USABILITY AND USER EXPERIENCE IN OPEN COMMUNITY WEB PORTALS: A CASE STUDY IN SMART PORTS DOMAIN

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ABSTRACT

Open community web portals and information sharing platforms have been widely used to generate and share knowledge. Recent advances in technology and growing interest in crowdsourcing tools have helped to improve the technical competency and quality of these platforms. However, usability and user experience aspects are still challenging as satisfying the needs of different users is an open problem for such systems. This paper presents a case study of the user experience improvement of an open community web portal that facilitates information sharing in the context of smart ports domain. The case study employed data collection methods such as surveys and focus group meetings coupled with usability tests to collect feedback. User scenarios were designed and tested on the SPEED (Smart Ports Entrepreneurial Ecosystem Development) open community portal. Feedback around the user interface of the portal was mostly positive. There have been minor improvements in the navigation of the portal. Findings and lessons learnt are presented in this paper.

1. INTRODUCTION

The constant striving towards efficiency, innovation and global competition is putting pressure on businesses and their software providers to shift from desktop software to web applications or web portals. According to Stoffel and Cunningham (2005), Web portal is "…a single-point, integrated, multi-channel, user-personalised, user customisable Internet site providing access to information, people, and processes". Web portals have been widely implemented and used for different purposes for many years (Sampson and Manouselis, 2005). This popularity of web applications and web portals to promote consistent web presences and provisions of services brings however some challenges, such as how to motivate user participation and how to engage users (Brakel, 2003, Butler et al., 2002, Faliagka et al., 2015, Li and Jiang, 2019, Ridings and Gefen, 2004, Spallek et al., 2008).

Principal ways of encouraging web portal users' interactions and influencing their behaviours are connected to characteristics such as content (contained business related information or access to external information resources), design (providing users with the pleasant, usable, and stable environment), personalisation capabilities (serving users' specific preference and needs), and formation of virtual communities (bringing together users with similar interests and needs) (Butler et al., 2010, Sampson and Manouselis, 2005, Zhou, 2003). That means that usability attributes result in increasing engagement (Nam, 2014), higher quality information (Attfield et al., 2011), richer user experiences (Li and Jiang, 2019), and improved opportunities to ask or receive clarification on resources (Arthana et al., 2019, Maligat et al., 2020, Rohayati et al., 2018, Sampson and Manouselis, 2005, Zarish et al., 2019). User experience and usability features have played a significant role in stimulating engagement and formation of users' expectations (Li and Jiang, 2019, Ekaterina, 2017, Butler et al., 2010).

As the need for usable web portals for potential and new users is still demanding (Oliha, 2020, Oliha, 2014, Frøkjær et al., 2000, Liao et al., 2011), we present an empirical study about the usability and user experience of web portals in this paper. A case study evaluating the usability and user experience of the SPEED (Smart

Ports Entrepreneurial Ecosystem Development) open community Web portal is presented. This ideation platform has been developed to build a network community connecting high-tech start-ups with large and complex ports across four European countries, namely Belgium, France, the Netherlands and the UK. Focus group meetings were applied to examine the ease of use, community focus, information benefits, and navigation of the portal. The case study provided us with important lessons learnt which will be useful for portal developers.

The remainder of the paper is organised as follows: paper continues with a brief discussion of related literature in the next section. Section 3 presents the details of the case study followed by the lessons learnt in Section 4. Finally, Section 5 presents the conclusions and recommends potential future work.

2. BACKGROUND

Sales portals, customer portals solutions, intranet portals, and all other information portals allow users to connect to one another and provide a richer user experience such as peer commenting, and social networking (Benz et al., 2020, Butler et al., 2010). Past research has shown that individuals use web portals to save time and cost when sharing information (Benz et al., 2020, Guo et al., 2018). Web portals often require users to create user profiles in order to enable users to share knowledge or to participate in social networking activities (Benz et al., 2020). Once registered, users are more encouraged to be involved if they benefit from the resources and business focus networking (Hann et al., 2007).

