JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

APPLICATION OF FAST FRAMEWORK IN THE DEVELOPMENT OF UNTAN FMIPA LABORATORY INFORMATION SYSTEM

Yudha Arman[1], Renny Puspita Sari[2], Nurul Mutiah[2*], Dian Prawira[2]
[1]Physics, Universitas Tanjungpura
[2]Information Systems, Universitas Tanjungpura
email: *yudha_arman@physics.untan.ac.id

Abstract: The laboratory is one of the facilities owned by the FMIPA Laboratory, which is one of the facilities owned by Tanjungpura University to support tridharma activities. There are several problems in laboratory management, namely that management is carried out manually, so it takes a long time to apply for the loan of laboratory equipment and to prepare a free laboratory loan letter. In order to improve services, ensure data security, and accommodate all laboratory data, it is necessary to develop an FMIPA laboratory information system (SILABMIPA). The FAST framework is used in developing SILABMIPA to suit user needs. The analysis and development of SILABMIPA follows the FAST method with the stages Scope Definition, Problem Analysis, Requirements Analysis, Logical Design, Decision Analysis, Physical Design and Integration, Construction and Testing. With the construction of SILABMIPA, it can make it easier for managers to manage laboratories, assist students in applying for and borrowing equipment, as well as making laboratory loan-free certificates. Based on the results of system functional testing against SILABMIPA, it was found that the system operates well in accordance with the user's functional needs. Meanwhile, the system interface test results including software aspects, functionality aspect, and visual communication aspects obtained a percentage score of 82.60% in the very good category.

Keywords: information systems; fast framework; laboratory service

Abstrak: Laboratorium FMIPA merupakan salah satu sarana yang dimiliki Universitas Tanjungpura dalam mendukung berbagai kegiatan akademik. Terdapat beberapa masalah didalam pengelolaan Laboratorium FMIPA yang dilakukan secara manual seperti lamanya waktu yang diperlukan untuk mengajukan peminjaman alat laboratorium dan pembuat surat bebas pinjam laboratorium. Salah satu upaya yang efektif dalam meningkatkan layanan, menjamin keamanan data, serta menampung seluruh data laboratorium, diperlukan suatu sistem berbasis teknologi yakni sistem informasi laboratorium FMIPA(SILABMIPA). Agar pengembangan SILABMIPA sesuai dengan kebutuhan pengguna maka digunakan metode *Framework for the Application of Sistem Thinking* (FAST) sebagai metode pengembangan perangkat lunak. Analisis dan pengembangan SILABMIPA mengikuti metode FAST dengan tahapan *Scope Definition, Problem Analysis, Requirements Analysis, Logical Design, Decision Analysis, Physical Design and Integration, Construction and Testing*. Dengan dibangunnya SILABMIPA dapat memudahkan pengelola untuk melakukan kelola laboratorium, membantu mahasiswa dalam pengajuan dan peminjaman alat, serta pembuatan surat keterangan bebas pinjam laboratorium. Berdasarkan hasil pengujian fungsional sistem terhadap SILABMIPA berbasis *website*, didapat bahwa sistem beroperasi dengan baik sesuai dengan kebutuhan fungsional pengguna. Sedangkan hasil pengujian antarmuka sistem termasuk dalam aspek perangkat lunak, fungsionalitas, dan komunikasi visual pada sistem memperoleh nilai persentase 82.60% dengan kategori sangat baik.

Kata kunci: sistem Informasi; kerangka kerja fast; layanan laboratorium

JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

INTRODUCTION

The rapid development of technology has triggered various organizations, especially higher education organizations, to find various problem solving solutions in supporting the tri dharma process and can make it easier for system managers to organize information and optimize organizational work processes [1]. The laboratory is one of the facilities that supports the three principles of higher education. The laboratory is a space designed to carry out the needs of the tri dharma process of higher education including education, research and community service in which there is infrastructure and supporting facilities tailored to needs [2]. In order to implement a good laboratory use process, an effective and efficient inventory and management process is needed. Laboratory management is a process of planning, managing, directing, monitoring and controlling laboratory equipment and supplies used to achieve certain goals, in this case the implementation of the tri dharma process of higher education [3]. Inventory in the laboratory management process is documentation of facilities and infrastructure for laboratory equipment and laboratory activities to prevent misuse, facilitate laboratory operations and inspections [4].

