Abstract: A virtual professional community of practice (VCoP), HOBE+, was set up in 2011 to foster and facilitate innovation. It was aimed at all primary care professionals of the Basque Public Health Service (Osakidetza) in the provinces of Biscay and Araba. HOBE+ incorporated innovation management process from the generation of ideas to their implementation.

In 2015, based on its success, HOBE+ became a corporate tool in Osakidetza extending its radio of action to all employees and settings (primary and Hospital care).

This manuscript objective is to assess, via a case study method, the process of developing and implementing a VCoP open to all primary care professionals in Osakidetza, including the take-up, participation and use of this VCoP in the first 15 months after its launch in October 2011. The usefulness of the VCoP was also assessed through a survey gathering the opinions of the professionals involved.

The experience shows that it is possible to create a virtual CoP for innovation in primary care where professionals from different professional categories propose ideas for innovation that are ultimately implemented; a experience that had been later on refined and extended to all Osakidetza.

Keywords: Basque country, Primary care, Innovation, CoP, Online professional community of practice, HOBE+, Osakidetza, BIOEF

1. Introduction

1.1 Open innovation and knowledge management

Sustainability in competitive environments requires companies to share knowledge beyond their traditional boundaries in order to innovate [1]. This open innovation paradigm (open innovation being a term coined by Professor Henry Chesbrough[2]), postulates the need for internal and external flows of knowledge around organisations to extract the most value from their innovative potential.

In the healthcare sector, even in countries with universal coverage, tax funding and quasi-monopoly of public providers (like the Spanish National Health Service), the pressing problems of chronic diseases and multimorbidity, as well as rapid technological and social changes, jeopardise the sustainability of healthcare systems. Innovation is regarded as critical for long-term sustainability in this sector.
The discipline known as knowledge management deals with the study of the most important decisions about knowledge itself, and has become one of the most common approaches in the field of strategic management\textsuperscript{[3,4]}. Knowledge management doesn’t have a single definition. Knowledge management can be used to understand performance in organisations. Being healthcare delivery a knowledge driven process, knowledge management provides an opportunity for improvement and innovation in processes. A review on knowledge management in the healthcare industry shows important insights\textsuperscript{[5]} and states that knowledge management is systemically more complex in healthcare due to existing tensions within and between issues in three domains: specific value-laden aspects of clinical practice; normalization of workplace practice into generic process flows; and the technical integration of disparate information systems that is key for knowledge application.

The content of the discipline includes the analysis of knowledge management processes (development, integration, protection, transfer and exploitation) needed to get the most value from efforts to generate intellectual capital in organisations. More specifically, Sáez Vacas et al.\textsuperscript{[6]} define it as the process of identifying, grouping, sorting and continually sharing knowledge of all kinds to meet present and future needs to identify and exploit knowledge (both pre-existing and newly acquired) in order to develop new opportunities.

The knowledge creation spiral model of Nonaka and Takeuchi\textsuperscript{[7]} integrates open innovation and knowledge management. These authors argue that an organisation cannot create value without the initiative of different individuals and interactions that are established in the working groups. Further, they indicate the existence of cross-organisational knowledge from relationships between organisations and external agents, whose existence adds value to the open innovation process. These authors describe the knowledge creation spiral this way. First of all, they divide the knowledge in two types:

1.1 Explicit knowledge

Knowledge that can be structured, stored and distributed. Such knowledge can be transmitted easily from person to person.

1.2 Tacit knowledge

Those skills that are part of our mental model, the result of our personal experience and involves intangible factors such as beliefs, values, insights, intuition, etc … , and therefore cannot be structured, store or distribute.

Thus, the explicit knowledge can be easily processed by a computer, distributed electronically (eg via e-mail) or stored in a database, however, the nature of tacit knowledge complicates it’s processing and distribution. This requires transforming it into concepts that everyone can understand, and this way, convert it into explicit knowledge (and the other way around).

So, both open innovation and knowledge management require specific tools to facilitate the flow of ideas in a structured and standardised way in order to achieve specific results. In this context, communities of practice (from now on CoPs, as they are commonly known in the literature) have been associated with knowledge management as people have begun to see them as a way to develop social capital, nurturing new knowledge, stimulating innovation, and sharing tacit knowledge within an organisation.

1.3 Communities of practice and virtual communities of practice

Advances in information technologies over the past 10 years have allowed the general public and professionals to obtain easy access to information from diverse areas of knowledge. More specifically, Web 2.0 applications enable the exchange of knowledge and opinions between different users, allowing a multidirectional flow of information; therefore, they facilitate the creation of virtual communities.

