POWER2DM

"Predictive model-based decision support for diabetes patient empowerment"

Research and Innovation Project
PHC 28 – 2015: Self-management of health and disease and decision support systems based on predictive computer modelling used by the patient him or herself

Deliverable 3.10

D3.5.1 - Behaviour Change Intervention Contents

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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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V0.1	6.8.2018	Deliverable template & chapter about translation	SRFG	SAS
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POWER2DM CONSORTIUM PARTNERS

abbrev	Participant organization name	Country
TNO	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	Netherlands
IDK	Institute of Diabetes “Gerhardt Katsch” Karlsburg	Germany
SRDC	SRDC Yazilim Arastirma ve Gelistirme ve Danismanlik Ticaret Limited Sirketi	Turkey
LUMC	Leiden University Medical Center	Netherlands
SAS	SAS Servicio Andaluz de Salud	Spain
SRFG	Salzburg Research Forschungs Gesellschaft	Austria
PD	PrimeData	Netherlands
iHealth	iHealth EU	France

EXECUTIVE SUMMARY

-The purpose of this deliverable is to implement, static knowledge modules content as well as define dynamic knowledge using the authoring tools implemented in Task 3.3. The content requires adaptations for each pilot study, due to the need of different languages and different cultural backgrounds.

-Chapter 2 shows actions related to energy battery and emotional compass adaptation.

-Chapter 3 refers to Knowledge Module Content. Intervention tables and POWER2DM web component have been adapted to each social and cultural context of partner countries that participate in POWER2DM project.

-In Chapter 4, medication lists are checked and compared from partner countries with KADIS and Mobile app.

-Chapter 5 shows close cooperation with the Patient Organizations to be involved in the project.

OPEN ISSUES

No:	Date	Issue	Resolved
1			

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose and Scope

The purpose of this deliverable is to implement, static knowledge modules content (such as text, multimedia snippets), as well as define dynamic knowledge (rules and workflows) using the authoring tools implemented in Task 3.3. The content requires adaptations for each pilot study, due to the need of different languages and different cultural backgrounds. Indeed, different decision rules are applied to different countries, as different interventions or medications could not be legalized in individual countries. Therefore, we check that the rules and workflows are legally correct in each country supported for POWER2DM. Work has been carried out in close cooperation with the Patient Organizations to be involved in the project under guidance of the IDF

1.2 References to POWER2DM Documents

- POWER2DM Description of Work
- D3.3.1 - Action Plan Engine
- D2.2.1. Short-term Predictive Component

1.3 Definitions, Abbreviations and Acronyms

Table 1 List of Abbreviations and Acronyms

Abbreviation/ Acronym	DEFINITION
IDF	International Diabetes Association
BCT	behaviour change theory
AEMPS	Spanish Agency of Medicines and Sanitary Products
ADICOR	Asociación para la Diabetes de Córdoba

2 ENERGY BATTERY & EMOTIONAL COMPASS

In every human, a balance between what one should do and resting is essential, this balance allows us to maintain our physical and mental health. This is also essential in conditions such as diabetes. The objective of this action is give advice to the patients and to establish a series of strategies to help to recharge his energy. We have adapted these advices, text and multimedia, to Spanish.

