

# Linkmate: An Online Communication System For Bureau Of Jail Management And Penology

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**Abstract**—With the consent of Bureau of Jail Management and Penology (BJMP), this project aims to provide a more efficient method of communication between inmates and their visitors and an improved scheduling system for online visitation. The project focuses on creating an application that will allow inmates and relatives to communicate via e-mail and video call. However, inmates and relatives must agree to the policy that their conversations will be under the surveillance of BJMP for security purposes. In order to develop the system, the developers used programming languages like PHP, SQL, and Java. The development of the system was done through scrum methodology since this is the most suitable approach for the developers. After developing the system, the developers were able to see how their system functions. Data regarding the functionality, usability, reliability, performance, and security of the system was gathered using questionnaires from 50 respondents who were composed of six BJMP officers, 24 FEU Tech students, and 20 people who are related with someone inside a jail. The developers learned that the system can still be improved in terms of reliability and usability because these are the factors that gathered an average score in their tally of answers from respondents. The developers recommend to future researchers that are going to tackle this kind of research to focus more on the efficiency of the system. The developers also recommend to provide more security features to further improve the security of the project.

**Index Terms**— Decision Support System; Online Investment System; Report Generation; Livestock Investment; Livestock Farming; Project Investocks; Decision Tree Algorithm

## 1 INTRODUCTION

Today's means of communication can be accessed virtually anywhere and people can exchange information with ease for the internet is easily available both in computers and mobile phones where e-mails, texting services, and video conference can be done. This helps people communicate with anyone in the world and build relationships with the ones who are far away. Inmates who are currently serving time in a penitentiary are deprived of their freedom. These people are considered as persons deprived of liberty (PDL). If a PDL seeks to communicate to an immediate family, doctor, and lawyer, it must be first approved by an officer. It is crucial that a PDL retains to have close ties with the people who are closest to the PDL as it provides support during their time in jail. The importance of maintained communication between a PDL and their loved ones plays an important role not only during their sentence but upon their release as well. This connection created over the span of one's sentence benefits the life of a PDL after their time in jail is complete, as this will provide the PDL the motivation to start over again. The main purpose of this research is to improve the communication within the facility of Bureau of Jail Management and Penology (BJMP) by providing the facility a scheduling and communication system.

## 2 REVIEW OF RELATED LITERATURE

According to [1] the implementation of E-Dalaw helped Bilibid prisoners communicate with their family during their incarceration. This reformation program acted as a way for inmates to strengthen relations with family locally or abroad through video call upon their release from prison. Resuello and Tatlonghari conducted a survey from the users of E-Dalaw and gained positive feedback for the system suggesting an overall satisfaction in using the system. [2] observed that video calling visitation for inmates is safer and more convenient. Prison Policy Initiative's data show that 74% of US correctional facilities resolve to video calling. Over

the recent years, the trend of actual in-person visits are slowly declining and over the country video call visitations are taking over. The transition to video call for visitations helps security in jail facilities by reducing contraband being imported by visitors. [3] emphasized that video visitation is gaining popularity at correctional facilities since it improves contraband control. Contraband is an object that has been exported or imported illegally, usually drugs and weapons. Another reason for its sudden popularity is that it is safer for inmates and correctional officers. According to Rachel Vanhoy, as cited by Careless (2018), director of Business Management with the Mecklenberg County Sheriff's Department in Charlotte, North Carolina, video visitation carries the benefit of minimizing inmate and visitor movement within the facilities. Lastly, video visitation promotes increased visits. With a higher number of visits, inmates' morale also improves. Happier inmates make correctional facilities safer and easier to maintain. According to [4] as cited by Gordon (2015), a professor who studies correctional policy at Arizona State University's School of Criminology and Criminal Justice, video visitation could be good, positive, and more innovative. Video visitation provides options for prisoners to discuss their plans with their family and friends. According to [5] the Lancaster County Jail offers long-distance video visitation. This option allows loved ones of an inmate to have a video conversation using a camera on a computer, tablet, or a phone call from home. Originally, the jail receives at least \$330,000 dollars a year for the old telephone system. However, the jail expects to receive another \$12,000 annually from the remote video calls.

