



Deliverable 2.4 a

Exploitation plan

Responsible Unit: Bartenbach

**Contributors: CNR, Ideable, Apollis,
FSL, ANA**

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Document Technical Details:

Document Number	D2.4
Document Title	Exploitation plan
Version	1.0
Status	Final version
Work Package	WP2
Deliverable Type	Report
Contractual Date of delivery	31/03/2019
Actual Date of Delivery	31/03/2019
Responsible Unit	Bartenbach
Contributors	CNR, Ideable, Apollis, FSL, ANA
Keywords List	Exploitation, PETAL product, exploitation of research results, SWOT analysis
Dissemination Level	Public

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Contents

INTRODUCTION	5
1 PETAL PRODUCT DESCRIPTION	6
1.1 Initial expectations	6
1.2 PETAL product basic offer	6
1.2.1 PETAL Personalization platform and sensors	7
1.2.2 PETAL Lighting System	12
1.2.3 PETAL Cognitive Stimulation Tools.....	13
3 EXPLOITATION OBJECTIVES AND METHODOLOGY	14
3.1 Exploitation Objectives	14
3.2 Exploitation Methodology	15
4 EXPLOITATION STRATEGY BY EACH CONSORTIUM PARTNER	24
5 EXPLOITATION ENVIRONMENT AND CONTEXT	26
5.1 SWOT Analysis	26
7 TIMELINE AND KEY PERFORMANCE INDICATORS (KPIs) FOR EXPLOITATION	32
8 CONCLUSION AND NEXT STEPS	34
10 REFERENCES	35

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List of Figures

Figure 1 PETAL-Product	7
Figure 2 Mijia Door/Window Sensor	8
Figure 3 Xiaomi Honeywell Fire Smoke Detector	8
Figure 4 LEMFO LEM7 Android 7 Smartwatch	8
Figure 5 Advantages of PETAL-Lighting System	12
Figure 6 Proto-type flat with PETAL-Lighting System	13
Figure 7 Example of a cognitive stimulation game played on a tablet	14
Figure 8 Exploitation Process	15
Figure 9 Ideables service platform "kwido.com"	25
Figure 10 SWOT analysis dimensions	27
Figure 11 Measurement of exploitation success with Key Performance Indicators.....	32

List of Tables

Table 1 Sensors and lights integrated into the PETAL Rule Editor	11
Table 2 Exploitation grid	17
Table 3 Strengths of the PETAL product.....	27
Table 4 Weaknesses of the PETAL product	29
Table 5 Opportunities of the PETAL product	30
Table 6 Threats of the PETAL product.....	31
Table 7 Key Performance Indicators for the successful exploitation of PETAL.....	32
Table 8 Exploitation timeline	33

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	Exploitation plan	PETAL
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INTRODUCTION

Within the framework of the project PETAL an intelligent platform controlling lighting and other supportive applications has been developed and tested in laboratory and usability trials. The PETAL system will be implemented and empirically evaluated in private households of people with *Mild Cognitive Impairment* (MCI).

Beside this, a valuable business model draft has been built up to bring the PETAL-system into the AAL- and healthcare market. In addition, a dissemination and exploitation plan have been designed. The exploitation plan will be described within this deliverable.

The purpose of this deliverable is to create a viable exploitation plan that will describe the expected exploitation by the project consortium and each partner as well as the possible exploitation strategy. All partners have contributed to this deliverable and explained their individual interests in terms of exploitation objectives. These objectives and the business model for the PETAL product will be described below in detail. In order to better understand the exploitation plan, first an overview of the PETAL product components will be provided.

Further information about dissemination, the market potential of the PETAL product and the preliminary business model can be found in D2.2a Dissemination plan and D2.3a Market analysis and preliminary business plan.

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1 PETAL product description

1.1 Initial expectations

The goal of this project is to develop, implement and empirically evaluate an intelligent platform able to monitor users' behaviour and remotely control their lighting system by means of personalization rules that can be written also by people without programming knowledge. This enables care givers to provide personalized and context-dependent assistance directly in the patients' homes with the goal to improve quality of life and decrease healthcare delivery cost.

The main exploitation of the project will be the PETAL-product, that will be developed and evaluated within these three years. This PETAL-product consists of the PETAL-platform (composed of a Context manager, a Rule manager, and a Rule editor) that can be deployed as a service and has been integrated with various sensors, lights and other applications that will be described shortly below. Beside the PETAL-product, the research results as well as new contacts made during the project will be exploited by the consortium members.

We expect that a service like PETAL is filling the current gap in the market for a solution consisting of personalizable rules that control an intelligent lighting system and various applications within a household of people with cognitive declines. Consequently, PETAL will have a high potential to run as a commercial service, especially in the eldercare market.

1.2 PETAL product basic offer

The PETAL-system offers a smart home environment consisting of a platform for creating rules, various sensors gathering information, a middleware (context manager) able to connect events detected through the sensors with actions in order to change the devices' state according to the rules and, furthermore, the PETAL-system provides cognitive stimulation tools and an easy-to-install lighting system for the whole flat (max. 4 rooms) of ones' person with MCI living alone or with a caregiver (see Figure 1). On the one hand, the system is created to support elderly with MCI in their activities of daily living and to extend the time of living independently at home. On the other hand, care activities of formal and informal caregivers should be assisted and improved so that the caregivers' burden is reduced. As a result, the PETAL-system improves the quality of life of the elderly with MCI and their caregivers and decreases healthcare delivery costs. The single components are described shortly now.

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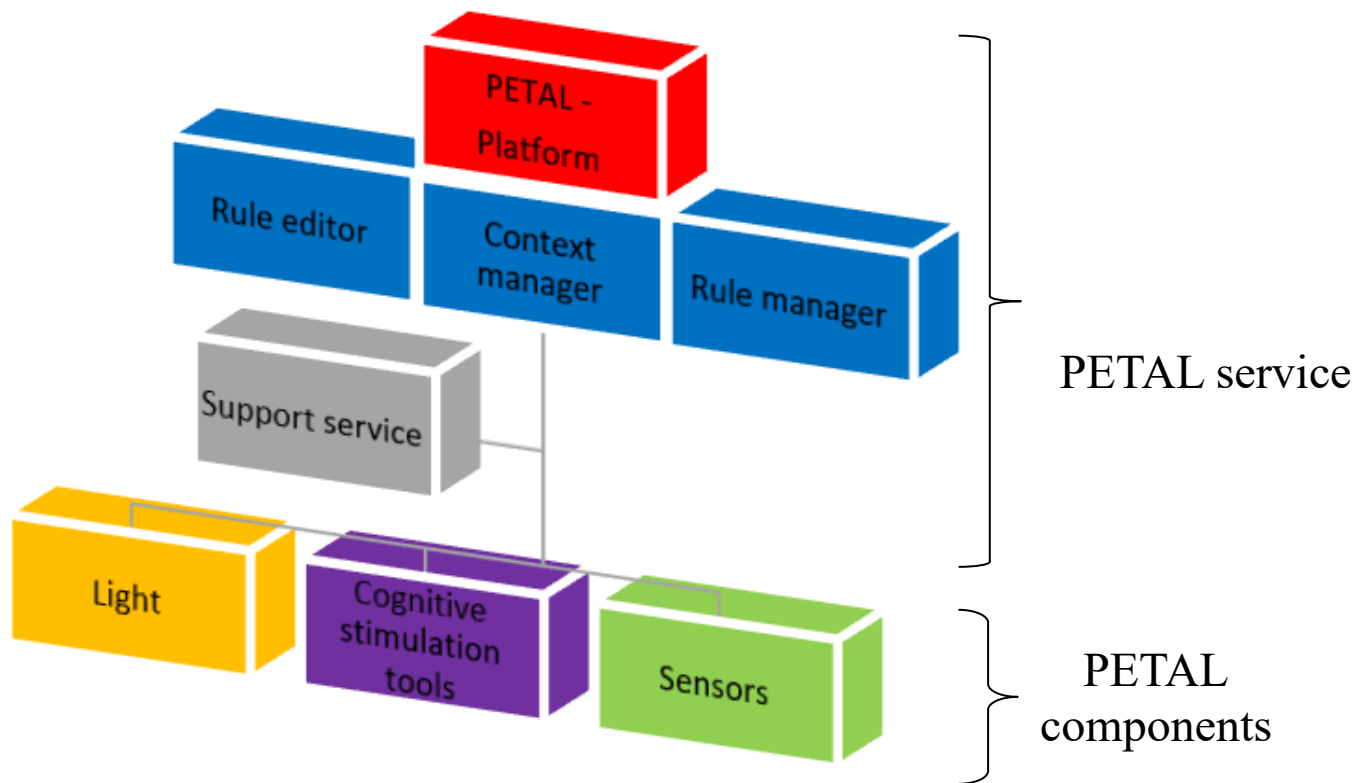


