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"INTRODUCTION OF A CLINICAL INFORMATION SYSTEM IN A REGIONAL GENERAL STATE HOSPITAL OF ATHENS, GREECE"

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Abstract

The introduction of a Clinical Information System (CIS) in a healthcare organisation is a particularly complex process, requiring thorough design and the close co-operation of many key-position people within the organisation. Moreover the whole process is extremely time-consuming. This contribution presents the first phases of such an introduction in a regional state hospital in Greece. During these phases a number of preparatory actions took place in order to establish and set available in the hospital all the necessary infrastructure. Then the CIS was introduced in two pilot clinics, interconnected with the existed administrative system and customised in order to meet the needs of the various clinical departments.

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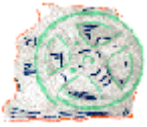
1.   Introduction

Ten years ago, the Greek Ministry of Health and Welfare (GMHW) announced a program with the main objective to computerise the Greek Healthcare Organisations providing an Integrated Administrative Information System.

The first group of hospital (15) adopted an administrative system, which was developed by "KHYKY" one of the state's computer serving departments. Among them was the "G. Gennimatas" hospital[1] which is the hospital that it is discussed in this paper.

The administrative system in use has proven certain benefits and it showed up the need for the introduction of a clinical system which has to be interconnected with the administrative one in order to form an integrated HIS.

On that direction "G. Gennimatas" hospital was chosen as the pilot site where the introduction of a clinical IS should be tested. After an open to the public procedure and a rather long period of negotiations, the Greek software manufacturing company "Intrasoft S.A." was awarded a subcontract for the implementation of the Clinical Information System. Intrasoft S.A. already had a general purpose Clinical Information System product that had to be modified in such a way that it would be compliant to and meet the needs of the chosen hospital. The whole project started in "G. Gennimatas" in the fall of 1998.

The planning of the project resulted from the co-operation of the following parties: the hospital's MIS department, the GMHW's MIS department, CTI[2] as the technical manager of GMHW, "KHYKY" as the developer of the administrative subsystem and "Intrasoft" S.A. as the company implementing the Clinical Information System.

There were two major objectives in this pilot project. The first objective concerned the implementation of the CIS itself, and the second one concerned the identification of the difficulties in the introduction of a clinical system in a regional state hospital. The milestones of the pilot project included: a) the customisation of the CIS which "Intrasoft SA" has implemented, in order to meet the specialised needs of all clinical departments of the hospital, b) the interconnection of the two systems (administrative and clinical), c) the acceptance of the system by the users of all levels.

In this paper it is described the first phases of the above-mentioned project which have already been implemented successfully.

2.   Existing IT technology

The application of Information Technology was introduced at the hospital in the early 90s. The Ministry of Health and Welfare invested in the development of an *Integrated Information System for Administration* of a Hospital, known as IIASH, and assigned this project to KHYKY since at that time, there were no software vendors in the market with a proven track of experience in developing and supporting such a system and therefore, the choice of KHYKY was the only choice left to the Ministry taking considering that the Greek National Health Care System counts almost 130 hospitals.

The first applications started to launch in 1993. The administration of the hospital's Pharmacy department was the first installed application. A year later, the Patient's Admissions Office and the External Patients' Appointment Office were installed. Then, the Billing department's application was installed. In 1996 the software applications for the Warehouse and Supply departments were used productively. A year later, the software application for the Dietary department was installed. In 1998,

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[1] General Hospital of Athens "G. Genimmatas" with 750 beds and more than 2.500 employees is one of the largest state hospital of Greece.

[2] C.T.I. is the technical manager of the Greek Ministry of Health and Welfare regarding IT programs within Community Support Framework 1994-1999 (jointly funded by EU and Greece).
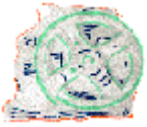
the last software application was installed concerning the Accounting department that is interconnected with all applications.

The IIASH system was developed under the close supervision of the users of the system. Hence, this information system is widely accepted by the users and in the short period of time of few weeks each application was productive to the benefit of the patients and the Hospital.

