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Chapter 17. Exploitation, Dissemination and Communication: an integrated framework in EU research.

Abstract: Europe's ageing demographics gave rise to the gold rush by entrepreneurs and innovators who started to investigate the market of solutions for older adults. Now joined by big players from the Information and Technology sector, the Silver Economy is a lion's den where EU-funded research and innovation projects sometimes struggle to find a place. This chapter presents the market analysis and strategy for exploiting a virtual coach for healthy ageing developed within the "Horizon 2020" EU research and innovation programme, taking account of the latest macroeconomic forces at stake.

Introduction

In the last decades, the healthcare systems of the most developed countries have been facing a number of challenges that required great flexibility and the ability to adapt to fast changes. These include: ageing population, growth of chronic diseases, shrinking of the gross domestic product (GDP), increased pace of technological innovation, consumerization, and digital transformation (McKinsey & Company, 2019). Furthermore, the ongoing COVID-19 emergency has brought out new urgent issues -usually destined to the least developed countries (WHO, 2020)- such as epidemic preparedness, infectious disease prevention, hospitals' capacity saturation, and health care sanitation. Struggling with this combination of challenges and adversities, the resilience of healthcare systems has been dramatically put at risk. In such tough conditions, the innovation brought by new products, services, and business models can provide vital solutions (Elton & O'Riordan, 2016).

However, innovation development is a complex process composed of different critical phases and interactions with a bunch of usually very diversified actors. Moreover, to be successful, innovation must be adopted by several organizations, requiring to be largely diffused in the field of application (Rogers & Everett, 2003). Therefore, all the activities, processes, and strategies necessary to effectively make the innovation spread in the market and across organizations assume a role of paramount importance. In such context, innovators must pay great attention to strengthen the communication and knowledge sharing through the value chain, nurture long-term relationships with the most relevant stakeholders, and manage and monitor the interdependent decision-making processes (Makkonen & Johnston, 2014; Payne et al., 2008; Storbacka & Nenonen, 2015; Woodside & Biemans, 2005).

Healthcare is one of the most complex and diversified sectors, it includes hospitals and clinics, pharmaceutical, insurance, and medical device and equipment companies, and either national or local health authorities. In this ecosystem, different players might take the role of innovator. Funding several projects around the continent, the European Commission (EC) can be considered an innovation booster for several sectors, healthcare included. Within its latest research and innovation programme, "Horizon 2020" (H2020), almost €8 billion of funding were made available for health-related research (European Commission, 2014). This latter aims at tackling issues such as population ageing, increasing burden of non-communicable diseases, expensive innovative healthcare and medicinal products, and slow pace of digitalization uptake by leveraging on solutions mainly based on personalized, digital, and preventive care (European Commission, 2019). The funding is usually assigned to public-private collaborations -the so-called Consortia- in which partners from different countries, industries, and academia come together to develop a common project. These EC-funded projects are typically characterized by high innovation potential, partnership centrality, transnationality, organizational variety and diversity, long length duration, no structured decision-making hierarchy, and high degree of risk uptake. These specific features create a context of unique complexity. Hampered by this complexity, many EC-funded projects risk leaving no significant impact, failing to exploit their innovation potential (Veugelers et al., 2015). To tackle this issue, the EC indicated the necessity to adopt effective Dissemination and Exploitation (D&E) strategies during the development of these projects. *Dissemination* means sharing research results of the project with potential users - peers in the research field, industry, other commercial players, and policymakers, whereas exploitation is the use of results for

commercial purposes (European IPR HelpDesk, 2016). An effective D&E strategy leads to outcomes such as: launching of the innovative products or services to market, transfer of results and best practices to different and broader contexts, potential tailoring to the needs of others, continuation after the funding period has finished, influences on policy and practice, as well as serving the public good (Siakas et al., 2012). Therefore, an effective D&E strategy is of paramount importance for the successful adoption and diffusion of innovation, and ultimately to "bring innovation into action". Furthermore, the provision of a detailed and thorough D&E plan is also a mandatory condition required to access the research funding (European Parliament, 2014).

While the necessity and importance of these issues have been highlighted, few has been said by past contributions about how to operatively design and develop a D&E strategy. Current and future EC-funded projects could greatly benefit from evidence-based guidelines and frameworks to support the dissemination and exploitation of project results. For this reason, the authors decided to report in this chapter the experience matured within the ground-breaking EC-funded project named NESTORE – Novel Empowering Solutions and Technologies for Older people to Retain Everyday life activity, an H2020 research project that aims at developing and bringing to the market a personalized, artificial intelligence-enabled virtual coach for the wellbeing and care of European 65+ citizens as they age. Using the NESTORE experience, this chapter aims at furthering both theory and practice by illustrating how dissemination and exploitation activities can be organized within an EC-funded project to lead to the successful adoption and diffusion of innovations in the healthcare sector.

The empirical context and research design

NESTORE is a 36-month pan-European H2020 research project aimed at developing an integrated portfolio of innovations for healthy ageing of European citizens aged 65+. The efforts of the project aimed at developing a multi-dimensional and personalized virtual coaching technology. A virtual coach proposes activities, feedback, and motivation according to its user's personality, punctual needs, preferences and moods, while monitoring several parameters from different sources (Brandenburgh, et al., 2014), and establishing a relationship with the trainee (Fasola & Mataric, 2013). Virtual coaches have a strong potential to maximise users' adherence to the program resulting in a higher probability of reaching the goal of health promotion (Mastropietro, et al., 2018).

