seems to be absent in terms of emotions, but is indirectly visible in terms of user behaviour which is shown in flow directions and number of IDs that follow those flows. The interviewee added that this is their way to express experience.

### 3.1.7. Conclusion – Expert Interview

The interview has provided us with practical insights, acknowledging, contradicting and complementing the results of our literature study. The interview protocol was based on five interview research questions (IRQs), each focusing on a subtopic discussed in our literature review. The discussed topics were: Types of journeys (IRQ1), how the software supports journeys and improves user experience (IRQ2), the applications and user fields of JourneySoftware (IRQ3), used concepts (IRQ4), and notation (IRQ5).

***IRQ 1*** As types of journeys, JourneySoftware recognised customer journeys, actual journeys and planned journeys, but were unaware of user journeys. JourneySoftware only supports actual customer journeys but is usually implemented with an external tool to complement JourneySoftware with planned journey mapping.

***IRQ 2*** To support customer journey mapping and improving user experience, JourneySoftware captures individual customer behaviour, gives each journey an ID and creates a cumulative overview of multiple journeys. Additionally, the software contains AI technology that helps to navigate journeys by suggesting business services at specific moments. In contrary to the literature that stated customer journeys are multi-channel with a focus on user experience, JoureySoftware appeared to be omnichannel with a focus on engagement.

***IRQ 3*** Concerning the applications of CJ/UJ mapping that were found in the literature, JourneySoftware acknowledged that many clients use the software for improvement of products and services (i), journey optimization (ii), and understanding/acquisition of new customers (iii). Additionally, they added that many customers apply their software for *keeping customers loyal* (iv), cross-selling and up-selling (v) and *internal optimisation.* As fields of practice for actual customer journeys, JourneySoftware recognised Marketing as one of the fields but did not recognise architects and UX designers in their clients. Though, the interviewee complemented the list by adding *customer services* as one of their main application fields.

***IRQ 4*** Discussing the concepts, the list of concepts from the literature was compared to the concepts used and applied by JourneySoftware. In total, many concepts were acknowledged by JourneySoftware. Remarkably, user journeys, buyer journeys, mapping and deviation were not recognised. Additionally, touchpoint was used but with different semantics (instances of channels). Additionally, they use *activity* as concept what we previously perceived as touchpoint.

***IRQ 5*** As notation, JourneySoftware mapped a flow of activities going from left to right. Channels were represented in swimming lanes on the left side, while stages were shown on top. Additionally, the journey goal was shown as *proposition* and deviations were shown in numbers (although the term was not a recognised concept). At last, experience was not included in JourneySoftware's notation.

# 3.2. Case study: ContextMSP

In section 3.1, we complemented our literature results with practical insights from an actual customer journey software vendor. In this section, we perform a case study at a banking company. The *main objectives* for this case study are complementing and comparing the list of user-/customer journey concepts (i) and investigating journey mapping and collaboration among architects and UX designers (ii). This helps us in the process of *theory building* as we gather extra requirements or requirements support for our artefact. For this case study, we partly follow the structure of Runeson & Höst (2009), discussing the case study design, results and conclusion. The introduction and related work on the topic are not discussed as UJ/CJ have been extensively discussed in the literature study.

## 3.2.1. Case study design

The case study is held at a multiservice provider (MSP) in the Dutch banking domain. Due to privacy regulations, the MSP is anonymized as ContextMSP. With more than 61.000 active employees and operating in 44 countries across the world, ContextMSP can be considered as a large enterprise. By doing a case study, we aim to observe their user journey and customer journey practice (to complement literature study results) and investigate the collaboration between architects and UX design. Hence, we define our scope the way the results are structured: we focus on terminology (3.2.2.), UJ/CJ practice among architects (3.2.3.) and UJ/CJ practice among UX designers (3.2.4.). For the latter two, we also aim to observe their notation of user- and customer journeys. Taking the elements of our scope, we define the following case study research questions (CSRQs):

***CSRQ1.*** *What terminology is used at ContextMSP?*
***CSRQ2.*** *How do architects and UX designers communicate at ContextMSP?*
***CSRQ3.*** *How do architects of ContextMSP apply UJ/CJ mapping in their daily practice?*
***CSRQ4.*** *How do UX designers of ContextMSP apply UJ/CJ mapping in their daily practice?*

For selecting the subjects, *convenience sampling* was used: current responsibilities and activities of employees were compared to the topics covered in the CSRQs above. This led to an architect that is active in creating a CJ framework for ContextMSP, hence we chose this architect for CSRQ1; to examine the terminology at ContextMSP. As the framework is meant for architects, and the architect appeared to be active in collaborating with UX, the same expert was selected for CSRQ2 and CSRQ3. For investigating the UX perspective, two UX designers were chosen. One UX designer was active in collaborating with architects, and thus selected for CSRQ2. The other UX designer was a lead UX designer, active in creating journeys and determining standards for creating them. Hence, this UX designer was chosen for CSRQ4. Research techniques used in this case study are interviews (informal and semi-formal), observation and document analysis.

The interview results were processed the same way as we did with JourneySoftware. During the interview, the answers of the interviewee were directly noted and summarized and checked by the interviewee after the interview. There are memo's available of the conversations (just to be certain), but they were unnecessary. For future research, these recordings could be of use (please contact the author in case of interest).

## 3.2.2. UJ/CJ Terminology

Just like at JourneySoftware, we also investigated the used concepts at ContextMSP. Getting an overview of what elements are common will later help us evaluating the initial requirements for the artefact. For investigating the used UJ/CJ terminology at ContextMSP (CSRQ1), the list of concepts from our literature study (Appendix A) was presented to the architect. By reading the concepts and definitions, the expert marked on a checklist which concepts are applied at ContextMSP. When filling in the checklist, the expert

noticed some concepts are practised/applied at ContextMSP, while the concept is not used. Hence, the checklist was split into two columns: *Concept used* and *Concept applied in practice*. The investigation of concepts can be found in Appendix C.1., and results into the overview of used concepts at ContextMSP shown in Table 7.

Table 7: UJ/CJ concepts recognized and applied at ContextMSP

| Concepts used at ContextMSP | | | | | | | |
|---|---|---|---|---|---|---|---|
| **General concept** | **Concept used** | **Applied in practice** | **Comments** | **Journey specific Concept** | **Concept used** | **Applied in practice** | **Comments** |
| **User journey** | | X | Used at UX Design | **Touchpoint** | X | ** | Main component! |
| **Customer journey** | X | X | 100% used Important! | **Moment of truth** | X | X | Used at UX Design |
| **Buyer journey** | | X | | **Deviation** | | X | Alternative/Exception |
| **Mapping** | | X | | **Breakpoint** | | | |
| **User journey map** | | X | Used at UX Design | **Initiator** | | X | Always a ustomer |
| **Customer journey map** | X | X | | **Trigger** | X | X | Event (as trigger) |
| **Buyer journey map** | | X | Started recently | **Goal** | X | X | |
| **Journey concept** | X | X | | **Time** | | | |
| **Planned journey** | | X | | **Timeline** | X | X | |
| **Actual journey** | | X | | **Stage** | | X | Process used as stage |
| **Scenario** | | | | **Channel** | X | X | |
| **Persona** | X | X | | **Trace** | | | |
| | | | | **Experience** | X | | Used at UX Design |
| | | | | **Note** | | | |
| | | | | **Opportunity** | | | |
| | | | | **Lens** | | | |

Starting with the *general concepts*, the concept terms do not seem to be used at ContextMSP. However, almost every general concept is applied in UJ/CJ context, except for *scenarios*. Customer journeys are well recognised at ContextMSP. According to the architect, they seem to play a big role across different business functions and departments. Customer journey mapping helps ContextMSP understand customers or potential customers, and meet their needs given their context. The concept “user journey” is not used at ContextMSP. Though, user journey mapping does seem to be applied at UX design. UX design uses user journey maps to improve the digital experience, but (incorrectly) calls them “customer journey maps”. Furthermore, ContextMSP is active in mapping buyer journeys, actual journeys and planned journeys.

Compared to the general concepts, *journey specific concepts* seem to be recognized and applied less in practice. Touchpoint, deviation, initiator, trigger, goal, timeline, stage and channels seem to be applied elements. Moment of truth and experience is not used among architects but seems to be practised at UX design. Touchpoint is marked with a ‘**’ sign as it is a special case. When discussing the definition of a touchpoint, the semantics seem to be different than the definition from our study of concepts; *“an instance of interaction with a service provider”* (Halvorsrud et al., 2016). According to the architect, a touchpoint is *a container of multiple interaction steps (activities) happening on a channel*. In case a journey would remain at a single channel, all steps will still count as one single touchpoint. Only when switching to a different channel during the journey will trigger a new touchpoint.

### 3.2.3. UJ/CJ among architects

For investigating the collaboration between UX designers and architects (CSRQ2) and user/customer journey mapping from the perspective of the architects (CSRQ3), an interview was held with an architect of ContextMSP. The architect was active in creating a customer journey framework for ContextMSP. The interview protocol (and answers) can be found in Appendix C.2, and covered the following topics:

- Current communication/collaboration between UX and architects (CSRQ4)
- Customer- vs user journeys (CSRQ1)
- How architects create user/customer journey maps (CSRQ2)
- The customer journey framework (CSRQ2)

#### Collaboration between UX and Architects

Architects seem to collaborate with UX designers in terms of giving advise from a technical point of view. Architects mostly help UX designers optimize *customer flows* to help improve a system or feature, thus customer flows are used as a means for communication between both fields. To create these customer flows, free format is used: simple, informal models without rules to follow. The use of free format creates a major issue in the collaboration between UX designers and architects: meetings become exhaustive as a lot of time is spent at iteratively explaining concepts, models and semantics to reach mutual understanding. The architect added that there is a need for a universal language and sees a potency in the use of user-/customer journeys in this collaboration.

#### User-/customer journey maps among architects

Discussing the user/customer journey mapping practice, architects seem to be only active in making *planned customer journeys*. Architects seem to create them in two formats:

1. Customer journey map in free format
2. Customer journey map in Archimate, using the Customer Journey Framework

##### *Customer journeys in free format*

To illustrate the use of free format customer journeys, an example was provided by the architect, shown in Figure 20. The example shows a planned customer journey for acquiring a savings account. As identified in 3.2.2., ContextMSP has a different perspective on the semantics of a touchpoint. Here we see that multiple activities can be contained in a touchpoint, depending on whether there is a switch from channel to channel. This is due to ContextMSP is focused on supporting omnichannel journeys; continuous synchronous journeys across different channels (previously discussed in 3.1.3.).

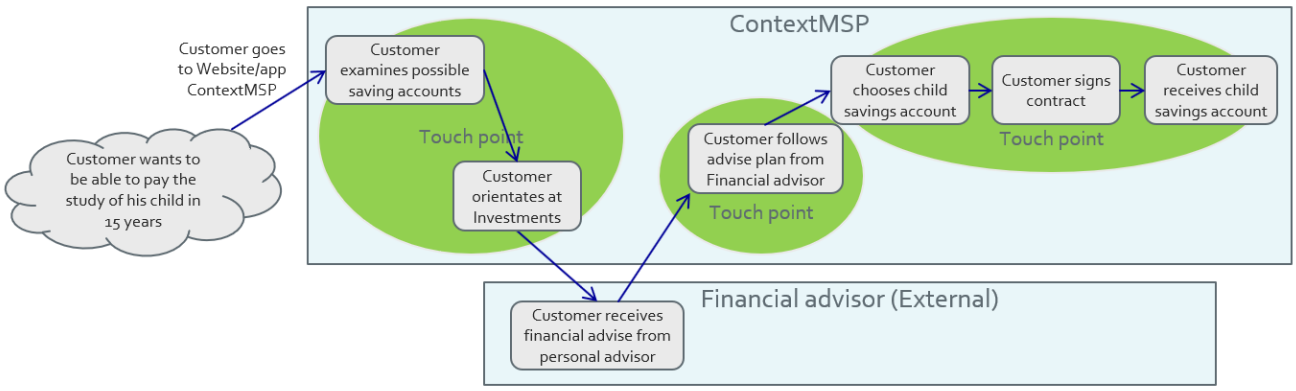



Figure 20: Customer journey example among architects, created in free format

By discussing the customer journey example, the architect brought up three current issues around customer journey mapping in ContextMSP:

1. *Where does the customer journey start and end?*
2. *How can the customer journey be separated into sub journeys?*
3. *Are external steps also part of the customer journey?*

The answer to the first two questions remains in the *abstraction level*: whether the journey should be detailed or high-level (depending on the purpose). Although the abstraction level is not in the list of concepts from our literature study, there seems to be a **practical need** to have an abstraction level determined for each journey. To answer the third question, it would be best to leave external customer journey steps out of scope. According to our literature study, customer journeys are merely about the interactions between service provider and customer, and the experience that comes with it.

### *Customer journeys in Archimate*

At ContextMSP, customer journeys are also made in architecture to show the architectural components related to a customer journey. For this, ContextMSP uses Archimate and a customer journey architecture framework developed by ContextMSP. The customer journey framework is meant to provide structure for architects for modelling customer journeys in Archimate. The original framework can be found in Appendix C.2. The framework is specifically focused on sales architecture, used in *Project Start Architectures* (PSAs) when something new is introduced but still needs to be connected to current architecture. To clarify the framework, we have added the Archimate layers to the framework which is shown in Figure 21 below.

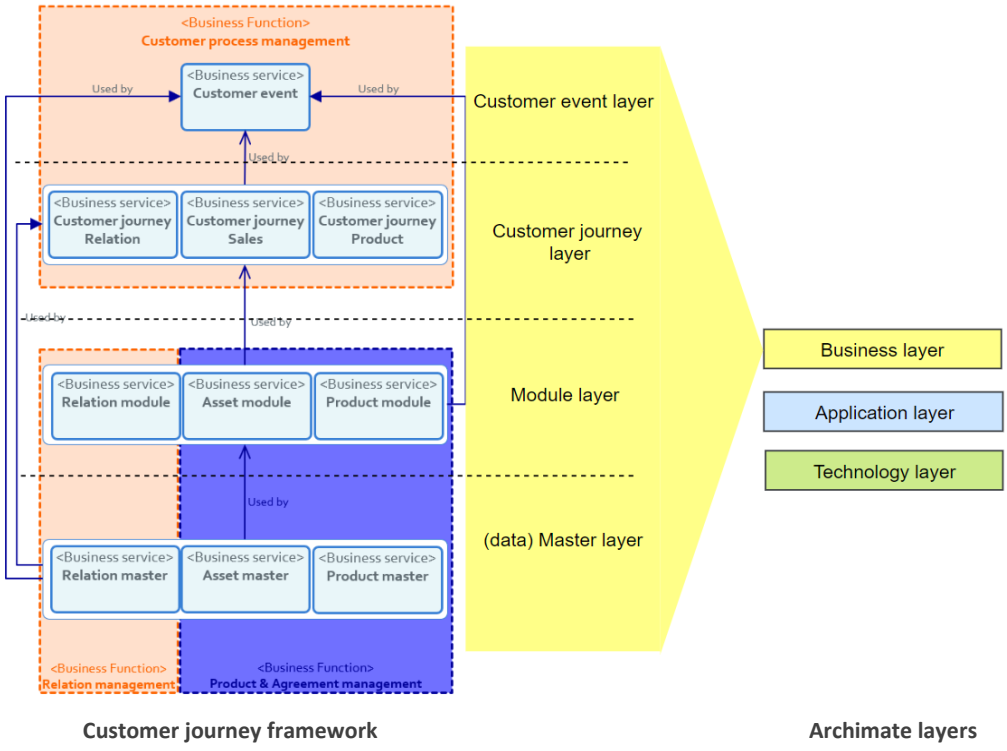



Figure 21: CJ framework (from ContextMSP)

The framework consists of four layers, all sublayers of the Archimate business layer. The four layers are *Customer event* (1), *Customer journey* (2), *Module* (3) *and Data Master* (4). The layers are structured in a way that each layer creates business services that support the layer above. Figure 73 in appendix C.2. provides an example of how the framework can be applied to architecture. To clarify this example (as the architecture example is extensive), an abstract version is made and shown in Figure 22.

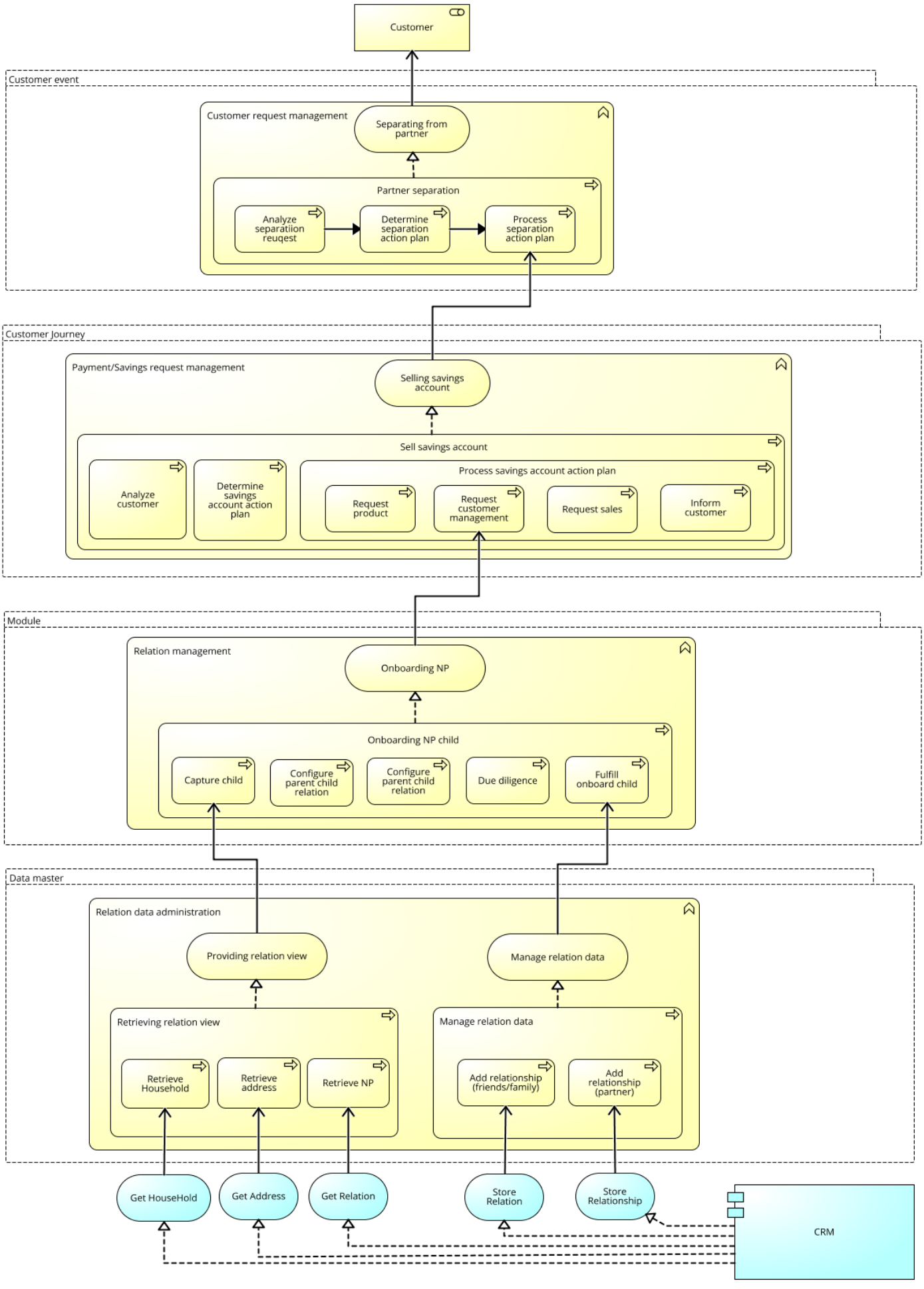



Figure 22: customer journey example(simplified) among architects, created in Archimate

The example in Figure 22 shows the architecture of the customer journey: *Selling a savings account* (customer journey layer). The request for a savings account is triggered by a separation of a customer from its partner (customer event layer). A divorce or separation can trigger a customer's mind to start saving study money for their children when they are older. The customer journey, modelled as a service, is enabled by Payment/Savings request management and supported by *Relation management* (module layer). Relationship management is responsible for onboarding natural persons (NPs). Subsequently, the onboarding process is supported by *Relation data administration* (Data master layer), using application services of the CRM system.

Further analysing this customer journey map, we see that this is a new way of mapping customer journeys compared to our literature study. Instead of taking the customers perspective, the processes are written from the companies' perspective, such as" inform *customer*" rather than "*receive notification*". Additionally, elements discussed in the journey examples of part 2.4. and 3.1. (such as channels, stages, touchpoints, experience or flow between the CJ elements) seem to be absent from this customer journey notation. The customer journey layer seems to merely focus on showing the structure of architectural elements: what architectural elements support a specific customer journey. Using this view, both sales and architects can directly see what processes, functions and employees are involved in the realisation of a specific customer journey.

### 3.2.4. UJ/CJ among UX designers

To further investigate the collaboration between UX designers and architects (CSRQ2) an interview was held with a UX designer (UX interviewee 1) that actively collaborates with architects of ContextMSP. To examine the user/customer journey mapping from the UX perspective (CSRQ4), an interview was held with a lead UX design (UX interviewee 2). The UX interview protocol, answers and notes can be found in Appendix C.3. The interview covered the following topics:

- Current communication/collaboration between UX and architects (CSRQ4)
- Customer- vs user journeys (CSRQ1)
- How UX designers create user/customer journey maps (CSRQ3)

#### Collaboration between UX and Architects

From the UX perspective, UX designers collaborate with architects to discuss UX proposals and UX deliverables. Architects seem to complement UX designers with a bird-side view and a technical view. When creating visual- and interaction designs, UX designers want to ensure their creations and solutions are technically feasible, thus asking architects for technical impact analysis. For communicating UX ideas with architects, UX designers use *customer flows* and *interaction models*. Complete examples of customer flows and an interaction model can be found in Appendix C.3. To give an impression, Figure 23 contains snapshots of the examples.

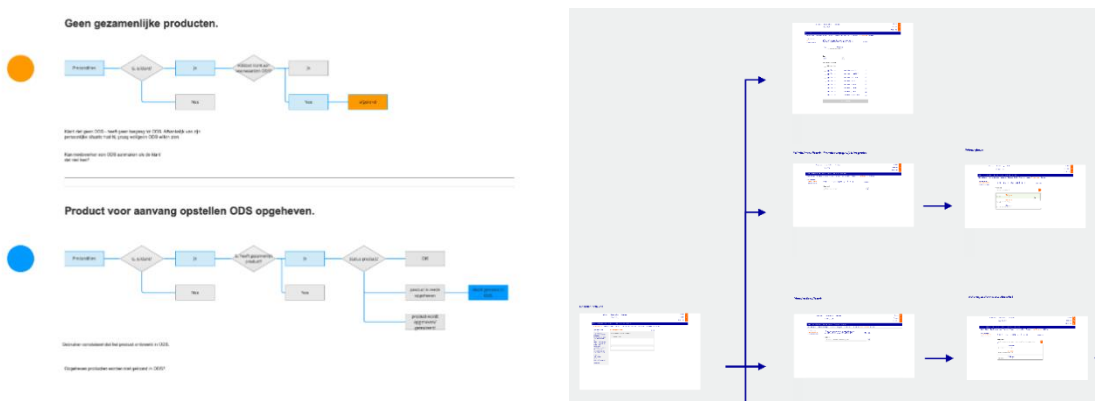



Figure 23: Customer flows (left) and interaction model (right)

Journey maps are not used in the communication between UX designer and architects, although the interviewee saw great potency to use it as a means to communicate. He adds that there is a condition for introducing the use of journey maps in this matter: there needs to be additional time available to create and discuss the journeys.

### User-/customer journey maps among UX designers

Discussing user/customer journey mapping, UX designers seem to merely speak of *user journeys* but only talk in terms of *customer journey*s. When discussing the differences, it appears they create *planned user journey maps* and *planned customer journey maps.* Where user journeys are used for improving a specific system, for example, a part of an app, customer journeys are used for a holistic view that includes multiple channels. At UX design the mapped experience is either the expected experience or experience measured from market research. Previously, UX designers created customer journeys using Sketch, only following some predefined rules on how to create the journeys. However, the creation of customer journeys is now further standardized by using Smaply instead of Sketch. Where Sketch still gave UX designers some freedom in how to create journeys, Smaply has a predefined format to create journeys with. Thus, two customer journey maps have been observed and discussed:

1. Customer journey map created with Sketch (old way)
2. Customer journey map created with Smaply (new way)

The complete customer journey maps can be found in Appendix C.3. In the following sections, we discuss and examine the example a part of the customer journey maps (as the full journey maps are extensive).

***Customer journey in Sketch (Partly free format)***

The first example is shown in Figure 24. It is a customer journey of buying a house (with the help of a bank), created in Sketch. The customer flow is shown from left to right. The X-axis serves as a time frame in which the journey takes place. On top of the journey, *stages* are represented (both high-level and low-level stages), and the *experience* is represented with emoticons as well as the height of the emoticons on the Y-axis (under, on or above the 'neutral' emotion line). The experience is measured through a market research with customers. *Thoughts,* a new concept compared to our established list of concepts, are represented through dialogue balloons. *Activities* are represented in text with squares around them. The *channels* are linked to the activity, each given its own symbol. Additionally, *moment of truth* and *pain points* are represented by chosen symbols. *Pain points* are a new concept, which represents an issue-to-solve in a journey. When asking where the interviewee saw the touchpoints, she answered to see the activities linked to a channel as a touchpoint, since those are the moments the customer interacts with ContextMSP.

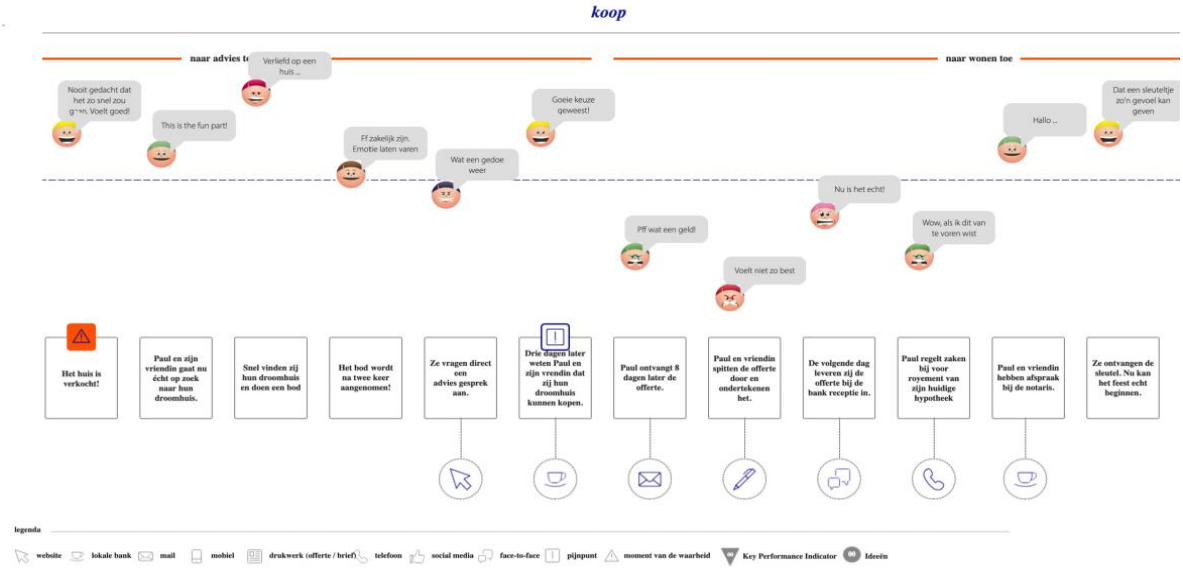



Figure 24: Customer journey example among UX designers (old notation)

***Customer journey in Smaply (Smaply format)***

The other example is the customer journey in the current UX format, created with Smaply. The customer journey of a *persona* named Fadil, is shown in Figure 25. The format can be compared to the grid format of Nielsen Norman Group (2019), discussed in the literature study (2.4). On top of the journey map, the customer *goal* is shown. The *stages* are mapped on the X-axis at the top of the journey, and the *experience* is represented by emoticons, as well as placing the emoticon on a specific height of the Y-axis. The *channels* are once shown by swim lanes and symbols corresponding to the channel. Additional elements are *quotes*, *idea's and tips* and *pain points.* Pain points were already identified as new elements in the Sketch example, as well as thoughts which are similar to quotes here. Idea's and tips sound new but actually represent opportunities and are therefore not seen as a new element. As the last element, we see a *backstage lane*. Although empty, this lane is created for a reason: implement technical/architectural information. This implicates that Smaply believes that UX designers should also think about technical aspects. They already created some sort of link between UX and architects, acknowledging the necessity to link both fields (the main motive of this thesis).

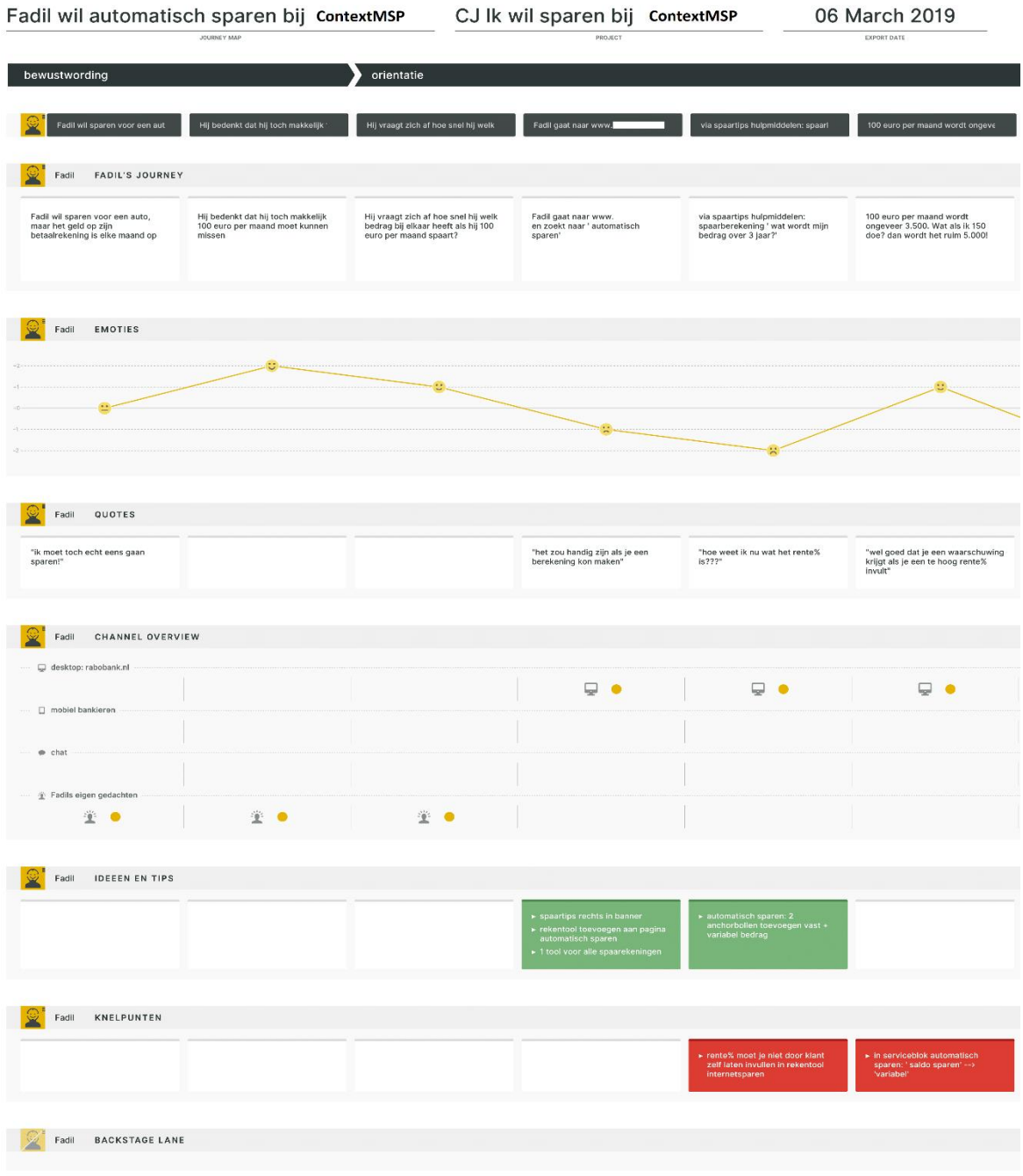



Figure 25: Customer journey example among UX designers (new notation)

An interesting comment by the second interviewee was that she was a bit frustrated that the term journey is starting to be used everywhere within ContextMSP, while many of these journeys do not even include experience. According to the interviewee, this is the main component what separates a journey from a scenario or customer flow. Hence, experience is seen as a must in our requirement list in 3.4.

### 3.2.5. Conclusion - Case study

In this case study, we examined ContextMSP to investigate their current practice of user-/customer journey mapping and the collaboration between UX designers and architects. We focused on four topics: The user-/customer journey terminology (CSRQ1), communication and collaboration between architects and UX designers (CSRQ2), and the current practice of UJ/CJ mapping among architects (CSRQ3) and UX design (CSRQ4).

***CSRQ 1*** When analysing the terminology, we saw that most UJ/CJ general concepts and specific elements are applied in practice although the name of the concept is not always used. User journeys are created at UX design and buyer journeys are created at marketing, but both are just called customer journeys at ContextMSP. We also saw in the UX example that personas are actually part of a customer journey as well. Touchpoint seems to have a different meaning at ContextMSP: here a touchpoint is seen as a container of multiple *activities* in one *channel*. Though UX designers did not even map touchpoints, but mapped activities and channels instead.

***CSRQ 2*** Examining the collaboration between UX designers and architects (CSRQ2), architects apparently complement UX designers with their holistic- and technical viewpoint. Architects analyse whether new idea's or changes from UX designers are technically feasible with the current architecture/technology. Additionally, architects have a" bird's eye view" that helps UX designers see things more globally, for example looking at the pre-purchase, purchase, and post-purchase phase. When communicating, the two fields seem to discuss customer flows and interaction models. When collaborating, customer flows and interaction models, as well as free format models are used. Journey maps are not yet used although the interviewees (both UX designers and the architect) saw great potency in using journey maps as well.

***CSRQ 3*** Investigating UJ/CJ practice among architects, we saw architects only create customer journeys, made in *free format (tool of choice)* or in *architecture (Archimate)*. To create the customer journey in Archimate, a customer journey architecture framework was created showing the relations between elements. Although it sounds like ContextMSP is also relating customer journeys to architecture, just like the aim of our thesis, both are very different. Instead of connecting a customer journey to architecture (the aim of this thesis), ContextMSP's architectural customer journeys *only show the architectural parts* involved in a specific customer journey, still missing the journey itself. Additionally, both customer journey examples miss many common customer journey elements. *Experience, channels* and *stages* were all not present although these are common elements of a customer journey.

***CSRQ 4*** At last, we investigated UJ/CJ mapping among UX designers. UX designers also seem to only speak of customer journeys but happen to create both user- and customer journeys. As examples, we observed two customer journey examples. One was party free format (made in Sketch), while the other was compliant to the format of the tool it was created with (Smaply). These journeys are more representative of the examples discussed in the literature (2.4), and most elements were common to our list of journey specific elements. The UX customer journeys even add two new elements to our list: *thoughts* (shown as quotes) and *pain points*. Thoughts represent what the customer thinks at a certain moment, while pain points are issues in the journey, indicating where and how a journey can be improved.

# 3.3. Summary – Practical Investigation

In this chapter we examined how user- and customer journeys are applied in practice, complementing the literature study results (Chapter 2) with insights from a practical viewpoint. To do this, we held an in-depth interview with an actual customer journey software vendor anonymized as JourneySoftware (3.1) and performed a case study at ContextMSP, an MSP in the banking domain (3.2). To find out to what extent user journey maps are supported and applied (SQ1), we complement the literature study results by examining the types of journeys (SQ1.1), the elements of a journey (SQ1.2) and the current ways how user journeys are mapped (SQ1.3). Additionally, this time we also investigated how user journeys are supported and applied in the fields of UX design and enterprise architecture (SQ1.4).

***SQ 1.1*** As types of journeys, JourneySoftware supports actual customer journeys, were aware of planned journeys (although they do not support it), but unaware of user journeys and buyer journeys. The results of ContextMSP on this matter were similar, they create and speak of planned journeys, actual journeys and customer journeys, but do not recognize buyer journeys and user journeys. However, when explaining these journeys, buyer journeys seems to be applied at Marketing for new customer acquisition, and user journeys seem to be used a lot at UX design to improve the UX of a system. The results journey types recognized and applied can be found on the left in Table 8.

Table 8: Recognized and applied General- and journey specific concepts (JourneySoftware + ContextMSP)

| General concepts | Case study | | Expert interview | Journey specific Concepts | Case study | | Expert Interview |
|---|---|---|---|---|---|---|---|
| Concept | ContextMSP | | JourneySoftware | Concept | ContextMSP | | JourneySoftware |
| | Concept used | Applied in practice | Term used & applied practice | | Concept used | Applied in practice | Term used & applied practice |
| User journey | | X | | Persona | X | X | X |
| Customer journey | X | X | X | Touchpoint | X | X | X |
| Buyer journey | | X | X | Moment of truth | X | X | X |
| Mapping | | X | | Deviation | | X | |
| User journey map | | X | | Breakpoint | | | X |
| Customer journey map | X | X | X | Initiator | | X | |
| Buyer journey map | | X | | Trigger | X | X | X |
| Journey concept | X | X | | Goal | X | X | X |
| Planned journey | | X | | Time | | | X |
| Actual journey | | X | X | Timeline | X | X | X |
| Scenario | | | | Stage | | X | X |
| | | | | Channel | X | X | X |
| | | | | Trace | | | |
| | | | | Experience | X | X | X |
| | | | | Note | | | |
| | | | | Opportunity | | | X |
| | | | | Lens | | | |

An interesting result about actual customer journeys is that it does not seem to be applied in the fields of architects and UX design. JourneySoftware does not see their software applied in those fields as most clients use it for customer service and marketing. Additionally, all examples discussed in the interviews of ContextMSP were planned journeys. Due to this result, we are more likely to shape our artefact in scoping on static, planned journeys instead of dynamic, actual journeys.

***SQ 1.2*** The practical investigation results of user/customer journey concepts are also shown in Table 8. We saw that UX designers at ContextMSP use a persona in a journey map, thus persona has been moved to the journey specific concepts. Table 8 also allows us to see which concepts JourneySoftware and ContextMSP have common: touchpoint, moment of truth, trigger, goal, timeline, stage (although differently named) channel and experience. Further, we see that

ContextMSP recognises/applies Deviation and Initiator to their journey map, and that JourneySoftware applies Opportunity. These insights will play a role in our Treatment Design, helping us to select the elements for our artefact.

Additional to the Journey specific elements defined in our literature study, the practical investigation has lead to new elements: *Thoughts*, *abstraction level*, *pain points*. For the architect, there is a need to have an abstraction level defined to determine the level of detail of a journey. Additionally, experience has become a must-have due to one UX interviewees being frustrated that people start to use journey on everything similar to a flow chart.

One issue raised when touchpoint was discussed as concept. The definition of JourneySoftware and ContextMSP seemed different from our definition. As we defined touchpoint as "An interaction between customer and service provider" (Halvorsrud et al., 2016), Both ContextMSP and JourneySoftware sees touchpoint as synonym to a channel; a mechanism that enables interactions rather than the interactions themselves. UX designers at ContextMSP did not speak of touchpoints linked activities to channels. The architect on the other hand said he saw a touchpoint of a session of multiple activities on a specific channel. Nagornov (2019) clarifies the difference, stating that a touchpoint is enabled by a channel, such as booking a table (Touchpoint) through an app(channel), and that booking a table is a high-level process consisting multiple activities. Hence the confusion is now solved: a touchpoint is a high-level process that can be subdivided into lower-level activities and is enabled by a channel.

***SQ 1.3*** We also examined current ways of mapping user journeys. As user journey maps are hard to find, we mainly investigated customer journeys instead of user journeys. In the literature, we examined existing frameworks and methods that can be used to map user- and customer journeys as well as multiple user- and customer journey examples in section 2.4. In the practical investigation, we evaluated a customer journey example from JourneySoftware and multiple customer journey examples from ContextMSP. As a result, observed elements and visualisations are taken into consideration as initial requirements for our artefact.

***SQ 1.4*** At last, we investigated how user journey maps are currently supported and applied in the fields of UX design and enterprise architecture. In the interview with JourneySoftware, we saw that actual journeys are not commonly applied within these fields. At ContextMSP, we analysed multiple planned customer journey examples and found that customer journeys created by architects are quite different from the ones made by UX designers. Architects seem to use free format or use their architectural language Archimate to create journeys. UX designers seem to create journeys in the predefined format of Smaply, which is their customer journey design tool. The UX design customer journeys contained significantly more elements that were defined in our list of Journey Specific Elements. Architects do not seem to use things like channels, stages or experience, which could be due to the high-level perspective architects have compared to the detailed view of UX designers. Furthermore, UX designers and architects seem to collaborate in the way that architects complement UX designers with a holistic view and a technical view. When communicating with one another, they only use customer flows and interaction models. All interviewees at ContextMSP saw great use in using journeys to communicate with one another.

> *Answer to* ***SQ1:*** It seems like user journeys are only created at UX design, and that customer journeys are more popular than user journeys in both literature and practice. The popularity of customer journeys gives great motives to later extend our thesis artefact to support customer journeys. Just like user journeys, there are many different customer journeys. The case study showed that this results in communication issues that could be solved with a universal journey language that everyone understands.

## 3.4. Initial requirements - UJEA

Approaching the end of our Problem Investigation, we look back at a Literature Study (Chapter 2) and a Practical investigation (Chapter 3) in which we investigated existent and missing knowledge about user- and customer journeys. The identified needs, gaps and existing elements result in a set of requirements from which we can start building our artefact: User Journey Extended Archimate. The list of requirements is preliminary as it summarizes *all possible* requirements from Chapter 2 and 3 that could be implemented. In our Treatment Design, we will select a subset of requirements that will be implemented. The set of preliminary requirements is shown in Table 9 on the next page. For each requirement, the literature sources and practical sources are given. For practical sources, the amount of interviewees (or observations) are shown between brackets.

Table 9: Initial requirement list for User Journey Extended Archimate (UJEA)

| Initial requirements list | | | |
|---|---|---|---|
| **Req ID** | **Description** | **Literature support** | **Pracitcal support** |
| *Req1.* | The artefact should support user journeys | (Nenonen et al., 2008), (Hannington & Martin, 2012), (Andrews & Eade, 2013), (Hobbs & Fenn, 2013), (Marquez et al., 2015), (Gürvardar et al., 2016), (Bernard & Andritsos,2017) | Case study (3) |
| *Req2.* | The artefact should support Customer journeys | (Følstad et al., 2013),(Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), (Bernard & Andritsos 2017), (Paluch, 2017), Lankhorst, 2017), Norton & Pine, 2013), (Signavio, 2018) | Expert interview(1), Case study (3) |
| *Req3.* | The artefact should support Buyer journeys | (Lemon & Verhoef, 2016) | Expert interview(1), Case study (1) |
| *Req4.* | The artefact should support Planned journeys | (Norton & Pine, 2013), (Følstad et al., 2013), (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), (Paluch, 2017) | Case study (2) |
| *Req5.* | The artefact should support Actual journeys | (Følstad et al., 2013), (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), (Paluch, 2017) | Expert interview(1), Case study (2) |
| *Req6.* | The artefact should support Journey concepts | (Norton & Pine, 2013) | Case study (1) |
| *Req7.* | The artefact should support Scenario(s) | (André, 2007), (Nenonen et al., 2008), (Hannington & Martin, 2012), (Maguire, 2013), (Hayes, 2011) (Kiseleva et al., 2016) | - |
| *Req8.* | The artefact should support Persona(s) | (Hannington & Martin, 2012), ((Hobbs & Fenn, 2013), (Maguire, 2013), (Kusinitz, 2014), (Bernard & Andritsos 2017), (Lankhorst, 2017), (Signavio, 2018) | Expert interview(1), Case study (2) |
| *Req9.* | The artefact should support Touchpoints | (Lillrank, 2009), (Koivisto, 2009), (Clatworthy, 2011), (Zomerdijk and Voss, 2011), (Følstad et al., 2013), (Halvorsrud et al., 2016), (Lemon & Verhoef, 2016), (Halvorsrud and Kvale, 2017), (Lankhorst, 2017), (Bernard & Andritsos 2017) | Expert interview(1), Case study (3) |
| *Req10.* | The artefact should support Stages | (Keyser et al., 2015), (Woof & Anderson, 2015), (Lemon & Verhoef, 2016), (Bernard & Andritsos 2017), (Halvorsrud and Kvale, 2017), (Lankhorst, 2017) | Expert interview(1), Case study (2) |
| *Req11.* | The artefact should support Channels | (Sousa & Voss, 2006), (Peterson et al., 2010), (Norton & Pine, 2013), (Keyser et al., 2015), (Woof & Anderson, 2015), (Halvorsrud et al., 2016), (Lemon & Verhoef, 2016), (Halvorsrud and Kvale, 2017), (Lankhorst, 2017), (Bernard & Andritsos 2017) | Expert interview(1), Case study (3) |
| *Req12.* | The artefact *must* support Experience | (Nunes, 2003), (Clatworthy, 2011), (Hobbs & Fenn, 2013),(Følstad et al., 2013), (Norton & Pine, 2013), (Chang et al., 2014) (Anderl et al., 2016), (Halvorsrud et al., 2016), (Lankhorst, 2017), (Halvorsrud and Kvale, 2017), (Bernard & Andritsos 2017), | Expert interview(1), Case study (1) |
| *Req13.* | The artefact should support Moment of truth | (Norton & Pine, 2013), (Signavio, 2018) | Expert interview(1) |
| *Req14.* | The artefact should support Deviations | (Hobbs & Fenn, 2013), (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), | Case study (1) |
| *Req15.* | The artefact should support Breakpoint(s) | (Hobbs & Fenn, 2013) | Expert interview(1) |
| *Req16.* | The artefact should support an Initiator | (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017) | Case study (1) |
| *Req17.* | The artefact should support a Trigger | (Signavio, 2018) | Expert interview(1), Case study (2) |
| *Req18.* | The artefact should support a Goal | (Bernard & Andritsos 2017), (Signavio, 2018) | Expert interview(1), Case study (3) |
| *Req19.* | The artefact should support Timeline of the journey | (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017) | Expert interview(1) |
| *Req20.* | The artefact should support Time of Touchpoints | (Bernard & Andritsos 2017) | Expert interview(1) |
| *Req21.* | The artefact should support Traces | (Halvorsrud et al., 2016) | - |
| *Req22.* | The artefact should support Notes | (Signavio, 2018) | - |
| *Req23.* | The artefact should support Opportunities | (Lankhorst, 2017), (Nielsen Norman Group, 2019) | Expert interview(1), Case study (1) |
| *Req24.* | The artefact should support Internal ownerships | (Nielsen Norman Group, 2019) | - |
| *Req25.* | The artefact should support Lens(es) | (Bernard & Andritsos 2017) | - |
| *Req26.* | The artefact should support a flow of interactions | (Maguire, 2013) | Expert interview(1) |
| *Req27.* | The artefact should support Information points | (Tempkin, 2010) | - |

| | | | |
|---|---|---|---|
| *Req28.* | The artefact should support Activities (individual steps the user takes) | (Nielsen Norman Group, 2019) | Expert interview(1), Case study (2) |
| *Req29.* | The artefact should support the Abstraction level of a user journey | - | Case study (1) |
| *Req30.* | The artefact should support thoughts | (Nielsen Norman Group, 2019), (Signavio, 2018) | Case study (1) |
| *Req31.* | The artefact should support pain points | (Nielsen Norman Group, 2019) | Case study (1) |
| *Req32.* | Experience should be visualised by the colours red, yellow and green. | (Naz & Helen, 2004), (Elliot & Aarts, 2011), (Kaytes, 2019), (Tempkin, 2010) | - |
| *Req33.* | Experience is determined by the position on the Y-axis | (Kaytes, 2019), (Tempkin, 2010), (Bestebreurtje, 2018) | Case study (1) |
| *Req34.* | Experience should be represented by emoticons | (Tempkin, 2010), (Lankhorst, 2017) | Case study (1) |
| *Req35.* | Channels should be visualised with swimlanes on the Y-Axis | (Lankhorst,2017), (Marquez et al, 2015) | Expert interview(1), Case study (2) |
| *Req36.* | Stages should be visualised on the X-axis, on top of the journey | (Wolny & Charoensuksai, 2014), (Bestebreurtje, 2018), (Lankhorst, 2017), (Marquez et al, 2015) | - |
| *Req37.* | Touchpoints should be visualised on the X-axis | (Kaytes, 2019), (Tempkin, 2010), (Bestebreurtje, 2018), (Lankhorst, 2017), (Marquez et al., 2015), (Kampik, 2018) | - |
| *Req38.* | User journeys should be modelled in or connected to the Business layer | - | Case study (1) |
| *Req39.* | The user journeys made with Archimate should be static like Archimate | - | Case study (1) |
| *Req40.* | The artefact should support omnichannel journeys | - | Expert interview (1), Case study (2) |
| *Req41.* | The artefact should support traceability links between user journey elements and architecture components. | - | Case study (1) |
| *Req42.* | The artefact must be understandable by both UX designers and Architects | - | Case study (2) |
| *Req43.* | The artefact must be compatible with Archimate standards and concepts | - | Case study (1) |
| *Req44.* | The user journey should match the level of abstraction of the architecture | - | Case study (1) |

# PART B
# TREATMENT DESIGN

# 4 USER JOURNEY EXTENDED ARCHIMATE (UJEA)

In chapter 2 and 3, we investigated the current status of user journey mapping and identified literature gaps, as well as practical gaps. As a result, we have created a list of initial requirements that serves as a starting point for creating the artefact. By creating the artefact in a structured way, we aim to answer question SQ2: *How to create a modelling language that supports both user journeys and enterprise architecture?* To answer the question, we start by designing a high-level procedure (4.1), that was iteratively adjusted (agile) during the treatment design. Next, we evaluate the list of initial requirements (4.2) and structure user journeys with a final taxonomy and by proposing a meta model (4.3). What follows, is that we examine Archimate, identifying its structure and concepts (4.4). After we evaluated the requirements, structured user journeys and examined Archimate, we create User Journey Extended Archimate (4.5); which consists of a mapping between the two domains, a new Archimate framework, an UJEA meta model, a graphical notation and a cross-layer meta model. At last, we discuss the possible applications of UJEA and how it aligns UX designers and enterprise architects.

