Deliverable D8.2: **Design, Technology, and IP analysis + Management of intellectual property rights for efficient and fast exploitation of project results (associated with task T 8.2)**

Abstract: The development of value propositions and business model in REACH is carried out in 5 consecutive phases. Principally it follows the five tasks of WP 8 (development of service-oriented future business strategies) and integrates knowledge and outcomes of selected tasks of WP9 such as innovation (T9.3), IP (T9.6), and stakeholder management (T9.7). Concrete value propositions and business models will be developed based on the REACH "Touchpoints and Engine Concept" designed to capitalize on value-based, personalized, and preventive care and the large-scale utilization of data and a platform approaches. This deliverable report presents the preliminary outcomes of task 8.2 (phase 2 of the business model development phase). This deliverable is structured in 4 main chapters by using the Touchpoint concept "Socializing & nutritional monitoring + intervention" as an illustration for the development of value propositions and business model throughout the entire report to present the product service system concepts defined in previous work packages. IP analysis is conducted based on the earlier analysis with IP experts in T9.6. Since the task T8.2 continues throughout the project (M1-M48) and its goal (the development of value propositions for each Touchpoint) is a complex task, this deliverable report reports about the development of the necessary methods and procedures using Touchpoint 3 (Socializing and Nutritional Monitoring) as an example. The finding of this exemplary case study will be applied to detail subsequently also the value propositions and business model concepts for the other Touchpoints.

Date	Activity	Status
31.05.2017	Deliverable strategy ready	completed
30.06.2017	Deliverable structure ready	completed
01.08.2017	Input of participants/partners ready	completed
15.09.2017	Input integrated and formalized	completed
10.10.2017	Draft of report ready	completed
20.10.2017	Review input received	completed
01.11.2017	Submission to EU	completed

Tasks of the involved partners concerning the deliverable (and respective tasks) presented in this report:

Partner	Short task description
TU/e	Leading report writing, responsible for significant development of the report
Sturrm	Expert input, report reviewing
AH	Expert input, report reviewing
TUM	Report reviewing

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Key expressions

Abbreviations for partners:
    AH: ArjoHuntleigh
    AM: Alreh Medical
    CU: University of Copenhagen
    DTU: Technical University of Denmark
    EPFL: École Polytechnique Fédérale of Lausanne, Switzerland
    HUG: Hôpitaux Universitaires Genève
    PSS: Product Service System
    SC: SmartCardia
    SK: Schön Klinik
    TU/e: Eindhoven University of Technology
    TUM: Technical University of Munich
    ZZ: ZuidZorg

Business model canvas: was initially proposed by Alexander Osterwalder, and represents a set of critical aspects to consider and analyze when developing a business model.

Business Model: "A business model describes how an organization creates, delivers, and captures value" (Osterwalder and Pigneur, 2010).

D: Deliverable report.

Engine concept: A REACH Engine concept refers to a cloud-based digital platform/backend that supports health and behavioral data analysis, creates different user profiles and provides personalized motivation and real-time feedback to both the user and their caregivers.

Formal/informal caregiver: a formal caregiver is a care professional (e.g., nurse) who offers care services either in an institutional setting or at home; an informal caregiver is usually a spouse/relative/friend of an impaired person, who provides care services at home, generally with no remuneration.

Product-service-systems: Product-service-systems can be defined as "a marketable set of products and services capable of jointly fulfilling a user's need" (Goedkoop, et al. 1999).

Stakeholder: In REACH we refer with the term "stakeholders" to the whole network and diversity of players, partners, shareholders, end users, organizations, companies, institutions, and others that relate to, act in, are impacted by, and/or are interested in the activities, developments, and goals of the project.

T: Task defined in the project proposal.

Touchpoint/Touchpoint cluster: Touchpoint refers to each form interaction that your customers have with your products and services. It includes any physical, communication, human and sensory interactions with and within your organizations (Brigman, 2013). Touchpoint cluster in this report refers to those touchpoint concepts that share common purposes such as touchpoint concepts for mobility services or similar technology platform such as touchpoint concepts based on wearable technologies.

Use case setting: Use case setting refers to the four solution operators and this report called them the use case setting since they reflect concrete application scenarios.

Value proposition: "Value proposition describes the benefits that your customers can expect from your products and services" (Osterwalder et al. 2014).

WP: work package defined in the project proposal.

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1 Background and summary of tasks and activities related to T8.2/D29

To establish the presence in the ITC-based healthcare market in the EU and—eventually—beyond (especially in China, with its considerable market potential). To enhance market potential by sidestepping the focus of conventional solutions (i.e., non-preventive home-care, etc.) by concentrating on delivering highly specialized services and products in the areas of prevention and prediction. WP8 is the work package through which work towards these objectives are steered.

In WP8 individual task relate to each other as follows:
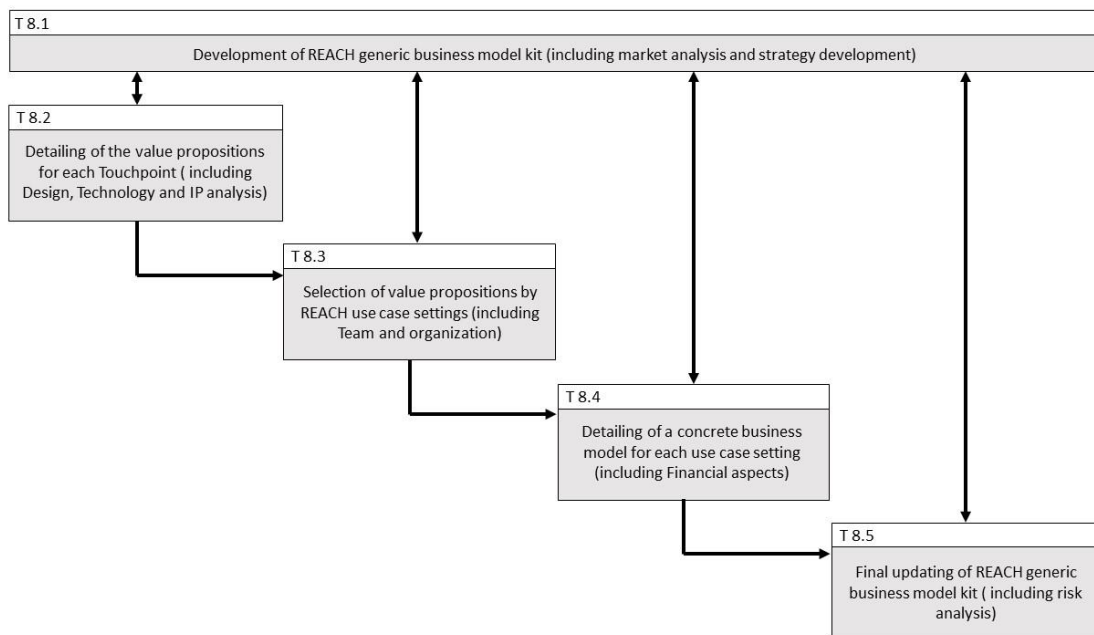
Figure 1-1. overview of WP8 subtasks

In WP8.1, the consortium team has jointly reviewed the ICT-based healthcare market on the four national markets and the EU market related to the REACH systems. Through a workshop together with the technical partners and academic partners, the trends, the current healthcare markets, the business models for these local markets and their extension towards the EU market has been analyzed and envisioned. The Touchpoint and Engine concepts development teams then can make use of these results and create suitable propositions for the local and EU markets. All in all, the work completed in T8.1 indicates that a modular business model (co-adapted to a modular system architecture) is required to allow REACH fulfilling the requirements of various countries and use case settings. Furthermore, first directions for the capitalization on value-based, personalized, and preventive care – a key scientific question of WP8 - and the large-scale utilization of data and a platform approach were explored.

