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Strategic Intelligence Monitor on Personal Health Systems Phase 3 (SIMPHS3)

eTrikala (Greece)
Case Study Report

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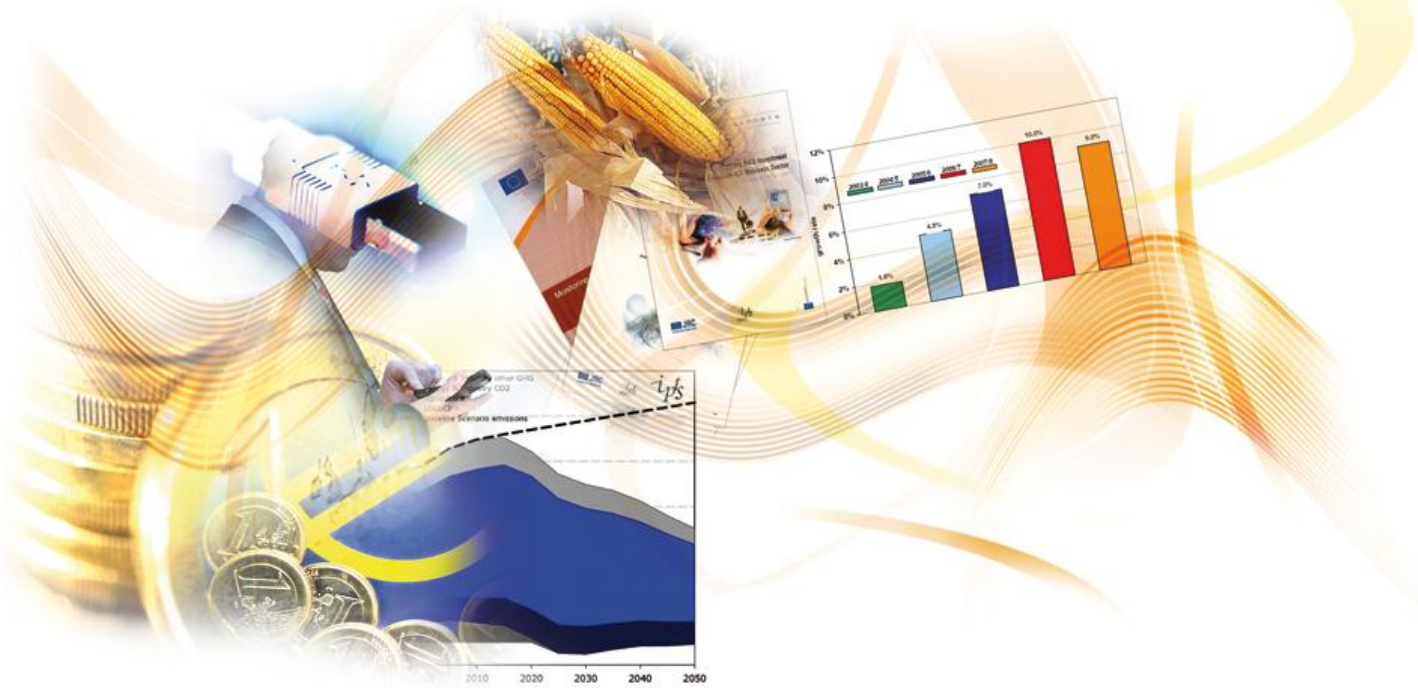

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Abstract
Since 2004, the office for the development of eGovernment services of the Trikala municipality (henceforth eTrikala Office) has been promoting new broadband technologies and the implementation of ICT projects for the municipality.
On 8 April 2008 this office became a start up company, eTrikala S.A. The municipality of Trikala the majority shareholder owning 99% of the share capital, and the remaining 1% is owned by the local Chambers of Commerce.
The first service to be implemented by eTrikala S.A. was a Telehealth centre in the municipality. Up until 2010, the centre provided telemonitoring services to chronic patients suffering from the following chronic diseases: diabetes type II, chronic heart failure, and COPD. Patients were equipped with light-weight handheld devices and could record their vital signs at home. The data recorded was periodically transferred to the municipality hospital and private physicians over the internet or GPRS for review and feedback by doctors via the telehealth centre. In 2010, the eTrikala telemonitoring services were also extended to the older population suffering from mild cognitive impairment. The service was discontinued in 2013 due to the lack of specialised health care professionals (e.g. psychologists) needed to provide advice and assistance to the home-telemonitored patients.

