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REVIEW

Information management in university residences: an experience from the UCM in Pinar del Río

Gestión de la información en residencias universitarias: una experiencia desde la UCM de Pinar del Río

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ABSTRACT

This study addressed the fundamental role played by information management at the Student Residence of the University of Medical Sciences in Pinar del Río. It analysed how, from an organisational perspective, information was a key resource for decision-making, strategic planning and continuous process improvement. Through a detailed characterisation of the entity, the specific management needs that arose in the handling of data related to enrolment, inventory and the control of scholarship students were identified. The background of automated systems applied in other Cuban universities, such as Holguín, Ciego de Ávila and Pinar del Río, was reviewed, highlighting their contributions and limitations. The work also delved into agile software development methodologies, particularly extreme programming (XP), and tools such as UML and Axure RP, selected for their effectiveness in modelling and prototyping information systems. As a result, a customised technological solution was proposed that responded to the specific characteristics of the institutional environment, with the aim of optimising information management processes. This initiative aimed to facilitate operational efficiency and strengthen the university's social role in the comprehensive training of its students.

Keywords: Information Management; Student Residence; ICT; Educational Software; University.

RESUMEN

El presente estudio abordó el papel fundamental que desempeñó la gestión de la información en la Residencia Estudiantil de la Universidad de Ciencias Médicas de Pinar del Río. Se analizó cómo, desde una perspectiva organizacional, la información constituyó un recurso clave para la toma de decisiones, la planificación estratégica y la mejora continua de los procesos. A través de una caracterización detallada de la entidad, se identificaron las necesidades específicas de gestión que surgieron en el manejo de datos relacionados con la matrícula, el inventario y el control de estudiantes becados. Se revisaron antecedentes de sistemas automatizados aplicados en otras universidades cubanas, como Holguín, Ciego de Ávila y Pinar del Río, destacando sus aportes y limitaciones. El trabajo también profundizó en metodologías ágiles de desarrollo de software, en particular la programación extrema (XP), y en herramientas como UML y Axure RP, seleccionadas por su eficacia en el modelado y prototipado de sistemas de información. Como resultado, se propuso una solución tecnológica personalizada que respondiera a las características propias del entorno institucional, con el fin de optimizar los procesos de gestión de la información. Esta iniciativa pretendió facilitar la eficiencia operativa y reforzar el rol social de la universidad en la formación integral de sus estudiantes.

Palabras clave: Gestión de la Información; Residencia Estudiantil; TIC; Software Educativo; Universidad.

INTRODUCTION

Definitions are helpful as long as they help to understand concepts better. In its generic form, the term information can be defined as a message generated by a sender and intended for a receiver in a communication system on a durable medium. Managing information means seeking new meanings and analysis, applying the principle that the whole is greater than the sum of its parts. It is producing an impact on the environment of any organization.[1,2] It is a process that must be present in every step of the organization; it is both a process and a subprocess. It requires action, decision, and evaluation. Through management, the information resources necessary for good decision-making are provided, and new knowledge is developed that enables quality and efficiency in the services and products of organizations.[3]

Information has been considered a crucial resource for society, as evidenced in various civilizations and historical stages of sociocultural practice. Data is used to support a fact, transmit knowledge, and communicate, among other functions. In the business context or from an administrative point of view, it is a decisive resource that can determine the success of an organization as long as it is managed efficiently.[4,5]

The purpose of information management is to provide mechanisms that enable the organization to acquire, produce, store, transmit, and ultimately retrieve, at the lowest possible cost, data and information with sufficient quality, accuracy, and timeliness to serve the organization's objectives.[1,6] In perfectly understandable terms, it would be to obtain the correct information, for the person who needs it, when they need it, at the best possible price to make the best decisions.[7]

Information management in processes is vital in today's society. In any process involving planning, organization, execution, and effective control, information management is a decisive factor in its successful completion. Information management is key to knowledge management and innovation processes and is extremely important for decision-making and process improvement, hence its importance in educational centers.[9,10]

DEVELOPMENT

Information management process in the student residence area of the UCM with the use of computer tools in the world and Cuba

This chapter describes the entity where the research will be carried out, delving into its organizational structure and the different processes and objects involved in the study and explaining the business process that will be worked on. It also illustrates and outlines the various types of software available for the study and justifies the use of the technologies, methodologies, and tools used to obtain the information architecture for managing the information processes at the UCM Pinar del Río Student Residence.