According to Wenger, McDermott and Snyder 1 \textsuperscript{[8-12]}, a CoP is a group of people who share a concern, a set of problems or a common interest in a topic at a personal or professional level, and who increase their knowledge and experience in this area through continued interaction. CoPs can become formidable tools for managing knowledge in organisations beyond the limits of formal systems. Besides their benefits in terms of dissemination of organisational knowledge, such communities can also serve as talent integration tools and help to strengthen the sense of belonging to
an organisation.

A CoP can be a very effective tool for knowledge exchange between peers and between different hierarchical levels. Indeed, established hierarchies tend to disappear as people become focused on the specific knowledge area or topic itself. Habitually, a facilitator (also called moderator or coordinator depending on the authors) is needed in order to galvanise and manage the community. However, self-regulation should be allowed and there should be no manipulative authoritarian attitudes, rather members should be stimulated with questions, and proposals for improvements and actions, together with active networking.

The CoP concept has been taken forward from an analytical or theoretical approach to a management tool that can be deliberately cultivated. In particular, Wenger, McDermott and Snyder focus on the use of CoP as a knowledge management tool. The authors suggest that organisations can improve the capacity of their members through the use of this type of community.

While the concept is subject to different interpretations, we can identify the main characteristics of a CoP, namely the support for formal and informal interaction among users to promote the exchange of knowledge and encourage learning. According to the work of Wenger and colleagues, CoPs are characterised by three features: a domain of knowledge, a community of people interested in this area of knowledge and shared practice within that scope.

Systematic reviews of the field show that CoP-related publications have focused on areas such as education or business, significantly less having been published on their use in the healthcare sector. As for evidence of the effectiveness of CoPs in healthcare, there have been some reports of positive effects on continuing education, knowledge transfer and adoption of innovation. However, these studies are qualitative and very heterogeneous, and the CoPs evaluated have been developed in the context of complex and multifaceted interventions. These factors make it difficult to attribute specific effects to the CoP or to draw strong conclusions.

One of the key factors in the success of CoPs is the facilitator, who has a crucial role to play in ensuring the effective functioning of the CoP, especially in the case of a virtual CoP. The facilitator’s mission is to promote participation and manage the content exchanged between members of the CoP, identifying relevant content and storing it properly for easy retrieval.

Some consider VCoPs to be “semi-communities” as, being computer-mediated contact, they lack some of the most important aspects of communication. This has been changing in the last decade, however, due to advances in social software tools. There are platforms where you can communicate in written, spoken and even “symbolic” ways, such as Second Life and other virtual world environments.

In VCoPs, peripheral participation refers to people who do not send messages and/or do not contribute to the forums, but do connect and read what is said in the debates. These users are known as “lurkers” and even though they do not contribute directly they usually obtain benefits from the knowledge sharing that takes place on the platform, applying ideas and improvements in their day-to-day job. These types of benefits are, however, difficult to quantify.

1.4 The HOBE + VCOP

HOBE + (Hobe, derived from the Basque word for improvement, “hobekuntza”) is an innovative online VCOP of primary care professionals developed in order to generate, identify and promote innovation and improvement within the Basque Health System. Launched in October 2011 by four primary districts of Osakidetza in Biscay and the Basque Institute for Healthcare Innovation (O + berri), Hobe + provided an opportunity for primary care professionals to identify, propose, define and develop innovative ideas that arise in their daily work in Osakidetza. This initiative encompasses a process of innovation management from idea generation to its eventual implementation. In June 2012, the Araba primary care district joined the platform.

Participation in HOBE + was voluntary. All primary care workers from Biscay and Araba were invited to use the platform, but it was their own decision whether to participate or not. HOBE + users could share their innovative ideas or suggestions for improvements, as well as access those proposed by others, at different levels of detail. Once ideas were introduced, users were able to discuss them, enriching the ideas and offering alternatives through their comments.

In previous reviews, no publications were found on VCoPs specifically dedicated to innovation in primary
care. Therefore, it was detected the need of an assessment of the process of developing and implementing a VCoP open to all primary care professionals in Osakidetza, exploring the take-up, participation and use of this CoP in the first 15 months after its launch, and assessing the opinions of the professionals involved in this initiative.

Based on the results of this assessment, a reflection period took place in order to decide how to extend this experience to all Osakidetza employees (both primary care and Hospital care professionals) and also to refine the innovation process in order to achieve quicker results implementing detected ideas. This quick implementation need was critical in those ideas that had a corporate approach (those that cannot be developed or implemented from a local setting perspective). So, turning HOBE+ into a corporate tool turned into something critical to be successful implementing corporate ideas.