Based on the 2019-2024 Strategic Plan of the Faculty of Mathematics and Natural Sciences (FMIPA), the Laboratory is one of the facilities owned by Tanjungpura University to support various academic activities. Currently FMIPA has 13 laboratories. The capacity and time allocation for use of the FMIPA laboratory is very limited to meet the needs of the entire FMIPA academic community. Practical activities organized by various laboratories under the auspices are handed over to departments or study programs whose fields of study are very intersecting. Various processes that take place at the FMIPA UNTAN Laboratory still use conventional media so that searching and processing data takes a relatively long time and existing data is vulnerable to damage or loss. One effective effort to increase the efficiency of data search and processing time, improve services, ensure data security, and accommodate all laboratory data, requires a technology-based system that is able to accommodate the various needs of all processes that take place in the laboratory. A laboratory information system is a system that manages and stores data on all laboratory activities, starting from equipment inventory, borrowing equipment, using equipment, lab usage, correspondence and other laboratory needs [5]. Laboratory information system development is a facility that has now become the main equipment in the laboratory governance system [6].

To implement the FMIPA laboratory information system in this research, a software development method was used. Software development methods are frameworks used so that software is built according to user needs and follows standards [7]. This research uses *Framework for the Application of Sistem Thinking* (FAST) as a software development method. FAST is a software development method that aims to make the management of data and information needed in development effective and accurate [8]. Several previous studies have implemented FAST as a software development method [9], [10]. Based on this research, it was found that implementing FAST as a method in developing information systems can create a system that is built according to user needs and is built by applying the principles of systems thinking so that it can view problems and solu-

JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

tions in an information system and in a comprehensive way. Based on this, this research carried out a design for a Laboratory Information System FMIPA UNTAN by applying the FAST method.

METHOD

The FAST method is a software development method that can capture user needs precisely. The FAST stages consist of Scope Definition, Problem Analysis, Needs Analysis, Decision Analysis, Logical Design, Physical Design, Construction and Testing, and Installation and Delivery. This research method adopts the stages of the FAST method. The research stages can be seen in Figure 1.

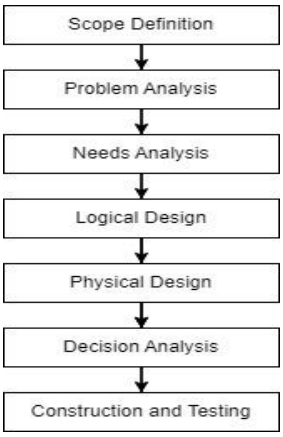

Figure 1. Research Methodology

The research stages carried out consist of:

1. Defining the scope to be completed and collecting information using the SMART method.
2. Problem analysis containing the main problems of the current system carried out using the PIECES method.
3. System requirements analysis which includes the results of the functional and non-functional requirements analysis of the system being built.
4. Logical design which contains system design both in the form of UML diagrams and data modeling.
5. Physical design which changes the logical design into a physical design in the form of a relational database design and interface design that is ready to be implemented.
6. Decision Analysis in the form of selecting the software and hardware used to build the system.
7. construction and testing is carried out by implementing logical and physical designs into coding form and testing is carried out on the system that has been built. Testing was carried out using the black box method. testing was carried out using the black box method. The test questionnaire is calculated using a Likert scale calculation with formula (1).

$$\%\ Index = \frac{total\ score}{y}\ X\ 100 \quad (1)$$

RESULTS AND DISCUSSION

Analysis and design in this Laboratory Information System uses a system development method, namely the Framework for the Application of System Thinking (FAST), which is carried out sequentially based on stages, namely, Scope Definition, Problem Analysis, Requirements Analysis, Logical Design, Decision Analysis, Physical stages. Design and Integration, Construction and Testing, and Installation and Delivery.

