

IIDS: Interoperable ID Solution for e-Government Systems

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Abstract

Objective: This study was conducted to develop an interoperable digital identification system (IIDS) to help the local government units modernize and streamline its client service delivery. **Methods/Analysis:** Quantitative methods, such as guided interview and evaluation questionnaires, were used for the data collection, and adopted the Princeton Project Management Methodology (PPMM) throughout the IIDS software development process. **Findings:** The municipalities of Nabua and Bula, Camarines Sur, Philippines have no official identification system, thus, led to inefficient service delivery and identity management. To address these issues, IIDS include core features, such as ID Application, Data Management, ID Generation module, and integration with other e-governance systems to assist human resource officers to fast-track identity management through harmonization with other related e-Government modules. Also, the addition of the Report Generation and Data Analytics modules provided valuable demographic information and vital statistics for analysis to improve the municipalities' decision-making strategies. Based on the evaluation results, the overall Likert score of 4.79 shows that respondents' perception of the system is "strongly agree" based on ISO 9126 software quality metrics in terms of functionality, reliability, usability, efficiency, portability, and maintainability. **Novelty/ Importance:** Conclusively, the provision of IIDS from a municipal government level resulted to the implementation of an interoperable ID solution endorsed by an ordinance, as it relates to efficient citizen services and governance.

Keywords: e-Governance, Interoperability, Information and Communications Technology (ICT), Local Government Unit, Local ID System

1. Introduction

The electronic ID system is a modern tool used to verify citizenship and identity. Globally, it provides a strong foundation measure for any government to effectively deliver inclusive and accurate access to public services¹, such as opportunities in health², social and finance programs³, and other purposes⁴.

According to World Bank Group's 2018, there are about one third or 312 million people in South Asia, including the Philippines, lacking evidence of identity⁵. People living in remote municipalities are the most likely to lack an ID and thus, often struggle to gain access to a panel of public services. Initiatives to deploy an electronic ID system were seen as a solution by governments to close the identification gap worldwide. An electronic identification card or e-ID is a physical form of photo identification containing personal, demographic, and biometric information of an individual for verification or authenti-

cation. Eventually, the e-ID system should allow citizens to access local government services as seamlessly as possible to reduce fraud⁶ and corruption⁷.

E-ID is one of the essential building blocks of e-Government, as stated in a related paper⁸. That is if the citizen's perspective of an e-ID was positive, it could result in a notable possibility of a successful e-Governance system. In consideration, to promote the appeal of the e-IDs, some countries have interlinked the card with other establishments for extra services and benefits⁹. For example, several IDs issued in the United States also served as discount cards, library cards, or membership cards to events and establishments. However, schemes to support the interlinking and interoperability of government e-ID cards remain to be overlooked¹⁰. In fact, to this date, coordination between different government agencies for an interoperable e-ID system remains a challenge¹¹.

Since 1973, the Philippine government has been continuously initiating the establishment of a national ID sys-

tem¹², but to no avail. Two decades later, President Fidel Ramos instigated Administrative Order (AO) No. 308 implementing a “National Computerized Identification System”. Unfortunately, the AO was declared unconstitutional in the absence of a legislative basis. Given the circumstances, President Gloria Arroyo then issued Executive Order No. 420 directing the creation of a Unified Multi-Purpose ID (UM-ID) system for all government agencies. The UM-ID system harmonized the various government ID cards available to members of the Social Security System (SSS), Government Service Insurance System (GSIS), Philippine Health Insurance Corporation (Philhealth), and the Home Development Mutual Fund (HDMF) or more popularly known as the Pag-IBIG fund. However, the program was presumed discriminatory since the unification was available only to members and thus, has excluded millions of Filipinos from the coverage.

After a long wait, the House Bill 6221 or also known as the Act Establishing the Filipino Identification System¹³ eventually passed the third and final reading last September 2017. Shortly thereafter, was signed into law the “*Philippine Identification System Act*” or *Republic Act. 11055, which requires Filipinos as well as resident aliens of the Philippines to register using one national ID system signified as the "Philippine Identification System" or the "PhilSys"*. Meanwhile, as of date, the development of the PhilSys has not yet been imposed¹⁴.

Nevertheless, the implementation of a national ID system has long been a controversial issue in the Philippines¹⁵. Resistance to this type of measure introduced constant worry on the issue of security, such as the right to privacy and data protection¹⁶. During a national ID debate¹⁷, it was evident that Filipinos fear toward the implementation of an e-ID system are about the privacy rights violations and possible data corruption. However apparently, the concept of fear on the consideration of an e-ID system was toppled by the desire of Filipinos for an “efficient and transparent governance”^{17,18}.

