

FUNCTIONAL REQUIREMENTS ANALYSIS OF E-COUNSELING

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ABSTRACT

This article aims to analyze the functional requirements of counseling activities that utilize information technology, called e-Counseling. This article used information resources of literature review, observation, interview, and researchers' experience as a methodology. The author conducted the analysis of functional requirement based on knowledge management system. Design of e-Counseling uses prototype software development methodology. The result of this study showed that all the functional requirements of e-Counseling could be traced well and completely based on knowledge management activities, among others knowledge acquisition/ creation, knowledge sharing, knowledge storage, and knowledge utilization. It could be concluded that the traceability quality of functional requirement analysis of e-Counseling had been met completely, effectively and efficiently.

Keywords: *E-counseling, Knowledge Management; Knowledge Management System*

1. INTRODUCTION

Counseling is part of the guidance, both as a service and as a technique. Counseling is an interpersonal process; one person is assisted by one other person to increase understanding and ability to find the problem [1]. Counseling is a relationship between trained helpers with someone who seeks help where helpers' skills and the atmosphere they make help others learn to connect with themselves and others in ways that grow and productive. In general, the term of counseling has long been known to man through history. Counseling relates to the historical development of individual potentials that can be traced from ancient societies. They emphasize the efforts to develop and strengthen the individual through education, so that can fill his role in society. Furthermore, they believe that in individuals there are forces that can be stimulated and guided towards effective goals for both themselves and their environment. If we examine the understanding of the counseling understanding outlined above, several aspects are components of a counseling, i.e., a trained counselor, a counselor as a beneficiary, an atmosphere and a method of assistance.

On the other hand, there have been technological developments that are essentially every utilization of technology aimed at improving the quality of human life [2], one of the technological devices that can be used in the counseling process is with the utilization of information systems. The

information system is a combination of information technology and the activities of people using computerized technology[3]. Information systems are systems that process data in an organized manner [4]. Based on many types of research, information system has a very good capability in decision making, the system has advantages in terms of accessibility of good data, efficient in time[5], accurate [6], support decisions precisely [7], more economically [8], wide accessibility [9], improve user understanding [10], improve productivity [11], provides good data and information [12], and used as a data storage medium [13].

The development of Information and Communication Technology (ICT) presents a new challenge to share information and knowledge[14], [15], included guidance and counseling practitioners to try to facilitate its knowledge with technological advances today. One of the guidance and counseling services by using computer technology, especially internet is E-counseling, it is a manifestation of a combination of scientific advancement of counseling services and mastery of technology science. Counseling is a process of consult that often takes an immediate time, while between client and counselor may be limited by distance. Therefore, it needs practical and flexible media as a bridge between clients and counselors to conduct a consultation session without being limited by space and time. To resolve this problem E-counseling is one of the most effective and efficient ways of the long-distance counseling process between counselors and

counselors to help with issues related to the personality and counseling life on the internet. On the other hand, consultation data should be kept as part of the learning process for counselors in conducting their counseling activities.

Based on the explanation above, we conduct the analysis process of e-Counseling functional requirements using Knowledge Management System (KMS) as a framework. So that, knowledge of counseling practitioners are stored properly in e-Counseling. In the next section will be explained about counseling process as elicitation of e-Counseling, functional requirement analysis of e-Counseling based on KMS, and then traceability of functional requirement.

2. METHODOLOGY

This article used information resources of literature review, observation, interview, and researchers' experience as a methodology. The author conducted the analysis of functional requirement based on knowledge management system. For the design of e-Counseling uses prototype software development methodology with structural model using Context diagram and Data Flow Diagram (DFD). During the software development process, developers and clients can interact in each process [15] [16].