In early 2015, Osakidetza decided to scale-up HOBE+, defining a new corporate business process and refining the existing local process in order to make it feasible and building a custom based VCoP that would be accessible to all Osakidetza employees and settings (ideascale was no longer needed, and all the knowledge of HOBE+ was transferred to this new application). This is the way HOBE+ turned corporate and rebranded to PARTE HARTU (Participate or Take Part translation in Basque).

2. Materials and methods

A case study approach was adopted based on researchers’ observations, data provided by the technology platform supporting the VCoP, and data from a survey completed by HOBE+ users.

Regarding the survey, the 1,627 registered users of Hobe+ were consulted. A survey was sent out on 10 and 11 December 2012 to gather extra information about the users profile, usage and opinion about HOBE+.  

2.1 Variables assessed

First, data were collected on the processes involved in the creation and implementation of the HOBE+ VCoP based on observations made by the researchers during the course of the project.

Second, the dashboard of the technology platform offered quantitative data on how primary care professionals take-up, use and participate in the VCoP. The following variables were explored:

• Acceptance of the VCoP by primary care professionals, measured in terms of the total number of professionals that take-up the offer and register in the VCoP.
• Participation, as measured by the rate of interactions between professionals across the VCoP, in terms of the numbers of contributions and comments.
• Use, as measured by the number of entries in the VCoP, the number of ideas put forward, and the number of comments posted.
• Impact, as measured by the number of ideas carried through to implementation.

Third, from the survey we analysed the following variables:

• User profile information
• Perception of the usefulness of HOBE+

These data come from the 233 users who completed the survey within 15 days of receipt, the response rate being nearly 15% (233 of the 1627 registered users).

3. Results

3.1 Creation of working groups to manage the VCoP

An innovation process was established in order to detect and refine innovation ideas in HOBE+. This process defines the potential channel for ideas, from their proposal to their eventual implementation in primary care organisations. For this management of the actions during each phase of the innovation process, two working groups were created: the Ideas Group and the Innovation Group, both made up of non-managerial staff from various levels of the organisations participating in HOBE+. Further, the CoP innovation process was defined in order to manage platform usage and the work of these groups. Both groups are facilitated by BIOEF.
The Ideas Group is responsible for the initial screening of ideas and galvanisation of the platform. Its members filter existing ideas, fleshing out each selected idea in sufficient detail and depth to ensure they could become real projects or improvements. This is achieved by galvanizing the platform, fostering debate and seeking information that could support ideas that emerge. Once an idea is solid enough, Ideas Group members decide whether they can foster its implementation based on its complexity and the possible need for further validation from other hierarchical layers. If further steps are needed, selected ideas are passed to the Innovation group. Hence, the main duty of the Ideas Group members is to serve as a first filter to ideas and, where possible, supply background information such that they could be selected as projects. Ideas group members dedicate around 16 hours a month to the community, focused mainly on these tasks.

The Innovation Group carried out a more in-depth analysis, as well as studying the feasibility of the proposals coming from Ideas Group. In most cases, members of this group were more senior and experienced than the Ideas Group members and had enough background or influence at a managerial level for validating or filtering out ideas. At the same time, they refined the associated proposals and decide whether they could be implemented from this level or they need approval from the Management Group.

The Management Group, also facilitated by BIOEF, had the ultimate responsibility for taking decisions on proposed changes, improvements or initiatives, as well as integrating them into management plans or passing them on to other levels of management. It was also responsible for identifying the corresponding resources and the development of innovation projects that require prior research or pilot schemes.

BIOEF’s facilitator role included the coordination of the 3 working groups, preparation and conduction of the meetings of each group and supervision, follow up and support in the development of every selected idea. At the same time, if one of the ideas approved by the Managers group needed any special coordination or agreement with Osakidetza’s Headquarters for its implementation. Therefore BIOEF played the coordinator role between Osakidetza Headquarters and HOBE + member groups.

3.2 Technology platform

In order to identify a suitable IT platform for HOBE+, several national and international healthcare-related CoP projects and tools were analysed (see Appendix 1). Among all these options, we decided to purchase the licence for the IdeaScale software to support the CoP based on its flexibility to be adapted to the requirements and functionality required for the innovation process. This software offered extensive leverage of the database generated, and provided administrators with valuable information to assess how the CoP was being used, participation rates and results, as well as the status of the ideas generated by users.

3.3 Launch and development of the HOBE + innovation community

On 6 October 2011, HOBE + was launched. That day, all primary care professionals in Biscay with an email address received an invitation to join the community. To sign up, all they had to do was click the link in the email and set a password.