Preface

The Strategic Intelligence Monitor on Personal Health Systems (SIMPHS) research started in 2009 with the analysis of the market for Remote Patient Monitoring and Treatment (RMT) within Personal Health Systems (PHS). This approach was complemented in a second phase (SIMPHS2) with the analysis of the demand side, focusing on needs, demands and experiences made with PHS by healthcare producing units (e.g. hospitals, primary care centres), healthcare professionals, healthcare authorities and patients amongst others.

Building on the lessons learnt from SIMPHS2 as well as on the European Innovation Partnership on Active and Healthy Ageing initiative, SIMPHS3 aims to explore the factors that lead to successful deployment of integrated care and independent living, and define best operational practices and guidelines for further deployment in Europe. This case study report is one of a series of case studies developed to achieve these objectives.

The outcomes of SIMPHS2 are presented in a series of public reports discussing the role of governance, innovation and impact assessment in enabling integrated care deployment. In addition, through the qualitative analysis of 27 Telehealth, Telecare and Integrated Care projects implemented across 20 regions in eight European countries investigated in SIMPHS2, eight facilitators have been identified, based on Suter's ten key principles for successful health systems integration.

The eight main facilitators identified among these as necessary for successful deployment and adoption of telehealth, telecare and integrated care in European regions are:

- Reorganisation of services
- Patient focus
- Governance mechanisms
- Interoperable information systems
- Policy commitment,
- Engaged professionals
- National investments and funding programmes, and
- Incentives and financing.

These eight facilitators have guided the analysis of the cases studied in SIMPHS3 and a graphical representation with arrows whose length represents the relative importance of each facilitator is presented in each case study.

In addition to the above facilitators analysed in each case report, a specific section is dedicated to the analysis of care integration. It should be noted that the definition of vertical and horizontal integration used in this research is taken from the scientific literature in the field of integrated care[1] and differs from the one mentioned in the European Innovation Partnership on Active and Healthy Ageing Strategic Implementation Plan[2]. We define horizontal integration as the situation where similar organisations/units at the same level join together (e.g. two hospitals) and vertical integration as the combination of different organizations/units at different level (e.g. hospital, primary care and social care).

[1] Kodner, D. (2009). All together now A conceptual Exploration of Integrated Care.

[2] http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/steering-group/operational_plan.pdf (page 27)

Table of contents

LIST OF TABLES

LIST OF FIGURES

Case outlook

Since 2004, the office for the development of eGovernment services of the Trikala municipality (henceforth eTrikala Office) has been promoting new broadband technologies and the implementation of ICT projects for the municipality.

On 8 April 2008, this work was taken over by eTrikala S.A., a start-up company established within the municipality of Trikala. It is the majority shareholder owning 99% of the share capital, while the remaining 1% is owned by the local Chambers of Commerce.

The first service to be implemented by eTrikala S.A. was the Telehealth centre of the municipality of Trikala. Up until 2010, the centre provided telemonitoring services to chronic patients suffering from the following chronic diseases: diabetes type II, chronic heart failure, and COPD. Patients were equipped with light-weight handheld devices and could record their vital signs at home. This data was transferred periodically to the municipality hospital and private physicians over the internet or GPRS for review and feedback by doctors via the telehealth centre. In 2010, the eTrikala telemonitoring services were also extended to the older population suffering from mild cognitive impairment. The service was discontinued in 2013 due to the lack of specialised health care professionals (e.g. psychologists) needed to provide advice and assistance to the home-telemonitored patients.

The telehealth services have also been tested to address the needs of the Roma community of the city, which often face social exclusion and have difficulties in accessing specialised care. However these services have also been discontinued.

At the moment, despite the full availability of the ICT equipment for providing home telemonitoring services for a larger range of diseases and population segments, the services in place only address the three diseases (type II diabetes, chronic heart failure, and COPD) that have been supported since the beginning of the eTrikala S.A. activities

Therefore, the case study reflects this chronology of events and focuses its attention on the analysis of the services related to the three pathologies still monitored that mainly address the elderly community and home care management, as well as health and social care services integration. What started as a telehealth centre has now become the eTrikala Telecare Centre, which enables vertical integration of social and health care (general hospital) practitioners in the municipality of Trikala. Moreover, it supports citizens and patients in the management of their clinical history by means of a virtual portal enabling each individual to upload, withdraw, view and share personal health-related information in accordance with existing security and privacy regulations.