Prototype software development has five processes, among others communications, quick plan, modeling quick design, construction prototype, deployment delivery and feedback. All of the processes will continue until all software requirements are met, and software is completed. In communication process developers and clients meet and define common goals, desirable needs and descriptions of the parts required. In quick plan process, the design is done quickly to represent all aspects of the software is known and this design becomes the basis for making prototype. Modeling quick design focused on the representation of software aspects that users need. Modeling quick design tends to process prototype creation. Build a prototype framework or design of the software to be built is conducted in the construction of prototype process. And the last, in deployment delivery and feedback process, the prototype that has been created by the developer will be distributed to the user for evaluation, then the user will provide feedback that will be used to revise the software requirements to be built. Repetition of this process continues until all needs are met.

Literature previously discusses Knowledge Management System (KMS) in the learning process,

in this article, we implemented and modified of KMS with a study focused on e-Counseling process based on the general process applicable to the counseling process. Based on KMS functionality, we breakdown the functionality into e-Counseling functional requirements as a basic frameworks. This article prove that KMS framework that used for learning process before can also be used for another case such as e-Counseling. And also, e-Counseling with KMS can be used to learn every client's issues during an online counseling session.

3. RESULT AND DISCUSSION

3.1 Elicitation of e-Counseling

E-Counseling is also called online counseling consists of two words namely the word "counseling" and the word "online." The word counseling refers to individual counseling that is the process of providing assistance done through counseling interviews by an expert (counselor) to an individual who is experiencing a problem (client) that leads to the problem faced by the client [17]. While the word online network (internet) and used by computers or other devices. Online counseling is internet counseling that generally refers to professions related to mental health services through communication technology. Counseling is developed using the simplest of communication technologies such as email, a session with chat, and live video sessions.

The use of multimedia will strengthen the function of e-Counseling, consider the communication by using the human senses will increase understanding of the problems. Multimedia is a digital product that presents and combines text, sound, images, animation, audio, and video, implemented with tools and connections so users can navigate, interact, create, and communicate [18]. In counseling, multimedia is used as a medium of education. Based on the results of research the use of multimedia for educational process has proven capable to create pleasant atmosphere [19], increase motivation [20], improve educational effectiveness [21], increase the level of understanding [22], education focus on the learner subject [23], and investment efficiency of education facilities [24].

The taxonomy of online counseling practice forms [25], consists of: (1) individual counseling based on email, involving long distance synchronous interactions between counselors and clients using what is read via text to communicate; (2) individual chat-based counseling, which involves synchronous remote interaction between counselor and client using what is read via text to communicate; (3) couples counseling based on chat, which involves

synchronous remote interaction between one counselor or more than one and the client pair by using what is read via text to communicate; (4) group counseling based on chat, which involves synchronous remote interaction between counselor (or more than one counselor) and some clients using what is read via text to communicate; (5) individual video-based counseling, which involves synchronous remote interaction between counselor and client using what is seen and heard via video to communicate; (6) video-based counseling, which involves the involvement of synchronous remote interaction between one counselor or more than one and a pair of clients by using what is seen and heard via video to communicate; (7) video-based group counseling, which involves synchronous remote interaction between multiple counselors and multiple clients using what is seen and heard via video to communicate.

There is 3 phase of the online counseling process, and also every phase is certainly a necessity that must exist in e-counseling [17].

- a. Preparation Phase. The preparation phase includes the technical aspects of the use of hardware and software, which support online counseling. Such as computer/ laptop devices that can be connected to internet/ Ethernet, headset, mic, webcam and so on. The software which supports counseling process, in this case, is e-Counseling, must be ready. Also, the readiness of counselors regarding skills, academic appropriateness, ethical and legal judgments, issues of issues to be discussed, and governance.
- b. Counseling Phase. Stages of online counseling can be done similarly to the face-to-face (f2f) counseling process in five stages among others: introduction, consulting, interpretation, coaching, and assessment. (1) Introduction, the first contact between counselor and client has a decisive influence on the continuity of the next meeting, the close relationship between counselor and client and mutual trust must be developed. (2) Consulting, target consulting is the things that are raised by the client related to the development and problems in the relationship counseling. (3) The interpretation of interpreting the client's meanings, problems, goals, and feelings, is part of the general techniques of individual counseling. (4) Coaching or guidance, which affirms the client's desire to set goals, develop programs, plan schedules, plan reinforcement, and personalize steps to take, this is part of general counseling techniques. (5) Assessment/