In the scope definition, the activity carried out is defining the boundaries of the information system project contained in the Project Charter. In this discussion, there are project limitations,

JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

namely a website-based system for FMIPA Tanjungpura University, whose users consist of academic admins, deans, lecturers and students. The types of services in the system will be based on user needs. To determine the feasibility of the project, it can be found in the Project Charter using the SMART Method. SMART is an abbreviation for Specific, Measurable, Achievable, Relevant, and Timebound. The SMART method is an approach to planning and setting targets that are precise and measurable [11]. Table 1 below is the result of SMART method analysis from the FMIPA laboratory information system.

Table 1. Results of SMART method analysis

SMART Method	Description
Specific	The aim of this project is to build a laboratory information system for FMIPA Untan which provides laboratory management services for all study programs at FMIPA Untan, which makes it easier for lecturers and students to carry out activities in the field of tri dharma of higher education which creates -use the laboratory as a support.
Measureable	Satisfaction and usefulness of the laboratory information system services that were built were measured using a survey intended for academic admins, lecturers and students.
Achievable	In achieving its goals, FMIPA Untan prepares human resources who have expertise in accordance with their fields, carries out planning based on project priorities according to predetermined time estimates and budgets, builds communication and coordinates both individually and in project teams based on the project's RACI Chart.
Relevant	The objectives of the FMIPA laboratory information system project are in line with the Vision, Mission and Objectives of FMIPA Untan which focuses on improving the quality of implementing the tri dharma of higher education.
Time Based	The SI-LABMIPA creation project lasted for 6 months, starting from June until December 2023.

Problem analysis is carried out using the PIECES method which identifies problems in the system through the Performance, Information, Economic, Control, Efficiency and Service components. At this stage, what is done is to understand in detail the problem scope of the system using PIECES analysis to identify problems with the old system and create an information vision and functional vision of the system. Table 2 describes the PIECES analysis of the system.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 2. System PIECES Analysis

Type Analysis	Old System	New System
Performance	The process of checking laboratory data is limited by space, so it can only be seen or checked in one place. This makes the performance of laboratory management stiff and static.	The system built is a web-based application system so that laboratory data can be accessed anytime and anywhere. This makes laboratory performance more flexible and dynamic.
Information	The resulting laboratory data and information are not timely because the resulting data is still managed manually.	The information produced is timely and can be accessed directly by parties who need the information.
Economy	In the old system, various processes that took place such as managing schedules, borrowing laboratories, inventorying tools and materials, and so on required a lot of paper, thereby increasing the costs that had to be incurred.	Schedule management, laboratory borrowing, inventory of tools and materials, and so on do not require paper and can be done directly via computer so that costs can be reduced.
Control	Laboratory data can be manipulated because all processes such as laboratory loans, inventory of tools and materials, and so on are carried out manually.	Laboratory data is very unlikely to be manipulated because it is online and utilizes technology in every management process.
Efficiency	It takes a very long time because all laboratory management processes must be carried out one by one.	Laboratory management such as laboratory lending, inventory of tools and materials, and so on can be faster because various processes can be carried out at once.
Service	Human error is very prone to occur because it is still manual, thereby reducing the quality of laboratory services provided.	Minimizing the occurrence of human error thereby improving the quality of laboratory services provided.

