

Research Article

Information Architecture for the Management of Collaborative Information to the Citizen on Health Care Issues in the Areas of Pinar del Rio Municipality

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Received: October 10, 2024; Accepted: October 15, 2024; Published: October 20, 2024

Abstract

Introduction: Information Technologies are currently essential elements for the improvement and development of a country, on the other hand, Cuba has identified from very early on the need to introduce Information and Communication Technologies in social practice and achieve a digital-technology culture as one of the crucial characteristics of the new man. Cuba is moving towards electronic-government, achieving digital technology and information literacy in the decisive processes, creating channels to increase citizen participation. How to contribute to the management of collaborative information to the citizen on health care issues in the areas of Pinar del Rio municipality?

Objective: to develop the Information Architecture for the Citizen Collaboration in the health care issues in the areas of Pinar del Rio municipality.

Methods: a Technological Innovation Research on information management in the health care areas of the municipality under study is carried out following the methodology of software development for Extreme Programming, and applying theoretical and empirical methods for the analysis, review and modeling of the processes under computerization.

Results: it was found that the proposal of information technology is based on managing the information of the different medical services, serving as a tool to help to the organization of the healthcare system and make it more efficient.

Conclusion: a computerized prototype was created that will avoid the gathering of people who come to the institutions in search of answers to questions directed to knowledge or orientation for a determined problematic on purpose of the community projection.

Keywords: Access to information, Software design, Software, Medical informatics applications, Information technology

Introduction

Information and Communication Technologies are currently fundamental elements for the improvement and development of a country [1]. In this sense, Cuba has identified from a very early stage the convenience and need to dominate and introduce social practice ICT and achieving a digital culture as one of the essential characteristics of the new man, which would facilitate society to get closer to the goal of sustainable development [2,3]. In the field of health, it offers a strength in technological progress that presents positive experiences worldwide [4,5]. The most optimistic projections in this regard suggest that a computerized and interconnected world not only ensures growth and development, but which also guarantees improvements in access to facilities that enhance the quality of life, and facilitate broad access to digital content and services for citizens [6,7]. The effort that the Cuban State has made to support the computerization of society is a fact. Concrete actions are developed throughout the country to conclude the initial stage of electronic government [8], it is not only to create the platforms, but also that they work with good practices, provide digital services to the population and interact with the people. In this way, digital and information literacy is achieved as the ability

to locate, organize, understand, evaluate and analyze information through digital technology, create channels that allow increasing citizen participation [9,10]. The creation of a computer prototype [11], for the people of Pinar del Río who access the health areas of the main municipality of the province, allows the description of many useful processes to any citizen [12-14], and the possibility of having of them in a single and integrating platform [15,16]. This prototype is based on improving social welfare and the actions carried out by an informed population, in order to provide services and information to citizens, increase effectiveness and efficiency of public management [17], and increase the transparency of the sector with the participation of all communicators who require some information [18-20]. In the different health areas of the main municipality, several processes are developed, this research is immersed in the computerization of each of them, which are aimed at the satisfaction and knowledge of the citizen, maintaining the health of the population, with health promotion and community participation, with the planning, organization, monitoring and evaluation of the processes.

Whose objective is aimed at Electronic Government, where they can streamline, improve, adapt, socialize and reduce costs of

the processes and/or activities of the public system, motivated by the use of advances in ICT, through channels that allow increasing participation citizen, with the aim of improving the health status of the population, increasing the quality and satisfaction of the people with the services provided, making the system efficient and sustainable and guaranteeing its development, through community projection. This will be achieved by bringing health services to the community, through the different medical specialties, and with the strengthening at all times of actions aimed at the well-being of citizens who require health services. In each polyclinic, health services are brought to the community with community projection where each specialty such as Surgery, Endocrine, Cardiology, Urology, Traumatology, Dermatology, Menstrual Regulation, Orthopedics, Adult and child Traumatology, Angiology, Nephrology, Gastroenterology, Rheumatology, Adult and child allergy, Optometry, ENT, Ophthalmology, Infertility Consultation, Driver's License. They are carried out on different days of the week, when the patient is referred from the medical office to the area, or due to medical expenses, this arrives with the referral for the specialist to the admission department of the health unit, the Registration with the patient's data, identity card, name and surname, doctor's office, referred by, age, consultation date and time, and the patient is verbally notified of the day the consultation is scheduled. The patient goes to the polyclinic on the day scheduled with the specialist, without knowledge of the place or location of the consultation and the doctor who is going to attend him, as well as the regulations that are established, in addition to the different services that are provided in the institution. What results in a problem in terms of organization and rationalization of the services provided. The problem detected in the development of electronic government in the health sector justifies this research, developed with the participation of citizens who go to the different services. The work is the result of a research project of the master's degree in Health Informatics, with the aim of developing the information architecture for citizen collaboration in health matters in the areas of the Pinar del Rio municipality.

