

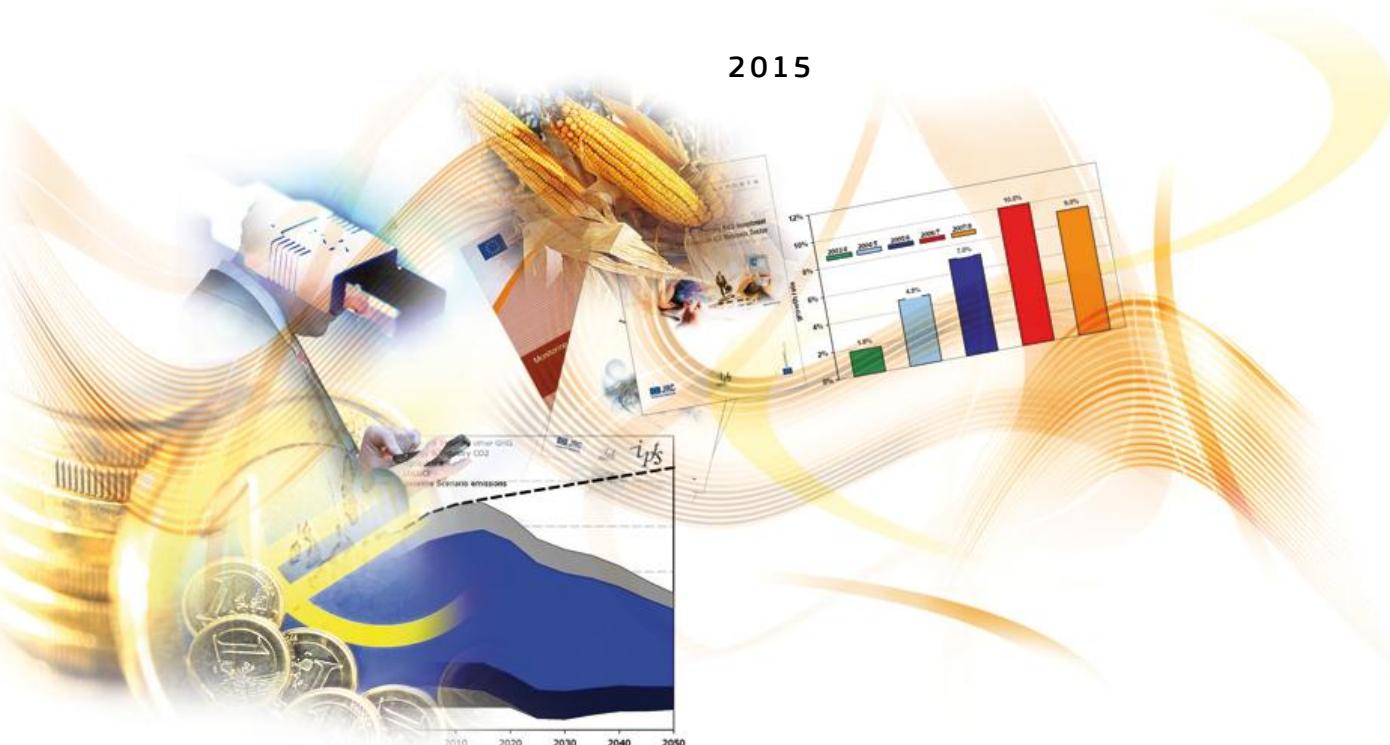
JRC SCIENCE AND POLICY REPORTS

Strategic Intelligence Monitor on Personal Health Systems Phase 3 (SIMPHS3)

*Diabmemory (Austria)
Case Study Report*

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Abstract

In 2010, the Austrian Social Insurance Institution for Railways and Mining Industry (Versicherungsanstalt für Eisenbahnen und Bergbau, VAEB) started a proof-of-concept diabetes telemonitoring project called DiabMemory, as part of a wider programme called "Health Dialogue" ("Gesundheitsdialog"). DiabMemory allows diabetes patients to track health parameters using a mobile phone and share this data with their General Practitioner (GP). After being diagnosed with type 1 or 2 diabetes in primary or secondary care, patients insured by VAEB are given the opportunity to stay for a period of one to three weeks at a special rehabilitation facility in Breitenstein (Lower Austria) to receive education on all aspects relevant to their health and medical conditions like nutrition, physical activity, and psychological aspects. If they decide to join the programme, they receive the equipment and training on how to use the DiabMemory system and how to integrate it into their everyday lives. After their stay in Breitenstein, participants are able to use DiabMemory without further help. A web-based application allows health professionals responsible for therapy management within the Health Dialogue programme to access patient data and adjust therapy plans when needed. Moreover, they can provide users with motivational messages and feedback can be sent directly to the patient's mobile.

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Preface

The Strategic Intelligence Monitor on Personal Health Systems (SIMPHS) research started in 2009 with the analysis of the market for Remote Patient Monitoring and Treatment (RMT) within Personal Health Systems (PHS). This approach was complemented in a second phase (SIMPHS2) with the analysis of the demand side, focusing on needs, demands and experiences of PHS by healthcare producing units (e.g. hospitals, primary care centres), healthcare professionals, healthcare authorities and patients amongst others.

Building on the lessons learnt from SIMPHS2 and from the European Innovation Partnership on Active and Healthy Ageing initiative, SIMPHS3 aims to explore the factors that lead to successful deployment of integrated care and independent living, and define the best operational practices and guidelines for further deployment in Europe. This case study report is one of a series of case studies developed to achieve these objectives.

The outcomes of SIMPHS2 are presented in a series of public reports which discuss the role of governance, innovation and impact assessment in enabling integrated care deployment. In addition, through the qualitative analysis of 27 Telehealth, Telecare and Integrated Care projects implemented across 20 regions in eight European countries investigated in SIMPHS2, eight facilitators have been identified, based on Suter's ten key principles for successful health systems integration.

The eight main facilitators identified among these as necessary for successful deployment and adoption of telehealth, telecare and integrated care in European regions are:

- Reorganisation of services
- Patient focus
- Governance mechanisms
- Interoperable information systems
- Policy commitment,
- Engaged professionals
- National investments and funding programmes, and
- Incentives and financing.

These eight facilitators have guided the analysis of the cases studied in SIMPHS3 and a graph showing the relative importance of each facilitator is presented in each case study.

In addition to the above facilitators analysed in each case report, a specific section is dedicated to the analysis of care integration. It should be noted that the definition of vertical and horizontal integration used in this research is taken from the scientific literature in the field of integrated care.¹ This definition differs from the one mentioned in the European Innovation Partnership on Active and Healthy Ageing Strategic Implementation Plan.² We define horizontal integration as the situation where similar organisations/units at the same level join together (e.g. two hospitals) and vertical integration as the combination of different organizations/units at different level (e.g. hospital, primary care and social care).

¹ Kodner, D. (2009). All together now: A conceptual Exploration of Integrated Care.

² http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/steering-group/operational_plan.pdf (page 27)

Table of contents

ACKNOWLEDGMENTS.....	1
CASE OUTLOOK.....	5
1 BACKGROUND	7
1.1 AUSTRIA	7
1.2 THE AUSTRIAN HEALTH SYSTEM.....	7
1.3 VAEB.....	14
1.4 AIT	16
2 INTEGRATED CARE ANALYSIS.....	17
2.1 DIMENSIONS OF INTEGRATION	17
2.2 IMPACT	18
2.3 DRIVERS AND BARRIERS	20
2.4 HEALTH PROFESSIONAL AND PATIENTS.....	22
2.5 INFORMATION AND COMMUNICATION TECHNOLOGIES.....	23
2.6 GOVERNANCE AND POLICY SETTING.....	26
2.7 ORGANISATION AND PROCESSES	28
2.8 REIMBURSEMENT MODEL AND ECONOMIC FLOW	29
3 TRANSFERABILITY	29
4 CONCLUSIONS	30
REFERENCES	32
ANNEX.....	33

LIST OF TABLES

Table 1 - General information about the Austrian Healthcare System	8
Table 2 - DiabMemory usage data and statistics	18

LIST OF FIGURES

Figure 1 - Health expenditure per capita in Austria and in the Europe WHO's region	8
Figure 2 - Evolution of Health systems Expenditure as % of GDP.....	8
Figure 3 - Flowchart of Health Care Responsibilities in Austria.....	11
Figure 4 - Funds Origin.....	13
Figure 5 - VAEB facilities in Austria.....	15
Figure 6 - Patient compliance - Web vs. App.....	20
Figure 7 - DiabMemory components and feedback loop (© AIT).....	23
Figure 8 - DiabMemory app screenshots	24
Figure 9 - Smartphone with the DiabMemory app and ID-card.....	25
Figure 10 - Visualisation of glucose data in DiabMemory's web platform.....	26
Figure 11 - Health Dialog partners.....	28
Figure 12 - Facilitators of Diabmemory initiative.....	31
Figure 13 - High glucose levels over 12 months (77 patients).....	33
Figure 14 - Low sugar levels over 12 months (77 patients).....	33

Case outlook

In 2010, the Austrian Social Insurance Institution for Railways and Mining Industry (Versicherungsanstalt für Eisenbahnen und Bergbau, VAEB) started a proof-of-concept diabetes telemonitoring project called DiabMemory, as part of a wider programme called "Health Dialogue" ("Gesundheitsdialog"). DiabMemory allows diabetes patients to track their health parameters using a mobile phone and share this data with their General Practitioner (GP). A central element of the project is the use of mobile-Health (mHealth) to establish a close link between patients and their caregivers. Patients are equipped with Near-Field Communication (NFC) enabled mobile phones with a pre-installed diabetes application; individual Radio Frequency and Identification (RFID) based ID cards for identification and authentication, and a varying set of medical measurement devices (glucose meter, blood pressure device, weight scales). A dedicated mHealth service platform provides mobile phone and web-based access for patients and doctors. It features a diabetes-specific electronic patient record, communication via email and SMS, data storage and processing, trend curve visualization, as well as support for device management and logistics.

