

ENHANCING SUPPORT FOR SENIOR CITIZENS: DEVELOPMENT AND EVALUATION OF THE OSCA INFORMATION MANAGEMENT SYSTEM WITH AGILE METHODOLOGY AND ISO/IEC 25010 COMPLIANCE

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ABSTRACT

The elderly were a member of the vulnerable group which the government supported and assisted in every way possible. To contribute to the support and assistance needed by the elderly who are called senior citizens, this study was conducted. This aims to develop and design a usable, performance-efficient, and functional suitable to the operation and service of the Office of the Senior Citizen Affairs (OSCA), Cabanatuan City office. The System Application Office of the Senior Citizen Affairs Information Management System with Analytics (OSCA-IMSA) was developed using the Agile System Development Life Cycle (SDLC) Model. The agile model has different phases and sub-phases that guarantee the quality and efficient development of the system. Every phase and sub-phases lead to a well-organized, and systematic process of system development. The proponents adopted the ISO/IEC 25010 criteria as an evaluation tool to assess the system's usability, reliability, performance efficiency, functional suitability, security, portability, maintainability, and compatibility. The self-made survey questionnaire was used as the main tool to collect the data from the respondents. Purposive sampling was used to determine the right respondents for the study. The study was composed of two different sets of respondents, the first set was the System Users and the second set was composed of IT Experts. The Office of the Senior Citizen Affairs Information Management System with Analytics (OSCA-IMSA) was evaluated and assessed by the respondents with a result of being highly functional, highly efficient, highly portable, highly maintainable, highly compatible, highly secured, highly reliable, and highly usable. This result indicates that the system passed and conformed to the ISO/IEC 25010 Software Product Quality Standard, hence, is recommended to be deployed at the research locale.

Keywords: OSCA, Senior Citizens, Information Management System, ISO/IEC 25010, Analytics

1. Introduction

Modernization and digitalization are fast and continuously changing the perspectives and mindsets of everyone in providing services. Technologically assisted services are now common and ideal to provide a high level of customer satisfaction. A drastic change from manual processes to computerized and automated processes is not just a trend but a must for every office to meet the fast-changing expectations of the clientele in service sectors. The computerized system is better than the manual correspondence system to run more effectively and efficiently and the system is now more conducive than the previous system (Kumar et al, 2022; Fareed & Yassin, 2022).

Government offices as one of the largest service sectors in providing different services to its citizens are not exempted from this change. In today's modern society, this development is inseparable from the increasing demands placed on governments as service providers to be more effective, efficient, and transparent in their administrative duties (Sihombing et al., 2023). The Philippines government has recognized the transformative potential of Information Technology (IT) in enhancing public services and is strategically focusing on integrating IT solutions to improve governance and service delivery. Electronic government, or e-government, increases the convenience and accessibility of government services and information to citizens (Carter and Bélanger, 2005). Embracing digitalization and leveraging technology can streamline bureaucratic processes, reduce red tape, and enhance the efficiency of public services. Digitalization is one of the most promising tools for combating one of the world's most enduring challenges, corruption (Santiso, 2022). By incorporating IT into various government functions, the Philippines aims to create a more accessible and citizen-centric service (Ali et al., 2021).

The sluggish pace of government processes, often attributed to manual and bureaucratic procedures, poses a significant challenge that demands prompt resolution. Many government agencies still rely on traditional, paper-based workflows, leading to delays, inefficiencies, and an increased likelihood of errors. This manual approach not only impedes the timely delivery of public services but also contributes to frustration among citizens who expect swift and seamless interactions with government entities.

To address this issue, a fundamental shift towards digitization and automation is imperative. Implementing electronic systems and workflow automation tools can streamline processes, reduce paperwork, and minimize the scope of human errors. By transitioning to digital platforms, government agencies can accelerate decision-making, enhance communication, and provide more agile and responsive services to the public.

One of the sectors that are being served by the government is the list of vulnerable groups of individuals, one is known as the elderly, who most commonly is referred to as the “senior citizens”. They are commonly the oldest and called to be the older adults in the community. The United Nations defines an elderly person as someone who is above 60 years old (UNHCR, 2018). A person can be part of the senior citizen community when they reach the age of sixty. However, additional socio-cultural referents, such as family status (grandparents), personal appearance, or maturity level health issues, are frequently used by families and communities to define age. In the Philippines, it is customary to value, care for, and attend to the elderly members of the family; as a result, when they attain a retirement point of 60, they are regarded as senior citizens (Sosa-Malabanan, 2016).

