Patterns and Potentials
of Information Technology use
by Maltese Family Doctors

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Declaration of Authenticity

“I, the undersigned, declare that this dissertation is my own original work and was completed under the supervision of Dr Hugo Agius Muscat, MD MSc.”

[Signature]  
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“In my opinion, this dissertation deserves to be awarded at least a Pass by the MSc (Family Medicine) Examining Board.”

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Abstract

The time and money invested in paper work in the general practice setting and in the healthcare system in general always imposes a question, i.e. why does family practice not fully benefit from what technology can offer, like many other medical fields, or non medical fields such as business?

This study reviews existing literature about use of computers by family doctors. Although scarce in quantity and limited, the core contents were grouped and moulded to present what computers are used for in family medicine and how family doctors are using them in different areas of the world.

An online questionnaire was distributed to Maltese family doctors who are already using computers in order to study their pattern of use and the potential to grow this use in order to support their development for a continuously improving medical practice.

The data collected was grouped and analysed. The results are presented as a thorough description of the participants’ pattern and potential of computer use. The results were considered indicative of the current situation in Malta, which was found to be promising.

The results suggested that, although the majority of family doctors who own a computer either at home or at their clinic or both, make variable use of technology, they are in continuous search for means and solutions that technology could offer to help them with their professional challenges. An Information Technology acceleration programme for family doctors is proposed by the researcher; its main features were documented in this study as part of the discussion and recommendation. This study did not aim at exploring the number of Maltese Family doctors who are computer literate but rather to study the pattern of use by the existent IT users.
DEDICATION

To ISMAEL
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Chapter 1

Introduction
1.1 Background of the Study

Today, we are living in a world where technology races against time. The effect of technology in all the aspects of our daily life can be seen, felt and depended on. Computers are becoming part of our life, without which, what we consider as simple tasks would become difficult and sometimes impossible to be done in a particular period of time (Heeks 2008).

Computers found their way to the medical field and proved to improve time and task efficiency. The hospital of today is a living example that computers are a corner stone of the daily hospital work. In Europe; hospitals are using computers in medical records, patient information, accounts, management and a countless number of other uses (Shortliffe EH et al 1990).

Family doctors, being the gate keepers to the health system and the first healthcare members, the patient encounters when s/he has a health issue are expected to make use of technology if it can offer what would help them to continuously develop their profession and provide their patients with the quality of service they expect.

Recent advances in computer hardware, software and telecommunications, and particularly in the development of the electronic medical record, mean that family practitioners around the world now have access to a multiplicity of tools which offer the potential for significant time savings and improved quality of healthcare provision. Areas such as practice management, medication management, prescription generation, clinical record keeping, decision support, medical research and continuing medical/professional education can all be aided through the use of information technology in a family practice setting. (Walker et al., 2005)
Many other areas of medicine have been very active in embracing this technology. Studies have been conducted about benchmarking the e-health development in Europe by Eurostat (i2010). European countries vary in their trends of using computers in the medical practice, and this is where the need for IT acceleration programme starts in order to meet the needs of the low users and improve that of the powerful users.

1.2 Purpose of the study

The researcher of this study is a Maltese medical practitioner as well as a Master trainer for information technology acceleration programmes, which aim at utilizing technological solutions in facing professional challenges.

Being a doctor himself, the researcher is trying through this study to discover the missing link between the professional challenges a family doctor faces every day and the existing solutions, offered by information technology.

By studying the pattern of computers use by Maltese family doctors and the obstacles preventing them, if any, from making full use of information technology, any plan for enhancement that use would be based on factual grounds.

This study, as a standalone or followed by other larger studies, can form the basis for a plan of enhancing the information technology use by Maltese Family doctors.

1.3 Aims and Objectives of the study

The main aim of the study is to explore the missing link between the professional challenges met by primary health care physicians and their pattern of usage of available Information Technology solutions.
The objectives are:

1. To describe the usage of computer solutions by family doctors in order to meet their professional challenges and personal development goals.

2. To suggest an Information Technology acceleration programme for family doctors that would improve the usage of IT solutions.

1.4 The Research Question

This study seeks to answer the following questions:

1. To what extent are family doctors familiar with computer usage?

2. What is the pattern of usage of computing in both their professional and personal life?

3. Is there the need for an acceleration programme to help in augmenting the usage of computers in the population of family doctors?
Chapter 2

LITERATURE REVIEW
This chapter explores the existing literature related to the computer use in the medical practice with highlighting the particular uses in family practice settings. The sources for this chapter were acquired from many printed materials, scientific magazines, Medical journals, books and the internet. Literature review intensified to cover every issue related to computer use in Family Medicine without getting out of focus from the main subject. Statistics and information existed in the time of writing this chapter were highlighted to give an indication of the foreign and local situation related to computer use by family doctors. Maximum efforts are done to ensure the authenticity of the information reviewed.

2.1 Computers and Medicine

According to Bader & Braude, (1998), among the fields that have made tremendous advances in the twentieth century due to the advancement of computers, medicine stands out from the rest as the medical practice is dominated by information: its recording, retrieval, communication, and use in the areas of data collection and documentation of patients' conditions and generally in their medical records.

The medical field is continuously using the newest technology to improve the treatment and diagnosis of patients in order to help. There are many different aspects in which technology is being used to improve the field of medicine. Beside the diagnostic and therapeutic elements, technology helps in administrative matters such as patient billing, online referrals, and computerized patient records patient billing, online referrals, computerized patient records, pharmaceuticals and specialised medical equipment in specific fields such as radiology, distant or virtual surgery and virtual medicine. Technology as well allows health care systems to be interoperable; Walker et al. (2005) define four levels for interoperability between health information systems:
Level 1: Non-electronic data (e.g. mail, telephone)
Level 2: Machine-transportable data (e.g. faxed or scanned documents)
Level 3: Machine-organisable data (e.g. e-mail, proprietary file formats)
Level 4: Machine-interpretable data (e.g. structured data within standardised messages).

The internet being a global interlink had a remarkable impact on the health care system which is significantly present in the past few years, as it is a main source of today's medical information (Comscore, 2009). It helps in exchanging data, virtualisation of training and even in virtual surgeries. Medline is one of the most important medical records (Barnett, 1990). Started as an on-demand search service MEDLARS in 1964, it lists today more than 600,000 articles each year. Doctors around the world consult this huge database and sometimes they need to be trained to use its diverse features. Medline today can be accessed through a number of portals such as pubmed (Pritchard et al., 2005)

2.1.1 Computers in hospitals

In a hospital environment, patient information systems allow doctors at different locations to access permanent patient records from a centralized database and send notices to patients who need follow up treatment/ medication (Ash & Bates, 2004). These systems offer a huge administration uses without undermining their clinical ones to help doctors treat patients better, for example, a post-operative patient is monitored and his vital signs are recorded and shared amongst a number of locations. If an alarming change happens to his vital signs, the concerned staff will be alarmed immediately and since the information from these systems can be recorded, it allows for doctors to analyze the patient's process at any later date.
Technology prevailed also in the diagnostics field, diagnostic equipment is becoming much sophisticated and data from these equipments can be fed into any PC and shared between 2 or more departments when necessary (Bates et al., 2003).

An example of this is the modern Picture Archiving and Communication System (PACS) where, diagnostic images are transferred to computers in different hospital department for immediate diagnosis, reviewing or archiving.

2.1.2 Computers in family Practice

Agius Muscat, in his lecture “Computing in Family Practice”, reviewed the use of computers in family practice and classified this usage into a number of areas: Practice population management (Patient registration; age/sex register), Clinical record-keeping, Communication with (to/from) remote databases, decision support, clinical practice support, Information for patients, Research / audit, access to service information, access to knowledge resources, e-learning and continuous professional development and practice management.

According to Miller, who is an author of Information Technology articles (2005), an Electronic Medical Record is a secured electronic file of patient history, medical transcription notes, and all other information necessary to have a complete patient profile. Electronic medical records just like any other record keeping is building its database on a computer memory instead of the traditional paper and filing system. Computers offer super storage capabilities with easier and faster retrieval, which has made the patient record keeping one of the main uses of computers in a family practice setting.
2.1.2.1 Benefits of Electronic Medical Records

According to Miller, the electronic medical record has many benefits; Speed as less time invested in trouble shooting and allows more time invested in caring for patients. The electronic medical record can be stored and linked to a database of information capable of carrying much more information than traditional systems.

An electronic medical record can manage records from multiple offices as well as multiple types of records. Security also features the electronic medical record system as the backup of files saves them in case of emergencies. In addition, only authorized users may access them.

Safety is another benefit, an example of this is when a patient forgets to remind her doctor about her allergy to certain medications and the doctors does not consult his paper records in that consultation, that can end with an undesired effect. A situation like this can be compared to an ideal situation where records are electronically kept and retrieved when needed by the family doctor, all of the information the doctor needs to see will be there in full e.g. past or current medications, procedures, allergies, social habits and any information from a diagnostic source or another specialist. Diagnosis and treatment decisions might be altered based on that information, which is far more complete than what the patient can recall.

Electronic medical records are accessible even from a portable device such as a Personal Digital Assistant (PDA) or Palm device. In addition professionals can access an electronic medical record online from any location. Electronic medical records especially in their online form are affordable as much of the set up costs and overhead are eliminated and reduced to monthly usage fees.
Efficiency and manageability are two more advantages of electronic medical records. For individual patients, access to good care becomes easier and safer when records can easily be easily retrieved and shared. Important information such as blood type, prescribed drugs, medical conditions and other aspects of the medical history can be accessed much more quickly (Hillestad et al., 2005). The electronic medical record can be lifesaving if an emergency occurs and answers to those questions are needed during the emergency decision-making process.

Backups of the medical records can save them from being lost compared with a paper record which is subject to loss or wear and tear factors. Even if the patient does not continue to be under the care of a certain family doctor, keeping his records electronically, especially in the cases where patients can also gain access to them, means the patient won't be left without the records she may need to update his/her new doctor with his/her past/present medical history.

Money is saved by using electronic medical records; not just the cost of paper and file folders, but the cost of labour and space, too. In any business, time equals money. The efficiencies created by simply typing a few identifying keystrokes to retrieve a patient's record as opposed to staring at thousands of file folders, filing and refilling them saves a doctor's practice a lot of time and money. That's even taking the cost of the electronic system into account. All these advantages can provide better access to medical information at or near the point of care, potentially enhancing the quality of care delivered (Clark et al., 2002).