Figure 1 PETAL-Product

1.2.1 PETAL Personalization platform and sensors

The personalization platform is composed of various modules. It includes a personalization rule editor, which is a Web application that allows even people without programming experience to indicate the relevant events and/or conditions and the desired effects. The execution of the personalization rules is supported by two modules: a rule manager that sends the actions to perform to the relevant applications and devices, and the context manager that collects information from the available sensors and applications and indicates when relevant events and/or conditions occur.

There is also a PETAL app that may run in Android tablets, as well as a cognitive stimulation app that may be used to interact with the elderly users.

Beside various sensors that detect movement, temperature, gas, use of doors or objects (Figure 2), proximity, smoke, etc. and lights (for an overview of integrated PETAL-components see Table 1), the use of a smartwatch able to support communication through Bluetooth and WiFi has been integrated, and thus it can be used for real-time detection of the user position at home. The used

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smartwatch is LEMFO LEM7 Android 7 Smartwatch (Figure 3), and it offers the following functions that can be useful to monitor and to create supportive rules for elderly people with MCI: Dial, Message, Heart Rate Monitoring, Pedometer (Steps, Calorie, Distance), Camera, Remote Control Camera, Music, Alarm, Calendar, Browser, Mobile Phone Anti-lost, Map etc.



Figure 2 Mijia Door/Window Sensor



Figure 3 Xiaomi Honeywell Fire Smoke Detector



Figure 4 LEMFO LEM7 Android 7 Smartwatch

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List of already integrated devices into PETAL platform

Name	Function	Quantity	Price
Tablet Samsung Galaxy A Android SM-T580	Tablet to control home via applications	1	230€
Smartwatch LEMFO LEM7	Dial, Message, Heart Rate Monitoring, Pedometer (Steps, Calorie, Distance), Camera, Remote Control Camera, Music, Alarm, Calendar, Browser, Mobile Phone Anti-lost, Map	1	160€
Minew beacons with accelerometer	Detects use of doors, cupboards, objects, etc.	8	8€
Minew gateway	Gateway for the Minew sensors	1	60€
Estimote Proximity Beacons	Proximity Delegate detects Estimote Bluetooth Beacons	1 kit (4 beacons)	150€
Philips Hue Bridge + 3 lamps	System to remotely control lamps.	1 kit (1 bridge + 3 lamps)	200€
Philips Hue Go Portable lamp	Portable and remotely controllable lamp	1	100€
Philips Hue Motion Sensor	Motion Sensor Light Level Sensor Temperature Sensor The related context delegate runs on OpenHab Gateway	4	50€
Philips Hue Dimmer Switch	Turn On/Off the lights using the switch but leaving the lamps remotely reachable	3	25€

	Exploitation plan	PETAL
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Philips Hue LightStrips	Flexible light source	1	70€
GREAT-Luminaire + Raspberry Pi Controller + App	A health-luminaire that provides light treatment to improve sleep-wake-cycle and supports a natural melatonin secretion during the night with a biodynamic light curve, that leads to a better health on the long run. Furthermore, it provides scenes for activation and relaxation that have an immediate effect on the affective state of an observer and can be used to help structuring the day.	1	2100€
Xiaomi Sensors Smart Zigbee version	Honeywell Gas detector	1	95€
	Honeywell Smoke detector	1	70€
	Smart Socket Zigbee version (to remotely control devices)	1	35€
	Humidity (temperature and pressure) sensor	1	35€
	Mijia Door/Window Sensor	4	15€ per 4
Xiaomi gateway	The Xiaomi gateway serves as a hub for all Xiaomi devices, allowing the connection of various sensors	1	70€

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	Exploitation plan	PETAL
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Geniatech gateway	Gateway to install openhab - it applies the rules and interact with all the devices at home	1	250€
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Table 1 Sensors and lights integrated into the PETAL Rule Editor

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1.2.2 PETAL Lighting System

The PETAL-lighting system was developed and designed to support people with MCI in their daily activities and addresses the following effects: support spatio-temporal orientation, support structuring daily activities by light “zeitgeber” and light signals, direct attention in a timely manner and improve the sleep-wake rhythm (Figure 5).