Usability testing on various organisational web portals have indicated that engagement is heavily influenced by a portal's context (Al-Debei, 2013), consistent user interface (Axelsson, 2012) and its associated process flow (Attfield et al., 2011). To be precise, ease of use, information benefits, accessibility to resources, content creditability, usefulness, trustworthiness, accuracy, clarity, information architecture and its integration to external content providers and easy navigation could affect an individual's decision in engaging with a portal or not (Feledi et al., 2013, Kakol et al., 2017, Maligat et al., 2020),

For instance, the usability evaluation of an Indonesian cultural heritage crowdsourcing information platform has shown that low workflow efficiency affected users' satisfaction negatively (Arthana et al., 2019). Similarly, the test plan of a multimedia platform that promotes communication and information sharing among educators, parents and children indicated a couple of usability issues, such as navigation (lack of back button), commenting and editing profiles failures, which affected its users' attitude (Laranjeiro et al., 2017).

In another study by Shayganmehr and Montazer (2019), the importance of age on using e-government websites was demonstrated that pop-up notifications and advertisements on the homepage were annoying only to elderlies. This means that care need to be taken not to take users' willingness to engage with a system for granted, and it highlights the importance of usability investigations and improvements of web portals. In this study, we identified the best practices from the literature and applied the most common principles during the early phases of the development. Then we employed usability testing and focus group methods to improve the user experience. Next section explains the case study and outcomes of the focus group meetings.

3. CASE STUDY

The SPEED portal is an open community information portal, and its main purpose has been the promotion of innovation and efficiency in the smart port domain by building an ecosystem for smart port app development. This open community platform provides services to port stakeholders (such as port authorities, customs and excises), logistic companies (including ships, road, train), technology entrepreneurs, start-ups, students and members of the public.

The information shared on the portal is divided in the following main categories:
- *Port Logistics Challenges:* Accumulate and display ideas for further development.
- *Smart Port Technologies:* Existing software and hardware technologies that help improving port logistic systems.
- *Business Profiles:* Company profiles in the seaport domain.
- *Events:* SPEED project events (e.g., seminars, webinars, and hackathons).
- *Proof-of-Concept Solutions:* Feasible software and hardware proposals and principles.
- *Ongoing Research and Additional Output:* Published and ongoing research studies.

