UNIVERSITY OF THE PHILIPPINES MANILA

COLLEGE OF ARTS AND SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES AND MATHEMATICS

Social Protection and Support Initiative (SPSI):

SAGIP Information System version 2.0

Registration Module and Referral Module

A special problem in partial fulfillment

of the requirements for the degree of

Bachelor of Science in Computer Science

Submitted by:

Jayrell A. Recido

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ACCEPTANCE SHEET

The Special Problem entitled "Social Protection and Support Initiative (SPSI): SAGIP Information System version 2.0 Registration Module and Referral Module" prepared and submitted by Jayrell A. Recido in partial fulfillment of the requirements for the degree of Bachelor in Science in Computer Science has been examined and is recommended for acceptance.

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Abstract

Social Protection and Support Initiative (SPSI) is a collaborative project between Philippine Health Insurance Corporation (PhilHealth), Department of Social Welfare and Development (DSWD) and Department of Health (DOH) aimed at delivering better and coordinated social protection services using ICT solutions to improve the well-being and economic status of targeted poor families and individuals. Currently, a version of Sigurado at Garantisadong Insurance Pangkalusugan (SAGIP), one of the components of SPSI, is in place but is unusable due to a number of technical challenges that hinder its deployment. SAGIP version 2.0 aims to improve on the existing version to enable the constituent agencies of SPSI to effectively and efficiently deliver social services to the Filipino people. One of its key module is the Referral module which transfer referrals between the three departments. Aside from the referral, this project also focuses on the Registration Module which handles the digital member registration of PhilHealth.

K*eywords:* information system, e-governance, social protection, referral, registration, PhilHealth, SPSI

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I. Introduction

A. Background of the Study

National Health Insurance Program, a program established by the mandate of Article III, section 5 of Republic Act No. 7875 of the 1987 Philippine Constitution, was made to grant health insurance to every Filipino. Filipinos are now covered by affordable, acceptable, available and accessible health care services as stated in this Act. This social instruction program collects contributions from its members to be able to provide for those in need of medical assistance. This law states that people who can play for medical care are subsidizing for those who cannot, or in other words, disregarding financial status, effectively making the healthy people subsidize the health care of the sick. [1]

Under Article IV of the same Act, mentioned is the creation of Philippine Health Insurance Corporation to implement and enforce the National Health Insurance Program. Philippine Health Insurance Corporation, more commonly known as PhilHealth is a tax-exempted government corporation that gathers its funds from the contribution of its members and uses these collected funds to finance the medical care and assistance of its members. [1]

The implementing rules and regulations of the National Health Insurance Act of 1995, as stated in the Section 7, Rule 2 of the Republic Act 9241 mandates that all members of PhilHealth shall be issued one identification card each. The PhilHealth identification card shall contain essential information about the member, membership coverage details and other necessary information for the corporation. Mandatory documents and requirements are to be presented to the corporation to have an ID issued to the member. Requirements differ for the different member categories.

Based on the new PhilHealth Member Registration Form, the different member categories are as follows: Formal Economy, Informal Economy, Indigent, Sponsored, and Lifetime Member. Under the Formal Economy are the private employees, government employees, enterprise owners, household helpers, and family drivers. Informal economy consists of migrant workers, members of the informal sector (i.e. vendors, drivers, etc.), self-earning individuals, Filipinos with dual citizenship, naturalized Filipino citizens, citizens from other countries working/residing/studying in the Philippines, and organized groups. Members from National Household Targeting System for Poverty Reduction (NHTS-PR), which is under the Department of Social Welfare and Development (DSWD), are categorized as Indigent. Members under the sponsored category are those whose premium contributions are paid by the local government units (LGUs) and national government agencies. Lastly, lifetime members are the retirees and/or pensioners, and those members who have reached the retirement age with a total of 120 months of contribution.

As part of the government's step toward the convergence of its agencies, an umbrella project entitled Social Protection Support Initiative (SPSI) was developed. SPSI is an integration of assets of social service agencies including PhilHealth. Sigurado at Garantisadong Insurance Pangkalusugan (SAGIP) commits to SPSI by providing member registration and health insurance coverage to its beneficiaries and then transferring requests (referring) them to the apt agencies which could help them. Aside from PhilHealth, Department of Health (DOH), and DSWD are also a part of this initiative. SAGIP's counterpart for DOH is the "Watching Over Mothers and Babies" (WOMB), and the "Sustaining Interventions in Poverty Alleviation and Governance" (SIPAG) for DSWD. SPSI will serve as a one-stop shop to enable Filipinos to have access to government services provided by PhilHealth, DOH, and DSWD.

B. Statement of the Problem

The existing SAGIP has bugs and functionality problems including the Registration Module and Referral Module, thus rendering SAGIP unusable.

Referral Module

- Interconnectivity problem with SIPAG
- Cannot accept incoming referrals
- Cannot update the status of incoming referrals

Registration Module

- Cannot add dependents to member profile
- Cannot amend member information

To ensure integrity of the member database, PhilHealth allows only the Member Contribution Information System (MCIS) to have full access. It does not allow other application to directly access its contents. For those applications requiring data from MCIS, PhilHealth provides either web services, or packages. Since SAGIP does not directly access PhilHealth's repositories, it relies on web services and packages provided by PhilHealth. PhilHealth has some issues and errors on their WSDL's provided to SAGIP. There were times, also, that they gave inadequate access to SAGIP. Another concern is the availability of SIPAG's services. There were times that SIPAG updates their system (e.g. SOAP protocol, and/or IP Address) without informing SAGIP; thus, contributing to the interconnectivity problem with SIPAG. This affects the functions of SAGIP, specifically, the referral system. The original SAGIP also has inadequate documentation needed by PhilHealth who would take over the maintenance of SAGIP once deployed to PhilHealth production server.

C. Objectives

The primary goal of SAGIP version 2.0 is to ensure that all functionalities of the Registration Module and Referral Module specified by PhilHealth are working. In addition, all errors identified in the original version of SAGIP, noted with a single asterisk (*) will be fixed. Meanwhile, specific objectives, noted with two asterisks (**), are the responsibility of PhilHealth and will be followed up by the proponent.

I. Referral Module

Enable PhilHealth (Head Office/Service Office/Regional Office (PHRO)/Local Health Insurance Office (LHIO)) to do the following:

1. Send referrals to DSWD*
2. Accept referrals from DSWD and DOH*
3. Update status of referrals*
4. view membership request logs
5. produce referral productivity report

II. Registration Module

a. Enable PhilHealth (Head Office/Service Office/PHRO/LHIO), DOH, and LGU to do the following:
    1. Send member registration requests to Electronic Registration and Amendment System (ERAS)
    2. Send member amendment requests to ERAS*
    3. Update (add, edit, delete) dependents information to the member's profile*
    4. Send SMS to acknowledge registration of member or to inform approval of request for amendment of member information*

D. Significance of the Project

SAGIP version 2.0 would make the Registration Module and Referral Module usable because:

- All agreed functionalities of the Registration Module and Referral will be enforced
- All identified bugs of the Registration Module and Referral will be fixed
- All required PhilHealth WSDLs will be made available and hence accessible to SAGIP
- The latest protocol/access information of SIPAG will be reflected in SAGIP version 2.0 to ensure connectivity between the two systems

E. Scope and Limitations

1. The SAGIP system is owned by PhilHealth. The developers were given permission to develop SAGIP version 2.0 for their thesis to improve the existing SAGIP.
2. The source codes and access information will not be available for public viewing.
3. SAGIP relies on a temporary storage (ERAS database) for saving and fetching member data and sponsor data.
4. MCIS is strictly exclusive for viewing and editing by PhilHealth.
5. The status of each request is decided by MCIS and will reach SAGIP through a trigger executed by MCIS or ERAS on the corresponding SAGIP tables.
6. SAGIP has no direct access to PhilHealth databases, especially the member database. SAGIP is dependent on the data provided by PhilHealth web services or packages.
7. SAGIP referrals to and from DSWD are dependent on the availability of SIPAG's web services.
8. Communication with WOMB is one way, i.e., only WOMB sends membership requests as referrals to SAGIP. SAGIP does not send referrals to WOMB.

9. SAGIP is hosted in PhilHealth's test environment.
10. Transfer of SAGIP to their production server is the responsibility of PhilHealth ITMD department.
11. Testing/quality assurance will be performed by the development team and also by the PhilHealth ITMD department.

F. Assumptions

1. Data generated by PhilHealth web services are assumed to be accurate.
2. There is stable internet connection between PhilHealth, SAGIP, SIPAG, and WOMB to enable access to the various modules.
3. The credentials to access the database and web services will not be changed as these are hardcoded in the source code.
4. Aside from the usual user name and password to access the application, much of the security is implemented through firewalls, proxy servers, and restriction of IP addresses, web services, and packages.

II. Review of related literature

Information and communication technologies (ICTs) and the internet in general have been exploited in different fields for better processes. E-governance refers to the use of these ICTs to achieve better governance. Ping explains that e-government creates a comfortable, transparent, and cheap interaction between government and citizens, government and business enterprises, relationship between governments, and government and employees, so it made considerable and great progress in this century. [3]

As ICTs continue to evolve, governments embraced this evolution to provide more efficient and effective around-the-clock services [4] through the use of interactive websites and portals. [5] Furthermore, various governments around the world have also drafted mechanisms to fully implement e-government infrastructures in different aspects of service delivery. In Uruguay, the Electronic Government and Information Society Agency (AGESIC, Agencia de Gobierno Electrónico y Sociedad de la Información) has been established to support the development of e-government services. [6] Austria also has an e-governance system in place. [7] In the parlance of education, Dey and Kumar discussed adopting e-governance practices in higher education institutions (HEIs) to ensure quality education in Bangladesh. [5] Meanwhile, Sharma and Vaisla discussed e-health, the application of ICT to support delivery of healthcare services, for rural areas in the Uttarakhand province in India under an e-governance service delivery model. [8]

In the Philippines, the Department of Health (DOH) claims that e-health has continuously advanced and yielded considerable benefits to public health. Through these solutions, timeliness and accuracy of health reporting has been improved to monitor diseases and injuries, among others. Meanwhile, a national e-health program which will enable secure exchange of patient information in support to quality and responsive health system for all Filipinos is gradually being implemented, as per the Philippine eHealth Strategic Framework and Plan 2013-2017 drafted by the DOH and the

Department of Science and Technology. Included in the national eHealth program is an electronic health record system and an electronic referral system to facilitate health information exchange. [9] The electronic claims system for the Philippine Health Insurance Corporation (PHIC) or PhilHealth, also included in the national eHealth program, is already in place.

PhilHealth's electronic claims system, or eClaims, initially launched in 2011, provides an interface to view status of claims of institutional health care providers (IHCPs) online. The eClaims system intends to reduce turnaround time and improve operational efficiency in the processing and payment of claims. [10] Moreover, it streamlines key processes such as eligibility check, claims submission, verification, and payment, serving both PhilHealth members and its partner care providers. [11]

The paramount in e-government involves veiling organizational boundaries and providing services through a single point, which requires interaction and interoperation between heterogeneous applications and services provided by different agencies. [12] To address this challenge, various software architecture styles have been employed in the development of e-government systems, one of which is the service oriented architecture (SOA), considered the dominant architectural style in the recent decade. [13] SOA is an architectural design based on well-known design principles such as loose coupling and information hiding, which enables units of functionality to be provided and consumed as services. [14] A service represents business or automation logic in an enterprise system, each of which has its own autonomy that makes it independent from the others. To communicate with other services, a standardized protocol is used, such that is easier to integrate new services. [15]

E-Government solutions based on SOA is recommended for integrating traditional government solutions that are already deployed. [16] Moreover, SOA enables various government departments to re-use already developed services. [17] The government of the State of Alaska in the United States of America, for example, has utilized the SOA approach in their enterprise roadmap for the Department of Health and Social Services (DHSS). The enterprise roadmap outlines the gradual

transition to a shared services model from the existing model which allows each division to independently procure, implement, and operate necessary technologies to support day-to-day operations. The existing model has resulted to multiple siloed systems with redundant technical components, business capabilities, and duplicate data storage. This e-government solution is seen to result to a transition from division-centric IT approach to one that aligns with the technical and business needs across the department. [18] Meanwhile, Klischewski and Abubakr discussed the prospect of Egypt embarking on SOA to achieve interoperability of government-to-government services. The Ministry of State for Administrative Development (MSAD) specified e-governance priorities such as the increase in the number of services available to Egyptian citizens through the e-government portal and the improvement in the efficiency of administrative workflows and systems within the government, and upon consultation with a multinational IT company, the SOA approach was recommended to achieve such integration and interoperation. [19]

