Abstract—To give answer to necessities that nowadays presents the object (health), it is required to update its management processes, allowing to be at vanguard of technological advances. Taking into account the above, the proposal is to design an implementation platform, process management and crowdsourcing as an information system of services in health for the Colombian Caribbean Islands system, which includes Secretary of Health of San Andrés Archipelago Department, Providencia and Santa Catalina. The execution of this proposal will allow to evaluate crowdsourcing methodologies of participative online activities, from data collection for the generation of indicators related to: risk management, promotion and prevention programs, and disease control, implementing the application of Integral Care Guides and prevalence of diseases of interest in public health of mandatory for its adscription and relation in a interoperable way with the information integrated system of health of the islands, and Business Process Management (BPM) while evaluating the mechanisms of Vigilance and Control Inspection (VCI), from Health and Social Protection Ministry through the Integrated System of Information of Social Protection (SISPRO in Spanish).

Keywords—business process management, collaborative online work, Crowdsourcing methodology, processes management, promotion and prevention, public health, Vigilance and Control Inspection.

I. INTRODUCTION

The necessity of using technology and health areas represents nowadays and increment measured by the adequate use of technological gadgets that increase access factor, which implies to relate access capacity of health system to which to population has granted access. This project searches to implement Process Management in health adequate from the online participative methodology Crowdsourcing which will allow managing all the organization of Information Integrated System in health based in processes, understanding these as a sequence of activities oriented to generate an added value about an input to achieve a result. For which an output that at the same time satisfy the requirements of the information integrated system of Colombian Caribbean islands (case study) allowing to respond to users complaints and necessities, as more and more, citizens, organizations and companies claim to the health sector quality in their services. Critical in health sector management refers to inefficiency of big hierarchical structures of the Administration when trying to adapt to a world in full technological and economic transformation. The development of this management system will allow achieving a system of processes management (health), dealing with important challenges. Between the main challenges that will have to be overcome are: low quality, automatic processes, management and communication heterogeneity of the process at national level; the widespread perception of lack of use of emergent technologies, the deficient and unreliable information, as well as attention time in the service of information from online collaborative participation. Meanwhile, Colombian Caribbean islands Administration system (Case study Secretary of Health of San Andrés Archipelago Department, Providencia and Santa Catalina), will improve its perception about health processes quality with reliable information, granting access to promotion and prevention programs, and disease control implementing the application of Integral Care Guides and prevalence of diseases.
of interest in Colombian Caribbean islands public health system.
This methodology allows managing from evaluation and qualification, health territorial direction, and health promoter entities and health services institutions of the Colombian Caribbean islands system, San Andrés department, Providencia y Santa Catalina. Crowdsourcing will get and use for its benefit the user contribution, looking for indicators related to Risk Management, disease prevention and control programs, and prevalence of diseases of interest in public health for the department. Thus, through the implementation of this new technology, will be evaluated the Vigilance and Control Inspection mechanisms, access and consult of the information, information quality control, date and certification of health services and effectiveness of components, processes and standards of Guarantee Quality Assurance System and its impact on health services provision to users in an accessible and equitable way.
All the above establish the advantages of crowdsourcing methodology that supports in being a tool of collaborative online type, in which a person, institution, nonprofit organization or company, proposes to a group of individuals, through an open flexible call, the free and willingly fulfillment of a task. The fulfillment of the task, of variable complexity and modularity, and in which the crowd must participate providing their work, money, knowledge and/or experience, implies always a mutual benefit.

II. THEORETICAL APPROACH

A. Problem description

For the Colombian Caribbean islands system from the administration of San Andrés Archipelago Department, Providencia and Santa Catalina, one of the main factors for the tracing, planning and control lies in the management of programs related to Public Health, being this a point of interest from the necessity of the country in this area and particularly in Caribbean region. The mentioned necessity is aligned with Health and Social Protection Ministry policy that considerate in Article 111 of Law 1438 of 2011 a development of an evaluation and qualification system of Health Territorial Directions, of and health promoter entities and health services institutions, as a result of the application of indicators related to: risk Management, disease promotion and control programs, and prevalence of diseases of interest in public health. Similarly in the article 112 of Law 1438 of 2011 commands the Health and Social Protection Ministry to articulate the management and administration of information through the Integrated System of Social Protection Information [1].

Evaluation of attention quality in health establishments in the San Andrés Archipelago Department, Providencia and Santa Catalina, at present, is based on user satisfaction. There are different tools to measure the perception of this satisfaction, not being there any processes nor standardized methodologies for the collection of data in health or evaluation of quality in the Situational Analysis that is not systematized either, likewise the compilation of the consultations observations and clients and providers interviews, are done in an inconstant way or are not even registered nor there is assumption of implantation of any quality system.