3.   Goals to be obtained

Considering the above-described situation it was clear that the hospital was mature enough for the introduction of a Clinical Information System (CIS). Introducing a Clinical Information System in a hospital it is certainly expected to achieve certain goals such as:

  ?? improvement on the accessibility and management of paper-based medical records,
  ?? improvement of the time that is currently lost for ordering and resulting,
  ?? better scheduling for patient examinations and other treatment.

In our case these were not the top priority goals since, as mentioned earlier, this project was the first attempt to introduce a CIS in a state regional hospital in Greece, which means that we had to face and overcome other problems like:

1. User acceptance: Most of the users did not have any previous experience working with computers while we had to overcome the hesitation of the users caused due to changing habits and using unfamiliar and new technology.
2. Standardisation: Since there were no HIS systems introduced in Greek hospitals the lack of standardisation was a fact that we had to face. The only known standard that was used in university clinics, was the translation of ICD-9.
3. Laboratory system: The clinical system under consideration does not include a laboratory system and thus we had to find a solution for that since it was identified as a critical factor for the success of the whole project.

## 4.   Preparatory phase - Parallel Actions

In order to overcome the above-mentioned difficulties, a number of preparatory actions were taken. First, since a new system was at about to be introduced we had to set-up a computer network and have available the necessary hardware (servers, personal computers, and peripherals, e.g. printers, etc.) Second, due to the lack of standardisation a number of standardisation studies had to be conducted. Third, we had to somehow imitate the existence of a Laboratory Information System since that was not included in the CIS under discussion. Finally, we had to prepare an adequate training program for the users.

4.1   H/W Infrastructure

The European Community's Support Framework provided the necessary funds to acquire the necessary hardware infrastructure, which can be subdivided into three categories. The network cables, the active network equipment and the third one, the computer terminals and peripherals. A plan and a schedule were set and in the time period of one year everything was in order.

4.2   Classification

When the project started, there was no classification system available from the official state authorities. In order to overcome such a situation GMHW in co-operation with CTI proposed the development of four classification systems:
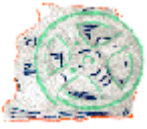
1) Classification of diseases, it was implemented by the translation of ICD-10.
2) Classification of medical procedures, it was made possible by exhaustively collecting all the medical procedures that took place in Greek Hospitals and then by codifying them. A software system was developed to support the dynamic update of the medical procedures and the distribution of this enumeration to the appropriate authorities.
3) Classification of in-vitro reactants, it was implemented by enlisting all in-vitro reactants that are used in all Greek state hospitals.
4) Classification of sanitary material, it was implemented based on ECRI and on EU 90/385/EU/20-6-90 and 93/42/EU14-6-93 guidelines developing a software system for the notification of GMHW and the corresponding EU authorities in case of an accident.

All of the above studies were carried out by a Greek company specialised in this area and the results have been announced in public and adopted by the GMHW.

4.3   Laboratory Information System

The CIS that we discuss in this paper does not include a laboratory information system. Nevertheless, and since after discussion with the physicians it was realised that such a system was of vital importance concerning the acceptance of the system from the users, we decided to set up a parallel project concerning the purchase of a LIS from a specialised company. In order to purchase such a system an open procedure was implemented by the hospital, which is currently in its final stage.

4.4   Training - User acceptance

Most of the future users of the clinical systems are not familiar at all with CIS. Moreover, especially the older employees are not that familiar even with personal computers. Hence, it was decided to rely mostly on the younger employees at least for the early stages since this category of employees did not appear to be negative against the project. An extensively detailed, two phase, training program was set with courses covering the work flows of the system, the roles of the staff in the system, and the use of all software operations. The first phase concerned classroom courses and the personnel were chosen according to the influence of the post in the clinic and the level of seniority. The second phase concerned an on the job training scheme according to which the trained personnel will be assisted by both colleagues and instructors while the personnel would be executing its duties.

5.   Implementation Plan

Taking under consideration the above mentioned affecting factors and the experience earned at other countries, an implementation plan was designed that it could overcome all the major problems. The main phases of this plan are:

First Phase: Introduction of the CIS in two pilot clinics. Two clinics were chosen to be the pilot ones. Training was offered to all personnel of both clinics and it was agreed with the developer of the CIS to provide whatever software component these two clinics would ask.

