# A Survey on the Usability and User Experience of the Open Community Web Portals

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**Abstract.** Web-based portals enable a new communication paradigm that could provide variety of benefits and support to both the customers and companies. Customers can have continuous access to the services, information, support, and payments on the portal with the possibility of personalisation. This paper presents a survey on the usability and user experience studies relevant to open community web portals and information sharing platforms. The objective of the work presented in this paper was to produce an overview of how literature reported on usability in relation to information sharing web portals. A systematic mapping method has been applied to identify and quantify primary studies focusing on the usability and user experience of the open community web portals.

**Keywords:** Usability · user experience · open community web portal · usability of web systems · human computer interaction.

## 1 Introduction

Web-based portals enable a new communication paradigm that could provide variety of benefits and support to both the customers and companies. Customers could have 24/7 access to the services, information, support, and payments on the portal with the possibility of personalisation. Thus, portals have gained a considerable attention in businesses and governments due to widespread functionality [12, 19]. In the recent years, due to the development of network infrastructures and sources, the expansion and evolution of web portals have been also influenced [20, 17]. On the other hand, 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 survey on the usability and user experience studies relevant to open community web portals and information sharing platforms. The objective of the work presented in this paper was to produce an overview how literature reported on usability in relation to information sharing web portals. The usability considerations for these information sharing portals were considered to be a non-trivial undertaking since multiple user groups with varying backgrounds

are interacting with the system simultaneously. That means that creators of information sharing portals will need to apply usability techniques. Which ones have been used and reported on, and how much impact these techniques had, and ultimately reported on, was one of the key questions this work aimed to answer. Additionally, we focused on finding out the trends in user experience of information portals and open community websites during this study.

The work presented in this paper provides an overview of how usability is dealt with in relation to information sharing portals. Considering these portals require user interaction through sharing of user created content, and the user participation, this study provides information of how usability has been discussed in recent publications.

The remaining of the paper is structured as follows: Next section presents the literature review and related work. Research methodology is explained in Section 3. Results and findings are presented in Section 4. Conclusions and potential future work are presented in Section 5.

## 2 Related Work

Usability evaluation is an important topic in user interface design practice and research. Many different methods have been specifically developed for web sites while the most prominent example is still user testing [14]. However, it is very time consuming and heavily constrained by available time, money and human resources so various tools have been proposed for automated usability testing over the years [13, 15].

We have recently presented a case study evaluating the usability and user experience of the SPEED (Smart Ports Entrepreneurial Ecosystem Development) open community web portal [8]. 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 application 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.

Throughout the literature we found many examples for research on the usability of web applications [10, 5, 2, 3]. User-experience (UX) has become a major area in open community portals which can be characterized as "users' judgment of product quality arising from their experience of interaction, and the product qualities which engender effective use and pleasure" [21]. Good usability and better user experience are essential as the use of the system should enhance the workflow and encourage active engagement [4]. An engaging user experience design can increase the likelihood of users' motivation to disclose thoughts and views [22]. From the user's point of view, there are various dimensions related to a web portal including quality, design and community support. For example, regarding the quality, content's creditability and usefulness are essential aspects, i.e. user's reliability to the portal's content and services in terms of usefulness,

trustworthiness and accuracy. Content organization and clarity are also very important in terms of an efficient and effective journey for the visitors. Community support has also gained interest lately facilitating the required tools and services for communication, interaction and collaboration within the network between the portal's users.

To better understand the various aspects of the usability and user experience of the open community web portals and information sharing platforms, we present a systematic mapping study in this paper. Critical to this effort is to determine the focus of the work, so this study focuses on open community web portals and online web platforms for information sharing and building knowledge collaboratively. Although review studies about usability and user experience evaluation are presented in the literature [6, 11], they are not specifically focused on open community information sharing portals or platforms. Sharing information is important for the scientific community. Over the years the internet became the main information source due to its actuality, interactivity and flexibility [7]. User-centered design significantly impacts the knowledge-sharing processes [18].

