

| | |
|---|---|
|  | <p>Acronym: ProACT Title: Integrated Technology Ecosystems for ProACTIVE Patient Centred Care Call: PHC25-2015: Advancing ICT Systems and Services for Integrated Care Duration: 42 Months Website: www.proact2020.eu Grant Agreement No.: 689996</p> |
|---|---|

| Document Identification | | | | |
|-------------------------|-------------|-------------------|--|------------|
| Deliverable ID | D6.5 | Deliverable Title | Report on Innovative Value Networks | |
| Release | Version | 1.0 | Date | 30/06/2017 |

| Key Information | |
|---------------------------------------|--|
| Deliverable description | Description and Discussion of Value Networks in Target countries and resulting Business Models |
| Deliverable type | Report |
| Original due date (month number/date) | M18 |
| Real due date (month number/date) | M18 |
| Principal Author (name/entity) | Jonas Albert (imec) |
| Partners Contributing (name/entity) | Jonas Albert (imec), John Dinsmore (TCD), Paul Fulton (Philips), Evert-Jan Hoogwerf (AIAS), Valentina Fiordelmondo (AAATE) |
| Internal Reviewer (name/entity) | Caoimhe Hannigan (TCD); Alessandra Pascale (IBM) |

| Dissemination Level | |
|---------------------|---|
| Restricted | |
| Public | X |



Release History

| Version | Date | Status* | Revision Comments | Author |
|----------------|-------------|----------------|--------------------------------|---|
| V0.1 | | R | Initial Draft | Jonas Albert |
| V0.2 | | R | Value Networks added | Jonas Albert |
| V0.3 | | R | Business Model Scenarios added | Jonas Albert |
| V1.0 | | R | Internal Revision | Caoimhe Hannigan, Alessandra Pascale |

*Status of deliverables is indicated by abbreviations/terms as follows:

Complete (C): The final deliverable document is 100% completed, reviewed and authorised for release by the partner responsible for the deliverable or the WP leader.

Revised (R): The final released document has been modified/updated with new content.



Table of Contents

| | |
|---|-----------|
| Release History | 2 |
| List of Abbreviations | 4 |
| Executive Summary | 6 |
| 1 Introduction | 7 |
| 1.1 Value Networks and Business Modelling | 7 |
| 1.2 The ProACT Service Offering | 8 |
| 1.2.1 The ProACT Service Offering and its PaaS & SaaS characteristics | 8 |
| 1.2.2 ProACT's Service Offering as Digital Health Innovations..... | 10 |
| 1.3 The significance of Business Modelling for Digital Health innovations | 10 |
| 2 Methodology | 12 |
| 2.1 Value Network and Business Modelling Methodology | 12 |
| 3 Value Network Analysis | 15 |
| 3.1 Application of the Methodology | 15 |
| 3.2 Value Network for Belgium..... | 16 |
| 3.3 Value Network for Ireland..... | 19 |
| 3.4 Value Network for Italy | 22 |
| 4 Business Model Scenarios per Trial-Site country | 24 |
| 4.1 General Considerations regarding the Business Model Scenarios..... | 24 |
| 4.2 Belgium | 25 |
| 4.2.1 Business-Model Scenarios..... | 25 |
| 4.3 Ireland | 30 |
| 4.3.1 Business-Model Scenarios..... | 30 |
| 4.4 Italy | 36 |
| 4.4.1 Business-Model Scenarios..... | 36 |
| 5 Bibliography | 41 |
| Disclaimer | 43 |



List of Abbreviations

| | |
|-------|---|
| ASL | Aziende Sanitarie Locali |
| HSE | Health Service Executive |
| NHSS | Nursing Homes Support Scheme |
| NTPF | National Treatment Purchase Fund |
| PaaS | Platform as a Service |
| PCRS | Primary Care Reimbursement Service |
| PwMs | Persons with Multimorbidity |
| RIZIV | Rijksinstituut voor ziekte- en invaliditeitsverzekering |
| SaaS | Software as a Service |
| SSN | Servizio Sanitario Nazionale |



List of Figures

| | |
|--|----|
| Figure 1: Value Network Belgium | 18 |
| Figure 2: Value Network Ireland | 20 |
| Figure 3: Value Network Italy | 23 |
| Figure 4: Belgium Business Model 1 | 26 |
| Figure 5: Belgium Business Model 2 | 28 |
| Figure 6: Ireland Business Model 1 | 31 |
| Figure 7: Ireland Business Model 2 | 33 |
| Figure 8: Ireland Business Model 3 | 35 |
| Figure 9: Italy Business Model 1 | 37 |
| Figure 10: Business Model Italy 2 | 39 |

List of Tables

| | |
|--|----|
| Table 1: Stakeholder Analysis Categories | 14 |
|--|----|



Executive Summary

The purpose of this deliverable is to define the ProACT Value Networks and to identify the key stakeholders within these networks, the role they fulfil, and how they are interconnected. To achieve this, the deliverable illustrates a set of different Value Networks within each of the ProACT trial-site countries and formulates the resulting implications for the exploitation of ProACT. Business Model Scenarios are of special interest in this case. In addition, the deliverable provides an overview of the logic behind Value Networks and Business Models and explains how both are connected, as well as why both are integral to defining the role of ProACT in a healthcare system.

In order to analyse Value Networks and different Business Model scenarios for ProACT, a service offering has to be defined that reflects the ambitions of ProACT. Given that the ProACT system is still in a development and prototyping phase, this service offering represents a vision for the ProACT system as a product, and may not necessarily be equivalent to the current state regarding ProACT development. In this case, the ProACT “Platform as a Service” (PaaS) and “Software as a Service” (SaaS) components were drafted in order to provide a base, upon which the analysis of Value Networks and Business Models could take place.

The novel Jonas methodology from Albert & Auwermeulen (2017) was selected to guide the exploitation planning tailored to Business Model generation for Digital Health innovations, while being closely linked to Value Networks. This allowed for transformation of insights from the Value Network Analysis directly into Business Model scenarios.

In this deliverable, the preliminary definition of the ProACT service offering is established based on the findings from WP1, WP2 and WP3. These outcomes were used to construct the actual Value Networks for every trial site country with implications for the exploitation options for ProACT in the respective member state. The insights from this Analysis will be used to draft Business Model scenarios for ProACT, which will provide the baseline consideration for all further exploitation efforts. These Business Model scenarios will be further refined in the next iteration of this deliverable (M40), based on our understanding of main PoC trial outcomes (including final system development) and interaction with relevant health system stakeholders in each trial site region.



1 Introduction

1.1 Value Networks and Business Modelling

Value Networks are theoretical constructs that show the flows of value inside a network of stakeholders in a certain market or an otherwise defined environment. They were originally developed to substitute the concept of the “Value Chain”, which was deemed no longer capable of describing more complex economic environments such as digital markets (Peppard & Rylander 2006). Value Networks usually consist of stakeholders that are dedicated to certain business roles, and feature connections that illustrate the flow of value in the form of services, payments and other streams between the different business roles. The overall goal is to show the creation and capture of value as a result of a networked effort, as opposed to the linear value adding process that is described within a value chain (Ballon 2007).

The terms ‘Business Model’ and Business ‘Modelling’ have been increasingly discussed in scientific literature relating to the commercialisation of innovative ideas and research projects in the last 15 years, bringing more and more attention to their use and application (Wirtz et al., 2016). Business Models are structured management tools, which are widely acknowledged to have a substantial impact on the success of a company, whereas the process of constructing a Business Model and determining its validity is called Business Modelling. The purpose of Business Modelling is to determine how an actor in a market environment creates and captures value (Magretta, 2002). In order to find market applications and create socio-economic value through Digital Health innovations, Business Modelling appears to be an effective tool that has the power to alleviate the complex issues innovators face when trying to enter health care market environments. As progress in Business Modelling has not caught up with the rapidly advancing technological developments in the Digital Health space, novel strategic approaches to develop new models are of the utmost importance. In order to succeed, most Digital Health innovations need to identify diverse streams of added value that drive them and generate revenue, involve a wide range of business-enabling stakeholders, adapt go-to-market strategies to market-specific regulations and combine all necessary information into a structured concept (Limburg et al., 2011).

As Business Models are primarily concerned with the capture of value, there is an inherent connection to Value Networks. Understanding the Value Network present in a certain market enables conclusions regarding the value generation and value capture of an innovative product or service that is introduced into the analysed environment.

The purpose of this deliverable is to construct Value Networks for each ProACT trial site country (Ireland, Belgium and Italy) and then generate Business Model scenarios for each environment with the intent of guiding ProACT exploitation efforts. As creating sustainable Business Models is the ultimate goal of the efforts in WP6, a methodology that incorporates the logic of Value Networks for creating different Business Models has been chosen. This deliverable will therefore serve as an initial exploration of different Business Model



scenarios, in order to lay the foundation for further investigation of the best approaches for exploitation of ProACT.

1.2 The ProACT Service Offering

1.2.1 The ProACT Service Offering and its PaaS & SaaS characteristics

Before being able to delineate relevant Value Networks as well as make statements regarding exploitation, the scope of ProACT's offering has to be established. As ProACT is defined to feature a "Platform as a Service" (PaaS) and "Software as a Service" (SaaS) offering, a general definition of the terms PaaS and SaaS will be provided. In addition, there will be clarifications regarding adjustments made to the meaning of these terms to fit within the scope of ProACT. Afterwards a definition of the vision regarding the ProACT service offering will be provided. It is important to note that this chapter represents a vision for ProACT rather than the development status at present.

Software as a Service (SaaS) describes a cloud-based software offering that provides a consumer with the capability to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings (Grance & Mell 2011).

Platform as a Service (PaaS) represents a cloud-based software offering that provides a consumer with the capability to deploy consumer-created or acquired applications onto a cloud infrastructure. These applications are created using programming languages, libraries, services, and tools supported by the same provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment (Grance & Mell 2011).

In order to assess the appropriateness of both definitions for ProACT we will present the current vision regarding the capabilities of the final ProACT hardware and software offering, forming the ProACT Service. It is important to note that this is an initial overview based on M1-17 project outcomes and current development of the system to date, which will be further refined over the course of the project. Particular attention has been paid to outputs from WP2 and WP3 dealing with the technological developments of ProACT.

ProACT System Overview

The ProACT system will consist of the following parts (cf. D2.1):

- A cloud-based storage and analytics platform (InterACT)
- A source-agnostic data collection system (CABIE)
- A kit of home-based healthcare support tools including novel and "off-shelf" measurement and sensing devices.



- A suite of end-user applications and support tools (CareApps)
- Innovative analytics to support person self-management (CareAnalytics)
- The capability to enable 3rd party software development via an open API

As the initial pre-trial technology selection will be made in M24 (D2.5 Part B) and final selection in M39 (D2.5 Part C) respectively, any technologies referred to in this document should be considered provisional. Connecting the technologies (and aggregating data) within the ProACT system will be CABIE, which will relay data to and from the InterACT Cloud and associated Care Analytics (please see D3.4 for an in-depth description) as outlined in Figure 1 below:

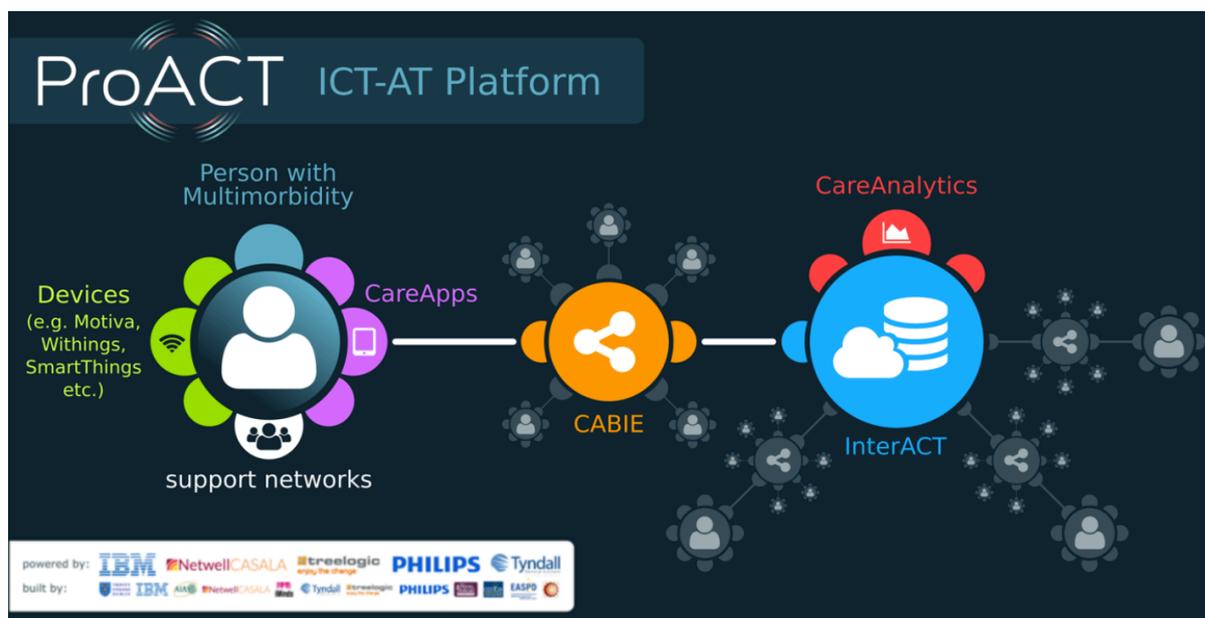


Figure 1: Overview of the ProACT System

All devices and CareApps will be directly provided by ProACT. The current selection to be provided include those that measure health and wellbeing (e.g. heart rate, activity levels, sleep, weight and blood pressure, please see D2.5 for an in-depth overview).

