INTEGRATION AND CENTRALIZATION OF EXISTING COLLABORATIVE SYSTEMS FOR TECHNOLOGY INFORMATION SYSTEM MANAGEMENT DIVISION

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ABSTRACT

This research aims to integrate and implement the existing collaboration subsystems, including Student Documentary system, Staff Documentary system, Thesis system, Advisor system, Meeting Room system and Student Record system that were developed by graduated students in Division of Information Technology Management, Faculty of Engineer, Mahidol University. The proposed system is developed by collaborative software of Microsoft SharePoint 2010™. This research also develops the new information dashboard for monitoring the subsystems information in one page. The existing systems have some duplication in each system. This research also redesigns the data architecture of data lists, including Students, Officers and Lecturers as a centralized data for subsystems, and also develops the simple customized user interface in the each system. Thus, this work has some limitations by Microsoft SharePoint 2010™ in the customization of the user interface. The future work should add more module into the system to make the higher performance system with facilities.

KEY WORDS: INTEGRATE SYSTEM / MICROSOFT SHAREPOINT 2010™ / INTELLIGENCE DASH BOARD / COLLABORATIVE SOFTWARE

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การรวมและจัดศูนย์กลางของระบบที่ใช้งานร่วมกัน กรณีศึกษากลุ่มสาขาเทคโนโลยีการจัดการระบบสารสนเทศ

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บทคัดย่อ

งานวิจัยฉบับนี้มีเป้าหมายเพื่อรวบรวมระบบงานที่มีการใช้งานร่วมกันที่ถูกพัฒนาเอาไว้แล้ว ได้แก่ ระบบจัดการเอกสารของนักศึกษา ระบบสารบรรณ ระบบจัดการการสอบวิทยานิพนธ์และสารนิพนธ์ ระบบนัดหมายอาจารย์ที่ปรึกษา ระบบจองห้องประชุม และระบบข้อมูลนักศึกษา ซึ่งได้รับการพัฒนาโดยนักศึกษาที่สำเร็จการศึกษาไปแล้วของสาขาวิชาการจัดการเทคโนโลยีสารสนเทศ คณะวิศวกรรมศาสตร์ มหาวิทยาลัยมหิดล ระบบงานทั้งหมดถูกพัฒนาขึ้นด้วยแพ็คเกจซอฟท์แวร์เพื่อใช้ในการทำงานร่วมกันในที่นี้คือ Microsoft SharePoint 2010™ งานวิจัยฉบับนี้มีการพัฒนาส่วนของการแสดงผลข้อมูล dash board ขึ้นใหม่เพื่อใช้ในการแสดงข้อมูลที่ดึงขึ้นมาจากระบบงานย่อยต่าง ๆ ทุกระบบภายในหน้าเดียว นอกจากนี้ยังพบว่าระบบงานเดิมมีการเก็บข้อมูลที่ซ้ำซ้อนกันภายในบางระบบ ซึ่งงานวิจัยฉบับนี้จึงต้องมีการออกแบบโครงสร้างการจัดเก็บข้อมูลภายใน list ขึ้นใหม่ซึ่งได้แก่ ข้อมูลนักศึกษา ข้อมูลเจ้าหน้าที่ และข้อมูลอาจารย์ เพื่อใช้เป็นข้อมูลส่วนกลางเพื่อนำไปใช้ในระบบงานย่อยต่าง ๆ นอกจากนี้งานวิจัยฉบับนี้มีการออกแบบส่วนติดต่อผู้ใช้งานขึ้นใหม่เพื่อให้ระบบย่อย ๆ ต่าง ๆ มีความกลมกลืนและเป็นหนึ่งเดียวกัน โดยการแสดงผลในส่วนที่ไม่ต้องการออกไป ซึ่งจะช่วยให้ผู้ใช้งานมีความเข้าใจในการใช้งานระบบได้ง่ายยิ่งขึ้นด้วย การพัฒนางานวิจัยฉบับนี้ในอนาคตนั้น สามารถเพิ่มโมดูลการทำงานภายในระบบต่าง ๆ ให้มีการทำงานที่ซับซ้อน มีประสิทธิภาพ และช่วยให้เกิดความความสะดวกในการใช้ระบบมากยิ่งขึ้น

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CHAPTER I
INTRODUCTION

The purpose of this study is to implement and integrate all systems derived from previous works of six graduated students into single virtual machine software on cloud. The problems of the existing six separated systems were that the information was stored in different databases. Thus, it was difficult to manage and utilize those information at full potential. However, this implementation would facilitate the users with easier access and better overall performance results of the information.

1.1 Background and Problem Statement

Nowadays, technology is dramatically developed making people to get easier access of technology than the past. It cannot be denied that one of the most successful factor of organization is computer technology. For instance, the computer storage technology is used to store an information of graduated student, the computer software application is used for creating and controlling a workflow to operate job. It also reduce a cost, and helps the whole process to get the maximum potential.

Currently the computer technology leads into various fields of organizations including academic organizations to spend their effort for research and development. The prior works developed by graduated students were also interesting. However, without good management technology, those works could not be applicable in the real practice.

The department of information technology management (ITM), Mahidol University is one of organization having awareness of the importance of the computer technology. Therefore, ITM starts to review the previous works of the graduated students which can be applicable to ITM staff to operate efficiently. Those previous works used the collaborative software [1] as a tools for information exchange. Thus, Microsoft SharePoint 2010 is used to create the subsystems, including Student

documentary, Student thesis, Staff documentary, Adviser system, Meeting room system, and Student recording system. However, these subsystems were developed on virtual machine without any data integration.

The researcher is interested in integration of these subsystems developed from the ITM's students as single data storage system by using the collaborative software on the cloud server technology to get the benefit of our case study. Moreover, these system could be help increasing the efficiency in the operation of the ITM faculty.

1.2 Objectives

To design the architecture, to implement and integrate the individual systems into collaborative system, and to create the dashboard for monitoring the information of all sub-systems.

1.3 Scope of Work

The system is created by implementation and integration of the existing developed individual systems from the graduated student in the Division of Information technology management, Faculty of Engineer, Mahidol University.

1.4 Expected Result

1. The user can easily manage the system with the advantages of cloud technology.
2. The unique data is implemented with the centralize database.
3. The user has a new experience with user-friendly interface.

CHAPTER II
LITERATURE REVIEW

This chapter would guide the reader through the literature review related to the software and the prior works of other researchers. The related software in this chapter is a collaborative software. In this study, we will use Microsoft SharePoint 2010 ™. The prior works of other researchers that will be integrated into single database server system which are Student documentary system, Student thesis system, Staff documentary system, Adviser system, Meeting room system, and Student record system.

2.1 Collaborative Software

Collaborative Software is the software which users can work together. It is suitable for the organizations having the shared information together with their communications. This software is support to track and to validate the information, and guarantees that information will not be getting lost. This software is running on a web application base that users can access anywhere and anytime.

Using this software in the organization would allow the process to work more regularity, and the data would be secured. This is because the defined permissions of users to access the data including information derived from the processing system is trustworthy. This is a major mechanism to drive the organization, since there is available to access the historical data and the current data to predict the future possibilities.

Collaborative Software can be categorized according to utilization:

1) Synchronous communication: It is a two-way communication. This communication is need the responses between the communicators, such as chat, forums, and appointments.

2) Asynchronous communication: It is a one-way communication. This communication is not need to wait for the responses between the communicators, such as email, conference, and web board.

3) Collaboration for education: It is a collecting the information that would be advantage for working. It is also the information from the outside of organization that can make an advantage of working, such as knowledge management.

In the Figure 2.1, it will explain how the collaboration software is better than email.

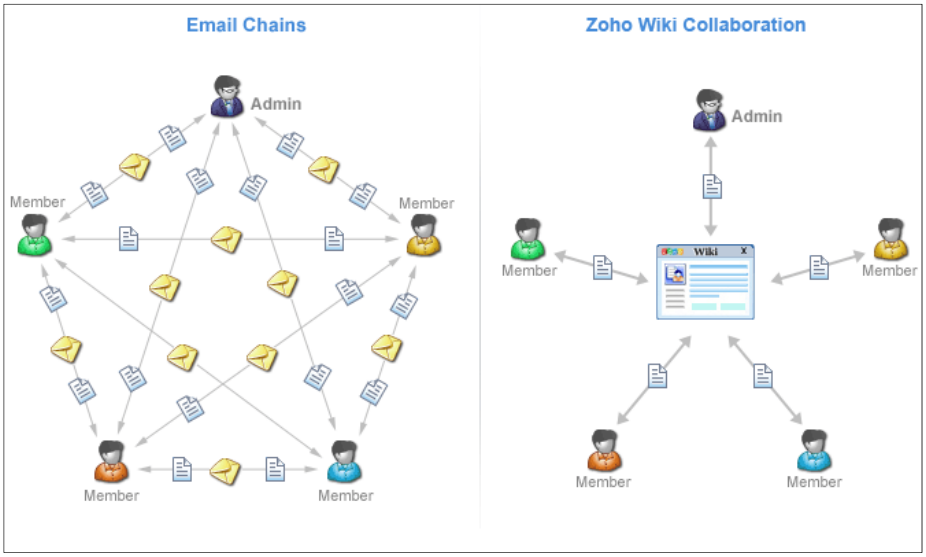


Figure 2.1 Email vs Collaboration [2].

In the Figure 2.1, it demonstrates the comparison between email communication and collaboration communication. The email is too complicated when the user need to send some mail to everyone, the receivers need to reply their emails to the sender. Whereas, the collaboration is not the same manner because this communication has a centralized data. The sender need to post/upload the mail/media to the center board/forum and then, the receiver can access/comment on that information through the collaboration system. This is more convenient and less complicated than the email communication.

2.2 Microsoft SharePoint 2010 ™

Microsoft SharePoint 2010 ™ [3] is a platform for the users to work with both formal and informal communication. SharePoint integrates data management system by combining search technology to support the requirement that changes in time tune. Administration and management system can easily be standards, according to the regulation, which can search, create, and manage the documents and information from multiple sources. Then, the system has integrated them into a single infrastructure. There can also work with other programs, documents, and Microsoft Office TM, which are available through the browser. In addition, there can bring the information in the SharePoint to present as pictures and patterns. Dashboard SharePoint is used in the data analysis and it can work as a step (Workflow).

For the features mentioned above, we can see that the SharePoint 2010 ™ is to help of our organization and our company getting successful in terms of the management administration making our business more profitable in the long term.

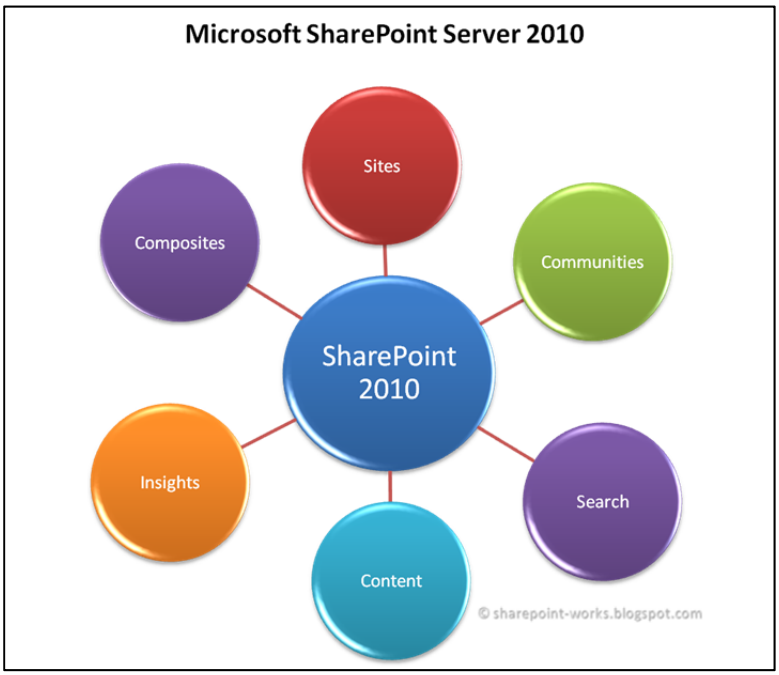


Figure 2.2 Microsoft SharePoint 2010 ™ Features [4].