The key drivers in this case have been the strong commitment and commonly-shared vision of all the actors involved. The existence of a widely distributed information and communication network infrastructure, integrating major care actors in the region, has also been important. Barriers to the diffusion of the eTrikala case that could also hinder the transferability of the initiative are the resistance of health care actors to organisational and technical change, the lack of evidence-based impact evaluation processes, low financial resources to upgrade implementation and a lack of political commitment.

1 Background

1.1 Greek social and health care services

The Greek healthcare system is a mixed system: the health care branches of the various social insurance funds co-exist with the National Health System (ESY- Ethniko Systima Ygeias).

The ESY, established in 1983, guarantees free health care services for all residents of Greece. The system covers the entire Greek population without any special entitlement condition, and regardless of professional category or region. Health care services are also provided to EU and non-EU citizens on the basis of multilateral or bilateral agreements. Furthermore, within the ESY context, primary health care services are provided through rural health centres and provincial surgeries in rural areas, the outpatient departments of regional and district hospitals, the polyclinics of the social insurance institutions and specialists in urban areas. Secondary care is provided by public hospitals, private for-profit hospitals and clinics or hospitals owned by social insurance funds. In general, if a foreigner is working in Greece and pays social security contributions, he/she is entitled to a medical card and to receiving medical treatment and free hospitalisation. The ESY is financed primarily by the Greek state through taxes and by employers' and employees' contributions to the compulsory social insurance schemes. Despite the fact that the percentage allocated from the national budget to health costs is continuously decreasing due to the current financial crisis, the accessibility for all to health and social services remains of paramount importance as it is enshrined in the country's Constitution.

Private sources of funding represent more than half the total expenditure for health care. Out-of-pocket payments include:

a) Co-payments and full payments for health care services provided by the NHS. For many NHS services, as well as for medication, the recipient is required to contribute a part of the cost under a set of cost-sharing regulations. Those who are not insured are required to pay the entire amount, and for hospitalization they are often required to pay about 50% of the expenses in advance.
b) Payments to private physicians, diagnostic centres and hospitals.

Out of pocket payments are among the highest in Europe as a percentage of total health care expenditure, yet another side effect of the financial crisis.

ESY services are supervised by 7 regional authorities covering the entire Greek territory. They make a direct link between the local communities and the Ministry of Health (www.moh.gov.gr). The financing of the ESY is highly centralised as financial transactions are subject to ministerial approval despite the fact that decision making, planning and allocation of resources take place at regional level. Social care falls exclusively under each municipality's jurisdiction and is therefore delivered locally to citizens who need that type of care. Some specific services such as home care, which was originally implemented through a pan-European EU-funded project, have had such a positive impact on quality of life, especially for the elderly population, that resources have been allocated locally to ensure its sustainability. These services are therefore part of the standard portfolio of services offered by each municipality. There is no private social care infrastructure in Greece as social care is mainly funded by public budgets. To provide care services, the Greek municipalities present a mixed budget for health and social care service provision. National funds may account for more than 50% of the funding depending on the financial

state of the municipality, and are complemented by income generated from sources such as nationally and European-funded projects, taxes directly paid at local level and income generated from activities for which citizens pay a minimal fee.

