eReserba Cardinal: An Integrated Room Reservation System for Higher Education Institutions

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Abstract

The advancement of technology required most organizations today to utilize an integrated information system. The use of such system was proven to help improve different types of processes through elimination of delays and minimizing errors. This study was conducted to optimize the scheduling of room reservation of a higher education institution in the Philippines which was found to be highly manual, time consuming, and tedious. Different units were responsible for the management of various rooms and their office locations were scattered around the campus that required too much traveling activities. Similarly, delays were also experienced due to availability issues of the concerned and authorized personnel who will approve the usage of rooms. Through information system design, an online system called eReserba Cardinal was created to facilitate ease of room management, provide real-time information, and offer a convenient manner of room reservation for students, faculty and personnel.

Keywords
Information technology (IT), integrated systems, room reservation, process flowcharts, data flow diagram

1. Introduction

The use of information technology aids a lot of industry nowadays to achieve a more accurate, efficient, and faster processing of information, and data management is one of the core functions of information systems. Gandomi and Haider (2015) emphasized that data management includes processes and technologies to acquire, store, prepare and retrieve data for analysis and the primary goal of automating manual processes is to minimize time. Improving processes, especially in enrolling customers or reserving for a facility is very significant to organizations that provide such services like hospitals, hotels, banks, schools, and others. Booking methods of time-based services at present have migrated from the traditional manual and phone method to computer-assisted practices; and most online booking facilities are typically service and web specific (Moore, 2008).

Incorporating information systems and technologies in college education is beneficial to professors and students since it allows both parties to perform well. Information systems and technologies does not only benefit professors and students but the higher education institutions (HEI) as well because of market-efficient management of resources and the business (Martins, et al. (2019). Further, involving computers and information systems in school facilities such as in libraries, in enrolment system and in grading system basically shows that people have become more dependent on information systems to survive (Koyluoglu, et al., 2015). This just makes everything very accessible and convenient for the people around the institution which results to a good performance when there is a good facility (Puchol, et al., 2017).

Facility reservation in most HEIs, specifically for usage of rooms, follow the 'pen and paper' system. Proper management of such facilities is a must since those are regarded as important components in providing quality

education (Intal, et al., 2018). Consequently, using a manual system is very much prone to data entry errors and inconsistencies which eventually leads to accumulation of more cost due to staff training and reports production (Breitmeyer, 2015). Manual reservation may also be the source of increase in waiting time and more abandonment (Legros, 2017). This is because in a manual system, several people are designated or authorized to approve such request and physical presence of these people are more often necessary. Physical or printed forms are commonly utilized and signed to process this type of request. Another issue to be considered is the ease of room management so that overlapping of rooms will not occur (Castillo, et al., 2011).

Improvement of an organization's process may result to a more efficient and effective system that can improve performance of the whole organization as well. Introducing technology to manual systems is the proper response to aid both system owners and users in order to bring significant savings in time and cost (Dalci and Tanis, 2004). Moreover, introduction of computer-based systems was found to improve quality of documentation (Ammenwerth, et al., 2001) and improve worker performance (Kittanah, 2016). Technology-based systems also allow paperless transactions, thereby reducing the amount of paper produced and used, saves money for the organization, and create tangible contribution in protecting the environment (Hattingh, 2001).

This study was conducted to optimize the current process of room request and reservation and promote paperless document handling system in one of the most recognized HEIs in the Philippines. A web-based application for room reservation was designed for use by students, staff, and faculty. The institutional or central office will be assigned to manage the online facility and ensure smooth operation of the system.

2. Methodology

The researchers have conducted series of interviews with the students, faculty, staff, and directors of the various offices managing the different rooms available for use in the HEI. At present, four (4) offices are in-charge of room management categorized as (a) academic lecture rooms, (b) audio visual rooms (AVR) and seminar room, (c) laboratory rooms, and (d) plenary rooms. These rooms are being managed by the Academic Office (AO), Campus Development Management Office (CDMO), Institutional Laboratory Management Office (ILMO), and School of Civil, Environmental, and Geological Engineering (CEGE), respectively. Further, data on room reservation for academic year 2018 to 2019 were reviewed to see which among the rooms were the most utilized and which department or unit made the most number of reservation requests.