## 3 Methodology

### 3.1 Process

A systematic mapping method has been applied to identify and quantify primary studies focusing on the usability and user experience of the open community portals [16]. The results were gained from the four repositories, assessed, and then aggregated to provide an objective overview of the relevant evidence. The method applied for the presented review study consisted of four steps, namely setup, search, screening, and classification. Each step resulted in a list of identified publications, and the final step resulted in the outcome of the systematic mapping exercise as shown in Figure 1.

To provide an effective overview of the primary studies and research areas, the coverage and the presence of a thesaurus for choosing databases are crucial [1, 9]. Figure 1 shows that four bibliographic databases/repositories (ACM Digital Library, IEEE Xplore, Science Direct, and Scopus) were chosen to conduct the search for publications. They were selected primarily based on data accessibility, resource stability, and full functionality of application of the chosen search string. Additionally, these resources are considered the main bibliographic databases/repositories for the subject of computer science.

### 3.2 Keywords

The authors aimed to keep the search as inclusive as possible, but ultimately decided to focus on "web" rather than "online" to allow for web portals/sites. The keyword "online" was considered to be too open, and it would have resulted in too many non - computer science related publications. In the screening step

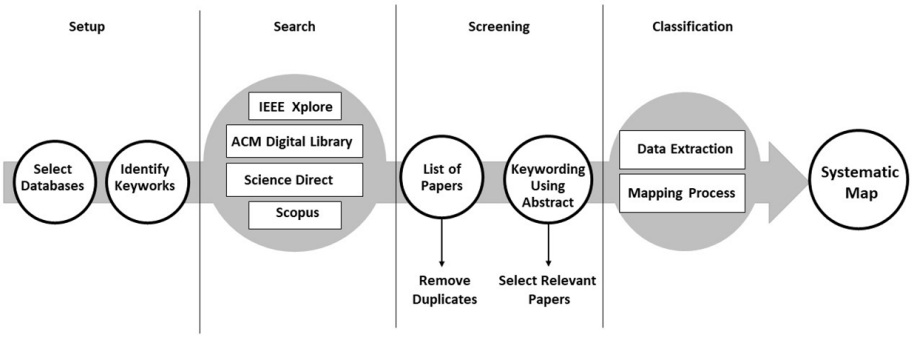


**Fig. 1.** Mapping process.

of the overall process the focus was on "web" in relation to the terms "site", "page", "system", "portal", and "platform". Figure 2 shows the search strings from three different point of views, namely user, system and functionality. The keywords were searched in the title and keywords of the papers as well as within the abstract and metadata if available.

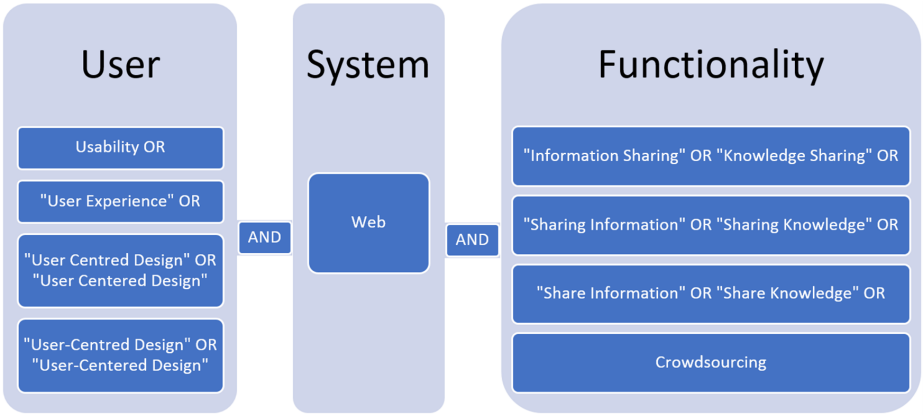


**Fig. 2.** Keyword selection.

For example, following query was used on the IEEE database: ("All Metadata": Usability OR "User Experience" OR "User Centred Design" OR "User Centered Design" OR "User-Centred Design" OR "User-Centered Design") AND ("All Metadata": Web) AND ("All Metadata": "Information Sharing" OR "Knowledge Sharing" OR "Sharing Information" OR "Sharing Knowledge" OR "Share Information" OR "Share Knowledge" OR Crowdsourcing).