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The home page provides links to all of these categories and easy navigation to different pages such as Help or Registration pages. Figure 1 shows a screenshot of the main page below.
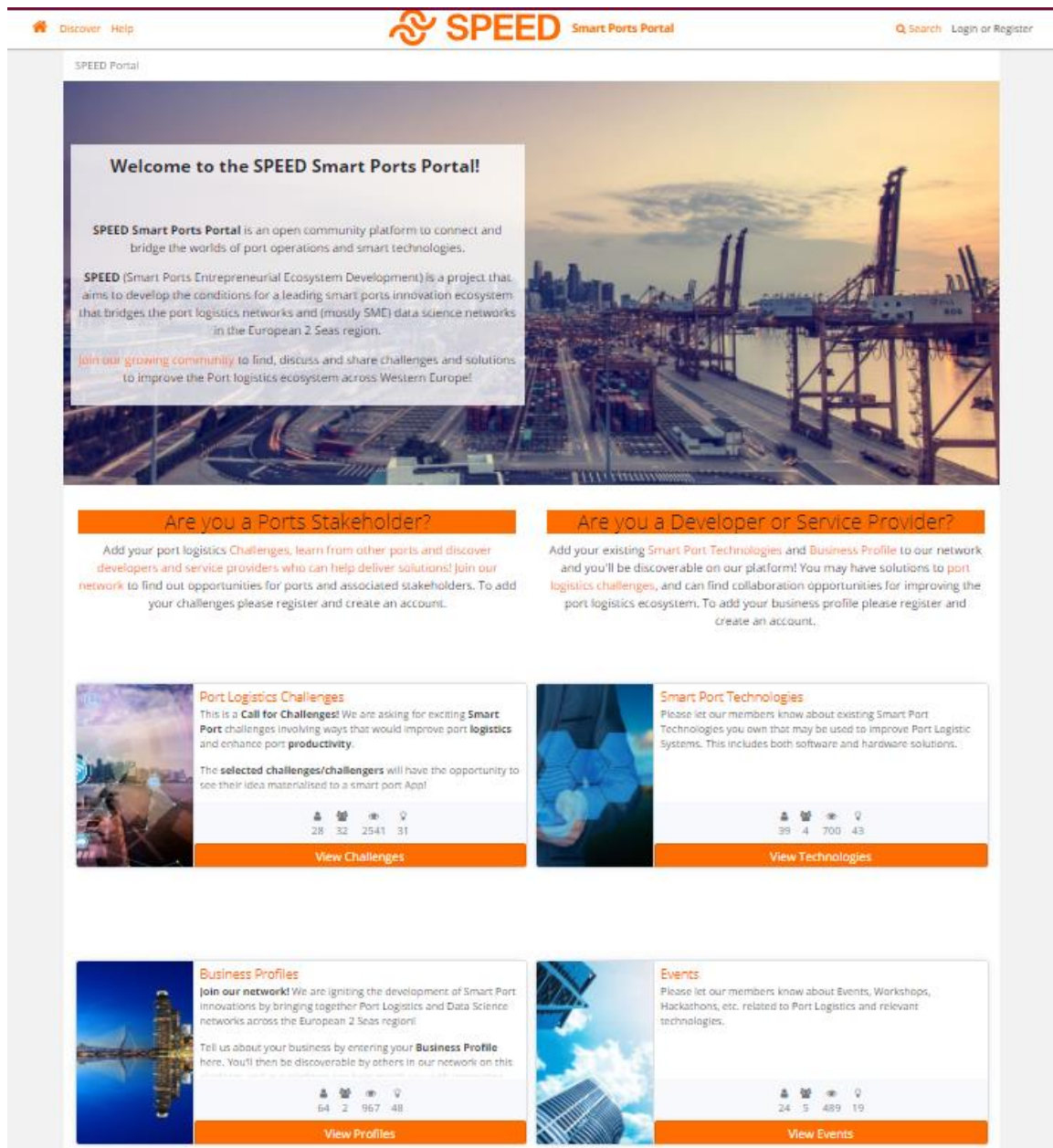

Figure 1. Screenshot of the SPEED Portal homepage

As part of the portal's development the overall quality of the portal's user experience was assessed. This assessment consisted of a survey covering various parts of the portal including portal engagement, a survey covering the general web experiences, and subsequent usability testing of the portal.

Many of the outcomes were helpful in improving the portal's user experience. There were, however, a few questions raised that resulted from the usability testing phase. For instance, the workflow that was considered for the port logistics challenges was not clear to the users. Similarly, users found the portal's navigation difficult due to the vocabulary choices; for example, users were often confused with terms like "Ideas" as they were used for all six categories (challenges, solutions, events, etc.), or "Conversation" to discover the ports connected to the portal. This terminology was result of adopting an already existing crowdsourcing providers

functionality. Usability testing certainly could have helped to address some of these issues before users encountered them. However, the development was only as good as our ability to anticipate users' behaviours, and a thorough usability testing would have helped us to represent the content in a manner that was not confusing to the users.

Focus group meetings were viewed as a viable supplement to open discussion and improve user experience as it is a valuable way to engage in conversation with users in order to establish users' expectations. Conducting focus group meetings was in essence taking a step back to reassess users' expectations of the navigation of the platform. This assisted us to limit the impact of potentially biased usability task designs and clarifying underlying assumptions.