Web services, on the other hand, can also be used to implement architecture according to SOA concepts. [3] A web service defines a standardized mechanism to describe, locate, and communicate with online applications. It provides a systematic and extensible framework for application-to-application interaction built on top of existing web protocols and based on open eXtensible Markup Language (XML) standards. [20] Moreover, it enables agile, robust, and cost-efficient development of information systems, making it the primary choice for implementing applications in e-government systems. [7] Das et al. proposed such mechanism in an e-governance implementation, wherein interaction among different government departments in the Odisha province in India is facilitated through web service standards and middleware on XML. The proposed approach based on SOA connects the databases of programs on poverty, housing, food security, employment, monetary support, electrification, and health insurance to ensure seamless transaction among concerned agencies, thus improving delivery of social services. [17] Ping also outlined a web-services based architecture of e-government service which consists of three roles: E-Government service provider,

e-government service requestor, and e-government service channel registry. In this framework, an e-government service provider publishes an e-government service channel description to an e-government service channel registry, and an e-government service requestor can then find the e-government service channel description in an e-government service channel service registry via internet. [3] In the Philippine setting, the eClaims system of the PhilHealth utilizes a web service, the Claims Eligibility Web Service (CEWS), developed by the corporation to improve delivery of services. To use the eClaims system, an interested IHCP must request the eClaims Web Service Package from PhilHealth and set it up in their local workstations. The CEWS consists of modules such as PhilHealth Identification Number Verification Utility, Doctor Accreditation Check, Doctor Accreditation Number Utility, and Check Single Period of Confinement. [11]

To further realize the benefits of implementing the SOA approach in e-government systems, the concept of an enterprise system bus (ESB) has been applied in various settings. The ESB is a combined technology with the traditional middleware technology, XML, and web services. [21] It is a specific mechanism to achieve SOA, and the agency to achieve intelligent integration and management among services. [22] Kurniawan and Ashari showed that ESB can be used to integrate numerous services from different government departments and display data from these services in a real-time executive dashboard system for Sleman district in Yogyakarta, Indonesia. [15] Barak and Madoukh, meanwhile, proposed to address the shortcomings of the current model for the Palestinian government's central database by transforming the current model into SOA and implementing it using ESB. The main component of the proposed SOA-based central database architecture is the Central Database Service Bus, the central platform of integration between web services. It also provides routing and transportation features for web service requests. Other components of the Central Database are service registry, government informational service, service orchestration, database management adapter, database replication service, systems management service, and security assurance service. The Central Database Service Bus facilitates the interaction among the

seven other components, acting like a glue that binds them. It will also route, transport, format requests and responses of the services, and provide service discovery through the registry. [23] In the context of healthcare, Ryan and Eklund presented an interoperability framework based on the ESB called Health Service Bus as a solution to the three levels of interoperability (technical, semantic, and process) as defined by the HL7 Interoperability Work Group. The authors proved that ESB is a powerful technology for standards-based integration, providing an excellent solution for communication in healthcare. [24]

Online registrations are much better in today's settings where popularity of online systems is increasing day by day and most of the systems are being digitized. According to Oladunjoye, online registration makes process easier, less tedious and less error-prone than manual systems. [44] In the context of healthcare, healthcare industry transcends its process to digital from manual through ICTs, thus inherits the processes and standards of digital and online processes. [45] According to a study by Contiero et al, patient registration in the health care industry is a crucial part in the deliverance of health care services since online registrations takes less time and stress for patients rather than the manual process that is less preferred by patients. [46]

III. Theoretical framework

A. Philippine Health Insurance Corporation

The Philippine Health Insurance Corporation (PhilHealth) administers the National Health Insurance Program (NHIP) since the former's establishment in 1995 through the passage of Republic Act 7875. It is mandated to provide health insurance coverage to all Filipinos. [25] As of 31 December 2015, 93,445,053 Filipinos are covered by the NHIP as PhilHealth members or member dependents. In terms of membership by sector, 49 percent are indigents, 30 percent are from formal economy, 9 percent are from informal economy, 8 percent are senior citizens, 2 percent are sponsored, and 2 percent are lifetime members. [26] Obermann et al. considers PhilHealth successful in terms of enrollment, but trails behind in other areas such as quality and price control. [27]

B. Social Protection Support Initiatives

The Social Protection Support Initiatives is a collaboration project of PhilHealth, Department of Health (DOH) and Department of Social Welfare and Development (DSWD) launched in 2014 aimed at delivering better and coordinated social protection services using ICT solutions to improve the well-being and economic status of targeted poor families and individuals. [28]

The SPSI project consists of three interdependent systems: Sigurado at Garantisadong Insurance Pangkalusugan (SAGIP) of PhilHealth, Watching Over Mothers and Babies (WOMB) of the DOH, and Sustaining Interventions in Poverty Alleviation and Governance (SIPAG) of the DSWD. [28] SAGIP aims to extend universal health care to all Filipinos through proactive registration. [29] WOMB on the other hand, facilitates the access to and utilization of the DOH's maternal, neonatal and child health services at the local levels, while SIPAG enhances

the capacity of local social welfare and development offices to manage cases through electronic social cage management system to assess the overall well-being of the target beneficiaries. [28]

C. Sigurado at Garantisadong Insurance Pangkalusugan (SAGIP)

Sigurado at Garantisadong Insurance Pangkalusugan (SAGIP) is one of the three electronic service programs under the SPSI. SAGIP is handled by PhilHealth and it aims to register all Filipinos with PhilHealth and remind its paying members to regularly pay their premium contribution to continuously avail themselves of health care benefits. It also has a mechanism to refer inactive members to appropriate sponsorships. [28] SAGIP version 1.0 was pilot tested in 2014 in the municipalities of Pola, Bansud, Mansalay, Bulalacao, Bongabong, and Naujan in Oriental Mindoro. [29]

D. Service oriented architecture

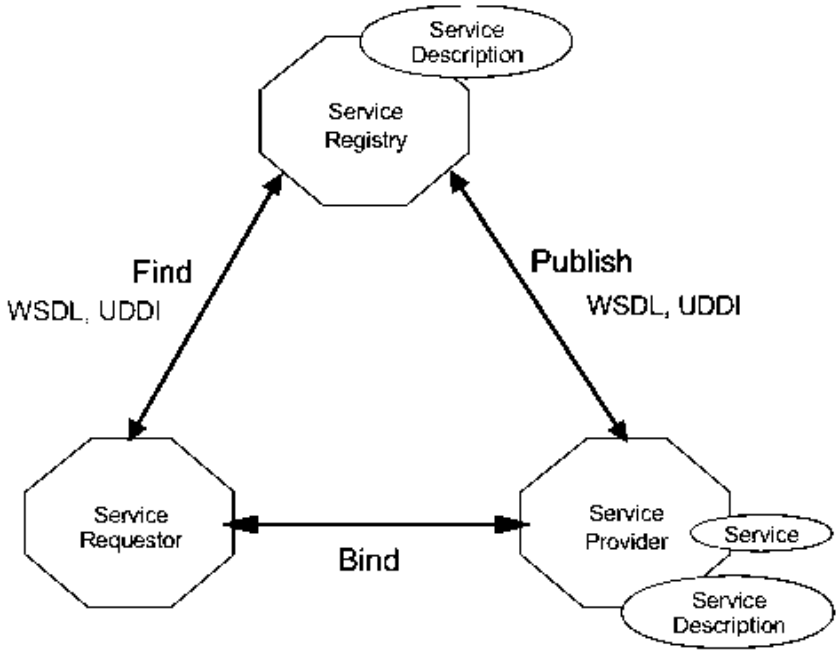
Service oriented architecture (SOA) is an approach used to create an architecture based upon the use of services. [30] A service represents business or automation logic in an enterprise system, each of which has its own autonomy that makes it independent from the others. To communicate with other services, a standardized protocol is used, such that is easier to integrate new services. [15]

One of the keys to SOA is that interactions occur with loosely coupled services that operate independently. SOA allows for service reuse, making it unnecessary to start from scratch when upgrades and other modifications are needed. This is a benefit to businesses that seek ways to save time and money. [30]

E. Web services

Web services define a standardized mechanism to describe, locate, and communicate with online applications. A web service provides a systematic and extensible framework for application-to-application interaction built on top of existing web protocols and based on open XML standards. [20]

The web services framework can be divided into three areas. First is the communication protocol to enable communication that is platform-independent, international, secure, and as lightweight as possible. Second is the service description to describe the web services as collections of communication end points that can exchange certain messages. Last is the service discovery to systematically find service providers through a centralized registry of services. [20]



Web services roles, operations and artifacts [40]

F. Web Service Description Language

The Web Service Description Language (WSDL) is an XML-based format to describe network services as collections of communication endpoints capable of exchanging messages. A WSDL service definition serves as a documentation for distributed systems. [36]

A WSDL document is defined using different elements, namely: Type, message, operation, port type, binding, port, and service. The type element contains data type definitions using some type system (e.g., XSD); the message element is an abstract, typed definition of the data being communicated; operation is an abstract description of an action supported by the service; port type presents an abstract set of operations supported by one or more endpoints; binding defines a concrete protocol and data format specification for a particular port type; port is a single endpoint defined as a combination of a binding and a network address; and service is a collection of related endpoints. [36]

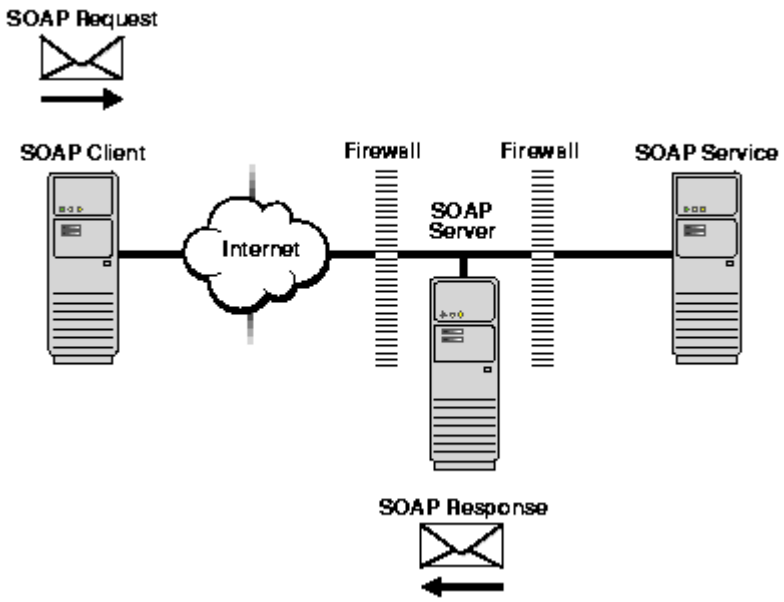
```
<!-- WSDL definition structure -->
<definitions
    name="MathService"
targetNamespace="http://example.org/math/"
xmlns="http://schemas.xmlsoap.org/wsdl/"
>
   <!-- abstract definitions -->
    <types> ...
    <message> ...
   <portType> ...

   <!-- concrete definitions -->
   <binding> ...
   <service> ...
</definition>
```

Basic structure of a WSDL definition [36]

G. Simple Object Access Protocol and NuSOAP

Simple Object Access Protocol (SOAP) is an XML-based protocol for messaging and remote call procedures (RPCs) in a distributed and heterogenous web environment. [31] When SOAP-based requests and responses are combined with a transport protocol such as Hypertext Transfer Protocol (HTTP), the internet may serve as a medium for applications to publish database-backed web services. Features of SOAP include protocol independence, language independence, and platform and operating system independence. [32]

NuSOAP is a rewrite of SOAPx4 by NuSphere and Dietrich Ayala. Using a set of PHP classes, NuSOAP allows developers to create and consume web services based on SOAP 1.1, WSDL 1.1, and HTTP 1.0/1.1. [33]



Components of the SOAP architecture [32]

H. Oracle ® Database

Structured Query Language (SQL) is a programming language specifically designed to enable creation of databases and to facilitate addition of new data to them, maintenance of data in them, and retrieval of selected parts of the data. [37] The language was developed by IBM Corporation, Inc. to use Dr. E. F. Codd's model of relational database management systems (RDBMS). SQL is accepted as the standard RDBMS language. [38]

Oracle ® Database is a commercial SQL-based RDBMS. In addition, Oracle ® Database implements object-oriented features such as user-defined types, inheritance, and polymorphism, making it an object-relational database management system (ORDBMS). It effectively extends the relational model to an object-relational one, making it possible to store complex business models in a relational database. [39]

I. Packages

In the context of Oracle ® Database, a package provides a method of encapsulating related procedures, functions, and associated cursors and variables together as a unit in the database. Similar to standalone procedures and functions, packaged procedures and functions can be called explicitly by applications or users. [40]

Packages are often implemented to provide advantages in the following areas: [40]

- encapsulation of related procedures and variables
- declaration of public and private procedures, variables, constants, and cursors
- separation of the package specification and package body
- better performance

J. CodeIgniter

CodeIgniter is an open-source PHP framework with a very small footprint, created by Rick Ellis in 2006. It was designed as a simple and elegant PHP toolkit to enable rapid development of both websites and web applications. [41]

CodeIgniter follows the model-view-controller architectural pattern, and provides Active Record database abstraction layer with support for all major relational database systems. It also follows the “don’t repeat yourself” principle by offering numerous classes and helpers and promotes the “convention over configuration” concept through optional sets of default configurations. [42]

IV. Design and Implementation

A. Context Diagram

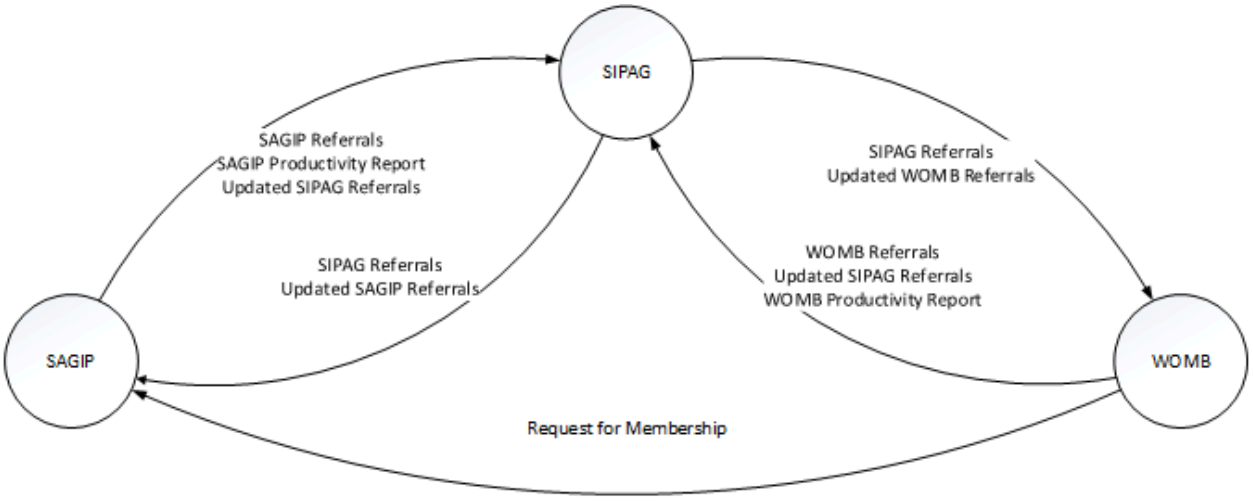


Figure 1

Context Diagram of SPSI

The context diagram of SPSI shows the interaction of the 3 main departments involve in the project and data they exchange with each other.

