

A Requirement Model of Online Book Publishing Management System

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Abstract

Book publishing is an activity that contains several process chains such as manuscript submission, review, editing, design, and publication. To make the book publishing industry stay relevant in today's world, these processes must use the advantages offered by rapid technology development. Hence, it is crucial to have a systematic and practical system providing all the necessary publishing processes online. Towards the Online Book Publishing Management System (OBMS) development, a requirement model by using Unified Modelling Language (UML) has been constructed. To evaluate the model, a prototype was developed to demonstrate its functionality for the author's role. The feedback from the prospect users is gained by conducting usability testing. The model can provide a better understanding of the process involved in the online book publishing system.

Keywords: Book Publishing Process, Requirement Model, Unified Modelling Language, Online Book Management System, Usability Testing

INTRODUCTION

Technology advancement has affected the book industry in both extreme and incremental shocks [1]. According to [2] the book industry competes in two layers: the bookstore and the internet. The usage of digital technology has also seemed to

improvising the industry's process related to supply and demand. Even the book industry seems to have an impact on the numbers of the country around the globe. The book industry remains essential after the sale figures of the print book have increased over the last five years, and the unit sales grow to over 650 million per year. This indicates there is still room for the publishing industry to deliver entertainment, education, and information contents to consumers [3, 4].

Digital technology has been used to make the book from the content format to other publishing processes. These processes can be categorized into editing, designing, printing, and marketing [5, 6]. Some aspect of e-book, online book sales operations and marketing, such as PayPal, online commercials like Amazon and Barnes & Nobles, have applied the usage of digital technology [7]. Unfortunately, the online system that offers and provides the whole process of book publishing from the submission of the manuscript until the publishing of the book by using a single platform is not yet available.

Thus, the objective of this study is to develop an online system that offers and provides the complete publishing processes in a single platform. The name given for this system is Online Book Management Publishing System (OBMS). OBMS main function is to support the process of publishing books, either electronic or print book. The processes will involve user login, manuscript submission, manuscript review, layout design, graphic design, and publishing. The user of this system will consist of author, editor, reviewer, publisher, graphic designer, layout editor, and administrator.

The requirement model has to be identified for the development of the OBMS. Thus, this paper contains information regarding the right requirement for the OBMS. After the relevant information is gathered, the data was modelled by using Unified Modelling Language (UML). Next, based on the constructed UML diagram, the prototype reflecting the system requirements of the OBMS was developed by using Adobe XD.

The completion of the prototype design is followed by the execution of usability testing. The quantitative method, which is a questionnaire, was used since it is the most prevalent in evaluating usability and does not distinguish the problem that has to be stated [8]. The analysis result has been collected, and the results are compiled as in the fourth section: Result and Analysis.

RELATED WORKS

Online and Electronic Services

Online service can be classified as a real-time system since it uses the system correctness in providing services to the user like the logical result of the computation and the time where the result is produced [9]. Online service can also be viewed as a social network that contains service providers and service consumers [10]. For the past few years, the number of social network platform keeps increasing [11]. The online social platform has become one of the media where users can always share and publish their personal daily life, experiences, ideas, information, expertise, and also the review of the product [12].

Electronic services or simply E-services are the service managed by customers [13] and can be accessed by using the internet. Several studies have been done [14, 15] regarding the quality of electronic services, and customer loyalty could be gained if the developer tries to satisfy the customer by providing a high quality of electronic service [16].

Requirements Modelling

Hull [17], in the book title "Requirement Engineering", stated that it is a misnomer to talk about requirement modelling because basically, it is a system design to be modelled and not the requirement. System development involving a

large amount of complex information that has to be managed. Thus, modelling allows this complex and wide system to be focused on a small part or subset of information at a time. Many studies [18-23] have been conducted by many researchers worldwide regarding the topic of requirement model shows the importance of the process in identifying the needs of the software system to be developed. Most of the studies used Unified Modelling Language (UML) for those purposes.