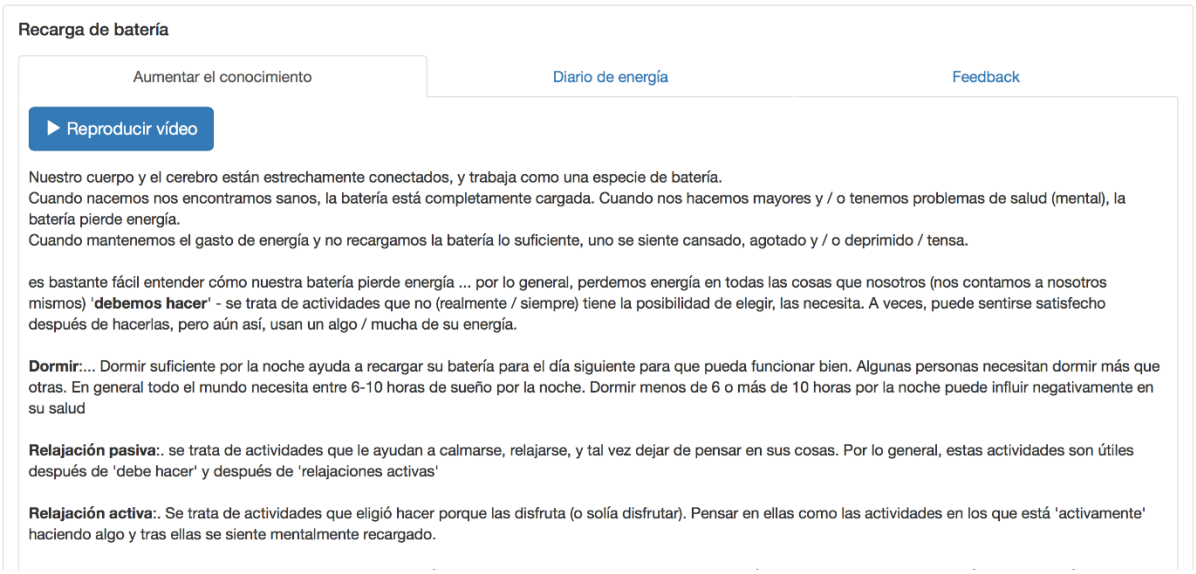


Figure 1. Translated and adapted energy battery content

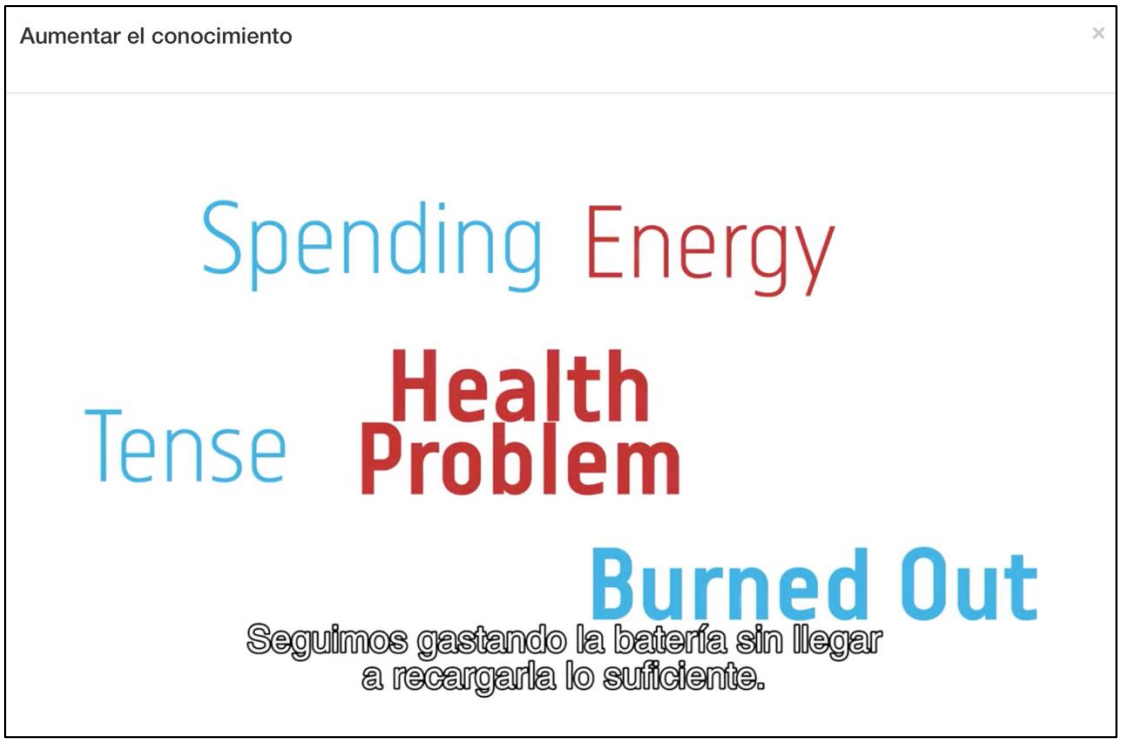


Figure 2. Energy battery video. Subtitles have been translated and adapted to Spanish socio-cultural context.

People with diabetes face the difficulty of integrating diabetes into their daily lives. Fortunately, many people with diabetes find a way to integrate diabetes into their lives in a positive way and for others this feels like a struggle. Personal goals in daily life can come into conflict with the self-management of diabetes, and they may feel as if they constantly have to choose between their important personal goals and their health goals. As a consequence, their self-management of diabetes or their quality of life can be negatively influenced.

This "emotional compass" helps to examine important areas in people with diabetes and how your diabetes is related to important things.

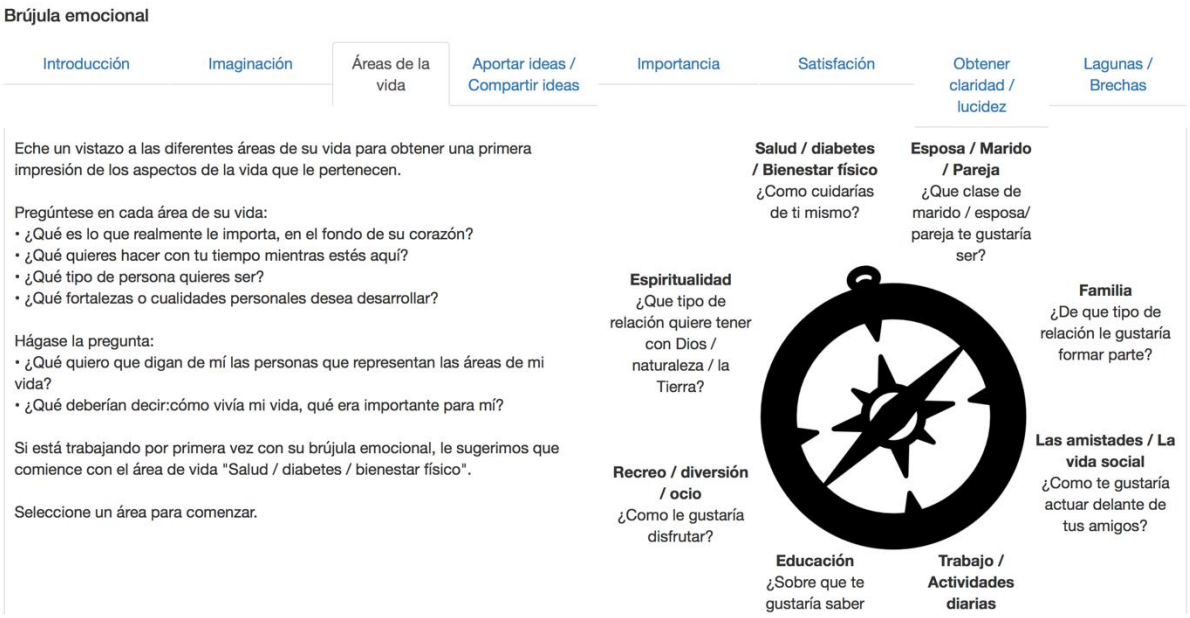


Figure 3. Emotional compass.