In order to protect and appreciate the valuable contribution of the senior citizen, the government created a law under the 1987 constitution known as the Republic Act No. 7432 of 1992 (comelec.gov.ph, 1992) as amended by Republic Act No. 9257 and recently amended by Republic Act No. 9994 of 2010 (official gazette, 2010). The law for senior citizens is called “Office for Senior Citizen Affairs (OSCA).” The mandate of the OSCA is to make sure all the benefits for the senior citizen are given. The OSCA law mandates every city and municipality to create an office that will implement the law. Hence, in all cities and municipalities, an Office for Senior Citizen Affairs (OSCA) was established. This office is led by a senior person who will be selected by the mayor for a term of three (3) years, renewable once, but with the option of being extended if the need arises. A general assembly of senior citizens organizations in the city or municipality shall recommend three (3) nominees (Comelec, 1992).

The law contains all the specific benefits for all the senior citizens in the country. Different discounts and privileges are given and exemptions in some fees such as socioeconomic programs which is really beneficial in reducing their expenses. They see it as a huge aid, especially when it comes to purchasing medicines, as some are too expensive for them to purchase. The only issue they raised was the procedure for obtaining discounts. They find it inconvenient and time-consuming (Inabang et al., 2019).

Apart from the discounts they are getting from their purchases, they are also given free medical and dental services in government establishments anywhere in the country. This of course is subject to guidelines issued by the Department of Health, and the Government Service Insurance System. This shift could be attributed to new laws and regulations requiring free medical and dental treatments in 2010 and the admission of people aged 60 and over in PhilHealth's "No Balance Billing" policy in 2015 (Siongco et al., 2020).

The Office for Senior Citizens Affairs (OSCA) in Cabanatuan City, Nueva Ecija is one of the offices within the country that provide services for the elderly. The jurisdiction of the office is only for individuals whose age ranges from 60 years old and above, thus, the services of the office only start when they meet this age. The office is the one to provide a list of all senior citizens registered in the office and distribute it to each barangay hall to inform the barangay officials in the area.

Currently, the OSCA-Cabanatuan City is using manual forms and checking their list manually in the spreadsheet. There are eighty-nine (89) barangays in the city and all the lists and reports are coming to the office. This makes the process slow since manual encoding and tallying between different kinds of reports such as per age of each senior citizen, those who have and do not have a pension are manually counted, and thereafter reports were created. Updating is also

challenging when using a spreadsheet because it can alter or delete files without noticing if there are mistakes that occur.

Thus, this research was conducted to create a system that will help improve the services provided for senior citizens in the chosen research locale. The main objective is to provide efficient service to senior citizens in Cabanatuan. The basic information about senior citizens is essential for the OSCA because it is the basis of the benefits provided by the government.

The system will be helpful in sorting the information of the senior citizens, such as per barangay, age, birth date, and those with pension and none. This system will also be used to easily identify senior citizens who are included in the pay-out for cash assistance and pension of the OSCA. It can also provide data about the total number of senior citizens in the city, those deceased, those with birthdays per month, and those given pensions, and the ranges of the citizens' age. These data were presented in a graph that can be used by the OSCA in their planning, decision-making, and providing efficient service.

Statement of the Problem

Senior citizens are an important part of the community, therefore, continuous improvement including the improvement of the services through an improved information system must be prioritized. Specifically, the study sought to answer the following: How may the Office of the Senior Citizens Affairs Information Management System with Analytics (OSCA-IMSA) use in providing service, planning, and decision-making for the OSCA be developed using the Agile System Development Model in terms: conception; inception; iteration; testing; and release? How may the proposed OSCA-IMSA be evaluated by IT experts in terms of the following ISO/IEC 25010 criteria: functional suitability; performance efficiency; compatibility; usability; reliability security; maintainability; and portability? How may the proposed OSCA-IMSA be evaluated by the end-users in terms of the following selected ISO/IEC 25010 criteria: functional suitability; performance efficiency; and usability? What are the features and functionalities of the OSCA-IMSA that will be helpful to services, planning, and decision-making in the OSCA? How may the level of effectiveness of the developed OSCA-IMSA upon implementation be described in terms of; system application; record management; message notification; generating reports; and data analysis?

2. Literature Review

Document Management System (DMS). This study emphasizes the transition from traditional paper-based document management to a modernized Document Management System (DMS). DMS utilizes software to store, organize, and secure essential organizational documents, offering advantages such as easy retrieval, enhanced security, and protection against physical damage. The focus is on its application in safeguarding valuable documents for senior citizens, and ensuring the privacy and security of their personal and medical information (Das et al., 2022, Haddad et al., 2022).