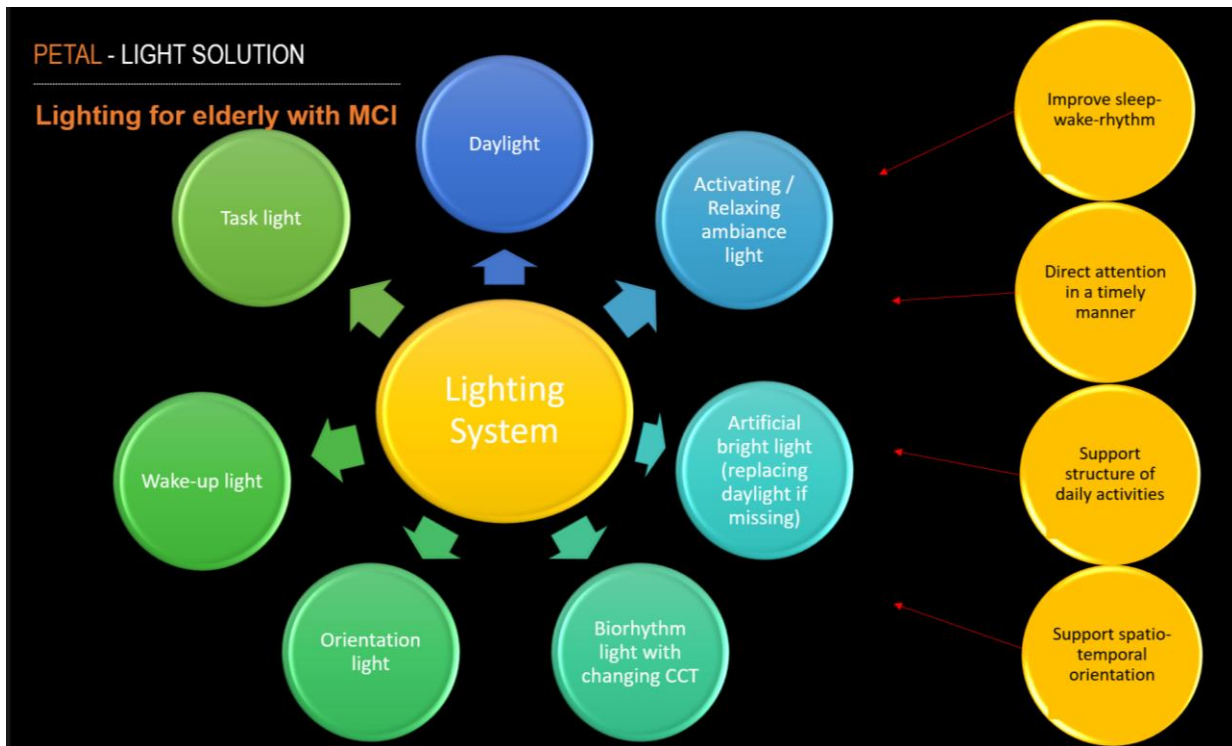


Figure 5 Advantages of PETAL-Lighting System

The PETAL-lighting system contains only certified lighting products that are already available in the market. Beside very commonly used bulbs, light stripes, and a portable lamp from Philips that provide a range of colour temperature and are remotely controllable, a special luminaire – the GREAT-Luminaire – will be used to reach health effects because the light intensities from the Philips products are very low. This luminaire was developed in an earlier AAL-project to provide a lighting concept that fulfils all needs of people with dementia and therefore perfectly fits to the PETAL goals as MCI is commonly known as an early stage of dementia. It provides high light intensities and a biodynamic light curve consisting of changes in the colour temperature and light intensity within a 24-hours rhythm to give a “zeitgeber” that leads to an improved sleep-wake-cycle. Furthermore, lighting scenes for activation and relaxation will be provided that affect the immediate affective state of an observer [1]. These scenes can be used to structure the day also. Beside using artificial light, daylight is also considered in the lighting concept. For the use of daylight, daylight sensors will be part of the system.

The lighting system is easy in installation, because mostly already existing lamps can be kept, only the bulbs must be replaced. New components such as the light

stripes, the Philips portable lamp and the GREAT-luminaire are also easy to adjust into the homes of elderly people with MCI because they are plug-and-play-solutions. Advanced technical knowledge is not necessary to implement the lighting system. Figure 6 shows an example of the lighting system installed in a typical flat.

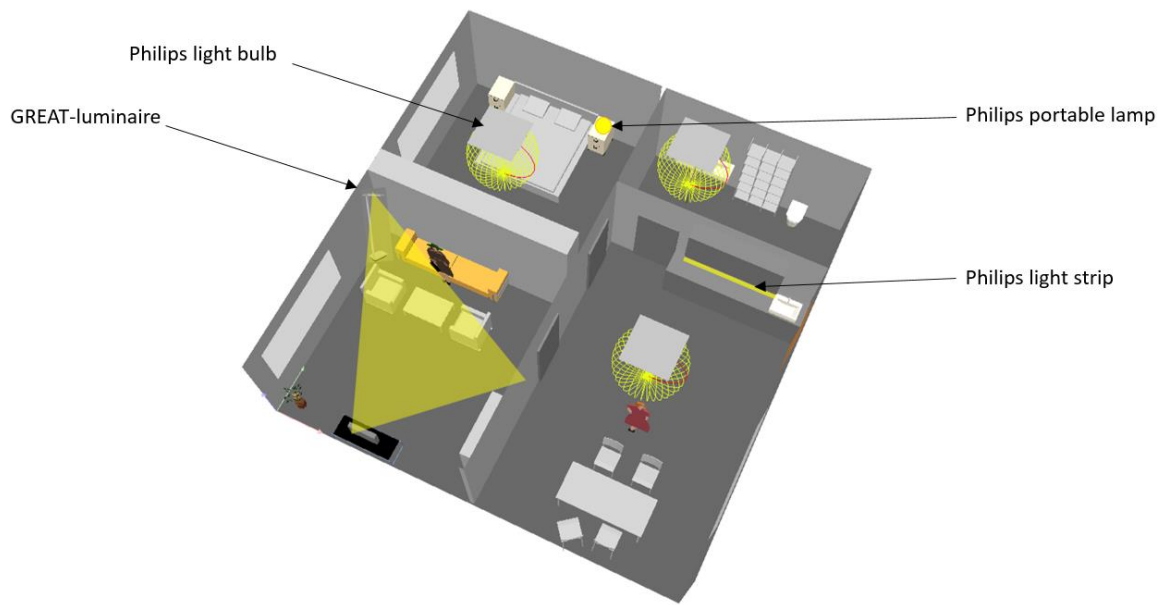


Figure 6 Proto-type flat with PETAL-Lighting System

1.2.3 PETAL Cognitive Stimulation Tools

The PETAL cognitive stimulation tools are based on serious games designed by psychologists, gerontologists and therapists. They will be performed within an App on a tablet that runs with android.

Through these games and an initial questionnaire, the App is able to analyse the initial cognitive level of a person, automatically assign a complete training plan adjusted to the elderly person and analyse possible cognitive impairments from that moment on. Additionally, a persons' self-perception of the performance and, also changes in the emotional state will be detected. The mental capabilities (attention, calculation, executive functions, language, memory and orientation abilities) of the elderly will be trained by using these cognitive stimulation tools in the same way as costly therapies would do.

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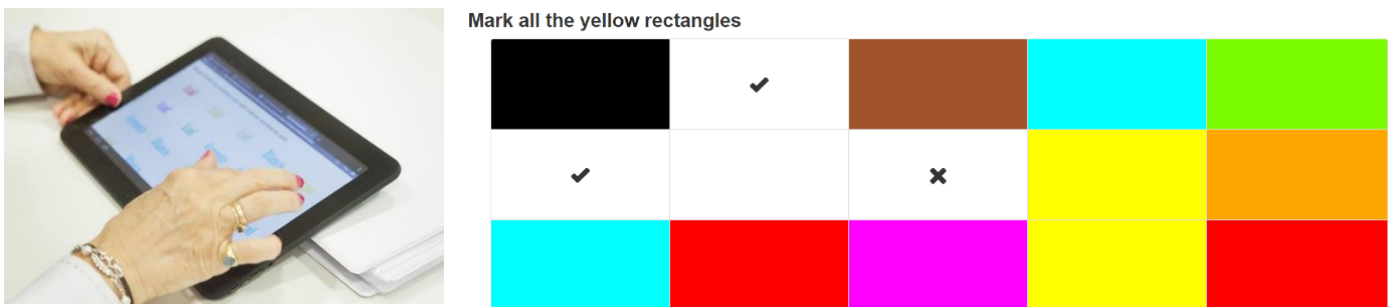


Figure 7 Example of a cognitive stimulation game played on a tablet

3 Exploitation Objectives and Methodology

3.1 Exploitation Objectives

Exploitation is described by the European Commission as: “The utilisation of results in further research activities other than those covered by the action concerned, or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardisation activities” [2]. The project results could be used for scientific, societal or economic purposes and the exploitation can be performed by the consortium itself or the exploitation can be facilitated for others by making the results available for them.