# 4.1. Design approach

We start our treatment design by shaping a treatment design procedure, providing a high-level overview of Chapter 4 as a whole.

## 4.1.1. High-level approach - UJEA

For creating User Journey Extended Archimate, we follow the high-level design procedure, shown in Figure 26.

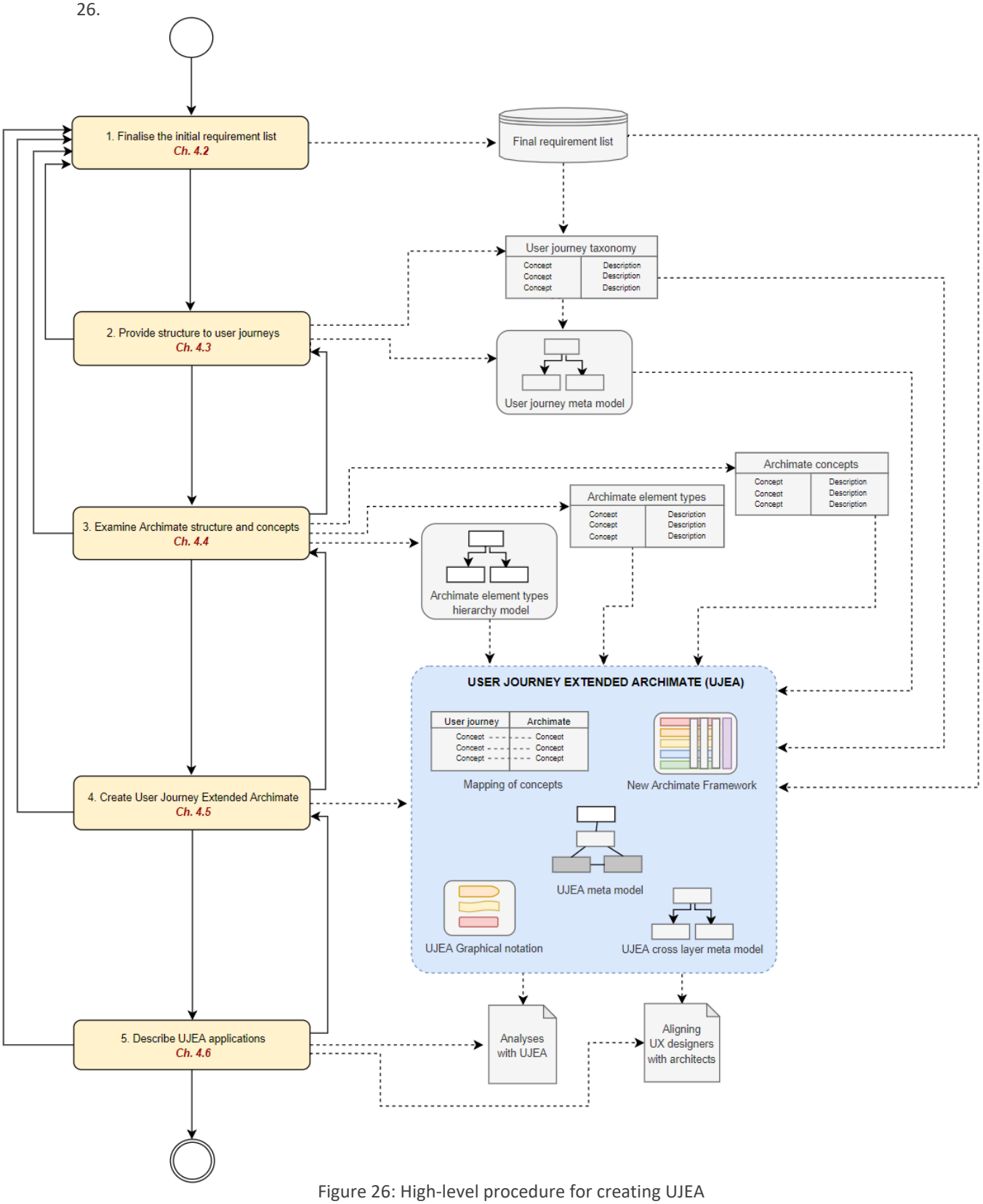



Figure 26: High-level procedure for creating UJEA

The procedure shows the required inputs for the artefact, the creation of the artefact and the artefact possibilities. Additionally, the corresponding chapter sections are shown in each step. The design procedure is agile, meaning we do not have to necessarily finish a step to jump to the next, and that we can always go back to a previous step. Iterative development is believed to be a fundamental rule when it comes to developing a taxonomy or meta model (Noy & McGuiness, 2001).

We start our design by finalizing the initial requirement list from section 3.4 (step 1). The initial requirement list was constructed by combining all possible solutions and ideas found in the literature study and practical investigation. For our artefact, we only want to keep necessary, valuable requirements that fit the artefact and purpose in mind. Thus, each initial requirement will be evaluated and either kept or dropped. For the evaluation, we look at the supporting literature and practical sources. Additionally, initial requirements are evaluated and complemented by members of The Open group (Appendix D). As result, we have a final list of requirements for building our artefact, as well as a final user journey taxonomy (as REQ 1-31 entail user journey related- or user journey specific concepts).

Next, we provide structure to user journeys (step 2). As user journey concepts were part of initial the requirements, we can derive our user journey taxonomy from the final requirement list. Next, we establish and visualise the relationships among the user journey concepts. The taxonomy and the relationships among user journey concepts are both essentials for creating the meta model in which we extend Archimate with user journey concepts. Hence, the user journey taxonomy and meta model are inputs for UJEA.

Having our user journey taxonomy and meta model, we also need to explore the Archimate structure and concepts in order to connect Archimate with user journey concepts. Hence, we examine the Archimate structure and concepts (step 3). We explore Archimates element types and concepts and derive their descriptions from the Archimate specification document (ArchiMate® 3.0.1 Specification, 2019). The descriptions will be used when we start mapping Archimate to user journey concepts; as we will compare concept descriptions to find a match for each concept. Additionally, we will derive the visual hierarchy of Archimate element types that we will use as input for our UJEA meta model.

When we are finished with collecting the required inputs for the artefact, we can start creating User Journey Extended Archimate (step 4). The artefact consists of 5 main components:

- *Mapping of concepts:* Linking Archimate element types and concepts to user journey concepts.
- *UJEA meta model*: A meta model that visualises the mapping of concepts and the relations among the user journey concepts.
- *New Archimate Framework*: The new user journey domain integrated into the Archimate framework.
- *UJEA graphical notation*: Visualising the shapes, icons and colours of the user journey elements in Archimate.
- *Cross layer meta model: S*hows the allowed relationships with Archimate elements from other layers.

The approach for creating UJEA will be explained in further detail in section 4.5 (!).

At last, we describe the applications of UJEA (step 5). There are different analyses possible the UJEA that will be explained. We finish the design by explaining how UJEA can be a solution to align UX designers with architects.

# 4.2. Evaluated requirements for UJEA

As first step of our design procedure, we evaluate the initial requirement list to select a subset of requirements with sufficient support that we will actually implement. This results into a final requirement list that we will use to create our artefact, as well as our taxonomy for user journeys since user journey specific elements are also included in the initial requirements list.

## 4.2.1. Evaluation of requirements

For determining the final requirements and user journey taxonomy, we evaluate the initial requirement list from section 3.4. For additional evaluation of our initial requirements, a discussion session was arranged with some members of The Open group. Although the discussion session was mainly supposed to evaluate the initial requirements, the session also lead to six new requirements, that can be found in Appendix D. The new requirements concern the mapping between user journeys and Archimate and convenient decisions for designing the graphical notation. the mapping of user journey concepts to Archimate and some requirements about the graphical notation. Although these requirements were derived from The Open Group, we will still evaluate them whether they are fit for our artefact. The results/notes from the discussion can be found in Appendix D.

The evaluation of initial requirements is shown in Table 10, containing the initial requirements (ID and description), design decisions along with a rationale for each design decision. For the initial requirements (Req 1-44) are evaluated by literature support(i), practical support(ii), and (sometimes) by the opinions of The Open Group(iii). The newly added requirements from The Open Group (Req 45-50) are evaluated by literature support (i) and practical support(ii).

Table 10: Evaluation of requirements list

| Requirements evaluation | | | |
|---|---|---|---|
| **ID** | **Description** | **Design decision** | **Rationale** |
| *Req1.* | The artefact should support User journeys | *Accept* | Even though customer journeys seem more popular according to our problem investigation, user journey maps are the former version of customer journey maps and thus provides a start (that can later be extended with customer journeys). |
| *Req2.* | The artefact should support Customer journeys | *Reject* | Despite the significant evidence that customer journey maps are popular frequently practiced among UX design and Architects, we scoped our thesis on the former version of customer journeys (user journeys) and keep the idea of extending to customer journeys for future research. |
| *Req3.* | The artefact should support Buyer journeys | *Reject* | The literature study, case study and the JourneySoftware interview showed that buyer journeys are used at marketing, not at UX design and enterprise architecture. |
| *Req4.* | The artefact should support Planned journeys | *Accept* | The case study showed that UX designers and architects mainly create planned journeys. |
| *Req5.* | The artefact should support Actual journeys | *Reject* | The case study and the JourneySoftware interview showed that actual journey maps are not common at UX design and enterprise architecture. |
| *Req6.* | The artefact should support Journey concepts | *Reject* | Insufficient reason found in the literature study and practical investigation. Although the terminology study at ContextMSP showed that this concept is applied, we did come across this concept in the other interviews. |
| *Req7.* | The artefact should support Scenario(s) | *Reject* | Insufficient support found in the practical investigation. |
| *Req8.* | The artefact should support Persona(s) | *Accept* | The literature study and practical investigation showed that personas are a common element for user- and customer journey maps. Additionally, persona was seen as a necessary element by The Open Group. |
| *Req9.* | The artefact should support Touchpoints | *Reject* | Despite significant recognition in both literature study and practical investigation, the case study and JourneySoftware interview introduced the overlap between Touchpoint and Channel. After discussing this issue with The Open Group, the decision was made to go for channel (Req10) to at least show what communication medium is used. |
| *Req10.* | The artefact should support Channels | *Accept* | Significant recognition of concept in both literature study and practical investigation. During the session with The Open Group, the choice was made to choose for channel and drop touchpoint (Req9), to at least show the used communication medium. Additionally, channel was seen as a necessary element by The Open Group. |

| | | | |
|---|---|---|---|
| *Req11.* | The artefact should support Stages | *Accept* | Sufficient support from the literature study and practical study. Stage was present in almost every discussed example in section 2.4, present in the example of JourneySoftware, and present in the examples of UX designers. Additionally, stage was seen as a necessary element by The Open Group. |
| *Req12.* | The artefact *must* support Experience | *Accept* | This must-have requirement was derived from one of the UX interviews, stating that experience differentiates journey maps from customer flows. Our definition of user journeys directly supports this statement. Additionally, experience was seen as a necessary element by The Open Group. |
| *Req13.* | The artefact should support Moment of truth | *Accept* | Common element found in the practical investigation. Both JourneySoftware, and ContextMSP showed that moment of truth is a common element for journey maps. |
| *Req14.* | The artefact should support Deviations | *Reject* | This is an element of actual journeys (Req5), which we decided not to implement. Additionally, practical investigation shows little support for this concept. |
| *Req15.* | The artefact should support Breakpoint(s) | *Reject* | This is an element of actual journeys (Req5), which we decided not to implement. Additionally, the literature study and practical investigation showed little support for this concept. |
| *Req16.* | The artefact should support an Initiator | *Reject* | Initiator was only recognised at ContextMSP but not present in the example customer journeys. Additionally, literature support was limited and as the user journey is seen from the user's perspective, the journey should always start with the user (that is already represented by Persona). |
| *Req17.* | The artefact should support a Trigger | *Reject* | The concept seemed familiar to JourneySoftware and ContextMSP. Though, literature support is little, the element was not present in the case study/journeysoftware examples, and "the idea to trigger a journey" is relatable to Goal (Req18) we choose to implement. |
| *Req18.* | The artefact should support a Goal | *Accept* | Recognised and applied at both JourneySoftware and ContextMSP and was seen as a necessary element by The Open Group. |
| *Req19.* | The artefact should support Timeline of the journey | *Accept* | Used at JourneySoftware and Recognised at UX designers of ContextMSP. Though we did not come across this concept among the UX and architect journey examples, the timeline was present in the example discussed at the The Open Group, as attribute for each stage. Hence, we accept this concept. |
| *Req20.* | The artefact should support Time of Touchpoints | *Reject* | Insufficient literature and practical support. Concept was only recognised at JourneySoftware, which is part of actual journeys (and thus out of scope). |
| *Req21.* | The artefact should support Traces | *Reject* | Trace was not found in the practical investigation, with only one literature source supporting it. |
| *Req22.* | The artefact should support Notes | *Reject* | Note was not found in the practical investigation, with only one literature source supporting it. |
| *Req23.* | The artefact should support Opportunities | *Accept* | Opportunity was present in the UX journey map examples, present in one of the journey map examples in the literature study (2.4) and recognised as concept by JourneySoftware. |
| *Req24.* | The artefact should support Internal ownerships | *Reject* | Internal ownership was added as it was found in an example discussed in the literature study (2.4). Though this concept was not found in other literature and neither in the practical investigation. |
| *Req25.* | The artefact should support Lens(es) | *Reject* | Lens was not found in the practical investigation, supported by only one literature source. |
| *Req26.* | The artefact should support a flow of interactions | *Accept* | Necessary to show the order of interactions/actions of the customer. A flow was present in every examined journey example. |
| *Req27.* | The artefact should support Information points | *Reject* | Information point was added to the requirement list as it was found in the journey example of LEGO to indicate a moment where data is required. Though, as we aim to connect architecture to journey elements, we can already link data elements to journey elements. |
| *Req28.* | The artefact should support Activities (individual steps the user takes) | *Accept* | Although literature support is scarce, the practical investigation showed that both JourneySoftware and ContextMSP are using activities to show the actions of the user, that simultaneously entail interaction between service provider and user, i.e. Touchpoint. As we dropped touchpoint due to its similarity with Channel, we use activity to represent both the user actions, as well as the interaction through a channel. Additionally, activity was seen as a necessary element by The Open Group. |
| *Req29.* | The artefact should support the Abstraction level of a user journey | *Accept* | Abstraction level was added as missing element by the architect at ContextMSP. Additionally, abstraction level was seen as a necessary element by The Open Group. |
| *Req30.* | The artefact should support thoughts | *Accept* | Thoughts found in two examples in the literature study, and in both UX customer journey map examples. |
| *Req31.* | The artefact should support pain points | *Reject* | Discussed in the session with The Open Group, pain points should not be included into planned journeys as it requires detailed analysis. Additionally, mapping negative experience will already indicate similar information to the reader. |
| *Req32.* | Experience should be visualised by the colours red, yellow and green. | *Accept* | The use of these colours to indicate experience was observed from multiple examples in practice and literature. |

| | | | |
|---|---|---|---|
| *Req33.* | Experience is determined by the position on the Y-axis | *Reject* | In the discussed journey examples, the Y axis was used for channels and experience. Positioning elements on the Y-axis to indicate experience was seen in multiple literature examples, as well as in UX design journey examples at ContextMSP. Though, Archimate has no semantics to the height of elements, except the order of type of elements described in the Archimate layer framework. As we have Req. 32 and 34 as alternative options for experience, this requirement is dropped. |
| *Req34.* | Experience should be represented by emoticons | *Accept* | The use of emoticons was observed from many examples, both in the literature study and the UX design journey map examples. |
| *Req35.* | Channels should be visualised with swimlanes on the Y-Axis | *Accept* | In the discussed journey examples, the Y axis was used for channels or experience. We saw sufficient examples (literature study, JourneySoftware, ContextMSP) where channels were depicted as swimlanes. |
| *Req36.* | Stages should be visualised on the X-axis, on top of the journey | *Accept* | Stages were visualised this way in every example that included stage as concept. |
| *Req37.* | Touchpoints should be visualised on the X-axis | *Reject* | Touchpoint (Req9) was rejected. Instead of touchpoints, activity will serve as the interaction/user action. |
| *Req38.* | User journeys should be modelled in or connected to the Business layer | *Accept* | Supported by the architect of ContextMSP, it is only logical to position the journey above the business layer as the business services are the services used by customers. |
| *Req39.* | The user journeys made with Archimate should be static like Archimate | *Accept* | We dropped the idea of supporting actual user journeys (Req5), and have decided to scope on planned user journeys (Req4) |
| *Req40.* | The artefact should support omnichannel journeys | *Reject* | As user journeys are single channel, this requirement does not fit the scope of this thesis but remains a suitable requirement for extending to customer journeys (as future work). |
| *Req41.* | The artefact should support traceability links between user journey elements and architecture components. | *Accept* | The traceability links between journey and architecture helps architects to assist UX designers with technical analysis/advice. The idea of tracing journeys back to architecture was the reason why the architects at ContextMSP created a customer journey framework for architects. |
| *Req42.* | The artefact must be understandable by both UX designers and Architects | *Accept* | To improve the communication between UX designers and architects, both parties have to be able understand the models. As Archimate is a language from the architects, it would be best to meet familiarity aspects of UX designers as well. |
| *Req43.* | The artefact must be compatible with Archimate standards and concepts | *Accept* | As the artefact is supposed to extend Archimate, this requirement is kept. |
| *Req44.* | The user journey should match the level of abstraction of the architecture | *Reject* | Together with The Open Group, we decided to create predefined abstraction levels that the creators who use UJEA must comply to. It is up to the creator to choose one of the abstraction levels, instead of basing the abstraction level on the underlying architecture. |
| *Req45.* | To map concepts to Archimate, first map the new concepts to element types, then map them to Archimate concepts. | *Accept* | Classifying concepts this way helps us to narrow down the possible matching concepts, and map the concepts in a more structured way. |
| *Req46.* | If touchpoint is to be mapped to Archimate, it should be a Business service (behavioural, and external) | *Reject* | For the scope of this thesis, Touchpoint (Req9) has been rejected. However, this requirement could be used for further research when extending Archimate further to support customer journeys. |
| *Req47.* | If channel is to be mapped to Archimate, it should be a Business interface (structural) | *Accept* | A business interface is a point of access where a business service is made available to the environment (ArchiMate® 3.0.1 Specification, 2019). The description matches perfectly with the purpose of a channel. |
| *Req48.* | If activity is to be mapped to Archimate, it should be a business service (behavioural, and external) | *Accept* | An alternative candidate mapping was a business process: “a sequence of behaviors to achieve a specific outcome” (ArchiMate® 3.0.1 Specification, 2019). However, a business process is internal, while a business service can be external (and the user’s actions are external from the company’s perspective). Additionally, according to the Archimate meta model, business services can trigger business services as well, creating a series of external behaviors. |
| *Req49.* | If persona is to be mapped to Archimate, it should be a role (structural) | *Accept* | A business role is the responsibility of performing specific behavior, to which an actor can be assigned, or the part an actor plays in a specific action or event (ArchiMate® 3.0.1 Specification, 2019). The description matches the idea of a persona, that represents a user type with certain properties, characteristics and behavior. |
| *Req50.* | If experience is to be mapped to Archimate, it should be a metric | *Accept* | A metric is the extent, quantity, amount or degree of something, as determined by measurement or calculation(ArchiMate® 3.0.1 Specification, 2019). This matches the idea of experience that can have different emotions as values. |
| *Req51.* | An abstraction level should be included with predefined levels | *Accept* | As abstraction levels are difficult to specify, predefined levels like “high-level” vs “low-level” would be helpful for creating and reading the user journey map. |

### 4.2.2. Final requirement list

To establish the final requirement list for our artefact, we exclude all rejected requirements from Table 10. As result, we have a final requirement list of 29 requirements in total, shown in Table 11. The requirement ID's are kept the same, so that the corresponding rationale for each requirement can easily be traced back.

Table 11: Final requirements list

| Final requirement list | |
|---|---|
| **ID** | **Description** |
| *Req1.* | The artefact should support User journeys |
| *Req4.* | The artefact should support Planned journeys |
| *Req8.* | The artefact should support Persona(s) |
| *Req10.* | The artefact should support Channels |
| *Req11.* | The artefact should support Stages |
| *Req12.* | The artefact *must* support Experience |
| *Req13.* | The artefact should support Moment of truth |
| *Req18.* | The artefact should support a Goal |
| *Req19.* | The artefact should support Timeline of the journey |
| *Req23.* | The artefact should support Opportunities |
| *Req26.* | The artefact should support a flow of interactions |
| *Req28.* | The artefact should support Activities (individual steps the user takes) |
| *Req29.* | The artefact should support the Abstraction level of a user journey |
| *Req30.* | The artefact should support thoughts |
| *Req32.* | Experience should be visualised by the colours red, yellow and green. |
| *Req34.* | Experience should be represented by emoticons |
| *Req35.* | Channels should be visualised with swimlanes on the Y-Axis |
| *Req36.* | Stages should be visualised on the X-axis, on top of the journey |
| *Req38.* | User journeys should be modelled in or connected to the Business layer |
| *Req39.* | The user journeys made with Archimate should be static like Archimate |
| *Req41.* | The artefact should support traceability links between user journey elements and architecture components. |
| *Req42.* | The artefact must be understandable by both UX designers and Architects |
| *Req43.* | The artefact must be compatible with Archimate standards and concepts |
| *Req45.* | To map concepts to Archimate, first map the new concepts to element types, then map them to Archimate concepts. |
| *Req47.* | If channel is to be mapped to Archimate, it should be a Business interface (structural) |
| *Req48.* | If activity is to be mapped to Archimate, it should be a business service (behavioural, and external) |
| *Req49.* | If persona is to be mapped to Archimate, it should be a role (structural) |
| *Req50.* | If experience is to be mapped to Archimate, it should be a metric |
| *Req51.* | An abstraction level should be included with predefined levels |

As we finished our requirement list, we can focus on the inputs for our artefact. For the artefact, we need to have an overview of the user journey concepts, descriptions and relations (i) and, as well as the Archimate concepts, descriptions and relations(ii). In the next section, we focus on structuring user journeys (i).

# 4.3. Structuring user journeys

Having our final set requirements, we still need filter and define the user journey concepts and their relations as we need this input for our artefact.

## 4.3.1. Final user journey taxonomy

We already filtered a subset from all possible user journey concepts (Req 8-31). Derived from Table 11, the remaining requirements that entail user journey concept are Req8, 10, 11, 12, 13, 18, 19, 23, 28, 29, and 30. These requirements almost contains our final set of concepts. As last step, we split user journeys (Req1) into *user journey* and *user journey map* as this provides structure to how user journeys are managed: there is a difference between the explicit and inexplicit user journey. As explained in Chapter 2, the user journey is the total of experiences across time (inexplicit), whereas a user journey map is a documented user journey (explicit). As result, we have our user journey taxonomy shown in Table 12.

Table 12: User journey taxonomy

| User journey taxonomy | | |
|---|---|---|
| **User journey concept** | **Definition / meaning** | **Corresponding Req.** |
| *User journey* | The total user experience (emotions, perceptions and feelings) across a period of time, as the user interacts with a product or service to achieve a goal using a system. (Nenonen et al., 2008; Hannington & Martin, 2012; Maguire, 2013) | *Req1.* |
| *User journey map* | Visualization of experiences people have when interacting with a product or service by using a system (Hannington & Martin 2012) | *Req1.* |
| *Persona* | Representation of a typical user that contains motivations, goals, pain points and other characteristics (Signavio, 2018). | *Req8.* |
| *Channel* | A medium for users and service providers to interact with one another (Sousa & Voss, 2006) | *Req10.* |
| *Stage* | Container of multiple activities to indicate a phase of the journey | *Req11.* |
| *Experience* | Emotions (i) and emotions scale (ii) (Bernard & Andritsos 2017). | *Req12.* |
| *Moment of truth* | Decision points that can make or break the success of the journey. It can be a simple decision, or a hard decision that is experienced as a barrier (Signavio, 2018). | *Req13.* |
| *Goal* | The thing what the user aims to achieve, such as obtaining a loan in a banking context, this is the final touchpoint of a service (Signavio, 2018). | *Req18.* |
| *Timeline* | Duration of the journey from the starting touchpoint to the final touchpoint. The timeline can be depicted by actual time or ordering touchpoints by giving them numbers (Bernard & Andritsos 2017). | *Req19.* |
| *Opportunity* | A suggested improvement. | *Req23.* |
| *Activity* | A user action. | *Req28.* |
| *Abstraction level* | The level of detail of a user journey map, determined by the creator that wants to inform the reader how the user journey map should be read. | *Req29.* |
| *Thought* | Representation of a user's thinking. They explain or add extra information to the emotions of the user. | *Req30.* |

We now have our final list of user journey concepts. With the artefact we aim to build, we need to know the relationships among the user journey elements, as not every element can just be linked to every element. For example, we want to relate emotions to activities, not to a channel. Thus, certain rules need to be created in which we specify the possible relationships between elements. A way to structure the (allowed) relationships among elements, is creating a meta model. Hence, we create a user journey meta model that we will later integrate into our artefact.

### 4.3.2. User journey meta model

The user journey meta model is shown in Figure 27. The meta model shows an overview of the user journey concepts, relations and cardinalities. The presented concepts are derived from the taxonomy of Table 12: *user journey, user journey map, abstraction level, persona, goal, channel, stage, timeline, activity, opportunity, moment of truth, thought* and *experience*. The attributes of the concepts are documented separately due to readability reasons.

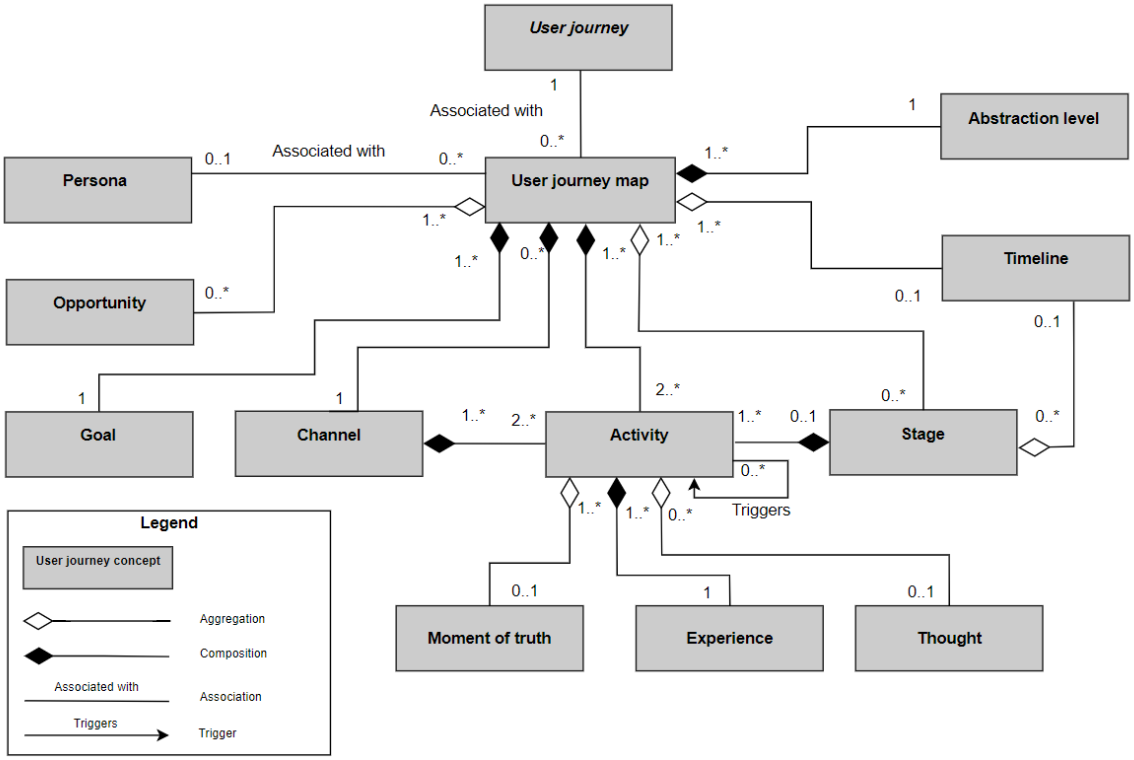



Figure 27: User journey meta model

Starting at the top, we see that user journey is presented in italics unlike the others. This is because user journey is an *abstract concept*; it cannot be instantiated and just serves to provide structure and context to the meta model. Where a user journey is the implicit journey of experiences of the user (the concept), a user journey map is a documented, explicit user journey, and thus can be instantiated.

A user journey map is always associated to *one* specific user journey, but a user journey can be associated (represented) by *multiple* user journey maps. This is because there can be multiple visualisations of the same user journey. A user journey map can have many different elements, of which some are optional while others are mandatory. As *mandatory* elements; a user journey map must always have one goal, one channel, an abstraction level and at least two activities (otherwise there is no flow). A user journey cannot have multiple channels as single-channel was one of the conditions of a user journey. However, this could be an easily adjustable element for future research to extend to customer journeys.

As for *optional* elements, a user journey map can have opportunities, stages and a timeline. These elements are kept optional as there is not always an opportunity to identify and we have examined and observed multiple examples without stages or timelines. Further, a user journey map *can* be associated to a persona. A persona is kept *optional* in case the architect wants to create a quick user journey just to show a customer flow with experience and does not want to make a full description of a persona. This decision was based on the journey example of architects at ContextMSP, that did not include a persona (probably to spare time). On the right of the model, we see that the optional timeline can either be presented on the whole user journey map (to show the total duration), or on each stage (which allows to map multiple timeframes). This decision was also based on the examined examples.

Moving to the bottom of the meta model, we see that a stage must have at least one activity, and a channel must have at least two activities. A stage without an activity would be redundant, and a channel with one activity would not be a flow. We also see a trigger relation from the activity to itself. This relation allows a flow of activities in the user journey map (that trigger one another). Further we see that an activity *must* have an experience and *can* have a moment of truth and a thought. The experience is made mandatory as a user journey without experience would become a customer flow. A thought and a moment of truth are kept optional as we only saw these elements in a few journey examples.

The attributes that belong to the user journey concepts are shown in Table 13. Most attributes are strings, even Time (attribute of Timeline) is chosen to be a string. By choosing strings, we give as much freedom to the users as possible when the user journey meta model is implemented (in our artefact for example). Leaving some freedom and space to potential users instead of putting restrictions on attributes could contribute to potential implementations by making it easier to use.

Table 13: User journey meta model attributes

| User journey meta model attributes | | | |
|---|---|---|---|
| **User journey concept** | **Attribute** | **Type** | **Description** |
| *User journey* | Name | String | Name of the user journey. |
| | Description | String | Additional information to the user journey. The creator is free to decide what additional information to add. |
| *User journey map* | Name | String | Name of the user journey map. It can be the same name of the corresponding user journey but this is not necessarily the case; there can be multiple user journey maps made for the same user journey. |
| | Description | String | Additional information to the user journey. The creator is free to decide what additional information to add. |
| *Persona* | Name | String | Name that represents a type of customer. |
| | Properties | String | Characteristics that specify what type of customer the persona represents. |
| | Goals | String | General motives or goals in life, or related to products/services/systems of the service provider. |
| *Channel* | Name | String | Name of the used channel. This has to be a digital channel/system. |
| *Stage* | Name | String | Name of the stage. |
| *Experience* | Emotion | Enumeration | A set of named experience values: {Happy, Neutral, Unhappy}. For simplicity reasons, we now stick to only three values, but more could be introduced later if requested by experts. |
| *Moment of truth* | - | - | As a moment of truth is contained by an activity, which on its turn can be further explained by a corresponding thought. As both the activity and thought already provide sufficient information about an important decision made, it would become redundant or unnecessary complex to name or add text to a moment of truth. |
| *Goal* | Name | String | Small description of the desired outcome of the user journey. |
| *Timeline* | Time | String | The time a process or journey should take, expressed in what the creator seems fit (secs, mins, hours, days, months, years). |
| *Opportunity* | Name | String | Name of the opportunity. |
| | Description | String | Additional information to the opportunity; what corresponding software the opportunity belongs to, which people/business functions/teams should be appointed for further action etc. |
| *Activity* | Name | String | Name of the activity. This entails a description of the interaction between the user and a digital channel (app, website, etc). |
| *Abstraction level* | Level | String | Two predefined levels: <High level> and <Low level>. The levels serve as guidance from mapper to reader; instructing from what level of detail the user journey map is made and thus how it should be read. There are however no strict rules to follow; the level serves as guidance to read the user journey map. The idea of using predefined levels was based on the notes of The Open Group session (appendix D). |
| *Thought* | Name | String | A description of the user's thought when an activity (interaction with a system of the service provider) is executed. |

As we finished our attributes table, we have now brought structure to user journeys: we created a final taxonomy, a meta model showing the relations, a table of attributes for each concept. Before we start to integrate user journeys into enterprise architecture, we need to select and explore an enterprise architecture language. This will be elaborated in the next section.

# 4.4. Archimate

As our SQ2 stated, we want to create a user journey integrated architecture language. The enterprise architecture language chosen for our artefact is Archimate. In this section, we explain why Archimate is chosen, we give an introduction of Archimate to provide some context, and examine its element types and concepts. The latter two contain vital information for mapping the user journey elements onto Archimate concepts.

## 4.4.1. Why Archimate?

Archimate is a common modelling language among enterprise architects. Many organizations are using it as their company company standard for describing enterprise architecture, and its value has been proven in practice (Lankhorst et al, 2009). Furthermore, there is significant tool support for Archimate (Al-Fedaghi, 2017) and the language was chosen as the standard for the enterprise architecture method TOGAF. At last, Archimate allows customization of the language that is tailored towards specific domains and applications. To customize the language, one has to create new elements and map these onto existing Archimate elements (ArchiMate® 3.0.1 Specification, 2019).

## 4.4.2. Introduction to Archimate

Archimate is an Enterprise Architecture modeling language that provides a uniform representation for diagrams describing the architecture of an (mostly large sized) company (Al-Fedaghi, 2017). Archimate includes a set of concepts, meta models, specifications for inter-related architectures, specific viewpoints for selected stakeholders, and specifications on how the language can be further customized. By specifying a structure and relations between different layers and specifying viewpoints, Archimate allows different architecture domains to be connected in one visualisation. Archimate is structured by the *Archimate Framework*. The framework is a structuring mechanism for architecture domains, layers, and aspects. It distinguishes between the model elements and their notation, to allow for varied, stakeholder-oriented depictions of architecture information (ArchiMate® 3.0.1 Specification, 2019). Originally, the core framework only contained three layers: the business layer, application layer and technology layer. In the past years the core framework has been extended multiple times, resulting into the *Full Archimate Framework*. The Full Archimate Framework is shown in Figure 28.

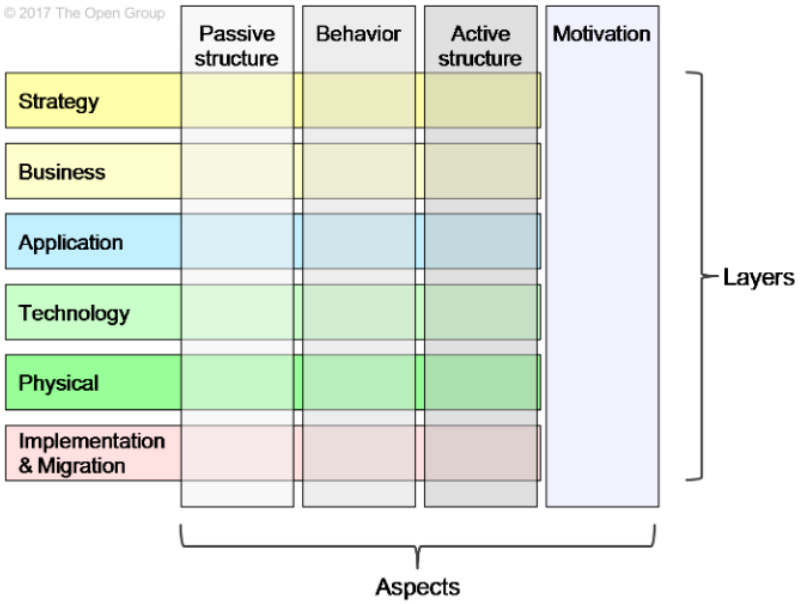



Figure 28: The Full Archimate Framework (ArchiMate® 3.0.1 Specification, 2019)

The framework is structured into two dimensions: *Layers* and *Aspects*. A layer represents a specific domain that contains a structure of elements and relationships, whereas aspects represent type of elements. The specified layers in the framework are Strategy, Business, Application, Technology, Physical, Implementation & Migration and Motivation (Lankhorst, 2017):

- *Strategy layer*: Contains strategic elements such as capabilities, resources and courses of action.
- *Busines layer*: Contains business services offered to customers, realized by organizational processes and actors.
- *Application layer*: Contains application services supporting the business (layer) and the applications that realize them.
- *Technology layer*: Contains technology services supporting the application layer, and hardware and infrastructure that realize them.
- *Physical layer*: Contains elements of the physical world that interplays with IT.
- *Implementation & migration layer*: Contains concepts used to describe how an architecture is going to be realized.
- *Motivation layer*: Contains elements that drive the design and operation of the enterprise.

As for aspects, the full framework identifies *Passive structure, Behavior, Active structure and Motivation* as element types. This is however a simplified version of the element types of the language. To be able to map the user journey concepts to Archimate concepts, we need to examine Archimates element types (i) and Archimates concrete concepts (iii).

### 4.4.3. Archimate element types

Archimate created hierarchy models and meta models that specify Archimate's *aspects* into more detail. Derived from the Archimate specification (ArchiMate® 3.0.1 Specification, 2019), we created the total hierarchy of Archimate's element types, shown in Figure 29. The element types are represented in white boxes and written in italics to show the classes are abstract. Abstract classes cannot be instantiated but serve to structure the language.

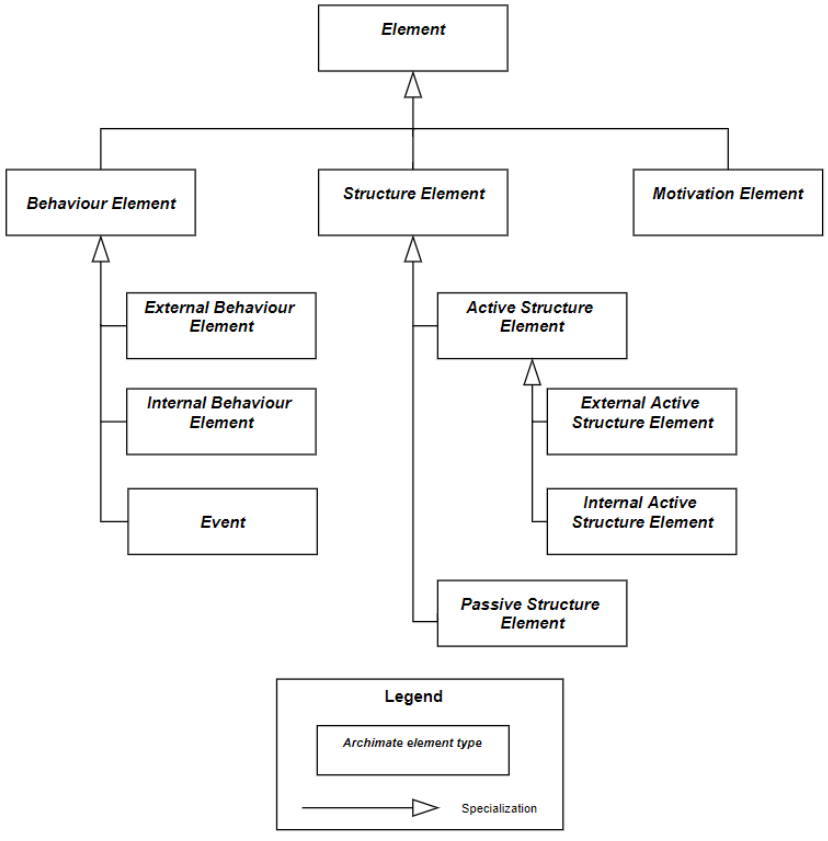



Figure 29: Archimate element types: hierarchy (ArchiMate® 3.0.1 Specification, 2019)

Examining the element types, we see the mentioned aspects of the Archimate framework again: *Active structure element, Passive structure element, Behavior element* and *Motivation element*. Furthermore, we see that there are three Behavior elements: *External behavior element, Internal behavior element* and *event.* For structural elements, we see that Active structure elements can be further subdivided into *Internal* – and *External active structure elements*.

To be able to match user journey concepts to Archimate element types, we need the descriptions of these element types. The descriptions have to be compared to the descriptions of the user journey elements to find proper matches between concepts. For this reason, an overview Archimate element type descriptions, derived from the Archimate specification document, can be found in Table 37, Appendix E.

### 4.4.4. Archimate concepts

To map user journey elements to Archimate, we also need an overview of the concrete concepts and their definitions. Derived from Archimate specification document, we created an overview of all concepts (and their notation). The overview is shown in Figure 30.

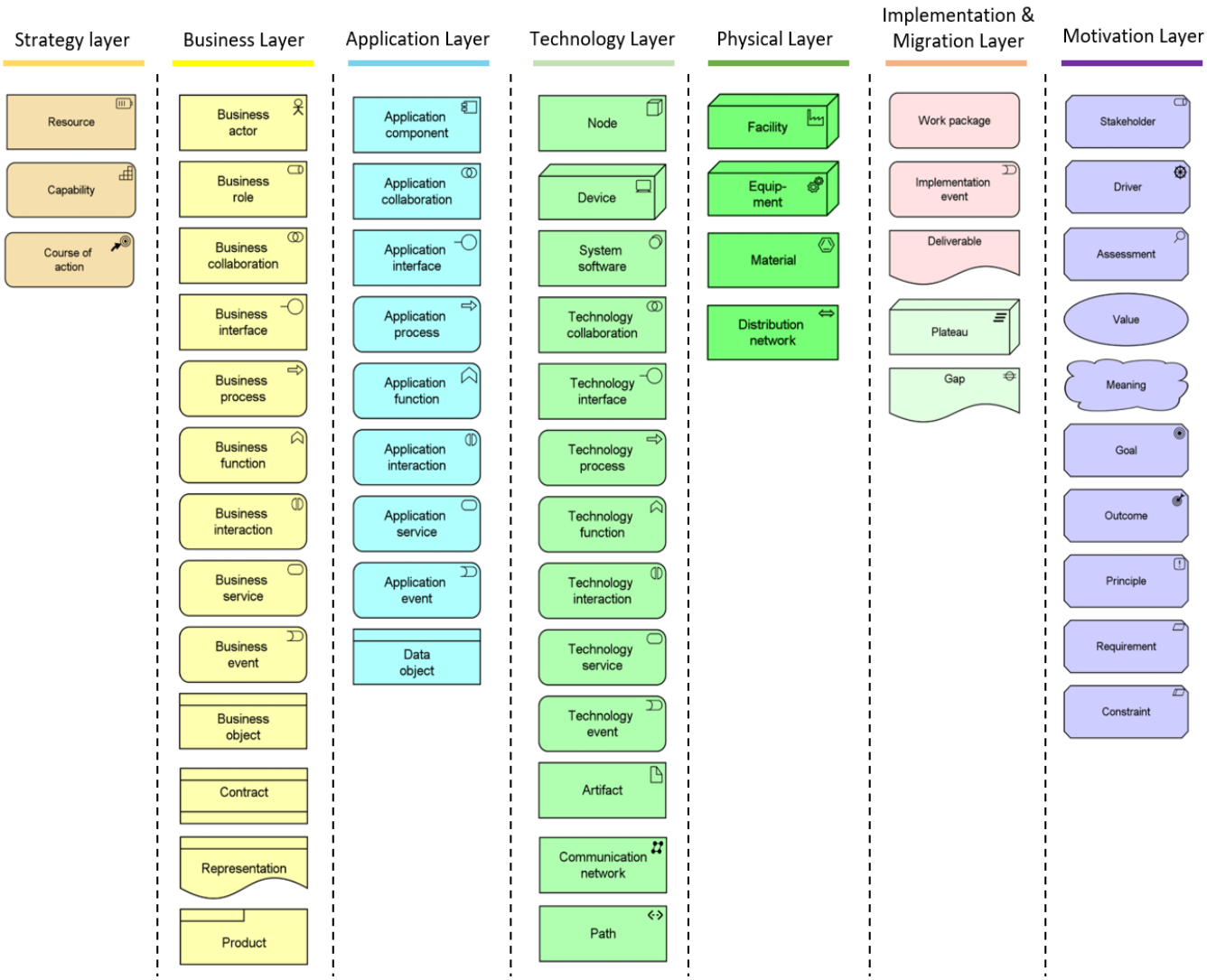



Figure 30: Archimate concepts (ArchiMate® 3.0.1 Specification, 2019)

- The *Strategy layer* consists of: {*Resource, Capability and Course of action*}.
- The *Business layer* consists of: {*Business role, Business collaboration, Business interface, Business process, Business function, Business interaction, Business service, Business event, Business object, Contract, Representation* and *Product*}.
- The *Application layer* consist of: {*Application component, Application collaboration, Application interface, Application process, Application function, Application interaction, Application service, Application event* and *Data object*}.
- The *Technology layer* consists of: {*Node, Device, System software, Technology collaboration, Technology interface, Technology process, Technology function, Technology interaction, Technology service, Technology event, Artifact, Communication network* and *Path}.*
- *The Physical layer consists of: {Facility, Equipment, Material and Distribution network*}.
- The *Implementation & Migration layer* consists of: {*Work package, Implementation event, Deliverable, Plateau* and *Gap*}.
- The *Motivation layer* consists of: {*Stakeholder, Driver, Assessment, Value, Meaning, Goal, Outcome, Principle, Requirement* and *Constraint*}

To be able to match user journey concepts to Archimate concepts in the next section, we will need the descriptions of the Archimate concepts. Hence, derived from the Archimate specification document, an overview of the descriptions of the Archimate concepts is created, shown in Table 38, Appendix E.