For all the above the present research raises the question:

Will the information system for process management and crowdsourcing, using the ICT services, Case study Colombian Caribbean islands system Secretary of Health of San Andrés Archipelago Department, Providencia and Santa Catalina serve for the management of governmental processes in the object of Health?

B. Justification

The implantation of processes management, as politic to incorporate, ingrain quality and continuous improvement in organizational culture of San Andrés Archipelago, Providencia and Santa Catalina Governorship (Case study Secretary of Health of San Andrés Archipelago Department, Providencia and Santa Catalina), as a more decentralized and participative system, that will help achieving resolution 4505 of December 28th of 2012 of Health and Social Protection Ministry, by health services institutions, companies administrators of benefits plans, and for this particular case, departmental direction, where with their work, besides of reducing substantially heterogeneity in the quality level amongst the different types of public health services, will accomplish an information system for process management with the functional administration, assigning “owners” to key processes, making possible an international management generator of value for the user and that, therefore, seeks their satisfaction. In order to do the above, it will be determined which processes need to be improved or redesign in contrast to the ones the governorship has at the present, establishing so priorities and a context to initiate and maintain improvement plans which allow to fulfill established objectives. In this way it is possible the comprehension of the mode that business processes are configured, as well as their strengths and weaknesses.

Against the above article 111 of Law 1438 of 2011, suggests orientate the fulfillment of the development of an evaluation and qualification system of Health Territorial Directions, of Health Promote Entities and Health Service Institutions, as a result of the application of indicators related with: risk management, disease prevention and control programs, and prevalence of diseases of interest in public health. All of this can be executed in adequate way with tools such as Business Process Management (BPM) and processes layout languages such as BPMN (Business Process Management Notation) and crowdsourcing, which purpose is to consolidate all the efforts that would make a government administration system in order to achieve its objectives. BPM and BPMN are presented as a new tendency to increase efficiency in business and generate competitive advantages that market demands. Reason why now is important to have in count that the key elements to achieve objectives are processes and their good administration, since processes occupy a transcendent place in technological initiatives, but are important too because they constitute the way organization can generate value for the client [1].
Therefore, departmental directions, must obey articles 43.1.2; 43.1.3; 43.1.6 and 46 of Law 715 of 2001 and 114 of Law 1438 of 2011; Departmental Directions will be responsible of: a) Recollect and consolidate the registry per person of activities of Specific Protection, Early Detection and the application of Integral Care Guides to the diseases of interest in public health of mandatory, remitted by Health Municipal Directions or Health Services Institutions (IPS as in Spanish) of their services net. b) Report to the Health and Social Protection Ministry, the register per person of activities of Specific Protection, Early Detection and the application of Integral Care Guides to the diseases of interest in public health of mandatory according to Technical Annexed that is part of the Resolution. c) Respond for fitting, coverage and quality of the information reported. d) Carry out technical assistance, training, monitoring and feedback to the Health Municipal Direction, Administrators Company of Benefits Plans including the ones in health exception regime and Health Services Institutions (IPS), which have in their charge the care of people who are not affiliated to the Social Security General System in Health. e) Carry out the verification of the reliability of reported information to Health Municipal Directions or Health Services Institutions (IPS) of their services net.

Besides, it is necessary to find a methodology that eases the use of tools which help to achieve the wished strategy. Business processes management is a sequence of activities that are carried out in series or parallel by two or more individuals or informatics applications, with the goal of finding a common objective. BPM helps to propose a strategy and transform it in measurable objectives. Processes approach allows examining the object (health), through a sequence that goes from macro processes, to procedures and their contribution to the objectives fulfillment, and primarily the relation between what is said, done and obtained.

To achieve the purposes and give answer to necessities that nowadays presents the object (health), it is required to update its management processes, allowing to be at vanguard of technological advances. Taking into account the above, it will be design a system that manages all the processes related to Early Detection and the application of Integral Care Guides for diseases of interest in public health of mandatory, implemented in health services, for their integration into the Integrated System of Information of Social Protection (SISPRO).

It would be of great importance that the Colombian Caribbean island system, from governorship of San Andrés islands, Providencia and Santa Catalina (Study case Secretary of Health of San Andrés Archipelago Department, Providencia and Santa Catalina), count, for their processes management, with a methodological tool which performs all the operations of handling information, related with responsibilities of health department secretary.

