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Adapting Unified Process Model Approach in Designing Application for Research Data Governance

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Abstract:
The management of data research at the Institute of Research and Community Service at Trunojoyo University of Madura (LPPM-UTM) is currently still manual. The process of taking researchers' biodata forms and submitting research files is still done manually. Therefore, we need an application that can overcome these problems. In this study the application was designed and built using the Unified Process model and Code Igniter Framework. The Unified Process Model (UPM) is an iterative, incremental, architecture-centric and use-case driven approach to software development. Code Igniter is an open-source software rapid development web framework, for use in building dynamic web sites with PHP, Code Igniter is loosely based on the popular model–view–controller (MVC) development pattern. Based on the results of functionality testing and questionnaire retrieval to the user, the results show that the average percentage of system attainment is declared as viable at 99.3% and not worth 0.7%. While the effectiveness of the system scored 69.4%.

Keywords: LPPM-UTM, Unified Process, Governance, Data Research, Code Igniter.

I. INTRODUCTION

Higher education is obliged to carry out research and community service besides implementing education as mandated by Law Number 20 of 2003 concerning Article 20 National Education System. In line with these obligations, Law Number 12 of 2012 concerning Higher Education Article 45 affirms that research in Higher education is directed at developing science and technology, as well as improving people's welfare and national competitiveness. In the article, it is also emphasized that community service is an activity of the academics in practicing and cultivating science and technology to advance public welfare and educate the nation's life [1]. One of the tasks of the Research and Community Service Institution (LPPM) at Trunojoyo Madura University (UTM) is to manage research data. According to administrator so far in the University of Trunojoyo Madura there is no separate system for managing research data so that every lecturer who wants to research must request files / data to LPPM manually. [2] To overcome the problems faced by LPPM officers regarding the management of research data, LPPM requires an application that is managed by LPPM officers. In making a software must have good analysis techniques and modeling techniques, so that the realization of a good software. There are several models in building a software, including: Waterfall Model, Spiral Model, Rapid Application Development (RAD) Model [3] and Unified Process Model [4].

II. LITERATURE REVIEW

A. *Related Works*

Riyan Adiwinata, Eko Adi Sarwoko, Indriyati. [5] explains that the Unified Process Method by emphasizing the reusable concept can accelerate the software development process. Usman Efendi, Yesi Novaria Kunang, Seva Novifika [6] explained that this method has two dimensions, the first dimension represents time and shows the dynamic aspects of software development, this dimension consists of four stages namely inception, elaboration, construction and transition. The second dimension represents the static aspects of the software development process which are grouped into several core workflows consisting of Business Modeling, Requirement, Analysis and Design, Test Implementation and Deployment. Defa Hanifta Putra, Satriyo Adhy. [7] explains that the use of a unified process allows developers to do several workflows in one phase and it could be that the workflow that has been done is repeated again in the next phase. Tito Sugiharto, Abdul Kadir, Ridi Ferdiana. [8] explains that the Rational Unified Process (RUP) is a software engineering method developed by collecting various best practices found in the software development industry. Eka Putra Sunaryo, Ricko Hidayat, Rizani Teguh. [9] explains that the RUP methodology (Rational Unified Process) because this methodology has led to the design of object-oriented systems.

B. *Governance*

Effective data governance is important in the company, setting parameters for data management and usage. With effective data governance, the problem solving process will enable business users to make decisions based on high quality data so that the results are more precise and at the same time information assets are also well managed. But implementing a good data governance framework is not easy. [10]

C. *Research*

Research methods or scientific methods are procedures or steps in obtaining scientific or scientific knowledge. So research methods are a systematic way to compile knowledge. While research techniques are a way to carry out research methods. Research methods usually refer to forms of research. [8]

D. *Unified Process*

The Unified Process is one software development process that applies object-oriented concepts developed by Ivar Jacobson, Grady Booch, and James Rumbaugh. [11]

The advantages of the Unified Process [12] include:

1. Providing easy access to basic knowledge for team members.
2. Provides instructions on how to use UML effectively.
3. Support the repetition process in software development.
4. Enables additions to the process.
5. Enables to systematically control changes that occur in software during the development process.
6. It is possible to run a test case using the Rational Test Manager Tool.