Unified Modelling Language (UML)

In Software Engineering (SE), UML is used to visualize the primary purpose, specify the modelling artefact, construct the code, document the system details, and maintain the software system [24]. From the definition of UML given by Object Management Group Inc. (OGM), which has been adopted in September 2003, UML is suitable for modelling the business processes and systems. It also has the characteristic of expressing the information or requirement easily [23]. UML contains several models, and each model represents discrete phases and a separate purpose of development processes. The models are classified into; structure diagrams, behaviour diagrams, and interaction diagrams.

Open Journal System

University of British Columbia (UBC), under a program called Public Knowledge Project (PKP), has developed Open Journal System (OJS) with subsequent participation by Simon Fraser University Library, the Canadian Centre for Studies in Publishing, and Stanford University. The software development project was directed by John Willinsky, and the project began its developing phase in the year 2000 with the help of three part-time undergraduate computer science students at UBC, led by Kevin Jamieson. OJS version 1.0 was officially launched in November 2002 at St. John's, Newfoundland [25]. Currently, OJS is running its latest version of 3.2 [26].

OJS's main function is to manage and publish the scholarly journal online, and it allowed its user to download and install the system on a local web server for free [27]. Roles in OJS can be divided into Author, Editor, Reviewer, Journal Manager, Section Editor, Copyeditor, Layout Editor, Site Administrator, Proofreader, and Reader. PKP describes that the among the features provided by the system are: OJS can be installed and controlled locally; all process are accessible online; extensive content's indexing; responsive and themeable interface; notify readers by e-mail; editors can organize the sections, system requirements, etc.; support multi-language and provide comprehensive online Help support. The difference between OJS compared to OBMS is OJS is a system developed for the journal, and OBMS's main focus is on the book, either it is electronic or printed books from various genres.

METHODOLOGY

This study has been using the Research Design Method, which consists of four stages: Initial Investigation, Data Collection, Data Model, and lastly Evaluation phase. The method seems reasonably suitable because research may be referred to as an activity that contributes to the understanding of a scenario or phenomenon [28-29].

Phase 1: Initial Investigation

This phase focused on the development of the project proposal. All the project details, such as the problem statement, research questions, research objectives, and method to used, have been identified and listed in the project proposal. The literature review regarding the search topic of requirement model, publishing process, electronic book publishing, and online book system was made to collect the information about the research project.

Phase 2: Data Collection

During this phase, the researcher gathered the list of requirements for the Online Book Publishing System from the document analysis technique. It is important to have a clear idea and understanding of the right and correct processes involved in book publishing. From the book publishing process flow, the information has been identified and divided into several categories such as the user of the system, the attribute of each user, and the functional requirement of the system. The researcher has also studied the existence of OJS Visual Guidelines version 3.0 [30] to have a better picture of the system's process and function.

Phase 3: Data Modelling and Design

The data modelling and design phase is the most challenging phase as it works as the medium tool between the researcher and end-user since it determines whether what the developer understands indicates what the user wants. This phase consists of two different parts, which are data modelling and data design. In data modelling, the data collected in the previous phase were transformed into the UML notation. The researcher has been using the software called Visual Paradigm version 16.1 to create the necessary diagram such as a class diagram, use case diagram, activity diagram, and sequence diagram. Whilst in the data design phase, the activity involved the development process of the OBMS's prototype. The prototype was developed by using Adobe XD application and the main colour of the interface are set to white, blue, and yellow, reflecting the colour of the Universiti Utara Malaysia's logo.

Phase 4: Evaluation

After the prototype development complete, it is evaluated by using the expert evaluation by using a questionnaire, and the questions are based on Perceived Usefulness, and Ease of Use referred from Davis [31]. The respondents selected are among the author who has published the book before either it is an electronic or physical book. Before answering the questionnaire, the respondent must go through the system's prototype by using the link. After that, they answered the questionnaire posted in Google form, and the response information was recorded automatically after the respondent clicks the submission button. The result of the evaluation is described in the next section.

RESULTS AND ANALYSIS

This result and analysis section is divided into three subsections which are the data modelling of the requirement list, the design of the prototype, and lastly, the result of the evaluation phase. These three subsections shall be answering all three research questions listed in the introduction section.

Data Requirement Modelling

In data requirement modelling, the list of requirements is transformed into the UML diagrams. Just like the flowchart, an activity diagram is used to model the process involved in OBMS. In this study, the activity diagram holds the important characteristic in showing the dependency between the activities involve while executing the OBMS (see Figure 1). It also helps in mapping activity to certain actors inside the OBMS [24].