The Figure 2.2 shows the main features of the system, given as:

1) Sites: SharePoint Site is used to access the partners, employees, and customers in a way that is effective both internal and external systems.

2) Communities: This feature is used to access the skills and to collaborate with others by new approaches from the organization through the lower levels employees to the higher levels.

3) Search: Many online contents created are frequently shared among multiple users for working together. Therefore, it is important that users can search for file sharing, web site, and Line-of-Business (LOB) easily and quickly via the SharePoint List, Site, the external information of systems, and Data Source.

4) Content: This feature are comfortable to create the reviews, announcements, and placement of content while the regulations are consistent whether content is created as either document or web page. In addition, SharePoint 2010 also includes content management system, given as: the document management, records the history, and web-content management.

5) Insights: Those, who work in information technology section and would like to transfer/share the quick news, also want to use the raw data to make a conclusion by business-oriented shared via analysis.

6) Composites: Business users for all types want to build the custom solution their self without the needs relied on the IT department every time if they have the work.

2.3 Existing Independent Systems

The existing independent systems have been developed by graduated student of Division of Information Technology Management (ITM), Mahidol University. There are 6 systems, including Student documentary system, Student thesis system, Staff documentary system, Adviser system, Meeting room system, and Student record system. Figure 2.3 displays the list of existing independent systems.

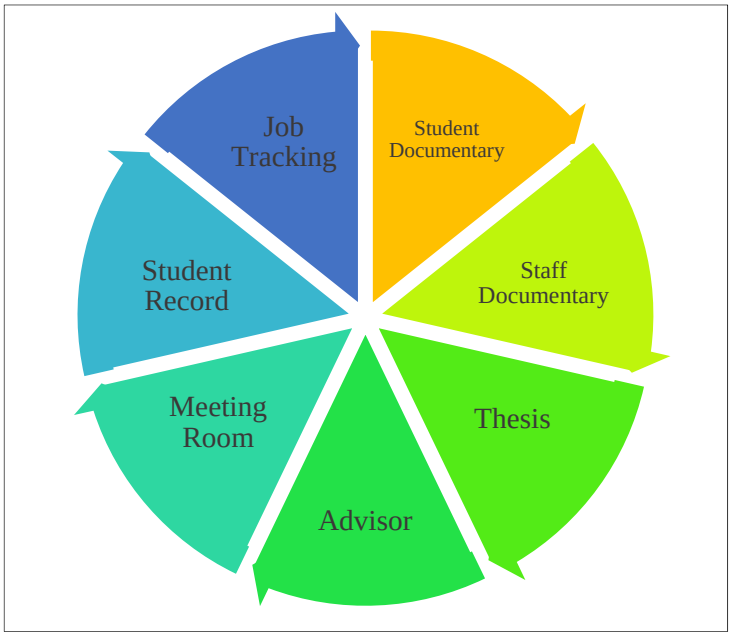


Figure 2.3 The List of Existing Independent Systems.

2.3.1 Student Documentary System

Student Documentary system [5] has been developed to facilitate the work of staffs, lecturers, and students in Division of Information Technology Management, Mahidol University. This system is to manage the student request form and is to reduce the paper usage in organization. Moreover, this system will fix the loss document problem and reduces the time to find a wanted document. The expected result is improve the performance in the organization. The Figure 2.4 demonstrates the home page of Student Documentary system.

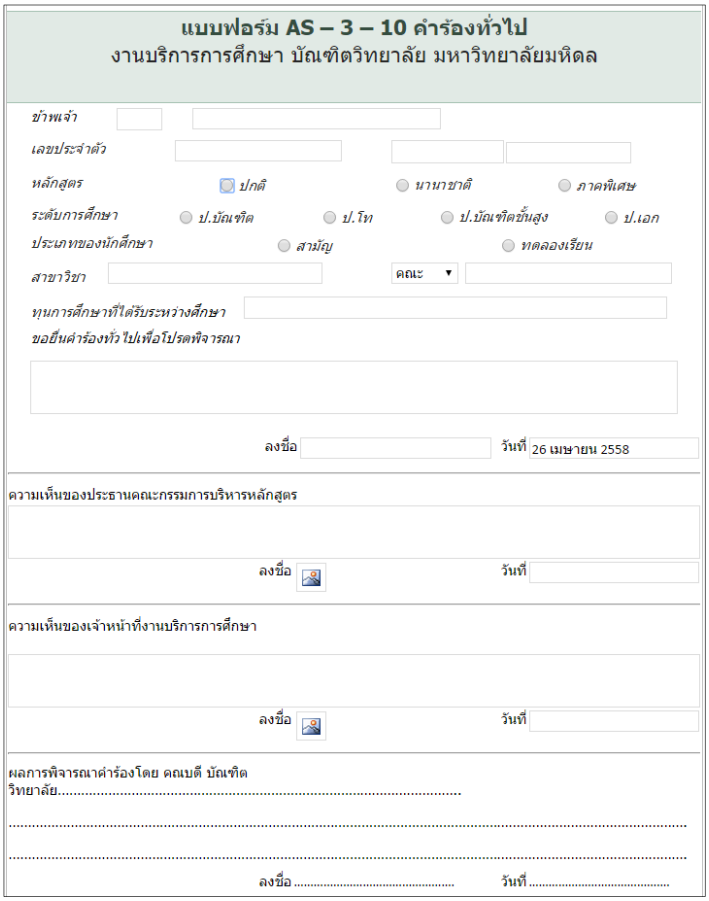


Figure 2.4 The general form of Student Documentary System.

2.3.2 Staff Documentary System

Staff Documentary System [6] has been developed to manage the both receiving and sending documents in Division of Information Technology Management, Mahidol University. This system is to replace the existing system using paper with the new system of electronic document. This system would reduce the time for finding the document and data errors in order to prevent the document losses. The Figure 2.5 demonstrates the form page of Staff Documentary system.

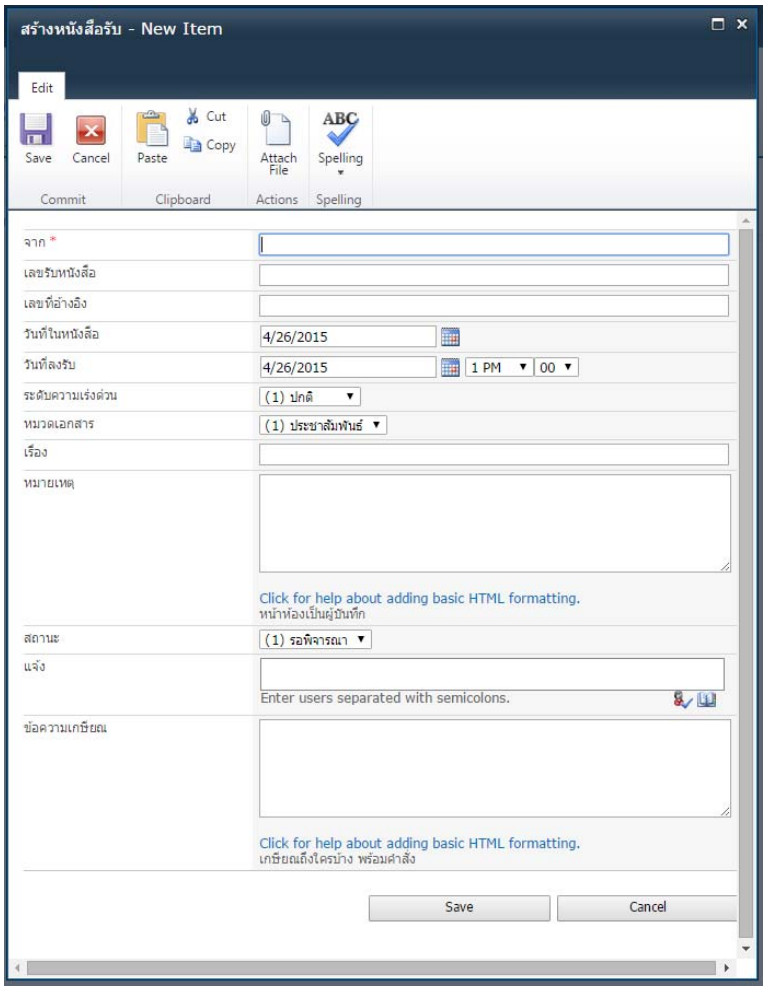


Figure 2.5 The screen of creating the receiving document form of in Staff Documentary System.

2.3.3 Thesis System

Thesis System [7] has been developed to solve the documents required for the Master thesis taking the delay for the submission. The existing thesis system using the paper forms would make the difficult problems for finding and tracking the sent form. That is taking time to manage the documents. Therefore, the existing thesis system would be replaced with the new thesis system to improve the working performance with 3 features, including time management for documentation, reducing the complications for submission process, and prevention of documentation losses. This system would also reduce the paper usage of organization. The Figure 2.6 demonstrates the form page of Thesis system.

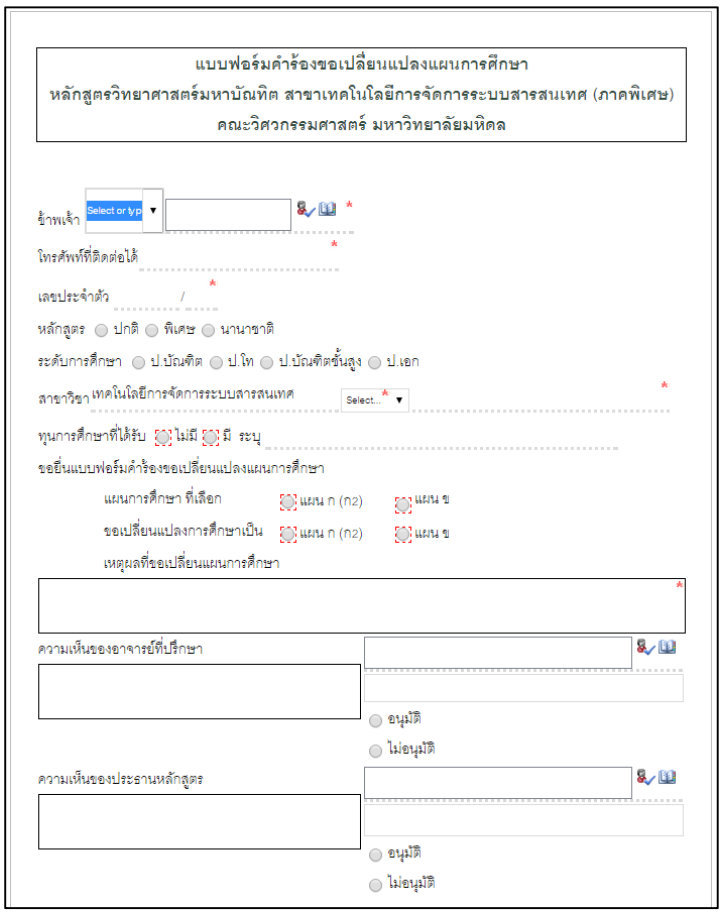


Figure 2.6 The captured screen of the academic plan's changing form of Thesis System.

2.3.4 Advisor System

Advisor System [8] has been developed for the advisor to follow up the progress of student thesis/dissertation in Division of Information Technology Management, Mahidol University. Moreover, it also supports the communication between advisor and student with making an appointment through the calendar system. Therefore, this system is to enhance the communication, and reduces the paper usage for entire process. The Figure 2.7 demonstrates the calendar page of Advisor system.