III. RESEARCH METHODOLOGY

The method used in this study is the Unified Process Model. The Unified Process model is one of the software development processes developed by Ivar Jacobson, Grady Booch, and James Rumbaugh. [11]. Unified development model. The process has 4 phases and 5 workflows as illustrated in Figure 3.1:

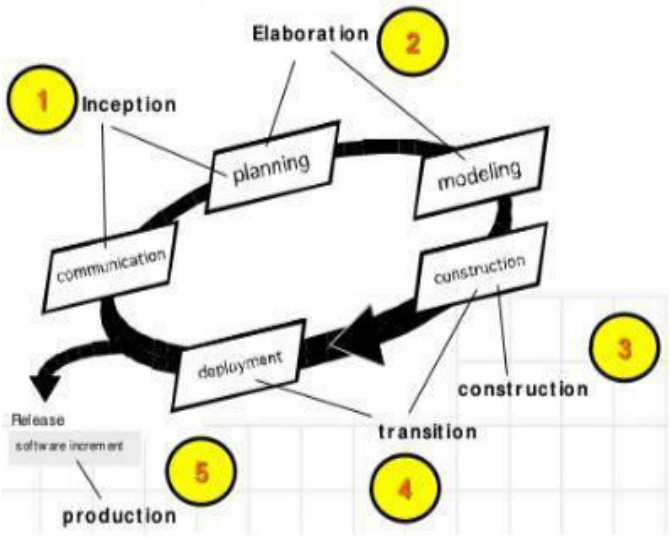

Figure 3.1. Unified Process Structure

Based on Figure 3.1. the unified process phase is described as follows [13]:

- **Inception**: This phase has a focus on understanding the scope of the project, objectives, and getting enough information to ensure whether the software is worthy of continued development or not. What is emphasized in this phase is workflow system requirements and analysis.

- **Elaboration**: System requirements that have previously been obtained at the inseption phase are improved in the elaboration phase so that the system requirements become more structured and close to valid. Intense workflow carried out in this phase is system requirements, analysis, and design.

- **Construction**: The focus of this phase is to build and carry out software testing. Therefore, an intense workflow carried out at this phase is implementation. Software at this phase has reached the beta version and is ready for testing to the user.

- **Transition**: Errors (software defects) that have been found in the previous phase have been corrected. In this phase, the software is deployed to the client (client).

IV. SYSTEM DESIGN

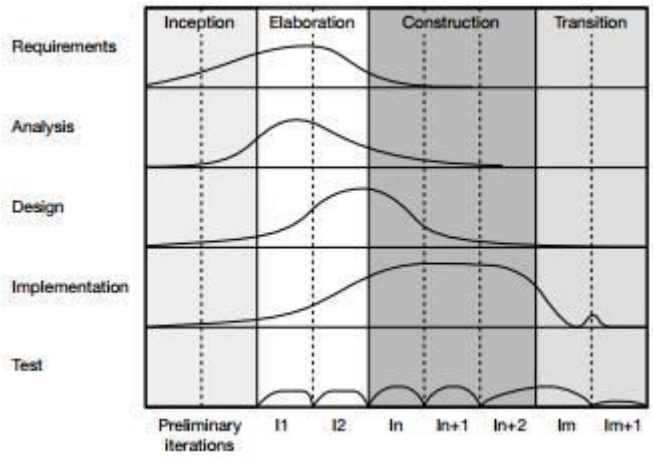

Figure. 4.1: Unified Process Structure

The system designed in this study uses the Unified Process Model. The Unified Process model is one of the software development processes developed by Ivar Jacobson, Grady Booch, and James Rumbaugh. [11]. The Unified Process development model has 4 phases and 5 workflows as illustrated in Figure 4.1. Based on Figure 4.1. the Unified Process phase is explained as follows [9]:

- **Inception**

This stage is more about modeling the required business processes (business modeling) and defining system requirements that will be created (Requirements). The expected results from this stage are fulfilling objective lifecycle milestones with the following criteria:

a. Feedback from defining scope, cost estimates and estimated schedules.
b. Needs are clearly understood (proven) and in line with the primary case needed.
c. Credibility of estimated costs, estimated schedule, scale determination
b. priority, risk and development process.
a. The scope of the prototype that will be developed.
b. Build a baseline by comparing actual planning with planned planning.

This Requirement Phase is carried out in three phases, namely in the phase of the Reception, Elaboration and Construction. Based on figure 3.2. above, the Requirements stage is mostly carried out in the Elaboration phase rather than the Construction and Construction phases.

- **Elaboration**

This stage is more focused on system architecture planning. This stage can also detect whether the desired system architecture can be created or not. Detect risks that are easy to occur from the architecture created. This stage is more about system analysis and design and system implementation that focuses on system prototypes. The expected results from this stage are fulfilling objective lifecycle milestones with the following criteria:

a. The case model used (use case) where the case and the actors involved have been identified and most cases must be developed. The use case model must be 80% complete.
b. A description of the software architecture from the software development process has been made.
c. Elastic design can be obtained

b. implemented and implemented the use case. Business cases or business processes and a list of risks that have been corrected (revisions) have been made.
a. Development plans for all projects have been made.
c. Prototypes that can be demonstrated to reduce any technical risks identified.

- **Construction**

This stage focuses on developing components and system features. This stage is more on the implementation and testing of systems that focus on the implementation of software in the program code. This stage produces a software product which is a condition of the Milestone Initial Operational Capability or initial operational capability limit.