3 KNOWLEDGDE MODULES CONTENT

3.1 PATIENT INTERVENTION TABLES

The overall goal of WP3 is the design and development of a personalised decision support system, in particular;

- To select the required self-management DSS functionalities

- To develop dynamic behaviour change intervention models for a personalised decision support system based on behaviour change theory (BCT)
- To improve the EMPOWER Recommender Engine for automated adaption of goals and action plan based on predictions (WP2)
- To improve the EMPOWER Action Plan Engine and develop a guidance-based goal specification process including a feedback mechanism based on the available patient profile and WP2's Predictive

Framework

- To develop the Web and Mobile-phone GUI components to deliver the DSS functionality and behavioural change interventions
- To integrate the models, services and the GUI components into Personalized Self-Management DSS System for guided goal setting, activity planning needed to foster behavioural changes, delivering adaptive BCT interventions.

In D3.5 Implemented static knowledge modules content interventions tables have been reviewed and translated three languages (Dutch, German and Spanish). Several forms of messages addressing the same situation (up to 6) were developed in order to improve the interaction and usability of the system. In this task, Patient Organizations took an active role, helping and reviewing them. These translated and adapted interventions tables are necessary for the Protoype 2 (**Figure 1**)

13 Author(s)	14 [lang=en] Intervention Text to Patient. This is a hyperlink [example](http://www.example.com/) No blank space between "](" This is a **bold text**	spacer	Translation to Spanish
srfg,lumc	Great success! Allow yourself a small reward for it. Think of something that YOU like (a magazine/newspaper, taking a nice bath, drinking coffee on a terrace etc.)		¡Gran éxito! Permítete una pequeña recompensa por ello. Piense en algo que le guste (una revista / periódico, tomar un baño agradable, tomar un café en una terraza, etc.)
srfg,lumc	Great job! Keep up the good work!		¡Gran trabajo! ¡Sigan con el buen trabajo!
srfg,lumc	Excellent! You've got all your activities done and they will lead to goals!		¡Excelente! ¡Has completado todas tus actividades y te llevarán a cumplir metas!
srfg,lumc	Good work!		¡Buen trabajo!
srfg,lumc	So fine!		¡Muy bien!
srfg,lumc	That is the spirit!		¡Ese es el espíritu!
	You are doing great! Have you ever thought of sharing your experiences with diabetes with others? Other people may benefit from your experience! And sharing your goal progress might give an extra boost in your self-confidence. You might consider sharing your experiences in a blog.		¡Lo estás haciendo genial! ¿Alguna vez pensó en compartir sus experiencias con respecto a la diabetes con otras personas? ¡Otras personas pueden beneficiarse de su experiencia! Y compartir su progreso hacia la meta, podría darle un impulso adicional a la confianza en sí mismo. Puede considerar compartir sus experiencias en un blog, con compañeros, en alguna asociación.

Figure 4. Translated and adapted intervention tables.

3.2 POWER2DM WEB COMPONENT (WORDPRESS WEBPAGE)

To help patients to treat their diabetes with a support system SRFG have created a web page https://p2dm.salzburgresearch.at/ (**Figure 2**) which has included a total of 60 topics of interest for patients with diabetes.