The current room reservation method was also evaluated to identify which process or processes may be improved or simplified. Likewise, a data flow diagram (DFD) was designed to present improvements and develop an integrated system for reservation using technology. Rosing, et al. (2015) defined DFD as "a graphical representation of the flow of data through an information system used for the visualization of data processing (structured design) to show what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored".

3. Results and Discussion

3.1 Review of Current Reservation Process

The reservation process of the various rooms has similarities but different offices are in-charge of managing the facility. The historical data collected for the different rooms bear various information such as date and time of use, room number, requesting department or organization, name of requestor and remarks.

3.1.1 Reservation of Academic Lecture Room

For the period of assessment, data showed that the frequently reserved academic lecture rooms are those located in the north west building while the most frequent time of reservation was from morning to early afternoon during Mondays and Saturdays. The process for reserving the academic lecture room is shown in Figure 1. The first step in reserving the academic room is to go to AO and ask the staff in-charge for room reservation. The requestor should ask for a reservation form and fill-out the necessary information. The requestor should also sign the form together with the faculty adviser (if the requestor is a student) and the dean of the department. With the complete filled out form,

the student will return the form to AO staff who in turn shall check room availability on the requested time slot. If available, the request will be approved, and the requestor will receive a confirmation form.
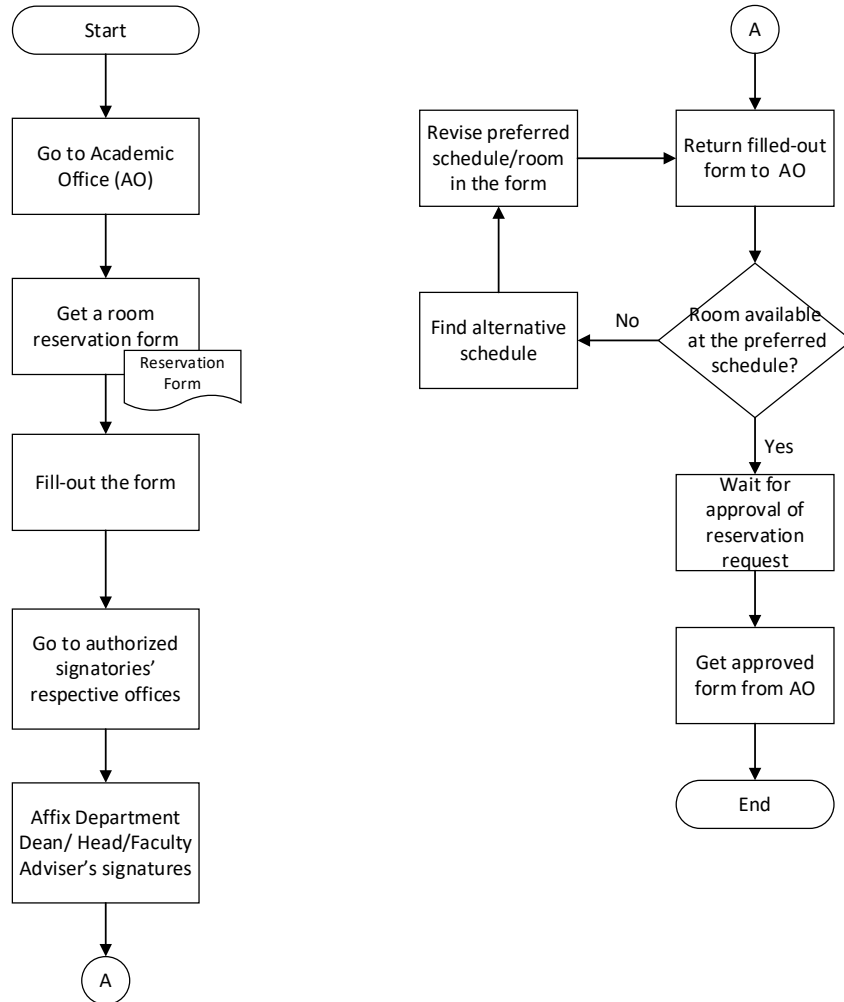