Methods

The research is due to a technological innovation project for the development of a computer application for the management of Citizen Collaboration on health issues in the areas of the Pinar del Rio municipality, in the period from 2019 to 2021, based on the study of the current needs and shortcomings of the population, in the four polyclinics of the Pinar del Rio municipality. The results presented correspond to the analysis and design stages of the project, and they used theoretical research methods such as historical-logical and induction-deduction, to capture functional and non-functional requirements, as well as modeling, of the information architecture on which the Citizen Collaboration management process in the areas of the municipality is based. Among the empirical methods, the following were used: the interview with citizens who require health services, as well as the bibliographic review during the analysis and design of the prototype of the computer application. During the course of this research, periodic bibliographic reviews of articles in magazines, national newspapers, scientific publications, related to electronic government in Cuba, development and computerization of a society, literacy of the population regarding digitization of processes,

web applications were carried out to manage information. The DeCS health descriptors were used as search strategies to determine keywords, databases such as SciELO, by indexing the terminologies from the common language to the permuted language. For the modeling of the prototype object of study and research, the following trends were used for its design and analysis: extreme XP programming, as an agile development methodology whose main objective is to increase productivity when developing a software project, to model, build and document the elements that make up a software product that responds to an object-oriented approach; the Unified Modeling Language (UML), for the capture of requirements, analysis, design and interoperability with other applications with a multiplatform support. ENTERPRISE ARCHITECT, one of the UML CASE tools, was also used. For the simulation of the behavior of the interfaces, the design of the wireframes and the basic prototype, Axure RP was used as a development tool.

Results

In the health sector of the Pinar del Rio municipality, several processes are developed in the admission area related to citizens who request medical appointments for the different consultations that are developed. Next, the relationship of the process to understand more clearly the aspects worked, starting from the citizen who refers his personal data to the worker who works in admission and in turn verifies if there are shifts for the required consultation, the reservation and notification of the same. The research determined through the analysis of the process, the procedures, methods and techniques for solving the problem, based on the modeling of the collaborative management process with the citizen on health issues in the areas of the Pinar del Rio municipality, with the implementation of the following requirements that describe the functionality of the software. The functional requirements that the prototype must meet are nothing more than the capabilities of the product to satisfy both the customer and the end users.

Functional Requirements

- R1. Authenticate User
- R2. Change Password
- R3. Manage Citizen Data
 - R3.1. Insert Citizen Data
 - R3.2. Modify Citizen Data
 - R3.3. Delete Citizen Data
- R4. Manage Community Projection
- R5. Show Reports
 - R5.1. Patient Consultations
 - R5.2. Patients by Date
 - R5.3. Query by Date
 - R5.4. Referred Patients
 - R5.5. Patients by Municipality

R6. Perform Searches

R6.1. Search Patient

R6.2. Search Patient Month

R6.3. Search Patient Office

R6.4. Search Patient by Sex

R6.5. Search Patient by Age Group

R7. Shift Notification

R8. Consult Help

The information architecture was designed, for which the analysis and design stages of the software development process were executed. The actors of the system are defined who constitute the entity that is in charge of the realization of one or more of the functionalities that must be executed. Two actors are defined in the proposed software: the citizen, who is the person who can only enter their personal data and the desired query, and receive notification of it. The admission staff is in charge of managing all the information in the application, that is, inserting, modifying and deleting, in addition to changing the password, and accessing all the consultation options, searches provided by the system and obtaining reports. The functionalities diagram based on the XP methodology is shown, with the relationship between the actors and the different processes of the proposed system.

Description of the System Functionalities

The tool is designed to satisfy the information management requirements of the Citizen Collaboration on health issues, by providing services to the community. With the implementation of the software, which is designed to work from the web, through the network of networks on any platform, which for Pinar del Río citizens who access the health areas of the head municipality of the province allows the description of many useful processes, and the possibility of having them in a single and inclusive platform and the actions carried out for the sake of an informed population, in order to provide services and information to citizens, increase the effectiveness and efficiency of public management. With an informed population, resources, development and knowledge are gained. At the same time, it allows the citizen from his home, work center, recreational area, through the technological development that the province has in terms of info-communications. This prototype manages information regarding health issues in terms of information from polyclinics on location, mission and vision, structural and organizational composition, in addition to the services provided, information related to primary health care, epidemiological alerts, programs specialized, and everything concerning the community projection. The system is designed so that any user can access its interface, select the health area and view the information options that it provides, the citizen must select the health area to which they belong in order to access it, obtain information on health issues and be able to request any consultation related to community outreach. The citizen presses on the community projection button, a window is displayed with the relationship of the consultations by specialty, with the time, day and frequency per week, as well as their location. It must be selected with a click on the query

button to schedule a desired shift. The functionality for the Citizen Data management is essential for the beginning of each process. Once the health area has been selected, the citizen selects the consultation to which he was referred to program the doctor's turn, the system refers you to a new window, to fill in the data requested by the form, name and surname, identity card, municipality, doctor's office, age, sex, referred by, specialty. Once these data are entered, the citizen's e_mail and contact telephone number is required so that he or she is notified of the turn for consultation. The citizen must fill in all the fields that present an asterisk (*), these data being mandatory. The system specifies the mandatory fields that must be filled in. When any field is left blank, the process does not end. The system sends you a message.