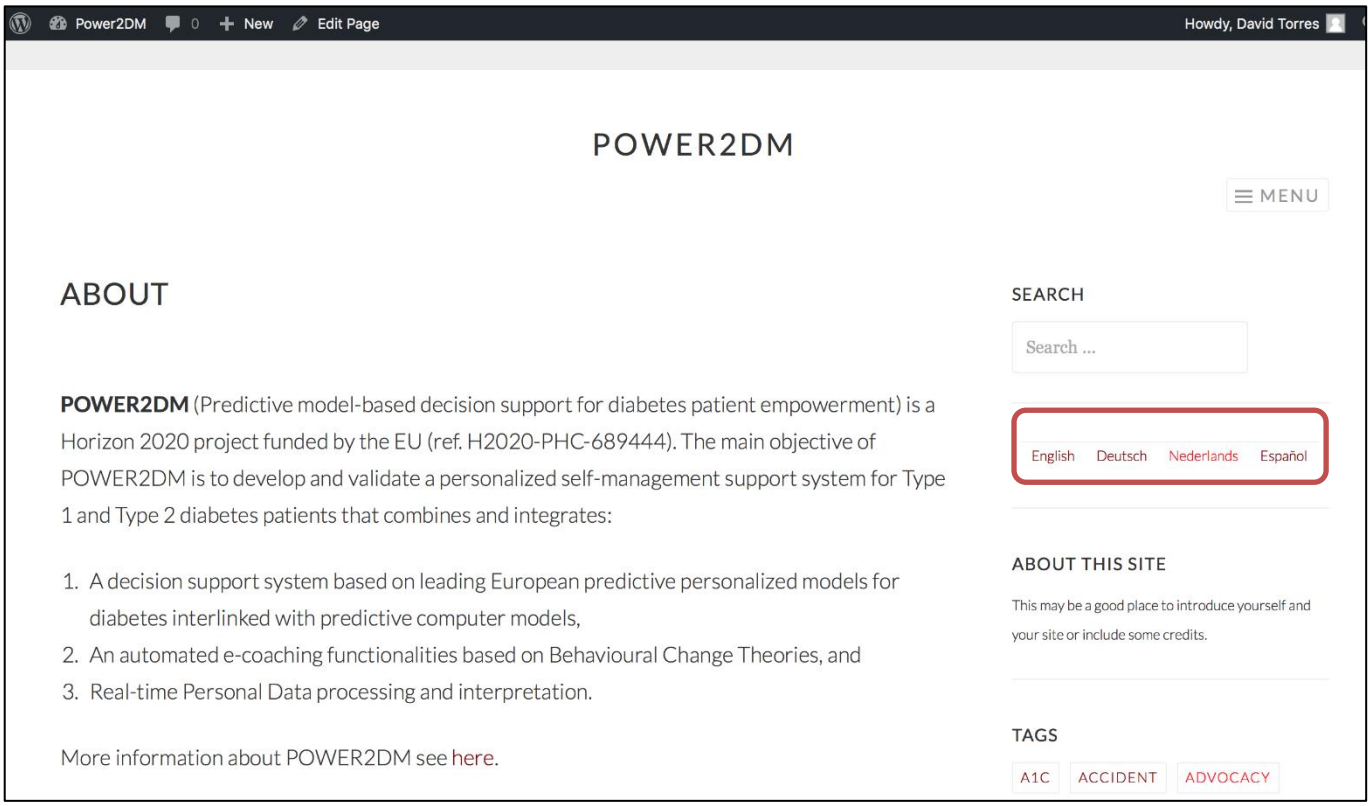


Figure 5. Power2DM WordPress Website Main Page. Patients can choose web in different languages (red square).

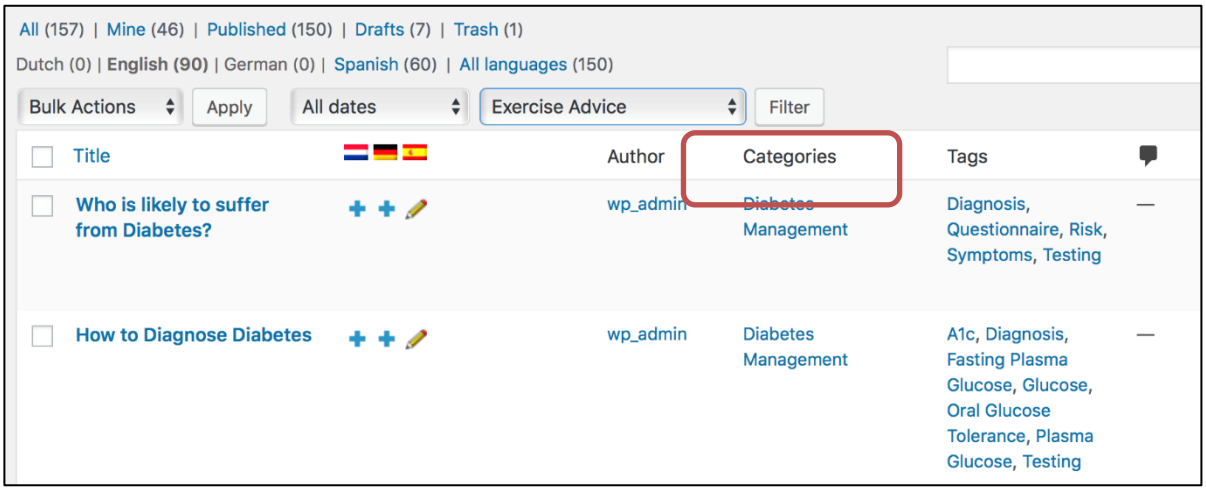


Figure 6. Power2DM WordPress Website Posts. Topics can be filtered by patients in categories (red square).

Although all topics have been tried to be valid for all patients with diabetes, some are directed more to type 1 diabetes patients and others to type 2 diabetes. These themes have not only been translated, but adapted to the social and cultural context of each partner country. In the different post, topics related to nutrition, exercise advice and management, daily life management, drugs or others in which patients are advise how to react to certain situations, for example to hypoglycemic

episodes, which have been adapted to each country and healthcare system(**Figure 3**). In some of the recommendations external sources of information are included(**Figure 4**) to help patient´s empowerment .