### 3.3 Paper selection

398 papers were initially identified after applying the search strings in the selected databases. Table 1 indicates the initial paper count from each repository. We included research articles published as a journal paper, conference paper or book chapter between January 2010 and December 2021 in this mapping study. So, full proceedings, newsletters, etc. were excluded.

**Table 1.** Initial paper count from each repository.

| Database | Initial Results |
|---|---|
| IEEE Xplore | 67 |
| ACM Digital Library | 42 |
| Science Direct | 9 |
| Scopus | 280 |
| Total | 398 |

After the initial screening step, 234 papers were selected in the first round according to the following exclusion criteria:

- repeated studies in different repositories (same results in different search results),
- not accessible papers (if we cannot access the full paper after searching online or contacting the authors),
- multiple publications (only the latest or most complete one such as journal paper was selected),
- identified as completely out of context by title or abstract.

In the second round, we excluded irrelevant papers per contribution as they should be related to user experience or usability aspects for web portals. As a result, 98 papers were used for classification and mapping study after applying the established protocol used to search, select, and evaluate the primary studies.

At the last round of selection, after the data extraction, papers presenting studies in the context of generic web development or using crowdsourcing as a means to assess websites were excluded because those were not focus of this review study. After the last round of screening, 42 publications were considered to be relevant per context and functionality, i.e. related to information or knowledge sharing systems and focusing on usability in some way. Figure 3 shows the number of papers in each round. Selected papers are briefly listed in the Bibliography with paper title and year. The mapping file is available upon request from the authors.

### 3.4 Questions

Our main research question in this research was "What are the methods and important aspects on the usability and user experience of the open community

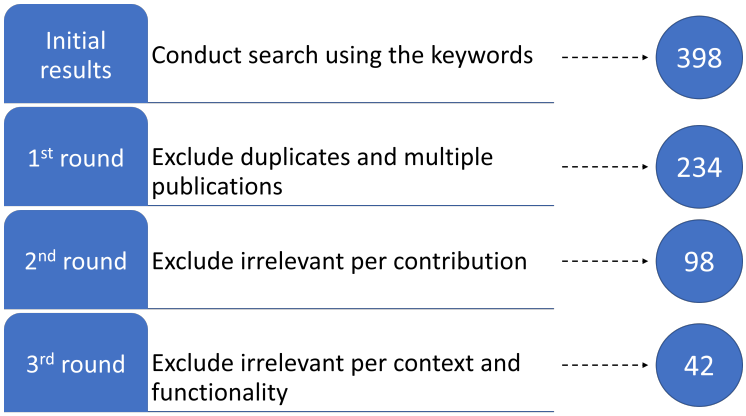


**Fig. 3.** Number of selected papers in each round.

web information portals?". After a planning stage, we conducted the search and completed the mapping study by analysing the findings and reporting the results.

During the mapping study all authors were involved in the analysis of the papers and checked for validity. Following questions were investigated for each paper:

- Contribution Type: What is the type of the contribution in the paper? e.g. new method, case study, software implementation, etc.
- Application Domain: What is the application domain? e.g. health, transportation, education, etc.
- Research Method: Which research methods have been used?
- Usability Methods/Frameworks/Standards: Have any specific usability related methods, frameworks or standards been used in the study? e.g. Nielsen's, System Usability Scale, user testing, etc.
- Usability-UX Features/Best Practices: Which specific usability/user experience aspects, features or best practices are considered in the paper?
- Usability-UX Issues/Challenges: Which specific usability/user experience related issues or challenges are considered in the paper?
- Developers/Admin Experience: Does the paper discuss any aspects related to developers or admin experience?
- Portal's Features: Have any specific features of the portal been mentioned?

The results show that different assessment strategies and development techniques were used. They also indicate that there is no unified approach available to deal with usability for information web portals. Detailed analysis of the results and findings are presented in the next section.

## 4 Results

This section will present the results of the mapping study and our findings for the questions listed in the previous section. Figure 4 shows the distribution of publications over the years. It is noticeable that 2015 produced most of the publications. That may be explained through a relative maturity of web development, and that web portals are not considered separately from general web sites in academic literature. However, for the purpose of this mapping study, the decision was taken to consider web portals as special due to their crowdsourcing and knowledge sharing capabilities.