Results are further described as the output of the action, including data, products, knowledge and/or information. The consortium members of the PETAL project are more interested in specific outcomings depending on the type of organization. For example, Ideable is interested in selling the PETAL-product and providing a service for elderly while FSL is interested in publishing research data in scientific journals. The different exploitation interests between the consortium partners build up a perfect match to exploit every important result gained within the project PETAL.

Exploitation success will be measured by a) using results in further research activities, b) developing and marketing a product or process, c) creating and providing a service, and d) using results in standardisation activities. The exploitation success will be addressed more detailed within section 7 Timeline and Key Performance Indicators for exploitation.

This deliverable will describe how the PETAL consortium plans to exploit the various objectives mentioned above.

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	Exploitation plan	PETAL
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3.2 Exploitation Methodology

The exploitation process carried out by the PETAL consortium consists of three steps: 1. Identification of possible project results, 2. Identification of the interested consortium partners for each result, 3. Definition of the exploitation strategy for each partner and between partners.



Figure 8 Exploitation Process

Step 1. Identification of possible project results

In the first step, the consortium needed to identify all possible results that will be gained from the project PETAL. A first brain storming within a section of the General Meeting in Bolzano (M09) was used to find out which results are expected at the end of the project by the consortium. This brain storming results were further discussed in a more advanced state of the project during the General Meeting in Rome (M16). The process enabled a progressing idea of exploitable results with more detailed information about the technical solution and the research results expected from the composed study design. The exploitable results are listed in table 2 Exploitation grid.

Step 2. Identification of consortium partners going to exploit the results

In the second step the different results were selected and discussed with all consortium partners to identify the specific interests of each partner. This leads to an easier categorization and showed up possible overlapping interests between consortium members. Overlapping interests need to be discussed and a contractual agreement must be designed and signed by all the relevant partners to avoid misunderstandings. Furthermore, such a written agreement strengthens

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	Exploitation plan	PETAL
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liabilities. The roles of the consortium partners are also described in table 2 Exploitation grid.

Step 3. Defining the exploitation strategy for each partner and between partners

In the last step strategies that ensure the successful exploitation of each result were defined by all partners together and we decided to design a contractual agreement that will be subscribed at the end of the project to strengthen liability. Figure 8 shows the process of exploitation methodology and table 2 shows the results of this three-step process in an exploitation grid.

The PETAL results are categorized into three dimensions:

- 1) Knowledge
- 2) PETAL product (service and components)
- 3) Networking and Contacts.

These categories are further divided into more detailed subcategories:

- 1) Knowledge about:
 - a. Needs of MCI patients and caregivers
 - b. Light effects on MCI patients and caregivers
 - c. Effects of cognitive stimulation tools usage in MCI
 - d. Usability and accessibility of the PETAL Rule editor
 - e. Implementing and performing field trials with MCI patients and caregivers in private settings
- 2) PETAL product:
 - a. Sales of PETAL service
 - b. Sales of PETAL components
- 3) Networking and Contacts: Using new contacts for further research activities.

Each partner expressed its interest for each subcategory and described their exploitation strategy. The filled-in exploitation grid visualizes the interests of each partner and eases the discussion on the successful exploitation.

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Table 2 Exploitation grid showing exploitable results, the roles of consortium partners, the exploitation strategies and the target sectors

KEY EXPLOITABLE RESULTS This column contains the key exploitable results identified by the consortium		INTEREST IN THE EXPLOITATION Level of interest in the exploitation of each result. ¹	ROLE IN THE EXPLOITATION² owner or beneficiary	EXPLOITATION PLAN		
				EXPLOITATION STRATEGY How will the result be exploited e.g. publication in specific journal?	TARGET SECTOR Target sector of application as specific as possible e.g. "healthcare in Spain"	TARGET USERS/CLIENTS/AUDIENCE Target users/clients/audience of exploitation activity as specific as possible
Knowledge	Knowledge about needs of MCI patients and caregivers	ANA: high interest Apollis: high interest BART: medium interest FSL: high interest	ANA (owner), Apollis (owner) BART (owner) FSL (owner)	ANA and FSL: will disseminate the relevant findings through scientific publications, conferences and workshops towards the specialists and other stakeholders involved in the elderly care Apollis: will disseminate the relevant findings through individual contacts with end-user-organisations and public administration and with workshops towards different stakeholders involved in the elderly care BART: Knowledge will be used to create best-fit-lighting designs in clinics and health-care-centres (department for lighting design/light planning of Bartenbach)	Elder care / healthcare associations and influencers, Lighting design projects all over the world e.g. Bartenbach already made the lighting design in a psychiatric clinic in Slagelse (Denmark) and Hall (Austria)	Elderly in general, Elderly with cognitive declines, healthcare institutions (clinics, hospitals, caring homes), architects

¹ High interest = to exploit such result is very important for my activity; Medium interest = I would like to exploit such result at the end of the project, but I am not sure; Low/No interest = I will not exploit such result at the end of the project

² Owner = you have contributed/ will contribute to the development of the result; Beneficiary = you are interested in the exploitation of a result produced by other partners.

	<h2>Exploitation plan</h2>	<h2>PETAL</h2>
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Knowledge	Knowledge about light effects on MCI patients and caregivers	ANA: high interest Apollis: medium interest BART: high interest FSL: high interest	ANA (owner: findings from field trials' research activities) BART (owner: lighting system and findings from field trials' research activity) Apollis (owner: findings from field trials' research activities) FSL (owner: findings from field trials' research activities)	ANA: will disseminate the relevant findings through scientific publications, conferences and workshops towards the specialists and other stakeholders involved in the elderly care Apollis: intends to use this knowledge by offering and doing usability tests for technological partners and their products developing AAL solutions and similar applications related to web platforms and rule editors BART: Knowledge will be used to create best-fit-lighting designs in clinics and health-care-centres (department for lighting design/light planning of Bartenbach) and for future research projects FSL: will disseminate the results through scientific conferences, posters at neuroscience meetings and publications in scientific journals	Lighting market, Lighting design projects all over the world e.g. Bartenbach already made the lighting design in a psychiatric clinic in Slagelse (Denmark) and Hall (Austria), solution providers, research institutions	Elderly in general, Elderly with cognitive declines, healthcare institutions (clinics, hospitals, caring homes), architects
	Knowledge about effects of cognitive stimulation tool usage in MCI	Ideable: high interest FSL: medium interest	Ideable (owner) FSL (beneficiary)	Ideable: usage and exploitation via service platform kwido.com FSL: possible results of the frequency and the effects of cognitive stimulation tool usage in MCI will be disseminate through scientific conferences and workshops towards specialists involved in the elderly care.	Eldercare service platform "kwido.com"	Eldercare in general B2B