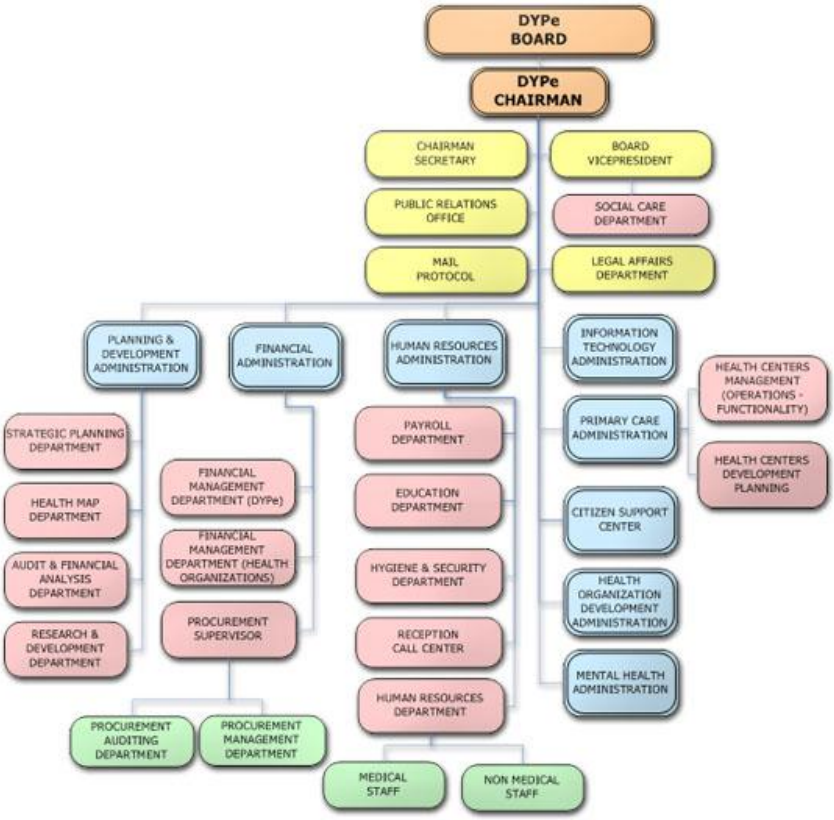
1.2 The Health Authority in the Thessaly Region

The 5th Regional Health Authority of Central Greece (5th DYPE) covers the areas of Thessaly and Central Greece and is responsible for the uniform management, co-ordination, supervision and control of operations for all the healthcare and social services providers operating in Thessaly and Central Greece. The jurisdiction of the 5th DYPE coincides with the administrative boundaries of the two districts. The entities that it supervises are listed below:

- 13 hospitals
- 33 health centres (primary healthcare provision)
- 282 peripheral surgeries (primary healthcare provision)
- 14 social care centres
- 4 centres for Mental Health

The administrative and functional structure of DYPE Thessaly is depicted in Figure 1.

Figure 1: Organisational Chart of DYPE Thessaly



Source: http://www.dypethessaly.gr/organosi_en.htm

Table 1: Thessaly and Sterea regional health system characteristics

	Thessaly and Sterea region	Trikala municipality
Geographical coverage km²	38,946	608
Inhabitants per km²	53	134
Number of inhabitants	2,050,000	81,355
Life expectancy at birth, years	77.2 males – 80.4 females	
Regional GDP (2010), billion €	€10.742	
Regional GDP per inhabitant (2010) €/inhabitants	€14,600	
General Practitioners /1,000 inhabitants (2010)	0.78	
Specialists /1,000 inhabitants (2010)	3.67	
Regional Budget for Health services management (2013), billion €	€8.5 billion	
Health care professionals / 100,000 inhabitants	386	
Regional health care budget € per inhabitants (2013)	1,888 €	
Hospital beds (2012)	20,493	
Hospital beds/1,000 habitants (2012)	4.5	

Source: Thessaly and Sterea region

Under the new legislative framework "Kallikratis" 3852/2010, ΦΕΚ 87Α', some of the responsibilities of regional/national authorities have been transferred to the municipalities. They comprise the following as described in the relevant decrees:

- Protection of public health by implementing special programmes, either scheduled or in an emergency according to the case, and by dissemination of information to citizens and awareness–raising activities on public health issues.
- Provision of health services and care in general, as well as social services so as to support the citizens of the area as well as possible.
- Primary health care (from the regional health authority to the municipality).
- Local actions for social solidarity which had been up until 2010 delivered centrally by the Ministry of Health.
- Assignment of physicians responsible for issuing health certificates for various professional categories.
- Issue of disability cards and running the relevant assessment and decision-making committees.
- Issue and revocation of professional licenses for health professionals and relevant premises (i.e. private surgeries).
- Issue of licenses for opening and operating private mental health clinics and asylums.
- Supervision of health professionals' associations at local /municipal level.
- Rescue teams and paramedics are still controlled centrally through the National Centre for Immediate Help and they maintain the right to redirect patients to wherever they deem most appropriate for the incident.