CareApps for persons with multimorbidity (PwM) and their support networks (or actors) will have the capability to provide visualized feedback from the data collected by ProACT devices. This includes the ability to provide self-management support via the provision of educational content and feedback to self-report questions. In addition, CareApps may be customised based on the personal preferences of the PwM, providing the individual with full control over which data is sent to their support actors (e.g. informal and formal carers).

The capabilities of the ProACT Software and ProACT devices combined form the ProACT Service Offering.

As can be seen from the previous description, ProACT provides a SaaS solution quite close to the original definition: A cloud-based service, which enables consumers to use provided CareApps via different access options.

The PaaS model is also applicable to ProACT on the basis that the system provides an open API for developers to provide apps based on the ProACT infrastructure. Therefore we can define PaaS as ProACT devices and software providing a platform to enable the use of the ProACT SaaS components while giving users and other parties the option to add other new devices and CareApps via the open API component.

1.2.2 ProACT's Service Offering as a Digital Health Innovation

Classifying something as being part of “Digital Health”, means that a service or a product is utilizing digital technology at its core to reduce inefficiencies, improve access, reduce costs, or increase quality for health providers and/or health-related stakeholders. In addition, Digital Health services or products aim to make medicine administration more personalized for patients and allow individuals to better track and manage their health (FDA, 2017).

ProACT's intended benefits cover most of these core principles, and we therefore define ProACT as a Digital Health innovation. This is important in terms of terminology, as literature regarding analysis and exploitation of Digital Health Innovation will be used throughout this deliverable.

1.3 The significance of Business Modelling for Digital Health innovations

There are several identified advantages of Digital Health innovations, including enhanced means of communication, data sharing, quality enrichment of services and increased effectiveness of service delivery. These advantages have made Digital Health related innovations the target of numerous accelerator programs, government initiatives and private investments (Eysenbach, 2008; Popescu, 2016). In order to support the realization and market-application of Digital Health innovations, Business Modelling has been identified as a tool of great importance. It can be attributed with the development of an innovation and its successful implementation on the market. The unique characteristics of Digital Health innovations are that they often rely on a large and diverse number of stakeholders to function sustainably while at the same time demanding a flawless implementation within the targeted market (van Limburg et al., 2011; AbuKhoussa et al., 2012; Heerden et al., 2012).

Digital Health innovations need to identify the added value that drives them and generates revenue. This value creation usually involves a wide range of business-enabling stakeholders as well as significant effort around adapting go-to-market strategies to the market-specific regulations by Digital Health innovations (van Limburg et al., 2011). According to Parente (2000), a Business Model identifies the market barriers that digital companies must overcome and provides perspective on opportunities for building an infrastructure that is capable of delivering both at private and at public levels.



A major flaw in current Digital Health innovation is that Business Model construction occurs post digital innovation development, rather than integrating Business Modelling in the development process (Van Limburg et al, 2011). This is primarily due to the complexity of health care innovation and difficulty of innovating due to the complex, multi-stakeholder healthcare landscape (Herzlinger, 2006). According to Burns (2012), the business of health care differs from other businesses radically on the level of value chains, or respectively Value Networks. In a traditional production model, a value chain links raw materials, manufacturers, distributors and end consumers. In the health care sector this is more complex as there are often multiple key sets of actors and several mediators to modify and redirect value flows. Key actors can be categorised according to individuals and organizations that purchase health care, provide health care and produce health care products (Burns, 2012). Mediators are those firms or organizations that finance health care and those who distribute healthcare. Other key difficulties related to innovation in the health care industry are the unique/differing national funding mechanisms (including the fragmentation of stakeholder groups and different reimbursement models), decoupled buyer/user decisions and the strong regulatory framework for technology deployment (Hwang and Christensen, 2008; Herzlinger, 2006).

As such there is need for a more nuanced vision of Digital Health Business Modelling, where the above specifics of the industry are taken into account throughout the development process and not simply at the end. This standpoint is also building upon Van Limburg et al.'s (2011) findings that building a Business Model for Digital Health should be an iterative process, integrated in the product development phase. This approach is at the forefront of ProACT's co-design methodologies and iterative, action research, trial design.

Overall Business Model methods for Digital Health innovation are in their infancy, with the majority of those deployed based on generic approaches. Today, we perceive Osterwalder's (2010) Business Model Canvas to be the most prevalent generic Business Model approach applied. Although frequently used by Digital Health entrepreneurs, it can be reasoned that this model has significant limitations as it does not take into account the intricacies of the health sector such as country-specific regulation, third party payer insurance systems, decoupled value creation and complex stakeholder cost and revenue sharing situations. Ridley's Model H¹ (2014) represents an attempt to modify Osterwalder's Business Model Canvas to a modular approach tailored to the (digital) health industry. Although this approach made the method more domain-specific it still uses the same rationale of pre-made categories and strict classification of actors, again presenting limitations to the diversity of situations facing Digital Health innovators seeking to deploy new technologies within varying EU and international healthcare systems.

Albert & Auwermeulen (2017) propose the first Business Modelling approach that is dedicated to the Digital Health domain, which alleviates the identified weaknesses in other approaches. In order to generate valid Business Model insights for ProACT, the Albert &

¹ No direct publication. Management Tool found on imaginego.com/modelh/



Auwermeulen (2017) Business Model approach was chosen as methodology for this Deliverable and is discussed in detail in the section below.

2 Methodology

The goal of this deliverable is to construct Value Networks for the ProACT target trial site regions, to help produce sustainable Business Models for deployment at these national levels. A second outcome of this will be to provide policy and regulatory guidance/recommendations at a European level to facilitate how ProACT may in future launch in the EU-wide health market. In this section, we will initially focus on our approach to the creation of the Business Models and construction of the Value Networks.

2.1 Developing the ProaCT Business Model(s)

To deliver this an approach was chosen that utilizes the concept of Value Networks and generates Business Models using the same logic and visual language regardless of national context. The approach from Albert & Auwermeulen (2017) is a recent Business Modelling methodology that supports this, as it is tailored towards creating Digital Health Business Models in complex environments, involving numerous stakeholders and mapping the relationships between them. The approach alleviates the severe weaknesses (as outlined in Section 1.3) that other current approaches such as the Osterwalder Business Model Canvas show when applied in the domain of health or Digital Health across multiple regions (Albert & Auwermeulen 2017).

The Albert & Auwermeulen (2017) approach is based on the concept of selecting and analysing stakeholders in a pre-defined market environment. Stakeholder theory has its origins in 1984. Freeman defined stakeholders as “any group or individual who can affect or is affected by the achievement of the organization’s objectives” (Hannan and Freeman, 1984). In the development and deployment of projects (including Digital Health), identifying and understanding stakeholder engagement is seen as highly important (Morris et al., 2006; Winter et al., 2006).

The Model from Albert & Auwermeulen (2017) is organized in a step-by-step fashion. It is tailored to work around an innovative product or service, henceforth called “innovation”. The core of the approach is comprised of the stakeholder information-categories. These categories are labelled as: **Understand, Scope, Environment, Define Stakeholders, Investigate Stakeholders** and **Assemble**.

These categories provide the means of thoroughly researching each identified stakeholder with regards to their function, revenue structure, decision making, experienced changes through the introduction of the innovation, willingness to pay and willingness to contribute. Each category features a set of core-questions. The categories represent the means to properly assess the role of a stakeholder in a potential Business Model as well as what the prerequisites are for fulfilling this role. Below we discuss these categories in depth.



Understand

The initial challenge is to thoroughly understand and define what the core innovation is that is intended to be brought to the market. The key questions to answer in this step are: What added value is the innovation intended to give? Who is the target-population that the innovation will be used by? And who is anticipated to gain added value from the innovation?

Scope

After specifying the innovation with the added value initially defined, the approach demands a scoping of suitable target markets, which usually means picking target-countries. There are cases when a further sub-segmentation (e.g. regional markets) may also be more appropriate. Scoping target segments has to be determined for each new innovation separately. It is crucial to clarify how health care is organized in each respective target-market so Business Models can be adjusted accordingly based upon stakeholders input. It is also importance to present a first assessment as to how and where the innovation is envisioned to be deployed (e.g. Hospital, Nursing Home, Consumer device etc.). Criteria for choosing a country may be based on: Health-specific regulations favouring the introduction of the innovation or a similar health system to countries where the innovation is already deployed.

Key questions to answer in this step are: In which environment is the innovation intended to be deployed? In which country/countries is the innovation intended to be launched? Within ProACT the pilot-countries are our designated first target-countries.

Environment

In this step, a systematic review of all potentially relevant stakeholders in the targeted environment, consisting of market and country, is provided. This should include health-services and health-governance related stakeholders as well as non-health stakeholders if they are deemed crucial to the success of the innovation. In addition, there should be an overview of how the provision of health care works in the targeted environment, as well as which regulations/laws could impact potential Business Models. Creating Value Networks for target markets is one of the best ways to describe and visualize target environments. Using a methodology for their construction such as that described by Ballon (2007) is recommended, but other approaches are anticipated to work as well. Key questions for this step are: How is health (care) organized in the target environment? How do reimbursements work? Which stakeholders in the target environment could be important for the innovation? Which regulations/policies are likely to have an impact on the deployment of the innovation?

This step of the methodology is the most extensively featured in this deliverable as it is reflected by the Value Networks of the ProACT pilot countries.

Define Stakeholders

In order to prepare a shortlist of stakeholders for in-depth analysis, this step incorporates narrowing down stakeholders introduced in the previous step. The knowledge gathered in the "Environment"-segment is hereby used to define the stakeholders deemed necessary for the innovation to be brought to market and to generate revenue. Key questions in order to select the stakeholders are: Which stakeholders will have to be interacted with in order to register the innovation or apply for eligibility for reimbursement? Which stakeholders will use/be in contact with the innovation? Which stakeholders are critical showstoppers for the innovation to be implemented? Which stakeholders' cooperation is anticipated to be needed in order for the innovation to work as intended?



The ideas around which stakeholders to involve in the final Business Model scenarios were taken from the extensive Stakeholder Analysis conducted in D1.2 as well as from the results of the Value Network Analysis conducted in this deliverable.

Investigate Stakeholders

The investigation of the shortlisted stakeholders is the core-piece of the approach. As shown in Table 1, each stakeholder selected in the previous step is analysed regarding function, revenue structure, decision-making, and situation with and without the introduction of the innovation, willingness to pay and willingness to cooperate.

It is important to note that not necessarily all of the categories have to be filled out for every stakeholder, as some might not make sense. For example, when analysing a public agency that determines which services are eligible for reimbursement, it is highly unlikely that willingness to pay will play a role, if the organization is not the reimbursing actor in the respective health system.