In parallel, the REACH consortium has identified the four most promising innovations that the project will develop (Innovation 1: Personal mobility and training device; Innovation 2. Active environment; Innovation 3: Elements, motivational techniques, and know-how for

healthcare platform; Innovation 4: Medical grade wearable) as well as the consortium partners and external stakeholders backing this innovation. However, REACH has the aspiration to launch from each of its 6 Touchpoints and Engine clusters and innovation and is, therefore, experimenting with new business strategies that leverage the advantages of data-driven early intervention. In WP8.2, Touchpoint 3 concept is then worked out more in detail to develop the methodological toolkit.

In this Section, an overview over **WP8** and **Task T8.2** is provided. First, in **Section 1.1** the process of developing the REACH value propositions and business models is presented, and **T8.2** is situated in this particular context. Second, in **Section 1.2**, an overview of Touchpoints and Engine concept building the basis for REACH's value propositions and innovation potentials is given. Third, in **Section 1.3**, the focus of **Task 8.2** (stating "REACH business model development phase 2"; see **Figure 1-1**) aiming at the detailing of the value propositions for the REACH Touchpoints is outlined. Since the task continues throughout the project (M1-M48) and the development of value propositions for each Touchpoint is a complex task, this deliverable report reports about the development of the necessary methods and procedures using Touchpoint 3 (Socializing and Nutritional Monitoring) as an Example.

1.1 WP8 overview

The development of value propositions and business model in REACH is carried out in 5 consecutive phases. Principally it follows the five tasks of WP 8 (development of service-oriented future business strategies) and integrates knowledge and outcomes of selected tasks of WP9 such as innovation (T9.3), IP (T9.6), and stakeholder management (T9.7). Concrete value propositions and business models will be developed based on the REACH "Touchpoints and Engine Concept" designed to capitalize on value-based, personalized, and preventive care and the large-scale utilization of data and a platform approaches.

The five consecutive phases of value propositions and business model development in REACH:
1. Phase 1/ T8.1 - **Development of REACH generic business model kit**: a generic business model kit was developed based on the insight that due to significant differences in the healthcare reimbursement systems in European countries, country adapted instantiations are needed. Also, within each country's reimbursement system the different types of geriatric care present in each country are subject to different reimbursement mechanism and business approaches.
2. Phase 2/ T8.2 (+ work carried out in WP2 2-7) - **Detailing of the value propositions for each Touchpoint:** as an outcome of WP1 together with the key stakeholders and users the REACH "Touchpoints and Engine Concept" was developed. The concept subdivides into six development clusters, from which the first four represent the four key dimensions of physical activity and the last two are cross-sectional topics. The development clusters detail the concepts, develop prototypes, test and evaluate them, and last but not least detail the value propositions. **Current phase!**
3. Phase 3/ T8.3 (+T9.3 – 9.7) - **Selection of value propositions by REACH use case settings:** based on concrete value propositions detailed by the development clusters in the previous phase, the use case settings, their stakeholders and

decision makers will be invited to select those value propositions that are most valuable and suitable for them and in which they see the potential to create an added value.

4. Phase 4/ T8.4 (+T9.3 – 9.7) - **Detailing of a concrete business model for each use case setting:** based on the value propositions selected for each of the 4 REACH use case settings, a specific and detailed business model will be developed that considers the full spectrum from key partners and resources composition to, customer relations, sales channels, cost structures and revenue mechanisms. In this phase, flanking the development of each business model, a more detailed market, and IP analysis will be carried out.

5. Phase 5/ T8.5 (+T9.3 – 9.7) - **Final updating of REACH generic business model kit:** in this phase, based on the based model building blocks developed and concretised in previous phases, the initially developed REACH generic business model will be updated and made more concrete and realistic, and augmented with analyses that indicate the potentials and risks of its elements in a variety of exemplary situations and personalized care cases.

Outcomes of the five phases to develop value propositions and business models will be 1) a detailed REACH business model for new products and services for each use case setting (confidential - treated confidential and only shared among the partners and the EC services), and 2) a generic REACH business model for use beyond REACH (public – to be disseminated publicly and shared and used beyond REACH).
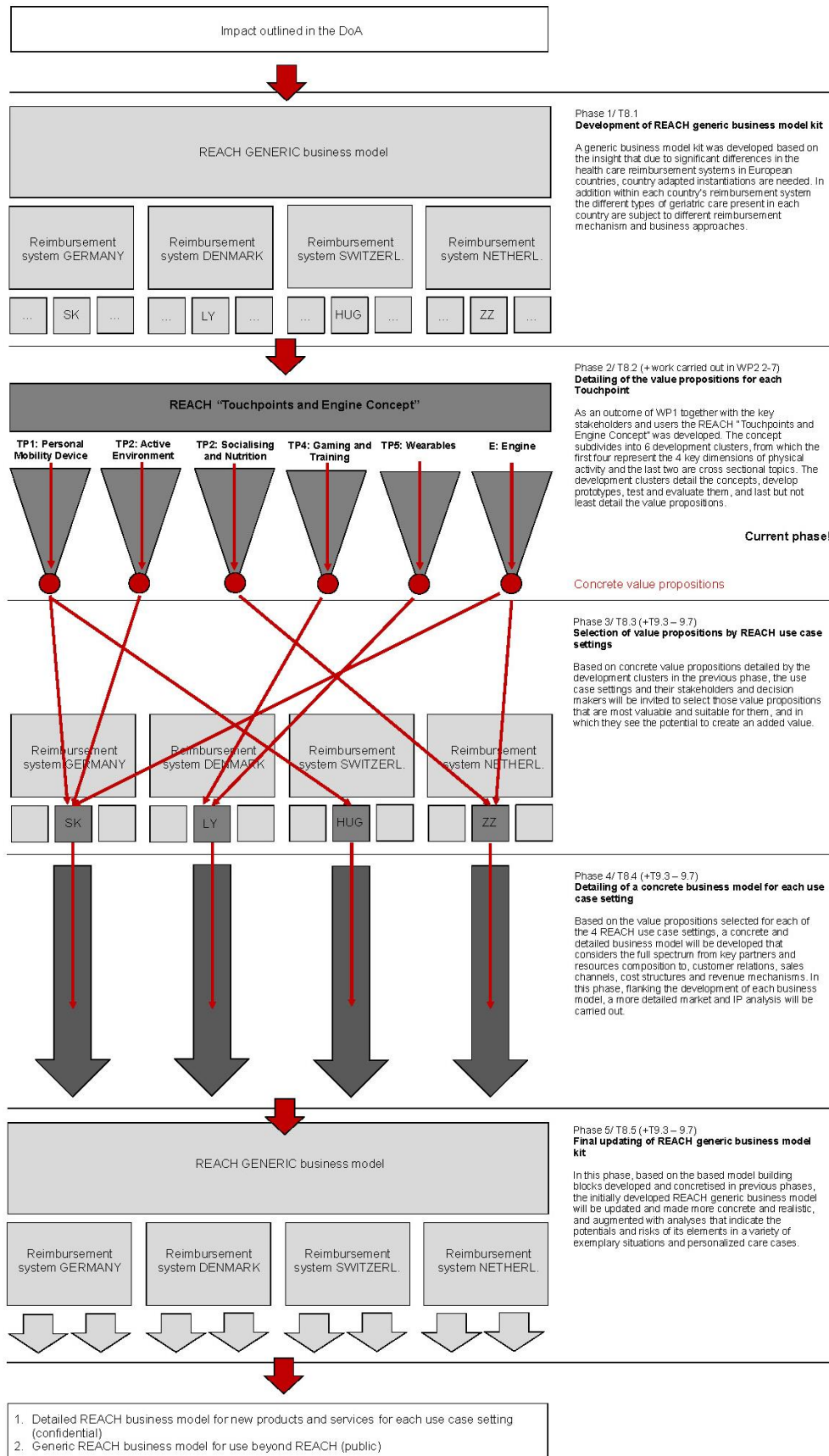
Impact outlined in the DoA

REACH GENERIC business model

| Reimbursement system GERMANY | Reimbursement system DENMARK | Reimbursement system SWITZERL. | Reimbursement system NETHERL. |

... SK ... | ... LY ... | ... HUG ... | ... ZZ ...

