DITIS – VIRTUAL COLLABORATIVE TEAMS FOR HOME HEALTHCARE

GOOD PRACTICE - PROJECT

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Contents

Introduction to the Good Practice:

DITIS is a system that supports dynamic Virtual Collaborative Medical Teams dealing with the home-healthcare. It supports the dynamic creation, management and co-ordination of virtual medical teams, for the continuous treatment of the patient at home, and if needed for periodic visits to places of specialized treatment and back home. DITIS is an Internet (web) based Group Collaboration system with secure fixed and GPRS/GSM/WAP mobile connectivity.

Problem:

Care of chronic illnesses (e.g. cancer patients) by a team of health care professionals at home is often necessary due to the protracted length of the illness, the differing medical conditions, as well as the different stages of the chronic illness. More specifically, home care can offer comfort for the patient and their family, in the familiar surrounding of their home, and at the same time being cost effective, as compared to the high cost of hospital beds.

Solution:

DITIS was designed to deliver a product that can improve the quality of the citizen's life. Contrary to state of the art health processing structure which is, in all practical terms facility-based care, this project aimed to shift the focus into home-based care, where everything is moving around the patient. The virtual healthcare team was able to provide dedicated, personalized and private service to the home residing patient on a need based and timely fashion, under the direction of the treating specialist. The main goal was the chronic and severe patients, such as cancer patients, to enjoy 'optimum' health service in the comfort of their home (i.e. a focus on wellness), feeling safe and secure that in case of a change in their condition the health care team would be (virtually) present to support them.

Impact:

Through DITIS, the face of cancer care and telecommunications in Cyprus has transformed. The Bank of Cyprus Oncology Centre is working with the team of DITIS on direct referrals through the system and security issues. Also the new technologies of ADSL and GPRS offer easier access by the health care team to current patient information and each other, at all times, and from anywhere. The results of an initial assessment on the cost benefits indicate the usefulness of the system to all stakeholders.

Concluding, chronic patients, such as the cancer patient, can now enjoy 'optimum' health service, with improved quality of life, in the warmth of their own friendly environment, without a degradation in the quality of care provided to them, feeling safe and secure that in case of a change in their condition the health care team will be (virtually) present to support them

1. Relevancy of the Good Practise (GP) project

The “Relevancy of the GP project” section provides quick check and definition of its relevancy in regards to HoCare project objectives.

Good practice of quadruple-helix cooperation in R&I?	Yes, this GP project includes good practices of quadruple-helix cooperation in R&I
Good practice of delivery of Home Care R&I?	Yes, this GP project includes good practices of delivery of Home Care R&I.
If not in Home Care R&I, describtion and proof of its potential for transferability to delivery of Home Care R&I	
Generation of innovation in home care through answering unmet needs identified by formal or informal healthcare providers?	Yes, this GP project includes good practices of innovation through answering unmet needs.
Generation of innovation in home care through public driven innovation?	Yes, this GP project includes good practices of public driven innovation.
Generation of innovation in home care via quadruple-helix cooperation for quicker delivery to the market?	Yes, this GP project includes good practices of innovation via cooperation for quicker delivery to the market.

2. Quick overview of the GP project

The “Quick overview of the GP project” section provides initial overview of the good practice project (GP project) and enables readers to see if this GP project idea is relevant for possible transfer to their organization potential innovation activities.

Name of the GP project	DITIS: Virtual collaborative teams for home healthcare
Region of origin of GP project	Cyprus
5 keywords that best describe the content of the GP project	Mobile e-health, Virtual collaborative home-healthcare teams, Computational model and system implementation, Multilayer security framework facility-based care
Relevant Programme name through which the GP project has been funded	Cyprus Research Promotion Foundation (RPF) (1999-2001 and 2004-2006) and Microsoft Cambridge Research Labs (2003-2004).
Relevant support programme / intervention area name of the GP project through which it was funded	N/A
Single or multiple recipients?	multiple recipients
Type of lead recipient and its role (SME, LME, research centre, innovation centre, network/association,	public