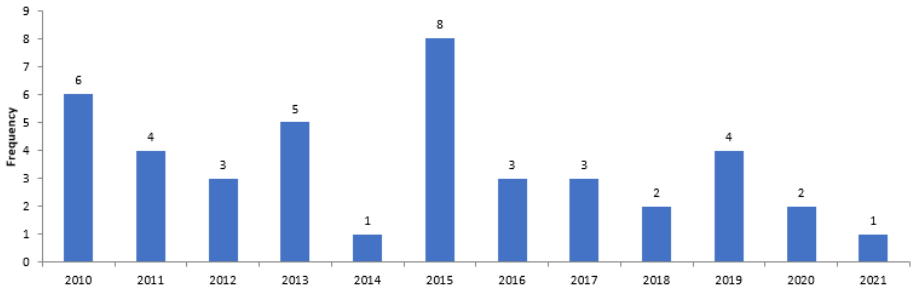


**Fig. 4.** Number of papers identified per year.

Contribution types of the papers were different in the papers but most of them presented system design and development studies including software implementation. Figure 5 shows the various contribution types of the selected studies and the count of how many papers are categorised into those types.

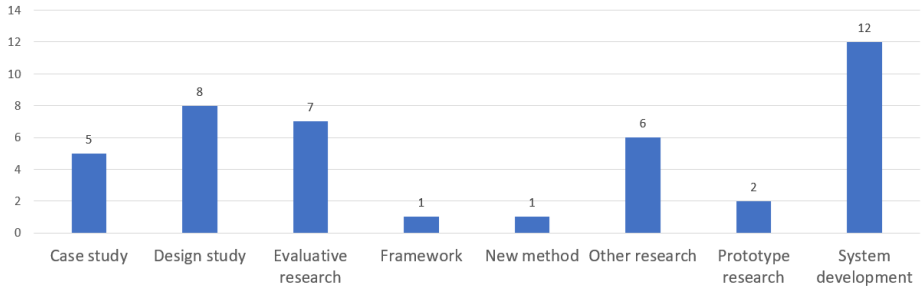


**Fig. 5.** Contribution types of the papers.

Most publications about web-based portals and knowledge sharing sites considered and discussed in the literature were focusing on Education (11 explicit

mentioning). Knowledge Sharing had the second strongest representation (8). In fact, knowledge sharing was the purpose for most portals even if other domains had the main focus. Two of the publications focusing on Knowledge Sharing portals mentioned Wikis specifically. The other two domains worth mentioning are Health (7) and Government (4). Further domains did feature, but were limited to one or two instances. Table 2 lists the number of papers per domain.

**Table 2.** Number of papers identified per domain/theme.

| **Domain/Theme** | **Count** |
|---|---|
| Architecture | 1 |
| Content management system | 1 |
| Commerce | 2 |
| Defence | 1 |
| Education | 11 |
| Environment | 1 |
| Geographic information / mapping | 1 |
| Government | 4 |
| Health | 7 |
| Knowledge sharing | 8 |
| News | 1 |
| Non specific | 1 |
| Social networking | 1 |
| Software engineering | 1 |
| Tourism | 1 |

27 out of 42 publications selected employed some form of usability method or assessment of web portals. This may appear as a relatively low number, but in the remaining publications usability may not have been the main focus of the research. Figure 6 shows the various methods used in the selected studies and the count of how many papers used each method. It can be seen that a variety of methods and assessments were employed and some papers used more than one method. The most utilised method was the use of questionnaires, and user testing was the second most used approach. This seems logical as usability is dependent on the users of a system.

Table 3 lists the usability or quality aspects influencing if users are engaging with a web portal so judged to be important for user experience. It can be seen that some aspects are incorporate others. Specifically, *functionality* is actually also encompassing *interactivity, searchability, crowdsourcing, sharing information, feedback mechanism, help functionality, communication facilities, recommendation mechanism, collaborative,* and *competition/reward*, and it appears logical that a functionality would impact users' desire to interact with a web portal.