Phase 1/ T8.1
Development of REACH generic business model kit

A generic business model kit was developed based on the insight that due to significant differences in the health care reimbursement systems in European countries, country adapted instantiations are needed. In addition within each country's reimbursement system the different types of geriatric care present in each country are subject to different reimbursement mechanism and business approaches.

REACH "Touchpoints and Engine Concept"

TP1: Personal Mobility Device | TP2: Active Environment | TP2: Socialising and Nutrition | TP4: Gaming and Training | TP5: Wearables | E: Engine

Concrete value propositions

Phase 2/ T8.2 (+ work carried out in WP2 2-7)
Detailing of the value propositions for each Touchpoint

As an outcome of WP1 together with the key stakeholders and users the REACH "Touchpoints and Engine Concept" was developed. The concept subdivides into 6 development clusters, from which the first four represent the 4 key dimensions of physical activity and the last two are cross sectional topics. The development clusters detail the concepts, develop prototypes, test and evaluate them, and last but not least detail the value propositions.

Current phase!

| Reimbursement system GERMANY | Reimbursement system DENMARK | Reimbursement system SWITZERL. | Reimbursement system NETHERL. |

SK | LY | HUG | ZZ

Phase 3/ T8.3 (+T9.3 – 9.7)
Selection of value propositions by REACH use case settings

Based on concrete value propositions detailed by the development clusters in the previous phase, the use case settings and their stakeholders and decision makers will be invited to select those value propositions that are most valuable and suitable for them, and in which they see the potential to create an added value.

Phase 4/ T8.4 (+T9.3 – 9.7)
Detailing of a concrete business model for each use case setting

Based on the value propositions selected for each of the 4 REACH use case settings, a concrete and detailed business model will be developed that considers the full spectrum from key partners and resources composition to, customer relations, sales channels, cost structures and revenue mechanisms. In this phase, flanking the development of each business model, a more detailed market and IP analysis will be carried out.

REACH GENERIC business model

| Reimbursement system GERMANY | Reimbursement system DENMARK | Reimbursement system SWITZERL. | Reimbursement system NETHERL. |

Phase 5/ T8.5 (+T9.3 – 9.7)
Final updating of REACH generic business model kit

In this phase, based on the based model building blocks developed and concretised in previous phases, the initially developed REACH generic business model will be updated and made more concrete and realistic, and augmented with analyses that indicate the potentials and risks of its elements in a variety of exemplary situations and personalized care cases.

1. Detailed REACH business model for new products and services for each use case setting (confidential)
2. Generic REACH business model for use beyond REACH (public)

Figure 1-2. The five consecutive value proposition and business model development phases in WP8

1.2 Touchpoints and Engine concept: the basis for REACH's value propositions and innovation potentials

As a significant achievement of the first project year, the REACH consortium has developed and detailed a holistic conceptual solution, the "**Touchpoints and Engine concept**s." They were created based on an in-depth analysis of the four REACH use case settings, and the identification and inclusion of consortium internal and consortium external stakeholders (elderly, care personnel, insurances, etc.) in the system architecture development process. This conceptual solution fully reflects REACH's "Product-Service-System" value proposition. Five physical touchpoints will function each as data gathering and intervention devices, which are bound together by cross-sectional, integrated engine (i.e., platform) functionality.

Touchpoints 1-4 represent the development of innovation clusters within the consortium. Furt
1. hermore, each of them represents a specific dimension of physical activity in general (REACH Physical Activity Dimensions (PADs))
2. and will implement an instantiation REACH's unique Sensing-Monitoring-Intervention Activity Flow
3. each develops a value proposition and hold a concrete innovation potential

Touchpoint 5 and the Engine state cross-sectional development areas that serve these 4 PADs. A detailed description of the Touchpoint and Engine concepts and the associated REACH partners and use case settings are outlined in detail in **Deliverable T1.4/D4**.

Table 1-1. List of REACH Touchpoint concepts and represented PADs

Touchpoint 1: Personal Mobility Device PAD 1: macro mobility, general physical mobility in-house and neighborhood	
Touchpoint 2: Active Environment PAD 2: micro-mobility, postures, and ADL execution	

Touchpoint 3: Socializing & Nutritional Monitoring + Intervention *PAD 3: nutritional monitoring and intervention in the context of physical activity, fictional ability, and socializing*	
Touchpoint 4: Gaming & Training *PAD4: gaming and training*	
Touchpoint 5: Wearables	

"Touchpoints" will act as "graspable" front end towards the end users (elderly). Touchpoints will mainly materialize as "furniture/Pl²Us" in a broader sense. They include elements that can be placed and moved within a certain environment or setting (e.g., beds, bath furniture, mobile walkers/standers, large-scale interfaces, smart flooring tiles, smart tables, etc.) but also as ambient sensor add-on modules and wearables. The Touchpoints will serve as data gathering devices as well as mediators of services and interventions coordinated by the Engine towards the end user. Each Touchpoint is modular in itself (thus also serving as a kind of physical product platform) and made up of several subsystems. These subsystems can adapt the system both for a certain person or setting as well as over time. The "Engine" ICT platform - in itself also modular with regard to its functionality – serves from the viewpoint of the end user as "invisible" back-end system. In general, the end users (seniors) are supposed to interact with the "engine" primarily in an indirect way through the Touchpoints. The REACH consortium has based on its initially defined Sensing-Monitoring-Intervention concepts outlined in the DoA, as part of the work carried out so far, detailed and took these concepts further towards a unique Sensing-Monitoring-Intervention Activity Flow.

1.3 Task T8.2: Design, Technology, and IP analysis + Management of intellectual property rights for efficient and fast exploitation of project

The deliverable report of T8.1 developed the REACH business model by using the four use case settings (SK, HUG, ZZ, and Lyngby) as concrete examples. It made the first attempt towards defining an initial business strategy and vision of deploying REACH and making use of in each of the four use case countries through developing a coherent roadmap from market/situation/prognosis analysis. It was decided that a multi-dimension perspective is to be applied to develop the REACH business models from the testbed level to the specific market conditions on the national level, to the overall REACH business model at the EU level.
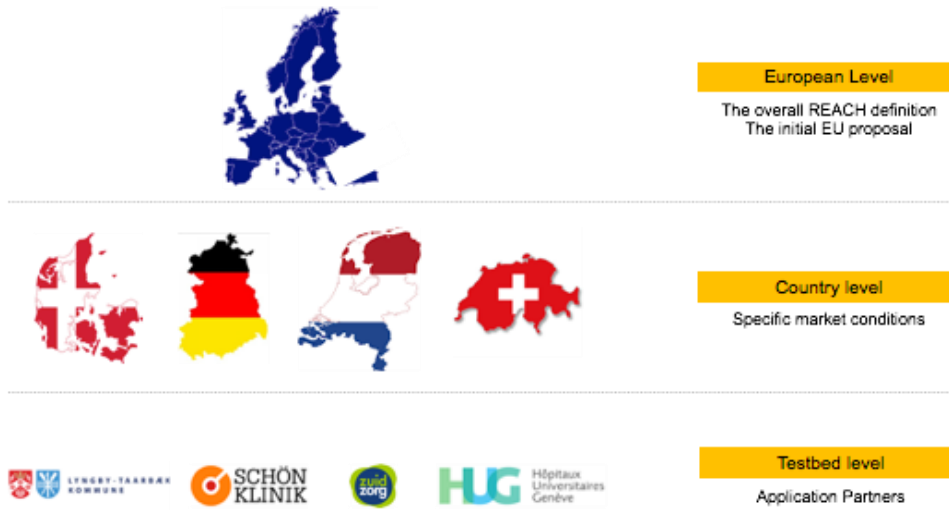

Figure 1-3. A multi-dimension perspective in REACH business model development

Although the national markets involved in REACH system development differ from each other, the resulted business models at the national level in deliverable report T8.1 (Lingegard et al., 2017) share some key commonalities.
The to-be-collected data using our sensing and intervention system in the touchpoint and engine concepts and the to-be-developed data analytics algorithms and approaches have been recognized as key assets of the REACH business model at the national levels.