Figure 1. Academic Lecture Room Reservation Process

3.1.2 Reservation of Laboratory Room

Laboratory rooms are commonly reserved for longer hours of use. These rooms were reserved for final examinations, make-up classes, student organization meetings and assemblies, seminars, and workshops or trainings. To reserve a laboratory room, presented in Figure 2, the requestor shall first ask the laboratory assistant in-charge to verify availability. If the desired room is available on the intended date and time of use, the requestor will then go to ILMO and get two (2) copies of lab room reservation form. The forms shall be properly filled-out and signatures of the faculty adviser and the dean of the department are to be obtained. Then, the requestor will have to go back to the laboratory assistant to reserve the desired room and have them signed. Finally, approval of reservation will be secured by proceeding to ILMO for final signatory and submitting the first copy of the form. The second copy of the form, on the other hand, is to be submitted back to the laboratory assistant for recording purpose.
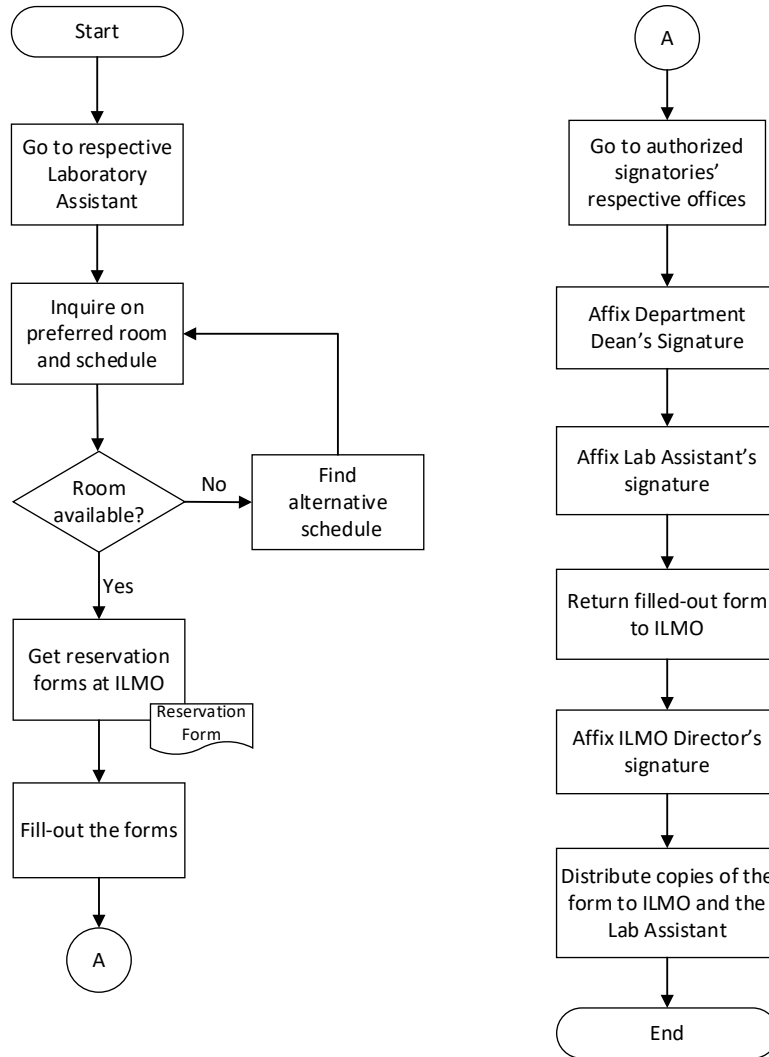
Figure 2. Laboratory Room Reservation Process