In Boston, USA, The department of general paediatrics in 2000 evaluated the quality of paediatric primary care, including preventive services, before and after the introduction of an electronic medical record (EMR) and concluded that Use of the EMR in this study
was associated with improved quality of care. This experience suggests that EMRs can be successfully used in busy primary care centres and, as recommended by the Institute of Medicine, must play a central role in the redesign of the US health care system. (Adams et al., 2003).

In 2005, a paper by Richard Hillestad and James Bigelow, who are senior management scientists at RAND in Santa Monica, California, examined the potential health and financial benefits of health information technology (HIT). The paper concluded that effective EMR implementation and networking could eventually save more than $81 billion annually in the United States through:

- improving health care efficiency and safety

- HIT-enabled prevention and management of chronic disease could eventually double those savings while increasing health and other social benefits.

### 2.1.2.2 Difficulties in using EMR by family doctors

While the use of computers in family practice is proving its advantages over the traditional systems, family practitioners in many areas of the world are still reluctant in replacing their traditional pen and paper style (Harris, 2002).

In 2002, Jacob Reider M.D, in his article about using computers in family practice office setting, wondered why while nearly all United States family physicians use computers in their offices for billing and scheduling, fewer than 20% use computers for clinical purposes while in Sweden for example, 90% of Swedish doctors use electronic medical records.
The Medical Group Management Association survey (2002) highlighted several key factors as barriers to computer use in family practice, amongst those factors are the lack of resources to invest in information technology, the time and effort to prepare medical records, the skills and manageability issues which become sometimes the source of fear for many doctors as some software require certain technology skills that the user/owner may be worried that he or she cannot offer and the difficulty in integrating various systems for maximal benefits, the survey was concluded on a rather negative note that clinical applications of technology are too complicated and costly.

Here it was made clear that more training and reassurance would help family doctors overcome their reluctance to use information technology in their daily work, which will help them benefiting from the advantages technology use offers the clinical profession.

2.1.2.3 E-learning, online knowledge and Continuous Professional development

According to Agius Muscat, E-learning is "learning facilitated and supported through the use of information and communication technology". This concept has evolved from computer assisted learning at any place (home, surgery, etc.). This technology has progressed from desktop station use with some optical media (CD-ROM, DVD, etc.) into accessing websites on-line into wireless access through small sized portable devices. That made the technologically skilled person shifting from being a geek to a person with basic part of literacy (Agius Muscat, 2009).

The continuous professional development, traditionally called "Continued Medical Education" is a process of lifelong learning that all doctors undertake from medical school until retirement for updating their medical knowledge. It has evolved into a new concept where doctors need skills that extend beyond updating their medical knowledge
in order to practise effectively. Such skills include management, education and training, information technology, audit, communication, and team building. This new concept is now defined as Continuous Professional Development (Boulay, 2000).

Pack et al. (2000) explained that continuous professional development is the process by which health professionals keep updated to meet the needs of patients, the health service, and their own professional development as it includes the continuous acquisition of new knowledge, skills, and attitudes to enable competent practice.

That term continuing professional development acknowledges not only the wide ranging competences needed to practise high quality medicine but also the multidisciplinary context of patient care.

The Internet provides two features that would be of major interest to the health professional for continuing development. Firstly, there are web addresses of institutions or organizations that function as CME/CPD providers and schedules of proposed CME/CPD events (e.g. http://www.drsref.com.au/cme.html). Secondly, some Internet sites offer lessons on selected topics. They often enable the practitioners to receive credit approved by different CME/CPD authorities. Some non medical websites, such as youtube.com is now being used by some doctors to share their educational videos and procedures. Other ways in which the Internet may be used in CME/CPD are for electronic mail and discussion groups.
2.2 An overview of Information technology use by family doctors in

Europe and the USA

2.2.1 in the USA

A study done in 2003 by the Department of Continuing Education, Harvard Medical School, Boston, Massachusetts and the division of Continuing Medical Education, University of Alabama and the School of Public Health, University of Wisconsin at Lacrosse, USA, explored the information seeking behaviour of the family physicians.

The study assessed the way family physicians use the Internet to look for clinical information and how their patterns vary from those of specialists. The study found out that the majority (59%) of family physicians regularly uses the Internet to access clinical information daily or weekly; they also regularly access the Internet for personal use and for email. Family physicians' responses differed from survey responses for other specialties in terms of strategies for seeking clinical information.

The Family physicians were found to consider the Internet important to the practice of medicine, and the majority uses it regularly. Their searches differ from colleagues in other specialties with a focus on direct patient care questions. Almost half of family physicians use hand held computers, most often for drug reference (Casbeer et al. 2002).

According to Criswell and Parchman (2002), handheld computers (PDAs) are widely used in family practice residency programs in the United States. Although handheld computers were designed as electronic organizers, in family practice residencies they are used as medication reference tools, electronic textbooks, and clinical computational programs and to track activities that were previously associated with desktop database applications.
Criswell and Parchman conducted a survey in 2000 on all American Academy of Family Physicians (AAFP) residency programs in the United States, where over two thirds of the family residency programmes found to be using Handheld computers (Criswell et al. 2001).

Regarding the usage of EMR software by family physicians, the national centre for health statistics in 2005, presented the latest data from the National Ambulatory Medical Care Survey (NAMCS) which indicated that one-quarter of office-based physicians report using fully or partially electronic medical record systems (EMR), a 31% increase from the 18.2 percent reported in the 2001 survey. To better understand physicians’ use of EMRs, the 2005 NAMCS included questions about EMR system features that health information technology experts consider to be the minimal requirements of a complete EMR, such as computerized orders for prescriptions, computerized orders for tests, reporting of test results, and physician notes. Based on these requirements, only one in ten of the physicians surveyed are considered to be using EMRs. This report presents estimates of EMR use by physician, practice, and location characteristics of office-based physicians.

Later on, it was found also that fewer than 10% of American hospitals have implemented health information technology; while about 16% of primary care physicians use electronic records. Incentives such as the 2009 economic stimulus package (HITECH) are aiming at aiding more primary care physicians to adopt Electronic Medical Records, this act promises incentive payments to those who adopt and use "certified EMRs" and, eventually, reducing Medicare payments to those who do not use an EMR. In order to receive the EMR stimulus money, the HITECH act requires doctors to also show "meaningful use" of an EMR system (Moore, 2009).
2.2.2 In Europe

Till recent times, the number of research about the use of EMR was scarcer than that done in the USA. It was found that national penetration of Electronic Medical Records have reached over 90% in primary practices in Norway, Sweden and Denmark compared to less than 20% in the USA (HHS, 2005). Those EMR systems that have been implemented however have been used mainly for administrative rather than clinical purposes.

However, the market in electronic medical record systems across Europe is expected to grow very fast in the coming years because of the strong business and clinical benefits such systems can deliver. The Frost and Sullivan report concludes that standardisation is the biggest issue shaping the pace of EMR adoption in Europe (Frost and Sullivan report, 2007). According to the report, titled “European Electronic Medical Records Markets”, the European EMR market was worth around 2.5 million Euros in 2007 and will reach 1 billion Euros by 2013.

Kiran, a research analyst quotes “Having accurate patient data plays a vital role in treating patients effectively, but this has always depended on maintaining comprehensive records of patients’ encounters with the medical system”. It is expected that the paperless, interoperable, multi-provider, multi-specialty, multi-discipline computerised medical record is going to be more efficient compared to current systems which are not delivering sufficiently safe, high quality, efficient and cost effective healthcare and that computerisation, with the EMR at the centre, is effectively the only way forward. Hence Governments in Denmark, Finland, France and the UK have announced - and are implementing - plans to build integrated computer-based national healthcare infrastructures based around the deployment of interoperable electronic
medical record systems and many of these countries aim to have EMR systems deployed for their populations by 2015 (eHealth Europe, 2007).

In April 2008, The European Commission published a pan-European survey on electronic services in healthcare (eHealth) that shows 87% of European doctors (General Practitioners) use a computer, 48% with a broadband connection.

European doctors increasingly store and send patients' data such as lab reports electronically. In using such eHealth applications, doctors and medical services have already improved healthcare in Europe through, for example, more efficient administration and shorter waiting times for patients.

The report also highlighted where doctors could make better use of Information technology solutions to offer services such as telemonitoring, electronic prescriptions and cross border medical services.

According to Viviane Reding, the EU Commissioner for Information Society and Media, Europe is starting to reap the benefits of broadband connections in the eHealth Sector, and according to the 'Benchmarking ICT use among General Practitioners in Europe' survey presented by the Commission in 2006 "eHealth" applications have a growing role in the doctor's practices. The survey however indicated that there is a significant difference in these applications availability and use across Europe. It was found that about 70% of European doctors use the Internet and 66% use computers for consultations. Furthermore, there are wide differences across countries: Denmark has the highest broadband penetration among General Practitioners (91%), Romania the lowest (about 5%).
Administrative patient data is electronically stored in 80% of general practices. 92% of these also electronically store medical data on diagnoses and medication; 35% electronically store radiological images. European doctors often transfer data electronically with laboratories (40%), but less to other health centres (10%).

The survey showed that countries, most advanced in ICT access and connectivity, are the ones who are more likely to use them for professional purposes. For example, Denmark, where high-speed internet is most widely available in Europe, sees extensive use of email communication between doctors and patients in about 60% of practices (the EU average is only 4%).

The survey also highlighted some still growing areas such as electronic prescriptions (e-Prescribing), which is practiced by only 6% of EU General Practitioners. This is widely used in only three member states: Denmark (97%), the Netherlands (71%) and Sweden (81%) and Telemonitoring, which allows doctors to monitor a patient's illness or manage chronic diseases remotely, only used in Sweden (where 9% of doctors provide telemonitoring services), the Netherlands and Iceland (both about 3%).

The survey found that exchanging patient data across borders is still low, done by only 1% of the EU's General Practitioners, and is highest in the Netherlands (at 5%). The majority of European doctors were found to be in favour of using Information Technology to improve the quality of healthcare services that they provide but those Doctors who are not using technological solutions declared lack of training and technical support as major barriers.

The final report indicated that to spread eHealth, more ICT in medical education, more training and better electronic networking among healthcare practitioners wanting to share clinical information are needed.
2.2.3 Information Technology and Family Medicine in Malta:

At the time of writing this review, data about Electronic Medical Records use or computer use by family doctors was hard to be found, on the other hand the Maltese hospitals (both governmental and main private hospitals) are found to be using records system for administration and clinical use, e.g. the Compucare system at St James Hospital. The Picture Archiving and Communication System (PACS) for the easy processing and sharing of medical images was recently introduced in the main governmental hospital and in some private hospitals (St. James Hospital).