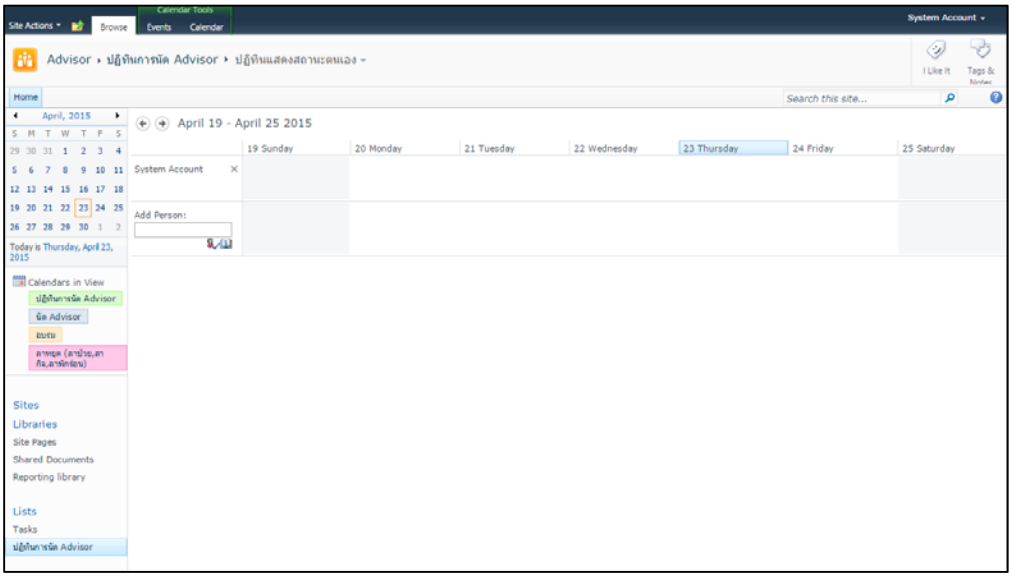


Figure 2.7 The calendar page for appointment of Advisor System.

2.3.5 Meeting Room System

Meeting Room System [9] has been developed to manage the booking process for meeting room in Division of Information Technology Management, Mahidol University. This system is to replace the existing manual room reservation process that cannot be checked the available status of the room. The Meeting Room system will be represented in calendar that has to fill in a booking record. This would help the students, officer, and lecturer to check the status of the desired room, and this system also keeps the records of room usages to report the statistics of room usages.

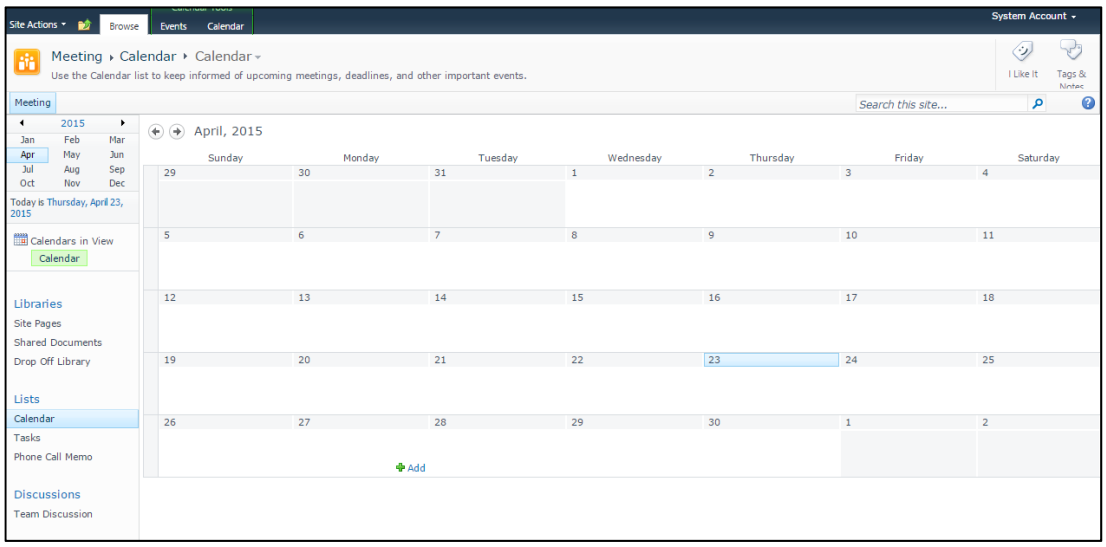


Figure 2.8 The captured screen of calendar page for Meeting Room System.

2.3.6 Student Record System

Student Record System [10] has been developed to store the related data of students in the Division of Information Technology Management, Mahidol University. This is to replace the existing student record system responded by officer. The officer may do the mistake in the process, and the data storage was not a standard or systematic platform. Therefore, the use of the new Student Record system is proposed. This would help to make the data clean and more accuracy for storing the data. Moreover, this would reduced the searching time for information, and would establish the reliability of data in the system.

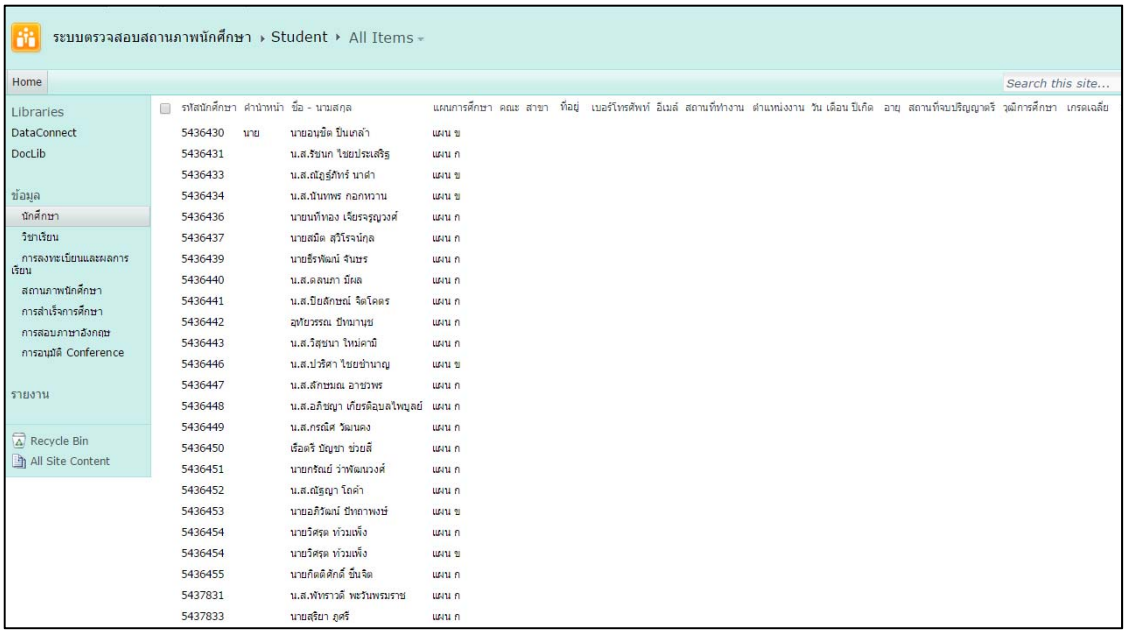


Figure 2.9 The student list of Student Record System.

2.4 Decision Support System

Decision support system (DSS) [11] is one of subsystems in the management of information systems. This would help the managers to make decisions in the event and unstructured/semi-structured business activity. DSS may be used with either single individual or group to support decision. Moreover, it also supports the decision of strategy for manager.

DSS is the software that helps to decide about management, gathering information, data analysis, and building the complex modeling. Moreover, DSS also coordinates the work between people and software technology by interaction. DSS is an interactive system which the user is able to find answer easily, and is convenient for unstructured problem. The decision support system consists of a set of tools, pattern (Model), and other resources that users and analysts use to evaluate and to solve the problems. Therefore, the principle of DSS provides the necessary tools for executives in the data analysis with complex patterns. However, the practical approach of flexible DSS has been designed to enhance efficiency in the work beginning of responding the requirement of data. During the 1970s, the development of information technology

and the expansion of the business organization in the United States were appropriate for collecting the data and modeling of various decisions. This concept is also the basic of the development of decision support systems (DSS) in today.

Therefore, the summary definition of DSS is an information system that can interact with the user by this system to collect information and models in key decisions for encouraged the manager is decision the problems by semi-structured and unstructured.

CHAPTER III
RESEARCH METHODOLOGY

This chapter will represent the methodology for implementation and integration of multiple subsystem into single large system. The Figure 3.1 represents the overall web portal system including various subsystems.

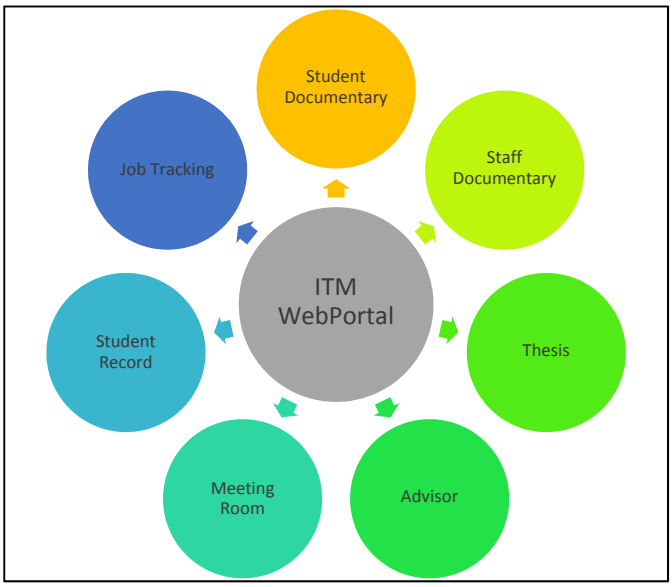


Figure 3.1 Overall Web Portal System.

3.1 The Study of Existing Systems

The study of existing systems will indicate the processes of six individual systems that will show how each system works. It also helps to design the shared data for the new system.

3.1.1 Student Documentary System

In this study, the Data Structure or the data architecture of Student Documentary System is shown in Figure 3.2. This will be categorized into 2 types of data, including Libraries and Lists. The data structure in Libraries type includes many documentary forms beginning the alphabet code of “AS” (as shown in Figure 3.2) and “GR” forms (as shown in Figure 3.3). In Figure 3.4, there are 3 lists of system, given as: Approved Line, Lecturers and Student.

Figure 3.2 Data Architecture of Libraries of Student Documentary System (AS Forms).

Figure 3.3 Data Architecture of Libraries of Student Documentary System (GR Forms).

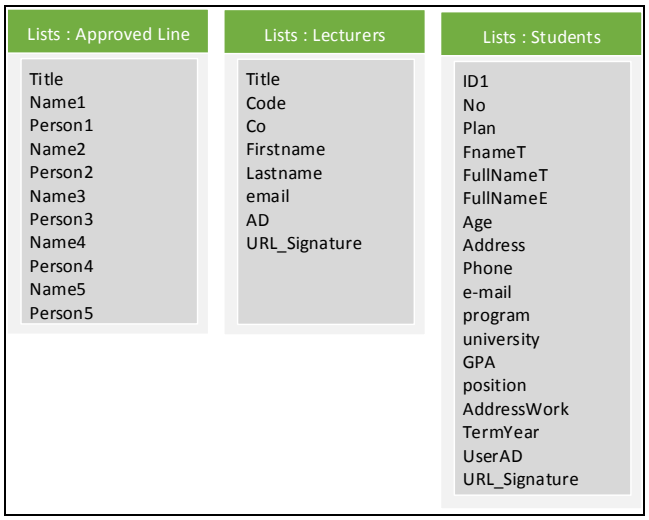


Figure 3.4 Data Architecture of Lists in Student Documentary System.

3.1.2 Staff Documentary System

In this study, the data architecture of Staff Documentary System is also given as shown in Figure 3.5. There are 5 lists of system to store the data, including Receive, Send, Secret, CreateRecieve and CreateSend.

Figure 3.5 Data Architecture of Lists of Staff Documentary System.

3.1.3 Thesis System

This study uses the data structure to show the data architecture of Thesis System. Figure 3.6, it demonstrates the library's data architecture of Thesis System including the library of "ChangePlan", where as the list's data structure of both Lecturer and Student are shown in Figure 3.7.

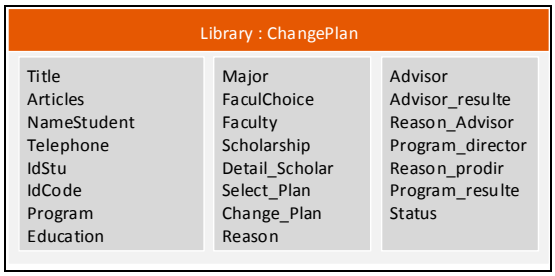


Figure 3.6 Data Architecture of Library in Thesis System.