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	<h2>Exploitation plan</h2>	<h2>PETAL</h2>
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Knowledge	Knowledge about usability and accessibility of personalization platform / Rule editor	<p>Apollis: medium interest BART: medium interest CNR: high interest</p>	<p>Apollis (beneficiary), BART (owner), CNR (owner)</p>	<p>Apollis: intends to use this knowledge by offering and doing usability tests for technological partners developing AAL solutions and similar applications related to web platforms and rule editors BART: If the connectivity/usability/accessibility is good, the platform could be used for demonstrating lighting automation to customers, CNR: The results of the project will be documented and published within the general scientific community, both through conference and journal papers (and specialized publications about the elderly and healthcare sector). CNR will give tutorials presenting the project results as well as discuss them in university courses and by participating to seminars and workshops about related topics. Wider industrial groups will be reached through seminars presented to other organizations with which CNR is in contact, and to groups of industrial users. Further research projects will exploit this knowledge.</p>	<p>AAL market and new technologies, care market and care platforms, personalization platform market, home automation, solution providers, research institutions, architects and other customers: The platform connects multiple devices with lighting and could be interesting for lighting design concepts e.g. detection of the mood that can be used to adapt lighting to the affective state of an observer.</p>	<p>Elder care / healthcare associations and influencers, architects, customers from the lighting design department of Bartenbach</p>

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	<h2>Exploitation plan</h2>	<h2>PETAL</h2>
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Knowledge	Knowledge about home automation software	BART: high interest CNR: high interest	BART (beneficiary), CNR (owner)	BART: Knowledge will be used by the department for lighting design/light planning of Bartenbach, CNR: The results of the project will be documented and published within the general scientific community, both through conference and journal papers (and specialized publications about the elderly and healthcare sector). CNR will give tutorials presenting the project results as well as discuss them in university courses and by participating to seminars and workshops about related topics. Wider industrial groups will be reached through seminars presented to other organizations with which CNR is in contact, and to groups of industrial users. Further research projects will exploit this knowledge.	Home automation, architects, lighting design costumers	Architects and other audience that wants to automate their home environment
	Implementing and performing field trials with MCI patients and caregivers in private settings	ANA: high interest Apollis: high interest BART: high interest FSL: low/no interest	ANA (owner) Apollis (owner) BART (owner) FSL (owner)	ANA and BART: use for further research projects Apollis: use for further research projects and consultancy	BART and ANA: use experiences with field trials for further research projects concerning lighting for elderly with or without diseases in the healthcare sector as well as in private lighting design projects. Apollis: intends to address solution providers and research institutions	Elderly in general, Elderly with cognitive declines, healthcare institutions (clinics, hospitals, caring homes,...), architects

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	<h2>Exploitation plan</h2>	<h2>PETAL</h2>
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PETAL product/service	Sales of PETAL service	ANA: high interest Apollis: high interest Ideable: high interest FSL: medium interest	Ideable (owner: PETAL service), CNR (owner: PETAL service) ANA (beneficiary & promoter of PETAL service in Romania) Apollis (beneficiary & promoter of PETAL service in Italy) FSL (beneficiary & promoter in Italy)	Ideable: will integrate the PETAL service into “kwido”, a B2B subscription business model for services for elderly people with and without cognitive declines. Clients would be elder care businesses, both for home care or even homes for seniors. CNR: will exploit the PETAL platform as a solution-package (a software package which includes all platform components and assistance in developing customised systems) or the single platform components (e.g. Rule Editor) as well. CNR considers sales of the PETAL-service in Italy. ANA: will search for opportunities to exploit the PETAL platform as a solution-package or the single components on the Romanian specific market segment – ANA will act both as a direct beneficiary in their facilities and, also as a promoter to other potential beneficiaries from Romania Apollis: will exploit the PETAL platform as a solution-package by promoting it to care organisations and elderly people acting as an intermediary and consultant (i.e. for analysis of needs) FSL: will search for possible opportunities to commercialize PETAL platform as a software package or single components as well	AAL market and new technologies, care market and care platforms for elderly persons with cognitive or other type of impairment, personalization platform market, elder care sector – B2B sector	Elderly in general, Elderly with cognitive declines, healthcare institutions (clinics, hospitals, caring homes), informal and formal caregivers, younger audience interested in health lighting, architects, audience that wants to automate their home environment. For Ideable, clients would be telecare companies, home care agencies or nursing homes. End-users would be elderly users connected to formal caregivers.
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	<h2>Exploitation plan</h2>	<h2>PETAL</h2>
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PETAL product/service	Sales of PETAL components	<p>ANA: high interest Ideable: high interest BART: medium interest</p>	<p>ANA (beneficiary & promoter in Romania) BART (owner: GREAT-luminaire) CNR (owner: PETAL personalization platform) Ideable (owner: mementia App)</p>	<p>ANA: Use of PETAL components to optimize their patients' treatment BART: Use its common sales channels to sell the GREAT-luminaire and will provide marketing for it at different events and congresses Ideable: will mainly exploit the indoor tracking system</p>	<p>BART: revenues will come from the sold GREAT-luminaire in terms of a licence model for the optical concept Ideable: elder care sector – B2B sector CNR: AAL market and new technologies, care market and care platforms for elderly persons with cognitive or other type of impairment, personalization platform market</p>	<p>Elderly in general, Elderly with cognitive declines, healthcare institutions (clinics, hospitals, caring homes), informal and formal caregivers, younger audience interested in health lighting, architects, audience that wants to automate their home environment</p>
	Widen usage of Rule Editor	<p>ANA: high interest CNR: high interest</p>	<p>ANA (beneficiary & promoter in Romania) CNR (owner: Rule Editor)</p>	<p>ANA and CNR: Information campaign, addressing clinics, doctors in private practice, insurances, healthcare institutions, dementia support services for relatives and patients. Online and offline marketing</p>		<p>Elderly in general, Elderly with cognitive declines, healthcare institutions (clinics, hospitals, caring homes), informal and formal caregivers, younger audience interested in health lighting, architects, audience that wants to automate their home environment</p>

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	<h2>Exploitation plan</h2>	<h2>PETAL</h2>
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Networking and Contacts	<p>Using new contacts to end-users or institutions for further research activities</p>	<p>ANA: high interest Apollis: high interest CNR: high interest BART: high interest FSL: high interest Ideable: high interest</p>	<p>ANA (owner: new contacts both with individual end-users and with institutions in Romania) Apollis (owner: new contacts with institutions) BART (owner: new contacts with end-users and research institutions at congresses) CNR (owner: new contacts with institutions) FSL (owner: new contacts with first and secondary end-users in Italy)</p>	<p>ANA: Presenting and discussing work carried out in the project in various venues - new opportunities for research collaborations in new projects can emerge Apollis: Presenting and discussing work carried out in the project in various venues - new opportunities for research collaboration or for consultancy services can emerge BART: Interested in proposing for further AAL projects. The contacts will be used for this reason (partners, participants) CNR: Presenting and discussing work carried out in the project in various end-uses - new opportunities for research collaborations in new projects can emerge FSL: Presenting and discussing work carried out in the project in various venues - new opportunities for research collaborations in new projects can emerge</p>	<p>ANA, CNR, FSL: Health-related organizations, companies developing interactive technologies; Older adults' organizations; Research institutions Apollis: Older adults' organizations, solution providers, research institutions BART: Use of new contacts for proposing research projects in the healthcare sector</p>	<p>Elderly in general, Elderly with cognitive declines or affective disorders, healthcare institutions (clinics, hospitals, caring homes), younger audience interested in health lighting</p>
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4 Exploitation strategy by each consortium partner

Overall the consortium members intend to exploit the objectives described above with three exploitation strategies:

- 1) New research: partners are interested in publishing project results and to be involved in new research activities/projects
- 2) Commercial exploitation: partners are interested in the sales of the PETAL product (service and/or components) by launching the new product on the market
- 3) Internal knowledge gain: partners plan to use the project results internally to improve procedures and knowledge within the own organizations.