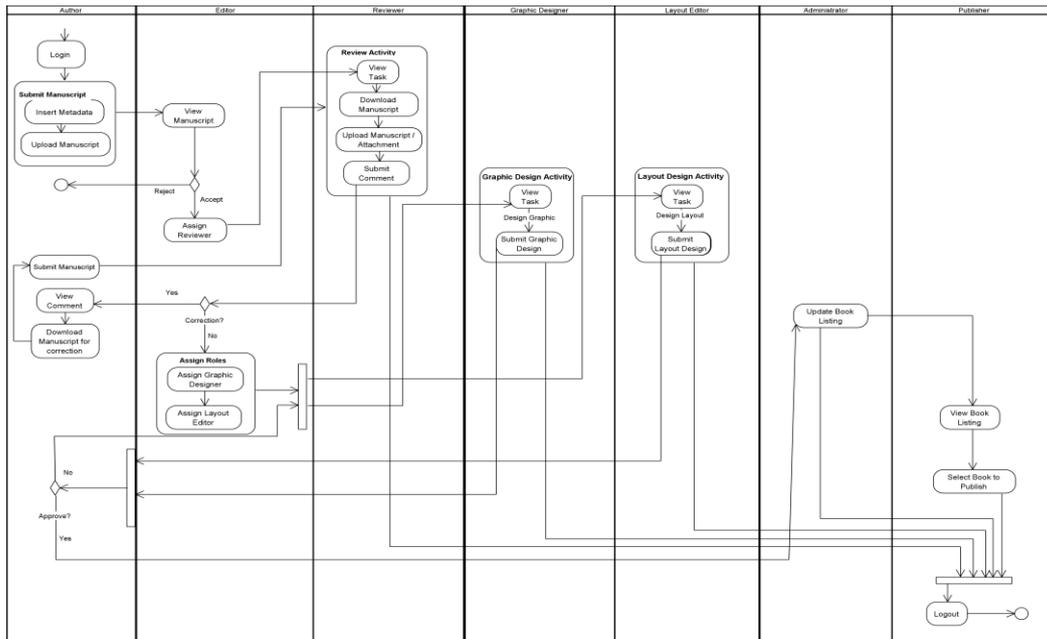


Figure 1. Activity diagram of OBMS

The first actor or user to call out the action in the activity diagram is the author. The whole process started when the author submits a new manuscript by using the system’s website. The editor will review the manuscript and decided whether to accept or reject the manuscript content. If the manuscript is accepted, the editor then will assign three roles which are reviewer, layout designer, and graphic designer. Each role will receive the task notification once the editor submits the assigned information.

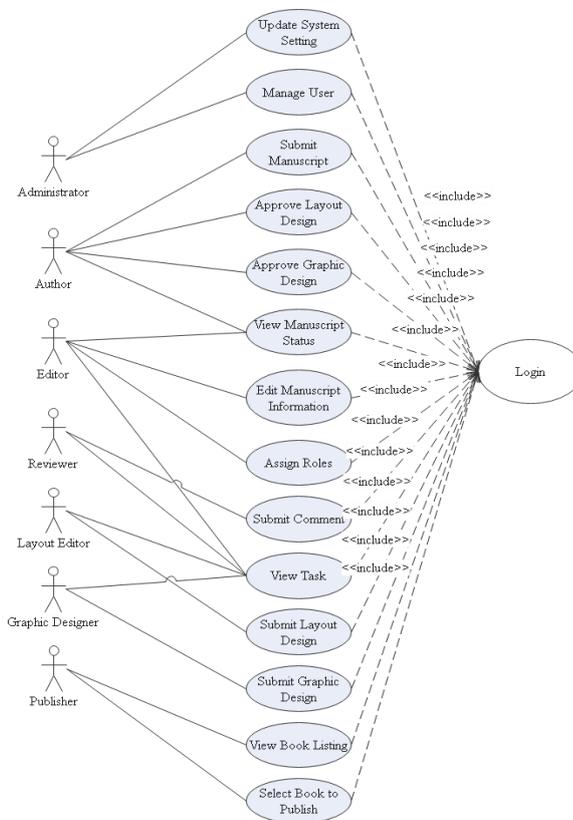


Figure 2. Use case diagram for OBMS

The reviewer will view the task, review the manuscript by downloading the file, and submit the comment whether the author has to correct it or not. If the author has to make the correction, they will be given time to make the correction and submit the manuscript again for the second review. If the manuscript passed the second review, the process would continue to the next process, which is the graphic design and layout design activity.