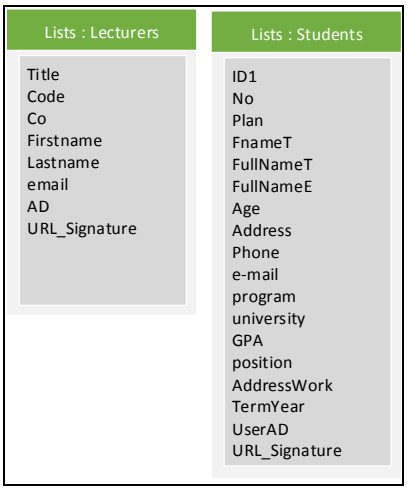


Figure 3.7 List's Data Architecture of Thesis System.

3.1.4 Advisor System

This study uses the data structure for the data architecture of Advisor System. In the Figure 3.8, it represents the list's data architecture of system including list of Calendar for making an appointment.

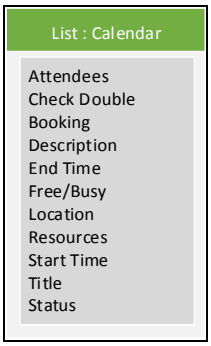


Figure 3.8 List's Data Architecture of Advisor System.

3.1.5 Meeting Room System

In Figure 3.9, the data architecture of Meeting Room System representing this study is the list of Calendar for booking the meeting room.

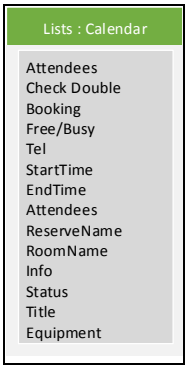


Figure 3.9 Data Architecture of List of Meeting Room System.

3.1.6 Student Record System

This study uses the Data Structure for the data architecture of Meeting Room System, as shown in Figure 3.10. There are 8 lists in this subsystem, given as: Conference, Courses, Exam, Graduation, Register, Status, Lecturers, and Students.

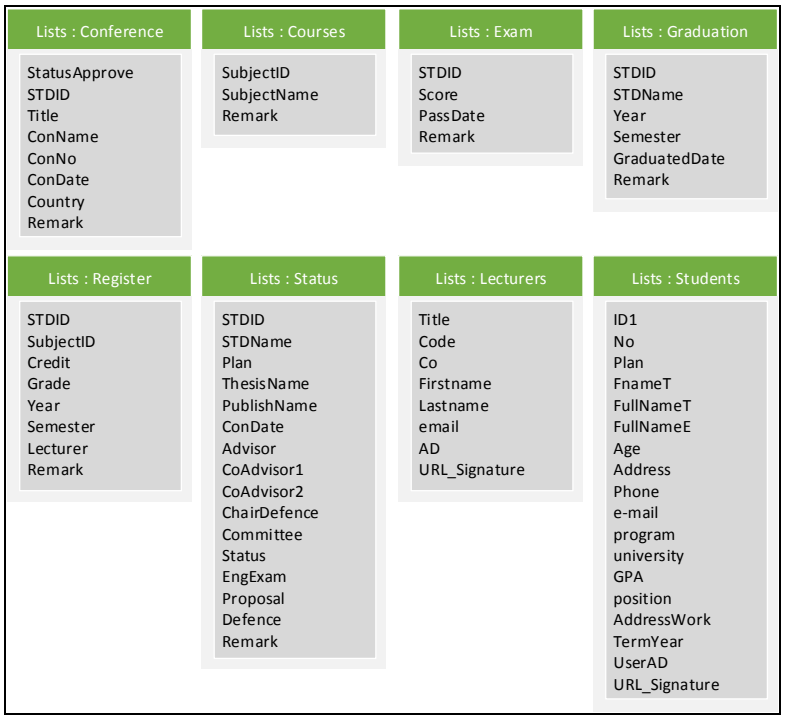


Figure 3.10 Data Architecture of Lists of Student Record System.

The information of this study will be uses in the design of web portal architecture in the next part.

3.2 Data Architecture Design

In this part, the information of the prior works would be used to design a new system architecture. This would integrate the individual subsystems into a single large system based on web portal. For the new system, we design not only new architecture, but also new user permission. The permission is used to specify the information accessibility for each user, such as student, officer, and lecturer.

To compare with the architecture of existing independent systems, Figure 3.11 is to demonstrate overall data architecture of existing subsystems. We select the duplicated lists that can be the shared data, given as: Student and Lecturers. Both Lecturer and Student lists have been appeared on 3 systems, given as: Student Documentary System, Thesis System, and Student Record System.

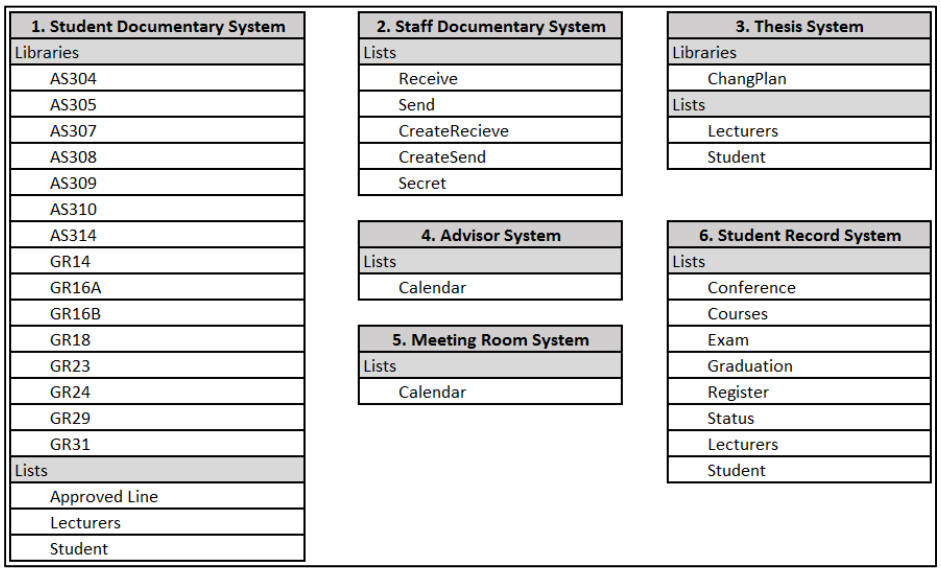


Figure 3.11 Overall Data Structures for determining the shared data of existing independent subsystems.

Therefore, the new architecture design will drop the list of Student in the existing subsystems, and creates a new centralized Student list in the root site. The lecturer list will also take a same process. The new data architecture will be represented in Figure 3.12.

The Figure 3.12 is a new data architecture for new system. This will change both Student and Lecturer lists of the existing subsystems into the new web portal site, and creates the new officer list in this site. The existing systems uses the information of student, lecturer, and officer from the mentioned lists.

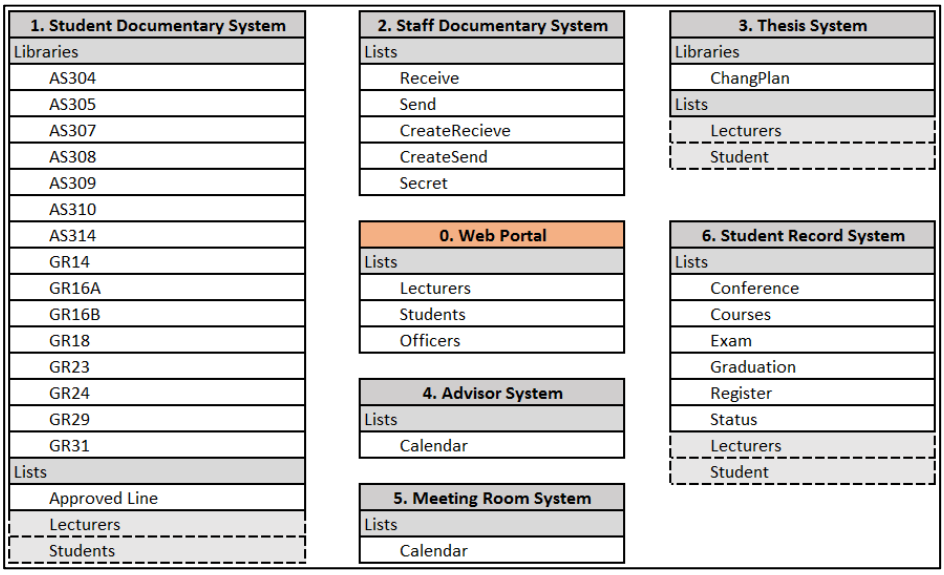


Figure 3.12 Data Structure of new architecture design for the new system.

3.3 Implementation

This part explains about the installation of existing independent systems into the new SharePoint cloud server. When installation completed, next process is testing the installed systems. Finally, there is the integrated process with the new architecture and setting the permission for the users from each site as shown in Table 3.1. The user permission in Tables 3.1 and 3.2 will be used to create the different user rules on a different roles for each site. This would help to easily manage the permission in the new system.

Table 3.1 Users permission.

Systems	Student	Lecturer	Officer	Admin
1. Student Documentary System	G	G	G	F
2. Staff Documentary System	D	G	G	F
3. Thesis System	G	G	G	F
4. Advisor System	G	G	G	F

Table 3.1 Users permission. (cont.)

Systems	Student	Lecturer	Officer	Admin
5. Meeting Room System	D	G	G	F
6. Student Record System	R	R	G	F

Table 3.2 Permission description.

Letter	Name of permission	Permission description
F	Full control	User can access to this site with the command of Create, View, Edit and Delete Permission.
R	Read only	User can access to this site with the command of View Permission.
G	General	User can access to this site with the command of Create, View and Edit Permission.
D	Denied	User cannot access this the site.

3.4 Business Intelligence Dashboard

The application page of Microsoft SharePoint 2010 is very simple and is no more information. In this part, we will design the new information box, called Business Intelligence Dashboard, to show the information taken from the separated systems. This dashboard would help the users to know the information for them without access of the subsystem easily. The Figure 3.13 shows the information of this dashboard.

The Figure 3.13 is a dashboard for both lecturers and officers. This dashboard will filter the information from the subsystems corresponding to the usages for either lecturer or officer.

Figure 3.13 Intelligence Dashboard Design for lecturers.

The Figure 3.14 is a dashboard for the officers. This dashboard will filter the information taken from the subsystems concerned by officers.

Figure 3.14 Intelligence Dashboard Design for officers.

The Figure 3.15 is a dashboard for the students. This dashboard filter the information taken from subsystems concerned by student.

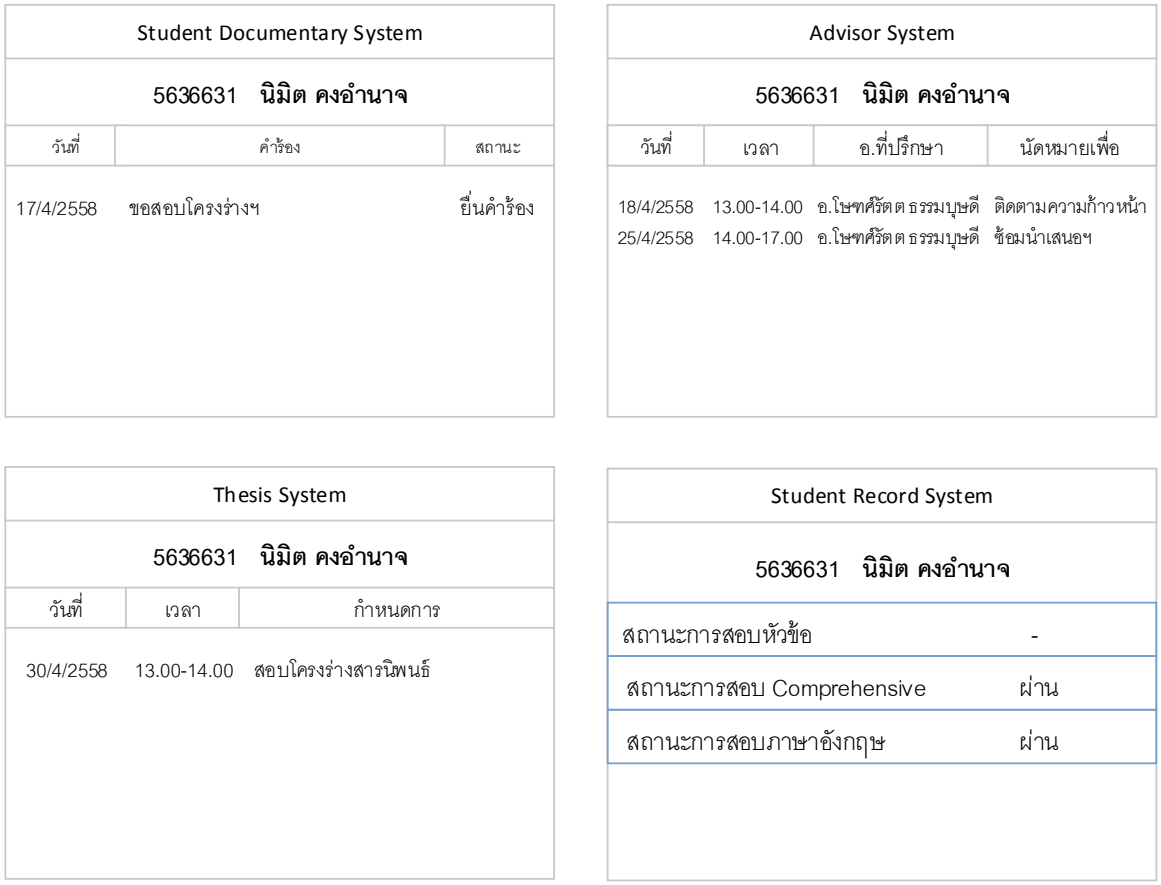


Figure 3.15 Intelligence Dashboard Design for students.