- termination of counseling, outcomes of individual counseling services should take three types of assessments: immediate assessment, short-term assessment, and long-term assessment. Immediate assessment, i.e., assessment at the end of individual counseling services. The focus of the assessment is immediately directed to the acquisition of new information and understanding, in the sense of comfort, and the planned post-action activities.
- c. Post-Counseling Phase. Stages of online counseling can be done similarly to the face-to-face (f2f) counseling process in five stages among others: introduction, consulting, interpretation, coaching, and assessment. (1) Introduction, the first contact between counselor and client has a decisive influence on the continuity of the next meeting, the close relationship between counselor and client and mutual trust must be developed. (2) Consulting, target consulting is the things that are raised by the client related to the development and problems in the relationship counseling. (3) The interpretation of interpreting the client's meanings, problems, goals, and feelings, is part of the general techniques of individual counseling. (4) Coaching or guidance, which affirms the client's desire to set goals, develop programs, plan schedules, plan reinforcement, and personalize steps to take, this is part of general counseling techniques. (5) Assessment/ termination of counseling, outcomes of individual counseling services should take three types of assessments: immediate assessment, short-term assessment, and long-term assessment. Immediate assessment, i.e., assessment at the end of individual counseling services. The focus of the assessment is immediately directed to the acquisition of new information and understanding, in the sense of comfort, and the planned post-action activities.

Phase three is the post-process stage of online counseling. At this stage it is a continuation of the previous stage where after the first assessment (1) the counseling will be marked with the effective client living (ECL) condition, (2) Counseling will be continued thereafter f2f, (3) Counseling will be continued at the next online counseling session, and (4) the client will be referral to another Counselor or other expert.

E-counseling has advantages and disadvantages. The advantages, among others: service can be done in a flexible time, has an efficient time because it can be done even if the counselor and counselee do not meet in person,

efficiently financially because if the counselor and counselee are separated a great distance, can improve the counselor and counselee understanding of the development of Information Technology (IT), schools or colleges that have been able to run e counseling of course the agency has been selling and high quality and can be known by the wider community, and then can spur counselor and counselee to always learn the development of IT.

signals for counseling process must in good condition; sincerity counselor to provide services in a non-formal; it is difficult to capture the emotional expression of non-verbal counselees; and treatment monitoring is based on counselee information only.

3.2 E-Counseling Functional Requirement Based on KMS

KMS is a process that helps companies to identify, select, organize, distribute, and transfer critical information and expertise that are part of corporate memory and which typically reside within the company in an unstructured form. The KMS is developed using three sets of technologies; there are communication, collaboration, and storage and retrieval [27]. There are three criteria that must be achieved for the implementation of KMS, among others: the system reflects and is responsive to the needs of the company; the system reflects the principles of Knowledge Management, particularly the impetus for collaboration and communication; and the system reflects a deep concern for the individual throughout the development phase.

KMS has four activities which are described in Figure 2, among others knowledge acquisition or creation, knowledge sharing, knowledge repository, and knowledge using [28]. Knowledge acquisition is an accumulation, transfer, and transformation of expertise in solving problems from sources of knowledge; somehow knowledge is defined by someone who finds new ways of doing things or creating know-how. In an organization, there will be individuals who create new knowledge or ideas. Creating such knowledge is not only to create knowledge or idea of perfunctory but also pay attention to how to create a knowledge so that later can be used in an organization. Creating a new knowledge within an organization is an endless process that includes creating new ideas, capturing new paradigms, and incorporating isolated principles to build new processes. In this article, knowledge acquisition is transferred to a computer.