In June 2012, Araba primary care district decided to join HOBE + not only to develop an innovation process in their own district but also to be able to share knowledge and best practices with other primary care districts in Osakidetza.

3.4 Acceptance, participation, use and impact

Acceptance was assessed in terms of the number of professionals who registered in the HOBE + VCoP out of the total number who received an invitation.

In Table 1 the total number of professionals registered is represented as well as the percentage registered by professional category.
Acceptance of the CoP by the primary care professionals  

<table>
<thead>
<tr>
<th>Professionals invited</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors Invited</td>
<td>1732 (33)</td>
</tr>
<tr>
<td>Nursing professionals invited</td>
<td>1916 (37)</td>
</tr>
<tr>
<td>Administrative staff invited</td>
<td>1058 (20)</td>
</tr>
<tr>
<td>Technicians invited</td>
<td>128 (3)</td>
</tr>
<tr>
<td>Other staff invited (unspecified)</td>
<td>356 (7)</td>
</tr>
<tr>
<td>Professionals registered (positive answer to invitation over invited professionals)</td>
<td>1627 (31)</td>
</tr>
<tr>
<td>Doctors registered (among registered professionals)</td>
<td>520 (32)</td>
</tr>
<tr>
<td>Nursing professionals registered (among registered professionals)</td>
<td>486 (30)</td>
</tr>
<tr>
<td>Administrative staff registered (among registered professionals)</td>
<td>340 (21)</td>
</tr>
<tr>
<td>Technicians registered (among registered professionals)</td>
<td>95 (6)</td>
</tr>
<tr>
<td>Other staff registered (unspecified) (among registered professionals)</td>
<td>186 (11)</td>
</tr>
</tbody>
</table>

Table 1. Acceptance of the CoP by the primary care professionals (total and by category)

In terms of participation, Table 2 shows the proportion of “real”, that is, active, users of the platform compared to those that only use HOBE + to obtain information created by other users.

<table>
<thead>
<tr>
<th>Participation in the CoP</th>
<th>n (% of the total number of registered users)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered users that have contributed ideas</td>
<td>58 (4)</td>
</tr>
<tr>
<td>Registered users that have commented on ideas</td>
<td>99 (6)</td>
</tr>
<tr>
<td>Idea contributors by professional category</td>
<td>n (% of the total number of idea contributors)</td>
</tr>
<tr>
<td>Doctors</td>
<td>23 (40)</td>
</tr>
<tr>
<td>Nursing professionals</td>
<td>23 (40)</td>
</tr>
<tr>
<td>Administrative staff</td>
<td>9 (15)</td>
</tr>
<tr>
<td>Technicians</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Other staff (unspecified)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Comments to ideas by professional category</td>
<td>n (% of the total number of comments)</td>
</tr>
<tr>
<td>Doctors</td>
<td>39 (39)</td>
</tr>
<tr>
<td>Nursing professionals</td>
<td>31 (32)</td>
</tr>
<tr>
<td>Administrative staff</td>
<td>18 (18)</td>
</tr>
<tr>
<td>Technicians</td>
<td>7 (7)</td>
</tr>
<tr>
<td>Other staff (unspecified)</td>
<td>4 (4)</td>
</tr>
</tbody>
</table>

Table 2. Participation in the CoP (among registered users)

Table 3 reports data regarding the use of the VCoP. It lists the total number of activities registered in HOBE+, including all the ideas submitted and the actions that they generated, such as comments or votes received.
Use of the VCoP

<table>
<thead>
<tr>
<th>Use of the VCoP</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of ideas submitted</td>
<td>133</td>
</tr>
<tr>
<td>Total number of comments regarding ideas</td>
<td>916</td>
</tr>
<tr>
<td>Total number of votes (positive or negative) on the ideas</td>
<td>2013</td>
</tr>
<tr>
<td>Average number of comments per idea</td>
<td>6.3</td>
</tr>
<tr>
<td>Average number of votes (positive or negative) per idea</td>
<td>16.4</td>
</tr>
<tr>
<td>Total number of visits</td>
<td>16355</td>
</tr>
<tr>
<td>Total number of pages visited</td>
<td>77378</td>
</tr>
<tr>
<td>Average length of visit (min:sec)</td>
<td>06:44</td>
</tr>
<tr>
<td>Average number of pages/visit</td>
<td>4.73</td>
</tr>
</tbody>
</table>

Table 3. Use of the VCoP

The impact that the HOBE + VCoP had by the end of its first 15 months of activity is reflected in Table 4. Of a total of 133 ideas suggested, 23 were selected by the Management Group for implementation. These cover a wide variety of topics, from implementing specific improvements to the electronic medical record, improving stock management in healthcare centres, and designing new centralised purchasing procedures for specific items, to developing initiatives to promote training and information for adolescents and young people in key aspects of health: lifestyle, sexuality, socialising and mental health and so on.