Information management

Information management (IM) is the conventional name for a set of processes by which the life cycle of information is controlled, from its acquisition (by creation or capture) to its final disposal (archiving or deletion). These processes also include extracting, combining, cleansing, and distributing information to interested parties. Information management aims to ensure the integrity, availability, and confidentiality of information.[11]

In the context of organizations, information management can be identified as the discipline responsible for everything related to obtaining the correct information in the proper form, for the right person, at the correct cost, at the right time, in the right place, and coordinating all these operations for the development of the right action. In this context, the main objectives of Information Management are to maximize the value and benefits derived from the use of information, to minimize the cost of acquiring, processing, and using information, to determine responsibilities for the effective, efficient, and economical use of information, and to ensure a continuous supply of information.[12]

Information management is not differentiated from document management or archiving. IM emerged in the mid-1950s when computer systems became commonplace in all organizations. Depending on the definition of "document" and "file," the concepts may be used interchangeably.

The term is widely used when emphasizing a document management model that, in addition to traditional elements, involves information and communication technology (ICT) in the organization, storage, and retrieval of information. In this context, an IM expert must, in addition to archival skills, have skills in ICT-related areas such as computer networks, cryptography, operating system and server administration, etc.

Therefore, Information management encompasses a set of elements and processes vital to management in different dimensions for information work in an institution or organization.

Management of information associated with processes in the UCM Student Residence

The University as a social institution is the product of a very different era from the present. In their origins, universities became institutions that treasured all society's knowledge. The development of science at that time made this possible. Until the first half of the 20th century, it was possible to say with some certainty that

when a person completed their university studies, they were prepared to practice professionally for the rest of their life. Today, this is no longer the case.[13]

The Student Residence is one of the three substantive processes of universities worldwide. Whose function is closely linked to the other core functions (teaching and research), since through it, we modify the social behavior of a people, neighborhood, or community, given that the University as an institution is the repository of culture, science, and qualified human resources to develop and transform society for the better, responding to its social mandate.

The University of Medical Sciences of Pinar del Río, under the leadership of the General Directorate of Educational Work, manages the Student Residence as a formative, integrative, and systemic process based on cultural interaction within the University in constant two-way communication with society, including the university community, guiding social transformation and responding to specific needs at a given time. It has its objectives and content, is carried out through different methods, uses appropriate means and resources, and employs systematic planning and evaluation mechanisms for its improvement. It is precisely this social role of our University that is one of the most debated topics in the contemporary university field, on which philosophers, educators, politicians, and academics have expressed their views in recent years, and this is no coincidence, given the importance of the university-society relationship in helping to achieve harmonious development. This social mission goes beyond the simple training of the professional cadres that society requires at the highest level. In addition to teaching, scientific research, and postgraduate education, there is the dissemination of culture and the extension of its services to the entire population. It is precisely one of the main battlegrounds in the battle for culture.[14]

Description of the entity where the research is being conducted

The University of Medical Sciences of Pinar del Río is located at Km. 89 of the Central Highway. Its corporate purpose is focused on training human resources for the health sector. Its mission is: "To implement and monitor the training of competent undergraduate and postgraduate human capital, with high scientific rigor and deeply human and ethical values, who will generate high scientific output to meet the demands of the national health system by the economic and social policy guidelines of the government and the PCC." Its vision is: "We are an institution committed to the Cuban social project, which promotes and is committed to the construction of prosperous and sustainable socialism approved by the Party Congress, in the development axes until 2030, and contributes to the Cuban economic model, which is advancing in the search for quality in its training processes. We train undergraduate and postgraduate human capital that is competent, high-quality, and scientifically rigorous, with deep human and ethical values that generate high scientific output to meet the demands of the national health system. We have a revolutionary faculty of excellence, innovation, stability, broad general culture, solid political and ideological preparation, motivation, and the ability to achieve the transformations necessary to improve Cuban higher education. We meet the training and improvement needs and demands of professionals and cadres, prioritizing the training of doctors. We achieve results in science, technology, and university innovation linked to national priorities, which, together with university management of knowledge and innovation, impacts and contributes to social development at the territorial and local levels. Our trained and motivated staff lead with a strong sense of belonging, effectively using the resources available to the organization to successfully achieve objectives, enhance the status of workers, and improve study, work, and living conditions".[15,16,17]

Since its creation, the University has awarded degrees to 28844 professionals, including 8866 doctors, 1117 dentists, 6593 nurses, 190 psychologists, 5569 graduates in various health technology programs, 6543 technical graduates, of whom 1180 are international students of 52 nationalities.