## 3 THE REQUIREMENTS ANALYSIS

The requirement analysis is the first requirement in software development process. This analysis discusses the requirements that were accomplished within the system, which was crucial since it was used to guide the developers in the creation of the system. The requirements include operational, technical, schedule, and economic feasibility together with requirements modelling.

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**Operational Feasibility**

The system will be used within the facilities of BJMP. Moreover, the traditional system used in BJMP specifically E-Dalaw served as the developers’ guide in creating the new system.

**Technical Feasibility**

The system is simple yet effective. The system does not require the users to be knowledgeable with computers since it involves two devices for e-mailing and video calling. The devices for this system specifically computers and mobile phones are also available for the inmates and visitors since the facility will provide.

**Economic Feasibility**

The system is economically feasible since the required costs for this system only include devices and an internet connection that are most likely to be available in the precincts.

The tangible costs and benefits include:

1. More convenient way of communication between inmates and their relatives;
2. Reduced transportation fees for relatives;
3. Easy communication between lawyers and doctors and their convicted clients;
4. Lessened amount of guards to be actively monitoring the kiosks; and,
5. Not using a third-party application for video calling.

The intangible costs and benefits include:

1. Easier monitoring of e-mail communication allowing a secured exchange of messages and conversations;
2. A more efficient way of viewing the monthly users of the system;
3. More proper and easier structured scheduling to be handled by the staff of the facility; and,
4. Improved communication within the facility.

**Schedule Feasibility**

A time table was created that helped the developers to monitor the development of the project and to assure its schedule feasibility. The time frame allotted for the life cycle of project development was eight months that started in August, 2018, and ended in June, 2019.

TABLE 1  
SOFTWARE SPECIFICATION

HARDWARE	SOFTWARE
Database	MySQL Database
Server	Apache Server
Frontend framework	Bootstrap, HTML5, SweetAlert, and CSS
Backend framework	PHP, CodeIgniter, WebRTC API
Android development	Android Studio
Browser	Google Chrome

Table1 shows the required specifications of the software used in developing the system.

TABLE 2  
HARDWARE SPECIFICATION

HARDWARE	SPECIFICATION
	<b>Operating software:</b> Windows 7 above
Desktop computer and laptop	<b>Random Access Memory(RAM):</b> 4GB and above
Peripherals	<b>Microprocessor:</b> Intel Core or later Webcam, microphone, speakers or earphones with mic <b>Android:</b> Android Platform
Mobile Device	<b>API Level:</b> 21 and above <b>RAM:</b> 2GB and above

Table 2 displays the minimum specifications of hardware needed for the system to run. The desktop computer or laptop must have a processor and RAM that can perform simple tasks such as conducting video calls. Furthermore, their devices must have a webcam, microphone, and speakers. The mobile devices must use the Android operating system since the system does not cater to Apple devices. These requirements can be easily obtained by users, but the users must have a stable internet connection in order to use the system efficiently.

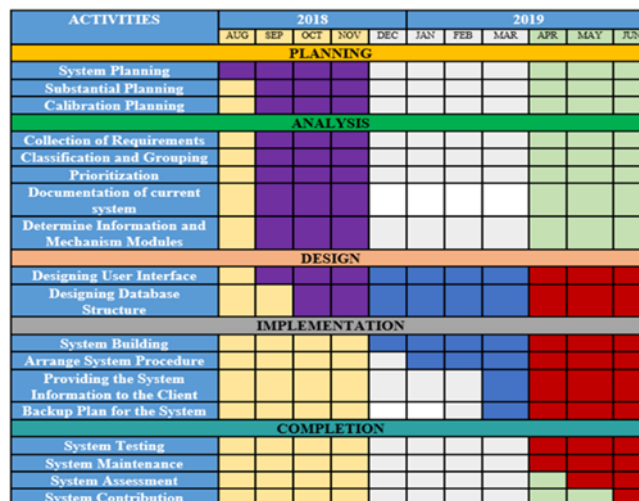


Fig 1 Gantt Chart

Figure 2 shows the allotted time frame for designing, developing, implementing, and project turnover of the system. The first four months were used for planning, designing, researching, mentoring, and consulting for the project, while the rest were allotted for development of the system.