Data Analytics in the Information Era. The study explores the significance of data in today's information era and its widespread use across various industries. It highlights how organizations leverage data analytics to enhance efficiency, profitability, and service optimization. Specifically, the application of data analytics is discussed in identifying trends related to senior citizens, such as their ages, population in specific locations, and pension status. The use of data analytics is portrayed as a tool for swift and informed decision-making in managing programs and services for the elderly (Lee & Mangalaraj, 2022; Bharadiya, 2023; Behl et al., 2022; Nti et al., 2022).

Rural Health Unit Record Management System. This research focuses on the challenges faced by Rural Health Unit staff in managing patient records and appointment notifications. The study introduces a system designed to streamline the organization of patient information and improve communication through SMS notifications for follow-up appointments. The assessment incorporates software quality standards, emphasizing the system's effectiveness in managing patient data and facilitating communication within the health unit. Data analytics is also employed to enhance healthcare workers' efficiency in providing accurate services and meeting patient needs (Sharma et al., 2022).

Big Data Analytics for Medical Applications. This study delves into the importance of big data analytics in the medical field, addressing the complexities of handling large-scale and diverse data collections. It emphasizes the role of big data analytics in healthcare, including data backup and addressing significant health issues. The relevance of the study to the proposed system lies in its exploration of how data analytics can be applied to manage the growing data of senior citizens, providing insights into the potential applications of system software for organizing and analyzing this extensive data (Das et al., 2018).

Agile Methodology for Data Management System. The Agile Methodology for Data Management Systems focuses on the use of agile development strategies in creating a software system application. Agile methodology is described as a collaborative and iterative approach that promotes adaptability and efficiency in software development. The researcher applies this methodology to enhance the efficiency of services for senior citizens and improve decision-making through data analytics. The emphasis is on how agile methodologies contribute to teamwork, adaptability, and the rapid implementation of software solutions tailored to customer needs and organizational vision (Haidabrus et al., 2021).

3. Research Methods

The study used a developmental research method. Developmental research is most commonly used in studies that create or develop a technology to address one problem. Developmental research is defined as "the systematic study of designing, implementing, and assessing instructional programs, procedures, and products that must satisfy the requirement of internal consistency and effectiveness," as compared to basic instructional development (Richey et al., 2004).

This method is applicable to this study because the expected output is a system that can be used and utilized by the OSCA-Cabanatuan City, Philippines.

The respondents involved in this study are distributed as follows:

Table 1 - Distribution of Respondents

Respondents	Number of Respondents	Percentage
IT Experts		
Programmers/ Developers	4	26.66%
System Analyst	2	13.33%
From the Cabanatuan City Hall	2	13.33%
From the Academe	3	20.00%
Subtotal	11	73.33%
System User		
OSCA Head	1	6.66%
Office Personnel	3	20.00%
Subtotal	4	26.67%
Total	15	100.00%

As shown above, the respondents are composed of the system users and the IT experts. System users were selected because they are the end-users of the system. Hence, their opinions, suggestions, and evaluation of the system are very important in the final output enhancement. The IT experts such as the programmers, system analysts, and the IT experts from City Hall and Academe were chosen to help the researchers in improving the system through their valuable suggestions and recommendations.

OSCA information management system with analytics is designed and developed using the agile development model. It is composed of a set of steps that a product goes through as it progresses from initiation to completion. Concept, inception, iteration, testing, production, and retirement are among its phases (Wrike, 2022). OSCA information management system with analytics is a customer-based model. This means that customer satisfaction should be considered first when designing and developing a system.

The software development environment is focused on reaching functional products in the shortest period by making use of the least amount of resources possible (Mohino, et. al, 2019). The researchers used the agile method to help in creating a clear view of the desired output. It is

systematic and organized in sequential steps, hence, it promotes the delivery of a working product in small and incremental releases. It also places a strong emphasis on customer collaboration throughout the development process. Agile facilitates regular feedback and communication, ensuring that the system aligns with the goals and expectations of the end users. Lastly, Agile methodologies encourage regular retrospectives and continuous improvement. In a research-oriented proposed system development, this allows the researchers to reflect on what is working well and what needs improvement leading to more efficient and effective development processes. Further, supported by Lyandau and Butkevich (2023), mentioned in their study that this method takes into account all specific features of project management for developing and introducing information technologies.

Figure 1 below shows the research design of the study. It is the visual representation of the agile system development life cycle used by the researchers.