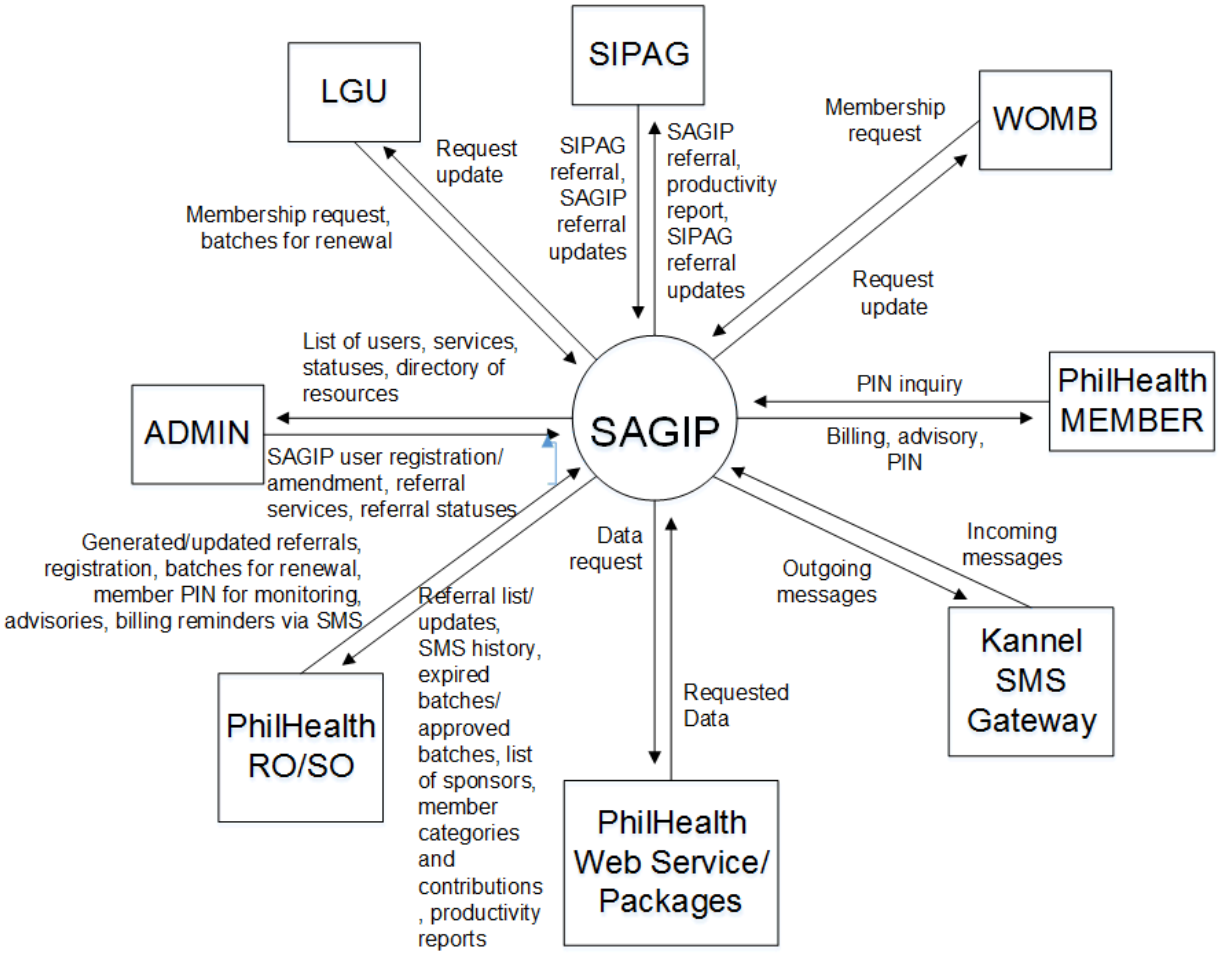


Figure 2

Context Diagram of SAGIP

The context diagram in Figure 2 shows the interaction of SAGIP with the other entities involve in its services.

B. Use Case Diagram

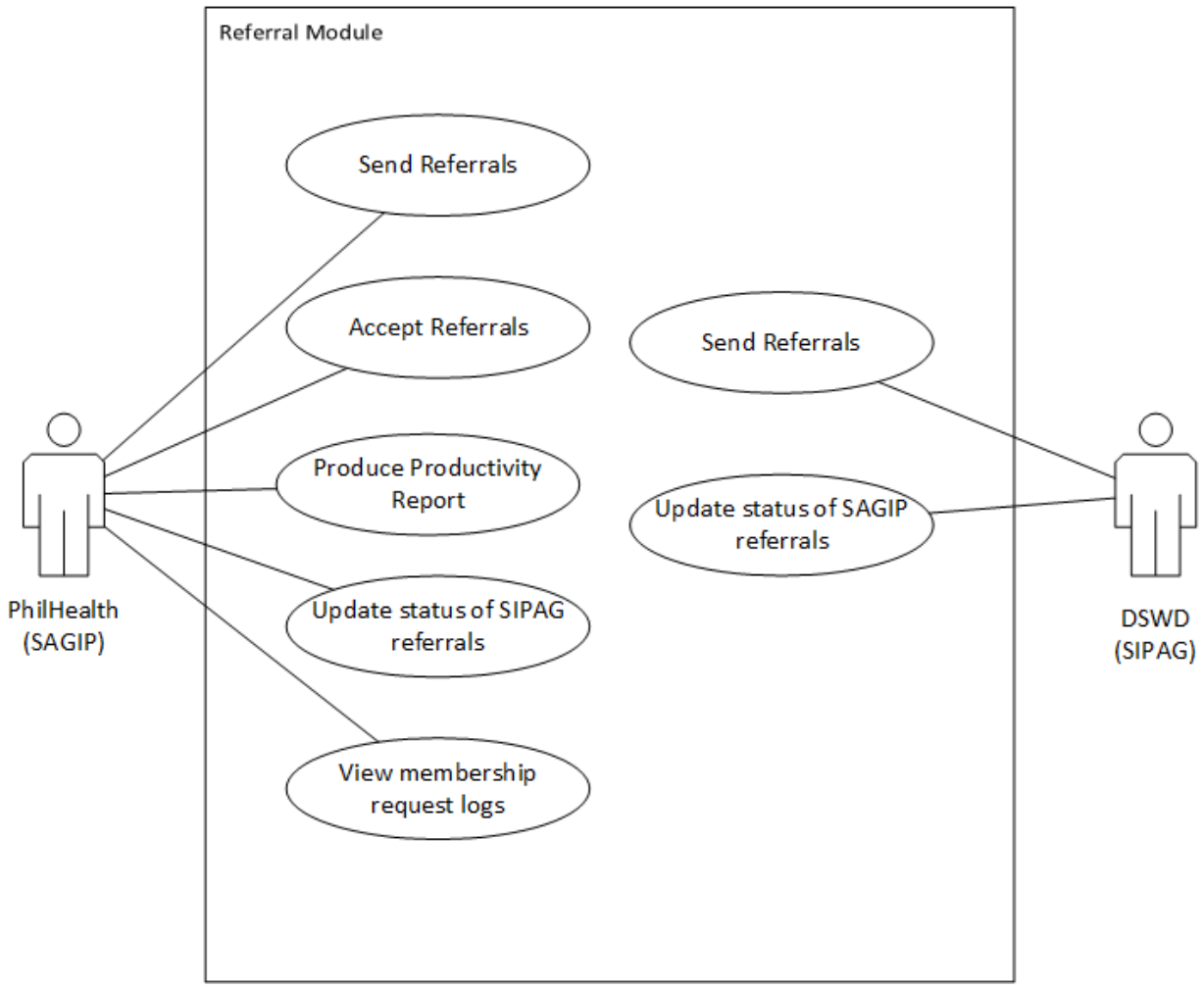


Figure 3

Use Case Diagram of Referral Module

Figure 3 shows that SAGIP and SIPAG users can access the Referral Module. SAGIP users can accept referrals, produce productivity reports, update status of SIPAG referrals, and view membership request logs, while SIPAG users can update status of SAGIP referrals. Both users can send referrals.

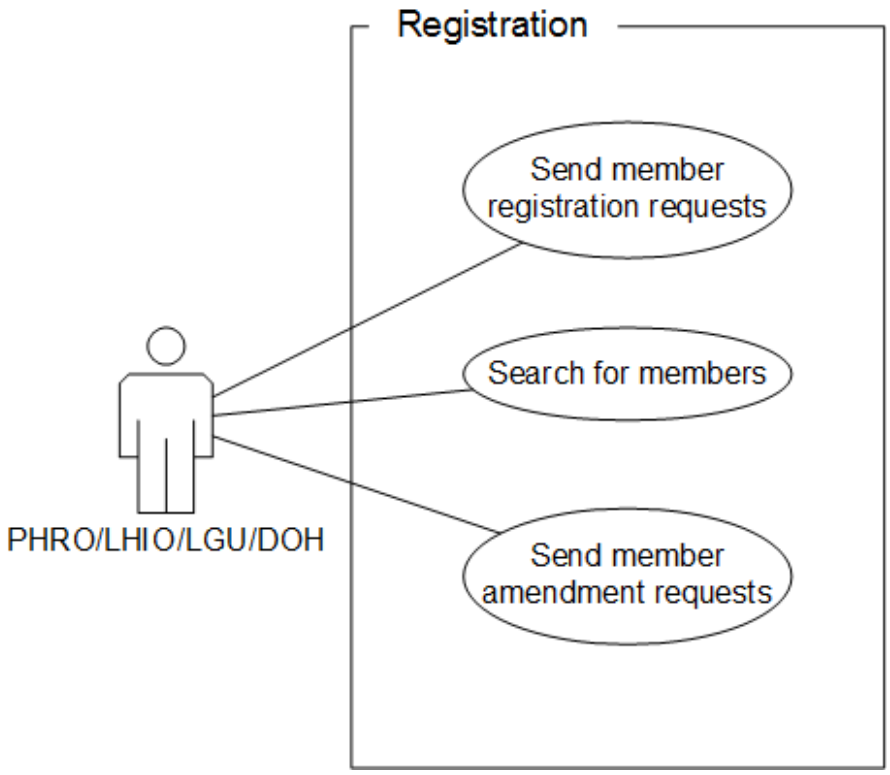


Figure 4

Use Case Diagram of Registration Module

Figure 4 shows the three functions provided in the Registration Module. All users with access to the module can use the three functionalities of the Registration Module.

C. Process Flow Diagram

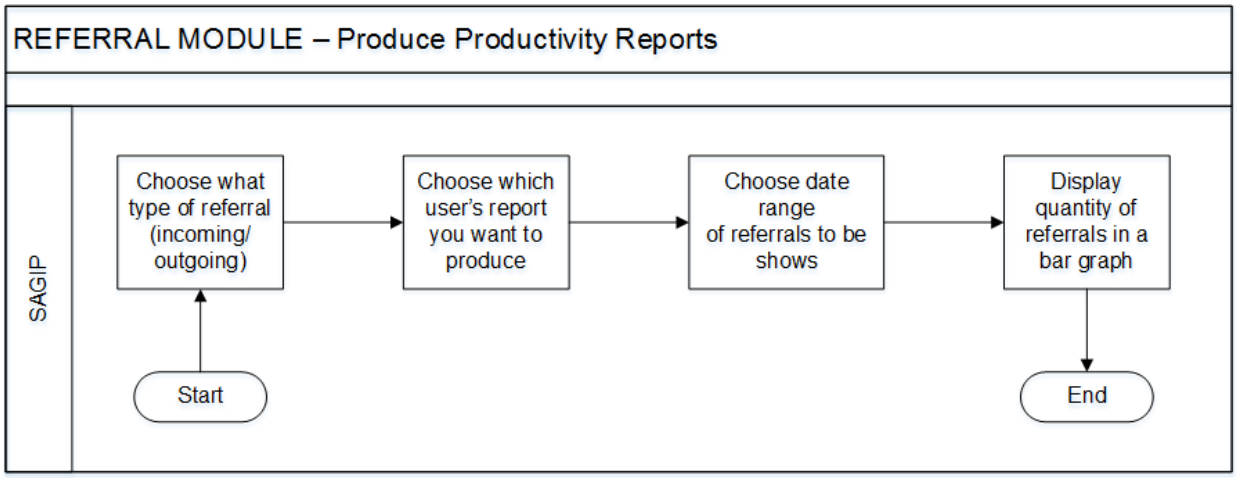


Figure 5

Process flow diagram of Referral Module: Produce Productivity Reports

Figure 9 shows how the user can classify the reports to be produced based on the type of referral (incoming/ outgoing), who sends/receives the referrals and the referrals which are processed on the chosen date range.