Then, knowledge sharing is done after creating new knowledge and organizing it. The success of an organization in conducting knowledge management depends on how to share that knowledge properly and correctly. The effectiveness of KMS cycle depends on individual ability to share the knowledge. Culture has an important role to share useful knowledge. The formation of a culture in which "knowledge sharing is power, not knowledge is power," has a great influence on the success of knowledge sharing in the knowledge management cycle. At knowledge storage stage the cycle of KMS refers to storing, recording and preserving knowledge.

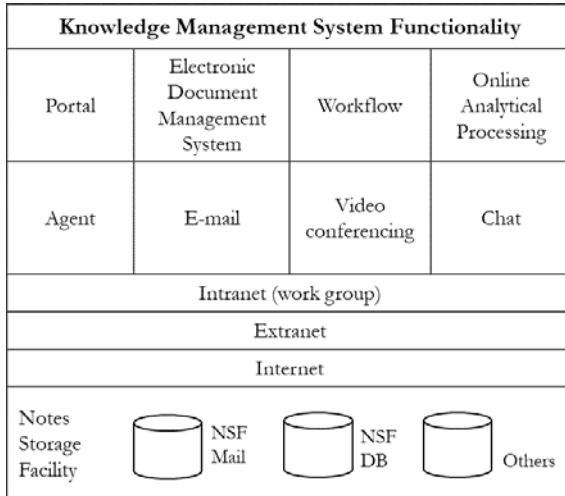


Figure 1: Functionality Framework of Knowledge Management System[26]

Disadvantages of online counseling include counseling highly dependent on media support; if the media used is not problematic, counseling will be smooth to do. So that the design of e-Counseling is expected to be an effective communication medium between the client and the counselor. On the other hand, the counseling data storage (by keeping identity and privacy of the client) can be used as a learning medium for the counselor. The e-Counseling application is designed in quality with a high level of security and confidentiality. For further research can be done by analyzing the communication pattern, confidentiality, and system security.

On the contrary, online counseling may be disconnected and may not even be operated by a power failure, impaired connection, or damage to the device used. Another condition is the low or untreated counselors in the use of media. The absence of any formal and specialized training that can be followed for skill in online counseling. In addition, the disadvantages of e-counseling among others: the initial cost is large enough to prepare hardware purchases such as computers, internet services, etc.; limited ability of counselor and counselee about understanding of IT development;

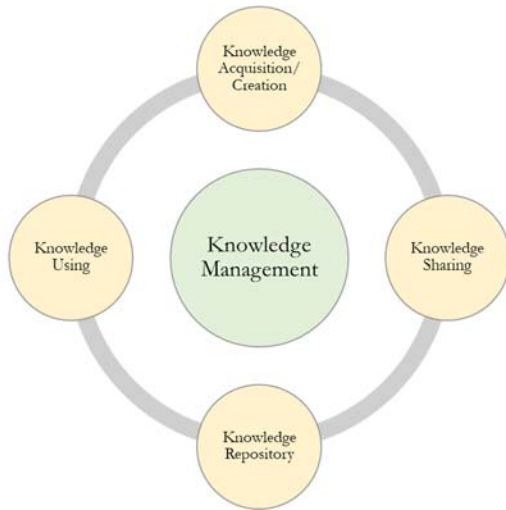


Figure 2: Knowledge Management Activities

Knowledge storage is a requirement before sharing knowledge. After creating new knowledge, it is necessary for an organization to organize the process of knowledge so that later can become a quality knowledge. And the last is knowledge using or applying that implement knowledge refers to the application of shared knowledge without prejudice to the person who is the source of that knowledge. The knowledge that has been created, organized and shared, then is applied knowledge in an organization. To make and to make the organization last longer.