As a virtual coach, NESTORE supports healthy ageing on five different levers: physical activity, nutrition, social, cognitive and psychological. The technology of NESTORE operates through tangible objects and sensors, software and apps, and artificial intelligence. Specifically, the system works on 3 levels: Sensing, Reasoning, and Coaching. The first is a multi-parameter and multi-domain physical sensing layer able to gather the user's key parameters (in the five well-being dimensions). It includes a wearable smart bracelet, a set of beacons for environmental monitoring and social interaction assessment, a smart scale, and a sleep monitoring device. The second level encompasses the intelligent Decision Support System able to analyse the seniors' behaviour and suggest personalized "pathways of interest" following the Health Action Process Approach (HAPA). Third, the multi-function tangible objects which can assume different configurations, communicating and engaging the users with personalized coaching activities. NESTORE strategy is to differentiate itself from other eHealth solutions, as a validated and multi-dimensional personalized system based on scientific knowledge. The effectiveness of its feedback is ensured by the scientific validated multi-disciplinary knowledge provided by experts in the different health domains involved.

The NESTORE Consortium is a collaborative and complex network composed of 15 partners from 8 European countries, including 7 universities and two research institutions, while the industry is represented by three SMEs and one large corporation (Table 1). The consortium firm beliefs that NESTORE will have a wide societal and economic impact over a long time answering the expectations of the H2020 program.

Furthermore, NESTORE will also benefit from the direct involvement of a pool of external experts and stakeholders, with different backgrounds, experiences, and skills that will follow the project, helping NESTORE development via direct advice, and thus assisting it in the achievement of its key milestones. Such group has been named as Forum of Advisory Stakeholders (FAS) and gathers regularly once per year to review the project results and provide recommendations.

Table 17.1 NESTORE Consortium

Partner	Country	Type
AGE PLATFORM EUROPE	Belgium	Societal
CONSIGLIO NAZIONALE DELLE RICERCHE	Italy	Research
FLEXTRONICS DESIGN SRL	Italy	Industrial
FUNDACIO EURECAT	Spain	Industrial
FUNDACIO SALUT I ENVELLIMENT	Spain	Research
HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE	Switzerland	Research
LA MERIDIANA DUE - SOCIETA' COOPERATIVA SOCIALE	Italy	Societal
LOUGHBOROUGH UNIVERSITY	United Kingdom	Research
NEOSPERIENCE SPA	Italy	Industrial
PREVENTIVE COLLECTIEF	Netherlands	Societal
ROPARDO SRL	Romania	Industrial
SHEFFIELD HALLAM UNIVERSITY	United Kingdom	Research
TECHNISCHE UNIVERSITEIT DELFT	Netherlands	Research
UNIVERSITAT DE BARCELONA	Spain	Research
UNIVERSITAT ZURICH	Switzerland	Research

An integrated conceptual framework for setting an effective Exploitation and Dissemination strategy

The H2020 programme focuses on research to develop innovations for a smart, sustainable, and inclusive growth of EU. These innovations target some of the most compelling challenges for the European society, as well as the worldwide community. To meet these objectives, it is crucial to successfully transfer innovations from the laboratory to the market. Following this paradigm, the activities of dissemination and exploitation of project results have taken a role of key importance. This in line with the latest literature that highlights the setting of an effective strategy able to enclose communication (Makkonen and Johnston, 2014) and business networking on the base of standardized guidelines (Woodside and Biemans, 2005), as a decisive element influencing the market acceptance and diffusion of an innovation.

To support this, the NESTORE consortium has formalized five steps that might be followed to set an effective exploitation strategy for EC funded projects in the industrial health and social care context.

These steps were collected in an original framework named the *Exploitation and Dissemination Canvas* that was discussed by the whole Consortium and then approved by the three EC reviewers. The whole process was carefully managed by the Core Exploitation Team (CET) a board established to support and supervise the exploitation activities ensuring the alignment among Dissemination and Exploitation. The Core Exploitation Team is composed of: The Scientific Coordinator of the project, the Project Manager, the Exploitation Leader, and the Communication and Dissemination Leader.

The Exploitation and Dissemination Canvas displays all the necessary pieces of information, their interdependence and temporal sequence. It targets exploitation and dissemination objectives with an integrated approach and it is designed to be replicable in other EC-funded projects (especially related to the healthcare sector).

Step I: External Analysis

The first relevant step that each EC-funded project should follow deals with an in-depth analysis of the external landscape. This first step requires a mixed-method approach to get information about both the "demand" and the "supply" sides allowing the combination of evidence gathered from various sources of data to crystallize a more comprehensive picture of the external landscape.

The demand side

Regarding the former, the *demand side* should be investigated by combining desk analysis to collect data made available by institutional reports and in-depth understanding of the stakeholders' needs. The NESTORE

Consortium agreed that good exploitation should be driven by the users' needs and requirements. To meet this expectation, two different paths were followed. First, the Consortium started collecting data made available by institutional reposts and other secondary data sources about final users' characteristics (e.g. demography, health status, and prevalence of the chronic disease, IT literacy) on a panel of 11 European Countries focusing on the NESTORE target domains: nutrition, physical, social, cognitive and psychological. reports data for the 3 pilot-site Countries (Italy, Spain, The Netherlands) as an example.