Given the growing interest of government agencies in implementing an e-ID system, the greatest challenge is to set a balance between citizen’s right to privacy and legitimate national interest, particularly along with three (3) aspects. One, the e-ID system must be interoperable. The system must be interlinked with the different e-Government related systems for the purpose of information and resource sharing. Two, the e-ID system shall act as “the identity provider” through a central registry reposi-

tory database to encourage a universal ID system. Three, a secured e-ID system that is ready to combat unprecedented access to citizen’s registry. Although, several e-ID systems have been discussed and conducted with one or two aspects^{19 20}, the attempt to redesign an e-ID system complementing the three aspects is a new perspective in e-Government.

The rest of this paper is organized as follows: Section 2 contains discussion on the methodologies used, including the software development lifecycle and research techniques. Section 3 provides the results and discussions per phase of the software development methodology. Conclusion, acknowledgment, and references were discussed in Sections 4, 5, and 6, respectively.

2. Research Methodology

2.1 Software Development Methodology (SDM)

The study applies the Princeton Project Management Methodology (PPMM)²¹ from initiation up to the close-out phase to manage the software development of the IIDS.

The PPMM software methodology presented in Figure 1 consisted of 4 phases. First is the *Initiation Phase*. Here, the initial data gathering was conducted using the initiation template to identify the scope of the project. A communication plan was also cascaded to the LGUs to clear details about the project. Second is the iterative process called *Technical Planning and Tracking Phase*. A detailed project schedule in the form of a Gantt chart was formulated to make sure that all tasks are within the timeline. Technical equipment specifications were also provided to facilitate the immediate implementation of the procurement of goods. The project team conducted cyclic meetings, consultations, and brainstorming with and LGU counterparts to ensure that everyone understands the purpose and scope of the project. The meat in this phase was the actual system coding. Here, the team translated end-users’ processes and requirements into computer code. Similarly, test-runs were conducted to detect potential errors and see whether the system functions along with its initial goals. At the same time, public and committee hearings with the SB committee were instigated to ensure the creation and enactment of a local ordinance to support the project. The third is the *Delivery phase*. Here, the deployment plan was developed and implemented along with additional deliverables such as