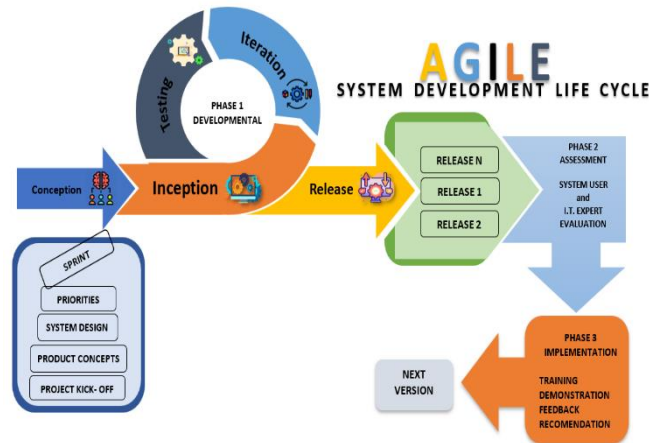


Fig. 1. Agile System Development Life Cycle

The system was developed following these major phases: developmental, assessment, and implementation. The first phase is the Developmental Phase which is based on the Agile System Development Life Cycle (SDLC), in this stage, the researchers follow the 5 sub-phases, conception, inception, iteration, testing, and releasing. The conception stage is where the planning, meetings, and conceptualization of the system are held (de Vicente Mohino et al., 2019). Inception, this is the part wherein the researchers met with the OSCA head and its personnel to discuss their needs. This stage was also the part where the researchers identified the programming languages and designed the visualization models such as data flow, entity-relationship, and use case diagrams which are used in developing the system. The third stage is the iteration. During this stage, the researchers started the actual development or coding of the system following the plan and the visual diagrams. The specific programming languages were PHP, Maria DB, and XAMPP. The fourth stage is called testing where the researchers conducted a fault detection procedure to ensure that the system is working properly. The last sub-phase is release/retire. This is the point where the system was released and made ready for assessment by the system users and IT experts.

The second phase of the development was called the Assessment Phase. This is the phase where the system users and the IT experts test and assess the system based on the ISO/IEC 25010 Software Product Quality Standard. After the assessment, the researchers adapted and improved the system based on the recommendations and suggestions of the respondents, especially the IT experts.

The last and final phase of the software development is the Implementation Phase. Here, the researchers released the system for the operation of OSCA-Cabanatuan City. The user-experience feedback was also collected for the next version of the system in the future.

4. Results and Discussions

The Office of the Senior Citizens Affairs Information Management System with Analytics (OSCA-IMSA) was developed using the agile system development life cycle. Details of the said development phases are discussed below:

Conception Phase

The researchers asked for the permission of the Head of Office of the Senior Citizens Affairs (OSCA)-Cabanatuan City to allow them to conduct the study in their office. This request was formalized through a written letter signed by the researchers. When the permission was granted, the researchers visited the office to meet with the Head of the office and the staff to discuss the objectives of the research, the flow and process in the office, the forms, and the important reports needed by the office.

During this stage, the researchers and the OSCA team planned the scope of the project, and the time needed to develop and implement the proposed system. The researchers came up with this schedule:

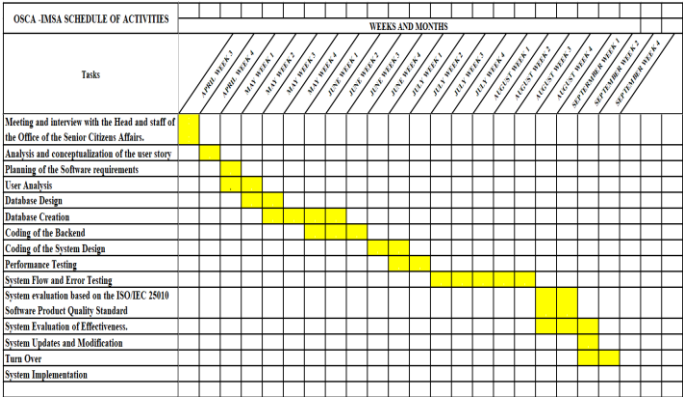


Fig. 2. OSCA-IMSA Schedule of Activities

The Gantt chart above shows the schedule of the software development activities performed by the researchers during the system development. A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities, tasks or events, displayed against time. The schedule of activities started with the planning stage where the researchers met and interviewed the head and staff of the OSCA. The chart also shows that the activities ended with the turnover of the system to the OSCA-Cabanatuan City.

Development Phase

The development phase is the most crucial phase of this study. During this phase, the researchers prepared different visualization models to serve as tools in the actual system development.

First in the list, is the use case diagram (UCD). It is a visual form of system design that helps software developers comprehend the system's behavior. Maintaining and updating the system can be a difficult task when it has no visualization of a system behavior or software requirement specification document (Andriyani et al., 2022). Figure 3 presents the Use Case Diagram of the system OSCA-IMSA. It shows the different activities that can be performed with the use of the system. The system administrator, staff, head, and even the local government officials may have access to the system as shown below.