In order to generate the initial Business Model scenarios for ProACT, assumptions regarding the stakeholders were made based on existing insights and expert opinions inside and outside the consortium from the extensive care pathway and stakeholder analysis made in D1.1 and D1.2 respectively. A full-fledged analysis incorporating this step will be conducted in the next version of this deliverable at M40, not only incorporating the knowledge gathered in WP1 but also additional insight gathered from the trials (WP5).

Table 1: Stakeholder Analysis Categories

| Analysed Category | Key-Question |
|----------------------------------|--|
| Function | What are general actions a stakeholder performs in the target market? What is the potential function in interaction with the innovation? |
| Revenue Structure | How does the stakeholder generate revenue? What type of revenue does the stakeholder generate? |
| Decision Making | How autonomous is the stakeholder in making business-related decisions? What are they based on? What are specific decision-making procedures? |
| Situation without the Innovation | What is the status quo in current operations for this stakeholder without the innovation? |
| Situation with Innovation | What changes will occur for the stakeholder with the introduction of the innovation? |
| Willingness to Pay | Under which circumstances is the stakeholder willing to pay in general? What part(s) of the innovation is the stakeholder willing to pay for? |
| Willingness to Contribute | Under which circumstances is the stakeholder willing to cooperate in general with the innovation? What are the prerequisites for the stakeholder to contribute to the Business Model? |



Assemble

The final step of the approach consists of drawing the conclusions from the previously gathered and structured information. Filling in the categories for every identified stakeholder allows combining of the results in a comprehensive stakeholder databank. This step is the most variable in the approach, heavily dependent on the nature of the innovation. The assembling of a Business Model from the stakeholder databank is based around the idea that every stakeholder has certain prerequisites to fulfil an envisioned role in the final Business Model. As it is assumed that revenue generation is the main purpose of deploying the innovation, the assembling starts with stakeholders that have an identified willingness to pay. It is then analysed what the prerequisites for the identified willingness to pay are. In our experience in Digital Health innovation, “unlocking” willingness to pay usually involves contribution from other stakeholders, which then leads to a cascade of dependencies of stakeholder cooperation. After all necessary prerequisites for stakeholder contribution (non-monetary and monetary) are defined, an informed decision can be made with regards to which willingness to pay areas should be exploited and which stakeholder configuration would be the most feasible. The same goes for identified crucial non-monetary contributions, approached by identified willingness to contribute and their prerequisites.

Key Questions to ask for this step are: Which stakeholders are possible revenue generators? What are the prerequisites for these stakeholders to provide revenue for the company deploying the innovation? Which stakeholders are contributing critical non-revenue generating functions? What are the prerequisites for these stakeholders in order to perform these functions? The result of answering the key-questions and assembling the stakeholders is a tangible to-do list and a stakeholder configuration that is tailored to the targeted environment for the innovation.

Outcomes for this step were determined using a combination of desk research, expert stakeholder evaluations from WP1 as well as the outcomes from Value Network Analysis described below and an interactive workshop with the ProACT consortium members at the consortium meeting in January 2017. As this deliverable represents the first iteration of effort around Business Models and Value Networks, the “Assemble” step will be comprehensively conducted in the next phase of the project as the implementation of the ProACT system in the main trials is finalised. At this point potential Business Model scenarios were selected and will be discussed later in this deliverable to provide a baseline for exploitation options.

3 Value Network Analysis

3.1 Application of the Methodology

The methodologies described in Section 2 provide the framework for all Business Modelling activities in ProACT, also incorporating Value Network related methodologies such as the approach from Ballon (2007). The main goal in this deliverable is to provide an overview of the different target environments for ProACT and their respective Value Networks as well as different Business Model scenarios for ProACT. The construction of the Value Networks presented in the following sections are mainly based on steps 1 to 3 (Understand, Scope, Environment) of the approach from Albert & Auwermeulen (2017) as outlined in Section 2.



Generation of the Value Networks was strongly informed by consulting the comprehensive stakeholder mapping and user requirements, undertaken in D1.1 and D1.2. The content from these deliverables contributed to a determination of the environment ProACT is aimed to be introduced to in each of the trial site regions. The existing information was complemented with relevant national literature on each health system in which ProACT will be deployed. The scope regarding the Value Networks was set according to the trial sites of ProACT as stated in the Grant Agreement, as these countries are the most likely to be targeted initially when it comes to the exploitation of ProACT. As the efforts around WP6 progress further, we will determine the suitability of bringing ProACT to the wider EU market and report in the next update to this deliverable (M40).

The purpose of the Value Networks is to provide an overview of the most important stakeholders in the trial site countries' health systems and the value interactions between them. These networks will guide the construction of initial Business Model scenarios. The main source of information regarding the health systems besides D1.1 was the respective expertise inside the consortium and the "Healthcare Systems in Transition"- reports from 2009-2014 from the European Observatory for Health. The following reports were used as a main-source of information: Health Systems in Transition Vol. 12 No. 5 2010: Belgium (Gerkens 2010), Health Systems in Transition Vol.11 No. 4 2009: Ireland (McDavid 2009) and Health Systems in Transition Vol. 16 No. 4 2014: Italy (Ferré 2014). Additional information was also provided by the respective trial site partners on request throughout the development of this deliverable to ensure accuracy in approach.

3.2 Value Network for Belgium

The Belgian Value Network (Figure 1) is greatly influenced by the organisation of the Belgian Health System as a Social Health Insurance System (Bismarck system) with mandatory health insurance: Publicly controlled health insurance funds provide insurance to the whole population. If an individual makes use of a health service, they are either later reimbursed for the money they paid or, as is mostly the case in Belgium, they do not have to provide payment as the health service providing entity can directly file for reimbursement with the responsible public insurance.

The majority of the system is tax-financed, meaning that the population provides tax-based income to the federal government, which in turn finances the "Rijksinstituut voor ziekte- en invaliditeitsverzekering" (RIZIV), a state agency that is tasked to coordinate and govern all matters around health insurance and invalidity. The RIZIV governs which services and drugs are eligible for reimbursement by public insurance funds, thereby directing reimbursement spending in the whole country. The RIZIV also distributes the tax-based money between all public insurers via prospective budgeting. In addition to the tax-financed budgets, the public insurance funds are also provided with revenue through mandatory yearly fees, paid by every insured individual.

There also exists private health insurance in Belgium, which is optional. These types of insurers offer both complementary and substitutional health insurance. Complementary insurance only incorporates non-medical advantages such as single-rooms for hospital inpatient treatment, shorter waiting times and non-medically relevant improvements to

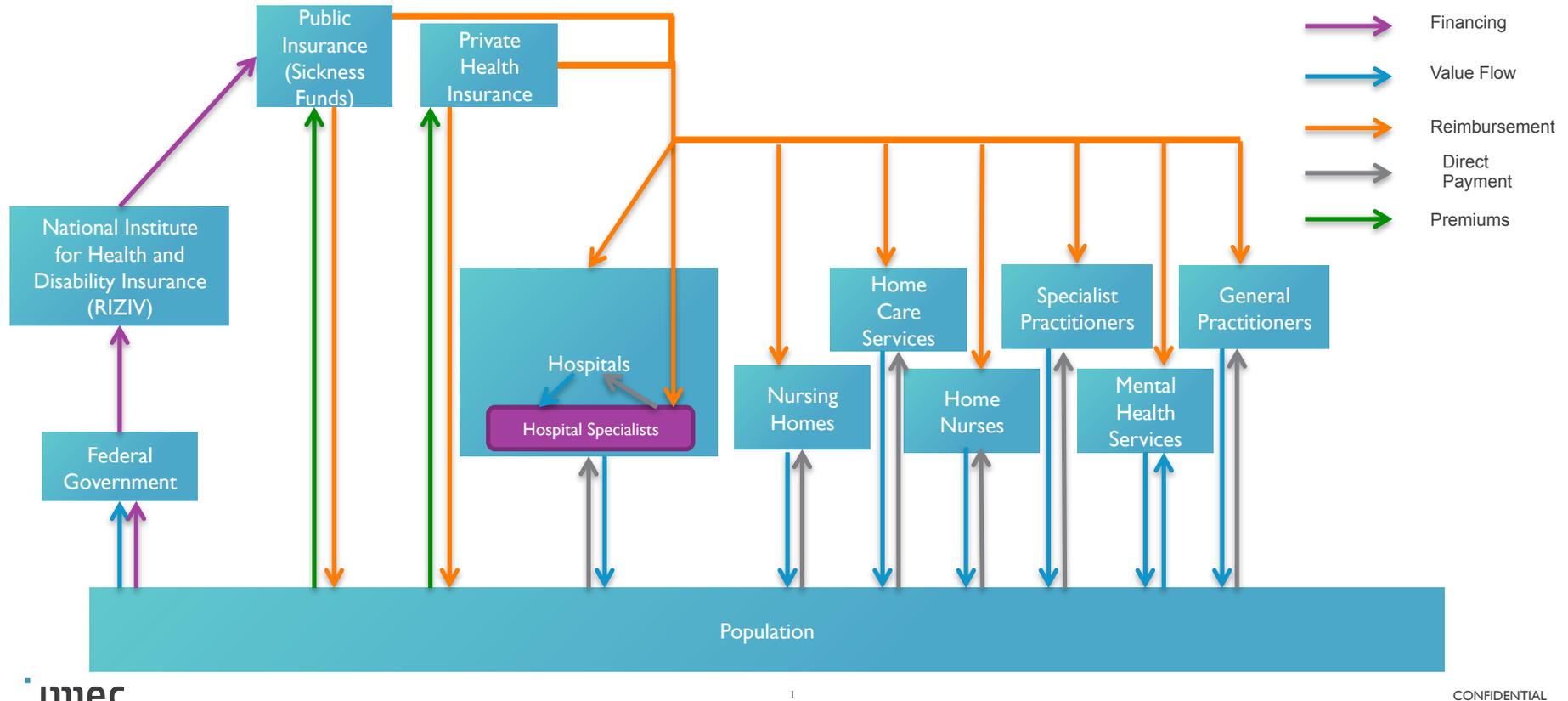


reimbursed treatments e.g. see-through braces for teeth. In case of substitutional private health insurance, the private insurer takes over all responsibilities from the public insurer and reimburses health expenses after the insured individuals paid the health service provider. It is also common that employees have private complementary insurance via their employers that only replaces the inpatient-reimbursement from the public insurance.

Reimbursement is handled on the basis of “fee-per-service”, meaning that every extra service performed by a healthcare actor can be billed towards an insurance provider as long as it falls under scope of the official regulations or a respective private contract.



VALUE NETWORK BELGIUM



imec
Figure 2: Value Network Belgium

CONFIDENTIAL



Primary care in Belgium is mainly provided through GPs who operate in private practices. As there is no gatekeeping mechanism in place, Belgians could also technically receive primary care at any hospital, but this is not common practice, except for emergency cases. Secondary care in Belgium is provided through specialist physicians either operating from private practices or hospitals. Specialists operating from hospitals are only very rarely salaried (only in university hospitals) and usually receive a fee-for-service compensation directly from the respective insurance and pay the hospital for the resources they use. Although Belgian hospitals have many different types of ownership, the Value Network relevant role of them does not change depending on this fact.

Nursing homes and home care are also financed through the Belgian social health insurance. Nursing homes can have a wide variety of owners both coming from public and private sources. In some cases, they are also providing home care, whereas the majority of home care providers are independent and privately organized. In the Belgian environment, independently working home care nurses are common, which creates another important stakeholder apart from the homecare service providers.

All Belgian health service providers usually charge a co-payment (except for chronically ill patients) for every visit for outpatient treatment. For inpatient treatment or longer stays there are also cases of additional payments, these are however highly individual and depend on additional services requested and the insurance situation of the service-receiving individual.