It should be noted that after four years of implementation, some municipalities, especially in geographically-isolated areas, are not fully complying with the Kallikratis legislation framework. This is due to lack of resources at various levels that does not allow some municipalities to take over these demanding tasks. These municipalities are well known and they have been given a schedule for fully compliant implementation by 2018.

1.3 eTrikala case

The eTrikala case is an example of Integrated Care based on an ICT infrastructure managed by a telecare centre that constitutes a single entry point to health and social services provision. Thanks to the telecare centre and the ICT infrastructure, medical intervention and social support can be provided to all citizens, eliminating discrimination and other problems linked to social isolation. The citizens receive personalised health services and advanced community services. As a result, the telecare centre constitutes an efficient channel for the provision of citizen-centric services, while strengthening the role of the community public bodies involved in health and social care integration.

The eTrikala case has been conceived by the municipality of Trikala as a long-term strategic plan that is constantly evolving to transform the local society on the basis of the opportunities created by the information society. It includes several telematics services for the citizens such as e-government, e-transport, e-health, etc.

The initiative started in 2008 when the office responsible for ICT initiatives became e-Trikala S.A. 99% of this ICT company was owned by the Trikala Municipality and 1% by the local Chambers of Commerce. Since its inception, the main scope of the company was the promotion of ICT-based public services and moving government services closer to citizens.

More specifically, the e-health services were the first to be launched by the eTrikala initiative. The services provided were based on the innovative technology and solutions of the health-telematics company VIDAVO. Novel micro-telemedicine devices were used for the wireless transmission of vital signs to a web-based platform via TCP/IP.

The focus was primarily on remote management of chronic conditions and at that stage, integration of services was not a concern. The conditions addressed back then were type II diabetes, chronic heart failure and COPD. At the beginning of 2010, however, the integration of care services was introduced, addressing primarily the elderly suffering from mild cognitive impairment. The service was discontinued in 2013 due to the lack of specialised health care professionals (e.g. psychologists) needed to provide advice and assistance to the home telemonitored patients.

The eTrikala Telecare centre currently provides telemonitoring services only to chronic patients and the elderly suffering from diabetes type II, chronic heart failure and COPD, together with social services provided to all citizens.

The telecare centre focuses on:

- The provision of health and social care to the citizens of the region.
- The provision of advanced healthcare services, regardless of geographical limitations.
- Preventive medicine.
- Efficient human resources management (for the healthcare providers).

- Subcontracting scientific personnel and diffusion of specialised knowledge.

Big market players, such as Vodafone Hellas SA support the telecare centre activities and its expansion via corporate social responsibility programmes.

The eTrikala telecare centre offers its services in terms of tele-monitoring of chronic patients with the cooperation of the city's General Hospital, which is responsible for both primary and secondary health care provision in the municipality. Additionally, social care professionals can use the eTrikala platform in order to register data for their cases even if there are no health issues involved.

The following additional activities, complementary to home telemonitoring services, are currently provided by eTrikala S.A:

- **"Help at home"** initiative (http://www.deka-trikala.gr/el/koinonikes-domes). It represents a further step by the region's social services towards senior citizens who cannot fully look after themselves, including those who are confined to bed. The initiative aims to improve the quality of life of the target population by assisting the individuals themselves, supporting their family environment and enhancing the skills of qualified service staff. "Help at Home" targets individuals who benefit from the video-counselling services of the eTrikala Telecare centre that also provides the needed ICT infrastructure to integrate the organizations health and social services.
- **"Demosthenes"**, the Telephone help line of DEKA that is currently used to handle all types of complaints, inquiries and calls from citizens about the administration of the municipality of Trikala. Specialised employees interact with citizens through various channels, e.g. by phone, mail or visits of the citizens to the physical "Demosthenes" offices. In accordance with a pre-defined process managed by the eTrikala centre, each complaint or request is forwarded to the municipal services concerned for further handling. Optionally, an online form provided on the municipality's website can be used by the citizens for interacting with public services. The "Demosthenes" service also covers complaints relating to health and social care infrastructure and services.