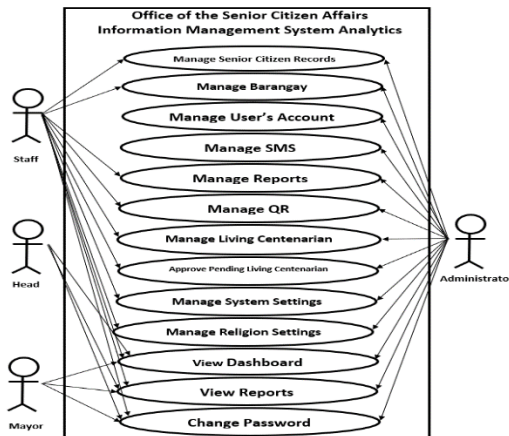


Fig. 3. Use Case Diagram for OSCA-IMSA

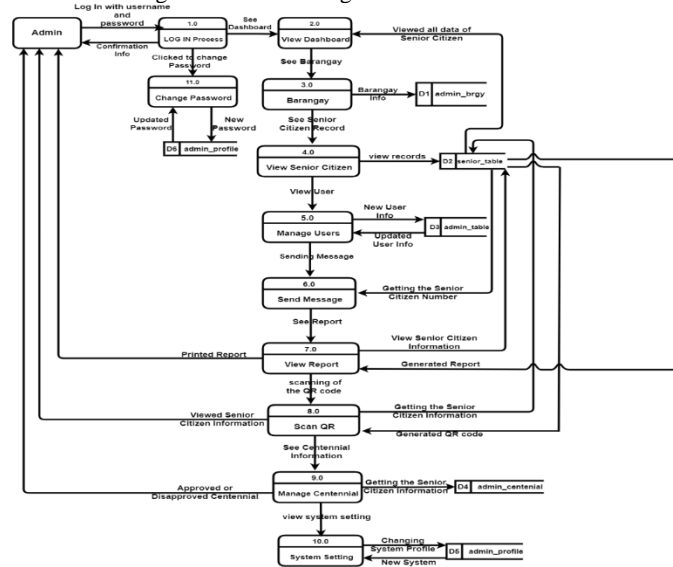


Fig. 4. Context Diagram for OSCA-IMSA

Second, the context diagram for the OSCA-IMSA system is shown in Figure 4. It illustrates the overall context of the system based on the users who have access to it and the information they may supply to and obtain from it.

Third, the data flow diagram (DFD). The administrators are the most trusted persons in an organization. “Trust but verify” is an approach to have an eye on the administration (Ali et. al., 2021). Thus, the figure below shows the access rights of the administrator on the proposed system.

As depicted in the table, the admin has full access to the system. He/she can view and generate reports. Admin access includes *Changing Passwords*, *Viewing Dashboard*, *Barangay*, and *Senior Citizen Records*. Admin can also *Manage Centenarian* records, *Scan QR* codes, and *Send Messages* to the senior citizens, barangay captains, and secretaries. Lastly, the Admin can modify the system settings.

The DFD for Admin, presented in Figure 5, was designed as illustrated above because the admin has the primary responsibility for maintaining the security within the system. The full control over the system by the admin will be helpful for the office to maintain the access of each system user. These users have limited access as set or provided by the system admin. The system users also have to create their personal accounts on the system.