Results in terms of numbers of ideas taken forward

<table>
<thead>
<tr>
<th>Results in terms of numbers of ideas taken forward</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ideas submitted</td>
<td>133 (100.00)</td>
</tr>
<tr>
<td>Ideas accepted by the Ideas Group</td>
<td>50 (37.59)</td>
</tr>
<tr>
<td>Ideas accepted by the Innovation Group</td>
<td>38 (28.57)</td>
</tr>
<tr>
<td>Ideas accepted by the Management Group</td>
<td>23 (17.29)</td>
</tr>
<tr>
<td>Ideas ultimately implemented or in the process of being implemented</td>
<td>23 (17.29)</td>
</tr>
</tbody>
</table>

Table 4. Results in terms of ideas taken forward

Qualitative analysis of the ideas submitted to date shows that they tend to be related to the improvement of current clinical and managerial processes, IT problems and day-to-day situations, rather than disruptive innovations.

Additionally, BIOEF sent a survey to registered users of the platform on 10 and 11 December 2012 in order to gather extra information about the user profiles and opinions of HOBE+. The target population for the survey were the 1,627 registered users of HOBE+. The data analysed in this study are from the 233 users who completed the survey within 15 days of receipt, meaning that the response rate was nearly 15% (233 of the 1,627 registered users).

Based on this survey, Table 5 shows the extra information obtained related to the profile of HOBE + users.

User distribution by primary care district

<table>
<thead>
<tr>
<th>User distribution by primary care district</th>
<th>Survey respondents n (%)</th>
<th>Invited professionals n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilbao primary care district</td>
<td>88 (37.76)</td>
<td>1179 (22.7)</td>
</tr>
<tr>
<td>Ezkerralde - Enkarterri primary care district</td>
<td>56 (24.03)</td>
<td>1076 (20.7)</td>
</tr>
<tr>
<td>Araba primary care district</td>
<td>31 (13.30)</td>
<td>999 (19.3)</td>
</tr>
<tr>
<td>Uribe primary care district</td>
<td>30 (12.87)</td>
<td>734 (14.1)</td>
</tr>
<tr>
<td>Interior primary care district</td>
<td>28 (12.01)</td>
<td>1202 (23.2)</td>
</tr>
</tbody>
</table>

User distribution by sex

<table>
<thead>
<tr>
<th>User distribution by sex</th>
<th>Survey respondents n (%)</th>
<th>Invited professionals n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>53 (22.75)</td>
<td>1137 (21.9)</td>
</tr>
<tr>
<td>Women</td>
<td>180 (77.25)</td>
<td>4053 (78.1)</td>
</tr>
</tbody>
</table>

User distribution by age

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Volume 3 Issue 1 | 2019 | 7
### Table 5. User demographics and platform usage metrics

Additionally, **Table 6** shows data related with the user perception of the usefulness of various aspects of the platform.