In the literature, it is often stated that using multiple methods for collecting user feedback provides a better, more complete, picture of the user experience. For example, Nielsen (1997), suggests observation to supplement focus groups and Oldham (2008) proposes focus groups, usability testing, and surveys can be used effectively together to discover both how users think and how they navigate a web site. Hence, focus groups were viewed as a unique opportunity to assess the quality of usability features of the SPEED open community portal through collecting qualitative feedback from users about their web experiences.

The focus group had eight members consisting of partners from the SPEED project from both industry and ports community as well as academics in relevant disciplines (SPEEDProject, 2021). In addition, our team from Bournemouth University (BU) and one IT support member of the crowdsourcing solution provider attended all focus group meetings. We held three sessions in April, May and June last year. All meetings were run remotely via Zoom due to the constraints posed by the Covid 19 pandemic, and since the members were based in different European countries, namely in the UK, Belgium and the Netherlands.

The focus group sessions were moderated by one of the senior software developers from our team who had experience moderating usability testing. A planning session was conducted by the BU team to formulate the questions, and to design the protocol in two parts. Part one focused on the SPEED Portal User Interface, and part two focused on the SPEED Portal Increasing Engagement Ideas.

3.1 SPEED Portal User Interface

For the first part, we shared the link of the Web portal (SPEEDPortal, 2021) with the focus group members, and we asked them to register as well as to sign a consent form. While the instructions were explained to all members in the meeting, an eight-question survey was shared via Mentimeter (https://www.mentimeter.com) to get the participants' anonymous feedback about the portal. We gave the users some pre-defined tasks and asked their opinion of the usability of the portal. Figure 2 presents the questions and the initial results for the Mentimeter survey.