After being diagnosed with type 1 or 2 diabetes in primary or secondary care, patients insured by VAEB are given the opportunity to stay for a period of one to three weeks at a special rehabilitation facility in Breitenstein (Lower Austria) to receive education on all aspects relevant to their health and medical conditions like nutrition, physical activity, and psychological aspects. This setting is ideally suited to offer patients an easy way to join the Health Dialogue programme and, if they decide to do so, receive the equipment and training on how to use the DiabMemory system and how to integrate it into their everyday lives. After their stay in Breitenstein, participants are able to use DiabMemory without further help. If needed, VAEB assists patients at their healthcare support centres which are located in different places all over Austria.

A web-based application allows health professionals responsible for therapy management within the Health Dialogue programme to access patient data and adjust therapy plans when needed. Moreover, they can provide users with motivational messages and feedback can be sent directly to the patient's mobile. Currently, physicians use the web system with their individual credentials. Interfaces to electronic patient record systems are already being planned. In the future, the DiabMemory team intends to provide all participants with additional access possibilities by linking the DiabMemory system up to the forthcoming Austrian national electronic health record system.

The 'Health Dialogue' programme is an initiative of VAEB. In order to promote the implementation of such innovative initiatives, VAEB had to undergo a profound reorganisation. Its Health, Accidents and Pensions divisions were merged into a single division and a new division for Health and Innovation was created. The implementation of the DiabMemory programme has been carried out by a consortium of partners that includes VAEB, the Austrian Institute of Technology (AIT), the Institut für Gesundheitsförderung und Prävention (IfGP), the General Practitioners (GPs) and Deloitte. VAEB has been the main driving force of the initiative and has provided the funds. In the early stages of the initiative, the AIT and the General Practitioners collaborated in order to develop a master plan that led to the implementation of the telemedicine solution. IfGP is responsible for an extensive evaluation programme that comprises various measures of patient and physician satisfaction, patient compliance, medical outcomes and health economic impact. However the results of this evaluation were not public at the time of

writing. Finally, Deloitte has performed project management duties and worked on the business aspects of the initiative.

DiabMemory was successfully rolled out at the Breitenstein health facility in April 2010. From a total of 596 patients recruited during the course of the project, 438 (i.e. 73%) were still active as of September 2014. Moreover, early results of an evaluation performed by the IfGP indicate that DiabMemory is highly valued by the majority of patients. Although no medical data have been made public yet, intermediate results show promising trends in the levels of HbA1c and blood glucose levels in patients who use the DiabMemory system regularly.

The main driving force for the success of the DiabMemory initiative has been the vision and involvement of the Division of Health and Innovation of VAEB. In addition, the maturity of the mHealth solutions provided by the AIT has also been essential in ensuring the success of the initiative. On the other hand, one of the main barriers for the integration of the initiative into common practice is the lack of a critical mass of patients that would make it profitable for GPs to assess their patients remotely using the telemonitoring application. GPs receive a fee for assessing patients remotely with DiabMemory, but the small number of patients using the system means that VAEB's GPs may only have 1 or 2 patients within Diabmemory which does not make it worth using the system.

1 Background

1.1 Austria

The Republic of Austria is a federal republic and a landlocked country of roughly 8.5 million people in Central Europe. It is bordered by the Czech Republic and Germany to the north, Hungary and Slovakia to the east, Slovenia and Italy to the south, and Switzerland and Liechtenstein to the west. The territory of Austria covers 83,855 square kilometres and has a temperate and alpine climate. Austria's terrain is highly mountainous, lying within the Alps; only 32% of the country is below 500 metres and its highest point is 3,798 metres.

Today, Austria is a parliamentary representative democracy. The capital and largest city, with a population exceeding 1.7 million, is Vienna. Austria is one of the richest countries in the world, with a nominal per capita GDP of \$46,330 .The country has developed a high standard of living and in 2011 was ranked 19th in the world for its Human Development Index. Austria has been a member of the United Nations since 1955, joined the European Union in 1995, and is a founder of the OECD. Austria also signed the Schengen Agreement in 1995, and adopted the European currency, the euro, in 1999.

As in the rest of OECD countries, the Austrian population is still ageing, although it is in the final stage of this demographic transition. The proportion of under 15 years is expected to drop to 14.3% (from 17% in 2000), while the proportion of over 64 years is set to rise to 19.5% (from 15.5%) by 2020.

As a federal republic, Austria is divided into nine states (Bundesländer). The states are not mere administrative divisions but have some legislative authority distinct from the federal government, which is responsible for Legislation and Administration of the Health Care System and other important issues (food safety, the military, monetary and banking systems).

The Constitutional Finance Law establishes a framework for financial relationships between the federal government, the regions and the local authorities. Moreover, it states how taxes are allocated at the different levels.

1.2 The Austrian Health System

The Austrian Health System provides universal coverage for a wide range of benefits and high-quality care to all Austrian and EU citizens. Free choice of providers and unrestricted access to all care levels (general practitioners, specialist physicians and hospitals) are characteristic features of the system. Population satisfaction is well above the EU average. Income-related inequality in health has increased since 2005, although it is still relatively low compared to other countries. The health-care system has been shaped by both the federal structure of the state and a tradition of delegating responsibilities to self-governing stakeholders. On the one hand, this enables decentralised planning and governance, adjusted to local norms and preferences. On the other hand, it also leads to fragmentation of responsibilities and frequently results in inadequate coordination. This trend has two main consequences: patient satisfaction, as the system provides tailored care depending on regional and personal demands; and budget imbalances: the costs of the health-care system are well above the EU15 average, both in absolute terms and as a percentage of GDP (10.8% vs. 10.4% in 2011) (European Commission, 2013). For this reason, efforts have been made for several years to achieve more joint planning, governance and financing of the health-care system at the federal and regional level. In this context in

2005, Austria created the Federal Health Agency and regional agencies, in order to intensify cross-stakeholder coordination and foster a more homogeneous health care provision. However, as in any health system, a number of challenges remain. Table 1 presents general information about the Austrian Healthcare System. As shown in Figure 1 and Figure 2, health expenditure per capita and as a percentage of GPD lie above the European average.

Table 1 - General information about the Austrian Healthcare System

Geographical coverage km²	83,871
Inhabitants per km²	98.04
Number of inhabitants	8,495 000
Life expectancy at birth, years	78 males – 83 females ⁴
GDP (2014), billion \$	361,000
GDP per inhabitant (2014), \$	42,600
General Practitioners /1.000 inhabitants (2010)	4.78
Nurses	7.83
National Budget for Health services management (2013), billion \$	40,555
Health care professionals / 100.000 inhabitants	1,274.53
Health care budget, € per inhabitants (2013)	5,066.02
Hospital beds (2011)	68,758
Hospital beds/1.000 habitants (2012)	8.2

Source (Hofmarcher, 2013) and WHO

Figure 1 - Health expenditure per capita in Austria and in the Europe WHO's region

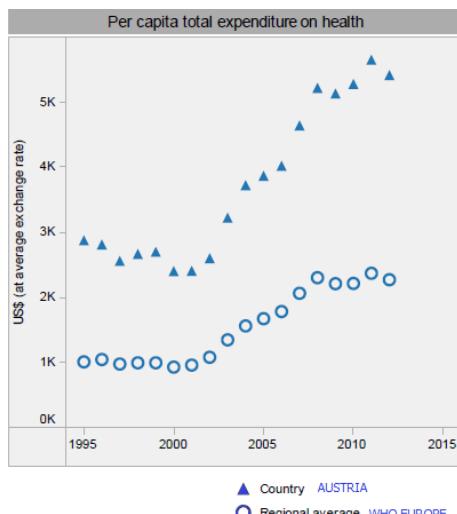
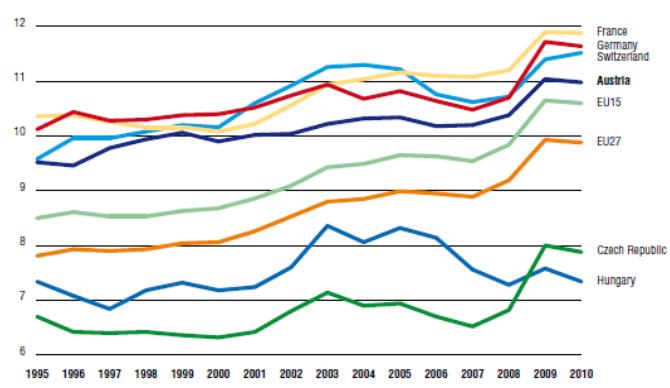


Figure 2 - Evolution of health systems expenditure as % of GDP



Source (Hofmarcher, 2013)

Source (Hofmarcher, 2013)

According to the 2013 Health system review on Austria ((Hofmarcher, 2013), Austrians are much more satisfied with their health system than most other Europeans. This could be explained by the high level of coverage and provider choice that Austrian patients generally

enjoy and by the decentralised planning and governance of the system that allows catering for local needs and preferences.

Nevertheless, there are important structural imbalances in healthcare provision, with an oversized hospital sector and insufficient resources available for ambulatory care and preventive medicine. Austria also has stark regional differences in utilisation, both in curative and preventative services, including hospital beds, specialist physicians, outpatient rehabilitation, psychosocial and psychotherapeutic care and nursing. There are clear social inequalities in the use of medical services, such as preventive health check-ups, immunization or dentistry. One of the key weaknesses of the health-care system stems from the scarce funds allocated to the prevention of illnesses and conditions. Spending on preventive medicine, at 2% of total health spending, is significantly lower than the EU15 and OECD average (both 3%) (Hofmarcher, 2013), and also has a below-average rate of growth. It remains to be seen whether the focus on health promotion and prevention of the 'framework health goals' approved in 2012 will be translated into precise measures, whether clear responsibilities for implementation can be assigned, and whether sufficient funding will be made available. This would be likely to improve the health of the Austrian population and would help to reduce costs associated with preventable diseases.

This lack of investment in prevention may have been the trigger for the increased incidence of preventable diseases. Consequently, non-infectious preventable diseases such as cardiovascular problems and neoplasms associated to smoking habits are important causes for hospital stay and death in Austria. Life-style habits may also affect this trend, especially in young people. (27% of 15-year-old Austrians smoke, 17% in OECD). Moreover obesity rates have increased remarkably over the last few years (the prevalence rate of obesity in adults has increased from 8.5% to 12.8% over the period 1990 - 2010) (OECD, 2012).