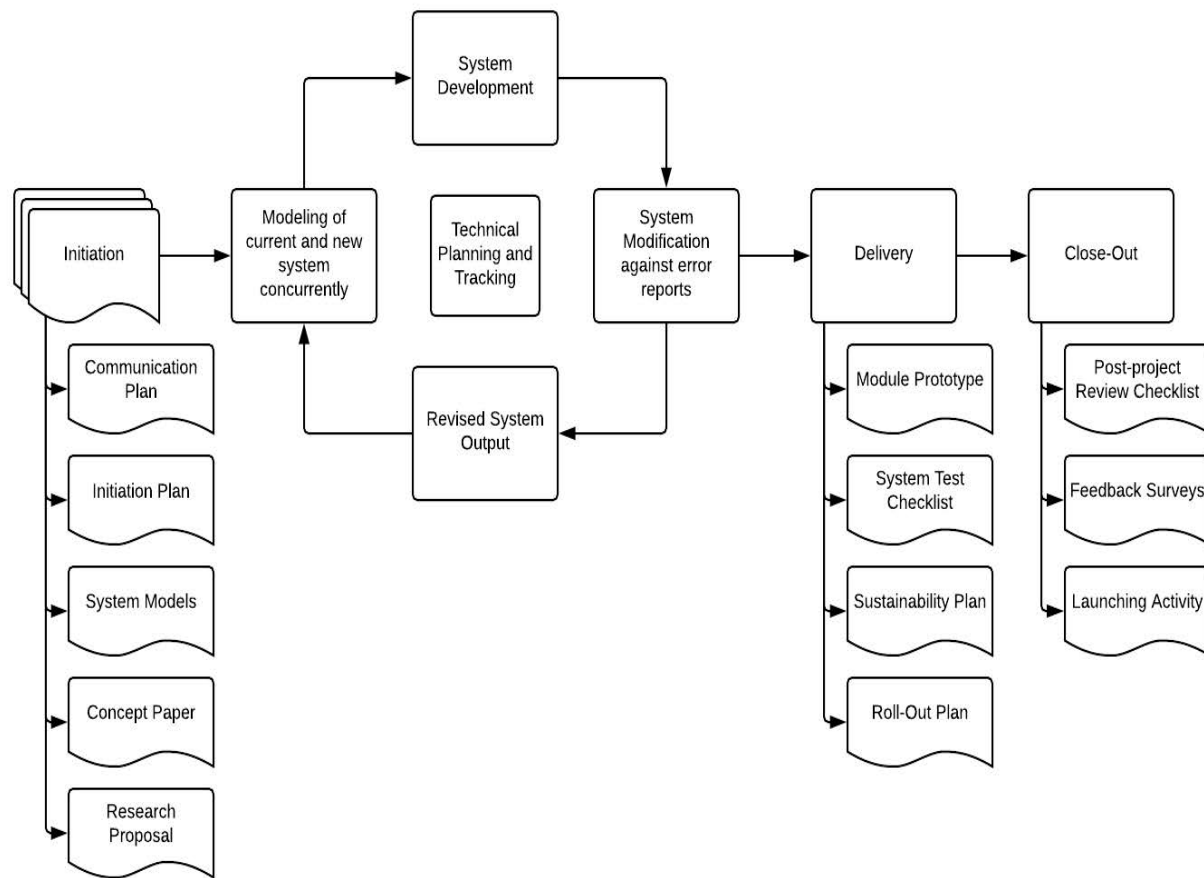


Figure 1. Modified PPM.

the users manual and users training to ready end-users for the system implementation. Lastly is the *Close-out Phase*. This phase include activities such as closing meetings and final review of the expected output vs. the objectives.

2.2 Research Design and Methods

This study used developmental-quantitative research methodologies from data collection, system development, simulation testing until interpretation of evaluation results. A semi-structured interview was conducted to four (4) Human Resource Officers from Nabua and Bula LGUs in Camarines Sur, Philippines. In the interview the respondents were asked to express their perceptions and beliefs including the difficulties and successes they had with the current process flow on citizen profiling.

A simulation test combined with two sets of questionnaires were utilized to evaluate the system's acceptability in terms of the six (6) ISO 9126 software quality metrics.

The simulation test was conducted using the actual IIDS system, starting from the application, payment, printing, and the release of the ID. Simultaneously, the first set of questionnaire was distributed to the end-users from the Human Resource Management Office of both municipalities, while the second set of questionnaire was distributed to 10 IT experts from the Camarines Sur Polytechnic Colleges – ICT department. The first set of the survey questionnaire comprised of closed-ended questions on efficiency, functionality, reliability, and usability, while the second questionnaire focuses on the level of acceptability of the system along with portability and maintainability. The internal consistency of the questionnaires was established using Cronbach's Alpha calculated using SPSS. Moreover, all evaluation criteria were rated based on a scale of 1 – strongly disagree, 2 – disagree, 3 – fairly agree, 4 – agree, and 5 – strongly agree. Weighted Mean and Likert Scale were also used to indicate the derived

average from the respondents' responses on the evaluation questionnaire as well as to interpret the ratings for all indicators.

3. Results and Discussion

3.1 Initiation

Both the municipalities of Nabua and Bula still process and deliver citizen-oriented transactions (for example citizen profiling) manually. As per the survey result, the manual process resulted to two (2) common problems presented in Table 1.

3.2 Technical Planning and Tracking

3.2.1 Planning

With the identified problems on the process of citizen profiling, a tailored-fit web-based local id solution was proposed with the following components: (1) ID Application, (2) Data Management, (3) ID Generation; (4) Report Generation, (5) Data Analytics, (6) Payment Integration of Point of Payment System (PoPS)²³, (7) Identification verification for Business Permit and Licensing (eBPLS)²⁴, (8) Identification verification for Building Permit (eBPS)²⁵, (9) Identification verification for Legislative document requests (LemTrac)²⁶, and (10) Identification verification Real Property and Tax Assessment (RPATS).

3.2.2 Development

The system was developed using web technologies. The front-end interface was written using HTML5, Javascript, and PHP v7. CodeIgniter-Bootstrap framework and RESTful API were also used to build the dynamic webpage

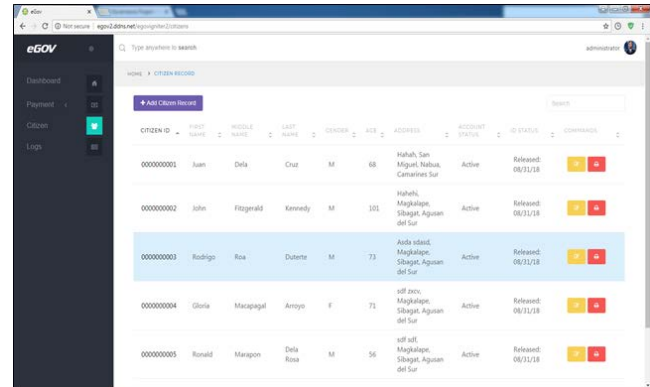


Figure 2. LIDS data management interface.

per component. Figure 2 represents the system output of the second component- Data Management, which enables end-users to view, add, and update citizen's records.