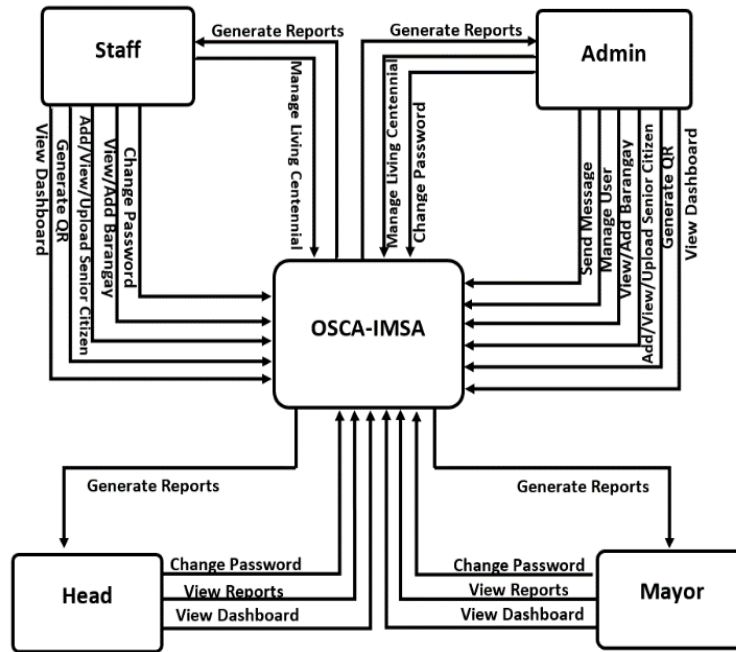


Fig. 5. DFD of OSCA – IMSA for Admin Access to the System

Figure 6 illustrates the DFD for office staff. It shows the access privileges of users to the OSCA-IMSA. The diagram also shows that they have access to the major functions of the system. These functions include *Changing Passwords*, *Viewing Dashboard*, *Barangay*, and *Senior Citizen Records*. Staff can also *Manage Centenarian* records, and *Scan QR* codes

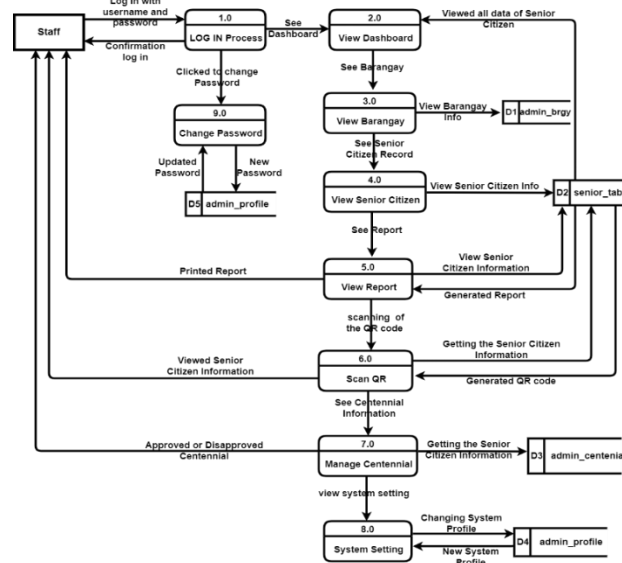


Fig. 6. DFD of OSCA – IMSA for Office Staff

Considering that the security of software-intensive systems is frequently attacked, the researchers made sure that this is addressed in the system. High fines or loss of reputation are potential consequences of not maintaining confidentiality, which is an important security objective (Seifermann et al., 2022). This was considered in this study, thus, they set a limitation in some functionalities and features of the system.

The access of the staff was almost the same as the admin, except for the access to Send Messages, System Setting, and User Enrolment. These functions were limited for the admin to maintain a high level of security. The Send Messages can be used for personal or other purposes like sending notifications and reminders to senior citizens. The creation of a new user was only limited to one access and the admin has control over it.

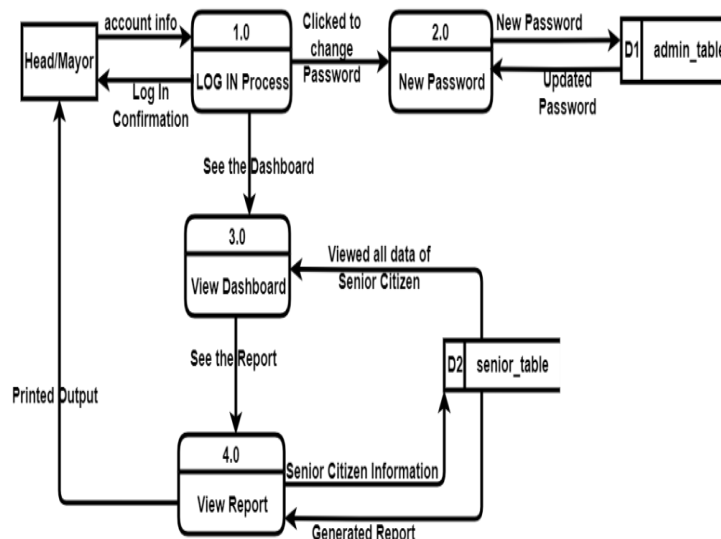


Fig. 7. DFD of OSCA – IMSA for Mayor Access to the System

Figure 7 above illustrates that the LGU official particularly, the City Mayor, has access to only two major functions of the OSCA – IMSA, these are the Reports and the Dashboards. These provide information as regards the statistics on the services provided by the office.

In order to ensure the security of the system, the administrator needs to dynamically maintain the role assignments to users for optimizing user-role assignments (Rao et al., 2021). For this system, the Head/Mayor of the office is not directly engaged in the daily operation of the office. He/she is mostly involved in the planning and decision-making. This is why the system access for the Head/Mayor was only limited to the generation and viewing of important reports for decision-making. Dashboards can also be accessed by the user of the said account.