university/school, municipality, other public body, other (specify)	
Types of participating partners and their roles (list all participating partner types. E.g.: hospital, social house, senior house, patient association, networks, SMEs, LMEs, research actors, business supporting organizations, public institutions/regulators, other (specify)	Cyprus Association of Cancer Patients and Friends (PASYKAF) - NGO Cyprus Research Promotion Foundation – Non-profit organisation Microsoft Cambridge Research Labs - SME Cyprus Telecommunications Authority (CYTA) - Semi-Governmental Organization. NetU - SME WinMob Technologies Ltd - SME Ericsson (through S.A. Petrides Ltd) - SME Microsoft - SME XDA - SME Cyprus Development Bank (CDB) - Public Company University of Cyprus - Public University
Summary of the good practice	Complex and chronic illnesses, such as cancer, demand the use of specialized treatment protocols, administered and monitored by a patient centric co-ordinated team of multidisciplinary healthcare professionals. Care of chronic illnesses (e.g. cancer patients) by a team of health care professionals at home is often necessary due to the protracted length of the illness, the differing medical conditions, as well as the different stages of the chronic illness. Most importantly home care can offer comfort for the patient and their family, in the familiar surrounding of their home, and at the same time being cost effective, as compared to the high cost of hospital beds. Hospital based treatment for chronic patients is limited, often demand based for short periods of time, used mainly for acute incidents. As it is not possible for the health care team to be physically present by the patient at all times, or at any time physically together, whilst the patient is undergoing treatment at home (or work), a principal aim is to overcome the difficulty of coordination and communication, through DITIS (ΔΙΤΗΣ, in Greek, stands for: Network for Medical Collaboration). DITIS is a system that supports dynamic Virtual Collaborative Medical Teams dealing with the home-healthcare. It supports the dynamic creation, management and co-ordination of virtual medical teams, for the continuous treatment of the patient at home, and if needed for periodic visits to places of specialised treatment and back home. DITIS is an Internet (web) based Group Collaboration system with secure fixed and GPRS/GSM/WAP mobile connectivity. It employs Mobile Agents, Web Databases with Java Database Connectivity for storage and processing of information, including Electronic Medical Record (EMR) and coding of diagnosis and health care protocols pertinent to cancer patients (in accordance with National and International standards, e.g. WHO ICD-10, ICD-0, HL7), software for collaborative work, intelligent interface for uniform access to the common database and the Group Collaboration software for both fixed and mobile computing units. DITIS implements a tele-cooperation system establishing the virtual presence of a dynamic specialized team of healthcare professionals who care for the patient at his home. Access to DITIS is provided through Fixed and Mobile Computing Units (e.g. Smart Phones, Pocket PCs, PDAs, Handheld PC's, Palm PCs). The collaboration platform is based on identified roles and scenarios of collaboration, analysed using UML. These scenarios are currently 'hardwired'. In the future the collaborative functionality of artifacts may be enhanced with embedded hybrid intelligence. DITIS was initiated in 1999, supporting the activities of the home

