

# THE SYSTEM DEVELOPMENT OF DIGITAL LIBRARY BY USING CONVERSATIONAL AGENT FOR ENHANCING INTELLIGENT STUDENT RELATIONSHIP MANAGEMENT

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## ABSTRACT

Abstract— This article presents the system development of digital library by using conversational agent for enhancing intelligent student relationship management. The system integrated intelligent technologies such as data warehousing, conversational user interface (CUI), multi-agent system, machine learning and web services technology. The system can be applied to the context of each institution and student will gain experience from the intelligent student relationship management system as well as the satisfaction of digital library. When graduated, the graduates still have the feeling of commitment and would like to participate in the development of institutions, resulting in a cycle of quality education development that affects the stability of the institution budget, quality of instruction and student retention rates that leads to sustainable development of the country.

Keywords— Digital Library, Conversational Agent, Intelligent Student Relationship Management

## INTRODUCTION

The university is an institution of higher education that plays a role in producing manpower to develop the country. Higher education graduates who are manpower and are product of higher education institutions including being an indicator of the quality of educational management at the faculty and university level. Producing of graduates to be in accordance with the standard of learning results must rely on the system several mechanisms and factors together. At present, higher education institutions are adjusting to provide services to students at all levels but still encountered problems, many students leave university before graduations, one of the main reasons is that students do not receive enough learning support during their studies [1] such as instant counseling and personal learning resources recommendation etc.

At present, every university uses digital library as a tool to access various information resources. Digital library is an online database system that stores and links various information resources such as digital objects that can include text, e-Book, still images, audio, video, or other digital media formats. The digital library is an important system for supporting the teaching and learning in the university because students search information resources through the digital library web system, but the digital library will be just as a data warehouse, which makes it impossible to use the digital library to support teaching and learning in full capacity. Student can search through the text box on web page only, which may not yet meet the needs of current students due to the use of search terms or keywords through the text box on web page, there are limitations in providing information services.

Nowadays, with advances in information and communication technology, leaps and bounds affect education management system by technology that will support the teaching and learning process and maintain the relationship between students and educational institutions must lead the way of customer relationship management (CRMs) [2] combined with intelligent technology such as data mining (DM), data warehousing (DW) intelligent information management (IIM), multi-agent system (MAS) and intelligent conversational agent (CA) [3]. Therefore, the researcher decided to investigate conversational agent to develop the digital library system for enhancing intelligent student relationship management (i-SRM).

## LITERATURE & THEORY

Student relationship management (SRM) is the implementation of customer relationship management (CRM) strategies that are adapted to match the educational context with an important goal to create and maintain relationships between students and educational institutions [3].

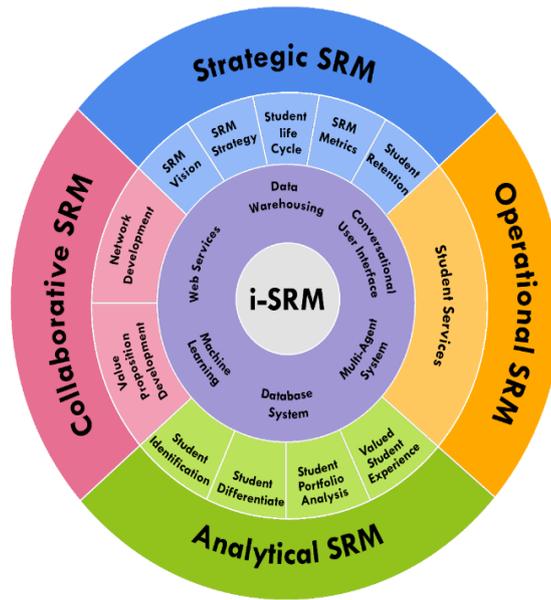
Creating and maintaining relationships between students and institutions for a long time need to create something called “Student Loyalty” from the marketing perspective Student loyalty is an important goal in managing student relations with 3 reasons: 1) university income that maintain a large number of students will have a solid financial foundation and can continue to carry out university activities. 2) Participation and commitment, students who are loyal to the university will have a positive attitude towards teaching and learning which allows students to become more involved in the teaching and learning process and 3) To support the university continuously, students who are loyal will participate in supporting and publicizing the university after graduation [4], from these three reasons, student loyalty is important in managing student relationship and universities will survive under current educational competition.

From the investigation of student’s loyalty, the student satisfaction has a high influence on student loyalty but the student's loyalty is not an easy task and takes time. Therefore, the management of student relations should have characteristics that emphasize the satisfaction of students in various areas, especially in the quality of teaching and learning including offering various learning materials and services to students which results in student satisfaction and loyalty to the university and also reduces the risk of student dropout before graduation.