Second Phase: Interconnection with the administrative system. In parallel with the introduction of the CIS in the two pilot clinics we requested the CIS developer and IIASH (administrative system) developer to work together in order to interconnect the two systems. This task appeared to be easier than what it was initially expected.

Third Phase: Customisation of the CIS. After the introduction of the CIS in the pilot clinics, the CIS developer continued by collecting the requirements of the rest of the clinics and then customising the S/W in order to meet these requirements.

Fourth Phase: Step by step introduction of the CIS to the other clinical departments. After the completion of the customisation, it is currently designed the procedures to activate discrete
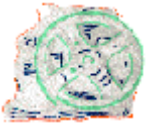
operations to all clinical departments simultaneously.

So far, the first 3 phases have been successfully completed and the last phase is under study and consideration.

5.1   *Introduction in two pilot clinics*

A Clinical Information System (CIS) was installed at both clinical department and it was called the Basic Solution. The Basic Solution was rather a general purpose program that implemented general work flows and required no strict procedures and acting roles for the personnel than a regularly formed Clinical Information System.

The initial plans of the project required the selection of at least two clinics among the 32 available ones. The criteria of the selection of two pilot clinics were: 1) The chosen clinic must have as many as possible specialised divisions. 2) The business nature of the clinic must be such that it will be in a position to interact with almost all the rest of the hospital's administrative departments and clinics. 3) The chosen clinic must have some number of biomedical equipment that already communicate with computers and the personnel is familiar to the use of such specialised equipment. Two such clinics were chosen to be the Renal and Cardiology clinics and the Basic Solution application software was installed there.

In order to meet the specific needs of each clinic and to extract valuable information from the experts and the users, a representative team was formed in each of the clinics consisted of the director of each clinic, a medical doctor member of the clinic's staff, a clinic's resident medical doctor, and the clinic's chief of the nursing staff. The team of each clinic was presenting the views of the clinic's staff after the use of the installed software. The analysts and the programmers were implementing the demands of the team and the staff of the clinic was performing trials on the implemented software.

The Renal and Cardiology clinics had to use the system for a period of two months. A training course offered to all the levels of the staff of both clinics by the manufacturer of the application software forming training groups of users with similar roles on the system. Studying the demands of both clinics, it was clear that both clinics demanded the same set of work instructions, work procedures, work flows, work inter-departmental interactions and the same roles for the personnel of the clinics but with different side activities, i.e. the personnel of the Cardiology clinic was focused in the treatment of heart diseases while the other clinic to renal related diseases.

5.2   *Customisation of the S/W*

For the customisation of the application software in all clinics followed successfully exactly the same procedure as with the customisation of the two pilot clinics. All the meetings held in each clinic were recorded and the meetings' notes were dispatched to each participant of the meeting. The recorded content of the meetings played a double role for the project. First the management of the project was kept up with the progress of the project and second, the meetings' participants had the chance to have notes with their views, demands and agreements.

The management of the project treated each clinic as a different, special, case demanding its specific requirements. The contents of each case – clinic were very similar, up to 90%, because almost all clinics had the same kind of demands with respect to the Administration departments of the hospital, the hospital's laboratories, and the interaction or co-operation with other clinical departments of the hospital. The difference from clinic to clinic were the special subdivisions that each clinic has and this difference was up to 10% of the total work out, for example, for the clinic of Cardiology, one of its special cases was the Holter subdivision.
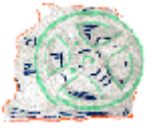
6.   Experiences – Conclusion

The project, overall, achieved its goals. The achievements concentrate at two focal points. First, the system was installed and customised successfully. The second, and most important, point is the fact that the hospital besides the installed system has experienced employees that obtained knowledge in both project management and clinical operations. The hospital's MIS department knows the operations of each clinic within the hospital. The operations of each clinic placed in a list. The common operations to all clinics will be activated first. For example, the application ordering pharmaceuticals will be activated first since all clinics perform this operation. The hospital's operations will be viewed horizontally. In other words, apart from the fence of each clinical department, there are operations that affect all clinical departments. This way of viewing hospital's operations helps to integrate the developed information system.

The initial objective goals have been achieved to the expected extend. From now on, the next challenge will be to set this huge system into productive operation. To activate such a system that involves so many people and so many different medical majors, it is the scope of a new project with different orientation headings.

6.   References

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