In terms of data storing, MariaDB 0.1.26 and Apache 2.4.27 were used as back-end database and web server, respectively. On matters of data security, the system adopted the CodeIgniter URI security framework that can resist common web application vulnerabilities such

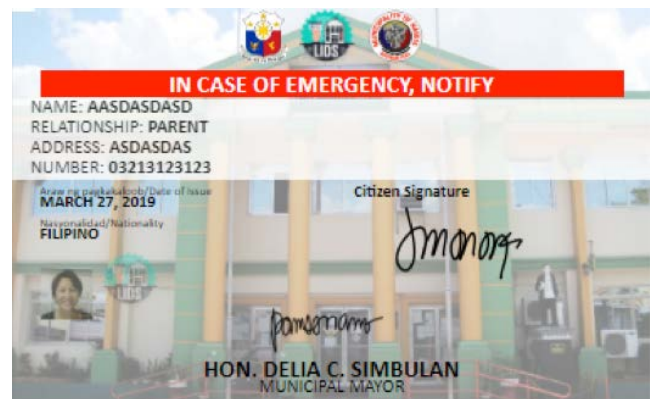


Figure 3. Sample ID.

Table 1. Common Problems Encountered in the Process of Citizen Profiling

Problems Encountered	Description
Decentralized citizen record	Manual recording of citizen's personal information per transaction, thus no baseline data on the profile of every citizen was banked
No report generation and data analysis	The officers of the human resource lack records on transactions and resident's data, thus no periodic and statistical reports were generated

as remote execution, enumeration, XSS attacks, and SQL injection. Moreover, the data elements of IIDS are in context with the recommended database format from the Department of Information and Communications Technology (DICT) to avoid conflict on data entries. Figure 3 presents the sample ID as output for the third module, ID Generation. The ID generated by the system is patterned based on the format of the proposed national ID in the Philippines. The barcode on the front left side serves as the authentication mechanism of the ID for individuals making a transaction.

3.2.3 Testing

After successful planning and system development, the end-users assessed IIDS through an actual simulation test. Table 2 presents the results on the end user's evaluation ratings per indicator.

Table 2. End-users' rating

Indicators	AWM	VI
1. Functionality	4.73	Strongly Agree
2. Reliability	4.70	Strongly Agree
3. Usability	4.85	Strongly Agree
4. Efficiency	4.87	Strongly Agree

The second set of questionnaires was distributed to IT experts to test the system's portability and maintainability. Table 3 reflects the summarized ratings collated from IT experts.

Table 3. IT experts' rating

Indicators	AWM	VI
1. Portability	4.89	Strongly Agree
2. Maintainability	4.73	Strongly Agree

As shown in Table 3, IT experts acknowledged the acceptance of the system having both portability and maintainability a strongly agree rating. The adaptability of the system to different environments as well as its installability was considered in determining the system's portability, which resulted in an average rating of 4.89. In terms of maintainability, the average weighted mean of 4.73 clearly suggests that the system is capable of effortlessly maintaining, and deficiencies can be diagnosed easily in times of failure or modification since the code can easily be understood.

Having the system evaluated by both the end-users and IT experts, IIDS was generally perceived to be highly

acceptable for all the software quality metrics used with an average Likert score of 4.79. This suggests that the developed local ID system for the municipalities of Nabua and Bula confidently attained all anticipated requirements both in terms of implementation (functionality, reliability, usability, and efficiency) and development (portability and maintainability).

3.2 Delivery

IIDS was deployed and presented to the LGU counterparts for their comments, suggestions, and recommendations. The system was modified based on the test plan results, which was followed by successive users' training. The LGU counterparts also reviewed all aspects and ensured that the project objectives are met before the live implementation of the system. The project launching and transfer of the fully functional system to the municipalities of Nabua and Bula was the last step in this phase.

3.4 Close-Out

The team, the funding agency (DOST-PCIEERD), administrators from the implementing agency (CSPC) and the LGU counterparts reviewed the project outcomes vs. the objectives, and scheduled future projects or programs (consultation, OJT, and extension) to sustain the intention of the project.

4. Conclusion

Implementing a citizen-centric approach in delivering government services means that public satisfaction is increased. Based on the data and problems identified using a structured interview, it was found out that both municipalities lack a baseline data of citizen profiles, and no reports are provided for data analysis. As a solution to the aforementioned, the researchers introduced the development of a web-based local id system for the LGUs to efficiently facilitate the delivery of basic government services to the citizens to ensure that the developed system meets the need of the LGU counterparts, an evaluation of the system's functionality, reliability, and usability and efficiently was conducted. Moreover, IT experts assessed the system in terms of its portability and maintainability. Majority of the respondents evaluated the system to be highly acceptable. With an average result of 4.79 in the end user's evaluation, and 4.81 acceptability rating from IT experts, and a 4.79 overall rating. The result implies that the development

of a local id system for municipalities is considered a key factor for a successful e-governance system.

5. Acknowledgment

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