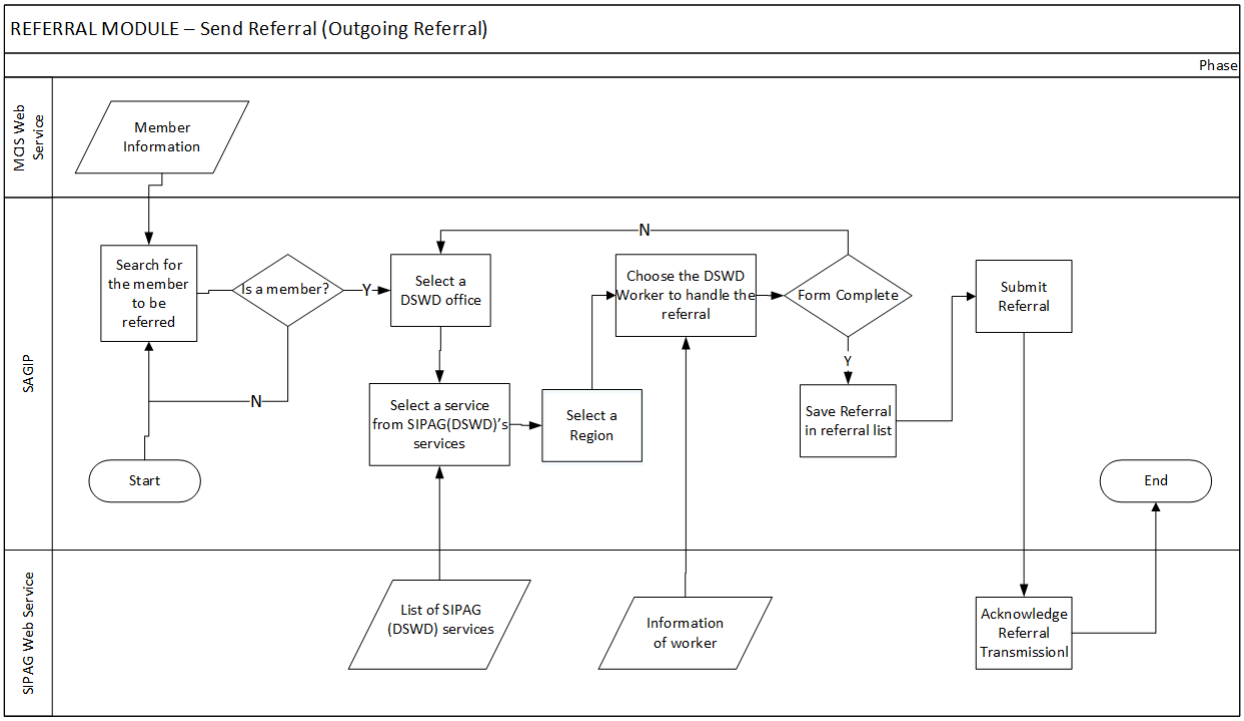


Figure 6

Process flow diagram of Referral Module: Send Referral (Outgoing Referral)

As shown above, the information of the member to be referred will come from PhilHealth's WSDL. The list of services and receiving agency will be supplied by SIPAG's WSDL. After completing the referral form, the referral will be sent to SIPAG.

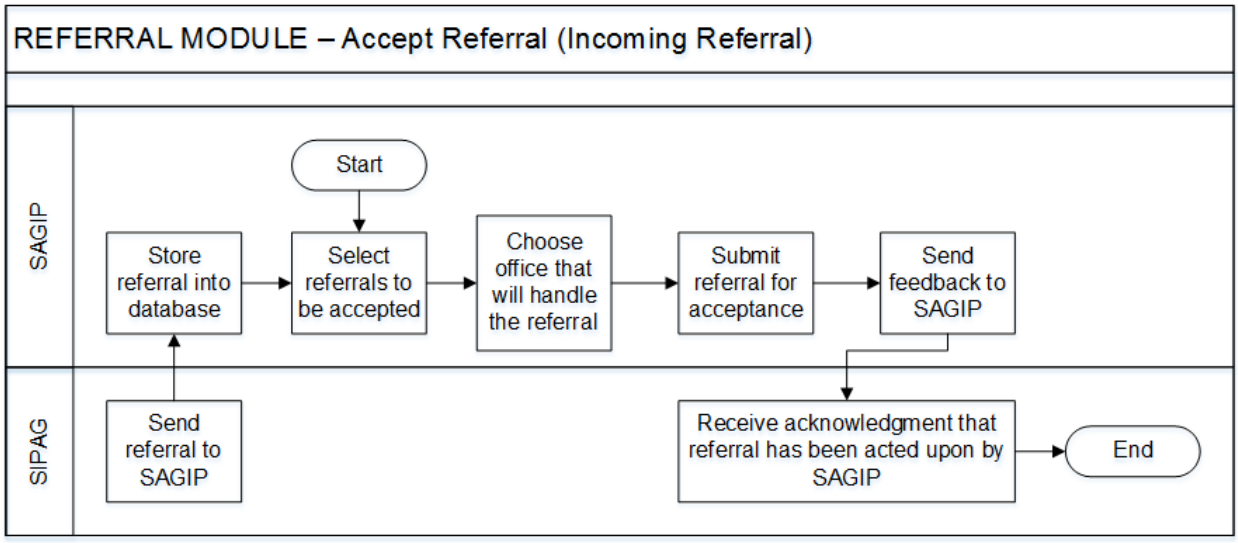


Figure 7

Process flow diagram of Referral Module: Update Referrals

After acting upon the referrals by SIPAG, SAGIP will send an acknowledgement to SIPAG about the status of the referrals accepted.

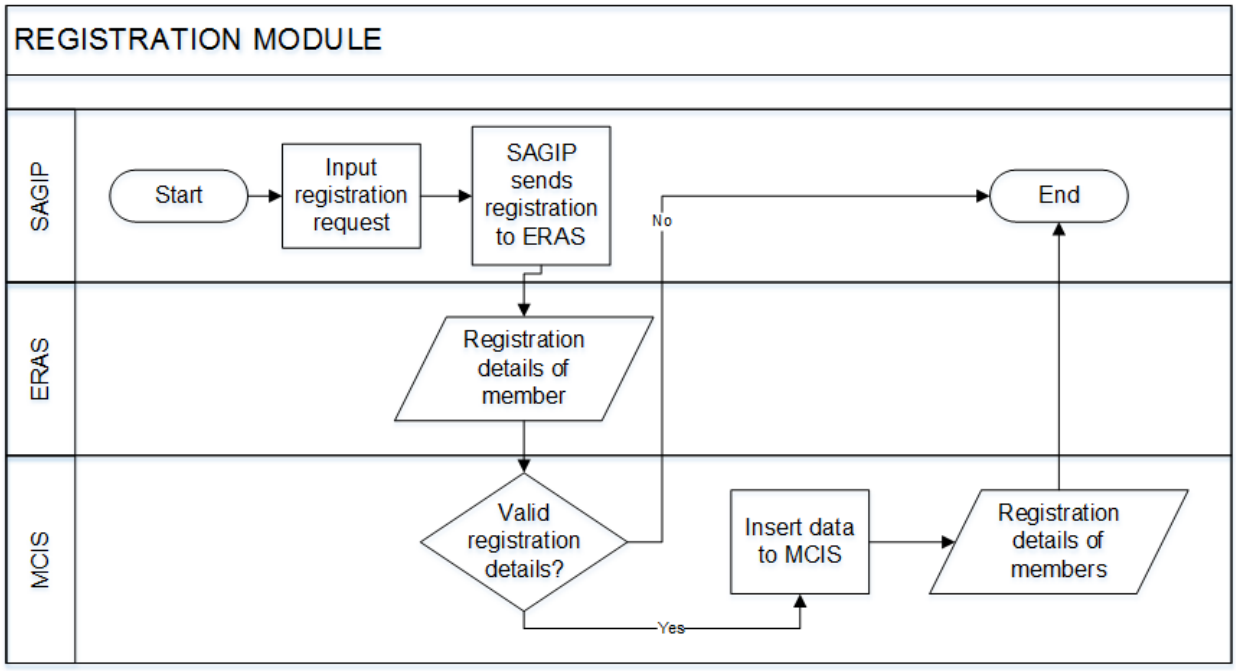


Figure 8

Process flow diagram of Registration Module

The Process Flow Diagram shown shows the interaction between SAGIP, ERAS and MCIS. Member registration details submitted by SAGIP will be stored in ERAS and to be approved by MCIS. Once approved, member registration details will be stored in MCIS.