As a result of building and investigating the Belgian Value Network we can derive the following conclusions that are relevant for exploitation of ProACT:

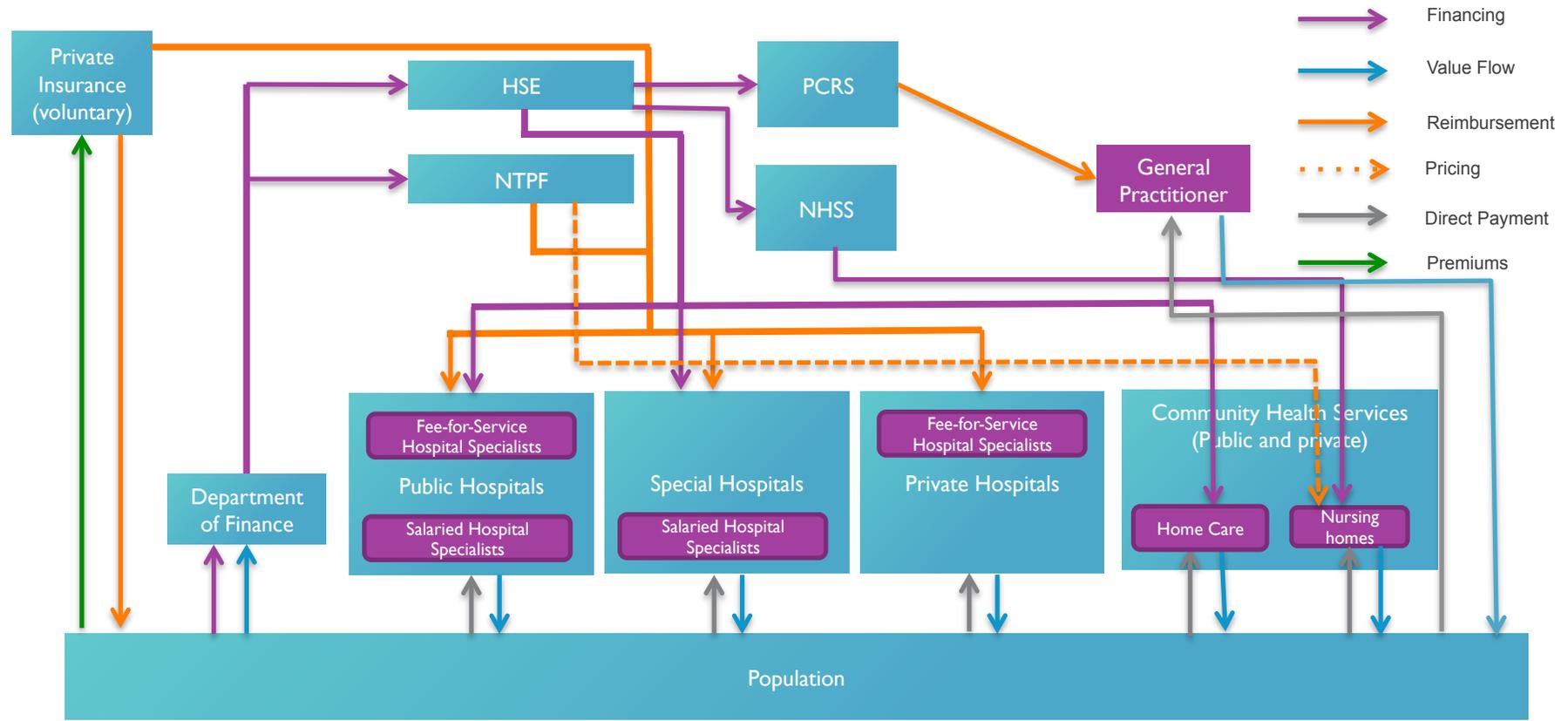
1. The RIZIV is the body to be convinced when any of the public providers should be payers.
2. Private insurers have significant potential to become payers for ProACT as they are capable of freely reimbursing any health-related spending and have payment channels for all types of institutions.
3. Due to the independent nature of the provision of primary and secondary care, incentives have to be given for any extra effort surrounding private practice physicians. If any health service provider has to spend extra time with ProACT as compared to normal operations, the costs would have to be met.
4. The fee-for-service environment makes it lucrative for certain healthcare providers to incorporate Digital Health innovations that increase their turnover with regards to billable services. This advantage can only be realized when the respective Digital Health innovation is reimbursed.

3.3 Value Network for Ireland

The Irish Value Network (Figure 2) is centred around the diverse public entities that are tasked with either directly financing and governing, or reimbursing, different health service providers. For the depiction in the Value Network, only the most important decision-makers were taken into account with regards to their relevance for enabling flow of revenue and reimbursement in potential exploitation scenarios



VALUE NETWORK IRELAND



imec

3

CONFIDENTIAL

Figure 3: Value Network Ireland



The Irish Health Care System is predominantly tax funded, although approximately half of the population is covered by voluntary health insurance. The Department of Finance is thereby responsible for distributing funds to the two main bodies: The HSE (Health Service Executive) and the NTPF (National Treatment Purchase Fund). The HSE is the main-financing body for almost all state-budgeted health service providers such as public hospitals, special hospitals and home-care providers. It also indirectly finances General Practitioners and nursing homes through the subsidiary public agencies NHSS (Nursing Homes Support Scheme) and PCRS (Primary Care Reimbursement Service). The vast majority of healthcare institutions are funded by this scheme, although being operated either by local authorities, or religious or lay boards of governors. The NTPF is a fund that can reimburse services in the whole country and even abroad in the UK in the case of excessive waiting times. It is also solely responsible for reimbursing services consumed in private hospitals, as well as providing pricing guidelines for nursing homes.

Private health insurance in Ireland is mainly comprised of providing extra services that are not of medical importance such as single beds in hospitals etc. In addition, private insurance also covers any out-of-pocket spending made by its insured population. Health insurance is non-mandatory.

Any medical personnel working in the publicly financed hospitals are salaried via the hospital funding, although medical personnel, especially physicians, can supplement their income with private activity. This private activity heeds from the separation of hospital beds into private and public beds, that separates capacity planning and reserves emergency capacity for directly reimbursed patients, either through the NTPF or through private insurances. The small amount of completely private hospitals usually employ their physicians on an independent basis as per fee-for-service. Every individual receiving treatment also has to make co-payments per service received. This is true for virtually every health service provided in Ireland.

Primary care is mainly provided through General Practitioners operating out of private practices that are reimbursed on a fee-per-service basis through the PCRS and source secondary revenue from out-of-pocket payments made by patients on a fee-per-service basis. Secondary care is only received via specialists in hospitals.

Home Care is mainly provided by a variety of private entities. It is directly regulated by the HSE and in some cases either also directly financed or privately paid, depending on the provider. Nursing and care homes on the other hand are, although privately operated by a multitude of private, religious and semi-public groups, primarily financed via the HSE while having to comply with the pricing restrictions set by the NTPF.

As a result of building and investigating the Irish Value Network we can derive the following conclusions that are relevant for exploitation:

1. The most important public body to convince of ProACT's effectiveness is the HSE, as it finances and governs the majority of relevant health care service providers that would have to use ProACT. The advantage of working with such a centralised stakeholder is that it allows for mass-deployment of a solution without being required to negotiate with every health care service provider.



2. Private hospitals seem to play a minor role in the Irish health system, and while probably the most easily approachable, they would most likely only be fit to be a smaller partner to gain momentum and traction on the market.
3. Private insurers have good potential to become payers for ProACT in the short term as they are capable of freely reimbursing any health-related spending, have payment channels for all types of institutions and have significant market impact in Ireland.
4. Other public players such as the PCRS, NHSS and NTPF are also important to communicate with in order to deploy ProACT in the public health system, although not as critical as the HSE.

3.4 Value Network for Italy

Italy's health-care system is a regionally organized National Health Service (Servizio Sanitario Nazionale, SSN) that provides universal coverage largely free of charge at the point of delivery, as outlined in the Value Network below (Figure 3). The Italian National Health System is organized at three levels: national, regional and local. At national level, the Italian parliament sets the objectives for public health and approves framework legislation, and the central government (Ministry of Health), supported by several specialized agencies, which set the fundamental principles and goals for public health, determining the core guaranteed benefit package for health services across the country based on allocated national funds to the regions.

The regional governments are responsible for planning, administration and practical delivery of health care services through the Local Health Trusts (Aziende Sanitarie Locali, ASL). At local level, the ASLs, which in turn are organized in districts, directly deliver public and community health services and primary care. Secondary and specialist health care services could be delivered directly by the ASLs or through public hospitals or accredited private providers. This setup is dictating the build-up of the Value Network as public players are strongly involved in the delivery of health and social services.

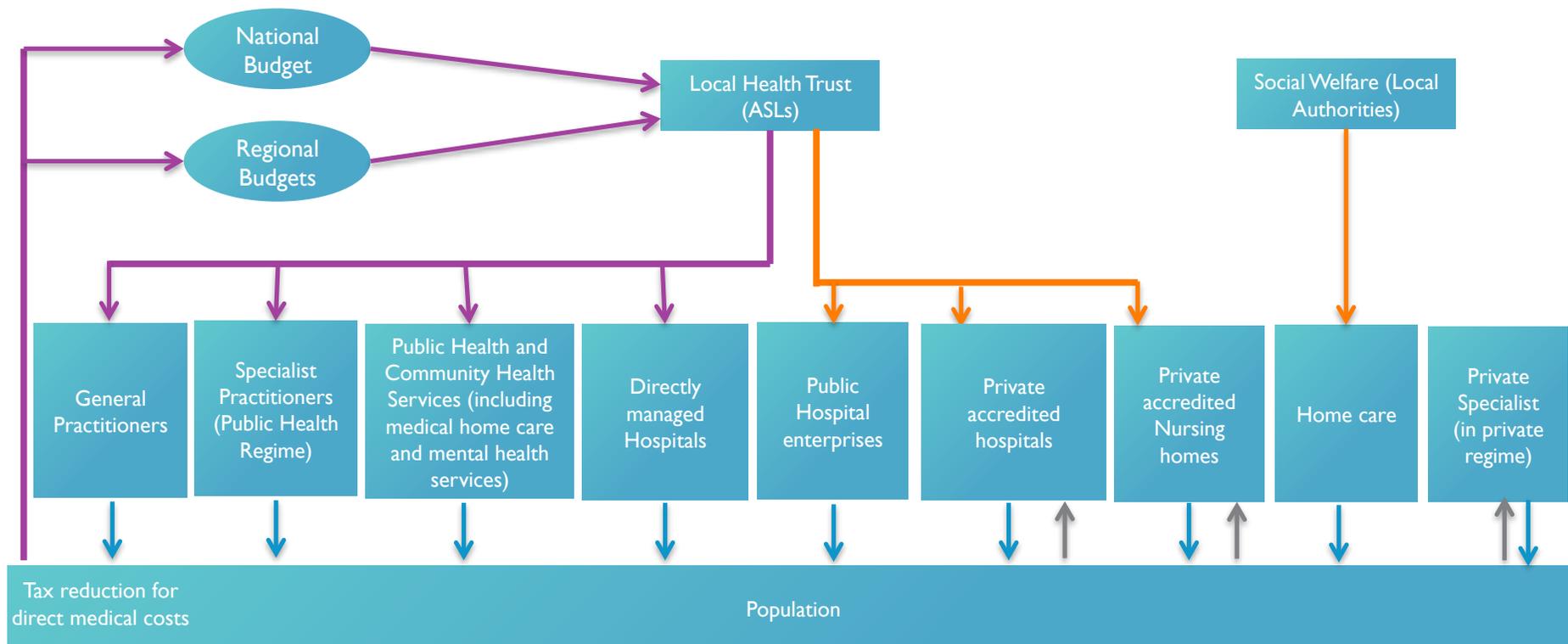
The system is almost exclusively tax-financed. Thereby, regional and national taxes are pooled and distributed between the different regional health authorities, according to a variety of established parameters.

The whole population is generally covered for health and social care costs, including inpatient and primary care, which are free at the point of use, with the exception of some services that require co-payments by the service user in relation to his/her financial capacity, which is determined by a specific calculation tool that takes both income and property into account, as well as family composition and other factors.

There are two main ways health service providers are financed by central and regional governments: (1) They are directly managed and budgeted through the ASLs such as general and specialist practitioners, directly managed hospitals and public health or community services. (2) They are reimbursed via an activity-based fee-for-service reimbursement regime.



VALUE NETWORK ITALY



imec

CONFIDENTIAL

Figure 4: Value Network Italy

Furthermore, both in health and social care the responsible statutory bodies work with subcontractors to effectively implement and deliver the services. This has led to the development of a large market of service providers that need to go to an accreditation process by the governing bodies before their services are financially covered by the public sector.