The Federal Constitution Law stipulates that responsibility for regulation of most health-care system areas lies primarily with the federal government, which handles it through 'the Federal Ministry for Health issues'. The latter is responsible for the supervision and legislation on hospital and ambulatory care. Nevertheless, the Regional Health Funds are the operating bodies in hospital care, and they must ensure hospital bed capacity and financing.

Each Federal State has its own governing body, called the Regional Health Platform, in which all the relevant stakeholders are represented (Federal Government, Land, local authorities, Chambers of Physicians).

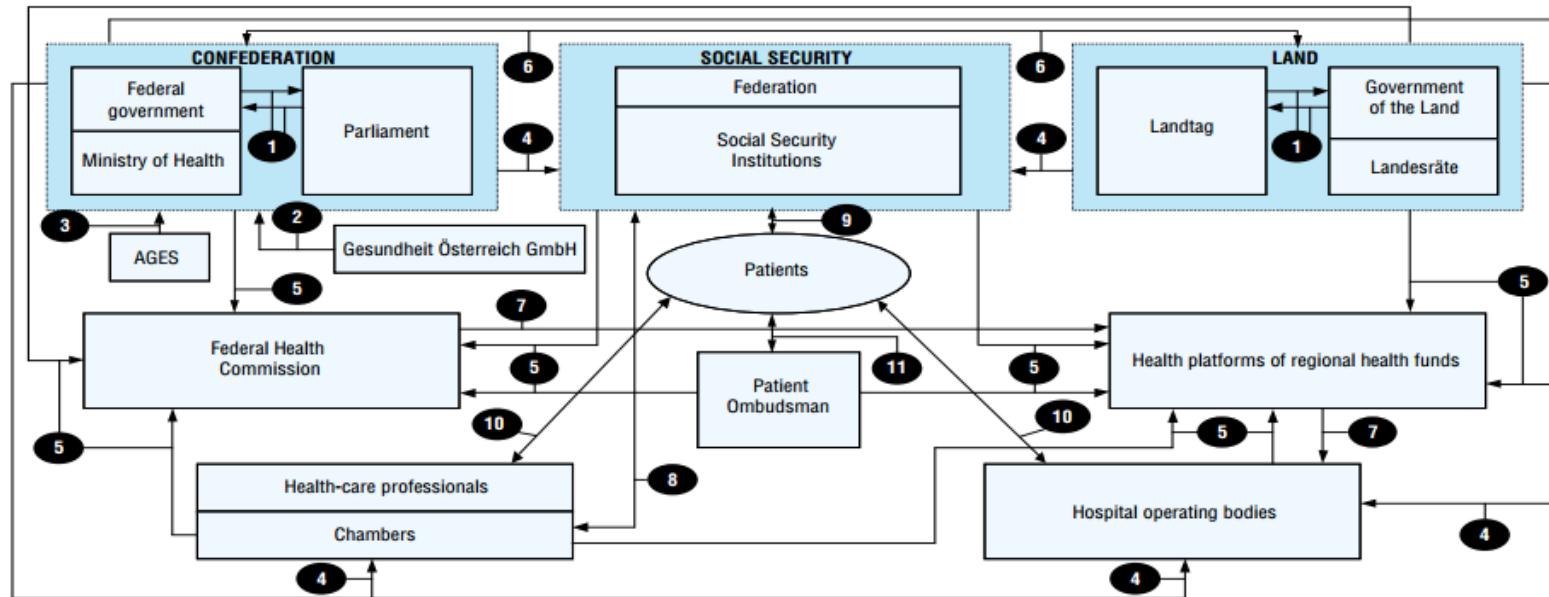
In the ambulatory and rehabilitation sectors, and in the field of medication, healthcare is organised through negotiations between the 22 Social Security Institutions or the Federation of Austrian Social Security Institutions on the one hand, and the Chambers of Physicians and pharmacy boards (which are organized as public law bodies), the statutory professional associations of midwives and other healthcare professions on the other. This cooperation works within a legally-defined framework to safeguard care and the financing of care. In some fields, social health insurers fulfil their obligation to ensure care provision through their own facilities. Social Security Institutions work as self-governing bodies, and cover some services like health insurance, pension benefits and work accident insurance. On the basis of agreements ('state contract'), the federal and regional authorities are mutually obliged to safeguard health-care provisioning in their areas of responsibility.

There are other important institutions involved in the implementation of health care:

- The Supreme Health Board which is a medical-scientific committee which advises the Health Ministry on medical questions.
- Gesundheit Österreich GmbH (GÖG), the institute for research and planning for the health care system which is divided into three sections: the Austrian Federal Institute for Health, the Healthy Austria Fund and the Federal Institute for Quality in the Health Service.
- The Austrian Agency for Food and Health Safety (AGES) which is mandated at national level to carry out a variety of tasks in the field of food safety.
- The Federal Health Agency, a public fund and a separate legal entity at federal level. The Federal Health Agency is the central facility for superregional and cross-sectional planning, governance and finance of the healthcare system. Federal resources are distributed by the Federal Health Agency to the nine regional health funds in accordance with a pre-agreed schema, established by the Federal Health Commission.
- The Federal Ministry of Labour, Social Affairs and Consumer Protection which is responsible for matters relating to social security, with the exception of health and occupational health insurance.
- The Federal Ministry of Science and Research, responsible for university education of physicians as well as the legal and structural management of universities offering medical training.
- The Federal Ministry of Finance which is responsible for taxation, budgeting, financial markets and financial equalisation, among others.

This decentralisation may generate fragmentation and lack of coordination, which makes the Austrian health system more costly than average and could hamper its performance. This is why there has been on-going reform since 2005, which has led to the creation of the Federal Health Agency and regional health platforms, which aim to intensify cross-stakeholder coordination at all levels and promote outpatient care. Figure 3 below presents an overview of all the different healthcare-providing bodies in Austria and their interrelationships.

Figure 3 - Flowchart of Health Care Responsibilities in Austria



(1) (a) Draft legislation by the federal government (minister responsible) to Parliament, or by the Land government (minister responsible at Land level) to the Landtag.

(b) Agreement of federal law by Parliament, or Land law by the Landtag.

(2) Support to the Federal Ministry of Health.

(3) Support to the Federal Ministry of Health, particularly in the context of licensing medication (AGES = Agency for Food and Health Safety).

(4) Health administration:

(a) at federal level (e.g. health-care policing, sanitary supervision of hospitals, monitoring of social security institutions and legal bodies representing interest groups);
 (b) at Land level (e.g. concerning permits to build and run hospitals, licensing processes for outpatient clinics and group practices, implementation of planning in the region, investment finance).

(5) Appointment of members of the Federal Health Commission or regional health platforms.

(6) Consultation mechanism between the federal level and local and regional authorities with regard to legislative measures (laws and regulations) which require additional expenditure.

(7) (a) Sanction mechanism: the Federal Health Agency (Federal Health Commission) can withhold financial resources from a regional health fund (health platform) if it contravenes compulsory plans and guidelines regarding quality and documentation.

(b) Regional health funds (health platforms) can designate a corresponding sanction mechanism for hospitals.

(8) Negotiations on market entry, services and tariff charges (collective and individual contracts).

(9) Legal membership of social security institutions (compulsory insurance).

(10) (a) Fundamental freedom of choice for patients over hospitals and independently practising members of the health-care professions.
 (b) Obligation to treat, which exists for public and private non-profit-making hospitals and contracted independently practising members health-care professionals.

(11) Legal representation of patients in every Land.

Source: Ministry of health.

The economic model of the Austrian health care system is supported mainly by two funding sources (Hofmarcher, 2013):

- Public funding (77.5% of total expenditure): These funds come from taxes and social insurance contributions. 99.9% of the Austrian population is a member of a health insurance company. Membership depends on the place of residence and profession, so the insurance companies do not compete for funds. Every member in the system has the right to access a broad set of services. Nevertheless, some of them require an extra payment (e.g. prescriptions). Some people, who fulfil specific criteria related to their social circumstances, are exempted from paying these charges.

The guiding principle behind the system is that the provision of treatment must be sufficient, appropriate and should not exceed what is necessary.

- Private funding (22.5% of total expenditure): the Austrian population is entitled to contract extra health care services with private health providers. Some health insurance companies offer their members the possibility to choose a particular physician and better hospital facilities.

Payment of providers differs depending on the source of financing and the type of provider. Public and non-profit-making hospitals providing statutory services receive a DRG³-based budget. Most health insurance funds use a mixed payment system, combining flat-rate payments (per patient, per quarter – basic service compensation) and fee-for-service payments to pay for ambulatory services provided to their members. The composition of health spending is as follows:

- 43% for inpatient care (much higher than the OECD average). Austria has acknowledged that the inefficiency of its prevention plans might be the cause of this trend.
- 26% Ambulatory Care
- 17% Pharmaceutical products
- 7.1 % Long-term care at home
- 3.6% Administration of Health care.
- 1.5% Prevention
- 1.2% Organisation
- 1% Patient Transport

As reported in Statistics Austria 2011 (Statistics Austria, 2011), the total public health expenditure in Austria in 2010 amounted to €23,689 million (94.7% of the total health budget) in 2010. The remaining €1,326 (5.3%) are invested in anticipating future needs and in research. More specifically, €456 million are dedicated to health research. These funds are allocated to support the clinical overheads of the three university hospitals and their research staff, a support which has grown at a rate of 5.7% per year since 2005 (Hofmarcher, 2013).

³ Diagnosis Related Group.