Brief description of the main processes in the entity

The University currently has a multi-disciplinary faculty, which is also located at the headquarters in Km. 89. It also has two other teaching blocks: the "Antonio Briones Montoto" Stomatological Clinic and the Simón Bolívar Clinic. It is in every provincial hospital and the polyclinics of the 11 province municipalities. The Medicine program has 2645 students enrolled in 119 brigades and 69 curriculum programs. It is carried out at the Central Headquarters and in the Health System of 24 University Headquarters teaching settings, distributed in five Hospitals and 19 Polyclinics, with 149 Family Doctor's Offices accredited for undergraduate teaching. The Health Technologies Teaching Department offers eight bachelor's degrees, 13 TSCCs, and technical training with two levels of entry: one program for 9th-grade students and six programs for 12th-grade students, two of which are CPE programs. It has 1303 students enrolled in 63 brigades. The nursing program has a faculty of 175 professors, including two tenured professors, 27 assistants, 58 teaching assistants, 86 instructors, and 2 ATDs. It has 1040 students enrolled, present in all province municipalities, and distributed across 50 brigades. The dentistry program has 137 students enrolled, 97 in the program itself and 4 in the TSCC dental prosthetics program, all distributed across 10 municipalities in Pinar del Rio. It has 16 teaching facilities and three student residences.[18,19,20]

Description of the business in which you will be working

The University of Medical Sciences in Pinar del Río has two student residences, one located at the main campus and the other in the Simón Bolívar teaching block, as well as two other decentralized areas in the municipalities of Consolación del Sur and Sandino. The student residence in the central block has three blocks with two towers each, of which two blocks are dedicated to housing Cuban undergraduate students. Several processes of vital importance for its proper functioning are carried out in these entities. All of these are carried out by people who deal with large volumes of information daily and perform a wide range of tasks in the enrollment and inventory process, which is carried out by the Residence management. All information management in these centers is done manually by the professionals who work there.

Some of the associated concepts are shown below to explain the processes.

Information management

refers to a cycle of organizational activity and the development, simulation, or modeling of information systems applicable to management areas in organizations for the acquisition of information from one or more sources, the custody and distribution of that information to those who need it, and its final disposal through archiving or deletion.

University residence

A center that provides accommodation for university students. The center is often integrated into or affiliated with a university, is generally located on or near the university campus, and usually offers a range of services requested by students.

Our University Residence accommodates a total of 1644 students, of whom 1050 are in the central block, 490 in the Simón Bolívar block, 78 in the municipality of Sandino, and 6 in the residence in the municipality of Consolación del Sur.

At the beginning of each academic year, the departments and degree programs must submit their scholarship requirements to the University Residence department according to the addresses.

In order to carry out the outreach activities carried out at the University, it is necessary to keep the number of students per degree program, academic year, and gender up to date. It is also necessary to monitor student evaluations and the application of any disciplinary measures.

In order to achieve this objective, it is necessary to study the computer applications that have been developed to date for this purpose, as they provide information on the graphical interface used, functionalities, applications for their creation, among other things.

Existing automated systems linked to the field of action

Information management system for the University Residence of the University of Holguín "Oscar Lucero Moya"

Development of a system that facilitates information management at the University Residence of the University of Holguín regarding scholarship registration processes and basic inventory. This system made it possible to consolidate the information needed by administrators, managers, and other workers at the University Residence to monitor data on scholarship students and professors, as well as the inventory of basic resources. This can be done without the need for workers to be present. The integrity and reliability of the information can be counted on without limiting the system's users.

A computer system for managing scholarship students at the University of Ciego de Ávila (RESIDUNICA)

The proposed system has been in operation for four years. After this time, and through a survey of the opinions of the residence workers and, mainly, the director, it was possible to measure the improvement in the performance of the main processes, which generate a series of information vital for the optimal fulfillment of its mission.