Primary care in Italy is exclusively provided through publicly financed General Practitioners. These practitioners can either operate from private practices or poly-clinics where they are integrated together with specialists. In general GP's in Italy fulfil a gatekeeping role for secondary care.

Secondary care is provided through specialist practitioners operating in private practices, community services, polyclinics or in public or private accredited hospitals. In parallel, there are a significant number of private players: private health and social care providers, entirely paid by the citizen, are sometimes preferred in order to avoid waiting lists and administrative burden.

Home care in Italy is either provided through the publicly financed community health services or privately organized home care (accredited or completely private).

Social care services are funded in combination by the federal government, the region and the Municipalities through general taxation. In long term care for patients with home care needs, the bulk of the cost are spent out of pocket. These costs are partially reimbursed by state grants and tax advantages. It is important to note that expensive long-term and home care in Italy has led to the development of a huge grey sector between formal and informal care which employs thousands of in-living personal assistants.

The situation for nursing homes in Italy is more regular, as they are predominately privately owned and reimbursed through the regional health authorities.

As a result of building and investigating the Italian Value Network we can derive the following conclusions that are relevant for exploitation of ProACT:

1. The Regional Health institutions are crucial when it comes to implementing ProACT with public financing support. Each ASL has a significant degree of freedom when it comes to providing healthcare, as such they are a key partner for the future exploitation of ProACT with a wide variety of health professionals.
2. The de-centralized provision of healthcare in Italy will most likely result in having to negotiate the implementation of ProACT with each region separately.

4 Business Model Scenarios per Trial-Site country

4.1 General considerations regarding the Business Model Scenarios

The Business Models were generated as a result of the Value Network mapping and analysis and a Business Model workshop conducted at the ProACT Cambridge Consortium



Meeting in Q1 (January) 2017. The construction of the Business Models was based on several assumptions that will have to be validated during the ProACT Proof of Concept and Transferability trials with all involved stakeholders. The scenarios presented in this deliverable are meant to form the baseline models for exploitation of ProACT in different environments and will significantly shape exploitation-relevant investigations during the trials.

All Business Models are constructed to be ProACT-centric regarding the mapped value streams. This means that there will be some value streams that are existing but not mapped in the visualisation of the Business Model scenario. However it is recognised that there are value-interactions between the health actors and the PwM, but in order to keep the visualisation readable and business focussed, these interactions were not explicitly displayed, although recognized with respect to the configuration of the Business Model.

The “ProACT”-player in the centre of all Business Model configurations is representing the (business)-entity that will provide and manage the ProACT services in the respective target countries. How this “ProACT”-player could look like, is discussed and delineated D6.8. For the Business Models, it is sufficient to understand this player as a company that sells, distributes and manages the ProACT service.

4.2 Belgium

4.2.1 Business-Model Scenarios

The first identified Business Model for the Belgian sector (Figure 4), derived from the Value Network Analysis (and internal as well as external expert discussion) incorporates the national social health insurance covering the cost of ProACT. There are two main monetary streams to be taken into account in these configurations: Reimbursement of caregivers and revenue towards ProACT. The revenue towards ProACT is most likely to be derived directly from the respective public insurer of the PwM and to be received in a pre-defined fee-per-service solution, based on the negotiations with the RIZIV in order to accept ProACT into the catalogue of reimbursed services. In addition, there is also the potential additional cost towards the care provider that is to be covered. This additional cost incorporates all extra effort ProACT causes medical/health professionals who use it (e.g. training on system use). This will for example include extra time to review collected data and to plan interventions based on the new knowledge that ProACT is providing. While of course ProACT aims at having the lightest footprint possible with regards to extra effort from the sides of professionals, the possibility of reimbursing (mainly spent time) this effort has to be incorporated into the Business Model considerations. In the case that ProACT generates more cost-savings than extra-effort, this stream can be ignored and it can be investigated if the cost-reduction is sufficient for opening up new revenue generating opportunities. It is envisaged that while there will be an initial period of required effort to become familiar with the system and its use, over time this would be reduced and PwM's, health professionals and associated actors would benefit from time saved in their management tasks due to quicker access to data and training around how best to manage the health and wellbeing of the PwM.



BELGIUM BUSINESS MODEL I

PUBLIC/PRIVATE HEALTH INSURANCE PAYS

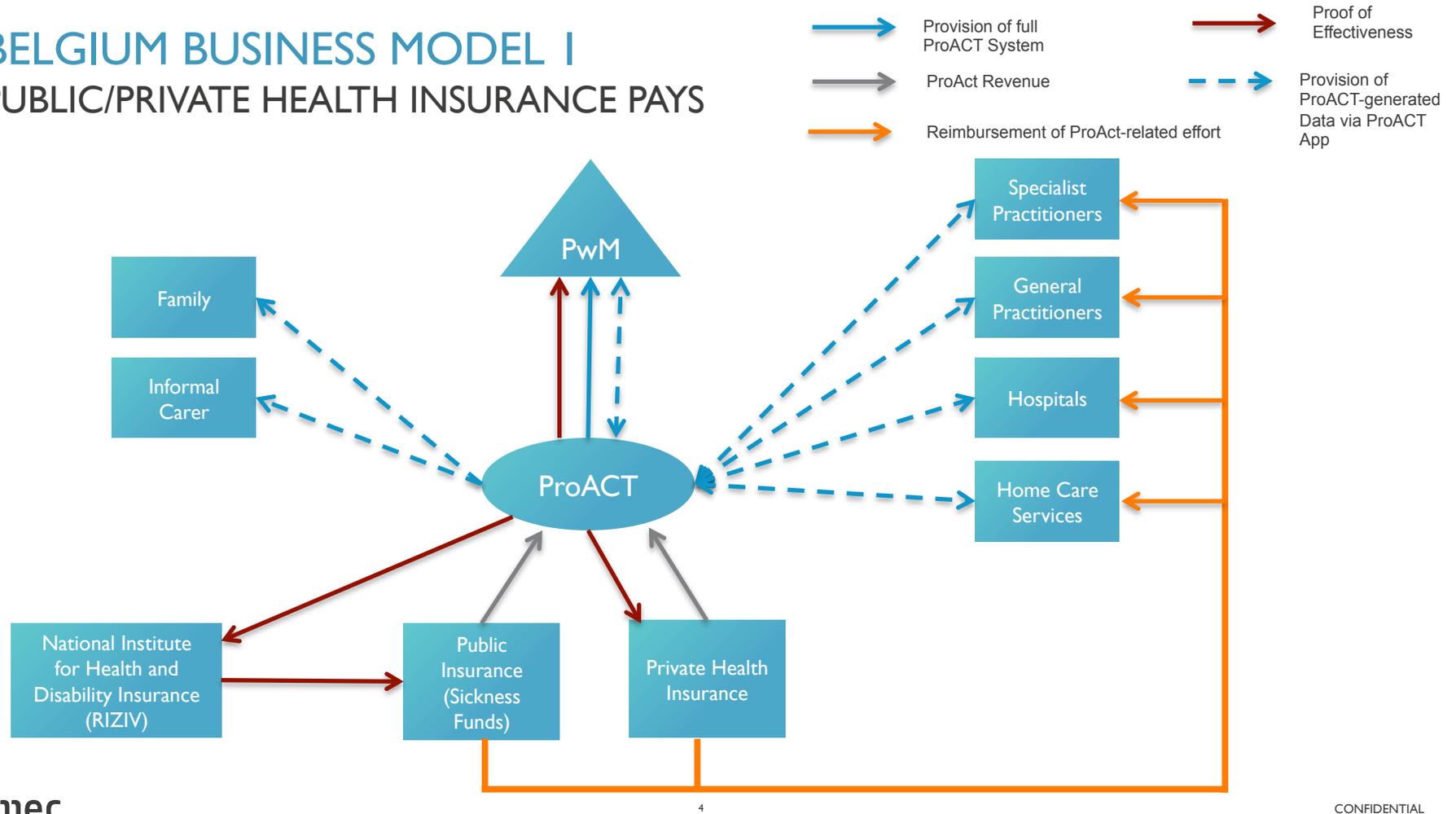


Figure 5: Belgium Business Model 1

CONFIDENTIAL



Proof of effectiveness has to be provided to three different entities: The RIZIV, the PwM and to private insurers. Proof of effectiveness in the Belgian case means different concrete things for all three affected stakeholders: The PwM has to be convinced that ProACT is worth using and brings additional value to their management and care, otherwise the individual will probably not make use of it, thereby making it impossible for ProACT to claim revenue. It can be argued that in most cases, the family and formal carer are also stakeholders to be convinced as they may influence the decision-making of the PwM. In order for the RIZIV to incorporate ProACT into its list of reimbursed services, a proof of effectiveness (including cost-effectiveness) has to be provided regarding the impact of ProACT on both individual and population health. While private health insurance will also need a similar proof of effectiveness as the RIZIV, it is expected to be more flexible with regards to individual contracting with ProACT, due to the higher amount of freedom in reimbursement of services.

ProACT is a data-driven innovation, hence the generation and distribution of data is one of the most important aspects, creating a significant part of ProACT's value proposition. The main data-generating stakeholder will be the PwM through self-assessment and measurements through the ProACT devices. This information will then be transferred to CABIE and InterACT for processing. The PwM will in turn receive visualized feedback regarding their data input, as well as potentially pushed information from the side of their care provider and family recognising that they linked in with the system to support the PwM. In an ideal scenario, all care providers themselves will have access to selected data, generated by the PwM, after it has been processed by ProACT system. Contextual data from the professionals themselves, such as measurements taken during appointments, could be for example fed into future iterations of ProACT, post the H2020 project phase and then redistributed to the designated recipient, which could be the PwM, another care provider and family and/or informal carer. Gathering data and making it available to a variety of stakeholders is one of the core-components of ProACT seen as valuable to most stakeholders involved. In Belgium, we also identified the desire from the side of (especially the private) insurances to receive health and lifestyle-related data from the PwM. We chose to not include this data stream in our initial Business Model as a conflict of interest between insurance and insured PwM could be foreseen. This however will be reviewed as the project progresses.

It is important in the analysis to capture a wide variety of care providers/support actors' interactions with the model due to the integrated care vision of ProACT. This is also anticipated to maximise the cost-saving potential of ProACT due to the exchange of data between a high number of caregivers, therefore increasing treatment outcome and decreasing unnecessary service utilization by the PwM.

As mentioned previously, the consideration that private health insurance will be willing to pay for ProACT is incorporated in this Business Model, as it is assumed that a proof of effectiveness (including cost-effectiveness) that is sufficiently strong enough to appeal to the RIZIV will also be attractive to private insurers. An argument can be made that the overall Business Model can be split in a "public only" and "private only" variation. Due to the situation in Belgium however, with private and public insurance often being intertwined or complementary, a combined model is deemed to be most appropriate.



