

Role of Information Systems in an University Setup – A Case Study

Shubham Gupta, Ashish Kumar, Roheet Bhatnagar*

Abstract— It is known that in modern Knowledge Societies, Knowledge is power and Data is money. Information is the key to any organization’s sustenance and information management is one of the major activity amongst various activities in modern day universities. The Information Systems (IS) have become a basic resource and part of any progressive university, and they play a great role for all the stakeholders. It is necessary to collect and store data that helps the systems serve their desired purpose, and from here, the universities need to work on collecting, processing, storing and transmitting such information through information systems. This paper aims to discuss the growth of Knowledge Societies in recent years and explore the role of Information Systems in an university system. This paper is focused towards the need, usefulness and application of Information Systems in modern day’s universities. The paper also discusses the challenges of implementing and developing an IS for a university setup, unlike, other business organizations. The core finding of this project study was that, the development of information systems is dominated by the challenges presented by new technology and approach. The results of the study are encouraging and saw an increase in the use, acceptability & appreciation of the IS’s due to the benefits resulting out of them.

Keywords—Knowledge Society, ICT, Information Systems, universities, data.

I. INTRODUCTION

As a result of the pace of development of modern Information and Communication Technologies (ICT technologies), the academic world has also entered the era of information society. We see so many systems right from the academic management system, examination system, online learning systems, student information system, faculty information system etc. in universities. The basic idea behind all these systems are capturing the relevant data and representing & visualizing them as required by different users.

A work system is a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific products and/or services for specific internal or external customers. An information system is a work system whose processes and activities are devoted to processing information, i.e., capturing, transmitting, storing, retrieving, manipulating, and displaying information. Thus, an information system is a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce informational products and/or services for internal or external customers. [1]

Information systems have become the backbone of most organizations. Banks could not process payments, governments could not collect taxes, hospitals could not treat patients, and supermarkets could not stock their shelves without the support of information systems. In almost every sector—education, finance, government, health care, manufacturing, and businesses large and small—information systems play a prominent role. Every day work, communication, information gathering, and decision making all rely on information technology (IT). [2]

Customers and participants are examples of agents. As figure 1 shows, business processes play a central role in larger information systems. A business process describes the flow of work within an organization. In this book, we use the following definition of a business process adapted from work by Weske (2007). [2]

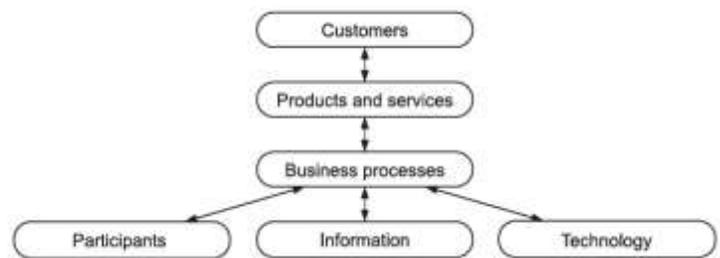


Fig. 1: An integrated view of an information system

II. LITERATURE REVIEW

In the planning and design phase of our system, we referred to many existing solutions of various similar systems which are currently active around the globe. We then performed an in-depth SWOT analysis to identify their major strengths and

Shubham Gupta is a final year Engineering student in the Department of Computer Science & engineering at Manipal University Jaipur. (e-mail:shubham.gupta@muj.manipal.edu)

Ashish Kumar is working as an Assistant Professor in the Department of Computer Science & Engineering at Manipal University Jaipur (email: kumar.ashish@jaipur.manipal.edu)

*Roheet Bhatnagar is working as a Professor & Head, Department of Computer Science & Engineering at Manipal University Jaipur, India (*corresponding Author email: roheet.bhatnagar@jaipur.manipal.edu).

weaknesses to incorporate features in our system accordingly. The various university’s systems we referred were as [3][4][5]:

- Central Michigan University: Although the system captured good amount of information, but it certainly lagged certain important and more frequently used information such as Guest Lectures, Faculty Development Programs, Online and various courses, etc.
- University of Waterloo: The system was simple and efficient but the overall look and feel of the application was little old in comparison to modern era. Also in the age of mobile devices, the system lacked responsiveness.
- Yale University: The Report generation module took a lot of time to generate the reports and moreover, the reports were pre-built and hard-coded as a result, custom-build reports were not possible without the intervention of a developer.
- Rice University: The application was fluent overall but lacked security features. Mobile responsiveness and ability to generate custom reports in various other formats like Excel were also missing. Moreover, the UI and UX of the application was a little bit complicated for senior faculty members.

MUJ-OFIS which will not only effectively cover the major bright areas of these existing systems but will also try to overcome the various disadvantages of the same.

III. MUJ-OFIS – A CASE STUDY

The application named Manipal University Jaipur - Online Faculty Information System (MUJ-OFIS) was created to record information (both academic as well as professional) pertaining to the faculty members of the University.

The idea is to have the details of all faculty in one place, and in a uniform format which will greatly facilitate in generating various types of reports required by university & governmental agencies from time to time. It will also help in reporting of events for department and university annual reports, as well as reports required during accreditation by different bodies.

The system provide a user friendly interface for accessing the user details from a centralized database. Problems such as multiple copies of same information, repetition of information at multiple locations can be avoided by using OFIS application.

Figure 2 below represents the main features of MUJ-OFIS, which caters to the need of different stakeholders.

After looking and analysing these various case studies, we planned out an exhaustive list of DO’s and DONT’s for our

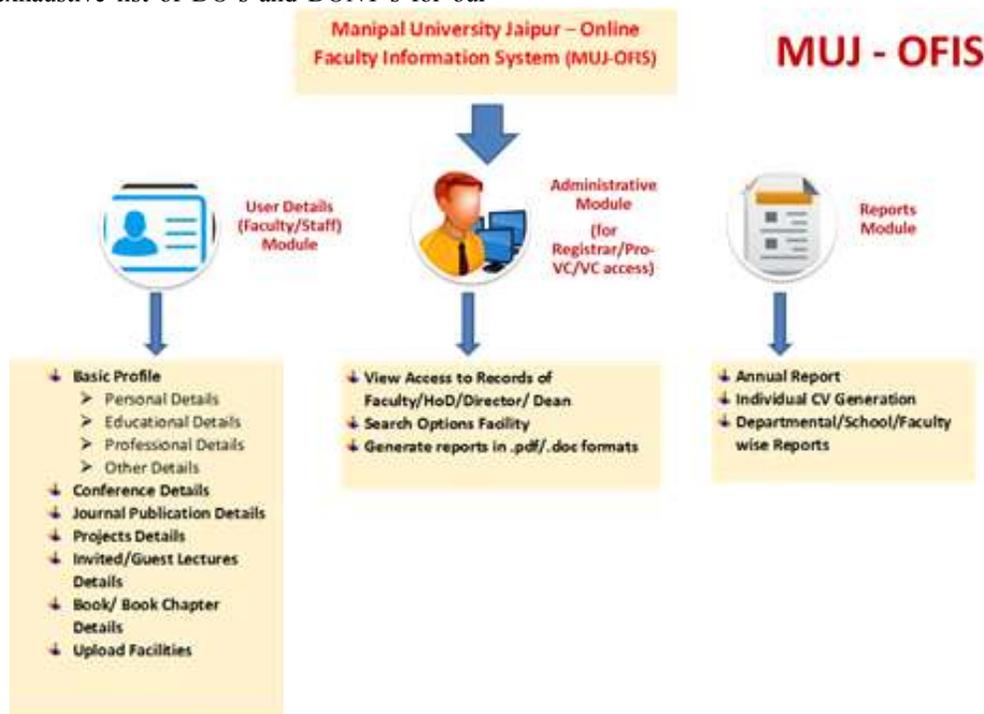


Fig 2: MUJ-OFIS main features

The departments and individual faculty members must regularly update their respective information in the system.