3.5 User Interface Design

The user interfaces of subsystems are so different in themes. To integrate the subsystems into single large system and to make more convenient user interface, we need to redesign the theme the similarity, and hide some unwanted menu on the first page of web portal site. When the new system is completely implemented, the system need to make test by actual users.

3.6 User Satisfaction Survey

After the implementation and complete testing of the new system, the user satisfaction is more important to evaluate the work. This survey will ask about the implementation of the new system, such as the user interface design and the validity of information in the Business Intelligence Dashboard. The results of the surveys will be used to improve the system for the further work.

3.7 Research Schedule

The Table 3.3 shows the process of implementation and integration of individual subsystems into a new web portal system.

Table 3.3 Research schedule.

Activities	JAN				FEB				MAR				APR				MAY				JUN				JULY			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Preliminary																												
2. Study of Existing Systems																												
3. System analysis and design																												
4. Implementation																												

Table 3.3 Research schedule. (cont.)

Activities	JAN				FEB				MAR				APR				MAY				JUN				JULY			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5. System Testing																												
6.Documentation																												

CHAPTER IV
RESULTS

This chapter represents the results of implementation and integration of the subsystems, given as: the new data list of students, officers, and lecturers for the usage of the subsystems, the intelligence dashboard, new user interface design, and the user satisfaction survey.

4.1 New Data Architecture

According to session 3.2, three new data lists, including officers, lecturers and students, are created in the root site. Tables 4.1 - 4.3 demonstrate the column design of lists of officers, lecturers, and students, respectively.

Table 4.1 Officers list in column design.

Column	Type	Meaning
OID	Single line of text	Officer's ID
PreNameTh	Single line of text	Prename in Thai
FNameTh	Single line of text	First name in Thai
LNameTh	Single line of text	Last name in Thai
FullNameT	Single line of text	Full name in Thai
FNameEn	Single line of text	First name in English
LNameEn	Single line of text	Last name in English
FullNameE	Single line of text	Full name in English
Email	Single line of text	Email Account
UserAD	Person or Group	Username
URL_Signature	Hyperlink or Picture	Signature image

Table 4.2 Lecturers list in column design.

Column	Type	Meaning
LID	Single line of text	Lecturer's ID
AcademicRank	Single line of text	Academic Rank
PreNameTh	Single line of text	Prename Thai
FNameTh	Single line of text	First name Thai
LNameTh	Single line of text	Last name Thai
FullNameT	Single line of text	Full name Thai
FNameEn	Single line of text	First name English
LNameEn	Single line of text	Last name English
FullNameE	Single line of text	Full name English
Email	Single line of text	Email Account
UserAD	Person or Group	Username
URL_Signature	Hyperlink or Picture	Signature image

Table 4.3 Students list in column design.

Column	Type	Meaning
Course	Choice	Course
SID	Single line of text	Student's ID
Plan	Single line of text	Study plan
PreNameTh	Single line of text	Prename Thai
FNameTh	Single line of text	First name Thai
LNameTh	Single line of text	Last name Thai
FullNameT	Single line of text	Full name Thai
FNameEn	Single line of text	First name English
LNameEn	Single line of text	Last name English
FullNameE	Single line of text	Full name English
Age	Number	Student's age
Address	Single line of text	Student's address
Phone	Single line of text	Student's phone
e-mail	Hyperlink or Picture	Email account
GradProgram	Single line of text	Graduated program

Table 4.3 Students list in column design. (cont.)

Column	Type	Meaning
GradUniversity	Single line of text	Graduated university
GPA	Single line of text	Graduated GPA
WorkPosition	Single line of text	Working position
WorkAddress	Single line of text	Working address
TermYear	Single line of text	Year class
UserAD	Person or Group	Username
URL_Signature	Single line of text	Signature image
Email	Single line of text	Email Account
MUTestPass	Yes/No	MU-Test status
ComprehensivePass	Yes/No	Comprehensive status
ProposalPass	Yes/No	Proposal status
DefensePass	Yes/No	Defense status
Graduated	Yes/No	Graduated status

The Figure 4.1 represents the relations between the new data lists and the existing systems. Both Student Documentary system, and Thesis system also use all of new lists, given as: Officers, Lecturers and Students. Staff Documentary system uses both Officers and Lecturers lists. Advisor system uses Lecturers list, whereas Student Record system uses both Lecturers and Students lists.

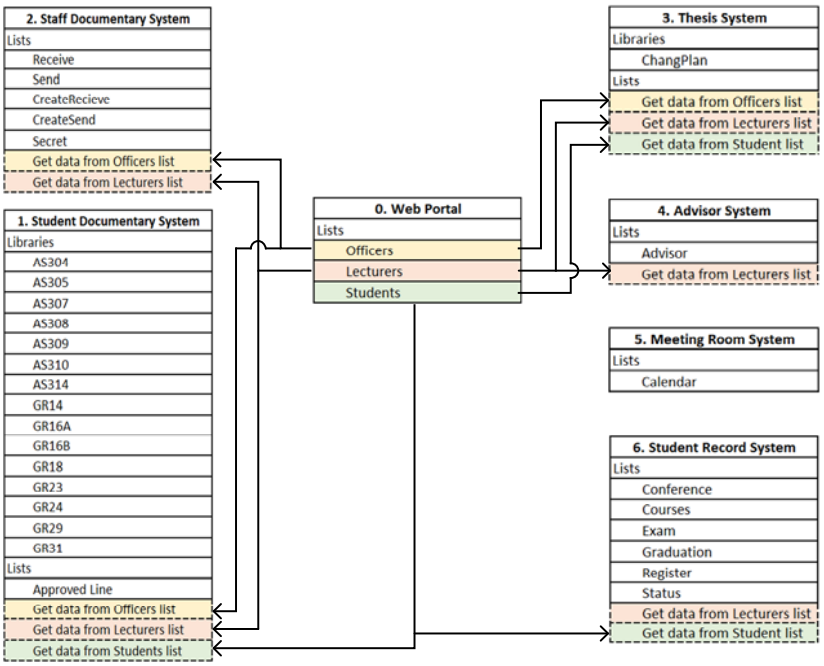


Figure 4.1 Relations of new data lists and existing systems.

4.2 Intelligence Dashboard

The Figure 4.2 demonstrates the result of dashboard for the lecturers. This dashboard would filter the information taken from the subsystems corresponding to the usage of lecturers.

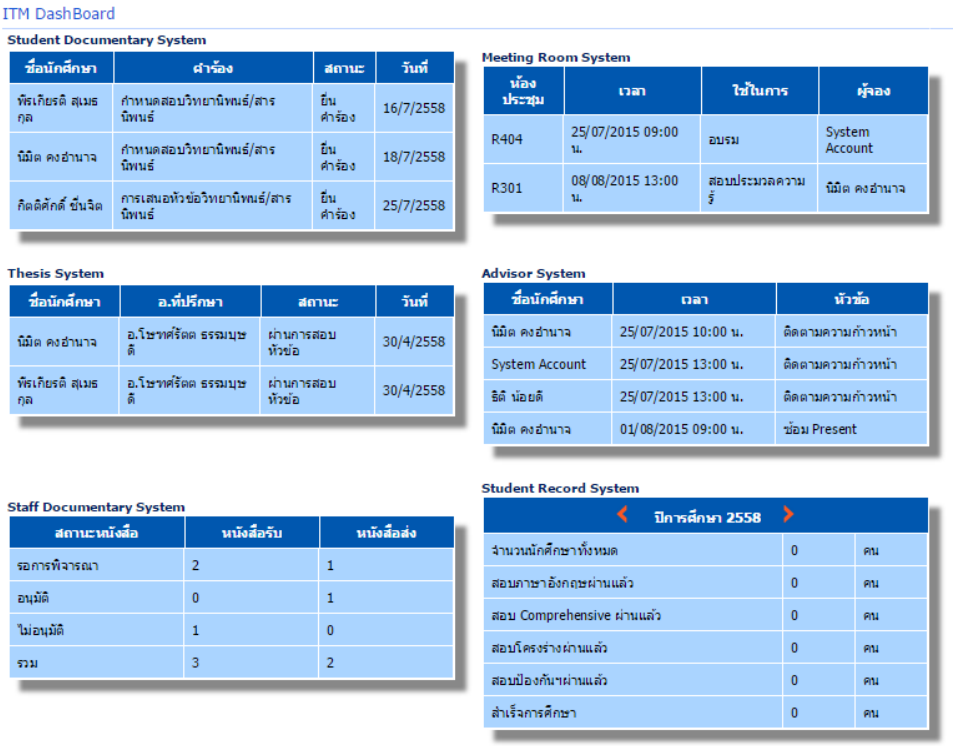


Figure 4.2 Results of intelligence dashboard design for lecturers.

The Figure 4.3 represents the result of dashboard for the officers. This dashboard would filer the information taken from the subsystems corresponding to the usage of officers.

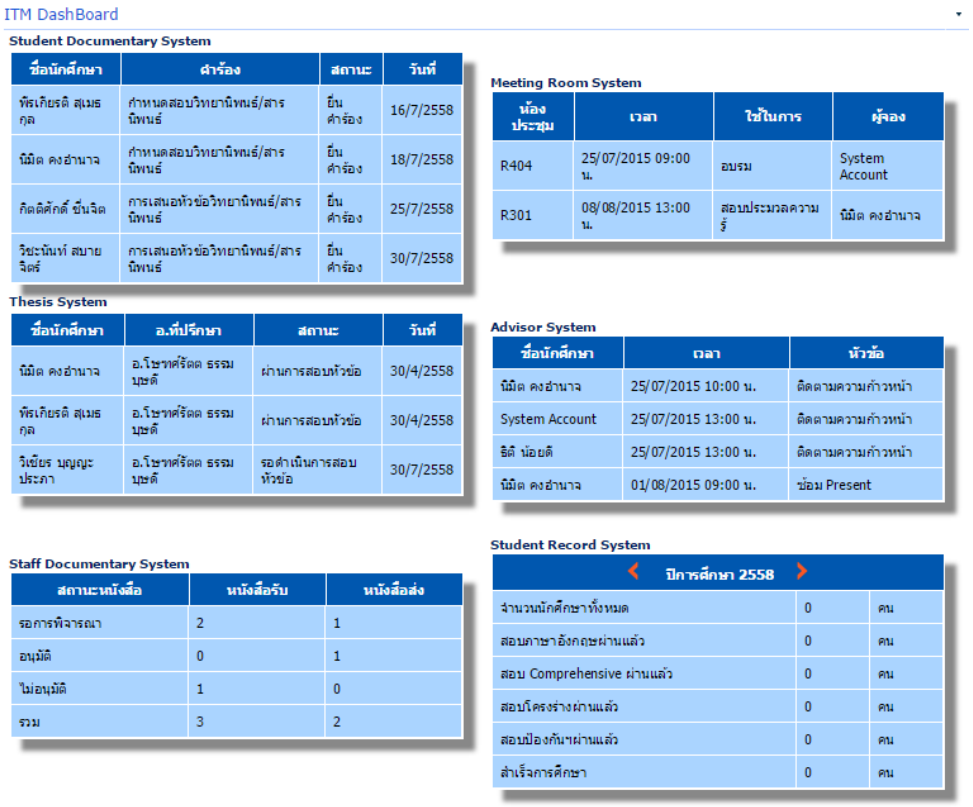


Figure 4.3 Results of intelligence dashboard design for officers.