BELGIUM BUSINESS MODEL II CONSUMER MODEL

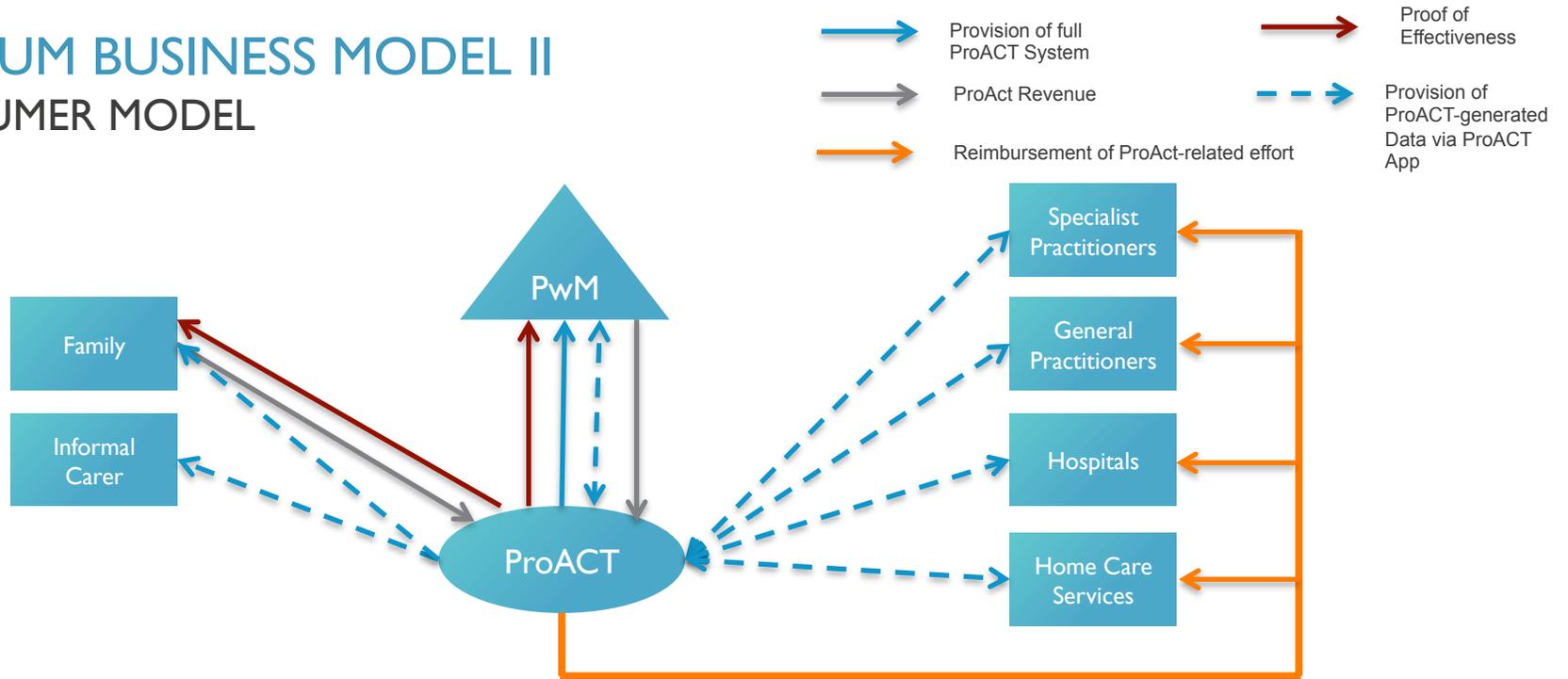


Figure 6: Belgium Business Model 2



The second scenario for the Belgian market (Figure 5) is a common Business Model archetype: The consumer model. In this model, the PwM is purchasing the ProACT service directly. In addition, it was also deemed plausible that there is a distinct willingness to pay from families who may provide ProACT to support their relative's self-management needs. Possible payment models here range from both parties paying a monthly fee, to payment per use of ProACT with all the possibilities in between. It is important to note that in this scenario, the proof of effectiveness towards the PwM is even more crucial than in the previous model, as ProACT does not only have to provide sufficient value towards the PwM to use it, but it also has to be perceived valuable enough for the PwM to pay for. We delineated that the family might be not only an important influencer in the PwM's life, but that a family member would also derive significant additional value from a related PwM's wellbeing (meaning that the family of a PwM experiences improved quality of life (QoL) correlated to improved PwM QoL). Therefore, the proof of effectiveness of ProACT has to be delivered in a way to the family of the PwM that they perceive the added value regarding improvement of the PwM's life, as well as potential added value towards their supporting role, such as increased insight into the health and wellbeing of the PwM or more information about how best to manage and/or support their relative's conditions.

Most problematic in this Business Model scenario for the Belgian environment is the integration of the different medical professionals. As already established in the previous Business Model scenario, it is highly likely that care providers on initial introduction of the system will spend extra time on ProACT as opposed to business as usual. At the same time the value of ProACT for the PwM increases with the number of care providers involved. However, with increased engagement with the system it is envisaged that health professionals will be able to accommodate it more effectively into their routine practice, potentially saving time with the PwMs, given the imminent access to the most up to date data about the PwMs health and wellbeing. In the consumer model scenario, the involved care providers would have to be reimbursed by ProACT for their extra effort on initial uptake. This could be then offset over time due to the added value of ProACT in reducing time and costs, for example increased efficiency by quicker access to patient data (e.g. time saved from accessing and reviewing paper based patient notes) or higher revenue through additional fees for service paid by clients willing to adopt the system.

Regarding data, the same implications apply as in the first Belgian Business Model scenario. Overall, the advantage of the consumer model is that it is easier to implement compared to the insurance-based model, as it does not require the lengthy process of negotiating with a public institution such as the RIZIV, while at the same time facing the disadvantage of lower demand for ProACT due to the fact that families and PwMs would have to pay for it by themselves.



4.3 Ireland

4.3.1 Business-Model Scenarios

The first Irish Business Model scenario (Figure 6) assumes that the Irish health authorities finance ProACT. Revenue in that case would be directly received from both the NTPF and the HSE. The NTPF is assumed to be the most important stakeholder with regards to enabling private health providers to be part of ProACT, whereas the HSE with its financing control over public providers is most likely to enable access to them.

Looking at the Irish Value Network and how the health system is organized, it is most likely that revenue in this scenario will be provided by either directly budgeting ProACT in exchange for providing the ProACT service towards a set amount of people or reimbursing ProACT for every PwM it provides its services to in regular intervals (monthly, yearly fees etc.) As in the Belgian example, pricing strategies are difficult to adjust when dealing with public authorities, which are usually bound by legal constraints regarding cost of care.



IRELAND BUSINESS MODEL I

PUBLIC HEALTH AUTHORITIES INCLUDE PROACT

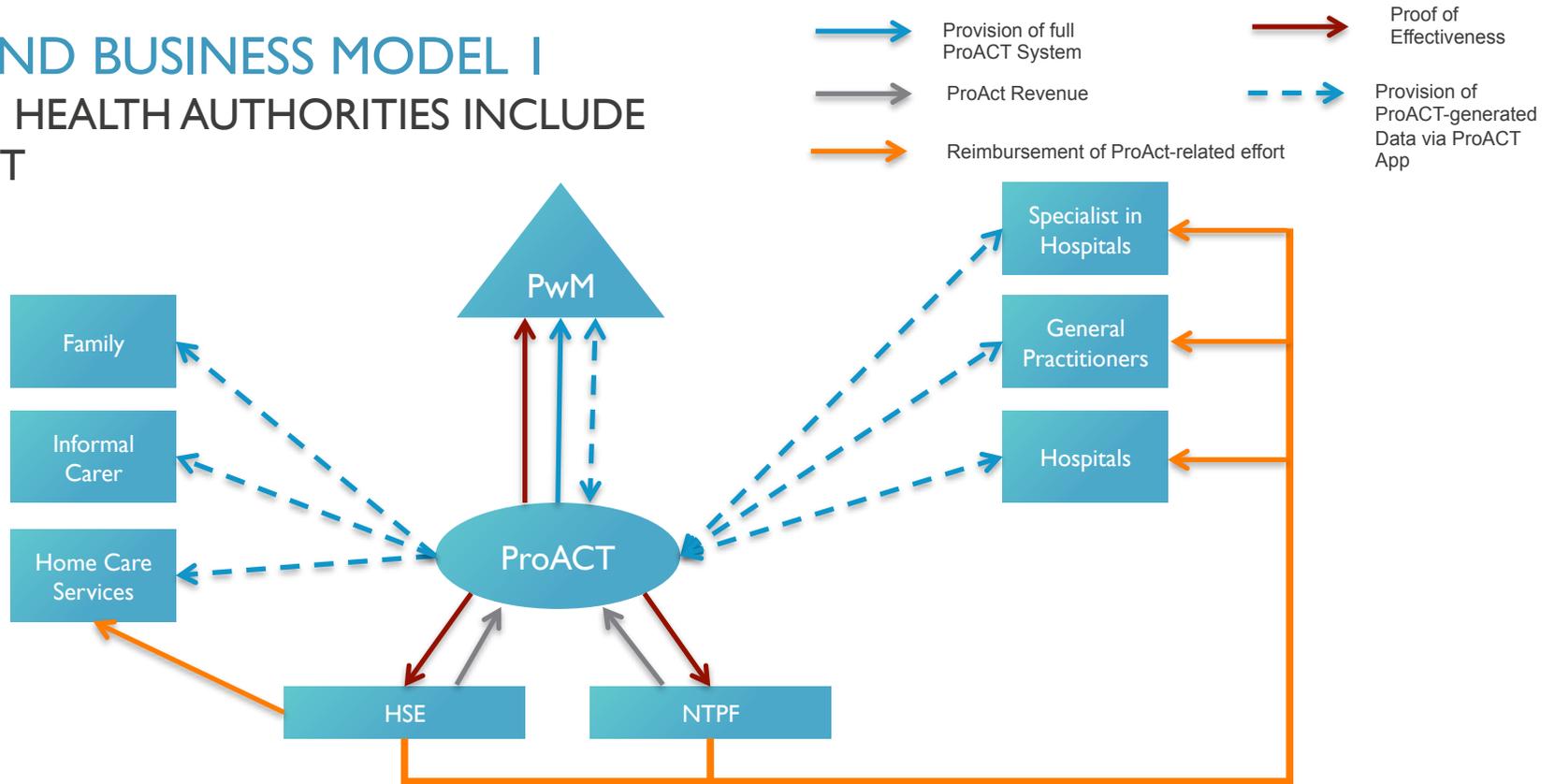


Figure 7: Ireland Business Model 1



Proof of effectiveness in this scenario has to be delivered to both the NTPF and the HSE in terms of public health value of ProACT. The rationale of proving effectiveness is expected to be similar to the situation with the RIZIV in Belgium. With the dual Irish system of direct financing and fee-for-service based reimbursement, it is of great importance to have both agencies convinced of the effectiveness of ProACT. Without the HSE, deployment of ProACT with directly financed care providers would likely be impossible. In addition it is to consider that only with cooperation of the NTPF, reimbursement is able to flow towards privately operated care providers, enabling them in turn to implement ProACT. Regarding proof of effectiveness towards the PwM, the same reasoning is applied as in the Belgian Business Models.

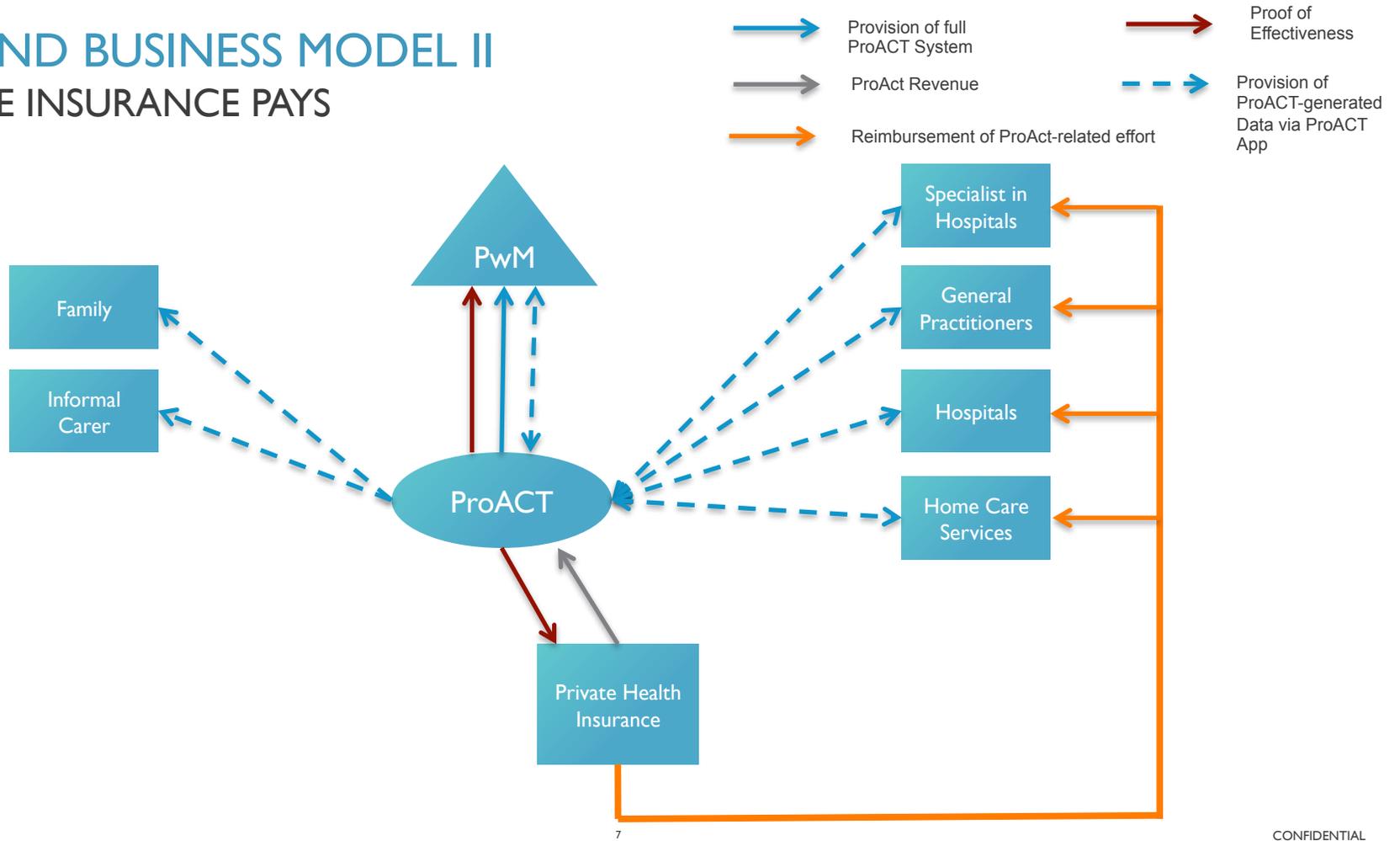
Data is sourced and distributed in the same way as described in the Belgian Business Models. One difference to consider might be that, due to the common financing, HSE-governed intuitions might be better connected than completely private ones. Also in the Irish case, involvement of care providers increases the value of ProACT. Regarding compliance and reimbursement of potential additional costs caused through ProACT, there are two scenarios to take into account: The publicly financed care providers are highly likely to be just tasked by the HSE to use ProACT if the HSE deems it valuable, with or without extra financing. In parallel to this, extra reimbursement for the private providers would have to come from NTPF, which would then be added to their cost regarding ProACT. As in the Belgian scenario, cooperation of care providers is crucial.