*Aesthetics* also encompasses *use of colour, symmetry, layout arrangement (balance and grouping), consistency* and *data hierarchy. Portability/compati-*

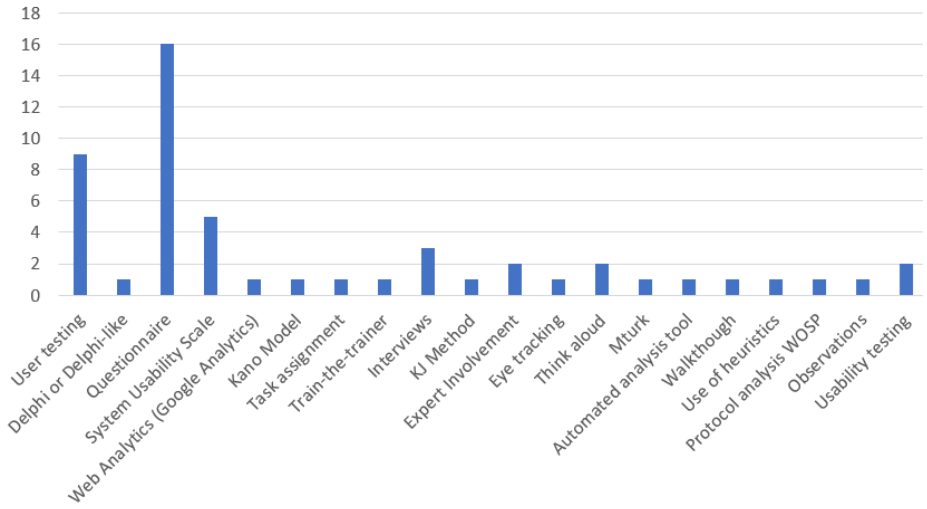


**Fig. 6.** Usability method or assessment technique used.

*bility* also incorporates *adaptability*. That is the reason *functionality*, *aesthetic*, and *portability/compatibility* have higher counts. Other aspects could have been grouped too, but these are somewhat judgement calls of the researchers. Apart from the groupings *accessibility* and *ease of use* were the most mentioned aspects to be important for usability of a web portal.

The challenges to usability and user involvement identified by literature in Table 4 mirror the aspects in Table 3. For instance *functionality* is seen as important for users to engage with a web portal. It may be counter intuitive to suggest a connection between *usability* and *functionality* and *lack or quality of functionality*,which also featured relatively strongly in Table 4, but without a perceived use or purpose a system may not be used, and as such *usable*. It could be argued that *quality of content* could be related to the *usability* since the quality of any information can frustrate users.

*Security*, although not directly related to *usability*, could be considered similarly related to *functionality* since perceived *security* will affect if users engage with a system. *Uncertainty and trust* are also related to *security*. *Performance* and *latency* , which impact waiting time are clearly impacting perceived *usability*.

For designers of web portals catering for *different types of users*, it would be interesting that there is *no central metric of usability*, and that there are different national usability indexes. These challenges could clearly also be seen as issues for developers and administrators of web portals, and they could have been featuring in Table 5 which shows challenges for web portal developers and administrators. *Maintainability* and *security* were the most prominent challenges for developers and administrators. *Ease of administration* could be considered as related to *maintainability*, and in fact *maintainability* could be described as the *usability* of a system from the perspective of developers and administrators.