The exploitation strategy by each consortium partner will be described in detail in the following part.

CNR is interested into the exploitation of the Personalization platform (including Rule Editor, Context Manager, Rule Manager) that will be further developed for future research projects. The PETAL platform will be delivered as Open Source combined with a commercial service provided by Ideable in Spain and Latam.

CNR is available to commercial agreement with companies to spread the PETAL product in other countries than Spain and Latam and, in case, CNR considers creating a Spin-off to provide the PETAL service in Italy also.

CNR will publish the results of the project within the general scientific community through conferences and journal papers.

In order to ensure that the results of the project will be communicated to a wide community, various initiatives will be organized. CNR staff members involved in the PETAL project will give tutorials presenting the project results as well as discuss them in university courses and by participating to seminars and workshops about related topics. Wider industrial groups will be reached through seminars presented to other organizations with which CNR is in contact, and to groups of industrial users.

The PETAL results will be exploited in further research projects as well.

Ideable is interested in the exploitation of the used cognitive stimulation apps and the indoor tracking system that will be developed under PETAL. In agreement with all the other consortium partners Ideable will offer the whole PETAL system or parts of it (cognitive stimulation, indoor behaviour tracking, etc.) to its existing and future B2B clients and will provide the PETAL service within the eldercare market in Spain and Latam. Ideable is already in the Spanish market offering its multidevice platform for caring for elderly people (kwido.com). This already existing platform and the PETAL product (service and components) will be integrated as a part of its existing portfolio. Ideable will perform the first market launch of the PETAL product in Spain. If the launch seems to be successful, widening of the market will be discussed. The PETAL product could be sold e.g. in Italy by start-ups or spin-offs from CNR. Thanks to its modular design, Ideable will offer the whole system or only the tracking activity system connected to

Kwido or to the potential customers' existing software. Ideable would act as seller and integrator.

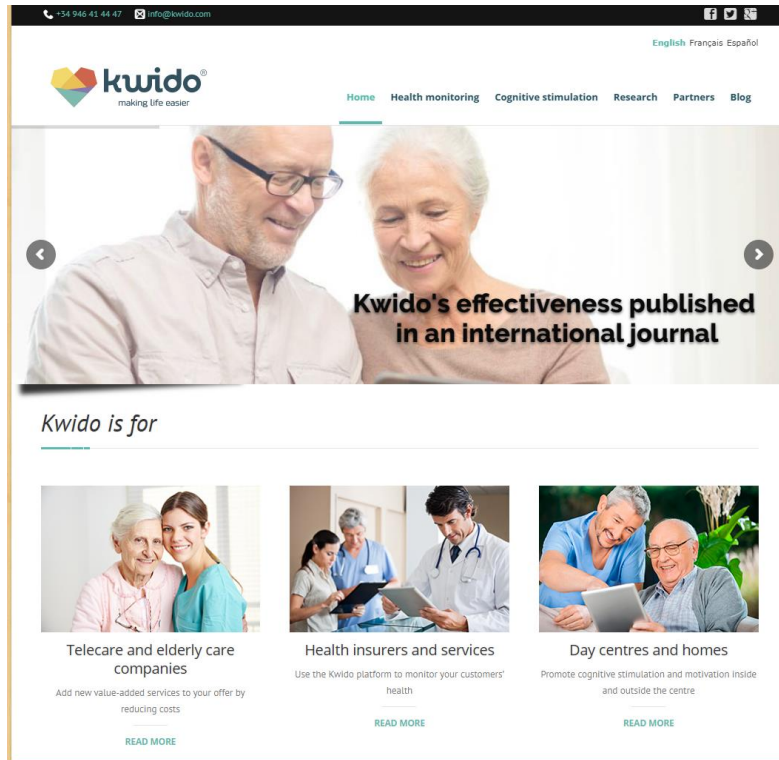


Figure 9 Ideables service platform "kwido.com"

Bartenbach will mainly exploit the knowledge gained during the project, e.g. knowledge about light effects and lighting needs of elderly and their caregivers. This knowledge will be used for lighting design concepts by the lighting design department of Bartenbach GmbH e.g. light planning for clinics. Besides that, the sales of the used GREAT-luminaire alone or in combination with the rule editor and sensors will give revenues via license model between the producer of the luminaire and Bartenbach. Bartenbach also plans to create an interactive lighting system combined with the rule editor (CNR) and an App for detection of emotional state (App from Ideable). Personalizable lighting and home automation are future goals of Bartenbach that seem more reachable with such a combination. The experiences with field trials in private homes and the new contacts made during the project period will be used to propose for new research projects. Bartenbach aims to improve the knowledge on light effects on health and wellbeing in elderly with or without cognitive declines and aims to provide effective products in this neglected field.

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	Exploitation plan	PETAL
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Apollis will also support the distribution of the PETAL-system by using already existing channels to end-user-organizations e.g. ASAA-Alzheimer Südtirol Alto Adige (<http://alzheimer.bz.it>), Wohnen im Alter – Abitare nella terza età (Sozialgenossenschaft – Cooperativa sociale; <http://www.wohnen-im-alter.it> - <http://www.abitare-nella-terza-eta.it>), Stiftung Griesfeld (Southtirol). Apollis will act as an intermediary and consultant and will promote the PETAL platform to possible customers. Apollis also intends to use the gathered knowledge by offering and doing usability tests for technological partners developing AAL solutions or similar applications and for further research projects.

ANA and **FSL** will mainly exploit the knowledge gained about MCI patients and their caregivers with questionnaires, interviews, and assessments during the field trials about their needs, light effects, cognitive stimulation tools and, usability and accessibility of the rule editor as well as they will use their experiences for further research projects and in treating their patients during clinical practice. Both will publish the scientific results gained during the field trials and hand over their knowledge to colleagues within their institutions. Furthermore, ANA will try to find sales partners or service providers for the PETAL product (service and/or components) providers in the Romanian healthcare market.

5 Exploitation environment and context

This section describes the internal and external environment and context in which the PETAL exploitation strategies will take place. It consists of a SWOT analysis outlining strengths, weaknesses, opportunities and threats of the PETAL product.

5.1 SWOT Analysis

This section describes the strengths, weaknesses, opportunities and threats (SWOT) of the PETAL-product from the project partner’s perspective.

This SWOT analysis will help the consortium to identify internal and external elements that will enhance or inhibit the exploitation of the set objectives. Figure 10 shows a visualisation of the SWOT-dimensions.

This SWOT analysis reflects the partners current point of view and will mature during the project for the final business model.