As we now explored the Archimate structure and concepts and descriptions, we can now start to map the user journey elements to Archimates elements to create our artefact: User Journey Extended Archimate (UJEA).

# 4.5. User Journey Extended Archimate (UJEA)

The following section contains the creation of our artefact. In the design procedure of section 4.1 we shortly introduced the 4 components of the artefact: The mapping of concepts, the UJEA meta model, the UJEA graphical notation and the Cross layer meta model. In this section, we discuss all steps that lead to these components. As this is an essential part of the thesis, the tables in this section have a different colour (*orange*). We also mentioned that the procedure of creating UJEA will be explained into more detail in this section. Thus, we start the section with a detailed approach for creating UJEA.

## 4.5.1. Low-level approach - UJEA

For creating the artefact, we follow the detailed procedure that is visualized in Figure 31. The steps are coloured in yellow on the left, while the Artefact and its subproducts are shown in a blue container. On the right, the input products from the previous chapters are shown. We start the artefact design by *mapping user journey concepts* to *Archimate element types* (step 1). In the previous section we gathered and examined Archimates element types, their descriptions and their relations. By comparing the descriptions of user journey concepts with the descriptions of Archimate element types, we can find matching concepts. The matched concepts will be shown in a table, as well as shown in a visual mapping for which we use the Archimate element types hierarchy model as a basis.

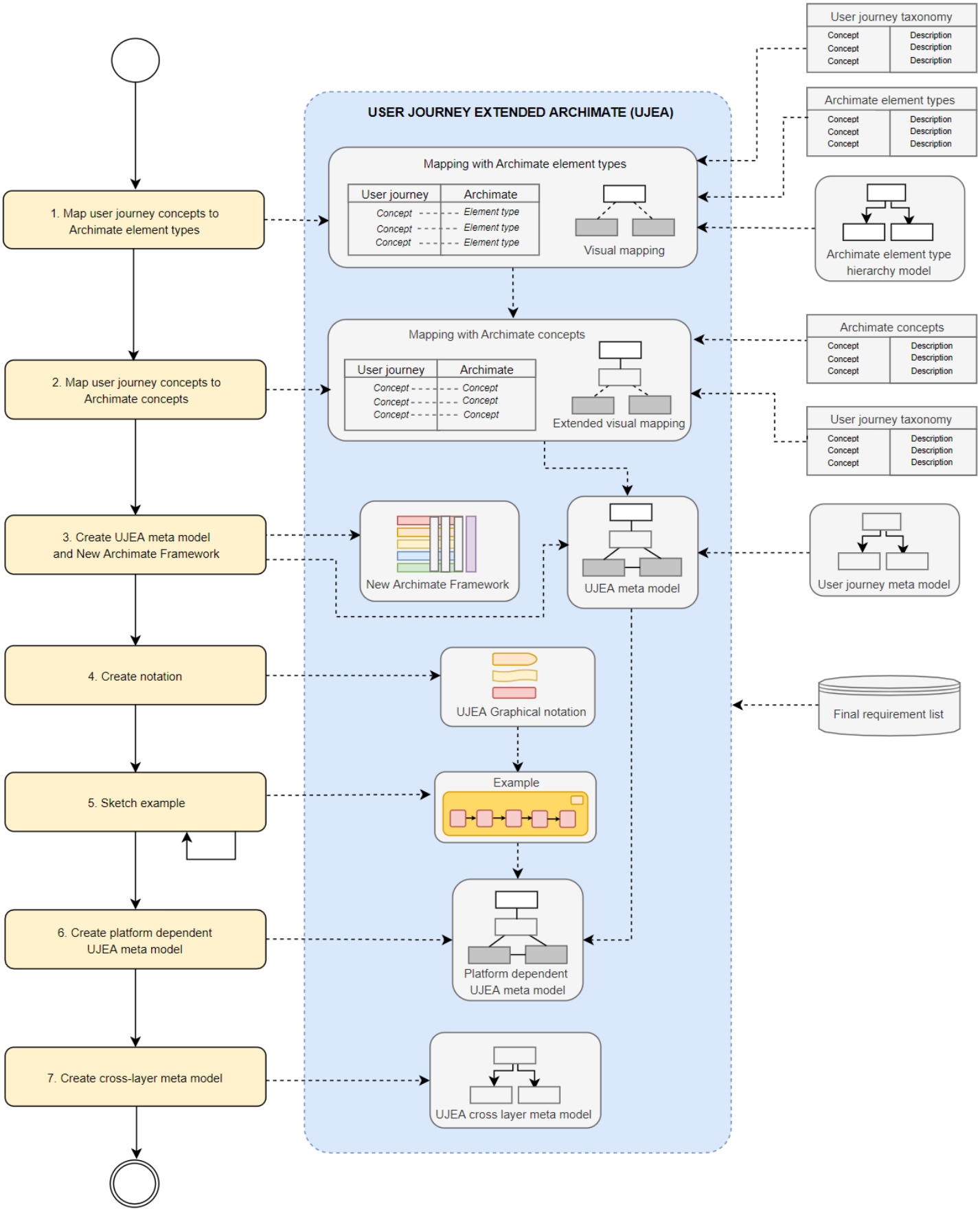



Figure 31: Detailed design procedure for User Journey Extended Archimate

Next, we start *mapping user journey concepts* to *Archimate concepts* (step 2). Just like step 1, we compare the descriptions of user journey concepts with the descriptions of Archimate concepts to find matches. The mapping of concepts will again be shown in a table, as well as a visual mapping. For the visual mapping, we use the visual mapping from the previous step and extend it with the new matches.

What follows is that we create the *User Journey Extended Archimate (UJEA) meta model* and the *New Archimate Framework* (step 3). Creating the UJEA meta model is actually a small step; we only have to add relationships among user journey concepts in the Extended visual mapping from the previous step. The relationships were already defined in the user journey meta model of subsection 4.3.2., and can simply be derived and integrated into the Extended visual mapping. For the New Archimate Framework, we simply have to add the user journey domain as a layer or aspect.

After creating the UJEA meta model, we can start creating the *UJEA graphical notation* (step 4). To do this, we first set up some general design guidelines to create a basis for our notation, followed by a graphical notation (shape, icon and colour) for each element.

With the notation finished, we can sketch an example (step 5) with Archi to give an idea of how UJEA can be applied, and how the sizes and positions of the graphical notation should look like. This is however an iterative process; multiple sketches will be drawn until a readable and simplistic version will serve the purpose of the example. We also see that the final requirements from section 4.1 have influence on the whole artefact.

When using Archi to create an example that visualises the user journey elements in the most optimal way, we will see that some relations are not precisely compliant to the UJEA meta model. For this reason, we create an adjusted version of the UJEA meta model (step 6), resulting in a *Platform dependent UJEA meta model.*

As last step, we create the *UJEA cross-layer meta model* to allow links between UJEA's user journey elements and Archimate elements from other layers (step 7). For this step, we follow one of the Archimate cross-layer rules that services of a layer can serve elements of another layer.

### 4.5.2. Mapping user journey concepts - Archimate element types

We start our mapping with matching the descriptions of user journey concepts to the Archimate element types that were introduced in 4.4.3. This helps us select a subset of potential Archimate concepts to map on each user journey concept. To map user journey concepts to Archimate element types, we will compare the descriptions of user journey concepts of Table 12 of section 4.3, with the descriptions of Archimate element types shown in Table 37, Appendix E. The result of this mapping is shown in Table 14 below. For each mapping, a rational is given that explains the thoughts and decisions behind the mapping.

Table 14: Mapping user journey concepts to Archimate element types

| User journey concept | Archimate element type | Rationale |
|---|---|---|
| *User journey* | Passive structure element | When speaking of a user journey, we speak of the journey of a user on a conceptual level. It does not perform behaviour. Instead, user behaviour and experience determine the user journey. |
| *User journey map* | Internal behaviour element | The user journey map is the explicit form of the user journey, containing a sequence of activities and experiences that occur by interacting with a company. The map contains user behaviour measured by a company, performed by a *persona* that represents a user. |
| *Persona* | Active structure element | In terms of a user journey map, the activities are performed by a persona. As the persona performs behaviour, it is an active structure element. |
| *Channel* | Active structure element | A channel exposes the functionality of a business service to users/customers. As exposing functionality and connecting users with a company can be seen as behaviour, this is an active structure element. |
| *Activity* | External behaviour element | As the activities will trigger one another, representing a series of behaviours, an activity is a behaviour element. When further specifying whether activity is internal or external behaviour, we look at who executes the activity: the user. As the user is external seen from the company's perspective, external behaviour element would seem the right mapping. |
| *Stage* | Internal behaviour element | A stage, or phase contains a sequence of activities. The container is however created by the company to provide structure to the series of activities. Hence, stage can be seen as an internal behaviour element. |
| *Experience* | Motivation element | Motivation elements drive the design and operation of the enterprise. In other words; motivation elements play part in why an organisation operates as how it does. Organisations aim for a high user/customer experience and take action to improve it. Thus, experience affects the design and operation of the enterprise. |
| *Moment of truth* | Motivation element | As the moment of truth is a decision point that influences the rest of the user journey, it also influences the company. Hence, a moment of truth is a motivation element. |
| *Goal* | Motivation element | A goal drives the user journey. A goal matches directly with the existing "Goal" element, that is already part of the motivation layer. *(Note!)* As this is a goal in a journey context, we adjust *goal* into *Journey goal* to prevent confusion. |
| *Timeline* | Motivation element | Timeline is an indication of time how long a certain stage or user journey map should endure; it represents a condition to be met and thus drives operations and architecture. |
| *Opportunity* | Motivation element | An opportunity represents requests for adjustments or new ideas and thus shapes the design and architecture. |
| *Abstraction level* | Motivation element | Abstraction level serves as a guideline to shape the user journey (in architecture) on a certain scope/perspective. Therefore, it guides/shapes the design and architecture. |
| *Thought* | Motivation element | A thought explains the experience. It shows why a user is negative or why a user is positive. As it answers a "why" question, a thought can be seen as a motivation element. |

Having each user journey concept mapped onto an Archimate element type, we can create a visual overview of the mapping. For this, we use the Archimate element types hierarchy from Figure 29 and connect each user journey element to it. The visual mapping of Table 14 is shown in Figure 32. The relation used between the elements is a specialization relation, as each user journey concept is a specialisation of the mapped Archimate element type.

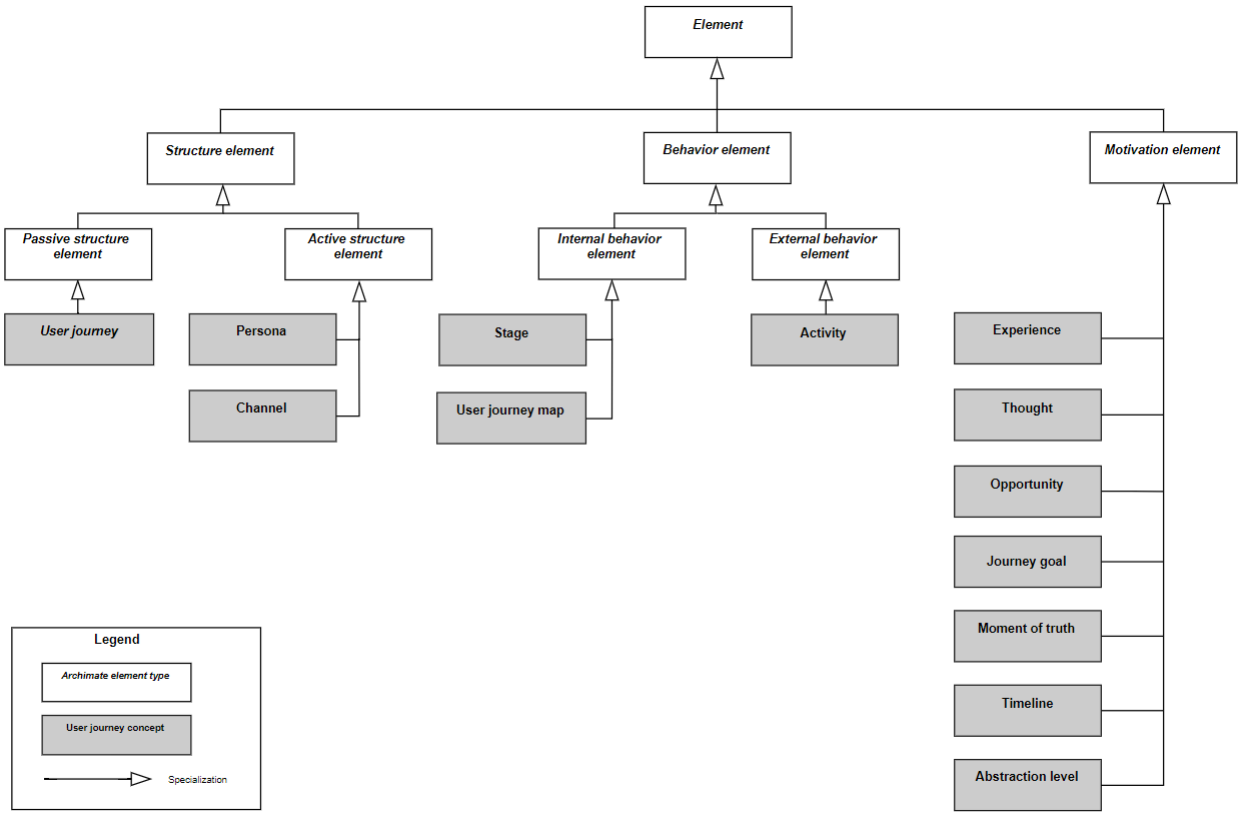



Figure 32: Visual mapping of user journey concepts to Archimate element types

The element types are again shown in white boxes and written in italic to show they are abstract classes that cannot be instantiated (but provide structure to the language). The user journey elements are shown in grey as they are concrete classes (that can be instantiated), except user journey itself, as this was the only abstract concept of our user journey meta model (Figure 27).

### 4.5.3. Mapping user journey concepts - Archimate concepts

As our next step of mapping user journeys to Archimate, we map the user journey concepts to the Archimate concepts that were introduced in 4.4.4. To help us with these mappings, Lankhorst (2017) already proposed a set mapping between customer journey concepts and Archimate concepts, shown in Figure 33.

| *Customer Journey Map* | *ArchiMate* |
|---|---|
| Persona | Business Role |
| Customer Journey, Process, Scenario | Business Process |
| Stage | Business Process |
| Touchpoint | Business Service |
| Channel | Business Interface |
| Experience, Feeling | Metric (specialisation of Driver), or profile attribute |
| Evaluation | Assessment |
| Opportunity, Improvement | Requirement |

Figure 33: Customer journey mapping to Archimate, proposed by Lankhorst

Although Lankhorst did not add rationals for these mappings, they can still serve as additional support for the mappings we find ourselves. To map the concepts, we compare the descriptions of user journey concepts from Table 12 to the Archimate concept descriptions from Table 38, Appendix E. As we already mapped user journey concepts to Archimate element types, we have already narrowed down the amount of optional mappings to choose from. The mapping of user journey concepts to Archimate concepts is shown in Table 15 below. Each mapping is explained with a rationale. The corresponding element types from the previous mapping are kept in the table to provide a full overview of the mappings.

Table 15: Mapping user journey concepts to Archimate element types

| User journey concept | Archimate element type | Archimate concept | Rationale |
|---|---|---|---|
| *User journey* | Passive structure element | Business object | A business object represents a concept within a business domain (ArchiMate® 3.0.1 Specification, 2019). The description matches with the description of a user journey; it is still a conceptual element until made explicit with a user journey map. |
| *User journey map* | Internal behaviour element | Business process | A business process is a sequence of business behaviours that achieves a specific outcome (ArchiMate® 3.0.1 Specification, 2019). A user journey map contains a series of user activities with the corresponding user experience, and thus counts as a series of behaviours. This mapping was also suggested by Lankhorst (2017) |
| *Persona* | Active structure element | Business role | A business role represents the responsibility for performing specific behaviour to which an actor can be assigned (ArchiMate® 3.0.1 Specification, 2019). In other words, a business role is a type of actor. This matches with idea behind a persona: a typical user type that summarizes many different individual users (actors). This mapping was also suggested by Lankhorst (2017) and suggested in The Open Group discussion session (Appendix D). |
| *Channel* | Active structure element | Interface | A business interface is a point of access where a business service is made available to the environment (ArchiMate® 3.0.1 Specification, 2019). As a channel allows the user to access products and services, these concepts seem to be the right match. This mapping was also suggested by Lankhorst (2017) and suggested in The Open Group discussion session (Appendix D). |
| *Activity* | External behaviour element | Business service | A business service is an explicitly defined exposed business behavior (ArchiMate® 3.0.1 Specification, 2019) that can be externally executed/used. The Archimate meta model allows business services to trigger one another, creating a series of behaviours. A Business process was also considered as it represents a sequence of behaviours to achieve a certain outcome (ArchiMate® 3.0.1 Specification, 2019). Though, a business process is about internal behaviour while the user and his/her actions are external. |
| *Stage* | Internal behaviour element | Business process | A stage contains one or multiple activities (ArchiMate® 3.0.1 Specification, 2019). In other words, it represents a collection of behaviours. Unlike activity, stage is not executed by the user, but merely serves as container. Thus, a stage can be an internal behaviour element. The mapping was also suggested by Lankhorst (2017). |
| *Experience* | Motivation element | Metric (Specialisation of Driver) | A metric is the extent, quantity or degree of something (Lankhorst, 2017). The experience represents a degree: the degree of happiness. The degree of happiness can be presented in strings (happy, unhappy or neutral) or scaled in quantities. This mapping was also suggested by Lankhorst (2017) and suggested in The Open Group discussion session (Appendix D). |
| *Moment of truth* | Motivation element | Assessment | An assessment is a result of an analysis (ArchiMate® 3.0.1 Specification, 2019). The description matches the idea of the moment of truth where the user evaluates the different options in order to make a decision (that determines how the journey will be continued or stopped). |
| *Journey goal** | Motivation element | Goal | A goal is a high-level statement, intent, direction or desired endstate for an organisation or its stakeholders. As the journey goal represents the desired endstate of the persona (that represents multiple users), the journey goal matches the goal concept. |
| *Timeline* | Motivation element | Requirement | A requirement is a statement of need that must be met by the architecture (ArchiMate® 3.0.1 Specification, 2019). As the timeline is an indicator of how long a stage or journey should take, it serves as a requirement that should be met. |
| *Opportunity* | Motivation element | Requirement | An opportunity is a suggested improvement. The suggested improvement can be seen as a need that must be met by the architecture. This mapping was suggested by Lankhorst (2017). |
| *Abstraction level* | Motivation element | Requirement | The abstraction level is the level of detail of a user journey map. The abstraction level says something about how a user journey map should be created and read. Thus, the abstraction level matches with the description of a requirement. |
| *Thought* | Motivation element | Meaning | A meaning is the knowledge, expertise or interpretation of an element in a particular context (ArchiMate® 3.0.1 Specification, 2019). A thought is a representation of a user's thinking and interpretations, it matches the description of |

* Note that we changed the user journey concept 'Goal' into Journey goal. The name of this concept is changed because Goal is already a concept within Archimate, and this is a goal specific for a (user) journey.

With our mappings finished, we create a visual overview of the mapping, shown in Figure 34. The Archimate element types are again shown in white boxes (written in italics), the Archimate concepts are visualised in light-grey and the user journey concepts in dark-grey (except for the abstract User journey concept that is shown in white).

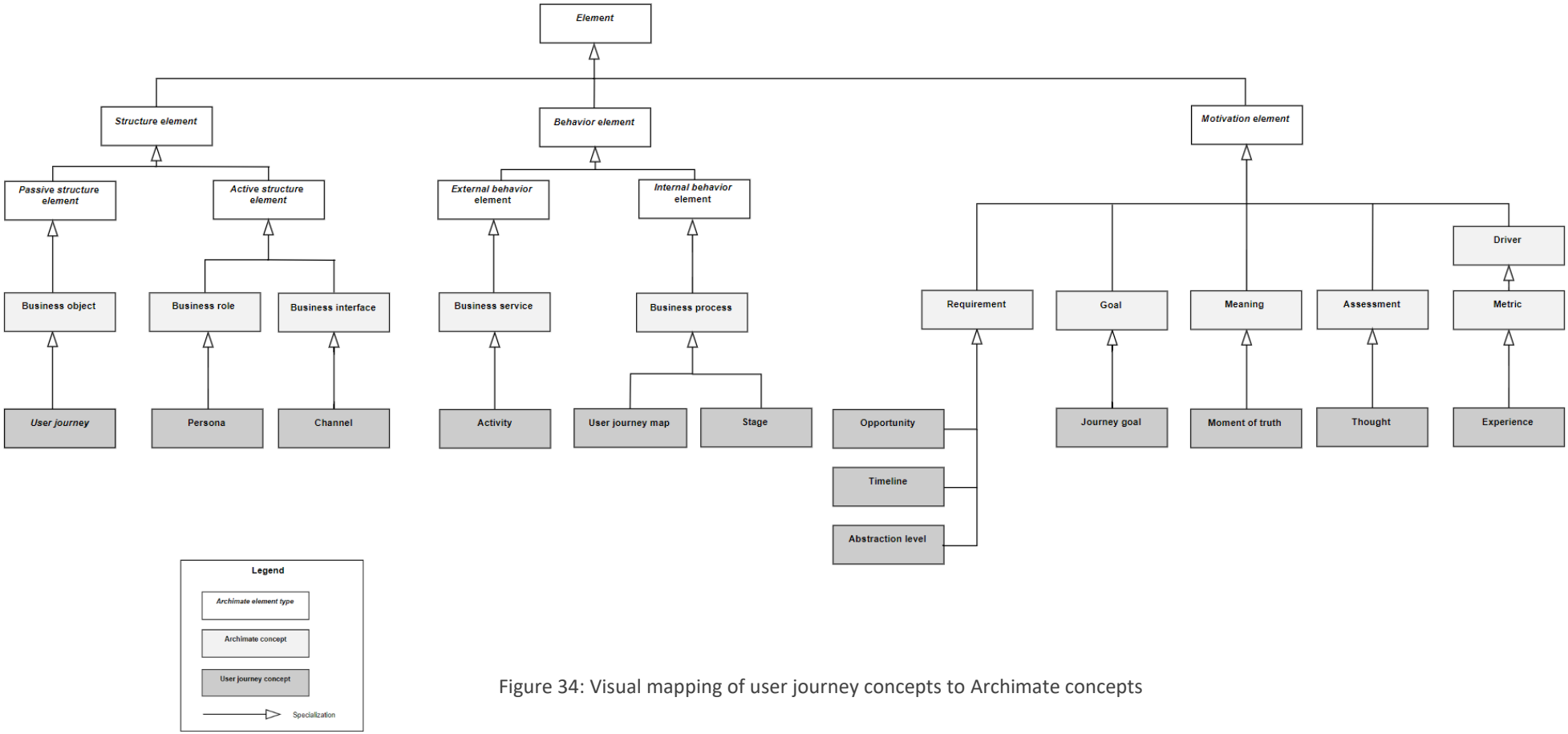



Figure 34: Visual mapping of user journey concepts to Archimate concepts

### 4.5.4. User Journey Extended Archimate meta model

As we have finished mapping the user journey concepts onto Archimate concepts, we have almost extended Archimate with user journeys. As final step, we need to integrate the relationships among the user journey concepts in Figure 34. These relationships were already established in the user journey meta model from Figure 27, subsection 4.3.2. However, the composition relationships from the user journey meta model are quite restricting the user's freedom compared to Archimate. Instead, Archimate tends to let the user decide which elements to include. However, Archimate does make certain elements mandatory in the specified viewpoints. In case an architect decides to use such viewpoint, there is of list of concepts that *must* be included. Hence, we replace the *compositions* from the user journey meta model into *aggregations*.

Combining the user journey meta model with the visual mapping from Figure 34, and replacing the compositions with aggregations, we create our meta model for *User journey Extended Archimate* (UJEA). The meta model is shown in Figure 35 (next page). Restrictions on elements to include will be specified in the *viewpoints* later (Subsection 4.6.1.). Note that the cardinalities from the user journey meta model have not been implemented in the UJEA meta model. According to Lankhorst (2016), Attributes, instances of entities and cardinalities are not supported in the Archimate meta models as they are "*too detailed for the enterprise architecture level of abstraction*". Along with a meta model comes a set of *attributes* for each meta class. However, the attributes remain the same as the identified attributes of the user journey meta model from Table 13 (subsection 4.3.2.)

As we now have our meta model, we still need to visualise how UJEA can fit in the current Archimate framework that was discussed in subsection 4.4.4. Comparing the definitions of *layers* (domains) and *aspects* (element types), the user journey extension seems to match more with a domain and thus a new layer must be introduced to the framework. The order of layers is structured from what happens at the front of a company (top of the framework), down to what happens internally (bottom of the framework). As user journeys are experienced by the user, the user journey layer should be placed at the top. Doing so, we extend the Full Archimate Framework as shown in Figure 36.

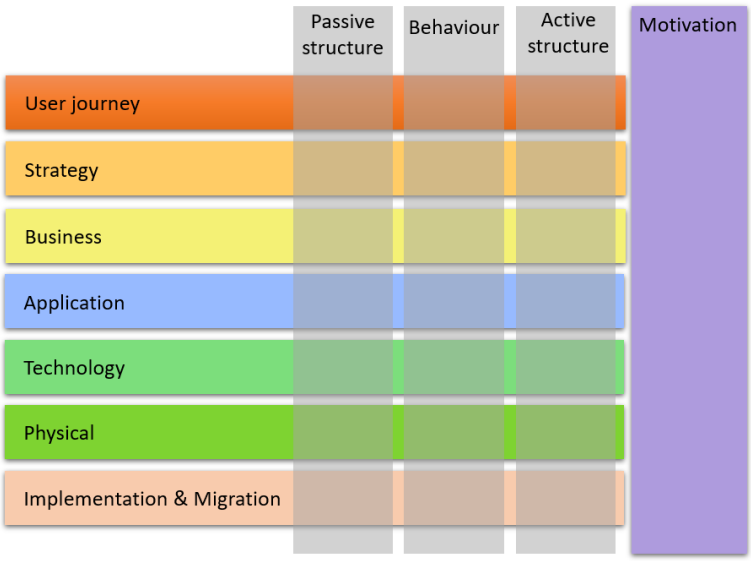



Figure 36: New Full Archimate Framework

As we have finished the UJEA meta model and the new Full Archimate Framework, we can start creating a notation, create our first example, and identify potential relationships with other layers to allow a cross-layer model. Hence in our next subsections, we create a notation (4.5.5.), we create an example (4.5.6.) and establish the relationships with elements from other layers (4.5.7.).

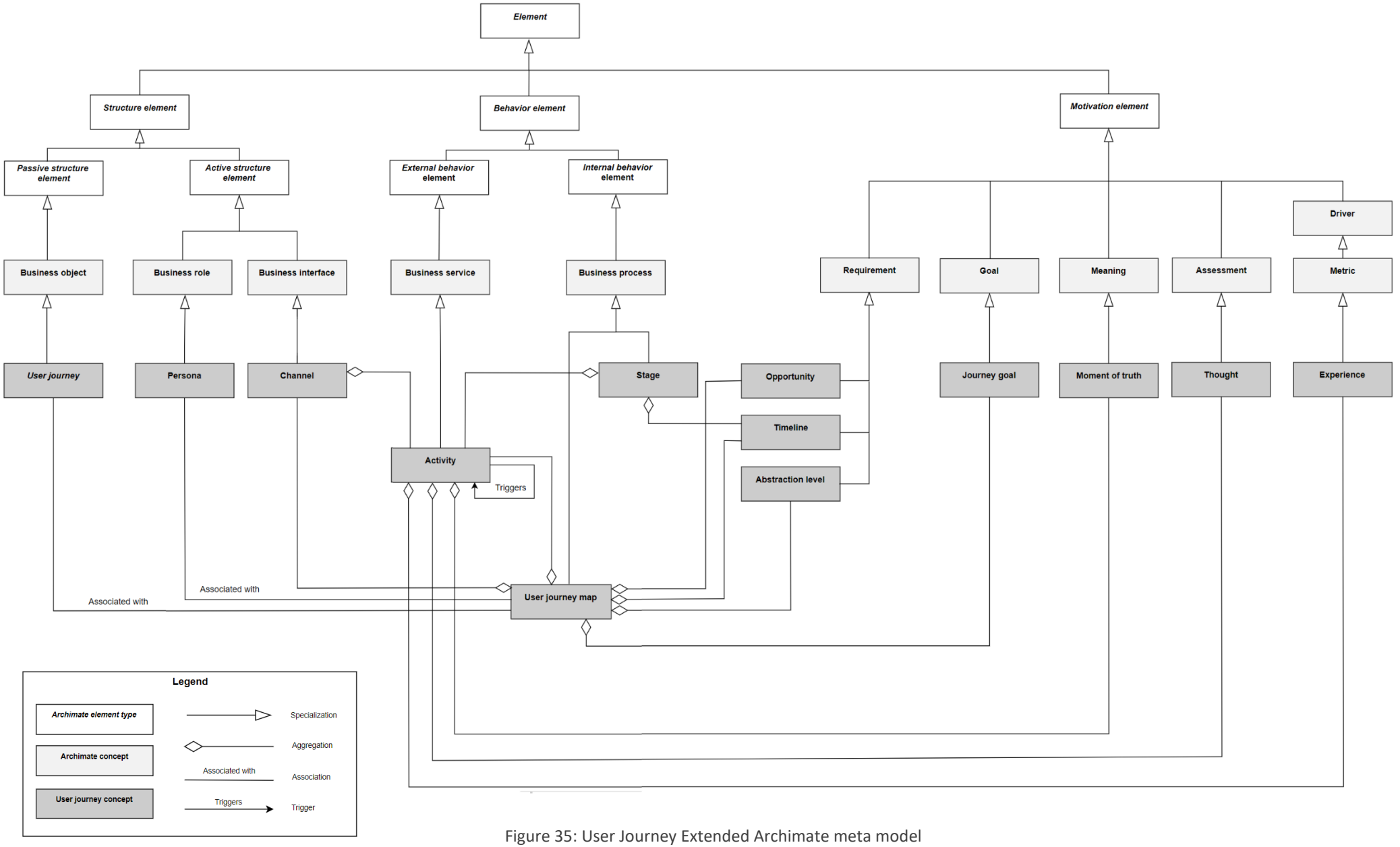



Figure 35: User Journey Extended Archimate meta model

### 4.5.5 Graphical notation

In this subsection, we will create a notation for User Journey Extended Archimate. We start with creating a set of guidelines help us shape the notation and ensure the notation will fit the artefacts purpose.

**1. Use of orange to denote user journey elements**

Following the Archimate layout conventions of Lankhorst (2017), colours should be used for emphasis. There is a perceptual order in the colour spectrum that determines the way humans view colours. The colour red seems to draw the most attention; it stands out of all the other colours and tends to focus on the foreground. User journeys happen on the front of a company, which would make red would be a nice match. Though, the implementation and migration layer has already been given the coour red, thus we choose orange, a colour similar to red, as the colour to denote user journey concepts. Another layout convention from Lankhorst (2017) says that colours should be used to indicate similarity. To follow the convention, we aim to colour all user journey concepts with an orange tint.

**2. Use of shapes of the matched Archimate concepts**

Following the Archimate layout conventions of Lankhorst (2017), similar shapes should be used for similar concepts. This means that when shapes are similar, people expect that semantics will be similar as well.
The convention helps us selecting shapes for the notation of each concept: we already mapped user journey concepts to Archimate concepts that had a matching description. Thus, we can use the shape of the Archimate concept that matches the user journey concept, as users are already familiar to its sematics.

**3. Select icons that are generally associated with the corresponding concept**

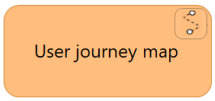
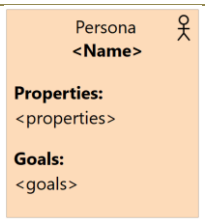
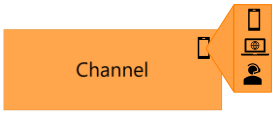
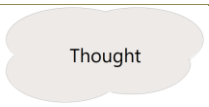
We aim to choose icons that people associate with the concept. This way, the semantics of the elements become self-exploratory through the association people have with that icon.

**4. Create a user journey notation that UX designers can understand**

During the case study, we observed that architects understand the deliverables of UX designers, but not the other way around. As we chose to extend the language of the enterprise architect, the UX designer might find it difficult to understand the semantics of UJEA. Thus, we tend to create a design similar to the observed UX design journeys at ContextMSP, positioning the elements in a similar way and adding emotions to the journey map (as the observed architect journey examples did not). The guideline sets priority on simplicity and usability and a focus to make it understandable for the UX designer.

As we now have a set of general guidelines, we start creating our notation for UJEA. The notation is shown in Table 16, along with a rationale for each notation. The rationale explains the selected icons, shapes and colours.

Table 16: Notation for UJEA

| User journey concept | Notation | Rationale |
|---|---|---|
| *User journey (abstract)* | - | The user journey itself is an *abstract concept.* Therefore, we do not model the user journey (no notation necessary). |
| User journey map |  | For the user journey map, we use the icon that is generally used to depict a journey. Further, we use the shape of a business process. The concepts of a user journey map are visualised inside the user journey map, rather than connecting elements with aggregations and compositions. Following the Archimate layout conventions of Lankhorst (2017), crossing lines should be avoided. Additionally, the journey maps exampled in the problem investigation showed one big map with elements placed inside. Thus, we stick to the design people are already familiar with. |
| Persona |  | Although mapped on business role, we take the icon of business actor as the icon associated to a human. Further, we use the shape of a note as notes are made to contain a bunch of text, which will be the case with a persona (showing the persona's properties and goals) |
| Channel |  | As shape, we use a rectangle as it represents a passive structural element. As icons, we specify app, website and chatbot as most common digital channels. Thus, we chose icons that are commonly used to represent these systems. |
| Stage |  | As stage was mapped on business process, we use both the icon and shape of a business process. The use of an arrow is a common icon for indicating a phase, thus it fits the purpose for indicating a stage. |
| Experience |  | Following the Archimate layout conventions of Lankhorst (2017), colours should be used to convey emotions. Additionally, requirement 32 and 34 from our requirement list said to use emoticons and colours to represent experience. Observed from the examples in the problem investigation, green is used for positive experience, yellow for neutral experience and red for negative experience. |
| Moment of truth |  | Moment of truth was to indicate an important decision was made by the user at a certain moment (activity). Thus, as sign of importance, we use an exclamation mark. The figure was kept small so it can be placed on the activity it belongs to (without taking too much space). The decision itself can already be traced from the thought and activity. |
| Journey goal |  | For goal, we stick to the icon and shape of a goal. A bullseye is a common representation for a goal. |
| Timeline |  | We choose the shape of a note as it has a plain look; it simply serves the purpose to show the time of a journey map or stage. The time is denoted with a string to give freedom to the user on how to express the time. |
| Opportunity |  | For opportunity, we chose an icon of a light bulb. Light bulbs are common for presenting idea's, matching the purpose and meaning of an opportunity. For the shape, we kept the motivation element shape. |
| Activity |  | For activity, we use an icon of a hand clicking on something. The 'click' represents a user interaction with the system used as a channel. As shape, we kept the behaviour element shape. We use a light shape as the elements behind it are quite dark. By using this colour contrast, we aim to get the attention of the reader towards the activities. |
| Abstraction level |  | Just like for Timeline, we use a simple, plain looking shape to indicate the abstraction level. It gives important information to the reader (The level of detail/scope of the journey) but it is not what we want the journey map reader to focus on. |
| Thought |  | A common icon or symbol for thoughts are grey or white clouds. Due to this reason, the clouds are kept grey instead of orange. The shape was already used in Archimate for the concept Meaning, which also happens to be the mapped Archimate concept. |

As we finished our notation, we use the notation and defined relations from the UJEA meta model to create an illustrative case that shows how the notation can be applied.

### 4.5.6. Illustrative case

In this section, apply the notation to a fictional case to illustrate the use of the notation. For this, we make use of an enterprise architecture tool called Archi. The illustrative case visualises the user journey of transferring money from a savings account to a debit account. The main objective of the illustrative case is to provide a visual example of how the notation can be applied, clarifying the *sizes* and *positions* of notation elements. The illustrative case is shown in Figure 37.

In this case, the user is represented by a *persona* named Bob. The persona is presented on the right, along with the properties and general goals. At the left of the user journey map, we see the *goal*: "Bob wants to have sufficient balance to pay his groceries". In the middle, we see the *user journey map* with the *abstraction level*: Low. This means that the user journey map is modelled from a detailed perspective. In the middle, we see a large swimlane with a telephone icon that represents the used *Channel*: an app. Within the swimlane, we see three *stages:* Login, Balance check and Tranfser money. Each stage has its own *timeline* donated into seconds.

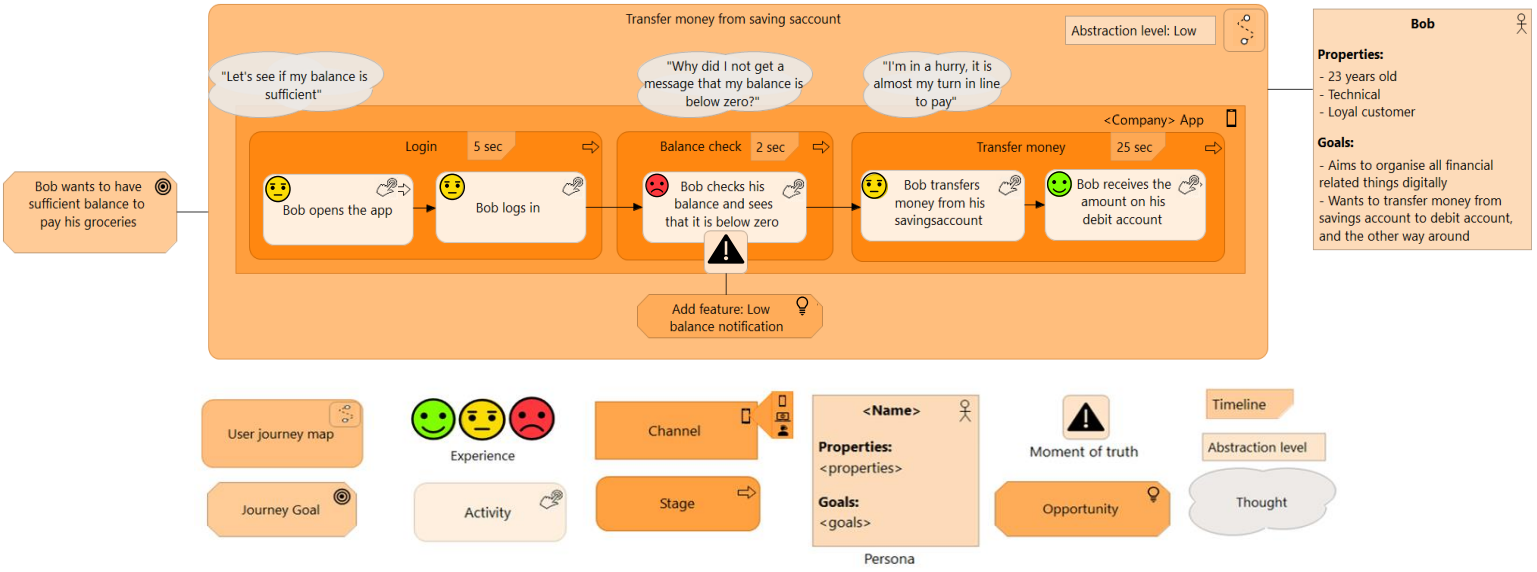



Figure 37: Illustrative case: Transfer money from savings account (user journey)

Within each stage, we see the *activities*, connected by trigger relations. The series of activities shape the scenario that Bob sees that his balance is below zero, and thus he transfers money from his savings account to his debit account. Each activity shows the *experience* of Bob at that time. We see that in general, bobs emotions are neutral, but at the middle activity he is not very happy he did not receive a message that his debit balance went below zero. In the end, we see that Bob is happy after he quickly transferred the required money. We also see a *moment of truth* connected to the activity where Bob notices his balance is too low, as Bob has to make a decision on what to do, which greatly influences the rest of the user journey. Additionally, we see an *opportunity* mapped onto the moment of truth: Introduce a low balance notification. Having this feature implemented would solve the unhappy status of Bob in this scenario. At last, Bob's *thoughts* are presented on top of the channel, giving extra context and explanation to the activities.

### 4.5.7. Platform dependent UJEA meta model

The example from Figure 37 was created through iterative sketching, varying the positions and sizes of the elements. This sketch turned out to be the most convenient way of presenting the information, but some relationships among elements had to be changed. This means that the example is not compliant to our UJEA meta model. Thus, we adjust the UJEA meta model with adjusted relationships visible in our Archi example from Figure 37. This leads to the creation of the *Platform dependent UJEA meta model*, shown in Figure 38. The adjusted relationships are coloured in orange.

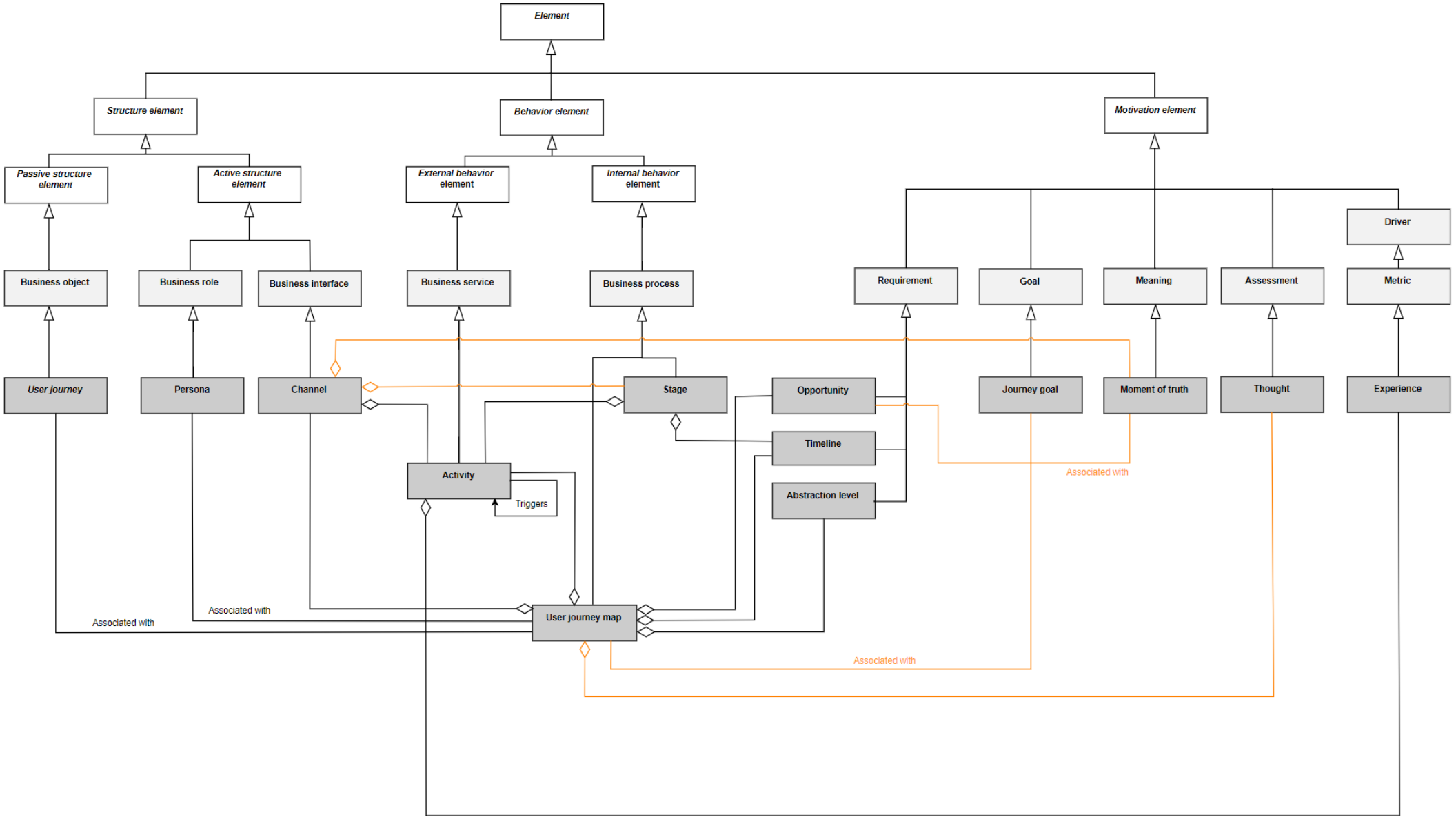



Figure 38: Platform dependent UJEA meta model

As the *Channel* in Figure 37 contained *Stages* and a *Moment of truth* while these elements were optional, there are two new aggregrations that go from *Channel* to *Stage* and *Moment of truth*. As *Moment of truth* is not modeled within the *Activity* (as it would reduce readability), we removed the aggregation from *Activity* to *Moment of truth*. Further, the association relation was used between *Opportunity* and *Moment of truth* to show an important user decision can lead to certain *Opportunities*. Hence, the new association link was included. The example also showed that the *User journey map* was linked to a *Journey goal* through an association instead of composition to improve the readability of the *User journey map*. Hence, the composition relationship between these two concepts is changed into an associated with relationship. In the example, *Thoughts* are not contained by the *Activity* anymore, but by the *User journey map*. This explains the aggregation relationship floating from *User journey map* to *Thought*.

### 4.5.8. Cross layering: Connecting the user journey to other architecture

To be able to connect a user journey map or specific user journey components to other architecture, we need to specify what elements and through which relationship they can be connected. If we look at the introduced strategy layer and motivation layer in the Archimate specification, it seems a meta model is created that shows which concepts or concept types may be linked to the newly introduced elements (ArchiMate® 3.0.1 Specification, 2019). Hence, we specify the allowed relationships with other Archimate concepts in a meta model, shown in Figure 39.

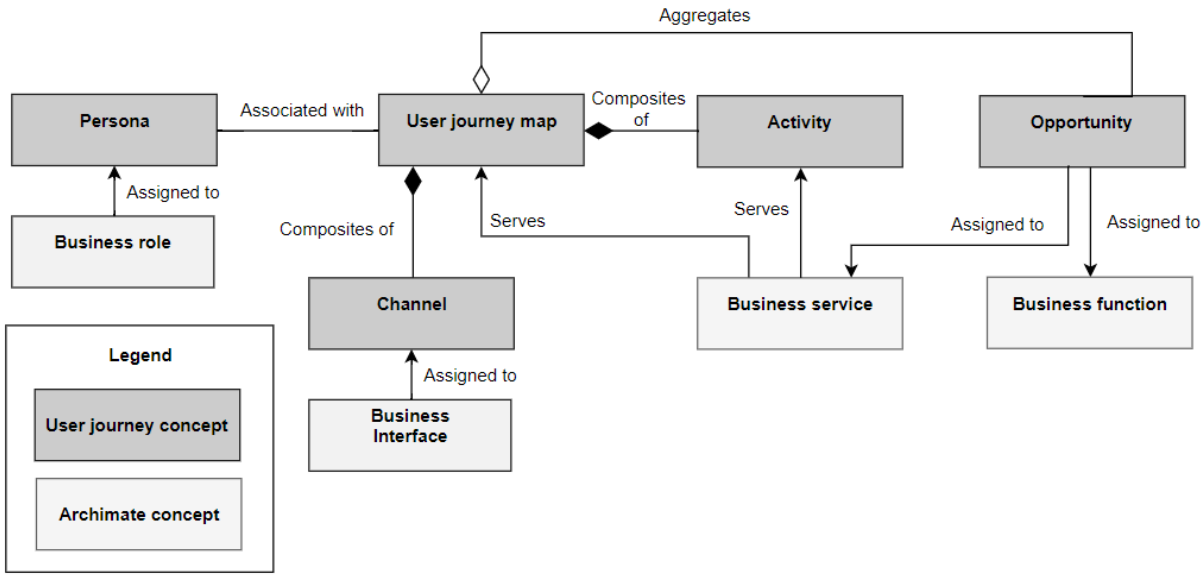



Figure 39: UJEA cross-layer meta model

A *User journey map* as well as an *Activity* can be served by a *Business service.* In Archimate, business services are the common elements to serve a different layer, allowing layers to be connected to one another. That is why Archimate is called a service-oriented modelling language (Lankhorst, 2017). Further, an *Opportunity* may be connected to *a Business service* or to a *Business function*. As opportunities need to be assigned to development teams, business function is the preferred option. We also see that a *Business interface* can be assigned to a *Channel*, as business interfaces (that correspond to the modelled channel) are commonly modelled within the business layer. We also see that *User journey maps* can be associated by other *User journey maps*. The rest of the relationships are inherited relationships among user journey concepts from the UJEA meta model. In the next chapter we discuss multiple applications of the artefact. Several cross-layer viewpoints will be defined with examples, showing how the UJEA cross-layer meta model can be applied.