D. Entity Relationship Diagram

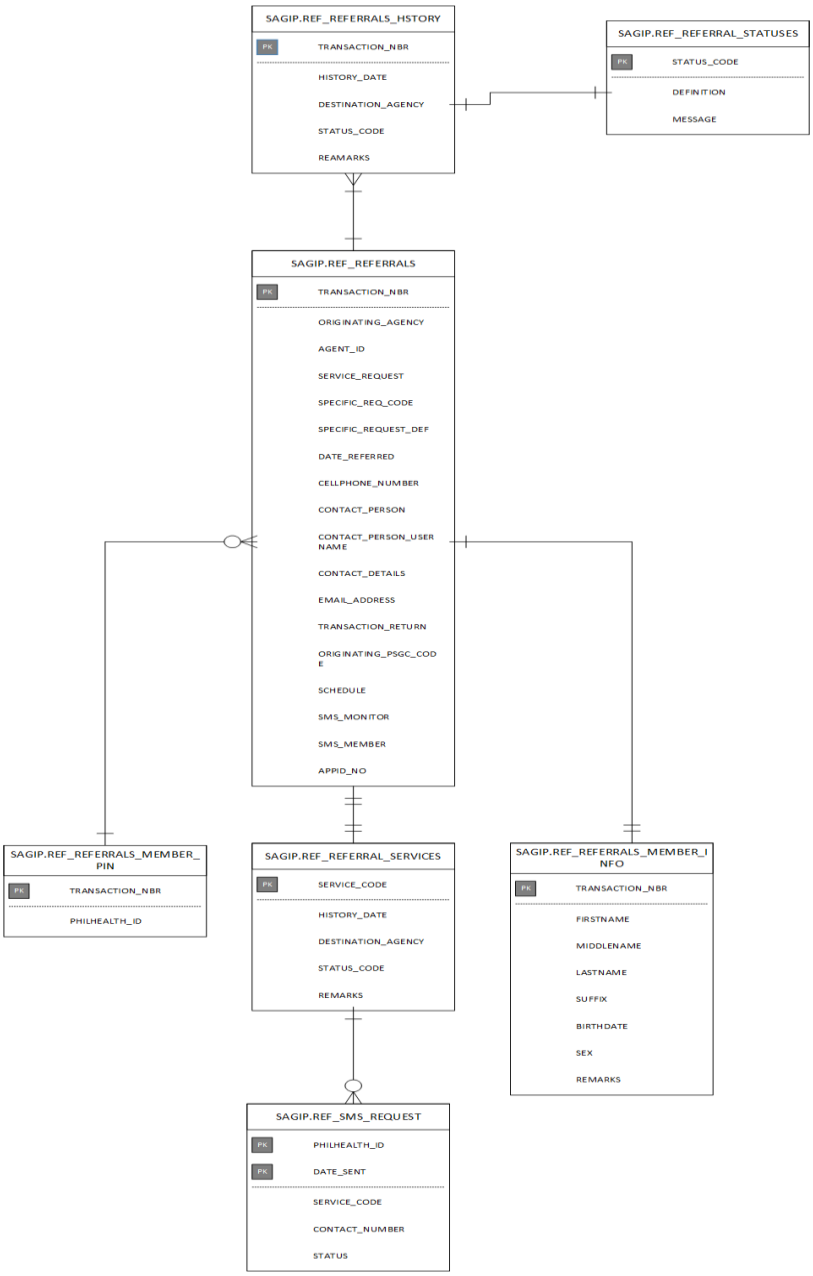


Figure 9

Entity Relationship Diagram of Referral Module

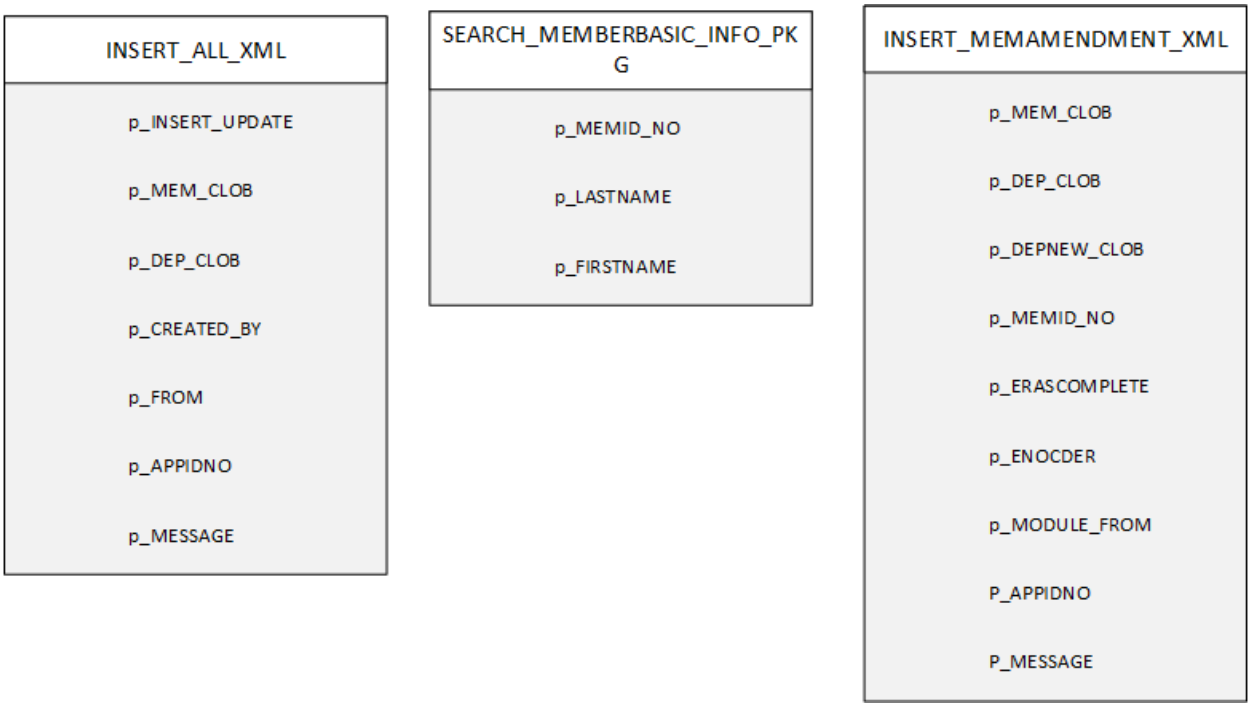


Figure 10

Entity Relationship Diagram of Registration Module

The Entity Relationship Diagram above shows the three functions of the PhilHealth ERAS database that will be used in SAGIP.

E. Technical Architecture Diagram

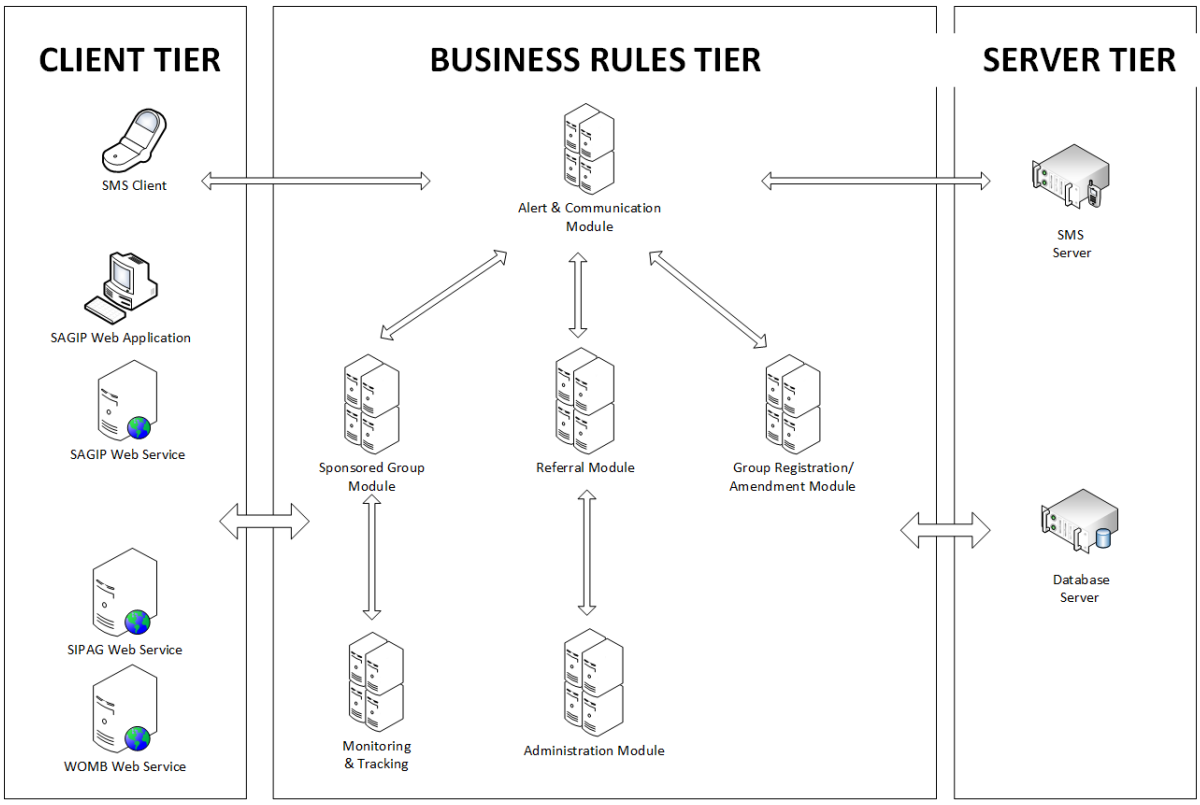


Figure 11

Technical Architecture Diagram of SAGIP system

F. Data Dictionary

Referral module

Table Name	Purpose of Table	Field	Data Type	Constraints	Related Tables	Description
REF_MEMBER_DEPENDENTS	Contains information of Dependents included in the search parameter. Used by PIN Inquiry functionality.	**TRANSACTION_NBR**	**Char(15)**	**Primary Key; Foreign Key**	REF_REFERRALS	Incoming Referrals with Pin Inquiry Service with dependents included in search parameter
		PARAMETER_ID	**Number**	**Primary Key**		Surrogate key per Dependent
		FIRSTNAME	Varchar2 (50)			First name of dependent
		MIDDLENAME	Varchar2 (50)	Optional		Middle name of dependent
		LASTNAME	Varchar2 (50)			Last name of dependent
		SUFFIX	Varchar2 (10)			Suffix of dependent
REF_OUTGOING_SEQUENCE	Contains sequence number used in OUTGOING Referral.	**DESTINATION_AGENCY**	**Char(3)**	**Primary Key; Foreign Key**	GEN_AGENCIES	Example. Agency Code is 053 for AGENCY SHORTNAME: LHIO - IPIL
		REFERRAL_SEQUENCE	**Number(5,0)**	**Primary Key**		TRANSACTION RETURN SERIES
REF_REFERRALS	Contains information about Referrals (Outgoing and Incoming) of PHIC to other Agencies (DOH and DSWD)	**TRANSACTION_NBR**	**Char(15)**	**Primary Key; Unique Key**		Per Referral you get Transaction Number with format : TYYMMDDRR000000 where 000000 sequence from REGIONS_SEQ table
		ORIGINATING_AGENCY	Char(3)	Foreign Key	GEN_AGENCIES	Example. Agency Code is 053 for AGENCY SHORTNAME: LHIO - IPIL
		AGENT_ID	Varchar2 (50)			Username of the PHIC Staff who encoded/accepted the referral

		SERVICE_REQUEST	Char(3)	Foreign Key	REF_REFERRAL_SERVICES	Category of Service of this referral. **For Outgoing**: P01 - Outgoing Service **For Incoming**: N01 - Printing of UMID Card; N02 - Printing of Paper ID; N03 - Biometric Capture; N04 -Social Intervention of OG; N05 - Pin Inquiry; N06 - Printing of MDR; N07 - Membership Registration
		SPECFC_REQ_CODE	Varchar2 (10)			Service Code specific to Destination Agency Ex. for DSWD Services are A B C for DOH Services are D E F
		SPECFC_REQ_DEF	Varchar2 (50)			Meaning of the above Service Codes provided by the Agency
		DATE_REFERRED	Date			Date referral request is made
		CELLPHONE_NUMBER	Varchar2 (20)			Current Cellphone Number of Member
		EMAIL_ADDRESS	Varchar2 (100)			Email Address of the Member
		TRANSACTION_RETURN	Char(19)			OA-DA-YYYYMMDD00000 (OA-Originating Agency, DA-Destination Agency, 5 digit sequence number)
		ORIGINATING_PSGC_CODE	Char(9)			PSGC Code of sender (Per PSGC Code, only one Contact Person per Destination Agency)
		CONTACT_PERSON	Varchar2 (300)			
		CONTACT_DETAILS	Varchar2 (50)			
		SCHEDULE	Date			Schedule of service. For status: FOR FURTHER ACTION.
		SMS_MONITOR	Char(1)			1- Staff Monitors Status of Referral through SMS; 0 - No SMS Monitoring

REF_REFERRALS_HISTORY	Contains status of Referrals per update. The first time a referral is made we generate a transaction number we also record the history date. When Destination agency acts on the referral, the same transaction number is used but history date is different.	**TRANSACTION_NBR**	**Char(15)**	**Primary Key; Foreign Key**	**REF_REFERRALS**	Per Referral you get Transaction Number with format: TYYMMDDRR000000 where 000000 sequence from REGIONS_SEQ table. This is a copy of Transaction number from REF_REFERRALS table
		HISTORY_DATE	**Timestamp(6)**	**Primary Key**		Date when the referral is updated
		DESTINATION_AGENCY	Char(3)	Foreign Key	GEN_AGENCIES	Example. Agency Code is 053 for AGENCY SHORTNAME: LHIO - IPIL
		STATUS_CODE	Char(2)	Foreign Key	REF_REFERRAL_STATUSES	External Status: 06 - Pending; 01 - Service Provided; 02- Service Not Provided; 04 - For Further Action Internal Status: 00-Waiting for Acknowledgement;
		REMARKS	Varchar2 (500)			IF UNSUCCESSFUL REFERRAL WRITEDOWN REMARKS, ELSE MAY OR MAY NOT WRITE REMARKS
REF_REFERRALS_INBOX	Contains OUTGOING Referrals. No Transaction Number generated while still not sent to Destination Agency to be forwarded to other Non-PhilHealth Agencies. Once referral is forwarded to Destination Agency and is saved in REF_REFERRALS then the corresponding entry here will be deleted. Serves as Drafts	**INBOX_ID**	**Varchar2 (40)**	**Primary Key**		
		PHILHEALTH_ID	Char(12)			PhilHealth ID of Member
		CONTACT_NBR	Varchar2 (20)			Current Cellphone Number of Member
		SERVICE_CODE	Varchar2 (40)			Service Code specific to Destination Agency Ex. for DSWD Services are A B C for DOH Services are D E F
		SERVICE_REQUEST	Varchar2 (150)			Meaning of the above Service Codes provided by the Agency
		DESTINATION_AGENCY	Char(3)	Foreign Key	GEN_AGENCIES	Non-PhilHealth Agencies
		AGENT_ID	Varchar2 (50)			Username of the PHIC Staff who encoded the referral
		CONTACT_PERSON	Varchar2 (50)			Contact Person for the Destination Agency. 1 Contact Person per PSGC Code of Destination Agency
		CONTACT_PERSON_PSGC	Char(10)			

	or Temp Table for Outgoing Referrals	CONTACT_PERSON_MOBILE	Varchar2 (40)			
		CONTACT_PERSON_AGENCY	Varchar2 (5)			
		SMS_MONITOR	Char(1)	Foreign Key		1- Staff Monitors Status of Referral through SMS; 0 - No SMS Monitoring
REF_REFERRALS_MEMBER_INFO	Used by Referrals on PIN Inquiry and Membership Request Referral Services. Stores the name, birthday, sex of requester who may or may not be a PhilHealth Member.	**TRANSACTION_NBR**	**Char(15)**	**Primary Key; Foreign Key**	**REF_REFERRALS**	Per Referral you get Transaction Number with format: TYYMMDDRR000000 where 000000 sequence from REGIONS_SEQ table. This is a copy of Transaction number from REF_REFERRALS table
		FIRSTNAME	Varchar2 (50)			First name of member
		MIDDLENAME	Varchar2 (50)			Middle name of member
		LASTNAME	Varchar2 (50)			Last name of member
		SUFFIX	Varchar2 (10)			Suffix of member
		BIRTHDATE	Date			Birthdate of member
		SEX	Char(1)			Sex of member
		REMARKS	Varchar2 (300)			Possible Results of Pin Inquiry: Insufficient, No PhilHealth ID, or Verified; If no PhilHealth ID and requester wants to be a PhilHealth member, the personnel (DOH, DSWD, PhilHealth) will open Group Registration and Encode Data there. If Insufficient (two or more search results), requester must go to PhilHealth to clear his records.