Intelligent Student Relationship Management (i-SRM) is to create and maintain student relationships with educational institutions through various services so that students become loyal by using intelligent technology as part of student relationship management, such as machine learning, intelligent agents and dialogue user interface (Conversational User Interface: CUI) etc [3].

The intelligent technology in student relationship management will result in changes and increased efficiency in providing services to students, such as offering various learning materials and providing services to students according to the characteristics and behavior of each student. have Providing automatic advice to students for support and assistance offering a place to practice professional experience that is consistent with the performance that students have according to each person, for example, which will result in the student's satisfaction and loyalty with the university directly.

Nutthapat Kaewrattanapat and Panita Wannapiroon published Intelligent Relationship Management Model (i-SRM), which is derived from the synthesis of customer relationship management models in 4 types, namely, IDIC model, CRM Value Chain, Gartner Performance Model (The Gartner's competency model: Eight Building Blocks of CRM ) Modeling the customer relationship management process (DEAR Model) and adjusting to fit the student relationship management context including the integration of intelligent technology, namely data warehousing, conversational user interface (CUI), multi-agent system (MAS), machine learning (ML) In addition, web services technology is also used in machine to machine communication.



**Figure 1**  
Intelligent Relationship Management Model (i-SRM).

From Fig.1 The intelligent student relationship management model is classified according to the dimensions of the 4<sup>th</sup> dimensional customer relationship management and the context of customer relationship management is adjusted to student relationship management.

1) *Strategic SRM* focus on students as a center and develop strategies and processes for maintaining valuable students until graduation including alumni care as well. Strategic SRM consist of 5 elements including SRM Vision, SRM Strategy, Student Life Cycle, SRM Metrics and Student Retentions.

2) *Operational SRM* focus on the parts of the automation services system related to students including enough support for teaching and learning while studying.

3) *Analytical SRM* focus on data mining statistics or mechanical learning for analyzing student data to be used to formulate strategies and strategies for managing student relationship. Analytical SRM consist of 4 elements including Student Identification, Student Differentiate, Student Portfolio Analysis and Valued Student Experience.

4) *Collaborative SRM* is the application of services and infrastructure of educational institutions together to create interaction between students, professors, academic support staff, learning resources, educational institutions, parents, company and other external agencies. Collaborative SRM consist of 2 elements including Value Proposition Development and Network Development.

In intelligent student relationship management, there is a difference from general student relationship management, that using intelligent technology as the basis of every activity in managing student relations. The group of intelligent technology used in student relationship management can be organized as follows

1) *Data storing* is a storage of various data within educational institutions for using in operations and analysis. In this section, the database system and data warehousing should be used.

2) *Intelligent services* is a transition from general electronic services, in addition to interacting with students in a graphical user interface (GUI). In intelligent student relationship management, there is a dialogue user interface or conversational user interface (CUI) for students to be comfortable in communication and having a good experience with the system.

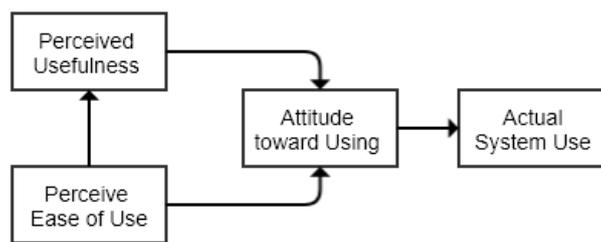
3) *Intelligent Modeling* is an intelligent analysis and development model by creating intelligent models using machine learning, which machine learning or machine learning is machine learning which is currently used to create intelligent systems [5] such as intelligent web and intelligent agent.

4) *Data sharing* is important in intelligent student relationship management systems. The technology that makes data exchange convenient and efficient is Web Services, which is a technology that exchanges data

with eXtensible Markup Language (XML) and provides Services Oriented Architecture (SOA) which consists of the Services Requester, the Service Provider and the Services Broker. In addition, Web Services can work under the technology cloud computing in the present as well.

## METHODOLOGY

The development of current information systems requires the development of a system that is useful and easy to use, otherwise the developed system may fail. The theory of technology adoption model (TAM) [6] for developing information systems, users must be perceived of useful and perceived ease of use which will result in the user having an attitude toward using the system and actual system use [7]. Therefore, researcher decide using conversational agent for interfacing between user and digital library.