<table>
<thead>
<tr>
<th></th>
<th>50-69 years</th>
<th>35-49 years</th>
<th>20-34 years</th>
<th>More than 20 years</th>
<th>10-19 years</th>
<th>0-9 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User distribution by years working in Osakidetza</strong></td>
<td>128 (54.93)</td>
<td>93 (39.91)</td>
<td>12 (5.15)</td>
<td>147 (63.10)</td>
<td>61 (26.18)</td>
<td>25 (10.72)</td>
</tr>
<tr>
<td></td>
<td>No Data</td>
<td>No Data</td>
<td>No Data</td>
<td>No Data</td>
<td>No Data</td>
<td>No Data</td>
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</thead>
<tbody>
<tr>
<td><strong>User frequency of accessing HOBE+</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Several times a week</td>
<td>47 (20.17)</td>
<td></td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
<tr>
<td></td>
<td>Once a week</td>
<td>106 (45.49)</td>
<td></td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
<tr>
<td></td>
<td>Once a month</td>
<td>54 (23.17)</td>
<td></td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
<tr>
<td></td>
<td>Only registered</td>
<td>26 (11.15)</td>
<td></td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td><strong>Table 6. Perceived usefulness of HOBE+</strong></td>
<td></td>
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<table>
<thead>
<tr>
<th></th>
<th>Totally agree n (%)</th>
<th>Agree n (%)</th>
<th>Partially agree n (%)</th>
<th>Disagree n (%)</th>
<th>Totally Disagree n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does HOBE + offer opportunities to increase users’ knowledge thanks to the vision of other users and / or experiences in other districts?</td>
<td>98 (42.06)</td>
<td>72 (30.90)</td>
<td>26 (11.15)</td>
<td>2 (0.85)</td>
<td></td>
</tr>
<tr>
<td>Does HOBE + offer users opportunities to establish new professional contacts both within and outside the platform that could be beneficial for their day-to-day activities?</td>
<td>67 (28.15)</td>
<td>52 (22.31)</td>
<td>80 (34.33)</td>
<td>16 (6.86)</td>
<td></td>
</tr>
<tr>
<td>Does participation in the HOBE + community provide direct support with the resolution of day-to-day problems?</td>
<td>48 (20.60)</td>
<td>81 (34.76)</td>
<td>42 (18.02)</td>
<td>4 (1.71)</td>
<td></td>
</tr>
<tr>
<td>Is HOBE + a useful tool for detecting and implementing innovations and improvements?</td>
<td>80 (34.33)</td>
<td>67 (28.75)</td>
<td>32 (13.73)</td>
<td>14 (6.00)</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Discussion

This case study offers an overview of the main aspects of setting up and developing a virtual community of practice for innovation in primary care in Biscay and Araba, as well as the results of its activity at the end of its first 15 months of life. Based on the achieved results, and the innovative spirit and goals of the initiative, the VCoP was scaled up and turned into a corporate tool 4 years later.

HOBE + serves as a practical example of the implementation of an initiative based on evidence in the literature on CoPs and open innovation. The openness to professionals of the first five organisations involved, irrespective of their professional category, was a key characteristic of the initiative. The acceptance and participation in HOBE + seemed satisfactory, outnumbering rates reported for other similar projects in the healthcare sector\[^{15,18}\]. The professional cate-
category most well represented in HOBE+ were family doctors, although nurses and administrative staff have also taken part in significant numbers. In terms of participation, however, a subset of users is notably more active. Specifically, 96.4% of those who signed up did not take an active part in HOBE+; therefore, to date, ideas had been created and defined by the other 3.6% of the registered users.

Such figures are consistent with other data available on participation in CoPs\textsuperscript{16,22}. Three levels of participation are usually observed. The first consists of a hard core of individuals who are very active in the community, the leaders. This group is usually small and does not make up more than 10 to 15% of the community. Then, there are active members who regularly participate in meetings and online discussions, but without the regularity or intensity of the leaders. This group is also small and usually represents 15 to 20% of the members. Finally, most members of CoPs are on the periphery and not actively involved in community activities. The important point here is the legitimacy of peripheral participation, i.e., when the learner hears and reads, but does not say or write anything. Traditionally, this type of activity is not considered to be participation and is discouraged, while in contrast, in the theory of CoP it is an essential part of the learning process.

Based on the results from the survey (Table 6) and informal input from various registered but non-active healthcare professionals, there is evidence that non-active users do consult the platform and take advantage of the knowledge sharing taking place through HOBE+.

Indeed, web metrics (Table 3) show great activity on the platform during these months, in terms of both number of visits and pages visited, that supports the view that the platform is utilised by more people than the 3.6% of active users. It also shows a significant average time per visit which reinforces the perception of usefulness found in the survey.

Further, once the ideas that emerge are implemented they potentially have an impact on all the organisations involved in HOBE+, directly affecting the healthcare professionals in all centres in one way or another, depending on the nature of each idea. That is, even though the main contributors to HOBE+ correspond to just 3.6% of the registered users, a much larger number of users reap direct benefits from the knowledge, best practices and innovations discussed.

These findings contrast to some extent with the conclusions of Kislov and colleagues\textsuperscript{21} that the construction of CoPs from scratch in primary care in the UK was problematic; yet they do agree that the multidisciplinary nature of the CoP is not a limitation. On the other hand, although there is some common ground in the area of knowledge, comparisons are difficult given the contexts, approaches and instruments used in the studies.

The establishment of an innovation process strengthened by the creation of support groups helped with the definition and galvanisation of ideas and, ultimately, led to the implementation of 23. In the absence of benchmarks, we cannot assess whether this number is high or low. The support of these selected 23 initiatives by the Management Group was decisive in making doable what seemed inconceivable some months ago, as all of the ideas involved cross-organisational issues that affected all the organisations and to be taken forward needed official support, requiring negotiation with Osakidetza headquarters. Some of these 23 ideas reflected changes that had been called for by primary care professionals in Osakidetza in the past and that only, via the structured process of HOBE+ and the efforts of its working groups, were finally being implemented or scheduled for implementation in approved action plans for the coming months.