**Data Gathering**

The approach the developers used to gather this information was mixed-methods research. The first method of data gathering used by the developers was qualitative approach. With the use of the internet, the developers were able to gather literatures and studies both foreign and local. These studies helped the developers to further understand and improve the capstone project. The developers were also able to find similar systems that can be used as a guide for the

capstone project. The second method of data gathering done by the developers was by an interview with the client. The people that the developers talked to were Jail Senior Inspector Socrates C. Nicart and Jail Senior Inspector Ray Xavier L. Tristeza. The interview was conducted in their office in 144 Mindanao Avenue, Project 8, Quezon City, Metro Manila; because of this appointment, the developers were able to clarify the needed requirements and information that were used in the system. Lastly, the last method utilized was quantitative research through the use of questionnaire. The questionnaires were answered using the Likert scale.

**Software Testing**

[6] According to Rajkumar (2019), software testing is done to locate and fix any errors detected in a project and to determine if the client is satisfied with the output. In this capstone project, the developers conducted three tests. The first test that the developers conducted on the project was the unit testing. Rajkumar (2019) stated that this type of testing is where the development team tests the individual components that can be found in the project. Usually the smallest parts of the system are the ones being tested in this phase. The second type of testing that the developers conducted was the alpha testing. [7] According to Sharma (2017), this testing is done before introducing the system to the client. This is done by the development team to avoid any unwanted errors and problems when exhibiting the project to the users. The last type of testing the developers conducted was the beta testing. Sharma (2017) stated that this is the final testing of the project before completely deploying it to the client. This is to ensure that the client will not encounter any errors during its utilization.

**Sampling Technique**

The purposive sampling technique was the type of sampling technique used in selecting the respondents who participated in the testing and evaluation of the system developed. The respondents selected were people who have relatives or clients that are in a correctional facility. A sample size of 50 respondents was selected to participate in the survey. The respondents were composed of the following: six BJMP officers, 24 FEU Tech students, and 20 people who are related with someone inside the jail.

**Statistical Treatment**

The Statistical treatment clarifies the information gathered by the developers. It evaluates the response of the sample group using the assigned numerical value, weighted mean and the characterization for easy appraisal and ranking of the information that were gathered from the questionnaire.

$$\bar{x} = \frac{\sum_{i=1}^n Xi}{n}$$

Equation (1) shows the weighted mean formula: the summation of all answers (x) is divided by the number of respondents (n).

TABLE 3  
LIKERT SCALE

Range of Weighted Mean	Interpretation
4.50 – 5.0	Excellent
3.50 – 4.49	Above Average
2.50 – 3.49	Average
1.50 – 2.49	Below Average
0 – 1.49	Poor

Table 3 displays the Likert scale used by the developers to interpret the gathered data. The investigation was done in order to collect the insights of the users regarding the functionality, usability, reliability, performance, and security (FURPS) of the system developed.