Both graphic designer and layout designer will submit their design for the author to approve. If there is any amendment to be made, the designer will have to work on the changes first before the author approves the design. Figure 2 displayed the Use Case diagram. Use Case diagram is always called static since it does not involve or represent the time's concept. It only shows the relationship between two use cases or between the actors and use cases.

Prototype Design Interface

As stated in the previous section, the OBMS prototype was designed by using Adobe XD application version 31.3.12.4. This application is selected because it is a computer-based application, and it does support the design and prototype process. The figures listed in this subsection are the prototype interface of OBMS for the author's role. Users or authors have to login before they can enter the system by clicking the button 'Login'.

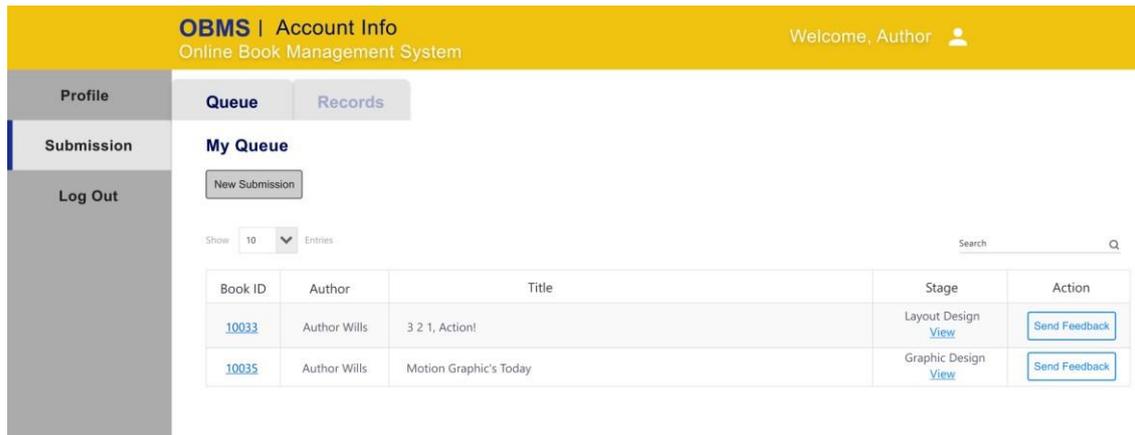


Figure 3. Login interface of OBMS

After that, an author can click on the profile icon to view the information regarding Profile and Submission, and in the Submission menu, an author can view the status of the submitted manuscript. To submit a new manuscript, the author must click on the New Submission button (see Figure 4).

Authors need to insert the title, select the genre, and upload the manuscript before they can click the 'Submit' button (see Figure 5). Once they have submitted the manuscript, they will be brought back to the view manuscript status page (see Figure 4).