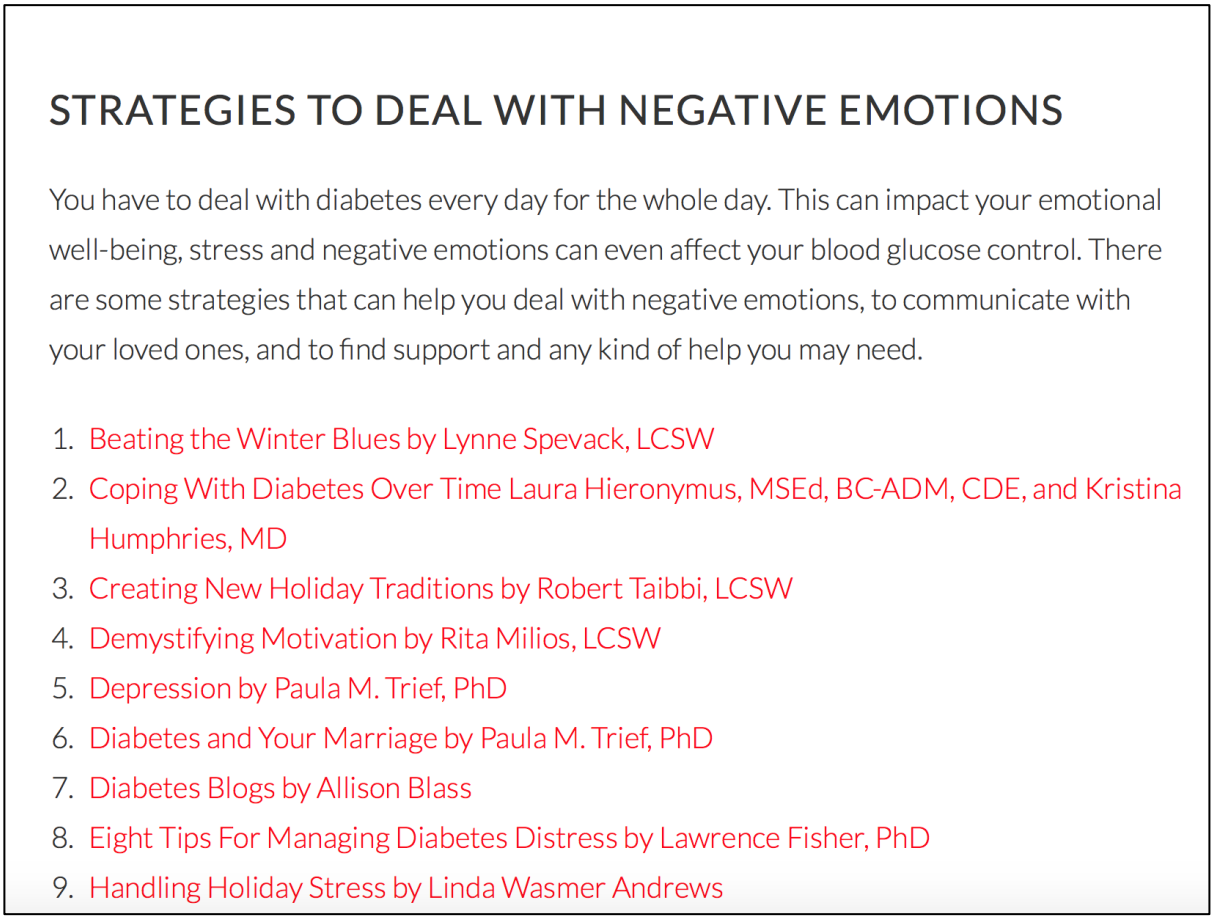


Figure 7. Power2DM WordPress Website Posts. Some topics included external sources of information to help patients.

4 CHECK AND COMPARISON OF MEDICATION LISTS FROM PARTNER COUNTRIES WITH KADIS AND MOBILE APP .

The KADIS® model based diabetes decision support programs and e-health diabetes care services were developed in the IDK over a period of about three decades by performing extended and innovative research and development activities. The worldwide unique, patented KADIS® program supports initially

primary care providers in their outpatient settings by patient-focused visualization and evaluation of the current metabolic situation of a given individual patient and by predicting the outcome of metabolic control in association with therapeutic interventions.

Assessment of each patients´s individual metabolic situation requires only an input of baseline characteristics, such as insulin dosage & oral antidiabetics drugs, caloric intake, and physical activity and a patient-related, individually characteristic daily glucose profile. As a therapy simulator, the KADIS®-based personalized decision support program assists physicians in choosing quick and save individually related diabetes management regimes that are most appropriate for achieving patient-focused glycaemic targets.

Medications as part of inputs of the KADIS® Home Monitoring Module
Inputs of the KADIS® Home Monitoring Module include some major points:

- Measured Glucose Data
- Basic Data (Age, Gender, Type of Diabetes, Onset of Diabetes, BMI
- Self Control Data (SK-Data):
    1. Medications: - Insulin (type, time, dosage) - OAD (type, time, dosage)
    2. Meals (time, quantity)
    3. Regular Exercise (time, duration, quantity)

In this context, a wide variety of medications are used in different countries, so it was necessary to adapt this medication to the socio-cultural and economic context of each of the partner countries.

An adaptation of the medications (names of drugs and brand name medications) available in the partner markets according to the categorization of the KADIS system (this medication will appear later in the iHealth app) has been carried out.**(Figure 5**). Spanish medication list has been extracted from "Pharmacotherapeutic guide for prescription: Public Health System of Andalusia 2016(http://www.juntadeandalucia.es/servicioandaluzdesalud/publicaciones/listadodeterminado.asp?idp=666).This guide has been made under a collaboration agreement between the Andalusian Health Service and the Andalusian Association of Primary Care Physicians. This guide is intended to achieve a rational use of the drug to improve the health of our citizens in the most efficient way possible and it can be used as a reference for prescription. In addition, this

medications can be checked on the official website of the Spanish Agency of Medicines and Sanitary Products (AEMPS): https://www.aemps.gob.es/medicamentosUsoHumano/farmacopea/home.htm