**Table 3.** Portal usability and quality aspects judged to be important.

| Usability/Quality Aspect | Count | Paper Identifier |
|---|---|---|
| **Ease of use** | 8 | 2, 15, 17, 23, 24, 27, 40, 42 |
| **Accessibility** | 9 | 4, 8, 9, 12, 31, 34, 37, 38, 42 |
| **Understandability** | 2 | 6, 13 |
| **User satisfaction** | 1 | 6 |
| **Usefulness** | 7 | 6, 7, 12, 13, 16, 27, 40 |
| **Simplicity** | 6 | 7, 12, 16, 31, 34, 42 |
| **Usability** | 7 | 6, 9, 10, 19, 25, 27, 38 |
| **Easy navigation** | 6 | 15, 25, 30, 31, 34, 37 |
| **Responsiveness** | 2 | 16, 31 |
| **Performance** | 2 | 16, 31 |
| **Content** | 2 | 27, 34 |
| **Learnability** | 3 | 30, 34, 40 |
| **Task efficiency** | 2 | 30, 39 |
| **Satisfaction** | 3 | 31, 33, 35 |
| **System efficiency** | 4 | 31, 33, 35, 40 |
| **Effectiveness** | 2 | 33, 35 |
| **Reliability** | 3 | 13, 23, 42 |
| **Legitimacy** | 1 | 37 |
| **SEO friendly** | 1 | 38 |
| **Functionality** | 9 | 13, 14, 19, 21, 23, 27, 34, 37, 41 |
| - *Interactivity* | 1 | 27 |
| - *Searchability* | 1 | 23 |
| - *Crowdsourcing* | 1 | 21 |
| - *Sharing information* | 1 | 19 |
| - *Feedback mechanism* | 2 | 34, 37 |
| - *Help* | 1 | 37 |
| - *Communication facilities* | 1 | 41 |
| - *Recommendation mechanism* | 1 | 41 |
| - *Collaborative* | 2 | 14, 19 |
| - *Competition/Rewards* | 1 | 17 |
| **Portability/Compatibility** | 5 | 14, 16, 25, 41, 42 |
| - *Adaptability* | 2 | 25, 41 |
| **Aesthetic** | 6 | 18, 22, 30, 31, 34, 37 |
| - *Use of colour* | 1 | 22 |
| - *Symmetry* | 1 | 22 |
| - *Layout* | 1 | 22 |
| - *Consistency* | 1 | 31 |
| - *Data hierarchy* | 2 | 22, 37 |
| **Social Factor/Good story** | 1 | 17 |
| **Community focused** | 1 | 9 |

**Table 4.** Identified challenges.

| **Usability Challenges** | **Count** |
|---|---|
| Latency | 2 |
| Different types of users | 2 |
| Age disparity | 1 |
| Attitude of users | 1 |
| Quality of content | 3 |
| Quality of user interface | 1 |
| Authorship and copyright | 1 |
| Privilege customisability | 1 |
| Uncertainty and trust | 3 |
| Performance | 4 |
| Reliability | 1 |
| Network availability | 1 |
| Complexity | 1 |
| Security | 4 |
| Security transparency | 1 |
| Developer limitations | 1 |
| Users' interpretations | 1 |
| Users' calculations of the utility of a resource | 1 |
| Information overload | 1 |
| Fragmentation of data | 1 |
| Personalisation of data | 1 |
| Clarity of usage | 1 |
| Lack of learnability | 1 |
| Functionality/usefulness | 5 |
| Lack or quality of functionality | 3 |
| Lack of portability | 1 |
| Lack of flexibility/customisability | 1 |
| Insufficient accessibility | 1 |
| Information not up-to-date | 1 |
| Poor feedback mechanism | 1 |
| Integration with other systems | 1 |
| No central metric of usability | 2 |

**Table 5.** Challenges for developers and administrators.

| **Dev./Admin. Challenges** | **Count** |
|---|---|
| Ease of administration | 1 |
| Extensibility | 1 |
| Deployment | 1 |
| Information representation | 1 |
| Maintainability | 4 |
| Requirement elicitation | 1 |
| Security | 3 |

Table 6 shows features and qualities of the web portals discussed. One of the key features is *content sharing*, which seems to be the main purpose of web portals. This combined with the importance of *ease of use* as indicated in Table 3 highlights that the tasks a user can carry out need to be easily achievable. The second most noted quality in Table 6 is *engaging* which is difficult to achieve as this may change depending on user groups and possibly even changing attitudes to what is considered to be engaging.

**Table 6.** Noted portal features and characteristics.

| **Feature/Characteristics** | **Count** |
|---|---|
| Content sharing | 6 |
| Focus on social nature of portal | 3 |
| Consensus support system | 1 |
| Communication facilities | 3 |
| Recommendation mechanism | 1 |
| Engaging | 5 |
| Visually appealing | 1 |
| Searchable | 1 |
| Reliable | 1 |
| Flexible | 3 |
| Privacy | 1 |
| Accessibility features | 4 |
| Assistive services | 1 |
| Collaboration tools | 1 |

### 4.1 Limitations

As with any systematic literature review the work presented in this paper has some threats to validity. The main issue could be linked to the selection of keywords. There may be synonyms that were not included in the search due to non-standardised terminology. However, in this study the search terms were purposely left open to include as many relevant publications as possible.