Regarding user perception, it should be highlighted that 80% of the survey respondents rated the initiative as useful to achieve continuous improvement and real innovation in Osakidetza.

At the same time, 80% of HOBE+ users felt that the organisation took into account and generally supports initiatives launched in the community, implying an alignment between different organisational levels. This should help provide professionals of the organisations involved in HOBE+ with a sense of empowerment and greater levels of autonomy and responsibility. These factors make it possible for certain improvements and innovations (those that are not highly complex and require only a limited level of responsibility) to be defined and implemented without having to wait for approval from supervisors for every step.

Indeed, the user’s perceived usefulness of the experience is positive in the 80.24% of the cases, based on the survey respondents data.

The study confirms the conceptual framework of the successful factors for VCoPs proposed by Probst and Borzil...
and, moreover, their applicability in the healthcare sector: the presence of facilitators and leaders that offer support is essential to the success of a CoP, as is the availability of a wide and multidisciplinary base of potential participants. Moreover, the CoP must have clear objectives, operate in an enabling environment that will generate trust, the technology platform must be user-friendly and there must be transparency and feedback to participants about their ideas. HOBES appears to satisfy these requirements, which would explain its initial success and bode well for its future sustainability.

The facilitator role played by a "neutral" agent (in this case BIOEF) had been key in facilitating the debate between professionals and ensuring that every single organisational level involved in the development, support and implementation of the idea assumes their responsibility during the implementation process. Indeed, except in specific cases, the work of the facilitator from the identification of the idea to its implementation had been absolutely necessary to prevent initiatives from grinding to a halt. Moreover, as Probst and Borzillo[22] proposed, there are several advantages of grouping managerial sponsors and COP coordinators into the same committee in order to achieve a more effective governance of the innovation process in which that managerial sponsors can assess COP's activity with a complete overview of the value of the different proposals.

Although there was a defined work process, the active participation and identification of ideas in reality involves a few particularly motivated users contributing on a voluntary basis (the 3.6% of registered users mentioned above)[23]. The present study does not address the theoretical debate about whether CoPs[24,25] only stimulate incremental innovation, while restricting disruptive innovation as there is no hybridisation of knowledge (e.g., from outside the healthcare sector).

On the other hand, the opening of HOBES to other agents such as hospital staff, patients and other stakeholders outside healthcare was been debated since the beginning of the project. This was a complex issue, as extending the field of knowledge of the CoP had to be balanced against the risk of losing a sense of belonging and shared practice among the professional community. This is indeed a challenge that is being addressed now in the new corporate approach, a topic that could be assessed for a future paper.

Participants in HOBES have shown the use of collectively shared, mostly tacit knowledge that is shaped by many sources, including accumulated personal experiences, education (formal and informal), guidance, and the narratives about patients that are shared among colleagues, according with the concept of mindlines used in the literature[25-26]. In this study a virtual network of healthcare staff contributes to better understanding of the mindlines of the community and shows that it is a useful tool for organisational learning[27]. Moreover, the facilitators have played a key role in the VCoP which is consistent with the literature[28].

Finally, this study has the limitations associated with a descriptive approach and lacks comparability in many respects. In particular, caution is required in the interpretation and extrapolation of the results as we have not identified comparable projects in primary care anywhere else in the world.

Another relevant limitation is the lack of an economic evaluation of the value of the implemented ideas versus the cost of their development and implementation. Most of the ideas implemented were related with business processes refinements and time savings. The ones that are in process of being implemented are related with logistics management and inventory improvements, requiring more time for their full extension and impact assessment. The impact assessment of all the implemented ideas definitely an interesting topic for a future new paper regarding the cost-benefit analysis of the VCoP, now turned a corporate tool.

5. Conclusion

HOBE + illustrates that it is feasible to create a CoP for innovation and improvement in primary care to which all staff can contribute, irrespective of their professional status, and how experience like this can be extended to a whole corporation years later based on its spirit and participation rate results.

In addition to the identification of new ideas, experiences as HOBE + offers other benefits such as the exchange of pre-existing knowledge and best practices between peers. This is a clear example of the added benefits that both active and not active members (the "lurkers" mentioned earlier) can reap from this type of community, helping them to im-
prove their performance and daily practice.