	healthcare service of the Cyprus Association of Cancer Patients and Friends (PASYKAF) in the district of Larnaca, using a patient centric philosophy, focused on home-based rather than facility-based care, receiving governmental and industry grants. It deploys a novel networked system for Tele-collaboration in the area of patient care at the home by a virtual team of medical and paramedical professionals, implemented using existing networking and computing components, initially addressing cancer patients. DITIS was originally developed with a view to address the difficulties of communication and continuity of care between the home health care multidisciplinary team (PASYKAF) and between the team and the oncologist often over 100km away. DITIS has through its database and possibility of access via mobile or wire line (computers) offered much more than improved communication. Its flexibility of communication and access to the patient's history and daily record at all times, home, outpatients or in the event of an emergency admission has offered the team an overall assessment and history of each symptom. DITIS has thus offered improved quality of life to the patient, for example by offering the nurses the possibility of immediate authorisation to change prescription via mobile devices and the oncologist the possibility of assessment and symptom control without necessarily having to see the patient. It has offered the home care service the opportunity to plan future services and lobby for funding by offering audit, statistics, and performance evaluation and with these in place, the possibility for research. The pilot initial results indicated the usefulness of the proposed system, as well as highlighted practical, at times frustrating, problems. DITIS is currently being extended to island-wide implementation to support the PASYKAF home care service. DITIS was designed to deliver a product that can improve the quality of the citizen's life. Contrary to state of the art health processing structure which is, in all practical terms facility-based care, this project aims to shift the focus onto home-based care, where everything is moving around the patient. The virtual healthcare team will be able to provide dedicated, personalized and private service to the home residing patient on a need based and timely fashion, under the direction of the treating specialist. Thus it is expected that chronic and severe patients, such as cancer patients, can enjoy 'optimum' health service in the comfort of their home (i.e. a focus on wellness), feeling safe and secure that in case of a change in their condition the health care team will be (virtually) present to support them.

3. Transferability

The "Transferability" section provides more detailed review of strengths and weaknesses of this GP project including description of necessary basic conditions for region and leading organization to potentially transfer it. At the end of the section, the key threats in the successful transfer open up possibility to focus on specific relevant issues important for the successful transfer.

Strengths and weaknesses of the project

What are the GP project strengths? Why it was funded?	- Can address a wide range of Patients suffering from chronic deceases.

	- Supports knowledge/evidence-based decision making and efficiency and effectiveness in service delivery - It supports open architecture - No needs for high bandwidth. - Accessible over a variety wireless technologies.
What are the key weaknesses of the GP project?	- Current technology limitations (e.g. WAP over GSM). The migration to new technologies (GPRS and ADSL) is resolving many of the original technical problems i.e. service is always on and bandwidth is much higher. - Maintenance cost - Initial health-care professional's phobia of technology. - Communication overheads are very high and costly in human and monetary terms. - Difficulty of coordination.

Basic conditions for successful transfer

Why is this GP project transferable? – innovation, impact, financial, legal, and timeframe aspects	DITIS could easily be transferred and adapted for rehabilitation, monitoring and training that are required for other (chronic) health problems and diseases. DITIS uses a number of state of the art technologies which are seamlessly put together, such as collaboration and personalization via mobile agents, access to medical data from anywhere and any time via a variety of mobile devices and a variety of protocols (i.e., WAP, HTML) and continuous connectivity via low bandwidth communication technologies such as GPRS and UMTS. The mobile access technologies are JAVA based therefore there is access device independence. DITIS, supports home-care by offering wireless health care services for chronic illnesses with emphasis on prevention, assessment and diagnosis. The main service is the dynamic creation, management and co-ordination of virtual collaborative healthcare teams for the continuous treatment of the patient at home, independently of the physical location of the team's members, or the patient. No technical limitation should be faced in EU countries. The main barrier would be the training curve and the translation of the platform documentation.
What are the basic conditions the region needs to have to be successful in transferring this good practise?	To understand the need for elaborating such a project targeting for the specific objectives (if relevant to local/regional/national situation) for producing the deliverables described below.
What are the basic conditions the leading recipient from the region needs to have to be successful in transferring this good practice?	- Dedicated Team of Health Professionals - Strong IT Team

Key threats in GP project transfer

What are the key potential threats for the GP project transfer?	- Patient familiarization with technology - Personnel training. - Trust issues of patients and personnel in IT. - Difficulties in cooperation among involved actors.

4. Description of the GP project

The "Description of the GP project" section provides more detailed information on the Good Practice project (GP project) and enables readers to get further detailed inspiration and easy ready-to-use information for possible innovation transfer to other project applications. This includes: tackled problem, time length of the GP project, objectives, phases, activities and deliverables of the GP project, its main innovation and target group.