We would like to also note that ACM search feature and user interface have changed while we were working on this study. Search results were different with the new version and included more irrelevant papers based on keywords search, but we included those new results and repeated the study for the ACM repository. In addition, ScienceDirect search feature did not allow more than eight operators, so search is repeated to include all keywords and results were merged.

Another possible thread to validity could be the interpretation of the categories presented in Section 4. classifying is a non-trivial process, and categories may not be universally agreed on. However, the results presented in 4 still indicate aspects that may impact user engagement which is the core purpose of web portals.

## 5 Conclusion

Understanding how users interact with the knowledge sharing platforms is very important to realise the issues that users may encounter when visiting a portal. The ultimate experience of a portal can only be judged by the portal's users themselves, and not by the developers only even if they are experienced usability experts. In this paper, we presented a systematic mapping study with the objective of identifying the trends in usability and user experience of information portals and open community websites.

Our findings have been utilised in the SPEED (Smart Ports Entrepreneurial Ecosystem Development) project. The project's main purpose was toward efficiency and innovation. If the ports' needs coordinates with the advanced data science, it could be an important step in expediting the developments. Therefore, SPEED portal was developed to build a network community connecting high-tech start-ups with ports and ports stockholders.

Future work would be related to what attracts users to web portals, and what engages their participation. Usability is clearly an important part to maintain users' participation, but it is not entirely clear yet how successful web portals encourage users to interact with the web portal.

## Acknowledgments

SPEED (Smart Ports Entrepreneurial Ecosystem Development) Project is funded by EU Interreg 2 Seas Mers Zeeën programme. The authors would like to thank Aikaterini Kakaounaki and Prof Reza Sahandi for their help and support.

## References

1. Bramer, W.M., de Jonge, G.B., Rethlefsen, M., Mast, F., Kleijnen, J.: A systematic approach to searching: an efficient and complete method to develop literature searches. Journal of the Medical Library Association : JMLA **106**(4), 531–541 (10 2018). https://doi.org/10.5195/jmla.2018.283
2. Dingli, A., Cassar, S.: An intelligent framework for website usability. Advances in Human-Computer Interaction **2014**, 1–13 (04 2014). https://doi.org/10.1155/2014/479286
3. Distante, D., Risi, M., Scanniello, G.: Enhancing navigability in websites built using web content management systems. International Journal of Software Engineering and Knowledge Engineering **24**, 493–515 (04 2014). https://doi.org/10.1142/S0218194014500193
4. Estuar, M.R.J., De Leon, M., Santos, M.D., Ilagan, J.O., May, B.A.: Validating ui through ux in the context of a mobile - web crowdsourcing disaster management application. In: 2014 International Conference on IT Convergence and Security (ICITCS) (2014). https://doi.org/10.1109/ICITCS.2014.7021823
5. Fernandez, A., Insfran, E., Abrahão, S.: Usability evaluation methods for the web: A systematic mapping study. Information and Software Technology **53**(8), 789–817 (2011). https://doi.org/10.1016/j.infsof.2011.02.007