# 4.6. Applications of UJEA

As we finished creating our artefact, we can explore the possibilities and applications of the artefact. In this chapter, we define different viewpoints (4.6.1.), the potential of traceability links (4.6.2.), and the explain how the artefact helps aligning UX designers and architects (4.6.3.).

## 4.6.1. UJEA viewpoints

Archimate allows architects to use their own views on the Enterprise Architecture. These views are specified in viewpoints. A viewpoint defines a scope/perspective on specific architecture, meant for a specific stakeholder(s), addressing specific concerns. A view on the other hand, is a visualisation of a specific viewpoint (ArchiMate® 3.0.1 Specification, 2019). As we extended Archimate with a user journey domain, we can also specify new viewpoints. As we discussed in subsection 4.5.4., the viewpoints are also used to make a set of elements mandatory for creating specific views. For defining the viewpoints, we follow the viewpoint template from ArchiMate® 3.0.1 Specification (2019).

### 1. User Journey Viewpoint

The user journey viewpoint depicts a whole user journey with all elements (either high-level or low-level). This viewpoint is used for UX designers, business analysts and architects to discuss an existing user journey or a new user journey in detail. The viewpoint specification is shown in Table 17. This viewpoint mainly serves the purpose of analysing and improving a specific journey.

Table 17: Viewpoint specifications: User Journey viewpoint

| ***User journey viewpoint*** | |
|---|---|
| *Stakeholders* | User, Enterprise architect , UX designer, Business analyst |
| *Concerns* | A specific user journey with all elements included |
| *Purpose* | Designing, evaluating, deciding |
| *Scope* | Single-Layer |

***Required elements***

- User journey map
- Persona
- Journey goal
- Channel
- Stage
- Activity
- Experience
- Thought
- Opportunity
- Moment of truth
- Abstraction level
- Timeline

***Example***

An example view of the user journey viewpoint was shown in the illustrative case discussed back in Chapter 4.5.6. The example is again shown in Figure 40 below.

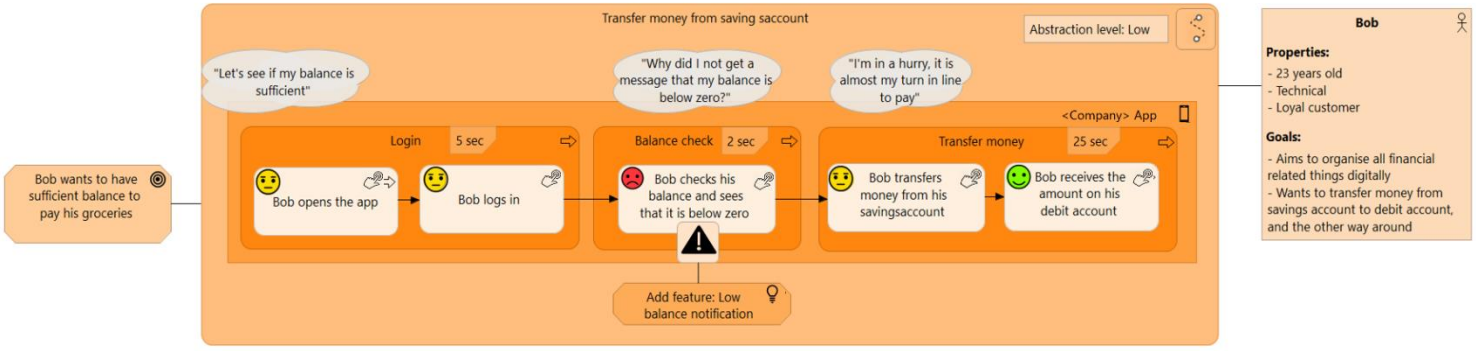



Figure 40: User Journey view (example)

## 2. User Journey Business Realization Viewpoint

This viewpoint shows which activities within a user journey map are supported by what business services, business processes and business functions. The viewpoint gives insight about what teams or individuals are responsible for certain parts of a user journey. The viewpoint specifications are shown in Table 18. As this is a cross-layer viewpoint, one must follow the cross-layer meta model that was defined in Chapter 4.5.8

Table 18: Viewpoint specifications: User Journey Business Realization Viewpoint

| *User journey viewpoint* | |
|---|---|
| *Stakeholders* | Enterprise architect, UX designer, Business analyst |
| *Concerns* | The business elements supporting a user journey |
| *Purpose* | Designing, evaluating, deciding |
| *Scope* | Cross-layer |

### *Required elements*

- User journey map
- Persona
- Journey goal
- Channel
- Stage
- Activity
- Experience
- Thought
- Opportunity
- Moment of truth
- Abstraction level
- Timeline
- Business service
- Business process
- Business function
- Business actor/ Business role (optional)
- Business interface (optional)

### *Example*

An example view of the User Journey Business Realization Viewpoint is shown in Figure 41 below. For connecting the user journey to the business layer, we follow the cross-layer meta model that was defined in Chapter 4.5.8. The business architecture connected to the user journey belongs to a company called ExampleBank, that has three business functions: *Access management, Balance management* and *Transaction management*. Each Business function has its own subprocesses. Examining how the user journey layer and the business layer are connected, we see several activities being *served* by different business services. For example, the business service *Show Customer Balance* serves two activities: The activity where Bob sees his old balance, and the activity where Bob receives a notification that the transaction was successful. Further, we see the opportunity *Add feature: Low balance notification* assigned to *Balance management*, meaning that Balance management will be responsible for creating this new feature.

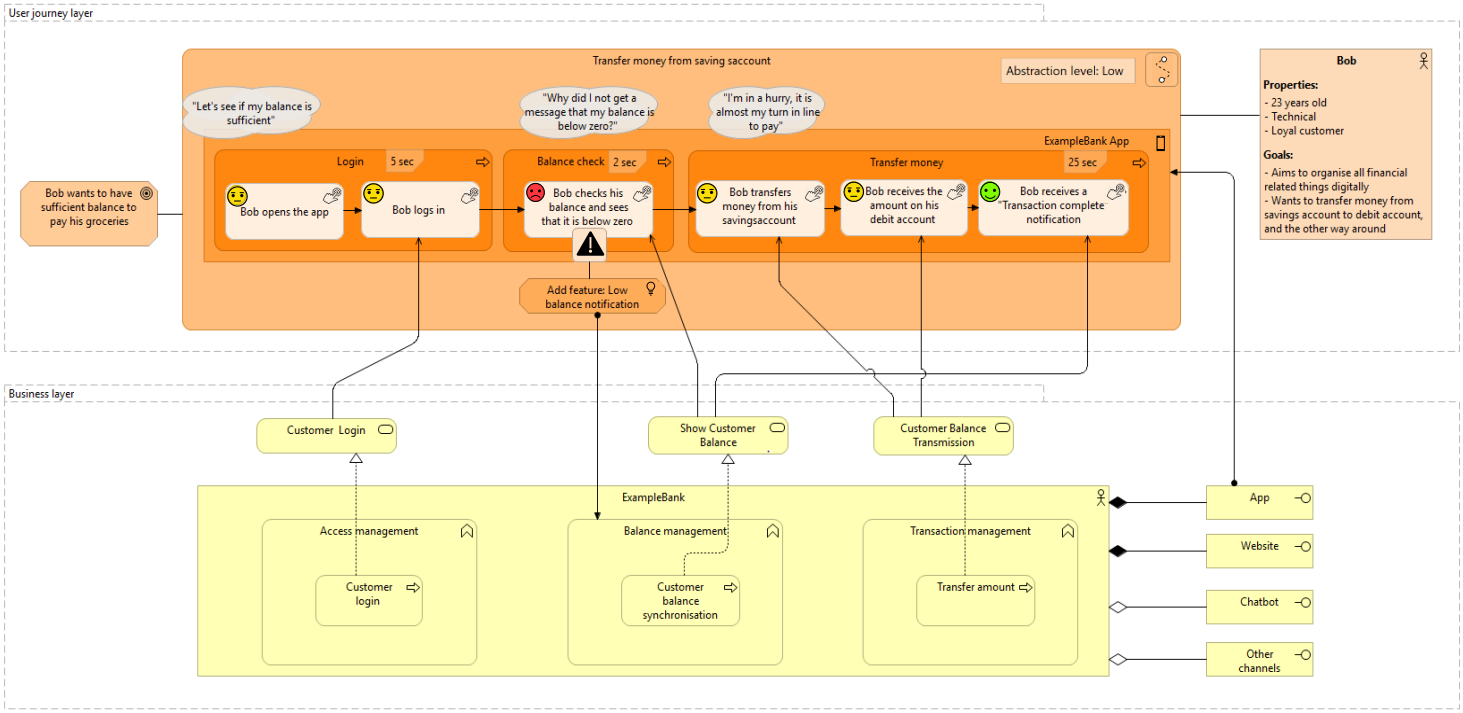



Figure 41: User Journey Business Realization view (example)

### 3. User Journey Application Realization Viewpoint

This viewpoint shows what applications are supporting the business processes and business functions that support the user journey. As this is a cross-layer viewpoint, one must follow the cross-layer meta model that was defined in subsection 4.5.8. The viewpoint specifications are shown in Table 19.

Table 19: Viewpoint specifications: User Journey Application Realization Viewpoint

| *User journey viewpoint* | |
|---|---|
| *Stakeholders* | Enterprise architect, UX designer, Business analyst |
| *Concerns* | Applications that support the business elements that support a user journey |
| *Purpose* | Designing, evaluating, deciding |
| *Scope* | Cross-layer |

#### *Required elements*

- User journey map
- Persona
- Journey goal
- Channel
- Stage
- Activity
- Experience
- Thought
- Opportunity
- Moment of truth
- Abstraction level
- Timeline
- Business service
- Business function
- Business process
- Business actor/ Business role (optional)
- Business interface (optional)
- Application component
- Application service
- Application process (optional)
- Application function (optional)

#### *Example*

An example of a User Journey Application Realization view is shown in Figure 42. The example is similar to User Journey Business Realization example, but now the user journey is also connected to the application layer.

In the application layer, we see two systems: *CRM system* and *Finance system*, offering application services to the business layer. *Customer login* is supported by *CheckCredentials*, *Customer balance synchronisation* is supported by *GetBalance*, and *Transfer amount* is supported by *ChangeBalance*. Furthermore, Examplebank has multiple channels shown as business interfaces such as a *Website*, *App* or a *Chatbot* (not all channels are shown).

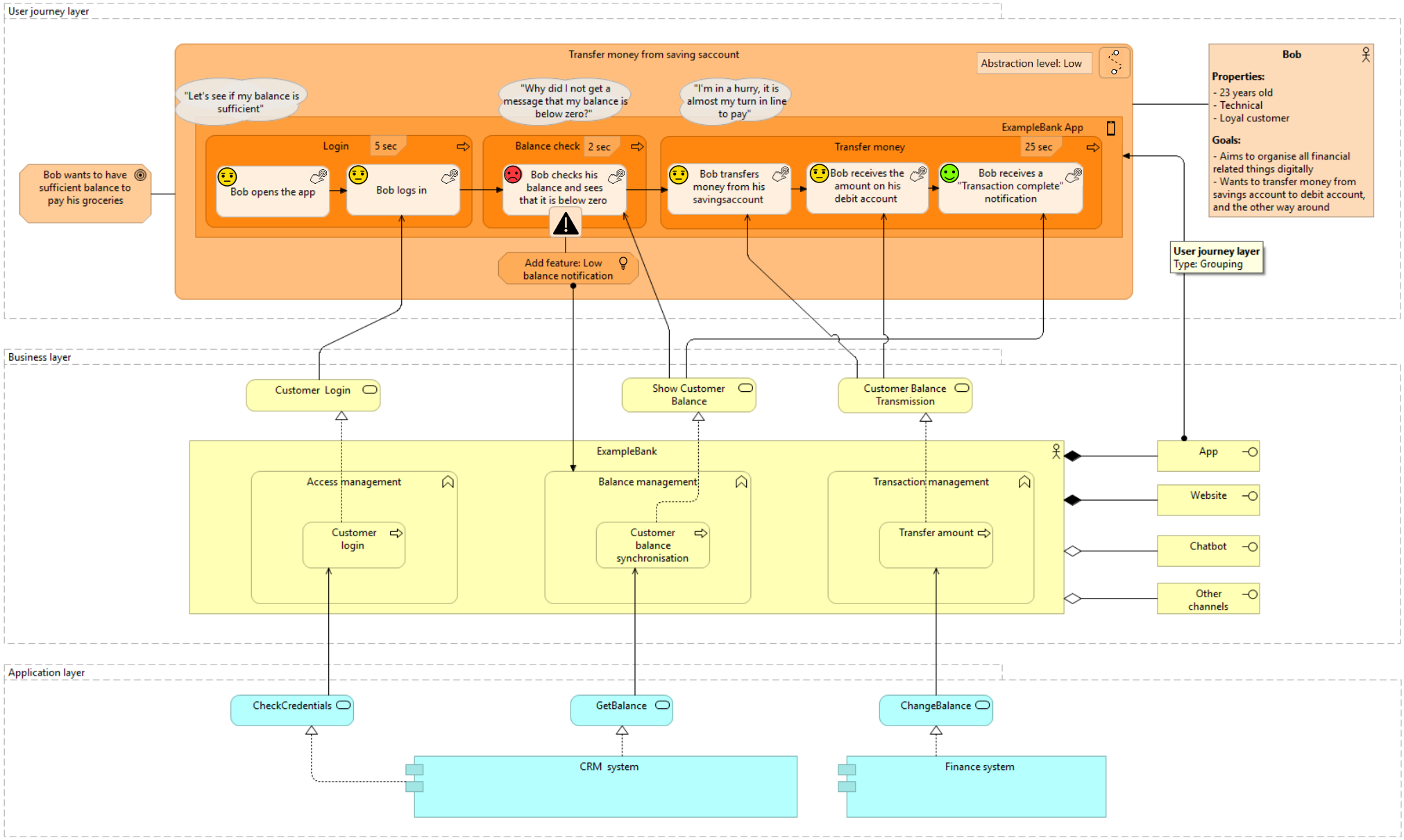



Figure 42: User Journey Application Realization view (example)

## 4. User Journey Overview Viewpoint

This viewpoint serves to create an overview of a set of user journey maps. By grouping or associating user journey maps, analysts, architects or UX experts can structure and brainstorm about user journeys. A user journey overview can provide a structure to make it easy to connect to the business layer, but it can also help other stakeholders to give an idea of specific journeys that exist in a certain context. The viewpoint specifications are shown in Table 20.

Table 20: Viewpoint specifications: User Journey Overview Viewpoint

| *User journey viewpoint* | |
|---|---|
| *Stakeholders* | Enterprise architect, Business analyst |
| *Concerns* | Multiple user journey maps (that can have commonalities) |
| *Purpose* | Designing, evaluating, deciding |
| *Scope* | Single-layer |

### *Required elements*

- User journey maps (at least 2)
- Grouping (optional)

### *Example*

An example of a User Journey Overview view is shown in Figure 43. The example shows a total of ten of user journey maps from the banking company ExampleBank. The user journey maps are grouped on common topics to create structure. The overview of journeys is structured in two onboarding related-, four product related- and two mortgage related user journey maps. Two user journey maps remain ungrouped as they had no topic commonalities with other user journey maps.

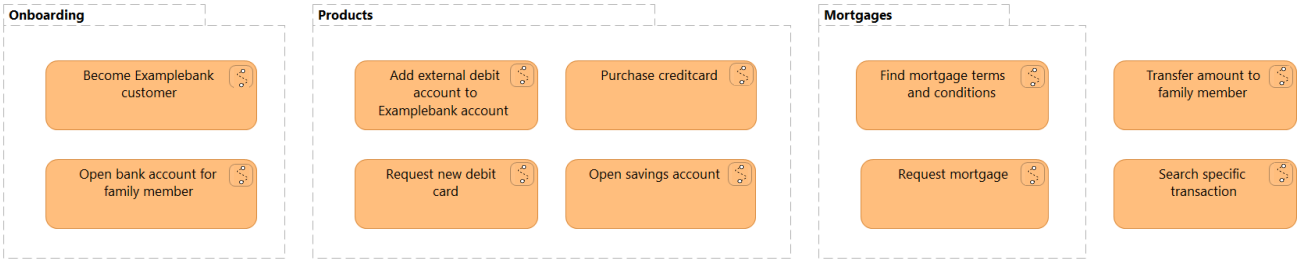



Figure 43: User Journey Overview view (example)

## 5. User Journey Overview & Business Realization Viewpoint

This viewpoint shows an overview of the business elements (functions/processes/services) that responsible for a set of user journeys. This viewpoint actually extends the User Journey Overview viewpoint by linking the user journey maps to the business layer. As this is a cross-layer viewpoint, one must follow the cross-layer meta model that was defined in subsection 4.5.8. The viewpoint specifications are shown in Table 21.

Table 21: Viewpoint specifications: User Journey Overview & Business Realization Viewpoint

| *User journey viewpoint* | |
|---|---|
| *Stakeholders* | Enterprise architect, Business analyst |
| *Concerns* | The business elements supporting a set of user journeys |
| *Purpose* | Designing, evaluating, deciding |
| *Scope* | Cross-layer |

### *Required elements*

- User journey maps (at least 2)
- Grouping (optional)
- Business service
- Business function
- Business process
- Business actor (optional)
- Business role (optional)
- Business interface (optional)

### *Example*

An example of a User Journey Overview & Business Realization view is shown in Figure 44. We see that 6 user journeys are supported by business services, -functions and -processes of ExampleBank. Starting on the left, the view shows that *Onboarding management* supports the user journey *Become ExampleBank customer*. Moving to the right, we see that Accountmanagement supports *Request new debit card*, *Purchase creditcard* and *Open savings account*. We Furthermore we see that *Mortgage management* supports *Request mortgage* and *Transaction management* supports *Transfer amount to family member*.

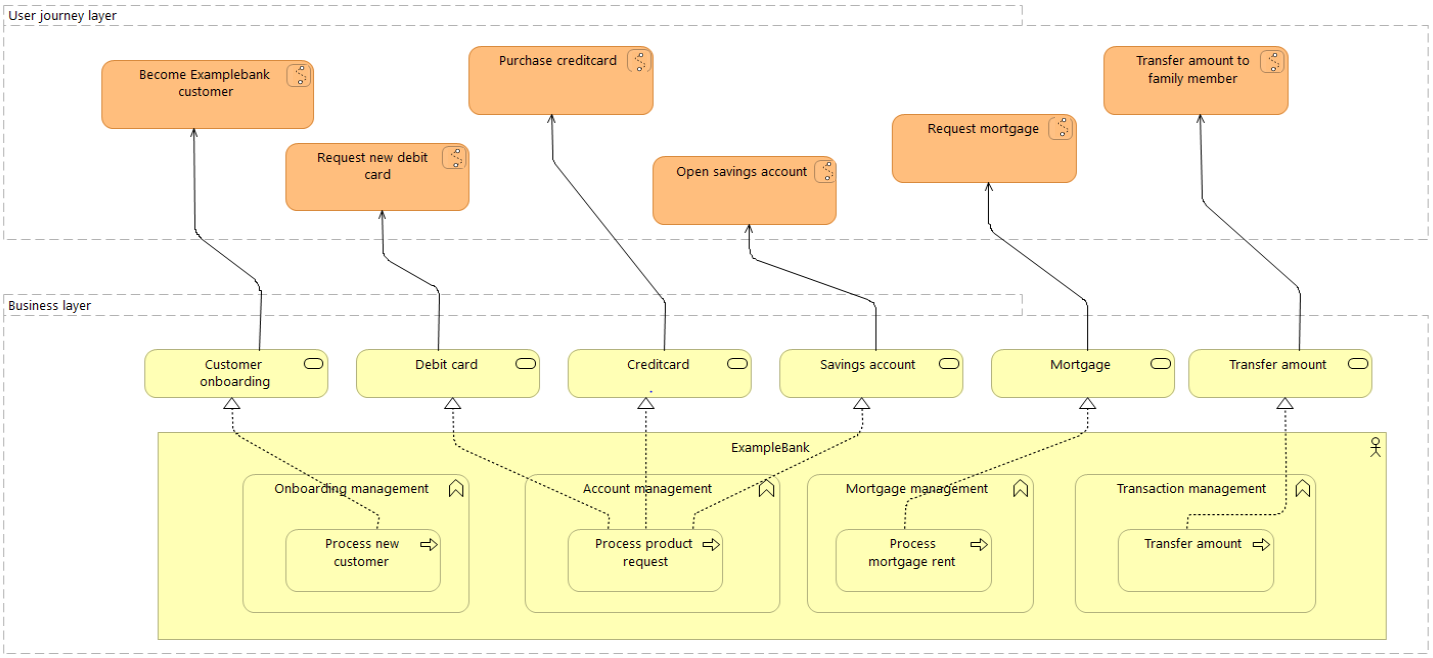



Figure 44: User Journey Overview & Business Realization view

## 6. User Journey Overview & Application Realization Viewpoint

This viewpoint serves to create an overview of applications, supporting the business services, -functions and -processes that support different user journeys. As cross-layer viewpoint, the cross-layer meta model from subsection 4.5.8 must be followed. The viewpoint specifications are shown in Table 22.

Table 22: Viewpoint specifications: User Journey Application Realization Viewpoint

| ***User journey viewpoint*** | |
|---|---|
| *Stakeholders* | Enterprise architect, Business analyst |
| *Concerns* | Applications that support business elements that support user journeys |
| *Purpose* | Designing, evaluating, deciding |
| *Scope* | Cross-layer |

### *Required elements*

- User journey maps (at least 2)
- Grouping (optional)
- Business service
- Business function
- Business process
- Business actor (optional)
- Business role(optional)
- Business interface (optional)
- Application component
- Application service.
- Application process (optional)
- Application function (optional)

### *Example*

An example of a User Journey Overview & Application Realization view is shown in Figure 45. The view extends the User Journey Overview & Business Realization example from Figure 44 with a set of applications supporting the business layer: *CRM system*, *Finance system* and a *Policy system*. The view shows that, for example, *onboarding of new customers* is supported by the CRM system, and that *Process product request, Process mortgage rent* and *Transfer amount* is supported by the *Finance system*. At last, a *Policy application* also supports the *Mortgage rent processing* as there are different (sometimes complex) policies for mortgages.

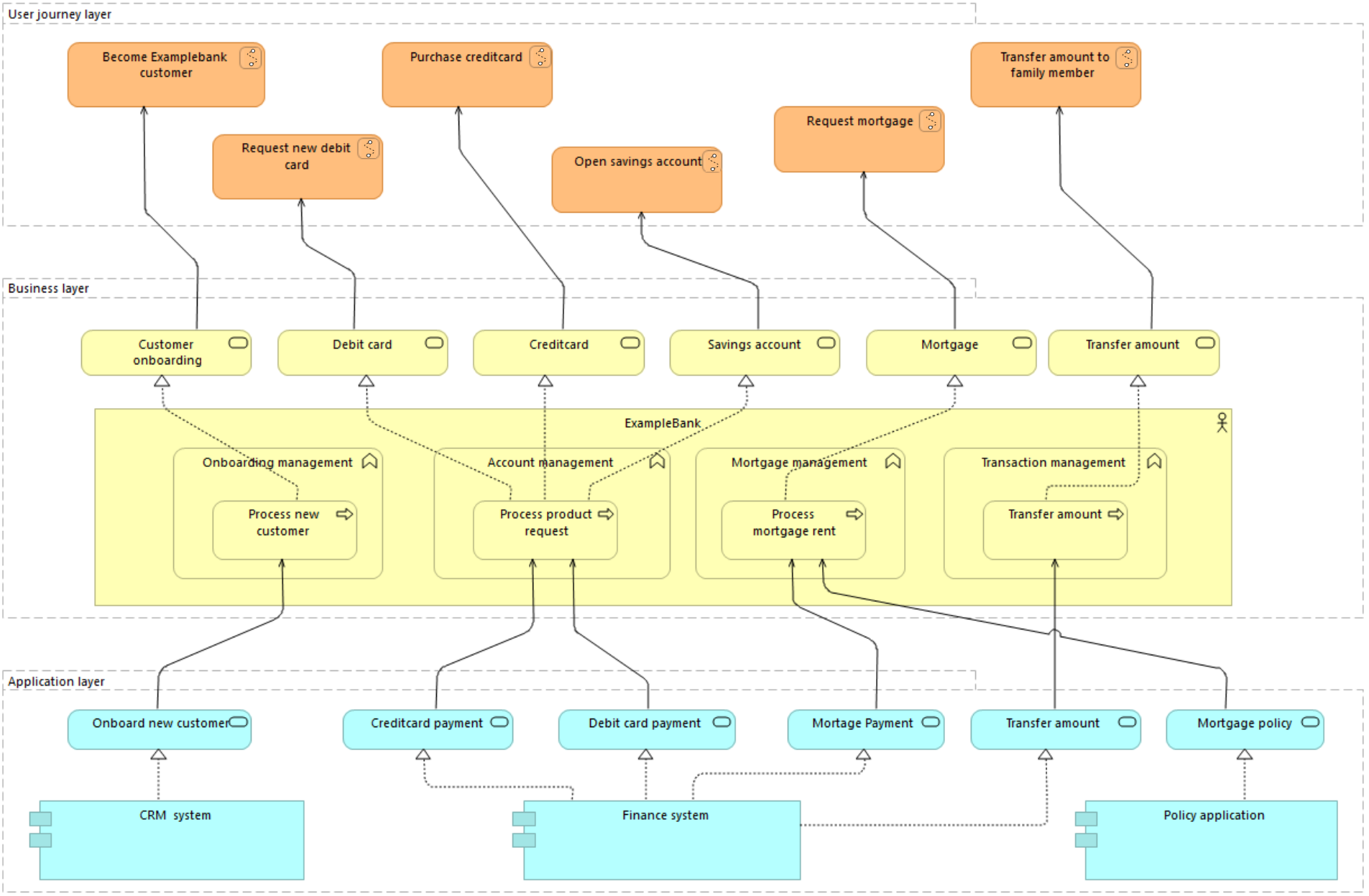



Figure 45: User Journey Overview & Application Realization view

### 4.6.2. Qualitative analyses: traceability links

Lankhorst (2017) described different types of analyses that can be performed with Archimate. One analysis in specific, *static functional analysis,* can be applied to user journey architectures to provide valuable insights. Lankhorst elaborated on static analysis with Archimate, showing that one can identify traceability links through relationships between elements. These traceability links can help visualize the impact of a specific change in the architecture. As example, Lankhorst showed a case of an insurance company that would want to change her role as intermediary. The example is shown in Figure 46.

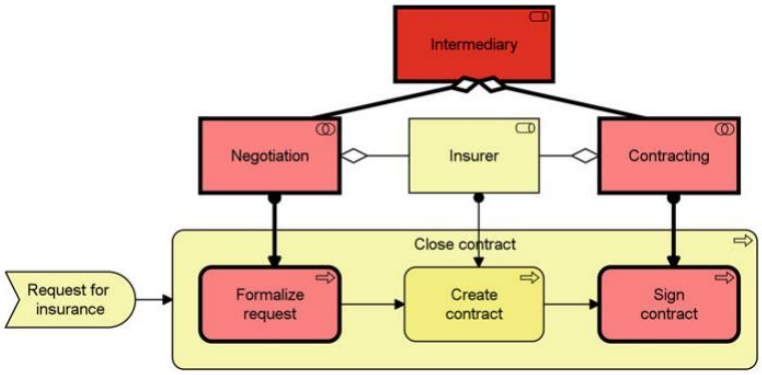



Figure 46: Traceability links through static analysis (Lankhorst, 2017)

The example shows a part of the business architecture of an insurance company; containing the company's roles *Intermediary* and *Insurer*, its business collaborations *Negotiation* and *Contracting*, and a business process *Close contract* that contains subprocesses to which the business collaborations are assigned. In case the insurance company wants to change its role as intermediary, it would impact both business collaborations Negotiation and Contracting. Changes to these business collaborations would on their turn have impact on the assigned business subprocesses. To visualize the chain of impacted elements i.e. *the traceability links*, Lankhorst coloured the impacted elements red. A visualization of the traceability links to a certain suggested change can help decision makers in giving insight to the affected elements and help them evaluate the difficulty and value of a specific architectural change.

By applying the traceability links of static functional analysis to user journey cross-layer views, we can create different impact analyses on user journey architecture. Hence, we identify two types of analyses: *Top-down traceability analysis* and *Bottom-up traceability analysis*.

#### 1. Bottom-up user journey analysis

In case a company considers changing the architecture, such as changing business processes or functions, or adjusting/replace that supports them, the company would want to know how many-, and what specific user journeys will be affected. Visualizing this through traceability links can give a direct picture of the consequences of a change. The traceability links start at the bottom (application layer) and go towards the top (user journey layer). Thus, we call this analysis the *Bottom-up user journey analysis*.

The Bottom-up user journey analysis can be applied to different cross-layer views. As example, we apply the analysis to the User Journey Overview & Application Realization view from Figure 47. The example shows the architecture that will be impacted by a change to the *Finance system* by highlighting the traceability links in red. With the analysis, one can see that a change to the Finance system would have great impact on the user journeys: four out of six user journeys will be impacted. This can be observed by following the traceability links, going from the application services, to the business processes and functions, to the business services that support the user journeys. With an overview of the impacted user journeys, one can create a trade-off analysis; discussing the value and role of each user journey, assessing in what way the journeys will be affected and other ways that help decision makers in finding the most beneficial architecture solution.

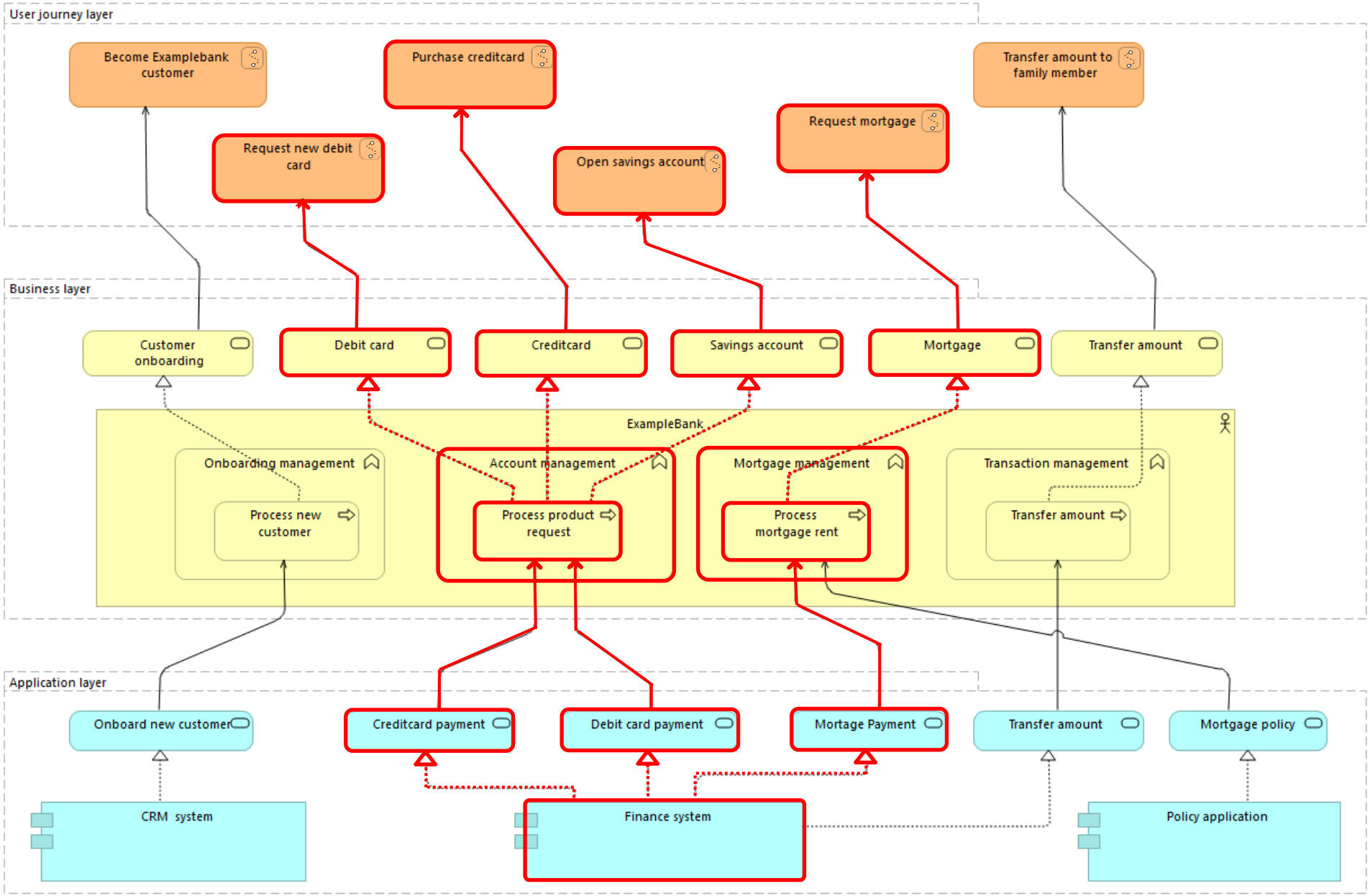



Figure 47: Bottom-up user journey analysis example: impacted user journeys when changing Finance system

### 2. Top-down user journey analysis

The initiator of an architectural change can start from the top: the user journey layer. For example, a specific step in a user journey could not go very well. The issue can be identified in multiple ways. A company could held a user satisfaction survey and find out that specific activity is not experienced well, or find out through google analytics that a certain feature is never used (analyzing click rates or webpage visits). To improve the negatively experienced activity, the company would want to know what business functions/processes are responsible, or what software is indirectly supporting the activity. As means to solve the issue, one could use the *Top-down user journey analysis*.

The top-down user journey analysis can be applied to different cross-layer views. As example, we perform a top-down user journey analysis to the discussed User Journey & Application Realization view from Figure 48 (Chapter 4.5.8.). The result is shown in Figure 48. In the example, we see a negatively experienced activity: ”Bob checks his balance and sees that it is below zero”. The corresponding thought to the activity explains that Bob is annoyed that he did not get a notification when his balance went below zero. When tracing down the business elements supporting this activity, we see that *Balance management* (business function) is responsible; the *Customer balance synchronization* process in specific. Tracing further down the architecture, one can see that the *CRM system* is the application supporting the troublesome activity. With the analysis, analysts can see that improving this specific user journey concerns the CRM system.

## 4.6.3. Alignment of UX designers and enterprise architects

In this thesis, we created the extended Archimate with user journeys to align UX designers with enterprise architects. Thus, alignment between the two parties is the main application of the artefact. In this section, we explain how UJEA can help bring UX designers and enterprise architects together.

The need for alignment between the two experts rose up from the fact that both fields work together to improve the user experience. Though, the experts are quite different in education background, work experience and technical expertise. For effective and efficient collaboration, the experts need to understand one another. As both fields are familiar with user journeys and customer journeys, we took the commonality as an opportunity to use user journey maps as means to communicate (that can be later extended to customer journeys). However, when examining user journeys and customer journeys in the literature, we found that both user journeys and customer journeys lack structure: there was no study on the most common user journey elements, no meta model and no notation to use.

By integrating user journeys into Archimate, we provided structure for mapping user journeys. While creating the artefact, we included multiple aspects of the UX designer’s user journey map in attempt to make the user journeys in Archimate understandable for both UX designers and Architects. This way, the experts can communicate through one common type of user journey maps with fixed semantics to make sure there is no room for different interpretations.

However, User Journey Extended Archimate provides more than just a common modelling language to facilitate communication. The artefact also creates the opportunity to link user journeys and user journey elements to existing architecture. The identified viewpoints and analysis possibilities of UJEA enables the enterprise architect to make strategic and technical evaluations on changing- or new user journeys. The strategic and technical perspective on the matter complements the detailed focus of UX designers to improve the experience of user journey. This way, the expertise of both fields is combined so that user journeys can be improved while taking the architecture into account, and architecture can be improved while considering the related user journeys.

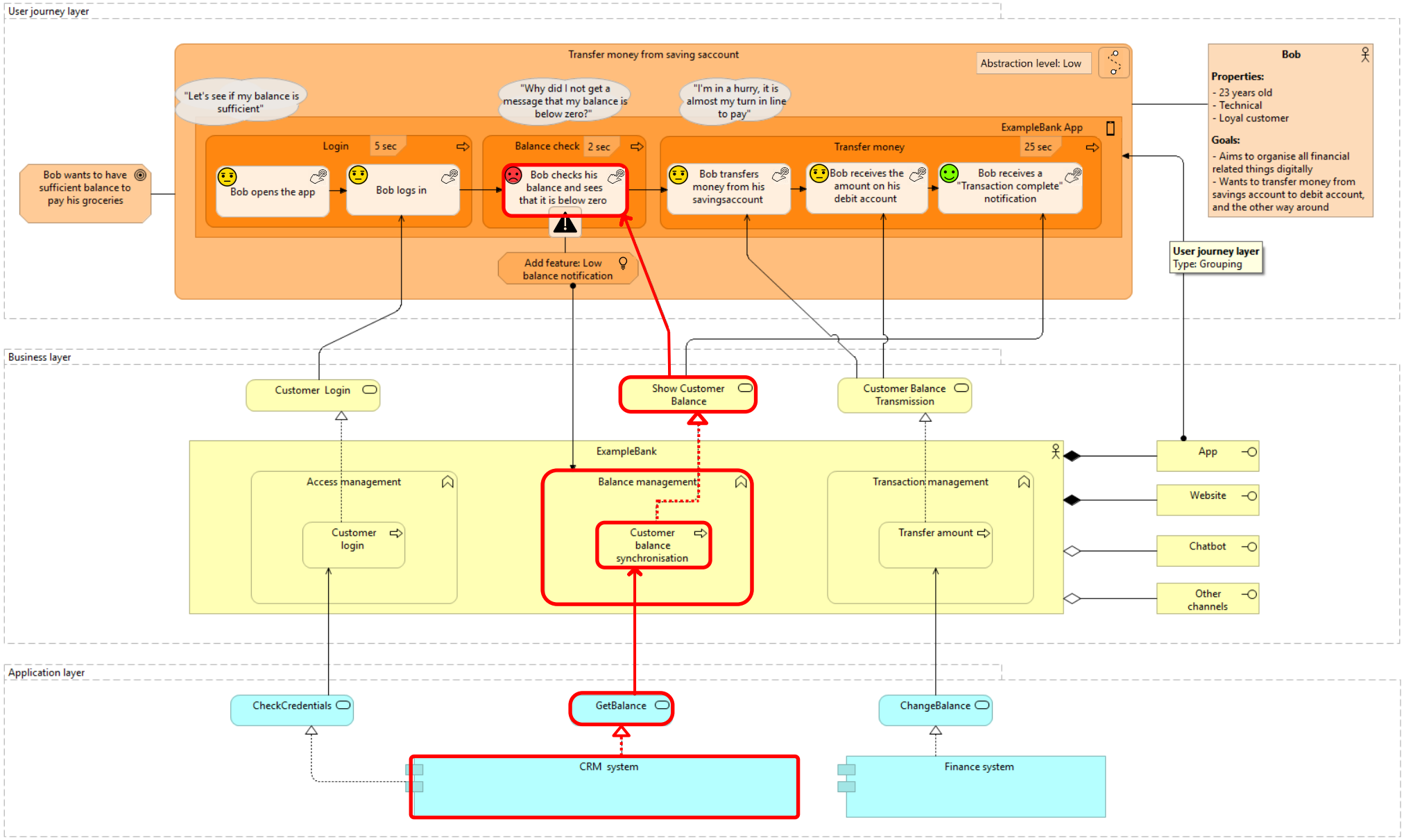



Figure 48: Top-down user journey analysis: Software system that (indirectly) supports a negatively experienced activity

# 4.7. Summary - UJEA

In this chapter, we investigated how we could create a modelling language that supports both user journeys and enterprise architecture (SQ2). To help us with creating the modelling language, we subdivided SQ2 into identifying the required inputs for UJEA (SQ2.1), specifying how user journeys can be integrated into Archimate (SQ2.2) and at last, the applications of UJEA and their role in aligning UX designers with enterprise architects (SQ2.4).

***SQ 2.1*** To identify the required inputs for UJEA, we created a high-level procedure that shows a flow of all required steps and products (section 4.1). The high-level procedure showed 3 necessary steps prior to creating the artefact: Evaluating and finalizing the requirements (section 4.2), structuring user journeys (section 4.3) and examining the Archimate structure and concepts (section 4.4). Each step produces deliverables that are inputs for the artefact. This leads to the following list of inputs: a final requirement list for UJEA (i), a (final) user journey taxonomy (ii), a user journey meta model (iii), a set of Archimate element types and descriptions (iv), a visual hierarchy of Archimate element types (v), and a set of Archimate concepts and descriptions (vi).

***SQ 2.2*** Specifying how user journeys can be integrated into Archimate, we already identified the prerequisites for the artefact: the discussed three steps that result in 6 deliverables that serve as input. In the high-level procedure we also identified five main products that the artefact consists of: A mapping of concepts(i), a new Archimate framework(ii), an UJEA meta model(iii), a graphical meta model(iv) and a cross-layer meta model(v). To answer SQ2.2, we needed to identify execute the steps that lead to these main products. This is done in section 4.6, in which we specified a low-level procedure for creating the artefact. First, we started mapping user journey concepts to Archimate element types to narrow down the possible matches (step 1) and then mapped user journey concepts to Archimate concepts (step 2). We mapped concepts by comparing descriptions and finding matches between them. The mappings were documented in a table (with rationale for each mapping), as well as graphical models. With our mappings finished, we included the relationships from the user journey meta model to create User Journey Extended Archimate (step 3). Next, we created a graphical notation (step 4) and created an illustrative case to clarify the positions and sizes of the notation (step 5). As we created the example with Archi and created the optimal visualization while experimenting with the artefact, we had to adjust the meta model into a platform dependent meta model (step 6). As last step, we created a cross-layer meta model to allow other architecture to be linked to the user journey concepts (step 7).

***SQ 2.3*** The applications of UJEA were also identified in the high-level procedure: UJEA's viewpoints and analysis possibilities. In total, six different viewpoints have been defined: a viewpoint focused on one single user journey, two cross-layer viewpoints for a single user journey, one viewpoint for an overview of multiple viewpoints, and two cross-layer viewpoints for multiple user journeys. As for analysis, we defined two different traceability analyses: one bottom-up approach going from architecture to user journey(s), and one top-down approach going from user journey(s) to architecture. At last, we discussed how these applications help aligning UX designers with Architects: the viewpoints serve as a means for communication and the analysis possibilities allow architects to complement the UX designer with a technical perspective/view.

> *Answer to **SQ2:*** To create a modelling language that supports user journeys and enterprise architecture, we selected an enterprise architecture language to extend it with user journeys. As input, we needed to structure user journeys (taxonomy, meta model), we identified matching concepts between the two domains (mappings), created meta models that integrate both domains and shows the relationships (UJEA meta model, cross-layer meta model), along with a notation to visualise the concepts.

# PART C
# TREATMENT VALIDATION

# 5

# VALIDATING UJEA

In the previous chapter, we successfully created the artefact of this thesis: User Journey Extended Archimate. In this chapter, we will validate the artefact by studying stakeholders' perceptions on the artefact. For this, technical action research will be performed at a banking company. In the technical action research, UX designers and architects will apply the artefact to a real case. To validate the artefact, we aim to measure the *perceived ease of use, perceived usefulness, intention to use, perceived collaboration value, perceived familiarity of concepts* and *perceived completeness*. Along with the perceived completeness, we aim to harvest a set of improvement suggestions for the artefact, to indicate future work.

# 5.1. Validating UJEA

So far, we have identified user journeys as a potential means to improve collaboration between UX designers and architects. We have investigated user journeys by doing a literature study, an expert interview and a case study at a bank, which led to a list of initial requirements. The requirements have been evaluated, which resulted in a list of final requirements and a user journey taxonomy. Using these as artefact inputs, we expended the *Archimate framework*, created the *UJEA meta model* (showing how user journey concepts are mapped onto Archimate), a *graphical notation* and a *cross-layer meta model*.

In this chapter we will evaluate UJEA. With the validation, we want to find out the perceptions of stakeholders on the use of the artefact, its collaboration value, and to identify potential improvements. To do this, we will test the artefact in real world conditions. Various UX designers and Architects will play a role in this validation, both applying the artefact to a real case in a banking context, derived from a bank. The bank aims for a 9+ customer experience, and multiple stakeholders are involved to achieve the goal. In practice, it comes down to a collaboration between UX designers, business analysts (BA's) and architects. The collaboration between these parties is valuable; while UX designers and BA's are experts in shaping user journeys, architects help UX designers from a technical perspective. When shaping a user journey or process, architects can see whether the journey is technically optimal and feasible.

For the validation, we conduct a technical action research project. In the technical action research, we will organize an interactive session in which experts apply the artefact to a real case, whereafter we perform a post-it session and a focus group in which stakeholders discuss various aspects of the artefact. During the hands-on session and focus group, we make notes for observational analysis (exploratory, descriptive and explanatory). Additionally, the subjects are asked to write down their opinions on post-its. After the post-it session, group discussions will be held. By gathering notes (observation), subject opinions on post-its, and subject opinions through discussion, we use data source *triangulation* for measuring data for finding patterns that are consistent across different measurements.

# 5.2. Research method

As announced in the previous section, we use technical action research as research method for our validation (Wieringa & Morali, 2012). Technical action research has three cycles that we apply to a the Contextbank case: “Becoming a customer online”. The resulting applied cycles are shown in Figure 49. The action research starts with an engineering cycle (EC1), which is the cycle we have done so far: we investigated the problem, designed our artefact and have arrived at our validation. From this point starts our research cycle (RC1) in which we create our validation design (research questions, variables), structure an evaluation session and execute the research. As we execute the research, we start the third cycle, which is another engineering cycle (EC2) in which we apply the artefact to a case at ContextBank. First, we examine the collaboration issue between UX designers and architects, and study stakeholders and cases to select participants and a specific case. As participants, we choose UX desingers, Business analysts and solution architects. As for the case, we select “Becoming a customer online” case. The prepared case will first be reviewed, where after stakeholders will apply the artefact on the case. After applying the artefact, a focus group is held. At last, we go back to the research cycle (RC1) where we analyse the results, that will be used as validation material for the first engineering cycle (EC1).