Description of the tackled problem

What was the problem / challenge tackled by the project?	Providing top quality care necessitates close collaboration, secure, easy and timely exchange of information, and coordination of the team activities. This had to be achieved irrespective of the physical presence of the individual members of the team, or even if different doctors treat the patient, for possibly different symptoms at different hospitals, or visit him at home. It is of course obvious, that the concurrent physical presence at the point of care of all members of the team is rarely possible.
What were the reasons for the problem?	Complex and chronic illnesses, such as cancer, demand the use of specialised treatment protocols, administered and monitored by a patient centric co-ordinated team of multidisciplinary healthcare professionals. Care of chronic illnesses (e.g. cancer patients) by a team of health care professionals at home is often necessary due to the protracted length of the illness, the differing medical conditions, as well as the different stages of the chronic illness. Most importantly home care can offer comfort for the patient and their family, in the familiar surrounding of their home, and at the same time being cost effective, as compared to the high cost of hospital beds. Hospital based treatment for chronic patients is limited, often demand based for short periods of time, used mainly for acute incidents. As it is not possible for the health care team to be physically present by the patient at all times, or at any time physically together, whilst the patient is undergoing treatment at home (or work), a principal aim is to overcome the difficulty of coordination and communication, through DITIS.

Time length of the GP project

What was the time length of the GP project in months?	24 months

Objectives of the GP project

Describe the overall and specific objectives of the GP project	<u>Overall Objectives</u> - a move towards people-centred services; - a commitment to healthy public policy and a desire to improve the health status of individuals and communities; - increased emphasis on knowledge/evidence-based decision making and efficiency and effectiveness in service delivery; - a shift from facility-based health services and a focus on illness, to community based health services and a focus on wellness; - the integration of agencies, programs and services to achieve a seamless continuum of health and health-related services; and - greater community involvement in priority setting and decision-making. <u>Specific Objectives:</u> - To provide of as optimum and effective home health care as possible - To support the activities of the home healthcare service of the Cyprus Association of Cancer Patients and Friends (PASYKAF) using a patient centric philosophy, focused on home-based rather thanfacility-based

	care, receiving governmental and industry grants. - To improve the communication and continuity of care between the home health care multidisciplinary team (PASYKAF) and between the team and the oncologist often located over 100kms away. - Improve quality of life of the patient *Clinical objectives* - To provide the presence of the (virtual) team by the patient at any given time, irrespective of locality, or cross country movement. - To improve communication within the dynamic (virtual) home care team and between the home care team and the hospital (locally, or cross country), thus providing enhanced quality care. - To provide flexible and secure access and management of healthcare records at any time and from anywhere, to improve continuity of care. - To improve collection of statistical data for further audit and research within home care setting, enhancing knowledge and offering possibility of evidence based care. - Provide continuation of care for chronic illness via Virtual Collaborative Medical Teams, finally leading to a Pan-European scale (to cover the needs of visiting or retiring patients or healthcare professionals in a foreign country). - To aid in making the dependant role of the home-care nurse legally binding (for example, in the home setting when interacting with a hospital doctor for the prescription of a pain drug in the home).

Phases, activities and deliverables

List all main phases of the GP project including their time length	- 1996 – The initial idea for cancer patients care is presented in a conference - 1998 – Work initiated, RPF Grant - 2000 – DITIS I deployment starts at PASYKAF - 2002 – Goals set for phase II - 2003 – Microsoft Research Labs grant - 2003 – Larnaca fully supported by DITIS operation - 2004 – Successful grant application for DITIS continuation - 2004 – All district offices main data entered, users are trained - 2005 – Larnaca team starts testing DITIS as true virtual collaborative team - 2005 – Direct connect with the Bank Of Cyprus Oncology Center - 2006 – DITIS connected with cardio patients of polyclinic LITO through 2 EU projects - 2009 – Cyprus wide use of DITIS PMS system
List and describe all main activities that were implemented by the GP project	- Requirements analysis - Infrastructure development - Design of Electronic Medical Record - Design of collaborative platform - Design of wireless e-services - Design of collaborative software agents - Design and implementation of prototypes - Design of user interface - Studies of system functionality. - Implementation - Testing and Evaluation
List all main deliverables of the GP project	- System Design and Specification - Training procedures and material - DITIS Platform