- Despite the fact that currently a combination of public and private scheme for the payment system is used in the four national markets of REACH, the envisioned business models for REACH at the national levels call for private payment scheme.
- There is also a strong shift from ownership to usership. It implies that the REACH system will be purchased and owned by the target users, but be rented by them.
- Since the needs for using the different functionalities of the REACH touchpoint and engine concept can grow in the process of aging, the REACH business model will support personalized on-demand usage instead of offer all functions at the same time.

Therefore, the differences in the business model for the REACH systems in different national markets will be reflected in the testbed level because of the different use case contexts (home vs. rehabilitation). Therefore, both the REACH system architecture and the REACH business model need to be modularized according to the use cases to allow an adjustment to the different stakeholder network configurations and reimbursement mechanisms in the national markets.

T8.2 will then continue detailing **of** the value propositions for each touchpoint at the use case level. Since the REACH project is still ongoing, in T8.2 we will look at each of the different Touchpoint concepts starting with TP3: Socializing & nutritional monitoring + intervention. Some of the opportunities (from a technology perspective) have been explored in T1.3 and T1.4. However, there was lack of exploration between the benefits of the technologies and the needs of the customers/users. In the meantime, the possibilities were explored on a high level of aggregation. We will, therefore, apply the value proposition design canvas, to see what the 'real job we get done' for the customer/user is, and how to chain up the products and services on offer in a logical and user-centered design. Based on this we will propose a product service system for each of the touchpoints.
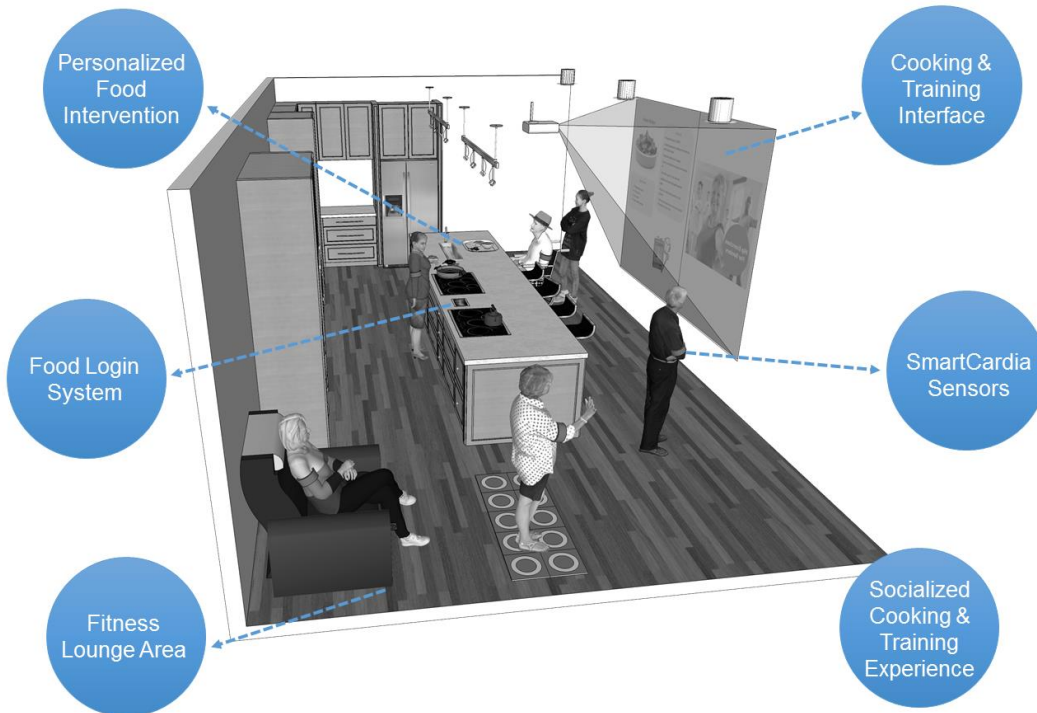

Figure 1-4. Visualization of the envisioned TP3 system level concept

To do this, we will identify:

- What is the product market fit? How does this help the customer/user?
- A description of the PSS, what types of products and services are in? What is their sequence, how does it work? Where does the user step in/out?
- A business model for the product service system throughout the healthcare journey context (home, hospital, rehab, (care)home) for the four different national markets.
- An overview of the different partners involved in the PSS and gaps in the overview where we might need new partners/technology.
- A reflection on where are the IP opportunities for further research exploration since the project is still ongoing.

The report is structured as follows:

1) State of the art related to value proposition representation. In **Chapter 2,** different methods and tools related to value proposition representation including value proposition design canvas, user experience flow and customer empathy map, product service system, business model are shortly reviewed.

2) The selected touchpoint concept. In **Chapter 3,** TP3. Socializing & nutritional monitoring + intervention. The value proposition design canvas is applied to present the intended values for customer/user, the product service system, the business model for the national markets, desired multi-stakeholder network, and potential IP opportunities.

3) Generalization. In **Chapter 4**, the developed platform is discussed for its generalizability to other Touchpoint and Engine concepts.

4) The conclusion is made in **Chapter 5**.

2   State of the art related to value proposition visualization

In this chapter, value proposition representation related methods such as experience map, business model canvas, and value proposition canvas are shortly discussed.

Experience map has been already discussed in the report of T1.1 based on "Understanding people and their experiences to deliver meaningful innovations" (Philips, 2014). It is one of Philips' most useful tools for creating people-centered solutions. They help to spot and contextualize the unmet needs of people and then translate these into innovation opportunities and directions. During the process, vast amounts of qualitative and quantitative information and knowledge are consolidated into a visual that makes immediate sense to everyone. A holistic insight into the total user experience is created using multiple perspectives on a particular issue or topic. It can be applied to map the current user experiences, gather user insights, identify opportunities for innovation. It can also be applied to visualize the intended experience to fulfill unmet needs. It can demonstrate how different stakeholders including end users experience the to be developed value propositions and reflect the different interactions and processes related to the intended value proposition. This method has been used quite extensively in T1.3 to develop the REACH Touchpoint and Engine concepts. Therefore we will not use them anymore but based on their results from REACH deliverable report D3 (to further detail the REACH Touchpoint and Engine concepts.