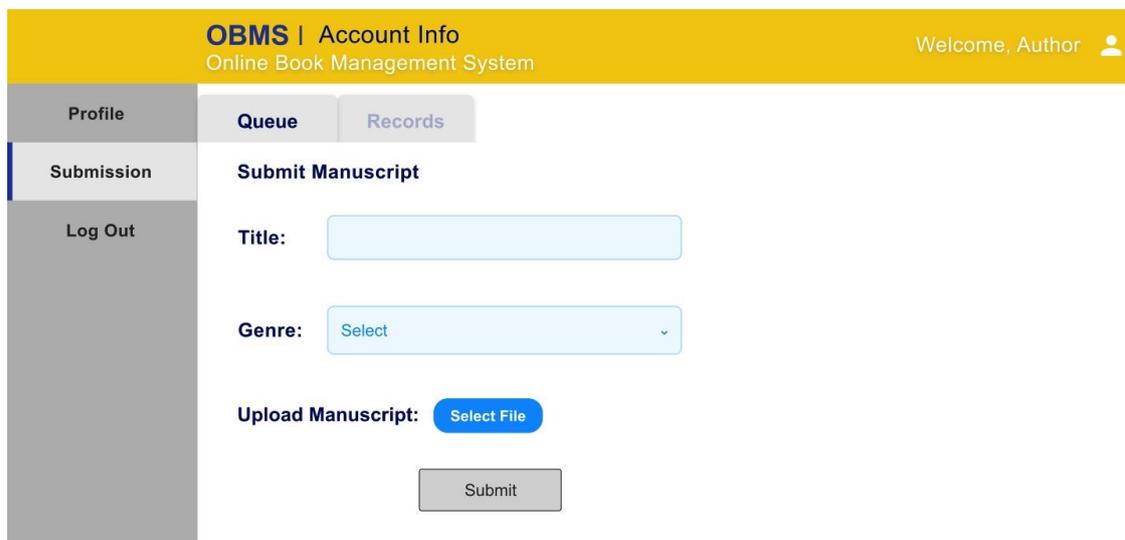
Besides submit a new manuscript and view the manuscript status, the author is also responsible for giving feedback regarding the layout design and graphic design. From the View Manuscript Status Page, the author can click on the Send Feedback button, and the Feedback page will appear as below. The author can insert the comment, upload the file with the comment attached to it, and choose whether to approve or request for amendment. Then, the author can click on the Submit button.



The screenshot shows the 'OBMS | Account Info' interface. The user is logged in as 'Author'. The 'Queue' tab is active, displaying 'My Queue'. A 'New Submission' button is visible. Below it, a table lists two manuscripts:

Book ID	Author	Title	Stage	Action
10033	Author Wills	3 2 1, Action!	Layout Design View	Send Feedback
10035	Author Wills	Motion Graphic's Today	Graphic Design View	Send Feedback

Figure 4. View manuscript submission status



The screenshot shows the 'OBMS | Account Info' interface. The user is logged in as 'Author'. The 'Records' tab is active, displaying 'Submit Manuscript'. The form includes the following fields and buttons:

- Title:** A text input field.
- Genre:** A dropdown menu with 'Select' as the current selection.
- Upload Manuscript:** A blue button labeled 'Select File'.
- Submit:** A grey button at the bottom of the form.

Figure 5. Submit a new manuscript page

Evaluation Result

The OBMS prototype is evaluated according to Perceived Usefulness (PU) and Perceived Ease of Use (PEU). The respondents had given their feedback after walkthrough the system's prototype. The samples consisted of six authors who had published at least a book before. The demographic information consists of the author's age, gender, and years of experience (in number format).

Out of six respondents, only one respondent is male, and the other five are female. As for the age, 66.7% age of respondents is between 25 until 39-year-old. Whilst the percentage recorded for age variable of 18 – 24 and 40 – 59 are each 16.7%. Lastly, for the experience period, 33.3% of respondents have one year of experience in book publishing, and the other four respondents have three, four, five, and six-year experience with a percentage of 16.7% each.

Table 1

Perceived Usefulness

Questions	Mean
Using OBMS would enable me to complete the tasks and scenarios quickly	4.3333
Using OBMS would improve the user performance	4.5000
Using OBMS would enhance my effectiveness in completing task or scenario	4.1667
Using OBMS would make it easier to execute my task	4.5000
I would find OBMS useful in the book publishing process	4.6667
Grand Mean	4.4333

Table 1 and Table 2 show the descriptive statistic for every question answer by the respondent. Perceived usefulness (Table 1) recorded the grand mean of 4.4333 indicates that most respondents felt the OBMS is useful to be applied in the publishing sector. The same result goes for Perceived Ease of Use when Table 2 shows that the grand mean 4.5000 stipulate that the OBMS is easy to use and to be interacted with.