REF_REFERRALS_MEMBER_PIN	Referrals with known Philhealth ID. Referrals other than Pin Inquiry. Example: Printing of MDR, Biometric Capture, services from DSWD such as Livelihood Assistance, Training, etc.	**TRANSACTION_NBR**	**Char(15)**	**Primary Key; Foreign Key**	**REF_REFERRALS**	Per Referral you get Transaction Number with format: TYYMMDDRR000000 where 000000 sequence from REGIONS_SEQ table. This is a copy of Transaction number from REF_REFERRALS table
		PHILHEALTH_ID	**Char(12)**	**Primary Key; Foreign Key**	**GEN_MEMBER_MCIS**	PhilHealth ID of Member requesting referral
REF_REFERRAL_SERVICES	Contains list of Services both Outgoing and Incoming.	**SERVICE_CODE**	**Char(3)**	**Primary Key**		Example: N01, N02, N03, N04, N05, N06,N07, P01
		SERVICE_TYPE_CODE	Char(1)			P - from PhilHealth; N - from Non-PhilHealth
		SERVICE_NAME	Varchar2 (150)			Service Description Example: Printing of UMID Card; Printing of Paper ID; Biometric Capture; Social Intervention of OG; Pin Inquiry; Printing of MDR; Membership Registration
REF_REFERRAL_STATUSES	Contains list of Status both Outgoing and Incoming. Library of Statuses for REF_REFERRALS_HISTORY	**STATUS_CODE**	**Char(2)**	**Primary Key**		External Status: 06 - Pending; 01 - Service Provided; 02- Service Not Provided; 04 - For Further Action Internal Status: 00-Waiting for Acknowledgement;
		DEFINITION	Varchar2 (500)			Detailed Description of Status Code
		MESSAGE	Varchar2 (500)			Message to be sent to Destination Agency per Status Code

Table 3. Data dictionary of the referral module

V. Results

The general design of SAGIP versions 1.0 and 2.0 includes the navigation bar which consists of its modules, and the user information. Displayed in the homepage of SAGIP is the SPSI logo, which is the integrated logos of DSWD, DOH, and PhilHealth.

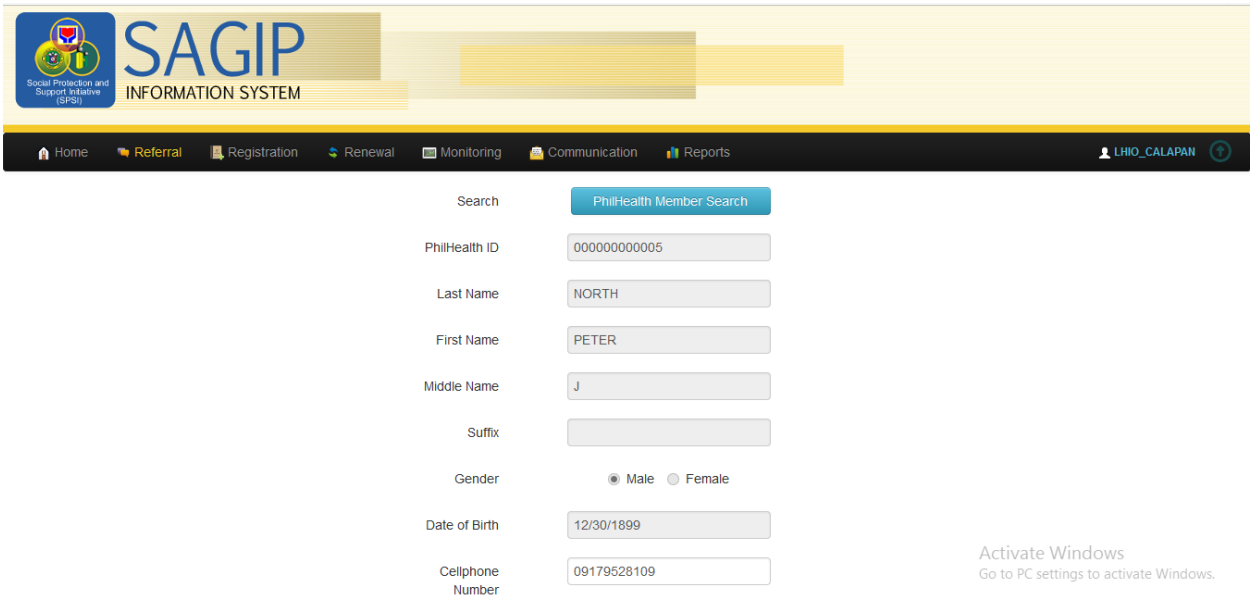
Figure 12

SAGIP Homepage

A. Referral

Figure 13. Referral Options

The Referral module has two options, PhilHealth Referrals, and Non-PhilHealth Referrals



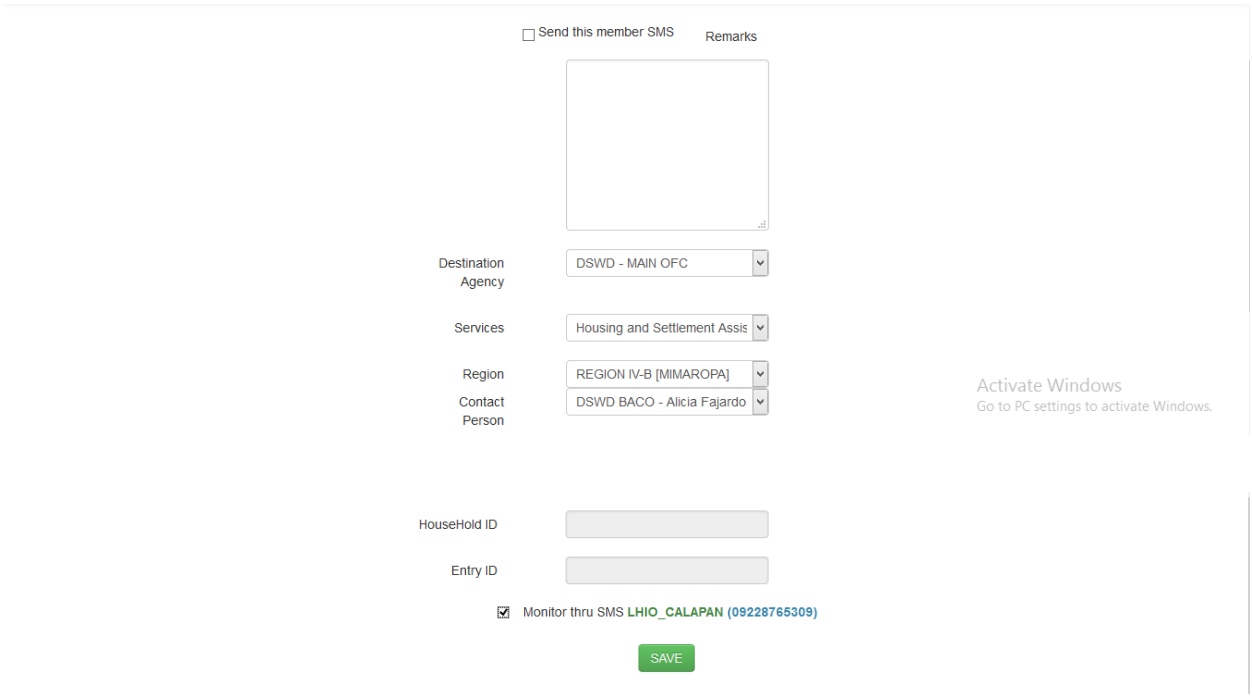


Figure 14. Add Outgoing Referral Form

In the Add Outgoing Referrals page, the user will first search the desired member via PIN or member information, and then select the desired referral information data to be sent.

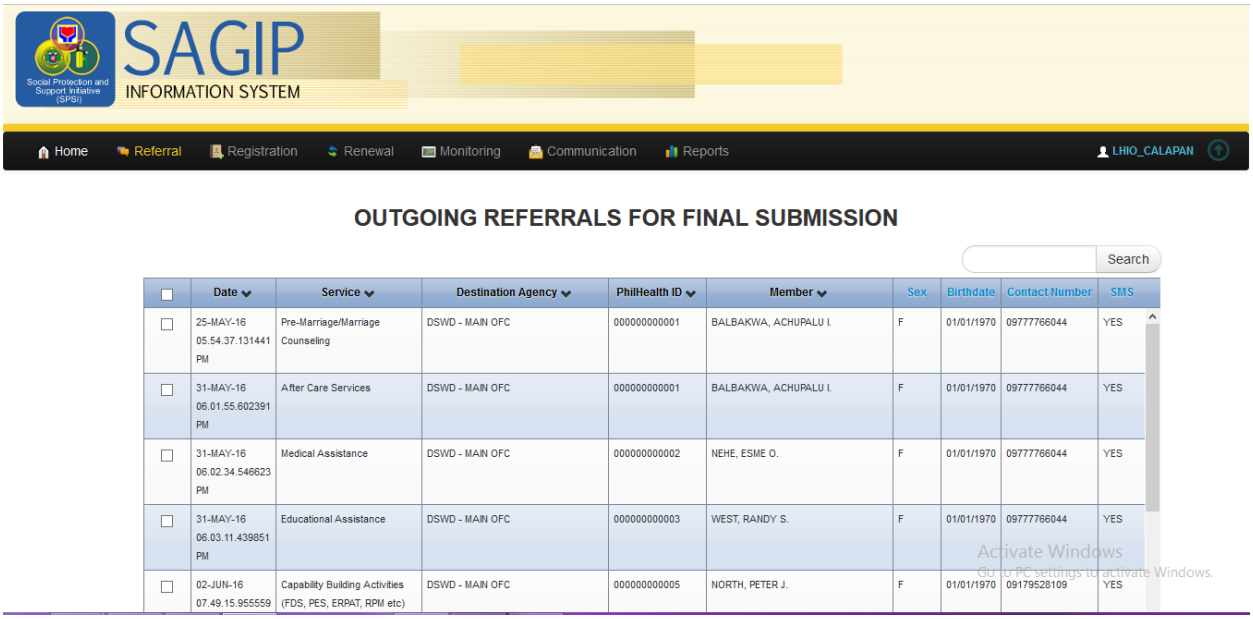


Figure 15. Outgoing referrals submission page

The outgoing referrals submission page shows the list of the saved referrals to be sent to other agencies

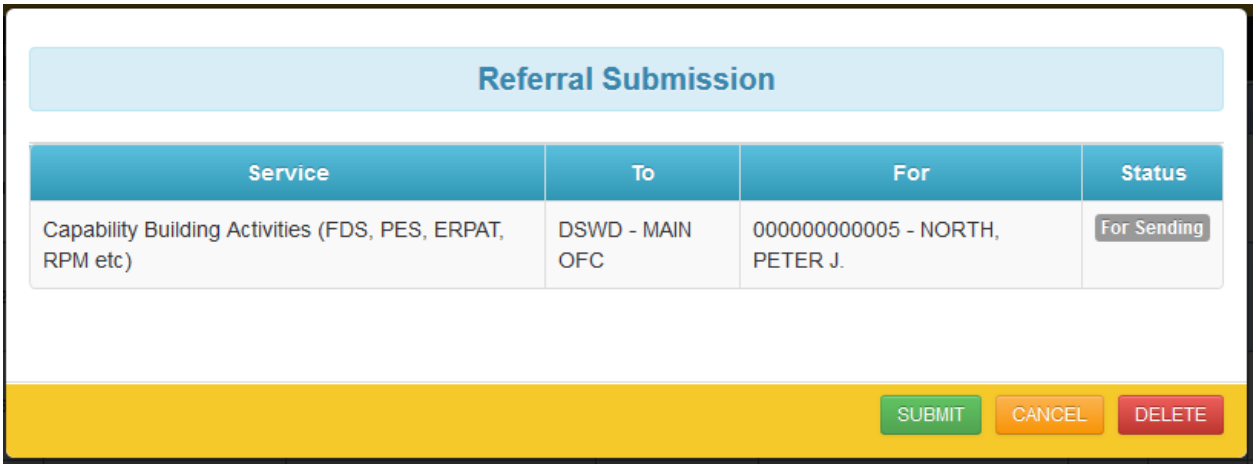


Figure 16 Submit outgoing referral modal

The selected referrals will be prompted for confirmation of submission

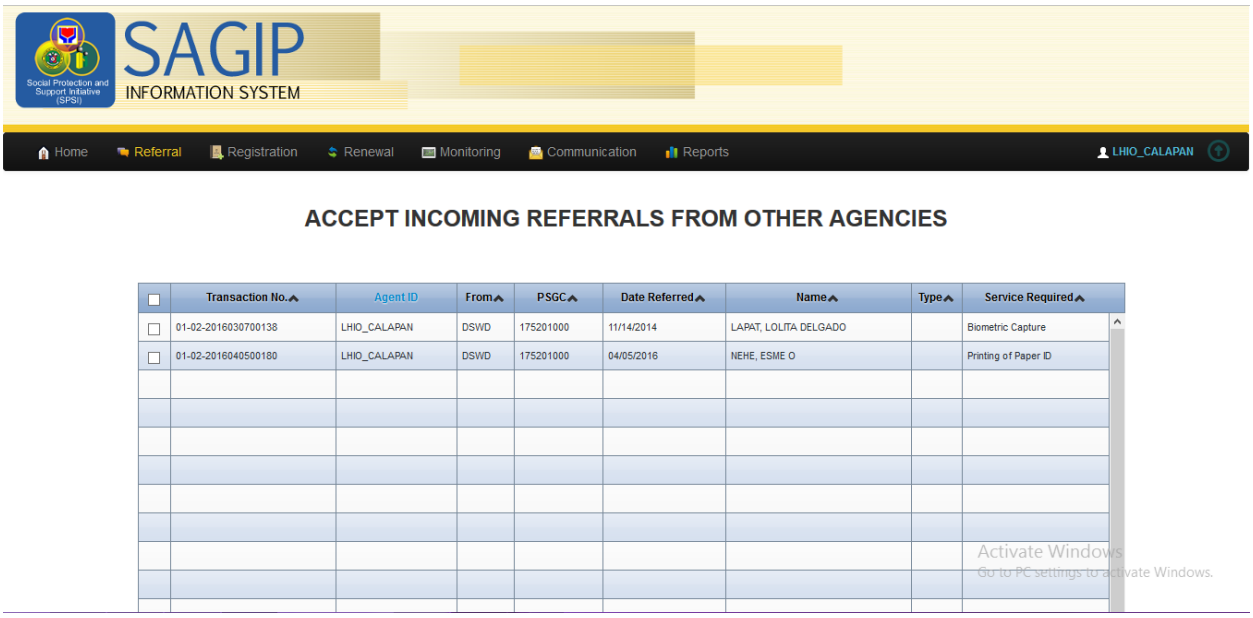


Figure 17. Accept Incoming Referrals Page

In accepting incoming referrals, the list of incoming referrals are displayed with details. A checkbox is available to select the referrals to be accepted