At the requirements analysis stage, what is done is to identify the functional and non-functional requirements of the system being built. At the Decision analysis stage, the activity carried out is determining the application architecture as shown in Figure 2. This Laboratory

JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Information System software can be accessed using the web, with a server using Apache and PHP language. Meanwhile, programming uses Sublime Text 3. Users can access the system via a PC or mobile device that has a Web browser application such as Mozilla Firefox, Google Chrome, Opera. As well as mobile web browsers such as Safari, UC Browser and Opera Mini. In this system, all data is stored on the server. Users can access data on the server by calling web pages on the web server. All incoming input will be stored in the database and can be accessed again if the user requests it via the web server.

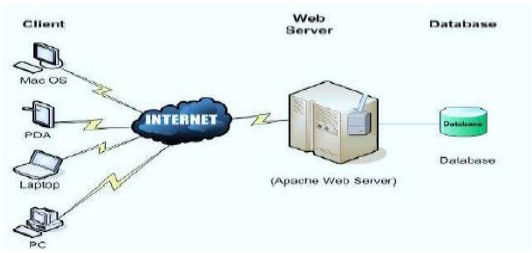

Figure 2. Application Architecture

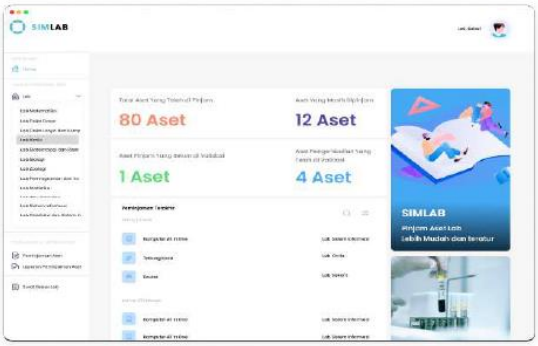

Figure 3. Implementation of Laboratory Equipment Information Dashboard

Figure 3 is an implementation of the interface used by users to view data on all equipment loans. Figure 4 is an implementation of the interface used by users to view all reports on the results of borrowing and returning laboratory equipment.

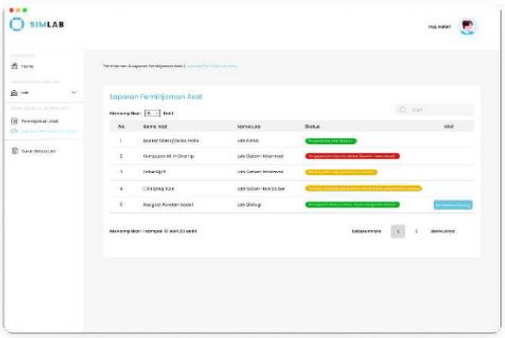

Figure 4. Implementation of the Report on Borrowing Laboratory Equipment

Figure 5. Implementation of the Laboratory Loan Free Letter

Figure 5 is an implementation of the interface used by users who successfully submit a laboratory loan-free letter.

Testing from the system interface side is assessed in three categories, namely software aspects, functionality aspects and visual communication aspects. Table 3 describes the test items for the software aspect category along with the questionnaire results from 27 respondents. Answer item 1 means very.

good, 2 means good, 3 means fair, 4 means poor, and 5 means very poor.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi ISSN 2407-1811 (Print)
Vol. X No 3, Juni 2024, hlm. 515 – 522 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i3.3252
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 3. Software Aspect Test Items And Results

Test Items	1	2	3	4	5
Ease of running the SI-LABMIPA application	17	10	0	0	0
Ease of accessing the features of the SI-LABMIPA application	11	16	0	0	0
Smooth page movements in the SI-LABMIPA application	4	20	3	0	0
Ease of moving pages using navigation buttons	8	17	2	0	0
Overall convenience of using the SI-LABMIPA application	15	10	2	0	0

Based on the results of testing three aspects of the interface to the FMIPA UNTAN Laboratory Information System using a questionnaire to 27 respondents, and calculations carried out using a Likert scale, a percentage score of 82.60% was obtained in the very good category.