Table 2

Perceived Ease of Use

Questions	Mean
Learning to operate OBMS would be easy for me	4.6667
I would find it easy to get OBMS to do what I want it to do	4.3333
My interaction with OBMS would be clear and understandable	4.6667
I would find OBMS to be flexible to interact with	4.5000
It would be easy for me to become skilful at using OBMS	4.1667
Overall, I would find OBMS easy to use	4.6667
Grand Mean	4.5000

The evaluation result clearly showed that the idea to construct the OBMS should proceed to the development phase. In the current situation, the author uses electronic mail to submit the manuscript and to receive the information regarding the publication process. With the development of the OBMS, to submit the manuscript, the author will no longer need to login into their electronic mail account. Instead, they just have to login to the OBMS and send the manuscript by using the access provided. OBMS will also provide the author and other users the availability to check the latest status or process of the manuscript. The roles involved in the discussion committee can also be assigned in OBMS.

CONCLUSION

The importance of digital technology in the publishing industry is undeniable when the technology has been widely used in the sales and marketing processes of e-book or physical book. However, the usage of digital technology is not fully applied in all book publishing process chain. Thus, this paper is structured to come out with a system called OBMS. OBMS contain a set of requirements needed to enable the process of book publishing from the manuscript submission stage until the book is being published. This paper is using the research design method since it is reasonably practical in achieving the listed research objectives.

The method's framework consists of four phases which are (i) initial investigation, (ii) data collection, (iii) data model, and lastly (iv) evaluation phase. Among the activities involved in this study are the collection of requirement lists, data modelling, the design and development of the prototype, and lastly, the evaluation of the prototype. The result and analysis section shows that both perceived usefulness and perceived ease of use each recorded the grand mean 4.43 and 4.50 indicates that the OBMS is acceptably easy to use and useful in performing the required functions. The novelty of this study is the successfully constructed requirements model for OBMS, which later can be used as a blueprint towards the development of the OBMS in the next study, and the research team shall refer to the listed and modelled requirement of OBMS to cater for the needs of the book publishing industry in the technology era.

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REFERENCES

1. Helpman, E. *General Purpose Technologies and Economic Growth*. MIT Press, 1998.
2. Ramrattan, L. and Szenberg, M. *Revolutions in Book Publishing: The Effects of Digital Innovation on the Industry*. New York: Palgrave Macmillan, 2016
3. Watson, A. *Topic: Book Industry*. 2020. Available from <https://www.statista.com/topics/1177/book-market/>
4. Greco, A.N. *The Book Publishing Industry*. Lawrence Erlbaum Associates Publishers, 2015
5. Kulesz, O., *Digital publishing in developing countries: the emergence of new models?* Publishing research quarterly, 2011. **27**(4): p. 311-320 DOI: <https://doi.org/10.1007/s12109-011-9241-4>.
6. Thompson, J.B. *Merchants of culture: the publishing business in the twenty-first century* (2nd ed.). Cambridge: Polity Press, 2012.
7. Gilbert, R.J., *E-books: A tale of digital disruption*. Journal of Economic Perspectives, 2015. **29**(3): p. 165-84 DOI: <https://doi.org/10.1257/jep.29.3.165>.
8. Maramba, I., A. Chatterjee, and C. Newman, *Methods of usability testing in the development of eHealth applications: a scoping review*. International Journal of Medical Informatics, 2019. **126**: p. 95-104 DOI: <https://doi.org/10.1016/j.ijmedinf.2019.03.018>.
9. Rajani, R. and Mahajan, M. *A review of scheduling tasks for real-time online services and maximizing the system's total accrued profit*. 2014 International Conference on Reliability Optimization and Information Technology (ICROIT), 2014, p. 13-16. DOI: <https://doi.org/10.1109/ICROIT.2014.6798286>
10. Reghu, R. and Sarath, G. *Finding a Trustworthy Service Provider in Online Service-Oriented Trust Network*. In: 2018 International Conference on Data Science and Engineering (ICDSE). IEEE, 2018, p. 1-5. DOI: <https://doi.org/10.1109/ICDSE.2018.8527731>.
11. Qi, L. *Word of Blog for Movies: A Predictor and an Outcome of Box Office Revenue?* Journal of Electronic Commerce Research, 2011. **12**(3): p. 187-198.
12. Ye, Q., Fang, B., He, W. and Hsieh, J.P. *Can Social Capital Be Transferred Cross the Boundary of the Real and Virtual Worlds? An Empirical Investigation of Twitter*. Journal of Electronic Commerce Research, 2012. **13**(2): p 145-156.
13. Ruyter, K., Wetzels, M. and Kleijnen, M. *Customer adoption of e-service: An experimental study*. International Journal of Service Industry Management, 2011. **12**(2): p. 184-207. DOI: <https://doi.org/10.1108/09564230110387542>
14. Parasuraman, A., Zeithaml, V. and Malhotra, A. *E-S-QUAL: A multiple-item scale for assessing electronic service quality*. Journal of Service Research, 2005. **7**(3): p. 213-233. DOI: <https://doi.org/10.1177/1094670504271156>
15. Cox, J. and Dale B. *Key quality factors in web site design and use: An examination*. International Journal of Quality and Reliability Management, 2002. **17**(7): p. 862-888. DOI: <https://doi.org/10.1108/02656710210434784>