The Figure 4.4 demonstrates the results of dashboard for the students filtering the information taken from the subsystems corresponding to the usage of students.

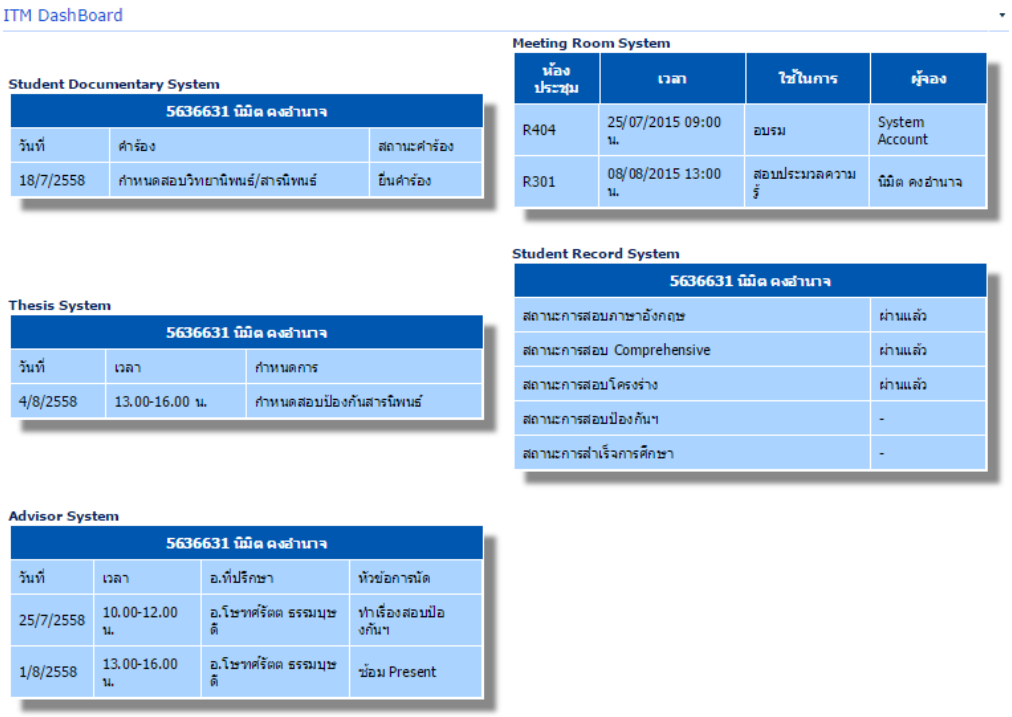


Figure 4.4 Results of intelligence dashboard design for students.

4.2.1 Student Documentary Dashboard

Student Documentary Dashboard is the information on dashboard filtering the data records from Student Documentary system, and the records are related to current users. The filtered record will display in the table columns, given as: student name, document form name, document status, and status date.

The Figure 4.5 is the results of Student Documentary Dashboard filtering the information taken from the Student Documentary system corresponding to both officers or lecturers.

Student Documentary System

ชื่อนักศึกษา	คำร้อง	สถานะ	วันที่
พีรเกียรติ สุเมธกุล	กำหนดสอบวิทยานิพนธ์/สารนิพนธ์	ยื่นคำร้อง	16/7/2558
นิมิต คงอำนาจ	กำหนดสอบวิทยานิพนธ์/สารนิพนธ์	ยื่นคำร้อง	18/7/2558
กิตติศักดิ์ ชื่นจิต	การเสนอหัวข้อวิทยานิพนธ์/สารนิพนธ์	ยื่นคำร้อง	25/7/2558

Figure 4.5 Results of Student Documentary dashboard for both officers and lecturers.

The Figure 4.6 represents the result of Student Documentary Dashboard filtering the information taken from the subsystems corresponding to the usage of student.

Student Documentary System

5636631 นิมิต คงอำนาจ		
วันที่	คำร้อง	สถานะคำร้อง
18/7/2558	กำหนดสอบวิทยานิพนธ์/สารนิพนธ์	ยื่นคำร้อง

Figure 4.6 Result of Student Documentary dashboard for students.

Table 4.4 represents the conditions and resources of data list taken from Student Documentary system to show on the dashboard.

Table 4.4 Conditionals of the selected data on Student Documentary Dashboard.

Topic	Information	Resources Name
Selected Fields	Form Name : Name of form Status : Status of form Created By : Sender name Created Date : Sender date Modified Date : Process date	AS-3-04 AS-3-05 AS–3–07 AS-3-08 AS-3-09 AS-3-10 AS-3-14 AS-3-15 GR_14 GR_16_A GR_16_B GR_18 GR_23 GR_24 GR_29 GR_31
Conditions	Officer : Select all items. Lecturers : Select items related to current lecturer. Students : Select items created by current student.	
Ordering	Ordering by both modified date and created date.	

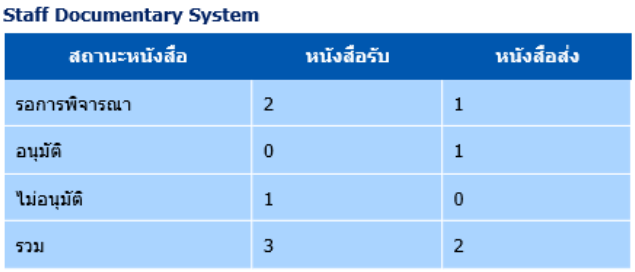
The information in Student Documentary dashboard is selected from all lists and libraries of Student Documentary system. The selected fields given as: Form Name, Status, Created By, Created Date, and Modified Date. The condition of the selected data for officers is that the items should be concerned with the current lecturer and student. The selected data are sorted by the modified date and the created date, respectively.

4.2.2 Staff Documentary Dashboard

Staff Documentary Dashboard is the information on dashboard filtering the record from Staff Documentary system and the record is related to current user.

The filtered record will be displayed on the column table, there are document status, summary of received document, and summary of send document.

The Figure 4.7 demonstrates the results of Student Documentary Dashboard will filter the information taken from the subsystems related to each officer / lecturer.



Staff Documentary System

สถานะหนังสือ	หนังสือรับ	หนังสือส่ง
รอการพิจารณา	2	1
อนุมัติ	0	1
ไม่อนุมัติ	1	0
รวม	3	2

Figure 4.7 Results of Staff Documentary dashboard for both officers and lecturers.

The Table 4.5 represents the conditions of data list of Student Documentary system to show on dashboard.

Table 4.5 Conditions for the selected data of Student Documentary Dashboard.

Topic	Information	Resources Name
Selected Fields	Count all items group by Form : document type Status : document status	eDoc
Conditions	Document officer : Select all items. Other officers and lecturers : Select item related to the current user.	

The information in Staff Documentary dashboard is selected from the list name of eDoc on the Staff Documentary system. The selected data are given as: document type and document status. The condition of the selected data for document

officer is to select all items. For other officers and lecturers, the conditions are to select the items related to the current user.

4.2.3 Thesis Dashboard

Thesis Dashboard is the information on dashboard filtering with data record from Thesis system, and the record is related to current user. The filtered record will be displayed on the column table, there are student name, lecturer name, thesis status, and modified date.

The Figure 4.8 represents the results of Thesis dashboard filtering the information taken from the subsystems corresponding to both officers and lecturers.

Figure 4.8 Results of Thesis dashboard for both officers and lecturers.

The Figure 4.9 demonstrates a result of Thesis dashboard filtering the information taken from the Thesis system created by the current student.

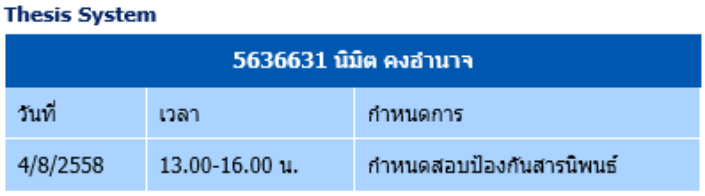


Figure 4.9 Result of Thesis dashboard for students.

The Table 4.6 represents the conditions and resources of data list of Thesis system to show on the dashboard.

Table 4.6 Conditions for the selected data on Thesis Dashboard.

Topic	Information	Resources Name
Selected Fields	Student : Student's name Advisor : Advisor's name Status : Document status Modified Date : Processing date	Change Plan Document
Conditions	Main officer : Select all items. Other officers and lecturers : Select items related to current user. Students : Select items created by current student.	
Ordering	Ordering by both modified date and created date.	

The information of Thesis dashboard is selected from all lists and libraries of Thesis system. The selected fields are given as: Student Name, Advisor Name, Status, and Modified Date. The conditions of the selected data for the main officer is to select all items. For other officers and lecturers, we select items related to the current user, whereas the items for students are selected which are created by the current student. The selected data are sorted by both modified date and created date, respectively.

4.2.4 Advisor Dashboard

Advisor Dashboard is the information on dashboard filtering the records from Advisor system, and the records are related to the current users. The filtered records will be displayed on the column table, there are given as: student name, booking date, and thesis name.

Figure 4.10 demonstrates the results of Advisor dashboard filtering the information taken from the Advisor system related to the current officers/lecturers.

Advisor System

ชื่อนักศึกษา	เวลา	หัวข้อ
นิมิต คงอำนาจ	25/07/2015 10:00 น.	ติดตามความก้าวหน้า
System Account	25/07/2015 13:00 น.	ติดตามความก้าวหน้า
ธิติ น้อยดี	25/07/2015 13:00 น.	ติดตามความก้าวหน้า
นิมิต คงอำนาจ	01/08/2015 09:00 น.	ซ้อม Present

Figure 4.10 Results of Advisor dashboard for both officers and lecturers.

The Figure 4.11 represents the results of Thesis dashboard filtering the information taken from the Advisor system created by current student.

Advisor System

5636631 นิมิต คงอำนาจ			
วันที่	เวลา	อ.ที่ปรึกษา	หัวข้อการนัด
25/7/2558	10.00-12.00 น.	อ.โชฑศ์รัตต ธรรมบุชดี	ทำเรื่องสอบป้องกันฯ
1/8/2558	13.00-16.00 น.	อ.โชฑศ์รัตต ธรรมบุชดี	ซ้อม Present

Figure 4.11 Results of Advisor dashboard for students.

The Table 4.7 is a conditions and resources of data list on Advisor system to show on dashboard.

Table 4.7 Conditions for the selected data on Advisor Dashboard.

Topic	Information	Resources Name
Selected Field	Created By : Booking's name Start Date : Booking's date Title : Thesis / IS name	Advisor
Conditional	Officers : Select all items. Lecturers : Select items related to current lecturer. Students : Select items created by current student.	
Ordering	Ordering by Start Date	

The information on Advisor dashboard is selected from Advisor lists of Thesis system. The selected fields are given as: Created By, Start Date, and Title. The conditions for the selected data for officers is to select all items. For lecturers, the items are selected that are related to the current lecturers, whereas the items for students are selected that are created by current students. The selected data are sorted by booking date.

4.2.5 Meeting Room Dashboard

Meeting Room Dashboard is the information on dashboard filtering the records from Meeting Room system, and the records are related to current user. The filtered record will be displayed on the column table, there are given as: room name, booking date, title, and booking name.

The Figure 4.12 represents the results of Meeting Room dashboard filtering the information taken from Meeting Room system.

Figure 4.12 Result of Meeting Room dashboard.

The Table 4.8 represents the conditions and resources taken from data list on Meeting Room system to show on the dashboard.

Table 4.8 Conditions for the selected data on Meeting Room Dashboard.

Topic	Information	Resources Name
Selected Fields	Room : Room name Start Date : Booking date Title : Objective Created By : Booking name	Calendar
Conditions	Officers : Select all items. Lecturers : Select items related to current lecturer. Students : Select items created by current student.	
Ordering	Ordering by Starting Date	

The information on Meeting Room dashboard is selected data from Calendar lists on Meeting Room system. The selected fields are given as: Room, Start Date, Title, and Created By. The conditions for the selected data are to select all items. The selected data are sorted by booking date.