3.2 SPEED Portal Increasing Engagement Ideas

In the second part, ideas for engagement and publicising were collected via Padlet (https://padlet.com). Suggestions were collected and listed under multiple categories which were shared with the members for their approval to have a consensus. Figure 3 shows a sample Padlet entry. We collected over 25 responses suggesting various improvements for better user experience.
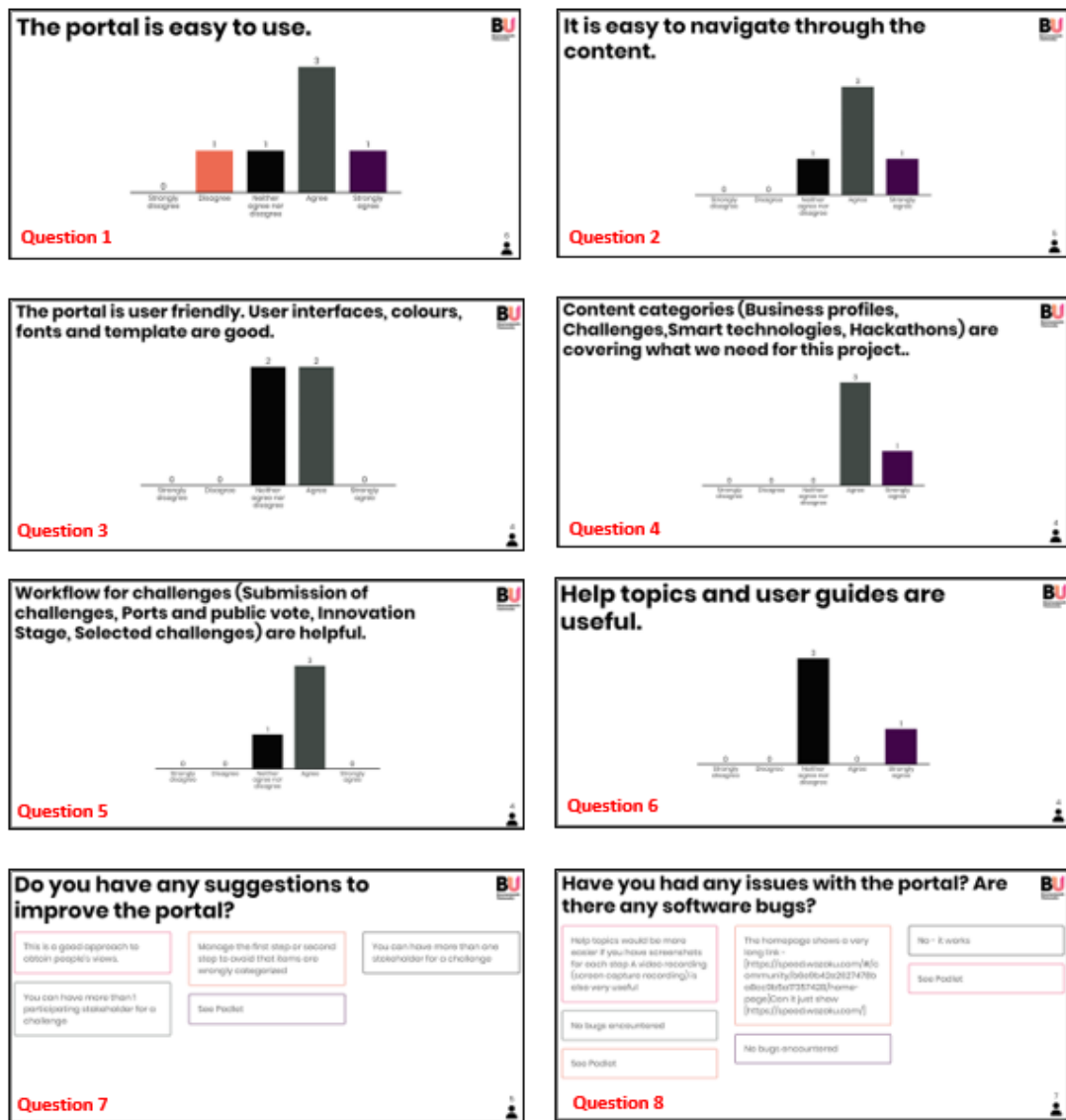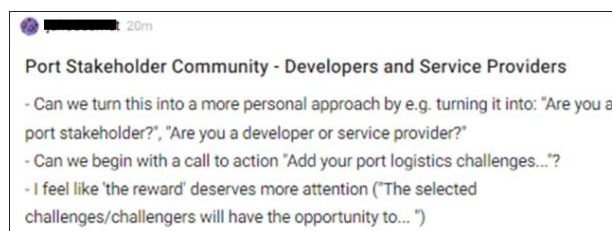
Figure 2. Mentimeter anonymous results

Figure 3. Sample Padlet entry

We needed to run a second short survey to agree on a few points where focus group members had different opinions. For example, while a number of users suggested an approval stage in the workflow for adding new content, some participants did not agree. Due to the platform is designed to be an open community platform we needed to clarify these points. Figure 4 shows a sample question about the workflow on the portal. As a result, a private stage is added in the workflow for automatic approval of the content but with a flexibility to be able to unpublish content by the admin.
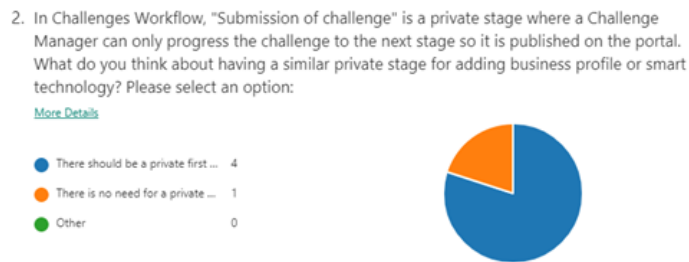
Figure 4. Sample survey question

With our experiments and focus group feedback, we could redesign different parts of the system and improve the user experience. Next section presents the lessons learnt and summarises the improvements done.