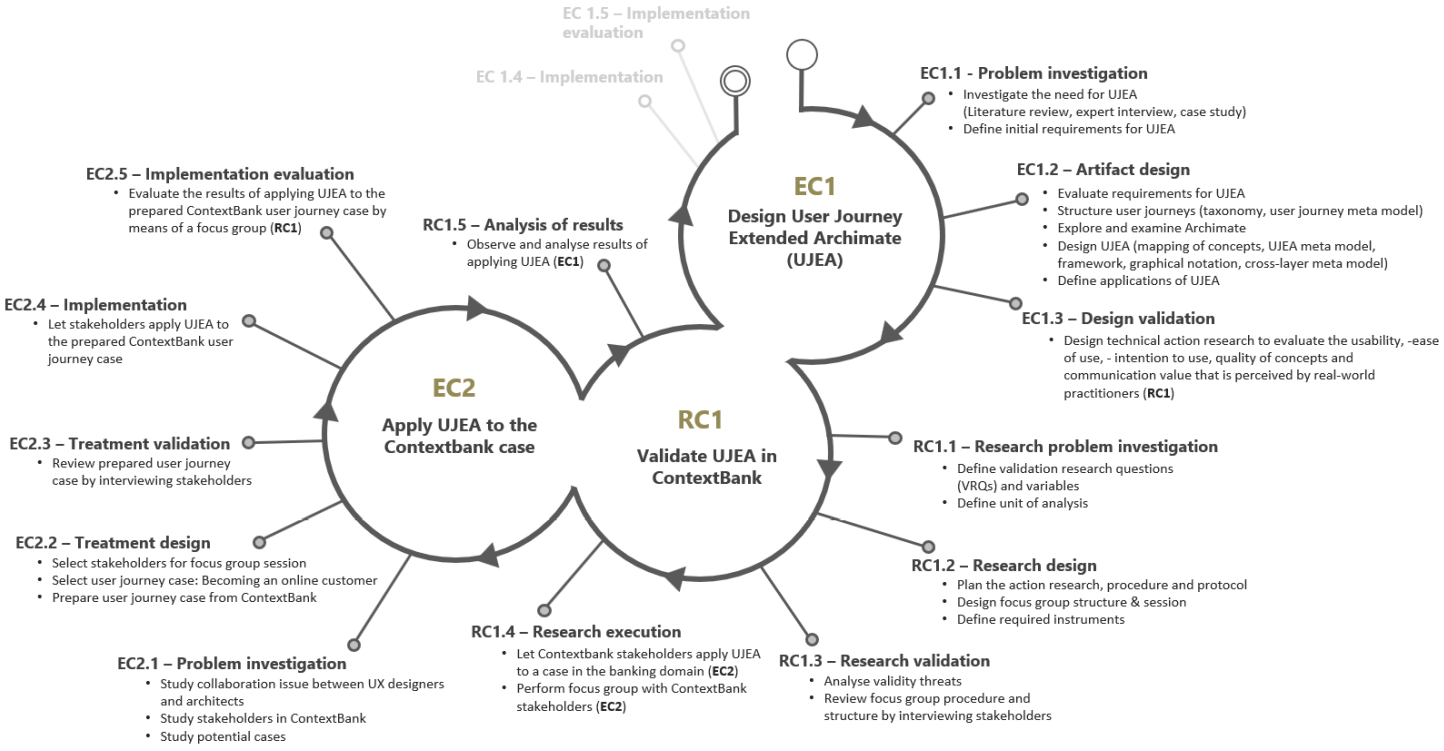



Figure 49: Technical action research methodology for validating UJEA with a case of Contextbank

# 5.3. Research design

In this section, we will discuss the research design of the technical action research. We start by identifying the goal, research questions and variables. Next, we define the scope of the validation, stating which components of the artefact will be validated. What follows, is that we will describe the Contextbank case, the unit of analysis and the subjects for the focus group. Next, we discuss the instruments used for the action research. At last, we finish the research design with the data collection procedure.

## 5.3.1. Research Goal

We start our research design by stating the goal of the action research, for which we use the goal template of Wohlin et al. (2012): **Analyse** the use of User Journey Extended Archimate **for the purpose of** evaluation **with respect to** stakeholder perceptions and intentions **from the point of view** of UX designers and architects **in the context of** improving (technically feasible user journeys. We shorten our goal into Evaluate User Journey Extended Archimate, and decompose the goal into validation research questions (Questions) and variables (Metrics). The result is shown in Figure 50. The validation research questions and variables will be explained in the next section.

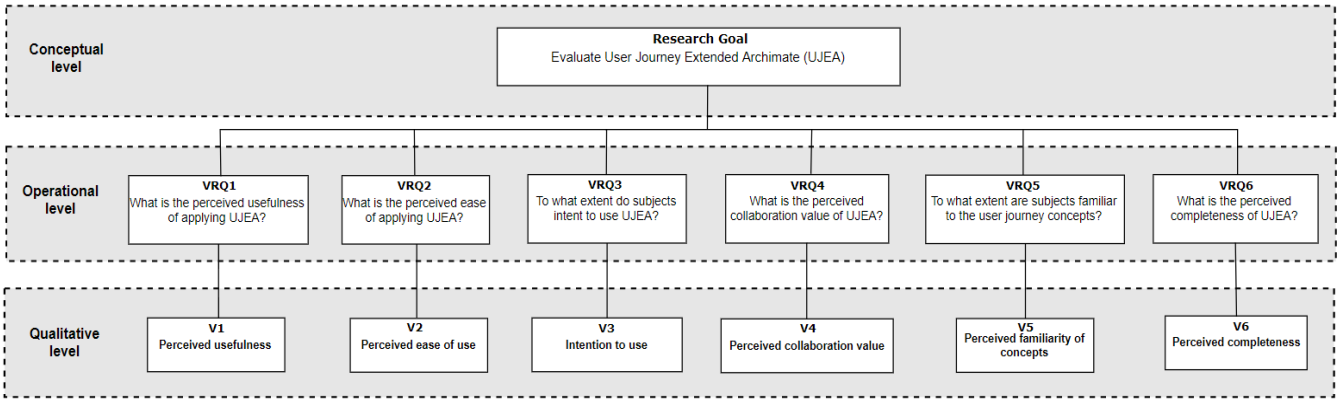



Figure 50: GQM model of the evaluation of UJEA

## 5.3.2. Validation research questions & Variables

In this subsection, we state the research questions and variables used to answer the research questions. For shaping our validation research questions and variables, we make use of the Method evaluation model from Moody (2003) shown in Figure 51.

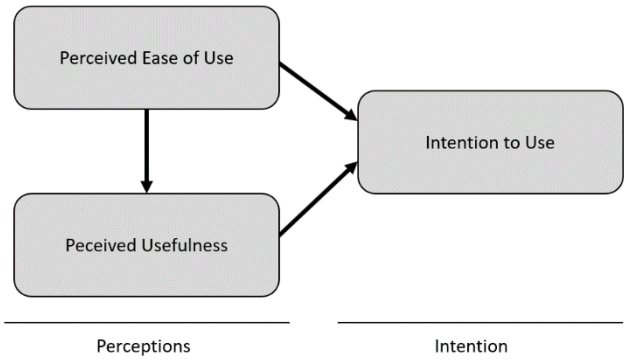



Figure 51: Method evaluation model (Moody, 2003)

The framework provides us with a set of variables (Ease of Use, Usefulness and Intention to use) that have been widely adopted in IT research for evaluation purposes. The first three validation research questions are based on the method evaluation model. In the next paragraphs we discuss the validation research questions (VRQs), variables and how we intend to measure the variables.

**VRQ1 What is the perceived usefulness of UJEA?**

The first validation research question is focused on measuring the **Perceived Usefulness** (V1): the degree to which stakeholders consider the artefact effective in achieving the intended objectives (Moody, 2003). With this question we want to see how helpful the artefact would be in practice for stakeholders.

**VRQ2 What is the perceived ease of use of UJEA?**

The second validation research question is focused on measuring the **Perceived Ease of Use** (V2): the degree to which stakeholders consider using the artefact would be free of effort (Moody, 2003). With this research question we want to see how difficult or easy stakeholders perceive the use of UJEA.

**VRQ3 What is the perceived intention to use of UJEA?**

Here we measure the last variable derived from Moody (2003); the **Intention to Use** (V3): the degree that stakeholders intend to actually use the artefact (Moody, 2003). Here we want to see whether stakeholders would actually use the artefact, or identify situations in which they think the artefact would come of use.

**VRQ4 What is the perceived collaboration value of UJEA?**

The previous VRQs were focused on the use of UJEA. This VRQ however is focused on whether the artefact actually achieves its main objective: improving the collaboration between UX designers and architects. For this, we create our own variable, the **Perceived Collaboration Value**, which we define as: the degree to which stakeholders perceive the artefact as valuable regarding collaboration with other stakeholders.

**VRQ5 To what extend are subjects familiar to user journey concepts?**

This VRQ is focused on measuring stakeholder perceptions on the user journey concepts included in UJEA. For this, we measure the **Perceived familiarity of concepts**, which we define as: the degree to which user journey concepts are familiar to the subjects. Measuring this variable shows us whether stakeholders are aware or used to the user journey concepts, which could be of high impact on the other factors. In case some concepts are totally unknown, we could suggest further research on specific concepts or even drop concepts if there is sufficient evidence to do so. We could also have gone for measuring the quality of concepts. However, quality is a large variable that consists of multiple subfactors. Instead, we focus on a more specific variable. To ensure participants still understand the concepts (since they have to apply the artefact), each participant will be provided with a set of descriptions that explains each concept in detail.

**VRQ6 What is the perceived completeness of UJEA?**

This VRQ is focused on measuring whether the artefact is complete or not. It could be that subjects believe in the potentials of the artefact, but they somehow miss some specific elements. Alternatively, they could have the feeling that the artefact is incomplete, but are not completely sure what is missing. For this matter, we measure the **Perceived completeness:** the degree to which subjects feel the artefact is complete or contains redundant elements.

### Approach for answering the VRQs

The approach to answer VRQ1-5s is to observe subjects (UX designers and architects) as they apply the artefact (i), harvest and analyse the subject's opinions through post-its (ii) and hold a focus group (iii). For VRQ6, we also use post-its (for which we create an 'improvement suggestions' category) and have prepared a short questionnaire (Appendix F).

### 5.3.3. Validation scope

The created artefact consists of five components: Mapping of concepts, the New Archimate Framework, the UJEA meta model, a graphical notation and a cross-layer meta model. To make our validation feasible for the time and resources available for the action research, we define a validation scope. For the action research, we focus on validating the user journey concepts of the UJEA meta model(i), the graphical notation(ii) and the UJEA cross layer meta model(iii). Though the UJEA meta model will only be partly validated; we merely focus on the user journey concepts as we do not bother the UX designers with a meta model (as they are not familiar to meta models). The validation scope is shown in Figure 52. These artefact parts in specific are chosen because they can be tested in an environment where subjects apply the artefact to a case. These parts play a direct role in the applicability/use of the artefact, while the mapping of concepts and the Archimate framework are merely focused on the structure of the artefact.

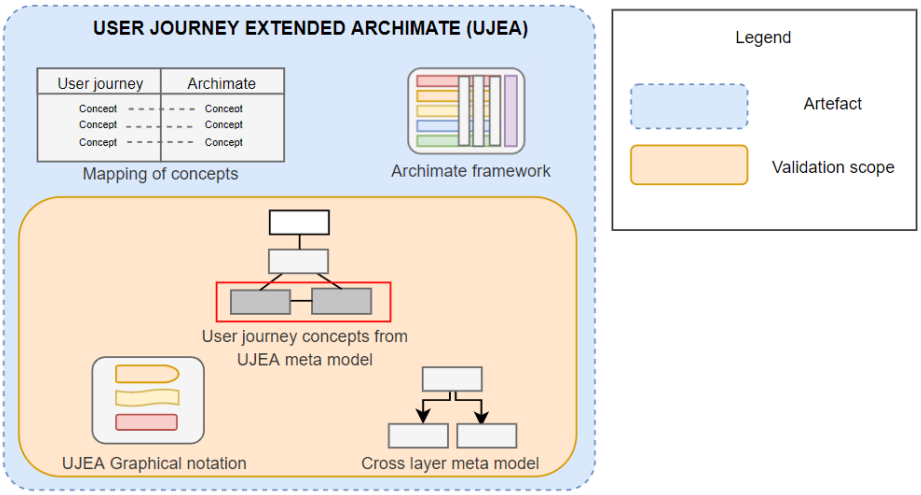



Figure 52: Validation scope on the

The validation scope corresponds to the chosen variables in subsection 5.3.2. When applying the artefact, subjects will get an opinion whether they perceive it as *useful*, *easy to use* and whether they *intent to use* it. Additionally, subjects will recognise or not recognise certain concepts when applying the user journey concepts; allowing us to measure their *perceived familiarity of concepts*. The *perceived collaboration value* does not validate a specific component of the artefact, but measures whether the artefact achieved its objective: improve the collaboration between UX designers and architects. At last, after applying the artefact we expect subjects to have a perception about the *completeness* of the artefact. They might have the feeling to miss some things among the user journey concepts (UJEA meta model, graphical notation), miss a graphical aspect, or miss relations in the cross-layer meta model.

### 5.3.4. The Contextbank case and unit of analysis

The action research will be performed at a dutch bank in the Netherlands. Due to privacy regulations, the bank will be referred to as Contextbank. Contextbank is a multiservice provider that aims for a 9+ out of 10 user experience. The 9+ user experience entails that every single digital service provided through the website, app or chatbot should be experienced very well by the users. In attempt to achieve this goal, multiple stakeholders work together. UX designers and business analysts shape and optimize user journeys, whereas solution architects consult UX designers on technical aspects and feasibility of user journeys. A solution architect is an enterprise architect focused on the application architecture. The two stakeholders are quite different from one another in terms of education, work experience and mindset. Where UX designers have a detailed, yet creative focus on creating screen designs and optimizing user journeys, solution architects have a bird-side view and a technical focus on the structure, processes, software and data of the enterprise. As result, collaborating can be a time-consuming process. Yet,

collaborating is a vital ingredient for user journeys to be optimal; both from the bank's perspective (technically optimal) and the user's perspective (highly rated user experience). The selected user journey for the action research is the 'becoming a customer online' user journey. The journey describes the flow and experience of the registration of a new customer, performed by the user through the website or app. The user flow of becoming a customer online is depicted in Figure 53.

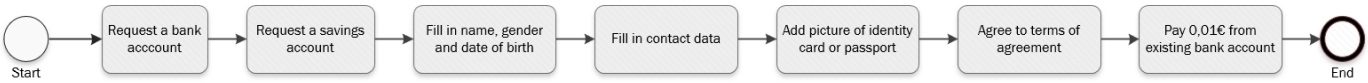



Figure 53: Unit of analysis: Becoming a customer

The flow starts with a request for a bank account, followed by a request for a savings account (optional). Next, the user fills in their name, gender and date of birth. Then, the user has to fill in his contact data (e-mail, phone number) and his address. The identification of the user is not complete without a picture of their identity card or passport, so this is uploaded as well. After accepting the terms of agreement, the user pays 1 cent using his existing bank account, as final step to become a customer of the bank.

As the action research is performed at a single case (Contextbank), with only one unit of analysis (becoming a customer online), the design is characterised as a single holistic case study. To provide an overview of the design, an overview is made that shows how the case and unit of analysis are structured. The overview is shown in Figure 54.

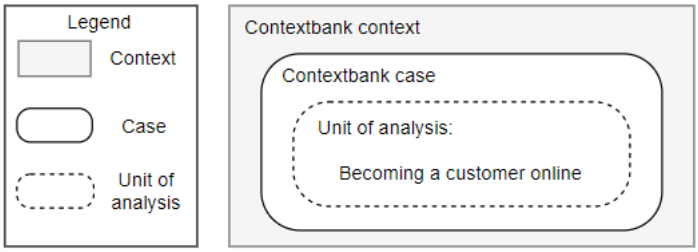



Figure 54: Design of the single holistic case study for the Contextbank case

## 5.3.5. Subjects

For subjects, we searched for UX designers and architects. As our unit of analysis is the process of becoming a customer online, we searched for UX designers and architects that have at least some knowledge about this process already. Choosing subjects that are familiar to the unit of analysis process mitigates the threat that participants get stuck or keep discussing about the case, rather than keeping the focus on applying the artefact. Also, we tried to find participants that already know each other or have worked together before, which makes the interactive session more attractive for subjects to participate. By asking and mailing around, we found three UX designers involved in customer processes, of which two of them are involved in customer onboarding and are used to work together. Additionally, we found three architects that are all involved in customer processes, and have experience with Archimate. All architects know each other quite well, so the subjects are used to collaborate with the other subjects. As result, we have a total of n=6 participants.

## 5.3.6. Instrumentation

For the interactive evaluation session in which we collect the data, we use the following instruments:

- UX designer assignment: A description of the exercise for the UX designers (Appendix F).
- Architect assignment: A description of the exercise for the architects (Appendix F).

- *Powerpoint presentation*: Introduction of the goal of the session, the identified gap, the artefact and the assignments.
- *Completeness questionnaire:* short questionnaire to measure the completeness of the artefact (Appendix F)
- *Graphical notation with concept definitions:* Given to UX designers and architects to explain the elements and graphical notation(Appendix F).
- *User journey example:* To show an example of a user journey created with the artefact, we give the UX designers the user journey example from the illustrative case of subsection 4.5.6. This provides insight to the subjects in positioning and sizing concepts in the right way (Appendix F).
- *Cross-layer meta model:* Given to architects to show the allowed relationships between the user journey layer and other architecture (Appendix F).
- *Informed consent*: A voluntary agreement to participate in research, and that data will only be used for that purpose (and will not be further distributed) (Appendix F).
- *List of rules*: A list of rules will be put on the wall to guide participants in what is allowed and what not during the session(Appendix F).
- *Contextbanks Business Function Model:* Given to architects that they can use to shape the architecture (due to privacy regulations, this document cannot be included in Appendix F).
- *Post-it wall*: Predefined categories in which participants can place their comments
- *Notation concepts printed on paper:* The graphical notation printed on paper that will be used by the subjects to apply the artefact with paper.
- *Post-its*: Small colored papers for writing opinions or comments. Post-its will be put on the post-it wall.
- *Markers & pens paper*: For sketching and writing down opinions.
- *Paper*: Available for sketches.
- *Whiteboard*: Available for sketches.

### 5.3.7. Data collection procedure

To validate the artefact, we collect expert perceptions on the identified variables of subsection 5.3.2. For collecting this data, we organize a two hour interactive evaluation session, for which we follow the procedure as specified in Figure 55 on the next page. The next paragraphs explain the evaluation session in detail.

**Evaluation session**

We start the session by giving the participants a warm welcome. This includes setting up a pleasant environment with drinks and cookies to create a relaxed environment. We begin the session with an introduction: a presentation in which we introduce the goal of the interactive session, the gap we aim to fill and the artefact itself. Next, we shortly introduce the case and the assignments. The case and assignments are explained in more detail on the assignments that are given to each subject. As final step before starting, we ask the subjects to fill in the informed consent.

Starting with the session, the subjects (6) are divided into two teams: One team of UX designers (3) and one team of architects (3). Starting with assignment 1; the UX team creates the user journey of the 'Becoming a customer online' case using the user journey concepts printed on paper. In the meanwhile, the team will work on a different assignment 1; they will have to identify and create the business services, business processes and business functions that are involved in the 'Becoming a customer online' case. When both teams are finished, all subjects will work together on assignment 2. In this assignment, the subjects are asked to the relationships between the user journey and the architecture, using the cross-layer meta model. When the teams are finished linking the architecture to the user journey, we start a post-it session for measuring opinions.

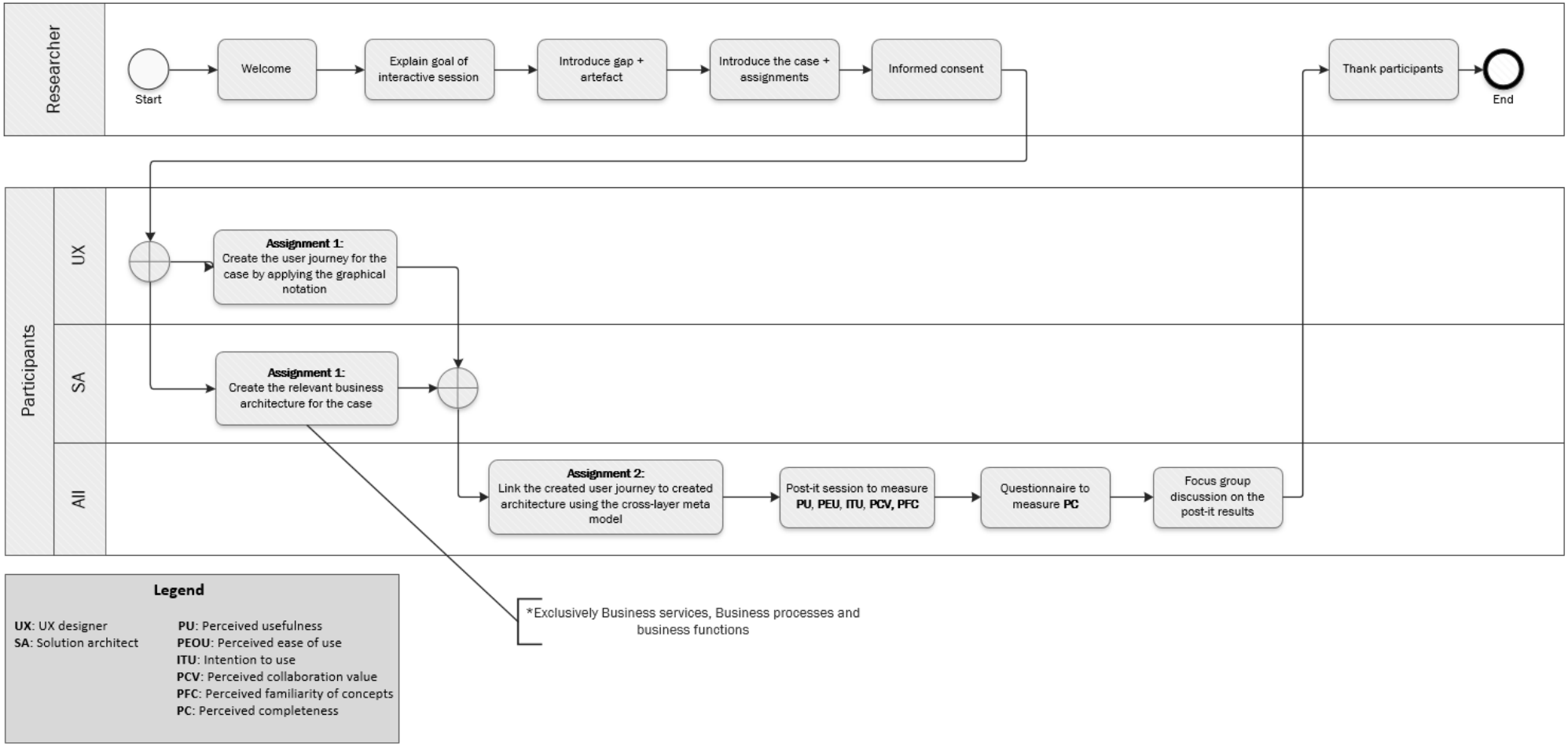



Figure 55: Data collection procedure

In the post-it session, we measure the *perceived usefulness, perceived ease of use, intention to use, familiarity of concepts* and *perceived collaboration value.* These five variables are measured by asking subjects to write down their thoughts on post-its and place them under the matching category on the post-it wall shown on Figure 56. The post-it wall contains these variables, and an "additional improvements" section. To see the difference between UX designer- and architect opinions, UX designers get orange post-its while architects get blue post-its. The subjects will place their post-its on the post-it wall, which is structured with the five variables, also shown in Figure 56.

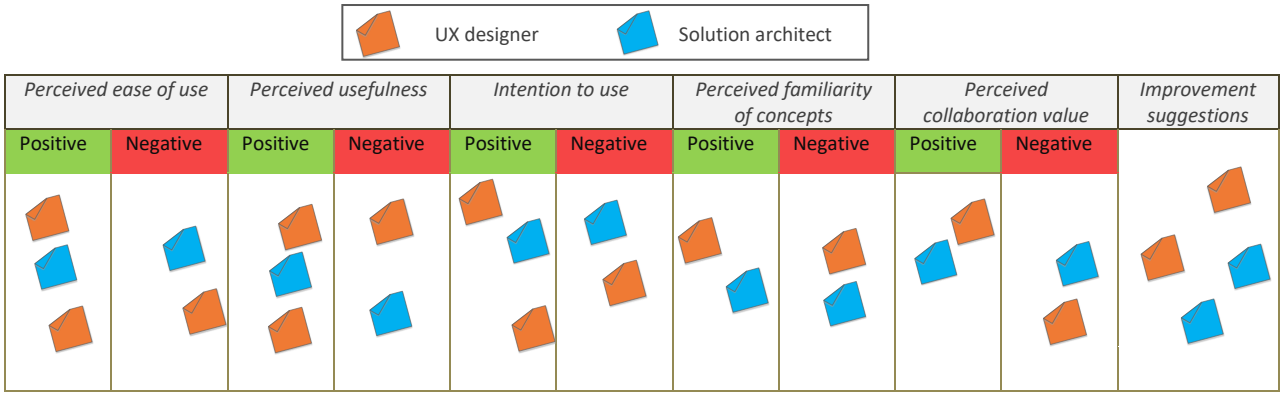



Figure 56: Post-it wall (with fictive post-its as example)

After finishing the post-it session, subjects are asked to fill in a short questionnaire on the *perceived completeness* of the artefact. The questionnaire can be found in Appendix F. After the post-it session, there is a group discussion on all six variables. For each variable, the positive and negative aspects are discussed. The goal of the discussion is to see the "common opinion" among the subjects. We finish the session by thanking the participants and answering questions (if any). As timing is essential for the evaluation session to succeed, we planned the activities in a timetable, shown in Table 23. The timetable merely serves as an indication rather than a strict restriction. The timetable can serve as a red line to ensure all aspects are covered in the session.

Table 23: Schedule for the evaluation session

| Who | Activity(s) | Est. time | Schedule |
|---|---|---|---|
| Researcher | Welcome & Introduction (goal, gap, artefact, assignment, case, informed consent) | ~20 min | 11:00 - 11:20 |
| UX designers | Create user journey, observe architecture | ~30 min | 11:20 - 11:50 |
| Architects | Identify, sketch and visualise relevant business- and application architecture | ~30 min | 11:20 - 11:50 |
| UX + Architects | Connect user journey to the architecture | ~20 min | 11:50- 12:10 |
| UX + Architects | Post-it session | ~20 min | 12:10-12:30 |
| UX + Architects | Group discussion | ~25 min | 12:30-12:55 |
| Researcher | Wrap up, thank participants | ~5 min | 12:55-13:00 |

After the evaluation session, we have gathered data through multiple measurements:

- ***Observations:*** Observed behaviour of UX designers and Architects as they work on assignment 1 and 2. For the observations, an independent intern at Contextbank was asked to document observations during the session.
- ***Post-its:*** Opinions that written down on post-its and placed on the post-it wall.
- ***Questionnaire:*** A short questionnaire on the completeness of the artefact.
- ***Audio fragments:*** Audio fragments during the assignments and the **focus group**.

By using multiple measurements, we use *triangulation* to search for consistent patterns between multiple datasets.

# 5.4. Validity & Ethics

In this section, we address decisions and issues regarding the validity and ethics of the action research. First, we discuss some general decisions that increases precision and strengthens the overall validity. These decisions concerns triangulation (the use of different perspectives, methodologies or data sources):

- *Observer triangulation*: The researcher will be involved in all parts of the action research (design, execution and data analysis).
- *Methodological triangulation*: We will gather data using three different qualitative measurements (observation in terms of nots, opinions in terms of post its, opinions in terms of recorded discussions) to find patterns that are consistent across the qualitative data sources.
- *Data source triangulation:* For the focus group session, we will have six different participants from context bank: three UX designers in one team and three architects in the other team. This creates a triangle of three experts within each team.

In the following subsections, we perform a validity analysis. Different threats to the research will be identified and explained, and for each individual threat we will discuss how we plan to mitigate the threat. For the validity threats, we follow the categories proposed by Wohlin (Wohlin, Runeson et al. 2004).

## 5.4.2. Conclusion validity

Conclusion validity concerns issues that affect the ability to draw correct conclusions regarding the relationship between treatment and the outcome.

- *Low statistical power*: This threat concerns the power of a statistical test to reveal true patterns in the data. As the action research is focused on qualitative data (except two likert scale questions of the completeness questionnaire), we do not consider that this threat applies to this study.
- *Fishing:* This threat concerns fishing for desired results. To mitigate this threat, we created self-explanatory assignments that should not need help of the researcher. The researcher interferes only when necessary, like explaining the assignments to participants or ensuring the participants are on schedule (in the end of the two hours, all variables should be measured). Also, this threat is mitigated through triangulation: conclusions are drawn based on consistent patterns across different measurements and different subjects.
- *Reliability of measures:* This threat concerns the reliability of measures. To ensure measures are reliable, each subject is completely free to write down their thoughts (concerning the five variables) on post-its. Subjects are told not to be judged for their opinions. Additionally, we only have two short predefined questions in the completeness questionnaire that ask whether they perceive the artefact as complete. Instead of using a set of predefined questions, we focus on measuring the opinions of subjects through observation, post-its and opinions gathered from the discussion.

## 5.4.3. Internal validity

Internal validity is concerned with factors that may affect the dependent variables without the researcher's knowledge.

- *History*: The time of when the treatment is applied can affect the results. To mitigate this threat, the focus group session was planned by comparing the agenda's of the subjects. May and early June seemed busy for the subjects, but by the end of June, the workload was decreased. Thus, the date was picked by the end of June, to prevent subjects being stressed and having their mind on something else.
- *Group threat*: The behaviour or opinions of subjects could be influenced by other subjects. To mitigate this threat, subjects are explained the assignment is a group project in which each individual has an

equal saying. Splitting up the subjects into two groups of three people, also reduces the chance that some subjects take lead in the assignment while others sit back and watch.

- *Instrumentation:* This is the effect of badly designed data collection forms that influence the results. By using post-its and five categories that subjects can place their thoughts on, we measure opinions without relying on specified questions. Although the perceived completeness is an exception to this, the questionnaire merely contains two questions about their perception of completeness, and one open question.
- *Selection:* The way the subjects are selected might affect the results. All subjects are familiar or involved with the selected 'Becoming a customer online'. This condition was necessary, to prevent discussions on the case itself, and focus on discussions around the artefact. Still, this could mean that the subjects are more positive about the case, that could influence the results. Though, we see the case just as a means to test the artefact, and the measurements are not focused on the case but on the artefact.
- *Pygmalion effect*: Subjects can start realising the expectations of the research, and change their behaviour due to it. This threat does apply to our study as the subjects are aware of the five variables we measure, and due to the categories of positive/negative for each variable. To mitigate this threat, we ask subjects to behave like this would be an assignment for Contextbank, and forget the experimental setting. Subjects are also asked to be open and write down anything that comes across their mind, whether it is positive or negative; both are equally appreciated.
- *Hawthorne effect*: Subjects could have a tendency to please or disappoint the researcher or his/her goals. To mitigate this threat, subjects are asked to be objective in their judgement, and stick to their own opinions; all feedback is welcome and appreciated.

### 5.4.4. Construct validity

Construct validity is related to the relationship between the concepts and theories behind the experiment and what is measured and affected.

- *Mono-method bias:* Using a single type of measurement gives the risk of a measurement bias. To mitigate this threat, we use multiple measurement techniques: gathering subject opinions with post-its, recording a discussion between subjects on the variables and post its and observing participants during the session (taking notes).
- *Interaction of testing and treatment:* Applying the treatment while aware of the dependent variables could make subjects more sensitive to the treatment. During the assignment, the subjects are already aware of the five variables (they form the categories on the post-it wall). To mitigate the threat, we chose not to focus on the correctness or completeness of the resulting models created by participants (as they would focus too much on not making mistakes). Instead, we focus on whether experts actually perceive the artefact as a useful tool to help them achieve their goals and improve their collaboration.
- *Restricted generalizability across constructs:* The treatment may affect studied constructs positively, while (unintentionally) affecting other constructs negatively. To prevent this threat, five different variables are measured.
- *Biased expection of the researcher:* This threat concerns the influence of the researcher on the opinions of stakeholders. This threat can be prevented by only intervening when necessary. Additionally, when the researcher speaks, it will be mostly in terms of understanding the assignment. We aim not to intervene as the subjects work together during the assignment or the post-it session. The group discussion will only be intervened if the discussion is wandering from the subject, or to move on with the discussion.
- *Inadequate preoperational explication of constructs*: This threat concerns that the constructs are not sufficiently explained to the subjects. To clarify the variables and prevent different interpretations or perceptions on the variables, each variable is clarified by the researcher at the beginning of the post-

it session. Additionally, the variables presented on the post-it wall are shown in dutch to make it more easily understandable (since all participants are dutch).

### 5.4.5. External validity

External validity is related to the ability to generalise the results of the experiments.

- *Interaction of selection and treatment*: This is the effect of having subjects that are not representative for the population we want to generalize to. To mitigate this threat, we use a real case of Contextbank, and stakeholders (UX designers and architects) that are actually involved in the 'Becoming a customer online' process. Additionally, the UX designers as well as the architects already know each other from work, which makes the interactive session representative for real-world practice.
- *Interaction of setting and treatment*: This is the effect of not having an experimental setting or material like in the real practice. To make sure the setting is representative for the population in practice, we organise the focus group within Contextbank, in a meeting room they are familiar with. The subjects have experience with the interactive smartscreen, and are used to sketching, discussing and interactive post-it sessions.
- *Interaction of history and treatment*: This is the effect of the time and day at which the session is held. Planning the session at the end of the day or week, could lead to subjects being a bit exhausted. On the other hand, starting early in the morning could mean the subjects are not completely awake and productive yet. Thus, the session is planned on a Tuesday at 11:00, which should be the time people are completely awake.

### 5.4.6. Legal, ethics and professionalism

For the action research we have taken several steps to address ethical issues:

- *Voluntary participation:* The focus group is held on a voluntary basis; subjects participate in free will and are able to quit the session when they want to. The subjects' agreement to voluntary participation is included in the informed consent (Appendix F).
- *Respecting the subject's privacy:* The privacy of subjects is guaranteed in that the subjects participate anonymously and that their produced content cannot be traced back to the individual. The subjects privacy is included in the informed consent (Appendix F).
- *Respecting the privacy of the organization:* The data gathered from the focus group is checked by stakeholders at ContextBank in search for privacy violations.
- *Non-disclosure agreement*: The researcher has signed an agreement, in which he guarantees that non-disclose information and/or data will be kept confidential and that it is only used for the academic purpose of this thesis.

# 5.5. Results

For the evaluation session, we followed the data collection procedure as described in subsection 5.3.7. We gathered data through: *observations* during assignment 1 and 2, *post-its* on the six defined variables, a *questionnaire* on the completeness of the artefact and *audio fragments* of assignment 1, 2 and the focus group. In this section, we will discuss how the evaluation session went and show the gathered results. The results will be not be analysed yet; this will be done in the discussion (5.6). For the results, we start with Observations (5.5.1.), followed by the Post-it results (5.5.2.), the questionnaire results (5.5.3.) and the audio fragments (5.5.4.). The evaluation session had a sample size of n=5, as one UX designer dropped out on the day of the session. This results into two UX designers, three architects.

## 5.5.1. Observations

For gathering the observations during assignment 1 and 2, a student assisting the researcher wrote down notes during the evaluation session. For the observations, the assistant focused on how subjects behaved and what subjects said during the assignments. We observed the interactions between participants, whether the artefact was applied correctly, whether the artefact was understood, what participants said out loud, whether they are confused about something etc. For assignment 1, the observational notes were separated for each team. For assignment 2, both teams had to work together, resulting in just one list of observations. The observational notes during the assignments are documented in Appendix G.

Unfortunately, not all observations were written down in the observational notes. With two teams each working on its own assignments which needed some guidance from the researcher, the researcher did not have time to make notes. Thus, further observations on how the assignments went are based what the researcher observed during the assignments (without having the time of writing it down). In the next subsections, we describe how the assignments went and highlight important behavioural observations. Additionally, we describe the result created by the subjects.

**Assignment 1**

Overall, assignment 1 went well for each team. The collaboration within each team went smoothly and each team started by breaking down the assignment into small parts and creating sketches. The UX team started to identify activities and stages, and the architecture team was sketching business architecture. During this time, the architects had quite some discussion about what the architecture should look like, exchanging each other's experience with the 'Becoming a customer online' case. When the sketches were finished, both teams successfully used the paper concepts to create the 'final' user journey and architecture. It took 50 minutes for both teams to complete assignment one (20 minutes more than expected). Possible causes to the longer duration are due to a longer introduction than planned and discussions on the case during the assignments.

The key observations for assignment 1 are:

- Teams had no issues applying the artefact.
- The UX team forgot to use the channel. When realising this, they created an alternative: putting the channel icon on each 'stage'.
- Moment of truth was repeatedly confused with Opportunity by one of the UX designers.
- Architects were confused to the *optimal* application architecture.

Figure 57 contains pictures of the subjects working on assignment 1.

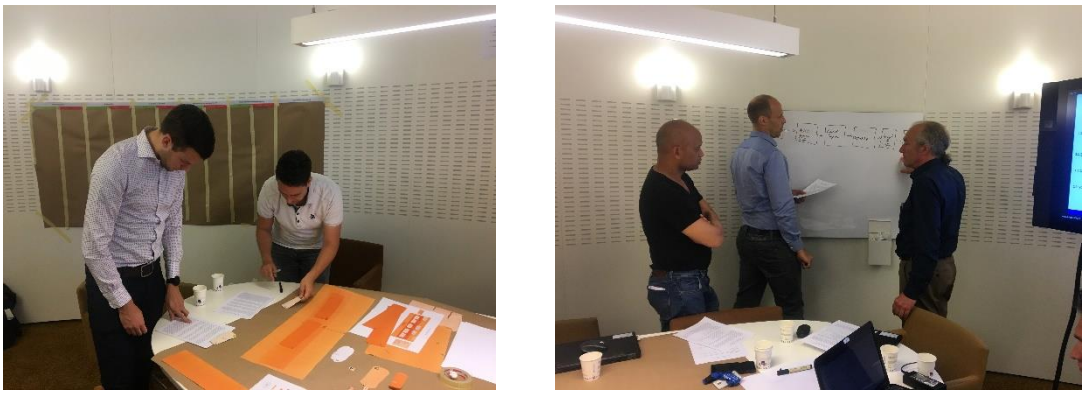


Figure 57: Assignment 1, team UX design (Left) and team architect (right)

### Assignment 2

When the teams started on assignment 2 together to connect the user journey to the architecture, the teams started to discuss each other's work. They were positively surprised that there is a clear link between the created architecture and there user journey, and there was a positive discussion about potentials of the artefact in terms of collaboration.

Key observations for assignment 2:

- Many discussions between UX designers and architects.
- Connecting the user journey to the architecture brought up many discussions about the created user journey/architecture, as well as daily work practice.
- The subjects were interested in each other's way of working, and the discussions can be characterised through positivity and curiosity.
- All three architects wanted to connect their business processes to the activities and stages. According to the meta model, this was not possible; it had to be done through business services.
- One of the UX designers incorrectly explained an architect that the moment of truth icon stands for an improvement.

Figure 58 contains pictures of the subjects working on assignment 2.

Figure 58: Subjects working on assignment 2

### Created user journey map and architecture

We can also make observations by analysing the created user journey, the created architecture and the links between both. The result of the user journey linked to the architecture, is shown in Figure 59.

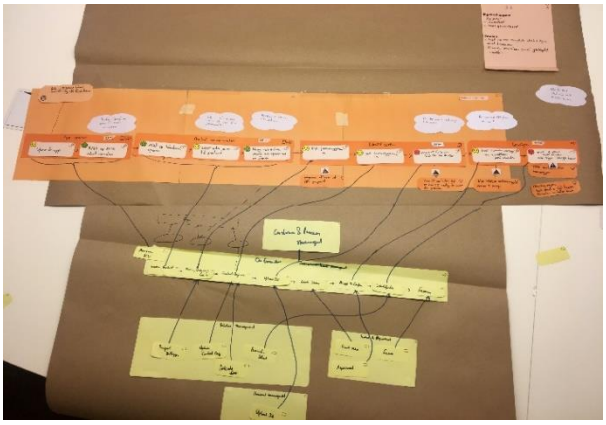


Figure 59: Created user journey + business architecture of the 'Become a customer online' case

As the content from Figure 59 is difficult to read, a digital replica is created, shown in Figure 60.

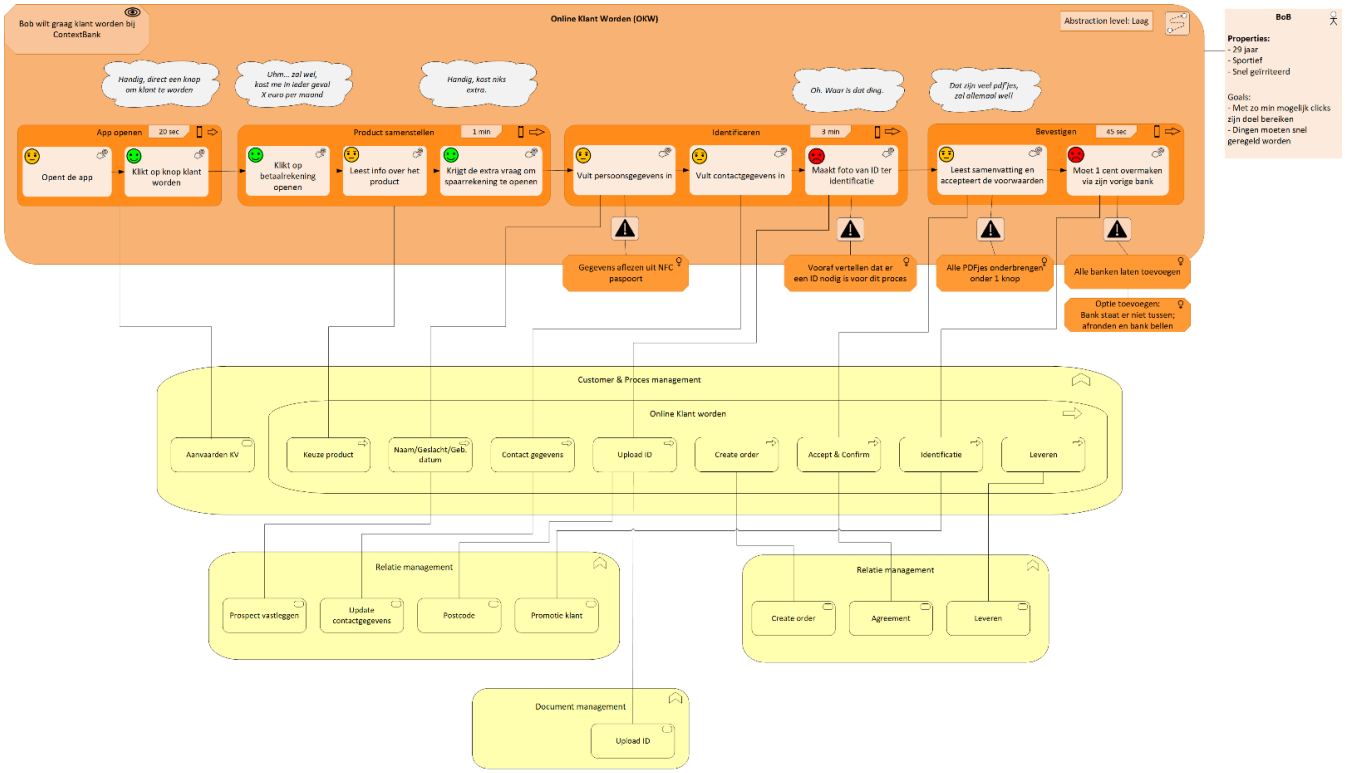



Figure 60: Digital replica of the created user journey + business architecture of the 'Become a

Key observations from the result are as follows:

- Both teams correctly applied the artefact with just a couple of deviations.
- The Goal is included in the user journey map, rather than linked to it.
- Instead of using the channel concept, an app icon was drawn on each stage.
- Instead of linking the architecture to the user journey through business services, the business processes are directly linked.
- Wherever there is an opportunity, there is also a moment of truth.
- All user journey elements were used except the channel.

### 5.5.2. Post-its

For the post-its, we follow the categories that were introduced in the data collection procedure (subsection 5.3.7). In this subsection we discussed the categories on post-it wall that was used for the post-it session. The post-it wall was constructed from the six chosen variables: *perceived ease of use(i), perceived usefulness(ii), intention to use(iii), perceived familiarity of concepts(iv), perceived collaboration value(v) and improvement suggestions(vi).* For the first five variables, we also subdivided the categories into *positive* and *negative.* The post-it session let to a result of 36 post-its in total. Figure 61 shows a photo of the post-its that were placed on the post-it wall. The post-it results have also been digitally processed, which can be found in Appendix G.

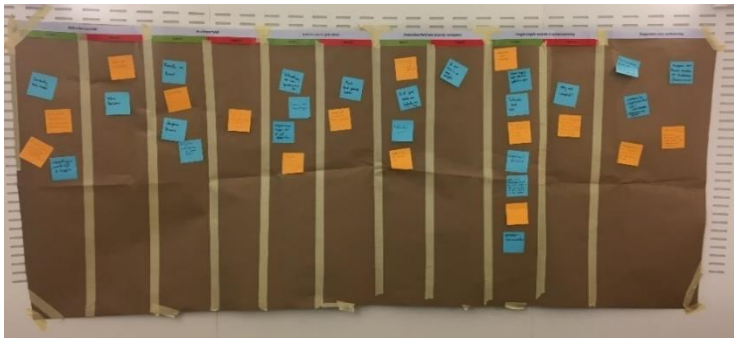


Figure 61: Post-it wall with the opinions of subjects

The distribution of the post-its, how they were spread out over the different categories on the post-it wall, is shown in Table 24 below. Overall there were more positive than negative post its. In total, there were 23 positive-, 8 negative-, and 5 improvement post-its.

Table 24: Distribution of post-its over different categories (36)

| Variables | #Positive post-its | #Negative post-its | Suggestions for improvement |
|---|---|---|---|
| *Perceived ease of use (PEOU)* | 4 | 2 | |
| *Perceived usefulness (PU)* | 4 | 1 | |
| *Intention to use (ITU)* | 4 | 2 | |
| *Perceived familiarity of concepts (PFC)* | 4 | 1 | |
| *Perceived collaboration value (PCV)* | 7 | 2 | |
| *Improvement suggestions* | | | 5 |
| Total | 23 | 8 | 5 |

To show the source of the post-its, whether they represent the opinion of the UX designer or the architect, two tables are created to show the distribution of the UX designer post-its and the distribution of the architect post-its. The distribution of UX designer post-its is shown in Table 25. The distribution of architect post-its is shown in Table 26.

Table 25: Distribution of UX post-its (14)

| Category | Perceived ease of use | Perceived usefulness | Intention to use | Perceived familiarity of concepts | Perceived collaboration value | Improvement Suggestion |
|---|---|---|---|---|---|---|
| *Positive* | 2 | 1 | 1 | 2 | 3 | |
| *Negative* | 1 | 1 | 1 | 0 | 1 | |
| *Improvement* | | | | | | 2 |
| Category total | 3 | 2 | 2 | 2 | 3 | 2 |
| Total | 14 | | | | | |

Table 26: Distribution of architect post-its (21)

| Category | Perceived ease of use | Perceived usefulness | Intention to use | Perceived familiarity of concepts | Perceived collaboration value | Improvement Suggestion |
|---|---|---|---|---|---|---|
| *Positive* | 2 | 3 | 3 | 2 | 4 | |
| *Negative* | 1 | 0 | 1 | 1 | 1 | |
| *Improvement* | | | | | | 3 |
| Category total | 3 | 3 | 4 | 3 | 5 | 3 |
| Total | 21 | | | | | |

Analysing Table 25 and 26, we see more that there are more architect post-its (21) compared to UX designer post-its (14). This is a logical outcome as the team of UX designers had one subject less than the other team. Additionally, we see that the post-its are quite equally distributed among categories. For UX designers, each category contains 2 to 3 post-its, while for architects the post-its range from 3 to 5.

### 5.5.3. Questionnaire

All five subjects filled in the completeness questionnaire (from Appendix F). The results of the completeness likert scales that measure the perceived completeness of the graphical notation and the user journey concepts, are shown in Figure 62. All subjects perceived the graphical notation as quite complete, as all subjects gave it a 4 out of 5. The overall artefact however was perceived as a bit more incomplete with 3 people rating it with a 4 out of 5 and 2 people rating it with a 3 out of 5.