4.2.6 Student Record Dashboard

Student Record Dashboard is the information on dashboard filtering the records from Student Record system to display the summary of total students, including MU-Test exam Pass, comprehensive pass, proposal pass, defense pass, and graduated status.

The Figure 4.13 demonstrates the results of Student Records on dashboard for both officers and lecturers. This dashboard displays the summary taken from the Student Record system.

Figure 4.13 Results of Meeting Room dashboard for both officers and lecturers.

The Figure 4.14 represents a result of Student Record dashboard for student. This dashboard displays the information from the Student Record system related to the current student.

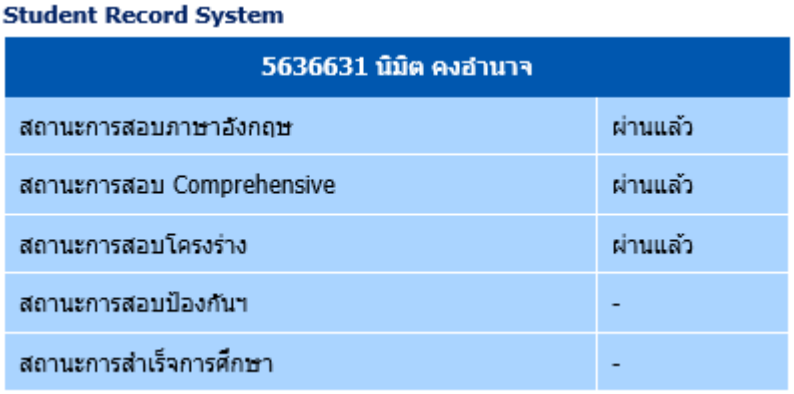


Figure 4.14 Results of Meeting Room dashboard for student.

The Table 4.9 represents the conditions and resources taken from the data list of Student Record system to show on the dashboard for both officers and lecturers.

Table 4.9 Conditions for the selected data on Student Record Dashboard for both officers and lecturers.

Topic	**Information**	**Resources Name**
Selected Fields	Count all items group by Student ID : Student's ID MUTestPass : MU-Test Status ComprehensivePass : Comprehensive Status ProposalPass : Proposal Status DefensePass : Defense Status Graduated : Graduated Status	Students
Conditions	Total Student : Select all items Total MU-Test Pass : Select items which MUTestPass is true. Total Comprehensive Pass : Select items which ComprehensivePass is true. Total Proposal Pass : Select items which ProposalPass is true.	

Table 4.9 Conditions for the selected data on Student Record Dashboard for both officers and lecturers. (cont.)

Topic	Information	Resources Name
Conditions	Total Defense Pass : Select items which DefensePass is true. Total Graduated Pass : Select items which Graduated is true.	

The information of Student Record dashboard is selected from Students lists on Student Record system. The selected fields are given as: Student ID, MUTestPass, ComprehensivePass, ProposalPass, and Graduated status. The conditions for the selected data for both officers and lecturers are to select summary of all items group by total of students, MU-Test Pass, comprehensive pass, proposal pass, defense pass, and graduated status.

The Table 4.10 represents the conditions and resources of data list on Student Record system to show on dashboard for students.

Table 4.10 Conditions for the selected data on Student Record Dashboard for students.

Topic	Information	Resources Name
Selected Fields	FullNameT : Student's Name MUTestPass : MU-Test Status ComprehensivePass : Comprehensive Status ProposalPass : Proposal Status DefensePass : Defense Status Graduated : Graduated Status	Students
Conditions	Select item which FullNameT is equal to the current student's name.	

The information on Student Record dashboard for student is selected from the Students lists on Student Record system. The selected fields are given as: Student

ID, MUTestPass, ComprehensivePass, ProposalPass, and Graduated status. The conditions of the selected data for both officers and lecturers are that FullNameT must equal to the current student's name.

4.3 New User Interface

For the results of new user interface design, according to the existing individual systems, there is a default user interface from Microsoft SharePoint 2010™. In this session, the unwanted menus should be hidden, whereas the important menus should be added for the each subsystems. The Table 4.11 represents the list of hidden menus that are no longer appeared on all subsystems.

Table 4.11 List of hidden menus.

Menu Name	Information	System
Libraries	Link to view all libraries in current site.	All systems
Lists	Link to view all lists in current site.	All systems
Discussions	Link to discussion webboard.	All systems
All Site Content	Link to view all site contents including List, Libraries, Site Setting	All systems

According to Table 4.11, there are 4 hidden menus, as follows

1. Libraries Menu: it is a link to view all libraries in current site that has been hidden from all systems.

2. Lists Menu: it is a link to view all lists in current site that has been hidden from all systems.

3. Discussions Menu: it is a link to discussion web board that has been hidden from all systems.

4. All Site Content Menu: it is a hidden link for all systems to view all site contents, including List, Libraries, Site setting.

The Table 4.12 demonstrates the list of additional new menus in the root site representing into the columns including menu name, information, and the system for appearance on menu.

The Table 4.12 List of new additional menu into the root site.

Menu Name	Information	System
Student Documentary System	Link to Student Documentary System.	ITM Portal
Staff Documentary System	Link Staff Documentary System.	ITM Portal
Thesis System	Link to Thesis System.	ITM Portal
Advisor System	Link to Advisor System.	ITM Portal
Meeting Room System	Link to Meeting Room System.	ITM Portal
Students List	Link to Students list.	ITM Portal
Officers List	Link to Ofiicers list.	ITM Portal
Lecturers List	Link to Lecturers list.	ITM Portal

The Figure 4.15 represents a captured screen from root site adding new 8 menus, given as: Student Documentary System, Staff Documentary System, Thesis System, Advisor System, Meeting Room System, Student List, Officers List, and Lecturers List.

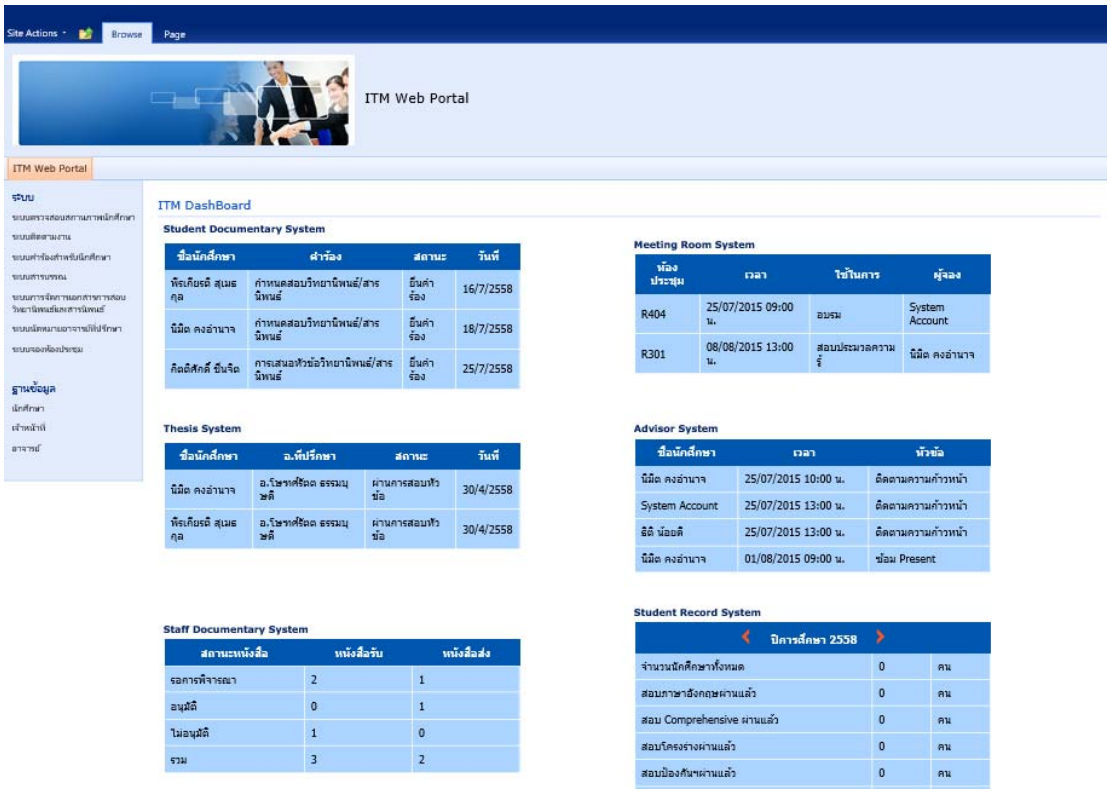


Figure 4.15 Captured screen of root site.

The Figure 4.16 demonstrates a captured screen from Student Documentary system hiding the default menus, including Libraries, Lists, Discussion web board, and All Site Content menu.

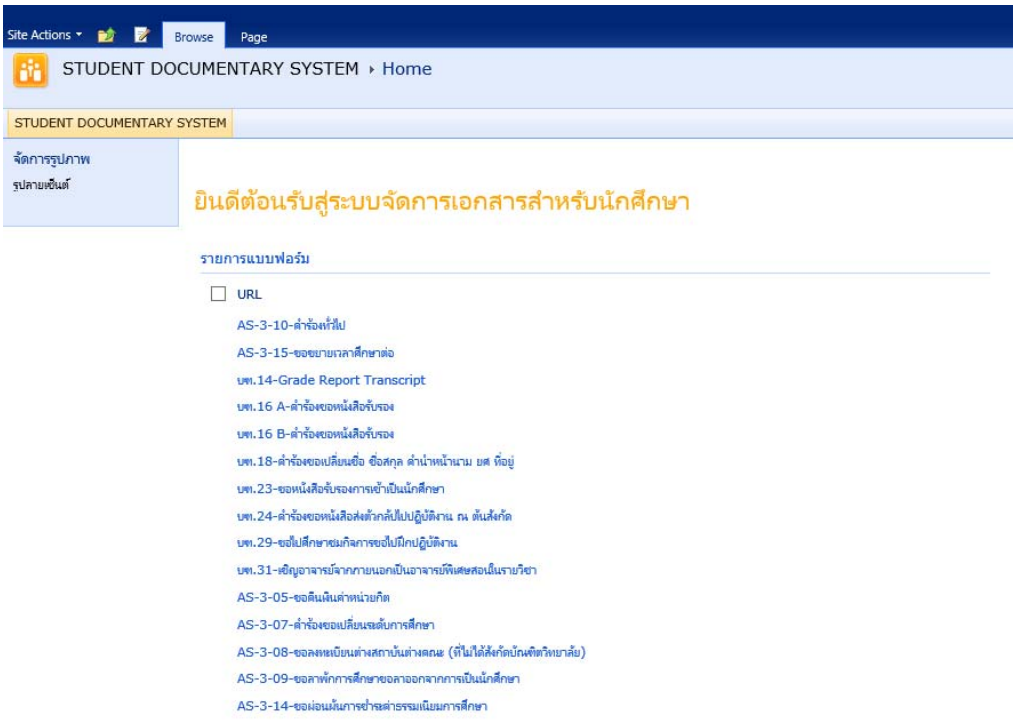


Figure 4.16 Captured screen of Student Documentary system.

The Figure 4.17 shows a captured screen of Staff Documentary system hiding the default menus, given as: Libraries, Lists, Discussion web board, and All Site Content menu.

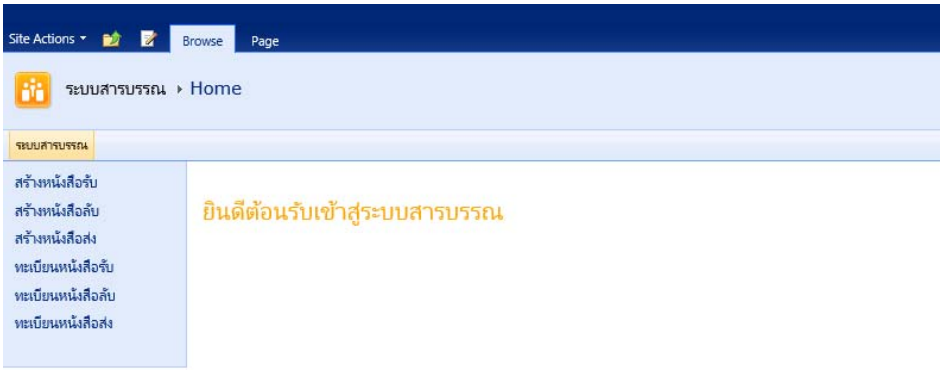


Figure 4.17 Captured screen of Staff Documentary system.