**System flow Chart**

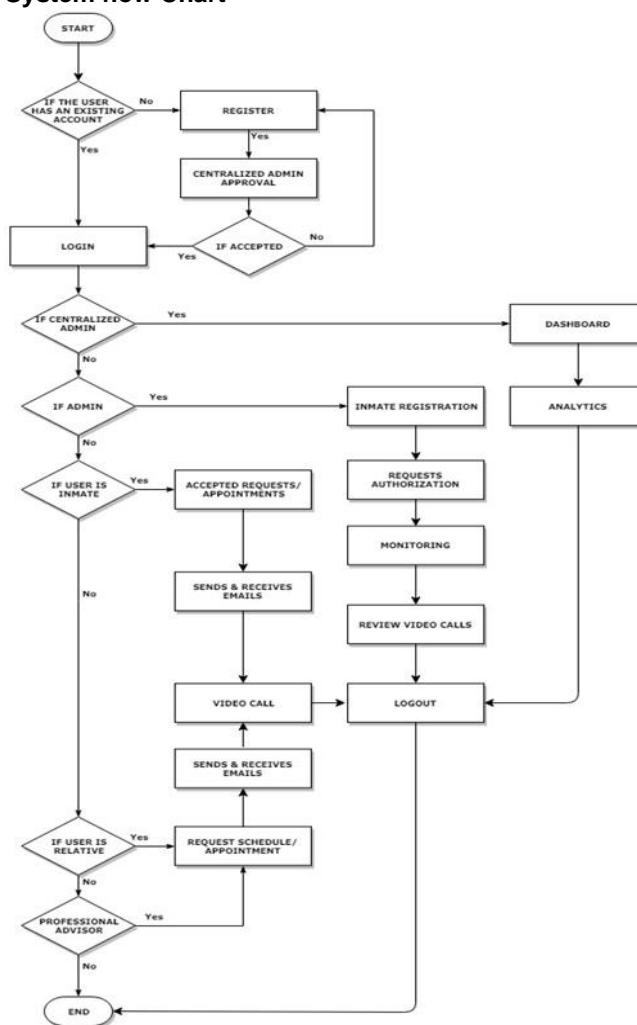


Fig 3 Flow Chart of the System

Figure 3 shows how the LinkMate system works. The process begins with user registration and logging in of users who are the inmates, inmates' relatives, attorney or doctor. Users are required to register their personal data that are to be approved by the administrative personnel. This helps the administrative personnel verify if the visitor is related to the requested inmate. Once the registration is approved, the

user will be able to access the system. Once inside the system, the relative and professional advisors may compose e-mails, schedule appointments, and conduct video calls. In contrast, inmates may only compose e-mails and conduct video calls. The administrators are divided into two types. The first type is the centralized administrator. This user has a dashboard that can view the data gathered in the system. This helps the management determine the activity within the system on a monthly or yearly basis. The second type of administrator is the administrative personnel. This user is responsible for approving the e-mails sent by the inmate, relatives, and professional advisors. Moreover, this user is also responsible for the approval of registrations of the visitors. Lastly, this user can review the recorded conversations between the inmate and visitor

**System Architecture**

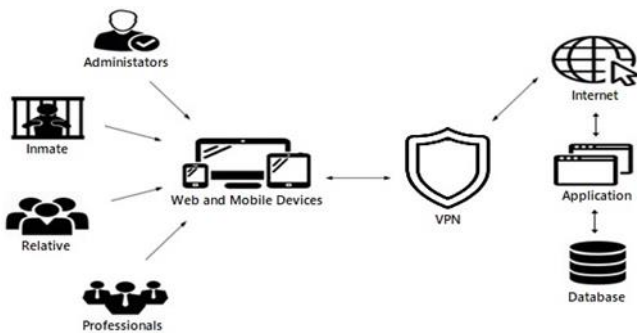


Fig 4 Flow System Architecture

Figure 4 shows the system architecture of the system. The inmates, relatives, and professional advisors are only able to interact with the frontend of the system, while the administrators can interact with the backend of the system as these are the users who are responsible with maintaining the database and system. To access the website a Virtual Private Network (VPN) is used to connect to the servers for a secure communication. Through the application, Advance Encryption Standard (AES) used for the adaptation of security measure for encrypting and decrypting information between users.

**Project Development**

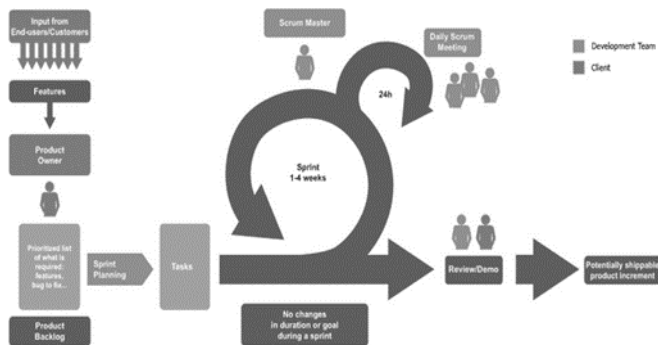


Fig 5 Scrum Methodology

Figure 5 shows how the development of the system was done using the scrum approach. The scrum guided the developers in constructing the system efficiently. [8] According to Le Cren (2018), this approach focuses on breaking down the whole system into smaller tasks and places these tasks on the sprint backlogs.

**4 RESULTS AND DISCUSSIONS**

The developed system is an online communication for the office of Bureau of Jail Management and Penology. It provides the inmates and their relatives an easier way to communicate through video calling on the website. The system provides the facility a scheduling module that keeps track of online visitations. After online videocalls are finished the videocall will be uploaded locally and through the server for tracking and records for BJMP.