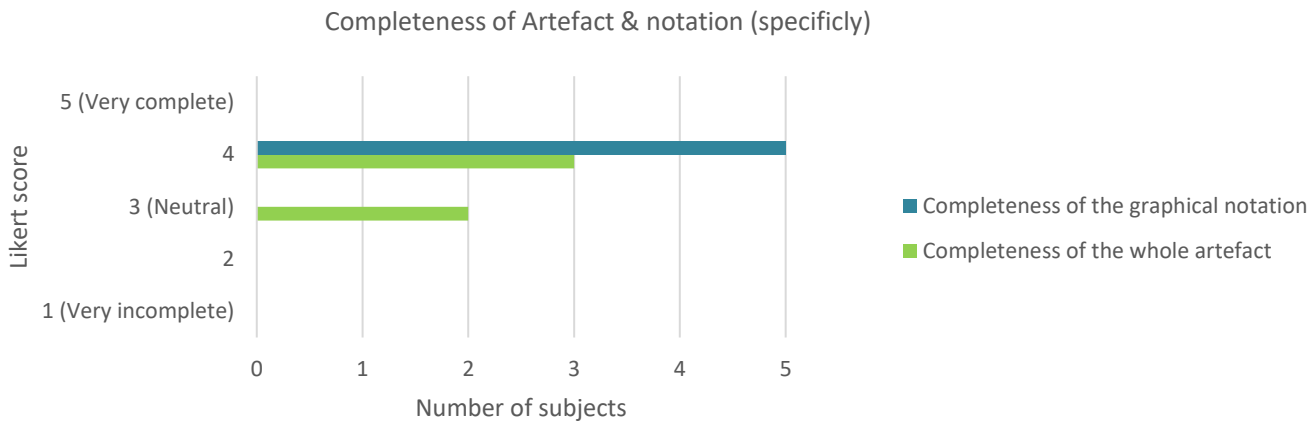



Figure 62: Completeness of the artefact and notation in specific

Additional to the two likert scale questions, the open question of the questionnaire led to the following missing elements:

- Include alternative flows (2x).
- Include risks.
- Include screen designs/ integration with interaction models.
- Allow business processes to connect to the user journey.

### 5.5.3. Audio fragments

During the evaluation session, comments on the artefact during assignment 2, the post-it session, the questionnaire and the focus group were recorded. To analyse these comments, we used Nvivo[1]. For coding in Nvivo, we follow the same categories as used in the post-it session, that were introduced in subsection 5.3.7. The created the nodes are shown in Figure 63. We created nodes for each phase of the evaluation session as well as nodes for each variable. Additionally, the variables perceived ease of use, perceived usefulness, intention to use, perceived familiarity of concepts and perceived collaboration value are given two subnodes: Positive and Negative. For the completeness of the artefact, we used used the Improvement (completeness) node.

As result, 37 audio fragments with were coded (and 6 evaluation phases). The coded audio fragments can be found in Table 39 in appendix G. How these audio fragments have been coded, is shown in Figure 64. Among these coded fragments, the 37 codes are distributed as follows:

- *Perceived ease of use:* **7** codes (5 positive / 2 negative)
- *Perceived usefulness:* **8** codes (6 positive / 2 negative)
- *Intention to use:* **4** codes (2 positive / 2 negative)
- *Perceived familiarity of concepts:* **2** codes (2 positive / 0 negative)
- *Perceived collaboration value:* **2** codes (2 positive / 0 negative)
- *Improvement(s):* **14** codes

At last, a visual overview of the coded audio fragments is shown in Figure 65. The overview shows the evaluation phases on the top, and tagged comments during assignment 2, the post-it session, the questionnaire and the focus group. Surprisingly, there were no comments on the artefact during assignment 1.

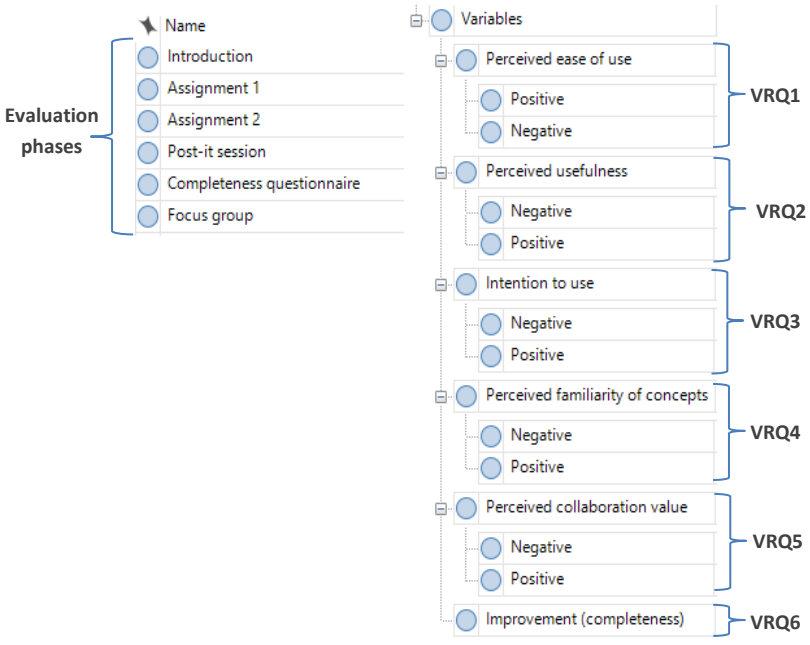



Figure 63: Nvivo nodes; evaluation phases (left) and comment categories (right)

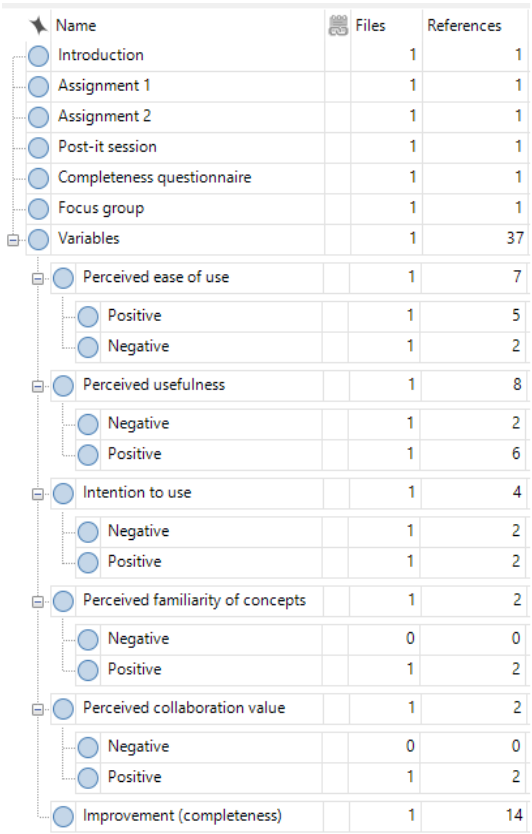



Figure 64: Coded audio fragments (37) and coded evaluation phases (6)

[1] http://www.qsrinternational.com/nvivo/nvivo-products

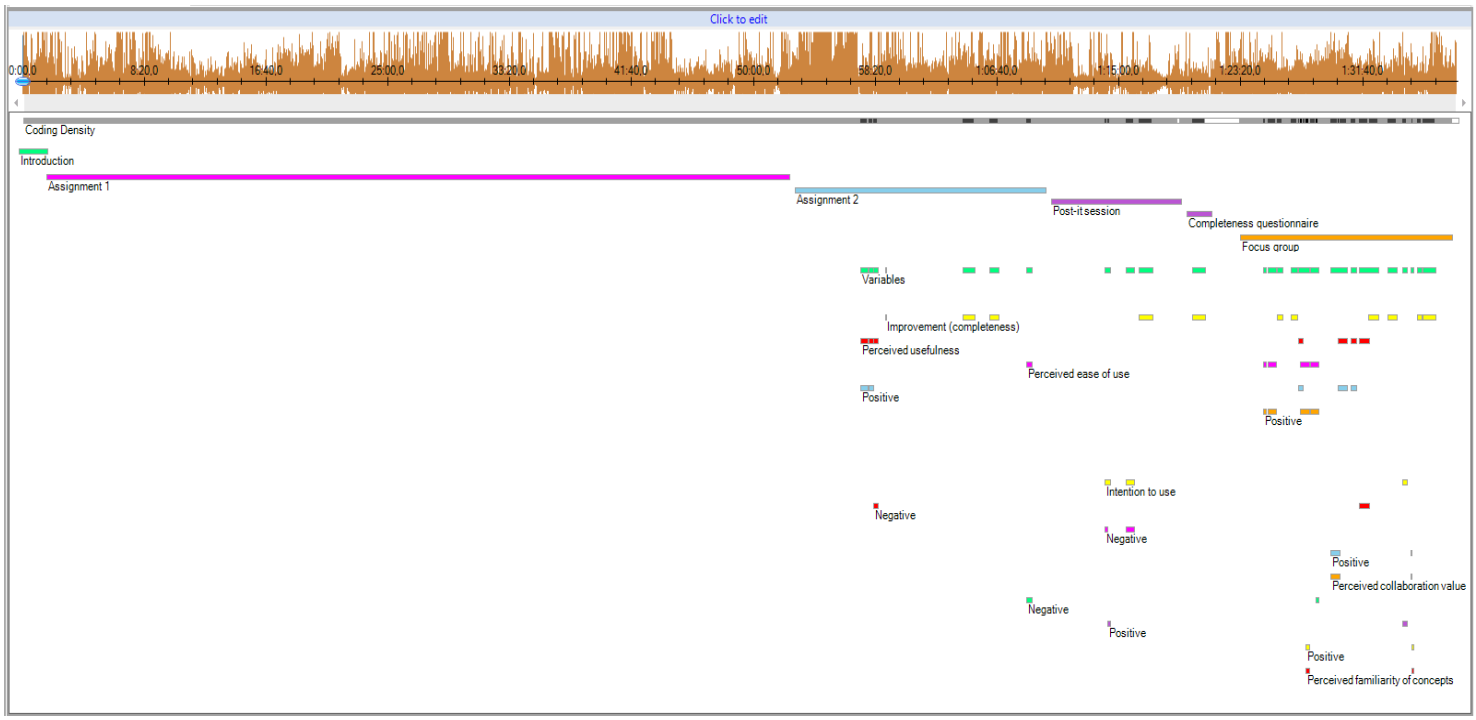



Figure 65: Coded audio fragments overview

# 5.6. Discussion

The previous chapter showed the results for each measurement. In this section, we discuss these results to find consistent patterns across different data measurements in order to answer our six validation research questions (VRQs). For analysing the results, we perform **clustering** on all results discussed in the previous section. Clustering is a technique that can be applied to qualitative data, in which data with similar characteristics is grouped for understanding and conceptualisation (Miles & Huberman, 1994). By using clusters, we are able to compare results from the observations (i), post-its (ii), completeness questionnaire (iii) and the audio fragments (iv). Additionally, it also allows us to see the amount of positive comments/observations compared to negative ones.

For creating the clusters, we checked for each comment or observation whether that finding was also present in a different data measurement. For example, we could find a positive comment among the post-its that it brings up interesting discussions, which was also observed by the researcher and stated twice by experts. This results in the cluster “Brings up interesting discussions” with a total of 4 findings supporting it. Findings that were only measured in one measurement, are still as a cluster but with just one finding supporting it. In case a comment like “Provides great overview” is found in one of the measurements but not found or observed anywhere else, “Provides great overview” still becomes a cluster, but with only one finding supporting it. Clustering this way allows us to combine large clusters with single findings in one overview.

When clustering the results, we only focus on observations, post-its and audio fragments and completeness questionnaire answers that are focused on the artefact. Comments about the case itself are out of scope for this discussion, as we focus to validate the artefact. Additionally, there are comments that say something about multiple variables. For example, an improvement post-it can be placed on the post-it wall, under familiarity of concepts, while actually indicating that something is missing and thus also belongs to perceived completeness. Another example is that a comment (audio fragment) can be coded as an improvement but also says something about the usefulness. In these cases, the data is put into *both*

clusters. Due to this decision, there can be more audio fragments for a specific variable than shown in the coded audio fragments overview of Figure 64.

In the next subsections, we discuss the results for each variable; *perceived usefulness* (5.6.1.), *perceived ease of use* (5.6.2.), *intention to use* (5.6.3.), *perceived familiarity of concepts* (5.6.4.), *perceived collaboration value* (5.6.5.) and *Perceived Completeness* (5.6.6.). The latter is combined with improvements as improvements somewhat indicate that the artefact is as complete as how it should be according to subjects.

## 5.6.1. Perceived usefulness

For the perceived usefulness, we created six positive clusters and three negative clusters. The clusters are shown in Table 27.

Table 27: Clusters for perceived usefulness

| Perceived Usefulness (PU) | | | | | | |
|---|---|---|---|---|---|---|
| ID | Description | #Obs. | #Post-its | #Audio fr. | #Quest. | Total |
| *Positive clusters* | | | | | | |
| PU1 | *Linking user journeys to architecture is useful* | 1 | 1 | 2 | | 4 |
| PU2 | *Creates overview & insight* | 1 | 2 | | | 3 |
| PU3 | *Allows to perform a gap analysis* | | | 2 | | 2 |
| PU4 | *Brings up informal discussion* | 1 | 1 | | | 2 |
| PU5 | *Stimulates re-use of existing architecture* | | | 1 | | 1 |
| PU6 | *Combines company perspective with user's perspective* | | | 1 | | 1 |
| *Negative clusters* | | | | | | |
| PU7 | *Linking only through business services reduces usefulness* | 1 | 1 | 1 | 1 | 4 |
| PU8 | *Screen designs are used instead of user journeys* | | | 1 | | 1 |
| PU9 | *Screen designs are not included* | | | 1 | | 1 |

***Positive clusters***

The results in terms of perceived usefulness were quite positive, with positive 13 observations/comments on the perceived usefulness. Based on observations, post-its and audio fragments, subjects did perceive linking user journeys to architecture as useful (PU1). Investigating why they perceive these links as useful; the answer could be found within the other positive clusters (PU2-6). The most prominent advantage is the large overview with different insights (PU2) and the opportunity for gap analysis (PU3). The latter has already been explained in the positive cluster discussion for ease of use; it shows experts what links are there, what links are not and results in a to-do list in case there is no supporting architecture while it should be. Another positive aspect is that the artefact brings up discussions (PU4). This aspect is confirmed during assignment 2, as there were many discussions as the subjects linked the models. At last, two positive comments mentioned the artefact stimulated re-use of existing architecture (PU5) and that linking the models combines the perspectives of both the company, and the user (PU6).

***Negative clusters***

There were quite fewer negative observations/comments that concern the perceived usefulness, with three negative clusters capturing a total of six observations/comments. Though, there is one clear issue that came across all four data measurements, which is that links between journey and architecture must be created through business services (PU7). Architects had a strong preference to directly link the business processes to the user journey activities, which actually goes a little against the Archimates standards. One architect argued "*the artefact has most potential and applicability in connecting the user journey to process modelling, instead of architecture*". All three architects strongly agreed to this opinion, making this an important improvement suggestion. Another negative aspect in terms of usefulness, are screen designs. Both architects and UX designers agreed that next to user journeys, the screen designs are used a lot as well, and should be considered in terms of the artefact. This results into the two clusters; screen designs are sometimes used instead of user journeys (PU8) and screen designs are not included in the artefact

(PU9). Where the first one sees screen designs as an alternative way of showing the same information, the latter contains the idea of including it into the artefact. Screen designs are a visual technique and not just an element, making it difficult to include into the artefact. Though, the idea of creating a similar version of the artefact for screen designs could be a great idea for future work.

## 5.6.2. Perceived ease of use

The clusters created from observations, post-its and audio fragments that concern the perceived ease of use are shown in Table 28. As result, there are three positive- and six negative clusters.

Table 28: Clusters for perceived ease of

| Perceived Ease Of Use (EOU) | | | | | | |
|---|---|---|---|---|---|---|
| ID | Description | #Obs. | #Post-its | #Audio fr. | #Quest. | Total |
| *Positive clusters* | | | | | | |
| EOU1 | *Links between user journey & architecture are easy to use* | 1 | 1 | 4 | | 6 |
| EOU2 | *The user journey & Archimate notation is easy to use* | 1 | 1 | 2 | | 4 |
| EOU3 | *Adding elements to models is easy* | | 1 | | | 1 |
| *Negative clusters* | | | | | | |
| EOU4 | *Linking user journeys to architecture with business services is inefficient* | 1 | 2 | 1 | 1 | 5 |
| EOU5 | *Moment of truth symbol <!> confused as Opportunity* | 2 | | 1 | | 3 |
| EOU6 | *Pitfall: Many connecting lines* | | 1 | | | 1 |
| EOU7 | *Small learning curve* | | 1 | | | 1 |
| EOU8 | *Channel (not used)* | 1 | | | | 1 |
| EOU9 | *The goal of the user journey was included in the user journey map itself* | 1 | | | | 1 |

***Positive clusters***

The three different positive clusters capture a total of 11 observations/comments related to the perceived ease of use. The most prominent positive cluster is that creating the links between user journey & architecture are easy to use (EOU1). According to the subjects, not only are the links easy to create, it provides an "*understandable and clear overview of what parts are linked, what parts are not linked and where we should take action*". Another positive aspect is that the notation of the artefact is perceived as easy to use (EOU2). The architects were known to Archimate and the UX designers were familiar with the user journey notation, stating all concepts were familiar. "*I recognised all concepts, we use the same concepts in my team*". Both EOU1 and EOU2 were found in three different datasets. At last, one UX designer mentioned on a post-it that it becomes easy to add elements or change an existing user journey (EOU3).

***Negative clusters***

The negative clusters capture a total of 12 observations and comments, which is quite a similar number compared to the 11 positive ones. The biggest negative cluster concerns how the links between user journey and architecture had to be made (EOU4). This aspect was found in all four different data measurements. Subjects perceived linking the activities to architecture through business services as inefficient. This is quite odd when compared to the most positive cluster, which states that creating these links is easy. This contrast can be explained due to the freedom of participants on how to apply the cross-layer meta model. Participants linked the user journey activities directly to business processes, as they perceive this as a more efficient way of linking the two models. The use of business services to connect the user journey to the architecture is because of the Archimate standards, stating layers should support each other through business services. Another issue was the confusion between of a Moment of truth and an Opportunity (EOU5). Subjects repeatedly perceived the notation of a Moment of Truth as an Opportunity, even incorrectly explaining one of the architects the meaning of a Moment of Truth symbol. The issue here might be caused due to the chosen notation, in that a <!> sign is also a common symbol for an improvement. Other negative aspects were the possibility of having too many lines for connecting elements (EOU6) and that the learning curve is small (EOU7). The latter is expected to be the downside of the simplicity of the

user journey notation, but the language can be expanded to solve this issue. Another issue was that the UX designers forgot to use the user journey channel (EOU8). When asked, they were aware of the app as the used channel. Though, the UX designer created a new notation; drawing the app icon on the Stage concept. The last issue in terms of ease of use, is that the user journey goal was included in the journey map itself (EOU9). When asked after the session, the UX designer explained that *"by including the goal into the journey map, the goal does not feel so much separated from the rest*".

## 5.6.3. Intention to use

For Intention to use, there are four positive clusters and three negative clusters. The clusters for intention to use are shown in Table 29.

Table 29: Clusters for intention to use

| Perceived Intention To Use (ITU) | | | | | | |
|---|---|---|---|---|---|---|
| ID | Description | #Obs. | #Post-its | #Audio fr. | #Quest. | Total |
| *Positive clusters* | | | | | | |
| ITU1 | *Would use links between journey and architecture* | | 3 | 1 | | 4 |
| ITU2 | *Gap analysis* | | | 2 | | 2 |
| ITU3 | *Encourages discussions* | 1 | 1 | | | 2 |
| ITU4 | *Initial assessment before creating screen designs* | | | 1 | | 1 |
| *Negative clusters* | | | | | | |
| ITU5 | *Not all UX designers create user journeys* | | | 1 | | 1 |
| ITU6 | *Must be used in the whole company to work* | | 1 | | | 1 |
| ITU7 | *Depends on availability of required data* | | 1 | | | 1 |

***Positive clusters***

There were nine positive comments/observations that are related to whether subjects would actually use the artefact in their practice. Comments and observations show that the main reasons of using the artefact are the links between journey and architecture (ITU1), the discussions that the artefact triggers (ITU2) and the gap analysis possibilities (ITU3). These clusters were also two in the positive usefulness clusters (PU1, PU3 and PU4). There is a chance that the other positive usefulness clusters such as overview (PU2) also play a role in the intention to use the artefact, but there is no clear evidence they do. At last, the possibility of doing an assessment before creating screen designs is also found to be one of the reasons to use the artefact.

***Negative clusters***

In contrast to the positive comments/observations, there were only three negative comments. Each negative cluster is based on a single comment. Though, these remarks are still valuable. One UX designer mentioned that not all UX designers create user journeys. "*In my work, I am more focused on screen designs and interaction models rather than user journeys*". This comment is related to clusters PU8 and PU9, that entail creating or expanding the artefact with screen designs. The other two aspects that would have a negative influence on the intention to use are organisational aspects: the artefact must be used/standardised throughout the whole company (ITU6) and required data must be available to all participants (ITU7). According to subjects, user journeys are not completely standardised throughout the company and that data availability issues are not rare. The data availability issues are related to regulations of rights and authorisations.

## 5.6.4. Perceived collaboration value

For the perceived collaboration value, there are five positive clusters and two negative clusters. The clusters are shown in Table 30.

Table 30: Clusters for perceived collaboration value

| Perceived Collaboration Value (PCV) | | | | | | |
|---|---|---|---|---|---|---|
| ID | Description | #Obs. | #Post-its | #Audio fr. | #Quest. | Total |
| *Positive clusters* | | | | | | |
| PCV1 | *Stimulates and improves collaboration with UX* | 1 | 3 | 2 | | 6 |
| PCV2 | *Ensures common understanding* | 1 | 1 | | | 2 |
| PCV3 | *Visual connections between each other's work* | 1 | 1 | | | 2 |
| PCV4 | *Creates balance between UX & Architect* | 1 | 1 | | | 2 |
| PCV5 | *Enables feasibility analysis on UX idea's* | | 1 | | | 1 |
| *Negative clusters* | | | | | | |
| PCV6 | *Incomplete cross-layer meta model* | 1 | 1 | 1 | 1 | 3 |
| PCV7 | *Frequent use of the artefact is a prerequisite* | | 1 | | | 1 |

***Positive clusters***

In total, there were 13 positive observations and comments regarding the collaboration value. The first cluster (PCV1) provides clear evidence that subjects believe in the collaboration value of the artefact, which will play a large role in answering VRQ4. One UX designer mentioned "*I think it would be a great idea to start using this to communicate with each other*". The architects were positive as well. One stated "*I definitely see added value in terms of collaboration*". Other positive clusters probably explain this positive outcome, stating that the artefact improves common understanding (PCV2), visually connects work from UX designers with work of the architects (PCV3), creates a balance between UX designers and architects (PCV4) and allows architects to perform a feasibility analysis on the work of UX designers (PCV5).

***Negative clusters***

Compared to the 13 positive observations and comments, there were only 4 negative ones. Though, one negative aspect is quite evident: the cross-layer meta model is incomplete (PCV6). This aspect has already come across in the discussion of the perceived ease of use (EOU4) and perceived usefulness (PU7): the architects really want to connect user journey activities to business processes without first creating business services between them. "*Linking these through business services would only take extra time during the collaboration*". Next to the issue with the cross-layer meta model, one organisational aspect was mentioned; there must be frequent use of the artefact in order to make it work (PCV7). This comment was also mentioned in the discussion of the intention to use (ITU6).

## 5.6.5. Perceived familiarity of concepts

For perceived familiarity of concepts, there are three positive- and two negative clusters. The clusters for perceived familiarity of concepts are shown in Table 31.

Table 31: Clusters for perceived familiarity of

| Perceived Familiarity of concepts (PFC) | | | | | | |
|---|---|---|---|---|---|---|
| ID | Description | #Obs. | #Post-its | #Audio fr. | #Quest. | Total |
| *Positive clusters* | | | | | | |
| PFC1 | *User journey concepts are familiar / standard* | 1 | 2 | 2 | | 5 |
| PFC2 | *Envisions UX practice & intentions* | 1 | 1 | | | 2 |
| PFC3 | *Architectural structure is familiar* | 1 | 1 | | | 2 |
| *Negative clusters* | | | | | | |
| PFC4 | *Missing exceptions* | | 1 | | 1 | 2 |
| PFC5 | *Missing risks* | | 1 | | 1 | 2 |

***Positive clusters***

In total, there were nine different positive comments/observations. The most evident positive aspect in terms of familiarity, is that the user journey concepts were familiar to both UX designers and architects (PFC1). The concepts are even recognised as the standards within the organisation. This cluster is supported through multiple data measurements and plays a big role in answering VRQ5. The architectural structure and elements were also familiar to the architects (PFC3). One of the post-its mentioned that the artefact envisions practice and intentions of UX designers. What the subject means, is that recognising the concepts from their collaborations in the past with UX designers.

***Negative clusters***

In contrary to the positive comments/observations, there were four negative ones. Investigating the negative clusters, we did not observe or hear any comment that a concept was completely new or not understood. Though, subjects did miss exceptions (PFC4) and risks (PFC5) and placed this comment under the familiarity of concepts category on the post-it wall. Apparently these concepts are familiar and expected to be included into the artefact. Although these post-its were placed under familiarity of concepts on the post-it wall, these clusters seem more fit to the perceived completeness.

## 5.6.6. Perceived completeness & Improvement suggestions

For the Perceived completeness, we combined the completeness questionnaire answers with the comments and observations on improvements. This decision is based on the logic that an improvement suggestion implicates the perception that the artefact is not complete yet, as the suggestion is still 'missing'. The findings of the completeness questionnaire are shown in Table 32, along with the improvement suggestion clusters.

**Completeness of the artefact (in general) & graphical notation**

Starting with the perceived completeness of the graphical notation, the subjects perceived the notation as quite complete, all rating it with a 4 out of 5. The completeness of the artefact as a whole is perceived a bit less, with a avg. rating of 3,6 out of 5. The cause of this lower rate can probably be found in the improvement suggestions. One factor that obviously plays a large role is the incompleteness of the cross-layer meta model. According to subjects, there should be a link possible between (business) processes and architecture. This clustered comment has come across multiple times already in the discussion (perceived ease of use, perceived usefulness and the perceived collaboration value). Another factor that could be of impact are the screen designs; there were multiple comments stating that screen designs should be included in the artefact as they are sometimes used instead of user journeys.

Table 32: Perceived completeness & Improvement

| Perceived Completeness (PC) & Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Questionnaire items (5pt Likert) | | Rated by subjects (avg.) | | | | |
| *Perceived completeness of graphical notation* | | 4 | | | | |
| *Perceived completeness of artefact as a whole* | | 3,6 | | | | |
| ID | Description | #Obs. | #Post-its | #Audio fr. | #quest. | Total |
| PC/IMP1 | *Allow processes to be connected to the journey (activities)* | 1 | 2 | 4 | 1 | 8 |
| PC/IMP2 | *Include screen designs (include or create new artefact)* | | | 4 | 1 | 5 |
| PC/IMP3 | *Include alternative flows/exceptions* | | 1 | 2 | 2 | 5 |
| PC/IMP4 | *Include Risks* | | 1 | 1 | 1 | 3 |
| PC/IMP5 | *Change notation for Moment of Truth* | 2 | | 1 | | 3 |
| PC/IMP6 | *Include requirements* | | | 1 | | 1 |
| PC/IMP7 | *Include required data objects* | | | 1 | | 1 |
| PC/IMP8 | *Change channel notation* | 1 | | | | 1 |
| PC/IMP9 | *Include journey goal into the user journey map* | 1 | | | | 1 |
| PC/IMP10 | *Integrate the language with created personas of the company* | | 1 | | | 1 |

***Adjust cross-layer meta model & integrate with screen designs***

As for clusters regarding the completeness and improvements, the two clusters just mentioned are the most prominent improvement suggestions found in the study: allowing processes to be connected to user journey activities (PC/IMP1) and including screen designs into the artefact (PC/IMP2). Especially the first one has sufficient support to change the cross-layer meta model, with a total of 8 observations/comments. The subjects did not even connect the models through business services, but drew the links as they wanted (this freedom was given to the subjects, so they still followed the assignment). The screen designs are a different issue. Screen designs seem to be often used instead of user journeys, though both are still quite different. Where screen designs show visual designs with detail already implemented, user journeys are still on a conceptual level. Creating user journeys and assessing them can prevent the situation that screen designs are thrown away after an architect reviews them. The idea of including screen designs into the artefact is a bit unrealistic as well. Screen designs are a visualisation technique on its own, and not on a conceptual or high-level. Still, a solution could be to allow the artefact to connect to created screen designs by introducing new links in the cross-layer meta model.

***Including new concepts/elements***

A couple of new elements have been requested by the subjects. These suggestions are including alternative flows (PC/IMP3), risks (PC/IMP4), requirements (PC/IMP6) and used data objects (PC/IMP7) into the artefact. From these improvements, the alternative flows and risks should be taken more serious than the other two as they are supported on multiple comments/observations. In terms of feasibility, these suggestions can be implemented quite easily. Though, adding these values comes with a downside; it could reduce the simplicity of the current notation.

***Change notation for moment of truth***

The notation of a moment of truth was seen as an opportunity (PC/IMP5) by one of the UX designers. This observation gives sufficient reason to change the notation for it.

***Alternative notation for Channel***

Channel was forgotten by the UX designers even though they were aware of the used channel (PC/IMP8). The UX designer solved this by drawing the same icon on each stage, which could a solution that opens the opportunity to expand the artefact to customer journeys. Drawing the icon on stages and activities opens the opportunity for creating a multi-channel journey.

***Journey goal & Persona integration***

The last suggestions are including the journey goal into the user journey map (PC/IMP9) and integrating the artefact with the standard personas of the company (PC/IMP10). The first suggestion can easily be adopted by changing the meta model and the illustrative case (that shows an example user journey). For the latter suggestion, the artefact could get a customisation feature when implemented into a company.

# 5.7. Summary

To validate User Journey Extended Archimate (the artefact), technical action research was performed. For the technical action research, an evaluation session was organised with five stakeholders: two UX designers and three Architects. The UX designers were asked to apply the artefact to a case in the banking context: 'Becoming a customer online'. UX designers were asked to create the user journey for the chosen case, while architects created the relevant business architecture at the same time. When both teams were finished, the two teams came together to link the user journey to the architecture. When the user journey was linked to the architecture, there was a post-it session to gather stakeholder opinions and a short questionnaire was filled in. At last, a focus group was held on the results of the post-it session. In the technical action research, we have gathered data using the following different measurements techniques: observations (i), post-its (ii), questionnaire (iii) and audio fragments with comments (iv).

To validate the artefact, several validation research questions (VRQs) were formulated in section 5.3.2. To answer these research questions, we gathered qualitative data on the following variables: *Perceived ease of use* (VRQ1), *Perceived usefulness* (VRQ2), *Intention to use* (VRQ3), Perceived collaboration value (VRQ4), Perceived familiarity of concepts (VRQ5) and Perceived completeness (VRQ6). To answer these VRQ's, we clustered the results. By searching for patterns across different measurements and analysing clusters with large comments/observations, we were able to differentiate small comments from important comments that allows us to answer the VRQs.

**VRQ1** The subjects were very positive about the usefulness of creating the links between user journey and architecture (visible in observations, post-its and audio fragments). The other positive clusters showed why they found it useful; it creates overview and insights, allows gap analyses and brings up discussions. One negative aspect that reduces the usefulness, is that the cross-layer meta model does not allow linking business processes directly to the user journey activities. By adjusting the cross-layer meta model, this issue could easily be fixed. Another (smaller) improvement suggestion in terms of usefulness, is integrating or including screen designs into the artefact.

**VRQ2** For ease of use, observations and comments showed that subjects perceived the notation and links between user journey and architecture are easy to use, yet requires improvement. Though the largest negative cluster showed a result that is a bit contradicting; subjects perceived linking user journeys to architecture through business services as inefficient. The reason why subjects still perceived the artefact as easy to use, is that subjects were free in whether they would follow the meta model, or diverse from it. Another important cluster was that the notation of moment of truth was seen as an opportunity. Both the cross-layer meta model and the moment of truth notation can easily be adjusted, fixing the major issues for perceived ease of use.

**VRQ3** In terms of whether the subjects would actually use the artefact (intention to use), subjects were very positive. They agreed that they would use the links between user journey and architecture as it brings up discussions with colleagues, gap analysis possibilities and assessment possibilities before screen designs are actually made. There were only minor aspects that would decrease the chance of using it. These aspects are mainly organisational conditions; required data needs to be available, the artefact must be used throughout the company and the UX designer must be active in user journeys.

**VRQ4** Subjects were very clear that there is positive collaboration value/potential of artefact. One subject even said "*I definitely see added value in terms of collaboration*". The main reasons supporting their opinion, are that the artefact ensures common understanding, shows visual connections between each other's work, creates balance between UX designers and architects and enables feasibility

analyses. Though, just like the usefulness and ease of use, the cross-layer meta model should be improved to give the artefact its potential to improve collaboration. Additionally, frequent use of the artefact across the company was again mentioned here as a precondition.

**VRQ5** For familiarity of concepts, both UX designers and architects seemed very familiar to the user journey concepts. One UX designer even mentioned the concepts are standardised across the UX design teams. Another positive aspect in terms of familiarity, is that the artefact and the discussion brings the experts in contact again with concepts of from other field (for UX designers: architecture concepts and for architects: user journey concepts). Two improvements in terms of familiarity of concepts, are to include exceptions and risks. One subject wanted to see these concepts included into the artefact.

**VRQ6** The artefact was perceived as quite complete, though there is still room for improvement. The completeness of the whole artefact was rated with an average of 3,6 out of 5. The measured completeness of the graphical notation in specific was a bit higher, with an average 4 out of 5. Both avg. scores are above 3 but can still be improved. Multiple improvement suggestions have been found in the evaluation session that could improve the completeness of the artefact. VRQ1,2 and 4 already showed that that the cross-layer meta model needs to be adjusted; allowing a link between business processes and user journey activities. This suggestion describes the largest improvement cluster. Another significant improvement is to either integrate screen designs into the artefact, or be able to link the a*rtefact to screen designs. The UX designer explained that screen designs are often used as a replacement for* user journeys, which should be taken into account for the artefact. Other improvement suggestions were to include exceptions, risks, requirements and required data objects into the artefact.

> *Answer to **SQ3:*** Overall, the expert's perceptions were positive on User Journey Integrated Architecture. Subjects perceived the artefact as useful, found it easy to use, intent to use it in their work, were familiar to the concepts and saw clear added value in terms of collaboration. Though, the artefact is perceived as not complete (yet), as there is still room for improvement (especially in terms of ease of use). Fortunately, the evaluation session let to a set of improvement suggestions. The major improvement suggestion is that the cross-layer meta model should allow business processes to be directly connected to the user journey. Other prominent improvement suggestions concern artefact integration with screen designs and to include alternative flows and risks. Besides artefact improvements, the evaluation also showed several organisational conditions in order for the artefact to work, concerning the availability of information and method standardisation across the company.

### 5.7.1. Lessons learned

Multiple lessons are learned from the validation. The biggest lesson learned from the evaluation session is that it requires a large effort in terms of preparation; in order to get the subjects together you need, measure each variable, ensure the assignments are clear/doable and to make sure it all fits in the reserved hour(s). Fortunately, there was sufficient time for some reviews and a strict schedule ensured everything went well. Additionally, an evaluation session like this also takes a lot of effort and responsibility during the exercise itself, which the researcher should be aware of. Another lesson learned is that a paper proof of concept turned out quite well; it gave subjects a pleasant experience and there was much interactivity between the subjects due to it. Unfortunately, a digital proof of concept could result into other results and the meta model was not tested due to it. itself. At last, we learned that letting subjects experience the artefact results in a lot of detailed feedback and concrete improvements.

# 6 CONCLUSION

As we have validated the artefact in the previous chapter, gathering stakeholder perceptions on various aspects of the artefact, we can now draw conclusions for this research project. Additionally, we discuss the limitations of the study. Limitations describe what could have gone better in the action research and what factors might have influenced the results. At last, we describe future work regarding the thesis topic or the artefact itself.

# 6.1. Conclusion

We started this thesis with two identified gaps. From a practical perspective, there seems to be a need to improve communication between UX designers and enterprise architects and make user journey maps universal. From a literature perspective, there is no universal terminology, meta model and notation for creating user journey maps. In attempt to solve both gaps, we aimed to integrate user journeys into enterprise architecture. For this, we stated the following research question: *"What steps and concepts are required to support the integration of user journeys into an enterprise architecture language?".* To answer the research question, we investigated to what extent user journey mapping is supported and applied (SQ1), how to create such user journey integrated architecture language (SQ2) and what experts' perceptions are on this modelling language (SQ3).

***SQ1*** For investigating to what extent user journeys are supported and applied, we performed a literature study, an expert interview with a customer journey software vendor and a case study at a Dutch bank. The results from this investigation showed that everyone has their own user journey terminology and notation that fits their needs, without a meta model that brings formal structure to the language, resulting in communication- and collaboration issues between UX designers and architects. Additionally, the literature and practical investigation showed that customer journeys; extended multi-channel user journeys, are more popular than user journeys. This gives great motivation to extent the artefact to customer journeys.

***SQ2*** After investigating the literature- and practical status of user journeys, we found a way to create the user journey integrated architecture language. First, we created a final user journey taxonomy with the most common concepts in order to create a user journey meta model. Next, we matched the user journey concepts to Archimate concepts by comparing concept descriptions. After, we visualised the links between the concepts of both domains, and used it to combine the user journey meta model with the Archimate meta model, resulting in our User Journey Extended Archimate meta model. Along with the meta model, we extended the Archimate framework and created a graphical notation for the modelling language. At last, we created a cross-layer meta model to show the allowed links between architecture and user journey(s).

***SQ3*** As final part of this thesis, we validated the artefact by measuring the experts' perceptions. By using technical action research with UX designers and architects applying the artefact to a real case, an evaluation session was held in which we measured the *perceived ease of use, perceived usefulness, intention to use, perceived collaboration value, perceived familiarity of concepts* and *perceived completeness*. Overall, subjects were rather positive on all variables. Still, the artefact is not complete and the ease of use, usefulness, intention to use and collaboration value can still be improved. Major improvements are to adjust the cross-layer meta model to allow a direct link from processes to user journey (i), integrate the artefact with screen designs (ii) include alternative flows (iii), risks (iv) and create organisational conditions (v). Organisational conditions concern aspects of data availability and universal use of the artefact.

> *Answer to **RQ**:* Our research question was focused on identifying the necessary steps and concepts to integrate user journeys into an enterprise architecture language. As for concepts, we needed a final set of common user journey concepts and linked it to the existing Archimate concepts. The final set of concepts consists of; *user journey, user journey map, persona, channel, stage, experience, moment of truth, goal, timeline, opportunity, activity, abstraction level* and *thought*. As for steps, we had to start investigating the literature- and practical status of user journeys and establish a final user journey taxonomy and meta model. Next, we chose an enterprise architecture language (Archimate) and linked the concepts of both domains to create the user journey integrated architecture (UJEA) meta model. Additionally, we created a graphical notation and a cross-layer meta model showing the allowed relationships. The last step was to validate the artefact with real experts and gather improvements for the artefact.

## 6.2. Limitations

There are a couple of limitations that should be to this research that should be mentioned. The first limitation is that the artefact was only tested on one case: the 'Becoming a customer online' case. The validation was limited to one case to ensure the evaluation was feasible in terms of time and resources. Results might have been different in case the artefact was applied to a different case. Another limitation is that the artefact was only validated at a single bank. Results might be different when tested across multiple banks, or tested in a context other than the banking sector. This is one of main limitations of using technical action research. To reduce this limitation, the evaluation session was held with five different stakeholders, both UX designers and architects. Each stakeholder was asked to give their individual opinion on the artefact. Despite the mentioned downside of the action research, the method came with great benefits. It gave us the possibility for in depth qualitative analysis and showed us detailed opinions and improvement suggestions from stakeholders after applying the artefact to a real case. Testing the artefact in multiple companies (across different sectors) or on multiple cases was not feasible for this thesis project, but will be part of suggested future research.

Another limitation is related to the proof of concept that was used during the technical action research. Even though a room with a digital smart screen was arranged, the reservation got cancelled and the validation had to be done in the alternative way. The graphical notation was printed on paper so that all stakeholders could simultaneously work on the user journey and architecture. A limitation to this proof of concept is that a paper version of the artefact could have brought up different results than testing it in a digital way. To reduce this limitation, the original graphical notation concepts were printed in different sizes. This way, we ensured the experience with the paper graphical notation is as similar as possible to the digital experience.

Furthermore, the UJEA meta model was not tested in the validation. This is due to the fact that UX designers are not used to semi-formal modelling languages and are thus not familiar to meta models. Giving the meta model to the UX designers would not make a difference. This was not a big issue as we were still able to judge from the resulting models whether the subjects applied the artefact while following the syntax. To reduce the limitation, we gave an example user journey to the UX designers, with which they could see how the user journey is structured. The idea of giving an example came from the perspective of Archimate. For Archimate, there are many different existing models that people can access and use as example. This ideology serves as a solution that UX designers are not dependent on the meta model but were still able to apply the graphical notation with the correct syntax. Still for future work, the meta model could be implemented in a digital proof of concept for further validation.

The last limitation is that we made a few organisational assumptions for the action research that are not always the case. We assumed that required data is available, and that everyone would use the artefact. According to subjects, this is not always the case in reality. Data is not always accessible for everyone, and different teams use different techniques to envision information. This limitation was hard to reduce as the artefact would be hard to test without the assumptions made. We categorise these issues as organisational aspects that start playing a role when the artefact would be implemented on a larger scale.

# 6.3. Future work

In the discussion and the limitations, we already introduced a couple of aspects for future work. In this section, we discuss the future work to improve the artefact, as well as future work in terms of validation.

## 6.3.1. Artefact improvements

The evaluation session brought multiple ways to improve the artefact. The artefact improvements that are recommended for future work are listed below.

- *Extend to customer journeys:* In this study we merely focused on user journeys, leaving customer journeys out of scope. Though, our literature review and practical investigation (Chapter 2 and 3) showed that customer journeys, are the more common than user journeys. Our research showed that customer journeys are multi-channel user journeys with a broader scope (including the pre-purchase-, purchase- and post-purchase phase). Future research should look into extending UJEA to customer journeys by making it multi-channel. One way to do this is to add additional channels to the graphical notation. A different way could be to follow the alternative channel notation that was proposed by one of the subjects in the evaluation session; placing a channel icon on top of a stage or activity within the journey. This allows phases and activities to vary without using a separate channel concept.
- *Adjust the cross-layer meta model:* The most prominent comment and improvement suggestion from the evaluation session was to adjust the cross-layer meta model. Although Archimate standards say different layers should be connected through services, the architects had a strong preference to connect the user journey activities and stages directly to business processes. As this link was the only link the architects focused on, further research should investigate whether this should be the only allowed relationship between user journey and architecture.
- *Integration with screen designs:* Another frequent improvement suggestion was to integrate screen designs in some way. One of the subjects stated that screen designs are also often used instead of user journeys. In case a team is used to creating screen designs, the artefact would not work for them. Integration can be done in multiple ways. One could include screen designs within the graphical notation or allow user journeys and architecture to be connected to the screen designs. For future research, we recommend to investigate the latter option as screen designs is a visualisation technique on its own. One could add new relations to the cross-layer meta model, but screen designs are not compliant to the Archimate standards. Thus, future research is recommended to figure out how to integrate screen designs with the artefact.
- *Add new concepts to the artefact:* The evaluation session led to a set of concepts that can easily be added to the artefact by extending the graphical notation. The concepts recommended by subjects are *alternative flows, risks, requirements, required data objects*. Further research is required to investigate how these concepts should be visualised, and how they fit in the UJEA meta model.
- *Notation changes:* Several notation changes were observed or suggested in the evaluation session. The most important notation improvement is to adjust the notation of a moment of truth. One of the stakeholders clearly confused moment of truth notation with opportunity. Thus, future research should look into replacing the moment of truth notation. Another improvement suggestion was observed; the UX designers created an alternative way of presenting the channel after they realised to forgot the channel concept. The subjects placed an app icon on top of stages and activities. This could be an alternative notation while also opening a window to extend the artefact to customer journeys. Future research should look into the most optimal way for visualising the used channel.

- *Persona integration with company standards:* The last concrete improvement suggestion was to be able to ingrate the persona with the standard personas from a company. According to one of the subjects, UX designers do not create a persona for each case but use one of the standard personas that are universally specified across the company.

### 6.3.2. Further validation

Next to improvements on the artefact itself, future research is also recommended on further validating the artefact. As mentioned in the lessons learned section (5.7.1.), the validation session was limited in terms of time and resources. The artefact should therefore be validated in different contexts and cases, and aspects that were not covered in the validation should be validated in further research.

#### Case and Context

- *Different case(s):* In this research, the artefact was validated with a single case. Further validating the artefact with other cases will give results that either further support our findings or contradict them. A different case would mean a different user journey and possibly different architecture supporting the journey.
- *Different bank:* In this research, the artefact was merely validated in a single Dutch bank. Validating the artefact at a different bank, in the Netherlands or in a different country, could give different results. This aspect is especially useful in further exploring the organisational aspects that play a role in the effectiveness of the artefact.
- *Different sector:* In this study we performed technical action research at a bank to validate the artefact. Investigating user journey practice or validating our thesis artefact in a different sector could lead to different results or improve the generalizability of our results.
- *Organisational aspects:* During the evaluation session, subjects remarked several organisational aspects that play a role in the effectiveness of the artefact. In the post-it session, subjects remarked data accessibility (i) and universal use of the artefact across the whole company (ii) as two organisational conditions that should be met in order for the artefact to work. Further research on organisational aspects could explore whether there are more organisational aspects that are of influence, and whether other stakeholders agree to the two mentioned organisational conditions.

#### Artefact aspects

- *Validate with embedded meta model:* As mentioned in the lessons learned (subsection 5.7.1.) and the limitations, the artefact was only validated with a proof of concept in paper version, without the UJEA meta model. Embedding the UJEA meta model within a tool could give different results than the paper version of the artefact. Digital interaction with the artefact could give different results and with the meta model embedded, the researcher can observe the amount of syntax errors during or after the evaluation.
- *Validate the mapping of concepts:* With our validation, we did not test whether the user journey concepts were correctly matched to the Archimate concepts. Interviewing an Archimate expert, for example one of the members of The Open Group, would be a suitable way to validate our mapping of concepts.
- *Validate application traceability:* In the evaluation session, the UX designers and architects only connected the user journey to business architecture. Though, also including the application architecture into the overview would allow the traceability to go from user journey to applications and vice versa, possibly leading to new results and allows further validation on traceability links with the artefact.

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# APPENDIX A:
# CJ/UJ concepts in the literature

This appendix contains tables regarding the study of concepts in Chapter 2. The first table, Table 33, represents the used search strings for the first step of our study of concepts; finding literature with UJ/CJ concepts and definitions. The second table, Table 34, shows the search strings that were used in step four; in which we found papers that acknowledge concepts in the context of UJ/CJ. The other two tables contain the results of our study of concepts, including concepts, synonyms, definitions and literature that mention the concept. Table 35 represents the general UJ/CJ concepts, and Table 36 represents the journey specific UJ/CJ concepts.