The system sends a message if when you are going to enter the identity card number you put letters instead of numbers and if any character is missing it returns a message specifying the error. When the citizen is going to enter the date for the consultation. Where the system specifies that only 24 appointments can be given per consultation and the 24 patients are already complete for that date. The system sends a message specifying that there are no available shifts for that date that you must select another and disables the remaining fields. If there are shifts for the selected date, it allows the introduction of the citizen's email and contact telephone number, captcha the image provided by the system to make sure that it is not a robot and if a user. The citizen clicks on the save button where this information is stored in the Database and the fields are cleared. Once all the data has been entered correctly, click on the Send Notification button, the system sends a notification message of the shift via email with the confirmation of the requested medical shift. The admission staff for each health area enters the prototype through a form where they enter their Name and Password in the corresponding text boxes when pressing the Enter button. If the user is recognized by the application (he is registered in the database of users with access), it shows him the corresponding interface, according to his role in the application. If, on the other hand, the user is not recognized, the application displays an error message "Incorrect username and/or password" in which it warns the user that they do not have rights to access the management of the processes that are developed in the area. The functionality of the admission staff shows the data of the patients that were previously inserted by the citizen, and that are stored in the database; the Reports that the system allows, as well as the Searches to it. It also allows you to change the password periodically as a security measure, and consult the help of the application for any questions in this regard. The application shows the registry of all the patients who were introduced to the system by the citizen himself with his personal data, in addition to the community projection or consultation to which he was referred to be evaluated with the specialist. It allows the admission staff to modify some patient data or delete the unnecessary record. To modify the data of a patient or citizen in the system, the admission staff must select the name of the patient to be modified. As long as the patient has not been selected, the rest of the form data is disabled. Among the functionalities of the application are the Reports, which are aimed at providing information regarding the information management process with the citizen in relation to community projection. The event starts when it is necessary to know, according to a specific query,

the patients that are registered. The system sends a message to select the consultation, and returns a list of all the patients that are registered for the selected consultation. In the same way, to know the patients who are registered for a previously selected date.

Discussion

The research carried out is due to a technological innovation project for the implementation of a computer application for citizen collaboration management in the health areas of the Pinar del Rio municipality. It is necessary to computerize the development of collaboration with the citizen on health issues in the different areas of the Pinar del Rio municipality, which allows managing all the information of the different medical services, therefore it constitutes a tool to help organize the system and provide you with more efficiency. The absence of a computerized system for the management of information to the population results in disorganization, the accumulation of personnel who go to the institutions in search of answers about the consultations of a specialty, the time and location, the procedure to be followed in mind to be attended by trained personnel to provide quality service. As part of the study of the object of computerization, a review of health sites with related topics was carried out that provide information to citizens who interact with software used in the country. The website entitled, National and Foreign Health Sites, stands out, showing a compilation of links to sites on public health issues in Cuba. Among them are the Provincial Nodes of Infomed, Health Specialties and Topics, Sites of Interest, Medical Societies, Health Legislation and Policies, Hospitals and Institutes, Faculties of Medical Sciences, as well as foreign sites on health in Spanish [15].¹

The analysis carried out on similar sites that provide information to the population on health issues, allowed to shape the structure of the application according to the citizens of Pinar del Rio, whether they refer to information of a general nature from the institutions, such as those related to health care properly with the community projection. Where it could be verified that, in the confronted sites, the information is very general and with the characteristics of each unit. In the province of Pinar del Rio there is El Portal del Ciudadano Pinareño [10], which is part of the strategy drawn up by the Government in the province of Pinar del Rio to implement electronic governance. More than thirty entities subordinate to the Council of the Provincial Administration (CAP) and other organisms of the province participate in this project. In addition to showing the work of the Government, in favor of the well-being of citizens and society in general. Existing computer systems do not meet the expectations of the health sector because the population needs to be more documented, to know everything concerning community projection and how health services are brought to the community, through plans, services or programs than institutions. All with the aim of improving their living conditions and thereby stimulating support for the family.

Conclusions

With this research, the Information Architecture for Citizen Collaboration in Health matters was developed in the areas of the Pinar del Rio municipality. The results of the analysis and design stages of the information management software have been presented. In

each stage, the required documentation has been prepared according to the development methodology, in addition, the implementation of the application prototype, as a conclusion of the design stage and its analysis. This software motivates the need to streamline, improve, adapt, socialize and reduce costs of the processes and/or activities of the public system and create channels that allow increasing citizen participation.

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Citation:

Martinez YV (2024) Information Architecture for the Management of Collaborative Information to the Citizen on Health Care Issues in the Areas of Pinar del Rio Municipality. *Integr J Nurs Med* Volume 5(5): 1-4.