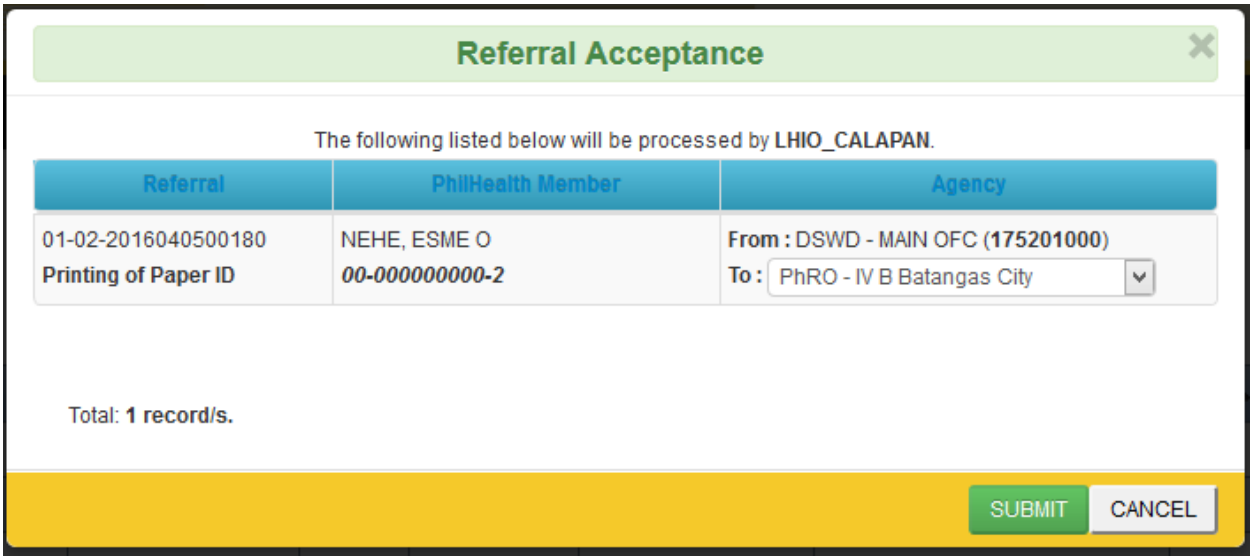


Figure 18. Accept incoming referrals modal

The selected referrals will then be reviewed for submission.

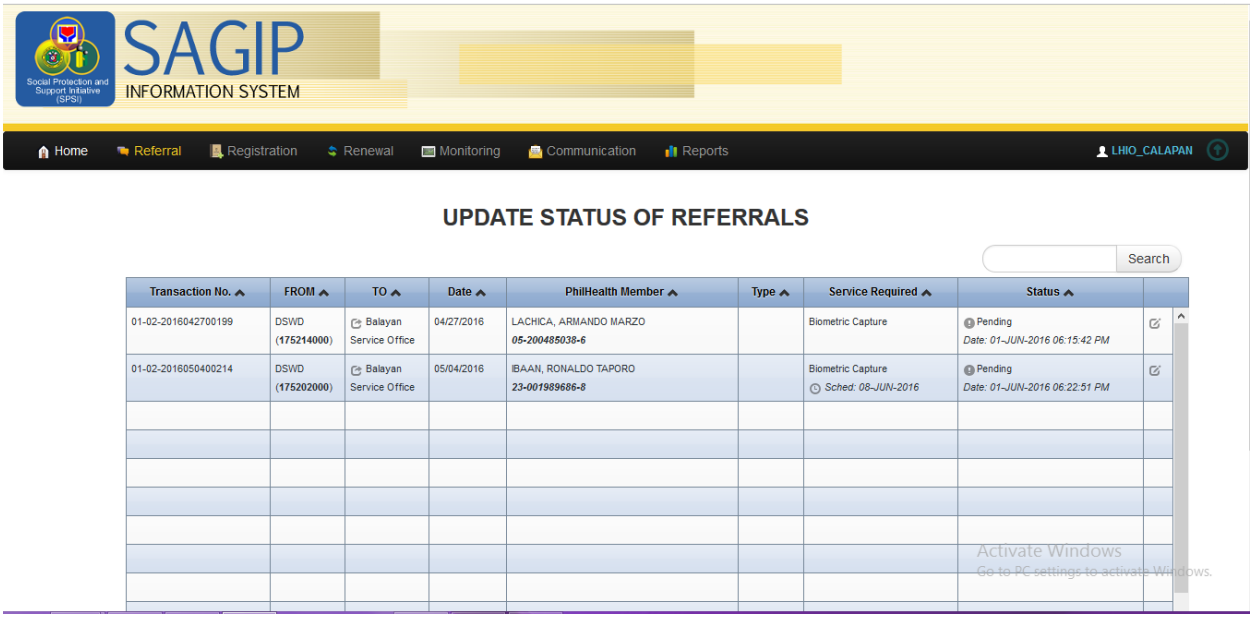


Figure 19. Update status of referral page

In the Update Status of Referrals Page, all accepted referrals are displayed

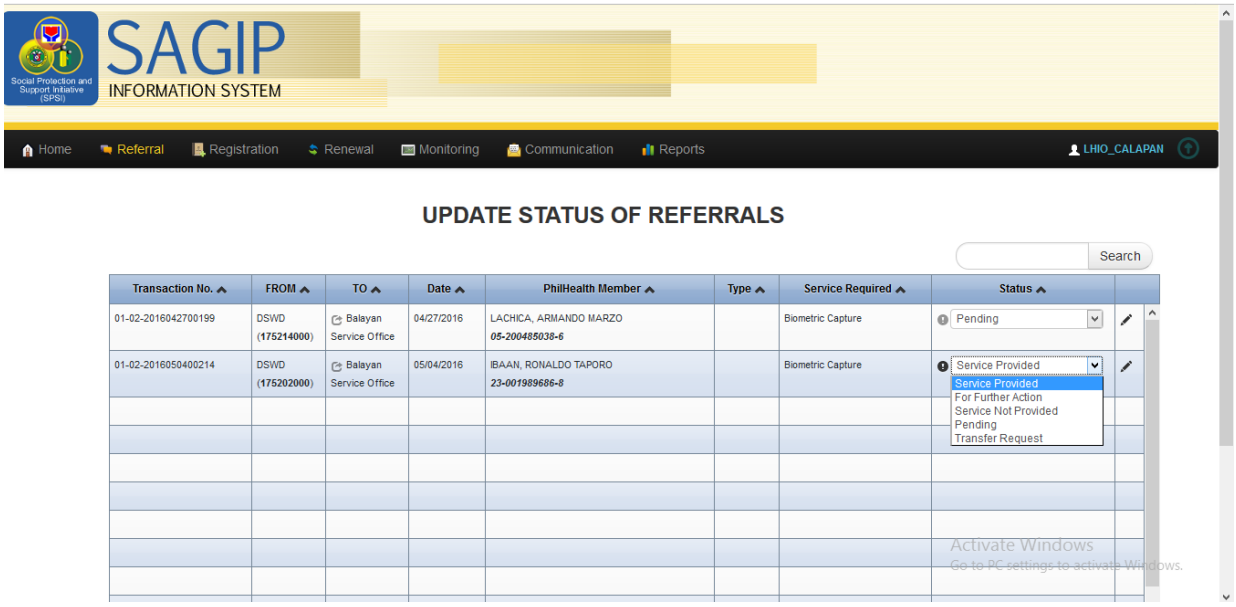
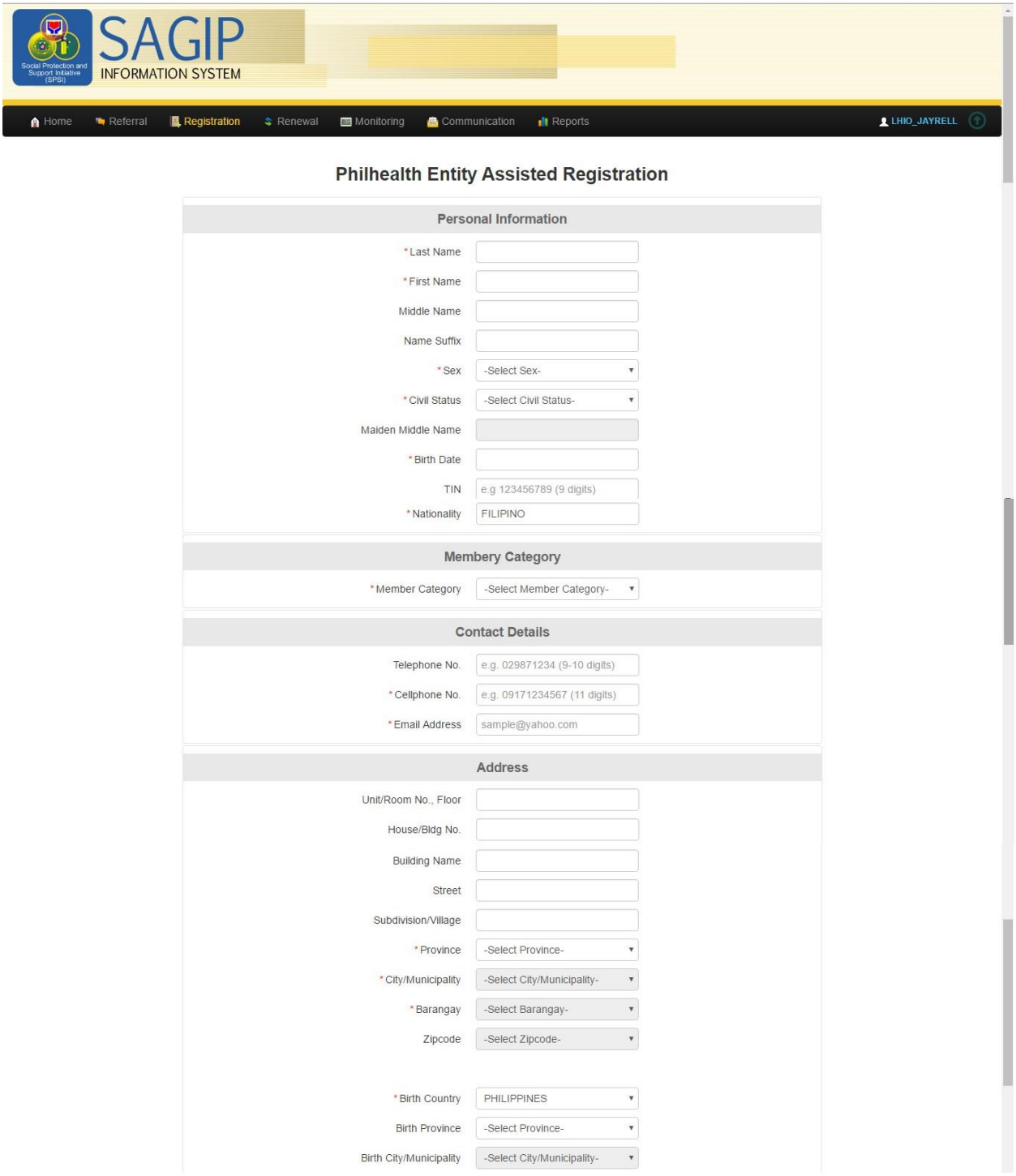


Figure 20. Update referral status options

The user can update the referral status of the selected incoming referrals. Referrals may be marked as Service Provided, For Further Action, Service Not Provided, Pending, and Transfer Request.