3.1.3 Reservation of Audio Visual Room and Seminar Room

The reservation of AVR and seminar room is under the responsibility of CDMO, the department also in-charge of campus wide facility management and maintenance. Figure 3 shows the process of reservation for these rooms which are being used for assembly of bigger audience such as department programs or events, lecture series, seminars, and trainings. To check availability, the requestor shall first visit the AVR office and get three (3) copies of the reservation form. The forms shall be neatly filled-out and require signatures of the dean and AVR personnel. After completing the form, the requestor shall proceed to CDMO and wait for approval. Once the form is signed and approved by the CDMO head, the requestor must go back to AVR office and confirm reservation of the desired date and time of use of the facility. The forms will be distributed or submitted to CDMO, AVR office, and security office.
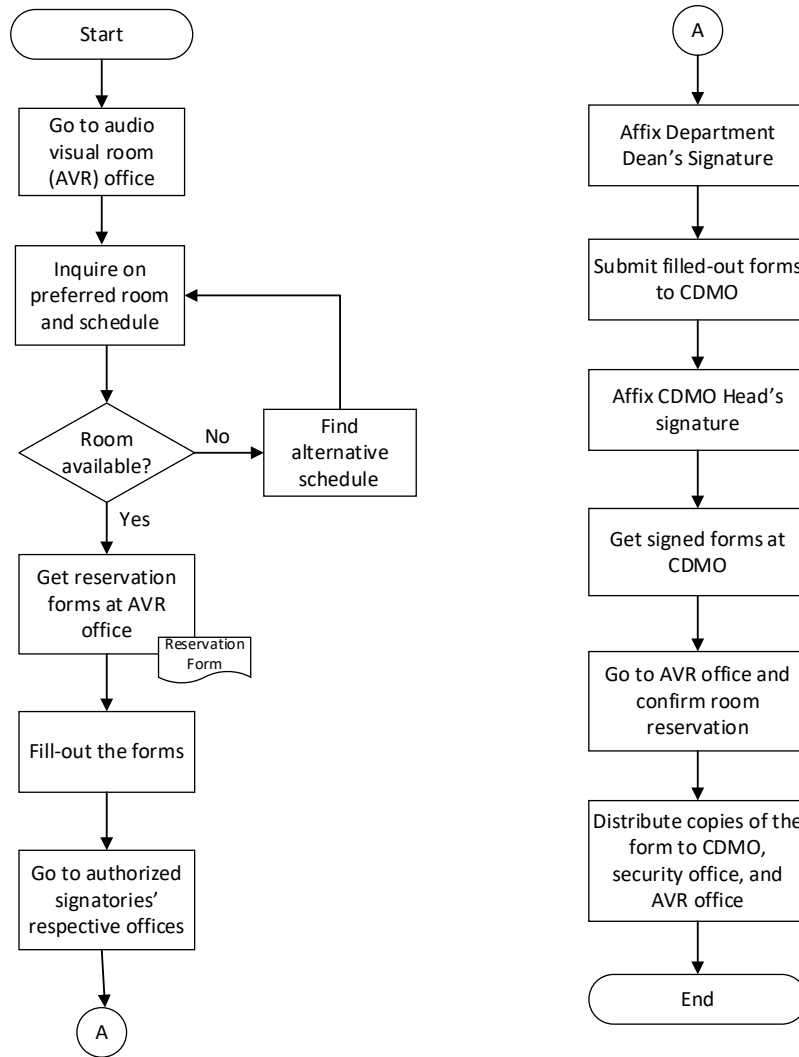
Figure 3. AVR and Seminar Room Reservation Process

3.1.4 Reservation of Plenary Room

The form utilized for reservation of plenary rooms as well as the procedure for reservation is similar to that of AVR and seminar room. However, availability is to be checked at the CEGE department instead of the AVR office since it is the one responsible for management of these rooms. If available, the requestor should get three (3) copies of the form from the AVR office, fill them out completely including the signatures of authorized persons, and submit to CEGE department for final approval. The forms will then be distributed to CEGE department, security office, and AVR office.