Table 33: Search strings used for finding literature on concepts and definitions

| Search strings - Step 1: Identify literature on concepts | |
|---|---|
| **User journey literature** | **Customer journey literature** |
| User journey | Customer journey |
| User journeys | Customer journeys |
| User experience journey | Customer experience journey |
| User journey map | Customer journey map |
| User journey mapping | Customer journey mapping |
| User journey definition | Customer journey definition |
| User journey definitions | Customer journey definitions |
| User journey concept | Customer journey concept |
| User journey concepts | Customer journey concepts |

Table 34: Search strings used for finding literature that mention/acknowledge the concept in UJ/CJ context

| Search strings - Step 4: Concepts acknowledged in CJ/UJ literature | | | |
|---|---|---|---|
| **Concept** | **Search terms** | **Concept** | **Search terms** |
| **User journey** | User journey, User journey definition, User journeys, User experience journey, User journey map | **Touchpoint** | Touchpoint user journey, Touchpoint user journey map, Touchpoint Customer journey, Touchpoint customer journey map |
| **Customer journey** | For this concept, the literature review of Følstad et al. (2013) provided sufficient acknowledgement | **Moment of truth** | Moment of truth user journey, Moment of truth customer journey, Moment of truth user journey mapping, Moment of truth customer journey mapping |
| **Buyer journey** | Buyer journey user journe, Buyer journey customer journey, Buyer journey user journey map, Buyer journey customer journey map, Buyer journey customer experience journey, Buyer journey mapping | **Deviation** | Deviation customer journey, deviation user journey, deviation experience journey, deviating journeys, |
| **Mapping** | Mapping, Journey mapping, Customer journey mapping, User journey mapping, Buyer journey mapping, Mapping customer journeys, Mapping user journeys, User journey map, Customer journey map | **Breakpoint** | Breakpoint user journey, breakpoint customer journey |
| **User journey map** | User journey map, User journey mapping, User experience journey map | **Initiator** | Touchpoint initiator, Initiator user journey, initiator customer journey |
| **Customer journey map** | For this concept, the literature review of Følstad et al. (2013) provided sufficient acknowledgement | **Trigger** | Trigger user journey, Trigger customer journey, starting point user journey, starting point customer journey, journey start |
| **Buyer journey map** | Buyer journey map, Buyer journey mapping, Buyer journey customer journey, Buyer journey customer journey mapping | **Goal** | Goal customer journey, Goal user journey, customer journey outcome, User journey outcome |
| **Journey concept** | Journey concept, Journey concept customer journey, Journey concept user journey, Journey concept experience journey | **Time** | Customer journey time, User journey time, Time customer journey, Time user journey |
| **Planned journey** | Planned journey, Planned customer journey, Planned user journey, Planned experience journey, Expected journey, Ideal journey, generic journey | **Timeline** | Timeline customer journey, Timeline user journey, Timeline user journey map, Timeline customer journey map |
| **Actual journey** | Actual journey, Actual customer journey, Actual user journey, Actual experience journey, User journey user behavior, Customer journey user behavior | **Stage** | Stage user journey, Stage customer journey, Stage user journey map, Stage customer journey map |
| **Scenario** | Scenario customer journey, Scenario user journey, Scenario experience journey, Scenario journey mapping, Scenario user journey map, Scenario customer journey map | **Channel** | Channel user journey, Channel customer journey, Channel user journey map, Channel customer journey map |
| **Persona** | Persona customer journey, Persona user journey, Persona experience journey, Persona journey mapping, Persona user journey map, Persona customer journey map | **Trace** | Trace user journey, Trace customer journey, Trace user journey map, Trace customer journey map |
| | | **Experience** | Experience user journey, Experience customer journey, Experience user journey map, Experience customer journey map |
| | | **Note** | Note customer journey, Note user journey, Comment user journey map, Comment customer journey map |
| | | **Opportunity** | Opportunity user journey, Opportunity customer journey, Opportunity touchpoint |
| | | **Lens** | Lens customer journey, Lens user journey, Lens customer journey map, Lens user journey map |

Table 35: General concepts of user- and customer journeys

| General concepts | | | |
|---|---|---|---|
| **Concept** | **Synonym(s)** | **Definition** | **Sources** |
| **User journey** | User experience journey | The total user experience (emotions, perceptions and feelings) across a period of time, as the user interacts with a product or service to achieve a goal using a system. (Nenonen et al., 2008; Hannington & Martin, 2012; Maguire, 2013) | (Nenonen et al., 2008), (Hannington & Martin, 2012), (Andrews & Eade, 2013), (Maguire, 2013), (Hobbs & Fenn, 2013), (Marquez et al., 2015), (Gürvardar et al., 2016), (Bernard & Andritsos,2017) |
| **Customer journey** | Customer experience journey | Customer's multi-channel experience and interactions with one or more service providers to achieve a specific goal (Halvorsrud et al., 2016; Halvorsrud et al., 2016) | >50 sources already in 2012 (Følstad et al., 2013) |
| **Buyer journey** | Decision funnel | Customer decisions and experiences that show the movement of customers towards the purchase of a product or service (Lemon & Verhoef, 2016) | (Lemon & Verhoef, 2016) |
| **Mapping** | Journey mapping | Tracking and describing user/customer experiences when using a product or service, and depicting it on a flow diagram (Bernard & Andritsos,2017; Maguire, 2013) | (Hannington & Martin, 2012), (Andrews & Eade, 2013), (Marquez et al., 2015), (Gürvardar et al., 2016), (Bernard & Andritsos,2017) |
| **User journey map** | User experience journey | Visualization of experiences people have when interacting with a product or service by using a system (Hannington & Martin, 2012) | (Hannington & Martin, 2012), (Hobbs & Fenn, 2013) |
| **Customer journey map** | | Visualisation Customer's experience and interactions with one or more service providers to achieve a specific goal (Halvorsrud et al., 2016) | >50 sources already in 2012 (Følstad et al., 2013) |
| **Buyer journey map** | Decision funnel, path-to-purchase model | Models of customer decisions and experiences to guide customers towards the purchase of a product or service (Lemon & Verhoef, 2016) | (Lemon & Verhoef, 2016) |
| **Journey concept** | | A journey in development, but still conceptual (Norton & Pine, 2013) | (Norton & Pine, 2013) |
| **Planned journey** | Expected journey, Ideal journey, Retrospective Maps, Generic journey | Hypothetical, static journey reflecting the service delivery process (Halvorsrud et al., 2016) | (Norton & Pine, 2013), (Følstad et al., 2013), (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), (Paluch, 2017) |
| **Actual journey** | Prospective Maps | Individual, dynamic journey that occurs during execution of a service (Halvorsrud et al., 2016) | (Følstad et al., 2013), (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), (Paluch, 2017) |
| **Scenario** | | A set of ordered user/customer actions used to create user journeys (Hannington & Martin, 2012) | (André, 2007), (Nenonen et al., 2008), (Hannington & Martin, 2012), (Maguire, 2013), (Hayes, 2011) (Kiseleva et al., 2016) |
| **Persona** | | Representation of a typical customer that contains motivations, goals, pain points and other characteristics (Signavio, 2018). | (Hannington & Martin, 2012), ((Hobbs & Fenn, 2013), (Maguire, 2013), (Kusinitz, 2014), (Bernard & Andritsos 2017), (Lankhorst, 2017), (Signavio, 2018) |

Table 36: Journey specific elements of user- and customer journeys

| Journey specific concepts | | | |
|---|---|---|---|
| **Concept** | **Synonym(s)** | **Definition** | **Sources** |
| **Touchpoint** | Service encounter, Communication channel, Contact point, Service event, Service moment | An interaction (instance of communication) between customer and service provider (Halvorsrud et al., 2016) | (Lillrank, 2009), (Koivisto, 2009), (Clatworthy, 2011), (Zomerdijk and Voss, 2011), (Følstad et al., 2013), (Halvorsrud et al., 2016),(Lemon & Verhoef, 2016), (Halvorsrud and Kvale, 2017), (Lankhorst, 2017), (Bernard & Andritsos 2017) |
| **Moment of truth** | Key moment | Decision points that can make or break the success of the journey. It can be a simple decision, or a hard decision that is experienced as a barrier (Signavio, 2018) | (Norton & Pine, 2013), (Signavio, 2018) |
| **Deviation** | | Touchpoints from where the path goes different than what was planned (Halvorsrud et al., 2016) | (Hobbs & Fenn, 2013), (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017), |
| **Breakpoint** | Drop-off | Moment where the journey stops (Hobbs & Fenn, 2013) | (Hobbs & Fenn, 2013) |
| **Initiator** | | Initiator of a touchpoint, can be a customer/user, service provider or subcontractor (Halvorsrud et al., 2016) | (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017) |
| **Trigger** | Start, starting point | Trigger of the customer journey, either an idea or demand (Signavio, 2018) | (Signavio, 2018) |
| **Goal** | Outcome | The thing what the customer aims to achieve, such as obtaining a loan in a banking context, this is the final touchpoint of a service (Signavio, 2018) | (Bernard & Andritsos 2017), (Signavio, 2018) |
| **Time** | | Time when a touchpoint is encountered by the customer (Halvorsrud et al., 2016) | (Halvorsrud et al., 2016), (Halvorsrud and Kvale, 2017) |
| **Timeline** | | Duration of the journey from the starting touchpoint to the final touchpoint. The timeline can be depicted by actual time, or ordering touchpoints by giving them numbers (Bernard & Andritsos 2017) | (Bernard & Andritsos 2017) |
| **Stage** | | Container of multiple touchpoints (Bernard & Andritsos 2017) | (Keyser et al., 2015), (Woof & Anderson, 2015), (Lemon & Verhoef, 2016), (Bernard & Andritsos 2017), (Halvorsrud and Kvale, 2017), (Lankhorst, 2017) |
| **Channel** | Customer channel, Service interface | A medium for users and service providers to interact with one another (Sousa & Voss, 2006) serving as a mediator of a touchpoint (Halvorsrud et al., 2016) | (Sousa & Voss, 2006), (Peterson et al., 2010), (Norton & Pine, 2013), (Keyser et al., 2015), (Woof & Anderson, 2015), (Halvorsrud et al., 2016), (Lemon & Verhoef, 2016), (Halvorsrud and Kvale, 2017), (Lankhorst, 2017), (Bernard & Andritsos 2017) |
| **Trace** | | Content that emerges as result of a touchpoint (Halvorsrud et al., 2016) | (Halvorsrud et al., 2016) |
| **Experience** | Feeling | Emotions (i), emotions scale (ii) and customer quotes (iii) (Bernard & Andritsos 2017) | (Nunes, 2003), (Clatworthy, 2011), (Hobbs & Fenn, 2013),(Følstad et al., 2013), (Norton & Pine, 2013), (Chang et al., 2014) (Anderl et al., 2016), (Halvorsrud et al., 2016), (Lankhorst, 2017), (Halvorsrud and Kvale, 2017), (Bernard & Andritsos 2017), |
| **Note** | Banner, Text | Comments that contain important textual information about the journey map (Signavio, 2018) | (Signavio, 2018) |
| **Opportunity** | Improvement | Touchpoint to improve (Lankhorst, 2017) | (Lankhorst, 2017) |
| **Lens** | | Grouping touchpoints to a certain context or domain, while excluding the other touchpoints (Bernard & Andritsos 2017) | (Bernard & Andritsos 2017) |

# APPENDIX B:

# Expert interview -JourneySoftware

*** As the interview was held in Dutch, the interview protocol and answers are Dutch as well. During the interview, the answers of the interviewee were directly written down and summarized, resulting in the documented answers below.*

**Vooraf**

- Bedanken voor de komst.
- Mijzelf introduceren
- Vragen of de interviewee zichzelf en zijn functie binnen JourneySoftware wilt introduceren
- Vragen of het gesprek opgenomen mag worden

**Algemeen**

1. In mijn literatuuronderzoek is naar voren gekomen dat er verschil wordt gemaakt tussen
    1. Customer en user journeys
    2. Actual en Planned journeys (tevens Dynamisch vs statisch)

Zijn alle vier de termen bij jullie bekend? welke worden ondersteund door JourneySoftware?

> *focus op CJ, in het specifiek: actual customer journeys. Werken wel samen met planned journeys want dat is een interessante koppeling: Top down vs bottom up (bottom up belangrijker want context wordt belangrijker). Ondanks dat wij bottom-up werken wilt de klant ook dingen blijven plannen. We werken dus met partners zoals Salesforce samen (zitten in planned journeys, prog: Journeybuilder). Ze hebben een integratiegebouwd met journeybuilder. Inbound en outbound bij elkaar, uniek volgens hem.*

2. Hoe creëert JourneySoftware real-time customer journeys? (Welke Technieken + Data)

> *One houdt per persoon dat bij. Is organisatorisch niet de doen-> personas gebruiken. Al journey gemapt?(aan bedrijf vragen). Wat voor activiteiten in zo'n journey. User journey niet belangrijk hangt.*
>
> *Data: Gedragsdata van nu (Waar klikken ze op, wat vragen ze). Alleen de voorgecategoriseerde data(filter). Uit backbone systemen van klant. Context staat centraal (wat is de klant op dit moment aan het doen).*
>
> *Bi: waar zitten bottlenecks, gaan mensen heen of terug?*
>
> *Ai: Wat gaan we ermee doen? Wat is de beste journey, huidige kennis van journeys en dan daarop inspelen (een gele website gevne ipv rode. Journey based decisioning) -> Next best conversation. Gaat om welke stap je toeschuift om een klant op een punt/goal te krijgen.*

**Toepassingen van CJM in de praktijk**

3. Uit literatuur is gebleken dat het hoofddoel van user journeys om user experience te begrijpen (1), te evalueren(2) en te verbeteren (3). Jullie noemen als hoofddoel het verbeteren van engagement. Zie jij hier overeenkomst of verschil tussen deze hoofddoelen?

> *Experience: hoe maak ik dit proces mee . Engagement is meer hoe van hoe kan ik jou triggeren om te blijven op langere termijn, wordt er écht geluisterd naar de klant. Wordt er naar mij geluisterd. Omdat dit blijft doorgaan is engagement eigenlijk een constant toenemende/lerende relatie.*

4. Uit literatuuronderzoek blijkt dat CJM vooral gebruikt wordt om
1.Een dienst product of dienst te ontwerpen of verbeteren.
2. Experience journeys optimaliseren
3. Een klant zover te krijgen dat hij/zij jouw product koopt (3) (buyer journey).
Komt dit overeen met het gebruik van JourneySoftware?

*Alle 3 absoluut. Bij punt 2 wel een toevoeging: zowel voor de klant als voor het bedrijf optimaliseren.*
*Verder 2 trends die wij zien:*
*- Vroeger was het meer cross/upsell, nu meer: waar heeft de klant behoefte aan.*
*- Begon met marketing/niet pushen, naar klant luisteren -> maar nu (onze visie) zouden eigenlijk alle afdelingen ermee bezig moeten zijn.*

5. Jullie doelen heb ik gemapt op de doelen uit de literatuur.

| | |
|---|---|
| Acquisitie | Buyer journey (3) |
| Onboarding | Journeys optimaliseren (1) |
| Servicing | Diensten optimaliseren (2) |
| Retention | Customers houden |
| Advocacy | Customers houden |
| LTV | Huidige meer of grotere producten laten kopen/gebruiken |

Ben je het eens met de volgende mapping op literatuur? Hoe verschillen Advocacy en Retention?

*LTV = lifetimevalue (kan ik de klant langdurig klant houden)*
*Acquisity = overhalen om te kopen.*
*Advocacy eigen klanten als ambassadeurs.*
*Onboarding= iemand die al klant is helpen met de eerste stapjes.*

6. Volgens literatuur zijn er 3 velden die CJ/UJ mapping gebruiken:

1. Marketing
2. Enterprise architects/business architects (vormgeven van diensten/informatie/architectuur)
3. UX design

Ziet u deze 3 velden ook terug in uw klanten?
Horen Acquisitie, onboarding, servicing, retention, Advocacy en LTV allemaal bij deze categorieëen?

*Customerservice mist in de rij. Interne optimalisatie mist ook. (interne diensten)*
*Maar wij zien vooral Marketing en customerservice.*

7. Wat is volgens jou de huidige status van customer journey tool support? Jullie concurrentie?

*Op gebied van actual journeys zijn wij de enige. Planned journeys, een hoop. Er zijn wel veel partijen die data verzamelen en BI erop loslaten. Maar echt de journeys shapen.*
*Journey analyse en Journey orchestration.*

**Nieuw vergeleken met literatuur**
8. Op jullie site staat dat JourneySoftware met AI en predictive models klantengedrag voorspelt, hoe gaat dat in zn werk? Wordt dit veel gebruikt?

*Diensten toeschuiven. Ook: verbeteren van journeys door automatische optimalisatie. Ze gaan oplossingen vergelijken en suggereert dus de beste dienst/verbetering om de flow beter te laten lopen. Dat baseert hij op voormalig gedrag van journeys. Dit wordt nog maar weinig gebruikt, deep learning staat nog in de kinderschoenen. Ook is adoptie hierin (in markt) nog laag. Mensen willen zelf die controle houden.*

9. Jullie noemen jullie touchpoints Omni-channel ipv multichannel (uit literatuur). Kan je dit verschil uitleggen? Geldt dit voor alle touchpoints en services?

> *Omnichannel: ipv ik kan communiceren via verschillende kanalen(multichannel). Omni = ik kan het gecoordineert doen. Het ene kanaal gaat verder met waar je in het andere kanaal gebleven was. Dit gaat dus compleet gecoordineerd. Wij zijn eigenlijk een soort hub tussen veschillende kanalen. Uitleg: Met ids koppelen ze journeys, onthouden ze waar ze zijn: wordt automatisch gesynchroniseerd. Vergt integratie van kanalen van het bedrijf maar is niet heel veel werk (gemiddeld 2 dagen). Integratie is makkelijk omdat we een onafhankelijk kanaal zijn. Wij zijn gebouwd om te integreren, de software dient eigenlijk als een hub.*

**Used concepts**

10. Qua gebruike termen/elementen vond ik deze lijst. Gebruiken jullie ook andere termen?

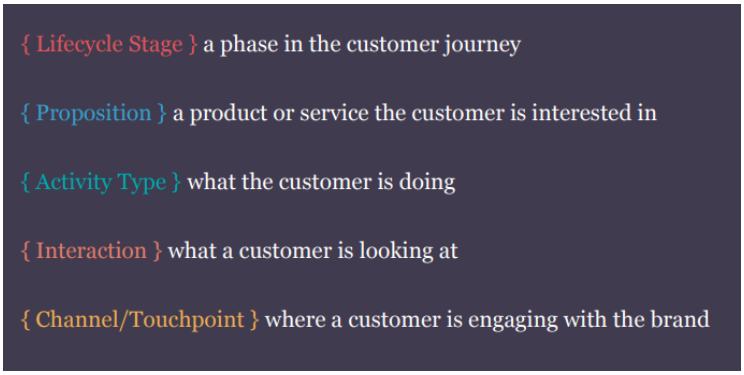



Figure 66: Terminology ppt slide of JourneySoftware

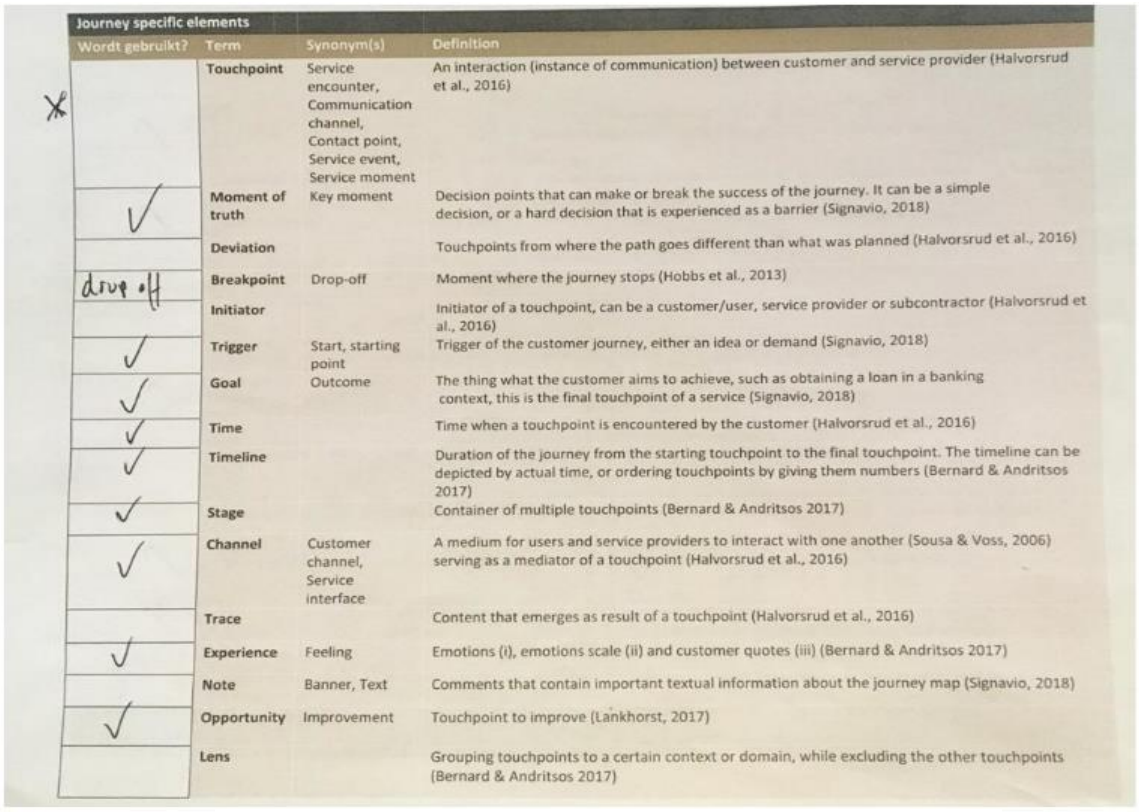
Zoja, Kunt u aankruisen welke bij u nog meer bekend zijn?

*Voor onze structuur is dit het belangrijkste .<u>Touchpoint gebruiken wij maar met een andere betekenis.</u> wij kennen 6 kanalen: Web app, fysiek, assited(callcentre) en social en outbound. Touchpoints zijn dan voor ons Website 1 website 2.* Outbound heeft bv als touchpoints: fax, email en brieven.

**General concepts**

| Wordt gebruikt? | Term | Synonym(s) | Definition |
|---|---|---|---|
| | User journey | User experience journey | Story about an individual's actions, feelings, perceptions, and frame of mind- including the positive, negative, and neutral moments as he or she interacts with a product or service over a period of time (Hannington & Martin, 2012) |
| ✓ | Customer journey | Customer experience journey | Customer's multi-channel experience and interactions with one or more service providers to achieve a specific goal (Halvorsrud et al., 2016; Halvorsrud et al., 2016) |
| ✓ | Buyer journey | Decision funnel | Customer decisions and experiences that show the movement of customers towards purchase of a product of service (Lemon & Verhoef, 2016) |
| | Mapping | Journey mapping | Tracking and describing user/customer experiences when using a product or service, and depicting it on a flow diagram (Bernard & Andritsos,2017; Maguire, 2013) |
| | User journey map | User experience journey, User journey map | Visualization of experiences people have when interacting with a product or service by using a system (Hannington & Martin, 2012) |
| ✓ | Customer journey map | | Visualisation Customer's experience and interactions with one or more service providers to achieve a specific goal (Halvorsrud et al., 2016) |
| | Buyer journey map | Decision funnel, path-to-purchase model | Models of customer decisions and experiences to guide customers towards purchase of a product of service (Lemon & Verhoef, 2016) |
| | Journey concept | | A journey in developent, but still conceptual (Norton & Pine, 2013) |
| | Planned journey | Expected journey, Ideal journey, Retrospective Maps | Hypothetical, static journey reflecting the service delivery process (Halvorsrud et al., 2016) |
| ✓ | Actual journey | Prospective Maps | Individual, dynamic journey that occurs during execution of a service (Halvorsrud et al., 2016) |
| | Scenario | | A set of ordered user/customer actions, used to create user journeys (Hannington & Martin, 2012) |
| ✓ | Persona | | Representation of a typical customer that contains motivations, goals, painpoints and other characteristics (Signavio, 2018). |

Figure 67: Used general UJ/CJ concepts by JourneySoftware



| Journey specific elements | | | |
|---|---|---|---|
| Wordt gebruikt? | Term | Synonym(s) | Definition |
| ✗ | Touchpoint | Service encounter, Communication channel, Contact point, Service event, Service moment | An interaction (instance of communication) between customer and service provider (Halvorsrud et al., 2016) |
| ✓ | Moment of truth | Key moment | Decision points that can make or break the success of the journey. It can be a simple decision, or a hard decision that is experienced as a barrier (Signavio, 2018) |
| | Deviation | | Touchpoints from where the path goes different than what was planned (Halvorsrud et al., 2016) |
| drop off | Breakpoint | Drop-off | Moment where the journey stops (Hobbs et al., 2013) |
| | Initiator | | Initiator of a touchpoint, can be a customer/user, service provider or subcontractor (Halvorsrud et al., 2016) |
| ✓ | Trigger | Start, starting point | Trigger of the customer journey, either an idea or demand (Signavio, 2018) |
| ✓ | Goal | Outcome | The thing what the customer aims to achieve, such as obtaining a loan in a banking context, this is the final touchpoint of a service (Signavio, 2018) |
| ✓ | Time | | Time when a touchpoint is encountered by the customer (Halvorsrud et al., 2016) |
| ✓ | Timeline | | Duration of the journey from the starting touchpoint to the final touchpoint. The timeline can be depicted by actual time, or ordering touchpoints by giving them numbers (Bernard & Andritsos 2017) |
| ✓ | Stage | | Container of multiple touchpoints (Bernard & Andritsos 2017) |
| ✓ | Channel | Customer channel, Service interface | A medium for users and service providers to interact with one another (Sousa & Voss, 2006) serving as a mediator of a touchpoint (Halvorsrud et al., 2016) |
| | Trace | | Content that emerges as result of a touchpoint (Halvorsrud et al., 2016) |
| ✓ | Experience | Feeling | Emotions (i), emotions scale (ii) and customer quotes (iii) (Bernard & Andritsos 2017) |
| | Note | Banner, Text | Comments that contain important textual information about the journey map (Signavio, 2018) |
| ✓ | Opportunity | Improvement | Touchpoint to improve (Lankhorst, 2017) |
| | Lens | | Grouping touchpoints to a certain context or domain, while excluding the other touchpoints (Bernard & Andritsos 2017) |

Figure 68: Journey specific UJ/CJ concepts used by JourneySoftware

**Notatie**

11. De volgende afbeelding (Figure 69) is een screenshot van een realtime customer journey die gegenereerd is door JourneySoftware. Kunt u de elementen uitleggen?

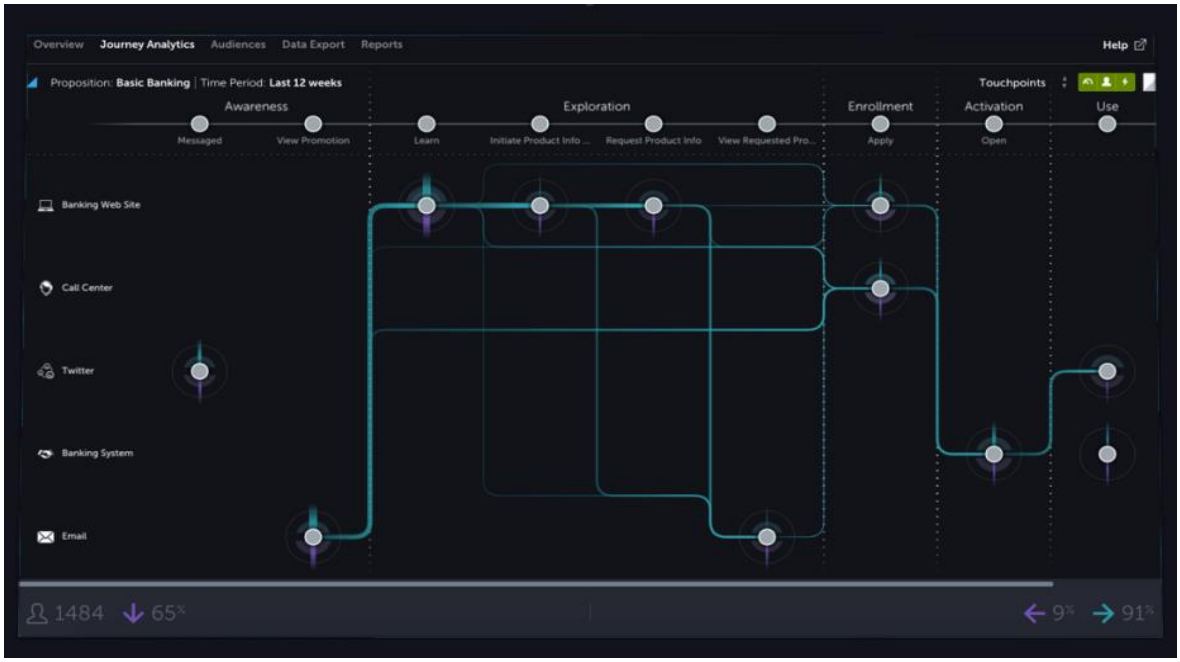



Figure 69: Screenshot of JourneySoftware

12. Wat zijn volgens u de hoofdeisen waar een nieuwe modelleertaal van user/customer journeys aan moet voldoen?

*Ga je naar de actual journeys kijken, dan moet het een open taal zijn omdat integratie een hoofdeis is.*

# APPENDIX C: Case study: ContextMSP

*** As the interviews were held in Dutch, the interview protocols and answers are Dutch as well. During the interview, the answers of the interviewee were directly written down and summarized, resulting in the documented answers below.*

## C.1. Investigating concepts

Welke termen gebruiken jullie ook volgens de bijbehorende definitie?(Kruis aan met een 'X' ). Indien een term gebruikt wordt maar met andere betekenis, geef het dan een sterretje ('*') en leg uit wat er anders is.

| General concepts | | | |
|---|---|---|---|
| Wordt gebruikt? | Term | Synonym(s) | Definition |
| | User journey | User experience journey | Story about an individual's actions, feelings, perceptions, and frame of mind- including the positive, negative, and neutral moments as he or she interacts with a product or service over a period of time (Hannington & Martin, 2012) |
| X | Customer journey | Customer experience journey | Customer's multi-channel experience and interactions with one or more service providers to achieve a specific goal (Halvorsrud et al., 2016; Halvorsrud et al., 2016) |
| X | Buyer journey | Decision funnel | Customer decisions and experiences that show the movement of customers towards purchase of a product of service (Lemon & Verhoef, 2016) |
| X | Mapping | Journey mapping | Tracking and describing user/customer experiences when using a product or service, and depicting it on a flow diagram (Bernard & Andritsos,2017; Maguire, 2013) |
| X | User journey map | User experience journey, User journey map | Visualization of experiences people have when interacting with a product or service by using a system (Hannington & Martin, 2012) |
| X | Customer journey map | | Visualisation Customer's experience and interactions with one or more service providers to achieve a specific goal (Halvorsrud et al., 2016) |
| | Buyer journey map | Decision funnel, path-to-purchase model | Models of customer decisions and experiences to guide customers towards purchase of a product of service (Lemon & Verhoef, 2016) |
| X | Journey concept | | A journey in developent, but still conceptual (Norton & Pine, 2013) |
| X | Planned journey | Expected journey, Ideal journey, Retrospective Maps | Hypothetical, static journey reflecting the service delivery process (Halvorsrud et al., 2016) |
| X | Actual journey | Prospective Maps | Individual, dynamic journey that occurs during execution of a service (Halvorsrud et al., 2016) |
| | Scenario | | A set of ordered user/customer actions, used to create user journeys (Hannington & Martin, 2012) |
| X | Persona | | Representation of a typical customer that contains motivations, goals, painpoints and other characteristics (Signavio, 2018). |

Figure 70: General UJ/CJ concepts used by ContextMSP

| Journey specific elements | | | |
|---|---|---|---|
| Wordt gebruikt? | Term | Synonym(s) | Definition |
| X | Touchpoint | Service encounter, Communication channel, Contact point, Service event, Service moment | An interaction (instance of communication) between customer and service provider (Halvorsrud et al., 2016) |
| X | Moment of truth | Key moment | Decision points that can make or break the success of the journey. It can be a simple decision, or a hard decision that is experienced as a barrier (Signavio, 2018) |
| | Deviation | | Touchpoints from where the path goes different than what was planned (Halvorsrud et al., 2016) |
| | Breakpoint | Drop-off | Moment where the journey stops (Hobbs et al., 2013) |
| | Initiator | | Initiator of a touchpoint, can be a customer/user, service provider or subcontractor (Halvorsrud et al., 2016) |
| X | Trigger | Start, starting point | Trigger of the customer journey, either an idea or demand (Signavio, 2018) |
| X | Goal | Outcome | The thing what the customer aims to achieve, such as obtaining a loan in a banking context, this is the final touchpoint of a service (Signavio, 2018) |
| | Time | | Time when a touchpoint is encountered by the customer (Halvorsrud et al., 2016) |
| X | Timeline | | Duration of the journey from the starting touchpoint to the final touchpoint. The timeline can be depicted by actual time, or ordering touchpoints by giving them numbers (Bernard & Andritsos 2017) |
| | Stage | | Container of multiple touchpoints (Bernard & Andritsos 2017) |
| X | Channel | Customer channel, Service interface | A medium for users and service providers to interact with one another (Sousa & Voss, 2006) serving as a mediator of a touchpoint (Halvorsrud et al., 2016) |
| | Trace | | Content that emerges as result of a touchpoint (Halvorsrud et al., 2016) |
| X | Experience | Feeling | Emotions (i), emotions scale (ii) and customer quotes (iii) (Bernard & Andritsos 2017) |
| | Note | Banner, Text | Comments that contain important textual information about the journey map (Signavio, 2018) |
| | Opportunity | Improvement | Touchpoint to improve (Lankhorst, 2017) |
| | Lens | | Grouping touchpoints to a certain context or domain, while excluding the other touchpoints (Bernard & Andritsos 2017) |

Figure 71: General UJ/CJ concepts used by ContextMSP

**User journeys vs customer journeys**
*Wij hebben het altijd over customer journeys. Echter denk we bij UX customer journeys als term gebruiken, terwijl we het daar hebben over user journeys.*

*Touchpoint andere berekenis dan theorie: [ContextMSP]: Van moment van begin interactie tot stoppen van de sessie. Als hij alles op 1 channel zou doen, dan zou het hele proces als een touchpoint worden beschouwd. Touchpoints worden aangegeven door de klant. Wanneer een nieuwe sessie begint bij een channel.*

# C.2. Interview: UJ/CJ among architects

**Vooraf**

- Bedanken voor de komst.
- Mijzelf introduceren
- Vragen of de interviewee zichzelf en zijn functie binnen ContextMSP kan introduceren?
- Vragen of het oké is om het gesprek op te nemen

Mij is vernomen dat u een terminologie heeft vastegeseld rondom user journeys en customer journeys binnen ContextMSP. In dit interview wil ik gaan kijken of deze terminologie overeenkomt met de concepten uit de literatuur. Voordat we naar de vergelijking gaan tussen literatuur en de door u vastgestelde termen, heb ik eerst enkele andere vragen.

**Samenwerking UX - EA**

1. Hoe is de samenwerking tussen architecten en UX design, en de rol van journeys hierin?

   *We werken samen met UX op gebied van customer flows uitwerken. Op gebied van journeys? Nee. Nog niet, maar zouden we wel willen. Qua modellen communiceren wij met free format; informele modellen. Er is veel behoefte aan een universele taal op gebied van journeys. Qua meetings zijn we vaan de eerste helft uitleggen van de legenda en hebben we vervolgens de 2$^{e}$ helft discussie van wat is wat. Iedereen is anders gevormd qua kennis (studie, voormalig werk) of is zelfs onbewust onbekwaam door geen Archimate of Togaf certificaat te hebben.*

**Customer journey framework**

2. Waarvoor wordt het framework gebruikt? (denk aan afdelingen, interne processen, begeleiding bij processen etc)

   *Deze wordt gebruikt door business- en solution architecten op de afdeling verkoop om customer journeys te maken, gekoppeld aan architectuur van processen en applicaties. Het wordt veel gebruikt bij PSA: project start architectures. Stel er is wat nieuws gemaakt door UX, dan moet het nog gekoppeld worden aan architectuur.*

3. Moeten alle gemapte journeys binnen ContextMSP conform jouw termen zijn, of is dit optioneel?

   *Het dient als standaard, maar wordt nog niet veel gebruikt.*

4. Waar kwam het idee of de opdracht vandaan om een terminologie vast te stellen? Ontstond er bijvoorbeeld een verzoek vanuit een probleem binnen ContextMSP?

   *Dit kwam vanuit een besluit tijdens een meeting. Toen Pega (CRM platform), gekocht werd speelde de*

*vraag op hoe we CJ's flexibel gaan maken. Hierbij is het uiteindelijke doel om vragen en informatie aan de klant voor te schotelen aan de hand van zijn of haar context.*

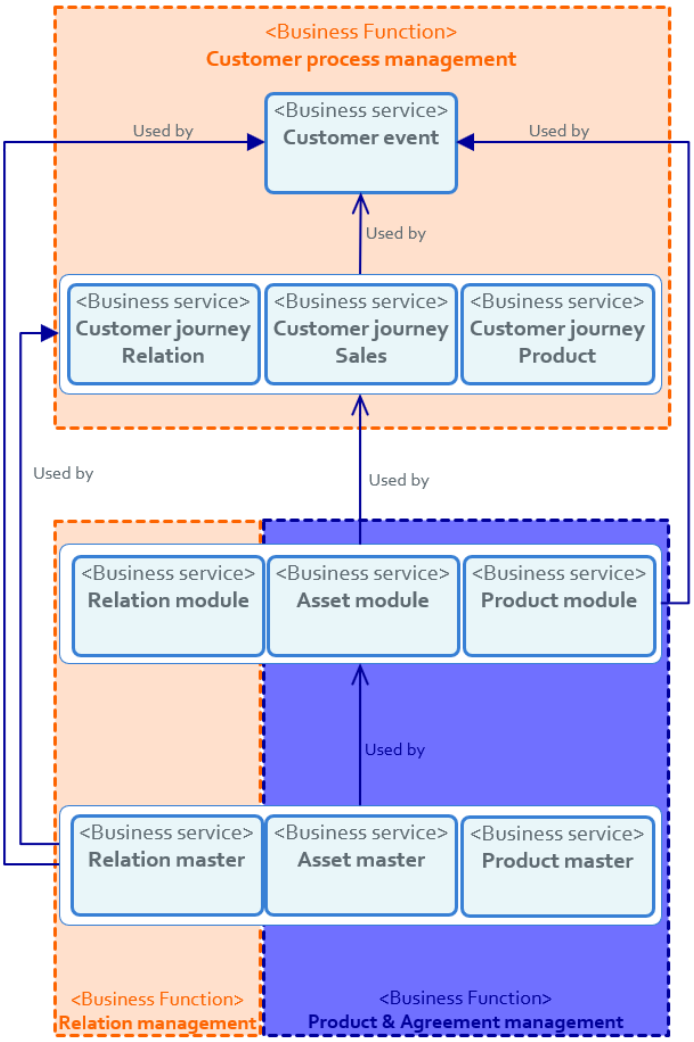
5. Wat was uw aanpak voor het vaststellen van uw terminologie?

*De concepten heb ik gekozen op basis van eigen kennis, en kennis verkregen van collega's. We hebben een half jaar lang zo'n 10 tot 15 meetings gehouden waarin we de terminologie met collega architecten besproken hebben. In het begin was dit met collega architecten binnen de afdeling, maar vervolgens ook met architecten van andere afdelingen.*

6. Is er een validatie uitgevoerd op uw set aan termen?

*Momenteel ben ik het metamodel aan het valideren. Dit doe ik door met andere architecten uit de modelling guilt te gaan zitten; dat is een soort architecten community. We gaan hierbij te werk van abstract niveau naar gedetaileerd niveau. (globale customer journeys naar gedetailleerde journeys).*

7. Kunt u het framework uitleggen?




- *Framework structureert welke business services ondersteunen welke business services*
- *Journeylaag: stel je verkoopt een product en je laat een scherm zien met een adres, die klopt niet, dan kan ie dat aanpassen in de module laag.*
- *In de CJ laag zitten de experts, daar zit de kennis en de business rules. In de customer event staat puur je **keuzemenu.** Het event stuk bevat dus alles wat bij de event komt kijken (alle mogelijkheden, belangrijke zaken)*

Figure 72: Customer journey framework for architects

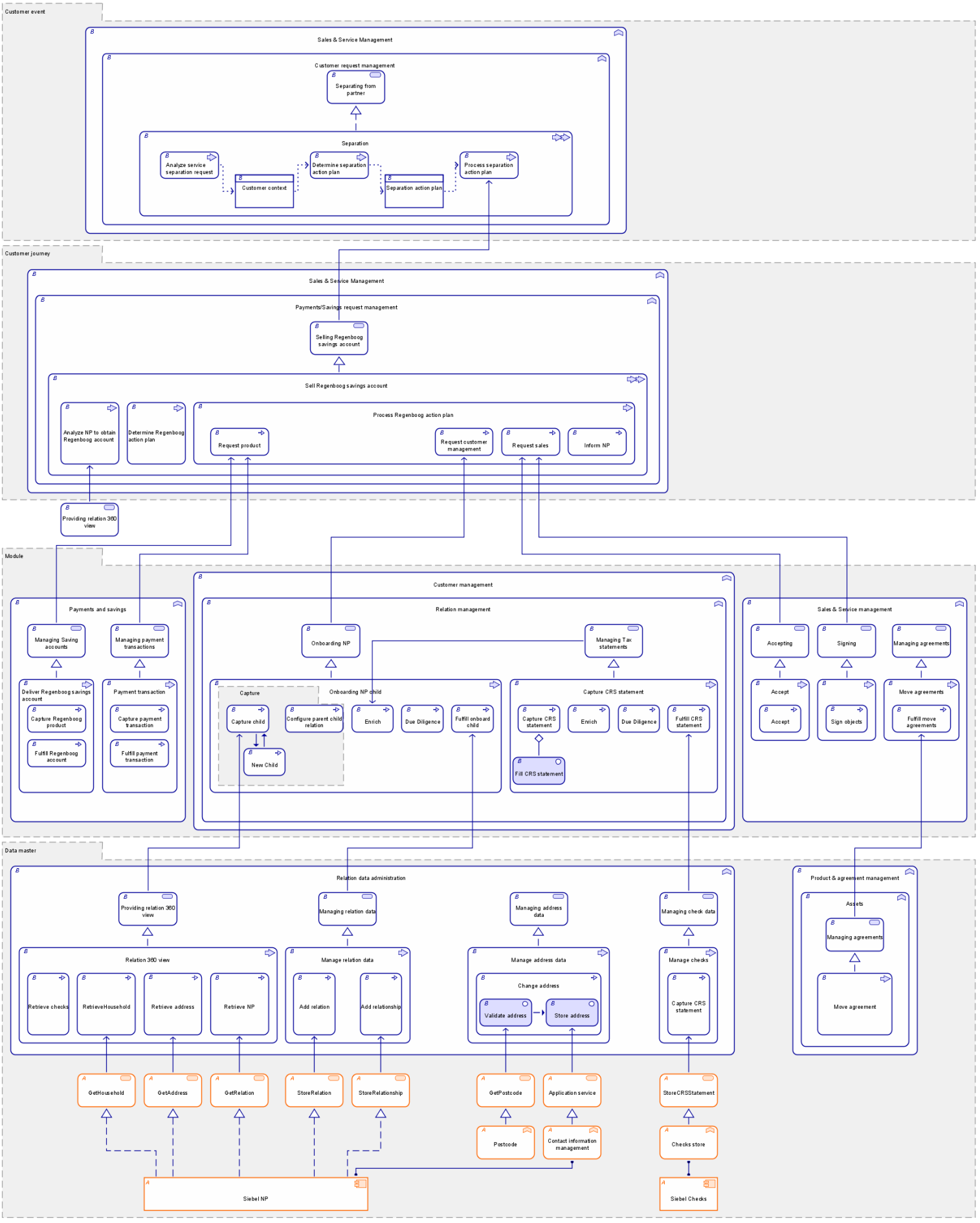



Figure 73: Customer journey framework applied to architecture

# C.3. Interviews: UJ/CJ among UX designers

**Vooraf**

- Bedanken voor de komst.
- Mijzelf introduceren
- Vragen of de interviewee zichzelf en zijn functie binnen ContextMSP kan introduceren?
- Vragen of het oké is om het gesprek op te nemen

Momenteel doe ik onderzoek naar hoe user journeys en customer journeys worden gemapt bij ContextMSP. Daarbij kijk ik hoe zowel architecten als UX designers journeys maken, en de huidige rol van journeys in de communicatie tussen de 2 partijen.

## UX interviewee 1

**User- vs customer journeys**

1. Maakt u onderscheid tussen user journeys en customer journeys? User journeys zijn gericht op de digitale experience van een systeem (single channel), customer journeys zijn gericht op de gehele ervaring verspreid over meerdere channels.

   *Bij UX spreken we alleen van customer journeys. Echter, na jouw uitleg kan ik zeggen dat wij zowel user journeys als customer journeys maken. Voornamelijk richten wij ons op de digitale experience van de app of website, maar we kijken ook regelmatig naar het hollistische plaatje, de pre-fase en voornamelijk de post-fase.*

2. Welke word(en) gebruikt door UX?

   *Zie antwoord hierboven.*

**Samenwerking UX - EA**

3. Op wat voor gebieden of problemen werken UX-ers en architecten samen?

   *Architecten zijn bezig met het high-level overzicht en het IT perspectief. Zelf vind ik dat UX'ers bewust moeten zijn van de consequenties en mogelijkheiden binnen onze IT: Bewust zijn van welke data nodig is , hoe we vragen stellen, welke vormgevingen, positioneren van features met betrekking tot data, welke interactietechnologieen kan ik gebruiken en of dit alles op technisch (architectuur) gebied mogelijk is.*

   *Dit doe ik door modellen en diagrammen ofwel UX voorstellen of UX deliverables te bespreken met architecten en zo te valideren op technisch gebied. Zo krijg je eigenlijk een technische impact analyse op de UX modellen. Het nadeel hiervan is dat dit mij extra tijd kost, wat mede de reden is dat niet elke collega dit doet.*

   *Er heerst behoeft aan betere communicatie voor betere technische impact analyses en om verkeerde interpretatie op onze modellen te voorkomen. Niet elke Uxer werkt samen met architecten, vanuit de UX cultuur is dit nog niet heel gebruikelijk en het kost extra tijd.*

4. Wat voor modellen worden hierbij gebruikt?

   *Als UXers gebruiken wij: Taakdecomposities(Functionaliteit), scenario's, wireframes, customer flows, scherm ontwerpen (hi-fi). Echter als je het hebt over wat gebruikt wordt om met architecten te*

*communiceren, hebben we het over Customer flows en interactiemodellen. Dan kijkt de architect van goh wat jij voorstelt is lastig vanwege dit en dat (vanuit de techniek).*

*Zie Figuur X en Figuur X.*

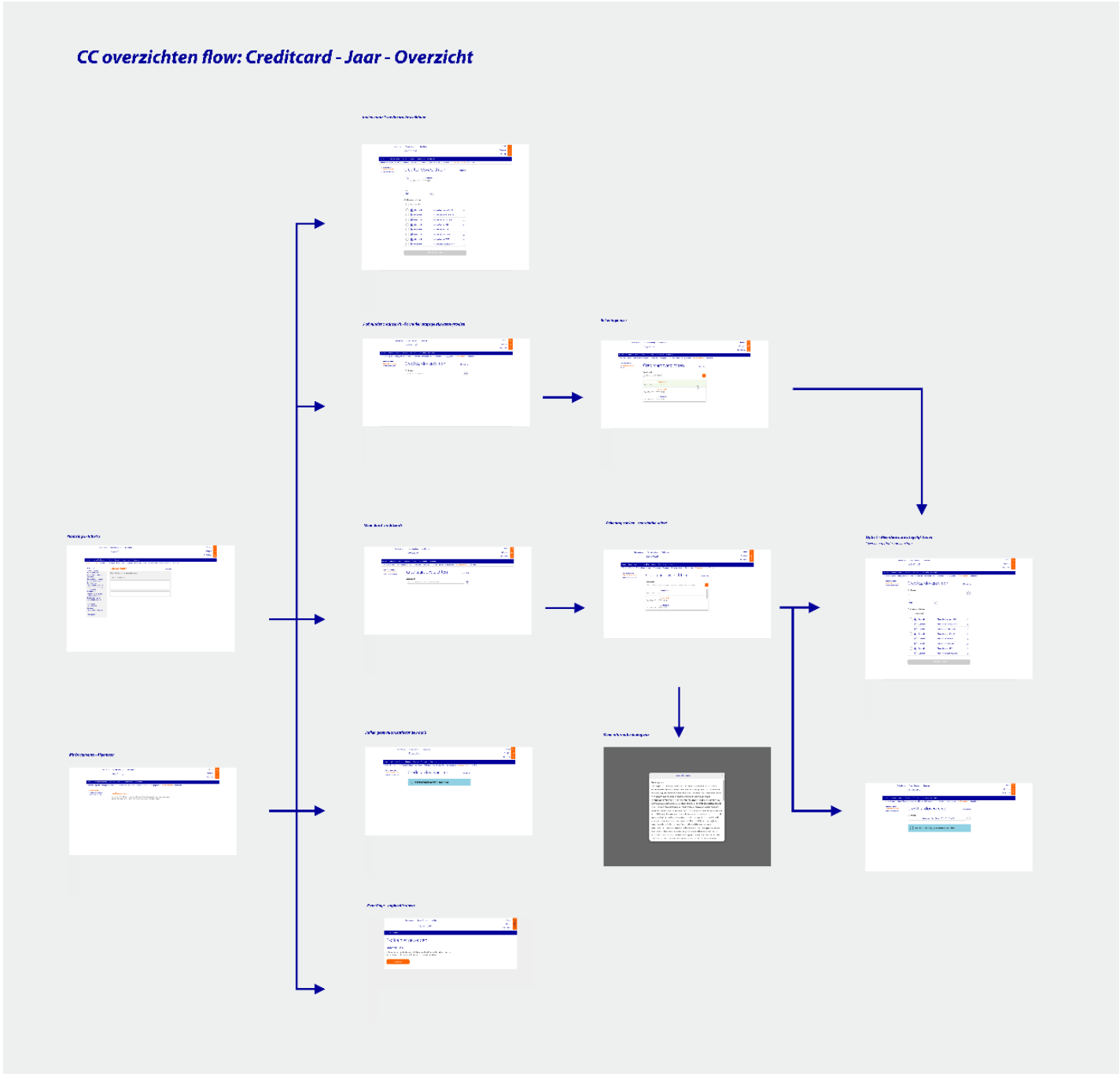
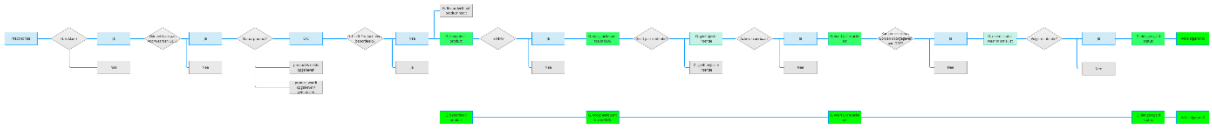
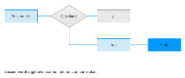



Figure 74: Interaction model example

Happy Flow

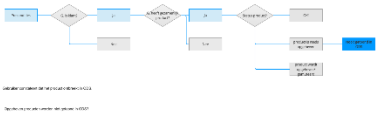


Geen klant meer.