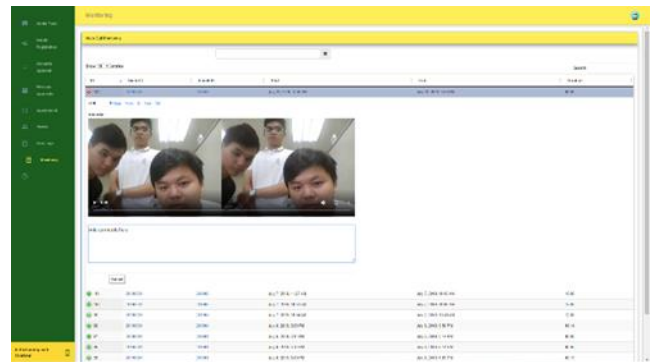


Fig 6 Sample Screen output (Monitoring Part)

Figure 6 shows the monitoring module which allows the Administrative Personnel to see call details and review past videocalls and leave remarks about the video call if any suspicion arise during the scheduled video call.

**Summary of Findings**

TABLE 4  
SUMMARY OF WEIGHTED MEAN FOR WEB AND MOBILE (BJMP)

Criteria	Weighted Mean	Interpretation
Functionality	4.10	Above Average
Usability	4.07	Above Average
Reliability	3.97	Above Average
Performance	3.79	Above Average
Security	4.5	Above Average
<b>Average Mean</b>	<b>4.09</b>	<b>Above Average</b>

Table 4 presents a summary of the BJMP evaluation of LinkMate. The categories that should be improved are the reliability and performance because there were times when the system was unable to efficiently cater to the requests of its users. The average mean of the FURPS of LinkMate as evaluated by the BJMP officers is 4.09, which is interpreted as above average.

TABLE 5  
SUMMARY OF WEIGHTED MEAN FOR WEB AND MOBILE (RELATIVE)

Criteria	Weighted Mean	Interpretation
Functionality	4.09	Above Average
Usability	4.23	Above Average

Criteria	Weighted Mean	Interpretation
Reliability	4.21	Above Average
Performance	3.95	Above Average
Security	4.28	Above Average
<b>Average Mean</b>	<b>4.15</b>	<b>Above Average</b>

Table 5 presents a summary of the relative evaluation of LinkMate. All categories were able to achieve an above average rating, but the performance category gained the lowest score meaning that it should still be improved. The average mean of the FURPS of LinkMate is 4.15, which is interpreted as above average.

TABLE 6

## SUMMARY OF WEIGHTED MEAN FOR WEB AND MOBILE (STUDENT)

Criteria	Weighted Mean	Interpretation
Functionality	4.03	Above Average
Usability	4.07	Above Average
Reliability	4.2	Above Average
Performance	3.99	Above Average
Security	4.28	Above Average
<b>Average Mean</b>	<b>4.11</b>	<b>Above Average</b>

Table 6 presents a summary of the student evaluation of LinkMate. All categories were able to gain an above average rating, but the performance category gained the lowest score. As shown by the results of the evaluation of three types of respondents, the performance category is the one that needs improvement. The average mean of the FURPS of LinkMate is 4.11, which is interpreted as above average.

## 5 CONCLUSION AND FUTURE WORKS

In conclusion, LinkMate: An Online Communication System for BJMP was created to improve the communication between the inmate and their relatives and advisors. This system can help both the inmates and their visitors in maintaining communication during their time inside the jail. It can also help the BJMP officers in managing the online visitations because it provides the officers a scheduling module. Online visitation security can also be improved since conversations will be recorded and can be reviewed if needed by the BJMP officers. Based on the testing and evaluation results, it can be concluded that the system consisted all the functionalities for both web and mobile application. The modules for the relative and professional advisor were developed and added: this includes the login module, registration module, scheduling module, e-mail module, attach ID module, video call module, and logout module. The modules were developed and added to the administrative personnel modules that include the login module, user management authorization module, scheduling module, announcement module, inmate registration module, record module, monitoring module, notifications module, call logs module, audit trail module, and the logout module. Similarly, the modules for the centralized administrator were added and developed that include login module, analytical report module, and logout module. All in all, the objectives of the capstone project LinkMate: An Online Communication System for BJMP have been met. The developers of the system LinkMate recommend the following to further develop a scheduling and communication system that future

researchers may develop. The improvement of the security for the system by adding a two-factor authentication when logging in. Enhancement of the mobile application by also making it available on different platforms and the design of the e-mail module and video call module. To provide the client an option to use the system as subscription-based.

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