3.2 Key Issues on Room Reservation

Several issues have been observed in the reservation process of the various rooms or facilities. Different forms are being used to reserve the different rooms. This makes the requestor a little confuse of which form to use and which office is responsible. Another observation is the location of the different offices. Reserving a room becomes tedious for the requestor since a lot of travelling is required to visit the concerned personnel and offices. In the case of reservation of laboratory rooms, the laboratory assistants are currently stationed at their respective laboratory room assignments while ILMO, the office in-charge, is situated in a different building. Travelling to and from different locations takes too much time but is necessary because of the current set-up of offices in the HEI. Finally, delay and

idleness happen because the personnel in-charge and their respective department heads more often are not present during working hours due to various reasons. This requires the requestor to visit the concerned office from time to time just to be posted or updated of the status of his request. Approval of request usually take one (1) to two (2) days even if the room is available for use.

3.3 Design of an Integrated Reservation System: eReserba Cardinal

To achieve process efficiency and optimize management of rooms, an integrated room reservation system was designed. Integrating the various processes of room reservation and creating a single system would help address the key issues observed. Figure 4 exhibits the data flow diagram (DFD) of the integrated system for reservation of rooms at the HEI.
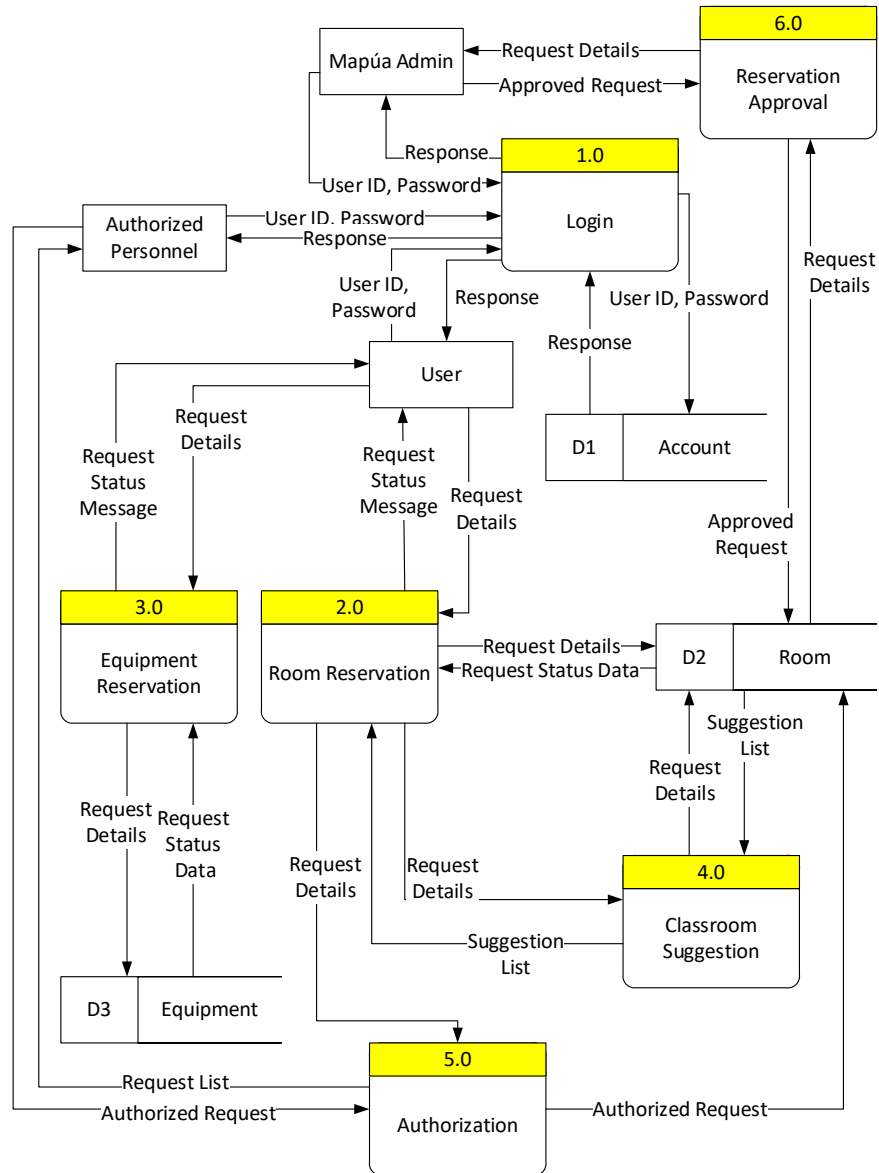