CONCLUSION

The Laboratory Information System which was developed using the Framework for the Application of System Thinking (FAST) method, has succeeded in meeting user needs regarding laboratory services. Based on the results of system interface testing on 27 respondents, the feasibility results were 82.60%, which is included in the very good category, so it can be concluded that the Framework for the Application of System Thinking (FAST) method is a method that can support the development of information systems appropriately. effective and can cover the needs of system users.

The next suggestion for the development of the FMIPA UNTAN Laboratory Information System is to add a feature for ordering queues for borrowing laboratory equipment so that users know information about the queue for borrowing laboratory equipment along with the time period for which the equipment is available. In terms of using methods for further research, problem definition can be done by adding the SWOT method so that the state of the organizational environment and information system needs and opportunities can be known with certainty.

BIBLIOGRAPHY

[1] M. Mesiono, H. Handoko, A. H. Siregar, and H. Hamdan, “Peran Strategis Teknologi Informasi dan Komunikasi di STIT Al-Ittihadiyah Labuhan Batu Utara,” *J. Educ.*, vol. 5, no. 3, pp. 8362–8375, Feb. 2023.

[2] K. Tone, “Sistem Pengelolaan Manajemen Laboratorium Komputer Jurusan Sistem Informasi UIN Alaudin Makassar,” *J. Instek*, vol. 2, no. 2, pp. 121–128, 2017.

[3] I. S. Marfuah, N. Susanti, and S. Supriyono, “Sistem Informasi

Manajemen Laboratorium Teknik Mesin (Studi Kasus: Universitas Muria Kudus Dengan Notifikasi Whatsapp)," *J. Inf. Technol. Ampera*, vol. 2, no. 3, pp. 167–179, Dec. 2021.

[4] N. D. Prasojo, J. Jamilah, and M. S. Sasmito, "Manajemen Pengelolaan Alat dan Bahan di Laboratorium," *Indones. J. Lab.*, vol. 6, no. 2, pp. 122–132, 2023.

[5] H. Apriana and P. A. Yohana, "Sistem Pengelolaan Informasi dan Manajemen Laboratorium Komputer Politeknik Negeri Banjarmasin," *J. Elektron. List. dan Teknol. Inf. Terap.*, vol. 1, no. 2, pp. 10–13, 2019.

[6] Suprapto, Marji, E. Santoso, D. E. R, N. Hidaya, and K. W. A, "Rancang Bangun Dan Pelatihan Sistem Informasi Laboratorium Bagi Pengelola Laboratorium Patologi Anatomi Rs XYZ," *Pros. Semin. Nas. Pengabdi. Kpd. Masy.*, vol. 2021, pp. 210–219, 2021.

[7] F. Syakti, "Metode Pengembangan Perangkat Lunak Berbasis Mobile: a Review," *J. Bina Komput.*, vol. 1, no. 2, pp. 82–89, 2019.

[8] D. Parulian, B. Alam Wijaksono, and M. Fazrie, "Application of FAST (Framework For The Application System Thinking) Method in Library Management Information System," *JISICOM (Journal Inf. Syst. Informatics Comput.*, vol. 6, no. 2, pp. 546–547, 2022.

[9] M. A. Firmansyah and A. M. Bakti, "Implementasi Metode Fast Untuk Pengembangan Sistem Simpan Pinjam Pada Koperasi Tarbiyah Berbasis Android," *J. Softw. Eng. Ampera*, vol. 3, no. 3, pp. 133–144, Oct. 2022.

[10] A. Novianti and R. P. Sari, "Perancangan Sistem Gudang Material dengan Metode FAST pada PT. Samcon," *J. Teknol. dan Inf.*, vol. 12, no. 1, pp. 93–105, Apr. 2022.

[11] D. Silaban, Supiyandi, and Rizky Vita Losi, "Rancang Bangun Sistem Dalam Pemilihan Rumah Dengan Metode Smart," *J. ZETROEM*, vol. 5, no. 2, pp. 169–173, Oct. 2023.