4. LESSONS LEARNT

As a result of our interactions with the different stakeholders, we included aspects in the portal which could have been neglected if we would not have sought the input of key stakeholders. The following list of changes were specifically taken on:

- Improving the Help topics and user guidelines
- Revising the workflow for adding new content
- Explaining the aim of the portal on the main page
- Revising the text and messages to be more clear
- Changing the language to call to action
- Improving the layout
- Adding an Events section for project related events
- Adding links between the submitted ideas
- Social media integration
- Getting feedback from the portal users
- Improving the navigation between pages

These can be roughly divided into overlapping lessons categories related to:

- *Content and functionality* (Adding an Events section for project related events, Adding links between the submitted ideas*, Social media integration, Getting feedback from the portal users*),

- *Visual layout and presentation* (Changing the language to call to action, Improving the layout), and

- *Understandability and navigation* (Improving the help topics and user guidelines, Revising the workflow for adding new content, Explaining the aim of the portal on the main page, Adding links between the submitted ideas*, Improving the navigation between pages).

Some of the aspects taken forward are related to two lesson categories, namely "Adding links between the submitted ideas", which can be considered as adding functionality and aiding navigation (indicated with a *). "Getting feedback from the portal user" is a functionality that can easily be integrated, but it also aids a positive feedback loop, which will hopefully ensure further user engagement.

A few suggestions were agreed to be postponed or not implemented. This was either due to the fact that it was not possible to implement given underlying platform limitations, or not needed at that time. For example, adding a calendar view for the events, and adding an idea category filter were not required. However, social media integration could not be fully implemented due to technical limitations, so considered as future work. Action items were listed and shared with the stakeholders. The BU team members and the IT support team members have implemented the changes incrementally where focus group members had a chance to check and provide feedback during the update. The overall goal throughout the implementation was to maintain some common goals of usability as much as feasible which include but are not limited to:

- Presentation of information and choices in a clear and concise way,
- Reducing ambiguity,
- Increasing consistency,
- Allowing user control over preferences,
- Aiming for minimalist design, and
- Placement of important items in relevant areas, etc.

Finally, areas of improvement were applied in response to feedback collected in both focus groups and usability testing, and invitees were given the opportunity to provide feedback as a follow-up measure to see if the changes met their expectations. The focus group members were satisfied with the portal's user interface, content, workflow and functions. Further usability tests have been carried out by inviting technology providers and challenge owners to use the portal. The portal is now stable and consistently used with continuous feedback and minor updates. The inclusion of the stakeholders clearly helped to identify issues with a portal that was created by professional developers.

5. CONCLUSION

User feedback on web portals' design and more importantly, understanding how users interact with the knowledge sharing platforms are significant to realise the issues that users may encounter when visiting a portal. In this study, data collected through focus group meetings and usability testing helped to improve the usability and user experience of the portal so that users were satisfied with the portal's context, user interface, and its associated process flow. As such, the study presents a real-world example of improving an information sharing portal. Navigation and accessibility to the portal's information were straightforward. We believe that outcomes and lessons learnt could be helpful in designing future knowledge sharing web portals. It could be argued that the use case of the portal may be a very niche one, but the ultimate purpose of the portal is to share information, and to collect feedback and contributions. That means that this ultimate purpose will be the same as the purposes of many web portals. Whilst lessons learnt about functionality may be less generally applicable, the lessons learnt about navigation, accessibility are important ones to consider. Since this may depend on the targeted user group, a similar practicable approach as taken in this case study is recommended when improving the usability of an information sharing platform, namely by employing focus group studies or similar open feedback channels. Variations may occur depending on the user group and the purpose of a portal, but the ultimate experience of a portal can only be judged by the portal's users themselves, and not by the developers even if they are experienced usability experts. As a future work, we would like to revise the content management approach to have a more flexible method. We are also planning to increase the visibility of the portal and to extend the application domain so that it has more impact.

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