**Figure 2**  
The General Technology Acceptance Model (TAM)

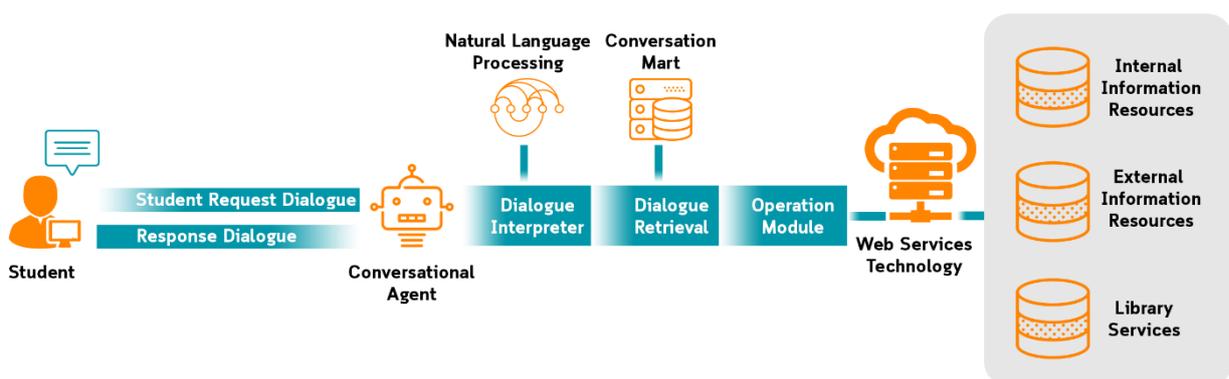
The system development of digital library by using conversational agent for enhancing intelligent student relationship management there are step as follow:

### 2.1. Investigation to Create Conversation Mart

The investigation to create conversation mart use questionnaires for users and service providers about services that are used regularly and analysis to create conversations and store them in the conversation mart.

### 2.2. System Architecture

The system architecture of digital library by using conversational agent for enhancing intelligent student relationship management as the Fig. 3



**Figure 3**

The system architecture of digital library by using conversational agent for enhancing intelligent student relationship management

From Fig.3 show that the system architecture consist of process as follow:

- 1) Student can request services via conversational agent and receive services or information resource from conversational agent.
- 2) Conversational agent is robot for translation (Dialogue interpreter) by using natural language

processing (NLP) to extract meaning and send to retrieve by dialogue retrieval process.

3) Operation module is process for set of conversation. This module exchange information via web services technology.

## 2.2. System Architecture Evaluation

This research is a study based on quantitative research. The researcher has studied and analyzed relevant documents and research from the international academic database and developing tools for interviewing samples and evaluating by 5 experts using the content validity index (CVI) assessment, which consists of 4 levels as follows

Level 1 Not relevant

Level 2 Somewhat relevant

Level 3 Quite relevant

Level 4 Absolute relevant

Then, the Content Validity Index (CVI) was evaluated by the Item Content Validity Index (I-CVI) from the number of experts evaluating content consistency at level 3 rather consistent. (Quite relevant) and level 4 are consistent (Absolute relevant) only and divided by the total number of experts. As the following equation

$$I - CVI = \frac{N_c}{N}$$

$I - CVI$  is a content-based accuracy index.

$N_c$  is the number of experts who evaluate content consistency at level 3 and level 4 only.

$N$  is the total number of experts

## RESULTS AND DISCUSSION

In this research, the conceptual framework and research hypothesis were conducted by creating an interview form consisting of 10 questions and evaluating the interview form with 5 experts. The results of the questionnaire were evaluated using the Content Validity Index (CVI) using the precision Item Content Validity (I-CVI) found that the content validity index (I-CVI) obtained from every expert assessment is in level 3 is quite consistent (Quite relevant) and level 4 is consistent (Absolute relevant). Therefore, it can be concluded that experts agree that the interview form created is accurate in content and can be used for data collection, the I-CVI value in each question is  $5/5 = 1.00$ . The I-CVI value shows that this system architecture can be used to develop digital library by using conversational agent for enhancing intelligent student relationship management.

## CONCLUSION

This article presents the system development of digital library by using conversational agent for enhancing intelligent student relationship management. The system integrate intelligent technologies such as data warehousing, conversational user interface (CUI), multi-agent system, machine learning and web services technology. The I-CVI to be used for system architecture evaluation, I-CVI value in each question is  $5/5 = 1.00$ . The I-CVI value shows that this system architecture can be used to develop digital library by using conversational agent for enhancing intelligent student relationship management. The system can be applied to the context of each institution and student will gain experience from the intelligent student relationship management system as well as the satisfaction of digital library. When graduated, the graduates still have the feeling of commitment and would like to participate in the development of institutions, resulting in a cycle of quality education development that affects the stability of the institution budget, quality of instruction and student retention rates that leads to sustainable development of the country.

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