The Synapse is a Maltese medical electronic journal used by family doctors and other specialists, currently there are 371 family doctors registered to make use of this electronic journal (information supplied by the Synapse management).

The Malta College of Family Doctors through its website (www.mcfd.org.mt), although is currently not a very advanced site, provides some information and updates related to current activities and medical information.

The Ministry of Health, the Elderly and Community Care (MHEC), provides the public, through its website “www.health.gov.mt”, information and advice related to the Health services.

The e-health services are growing slowly in Malta, according to the “e-user” website (www.euser-eu.org), the main barriers to these systems includes general resistance to change in the healthcare sector and complexity of implementation.
2.3 Issues related to the use of technology in family practice

After highlighting the advantages and the patterns of technology use by family doctors in Europe, it was felt suitable to research some documented issues related to the use of technology in family practice setting and some of its effects on both the family physician and the patient.

2.3.1 Computer use and the doctor-patient relationship

In 2006, a study was conducted and published by Margalit and colleagues for the effect of using electronic medical record software during the consultation on the doctor patient relationship. The study observed three family physicians and thirty of their patients. This study suggested that the way in which physicians use computers in the examination room can negatively affect patient-centred practice by diminishing dialogue, particularly in the psychosocial and emotional realm. Screen gaze appeared particularly disruptive to psychosocial inquiry and emotional responsiveness, suggesting that visual attentiveness to the monitor rather than eye contact with the patient may inhibit sensitive or full patient disclosure. (Margalit et al, 2006).

2.3.2 The practicality of using electronic medical records

Keshavjee et al (2001) studied the feasibility of using electronic medical records for decision support in Canada. Electronic Medical Record software requires the doctors to input the patient information in real time, which means during the consultation. Training on the use of such software was found mandatory to reduce the time required to input the information of the patient. It was also found that such software requires a pre-existing base of patient data to provide most clinically relevant decision-support; data
should be entered in a manner which is structured, standardized, consistent and relatively complete. Key fields of data required include details of medications past and present, diagnoses including adverse events and diagnostic test results, practice-wide decision support requires that most if not all, patients’ data be charted in the EMR decision-support software should work reliably and be useful in practice.

Keshavjee’s study also showed that only 64% of patients who were seen within the study had their information entered into the electronic medical record.

Many of those who don’t have their information entered have important diseases that require pro-active management. Furthermore, only 56% of patients had their data entered in real-time. This means that 44% of patients potentially may not be able to benefit from the medication advice (drug-drug interactions check, drug-disease interactions check) or other decision-support tools that may be available to the clinician through their Electronic Medical Records.

A major barrier highlighted by the study was the doctor’s general IT skills. The need for skills to use the keyboard and mastering the software interface made slower the inputting of patients’ data by the doctor and hence reduce the number of patients inputted in the system. The quality of data inputted was reduced too making it less useful of using the utmost benefit of the electronic medical record software.

The study concluded that there are still a number of both physician and practice-specific barriers to overcome before stating that the Electronic Medical Record is a clinical decision supportive tool and an enhancing factor to the quality of care the patients expect from their doctors (Keshavjee et al, 2001).
2.3.3 The cost of using technology in a family practice setting

When a family doctor introduces new device to his surgery, e.g. Blood cholesterol meter, besides improving the quality of service s/he is providing, the doctor thinks of covering the cost invested in this device, the patient will be the final payer for this new technology. When it comes to computers, this new technology requires new learning. The professionals who use this new technology must not only pay for the education, but it requires their time away from seeing patients in order to do the new learning. The computer use is usually accompanied by risks of failure, viruses and the need for continuous maintenance. These factors add costs to the original cost of introducing the technology itself. (Tokarcki, 2002)

2.4 Technology training and Medical informatics

Some medical schools have restructured their curricula, including training in information technology. Offering lower prices for computers, and the availability of graphic displays and other educational aids, make acceptance of this mode of learning easier. Future doctors are getting used to these lines of technology while they are still medical students; this would facilitate their change into using as much technology as possible in practice (The Scientist magazine 2007). Use of the computers in medicine is expected to be aided by the emergence of medical informatics as a discipline with its own organisation, e.g. the American Medical Informatics Association (Barnett, 1990).

Medical Informatics has recently developed and developed its own branches such as Healthcare Management Informatics (HMI) which is dedicated to the study, design and implementation of information technology solutions in support of the practice of healthcare
management in primary care and general practice, sub acute and rehabilitation care, hospital care and others (Kelly, 2009).

2.4.1 Training Programmes for orientation to technology in medicine

If we consider training doctors for the use of the internet for example, a short introductory course or a few interactive sessions, coached by an experienced user would be sufficient for getting a basic understanding of how the Internet can be used as an additional resource in CME/CPD. A continuously updated list of internet sites which are useful for CME/CPD can be found at http://www.cmelist.com/list.htm. A visit to these sites would show what is available in the field.

When it comes to the use of electronic medical records, some companies provide an onsite training for the use of the software interface as long as an ongoing support in case the doctor facing difficulty using the software.

If one is to apply the learning cycle to Information Technology training for family doctors, it would be extremely important to;

1) **Identify the current skill levels.** Doctors need to declare their computer skills level before for example investing in an expensive EMR system. According to P. Polack (2008), many EMR failures are really failures of planning on the part of the practice owners and administration.

2) **Determining what core skills will be needed with the new technology.**

Most EMR systems on the market use a graphic interface, so using a mouse is a mandatory skill. Other core skills would include: Turning a computer on and off, setting a default printer, being familiar with files and folders, using passwords and logging on and off properly. (Polack, 2008)
3) Finding the suitable training plan.

The availability of customisable training programmes will be of a major help in fulfilling the technology training needs doctors require (Devitt & Murphy, 2004). In the following chapter, the pattern of computer usage by Maltese family doctors will be studied and the main characteristics of a model of an Information Technology Acceleration programme will be highlighted.
3.1 Chapter Overview

This chapter will discuss the methodology used in this study. A description of the sample and setting for this study are presented while the aims and objectives of the study are highlighted. The tool is presented along with the method used to collect data. Issues of reliability and validity, together with the data analysis methods will concurrently be discussed.

3.2 Aims and Objectives

The main aim of the study is to explore the missing link between the professional challenges met by primary health care physicians and their pattern of usage of available Information Technology solutions.

The objectives are:

1. To describe the usage of computer solutions by family doctors in order to meet their professional challenges and personal development goals.
2. To suggest an Information Technology acceleration programme for family doctors that would improve the usage of IT solutions.

3.3 The Research Questions

This study seeks to answer the following questions:

1. To what extent are family doctors familiar with computer usage?
2. What is the pattern of usage of computing in both their professional and personal life?
3. Is there the need for an acceleration programme to help in augmenting the usage of computers in the population of family doctors?
3.4 The Study Design

A descriptive design was adopted to explore the pattern of both domestic and professional usage of personal computers by family doctors who are already known to make use of IT. A descriptive design was perceived to be appropriate for this study, since this design provides a simple way of investigating a current situation (De Vaus, 2001). The descriptive style would enable this study to be the base of any planned project for Information Technology acceleration for family doctors. It is also found that descriptive studies are means of quick collection of quantitative data about a particular problem or a particular situation (Polit and Hungler, 1999).

3.5 The Research Setting

The researcher’s interest focused mainly on the pattern and potentials of computer usage by Maltese family doctors already making use of IT. The respondents needed to specify their year of graduation (before or after 1995) in order to explore if the pattern and potential of computer usage is related to their year of graduation. The year 1995 is chosen as it was the year that a significantly improved operating system, Windows 95, was announced by Microsoft and started to be generalised. Before Windows 95, earlier versions of the operating system and other operating systems existed but the use of computers was not as simple as it is today (Washington Post, 1995).

3.6 Target population and Sampling Technique

The definition of target population used in this research was that of Polit and Hungler (1999). The target population for this study was the registered family doctors currently working in the primary health care sector in Malta who are known to be computer literate. In Malta there is no clear borderline between a hospital specialist and a family doctor as both disciplines can provide primary health care service to the Maltese community. For this
reason, in order to focus the research on family doctors, a convenience sample limited to family doctors was utilized. The sample was taken from the 371 users of the electronic medical journal website, The Synapse; www.thesynapse.net, who are known to be family doctors and who, being members of The Synapse, are IT literate. This number of members (data supplied by The Synapse management) is evidence that The Synapse is one of the leading online communities for Maltese family doctors. The questionnaire stated clearly the title of the study to ensure that only family doctors can answer. Being an online questionnaire, it was meant to be directed to those participants with at least a minimal usage of IT technology (being internet users).

Participants' Inclusion criteria:

1. Practicing family doctor in Malta
2. Web accessibility and basic IT skills

These criteria are useful to control variables such as being a specialist of other medical field than Family Medicine or those family doctors who are not using the web or IT technology in general. The use of this convenience sample can provide the researcher with useful information, however the researcher when interpreting the findings, cannot scientifically make generalisations about the total population from this sample because it would not be representative enough (Trochim and Donelly, 2007),

3.7. Research Method

Both quantitative and qualitative data collection could be used to research the objectives of this study. Qualitative research involves the collection and analysis of more subjective narrative materials with minimum researcher control (Polit and Hungler, 1999). Qualitative approaches have also the advantages of flexibility, in-depth analysis, and the potential to yield a more in-depth understanding of the respondent's beliefs, attitudes, or situation
(Bowling, 2002). However among the most cited criticisms of qualitative research are the issues of the complexity of data analysis whilst the reliability and validity of the findings is often questioned. Moreover, small and unrepresentative samples are usually studied, hence conclusions could rarely be generalized to the whole population researched (Cormack, 2000).

Alternatively Quantitative research entails a more formal, objective and systematic process in which statistical data is used to acquire information about the people or situations as they occur (Burns and Grove, 1995). Quantitative research designs generally require a large sample size for data collection ensuing to strong and generalizable findings. Furthermore, if methods are explained in detail, they are generally are very easy to replicate therefore high reliability is enhanced (Carr, 1994).

However one important limitation of the quantitative approach is its inadequacy to provide a holistic view of the complexity of human behaviours, and human experiences (Morgan and Drury, 2003). Given the strengths and weaknesses of both approaches, a quantitative method was deemed more appropriate for this study.

Online questionnaire was chosen as the mean of data collection, since data is gathered in a standardized way, which makes questionnaires more objective than interviews (Cormack, 2000). Furthermore, it is an efficient way of collecting information needed from a large number of respondents, in a very short period of time (Hale et al., 1999). Being an online questionnaire, it was directed only to those who can access, hence targeting exactly Family doctors who are active online users, hence IT literate.