Table 17.2 Desk analysis on European Countries (focus to pilot-site Countries)

	ITALY					SPAIN					THE NETHERLANDS				
PHYSICAL	Total population	Close to NESTORE target (55-64)		NESTORE target (65-74)		Total population	Close to NESTORE target (55-64)		NESTORE target (65-74)		Total population	Close to NESTORE target (55-64)		NESTORE target (65-74)	
		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES
BMI (%)															
Underweight	3,7	0,6	3,3	0,8	1,9	2,6	0,4	0,8	0,6	2,1	2,3	0,2	1,1	0	0,9
Normal	52,5	34,4	51	33,4	44	46,4	26	42,7	23,2	31,7	50	33	45,5	32,3	43,1
Overweight	43,8	65,1	45,7	65,8	54,1	51	73,6	56,5	76,3	66,2	47,7	66,8	53,4	67,7	56
Obese	10,5	16,7	14,1	15,1	16,7	16,2	24,3	21,3	22,5	26,9	12,9	16,2	17,6	14,6	20,8
Work-related physical activity (%)															
Heavy	6,8	9,8	4,9	3,1	1,7	3,2	3	1,3	0,7	0,4	NA	NA	NA	NA	NA
Moderate	28,1	29,5	33,9	23,9	31	16,7	19,9	16,1	17,3	11,7	NA	NA	NA	NA	NA
None or light	65,1	60,7	61,2	73	67,3	80,2	77,1	82,6	81,9	87,9	NA	NA	NA	NA	NA
	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES
Taking part in **sports/physical exercise** (>once a week) (%)	32	28	14	35	29	35	29	28	39	32	70	75	59	71	69
NUTRITION	Total population	Close to NESTORE target (55-64)		NESTORE target (65-74)		Total population	Close to NESTORE target (55-64)		NESTORE target (65-74)		Total population	Close to NESTORE target (55-64)		NESTORE target (65-74)	
		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES
0 portions	23	19,7	14,8	14,8	12,2	25	20,4	11,9	14,7	11,2	45,9	48,8	33,8	36,1	24,2
1-4 portions	65,1	69,1	68,1	68,1	68,5	62,6	64,5	69,7	70,2	69,3	29	28,1	36,5	33,7	38,1
5 portions or more	11,8	11,2	17,1	17,1	19,4	12,4	15,1	18,4	15,2	19,5	25	23,2	29,8	30,1	37,7
Frequency of fruit (%)															
At least once a day		74	80,3	80,6	85,3	66,7	72,6	81	80,2	84,2	41	38,9	54,8	53,4	65,1
1-3 times a week	11,1	10,8	7,4	7	4,9	16,3	13,8	8,9	7,4	6,7	20,9	20,2	15	15,6	11,3
4-6 times a week	12,7	11,6	10,1	10,3	8	12,6	10,5	7,7	10,7	7,8	27,6	28,6	22,6	21,4	16,7
Never/occasionally	5,3	3,6	2,1	2,1	1,8	4,4	3,1	2,3	1,7	1,3	10,4	12,3	7,6	9,6	6,8
Alcohol consumption (%)															
Every day	14,1	28,1	10,3	38,3	16,6	15,3	41,7	13,2	44,7	13,2	NA	NA	NA	NA	NA
Every week	24,4	29,9	17,2	24,1	11,4	22,3	20,9	18,4	16,1	9,6	NA	NA	NA	NA	NA
Every month	20	18,5	17,6	14,3	12,2	18,8	12,5	15,2	10,1	11	NA	NA	NA	NA	NA
Never or not in the last 12 months	32,8	16,3	44,2	17,1	50,2	31,3	18,5	40,4	21,1	52,1	NA	NA	NA	NA	NA
SOCIAL	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES
Face-to face contact with **family members** or **relatives** (> once a week)	84	86	86	81	87	77	77	82	75	79	75	75	79	73	76
Face-to face contact with **friends** or **neighbours** (> once a week)	87	85	87	86	88	90	88	93	91	90	87	84	87	87	88
Phone/internet contact with **family members** or **relatives** (> once a week)	81	80	80	77	85	85	82	86	80	90	85	84	82	81	90
Phone/internet contact with **friends** or **neighbours** (> once a week)	76	65	76	74	77	75	72	53	77	73	73	66	57	70	76
	Total population (16+)	Close to NESTORE target (55-64)		NESTORE target (65+)		Total population (16+)	Close to NESTORE target (55-64)		NESTORE target (65+)		Total population (16+)	Close to NESTORE target (55-64)		NESTORE target (65+)	
		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES
Cinema/Live performances/cultural sites/attending living sports (people with no activity limitation) (%)															
Cinema (1-3 times)	25,3	19,5	16,7	10,5	7,4	12,6	11,3	12,9	3,5	5	28,7	19,5	20,2	11,5	10,9
Cinema (+12 times)	5,1	2,6	2,5	1,7	1,4	3,4	1,2	1,9	0,4	0,9	4	1,7	0,9	0,9	0,5
Theatre and concerts (1-3 times)	22,2	16,6	19,1	10,8	11,2	14,5	14,7	12,5	6,5	8	36	30,9	30,5	23,8	19,9
Theatre and concerts (+12 times)	1,3	1,2	1,1	1	0,8	1,3	1,1	1	0,8	1,8	2,6	4	3,5	1,4	2,2
COGNITIVE	Total population	Close to NESTORE target (≤64)		NESTORE target (≥65)		Total population	Close to NESTORE target (≤64)		NESTORE target (≥65)		Total population	Close to NESTORE target (≤64)		NESTORE target (≥65)	
		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES		MALES	FEMALES	MALES	FEMALES
Prevalence of **dementia** (%)	2,09	0,04	0,05	0,64	1,36	1,75	0,04	0,05	0,56	1,11	1,47	0,04	0,05	0,46	0,92
	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES	Total population	Close to NESTORE target (50-64)	NESTORE target (65+)	MALES	FEMALES
Satisfaction with life (1-10)	6,6	6,6	6,4	6,6	6,6	7	6,6	7	6,9	7	7,7	7,7	7,7	7,7	7,7
Happiness (1-10)	6,8	6,9	6,4	6,8	6,8	7,3	6,9	7,2	7,3	7,3	7,8	7,9	7,7	7,8	7,8
Perceived health status as good or very good (%)	81,6	67	33	71	65	73	63	48	79	68	73	69	64	76	70
Have felt **lonely** (%)	7,2	6	13	6	8	6	11	5	7	3	2	6	2	4	
WHO-5 mental **well-being scale** (%)	59,4	60	52	61	58	68	63	63	70	65	65	67	70	68	63