B. Registration



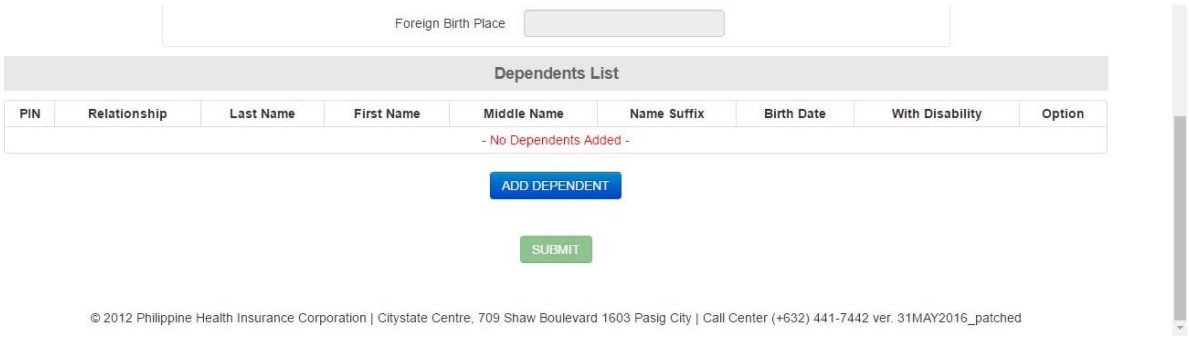


Figure 21. Register member form

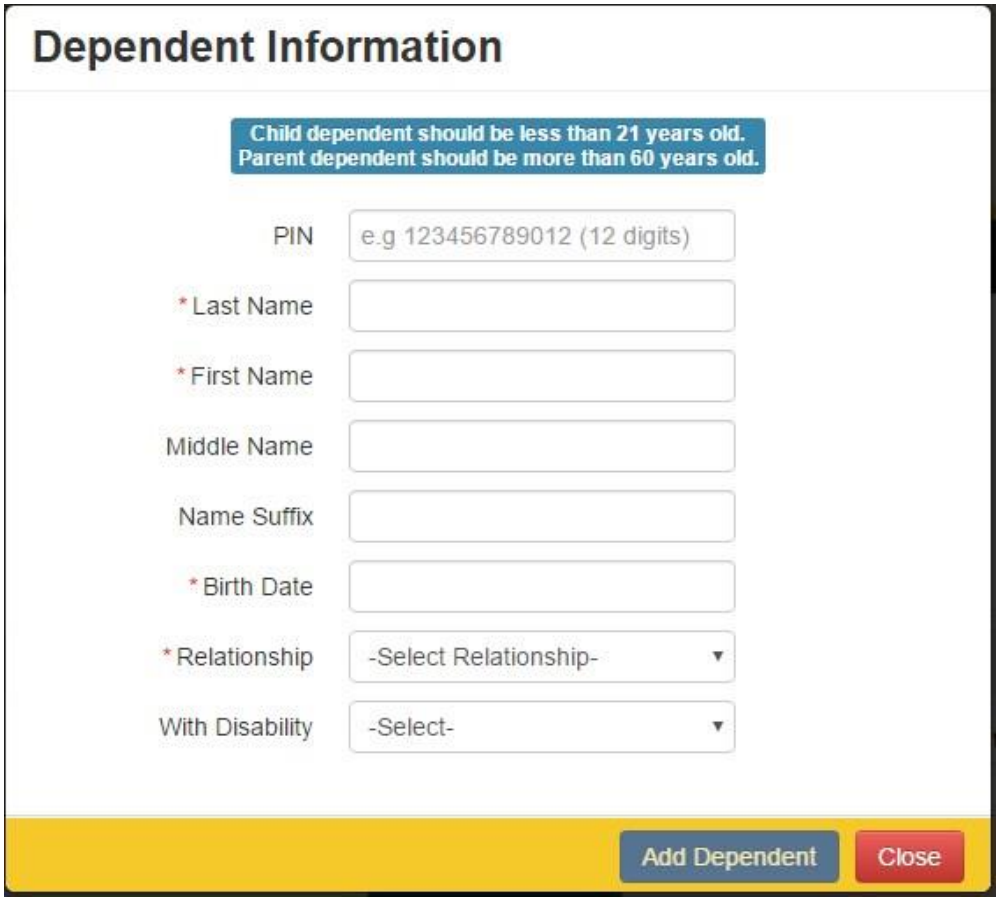


Figure 22. Dependent information form

The registration page also lets the user add dependents to the member profile

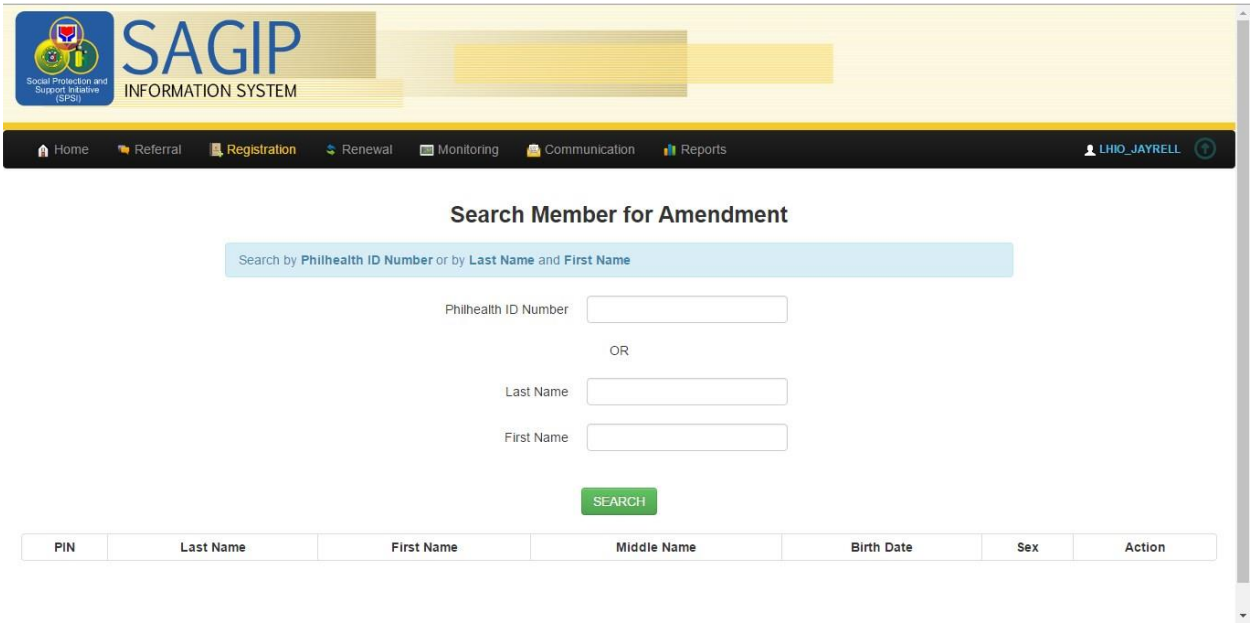


Figure 23. Search member amendment form

The Registration module can also amend member profiles

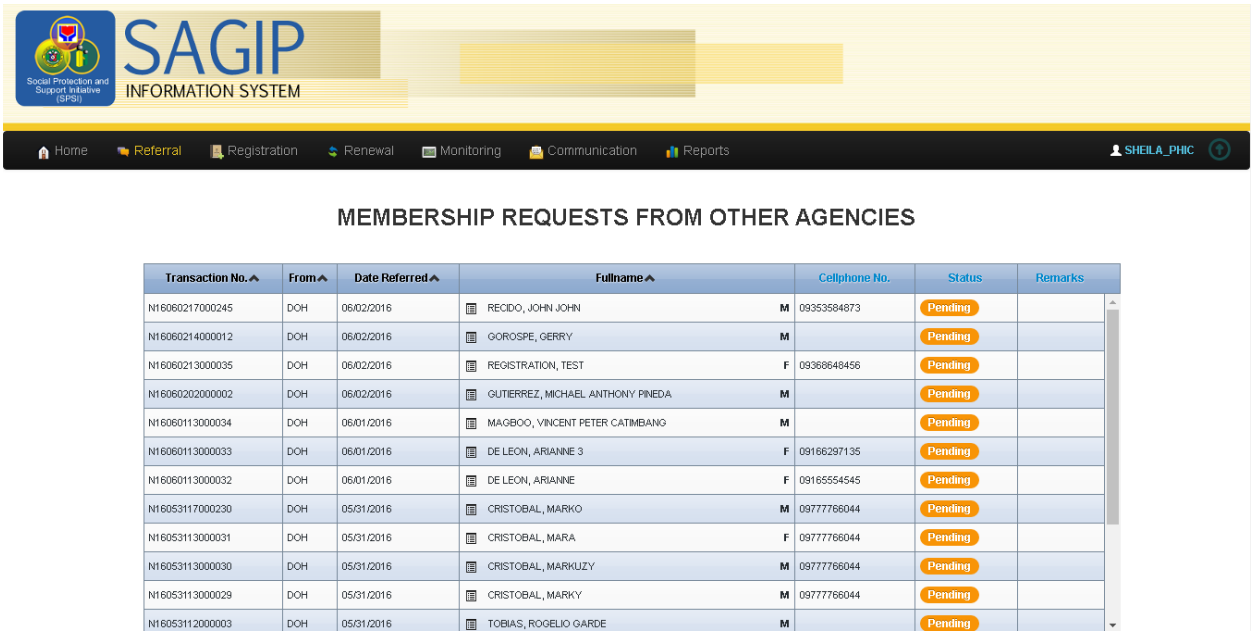


Figure 24. Membership Request Logs

Registration and Amendment Requests from Non-PhilHealth Agencies

VI. Discussion

The Social Protection and Support Initiative (SPSI): SAGIP Information System version 2.0 is a web-based application which aims to integrate and streamline the delivery of social services of Philippine Health Insurance Corporation (PhilHealth), Department of Social Welfare and Development (DSWD), and Department of Health (DOH) to the Filipino people. As the second iteration of SAGIP, it improved on the functionalities of the first version and fixed the identified bugs in the latter.

Through the referral module of SAGIP v2.0, PhilHealth can now send referrals to DSWD, accept and update referrals from DSWD and DOH, and view membership request logs. SAGIP also generates a productivity report which contains a summary of the incoming and outgoing referrals in the system, the PhilHealth agents handling the referrals, and the number of referrals acted upon by the PhilHealth agents. Meanwhile, DSWD and DOH can also send referrals to PhilHealth, and these referrals will be shown in dashboards in SAGIP v2.0.

PhilHealth, DOH, and LGUs can also send member registration requests using SAGIP v2.0. These requests will be forwarded to the Electronic Registration and Amendment System (ERAS), subject for approval. On the other hand, identified bugs in the amendment function are fixed. PhilHealth can now amend information of existing members to reflect changes such as marital status, and number and information of a member's dependent. Amendment requests will also be forwarded to ERAS for approval. Under the sponsorship module, PhilHealth and LGUs can now send requests for renewal of sponsorship of a batch. Requests for the addition of new members to a specific batch can also be done. These requests will be forwarded to ERAS for approval. Meanwhile, the correct status of a renewed batch is reflected in the system, unlike in the previous version wherein an expired batch, when requested to be renewed, has two statuses (expired and pending) when it should output only "pending." Request for membership to multiple batches is now restricted in the current SAGIP version, unlike in SAGIP v1.0 where it is allowed.

Moreover, PhilHealth can now display a PhilHealth member's member category and premium contribution details over time. List of sponsors under a specific province and city or municipality can also be displayed in SAGIP v2.0. These functions were absent in the previous SAGIP version because the PhilHealth web service that will provide premium contribution details was not provided then.

List of SAGIP referral services and list of referral service statuses can also be edited by the database administrator. On the other hand, upon consultation of the business processes of PhilHealth, it was established that the database administrator cannot add an entry to the directory of resource because another system does so. It should also be noted that SAGIP users with the "service office head" designation who are added in the system are automatically included in the directory of resource. With that said, the "Add DOR" button, present in the previous SAGIP version, was removed. Lastly, user activities needed to be recorded for auditing purposes are saved in a separate audit trail database.

Lastly, PhilHealth can now send billing reminders and advisories to its members through SMS. Text notifications are also sent to acknowledge referrals or to inform updates on status of referrals, and to acknowledge registration of member or to inform approval of request for amendment of member information. These functionalities were not present in the previous SAGIP version.

VII. Conclusion

The Social Protection and Support Initiative (SPSI): SAGIP Information System version 2.0 was developed to fully realize the potential of an effective web-based system to deliver social services to Filipinos nationwide. Overall, SAGIP v2.0 has significantly improved the previous version, enabling PhilHealth, together with its partner agencies Department of Social Welfare and Development (DSWD) and Department of Health (DOH), to give reliable service to stakeholders.

When fully deployed, SAGIP v2.0 will streamline referral of services to and from the constituent agencies of SPSI. With the referral module, locations which offer the services needed by a customer can easily be identified, eliminating the burden of unnecessary transfers of service providers. Moreover, request of services among partner agencies can also be easily made, enabling provision of services in the shortest time possible Meanwhile, with the registration module of SAGIP, non-PhilHealth employees such as LGUs and DOH employees with access to SAGIP can use the system to register members, thus making the registration easier since registrants need not go to PhilHealth offices to register to PhilHealth.

VIII. Recommendations

SAGIP version 2.0 can be further improved if the SIPAG web services are to be made available in the PhilHealth web server. Either that, or if PhilHealth would create its own web services. Referrals are highly dependent on SIPAG's web services, so it would be practical for SAGIP not to rely on SIPAG since interconnectivity issues between the two are where the referral errors usually arise.

For the Registration Module, amendment process could have been easier and much efficient if in the search member page, member search results will be displayed with the status of amendment so the user will not be prompted to send amendment requests when the member still has pending amendment. However, this depends on PhilHealth if they can provide the necessary web service for this.

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