Additionally by means of questionnaires the respondents' anonymity and privacy is safeguarded, which is crucial to obtain more frank, honest responses and to reduce
METHODOLOGY

interviewer bias (Burns and Grove, 1995). The use of questionnaires enhances the reliability since respondents are all answering in terms of the same options (Schutt, 2006).

The questionnaire was uploaded to a web space owned by a colleague to reduce the cost of the study as it is a self-funded project and a special html code was created to collect the answer of every participant separately. The banner and the title of the questionnaire consent page stated clearly the title of the study and the specificity of the population studied. The questionnaire can be viewed on: http://research.epicleap.com. The owner/editor of the portal was requested the permission to have a banner on the newsletter sent to all doctors which linked to the site of the questionnaire. Permission was granted and the questionnaire was available for users on the 24\textsuperscript{th} of February 2009 and concluded on 17\textsuperscript{th} of May 2009. Another session was opened beginning of 2010 and concluded 20\textsuperscript{th} of March 2010. A total of 55 valid answers were received.

However like any other instrument, questionnaire has its limitations. Since Questionnaires are standardized and the researcher was not present during the filling of the questionnaire, it was not possible for the researcher to explain any points in the questions that participants might not understand or misinterpret. This could lead to questions being ignored or inaccurately answered. The researcher sought to control this setback by using a user-friendly questionnaire and by adding some open-ended questions to allow respondents to express their opinion freely. Piloting the questionnaire further helped to reduce such drawback.

Questionnaires are known to have a poor response rate which may lead to response bias (Polit and Hungler, 1999). An attempt to overcome this problem was made by offering a gift to one of the respondents chosen by a draw which slightly succeeded to increase the
response rate. The gift idea is considered an incentive to respond with the framework of the ethical regulations as it is not of an exaggerated value, all the participants had the same chance to win the draw and the participants were clearly informed that answering the questions does not guarantee the winning of the draw. The respect project for ethical research code funded by EU (2004) stated clearly that unexaggerated incentives in research are not unacceptable.

3.8. The Questionnaire

The questionnaire (Appendix B) is divided into four sections. Sections two and three focused on the ICT usage both domestically and professionally. Section four focused on future prospect of IT usage by the respondent, while the first section defined the graduation time in relation to the year where Windows 95 operating system was launched.

Table 3.8.1 Summary of Questionnaire Content

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of a user friendly operating system.</td>
<td>Sections 1: Graduation date; before at or after 1995</td>
</tr>
<tr>
<td>Domestic use of Information technology.</td>
<td>Sections 2: Ownning a PC Type of PC used; Desktop workstation, Portable notebook, etc. Other Hardware owned Confidence in using the PC Software used Frequency of using the PC Duration of using the PC at home Main purpose of using the PC at home</td>
</tr>
<tr>
<td>Professional use of Information technology.</td>
<td>Sections 3: Ownning a PC Type of PC used; Desktop workstation, *Respondent was given the freedom to add other information he/she would like to add in a number of questions, e.g. Question 9 &amp; 12.</td>
</tr>
</tbody>
</table>
### METHODOLOGY

<table>
<thead>
<tr>
<th>Portable notebook, etc.</th>
<th>Intent of buying a PC if using not owned PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Hardware owned</td>
<td>Reasons behind not intending to own a PC</td>
</tr>
<tr>
<td>Pattern of professional usage of IT</td>
<td>Main areas of IT usage in the profession</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prospect of IT usage by family doctors</th>
<th>Sections 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating usefulness of IT for the profession</td>
<td>Challenges met in using a PC (Open question)</td>
</tr>
<tr>
<td>Prospect of IT to the profession</td>
<td>Seeking an IT solutions for professional challenges</td>
</tr>
<tr>
<td>Challenges met in using a PC (Open question)</td>
<td>Seeking IT training to improve the IT use in the profession</td>
</tr>
<tr>
<td>Seeking an IT solutions for professional challenges</td>
<td>Obstacles met in having the required training.</td>
</tr>
<tr>
<td>Obstacles met in having the required training.</td>
<td>Areas in which one is seeking IT training.</td>
</tr>
</tbody>
</table>

The researcher created this questionnaire taking in consideration the study’s objectives, literature findings and based on the researcher’s own experience as a master trainer in IT enhancement programmes. This tool has been tested; Pilot Study was done on six participants who were not included in the study. Although the questions were divided in four categories, no demarcation was given in the questionnaire form to reduce any respondent’s psychological feeling of a lengthy questionnaire and to reduce bias.

Some questions were based on answers of previous ones and hence modification of the electronic format was done to ensure accepting the answers even from those respondents who did not answer those questions. (Section two). The questions were formulated in line with the study objective to investigate the pattern of usage of IT technology by family doctors, their concept of how much important ICT solutions for professional challenges and the potential of future improvement in their usage through further learning and training.
The questionnaire used in this study was mainly composed of closed-ended questions. Closed-ended questions are claimed to be more efficient than open-ended questions as questions are more specific than open-ended and respondents are more willing to complete in a given short amount of time (Polit and Hungler, 1999). However closed-ended questions limits respondents' choice for expression leading to themes being superficially addressed (Cormack, 2000). Therefore one open ended questions and few open ended parts of others were deemed to be crucial in order to acquire more in-depth information.

The closed-ended questions requested the participants to choose from a range of pre-existing set of answers. These kinds of questions asked the respondents to look at a statement and then "rank" this statement according to the degree to which they agree. Other types of closed ended questions e.g. q19 is a nominal question yielding a yes/no answer were used to define an absolute behaviour such as to have or not to have a personal computer at workplace.

One of the disadvantages is that the limited set of answers resulted in what can be called a "forced-choice", in which the respondents are forced to choose one of the responses provided. This disadvantage was minimized by including a few open-ended items. The combination of open and closed ended questions provided an opportunity to collect both qualitative as well as quantitative data (Dervin and Dewdney, 1986).

Meticulous care was taken when constructing and wording the questions. The researcher considered that questions would not be leading and/or misunderstood (Cormack, 2000). Further efforts were made to make the questionnaire attractive, easy to read and contain clear directions.
As the questionnaire was a form of an online survey, it is important to highlight the common strengths and weakness of that type of surveys. Online questionnaire has many advantages, such as that the administrator has greater flexibility in displaying questions; questions can be displayed with check boxes, pull down menus, pop up menus, help screens or graphics. An online questionnaire allows responses to be received more quickly from subjects (Sharp et al., 2002). This method is also cheaper to administer, as there are no costs associated with using paper or other materials for printing. Postage costs are also eliminated. Since data is collected into a central database, the time for data capture is practically eliminated (Bradburn et al., 2004).

The disadvantages of such tool may be that not everyone has access to the Internet, so the response is limited to active internet users. This point is actually in favour of the objectives of this research, as only family doctors who are active computer users are studied.

The following points were taken in consideration to maintain a highly ethical tool:

- Answering the questionnaire was not obligatory.
- Confidentiality was preserved as, only in the rare occasion of duplicate answers, is the administrator notified with the email of the respondent.
- Questions allowed the option to choose an answer that denotes neutrality so the participant feels he/she has the opportunity to plead neutrality so that inaccurate data is not provided.
- Questions were set in a simple language so that the participant feels comfortable and knows exactly what he/she is responding to.

An introductory page was provided before going into the questionnaire page explaining the purpose and the confidentiality of answers.
3.9. The Pilot Study

The purpose of the pilot study is to discover any misunderstandings or ambiguities in the way the questions are written, to generate ideas for new items, as well as to assess the study design feasibility and acceptability (Burns and Grove, 1995).

Polit and Hungler, (1999) suggest that the subjects for pilot study should be chosen from the same population as subjects for the major study, so that any weakness detected will be truly representative in the major study. Hence, a pilot study was conducted on six family practitioners conveniently selected, who fulfilled the same criteria as that of the main study sample. Being colleagues to the researchers made it easier to test/retest and ensure that they have the required time to carefully read and answer the questionnaire.

The members of the pilot study sample were requested to comment on the clarity of questions asked, the layout, and the time taken to complete the questionnaire. From this feedback few alterations were necessary to improve comprehension of some questions and to evade repetition.

The amended questionnaire was then re-piloted with the same doctors. Following this pilot study no further changes were required. Overall the pilot study revealed that the questionnaire was generally understood by the respondents though completion of questionnaire was not found to be time consuming (15 – 20 minutes). On the whole it revealed that the tool was suitable to be used for the purpose of the present study.
3.10. The Reliability and Validity of the study tool

As the questionnaire was the researcher’s own work, it was deemed vital to test the validity and reliability of the entire questionnaire. It is widely known that for research to be of value, issues of reliability and validity must be tackled (Campbell T. 1996).

3.10.1 Validity

According to Bowling, (2002) Validity is the extent to which a measurement measures what it is supposed to measure. Face and content validity of the questions asked needed to be established

Face validity is an assessment of whether a measure appears, on the face of it, to measure the concept it is intended to measure (Black, 2003). In this study, Face validity was attained by giving the instrument to the supervisor, to evaluate and ascertain that it measures what it was supposed to measure in relation to the study’s aims and objectives. However such a method is very subjective and is not considered good enough (Oppenheim, 1992). Hence an evaluation of the tool contents through content validity was critically important. Content validity concerns the extent to which a measure adequately represents all aspect of a concept (Black, 2003).

This was accomplished by consulting an expert in the IT marketing field where users’ opinions, needs and potential are studied using on-line surveys before being offered IT solutions. The expert was given a copy of the questionnaire accompanied by the aims and objectives of the study, in order to analyze the content, relevance and structure. Overall the majority of the questions were found to be relevant thus the tool was deemed to have good content validity. Certain amendments were made according to the
expert’s recommendations before piloting. Pilot testing further aided in improving the comprehension and accuracy of the tool.

3.10.2 Reliability

Reliability is the extent to which a measurement procedure yields the same results on repeated trials (Cormack, 2000). The notion of reliability therefore includes the consistency of both the instrument and the conditions under which it is administered (Oppenheim, 1999). There are three main methods for assessing reliability; the test for stability known as ‘test-retest’, the test for internal consistency and the test for equivalence or parallel forms of tests (Polit and Hungler, 1999).

A test-retest method was adopted to determine the tool reliability. This test measures the stability of the instrument over time by administering the tool to the same group on two events (Black, 2003). The questionnaire was submitted twice to six family doctors conveniently selected from the researcher’s place of work with an interval of three weeks between the test and retest. However there are two main limitations of this approach. First, the respondents may remember specific questions and answer the same way as on the first occasion, which would be overstated in the reliability estimate.