Figure 4 - Funds Origin

		Taxes and contributions	Raising funds and pooling	Expenditure in 2010, in € millions	% of health expenditure
Local authorities	Yield share from general tax revenue, including 0.642% of VAT income before distribution of revenue shares to local authorities, towards financing of public hospitals (= targeted grant)	Centralized/decentralized	1109	4.7	
Länder (including Vienna)	Yield share from general tax revenue, including 0.949% of VAT income before distribution of revenue shares to Länder.	Centralized/decentralized	6 149 ^a	26.0	
Federation	1.416% of VAT income plus general tax income, e.g. funds raised under the Health and Social Sector Contribution Act (GSBG)	Centralized	995 ^b	4.2	
State, not including social insurance	-	-	8 253	-	
Social insurance (spending on non-financial transactions)	On average, 7.65% of monthly gross income, up to contribution cap (approximately 50% in 2009) + contribution payments via the state, e.g. for pensioners and reimbursements for service costs (approx. 8%) + fees and cost-sharing (approx. 5%)	Centralized/decentralized	15 436	65.2	
Total public health expenditure	-	-	23 689	100.0	

Source: Hofmarcher, 2013

In order to optimise healthcare provision in Austria, both the national Government and other stakeholders have created a legal framework that aims to facilitate the integration of ICT solutions into healthcare provision. The Health Reform Act of 2005, including the 'Health Telematics Act', defines the legal basis for implementing eHealth services in Austria. The first successful case of eHealth was the implementation of an e-card system back in 2005. Up to 8 million beneficiaries and 12,000 general practitioners were provided with an e-card comprising basic administrative data about the beneficiary (i.e. name, academic title, insurance number, card serial number and user group identification). The e-card works mainly as an e-Identification system, and mainly provides access to other applications that require secure patient identification. The e-card does not store any medical or other health-related data.

The ELGA (Elektronischer Gesundheitsakt) Act, passed in Austria in 2012, creates the legal basis for the country's first national Electronic Health Record infrastructure, which will provide semantic interoperable sharing of several types of medical documents amongst Austrian healthcare providers. The ELGA system will not involve the central storage of all patient data. Instead, the service will only maintain a centralised registry indicating the location of individual-related health data. Health data are defined as personal data that provide information about the physical or psychological state of an individual, including the data collected to assess the individual's state, as well as data collected for the purposes of preventive medicine or healthcare provision, for diagnosis, treatment or care methods, for provision of care, prescribed or taken medicines, medical aids, etc. Besides, the ELGA will comprise information about living wills, powers of attorney and a "patient summary" based on the application of patients' rights in cross-border healthcare. The ELGA system consists of the following components:

1. Patient Index
2. Healthcare Provider Index

3. Registry
4. Data Storage
5. Access Control Centre
6. Logging System
7. E-Health Access Point

The health data stored in the ELGA system will be available to authorized EHR-Healthcare Providers and EHR-Participants with Health Data in electronic form, without reference to location and time. The Austrian Ministry of Health will operate an Electronic Health-Directory Service (EHDS) that will (1) support the legitimate use of Health Data in electronic form, (2) improve information about health-related services, and (3) support planning activities and reporting. EHR-Healthcare Providers will be registered with the EHDS by authorised registration bodies, under the responsibility of the Federal Ministry of Health and the Federation of Austrian Social Insurance Carriers.

According to the ELGA Act, the following data should be available for hospitals, the General Accident Insurance and care institutions from 1 January 2015:

1. Clinical discharge reports from hospitals
2. Laboratory results.
3. Results of diagnostic imaging by members of the medical profession.
4. Medication data, by members of the medical profession
5. Medication data, by pharmacies or drug dispensing doctors at dispensation
6. Other results.

From 1 July 2016, this information should be available for pharmacies, freelance doctors, group practices and authorised independent clinics. From 1 July 2017, private hospitals should be integrated with the ELGA system. According to the law, living wills, powers of attorney and authorised data of the medical registers should be integrated by 1 January 2017. Finally, on 1 July 2022, freelance dentists, dental group practices and independent dental clinics should be integrated. As of today, physicians are obliged to introduce data about the patients they attend in the common health data repository.

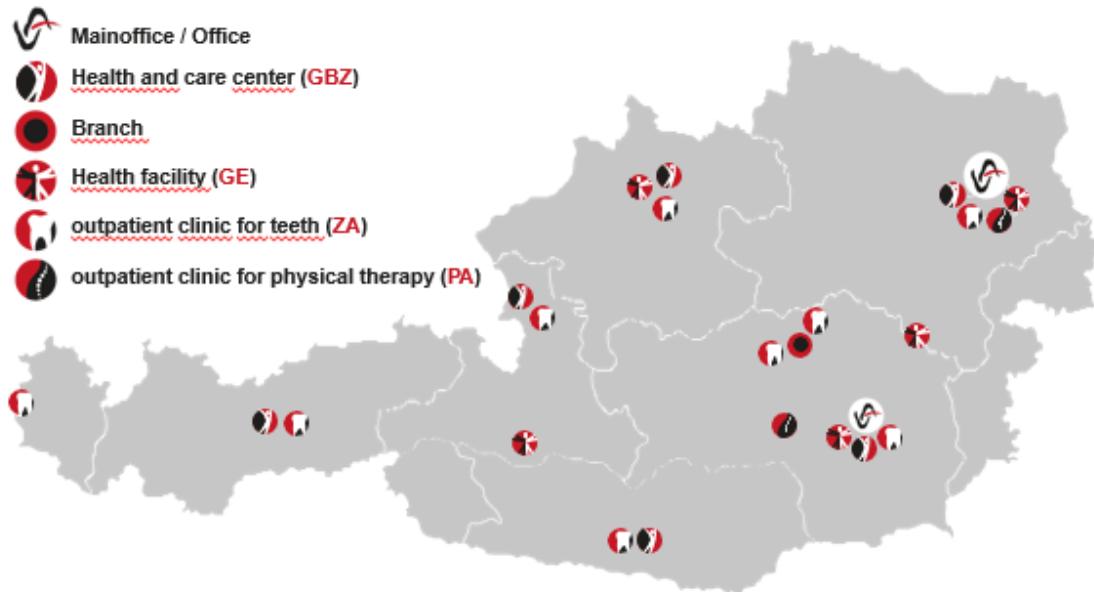
1.3 VAEB

VAEB (Versicherungsanstalt für Eisenbahnen und Bergbau, Austrian Social Insurance Institution for Railways and Mining Industry in English) is one of the 22 public insurance institutions in the Austrian health care system. They provide health care to all ÖBB (National Railway Company) employees, all private railway staff and all people involved in the mining industry. VAEB is one of the 4 nationwide insurance institutions in Austria, and it is therefore present in all 9 Austrian provinces (Länder).

VAEB facilities include offices, health care centres, health facilities, outpatient clinics for dentistry and outpatient clinics for clinical therapy spread throughout the country.

Figure 5 displays the location of the VAEB facilities in Austria.

Figure 5 - VAEB facilities in Austria



In total, 237,000 people are insured with VAEB and VAEB employs over 4,500 physicians across the country. Each physician attends approximately 1,000 patients.

VAEB started the project ‘Gesundheitsdialog’ or ‘Health Dialogue’ in 2010 which aimed to set a new standard in the management of chronic diseases by integrating different health care elements with the help of technology.

The Health Dialogue programme comprises initiatives such as:

- DiabMemory, a mHealth system for the remote monitoring of patients with diabetes which is the focus of this report.
- The “Bewegung als Medikament” (‘Movement as Medicine’) programme which aims to change the health behaviour of the participants in the long-term, combining regular group training sessions with training and education on exercise and nutrition.
- In “Gesund: Warum” (“Healthy: Why?”) which extends education and training to aspects such as diet and exercise, using practical examples in small groups of patients.
- The “Versichertenrat” (“Advice for policy holders”) is an open forum for interested policy holders. Current health and insurance issues are discussed and proposals for better health care are elaborated.
- Increasing health literacy, for example, via an interactive health information booth in a playful way.
- Health promotion programmes in the workplace.

VAEB was granted the eT-Award for innovative eHealth solutions at the eHealth 2011 conference in Vienna.

1.4 AIT

AIT (Austrian Institute of Technology) is the largest non-university research institution in Austria. It is owned by the Republic of Austria (50.46%) and the Federation of Austrian Industries (49.54%). 1,100 AIT employees carry out their research activities at their main facilities (Vienna Tech Gate, Vienna TECHbase, Seibersdorf, Wr. Neustadt, Ranshofen, Graz and Leoben).

AIT was established to bridge the gap between research and technology commercialisation, or in other words between basic research at universities and final marketing by industry.

The philosophy of AIT is based on the anticipation of new challenges. Their aim is to go ‘one step forward’ and create technologies and methods which answer new customer behaviour, systemic and social changes. They work on technology, but also support policy makers with input on the changes needed in legislation to enable research about and use of such new technology tools.

AIT was responsible for the development of DiabMemory, which is the mobile application that supports Health Dialogue’ (mHealth). This application, which has a useful and user-friendly interface, allows patients to be the centre of the care process, providing them with greater autonomy and motivating them to adopt a healthier lifestyle.

Moreover health professionals are empowered with a web-based application that allows them to manage therapy plans. The latter are supported by the data sent from the patient’s home through an AIT-patented system of medical devices. They can therefore provide real-time feedback to the patients’ mobile phones, improving the assessment of chronic conditions and care delivery to patients.

Finally, all these interactions and data are stored in a database, for later or further actions. This way a detailed clinical history of every patient is available for health professionals, facilitating a more personalised and tailored care provision.

2 Integrated care analysis

2.1 Dimensions of integration

VAEB (Versicherungsanstalt für Eisenbahnen und Bergbau, Insurance Institution for Railways and Mining) is a nationwide social insurance provider that provides insurance services to people working in the railway system and in the mining industry, and their families. As an insurance provider, VAEB provides accident insurance, pension insurance and health care provision. VAEB has health centres in the capitals of all federal counties in Austria and rehabilitation facilities located in different parts of Austria. Each facility is dedicated to the provision of rehabilitation services for conditions such as rheumatic diseases (in Bad Hofgastein), diseases of the musculoskeletal system (in Bad Schallerbach) or diabetes (in Breitenstein).