In addition to the diagrams presented above, the researchers also prepared and implemented a system development plan. This plan contains security, encryptions, and other bases used to determine the functions and features of the system as discussed below.

Security and Encryption Strategy

In disciplines like medicine and the social sciences, where collected data include sensitive information about study participants, the sharing and publication of individual-level records are controlled by data protection laws and ethico-legal norms (Avraam et al., 2021). During the conception stage, the researchers met with the head and staff of the Office of the Senior Citizen Affairs to discuss the security and safety of personal data in compliance with the Data Privacy Act. The researchers carefully planned the features to be added to the system to ensure the privacy and security of the data.

The researchers decided to use dummy names for the development and testing of the system to ensure that no personal data of the senior citizens were exposed or misused. Effective anonymization techniques should increase the uncertainty surrounding re-identification while retaining data utility, allowing informative data analysis (Avraam et. al., 2018). Using dummy names, they tested and ran the system without compromising the safety and security of senior citizens' information. It is a fact that there is a risk of privacy leakage when collecting the users' behavior data for building the recommendation model. However, existing privacy-preserving solutions are designed to tackle the privacy issues only during the model training and results collection phases (Liu et al., 2022). Further, using a dummy gives the researchers the freedom to test and retest the system while securing the privacy of the OSCA clients.

The researchers also included an encryption feature in the system. By doing so, every time the data of the senior citizens needs editing or updating, the system will ask for the password to continue the actions made. This helps protect the data of every senior citizen because only authorized personnel can edit or change the data of the senior citizens. Moreover, this encryption

feature not only protects the data but also the office because it limits access to authorized personnel only. In essence, in order to protect the confidentiality and integrity of sensitive data in accounting information processing systems, it is necessary to study the sensitive data encryption method (Li, 2020).

Finally, as a protection mechanism, the researchers also ensure that each system user can change their default password. Users will be required to enter or use a unique password by combining alphanumeric characters. This will help in making sure that only the user knows his/her own password. This strategy can maintain the system's credibility by protecting the data stored in it and ensuring data privacy.

System Features and Functions Plan

The main basis of the features and functions of the OSCA-IMSA was the user story discussed during the kick-off meeting and the Senior Citizen law, Republic Act No. 9994 signed on June 18, 2010. The law was the latest amendment of the senior citizen law which contains all the benefits, privileges, and the creation of the Senior Citizen office which is called the Office of the Senior Citizen Affairs (OSCA).

The planned main features of the system are as follows:

Dashboard which contains the data analysis graph for the planning, and decision-making of the system users. According to Navdeep et al., (2016), both service providers and clients of services will benefit from big data analysis. Record Management System (RMS) that allows users to manage documents and data records.

The OSCA-IMSA also has two differently connected features which are the barangay menu and the senior citizens menu. In the barangay menu, users can find the data of senior citizens organized per barangay with the inclusion of Google Maps with barangay pin location in Cabanatuan City. The senior citizen menu, on the other hand, shows the well-organized alphabetized senior citizen data that can be edited, modified, and archived. In addition, these features were also inspired by the study conducted by Conchanco (2017) entitled "Computerized Document Management and Archiving Systems". In the said study, he mentioned that safekeeping of the records and tracking of the moving documents are vital in terms of the university's administrative processes. In addition to these menus, the OSCA-IMSA was also designed to generate and print reports needed by the office through the data analytics included in the system.

Another feature is the messaging system, which allows the users to send messages to any senior citizens, barangay captains, and secretaries who use the system. This feature is based on the study of Atanacio and Lacatan, (2019) that focuses on the development of a rural health unit record management system with data analytics for the municipality of Bay, Laguna using ISO 25010. This function and feature was evaluated as good in all dimensions. They said that the issue in the rural health unit inspired them to create a system that will make it easier for staff members at the Rural Health Unit to organize patient information and simply notify patients of their appointment times via SMS. The same setup was adopted in the OSCA-IMSA. It also has a messaging system to notify senior citizens of the announcement of the upcoming distribution of assistance to the senior citizens.

The OSCA-IMSA also has a Quick Response (QR) code. It is a kind of barcode that a digital device can read easily and that encodes data as a series of pixels in a grid of squares. In marketing and advertising initiatives, QR codes are widely used to track information about products in a supply chain. QR codes nowadays, especially during the surges of the unprecedented global pandemic, this is a type of barcode used by different businesses and offices in different transactions. Thus, including this in the system is a timely decision that helps to improve the services of the office, since every computer has a camera that can be used to scan the QR code to view the records of the senior citizens quickly.