IV. METHODOLOGY

In this section the methodology adopted in developing the system is discussed. The system is designed to keep the number of additions in user’s base in coming future in mind.

The User Interface (UI) and the User Experience (UX) principles are considered in developing the system.

During its development many new novel techniques were used to make it more efficient, user friendly and relevant. One major technique is that of generating reports and the query response time was reduced to few milli-seconds for large volume of data from few minutes initially.

Since the application is too big to plan out any specific algorithm overall, the approach adopted was to sub-divide the application and work on important areas to optimize their usability by planning out certain out of the box innovative solutions for report generation module. The algorithms used were all custom built which produced very accurate and effective results with more than 40x times Efficiency.

- Tools & Techniques used: We focused on using agile methodology for our complete projects as the requirements were keep on changing according to the time. We had to make a system which was compatible to quick changes, both at front-end and back-end side. The technologies used were as :
- Front-End: HTML, CSS, Bootstrap Framework, JavaScript, PHP, AJAX, JQuery, etc.
- Back-End: MySQL for Database, Apache for Server, WAMP as software stack.

- Platforms Compatible with: MUJ-OFIS is compatible with all the modern browsers including Google Chrome, Opera, and Safari but has certain compatibility issues with Mozilla and IE when it comes to certain complex HTML5 based form elements like Date. Any device (be it your desktop, laptop, tablets or even mobile) with a working internet connection and above stated browsers can easily run MUJ-OFIS.
- Frameworks used: MUJ-OFIS is built using state of the art industrially used Laravel Framework with MVC architecture so as to meet the modern standards.

The design of the complete application product was arrived at in iterations to include all the functionalities and requirements from the stakeholders. The product was implemented based on the design, users were asked to enter their details using the front end, the system was tested for its functionalities and was stabilised.

Following are some of the snapshots of the UML diagrams created for the system.