Patients insured by VAEB from all over Austria who are diagnosed with diabetes – both types 1 and 2 – either by their GP (primary care) or by a specialist (secondary care) are entitled to spend one or three weeks in VAEB's rehabilitation centre in Breitenstein. During this time, patients receive continuous medical care, physiotherapy and balneotherapy, movement therapy, education about nutrition, training and consulting about diabetes and stress diagnosis. Besides education and training, during their stay patients are introduced to the Health Dialogue programme. If patients are interested in joining the programme, they are trained in the use of the DiabMemory system in-house by the staff in Breitenstein. The employees responsible for the training are not specifically hired for the project; instead, they are current members of staff who have been assigned these new roles.

After their stay in the health resort, patients go back to their normal lives, and they start their daily assessment using the DiabMemory equipment. This equipment includes a weight scale, a blood pressure meter, a glucometer and a dedicated smartphone. All of the measurement devices are equipped with NFC emitters, so patients can automatically upload their measurements into their smartphone, and then into the DiabMemory system without the need for an explicit interaction, which dramatically enhances the usability of the system. Patients who have joined the initiative take daily measurements of physiological parameters, such as glucose levels and weight, and record subjective data – such as mood – through questionnaires. All of the measurements are uploaded into the DiabMemory data repository, and become available via a web application. All of VAEB's health centres in Austria provide their GPs with access to the DiabMemory system. Therefore, all VAEB GPs can use the DiabMemory system to remotely manage the status of their patients who have joined the initiative. In order to attract more GPs and encourage them to use the system, VAEB signs a contract with them that establishes a minimum set of tasks and the corresponding fee for remotely managing patients. These tasks include reviewing patient data and providing feedback on a weekly basis. Once GPs decide to start using DiabMemory to assess their patients remotely, they receive special training on how to use the system.

Besides the medical services provided by the GP, each health centre acts as the technical helpdesk for patients who have joined the initiative. If a patient has any technical problems with the equipment provided by VAEB (for instance, the glucometer is broken or there are problems with the smartphone connection), patients have to go to their health care centre, where they can replace their devices and/or receive additional technical training. The

technical service is not provided by special staff, but by medical staff that have been trained.

Apart from the VAEB GPs and specialists (nurses, diabetologists, nutritionists...) in the Breitenstein facilities, no other specialists are involved in the DiabMemory processes. If patients wish to provide information about their assessment to a specialist in secondary care, they have the option of printing out the results and handing them in to the specialist.

To sum up, the level of integration of the DiabMemory solution into the overall healthcare process can be considered as low. During the training stage in Breitenstein, professionals from different disciplines are involved in the initiative, including physicians, diabetologists, nutritionists and specialised nurses who participate in the set-up and training phases. Once the patient is discharged, only the patient's GP and the physicians from Breitenstein are involved in their remote assessment. Trained medical staff – mostly nurses – in the local hospital help with the logistics and provide training support, but they do not participate in the remote assessment of the patient. No other tiers of healthcare (i.e. secondary care, etc.) are directly involved in the initiative. As mentioned above, if a patient visits a specialist in secondary care and wants to share the data acquired with DiabMemory with them, they have to print the data and deliver them by hand. Therefore, integration can be considered as strictly horizontal, as different GPs in different hospitals use the system. The system allows patients to enhance their self-care and to integrate self-help with the role of the GP.

2.2 Impact

Since the initiative started in 2010, 596 patients have been enrolled in the DiabMemory program. As of September 2014, 438 of these patients were still using the system on a regular basis, therefore reaching a 73.5% compliance rate. Table 2 displays a summary of the usage statistics for both patients and professionals.

Table 2 - DiabMemory usage data and statistics

Parameter	May 2010 – Sept.2014
Recruited patients (m/f)	596 (129/467)
Number of patients with DM type 1 (% of all patients)	37 (6,2%)
Still active patients (% of all patients)	438 (73,5%)
Number of logins via PC and Web browser	75,448
Number of logins via mobile/smart phone	760,137
VAEB users	70
VAEB user logins	10,331
General practitioners	100
General practitioner logins	10,680
Sent feedback messages	32,674

VAEB has approximately 4,500 general practitioners on its payroll. Each of these practitioners attends approximately 1,000 patients, both from VAEB and from other insurance companies. Out of these 1,000 patients, approximately 10% are insured by VAEB and from these only 4 – 5% may be diagnosed with Diabetes or considered as being at risk of developing diabetes (i.e. 4 – 5 patients in total). Moreover, approximately 40% of the patients who attend the 3-week training programme in Breitenstein will finally join the DiabMemory programme for managing diabetes remotely. As a result, it is very likely that a VAEB physician will only have 1 or 2 patients from the Health Dialogue programme. Many

physicians therefore do not consider it worth learning to use the platform and taking some time out of their routine praxis to assess patient data for a small fee, for only 2 or 3 patients. It is therefore going to be difficult to involve more physicians until a critical mass of patients are enrolled in the DiabMemory programme.

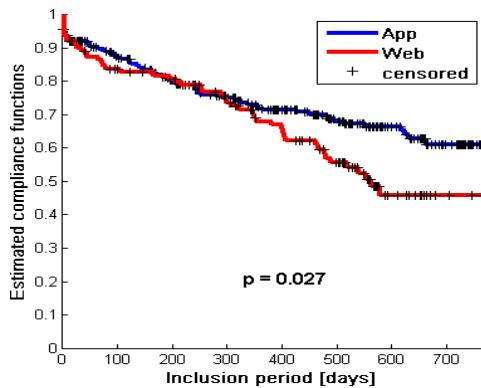
From a medical perspective, no data on the long-term impact of the initiative on the health condition of the patients are available yet. DiabMemory is a long-term project spanning 5 years. Early recruitment started in May 2010, and the project is still ongoing. An interim report on the progress of the initiative was planned to be delivered to the VAEB board of directors by the end of 2014. Although these results have not been made public, the experts consulted stated that the medical results for patients who are compliant with the DiabMemory monitoring protocol are really promising. The levels of HbA1c, and hypo and hyper glucose, are significantly reduced in the long-term in patients who follow the self-monitoring programme. In other words, the continuous use of DiabMemory helps patients to stabilise their glucose level, which has a positive impact on their health status (see Figure 13 and Figure 14 in Annex for more details). However, the data is neither conclusive nor statistically significant, according to the health professionals consulted for the preparation of this case study.

Nevertheless, these results constitute a significant improvement over the current situation: as reported by the professionals consulted, before the deployment of DiabMemory, patients in their second visit to VAEB's Breitenstein facilities – usually after 2 or 3 years after their initial stay at Breitenstein – usually showed a noticeable worsening in their health condition compared to their first visit, while the data gathered so far demonstrate that the health status of patients using DiabMemory remains more stable between visits.

From a technology standpoint, a retrospective study was conducted by AIT – the company that developed DiabMemory – to estimate the compliance of patients using a telemedicine system to record their health data and the feasibility of the inclusion of a telemedicine approach in the standard medical practice (Morak, 2012). When patients join the DiabMemory programme, they can choose between acquiring their data either via a PC-based web browser user interface or via a mobile phone and NFC-based patient terminal. Three different NFC mobile phone types ranging from feature phone to touchscreen-smartphone were used.

During a period of 21 months (approximately 700 days, from May 2010 to January 2012), a total of 359 patients with a median age of 57.4 ± 10.2 years joined the DiabMemory programme. Out of these 359 patients, 326 were suffering from DM type 2, 26 were diagnosed with DM type 1 and 7 were considered at risk of developing diabetes. 70.2% of all participants (252 in total) chose the mobile phone based patient terminal to acquire their health data, while the remaining 29.8% (107 in total) used the PC-based web browser user interface. Figure 6 displays the estimated compliance functions of patients using the system over a period of 700 days. As shown in Figure 6, the compliance of patients using the mobile application is significantly higher than the compliance of patients using the web platform to insert their data and to receive the GP's feedback. Moreover, the difference between the compliance levels increases dramatically one year after the patient's recruitment (approximately 350 days).

Figure 6 – Patient compliance - Web vs. App



Regarding patient satisfaction, the Division of Health and Innovation at VAEB has conducted a study on the acceptance of the system. This study comprised a set of questionnaires regarding the usability and perceived utility of the system, as well as questions about the perceived impact of the system on the patients' health condition and the perceived quality of health provision. The results of this study have not been made public, but according to the stakeholders consulted, the results of the study were highly positive: patients considered the system to be highly usable and, more importantly, patients considered that the system helped them to better comply with the therapy. One of the most remarkable points is that patients considered that the closed-loop approach adopted within DiabMemory helped them to avoid the feeling of being left on their own, and the periodic assessment performed by physicians helped them comply with the lifestyle changes recommended during their stay in Breitenstein.

Four patients were interviewed during the fieldwork for this case study at the Breitenstein premises. All patients interviewed were in their second stay in the facilities, and had been using the DiabMemory system since they were discharged after their first stay in Breitenstein. All patients interviewed expressed their satisfaction with the system, both in terms of usability and of the impact the system has on the assessment of their own health care. Three out of the four patients stated that their health condition had improved between the two stays. All patients considered that they received better care with the system than without the system, as they felt that their clinical status was more closely managed by the physician, even remotely.

From an economic perspective, no studies have been made available on the effectiveness of expenditure or the optimisation of costs that might arise from the use of the telemedicine approach. At the beginning of the initiative, Deloitte, the partner responsible for the project management and economic aspects of the Health Dialogue programme, worked on an economic model and business plan for the overall initiative. Although this study is not public, their conclusion was that, due to the number of uncertainty factors, it was not possible to develop a robust, reliable economic model.

2.3 Drivers and barriers

The Health Dialogue programme is an initiative of the Health and Innovation Division of VAEB. The vision and the commitment of the Head of the Health and Innovation Division, along with the collaboration of the other departments in the insurance company, has been one of the main driving factors for the success of the initiative.