The demand side analysis should also include the "voice of potential users". The NESTORE Consortium addressed this issue by designing and submitting a survey administered to the target users from two NESTORE pilot countries (Italy and Spain) to understand the determinants applying a theoretical framework based on two very popular theories: the Technologies Acceptance Model (TAM) (Davis, 1989) and the Theory of Planned Behaviour (TBD) (Ajzen, 1991). The insights gathered from the surveys administered in Italy and Spain help the NESTORE Consortium to shed further light on the design of the NESTORE exploitation strategy offering complementary information with respect to those collected from the desk analysis of a panel of salient European Countries. The most significant insights are shown in Figure 1. First, the intrinsic motivation supported by the perception of the utility and expected benefit - Perceived Usefulness according to the TAM model – is resulted to be the most significant determinant of the users' intention to use a virtual coaching system similar to NESTORE. Moreover, the impact of Perceived Ease of Use is still relevant suggesting the importance to develop a system simple to use even emphasising this characteristic with a graphical interface that clearly expresses the idea of simplicity. Besides the Perceived Usefulness and the Perceived Ease of Use, the analysis shows that social pressure (the Subjective Norm) has an indirect effect on the intention to use a digital solution for healthy ageing. It indeed affects the perception of usefulness (in both countries) and the perception of usefulness (only in Italy) showing that they are both exposed to the moral persuasion exerted by groups of stakeholders that important for the user. This confirms the need for the NESTORE Consortium to engage a conversation with this group of stakeholders through a focused dissemination plan that might help the deployment of the exploitation strategy. Concerning IT Literacy, the two countries show different

results. In Italy IT literacy, as well as Health literacy, affects mainly the Perception of ease of use while in Spain IT literacy positively affects the intention to use, mirroring its effect on the perceived ease of use that is not significant, and the perception of usefulness. Finally, all the control variables (the socio-demographic variables) do not affect the intention to use confirming the reference target.
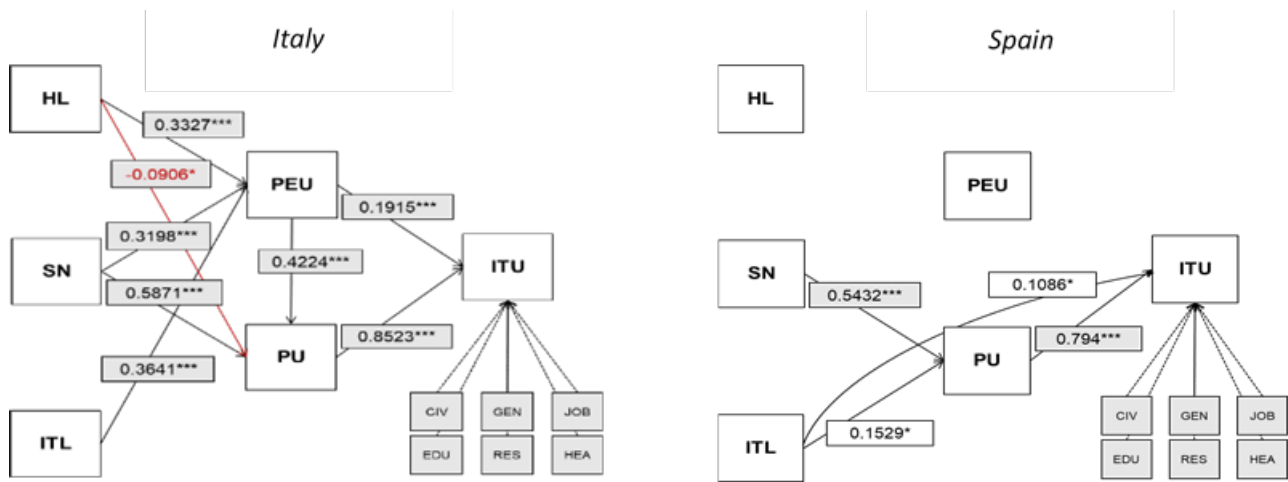

Figure 17.0.1 Statistical results from the survey administered in Italy and Spain

From the involvement of the FAS in this step, it was suggested how some users may like to use NESTORE just when needed, i.e. not on a continuous basis, while some others may need to be motivated on a punctual basis through an on-going "nudging" process. Therefore, NESTORE should be flexible enough to accommodate these different preferences. Furthermore, the FAS suggested that NESTORE's approach against loneliness should change with respect to the cultural and social-economic statute of its users, which may vary significantly from person to person. Such dimension was not comprehensively embraced by the project before then.

The supply-side
On the other hand, the *supply-side* should investigate potential competitors that the project solution will face once in the market.
Within the NESTORE project, the reference market - the "wellbeing" market - is wide, and includes different solutions, from generic pieces of advice in magazines to free-of-charge APP able to monitor the physical activity or other behaviours, also through the connection with wearable devices or again telemedicine services. Therefore, the supply side was investigated by clustering the potential competition along with different perspectives including i) products and/or service enough similar to NESTORE; ii) Apps specialized in health prevention and in engaging potential user into a healthier lifestyle; iii) Start-Ups developing products or services for the wellbeing and healthy lifestyle market by leveraging on digital technologies such as NESTORE.
The pieces of information needed for analysing products or services already in the market were collected systematically though a dedicated template interrogating different databases. For the Health App word, a different strategy was followed. The number of Health App available on the two-leading platform (Google Play Store and Apple App Store) indeed is around 325,000 health apps (both health and fitness and medical apps) with an estimated 78,000 new Health Apps entering the market every year. Considering the impressive size of the market, the developing rate, and the complex quality assessment, a systematic analysis of the whole app published in the databases resulted particularly challenging and ineffective to understand the competitor behaviours and their relationship with the NESTORE solution. The Consortium addressed this issue by defining some App archetypes on the base of five main polar characteristics: i) free – Paying; ii) Medical – Health and Fitness (H&F); iii) No/basic coaching – advanced coaching; iv) Mono-dimensional – Multi-dimensional; v) Integrated with devices – Standalone. The table below shows some examples of the analysis results. Table 3 offers a synoptic overview.