Further the attitudes, moods, knowledge and physical condition can be modified by intervening experiences between the two tests (Polit and Hungler, 1999). Attempts to overcome these limitations were done by allowing three weeks between the test and re-test in order to minimise the participants recall of their previous answers, questionnaire were given to them, for the second time to be answered at their
convenience. The answers were identical on both occasions hence no statistical tests were needed e.g. correlation coefficient.

3.11. Access and Ethical Considerations

Cormack (2000) stated that research should not provoke harm or distress to participants. Therefore permissions prior to the onset of the study was obtained from the Research Ethics Committee at the University of Malta (Appendix C).

The potential subjects for the pilot study were approached by the researcher to personally invite them to participate in the study and they filled the online questionnaire after agreeing with the online consent form. Other participants needed to accept and agree with consent form (Online) and supply their email addresses in order to proceed to the questionnaire page. An introduction to the subject of the study and the researcher was published together with the link to the consent page in the synapse newsletter.

Although confidentiality of the respondents was protected, complete anonymity of subjects could not be assured, since names and email addresses needed to be input by each respondent (to prevent abuse of the site) in order to access the questionnaire page. The answers are only compiled if the respondent complete the whole set of questions. This protected the rights of the respondents to withdraw from answering the questionnaire before completing it (right for self-determination) (Frankfort et al., 1996).
3.12. Data Collection

No personal contact was established between the researcher and the respondents of the study. All answers were received automatically upon completion of the tool by the respondents. From the 55 questionnaires collected, all questions were completed. The absence of personal distribution of the questionnaires contributed to the low response rate attained.

3.13. Data Analysis

The answers were collected from the administration page through an automatic web process created by the researcher. The questionnaire yielded mainly quantitative data together with few qualitative questions. The analysis of data was done primarily using descriptive methods. According to Black (2003) descriptive statistics present Numerical values such as mean, median, mode and percentages which can easily describe a pattern or a situation of a sample population.

Data analysis was done using the Microsoft spreadsheet package, named Microsoft Excel 2007 with both numerical and graphical interpretations. The spreadsheet software was used to generate tables, graphs and easily calculate sums and percentages.

The answers for quantitative questions were recorded in a binary format (1 for every positive answer and 0 for every negative answer); this allowed the spreadsheet package to automatically generate results using formulas created by the researcher. The answers of open ended and qualitative questions were collected, matched for commonalities, and summarized in the results.
Additionally, subjects were divided into two groups (Those who graduated before or in 1995 and those who graduated after 1995). Answers from the two groups were compared in many instances. Although data was collected using an automatic process, answers were manually checked and compared to the automatically generated binary format, this process was not difficult due to the small sample size.
4.1 Chapter overview

Data were compiled and analysed using statistical formulae in a Microsoft Excel spreadsheet. Data was collected in a binary form (1 for each item the participants choose and 0 for each item they did not choose). Data from all the respondent is presented in the first Excel sheet then two more sheets were created to present data from the two main categories of participants:

- Participants graduated before or in 1995.
- Participants graduated after 1995.

This is done for comparison reasons to discover any effect on commencing the profession before or after the availability of the Windows 95 operating system, which was more user-friendly than previous versions of Windows.

Binary data then are converted into percentages (for general participants then categorical) for the closed ended (quantitative questions) using the inbuilt formulation functions of Microsoft Excel. Answers for open ended questions were collected and summarised to sustain the representation of individual opinions to certain issues.

To facilitate comprehension of results, the findings are presented in tables, figures and graphs. On the advice of a statistician, the percentage figures presented have been rounded to the nearest whole integer for the purpose of clarity.
4.2 General figures:

The answers collected from 55 participants; 41 of them graduated before or in 1995 and 14 graduated after 1995. All the closed ended questions were answered with the exception of questions that were based on a positive answer of previous questions (a participant who answered "yes" to question number 10 does not need to answer question no. 11 or 12).

4.3 Domestic PC usage

The following are the results of all the participants’ answers;

4.3.1 Do you have a Personal Computer at home?

All the participants answered positively to this question, hence all the participants have a personal computer for their domestic use.

4.3.2 What kind of Personal Computer you have at home?

The answering possibilities for this question included:

- Desktop station
- Laptop or Notebook
- Both
- Other

The data collected showed that:

- 73% of the participants have a desktop, 73% of them have a laptop or notebook,
- 45% of them own both a desktop and a notebook or laptop.

The following table shows the results of both categories of participants.
Table 4.3.2.1 Ownership of a domestic PC

<table>
<thead>
<tr>
<th>Participants</th>
<th>Desktop</th>
<th>Laptop/Notebook</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>73%</td>
<td>73%</td>
<td>45%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>80%</td>
<td>68%</td>
<td>49%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>50%</td>
<td>86%</td>
<td>36%</td>
</tr>
</tbody>
</table>

As seen from the results more desktops, which represent the static nature of computing, are owned by older family doctors and more notebooks which represent portability are owned by younger doctors. 45% of participants own both type of computers.

4.3.3 Self confidence in using computers

The following table represents answers of the participants for questioning their confidence in using computers

Table 4.3.3.1 Self confidence in using computers

<table>
<thead>
<tr>
<th>Participants</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>91%</td>
<td>9%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The results show that 9% of the participants are not feeling confident in using their personal computers. The results also show that all the participants who are graduated after 1995 are feeling confident in using their personal computers while 12% of the participants who are graduated before 1995 are not feeling confident using their personal computers.
4.3.4 Domestic PC accessories

In this question, the researcher aimed at exploring the computing accessories the participant own, the number of accessories can indicate the strength of using personal computers as hardware computer accessories widen greatly the uses of personal computers. The following table shows the results of this question.

Table 4.3.4.1 what computing hardware/accessories are owned domestically

<table>
<thead>
<tr>
<th>Participants</th>
<th>Printer</th>
<th>Scanner</th>
<th>Digital Camera</th>
<th>PDA</th>
<th>Projector</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>98%</td>
<td>80%</td>
<td>82%</td>
<td>33%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>100%</td>
<td>78%</td>
<td>76%</td>
<td>32%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>93%</td>
<td>86%</td>
<td>100%</td>
<td>36%</td>
<td>7%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 4.3.4.2 the number of owned PC accessories

<table>
<thead>
<tr>
<th>Number of PC accessories</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owning participants</td>
<td>6</td>
<td>8</td>
<td>24</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Percentage</td>
<td>11%</td>
<td>15%</td>
<td>44%</td>
<td>25%</td>
<td>5%</td>
</tr>
</tbody>
</table>

The following conclusions can be summarised from the above results;
- 74% of the participants have more than 2 PC accessories
- 30% of the participants have more than 3 PC accessories
- 5% of the participants have more than 4 PC accessories
4.3.5 Domestic software usage

The respondent had a choice of the most common software in their generic descriptive title not to limit the choice to certain manufacturer. (e.g. instant messenger instead of MSN messenger, Skype, etc.) The researcher also gave space for the respondent to mention any additional software they may use. The following table shows the results of this question.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Office suite</th>
<th>Internet browser</th>
<th>Instant messenger</th>
<th>Email Software</th>
<th>Photo editing software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>80%</td>
<td>95%</td>
<td>45%</td>
<td>87%</td>
<td>44%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>78%</td>
<td>95%</td>
<td>44%</td>
<td>85%</td>
<td>46%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>86%</td>
<td>93%</td>
<td>50%</td>
<td>93%</td>
<td>36%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants</th>
<th>Website development software</th>
<th>Entertainment software</th>
<th>Games</th>
<th>Electronic services</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>17%</td>
<td>49%</td>
<td>22%</td>
<td>76%</td>
<td>7%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>20%</td>
<td>49%</td>
<td>22%</td>
<td>73%</td>
<td>2%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>7%</td>
<td>50%</td>
<td>21%</td>
<td>86%</td>
<td>21%</td>
</tr>
</tbody>
</table>
From the above, it is clear that the most used software packages are the internet browser, the office suites and the email software. The usage of e-services (internet banking, government e-services, etc.) were found to be high too. The following is the software used sorted by popularity;

Table 4.3.5.2 The usage of software by popularity

<table>
<thead>
<tr>
<th>Software</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Browser</td>
<td>95%</td>
</tr>
<tr>
<td>Email Software</td>
<td>87%</td>
</tr>
<tr>
<td>Office Suite</td>
<td>80%</td>
</tr>
<tr>
<td>Electronic services</td>
<td>76%</td>
</tr>
<tr>
<td>Entertainment</td>
<td>49%</td>
</tr>
<tr>
<td>Instant Messenger</td>
<td>45%</td>
</tr>
<tr>
<td>Photo Editing</td>
<td>44%</td>
</tr>
<tr>
<td>Games</td>
<td>22%</td>
</tr>
<tr>
<td>Website development</td>
<td>17%</td>
</tr>
<tr>
<td>other</td>
<td>7%</td>
</tr>
</tbody>
</table>
4.3.6 Frequency of domestic PC usage;

The respondent had to choose between 5 answers which describe computer usage pattern.

- On the go
- Daily
- 1-3 times a week
- Less frequently
- Never

It was found that 26% of the respondents use their computers on the go, and 67% use theirs on daily basis while 2% never use their computers at home.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the Go</td>
<td>27%</td>
</tr>
<tr>
<td>Daily</td>
<td>66%</td>
</tr>
<tr>
<td>1-3 times a week</td>
<td>5%</td>
</tr>
<tr>
<td>Once a week</td>
<td>0%</td>
</tr>
<tr>
<td>Less frequent</td>
<td>0%</td>
</tr>
<tr>
<td>Never</td>
<td>2%</td>
</tr>
</tbody>
</table>

4.3.7 Daily Duration of domestic PC usage;

The respondent had to choose between 4 answers which describe computer usage duration.

- Less than an hour daily
- 1-2 hours daily
- 2-4 hours daily
- More than 4 hours daily
Table 4.3.7.1 Daily Duration of PC usage

<table>
<thead>
<tr>
<th>Participants</th>
<th>More than 4 Hrs daily</th>
<th>2-4 Hrs daily</th>
<th>1-2 hours daily</th>
<th>&lt; 1 Hr daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>31%</td>
<td>27%</td>
<td>29%</td>
<td>13%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>34%</td>
<td>27%</td>
<td>29%</td>
<td>10%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>21%</td>
<td>29%</td>
<td>29%</td>
<td>21%</td>
</tr>
</tbody>
</table>

Figure 4.3.7.1 Daily usage of computer

From the above results it was found that one third of the participants use computers for more than 4 hours daily while 58% use computers for more than 2 hours daily. It was found also that older doctors use computers for longer hours during the day than younger ones.
4.3.8 Main areas of domestic PC usage;

It was found that about 95% of participants use computers mainly for internet surfing and information searching, the second purpose of computer usage was found to be communication (about 82%) and then entertainment (27%).