Another factor that has clearly contributed to the success of the initiative has been the collaboration between the different actors involved from the early stages of the programme. At the beginning of the project, the AIT was responsible for creating a master plan for the overall project that included both a technical and a medical part. The medical part was discussed thoroughly between the physicians at VAEB and other external experts. The basis for the definition of the medical part of the initiative took the Austrian guidelines for the treatment of diabetes as a starting point. The Austrian guidelines for the treatment of diabetes include recommendations about the use of electronic diaries for assessing the health condition of patients with diabetes remotely. One of the most relevant results of this discussion was the development of a set of guidelines and recommendations for integrating a telemedicine solution into the routine praxis. According to the advice provided in these guidelines, one of the most relevant elements in order to guarantee the compliance of patients in the long-term is to ensure a closed-loop communication between the doctor and the patient. A system that only handles the acquisition of data would seriously compromise the compliance of patients, as their motivation to insert new data would decrease dramatically at some point if they do not receive any feedback from their physician.

From a technology perspective, one of the most relevant factors that have contributed to the success of the initiative has been the maturity of the technology used to implement the telemedicine system. AIT, the partner responsible for the development and deployment of the DiabMemory telemedicine system, has been working on the development of mHealth solutions for the remote monitoring of chronic diseases for a long time, and the system has proven to be highly stable and reliable throughout the four years of the initiative. Technical robustness is a key factor in guaranteeing the feasibility of the initiative, as an unstable product would involve high maintenance costs that would hinder the long-term economic sustainability of the project. The AIT has made great efforts to ensure the easy set-up, manageability and low-maintenance of the technical solution. Therefore, no technical support or technical visits are needed. The system has been designed so that patients can receive a postal package with all the equipment and can set it up themselves. If patients run into any technical issue, they can contact the technical helpdesk or send back the equipment for replacement by post.

Another example of successful collaboration between the different actors involved is the delegation of responsibilities in the technical field between the main technical partner (AIT) and other partners in the initiative. While AIT manages the maintenance and reliability of the overall system (security and integrity of databases, availability of the web platform etc.), routine technical problems with the patients' equipment are handled by the insurance company. In order to reduce costs, it is paramount to ensure that technical problems can be fixed either on-site or by telephone by staff from the Breitenstein facility. In cases where the problem cannot be fixed remotely, faulty equipment is replaced by post. Moreover, all recruitment duties have been delegated to VAEB, leaving the AIT in charge of only the purely technical aspects of the system, and hence saving travelling costs for maintenance.

In terms of barriers, one of the main problems for the implementation of the DiabMemory system is the increase in the workload that arises from the integration of the system in the daily routine of VAEB professionals. VAEB is responsible for the recruitment and training of patients, and also acts as a helpdesk for assisting patients participating in the telemonitoring programme in case of technical problems. However, no new posts have been created in order to perform these tasks, nor have any new staff been recruited. This

increase in the workload of health professionals is one of the main barriers for the deployment of a remote monitoring system like DiabMemory. In order to circumvent this problem, the overall care process would have to be modified, for instance giving more responsibility to nurses – who would perform the first screening tasks. Changes in processes are however difficult and slow to implement.

With regard to the recruitment, during their 3-week stay in the Breitenstein health resort, patients are introduced to the DiabMemory system, and they can decide whether they are interested in joining the programme or not. In the early stages of the project, recruitment and the management of the first contact with the system was handled by the AIT, but these tasks were later considered outside of the scope of the AIT's responsibilities and delegated to VAEB staff. Moreover, at the beginning of the project all recruitment and management of the first hands-on with the system was performed during a single information session. Trying to train 10 or 15 patients in the use of the system in one only session was very complicated for the trainers, and the project team therefore decided to devise a new training method, dividing the introduction to the system in three stages with smaller groups of people. Nowadays, recruitment and training is performed by the staff of the VAEB's health resort in Breitenstein, either by trained diabetologists, nutritionists or nurses. This training process involves a great number of resources, both for the technical and the medical part, and imposes a greater workload on the medical professionals, turning this into a barrier.

From the technical support point of view, staff from the VAEB is required to act as a helpdesk in order to assist patients who encounter technical problems. This implies that medical – hence non-technical – staff has to be trained in order to be able to deal with technical issues in the system. Helpdesk services are centralised in Breitenstein, and supported by staff in other facilities. Acting as a helpdesk can be extremely time-consuming if the system is not robust enough or if patients are not properly trained. Therefore, the adoption of this type of new tasks also implies an increase in the workload of medical staff.

2.4 Health professional and patients

The implementation of the DiabMemory system made it necessary to create new roles in the health care provision process which can be described as follows:

- Physicians (general practitioners) who periodically assess the data submitted by patients and provide them with feedback
- Recruiters and trainers who bring patients into the system and train them on how to use it
- People who are responsible for all the technical equipment
- Helpdesk which assists patients on how to solve any technical problems
- Technical experts who teach physicians, recruiters, trainers and helpdesk staff how to perform their tasks within the DiabMemory system.

No new staff has been hired to perform these new roles. Instead, medical staff from the insurance company had to start performing these roles, which increased their workload in the first place.

Physicians who are interested in joining the DiabMemory programme in order to assess the health condition of their patients suffering from diabetes remotely sign a contract with the

insurance company. This contract establishes a fee for the execution of a minimum number of tasks. These tasks include reviews of patient data and providing patients with feedback on a weekly basis. The fee paid to physicians is relatively low compared to their income.

Recruiting, training and helpdesk duties are carried out by the insurance company. Currently, the VAEB staff members in charge of these tasks are medical staff trained in the use of the system by their technical counterparts. When patients first join the diabetes care programme in Breitenstein, they do not know anything about the Health Dialogue programme. During their 3-week stay, the VAEB staff (physicians, nurses and nutritionists) organise information sessions during which patients are introduced to the DiabMemory system. All patients interested in joining the programme are trained in the use of the system in subsequent sessions by VAEB staff. During the third training session, patients are provided with the system and start using it. In order to guarantee the proper assessment of the data acquired by the patient, it is essential to involve their GPs in the programme.

The helpdesk function is provided by the insurance company, and is centralised in the Breitenstein facility with support from other VAEB facilities across Austria. As in the case of recruiters and trainers, staff performing helpdesk duties are not specifically hired for the project; on the contrary, it is the current medical staff which is assigned new roles. Performing these new tasks implies a clear increase in the workload of these professionals.

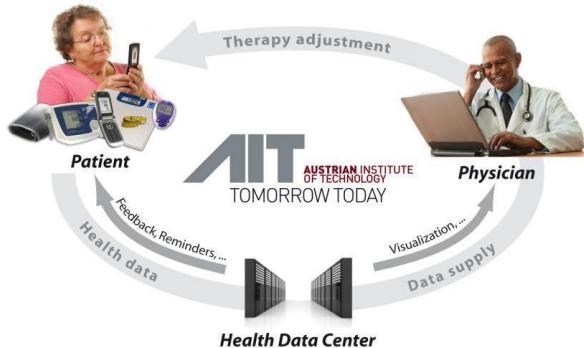
Patients are at the core of the DiabMemory system. During their 3-week stay in the VAEB's facilities in Breitenstein, patients diagnosed with diabetes 1 or 2 or patients at risk of diabetes receive training and education on how to cope with diabetes. This training is provided by specialised nurses, nutritionists and diabetologists. During their stay, the facility staff trains the patients on how to use the Health Dialogue programme. If patients are interested in joining the programme, the same training staff introduces them to the system.

2.5 Information and Communication Technologies

The DiabMemory system is the heart of the Health Dialogue Diabetes programme. AIT – the Austrian Institute of Technology – has been responsible for developing DiabMemory, the telemedicine system that enables diabetes patients to track essential health parameters using a mobile phone and to share these data with their general practitioner.

Figure 7 presents an overview of the main components of the DiabMemory system and the communication flow between the different actors and entities interacting with the system.

Figure 7 – DiabMemory components and feedback loop (© AIT)



The DiabMemory equipment for users comprises the following components:

- A smart phone with Android OS and NFC reading capabilities.
- A weight scale, NFC enabled.
- A glucose meter, NFC enabled.
- A blood pressure meter, NFC enabled.

Figure 8 - DiabMemory app screenshots

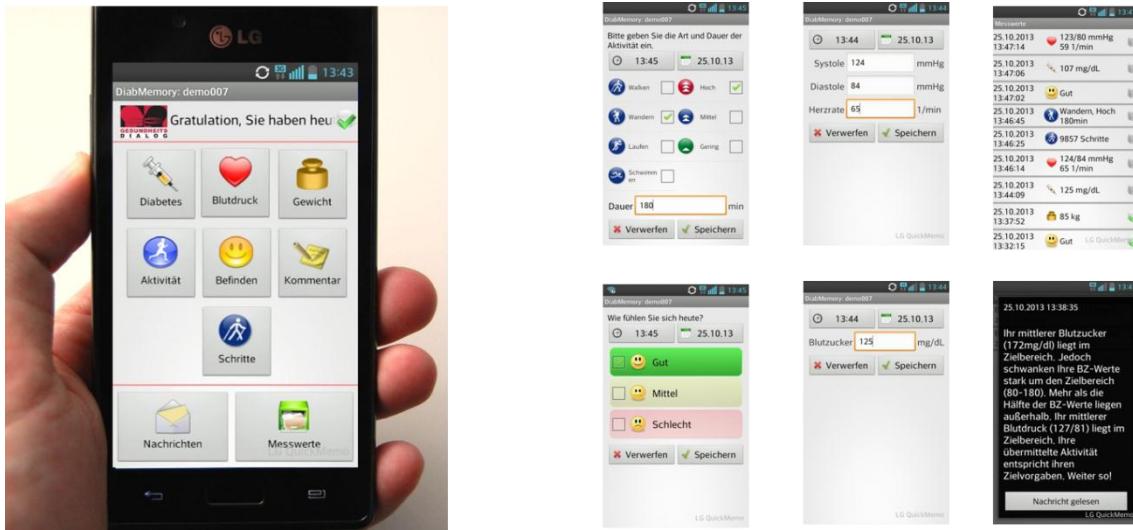


Figure 8 presents some screenshots of the DiabMemory application as displayed in an Android smartphone. The DiabMemory app allows patients to record information about their glucose levels, their blood pressure, their weight, their activity levels and their mood status. Besides, patients can also use a web platform to insert their data. The web portal is available at <http://www.diabmemory.at>.