Table 17.1 Health App polar type classification – relevant examples are displayed

App's name and logo		Payment	Category	Coaching	Dimensions	Equipment
	LUMOSITY	Free	H&F	Basic	Mono	Stand alone
	MIND GAMES	Free	H&F	Basic	Mono	Stand alone
	ENDOMONDO	Free	H&F	Advanced	Multi	Stand alone
	HRV4 Training	Paying	H&F	Advanced	Mono	Integrated with devices
	Calorie Counter	Free	H&F	Advanced	Mono	Stand alone
	Lose It!	Free	H&F + Medical	Basic	Mono	Stand alone
	WYSA	Free	H&F	Advanced	Mono	Stand alone
	Headspace	Free	H&F	Basic	Multi	Stand alone
	HealthLab Diabetes	Free	H&F + Medical	Basic	Multi	Stand alone
	ETERLY	Free	H&F	Advanced	Multi	Stand-alone OR integrated with devices
	Fitbit	Paying	H&F	Advanced	Multi	Integrated with devices
	Lark	Free	H&F	Advanced	Multi	Stand-alone OR integrated with devices

Concerning Start-Ups, the analysis was carried on extracting a sample of 1,580 Start-up (from 2013 to 2017) from Crunchbase, the most qualified source of data about Start-Ups. The dataset has been created filtering Start-up categories with terms as "healthcare, mHealth, personal health, home healthcare" and contains information about the organization (name, foundation date, headquarters location), and the funding received (total funding amount, last funding date, last funding amount). Then, the Start-Ups have been classified according to 15 macro-categories. Figure 2 shows the domains that have been more challenged in the last years and confirms that there is an interest for the areas covered by NESTORE: Intelligent tools to suggest diagnosis and/or disease management, Information on prevention and lifestyle, and Lifestyle monitoring with respectively 178, 98 and 30 Start-Ups identified.
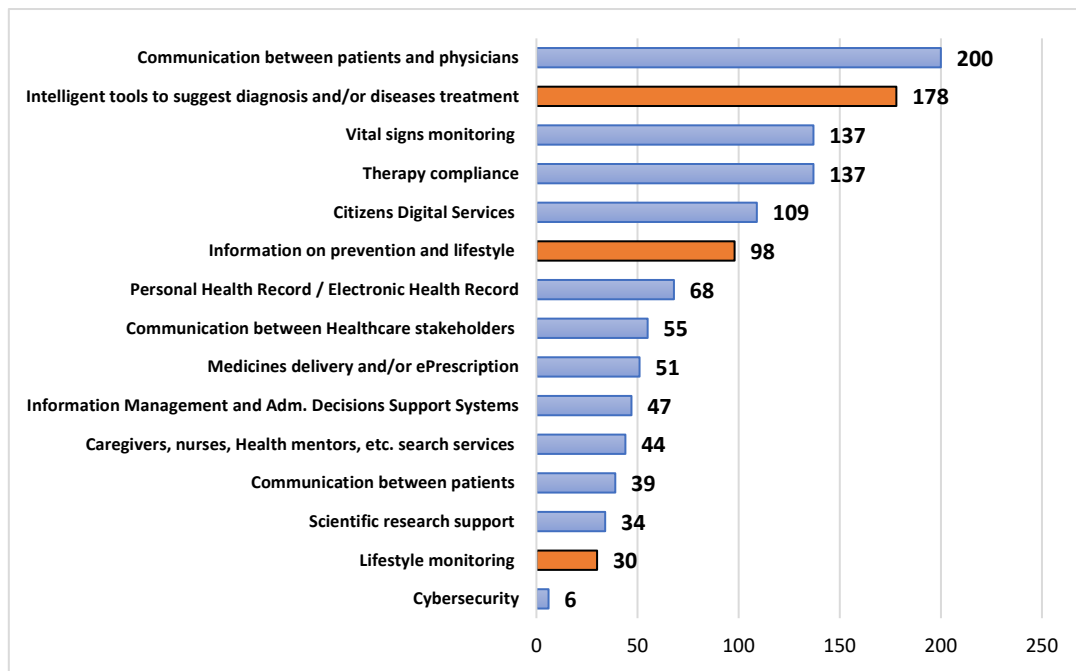
Figure 17.2 Distribution of Start-Ups against the Macro-categories

Regarding the funding amount, the median value per category was calculated to have comparable and reliable results. Results show that in the considered period, The Macro-category *Intelligent tools to suggest diagnosis and/or disease management* collected a median value of funds around $ 2,560,000, the *Information on Prevention and Lifestyle collected* a median value of funds around $ 1,340,000 and *Lifestyle monitoring* around $ 1,335,000. Considering that NESTORE covers mainly these three Macro-categories, the median value that has been jointly collected by them is aligned to the budget the EC Commission allocated for the NESTORE project. The advantage of NESTORE is that these areas will be integrated into a coherent innovative, multi-domain, cross-disciplinary and personalized coaching system to support healthy older adults to sustain their wellbeing and capacity to live independently.

Once collected all the information needed, the overall competition has been analyzed along two main dimensions: digitalization (i.e. use of digital technologies) and personalization (i.e. tailoring coaching activities). This two-level matrix refers to the existing ways in which senior adults can get information, advice, motivation, or incentive regarding the five NESTORE dimensions. According to the two characteristics, coaches have been classified in:

Passive inputs: solutions characterised by no/basic personalization (it means that people receive information but no feedback from the instructor/author/speaker) and no digitalization. This category includes newspapers, magazines, public events, advertising, informative brochures.