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	Exploitation plan	PETAL
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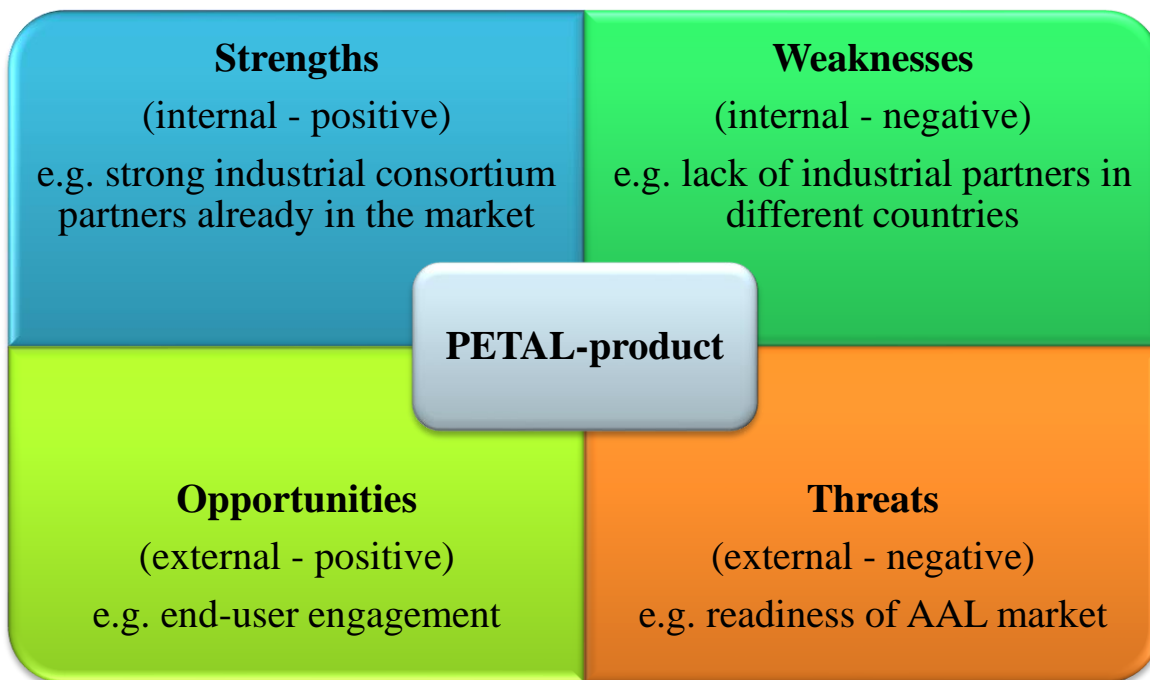


Figure 10 SWOT analysis dimensions

5.1.1 Strengths

The strengths describe all internal, advantageous resources reflected by the consortium members' expertise, know-how, experience and/or contacts. Table 3 shows the identified strengths.

Table 3 Strengths of the PETAL product

Strengths of the PETAL product
Ideable's already existing service platform "kwido.com" in Spain. Ideable, in its roadmap for the European market could also be an industrial partner in the rest of European countries where the PETAL partners cannot reach.
End-user organizations (FSL and Stiftung Griesfeld in Italy, ANA in Romania, Gerontopsychiatric clinic in Austria) are engaged
Societal important solution – percentage of elderly population raise in future generations
Personalizable and individual designs of the solution for individual needs of costumers (modular, scalable)
Experiences during laboratory tests and field trials – enhanced usability and accessibility
Good cooperation between multiple partners from multiple disciplines

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	Exploitation plan	PETAL
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Broad collective competence within the multidisciplinary consortium team
Unique selling point: no competitors offer a similar product currently in the market

The most important strength of the consortium for bringing the PETAL solution to the market, is that Ideable already has an existing service platform “kwido.com” for elderly with and without cognitive decline who need help in their daily lives. “kwido.com” provides a platform with modular caring tools in a B2B model to the Spanish costumers in the healthcare and elder care sector. The PETAL product with service will be integrated into this existing infrastructure and integrable components (sensors, lighting products, etc.) will be suggested there as well. This opens the possibility to make first steps in the healthcare market more easily. If the solution works well, a market widening for other countries can be established by using selling partners, possibly start-ups e.g. from CNR in Italy, or other already existing service platforms.

Furthermore, the end-user organisations within the PETAL project are able to use the PETAL-prototypes for marketing or trials with their patients, raising awareness for the solution. They will offer information about the PETAL product and kwido.com to their patients.

The fact that there is a strong societal need for our solution and that there is no comparable solution available at the market currently are strong strengths. The performed laboratory tests and the initial field trials showing a functioning solution enhances our self-confidence for the PETAL product.

The good cooperation between all partners with a multidisciplinary background is also an appreciable strength because it brings together the industrial interests with experiences in sales and marketing and the scientific knowledge.

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	Exploitation plan	PETAL
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5.1.2 Weaknesses

The weaknesses describe any possible internal disadvantage that inhibits the exploitation of the PETAL product. They are very important to identify the realistic market potential of our product and to estimate revenues.

Table 4 Weaknesses of the PETAL product

Weaknesses of the PETAL product
Industrial exploitation partner only for Spain and Latam (at least for the first market launch).
No field trials were performed in Spain, no Spanish version tested
PETAL components of the shelf – no guarantee for future availability
Different shipment costs and delivery times for different PETAL components
A minimal technical knowledge is necessary to interact with the system
A good internet connection is necessary for the functioning of the PETAL system
Sample size of field trials too small to state general efficacy

The PETAL product will be launched to the market in Spain primarily. This is on the one hand a strength, because the infrastructure is already existing, but it is also a weakness, because we do not have other industrial partners selling the product and service in other countries at the moment. The PETAL system was tested during the project in Austria, Italy and Romania referring to German, Italian and Romanian speaking people, but we did not test a Spanish version of the Rule editor.

Anyway, Ideable will assume the preparation of the platform in Spanish and even a rebranding for the Spanish market.

Another weakness is that because we are also using of-the-shelf-components we do not have any influence on prices of such products, shipment costs or delivery times. Furthermore, we cannot guarantee that the product will be available in the future because companies may decide to stop the production. So, the idea is to use a plug & play approach that is scalable and extensible and therefore allows us to change and add devices.

For costumers it could be too difficult to install and interact with the PETAL system because it requires a minimal technical understanding and a good internet connection to run smoothly. So, the challenge here is to design a system that is very user-friendly in installation and usage.

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	Exploitation plan	PETAL
---	--------------------------	--------------

And, at last, because of the small sample size during the field trials, we can only get a hint about accessibility and usability, but the sample size may be too small to state the effectiveness on a cognitive and emotional level.

5.1.3 Opportunities

Opportunities describe external advantages that benefits the exploitation of the PETAL product. It reflects the current market situation, expected changes in the market and in technologies and/or policies.

Table 5 Opportunities of the PETAL product

Opportunities of the PETAL product
Modular product is easy adjustable to market changes
Integration of new technological solutions is possible
The technological trend will have an influence on the technological knowledge of elderly in the next generations (more technical knowhow in elderly of the future)
No competitors offering a similar product currently at the market

The biggest opportunity for the PETAL product is seen in the elderly of next generations. Younger people are used to use technological devices in their daily lives and are more comfortable in controlling them than elderly nowadays. Next generations elderly will use the PETAL system with more self-confidence than the elderly does today.