The Figure 4.18 represents a captured screen of Thesis system hiding the default menus, given as: Libraries, Lists, Discussion web board, and All Site Content menu.

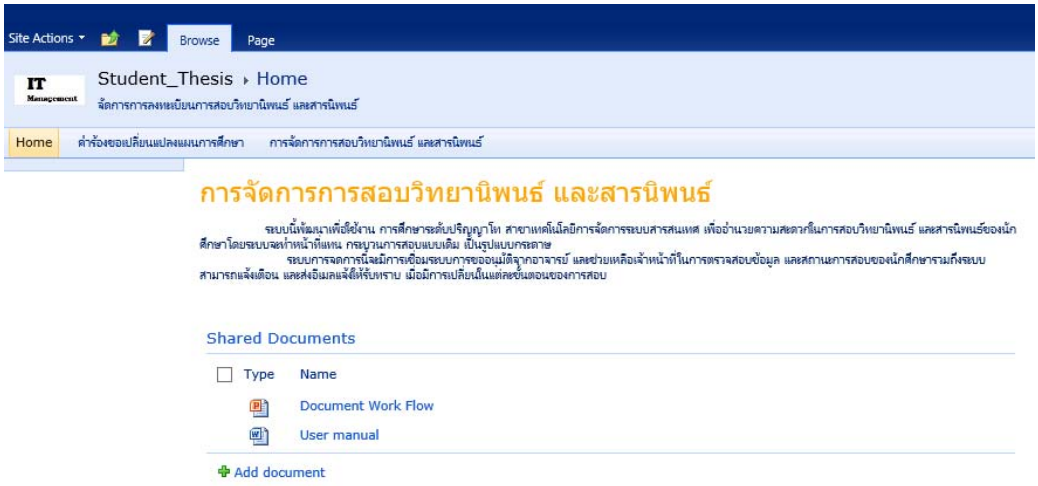


Figure 4.18 Captured screen of Thesis system.

The Figure 4.19 demonstrates a captured screen of Advisor system hiding the default menus, including Libraries, Lists, Discussion web board, and All Site Content menu.

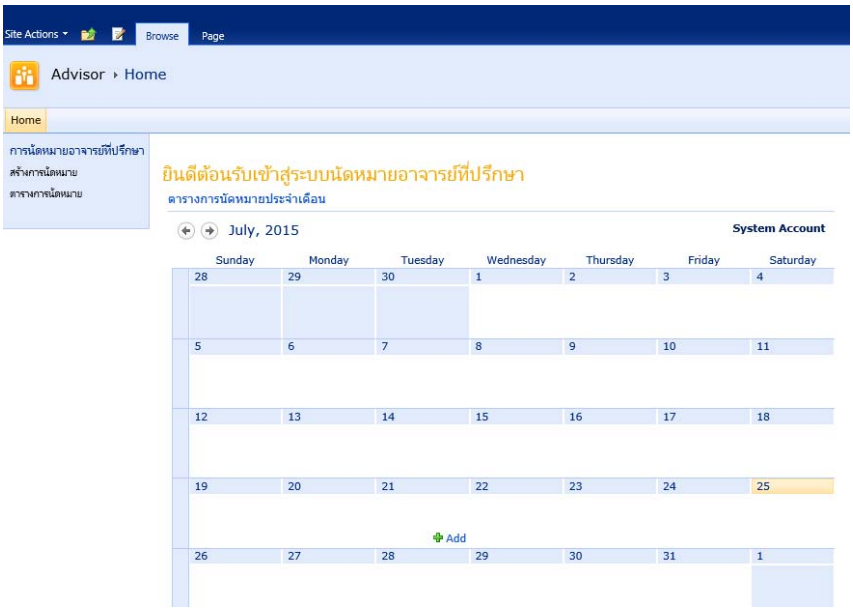


Figure 4.19 Captured screen of Advisor system.

The Figure 4.20 shows a captured screen of Meeting Room system hiding the default menus, given as: Libraries, Lists, Discussion web board, and All Site Content menu.

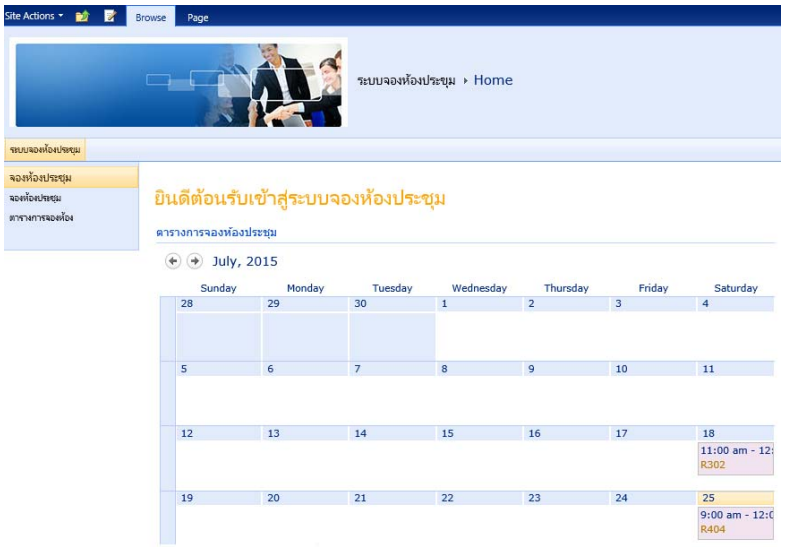


Figure 4.20 Captured screen of Meeting Room system.

The Figure 4.21 represents a captured screen of Student Record system hiding the default menus, including Libraries, Lists, Discussion web board, and All Site Content menu.

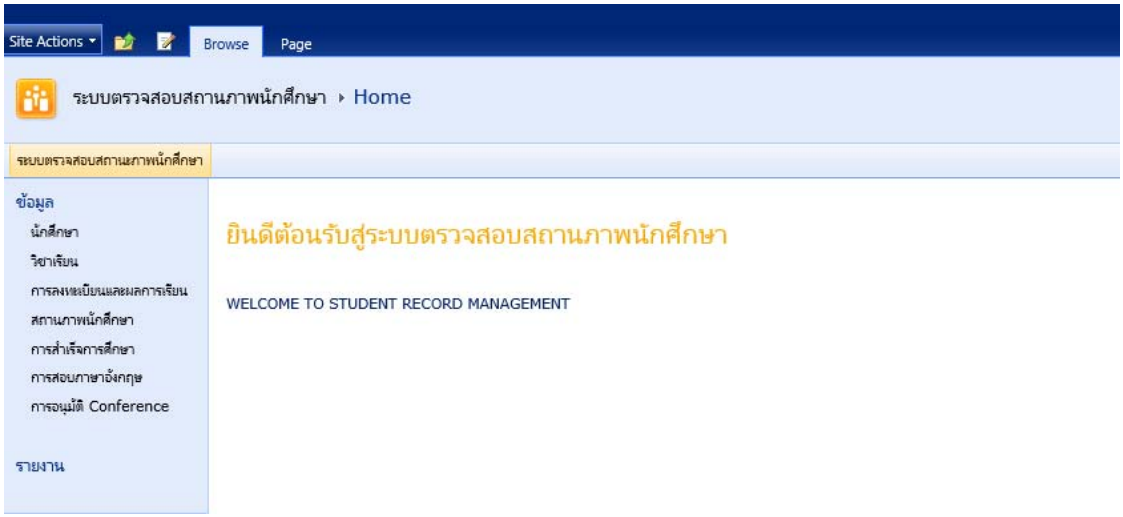


Figure 4.21 Captured screen of Student Record system.

4.4 User Satisfaction

Researcher uses the satisfaction surveys to evaluate this implementation. The satisfaction results of surveys taken from 2 officers and 1 lecturer are shown in the Table 4.13.

Table 4.13 Results of user's satisfaction.

Satisfaction Information	**Satisfaction Data**	
	($\bar{x}$)	**Satisfaction Level**
1. Simple and easy-to-use User Interface	4.00	Good
2. The accuracy and reliability of information	4.33	Very good
3. Systems with more convenient to work	4.33	Very good
4. System with anywhere and anytime accessing	4.66	Very good
5. Overall satisfaction in this proposed system	4.33	Very good
Average Satisfaction	4.33	Very good

Simple and easy-to-use User Interface is in a good level. The accuracy and reliability of information is in a very good level. Systems with more convenient to work is in a very good level. System with anywhere and anytime accessing is in a very good level. Therefore, overall satisfaction in this system is in a very good level in term of simplicity, user friendly interface, high accuracy, high reliability, more convenience, and flexibility for accessing anywhere and anytime.

CHAPTER V
CONCLUSION

As previously mentioned, this research is to integrate the existing subsystems into single large system. The intelligence dashboard for monitoring the information taken from the subsystems and the new advance user interface are also taken into account.

In this chapter, the implementation and integration has been completed in division of Information Technology Management, Faculty of Engineer, Mahidol University. There are conclusion and suggestion for future works.

5.1 Conclusion

The research has been created from the existing collaborative systems in Division of Information technology management, Faculty of Engineer, Mahidol University. This paper aims to integrate and centralize the data of existing systems having been developed in collaborative software of Microsoft SharePoint 2010™ based on the cloud technology to drive our proposed system. Therefore, the study of existing systems is more important to process the development of dashboard part. The dashboard should display the information taken from the subsystems. Thus, the researcher must know how the subsystems workflow work and where the data has been stored to get the correct information into the dashboard.

However, the published existing systems could not work/run properly on cloud server. To resolve this problem, the researcher has to customize the possible features of their existing systems. This should successfully make the proposed integrated system running smoother then their existing systems. The user interface of the subsystems has to customize for one site theme and hides some unwanted menu of the screen because of the limitation of Microsoft SharePoint 2010™.

The user's satisfaction surveys were taken from 2 officers and 1 lecturer. The average ratting results of the surveys is in very good level. However, this research needs more user's satisfaction surveys in other officers, lecturers, and students.

5.2 Suggestion and Future Work

The integration of existing systems is a combination model of the subsystems into single large system. This work should add more features into dashboard and their subsystems, given as: additions of information and interactive interfaces in dashboard, instant messaging for mobile, electronic signature support, and so on. With the limitation of user interface for usage, we have to customize the HTML coding by using Microsoft SharePoint Designer 2010™ program.

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APPENDIX

USER SATISFACTION SURVEY

แบบสอบถามเพื่อประเมินความพึงพอใจของผู้ใช้งานใช้งานระบบ
ซอฟท์แวร์เพื่อใช้ในการทำงานร่วมกัน กรณีการรวมระบบงานที่มีอยู่เดิมเพื่อใช้งานจริง

แบบสอบถามโดยนายนิมิต คงอำนาจ
นักศึกษาปริญญาโท สาขาวิชาการจัดการเทคโนโลยีสารสนเทศ
บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล
ปีการศึกษา 2558

คำชี้แจง: แบบสอบถามนี้ใช้ประเมินความพึงพอใจในการใช้งานระบบส่วนกลาง (Web Portal) ที่เกิดจากการรวมระบบงานที่มีอยู่เดิม : กรณีศึกษากลุ่มสาขาวิชาการจัดการเทคโนโลยีสารสนเทศ

1. ด้านข้อมูลผู้ตอบแบบสอบถาม

เพศ :	ชาย	หญิง	
ประเภทบุคลากร :	อาจารย์	เจ้าหน้าที่	นักศึกษา

2. ด้านความพึงพอใจในการใช้งานระบบ

รายละเอียด	**ระดับความพึงพอใจ**				
	5	**4**	**3**	**2**	**1**
1. หน้าจอระบบใช้งานง่าย ไม่ซับซ้อน					
2. ข้อมูลมีความถูกต้อง ครบถ้วน น่าเชื่อถือ					
3. ระบบช่วยให้ทำงานได้สะดวกมากยิ่งขึ้น					
4. ระบบสามารเข้าใช้งานได้ทุกที่ ทุกเวลา ผ่านเครือข่าย Internet					
5. ความพึงพอใจในภาพรวมของระบบ					

BIOGRAPHY

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