Quantified self: No personalization but digitalization is supported by the use of mobile devices, apps, and wearable technologies. (e.g. Basic Mobile apps, app + devices for self-measurement; common wearables including fitness trackers, smartwatches).

Coach next door: advanced personalization but no digitalization. The coach knows the learner and provides a customized service but the digitalization is not supported. Examples are personal trainers, integrated training Centers, nutrition and wellness Centers, and gyms.

Virtual coaching: users receive information, motivation, and feedback from the instructor that provides a customized service reinforced by the use of mobile devices, apps, and wearable technologies that can track activities (e.g. NESTORE).

Being the healthy ageing and prevention market a relevant but overcrowded market, to explore a "blue ocean" strategic positioning the project solution concerning other players, is of paramount importance and the benchmarking should be tailored and focused on the solutions that are enough similar to the NESTORE and satisfy the same needs. Therefore, the *Virtual coaching* category has been deeply analysed considering

the Target Users (healthy citizens and chronic patients) and the Dimensions covered (targeting the five NESTORE dimensions). The main results of the positioning are shown in Figure 3.
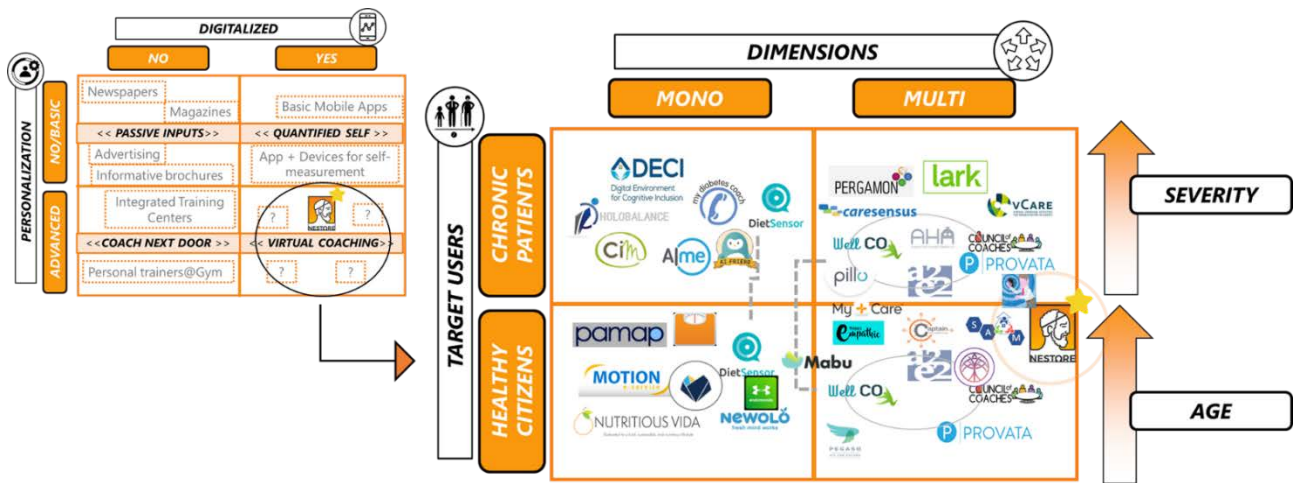

Figure 17.2 NESTORE Benchmarking Matrix

Step II: Internal Analysis

Besides the external one, the second step each EC-funded project should implement is an internal analysis. It should be conducted focusing on the identification and analysis of the most promising exploitable outputs developed within the project. Despite the reference angle for setting the exploitation strategy is the entire solution, we cannot ignore that EC-funded projects are often the result of a portfolio of innovations that might enter into the market as standalone solutions. According to the latest in-scope literature (Prato et al., 2015) on average nearly two new or substantially improve products or services can be outlined within each ICT European project. In this view, the Internal analysis should help to discover the 2/3 most innovative exploitable outputs from the project and subsequently to design the most appropriate exploitation strategy, thus maximizing their commercial potential.

Within the NESTORE Project, the so-called *exploitable outputs* were collected through one-to-one interactions with the Consortium partners based on a structured questionnaire grounded on the Innovation Radar method: a method endorsed by the European Commission and by the reviewers to collect important insights about innovation and innovators. Being designed as a reporting tool, the Innovation Radar questionnaire was adapted to the specific NESTORE case. Besides the original IR questions, the questionnaire was integrated with others, among them the Technology Readiness Level (TRL), the main competitors, and the partners' individual strategy.

Table 4 shows the heterogeneity in terms of the typology and development phase of the 21 innovative outputs that might emerge from the NESTORE project collected in the first round. Among them, 10 outputs have been classified as *products* (48%), 2 outputs as *services* (9.5%), 2 outputs as *processes* (9.5%) and 7 outputs as *know-how* (33%). This stratification is promising and in line with the methodology since *products* or *services*, unlike *process* and *know-how* that are lower ranked, are the preferred exploitable outputs because their potential in the market is more evident and easily accessible.