Business Model Canvas is a strategic management and lean startup template for developing new or documenting existing business models. It visualizes how companies can create their value proposition for which customers, with what activities and resources, with which partners at what price and revenue. It provides companies insights on how to align their activities to balance the tradeoff between efforts and value and between cost and revenue in business model innovation. Alexander Osterwalder proposed the Business Model CanvasOsterwalder based on his earlier book: Business Model Ontology. It consists of 9 building blocks for the developing business model activities:
1. Key partners: Who are your key partners/suppliers? Why the partnerships?
2. Key activities: What key activities does your value proposition require? What activities are important the most in distribution channels, customer relationships, revenue stream…?
3. Value proposition: What core values do you deliver to the customer? Which customer needs are you satisfying?
4. Customer relationship: What relationship that the target customer expects you to establish? How can you realize this in your business?
5. Customer segment: Which customer segments are you creating values for? Who are your most important customers?
6. Key resources: What key resources do you need to develop the value proposition? What resources are important?
7. Channel: Through which channels you can reach your customers?
8. Cost: What do you need to spend to develop the proposition?
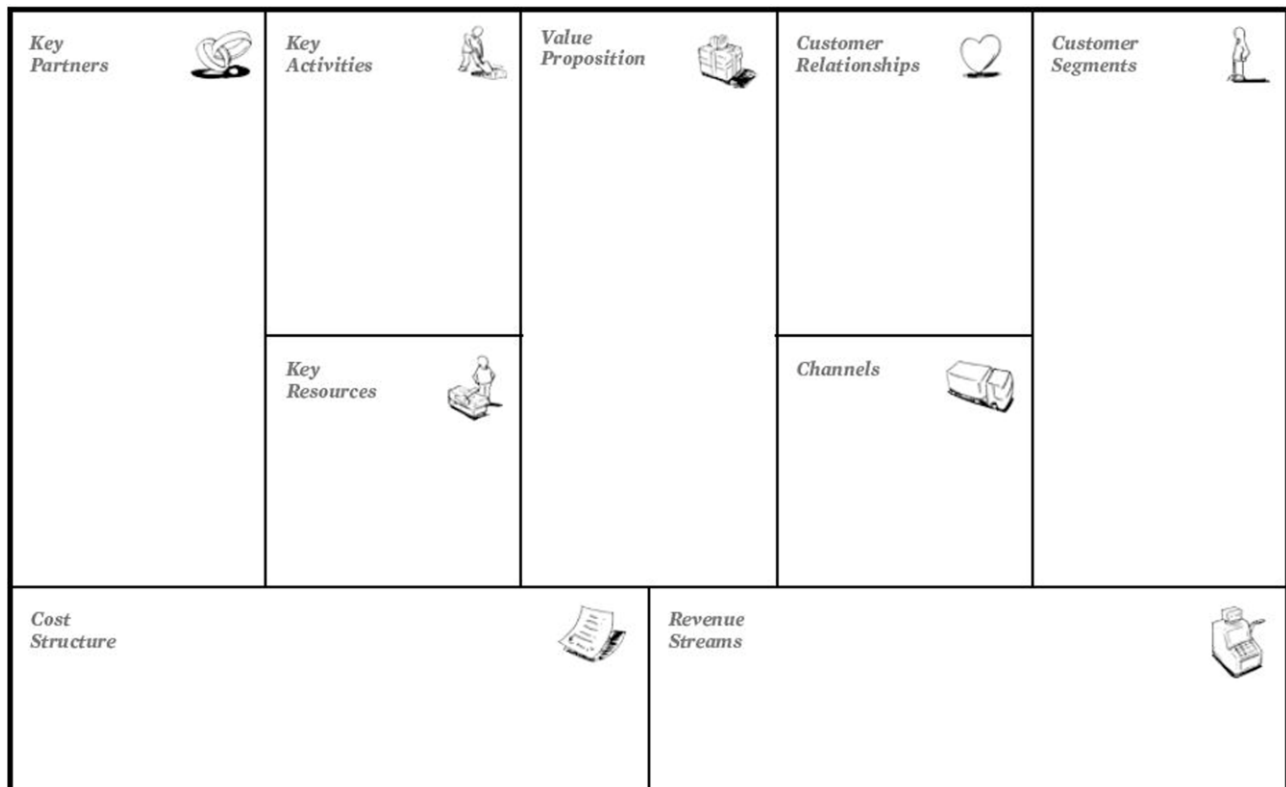9. Revenue: For what value are your customers willing to pay?

Figure 2-1. Business model canvas (https://www.creatlr.com/template/UOLHsfqGrLzugzVVttoi1e/business-model-canvas/, viewed on Oct 20, 2017)

Value proposition canvas provides a simple way to understand customers' needs and design the desired products and services (Osterwalder et al., 2014). It is based on a detailed analysis of the Value Proposition and Customer Segment. It is organized as follows in 6 elements:

- Customer Pains: In the box 'Customer Pains' all the negative emotions and undesired costs, situations and risk which the customer could experience before, during and after getting the job is done are gathered.
- Customer Gains: In the box 'Customer Gains' all the customer's benefits and desires, and may span personal, functional, or economic, etc. are collected.
- Customer Jobs: In the box 'Customer Jobs' all the customer needs, the problems that they are trying to solve and the tasks they are trying to perform or complete are collected.
- Product & Services: In the box 'Product & Services' all the products and services which your value proposition is built around are listed.
- Pain Relievers: In the box 'Pain Relievers' how the products address the challenges needs and the pains of the customer, how you eliminate negative emotions, undesired costs or avoidable situations are described.
- Gain Creators: In the box 'Gain Creators' how the product creates customer gain and how it offers an added value to the customer are described.
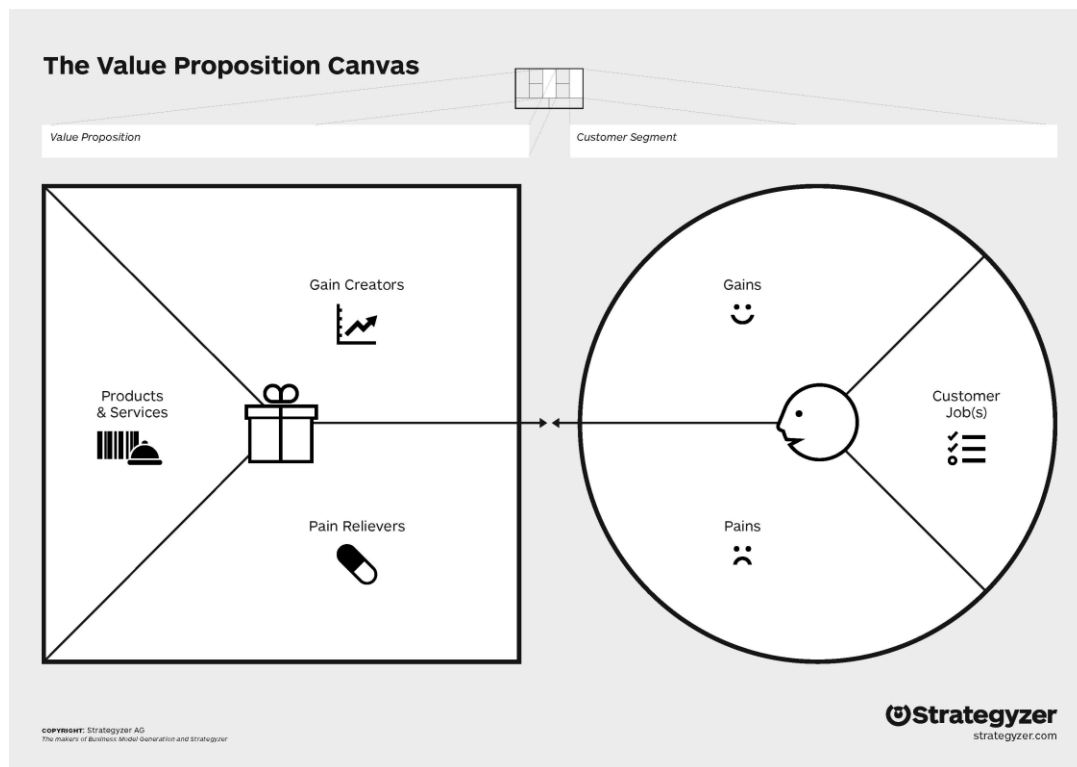
Figure 2-2. Value proposition canvas (http://d2idj4ahi73bav.cloudfront.net/14-value-proposition-canvas-osterwalder/value_proposition_canvas-osterwalder.jpg, viewed on 22 Aug. 2017)

The Value Proposition Canvas template is different from the Business Model Canvas. It is an additional tool that was later on developed by Osterwalder to zoom in on the two most important aspects of the value creation side (right side) of the Business Model Canvas, being: the Customer segments and the Value Proposition. Like this the template easily enables users to look for a product market fit between the needs of (potential) customers/users and the proposed features of the product or service that is on offer. Additional to the Value Proposition Canvas a template like the empathy map can be used to further dive into the pains and gains of a target group and immerse oneself even more in the user's perspective.