Therefore, the benefits and range of improvements achieved in Basque primary care through HOBE+ should not only be measured quantitatively in terms of the number of new ideas, but also qualitatively considering the impact of the knowledge exchange and discussion among peers, as can be seen from the results of the survey. Indeed, the benefits achieved from this qualitative perspective, such as knowledge sharing, professional fellowship, and peer to peer collaboration, were really taken in account at the time of deciding scaling up HOBE+ to a corporate VCoP.

Last but not least, the facilitator role had been critical in ensuring the progress of ideas along the innovation process (from their detection, definition and development, to implementation) including the coordination of three support groups (focused on Ideas, Innovation and Management). This role it’s still critical nowadays in the new corporate approach.

To sum up, the introduction of new innovations is possible in Osakidetza with initiatives like these, whose but their sustainability over time will depend on the generation of a culture innovation that ensures the continuous detection, development and implementation of new initiatives, increasing the responsibility and the active role of the health care settings professionals in a natural way, making the progress of ideas less dependent on (and ultimately independent of) the intervention of a facilitator.

**Appendix 1 (CoP projects and tools)**

**NORWAY**

- **Induct**
  - [http://www.inductsoftware.com](http://www.inductsoftware.com)
  - A software development company that has developed an Innovation platform that is being used by the Oslo University Hospital and the UK NHS.

**UNITED STATES**

- **Harvard**
  - [http://catalyst.harvard.edu](http://catalyst.harvard.edu)
  - Harvard University is recognised as having leading research groups in health-related areas.
  - The Catalyst Harvard group creates challenges to find solutions to specific medical issues.

- **InnoCentive**
  - [http://www2.innocentive.com](http://www2.innocentive.com)
  - This company launches a set of challenges defined by enterprises and institutions. It then gathers ideas to address these challenges from different respondents and ideas collected privately, assesses them and defines the winner or winners of the challenge.

- **National Academy of Engineering**
  - [http://www.engineeringchallenges.org](http://www.engineeringchallenges.org)
  - This institution searches across different websites (using open innovation) to identify the most important challenges for engineering today, and later they present a deliverable with the conclusions.

- **Idea connection**
  - [http://www.ideaconnection.com](http://www.ideaconnection.com)
  - This is an open innovation group that develops solutions to problems presented by various companies. Although defined as open innovation, it is more of a distributed innovation system.

- **IdeaScale**
  - [http://ideascale.com](http://ideascale.com)
  - This company offers a platform to which users bring their challenges and receive proposals from other users. A wide range of companies and organisations, including the USA Government, use this platform to address challenges ([http://opengov.ideascale.com](http://opengov.ideascale.com)).

- **Qmarkets**
  - [http://innovation.qmarkets.net](http://innovation.qmarkets.net)
  - This company has developed software for managing ideas through open innovation called Ideation 2.0.
Incent Solutions
http://www.incentsolutions.com
This is another USA-based company that develops software for Open Innovation. The IDS-Innovate product has been developed for the automotive industry. Its adaptation to new markets is being studied.

SPAIN
ideas4all
http://es.ideas4all.com/
This is a website developed in Madrid, to collect ideas and challenges to be developed through open innovation. Open to all themes and content, it is one of the first groups to develop an open innovation platform in Spain.

Europes World
http://www.europesworld.org
This was developed by the Catalonian government as a community of ideas at the European level. It primarily works with social issues.

Innova Health
http://www.saludinnova.com
This is a bank of innovative practices developed by the Andalusian Government. Users introduce ideas, knowledge about specific topics and best practices on the platform that may be of interest for other users in relation to innovation. The way it is being used, it could be considered as a tool for sharing knowledge.

Foro de inspiración
http://www.burubelarri.net/index.php
This is a space created for users, patients and health professionals, in order to bring forward new ideas to improve primary healthcare service in health centres in the district of San Sebastian.

Abbreviations
CoP, Community of practice; EMR, Electronic medical record; VCoP, Virtual community of practice; N/A, Not applicable

Conflict of interests
No conflict of interest was reported by all authors. HOBE+ was an online professional community of practice to foster innovation in healthcare-related practice whose outputs are used to improve day-to-day practice in Basque Health Service. In this case, the innovation provider and the potential client are the same entity.

Funding and Acknowledgments
HOBE+ was funded by the Basque Public Health Service (Osakidetza), and the Centre of Excellence in Research on Chronicity (Kronikgune).

The author would like to thank all Osakidetza primary care professionals in Araba and Biscay who have supported and participated in HOBE+ as well as the Osakidetza Headquarters professionals that helped extending HOBE+ experience to all the corporation.

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