This initial Business Model configuration is the most desirable for Ireland, although probably not the easiest to achieve. Due to the split in private and public providers, the public financing system would have to accept ProACT in order to achieve maximum coverage.



IRELAND BUSINESS MODEL II

PRIVATE INSURANCE PAYS



imec
Figure 8: Ireland Business Model 2

CONFIDENTIAL

The second Irish Business Model Scenario (Figure 8) assumes that private health insurance, covering approximately 50% of the population, will reimburse the use of ProACT in Ireland including potential additional cost of ProACT towards the care providers. It is deemed most likely that the private health insurer in Ireland would reimburse ProACT per service provision per PwM. As with all other models that feature such a solution, the modalities of the reimbursement will have to be determined while further shaping ProACT.

Proof of effectiveness would have to be provided towards the PwM, as in every other scenario. Private health insurance is, similar to the situation in Belgium, deemed to have a lower threshold to implement innovative solutions as the insurance providers are in competition with each other and are often at times covering expenses that are not included by the public health schemes. It is important to note that in this case, integrating publicly financed care providers into the scheme might be more difficult, as there is no pressure from the HSE or NTPF to use ProACT. At the same time, the extra cost of the private health insurance regarding the reimbursement of extra initial effort caused through ProACT has to be taken into account when negotiating with private health insurers (this is similar to the situation for support actors (e.g. health professionals) in Belgian context). We can assume that, also similar to the Belgian context, initial effort regarding training and getting used to the system will consecutively transform into care professionals deriving added value from the use of ProACT in terms of time savings and efficiency increases. Finally, in this scenario, each private health insurance provider would have to be contracted by ProACT separately to incorporate the ProACT service; this may be an advantage regarding the initial deployment of ProACT due to the pressure of competition between providers but may also create higher go-to-market cost when aiming for maximum coverage.

For data sourcing and distribution, as well as the involvement of care providers, the same concepts apply in Ireland as in the previously described scenarios for Belgium. The data will be sourced from the PwM in the same way and also distributed to care professionals, family and informal carers. The diverging organisation of care in terms of how medical professionals operate is not foreseen to have a significant impact on how data is forwarded and used.



IRELAND BUSINESS MODEL III CONSUMER MODEL

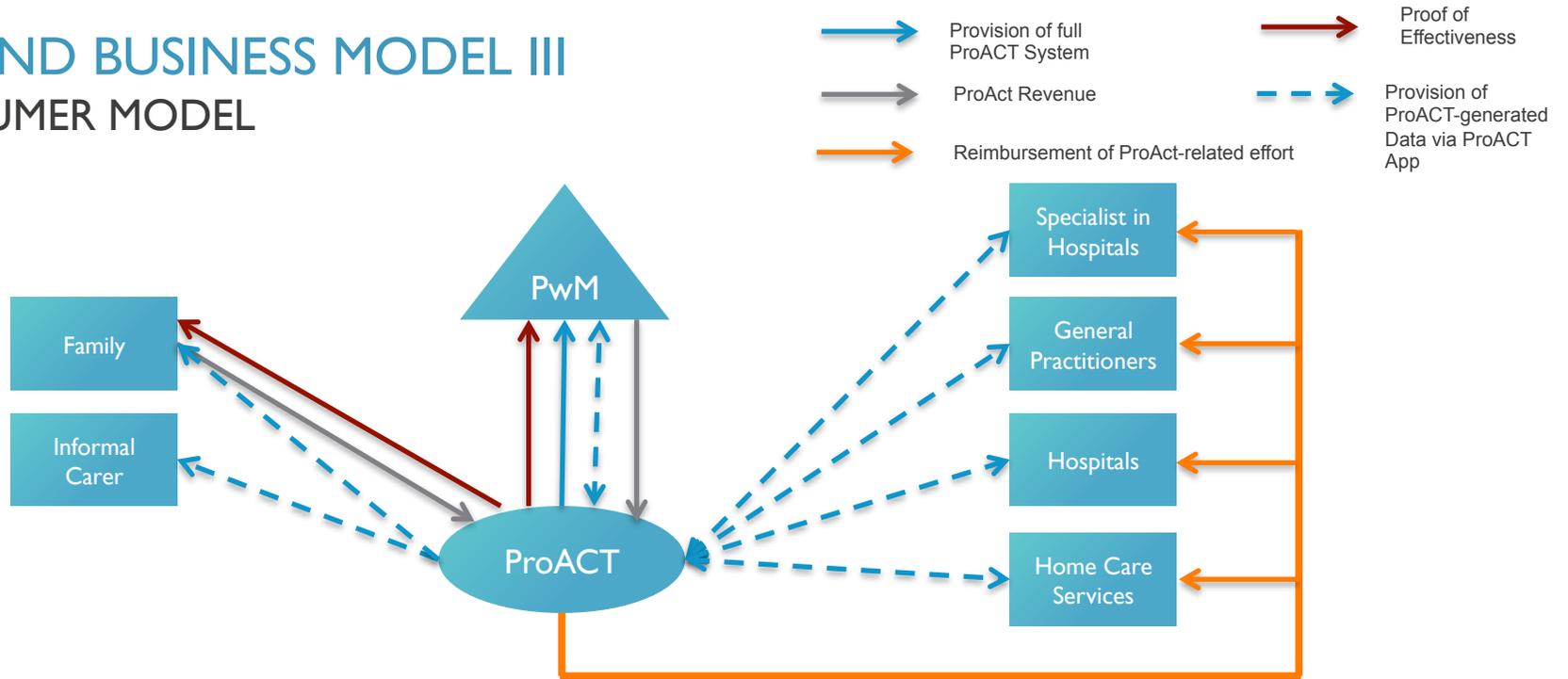


Figure 9: Ireland Business Model 3



The consumer model in Ireland (Figure 9) follows the same rationale as the consumer model in Belgium. One difference however, is that further work would need to be conducted to examine how easy and effective it could be to include care providers in ProACT that are directly salaried by the HSE or directly governed by the NTPF without the involvement of either of the two agencies. Therefore, we deem the first model the most viable potential solution for going to market at this stage, attracting early adopters to offset costs. Further information will be gathered during the trial period to understand the final proof of concept impact of ProACT to then present to the public bodies and associated stakeholders in order to refine the Business Models presented in the Irish context. Outcomes will be reported in the next update to this deliverable (M40)

4.4 Italy

4.4.1 Business-Model Scenarios

The first Business Model for Italy (Figure 10) is based around the Italian regional health authority (ASL) covering the cost of ProACT. In this scenario, there were two sources of revenue identified: Direct revenue from the ASL and direct revenue from the local social welfare authority. The ASL in this scenario is by far the most important revenue provider, as it governs all health-related activity in a region. The local social welfare authorities were only included because they are charged with providing reimbursement for home care, which has been identified as a crucial stakeholder in the stakeholder analysis in D1.1 and in the Value Network Analysis.

The revenue provided by the ASL is assumed to be either provided in a fee-for-service manner, similar to the insurance-based models in the other pilot countries, but given the position of power held by the ASL in every Italian region, it is also likely that some or all ASL that decide to implement ProACT, would prefer a budgeted solution, where they provide the cost for deploying the ProACT services with a certain payment in exchange for the supply of the ProACT system to the whole region for a fixed amount of time. Whether or not this scenario is preferred will be determined when further narrowing down the value proposition of ProACT and through more interaction with the regional health authorities in Italy during the transferability trial.

The local welfare authorities are most likely to provide revenue towards ProACT on a fee-for-service basis as this is the modus in which they reimburse home care for provided services. Regarding the reimbursement of extra effort for all other care providers, the ASL is in a unique position regarding the implementation of ProACT, as it could theoretically “enforce” the use of ProACT in one region, without dedicated the reimbursement necessary.