Automated information system for the student residence community at the University of Pinar del Rio "Hermanos Saiz Montes de Oca" (Saicre)

The Automated Information System for the Student Residence Community of the UPR arose from the need to efficiently manage the information on the scholarship recipients of the community above and their indicators to control it and quickly obtain the necessary queries and reports, which was previously done manually. This computer product stands out not only for the benefits its use brings by humanizing work and saving resources but also for the innovative features it offers in its updating and reporting processes and the tools provided to ensure its security.

The research was conducted on computer systems for information management in university residences currently used worldwide and in Cuba. There are no computer systems in the country that are adapted to the

real needs of this type of entity, which is why we decided to carry out this research.

Current trends and technologies for analysis and design

There are several methodologies for designing software, such as Scrum Methodology, Kanban Methodology, and XP Methodology. Of all of them, XP is one of the most suitable for modeling the management of processes carried out in healthcare services, given their complexity, as it allows the customer to be included as another member of the development team, thus ensuring that all the functionalities identified are fulfilled.

Figure 1. XPrograming logo

Extreme programming (XP) is an agile development methodology that aims to increase productivity when developing a software project. It prioritizes tasks that yield direct results and reduces bureaucracy in the workplace. Among its advantages is that individuals and their interactions are more important than processes and tools. Working software is more important than comprehensive documentation—collaboration with the customer rather than contract negotiation. There is no need to follow a fixed plan; rather, it is necessary to adapt to change.[21,22]

There are different modeling tools available, such as ArgoUML, Umbrello, BoUML, and Poseidon, but we decided to use UML because of its advantages.

Figure 2. UML logo

The Unified Modeling Language (UML) is a language that allows you to model, build, and document the elements that make up a software product that responds to an object-oriented approach. It is not a programming language but a general-purpose language for object-oriented modeling. UML is the universal standard used for documenting any application, regardless of the methodology used for its development.[23,24,25]

To implement this methodology, a set of tools is used to facilitate the modeling of diagrams and the development of prototypes. After analyzing them, the following is chosen:

Figure 3. ENTERPRISE ARCHITECT logo

ENTERPRISE ARCHITECT is one of the UML CASE tools, considered very comprehensive and easy to use, with multi-platform support and excellent interoperability with other applications. It was created for the entire software development lifecycle, automating and accelerating it, enabling the capture of requirements, analysis, design, implementation, maintenance models, and testing using UML, SysML, BPMN, and other open standards. It is a multi-user graphical tool designed to help teams build sustainable and robust systems. A truly shared vision can be delivered easily and accurately using high-quality, built-in reporting and documentation. It

supports all the basics regarding artifacts generated in the requirements definition and component specification stages.

There are many tools used to create prototypes, such as MockFlow, Invision, Fluidui, Figma, and Adobe XD, but due to its user-friendly environment, we use the following:

Figure 4. Axure RP logo

Axure RP is a comprehensive development tool designed to easily create basic or advanced wireframes and prototypes, even with a sketch-like appearance. Depending on the knowledge and experience of the information architect, additional features can be included to simulate better the interactions proposed in the project. One of its strengths as a prototyping tool is the interactivity it simulates in the behavior of interfaces. And the best part is that the prototypes work in any browser.

The information management process was described, how information associated with the UCM student residence in Pinar del Río has been managed to date, and the most feasible applications for managing this information. The structure and processes carried out at the UCM in Pinar del Río, along with its mission and vision, were outlined. Several software programs from Cuba and around the world that do not meet the needs of the business under study were analyzed.

CONCLUSIONS

Information management is a strategic pillar for the efficient functioning of any organization, particularly educational institutions such as the University of Medical Sciences in Pinar del Río. Throughout this study, it has been shown that, in the context of the Student Residence, information is an essential resource for ensuring comprehensive, organized educational processes that align with the needs of students and institutional objectives.

The analysis allowed us to understand the importance of implementing computer systems that optimize the management of large volumes of data, replacing manual methods with technological tools that facilitate decision-making, control, and traceability of processes. Likewise, it became clear that, although there are successful experiences in other universities in the country, there are still shortcomings in the specific adaptation of these solutions to the particular needs of the entity under study.

The study of the institutional environment, current technological trends, and software development methodologies made it possible to propose a feasible path for designing and implementing an information management system in line with the reality of the student residence. This will contribute to greater operational efficiency and reinforce the university's transformative role in society, consolidating its mission to train well-rounded professionals committed to social development.

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