16. Reichheld, F.F. and Schefter, P. *E-loyalty: Your secret weapon on the web*. Harvard Business Review, 2000. **78**(4): p. 105-113.
17. Hull, E., Jackson, K. and Dick, J. *Requirements Engineering - Colourful Book*, 2011. Available from <https://www.springer.com/gp/book/9781447158189>
18. Hussain, A., Mkpojiogu, E.O.C. and Mohd Nawi, M.N. *Requirements model for an e-health awareness portal*. AIP Conference Proceedings, 2016. **1761**. DOI: <https://doi.org/10.1063/1.4960888>
19. Bouraga, S., Jureta, I. and Faulkner, S. *Modeling requirements for content recommendation systems*. CEUR Workshop Proceedings, 2016. **1674**(1): p. 79–84.
20. Altarturi, H.H., Ng, K.Y., Ninggal, M.I.H., Nazri, A.S.A. and Ghani, A.A.A. *A requirement engineering model for big data software*. 2017 IEEE Conference on Big Data and Analytics, 2018. pp. 111–117. DOI: <https://doi.org/10.1109/ICBDAA.2017.8284116>
21. Hussain, A., Leong, C.C., Puteh, N. and Zaaba, Z.F. *Requirement model of the conference management system: A mobile app for creating and managing conference papers*. International Journal of Interactive Mobile Technologies, 2019. **13**(11): p. 197–212. DOI: <https://doi.org/10.3991/ijim.v13i11.11280>
22. Gunther, M., Scholz, A., Schmidt, P.P., Fay, A., Diekhake, P., Fuentes, D.E.D. and Becker, U. *Requirements engineering and modeling for building automation systems*. In: IEEE International Conference on Emerging Technologies and Factory Automation, 2016. ETFA. DOI: <https://doi.org/10.1109/ETFA.2016.7733675>
23. Han-Feng, Z., Yu, L. and Li-Yun, C. *Requirement model of equipment supporting system supported by space information*. In: 2011 IEEE 3rd International Conference on Communication Software and Networks, 2011. p. 615–619. DOI: <https://doi.org/10.1109/ICCSN.2011.6014165>
24. Unhelkar, B. *Software Engineering With UML*. Boca Raton, Florida: CRC Press, 2018.
25. Edgar, B.D. & Willinsky, J. A survey of the scholarly journals using Open Journal Systems. *Scholarly and Research Communication*, 2010. **1**(2): p. 1–22.
26. OJS 3.x Service Center. 2020. Available from <https://openjournalsystems.com/ojs3/>
27. Willinsky, J. *An example of open source software for journal management and publishing*. Emerald Group Publishing Limited, Cambridge, MA, 2005.
28. Kuhn, T. *The Structure of Scientific Revolutions*. Chicago, IL: University of Chicago Press, 1962/96.
29. Lakatos, I. *The Methodology of Scientific Research Programmes*, J. Worrall and G. Currie (Eds.), Cambridge, UK: Cambridge University Press, 1978.
30. Public Knowledge Project. *Learning OJS 3.0: Visual Guide*, 2015.
31. Davis, F.D., *Perceived usefulness, perceived ease of use, and user acceptance of information technology*. *MIS quarterly*, 1989. **2**(4): p. 319-340 DOI: <https://doi.org/10.2307/249008>.