	- System evaluation report

Main innovation of the GP project

What was the main innovation of the GP project?	The DITIS system integrates a number of state of the art technologies to provide a sophisticated tele-application in the medical domain. To substantiate the importance of such as system one must differentiate it from other related attempts. A number of related projects and efforts existed; however, no one, as far as we can ascertain, offered the features and innovation of DITIS within a single integrated application. We can classify these systems (and compare them to DITIS) based on their focus activities. Main features: - Supports virtual collaborative medical teams for the home care sector in regards to accurate diagnosis and treatment until a patient gets to the hospital or in a home care center. - Supports collaboration and virtual healthcare teams utilizing handheld devices for health care provision over commonly available GSM/GPRS based communication channels. The project and its consortium's composition is a classic example of how the utilization of the quadruple helix approach can provide such accurate and qualitative results that may resolve in a catalytically manner certain problems or needs.

Target group of the project

Who was the main target group of the GP project? (SME, LME, research organization, university, public institution, healthcare provider, business supporting organization, other (specify)	Severe chronic decease patients (eg Cancer Patients) supported through PACYCAF (NGO)
Describe the main target group	A severe chronic decease, such as cancer, demands the use of specialised protocols for treatment and symptom control from a coordinated team of experts (such as minimisation of pain using medicine, psychology, physiotherapy, etc…). It is obvious that the simultaneous physical presence of the team by the side of the patient, when the patient is at home (demanded by the length of the illness—till cure or death, which may last for years), at all times of need, is almost impossible. A fundamental aim of this project is to circumvent this problem through the use of a system (DITIS) for the support of a virtual medical team, using tele-presence based on communication network solution, for the continued support of the cancer patient at home.

5. Impact

The "Impact" section provides more detailed information on the effect of the GP project implementation and dissemination of major outputs.

Impact

What was the level of geographical impact of	Country

the GP project? (village, city, county, country, international, other (specify)	
What were the final impact indicators including their quantification?	- A comprehensive solution that brings state-of-the-art mobile technologies in support for emerging healthcare practices focusing on virtual healthcare team collaboration - Rich functionality, highly adaptable user interface, secure communication, open and highly interoperable system - Enables increased efficiencies that can translate in high quality service and lower costs - For the patient – quality of life • Opportunity to stay at home – Resting assured that should a change in condition occurs, the entire team is virtually there - For the healthcare professional – continuity of care • improved communication and collaboration • 24/7 access to patient information • tools for decision making - For the home care provider organization – evaluation • audit and statistics to help with planning, training and research • can support lobby for more support - For the healthcare system at large – directions for better healthcare • Opportunity to gather vital statistics that help with policy making Regarding Cancer patients is Cyprus: Paper case study of potential homecare savings - Indicative yearly cost without homecare (hospital based): 1.344.747 Euro • Number of patients: 210 • Cost per month per patient in the hospital: 1067 Euro - Indicative yearly cost with home care (for similar level of care): 124.882 Euro • Number of patients: 210 • Number of visits: 4000 • Cost per visit: 31.22 Euro - Indicative yearly running cost estimates without DITIS: • Total cost per nurse (excluding overhead): 53,570 Euro - Indicative yearly running cost estimates with DITIS (approx. savings: 40%): • Total cost per nurse: 35,141 Euro • Cost per nurse (excluding overhead): 32,141 Euro • Yearly maintenance, operational support, hosting, Telecom and Internet access cost: 90,000 Euro. For PASYKAF considering 30 professionals the cost per nurse is estimated at 3000 Euro per year - Cost savings are due to reduction of: • healthcare staff unnecessary visits to the head office • preparation work prior and after the visit in the head office • Access and updating patient data • communication/collaboration time among healthcare staff
Describe the changes resulted from the project activities	- Patient Management System (PMS) – considered essential • adopted by PASYKAF Cyprus wide 6 years after development and 3 years of paperless operation in Larnaca office • achieves paperless operation • full functionality is yet to be realised - Mobile access – considered beneficial • has been used in many instances when access on the spot was