In the approach needed for this work package, we have decided first to apply the Value Proposition Canvas method followed by the Business Model Canvas approach. Although we need to develop the value propositions for the REACH Touchpoint and Engine concepts, at the current project stage, we are not (yet) looking to build a proposition, but first, we need to validate our PSS from the user's point of view. The Value Proposition Canvas helps us to understand and validate up front if there is a need/demand for our PSS in the market and whether the context of use we have chosen for it is the right one. With the obtained insights we can then further define the potential business models and reflect upon the earlier business model development strategies discussed in T8.1 and eventually continue the development of the REACH Touchpoint and Engine concepts and their related business models.

3 Detailing TP3: Socializing & nutritional monitoring + intervention.

In this chapter, the value proposition canvas is applied to further detailing the earlier created REACH touchpoint concepts step by step. The TP3: socializing &nutritional monitoring + intervention is used as an example to illustrate how such a modular system can be created and how it can fit into different national markets and use cases in the context of REACH project.

For the food touchpoint, we have worked out a Value Proposition Canvas following the proposed method by Osterwalder, and asking ourselves the questions which are stated in the method. We started out by using a summary of the persona's we had created earlier on in work package 3.1. For the touchpoint food we distilled the following persona descriptions:

1) Henk: Home Persona: A senior 80-year-old man, living by himself, visiting the activity center in the neighborhood on a regular basis.
2) Bertha: Rehab Persona: A senior 75-year-old woman, being in Rehab after a stroke, with Dysphagia.

3.1 Applying value proposition canvas

In this section, we will explain step by step how the value proposition canvas method is applied to help understand and validate up front if there is a need/demand for the TP3 Touchpoint concept in the market and whether the context of use (use cases) we have chosen for it is the right one.

3.1.1 *Customer Pains & Gains*

Due to major changes in the life of elderly, such as the loss of a partner and friends, or disability/loss of mobility, many seniors become isolated. This situation does not only affect the state of mind of the elderly but also greatly affects their food intake patterns. Cooking is a time-consuming activity, and cooking for one alone is less nice and rewarding than preparing a meal for an entire family. Moreover, due to changing health status elderly should adapt their food intake to aid their health (diabetes, obesity, etc.).

Looking at how food can be used as a stimulant in the context of our elderly personas; there are some clear opportunities. Having a meal can be a very soothing social experience for many elderly. Some of the seniors visit the activity center in the neighborhood not only to have lunch at noon but also for the contact with others. As stated in the pains area before, food can also be used to aid elderly in their health condition and prevent (future) disease. Another gain we identified is the ability for food to reminisce. Food brings back memories and happy moments in time (a holiday, wedding, birthday, etc.).

3.1.2 *Customer Job(s)*

Distilled from both the pains and gains are the jobs that food can get done for the elderly personas we chose. We will be respectively: using food to prevent loneliness, linking food

intake to prevent chronic diseases, personalize food to health conditions and make elderly eat more healthy overall.

3.1.3   Pain Relievers & Gain Creators

A lot of the pain relievers described directly solve the pains for the elderly in both of our contexts. We have to make food interesting again for elderly; the way food can be interesting for young children. How can elderly discover new recipes, flavors, and tastes while not having to move toward too exotic choices? We need to provide them with the right inspiration and letting them discover this together really helps them.

Specifically, in a rehab context where a lot of elderly have dysphagia, easily swallowed food with a sense of flavor, texture, and color help them not to lose appetite while adding extra nutrients to their food depending on individual needs.

In both contexts we can have elderly experience food together, however in the rehab context they will be less likely to cook themselves, but why not? Cooking by themselves – or at least helping to prepare a meal – sparks a new interest in food and could help them to gain more appetite.

3.1.4   Products & Services

The products and services are categorized for the two different contexts. More so than products & Services they are describing features, assets even moments (as we are designing for an integrated solution PSS). It is the integration of these features that make for the added value of the touchpoint food and therefore of the REACH engine. By looking at multiple moments in the (daily) food intake of elderly and proposing new solutions for these moments, the REACH engine will be able to recover a lot of data and isolate behavioral patterns.
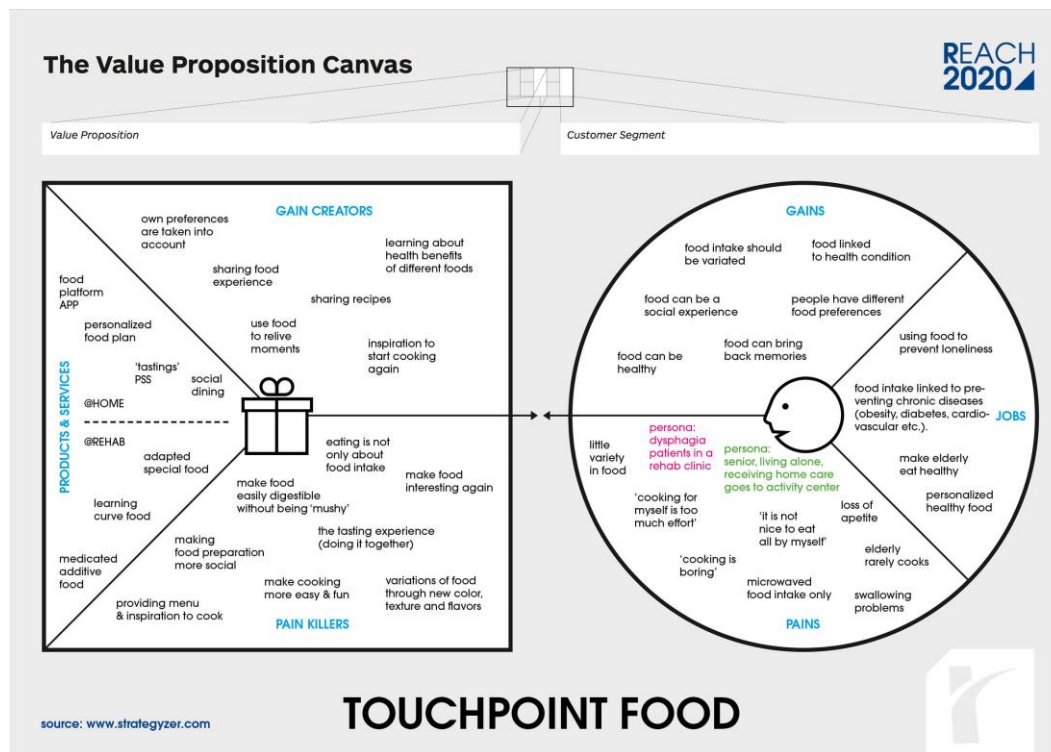
Figure 3-1 Value proposition canvas for REACH Touchpoint socializing &nutritional monitoring + intervention

3.2 PSS concept description

The concept SMAAK developed at TU/e exactly hooks into the Value Proposition Canvas outcomes in this report and will, therefore, be used as a reference PSS concept for the food touchpoint. The concept particularly highlights a PSS in the home context. For further exploration, this concept (or elements/features of it) can be adapted and shifted to the rehab context. In addition, the specific personalization and additional nutrients for the elderly food intake are well researched by Biozoon. Their expertise will be used in this touchpoint to ensure the added value for elderly.

SMAAK is a temporary service intervention to rekindle an interest in food among senior citizens. SMAAK stimulates seniors to make and share recipes and introduce new foods into their diet and lifestyle, addressing the growing problem of malnutrition among seniors. The concept involves a social tasting experience, printed personalized recipes for seniors at home and a platform for seniors to share their food creations.

SMAAK includes social incentives, which try to promote hedonic control of eating, as well as self-reflection/self-efficacy that tries to re-establish the homeostatic control of eating, for effective long-term behavior change.

Why SMAAK?
People's life expectancy is rapidly increasing, and with it, the growing problem of malnutrition among the senior population. Malnutrition leads to a variety of serious adverse effects on health, especially as you age.

3.3 Business Model Canvas

To look at potential IP possibilities for the PSS concept SMAAK we developed a business model canvas for the PSS. In the business model canvas, we have taken both of the described contexts for the personas used into account. Furthermore, some of the elements that were not yet fully described in the concept description were added in using expert knowledge on business modeling to be able to complete the picture for the food touchpoint.