Table 17.2. NESTORE exploitable outputs classified by typology

Products	
Ex.O. 3 Sheffield	Design prototype
Ex.O. 1 TUD	Mobile digital game
Ex.O. 2 Zurich	Serious game for cognition
Ex.O. 2 FSIE	Gender Checklist
Ex.O. 1 LU-CIM	Use Habits Recognition Module

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Ex.O. 2 LU-CIM	NESTORE EMOTIVE Wellbeing Engine
Ex.O. 1 NEOS	Sensor patient monitoring architecture
Ex.O. 3 HES-SO	Tangible coach
Ex.O. 1 Flex	Wearable device – smart bracelet
Ex.O. 2 Flex	Charging station

Services	
Ex.O. 2 EURECAT	Decision support system
Ex.O. 1 HES-SO	Conversational agent

Processes	
Ex.O. 1 Sheffield	Co-design methods
Ex.O. 1 HES-SO	Design guidelines

Know-how	
Ex.O. 3 Flex	Algorithm
Ex.O. 1 CNR	Descriptive models for healthy ageing
Ex.O. 2 CNR	Coaching plans
Ex.O. 3 CNR	The NESTORE specific ontology
Ex.O. 1 Zurich	Evidence-based intervention program
Ex.O. 1 FSIE	Steps for interaction system-individual
Ex.O. 2 HES-SO	Implementation of behaviour change

For the analysis, the NESTORE Consortium adopted consolidated guidelines (De Prato et al., 2015) to assess the score associated with the IR questionnaire. The IR has two main dimensions of analysis: the "Innovation Potential" and the "Innovator Ability". The NESTORE Consortium argued that at the stage of the project, the former dimension is more relevant concerning the latter. In this view, the analysis of the scores associated with the Innovation Potential Indicator helps to select the 2/3 more promising classifying the outputs based on their "potential" by clustering them in Low, Medium, and High-Potential Innovations.

Step III: Scenario crystallization

The cornerstone of the canvas is the crystallization of the exploitation scenarios, the most suitable business case to bring the EC-funded project results to the market and generate the expected impact. The identification of the exploitation scenarios should be informed by both internal and external analysis and should be crafted according to two main directions: commercialization and further research. The former refers to Go-To-Market scenarios where the project results are commercialized on the market, the latter refers to the need for collecting additional funding to progress further what will be developed and tested within the project. This is especially relevant, for example, when the strategy is to engage a conversion with payers that might be interested in gathering evidence from larger-size pilots, not frequently committed to EU-funded projects. For example, despite the opportunity for commercial exploitation of the NESTORE solution as a whole (or of single components) remains the preferred objective, the Consortium partners' claims that the search for additional funds to progress the results achieved within the project should be strongly considered. The main reason beyond is the fact that NESTORE is running small-size pilots to test the feasibility and performance of the NESTORE solution, but engaging a business conversation with health agency or other institutions requires a higher level of evidence. The Partners are aware that reaching this level of evidence and insights requires more research effort, eventually through a large scale pilot.

Reflecting on the experience of the NESTORE project, we suggest that the exploitation scenarios should be grounded on two or more exploitation hypotheses. The NESTORE Consortium, for example, started the process by identifying two dimensions: on one hand the level of integration along the value chain and on the other the revenue stream. The former is mainly related to the "openness" towards external players and suppliers of physical products/services not underestimating the possibility to transform NESTORE in an interoperable platform able to collect and digest data from different devices and services. The Consortium has argued that having a close system would make the communication and the data sharing among the different parts of the solution easier ensuring the reliability of the retrieved data. On the contrary, an open system could offer users a complete experience by continuing to use already possessed smart devices even resulting in a higher complexity in the management of users' data, and poorly interaction quality.

As regarded the revenue stream, the Consortium has envisaged different possibly: i) freemium for the citizens (or with small co-payment) with a third party that pays for the service - it may be the case of public healthcare agencies that intend to offer the service to their citizens – or for the data (e.g. companies that are interested in aggregated data on lifestyle behaviours for both research and commercial purposes) or ii) out-of-pocket paid by citizens.

Step IV: Exploitation and dissemination alignment: the stakeholder involvement

The fourth step is the involvement of the most relevant stakeholder in the scenario selection and validation. We argued that a successful exploitation strategy for the EC-funded project is strongly dependent on the capacity of the Consortium partners to engage a conversation with those groups of stakeholders that more than others might positively affect the results of the exploitation strategy. This deals with two different topics requiring different plans of action. On one hand, the strategic synergy across the project between exploitation and communication and dissemination, on the other the identification and selection of the most relevant stakeholders to guide both the dissemination and exploitation strategy.

In this view, concerning the former, the NESTORE Consortium strengthened the alignment among Dissemination and Exploitation by establishing the CET able to support collaboration and integration among the strategy combining both the academic and the industrial segment. Considering the latter, a robust approach to identify and select the most relevant stakeholders to engage in a conversation with was developed to focus the efforts and get tangible results within the project timeframe and to validate and fine-tuning the exploitation scenarios. The framework was presented in the guise of an original graphical representation labelled by the Consortium as "NESTORE DAISY Ecosystem Canvas".

Nine main types of stakeholders, that concur in parallel for the creation, implementation, and diffusion of NESTORE, were identified by the Exploitation and dissemination board. Each category together with examples of the possible actors to be involved are listed below:

- Standard makers: such as scientific communities, health authorities, technology privacy, or ethics standard makers who are involved in formulating policies, especially in matters of health and health technologies.
- Payers: they are the actors potentially in charge of the payment and distribution of the NESTORE solution. Al already stated, the NESTORE solution has a high potential either as a B2B (Business to Business) or B2C (Business to Consumer) business model. Thus, the Board has included in the ecosystem different payer options for who NESTORE could be of interest for generating value. For example, NESTORE could be provided or distributed by Healthcare Institutions for supporting the delivery of new health promotion services for the healthy ageing of European Citizens or by Health Insurance companies for improving their portfolio of services offered to their clients. NESTORE could also be of strong interest to Large Corporations interested in aggregated data on lifestyle behaviours for research and commercial purpose. Moreover, the Consortium has also decided to include citizens as a payer option but keeping high regard to the European project requirements of affordability and economical accessibility from the users.
- Investors/funders. Engaging a conversation with investors and funders such as the European Commission, Institutional funds, Private funds, and Business angels is considered of paramount importance to the project because of the development phase of the NESTORE system. These actors,

indeed, could provide the consortium of financial resources for proper, consistent, and legal development of the solution behind the end of the project.