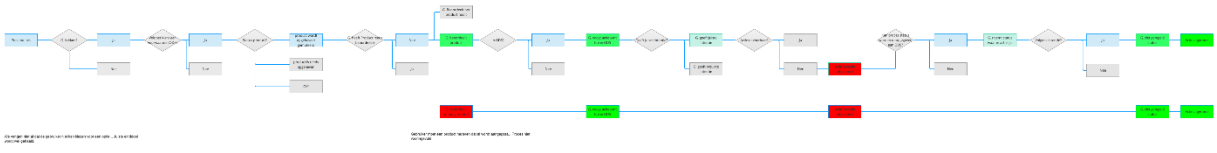


Geen gezamenlijke producten.

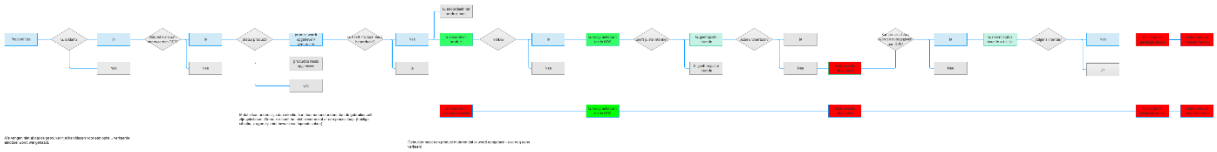
Product voor aanvang opstellen ODS opgeheven.



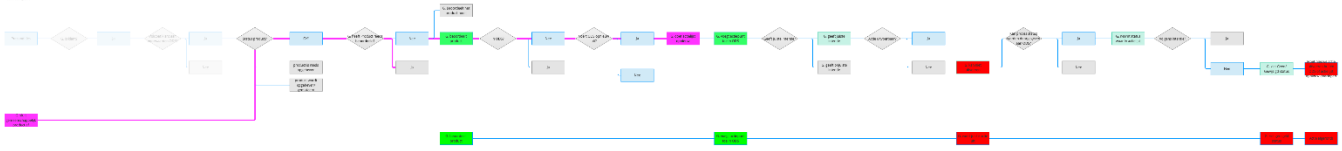
product heeft lopend proces (wordt opgeheven/gemuteerd) voor aanvang opstellen ODS #1 - volgens intentie



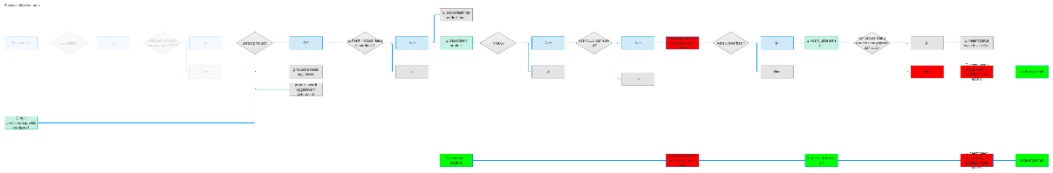
product heeft lopend proces (wordt opgeheven/gemuteerd) voor aanvang opstellen ODS #2 - niet volgens intentie



Product wordt na opstellen lijst afgesloten #1



Product wordt na opstellen lijst afgesloten #2



Gebruiker heeft reeds zijn product beoordeelt, maar buiten het ODS

Figure 75: Customer flows

5. Wat is de huidige rol van user/customer journeys in deze samenwerking?

   *Nihil.*

**Creating journey maps at UX**

6. Ziet u potentie in het gebruik van user/customer journeys voor communicatie met architecten?

   *Helemaal voor, maar de kanttekening is dat er tijd voor moet zijn.*
   *Als je alleen een interactiemodel maakt, zonder technsiche impact analyse of journeys met architecten, dan gaan er gaten zitten op gebied van customer experience of technische realiseerbaarheid.*

7. Zijn er bij UX bepaalde regels, formats of templates om de journeys te maken? Of is het allemaal free format?

   *Vastleggen van de journeys en het interactiemodel daar is complete vrijheid in. Wij moeten ons houden aan functionaliteiten*

8. Kunt u een voorbeeld van een gemaakte journey laten zien en de elementen uitleggen?

   - Niet aan toegekomen

## UX interviewee 2

1. Kunt u een voorbeeld van een gemaakte journey laten zien en de elementen uitleggen?

   *We maken zowel journeys hoe ze echt zijn en hoe het moet worden. Zo noemen wij dit verschil IST journeys en SOLL journeys. Met die IST ga je kijken van waar zitten de knelpunten, dan ga je daar ideeen genereren IST journey. De tool die we gebruiken is Smaply. We gebruiken een X aantal persona's met basisbehoeften die gebaseerd zijn op een uitgebreid marktonderzoek, en per journey kiezen we een persona. Zelf ben ik overigens van mening dat er veel over journeys wordt gesproken zonder er experience in te doen. Overigens vinden wij dat het niet uit maakt hoe je het visualiseert, als de belangrijke elementen er maar in zitten.*

   *Voor voorbeelden, zie figuur X voor de oude notatie en figuur X voor de nieuwe notatie.*

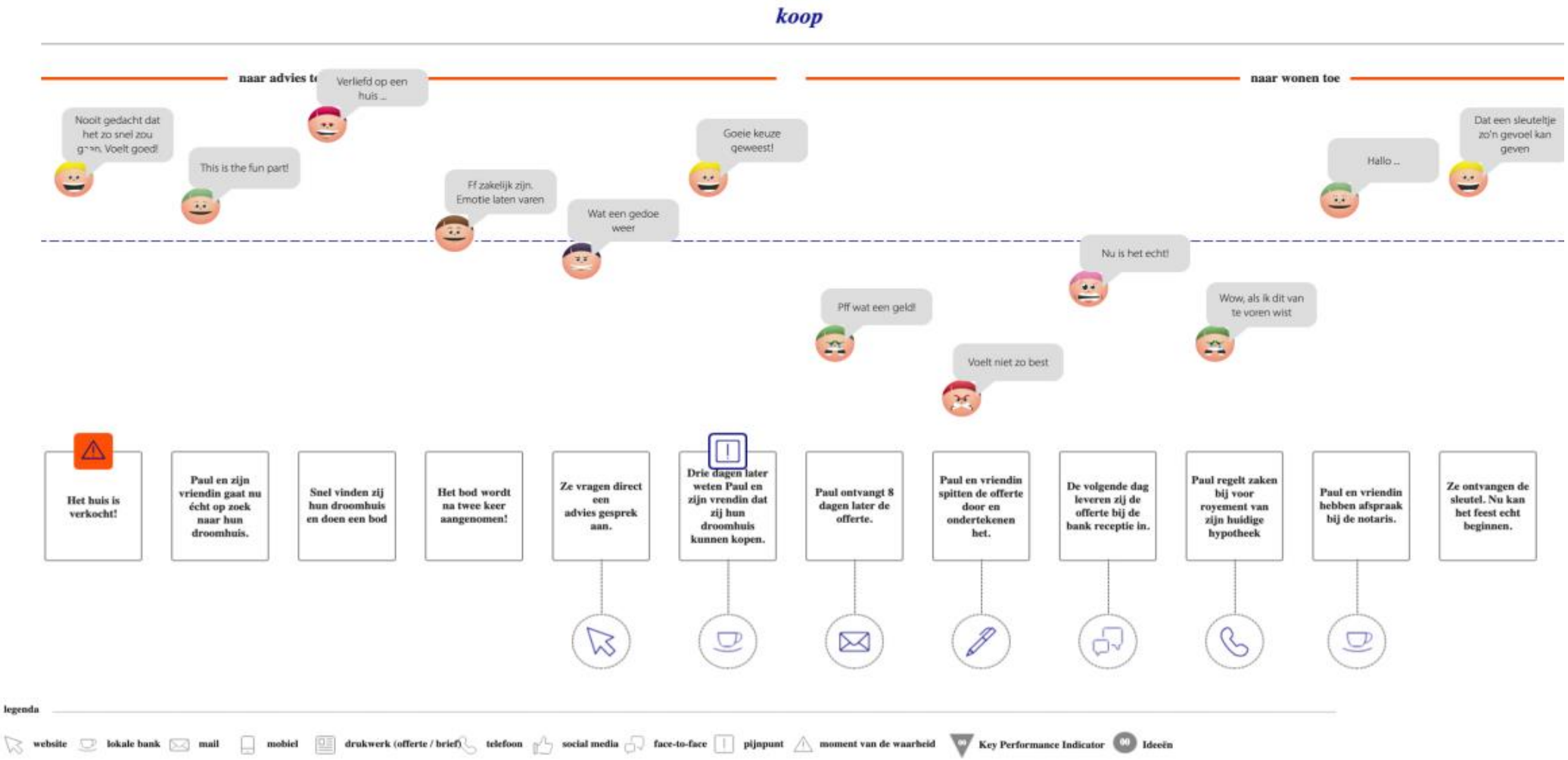



Figure 76: Customer journeys among UX designers (the old UX format)

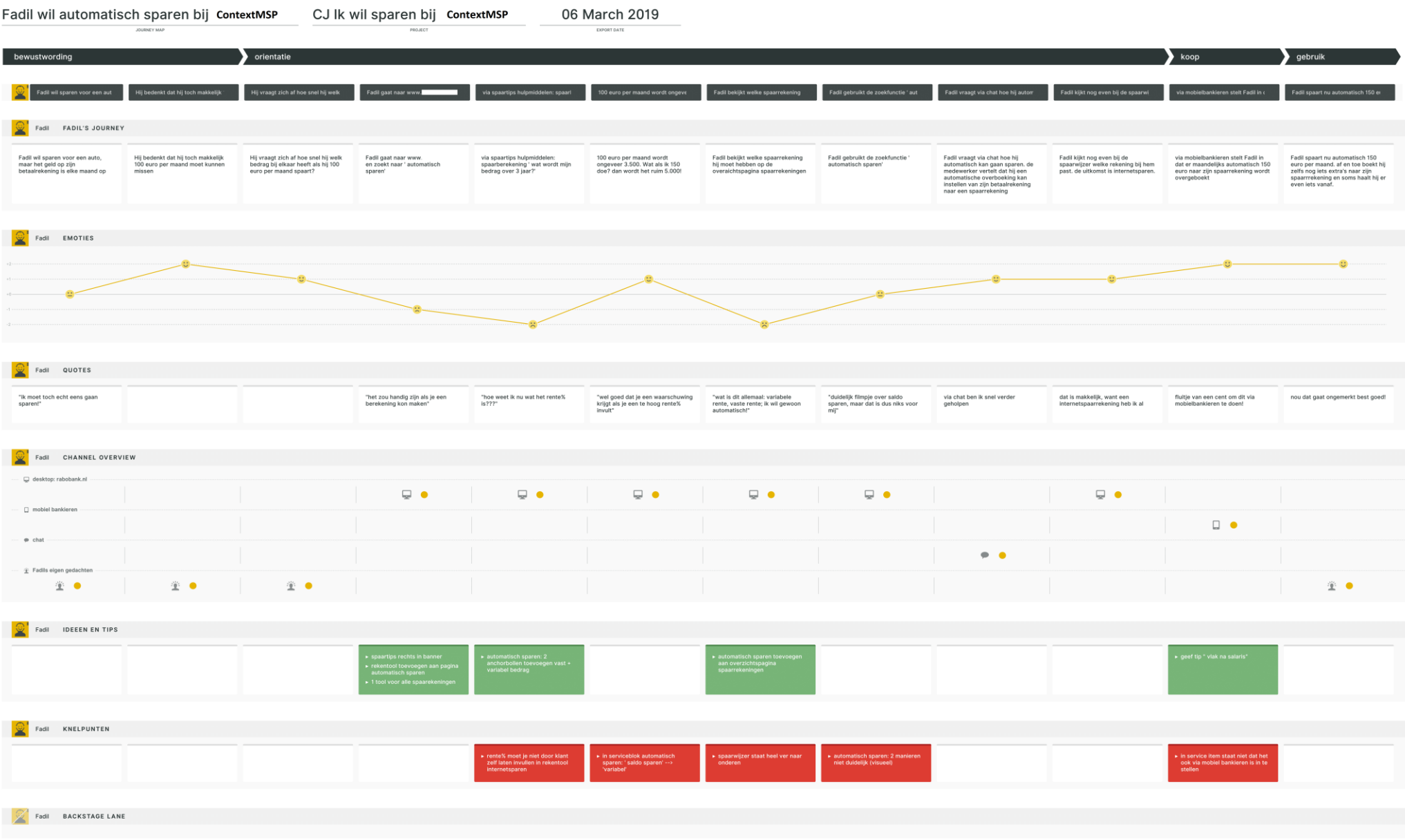



Figure 77: Customer journeys among UX designers (the new UX format)

# APPENDIX D: Discussion- The Open Group

Date: 12-3-2019
Location: Capitool 15, Enschede
Attendees: Henk Jonkers, Dick Quartel, Maarten Steen, Lars van den Bos

The following document contains notes of the brainstorm session with three members of The Open Group. During the session, elements of the initial requirement list were discussed. Additionally, The Open Group showed their own customer journey implementation as example (Lankhorst, 2019), which was also discussed in the literature study (2.4). The discussion lead to requirements being accepted/rejected, but also lead to new requirements for the mapping and the UJEA notation.

**During the interview, the answers of the interviewee were directly written down and summarized, resulting in the documented answers below.*

**Initial requirements evaluated**

- When discussing the difference between channel and touchpoint, both concepts seem to be perceived as almost similar by The Open Group. The difference is very small: channel seems to be focused on the medium of communication and touchpoint on the interaction itself. From the Archimate perspective, touchpoint would be a behavioural element while channel would be a structural element. Due to this insight, touchpoint and channel cannot be combined: one has to be chosen. To at least show what medium is used, it seems best to choose for implementing channel.
- Channel or Touchpoint, Stage, Experience, Activity, Persona, abstraction level and Goal are necessary elements for UJEA.
- Painpoints should not be implemented in planned journeys as it requires analysis of actual behaviour.
- For visualising the experience, you can use both emoticons and/or colouring, no strong preference.

**New requirements**

- To map concepts to Archimate, first map the new concepts to element types, then map them to Archimate concepts.
- If touchpoint is to be mapped to Archimate, it should be a Business service (behavioural, and external)
- If channel is to be mapped to Archimate, it should be a Business interface (structural)
- If activity is to be mapped to Archimate, it should be a business service (behavioural, and external)
- If persona is to be mapped to Archimate, it should be a role (structural)
- If experience is to be mapped to Archimate, it should be a metric
- If abstraction level is to be implemented, you need predefined abstraction levels. As example, you could have 2 levels, in which level 1 is high level, containing high level activities, whereas level 2 is more detailed, containing low level activities.

# APPENDIX E: Archimate descriptions

This appendix contains summaries of Archimate descriptions. The first set contains the descriptions of Archimate element types, represented in Table 37. The second set contains the descriptions of the Archimate concepts. This set is shown in Table 38.

Table 37: Archimate element types and descriptions (ArchiMate® 3.0.1 Specification, 2019)

| Archimate element type descriptions | |
|---|---|
| **Element type** | **Definition** |
| *Behavior element* | Element that represents a behavior, denoted by a verb. |
| • *Internal behaviour element* | A unit of activity performed by one or more active structure elements. |
| • *External behaviour element* | An explicitly defined exposed behavior, called a service. |
| • *Event* | a behavior element that denotes a state change. |
| *Structure element* | Element that can perform behavior, or on which behavior can be performed upon. |
| • *Active structure element* | An entity that is capable of performing behavior. |
| ○ *Internal active structure element* | An entity that is capable of performing behavior. |
| ○ *External active structure element* | a point of access where one or more services are provided to the environment, called an interface. |
| • *Passive structure element* | A structural element that cannot perform behavior. Active structure elements can perform behavior on passive structure elements. |
| *Motivation element* | element that drive the design and operation of the enterprise. |

Table 38: Archimate concepts and descriptions (ArchiMate® 3.0.1 Specification, 2019)

| Archimate concept descriptions | | |
|---|---|---|
| **Layer** | **Concept** | **Description** |
| **Strategy layer** | Resource | An asset owned or controlled by an individual or organization. |
| | Capability | An ability that an active structure element, such as an organization, person, or system, possesses. |
| | Course of action | An approach or plan for configuring some capabilities and resources of the enterprise, undertaken to achieve a goal. |
| | | |
| | Business actor | A business entity that is capable of performing behavior. |
| | Business role | the responsibility for performing specific behavior, to which an actor can be assigned, or the part an actor plays in a particular action or event. |
| | Business collaboration | An aggregate of two or more business internal active structure elements that work together to perform collective behavior. |
| | Business interface | A point of access where a business service is made available to the environment. |
| | Business process | A sequence of business behaviors that achieves a specific outcome such as a defined set of products or business services. |
| | Business function | A collection of business behavior based on a chosen set of criteria (typically required business resources and/or competencies), closely aligned to an organization, but not necessarily explicitly governed by the organization. |
| **Business layer** | Business interaction | A unit of collective business behavior performed by (a collaboration of) two or more business roles. |
| | Business service | An explicitly defined exposed business behavior. |
| | Business event | A business behavior element that denotes an organizational state change. It may originate from and be resolved inside or outside the organization. |
| | Business object | A concept used within a particular business domain. |
| | Contract | A formal or informal specification of an agreement between a provider and a consumer that specifies the rights and obligations associated with a product and establishes functional and non-functional parameters for interaction. |
| | Representation | A perceptible form of the information carried by a business object. |
| | Product | A coherent collection of services and/or passive structure elements, accompanied by a contract/set of agreements, which is offered as a whole to (internal or external) customers. |
| | | |
| | Application component | An encapsulation of application functionality aligned to implementation structure, which is modular and replaceable. It encapsulates its behavior and data, exposes services, and makes them available through interfaces. |

| | | |
|---|---|---|
| **Application layer** | Application collaboration | An aggregate of two or more application components that work together to perform collective application behavior. |
| | Application interface | A point of access where application services are made available to a user, another application component, or a node. |
| | Application process | A sequence of application behaviors that achieves a specific outcome. |
| | Application function | Automated behavior that can be performed by an application component. |
| | Application interaction | A unit of collective application behavior performed by (a collaboration of) two or more application components. |
| | Application service | An explicitly defined exposed application behavior. |
| | Application event | An application behavior element that denotes a state change. |
| | Data object | Data structured for automated processing. |
| | | |
| **Technology layer** | Node | A computational or physical resource that hosts, manipulates, or interacts with other computational or physical resources. |
| | Device | A physical IT resource upon which system software and artifacts may be stored or deployed for execution |
| | System software | Software that provides or contributes to an environment for storing, executing, and using software or data deployed within it. |
| | Technology collaboration | An aggregate of two or more nodes that work together to perform collective technology behavior. |
| | Technology interface | A point of access where technology services offered by a node can be accessed. |
| | Technology process | A sequence of technology behaviors that achieves a specific outcome. |
| | Technology function | A collection of technology behavior that can be performed by a node. |
| | Technology interaction | A unit of collective technology behavior performed by (a collaboration of) two or more nodes. |
| | Technology service | An explicitly defined exposed technology behavior. |
| | Technology event | A technology behavior element that denotes a state change. |
| | Artifact | A piece of data that is used or produced in a software development process, or by deployment and operation of an IT system. |
| | Communication network | A set of structures that connects computer systems or other electronic devices for transmission, routing, and reception of data or data-based communications such as voice and video. |
| | Path | A link between two or more nodes, through which these nodes can exchange data or material. |
| | | |
| **Physical layer** | Facility | A physical structure or environment. |
| | Equipment | One or more physical machines, tools, or instruments that can create, use, store, move, or transform materials. |
| | Material | Tangible physical matter or physical elements. |
| | Distribution network | A physical network used to transport materials or energy. |
| | | |
| **Implementation & Migration layer** | Work package | A series of actions identified and designed to achieve specific results within specified time and resource constraints. |
| | Implementation event | A behavior element that denotes a state change related to implementation or migration. |
| | Deliverable | A precisely-defined outcome of a work package. |
| | Plateau | A relatively stable state of the architecture that exists during a limited period of time. |
| | Gap | A statement of difference between two plateaus. |
| | | |
| **Motivation layer** | Stakeholder | Role of an individual, team, or organization (or classes thereof) that represents their interests in the outcome of the architecture. |
| | Driver | An external or internal condition that motivates an organization to define its goals and implement the changes necessary to achieve them. |
| | Assessment | The result of an analysis of the state of affairs of the enterprise with respect to some driver. |
| | Value | Relative worth, utility, or importance of a core element or an outcome. |
| | Meaning | Knowledge or expertise present in, or the interpretation given to, a core element in a particular context. |
| | Goal | A high-level statement of intent, direction, or desired end state for an organization and its stakeholders. |
| | Outcome | An end result that has been achieved. |
| | Principle | A qualitative statement of intent that should be met by the architecture. |
| | Requirement | A statement of need that must be met by the architecture. |
| | Constraint | A factor that prevents or obstructs the realization of goals. |

# APPENDIX F: Action research instruments

## A. Architect assignment

### Opdracht SA: Selecteren en visualiseren van Business- & Applicatie architectuur

Case: Online Klant Worden (OKW)

**Introductie**

Bedankt dat je meedoet aan deze interactieve sessie! Terwijl de UX designers de user journey van het Online Klant Worden gaan visualiseren op het scherm, is het jouw taak om de bijbehorende architectuur te vinden. Deze architectuur moet vervolgens gekoppeld worden aan de user journey. Deze opdracht doe je samen met de andere architecten. De UX'ers werken apart.

De user flow van het Online Klant Worden (wat de architectuur moet ondersteunen) luidt als volgt:

1. Gebruiker kiest "Betaalrekening aanvragen"
2. Gebruiker kiest "Spaarrekening aanvragen"
3. Gebruiker vult naam, geslacht en geboortedatum in.
4. Gebruiker vult contactgegevens in.
5. Gebruiker voegt foto van identiteitsbewijs toe.
6. Gebruiker gaat akkoord met algemene voorwaarden.
7. Gebruiker maakt 1 cent over vanuit zijn/haar bestaande bankrekening

**Opdrachtbeschijving**

1. Je hebt verschillende architectuur platen gekregen die slaan op het Online Klant Worden. **Selecteer** en **schets** de relevante business- en applicatie architectuur. Het gaat hier alleen om de **business services**, **business processes**, **business functions**, **application services** en **application components** die het Online Klant Worden proces direct ondersteunen; i.e. wat de klant op de app ziet tijdens dit proces. Verdere offline verwerking van ingevoerde gegevens valt voor deze opdracht buiten scope.
2. Eenmaal vastgesteld en geschetst kunnen jullie de architectuur m.b.v. Archimate te **modelleren** op het interactieve scherm. Dit doe je onder de user journey dat gemaakt is door het andere team. Omdat er maar één scherm is kan dit pas als het andere team klaar is. Zorg dus dat je het ontwerp met een schets klaar hebt liggen.
3. De **koppeling maken** tussen architectuur en user journey. Hiervoor is een meta model uitgedeeld die uitlegt hoe de koppeling gemaakt kan worden.

**Aan de slag!**

Bestudeer de architectuur platen, gebruik papier om eerst te schetsen en maak er wat moois van. Wanneer de andere groep klaar is met het interactieve scherm kunnen jullie de schets modelleren op het scherm. Mochten er vragen zijn kan je die altijd stellen.

## B. UX designer assignment

# Opdracht UX: Het visualiseren van een user journey

Case: online klant worden (OKW)

**Introductie**

Bedankt dat je meedoet aan deze interactieve sessie! In deze sessie is het aan jou de taak om een user journey te maken. Deze opdracht doe je samen met andere UX'ers. Intussen zullen de architecten bezig zijn met de bijbehorende architectuur van de journey. De architecten werken echter apart.

**Opdrachtbeschrijving**

Het is aan jou de taak om de user journey te visualiseren van het Online Klant Worden. Er is een blad gegeven met user journey concepten en de betekenissen. Probeer user journey concepten te identificeren (stap 1) uit het onderstaande scenario, om ze vervolgens op het interactieve scherm te visualiseren (stap 2). Hierbij mogen schetsen op papier gemaakt worden als hulpmiddel.

**Persona: Bob**

Bob is een 29 jarige sportieve jongen die werkt als consultant bij Deloitte. Hij speelt hoog niveau hockey en houdt ervan als dingen snel geregeld worden. *"Tijd is geld, niet alleen op werk, maar ook daarbuiten",* denkt Bob. Dit geldt voor Bob ook met dingen online regelen: Bob wil altijd met zo min mogelijk clicks zijn doel bereiken, en irriteert zich al snel wanneer dit niet lukt.

**Scenario**

Bob wil graag klant worden bij de Rabobank. Allereerst moet Bob zijn productkeuze maken (~ 10sec). Hij begint met het aanvragen van een betaalrekening. De app vraagt vervolgens ook of hij een spaarrekening wilt. Bob ziet het wel zitten om wat geld te sparen voor de verbouwing, en vraagt dus ook een spaarrekening aan. Eenmaal de productkeuze te hebben afgerond, begint het identificeren (~ 3min). Allereerst vult Bob zijn naam, geslacht en geboortedatum in. Vervolgens vult Bob ook zijn contactgegevens in. Bob wordt vervolgens gevraagd om een foto toe te voegen van zijn identiteitsbewijs. Eenmaal de foto in het juiste formaat toegevoegd te hebben, begint het afronden (~45sec): Bob gaat akkoord met de algemene voorwaarden, en maakt vervolgens 1 cent over vanuit zijn huidige (oude) bankrekening. Tot nu ging het proces vlekkeloos, maar er gaat nu iets fout; in het keuzemenu van beschikbare banken blijkt Bob's huidige bank, Triodos Bank, er niet tussen te staan. Bob wordt verzocht om het proces opnieuw te doorlopen maar nu via de website, wat grote frustratie opwerkt bij Bob. "Nu heb ik alles voor niets doorlopen, waar slaat dit op" denkt Bob. "Als er een alternatieve optie bestond voor deze laatste stap, was ik nu gewoon klaar geweest".

**Aan de slag!**

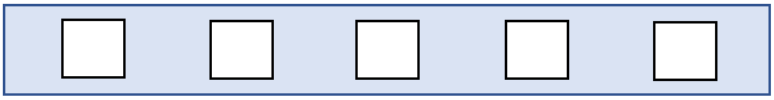
Nu het scenario bekend is kun je direct beginnen: identificeer de journey elementen in het scenario en visualiseer het. Niet elk element moet er verplicht in zitten en er is geen perfecte oplossing. Kijk naar wat handig zou zijn voor jezelf wanneer je deze case zou moeten uitwerken. Mochten er vragen zijn kan je die altijd stellen.

**C. Completenes questionnaire**

## Compleetheid van het artefact

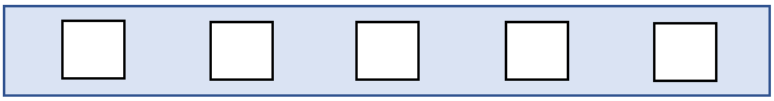
1. Hoe compleet vind je het artefact in het algemeen?

*Erg incompleet* *Erg compleet*



2. Hoe compleet vind je de user journey notatie?

*Erg incompleet* *Erg compleet*



3. Indien je wat mist, geef hieronder aan wat je miste (mag alles zijn):

_____

_____

_____

_____

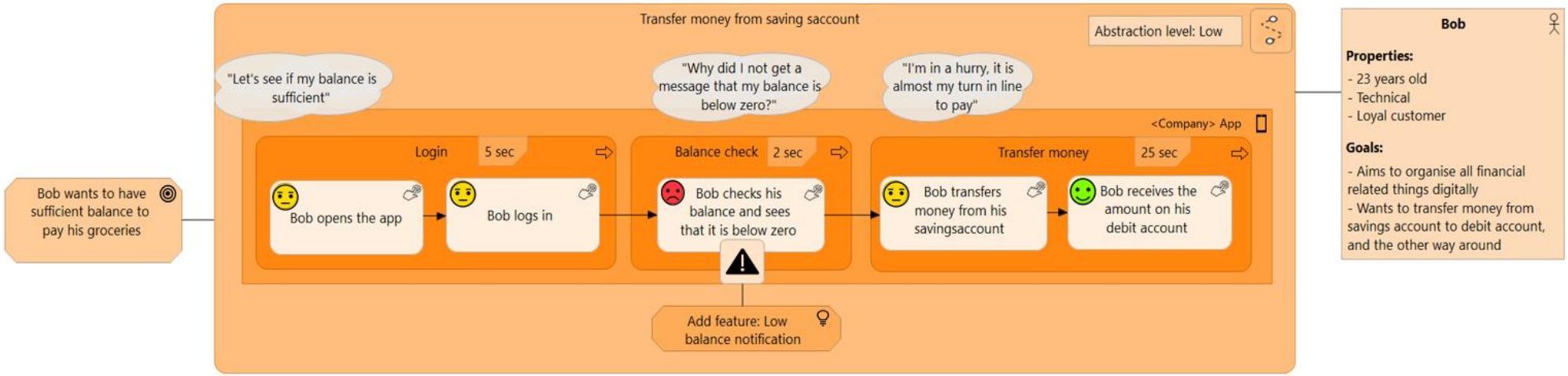
_____

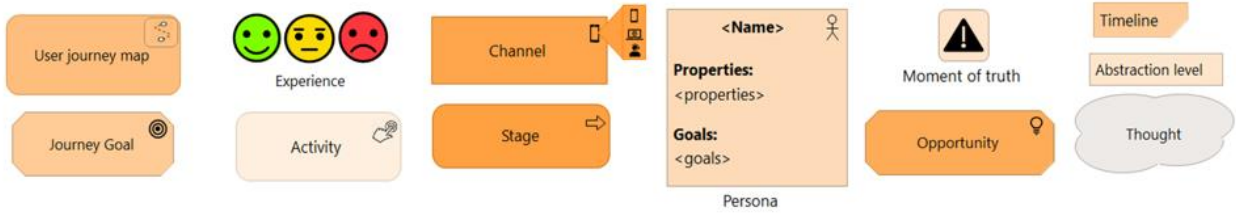
## D Graphical notation with concept definitions

### Grafische Notatie & betekenissen

# User journey voorbeeld

## E User journey example

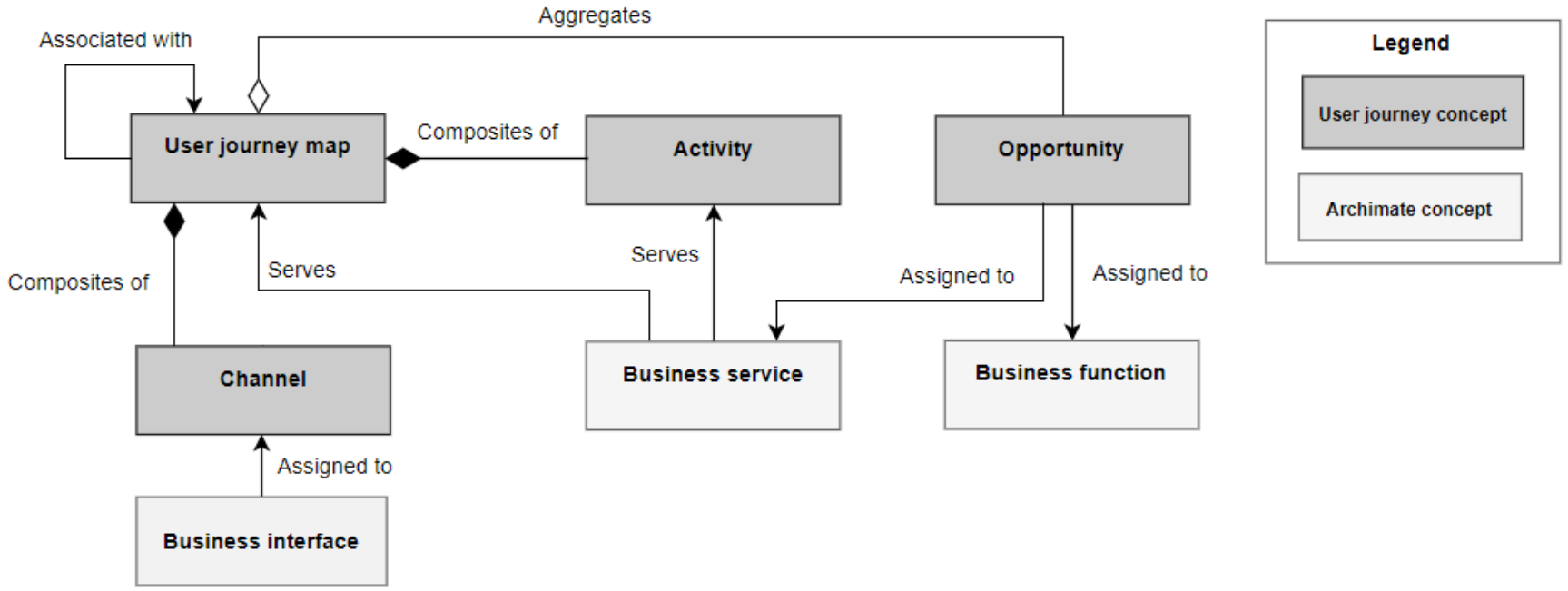


## F Cross-layer meta model

# Cross-layer meta model

*Laat de mogelijke koppelingen zien tussen user journey en architectuur



## G Informed consent

### Informed consent (20/06/2019)

**Taking part in the study**

- ☐ The research information dated 20/06/2019 has been clarified to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

- ☐ I consent voluntarily to be a participant in this study and that I can withdraw from the study at any time.

- ☐ I allow the researcher to make a recording during the study.

- ☐ I allow the researcher to take notes while I participate in the study.

**Use of the information in the study**

- ☐ I understand that information I provide will only be used for the master thesis of Lars van den Bos, more specifically in the chapter that deals with the evaluation of his created artefact (User Journey Integrated Archimate).

- ☐ I understand that personal information collected about me that can identify me, such as my name or function, will not be shared beyond the study team.

- ☐ I agree that my information can be anonymously quoted in research output.

**Commitment of the subject**

In addition to the agreements above, we ask for your signature as proof of your participation.

Signature of the subject: _____

**Commitment of the researcher**

*I hereby guarantee that non-disclose information and/or data will be kept confidential and that it is only used for academic purposes.*

Signature of the researcher:  _____

## Spelregels

1. Vragen mogen altijd gesteld worden.

2. Overleg met het andere team mag alleen in opdracht 2.

3. UX'ers mogen geen laptop gebruiken. Architecten wel
   (voor het opzoeken van architectuur).

4. Eerst mag het UX team op het scherm, daarna de architecten.

5. Schetsen mag altijd!

# APPENDIX G: Results

## G.1. Observations

*The following observational notes were taken during the evaluation assignments 1 and 2.*

### *Opdracht 1*

**Opmerkingen & observaties van UX'ers:**

- Uxers beginnen te overleggen.
- UX'ers beginnen met een schets het scenario in stukken te breken en te analyseren.
- Ze maken eerst op een wit vet een soort overzichtje met bullit points.
- Er vindt rustig overleg plaats en ze gaan samen door de case. Zijn het niet snel oneens met elkaar.
- Het proces is vrij groot, past nog maar net op het brownpaper.
- De Uxers verwarren moment of truth met opportunities. Leggen nu overal moment of truth neer bij veel proces stappen.
- ''ik had niet gezien dat er een ander icoontje op stond, hebben wel in blokken gehad maar alles is mobiel''
- De UX'ers gebruiken het kanaal niet.
- Soms discussie over welke emoticon er moet staan.

**Opmerkingen & observaties van architecten:**

- Vraag: Zowel business als applicatie architectuur?
- De bestaande case is niks aan veranderd, makkelijk toch?*beginnen met schetsen op het whiteboard*
- Overleggen gemoedelijk.
- Ik zie nu dat hele modelletje weer voor me wat je ooit had uitgetekend (tegen andere architect).
- Zijn echt serieus bezig, uitschrijven van het proces op het whiteboard gaat redelijk vlot en met goed overleg. Kennen het proces goed vanuit hun ervaring.
- Architect zegt ik kan de plaat erbij halen. Volgensmij gaat hij nu een plaat opzoeken van de case die hij eerder heeft gebruikt ooit.
- Ze praten veel uit ervaring over de case.
- Er is een Architect die wat meer de leiding pakt met het schetsen van het proces.
- Maken ook veel gebruik van het business function model.
- Architecten gaan best wel diep op de case op basis van hun eerdere ervaringen. Putten dus ook veel uit eigen ervaring wat betreft de case en niet alleen de gegeven case.
- Een van de architecten vraagt aan de ander: gaan we uit van het proces zoals nu ingeregeld of vanuit als we architect zijn wat we graag willen.
- De flow die we nu uitgetekend hebben is eigenlijk informatieverzameling.
- Andere architect zegt: dan zit er eigenlijk niks in deze architect plaat. Want het is alleen input van de klant. Bulk met data. Er zit geen backend systeem onder. Eigenlijk is nu online klant worden gewoon een groot aanvraagformulier.
- Architecten voornamelijk bezig op het schetsbord, nog niet de modelleertaal papiertjes erbij gepakt.
- De papiertjes van de architecten zijn vrij klein en beetje te weinig.

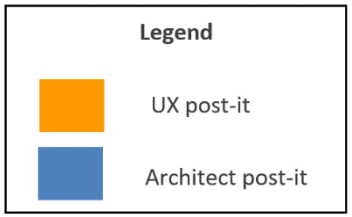
### *Opdracht 2*

- Architect: ''lachen die smileys erbij, dat is echt spot on''deze had wel rood kunnen zijn haha.
- Architect: Gaan we die nu koppelen aan deze rij of ook al aan de nieuwe ideeën?
- Architect: is in ieder geval handig dat je de stappen uit de customer journey hebt en hier hebben wij die van het proces.
- Aandere architect: koppeling die we hier hebben gemaakt zie je hier ook weer terug.

- UX'er: klant ervaart wat maar vanuit de bank ook een aantal stappen nodig om dat onboard proces te begrijpen, dit is dus meer de blik vanuit de bank (architecten plaat) en dit vanuit de klant (UX plaat)
- Architect: die proces laag moet je mappen op de klantenplaat
- UXer vraagt aan architect: jullie begonnen met de proces laag?
    - (er vindt discussie plaats tussen architecten en uxer, dat is wel interessant om te zien. Doordat beide processen naast elkaar liggen gaan ze met elkaar in proces en begrijpen ze misschien ook beter hoe ze werken).
- Architect: voor de order hebben we weer gegevens nodig van de klant identifier. (ze leggen echt dingen uit aan de UXer)
- Architect: dit is wel grappig eigenlijk want dan heb je eigenlijk de proceslaag opgeslagen.
- UXer: daarmee heb je eigenlijk al een nieuwe architectuur bepaald voordat wij de journey helder hebben.
- Er vindt veel discussie plaats tussen de architecten en Uxers.
- Architect: dit (architecten plaat) sluit aan bij wat daar staat (UXer plaat)
- Architect: verwarrende is dat je nu business services wilt koppelen terwijl wij liever de business processen willen koppelen.
- Architect: je moet eigenlijk zeggen dat processen business services leveren en dan die business services koppelen met de UX laag.
- Architect: spreken over orgechestreren van business services, dit is een klein procesje, wat doet die case? Legt vast in relatie management, kleine procesje levert een business service en die orchestreren we achter elkaar. .
- Uxer: (12:31): challenge vraag, straat en waar ik woon kan handmatig, maar postcode kan ook automatisch straat enzo invullen. Betekend dat als ik dat zou doen in het scherm dat dat ook hier (architecten plaat) een andere service aanroept? - Architect: ja je wilt het niet steeds opnieuw doen.
- Architect: wil je ze met letters koppelen of met een lijn?
- Gelach tussen architecten en Uxers, positieve samenwerking! Eentje grapt: durf niet over jullie plaat heen te tekenen!
- Er worden nu lijnen getrokken. Één van de architecten neemt hierin het voortouw, vraagt wel aan de Uxers wat ze willen maar over het algemeen tekend ie gewoon zelf wat ie denkt. Uxers kijken aandachtig toe.
- Architect: wat is dit? (op UX plaat), NFC zit dat er ook al in?
- UXer: nee die uitroeptekens zijn verbeterpunten, kritische notes waar het kan worden verbeterd.
- Architect: ''oh want ik zag het als moment of truth''
- Architect: misschien vanuit coaching overwegingen wel interessant om te praten met iemand van ares, kan dat mag dat?

# G.2 Post-it results

| *Perceived ease of use* | | *Perceived usefulness* | | *Intention to use* | | *Perceived familiarity of concepts* | | *Perceived collaboration value* | | *Improvement suggestions* |
|---|---|---|---|---|---|---|---|---|---|---|
| Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative | |
| Meta model is easy to understand | Be careful for too many connecting lines | The models provide insight | There seems to be a missing layer in the created architecture to be able to connect it | Encourages people to have a discussion with UX'ers or architects | Must be used across the whole company in order to work. | UX standards are used | Missing risks and exceptions | Allows to test the feasibility of a journey | The cross-layer meta model is incomplete | Connecting process models to the journey instead of business services |
| You can easily change or add an element to the model | Small learning curve | Provides overview | | I would use the connections between journeys to architecture | Users must be able to access the required data (this is not always the case) | Good way of expressing the intentions of UX | | Results in earlier understanding of each other's solutions | Must be used frequently to work | I miss a set of elements that I can choose from (relational elements) |
| The notation was easy to understand | | Results in informal discussion | | Connections between journeys and architecture are useful | | Recognisable architectural structure | | Interaction with UX | | Execute the experiment digitally instead of the screen |
| Connecting the user journey to the architecture was easy to do | | Connections between journey and architecture is useful | | Connections provide one large overview | | Results in universal journeys | | Creates discussions between UX - architect | | Use the 4 standard persona's of the company |
| | | | | | | | | Supports discussion | | We now have to create business services first to be able to connect the architecture |
| | | | | | | | | Visual connections that are also useful for the business | | |
| | | | | | | | | Creates a balance between UX and architect | | |



# G.3 Coded audio fragments

Table 39: Nvivo coded audio fragments

| ID | Nvivo code | Audio fragment (comment) |
|---|---|---|
| 1 | Usefulness Positive | “Koppeling tussen user journey en architectuur. ” |
| 2 | Usefuless Positive | ”Bankperspectief + Klantperspectief. ” |
| 3 | Usefulness Negative | ”Schermen zie je niet. ” |
| 4 | Improvement | ”Proceslaag wil je liever koppelen. ” |
| 5 | Improvement | ”De business services die uit de proceslaag komen zijn eigenlijk de journey activiteiten. Zelf zijn ze wat overbodig. ” |
| 6 | Improvement | ”Koppeling met schermen zou ook nuttig zijn. ” |
| 7 | Ease of use Negative | ”<!> tekent zie ik als opportunity. ” |
| 8 | Intention to use Negative | ”De user journey laag zelf zal ik niet gebruiken als architect. ” |
| 9 | Intention to use Positive | ”De koppelingen zou ik wel gebruiken. ” |
| 10 | Intention to use Negative | ”Ik ben hier eigenlijk maar 5% van mijn werk mee bezig, ik ben vooral bezig met schermontwerpen. ” |
| 11 | Improvement | ”In schermontwerpen komt eigenlijk nog veel meer naar voren. ” |
| 12 | Improvement | ”Alternatieve flows. ” |
| 13 | Improvement | ”Excepties. ” |
| 14 | Improvement | ”Risico’s. ” |
| 15 | Improvement | ”Maak het meta model levend: dat er makkelijk dingen toegevoegd kunnen worden. ” |
| 16 | Ease of use Positive | ”Makkelijk verbindingen leggen. ” |
| 17 | Ease of use Positive | ”Makkelijk te zien waar verbindingen niet zijn. ” |
| 18 | Ease of use Positive | ”Makkelijk te zien waar we iets moeten doen. ” |
| 19 | Improvement | ”Iets van requirements erin verwerken. ” |
| 20 | Improvement | ”Ik wil iets erin waarbij je laat zien wat voor gegevens nodig zijn. ” |
| 21 | Usefulness Positive | ”Ik vind het nuttig. ” |
| 22 | Ease of use Positive | ”Wij gebruiken percies dezelfde onderdelen. ” |
| 23 | Familiarity of concepts Positive | ”Ik herken alle elementen. ” |
| 24 | Ease of use Positive | ”Het was makkelijk te gebruiken. ” |
| 25 | Ease of use Negative | ”Met de hand is nog net wat meer werk dan digitaal. ” |
| 26 | Perceived collaboration value Positive | ”Ik vind het goed om hiermee meer samen te werken met UX. ” |
| 27 | Usefulness Positive | ”Het stimuleert hergebruik van bestaande architectuur blokjes. ” |
| 28 | Usefulness Positive | ”Geeft mogelijkheid om gap analysis te doen. ” |
| 29 | Usefulness Positive | ”Mee eens over de gap analysis. ” |
| 30 | Usefulness Negative | ”Er wordt niet altijd een user flow/scenario gebruikt. Het kan ook dat we een bestaande flow qua schermen aanpassen/vernieuwen. ” |
| 31 | Improvement | ”Schermen zijn belangrijk, het kan zo zijn dat er 3 schermen nodig zijn voor 1 activiteit. ” |
| 32 | Improvement | ”Schermen zijn handig, want voor het bouwen hebben de programmeurs wat visueels nodig. ” |
| 33 | Intention to use Positive | ”Qua begin stadia voordat de schermen worden uitgewerkt is dit handig. ” |
| 34 | Collaboration value Positive | ”Ik zie sowieso toegevoegde waarde in de samenwerking. ” |
| 35 | Familiarity of concepts Positive | ”Ik herken de de concepten. ” |
| 36 | Improvement | ”Koppeling via business services weglaten, gewoon processen eraan koppelen” |
| 37 | Improvement | ”Eigenlijk waar dit het meest van toepassing is, is niet de connectie met architectuur, maar meer de connectie met procesmodellering. ” |