BUSINESS MODEL **TOUCHPOINT FOOD** SMAAK
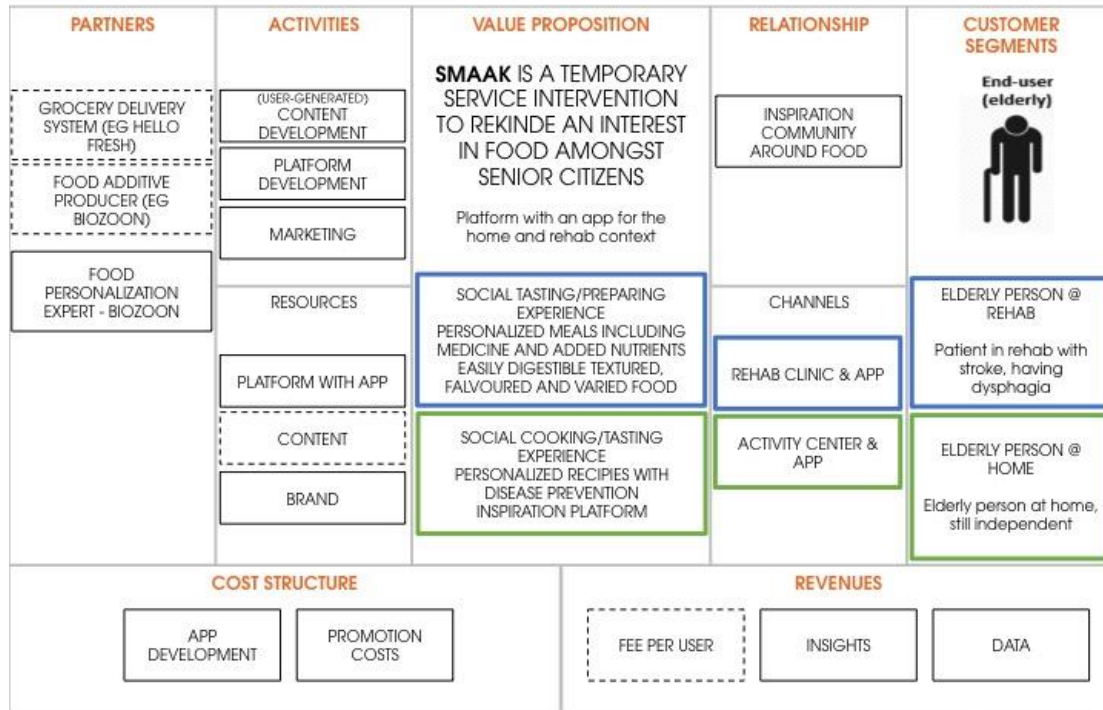
Osterwalder (2010)

The value proposition we offer to our customer segments is built up by a general part and a context-specific part. It describes the products & services and additional features we provide with the food touchpoint, in which we use SMAAK as a placeholder scenario.

SMAAK is a temporary service intervention to rekindle an interest in food amongst senior citizens. SMAAK consists of a platform and an additional app.

For the rehab context SMAAK provides:
• Social tasting/preparing experience
• Personalized meals including medicine and added nutrients
• Easily digestible textured flavored a varied food

For the home context SMAAK provides:
• Social cooking/tasting experience
• Personalized recipes with disease prevention
• Inspiration platform

Our end customers are the elderly in the home and rehab contexts, but they are eventually maybe not the ones that pay for the service of SMAAK. SMAAK asks for a (periodic) fee per user, which could be paid for by (local) government, insurance companies or clinics/institutions. This situation may differ per country in which we want to introduce SMAAK, due to regulatory influences. Therefore it is highlighted with dotted lines, as are some of our other elements in the business model that carry the same country-dependent factor.

Due to the health improvements SMAAK guarantees in their users, we earn back money that would otherwise be spent in the health sector. Furthermore, SMAAK generates revenue by distilling insights from data in the platform and monetizing this data to 3rd party developers in the health, food and nutrition industries. The SMAAK platform is therefore open to further development and plugins by 3rd parties to enhance the overall PSS.

Key to the operations of SMAAK is the content creation (personalized recipes) and the introduction of an internationally approved and appreciated brand needing vast marketing resources before word-of-mouth spreading takes over.

3.4 Stakeholder Model

In our stakeholder model, we have centralized the end consumer, the elderly. Around the elderly are the caregivers and then the clinics or institutions they work for. There are the informal caregivers and friends and family of the elderly surrounding these are. Potentially they all have a role in the platform, however, in our scenario, we have only worked out the roles for the elderly and the clinics or institutions (specifically: the rehab clinic and the activity center).

Distinctively different is the role of the app/platform in the contexts. Where in the rehab clinic the app is the gateway for cooks, caregivers and nutrition experts towards the elderly user and groups of users to ask for help preparing food an monitor food intake, the app is an add-on in the home context for users to contact one another and share recipes/inspiration on food. With the stakeholder model representation, we have depicted this difference.
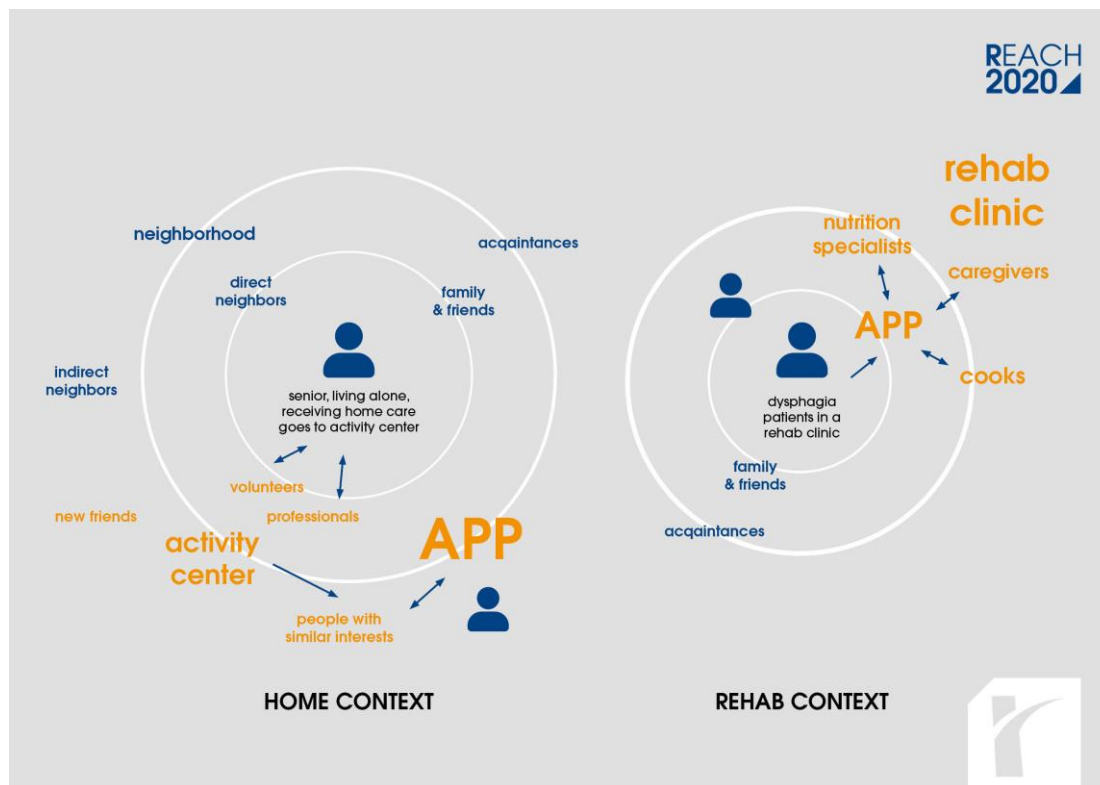
3.5 IP analysis

The deliverable report D40 on IP Management in REACH as the output of T9.6 presents strategies, plans, and procedures, regarding the development and management of intellectual assets/knowledge and their correct identification, handling, legal protection and leveraging in the context of REACH. It was agreed that the REACH IP strategy would be developed along the technology development activities, the so-called "touchpoints and engine strategy." Each touch point team was made responsible for the iterative development of a defined IP asset group by reviewing, adapting and updating the outlined IP management plans presented in deliverable report D40. Since we are still in the early stage of developing the Touchpoint concept socializing &nutritional monitoring + intervention, in this section, we will just quickly explain how the first IP analysis could be done based on the proposed IP management plans defined in D40. This is then a general approach, which can be applied to the IP analysis for all other Touchpoint concepts.