- Providers of physical products/services and Manufacturers of hardware and software for connected care. Starting from the assumption that the NESTORE solution could act as an open solution able to collect data from different devices and that could allow the provision of services by third parties that may interface with the system, the Board has decided to include within the relevant NESTORE stakeholders spreading out among the different wellbeing dimensions covered by the solution.
- Channels: they represent the pathways through which the NESTORE target segment could be reached out. To design the ecosystem, the Board has considered different channel options clustering them into physical channels, such as pharmacies and drug stores, tech retails, gyms and fitness centres, and virtual channels such as e-commerce.
- Influencers. The Project Officer and the three Reviewers have provided the Consortium with the recommendations to consider engaging some actors that could use their networks to generate an effect in terms of improving network activities. The Board sought the opportunity and included mass media, physicians and specialists, and third age advocacy groups as influencers.

Step V: Scenario refinement and business plan

The last step to effectively set an exploitation strategy is the designing and fine-tuning of the exploitation scenarios based on the insight gathered from the stakeholders involved.

This step should not be considered a one-way street, but a continuous circular journey where the Exploitation scenarios identified should be continuously refined and fine-tuned during the project lifetime by constantly including insights resulting from the monitoring of the external and internal context. This includes the collection of further evidence on the users' point of view as well as additional desk analysis and continuous updating of the project results concerning the potential competitor landscape that, being extremely dynamic, could be rapidly evolving in a short time. Moreover, once those groups of stakeholders that should be targeted for the Dissemination and Communication activities are identified, actions and activities to support the building of the envisioned ecosystem should be suddenly put in place to gather more feedback and ideas from different stakeholders and different audience types and incorporate them in the exploitation strategy.

The final step of the canvas, suggested for an effective exploitation and dissemination strategy, is the development of the Business Model Canvas for each exploitation scenarios crystalized valuable to offer a holistic view of how the project results could create, deliver and capture value. The Business Model Canvas should be complemented with the Value Proposition Canvas as well as with the Financials for the different exploitation scenarios, to support the choice of the most promising exploitation direction.

Finally, the FAS suggested that an economical study on the return of investment would be of tremendous help in this phase. NESTORE already performed a systematic literature review on Social Return on Investment (SROI) and on cost-benefit analysis but quantified metrics to depict the social return of investment are still missing. These topics are further analysed in chapter 15.

Discussion and Conclusions

This chapter aims at contributing to the ongoing debate over the innovation difficulties of Europe -that is the failing of several EC-funded projects in bringing innovation to market, despite the growing efforts from the EC both in terms of funding and political message (Veugelers et al., 2015)- with a focus on the particular context of the healthcare sector. A novel framework to align dissemination and exploitation activities within EC-funded research projects has been proposed.

The method is composed of five sequential steps.

The first step covers the analysis of the external landscape including both the demand and the supply side. The demand side includes the study of the specificities and priorities of the different countries involved (desk analysis) and the analysis of the potential users to understand their intention to use or adopt the project solutions. The supply side should consider i) comparable or substitute products or services; ii) innovative start-ups in the referred market and iii) other projects targeting the same needs or developing similar solutions that may enter the market in the future. This first step allows a comprehensive understanding of users' and stakeholders' characteristics and the potential market that the project solutions might leverage.

The second step analyses the internal context identifying the exploitable outputs of the project. This step refers to a framework that sees an innovative project as a portfolio of possible outputs, each with different characteristics and expected potential (Nogeste & Walker, 2005).

The third step is about the crystallization of the exploitation scenarios, the most suitable business case to bring the EC-funded project results to the market and generate the expected impact. The identification of the exploitation scenarios should be informed by both internal and external analysis and should be crafted according to two main directions: commercialization and further research.

The fourth step considers the alignment between exploitation and dissemination, with this approach the most relevant project stakeholders are involved in defining and validating the exploitation options. 9 different types of stakeholder have been proposed, this classification can be suitable and generalized also for other projects involving a similar ecosystem.

In the fifth step the exploitation scenarios design is finalized together with the development of the business models, which support the choice of the most promising scenarios for future development.

This framework has been proposed to address some of the root causes and barriers to innovation capitalization in EC-funded projects. These include the lack of defined schemes, skills, and knowledge on dissemination and exploitation activities. Many Consortia seem to consider dissemination and exploitation as abstract activities, only marginally linked to the "real work" of the project and with no added value (European IPR HelpDesk, 2016). The real potential of an effective dissemination and exploitation strategy results to be underestimated. This chapter aims at reversing these beliefs, providing a well-structured model. Furthermore, this framework can be useful to address other elements of complexity characterizing these projects such as great organisational variety, lack of a decision-making hierarchy, and very long project duration. For all these reasons, the proposed model could be adapted and replicated in other EC-funded projects maximizing the impact of research, as well as promoted by EC officers leveraging on NESTORE experience and results to highlight the crucial role of dissemination and exploitation activities. In any case, these efforts should also be complemented by a set of structured and comprehensive European policies and interventions aiming at furthering the integration of the European capital, labour, product, and services markets, making easier for players in the innovation system to interact, and, at the same time, ensure healthy competition, external financing, and private risk funding (Veugelers et al., 2015).

The framework and the findings presented are subjected to some limitations. First, even if involving a portfolio of heterogeneous innovations, the study is based on a single-case using an inductive approach. The proposed model should be replicated on different research projects to better discuss the generalization of our results.

Second, the innovations developed within the NESTORE project have not been launched on the market yet. Therefore, a longitudinal study to evaluate the results on the market of these innovations (i.e. their adoption and diffusion over time) should be considered for future research. This latter will allow further validation and improvement of our method designed to bring EC-funded project innovation into action in the healthcare context.

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