Table 1: E-Counseling Functional Requirement based on KMS Framework

KMS Framework	e-Counseling Functional Requirement (with FR-Number as Code)
Portal	e-Counseling as a portal that can be accessed online between counselor and client (FR01)

KMS Framework	e-Counseling Functional Requirement (with FR-Number as Code)
Electronic Document Management System	e-Counseling can manage input and output data, information or document, among others: <ul style="list-style-type: none"> - Creating client data, information, or document (FR02) - Retrieving client data, information, or document (FR03) - Updating client data, information, or document (FR04) - Deleting client data, information, or document (FR05) - Creating counselor data, information, or document (FR06) - Retrieving counselor data, information, or document (FR7) - Updating counselor data, information, or document (FR08) - Deleting counselor data, information, or document (FR09)
Workflow	e-Counseling provides a service, such as: <ul style="list-style-type: none"> - Client registration (FR10) - Counselor registration (FR11) - Find the counselor based on problem category, among others addiction, ADHD, adultery, aging, anger, bitterness, burnout, career, children, depression, insecurity, marriage, pregnancy, and psychological trauma. (FR12) - Choose the session or the consultation type, among others: video chat, phone, e-mail, chat, or in person (FR13) - Recording the consultation process with provided form, among others, who is the client, who is the counselor, what is the problem category, when the consultation held, what is the type of session, and the summary of consultation process. (FR14)

KMS Framework	e-Counseling Functional Requirement (with FR-Number as Code)	KMS Framework	e-Counseling Functional Requirement (with FR-Number as Code)
Online Analytical Processing	<ul style="list-style-type: none"> - e-Counseling can record the history of consult process (FR15) - e-Counseling can analyze client problem base on the history of consult process (FR16) - e-Counseling can give automatic recommendation or solution based on the history of consult process (FR16) - e-Counseling can give a statistical report of client information and client problem (FR17) - e-Counseling can give data analysis related to client problem (FR18) 	Intranet, extranet, internet	Based on the taxonomy of online counseling, e-Counseling provides individual counseling by email, individual chat-based counseling, couples chat-based counseling, group chat-based counseling, individual video-based counseling with one client and one counselor, individual video-based counseling with more than one clients and one counselor, and video-based group counseling (FR21)
Agent	e-Counseling has three users, among others Counselor, Client, and Administrator (FR19)	Storage	e-Counseling has data storage as a master data for Client, Counselor, Administrator, and History of Consult. And from master data can be created a report and an analysis data that also can be stored in e-Counseling (FR22)
Email, Video conferencing, chat	e-Counseling provides communication access, either between counselor and client, counselor and administrator, or between client and administrator, such as e-mail, phone, video conferencing, and chat (FR20)		

Based on functionality framework of KMS in Figure 1 and KMS activities in Figure 2, we have a functional requirement for e-Counseling that describe in Table 1. Then, the analysis result of the e-Counseling functional requirement is modeled by Data Flow Diagram (DFD) that described in Figures 3-5.