All the medical devices are equipped with the Keep In Touch (KIT) technology, a technology patented by AIT. KIT enables simple and intuitive data transfer from medical devices, as well as broad range of data capture using passive RFID tags (ID-cards, monitoring of medication, well-being, etc.). With KIT, the introduction of data into the system is realised in an almost implicit form. Users do not have to manually introduce any data into the smartphone, which improves the usability and accessibility of the system for users with low digital literacy, or with vision or functional impairment for instance. With KIT, users do not even have to explicitly log in to the system. The DiabMemory smartphone can read the patient's id from a patient's ID-card and launch the DiabMemory application automatically. Figure 9 presents the DiabMemory ID-card and its connection to a smartphone with a NFC-enabled loop.

Figure 9 - Smartphone with the DiabMemory app and ID-card

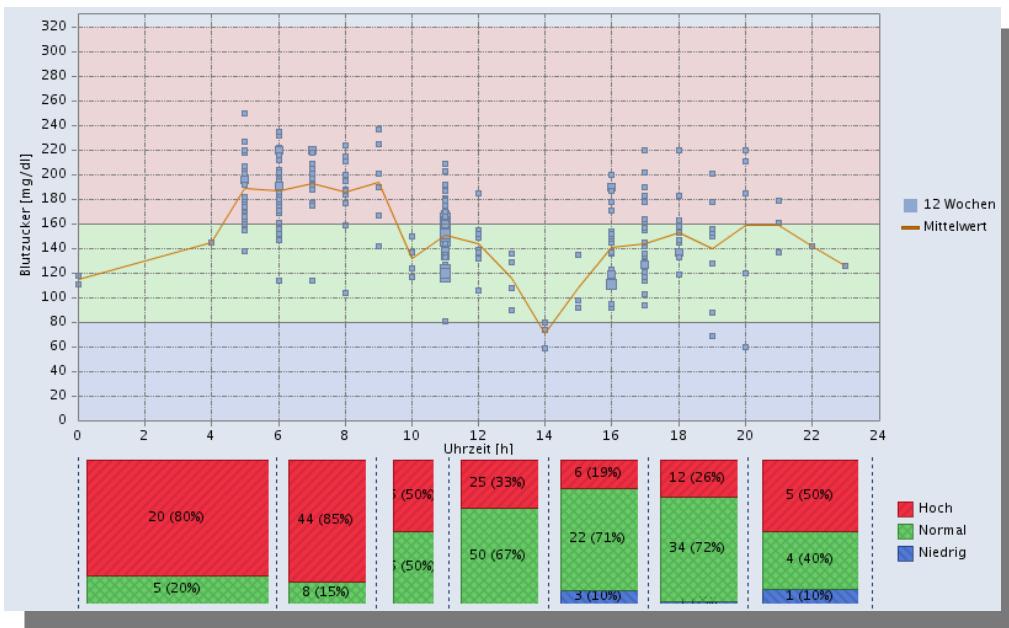


Every time the patient performs a measurement using any of the medical devices, they only have to place the smartphone close enough to the medical device in order to start the data transfer process. At the early stages of the project, no mainstream vendors of medical devices manufactured any medical devices with NFC capabilities. Therefore, during the early stages of the project, AIT developed prototypes of manually-integrated NFC equipment into commercial medical devices. Recently, AIT reached an agreement with mainstream medical device manufacturers, such as AND, in order to develop commercial NFC-enabled medical devices.

Once patients have finished acquiring their medical data in their smartphone, they have to touch the ID-card again in order to start the data transmission. The data are sent in a secure way and stored in the databases of the Health Data Centre maintained by AIT. If patients are using the web platform to upload their data, they only have to submit the data using regular web forms.

Users and medical professionals can access the data submitted by patients using the DiabMemory web platform. Figure 10 presents an example of the visualisation of the glucose data for a sample patient over a period of 24 hours. The visualisation of data allows both physicians and patients to obtain better knowledge on trends and more updated information, which helps prevent long-term complications.

Figure 10 – Visualisation of glucose data in DiabMemory's web platform



One of the most interesting aspects of the DiabMemory system, that distinguishes it from many other health monitoring systems, is the implementation of the closed-loop approach. Physicians participating in the DiabMemory initiative sign a contract with VAEB establishing a minimum number of interactions with patients. According to this contract, physicians have to review the data of all their patients participating in the DiabMemory initiative and send them feedback on a weekly basis. The DiabMemory platform allows physicians to send either pre-defined or personalised messages to patients depending on the monitoring results during a given period. Feedback messages are classified under one or more of the following categories:

- Motivational (encouraging patients to pursue the current course of action)
- Instrumental (providing patients with clear instructions)
- Confirmational (actively retrieving more information)
- Personal (personal engagement; chitchat)
- Factual (precise figures on a person's health status)

Regarding integration with other Health Information Systems, it is worth mentioning that all data gathered by the DiabMemory system are stored in a proprietary database, created and maintained by the AIT. Currently, there is no connection with any other health data repositories. Nevertheless, the AIT has worked on the development of methodologies and tools needed to integrate these data with the national electronic health record, bearing in mind that all data format and protocols are based on standards such as HL7 or CDA.

2.6 Governance and policy setting

VAEB has been the main driving force of the Health Dialogue initiative. Innovation and the use of ICT are at the core of the VAEB strategy, which aims to guarantee the sustainability of health care provision and to provide better health care and prevention programmes to their policy holders. The Health Dialogue programme is an exclusive initiative of the Health and Innovation division in the VAEB, and so far it does not seem to have influenced the

strategies of other insurance companies in Austria. The Health and Innovation division of VAEB receives its funding from the usual operational structure of the company, i.e. the health, accidents and pensions division and the service centre. Therefore, the funding used to implement the Health Dialogue initiative comes exclusively from VAEB, as part of its strategic plan for the future.

As to the policy environment, the healthcare system in Austria is under the joint authority of the federal and the regional levels (Länder) with delegation of responsibilities to self-governing bodies. The Federal Government is responsible for providing high-level guidelines in the field of eHealth that are later implemented at regional level and by the self-governing bodies.

In 2004, the Austrian social security started to develop a concept for a disease management programme for patients with Type 2 diabetes patients. The implementation of the disease management programme “Therapie Aktiv – Diabetes im Griff” started in 2007. The aim is to prevent long-term diabetes complications and to ensure quality of life for patients through:

- Prevention and health promotion
- Structured diagnosis and medical treatment of high quality
- Consideration of the overall patient cardiovascular risk
- Stronger involvement / participation of patients in the treatment process

Patients enrolled in the programme attended a training course on diabetes type 2, where they were taught techniques on how to cope with their disease. During the course, patients were provided with a “patient’s booklet” which dealt with topics such as healthy lifestyle, blood sugar management, diabetes medication and preventable long-term complications. Patient empowerment was one of the key goals of the project and patients signed contracts with their physicians establishing health goals. Medical examinations were provided on a regular basis. General practitioners who joined the programme were trained by other physicians, and were responsible for gathering data about the users participating in the programme. No data was acquired nor stored electronically through the ‘Therapie Aktiv’ programme, nor did it lead to integration into the praxis of general practitioners. Nevertheless, the ‘Therapie Aktiv’ programme served as a pilot test for the development of disease management programmes adopted in the general practice, and served as the basis, from both a conceptual and a practical point of view, for the deployment of more advanced solutions like DiabMemory.

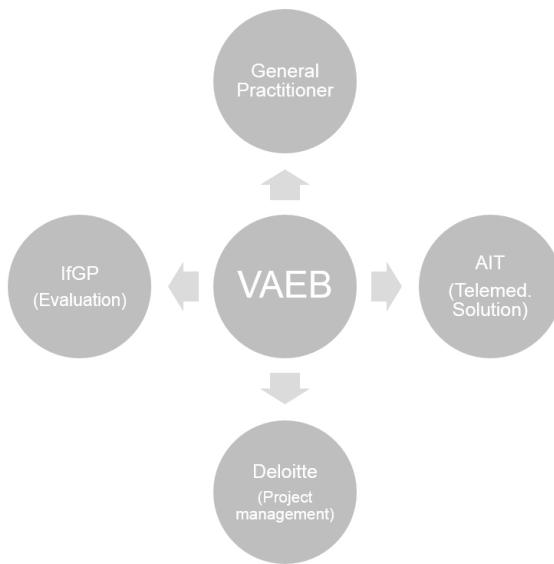
The Federal Ministry of Health has set up a commission about tele-health services in Austria which focuses on three main health dimensions: (1) diabetes (due to the activities carried out in Breitenstein), (2) heart failure, and (3) integration of a gate-keeping function to reduce the use of ambulatory services at the hospitals. The eHealth initiative was launched by the ADV (Arbeitsgemeinschaft für Datenverarbeitung) in cooperation with the Federal Ministry of Health in April 2005, and develops position papers focusing on the implementation of e-health for different target groups, from the perspective of all stakeholders involved (patients, caregivers, physicians, etc.). In 2013, the Commission published position papers regarding the remote management of diabetes (Bajjura, 2013), for the application of eHealth tools within the scope of emergency medicine and for the implementation of Ambient Assisted Living (AAL) services. VAEB representatives participated in the working group dedicated to the remote managing of diabetes, sharing their experience with implementing the Health Dialogue programme.

Nevertheless, there are still legal aspects that have to be discussed and clarified to the general practitioners. For instance, questions related to liability issues when physicians provide recommendations to patients in electronic form, to ICT and Health IT still need to be dealt with.

2.7 Organisation and processes

The Health Dialogue programme started in 2010 and is a joint effort of 5 organizations from Austria (see Figure 11).

Figure 11 - Health Dialog partners



As shown in Figure 11, VAEB has been the centre of the Health Dialogue programme. Besides their role in the organisation, General Practitioners from VAEB have contributed to the definition of the system and of the Disease Management Protocols. AIT, the Austrian Institute of Technology, is the partner responsible for implementing the telemedicine solution. IfGP (Institut für Gesundheitsförderung und Prävention) - the Institute for Health Promotion and Prevention - is responsible for project management, consulting, product development, process facilitation and evaluation. Finally, Deloitte has performed project management duties.