When conducting IP analysis, we need to understand which parts of the concepts can be protected by IP.
▪ Patents: for technology related patents, one can search the related keywords at https://worldwide.espacenet.com.
▪ Design rights: for design related form, shape and interactions, one can search at https://www.tmdn.org/tmdsview-web/welcome.
▪ Copyright: for copyright on design, software codes, images, website, movies, one can search at the Benelux office for IP (BBIE/BOIP, https://www.boip.int/), the German IP and Trademark Office (DPMA, https://www.dpma.de/english/index.html), The Denish IP and Trademark Office (DKPTO, http://www.dkpto.org/), the Swiss Federal Institute of IP (IGE/IPI. https://www.ige.ch/en.html).
▪ Trademarks: for product name and logo, one can search https://TMView.org, tmclass.eu.

- Tradename: for a company name, one can search the chamber of commerce in each country, and via Google.
- Domain name: for a domain name, one can search website URL names via Google.

For the Touchpoint concept socializing &nutritional monitoring + intervention, we just started to create the initial ideas. At the moment we have just a Tradename: SMAAK. By simply searching SMAAK via Google, we realized that this name had been already occupied by one restaurant business in Amsterdam. Therefore we need to consider creating a different Tradename. This simple analysis demonstrates to us that along the technical development of the Touchpoint concepts we will be able to apply the IP analysis approaches discussed here gradually.

4 Generalization

In the previous section, the value proposition and business model of the REACH Touchpoint 3 socializing &nutritional monitoring + intervention concept has been worked out in details. This section we will take a close look at the results and identify the common patterns that can be generalized to other REACH Touchpoints and Engine. How can we develop other Touchpoints and Engine concept into a modular system so that they can be adapted for different use cases?

The reported development of Touchpoint Concept socializing &nutritional monitoring + intervention has brought the following insights to us.

It is important to differentiate the needs of different use cases, namely the activity center vs. rehabilitation clinics. From the discussion above we realized that this is a significant factor to build the Touchpoint concept on top of the modular system: personalized nutrition recipes and ingredients.

The application of value proposition canvas helps to dedicate the modular system of Touchpoint concept to the development of gain creators for customer gains and pain relievers for customer pains. It is about promoting healthy eating via personalized nutrition recipes and social eating experiences. When this is applied in different use cases, for example, at activity centers or rehabilitation clinics, different stakeholders and service interface designs are required to create the intended values together with the activity centers or rehabilitation clinics.

The resulted business models at the different use cases share some common grounds. The intention to develop on-demand service based on the personal health/nutrition status, the data platform to monitor the personal healthy eating behavior, the analytics to detecting abnormal trends and predict unintended events are the common building blocks for all use cases. In T8.1, we have already learned that the REACH overall business payment model prefers to use the private payment system than public insurance structure. It implies that the REACH Touchpoint solutions will be part of the add-on packages on top of the basic insurance package at different countries. The differences between the business models for the different use cases lie very much in the service-payment model at the activity centers and the rehabilitation clinics.

Since we are still in the very early stage to develop the REACH Touchpoints concepts, we build on the results of T1.3, T7.1 and illustrate the envisioned value propositions and business models in the table below, based on the insights collected from the earlier analysis in Chapter 3.

Table 4-1 Envisioned value propositions and business models for REACH Touchpoints Concepts

Touchpoint	Short description of experiment/concepts	Value proposition Key components	Business Model Key Insights
Personal mobility device (Alreh Medical)	It will monitor the daily activity of the elderly (plus respond accordingly in the event of a fall or progressing inactivity) An individual intervention programme can be quickly implemented to protect the elderly against progressive inactivity (physical activity/personal mobility device) Result: staying at home for as long as possible, protecting against unwanted hospitalization.	- Personalized exercises and related games to stimulate more physical activities - Dedicated support for elderly with (light) disability - Monitoring exercise together - Monitoring individual exercise in progress - Create social values through activity center or caregivers at rehab	- Physical model plus digital game experience - Usership instead of ownership - Service on demand - Data platform - Analysis algorithm - Integrated service in care routines/activity center
Active environment (TUM) TP2, TP3, TP4 – The user feedback of the elderly will be considered in a second iteration step, aiming to improve the design and functionality.	Testing prototypes by elderly for improving the design and games, to investigate the user acceptance and activity improvement	- Contextual aware and personalized environment to support social, dining and exercise experiences in a gamification way - Monitoring progresses in groups or individually - Create social values through activity center or caregivers at rehab	- Physical model plus playful experience - Usership instead of ownership - Service on demand - Data platform - Analysis algorithm - Integrated service in care routines/activity center
Socializing and nutrition (TU/e, Biozoon)	No experiment was conducted yet. Only conducted early user research through interviews and first ideation	- Personalized nutrition food recipes/ingredients based on personal health status (e.g., dysphagia) - Personalized food services for nutrition promotion - Monitoring healthy eating progresses in groups or individually - Create social (cooking/dining) values through activity center or caregivers at rehab	- Personalized healthy recipes - Playful experience in cooking and dining - Usership instead of ownership - Service on demand - Data platform - Analysis algorithm - Integrated service in care routines/activity center
Gaming and training system (TU/e, with DTU)	Four elderly tested a set of Playware tiles and a game (called Color Race) to demonstrate how play facilitates intrinsic motivation of physical movement	- Personalized game and training in fun ways - Monitoring health progresses in groups or individually - Create social values for gaming and training through activity center or caregivers at Rehab	- Personalized games and fun training experiences - Usership instead of ownership - Service on demand - Data platform - Analysis algorithm - Integrated service in care routines/activity center
Wearables (TU/e early trial)	Testing Mi Band with seniors at activity center to learn how to improve wearable technology adoption by elderly people	- Personalized visualization of health progresses in groups or individually - Monitoring health progresses in groups or individually - Create social values through activity center or caregivers at Rehab	- Personalized monitoring of the health progress - Usership instead of ownership - Service on demand - Data platform - Analysis algorithm - Integrated service in care routines/activity center

5   Conclusion and next steps

This report uses the Touchpoint concept socializing &nutritional monitoring + intervention to demonstrate step by step how the value propositions and business models can be created for the REACH Touchpoint and Engine concepts for different use cases. The initial IP analysis approaches were explained so that all technical development teams could manage the related IP development along with the Touchpoint concept development.

Two important conclusions could be drawn below.
- There is a common module for all the value propositions of the Touchpoint concepts with their primary functional focuses on sensing, monitoring and analyzing and intervening in promoting physical activities, healthy eating, or gaming and training. The differences of these concepts lie in their detailed interfaces related to the use cases.
- Consequently, they share also a common ground on business models related to the data and analytics platform with a strong difference in their stakeholder management, service interactions and payment models in the different use cases and country context.

Now it is up to the technical development team to follow up the proposed approaches to further develop the value propositions and business models for all the Touchpoint concepts (the outcomes will be summarized in updates of this Deliverable report/T8.2). After that, the use cases will choose which concepts that they would like to continue developing in their contexts within REACH as part of T8.3. WP8 will facilitate this process in accordance with the business model development phases outlined in **Section 1.1**.

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