### III. CONCEPTUAL FRAMEWORK

#### A. Legal framework

HEALTH AND SOCIAL PROTECTION MINISTRY
RESOLUTION NUMBER 0004505 OF 2012 (28 DEC 2012)

By which is established the report related to the register of activities of Specific Protection, Early Detection and the application of Integral Care Guides for diseases of interest in public health of mandatory [1].

#### B. Theoretical framework

Here are exposed the necessary themes to establish a clear context about the topics or issues related with the crowdsourcing implementation project.

- **Process management**

  Process management implies ‘reorder workflows so they add value directed to increase satisfaction of clients and to ease tasks to the professionals’. In this sense, a care process should have a clearly definable mission (what, what for, for whom), demarcated borders with concrete inputs and outputs, clearly integrated sequences of stages, and should be measurable (quantity, quality, cost).

  But not every process that is carried out in organizations has the same characteristics, motive by which they can be classified, according to the more or less direct impact on the final user, in the following criteria:

- Strategic processes: they adequate the organization to the necessities and expectations of users. Definitely, they lead the organization to increase quality in services that are offered to its clients. They are oriented to strategic activities in the company.

- Operative processes: those that are in direct contact with the user. They include all activities that generate more added value y have more impact on the satisfaction of users. All clinic-care processes can be considered included in this category [2].

- Support processes: they generate resources that other processes need.

Table. 1 Types of processes. Taken of Xavier Badía

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<thead>
<tr>
<th>Strategic or management processes</th>
<th>Operative or key processes</th>
<th>Support processes</th>
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<tr>
<td>Needed for maintenance and progress of the organization</td>
<td>Direct relation with clients, and the impact on their satisfaction</td>
<td>Support operative processes so they can be fulfilled</td>
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<tr>
<td>Strategic plan, Satisfaction surveys, Quality plans, Investigation plans, Self evaluation</td>
<td>Clinic-care process</td>
<td>Patient management, Storage, Hostel, Maintenance, Pharmacy.</td>
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process, and did not counted with robust mechanisms to control business process management in integral way [9].

In context of processes improvement, BPM constitutes one of the tendencies in management, which allows in a deliberate and collaborative form to systematically manage all business processes of an enterprise. The benefits of BPM to organizations are extensive: it gives visibility to the directives about processes dynamics carried out in unconscious way by human resources of organization, and makes possible its quick modification to accelerate the adoption of change in operations of companies [10] [11].

To Khan Rashid, business process management is a discipline for shaping, automation, management and optimization of a business process through its life cycle with the goal of obtaining higher profits.

Howard Smith on the other hand, defines BPM as a new approach to address and manage innovation processes in companies, which constructs improvement, from the actual state of a process in a determinate time and that raises a radical difference in front of reengineering: which constructs improvement from total redefinition of process. In this view, BPM becomes an answer to the operative chaos that presents companies nowadays [13] [14].

After the impact of Workflow in the nineties, BPM is considerate its evolution, for this reason is interesting to take into account the concepts and terminology of workflow. In fact, the organism Workflow Management Coalition (WfMC) defines it as: “the automation of a business process, totally or partly, during which documents, pass information or tasks from one participant to another for the action, according to a group of procedure normative”. [6] [11] [15] [16].

BPM is based on information technology to automate tasks and to give agility to required changes for the enterprise. The technology that makes possible the implantation and adoption of BPM constitutes a new category of informatics systems called Bussines Process Management System (BPMS). Unlike traditional information systems based in data management, these systems specialize in business process management [17].

Generally and integrally, BPM can be defined as an improvement in business processes management of an organization from beginning to the end, from the deliberate, collaborative and increasing definition of technology, so in that sense attain clarity in strategic direction, alignment of resources of the organization and continuous improvement discipline, all of which are necessary and critical to fulfill the expectations of clients. The role of business processes modeling is to allow vision of processes in different levels (strategic, tactic and operational) as well as identification of processes optimization necessities in those levels.

At present, a question might surge and is how can the organization execute adequately and optimize processes? Organizations only count with two forms of implementing strategy: projects and processes. A project is “a temporal effort that is carried out to create a single product or service”, while a process can be define as “a group of activities that transform inputs in products of value for a client” (Hammer &Champy). It is important to note that projects themselves are formed by processes and that 80% of failure or success in projects is related to good administration [20] [21] [22].
In this context, surges with strength the initiative called Business Process Management (BPM) that can help to consolidate all the previous efforts. In year 2000, Gartner (Lawrence, 1997) predicted that BPM would be the next grand phenomenon; and later commented that “BPM wins the triple crown for saving money, saving time and adding value”. Another study executed by BPM Institute showed that 96% of respondents indicated that a processes centered approach was critical for success in their company [11].