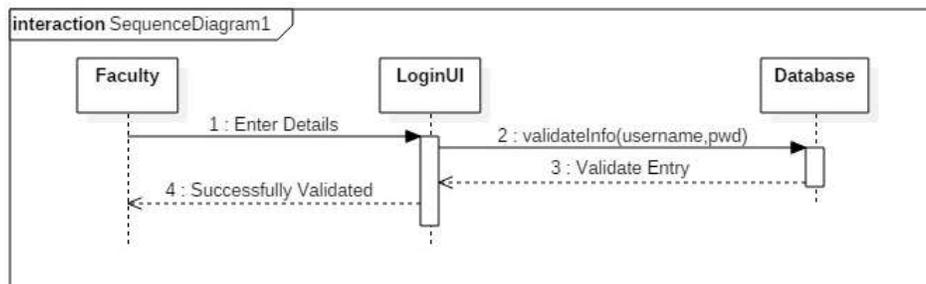


Fig 3: a sequence diagram for user Login to the system

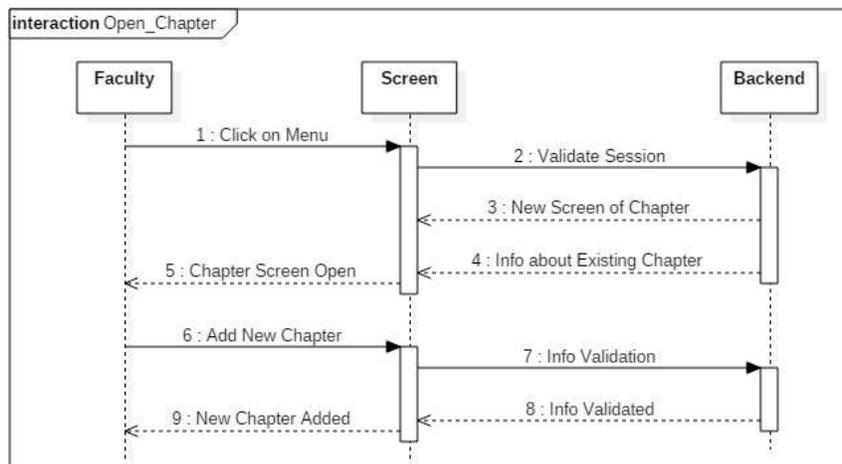


Fig 4: a sequence diagram for user to Add New Book Chapter in the system

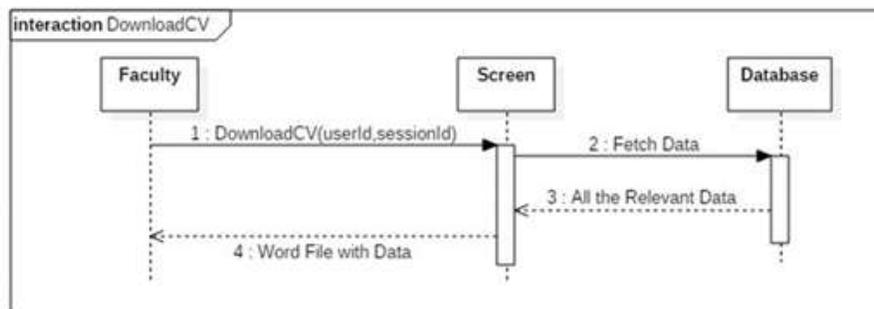


Fig. 5: a sequence diagram for user to download his/her CV from the system



Fig. 6: a use-case diagram for user to with the system

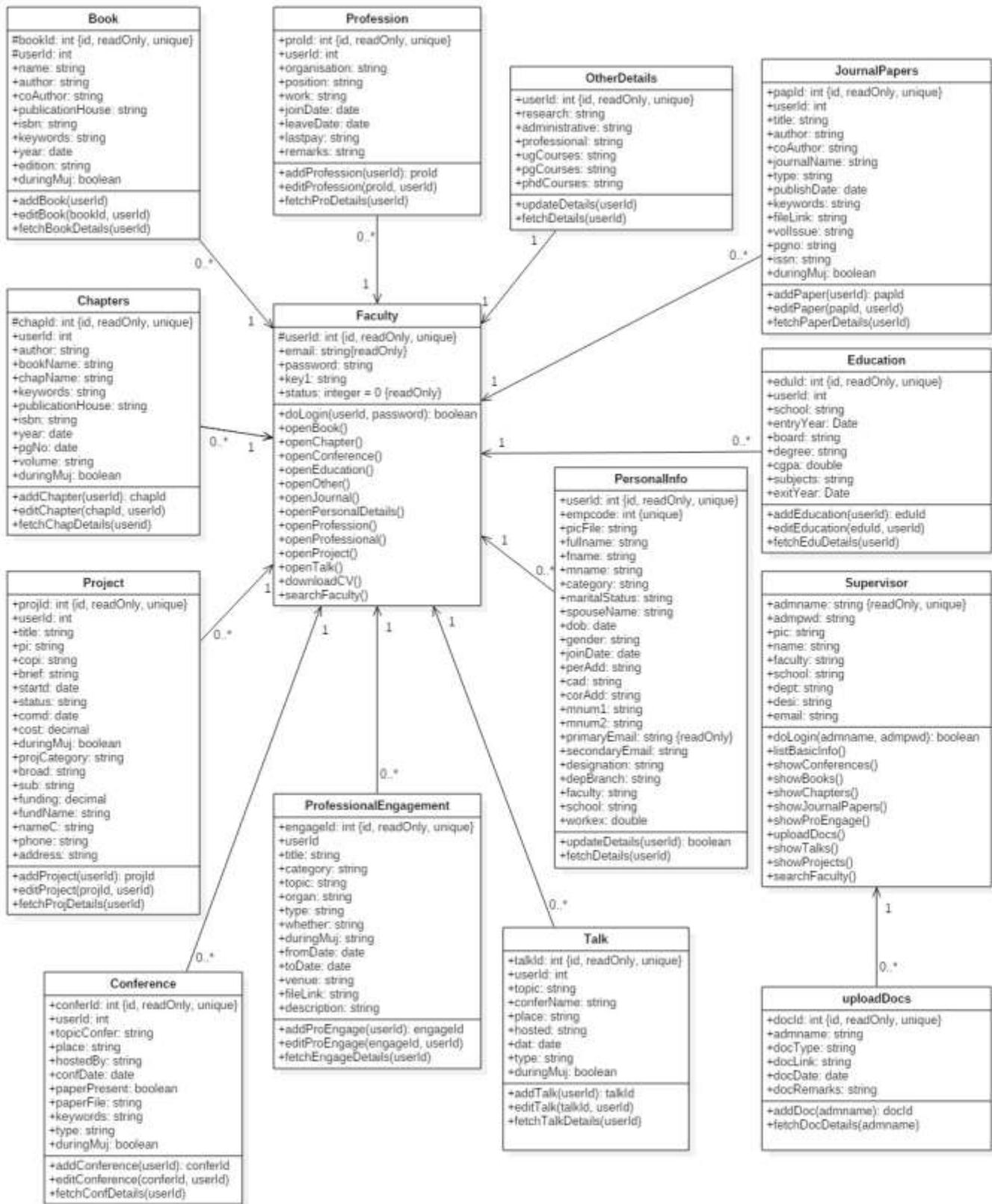


Fig. 7: a class diagram for the system

V.RESULTS

MUJ-OFIS is created to record faculty accomplishments, including research, publications, teaching, awards, and service

activities for each calendar year. The information entered will be used to generate a variety of reports such as the Annual Report, Departmental Report, and individual CVs as per the templates. At a much deeper level,

Faculty is now able to

- Keep their profile up-to-date
- Manage their reports easily
- Download their reports/details anytime.
- Archive past records and keep work history

Administration can

- Review/Download Faculty Activity Reports
- Review/Download Departmental Activity Reports
- Generate statistical facts
- Create documents

- [4] University Of Waterloo:
<https://uwaterloo.ca/engineeringcomputing/faculty-staff/online-faculty-information-system-ofis>
- [5] Yale University:
<http://facultyadmin.yale.edu/resources/facultyinformation-System>

VI. CONCLUSION

This paper discusses as to how need of an university can be better handled by developing and using an automated application (Information System) can improve the functioning of the university. The paper discusses the need of a central repository to update and maintain a document management system so that stakeholders can access & make use of the information for their specific purpose from time to