ITALY BUSINESS MODEL I

PUBLIC HEALTH AUTHORITIES INCLUDE PROACT

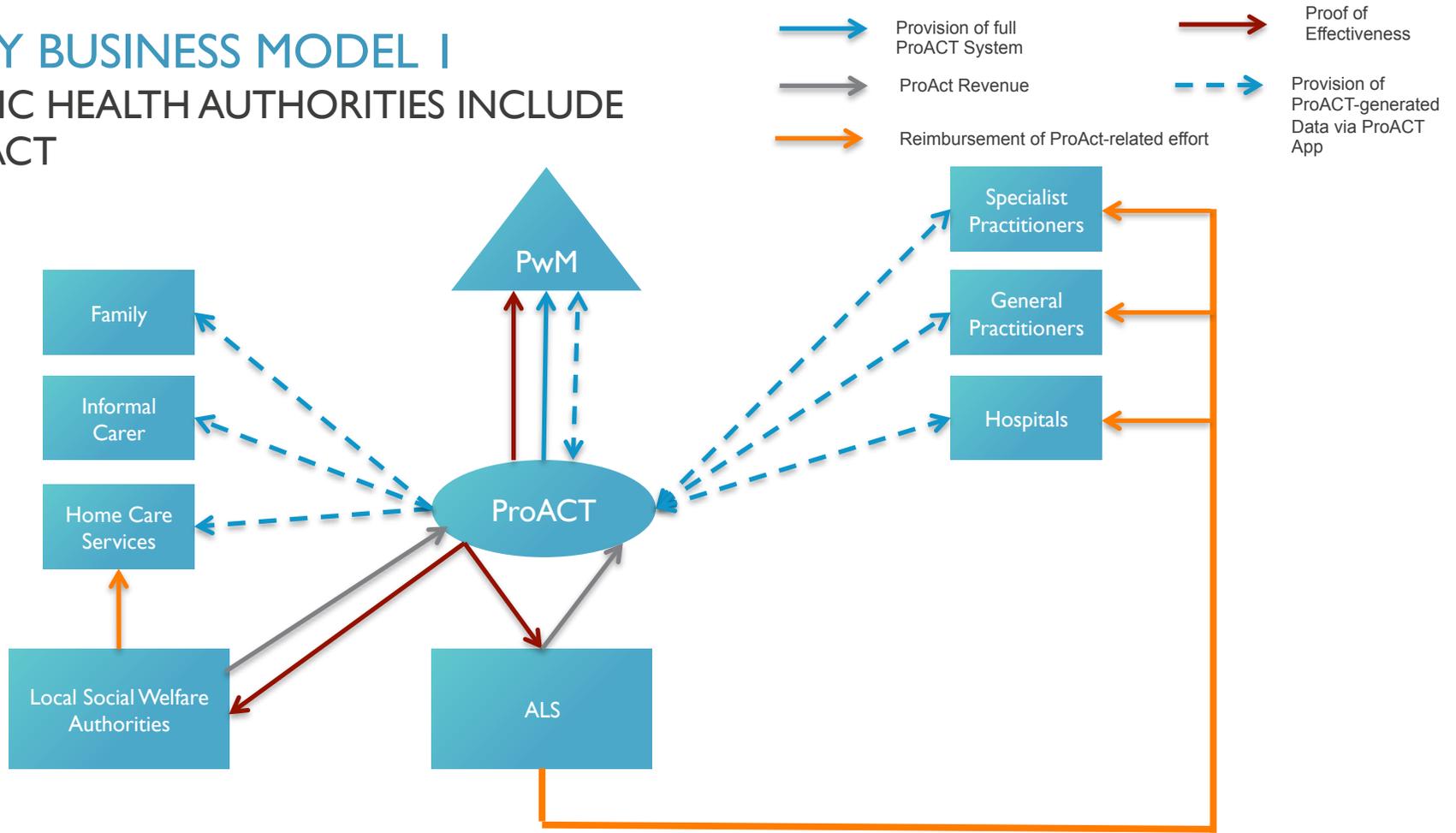


Figure 10: Italy Business Model 1

9

CONFIDENTIAL



Proof of effectiveness would have to be provided towards the PwM, in the same way as in all Business Model scenarios, and towards the ASL as well as the local social welfare authorities. It is important to note in the Italian case for the proof of effectiveness towards the PwM that informal carers play a much larger role in Italy. Therefore the functionality to allow use of ProACT by informal carers as well as the PwM is estimated to have a substantially larger impact in Italy compared to the other pilot countries. Proving the effectiveness towards the ASL is likely to be similar compared to proving it towards the Irish HSE, as both are similar in function. The difference in Italy is that there is not a single national organisation to convince regarding the public health value of ProACT, but one in every region, which will increase market entry cost for an Italy-wide deployment of ProACT. This federal organisation could also be used as an advantage, as the pilot-region of Bologna could serve as an easily comparable benchmark for how effective ProACT is, thereby accelerating adoption to other regions as well. Regarding the local social welfare authorities, we assume similar goals regarding effectiveness, meaning that they are likely to follow if the ASL deems ProACT valuable enough to implement it in a region, making the ASL the key-stakeholder to convince in this scenario.

The rationale behind stakeholder involvement and data generation as well as system distribution does not change in the Italian scenario compared to Belgium and Ireland. Due to the sector being dominated by care providers directly managed by the region, we deem the chances high for management and IT systems being harmonized, making the decision easier whether to integrate ProACT in local systems or to have interaction with ProACT run separately from local IT infrastructure.

As in both other target countries, the Business Model scenario involving integration with the public health authorities is also in Italy deemed the most favourable one according to our assessment, as it guarantees the widest coverage and would provide stable revenue to make ProACT sustainable.



ITALY BUSINESS MODEL II CONSUMER MODEL

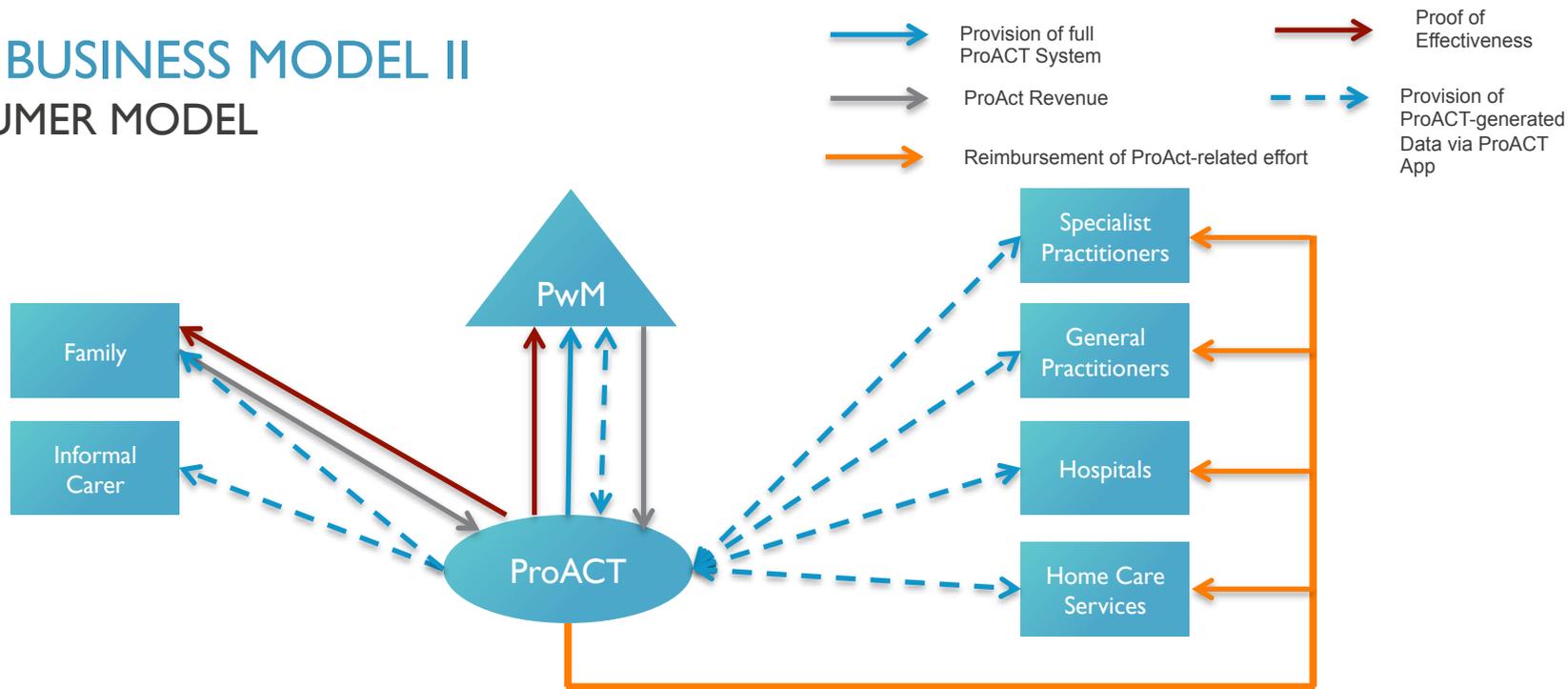


Figure 11: Business Model Italy 2



The same consumer model as in Belgium and Ireland can also be applied in Italy (Figure 11). Similar to the Irish situation, the problem of having to approach publicly financed care-providers without direct cooperation with supervising agency exists, even more so in the Italian context: It is highly likely that the majority of care providers in region would need the approval of the responsible ASL to integrate ProACT, therefore only the smaller number of independent private players could be targeted without having to provide proof of effectiveness towards the ASL. Hence, a short-term market entry strategy, which targets private care providers and early adopters could be adopted to create traction and provide the means to deliver proof of effectiveness later down the line.

All the sections above are forming the initial overview of the Value Networks in the trial countries and the resulting Business Model options for ProACT. These models will be further built upon, in order to understand how to best apply ProACT in a wider EU context.



5 Bibliography

AbuKhoussa, E., Mohamed, N., & Al-Jaroodi, J. (2012). e-Health cloud: opportunities and challenges. *Future Internet*, 4(3), 621-645.

Albert J., Auwermeulen van der T., 2017: Why classic Business Modelling doesn't work for complex business domains – A new Business Modelling approach for Digital Health. ISPIM Innovation Forum Toronto March 2017

Ballon, P. (2007). Business Modelling Revisited: The Configuration of Control and Value, *Info - The Journal of Policy, Regulation and Strategy for Telecommunications, Information and Media*, 9(5), 6-19

Burns, L.R., DeGraaff, R.A., Danzon, P.M., Kimberly, J.R., Kissick, W.L., Pauly, M.V., 2002. The Wharton School study of the health care value chain. The health care value chain: producers, purchasers and providers. San Francisco: Jossey-Bass 3–26.

Cleland, D. I. (1986). *Project stakeholder management* (pp. 275-301). John Wiley & Sons, Inc..

Eysenbach, G. (2008). Medicine 2.0: social networking, collaboration, participation, apomediation, and openness. *Journal of medical Internet research*, 10(3), e22.

FDA (U.S. Food and Drug Administration) 2017: Digital Health
Retrieved from <https://www.fda.gov/MedicalDevices/DigitalHealth/> on 01.03.2017

Ferre, F., de Belvis, A., Luca, V., Longhi, S., Lazzari, A., Fattore, G., Ricciardi, W., Maresson A., 2014. Italy – Health System Review. *Health Systems in Transition* Vol. 16 No. 4 2014. European Observatory on Health Systems and Policies.

Gerken, S., Merkur, S., 2010. Belgium – Health System Review. *Health Systems in Transition* Vol. 12 No. 5 2010. European Observatory on Health Systems and Policies.

Hannan, M.T., Freeman, J., 1984. Structural inertia and organizational change. *Am. Sociol. Rev.* 149–164.

Heerden, A. V., Tomlinson, M., & Swartz, L. (2012). Point of care in your pocket: a research agenda for the field of m-health. *Bulletin of the World Health Organization*, 90(5), 393-394.

Herzlinger, R. E. (2006). Why innovation in health care is so hard. *Harvard business review*, 84(5), 58.

Heerden, A. V., Tomlinson, M., & Swartz, L. (2012). Point of care in your pocket: a research agenda for the field of m-health. *Bulletin of the World Health Organization*, 90(5), 393-394.

van Limburg, M., van Gemert-Pijnen, J.E., Nijland, N., Ossebaard, H.C., Hendrix, R.M., Seydel, E.R., 2011. Why Business Modeling is crucial in the development of eHealth technologies. *Journal of medical Internet research* 13, e124

Magretta, J., 2002. *Why Business Models matter*



McDavid D., Wiley, M., Maresso A., Mossialos, E., 2009. Ireland – Health System Review. Health Systems in Transition Vol. 11 No. 4 2009. European Observatory on Health Systems and Policies.

Mell, P., Grance, T., 2011. The NIST Definition of Cloud Computing. Recommendations of the National Institute of Standards and Technology – Special Publication 800-145

Morris, P.W.G., Jamieson, A. and Shepherd, M.M. (2006), "Research updating the APM Body of Knowledge 4th edition", *International Journal of Project Management*, Vol. 24 No. 6, pp. 461-73.

Osterwalder, A., & Pigneur, Y. (2010). *Business Model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.

Parente, S. T. (2000). Beyond the hype: a taxonomy of e-health Business Models. *Health Affairs*, 19(6), 89-102.

Peppard, Joe, and Anna Rylander. "From value chain to Value Network:: Insights for mobile operators." *European Management Journal* 24.2 (2006): 128-141.

Popescu, G. H., Sabie, O., & Comanescu, M. (2016). The Role of Human Capital in the Knowledge-networked Economy. *Psychosociological Issues in Human Resource Management*, 4(1), 168-174.

Wirtz, B.W., Pistoia, A., Ullrich, S., Göttel, V., 2016. Business Models: Origin, development and future research perspectives. *Long Range Planning* 49, 36–54.



Disclaimer

This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No. 689996. This document reflects the views only of the authors, and the European Union cannot be held responsible for any use which may be made of the information contained therein.”



The **information contained in this document is strictly proprietary and confidential**. No part of this deliverable may be disclosed in any manner to a third-party without the prior written consent of the ProACT Consortium. The unauthorised use, disclosure, copying, alteration or distribution of this document is prohibited.

The **ownership of IPR** (Intellectual Property Right) as well as all foreground information (including the tangible and intangible results of the project) **will be fully retained by all partners without exception**. All issues regarding confidentiality, dissemination, access rights, use of knowledge, intellectual property and results exploitation are included in the Consortium Agreement (CA), which was signed by all partners before starting the project.