6. Følstad, A.: Users' design feedback in usability evaluation: a literature review. Human-centric Computing and Information Sciences **7** (2017). https://doi.org/10.1186/s13673-017-0100-y
7. Hellmers, J., Thomaschewski, J., Schön, E.M., Wriedt, T.: Usability evaluation methods for a scientific internet information portal. Journal of Universal Computer Science **18**, 1308–1322 (05 2012)
8. Kazemi, S., Cetinkaya, D., Liebchen, G., Sahandi, R.: Usability and user experience in open community web portals: A case study in smart ports domain. In: Proceedings of the 20th International Conference in E-Society (2022)
9. Lefoe, G., O'Reilly, M., Parrish, D., Bennett, S., Keppell, M., Gunn, C.: The carrick exchange: Not just another repository. In: Montgomerie, C., Seale, J. (eds.) Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications EdMedia + Innovate Learning 2007. pp. 108–113. Association for the Advancement of Computing in Education (AACE) (June 2007), https://www.learntechlib.org/p/25365
10. Lew, P., Olsina, L., Zhang, L.: Quality, quality in use, actual usability and user experience as key drivers for web application evaluation. In: Benatallah, B., Casati, F., Kappel, G., Rossi, G. (eds.) Web Engineering (ICWE 2010). Lecture Notes in Computer Science, vol 6189. pp. 218–232. Springer Berlin Heidelberg (2010)
11. Maia, C.L.B., Furtado, E.S.: A systematic review about user experience evaluation. In: Marcus, A. (ed.) Design, User Experience, and Usability: Design Thinking and Methods (DUXU 2016). Lecture Notes in Computer Science, vol 9746. pp. 445–455. Springer International Publishing, Cham (2016)
12. Maligat, D.E., Torio, J.O., Bigueras, R.T., Arispe, M.C., Palaoag, T.D.: Web-based knowledge management system for camarines norte state college. In: IOP Conference Series: Materials Science and Engineering - International Conference on Information Technology and Digital Applications (ICITDA'19). vol. 803 (2019)
13. Meier, F., Bazo, A., Burghardt, M., Wolff, C.: Evaluating a web-based tool for crowdsourced navigation stress tests. In: Marcus, A. (ed.) Design, User Experience, and Usability. Web, Mobile, and Product Design (DUXU 2013). Lecture Notes in Computer Science, vol 8015. pp. 248–256. Springer Berlin Heidelberg (2013)
14. Nebeling, M., Speicher, M., Grossniklaus, M., Norrie, M.C.: Crowdsourced web site evaluation with crowdstudy. In: Brambilla, M., Tokuda, T., Tolksdorf, R. (eds.) Web Engineering (ICWE 2012). Lecture Notes in Computer Science, vol 7387. pp. 494–497. Springer Berlin Heidelberg (2012)
15. Nebeling, M., Speicher, M., Norrie, M.C.: Crowdstudy: General toolkit for crowdsourced evaluation of web interfaces. In: Proceedings of the 5th ACM SIGCHI Symposium on Engineering Interactive Computing Systems. p. 255–264. EICS '13, Association for Computing Machinery, New York, NY, USA (2013)
16. Petersen, K., Vakkalanka, S., Kuzniarz, L.: Guidelines for conducting systematic mapping studies in software engineering. Information and Software Technology **64**(C), 1–18 (08 2015). https://doi.org/10.1016/j.infsof.2015.03.007
17. Pinho, C., Franco, M., Mendes, L.: Web portals as tools to support information management in higher education institutions: A systematic literature review. International Journal of Information Management **41**, 80–92 (2018). https://doi.org/10.1016/j.ijinfomgt.2018.04.002
18. Reychav, I., Wu, D.: The role of user-centered design and usability on knowledge sharing: a school website field study. International Journal of Knowledge and Learning **10**(1), 16–28 (2015). https://doi.org/10.1504/IJKL.2015.071051

19. Shekh.Khalil, N., Dogruer, E., Elosta, A.K.O., Eraslan, S., Yesilada, Y., Harper, S.: Eyecrowdata: Towards a web-based crowdsourcing platform for web-related eye-tracking data. In: ACM Symposium on Eye Tracking Research and Applications (ETRA'20). Association for Computing Machinery, New York, NY, USA (2020)
20. Subramanian, D.V., Geetha, A., Shankar, P.: An effective assessment of knowledge sharing and e-learning portals. International Journal of Web-Based Learning and Teaching Technologies **10**(2), 1–12 (apr 2015). https://doi.org/10.4018/IJWLTT.2015040101
21. Sutcliffe, A.: Designing for User Engagement: Aesthetic and Attractive User Interfaces, vol. 2. Morgan & Claypool (2009)
22. Walser, K.: Engaging citizens with ux design. In: Marcus, A. (ed.) Design, User Experience, and Usability. Design Philosophy, Methods, and Tools (DUXU'13). Lecture Notes in Computer Science, vol 8012. pp. 427–436. Springer Berlin Heidelberg (2013)

## Bibliography (List of Papers)

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| p2 | Ontos clip and share | 2010 |
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