	necessary • only then has it been considered an essential component by the end-users • BUT trust on availability not present at the moment to allow full reliance - Collaboration aspect – has potential • potential confirmed by small scale pilot • but, to be used organisation-wide • need to have PMS and Mobile access fully adopted and used (by the whole team)

Dissemination of outputs

Describe dissemination activities of the project outputs carried out during the GP project	N/A

6. Risks

The "Risks" section provides more detailed review of potential risks of this GP project implementation including their defined mitigation strategies to eliminate them.

Describe risks involved in implementing this GP project including their mitigation strategies	- Long delays – often beyond partner's control, research funding limitations, and research associates high initial turnover caused some frustration and mistrust. - A mismatch between the users high expectations and the inability of the technical team to enlighten the users about the complexity and time it would take for development. - Initial health-care professional's phobia of technology. - Underestimation of the initial workload to initially populate database, and generally to switch to a new system, which was still being developed. - Current technology limitations (e.g. WAP over GSM). The migration to new technologies (GPRS and ADSL) is resolving many of the original technical problems i.e. service is always on and bandwidth is much higher.

7. Budget

The "Budget" section provides more detailed review of costs regarding the project implementation as well as operational sustainability after its end. In addition, if relevant, public tenders within the project and additional generated incomes by the project are showed and explained.

Budget

What was the overall budget of the project in EUR?	1.5 Million Euro Funds origin: - RPF Grant 1999-2001 - RPF Grant Continuation 2004-05 - The Cyprus Development Bank 2001 - Microsoft Research Labs Cambridge 2003-04 (First funding for research project in the area) - University of Cyprus (from 1999 till today) - PASYKAF – Technical knowledge and pilot run (from 1999 till today) - CYTA – infrastructure (from 1999 till today)

	- 2 EU E-Ten projects adopting DITIS technology (2005-2007) - Other support
List relevant budget lines of the project including their % share from total budget	N/A

Additional income generated by the project

Did the project create any additional income?	no, the GP project did not generate additional income
If yes, specify which type of income and what amount in EUR?	N/A

Public tender

Did the project include any public tender?	no, the project did not include a public tender
If yes, specify what kind of contract (specific contract, general contract, other)	N/A
If yes, specify in what amount in EUR	N/A
Describe the public tender subject	N/A

Financial sustainability after GP project end

Was there an operational financial sustainability plan in the project after its end?	no, the GP project did not include an operational financial sustainability plan
If yes, specify where the operational funds after project end came from?	N/A
If yes, specify the amount of operational funds in EUR	N/A

8. Other information

In this section, specific additional information about the GP project could be revealed.

Please describe any other relevant information about this GP project (if relevant)	This project was initially funded by the Cyprus Research Promotion Foundation for a two year period (1999-2001). The total support of the Cyprus Telecommunications Authority (CYTA) with telecommunications infrastructure, WinMob Technologies Ltd for wireless technologies, Ericsson (through S.A.

	Petrides Ltd) for the provision of handsets, Microsoft for the .net framework and XDA devices, and the Cyprus Development Bank (CDB) for financial support are gratefully acknowledged. -Short information about the project: http://grid.ucy.ac.cy/index.php/projects/7-linc/past-projects/45-ditis-network-for-medical-collaboration8

9. Information gathered by …

The information about this good practise (GP) project has been gathered for the purpose of the HoCare project (Interreg Europe Programme) by the following organization:

Region	Cyprus
Organization name(s)	Nicosia Development Agency (ANEL) Αναπτυξιακή Εταιρεία Λευκωσίας (ΑΝΕΛ)
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