Branded OAD codes	Branded OAD Display	Name	Tablet	KADIS categorization (form or active substance code)
Glucobay(50)	Glucobay 50	Glucobay	50	Acarbose
Glucobay(100)	Glucobay 100	Glucobay	100	Acarbose
Glucobay(150)	Glucobay 150	Glucobay	150	Acarbose
Glucobay(500)	Glucobay 500	Glucobay	500	Acarbose
Glumida(50)	Glumida 50	Glumida	50	Acarbose
Glumida(100)	Glumida 100	Glumida	100	Acarbose
Acarbosa(50)	Acarbosa 50	Acarbosa	50	Acarbose
Acarbosa(100)	Acarbosa 100	Acarbosa	100	Acarbose
Diastabol(50)	Diastabol 50	Diastabol	50	Miglitol
Diastabol(100)	Diastabol 100	Diastabol	100	Miglitol
Plumarol(50)	Plumarol 50	Plumarol	50	Miglitol
Plumarol(100)	Plumarol 100	Plumarol	100	Miglitol
Miglitol(50)	Miglitol 50	Miglitol	50	Miglitol
Miglitol(100)	Miglitol 100	Miglitol	100	Miglitol
Biocos(850)	Biocos 850	Biocos	850	Metformin
Dianben(850)	Dianben 850	Dianben	850	Metformin
Dianben(1000)	Dianben 1000	Dianben	1000	Metformin
Metformina(850)	Metformina(850)	Metformina	850	Metformin
Metformina(1000)	Metformina(1000)	Metformina	1000	Metformin
Diabesin(500)	Diabesin 500	Diabesin	500	Metformin
Diabesin(850)	Diabesin 850	Diabesin	850	Metformin
Diabesin(1000)	Diabesin 1000	Diabesin	1000	Metformin

Figure 8. Medications list include names of drugs ,brand name medications, dosage and KADIS categorization.

All this collected information(from Germany, the Netherlands and Spain) has been integrated in the system designed by iHealth. The final system will optimally show the patients only medications available in their country.