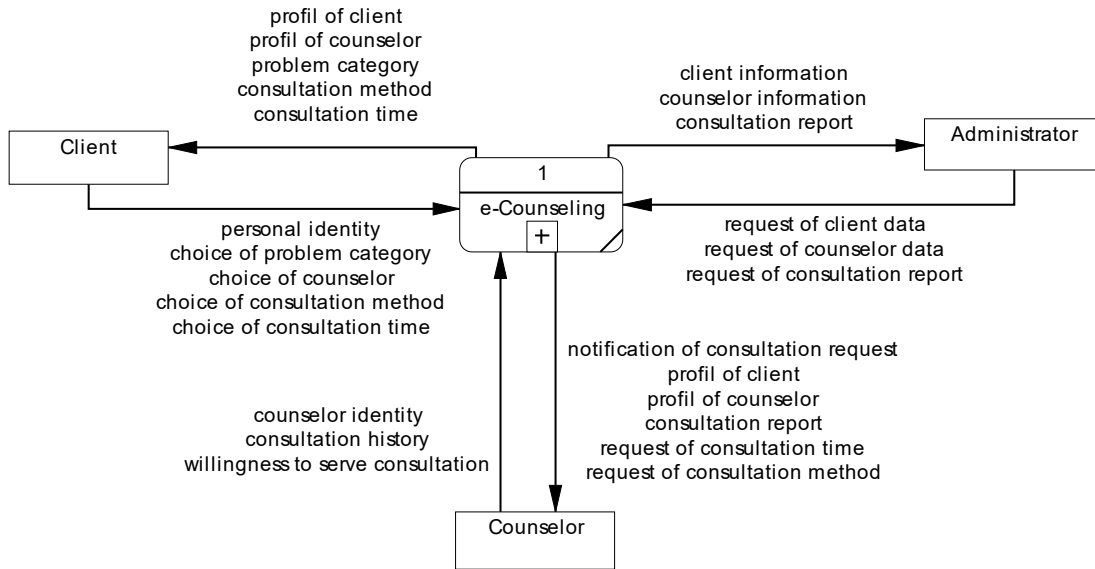


Figure 3: Context Diagram or DFD level 0 of e-Counseling

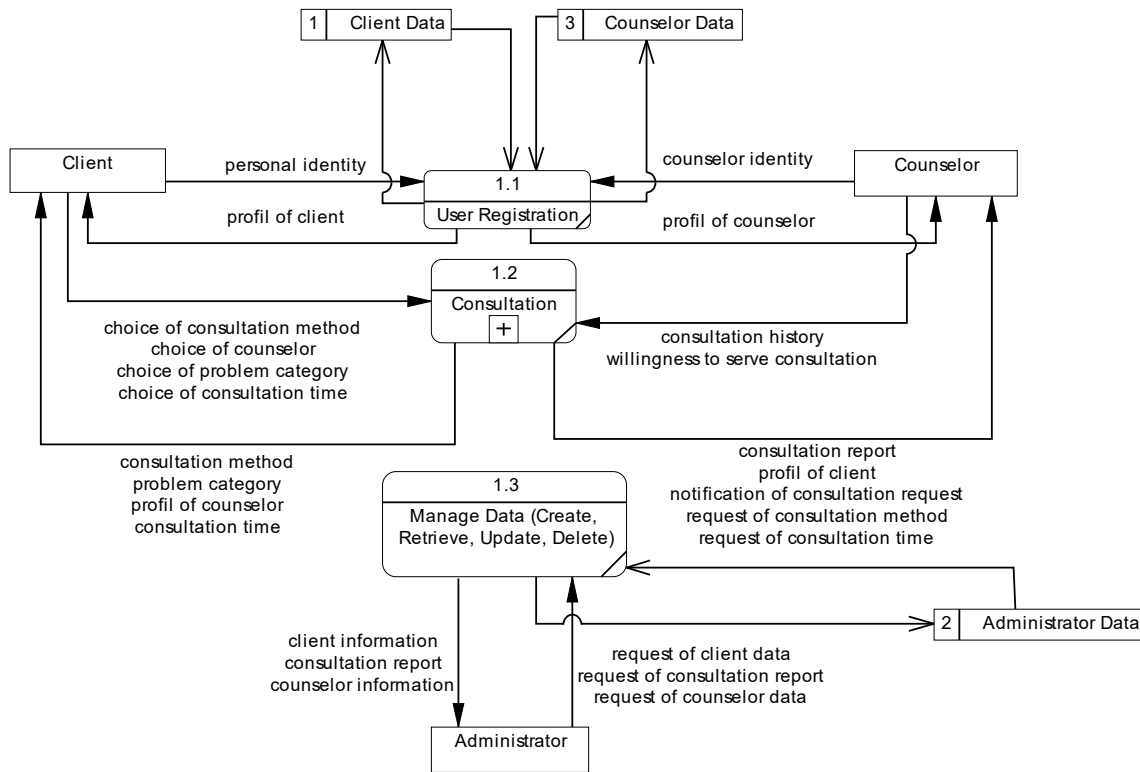


Figure 4: DFD level 1 of e-Counseling

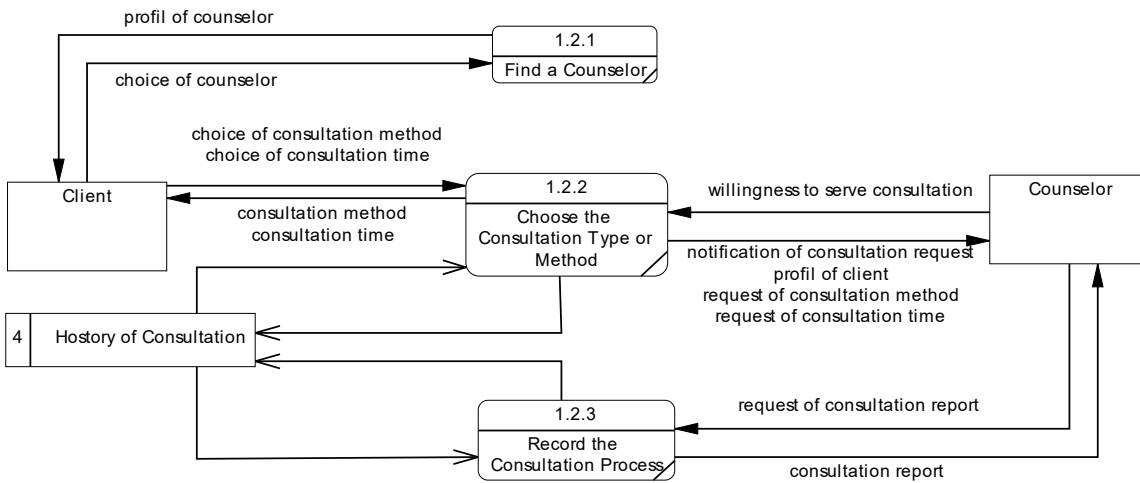


Figure 5: DFD level 2 of e-Counseling

Development of e-Counseling was done related to functional requirements that had defined in Table 1. DFD modeled all of the functional requirements. Then, for making sure that DFD had been reaching all of the functional requirement, we traced all of the process, data flow, and data storage

in DFD by the functional requirement. Traceability result was shown in Table 2.

Table 1: Traceability between DFD and e-Counseling Functional Requirement

e-Counseling FR	Model in DFD
FR01	All of the process in DFD
FR02	Process 1.3
FR03	Process 1.3
FR04	Process 1.3
FR05	Process 1.3
FR06	Process 1.3
FR07	Process 1.3
FR08	Process 1.3
FR09	Process 1.3
FR10	Process 1.1
FR11	Process 1.1
FR12	Process 1.2, 1.2.1, and 1.2.2
FR13	Process 1.2 and 1.2.2
FR14	Process 1.2 and 1.2.3
FR15	Process 1.2 and 1.2.3
FR16	Process 1.2 and 1.3
FR17	Process 1.2 and 1.3
FR18	Process 1.2 and 1.3
FR19	All of the Entities in DFD
FR20	Process 1.2
FR21	Process 1.2
FR22	All of Data Store in DFD

It proved that DFD was modeled all of the e-Counseling functional requirements completely. The architecture of e-Counseling was described in Figure 6 that had three users who access the interface of e-Counseling, an interface layer, facilities, actions, file format, and database. Based on analysis of e-Counseling functional requirement, there were three users, among others Client, Counselor, and Administrator or Admin.

The interface of e-Counseling was a web browser that more flexible to access, either in desktop or mobile. There were find a Counselor, Choose the Problem Category, Choose Method and Time of Consultation, Consultation process, and Statistical Reports as e-Counseling Facilities. Then, the actions of e-Counseling, among others View Category, Consultation Process, Generate Consultation History, Search Counselor, User Administration, Show Problem Category, Record the History of Consultation, Save Consultation Record Document, Show Counselor based on Category, and Fill Metadata. For the file format, based on the methods of consultation, there were a text file, picture, audio, and video. And the last, the database of e-Counseling was knowledge repository that could be processed and analyzed into the statistical and analytical report. For the example of user interface mockup design of e-Counseling is shown in Figure 7.