4.4 Professional PC usage

The following questions deal with the usage of computers in the clinic/place of work.

4.4.1 Do you have a PC at your clinic/place of work?

89% of the participants have a PC at their place of work while 11% do not. The following table shows the details of the answers.

<table>
<thead>
<tr>
<th>Participants</th>
<th>owning a PC at their clinics/workplace</th>
<th>Do not own computers at their clinics/workplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>93%</td>
<td>7%</td>
</tr>
</tbody>
</table>

The figures from the table above show that more young doctors have personal computers in their clinics than older ones.
4.4.2 Intention of owning a PC in case one does not have a PC at workplace.

11% of the participants do not have computers at their workplaces. Of these 33% intend to buy computers in the near future while 67% do not, that’s two thirds of those who do not own a computer. For that the answers from the following question were added for explanatory purpose. The following reasons were given by those who are not intending to buy a pc for their workplace.

- Having portable computer which is being used both for domestic and professional use.
- Considering the cost of technology; installation, software, training, maintenance.
- Time of inputting information is considered.
- Concerns about potential failure of technology.

4.4.3 Computer accessories owned by those who have computers at their workplace.

This question aimed at investigation the range of PC accessories owned by those who have PC at their clinics/workplace; the options for the participants’ choice were; printer, scanner, digital camera, PDA (personal digital assistant), projector, medical devices, and other devices.

<table>
<thead>
<tr>
<th>Number of PC accessories</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owning participants</td>
<td>6%</td>
<td>43%</td>
<td>18%</td>
<td>19%</td>
<td>12%</td>
<td>2%</td>
</tr>
</tbody>
</table>
4.4.4 The usefulness of IT technology for the profession, the participants' point of view

In this question, the participants are asked to rank the usefulness of ICT technology usage for their profession. The following figure show the results;

Figure 4.4.4.1 Usefulness of IT technology for participants' professional use

How participant evaluate the usefulness of a PC in their clinic

Necessary
Very Useful
Useful
Not useful

4.4.5 Professional benefits of computers for family doctors

In this question, the participants are asked to choose the main benefit that computing may provide to their profession; it was found that both data management (e.g. patient data management) and knowledge improvement through external sources (internet) or internal sources (media; CD/DVD, electronic books, etc.) are the two main benefit according to the participants opinion. Younger doctors gave the main importance to data management while according to older doctors, knowledge seeking and improvement is the main benefit.
### Table 4.4.5.1 Benefits of using computers in the practice

<table>
<thead>
<tr>
<th>Participants</th>
<th>Knowledge Improvement</th>
<th>Data management</th>
<th>Time and contact management</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>89%</td>
<td>89%</td>
<td>62%</td>
<td>75%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>88%</td>
<td>85%</td>
<td>59%</td>
<td>76%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>93%</td>
<td>100%</td>
<td>71%</td>
<td>71%</td>
</tr>
</tbody>
</table>

### 4.4.6 Pattern of IT usage in the family practice profession

In this question, the participants who have a PC at their work place, are asked to define how frequent they are using their computers at their clinics or place of work. The results showed that 88% of those participants who have a computer at their clinic use it frequently.

### Table 4.4.6.1 Patterns of IT usage in the family practice profession

<table>
<thead>
<tr>
<th>Participants</th>
<th>Frequent</th>
<th>Occasional</th>
<th>Rare</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>88%</td>
<td>14%</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>92%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>77%</td>
<td>15%</td>
<td>7%</td>
<td>1%</td>
</tr>
</tbody>
</table>
4.4.7 Main areas of IT usage in the family practice profession

In this question, the participants are asked to define the main purpose of the IT usage in their profession. The areas were predefined with a space to add any additional area which is not mentioned. The following table and figure shows the results;

Table 4.4.7.1 Areas of IT usage in the family practice profession

<table>
<thead>
<tr>
<th>Participants</th>
<th>Patient database</th>
<th>Medical Research</th>
<th>General research</th>
<th>Management</th>
<th>Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>78%</td>
<td>60%</td>
<td>45%</td>
<td>36%</td>
<td>25%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>80%</td>
<td>61%</td>
<td>44%</td>
<td>39%</td>
<td>27%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>71%</td>
<td>57%</td>
<td>50%</td>
<td>29%</td>
<td>21%</td>
</tr>
</tbody>
</table>

The main areas of usage were creating database of the patient for easy reference, improvement of quality of care and research (both medical and general). More than one third of the participants use computers for management of time and contact and quarter of them are using computers for financial management. Although all younger participants think that computing is important for data base creation, only 71% of them claim this feature as one of the main usage of computer in the clinic, this issue will be discussed in chapter 5 in detail.

4.5 Professional challenges, IT solutions and additional IT training

The following part of the questionnaire dealt with professional challenges that doctors face and that can be aided by using computers.
4.5.1 Main challenges faced by the participants in using computers in the family practice profession

This was an open ended question giving the space to the respondents to express freely their opinion regarding the main challenges they face in using computer in their profession, data is collected and similar responses are gathered then answers are ranked according to their popularity.

Main challenges faced by medical doctors:

- More than 20% of the respondents described *keeping patient record* as a challenge.
- *Practice management* and *enhancing productivity* using computers were the second commonest challenge
- *Time management* using computers was the third commonest challenge expressed by less than 10% of the respondents.

4.5.2 Searching IT solutions for professional challenges

The participants are asked whether they search IT solutions for the challenges they have, the following table and graph show the results;

<table>
<thead>
<tr>
<th>Participants</th>
<th>Searching IT solutions for professional challenges</th>
<th>Not searching IT solutions for professional challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>84%</td>
<td>16%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>93%</td>
<td>7%</td>
</tr>
</tbody>
</table>
The table above shows that 84% of the respondents seek IT solutions for the challenges they face in their profession which can be aided by computer usage.

**Figure 4.5.2.1 seeking IT solutions for professional challenges**

The above figure shows that more young doctors are seeking IT solutions for their professional challenges than older ones.

### 4.5.3 Obstacles in obtaining additional training in the usage of computers

The following are the commonest obstacles that participants expressed in obtaining additional IT training which can help them facing their professional challenges.

1. Time
2. Lack of motivation
3. Expenses
4. Lack of appropriate training programmes

The following table shows the responses presented in percentages.
Table 4.5.3.1 Obstacles in obtaining IT training

<table>
<thead>
<tr>
<th>Participants</th>
<th>Time</th>
<th>Lack of motivation</th>
<th>Expenses</th>
<th>Lack of training programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>90%</td>
<td>11%</td>
<td>27%</td>
<td>35%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>90%</td>
<td>15%</td>
<td>20%</td>
<td>29%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>86%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

90% of the respondent found time to be the main obstacle for continuing any IT training programme. Half of the younger respondents found expenses and lack of training programmes more impairing factors than their older peers while older doctors expressed the lack of motivation as an obstacle more than their younger peers.

4.5.4 Main areas where IT training are sought by family doctors

The respondents are given to choose as much areas as they would like to acquire additional training in; the following were the most common areas of sought training:

- Office suite
- Contact and time management software
FINDINGS

- General computer use
- Finance
- Internet and web search
- Communication
- Others

The following table shows the results of the respondents’ answers

<table>
<thead>
<tr>
<th>Participants</th>
<th>Office Suite</th>
<th>Contact and time mgt</th>
<th>General computer use</th>
<th>Finance</th>
<th>Internet</th>
<th>Communication</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>38%</td>
<td>47%</td>
<td>31%</td>
<td>18%</td>
<td>13%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Graduates before or in 1995</td>
<td>37%</td>
<td>49%</td>
<td>39%</td>
<td>17%</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Graduates after 1995</td>
<td>43%</td>
<td>43%</td>
<td>7%</td>
<td>21%</td>
<td>29%</td>
<td>21%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Areas where IT training is sought
The training sought by doctors graduated before 1995 is more for contact and time management followed by office suites and general computer use. Younger doctors seek more training in office suite followed by contact and time management, internet communication and finance.

4.6 Summary of the study findings

- 55 participants have answered the questionnaire; 41 graduated before or in 1995 and 14 graduated after 1995.

**Domestic use of personal computers**

- 100% of the respondents have a personal computer at home.
- 73% of the respondents have a desktop PC, 73% have a laptop (portable computer) and 45% have both a desktop and a laptop.
- Older doctors have more desktop computers while younger ones have more laptops.
- All respondents who are graduated after 1995 are confident in using their personal computers while 9% of the total respondents and 12% of those who are graduated before 1995 are not feeling confident in using their computers.
- 74% of the respondents have more than 2 hardware accessories attached to their computers at home while 30% have more than 3 accessories and 5% have more than 4 accessories.
- Domestically, Internet browsing, communication (email/instant messenger), office and electronic services (e-banking-e-government) are the areas computers are used most.
- 66% of the respondents use their computers on daily basis while 27% use it on the go.
- More than half of the respondents use their computers for more than 2 hours daily.
**Professional use of computers**

- 89% of the respondents have personal computers at their clinic/workplace.

- Only 1/3 of those who do not have a PC at their workplace intend to buy one. Concerns were; cost, time and lack of confidence in technology use.

- One third of the participants have more than two PC hardware accessories at their place of work.

- 55% of those respondents, who have a personal computer at their clinic, they find the use of computers necessary, 16% find it useful and 4% find it not necessary.

- 89% of those respondents, who have a personal computer at their clinic, consider knowledge improvement and data management as the main benefits of computer usage.

- 88% of those respondents who have a personal computer at their clinic, they use their computers frequently at their workplace.

- Main areas of usage of computers at clinics/workplace are patient database, medical research and general research consecutively.

**Professional challenges and IT solutions**

According to participants; professional challenges which require computing solutions are; keeping patient records, practice management, increase the productivity and time management consecutively.

**Training programmes**

- 84% of the respondents are seeking computing solutions for their professional challenges. Young doctors seek solutions more than their older peers.

- Obstacles met at seeking IT solutions for professional challenges are; time, lack of motivation, expenses and lack of appropriate training programmes.
- Main areas where training is sought are: office application, contact and time management, general computer use, finance, internet usage and communication consecutively.
5.1 Chapter overview

In this chapter, the results obtained from this study will be interpreted in a global way in relation to the objectives of the study and the significance of the results will be discussed.