time. It is imperative that the university obtain and maintain accurate and timely information about faculty professional activities. This system helps to provide that ability and complements other information and management systems, all of which support university's (in current case it is MUJ's) institutional planning, core values and priorities. The system has evolved in iterations and with continuous feedback from all the stakeholders. There have been several rounds of discussions, in order to make it efficient. So overall, the journey of making this application brought lots of learnings and it is hoped that it will facilitate the university to the best of its needs and in future one will see a much more evolved MUJ-OFIS.

VII. FUTURE WORK

The Online Faculty Information System is dynamic and designed to meet the unique needs of Manipal University Jaipur. Although much of the work has been done as per our initial planning, the only module left is:

- Dynamic report generation module which will be able to generate any and every kind of possible report from the front-end itself without the intervention of any developer.
- Graphical Analysis of the data is also requested by the users, so we are planning to integrate that as well.
- Security of the application will also be enhanced over time.
- Responsiveness of the application will also be further improved.

REFERENCES

- [1] Alter, Steven, "Defining Information Systems as Work Systems: Implications for the IS Field" (2008). Business Analytics and Information Systems. Paper 22. <http://repository.usfca.edu/at/22>
- [2] Information Systems: Introduction and Concepts, https://mitpress.mit.edu/sites/default/files/titles/content/9780262015387_sch_0001.pdf
- [3] Rice University: <https://faculty.rice.edu/proj/fis/fislogin>