The modularity and scalability of the PETAL product enables the integration of new technological devices as well as it enables to exchange components, that are not available anymore. Therefore, changes in the components' availability can be buffered very well.

The fact, that there is no comparable solution at the market currently (see D2.3 Market analysis and preliminary business plan), is important and advantageous for the PETAL product (service and components).

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	Exploitation plan	PETAL
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5.2.4 Threats

Threats describe external obstacles and risks that may occur and hinder the optimal exploitation of the PETAL product.

Table 6 Threats of the PETAL product

Threats of the PETAL product
Difficulties reaching target group costumers
New European General Data Protection Regulation (GDPR) – more sensitive handling with data
Products’ availability and costs
Current technical knowhow in the group of elderly
Only one distribution channel used (kwido.com in Spain and Latam)

One threat that may hinder a successful exploitation of the PETAL product is that we are using only one distribution channel, namely Ideable’s service platform “kwido.com” in Spain and Latam. Estimations for a successful launch of the PETAL product on the Spanish market are difficult and it may fail. We think that selling the PETAL product B2B may be a better option than direct sales to customers and will focus on that target group within the Spanish healthcare sector. Anyway, it may change if Ideable decides to go for the European market during next years with the new strategy that is preparing for its Kwido division.

Another risk is the new European General Data Protection Regulation. Because there were big changes in 2018 in this law, which was quite recently, it is difficult, to estimate the effort to fulfil it with a solution that mainly uses data from users and their homes for its functioning. It will be a challenge that have to be addressed in the final business plan and before market launch of the PETAL product.

We designed a basic PETAL product consisting of the Rule Editor and the PETAL service, that allows to integrate various sensors, lighting products, apps and other devices through the context manager. Because we are not the owners of these integrated components the future availability is not guaranteed. We must consider that we may need to exchange some of the used components very soon. But because the PETAL product is modular and scalable, we are confident, that we can deal with this challenge too.

One of the biggest threats we are facing with our PETAL solution is that the technological knowhow in the group of elderly is very low at the moment. But we are looking positively into the future, because the younger generation from now will be used to technological devices and will operate confidently with them, when they are older. Anyway, the PETAL system interfaces for the elderly users have

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	Exploitation plan	PETAL
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been designed following accessibility standards by Ideable, basing on a broad experience in this area. In fact, Ideable is also responsible for zocaalo.eu, the European marketplace for accessible apps for elderly users, and Ideable has followed its guidelines when designing the interfaces for notifications and cognitive stimulation that will be used by the end-users.

7 Timeline and Key Performance Indicators (KPIs) for Exploitation

Within the project period the exploitation of the PETAL results already has started. With various dissemination activities we aroused interest for the upcoming PETAL solution. The consortium created a PETAL homepage, held speeches on congresses and fairs and involved end-user organisations to inform relevant stakeholders about the project and its planned solution. The project itself therefore acts as a pre-exploitation phase which is very important for a successful launch of the PETAL product and service as well as for publishing the results of the project.

To measure the success of the exploitation of our different exploitation objectives Key Performance Indicators (KPIs) will be used. They were defined for each objective and are described in table 7.

Table 7 Key Performance Indicators for the successful exploitation of PETAL

Key Performance Indicators (KPIs)	
Use of Knowledge	<ul style="list-style-type: none"> • Numbers of publications in peer-reviewed journals • Number of joint public-private publications
Sales of PETAL service and components	<ul style="list-style-type: none"> • Market-ready product designed • Market launch done – internet presence integrated into “kwido.com” • Number of PETAL-service and -components sales within the first year after market launch • Number of sales partners found in other countries within the second year after the first sales period in Spain
Use of new Networks and Contacts	<ul style="list-style-type: none"> • Number of new project proposals submitted • Number of participants willing to be part of a new project e.g. field trials and studies

Figure 11 Measurement of exploitation success with Key Performance Indicators

While the use of knowledge and sales of PETAL service and components are mainly objectives that will take place in the future, the use of new networks and contacts already can start during the project period e.g. Bartenbach and Ideable

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	Exploitation plan	PETAL
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already proposed a new research project together with other partners in a technical call (H2020 ICT25) concerning virtual reality.

The following timeline shows that there are many activities that must be performed during the running PETAL project and many activities that start after the project end and go on for about two years to successfully exploit the projects results.

Table 8 Exploitation timeline

Pre-exploitation phase: activities performed during the running PETAL project			Exploitation phase: activities performed after PETAL project	
M31	M32-36	M36	M37	M49-61
D4.4b Field trial effectiveness and performance evaluation	Preparation of publications of study results and submission to journals	D2.5 Final business plan		
	Preparing Spanish version of Rule Editor	Integration of PETAL-system into "kwido.com"	PETAL-system launch: starting sales of PETAL-service and -components in Spain and Latam	Opening sales for other countries (CNR: Italy, ANA: Romania)

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8 Conclusion and Next Steps

This section provides a short summary and the conclusion from this deliverable. It outlines the key steps that must be performed to successfully exploit the PETAL project after its ending in October 2020.

We identified three different exploitation objectives that will be addressed by the PETAL consortium partners:

- Use of knowledge: **ANA** and **FSL** will exploit the gained knowledge in terms of publications and improvement of patients' treatment. **BART** and **CNR** will improve their already existing work flows: CNR will further develop the PETAL platform, BART will use the knowledge for lighting design and further research projects. Knowledge will be also used for further research activities by the other partners. **Apollis** will use the gathered knowledge to offer usability tests for new technological partners.
- Sales of PETAL service and components: **Ideable** will offer the PETAL service as part of its already existing service platform "kwido.com" basing on a B2B business model to relevant stakeholders. The already integrated components will also be suggested to end-users but need to be bought by the different component sellers itself. After a first successful year in Spain, **CNR** considers launching the PETAL product in Italy carried out by a Start-up or Spin-off (as it has already happened in the past with other research results). **ANA** will look for possibilities on the Romanian market. **Apollis, FSL, ANA** and **BART** will act as promoters for the PETAL system and inform relevant costumers using their channels and contacts.
- Use of networks and contacts: All partners will use their new contacts to propose for new projects in this field and make use of the contacts for future field trials or other study designs.

The exploitation strategies cover new research, a commercial exploitation and an internal knowledge gain and therefore shows a great impact on all project members' work.

Key Performance Indicators (KPIs) were defined to measure exploitation success within the first two years after project end. KPIs for exploitation of knowledge is the number of publications in peer-reviewed journals and number of joint public-private publications. KPIs for the sales of the PETAL product (PETAL service and components) are a market-ready product, the market launch with an internet presence integrated into the Spanish eldercare platform "kwido.com", the number of PETAL-service and -components sales within the first year after market launch in Spain and the number of sales partners (spin-offs/start-ups, already existing service platforms) found within the second year after the market

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	Exploitation plan	PETAL
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launch in Spain. KPIs for the use of new networks and contacts made during the PETAL project is the number of new submitted project proposals and the number of participants willing to be part of new projects e.g. for field trials or other study designs.

The PETAL consortium has the required skills, knowledge and experience to ensure the maximum exploitation of the project. With the commitment and contribution of all partners, a significant impact with the PETAL system can be achieved.

9 References

[1] Press Release: “Lichtdusche zur Leistungsoptimierung”, SkiAustria November 2018

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