The aims and the objectives will be highlighted in relation to their fulfilment by the study. The implications of the results will be discussed and recommendations will be provided. The results will be interpreted in relation to the study question. This chapter will also discuss if there are ways to improve the study so it would be useful as reference for future studies.

5.2 The achievement of the study objectives

This study tried to explore the link between professional challenges met by family doctors and their use of available technological solutions through studying their pattern of use of computers in their place of work.

The main objectives of the study were;

1. To highlight the usage of computer solutions by family doctors in order to meet their professional challenges and personal development goals.

2. To suggest an Information Technology acceleration programme for this particular healthcare sector.
The study used a questionnaire which covered both the domestic and professional use of computer technology. This was of an added value to just studying the professional use as:

- Being familiar with IT technology in general would facilitate the usage of technology solutions to meet any professional challenges,
- It highlights any difference in the pattern of use between the domestic and the professional lines which could be due to limited resources, reluctance or under awareness of the current professional technology solutions? The questionnaire also studied the graduation year of the participants as it showed at various points a difference in the usage and needs of IT technology.

The questionnaire investigated the main areas where family doctors feel the need for additional training in order to create a knowledge base to support the tailoring of an Information Technology acceleration programme for the Maltese situation.

The questionnaire succeeded to provide information on the domestic and professional pattern of technology use by the respondents, the main challenges for which the participants feel technology support would be useful, the Information Technology areas where participants need more training and the obstacles which prevent participants from obtaining additional Information Technology training.

The study had an apparently low response rate in relation to the whole GP population, but not to the population specifically targeted in this study. Holbrook et al. (2007) assessed whether lower response rates are associated with
DISCUSSION AND CONCLUSION

less demographic representativeness of a sample and found that surveys with much lower response rates were only minimally less accurate. Having an online questionnaire may be an extra added value to the results as they can be indicative of how far the usability of online solutions is considered by Maltese Family Doctors.

5.2.1 The first objective; “the pattern of computer use by Maltese family doctors”

To highlight this concept, the study had to explore issues such as owning a computer, type of hardware accessories (peripherals) attached to the participants’ computers, purpose of computer use, the frequency and daily duration of computer use, confidence in using computers, and the perception of usability of computer technology.

All the respondents found to have a computer at home and the majority of them have computers at their clinic/work place but only one third of those who do not have a PC at their workplace intend to buy one as they have some concerns, such as cost, time and lack of confidence in technology use.

Nearly all the participants have the two main hardware accessories offered by local retailers namely a printer and a scanner connected to their home computers but 74% of them have more than these two hardware accessories at homes and only one third (30%) have more than these two hardware accessories attached to their computers at their work place. Investing in buying more than a printer and a scanner in an indication of interest to use more
solutions of what the technology offers such as a Personal Digital Assistant (PDA) which is owned by third of the participants (33%).

As discussed in chapter 2, portability is a revolutionary advance in computer technology; the participants showed a good use of this advantage as 72% of them owned a portable computing solution (e.g. laptop). As nearly half the participants owned both a desktop and a laptop, this can indicate there is a fair investment of computer technology in the family doctor population. Doctors who graduated before 1995 owned more desktop computers than those who graduated after 1995, who use more portable computers. Portability affects both the frequency and usability of computers (Enders, 2002).

The main domestic computer uses by the participants were Internet browsing, communication (email/instant messenger), office use and for entertainment. Electronic services (e-banking– e-government) and e-government services are relatively recent in Malta, however more than 75% of the participants make use of these online services.

The study also showed that two thirds of the respondents use their computers on daily basis while only 26% use it on the go. More than half of the respondents use their computers for more than 2 hours daily. This is considered as a promising factor for the readiness to utilise computer solutions in all life aspects, especially the professional one. That was confirmed by 43% of respondents who find the use of computers necessary and the 26% who find it useful. When asked about the benefits of computer use, 89% of the
participants specified knowledge improvement and data management as the main benefits of their use of computers.

Using computers at their clinic, 78% of the participants were found to be frequent users of computers mainly for creating patients database, medical research and general research consecutively.

The main professional challenges, defined by the participants, where technology solutions are sought were keeping patient records, practice management, increasing productivity and time management consecutively.

As discussed in chapter 2, Electronic Medical Records (EMR) can offer good solutions for keeping the patient records (Adams et al., 2003) while other software packages such as spreadsheets and management software, can help facing financial and time management challenges.

5.2.2 The second objective: “To suggest an Information Technology acceleration programme for this particular healthcare sector”.

The study aimed at recommending a tailor made training programmes which can address the use of the available technological solutions for all the professional challenges of the participants.

As resulted from this study, all participants who graduated after 1995 are confident in using their personal computers and only 9% of the total respondents and 13% of those who graduated before 1995 are not feeling confident in using their computers. The study also found out that 83% of the
participants are searching for computing solutions for their professional challenges.

Doctors who graduated after 1995 are more in search for technological solutions than their senior peers. Main areas where training is sought are; office application, contact and time management, general computer use, finance, internet usage and communication consecutively.

The obstacles to getting the required training programmes according to the participants were the lack of time, lack of motivation, expenses and lack of appropriate training programmes.

5.2.3 Information Technology Acceleration programme for Maltese family doctors

As seen from the findings of this study, the majority of Maltese family doctors who are using computers are feeling confident in their use of computers, which they are frequently using both for their domestic and professional needs. They are defining their professional challenges and continuously seeking for Information Technology solutions for these problems but finding lack of time, appropriate programmes and expenses to decrease their motivation to get more training.

Therefore any training programme to be designed for the Maltese family doctors should not be time consuming and should be flexible in meeting a wide variety of technology needs, cheap and available to everyone.
The Electronic Medical Records software packages available in the Maltese market, although not covered by this study, would preferably be studied for the availability of specific training programme for client use by their providers before trying to reinvent a training programme for them. But when it comes to the general use software which can help in facing most of the challenges defined by the participants, such as office applications, contact and time management, general computer use, finance, internet usage and communication, a training programme should address the usability of these software in relation to live examples of professional challenges faced by the family doctor.

In order to meet with these needs a modular programme should be offered, the modules would be separate units where each unit is covering one of the professional challenges such as keeping with appointments or designing a patient information leaflet, etc. (Hendy et al. 2005)

Each module could start with a virtual family doctor character which recites his/her professional challenge. The use of graphics (preferably motion graphics) would stimulate the interest to the subject and makes the participants reflects to their own similar professional situations. For example; a virtual character, Dr. Borg, is a cartoon character presenting his difficulty in time management and how this challenge is affecting his professional performance.

The course participants would then be given the time to form small groups discussion for brainstorming and discussing their similar professional challenges. The trainer then would demonstrate an example of what
technology can offer (Microsoft Outlook or similar software) and present a short demonstration of the user interface, buttons and functions of the software. The participants would then be given the opportunity to try the software on individual computers under the direction of the trainer and to establish a certain task, such as; creating a new appointment or updating the list of contacts. A large group discussion could then follow to reflect on the technology solution presented and tried.

The module would preferably be of short duration, e.g. one day, at the end of which the participant would go back to their clinic more confident in using the computer technology in their daily professional life.

The modular programme should ideally have the following characteristics:

- Customisability: Participants would subscribe only to the modules they feel that they need.
- Time saving: a one day training course for each topic would encourage the participant to enrol for the modules they need, one at a time with a gap of time in between.
- Less expensive: the software suggested could be open source.
- New modules could be added when the need is felt or when new software is issued.

This interactive way of teaching where the trainer is acting as a facilitator and not simply a teacher could also make it interesting to go for training and the use of graphics and discussion would make the participants reflect to their professional life challenges and improve the training results. The simplicity of the programme would encourage doctors who are not using computers to try
the use of technology and define their actual needs (through discussions) for more advanced training.

However such a programme needs to be free of any commercial aspects. The main aim of such a training programme should remain as a way of improving practice and should be given a number of continuous professional development credits. For example, a local institution such as the Malta College of Family Doctors could adopt such a programme as a philanthropic activity with the aim to improve the quality of service family doctors provide their patients.

5.3 Strengths and limitations of the study

This study was one of the pioneering studies in the subject of computer technology usability for family medicine in Malta. Although the study is done to fulfil the requirement of a post graduate degree course, it may be used as a basis for further larger scale studies on the topic. Yet the researcher needs to highlight the main strengths and limitations of this study.

5.3.1 Strengths of the study

The study tried to explore a new topic which is the pattern of using computers by Maltese family doctors. Despite the scarce sources of contacts for the population of family doctors, this study used a relatively recent tool which is the online questionnaire. The strong technology background of the researcher helped in increasing the strength of the study and the suggested Information Technology Acceleration programme provided the study with a practical dimension.
The study presented a complete overview of the pattern; the participants use computers, both for their domestic and professional needs. It highlighted as well the challenges the participants face in using computers to help them managing their professional challenges. It also researched the main areas where participants felt the need for more technology training and the obstacles they face in getting such training.

At the end, the study presented an example of a tailor made training course that may be used as a model for Information Technology acceleration programmes for the family doctors.

5.3.2 Limitations of the study

Time was a primary limitation for conducting such a study. The time available did not allow alternative approaches for the study of the target population. The tool used carries the risk of low response rate which is a documented limitation of online questionnaire as explained in chapter 3; however, the effect of this limitation was reduced by the nature of the target population, i.e. active computer users. The study might have benefited from using another tool in addition, such as a semi-structured interview for respondents. This would have allowed for more probing of the characteristics of the respondents; however the time available did not allow this.

The second limitation was the scarcity of related information both locally and globally, most of the information found was related to the utilisation of specific software packages such as Electronic Medical Records. Maximum efforts were done to build a strong review of the available literature with the most updated and recent references.
The third limiting factor was the difficulty in passing the questionnaire to the largest possible number of family doctors. Using an online questionnaire and a medical journal website to advertise it were two limiting factors as no guarantee that all the family doctors subscribed to this web journal would visit the questionnaire site. Attempts were also made to distribute the questionnaire through the Malta College of Family Doctors without any success.

The fourth limitation was using a spread sheet programme for analysing the results which involved a considerable amount of time spent in creating and checking the required formulae. The use of a dedicated statistical package as SPSS would be of an advantage in saving time and giving a more exhaustive analysis of the collected data.

5.4 Conclusion

The study tried to explore a new topic which is the pattern of using computers by Maltese family doctors. Despite the scarce sources of contacts for the population of family doctors, this study used a relatively recent tool which is the online questionnaire which could render a higher response rate if distributed through many sources than just one medical online journal.