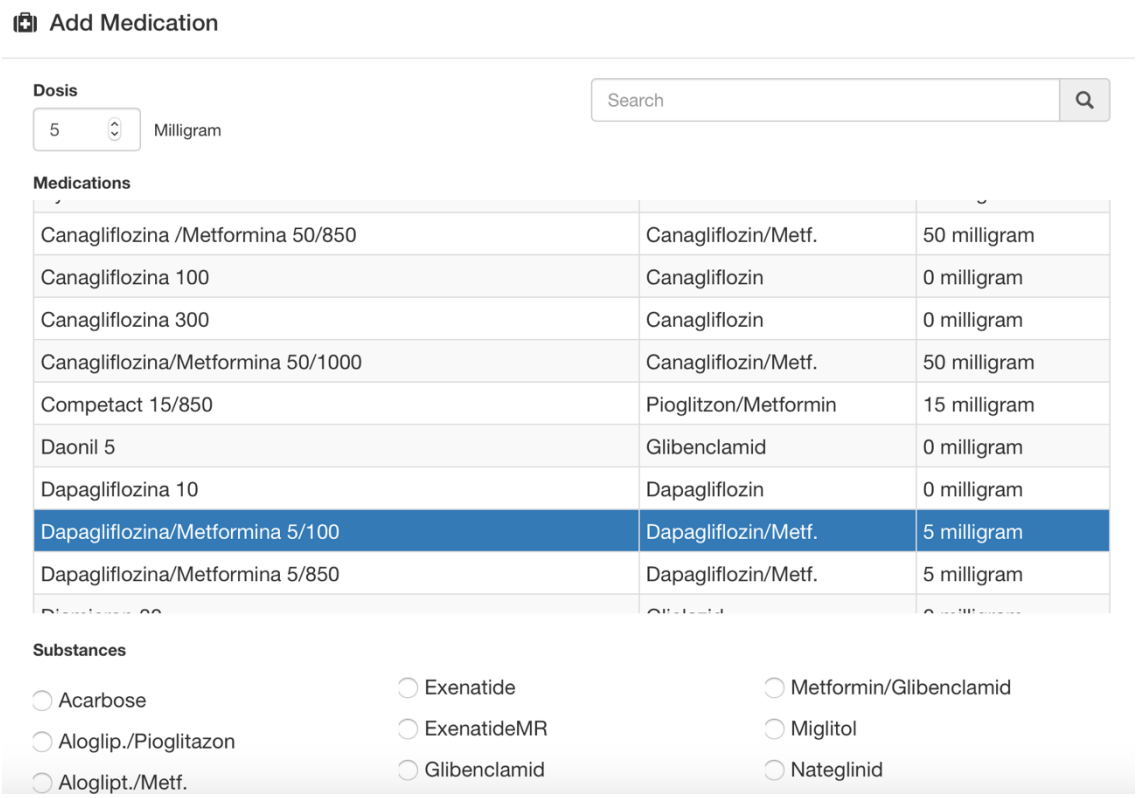


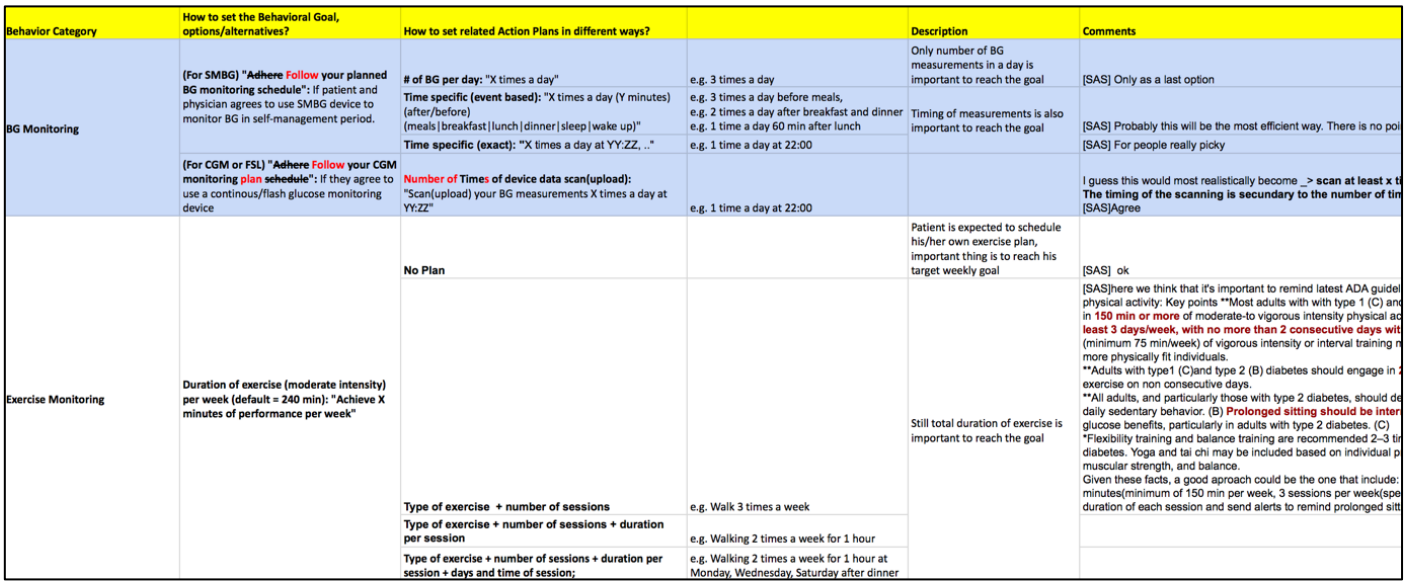
Figure 9. Example of Treatment plan from Shared Decision Making Application

5 MEDICAL INTERACTION CONTENT

Human computer interaction(HCI) interfaces will be designed to enable patients and doctors to interact . The user interfaces will be made available as mock-ups in an early stage of the project for evaluation and feedback of prospective end-users.

To improve the Action Plan Engine and develop a guidance-based goal specification process including a feedback mechanism based on the available patient profile and WP2's Predictive Framework. To finalize the list of possible Treatment Behavioral Goals and Plans in POWER2DM Evaluation campaign that clinicians will set for patient during consultations for the next self-management period a list of Behavioral Goals and Plans has been developed (SRDC). These Goals and plans include 6 categories:

1.BG Monitoring
2.Exercice monitoring.
3.Carbohidrates monitoring.
4.Steps Monitoring.
5.Medication Adherence.
6.KAIDS 3-day Data Collection of FingerPrint Identification.



Behavior Category	How to set the Behavioral Goal, options/alternatives?	How to set related Action Plans in different ways?		Description	Comments
BG Monitoring	(For SMBG) "~~Adhere~~ Follow your planned BG monitoring ~~schedule~~": If patient and physician agrees to use SMBG device to monitor BG in self-management period.	**# of BG per day:** "X times a day"	e.g. 3 times a day	Only number of BG measurements in a day is important to reach the goal	[SAS] Only as a last option
		Time specific (event based): "X times a day (Y minutes) (after/before) (meals|breakfast|lunch|dinner|sleep|wake up)"	e.g. 3 times a day before meals, e.g. 2 times a day after breakfast and dinner e.g. 1 time a day 60 min after lunch	Timing of measurements is also important to reach the goal	[SAS] Probably this will be the most efficient way. There is no poi
		Time specific (exact): "X times a day at YY:ZZ, .."	e.g. 1 time a day at 22:00		[SAS] For people really picky
	(For CGM or FSL) "~~Adhere~~ Follow your CGM monitoring plan ~~schedule~~": If they agree to use a continous/flash glucose monitoring device	Number of Times of device data scan(upload): "Scan(upload) your BG measurements X times a day at YY:ZZ"	e.g. 1 time a day at 22:00		I guess this would most realistically become _> **scan at least x ti** **The timing of the scanning is secundary to the number of tin** [SAS]Agree
Exercise Monitoring	Duration of exercise (moderate intensity) per week (default = 240 min): "Achieve X minutes of performance per week"	**No Plan**		Patient is expected to schedule his/her own exercise plan, important thing is to reach his target weekly goal	[SAS] ok
		Type of exercise + number of sessions	e.g. Walk 3 times a week	Still total duration of exercise is important to reach the goal	[SAS]here we think that it's important to remind latest ADA guidel physical activity: Key points **Most adults with with type 1 (C) an in **150 min or more** of moderate-to vigorous intensity physical ac **least 3 days/week, with no more than 2 consecutive days wit** (minimum 75 min/week) of vigorous intensity or interval training n more physically fit individuals. **Adults with type1 (C)and type 2 (B) diabetes should engage in exercise on non consecutive days. **All adults, and particularly those with type 2 diabetes, should de daily sedentary behavior. (B) **Prolonged sitting should be inter** glucose benefits, particularly in adults with type 2 diabetes. (C) *Flexibility training and balance training are recommended 2–3 tir diabetes. Yoga and tai chi may be included based on individual p muscular strength, and balance. Given these facts, a good aproach could be the one that include: minutes(minimum of 150 min per week, 3 sessions per week(spe duration of each session and send alerts to remind prolonged sitt
		Type of exercise + number of sessions + duration per session	e.g. Walking 2 times a week for 1 hour		
		Type of exercise + number of sessions + duration per session + days and time of session;	e.g. Walking 2 times a week for 1 hour at Monday, Wednesday, Saturday after dinner		

Figure 10. Treatment Behavioral Goals and Plans example.