In order to provide better support to the implementation of innovative initiatives in the field of healthcare, VAEB had to undergo an in-depth reorganisation. Initially, the VAEB structure comprised three main pillars: a department for health insurance, a division for accident insurance and a department for pension management. In order to support innovative approaches that allowed the company to cut health care costs, and to provide better long-term care services to their insurers, VAEB undertook a series of changes to its structure. First, the three 'classic' departments (i.e. health, accidents and pensions) merged into one division. Second, a 'service centre' unit was created to manage all horizontal issues, such as those related to infrastructures, IT, accounting, etc. Third, a Division for Health and Innovation was created. This division aims to bring innovation to the health care process by adopting a holistic approach fulfilling the following objectives:

- Reduction of treatment costs.
- Increase or preservation of individual health.

- Preservation of employment and workability.
- Reduction of long-term care.
- Maintaining the highest possible level of self-determination.

At the beginning of the project, the AIT was responsible for creating a master plan for the overall project that included both the technical and the medical part. The medical part was discussed thoroughly between the physicians at the VAEB and other external experts. The basis for the definition of the medical part of the initiative took, as a starting point, the Austrian guidelines for the treatment of diabetes.

2.8 Reimbursement model and economic flow

The Health Dialogue initiative has not received any public funding and has been fully funded by VAEB, specifically by the Health, Accident and Pensions division and the Service Centre. This initiative is the result of the long-term vision of the Division of Health and Innovation at VAEB, and at the moment there is no published evidence about the expected cost-savings that this initiative may bring.

Deloitte, the partner responsible for project management within the Health Dialogue initiative, performed an economic and business analysis at the very beginning of the project. Nevertheless, the results were not conclusive, and it was considered that there were too many variables to build a robust economic model.

As mentioned earlier, GPs receive a fee per patient assessed using DiabMemory. This fee reflects the usual amount GPs receive in Austria for attending patients. However, due to the fact that the number of patients managed with DiabMemory is low in relation to the overall number of patients in a GP's practice, the fee for taking part in the Health Dialogue is low in relation to the monthly turnover. Therefore, in order to act as a real incentive for GPs it is essential to achieve a critical mass of patients.

3 Transferability

The Health Dialogue is a good example of the integration of a telemedicine solution in routine practice. The Health Dialogue is an initiative of VAEB, more specifically of its Division of Health and Innovation. The main drivers for the success of this initiative have been the vision of the Head of the Division of Health and Innovation and the collaboration of all the health professionals from the Breitenstein facilities. Even though the first stages of the implementation imply an increase in the workload of health professionals, all the staff in VAEB collaborated with the other partners in order to ensure the success of the initiative.

Hence, the involvement of general practitioners and other health professional might be one of the main barriers that hinder the implementation of the Health Dialogue initiative at national level. So far, only policy holders from the VAEB have the possibility to use the DiabMemory telemedicine system. This implies that a General Practitioner who has 100 patients will probably have 1 or 2 patients who use the system. Therefore, many general practitioners consider that it is not worth spending time learning how to use the software in order to assess so few patients. Moreover, incentives depend on the number of patients assessed by the professional, and therefore few patients imply little income. In conclusion, there is a need to achieve a critical mass of patients in order to make sure that it is useful and profitable for general practitioners to join the programme.

In order to involve a larger number of patients, the collaboration of both the Government organisations and the other insurance companies in Austria is needed. As described in Section 3, VAEB had to undergo a profound reorganisation in order to bring innovation into their routine processes. Other insurance companies seem to be more resistant to innovation, as the implementation of innovative strategies will not bring any economic benefits in the short-term. VAEB has collaborated in the development of the position paper on diabetes developed by the eHealth commission set up by the Federal Ministry of Health in 2013 (Badjura, 2013). This position paper presents the Health Dialogue initiative as a success story of implementation of an eHealth solution for managing diabetes, and provides recommendations for future implementation.

All partners involved in the Health Dialogue initiative have made a great effort to disseminate the results of the project. The AIT has presented DiabMemory in several conferences and scientific journals, such as the Journal of Medical Internet Research (Kollmann, 2007) and the Journal of Medical Informatics (Klasnja, 2012). In November 2013, VAEB organised a big event coinciding with the Diabetes World Day, to which stakeholders from all over Austria (representatives from other insurance companies, policy makers, prospective users etc.) were invited. In addition, the project has been presented in several newspapers and on TV, and a lot of dissemination material has been developed. For instance, a video presenting the initiative was developed and is currently available on YouTube.⁴

All the lessons learned during the implementation of the Health Dialogue initiative will provide guidance for other telehealth initiatives. The AIT is collaborating with different insurance companies and organisations in order to export a similar concept for the remote management of other health conditions such as heart failure and hypertension. Moreover, for diabetes telemonitoring, the AIT has started a discussion in order to start collaboration with the 'Therapie Aktiv' project.

4 Conclusions

The Health Dialogue initiative is a great example of the integration of a telemedicine solution into routine praxis. This proof-of-concept has demonstrated the availability of mature technologies, and preliminary reports suggest that the use of the DiabMemory system will have a positive impact on the health condition of the patients. The success of this proof of concept has been based on the vision and commitment of VAEB, the insurance company which is at the centre of the Health Dialogue initiative, and the commitment and close collaboration of VAEB's medical staff, the technical partners in the AIT and the other partners in the Health Dialogue initiative. This collaboration environment is one of the key factors for the success of the project, though it may be difficult to expand it to other healthcare organisations, particularly other insurance companies. Moreover, in order to foster innovative approaches, VAEB had to undergo a profound reorganisation and create a specific division to support innovation, a process which may not be a priority for other insurance companies.

In order to move from a proof of concept to actual implementation at scale, a critical mass of patients needs to be reached. VAEB is a nationwide insurance institution and patients from all over Austria can enrol in the Health Dialog programme. This means that a VAEB

⁴ <https://www.youtube.com/watch?v=-U02rSOYHEQ>

family doctor in some other region in Austria, where there may be many railway and mining workers, might attend only 1 or 2 patients using the DiabMemory system. General Practitioners participating in the Health Dialogue programme receive incentives based on the number of patients attended. This fee can be considered suboptimal given the amount of time spent in training and in reviewing the data of a small number of patients.

At national level, the Austrian Government is creating a favourable environment for the development of innovative approaches in the provision of health care. The implementation of a national Electronic Health Record by the beginning of 2015 or the commission on telehealth started in 2009 will foster the inclusion of ICT solutions in the processes of the different health care organisations. However, there are still legal issues that have to be addressed, especially in terms of liability in the case of recommendations made by electronic means.

Figure 12 shows the main facilitators. To sum up, the reorganisation of services within the VAEB and their vision has been one of the main facilitators of the Health Dialogue initiative. The VAEB has put innovation at the core of its strategy, and has provided the funds needed to guarantee the success of the proof of concept and the incentives programme for involving General Practitioners. Nevertheless, it is important to attract a critical mass of patients in order to ensure the participation of general practitioners across Austria.

Figure 12 - Facilitators of Diabmemory initiative



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Annex

Figure 13 - High glucose levels over 12 months (77 patients)

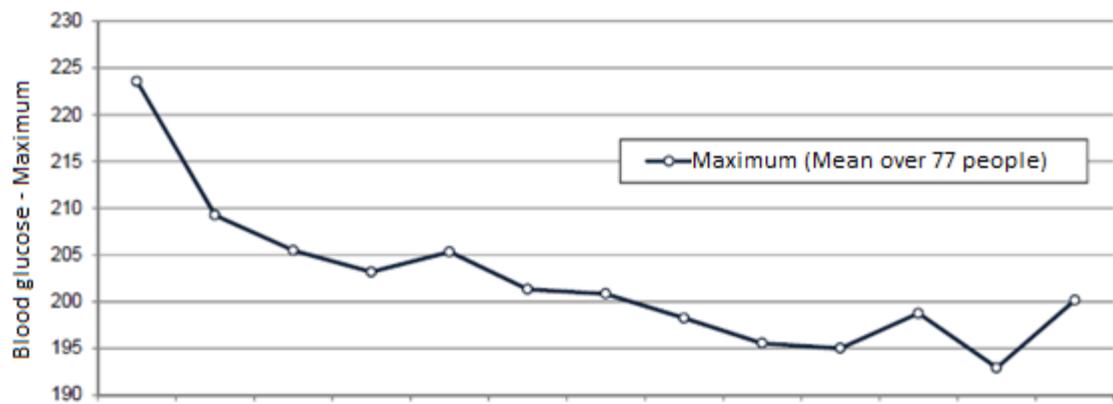
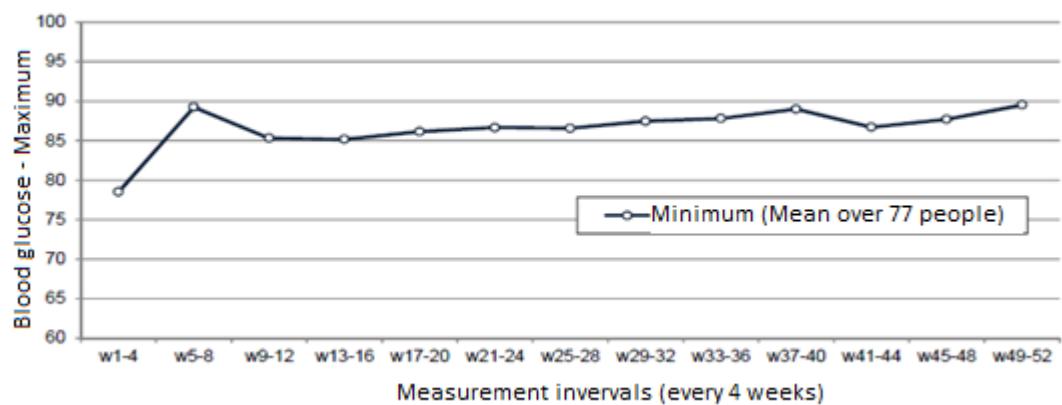


Figure 14 - Low sugar levels over 12 months (77 patients)



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