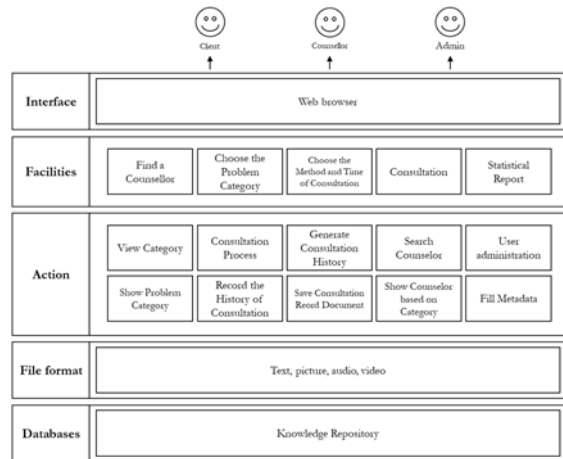


Figure 6: Architecture of e-Counseling



Figure 7: The Example of e-Counseling User Interface Mockup

The development of information and communication technology or often called ICT (Information and Communication Technology) presented a new challenge for guidance and counseling practitioners to try to consultations activities with technology. One of the guidance and counseling services by using computer technology, especially internet was e-counseling, it is a manifestation of a combination of scientific advancement of counseling services and mastery of technology science. Email counseling was often referred to as e-mail therapy, online therapy, cyber counseling or e-counseling. Email counseling was a therapeutic process which includes writing in addition to meeting directly with a counselor.

E-counseling was one of the guidance and counseling strategies that are virtual or counseling that takes place with the help of internet connection. In this case, the counseling process takes place via the internet in the form of website, e-mail, Facebook,

video conference (yahoo messenger) and other innovative ideas.

The benefit of e-Counseling, among others:

- a. Can save time. Through e-counseling, counselors can perform services wherever they are located, especially for students who need services right away. Also, through the website created in each school, students can access the information needed quickly.
- b. Schools or colleges that run e-counseling already surely have more value in aspects of technology-based guidance and counseling services.
- c. For those who are not familiar with the internet, with the socialization of e-counseling then lay counselors will be able to learn it. Thus, there is no obsolete or technological terminology. Of course, it is balanced with effort and a strong will to master the technology, and so forth.

The weakness of e-Counseling, among others:

- a. The initial cost of preparing for large cyber counseling, such as computers and their applications, the Internet and its devices.
- b. Professional counselor capability in technical mastery. For counselors and students/ or counsel who lay with the internet is certainly not able to run this program, so it is necessary to hold special training
- c. High low signal internet. The size of the internet signal will not affect the speed of the connection, especially in running a video conference that requires a good internet signal.
- d. Efforts to manage service strategies. How the counselor manages the service will determine the success of the goals be achieved.
- e. The sincerity of counselors to provide non-formal services. For counselees who require services outside of school hours/ non-formal, it takes its sincerity.
- f. Internet use for negative actions. In order not to give a negative influence on students from learning the internet, then early students are also taught the basis of character as a foundation to know the good of an action that is done.

4. CONCLUSION

KMS can be used in various aspects that want to take advantage of technology. One of which is e-Counseling which utilizes information and communication technology with internet which facilitates between client and counselor do the consultation process without having to face to face,

and anytime they can do it. This article discussed the functional needs of e-Counseling starting from the elicitation of e-Counseling needs, modeling the functionality requirements of e-Counseling using DFD, to design e-Counseling architecture and e-Counseling user interface. The process of requirements analysis of e-Counseling was done by using KMS framework. Based on the results of traceability, all functional requirements of e-Counseling had been met well, complete and by the needs of e-Counseling itself. For future research, implementation of the results of the analysis and design of functional requirements of e-Counseling in this article can be done. Can also be added methods of data analysis to generate useful reports.

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