The study presented a complete overview of the pattern of computer use by the participants, both for their domestic and professional needs. It highlighted as well the challenges the participants face in using computers to help them managing their professional challenges. It also researched the main areas where
participants felt the need for more technology training and the obstacles they face in getting such training.

The participants seemed to use computers regularly both for their domestic and professional needs. They are found to be in continuous search for technological solutions for their professional challenges. After identifying the main areas where they felt the need for more Information Technology training, the participants identified the main obstacles rendering them unable to get the training they need.

The study presented an example of a tailor made training course that could be used as a model for Information Technology acceleration programmes for family doctors. This study can be used as a standalone indicator for computer use by family doctors in Malta or as a basis for future studies which aim at studying any related subjects in details.
Chapter 6

Recommendations
6.1 Chapter overview

In the previous chapter, the results of the study were concluded and some suggestions for an Information Technology Acceleration programme guided by the study findings were presented in order to design a successful programme which would overcome the obstacles, the participants may meet in getting the training and, at the same time, meet their technology training needs.

In this chapter recommendations also will be presented for any future practical actions based on the results of this study as well as for any future studies which may deepen the field of research of this study.

6.2 Recommendations related to the results of the study

As the limitations, presented in chapter 5, may indicated the need for wider coverage of the study population the following recommendations may be taken in consideration for any future study on the same/similar subject:

1. The study population: Although this study tried to describe the pattern of computer use by family doctor by sampling only those doctors who are already using computers, it would have been more informative to cover the whole family doctor population: both those who are using computers and those who are not (due to lack of PC availability, lack of training, or reluctance). Future studies may consider widening the study population in this manner to render more results which can help in designing a global
modular training programme which can serve both the novices as well as the advanced users.

2. The research tool: to increase the response rate for any similar/future studies, a semi structured interview (phone or physical) may be used although it may require a huge amount of time to cover the total population and may have some cost/practicality issues.

3. The results should be analysed using a dedicated statistical package (e.g. SPSS) to get more elaborated statistical results in less time.

6.3 Recommendations related to the practicality of this study

As this study provided an example of a training programme to accelerate the computer use by the Maltese family doctors and explained in the previous chapter both the modular nature and the characteristics for such a programme, it may be of great benefit to take in consideration the following proposals related to this programme:

1. The programme could be introduced as an educational service for family doctors with basic knowledge of computing until a larger study explore the total population of family doctors, then the programme may be addressed to all family doctors, even those who will be introduced for the first time to computing.
2. As mentioned in the previous chapter, the programme could be adopted by a medical institution (e.g. Malta College of Family Doctors) in order to keep the programme free from any commercial or competitive threats by other commercial non-medical institution.

3. The programme fee should be kept as a minimum symbolic fee which can cover the costs spent in providing the training (trainer fee, computer lab rental, electricity, disposables, etc.)

4. The programme would need to be well advertised amongst the target population either by newsletters sent to them by post or through an event (e.g. conference) where the programme is introduced and launched.

5. The programme development should be dynamic, flexible and interactive so it will respond to the developing needs of the family doctors and add more modules accordingly. The development team should be a mixture of Information Technology experts and medical professionals in order to perfectly design the virtual character and challenging situations.

6. The trainers, if not from the medical field should be supported by a number of medical professional in order not to be deviated from the programme's main nature, which is training for use of technology to enhance medical practice.

7. The modules should offer an individual certification process which is preferably converted into continuous professional development credits.
Although the above mentioned recommendations concern the development of the Information Technology acceleration programme, this study can offer more advantages than just simply suggesting the programme. The results acquired from this study are indicative of the current situation of those doctors using the computer technology in their professional life. This study is recommended as a basis for any future study. The literature reviewed in this study, together with the recent references it provides, can be a good background for future literature reviews. The questionnaire designed by the researcher succeeded to cover most of the fields to be tested and could be used as a tool for future studies. Overall, the researcher is recommending this study for any future study which aims at enhancing Family Medicine practice through the use of the fast growing Computer Technology.


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 REFERENCES


Operational Definitions

CME/CPD
Continuing Medical Education (CME) the process of continuing education that helps those in the medical field maintain competence and learn about new and developing areas of their field, while Continuous Professional Development (CPD) is the means by which members of professional associations maintain, improve and broaden their knowledge and skills and develop the personal qualities required in their professional lives (Wikipedia.org)

Electronic Medical Record (EMR)
A medical record saved in a digital format, instead of the traditional paper record (researcher’s definition)

E-learning
Is a type of technology supported education/learning, where learning occur through the use of information technology or computers. (www.wikipedia.org)

E-Services
The provision of services through the internet

Internet
The Internet is a global system of interconnected computer networks, which can exchange information and give access to each other for sharing data (Researcher’s definition).

Laptop (Notebook)
A portable form of computers that operates based on a rechargeable battery power supply hence promotes portability. (researcher’s definition)

Netbook
A small form of laptops (Researcher’s definition)
**Personal Computer**

A personal computer (PC) is any general-purpose computer whose size, capabilities, and original sales price make it useful for individuals, and which is intended to be operated directly by an end user, with no intervening computer operator. It's a calculating and data processing machine (www.thesaurus.com).

**Personal Digital Assistant**

A personal digital assistant (PDA), also known as a palmtop computer, is a mobile device which functions as a personal information manager and connects to the internet (www.wikipedia.org).

**Printer**

A computer peripheral that reproduces text and/or pictures on paper or other kind of printable surface such as paper (www.ikipedia.org).

**Projector**

A device that project images, documents, movies onto a wall, charts or any opaque objects (www.wikipedia.org).

**Scanner**

A device that optically capture images, printed text, handwriting or an object and converts them into digital images (www.wikipedia.org).

**Wireless internet**

Acquiring the access to the internet service without the need of wires connected to the computer, its common form is what is called WLAN, standing for wireless local area network (researcher’s definition).
CONSENT FORM

I am a Maltese citizen and am over eighteen (18) year of age. I have been asked to participate in a research study entitled "Patterns and potentials on IT Technology use by Maltese Family Doctors."

The purpose and details of the study have been explained to me by the researcher, Dr. Mohamed A. Salem. I give my consent to the Principal Investigator and his delegate either make the appropriate observations/tests or both or take the necessary samples. I am aware of the inconveniences which this will cause.

I understand that the results of this study may be used for medical or scientific purposes and that the results achieved from this study in which I am participating may be reported or published however, I shall not be personally identified in any way, either individually or collectively, without my express written permission.

☐ I am under no obligation to participate in this study and am doing so voluntarily.

☐ I am/am not receiving any remuneration for participating in this study.

* Name of the participant

* E-Mail of the participant

For any queries or additional information, please contact Dr. Mohamed Salem on 99803040, or by email mcns@cnvol.net

Please click edit or delete on existing questions or add new to create one.

1. I was graduated
   - before 1995
   - 1995
   - after 1995

2. Do you have a pc?
   - yes
### 3. What kind of PC you have?
- Desktop station
- Portable PC (Notebook/laptop)
- Desktop and laptop
- Other (Please Specify)

### 4. Are you feeling confident in operating your PC?
- Yes
- No

### 5. Please check the hardware you own from the following:
- Printer
- Scanner
- Digital Camera
- Projector
- PDA (Personal Digital Assistant)
- Other (Please Specify)

### 6. Please check the software you frequently use from the following:
- Office suite (text editor, spreadsheets, presentation)
- Internet surfing software
- Instant messengers (chatting/communication software)
- Email software
- Photo-editing software
- Website development
- Entertainment software (e.g.; movie playing)
- Games
- E-services (internet banking, etc.)
- Other (Please Specify)
7. How frequent do you use your pc?
   - On the go
   - Daily
   - 1–3 times per week
   - Once weekly
   - Less frequent than once weekly
   - Never

8. Duration of your usage of your pc and other ICT technology:
   - Less than an hour daily
   - 1–2 hours daily
   - 2–4 hours daily
   - more than 4 hours daily

9. What are the main areas of your residential usage of ICT?
   - Internet surfing and information research
   - Communication
   - Entertainment
   - Other (Please Specify)

10. Do you have a pc at your clinic/place of work?
    - Yes
    - No

11. If No, are you considering purchasing a PC in the coming year?
    - Yes
    - No
    - Tick here if you answered yes to last question

12. If (NO), why?
    - I think I do not need it
I am not interested in Technology
I do not have time for it
I think having these technologies costs a lot
I am not confident in using ICT
Tick here if you answered yes to last question
Other (Please Specify)

13. Which of the following hardware you have in your clinic?
- Printer
- Scanner
- Projector
- Digital Camera
- PDA (Personal Digital Assistant)
- Medical Devices that can be linked to a PC
- Other (Please Specify)

14. How do you rate ICT usage for your profession?
- Not useful
- Slightly useful
- Useful
- Very useful
- Necessary

15. What can ICT technology do for your profession/practice?
- Improve my knowledge through internet research
- Time and contact management
- Data management
- Communication
- Other (Please Specify)

16. What is the pattern of your usage of ICT technology in your
practice?
- Frequent
- Occasional
- Rare
- Never used it

17. What do you use your pc for at your practice?
- Database of cases for easy review
- Medical Research
- General non medical use
- Management
- Finance
- Other (Please Specify)

18. What challenges you think ICT technology may help you in?

19. Do you seek ICT technology solutions for your professional challenges?
- Yes
- No

20. Do you feel the need for ICT training to update/improve your usage of ICT in your profession?
- Yes
- No

21. What would be the obstacles preventing you from further ICT training?
- Time
- I am uncomfortable with Technology
- Expenses
<table>
<thead>
<tr>
<th>22. What areas would you seek more training in?</th>
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<tbody>
<tr>
<td>- Office suite</td>
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<td>- Contact and time management software</td>
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<td>- General computer use</td>
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<td>- Finance</td>
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<td>- Internet and web search</td>
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<td>- Communication</td>
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<td>- Other (Please Specify)</td>
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Ref No: 49/2008

17th November 2008

Dr Mohamed A. Salem Rashed
103 St Catherine
Triq San Mikiel
Zurrieq

Dear Dr Rashed

Please refer to your application submitted to the Research Ethics Committee in connection with your research entitled:

PATTERNS AND POTENTIALS OF TECHNOLOGY USE BY MALTESE FAMILY DOCTORS

The University Research Ethics Committee at its meeting of 7 November 2008 approved the above-mentioned Protocol.

Yours sincerely

[Signature]

Dr M Vassallo
Chairman
Research Ethics Committee