- **Transition**

This stage is more on system deployment or installation so that it can be understood by the user. This stage produces a software product which is a condition of the Milestone Initial Operational Capability or initial operational capability limit. Activities at this stage include the user training, maintenance and testing of the system whether it meets user expectations.

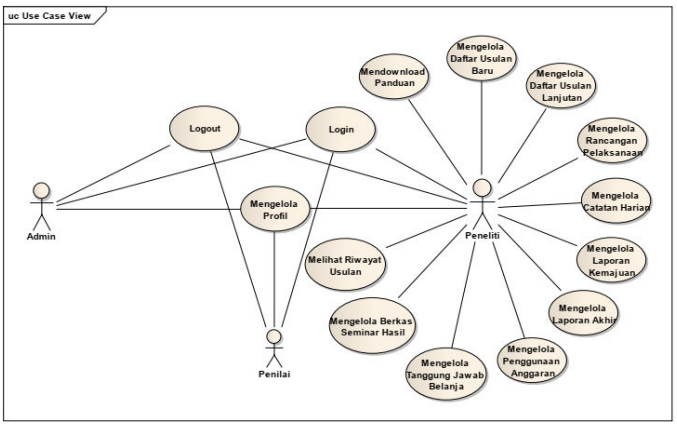

Figure .4.1. System Use Case Diagram

V. TESTING AND RESULT

The purpose of testing is to ensure that the system can provide the necessary functionality. Testing is done by testing functionality and testing the effectiveness of the system using a questionnaire to the user.

Table 5.1: User Questioner

No	Question	STS	TS	C	S	SS
1	Application easy to use	0	0	3	2	1
2	The application has a user friendly	0	0	3	3	0
3	All features of the application run correctly	0	0	1	5	0
4	The application makes it easy for users inside manage research data	0	0	4	2	0
5	Satisfaction in using the Application	0	0	5	1	0
6	Comfort in using the Application	0	0	4	2	0
	TOTAL	0	0	20	15	1

Table 5.1: is the result of a user questionnaire recapitulation in use the research data governance application. Questionnaire data collection gets results:

Amount of data (n) : 5
Number of questions : 6
Highest score (MAX) : 6 * 6 * 5 = 180
Result
- ✓ Enough : 20 * 3 = 60,
- ✓ Agree: 15 * 4 = 60,
- ✓ strongly agree: 1 * 5 = 5.

Total Score: 125

Percentage of eligibility : 125/100 * 100% = 69,4 %

System Feasibility Test is conducted by distributing questionnaires to each party related to the proposal of research proposals, including Lecturers as Researchers, Campus Staff and Administrators of LPPM with the following results. Questionnaire responses of respondents were arranged based on the Guttman scale expressed in the form of questions [14].

- **Researchers**

Distribution of questionnaires to lecturers with 10 respondents with 15 questions

Table.5.2. Table of Questionnaire Results for Researchers

Interpretation	1	2	3	4	5	6	7	8	9	10
Feasible	15	15	15	15	15	15	15	15	15	15
Not feasible	0	0	0	0	0	0	0	0	0	0

- **Campus Staff**

Distribution of questionnaires to Campus Staff as many as 5 respondents with 10 statements

Table 5.2. Table of Questionnaire Results for Campus Staff

Interpretation	1	2	3	4	5
Feasible	10	10	9	10	10
Not feasible	0	0	1	0	0

- **Admin of LPPM**

Distribution of questionnaires to the Admin with 3 respondents and 15 questions

Table 5.2: Table of Questionnaire Results for Admin

Interpretation	1	2	3	4	5	6	7	8	9	10
Feasible	15	15	15	15	15	15	15	15	15	15
Not feasible	0	0	0	0	0	0	0	0	0	0

Based on the questionnaire that has been distributed, then it will be analyzed by calculating the percentage of answers in each type of respondent. The data obtained can be calculated using the following formula:

$$P = \frac{F}{N} x\ 100\%$$

P = percentage response
F = number of answers
N = number of responses

- **Researchers**
  - Feasible : 150 / 150 x 100 % = 100%
  - Not feasible : 0 / 100 x 100 % =0.0%

- **Campus Staff**
  - Feasible : 49 / 50 x 100 % = 98%%
  - Not feasible : 1 / 50 x 100 % = 2.0%
- **Admin of LPPM**
  - Feasible : 150 / 150 x 100 % = 100%%
  - Not feasible : 0 / 150 x 100 % = 0.0%

VI. CONCLUTION

Based on the design and implementation of the system and the results of the calculation of questionnaire testing that has been carried out from 3 types of respondents, it can be concluded that the average percentage of system attainments stated as feasible is 99.3% and those that are not feasible 0.7% and based on user questionnaires combined with a table of ranges of effectiveness values produces a value of 69.4%. So from these results this application has been quite effective and meets the needs of users in conducting Research Data Management.

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