Figure 4. Data Flow Diagram for eReserba Cardinal

eReserba Cardinal is a web-based reservation system created to provide long-term solutions for inefficiency of the current manual reservation system. The proposed system is designed to maximize the usability of real-time data that could be used for immediate re-assessment of data flowing in the process through a reviewable interface provided for

the users. By design, eReserba Cardinal would eliminate common problems in manual documentation system and unavailability of personnel in-charge and will provide proper coordination and communication between the requestor and facility managers. Several entities were identified to utilize the proposed system and these include the requestor or user, faculty adviser, the department dean, personnel or staff in-charge, directors of the various departments managing the rooms, and the system administrator. The researchers have also identified six (6) processes that will enable the transfers and flow of data in the system. The first process is the log-in process. Users will be asked to provide credentials such as official email account or proper identification numbers which will be subjected to verification by the system. The verified information will come from two (2) data stores namely, student database and staff data base. The user will proceed next to the room reservation process where reservation request and room availability can be checked from the reservation database and room schedule data base. Since eReserba Cardinal also caters laboratory room reservations, laboratory equipment request will also be part of the system to accommodate equipment requests. Subsequently, the system will provide available room suggestions from the room schedule database. To address the issues on availability of proper signatories, the signing process was replaced with an authorization process that can be done online through e-mail. The process will send authorization request to respective personnel such as faculty advisers, department heads and facility in-charge. The authorization data shall come from the forms database that are filled up and stored in the data store. Lastly, a system administrator will serve as the overall manager of the process. The reservation process will handle requests, provide real-time availability, and facilitate easy and quick approval. Most organizations have been adopting various automated processes to improve the performance of certain parts of the organization. eReserba Cardinal will offer an online solution for the current inefficiencies of the manual room reservation method of the HEI. Electronic document management systems are found to provide positive result on performance since IT helps easily sort and retrieve information from databases (Kittanah, et al., 2016).

4. Conclusion

Manual processes are commonly found to be prone to data inaccuracies, are time consuming, and cost inefficient. The use of technology, particularly an information system, improves system efficiency, allows for better management of facilities, and increases worker productivity because a lot of non-value adding activities such as waiting times and travelling can be eliminated. The eReserba Cardinal, an integrated system for room reservation at HEIs, is a web-based application that will aid users to conveniently monitor the status of reservation request and easily manage various facilities and equipment. eReserba Cardinal can help eliminate the non-essential steps and redundancies in the current room reservation system of the institution, thus improving the speed and quality of the service the institution provides. The use of this system will also help reduce the usage of papers and go for eco-friendly transactions. In turn, organizations may be able to save money and help protect the environment. Future researchers can perform simulation of the proposed online reservation system in order to verify the system's efficiency and applicability to other HEIs. In addition, creating an information system for other services offered by the HEI may also be done to optimize the other processes. A mobile application may also be developed to complement the eReserba Cardinal web-based system so that users can easily and readily reserve their preferred rooms at a more convenient manner.

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Biographies

Josephine D. German is an Assistant Professor of the School of Industrial Engineering and Engineering Management at Mapua University in Manila, Philippines. She has earned her B.S in Industrial Engineering and Masters in Engineering (major in IE) from the same University. She is a Professional Industrial Engineer (PIE) with over 15 years of experience and has taught several courses in IE such as Methods Engineering, Logistics and Supply Chain Management, Systems and Procedures, Systems Engineering, and others. She has done several research projects in the field of logistics and supply chain management, systems modelling, entrepreneurship, risk management, and ergonomics and has an extensive experience in academic audits and accreditations. She is also a member of the Philippine Institute of Industrial Engineers (PIIE).

Paz Clariz A. Barzaga is an undergraduate of Mapúa University taking up Bachelor of Science in Industrial Engineering. She is a member of Philippine Institute of Industrial Engineers (PIIE). She is a driven student eager to learn new knowledge that will help answer todays problems and will pave way for the betterment of tomorrow. She also has interest in production planning and control together with facility planning and design.

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