System Setting is another feature of the OSCA-IMSA that makes it portable and usable for other municipalities and cities since the basis for the general operation, policies, and process of the Office of the Senior Citizen Affairs were based on the National law RA 9994 or the Expanded Senior Citizen Law. There is a little or few differences with the implementation of the office in each municipality or city, thus, being able to modify the Logo, Title, Head, Position, Google Maps

Pin and other general information of the system makes it more usable and flexible for other possible users.



Fig. 9. Dashboard Interface of the OSCA-IMSA

Discussion

The system that was developed is considered to be unique because it is intended to efficiently organize, manage, and analyze the data stored in the database. From the planning to execution of the system development process, the presence of the customers' point of view or the end-user was present and always a priority. A Gantt chart that shows the strategically planned dates to stay on track with the system development was carefully planned and executed by the researchers.

In order to maintain the highest system safety and security, users' limitations were also established to ensure that only authorized users have access to important or significant features of the system. This is the best way of maintaining the check-and-balance within the system platform. This strategy also strengthens the accountability of each system user to carefully take action only on what is provided for them in the system.

The context diagram, as depicted in Figure 4, serves as a visual representation of the system's overall context and its interactions with various users. In systems engineering and design, a context diagram provides a high-level view of a system, showcasing its external entities, the interactions between these entities, and the flow of information between them. In the case of OSCA-IMSA, the context diagram specifically outlines the users who have access to the system and the nature of the information exchange.

The data flow diagram (DFD) for each system user shows how they can access and use the system according to their job responsibility in the office. They are carefully delegated to access specific features of the system based on what they need to perform their duties in serving the senior citizens in Cabanatuan City.

The distinctive features and functions of the Office of the Senior Citizen Affairs Information Management System with Analytics (OSCA-IMSA) underscore its innovative and tailored approach to senior citizen affairs management. One standout aspect is the integration of a dashboard, leveraging data analysis graphs for enhanced planning and decision-making. This is a contemporary insight emphasizing the benefits of big data analysis for both service providers and clients.

The inclusion of a Record Management System (RMS) further sets OSCA-IMSA apart, drawing from Techopedia's (2022) definition of systematic document and data record oversight throughout their life cycle. The interconnected Barangay menu and Senior Citizen menu, inspired by a study on Computerized Document Management and Archiving systems, contribute to a comprehensive organization of senior citizens' data per barangay and alphabetically, allowing for efficient editing, modification, archiving, or status updates. The Messaging system, influenced by the success of a rural health unit record management system, introduces a practical and personalized approach, enabling notifications to senior citizens, barangay captains, and secretaries. The incorporation of QR codes responds to contemporary needs, particularly during the global pandemic, providing a convenient means to track information and view senior citizens'

records. Lastly, the System Setting feature showcases strategic adaptability, allowing easy customization for other municipalities and cities based on the national law RA 9994, highlighting OSCA-IMSA's versatility and potential for widespread applicability.

Finally, OSCA-IMSA reflects a holistic and customer-centric approach, emphasizing efficiency, organization, and security throughout the system's planning and execution. The integration of customer perspectives ensures strategic alignment and adherence to planned development timelines. The system's robust safety measures, including user limitations based on roles and responsibilities, exemplify a check-and-balance mechanism, promoting accountability and responsible system usage. Overall, OSCA-IMSA stands as a versatile, secure, and user-centric system with the potential for widespread applicability in enhancing senior citizen services across different municipalities and cities.

5. Conclusion

The Office of the Senior Citizens Affairs Information Management System with Analytics (OSCA-IMSA) was successfully developed using the Agile Software Development Life Cycle. The system was developed based on the different phases and stages of the Agile SDLC. The presentation of the system to the IT experts prior to their evaluation ensures that proper rating or assessment shall be made with the system. IT experts conclude that the system can help improve the service, planning, and decision-making of the OSCA-Cabanatuan City. Through the use of the system, it became possible to improve the quality of service for senior citizens. The OSCA-IMSA serves as a useful tool for the head and staff of the office in providing services, conducting plans, and decision-making in the office.

The system also passed the evaluation of the system users based on the ISO/IEC 25010 Software Product Quality Standard. They agreed that the expectations, goals, and objectives of the office are met by the system. The functionalities and features were very helpful in improving the quality of services provided for senior citizens. The system can generate reports and a database containing well-organized personal information of the senior citizens. Sending messages to notify them was just one of the functions and features that were identified to be helpful for the office. As a whole, the OSCA-IMSA was found to be very effective in the research locale. The system application, record management, report generation, message notification, and data analysis sub-parameters were assessed as Very Effective by the system users and IT experts. It can be concluded that the system excellently met all the system requirements of the OSCA-Cabanatuan City.

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