Initial stage analysis of conceptual data model of International Research, Innovation, Conference, and Competition System (IRICC)

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Abstract. Over the past ten years, Universiti Teknologi MARA Terengganu Branch (UiTMTB) Malaysia through Department of Research and Industrial Linkages has actively organizing conferences and innovation competitions as a platform for the researchers (i.e. lecturers and students) to share knowledge and exchange ideas in various field of expertise. All these events encourage researchers to be more productive to write and submit their research work for publication. The Department of Research and Industrial Linkages, UiTMTB has put a great deal of effort from planning until implementation to organize and ensure each of the programmes' objectives achieved successfully. However, initial investigation has found that the Department of Research and Industrial Linkages, UiTMTB still struggling to execute four main tasks which are i) participants registration, ii) reviewing process, iii) article status notification, and iv) fees payment process as all of these tasks have to be performed manually by the program committees. This has led to errors such as disorganize information, and miscommunication among the team members, reviewers, and participants throughout organizing the programmes. Looking at the situation, it indicates that the program committees needs a systematic system to execute all the critical tasks efficiently and effectively. Therefore, this study aims to propose a conceptual data model namely Conceptual Data Model of International Research, Innovation, Conference and Competition (IRICC) System that specifically address the user requirement particularly in organizing conferences and innovation competitions. Prior to developed the proposed model, initial stage of analysis to determine the availability and the needs has to be carried out. Three phases of research activities have been conducted which are i) user experience investigation, (ii) analysis of the previous works, and (iii) result analysis. Having carried out all three phases of research activities it was found that a Conceptual Data Model of International Research, Innovation, Conference and Competition (IRICC) System is urgently need to be explored.

Keywords: Human Computer Interaction, System Analysis and Design, Interaction Design, User Centred Design Approach, Usefulness
1. Introduction
Towards the digital society 5.0, most of the tasks particularly in professional organizations have to be executed systematically and effectively. This demand requires the automatic system to ensure that all of the tasks able to be conducted efficiently and effectively in term of quality of task, time, and cost. This situation is similar with Department of Research and Industrial Linkages UiTMTB which has been established since 2009. Over the past ten years, many research and innovation related programmes have been organized to fulfill the university requirement. All these seen as initiative to encourage and supporting system to increase the lecturers’ performance in terms of research, innovation, writing, and publication. Such of the programme are innovation competitions and conferences. They includes Graduate International Conference (GraCe), Higher Degree Working Paper Series (Hi-WorkS), International Invention, Innovation, and Design Competition and Conference (ICON), and Educational Project of Innovation Competition (EPiC). All of them are organized manually through email which leads to less systematic, less effective and less efficient works.

On the other hand, based on the initial analysis it was found that there are a lot of Conference Management Systems (CMS) have been developed to ensure that all the processes prior to execute the conference able to be conducted systematically and smoothly. EDAS and Open Conference System are some of the examples of CMS that available since the past 15 years [1][2]. Both of the CMS is open source and able to be utilized by any conference organizer. However, to maintain the system at certain level, the organizer has to pay the monthly fee. In terms of cost, it is less effective for the organizer particularly from the developing countries. There are also CMS that has been developed by the organizer itself such as UUM CMS and UM Conference System. In this case, they have their own server and database to store all the records.

Therefore, a conceptual data model that integrates all the conferences and innovation competition organized by Department of Research and Industrial Linkages UiTMTB is need to be explored. The proposed conceptual data model has to captures the overall structure of organizational data of the database management system. It includes the entities, attributes, and relationship of each of the entities. The purpose of a conceptual data model is to highlight the rules of interrelationship among attributes and entities as many as possible [3]. In this study, a Conceptual Data Model of International Research, Innovation, Conference and Competition (IRICC) System will be developed to ensure that all the of the critical tasks in managing conferences and innovation competition should be carried out systematically, effectively, and efficiently. Prior to developed the intended model initial stage of analysis has to be conducted. Therefore, the next section discusses the materials and methods involves in this study.