6 PATIENT ORGANIZATIONS

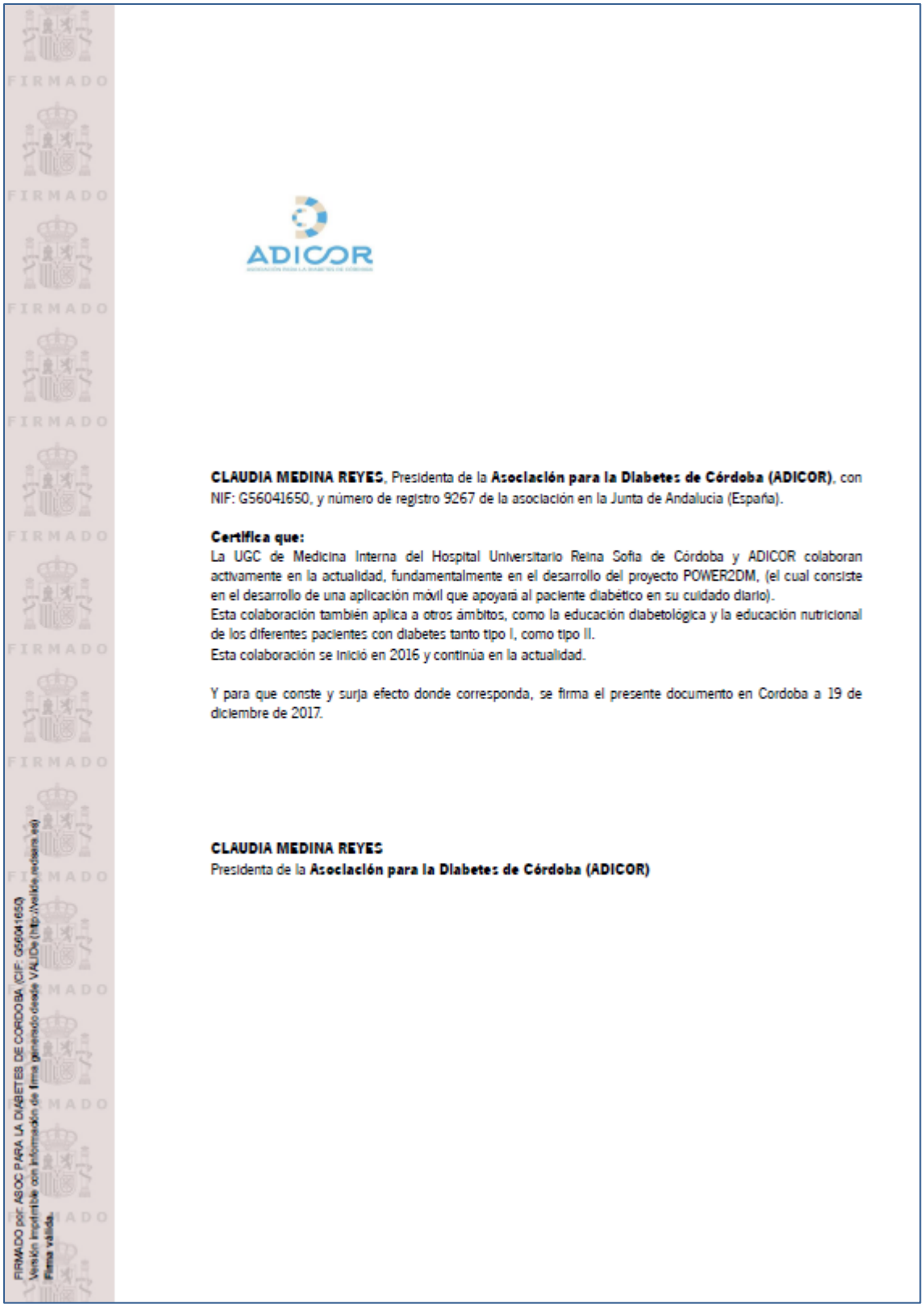
Work has been carried out in close cooperation with the Patient Organizations to be involved in the project. As an example, we attach the document that accredits the collaboration between ADICOR (Asociación para la Diabetes de Córdoba)and SAS members of the POWER2DM.

7 LITERATURE REFERENCES

1.http://www.juntadeandalucia.es/servicioandaluzdesalud/publicaciones/listadodeterminado.asp?idp=666).

2.https://www.aemps.gob.es/medicamentosUsoHumano/farmacopea/home.htm

8 APPENDICES



CLAUDIA MEDINA REYES, Presidenta de la **Asociación para la Diabetes de Córdoba (ADICOR)**, con NIF: G56041650, y número de registro 9267 de la asociación en la Junta de Andalucia (España).

Certifica que:
La UGC de Medicina Interna del Hospital Universitario Reina Sofia de Córdoba y ADICOR colaboran activamente en la actualidad, fundamentalmente en el desarrollo del proyecto POWER2DM, (el cual consiste en el desarrollo de una aplicación móvil que apoyará al paciente diabético en su cuidado diario).
Esta colaboración también aplica a otros ámbitos, como la educación diabetológica y la educación nutricional de los diferentes pacientes con diabetes tanto tipo I, como tipo II.
Esta colaboración se inició en 2016 y continúa en la actualidad.

Y para que conste y surja efecto donde corresponda, se firma el presente documento en Cordoba a 19 de diciembre de 2017.

CLAUDIA MEDINA REYES
Presidenta de la **Asociación para la Diabetes de Córdoba (ADICOR)**