- Crowdsourcing

The term crowdsourcing was proposed by Jeff Howe in year 2006 on Wired magazine. Its etymological meaning, separating the two terms that conforms it -crowd and sourcing- means sourcing or supplying from a crowd or multitude.

When defining the term, Howe argues that crowdsourcing is –the fact of taking the job that usually was done by an employee and externalize it to a undefined and generally group of people through an open call.

Obviously, this term, as Howe defines it, is possible thanks to Internet and associated information technologies. Before the era of Internet, the fact that there were a crowd in determined moment depended on the physical proximity of people formed it. Now, thanks to Internet and the rest of related technologies, it is relatively simple to have virtual crowds, which physical distance can be of thousand kilometers.

Attending to the definition, we can adapt crowdsourcing to health thanks to a net of specialized contacts, each of one in their own matter, on which consults are carried out by an “open call” that has information and wants to share it with the user easing very much the work. Teamwork sensation is wide, and a highly recommended experience, since feeling part of a community is one of the inherent characteristic of human being.

Crowdsourcing methodology helps to center in the patient so that collaboratively, new designs are established, problems are solved, or solutions are given to patients with not so frequent diseases, and that are applied in collaboration between actors for the resolution of problems in health sector. Patients who live with their illness know much more and can provide useful and relevant information to other patient in the same conditions about personal a necessary cares, and also difficulties that the sickness brings, sometimes more than what the doctor might explain or say. Patients provide support and many advices because they provide the experience that the medic lacks of. Nowadays instead of being consumers of sanity services, they are becoming providers of the own sanity cares [23] [24].

IV. RESULTS

With the development of this proposal, users of Caribbean islands system from the Health Departmental Direction of archipelago San Andrés, Providencia y Santa Catalina, will get benefit from the agility of processes and document search, since it will be more efficient in the provision of their services, they will be able to communicate quicker and will have more easiness in information management that is required from Health and Social Protection Ministry through the Integrated System of Information of Social Protection (SISPRO). Finally government will also see benefits since it will be able to have control over Departmental Directions or Health Districts.

Governorship as a future user of the information system will be able to perceive a substantial saving in processes generation as well as in acquisition of an ICT system for this kind of processes, achieving an efficient system which will avoid time expenses to execute procedures since by technology contretemps will be avoid.

Users of health system will have a better attention care because the entity will have a more efficient management system being interoperable, which will avoid contretemps and will make different procedures to be carried out in organize and agile way.

Design, development and implementation of this proposal will generate a success case, for the implementation of BPM, that will ease an efficient communication and management, which will allow in the future to carry out the implementation of this type of information systems in others departments as well as in different secretaries such as environment, education and planning of the same department.

V. CONCLUSIONS

The design of an Information System pro the Colombian Caribbean island system within the framework of Governorship of archipelago San Andrés, Providencia y Santa Catalina by processes management and ICT services, is established from the own necessity of health integrated system that guides online collaborative processes that allow to bring closer the user and health system to vanguard, and implements technological tools of information to automate tasks and bring agility to changes required by the state enterprise.

Colombian Caribbean islands system, under this information analysis, can make possible the implantation and adoption of BPM constructing a new category of informatics systems denominated Business Process Management System (BPMS), that for service processes interest, uses better possibilities of management and ICT services, and implements technological tools of information to automate tasks and bring agility to changes required by the state enterprise.

An implementation of a crowdsourcing platform as a proposal for the islands system of Governorship of archipelago San Andrés, Providencia y Santa Catalina, is possible through the insertion of a previous knowledge about its collaborative development, the use of techniques of information update and the environment in which will be carried out, are the main base for its implementation, thus the developer group of the tool will get knowledge based on academic activities since pedagogical engineer that makes stronger and potentiates fundamental dimensions in promotion and prevention systems development; promotion and prevention programs, and disease control implementing the application of Integral Care Guides and prevalence of diseases of interest in public health of mandatory in politics of recent health administration.
The execution of this proposal will allow evaluating crowdsourcing methodologies, by recollection of data for the generation of indicator related to: risk management, disease prevention and control programs, and prevalence of diseases of interest in public health, in the Colombian caribbean islands system, San Andrés department, Providencia y Santa Catalina, relating it in interoperable way with the integrated system of health information of the islands and management itself from the Health and Social Protection Ministry through the Integrated System of Information of Social Protection (SISPRO).

REFERENCES