2. Materials and methods
At the initial stage of the study User Centered Design (UCD) approach has been conducted with the targeted users to ensure the truthful results [4]. As shown illustratively in Figure 2, a series of activities has been carried out throughout this study. There are three phases involves which are (i) investigating user experience and (ii) elicitation of previous works and analyze result. In the first phase the target users of the system were interviewed. They are the program committees, reviewers, and participants. All the gathered data were recorded in the form of note taking, photographs, audio, and video. Next, based on the first phase, analysis of the previous establish systems were carried out. At this phase the functions and requirements of the previous systems were identified. Lastly, the availability and the needs of Conceptual Data Model of IRICC System were determined based on the data gathered in phase 1 and phase 2. Having finished all the three phases, the objective of this study is achieved.
3. Result analysis and discussion

As the organizer of conferences and innovation competitions, there are a lot of tasks have to be executed systematically, efficiently, and effectively in ensuring the objectives of the program could be achieve at optimum level. Similar context found in the case of the Department of Research and Industrial Linkages UiTMTB. Nevertheless, preliminary findings which involves organizer and experts have found that critical tasks including i) participants registration, ii) reviewing process, iii) article status notification, and iv) fees payment process were carried out manually. This means program committees, reviewers, and participants were connected only through email which leads to information missed place and miscommunication [5]. These gave dissatisfactory feelings among the committees, reviewers, and participants which reflect the overall quality and image of the programmes [1]. It also creates errors which led high level of pressure among the committees in ensuring each of the task have to be executed perfectly [6]. In addition, too much time need to be allocated to complete each of the task which is totally leads to ineffective cost [7].

The initial investigation also found that, the current development of conceptual data model particularly for the programme organized by Department of Research and Industrial Linkages UiTMTB is not flexible, insufficiently explored, and involving too many papers and filing (i.e. non electronic application with limited access and not user friendly) [8]. Again, often reported based on post feedback gathered from committees and participants of the programmes is information missed place and miscommunication due to less systematic, less efficient, and less effective works.

In oppose, most the existing conceptual data models of the conference system incapable to draw attention to multiple programmes that involves multiple functions and criteria of users. Also, the available conference system requires the organizer to pay the monthly fee in order to maintain the system active. Table 1 classified the current existing conference systems with their main functions and the organizers.

| Phase | Activity | Outcome |
|-------|----------|---------|
| Phase 1 | User experience investigation: • Program committee • Reviewers • Participant Method: UCD (interview) | Problem identification and research gap |
| Phase 2 | Analysis of the previous works: • 4 establish conference systems | 1. The functions and requirement of the previous |
| Phase 3 | Result analysis: • Phase 1 • Phase 2 | 2. The availability and the needs of Conceptual Data Model of IRICC |

Main objective achieved
As referred to Table 1, it ought to be noted that this is the research gap that should be the focal point of this study. Accordingly, this study will propose a Conceptual Data Model particularly to organize conferences and innovation competitions systematically, efficiently and effectively. The availability and the needs of IRICC System has been identified at the initial stage of the study.

4. Conclusion

The main aim of this study is to propose a Conceptual Data Model of IRICC System contains comprehensive entities, attributes, and relationships which specifically caters the needs of organizer of conference and innovation competition programmes in Universiti Teknologi MARA Terengganu Branch particularly Department of Research and Industrial Linkages. Prior to develop the intended model initial analysis that focuses on problem and research gap identification and the functions and requirements of the existing systems has been carried out in this study. Based on the initial analysis it was found that a Conceptual Data Model of IRICC System for UiTMTB is urgently need to be explored. The next phase of the study is to develop the Conceptual Data Model of IRICC System. It is aim that the validated proposed model will provide a complete useful conceptual data model for the developers to design and develop the conference system particularly for organizer that need to manage multiple conferences in a year.
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