Finally eTrikala S.A. hosts additional activities to support and enforce the core activity of the centre, such as:

- **"Independent"** service, an enhancement to the existing health and social care services, which is enabled by the eTrikala tele-centre. It allows care providers to send questionnaires to every possible user of the "Independent" service. All answers enhance existing users' health records with the aim of creating a common knowledge-base which can be accessed through the internet by all care actors according to their access rights. For example, technical staff have database administrator rights, physicians can insert comments after e.g. a videophone conference with the user or the formal care provider, care providers can comment on the current status of the person cared for, and the patient's family can view the comments about their relative.
- **SUSTAINS project** gives access for all citizens to their combined Electronic Health and Social Care record. The eTrikala telecare centre is responsible for the management of the system and its ICT platform guarantees the use of the service to all members of the Trikala health and social care system in accordance with the credentials and statutory rights of the user (e.g. patients, informal carers, third

sector, GP). The patient may choose which of the available professionals will follow up his/her case.

- **SmartCare project.** Funded by the European Commission, it is currently the largest trial in integrated care in terms of number of patients. The eTrikala telecare centre, the municipality of Trikala and the 5th supervising Health Authority monitor the project. The aim is for them to keep up with developments in integrated care, reinforce the services provided by the eTrikala Telecare centre and upgrade the related ICT platform.

2 Integrated care analysis

2.1 Dimensions of integration

When the eTrikala telecare centre and its ICT platform were set up, it was envisaged it would be available for every citizen in the municipality. However, for reasons of economies of scale, the initiative started with a focus on the older people suffering from type II diabetes, chronic heart failure and COPD, and these continue to be the only pathologies still addressed by the centre. The centre only provided home telemonitoring assistance to older individuals suffering from mild cognitive impairment from 2010 to 2013. The lack of specialised professionals (e.g. psychologist) forced the discontinuation of this service, even though the ICT equipment remains fully operational.

With respect to the provision of care services, the eTrikala initiative enables relations among different health and social care organisations, allowing them to share a mission, as well as information and knowledge about the services provided to the target population. The eTrikala platform therefore facilitates the exchange of information between health and social care professionals with the support of the administrative staff of the municipality.

In particular, the telecare centre offers adequate back-office and support functions which help to:

- Structure the exchange of information between health and social care professionals.
- Manage the administrative interaction between citizens and eTrikala as a service provider.
- Provide administrative support to health and social care professionals.
- Deliver integrated home care.

eTrikala further enables organisational and service delivery integration as in the case of the "Independent project" and "Help at Home" initiatives described earlier.

In terms of breadth of integration, eTrikala enables vertical integration, combining different organisations/units at various levels of the health and social care management process. This vertical integration is achieved mainly through administrative and clinical/social data-sharing between primary health care settings (GPs, caregivers, community nurses), local health units (General Hospital of Trikala) and the social care services of the municipality.

Based on the above, we can consider that the eTrikala initiative facilitates communication, information-sharing and collaboration through coordination of responsibilities and inter-organisational mechanisms, including administrative control of health and social care professionals. Despite the integration process among the health and social care actors in the municipality, the level of integration achieved is only partial, since organisational and

strategic integration among the care actors was not foreseen. This could, however, help to provide more effective services to the target population.

2.2 Impact

One might think that the original implementation plan for the eTrikala telecare centre was too ambitious at the time, as it envisaged the full integration of health and social care services at municipal level. As such it raised expectations not only for the other municipalities in the region of Thessaly, but also at a national level, in terms of potential benefits of service integration. In this context, implementation to date may appear to be rather limited. Nevertheless, some positive impact has already been identified:

- **Hospitalisation reductions:** This is a direct consequence of the effective integration of home care provision. Through the electronic care file, hospital physicians are better informed about patients. This has led to a direct reduction in average length of stay and hospital bed-days. The same holds true for planned and unplanned admissions into acute care. In addition, patients can be kept more stable at home and remain there, reducing the number of emergency visits.
- **Functional status and health outcomes**: The continuous flow of personalised information provided by the eTrikala platform has a positive impact on both health outcomes and the patient's condition. It also supports the network of informal carers.
- **Patients' satisfaction**: The continuum of care has improved patients' and their informal carers' satisfaction. They feel more secure and more aware of what is happening either to themselves or to their loved ones. Furthermore, the traditional relationship between professional carers and patients has improved, thanks to the flow of information between the various actors, which places patients and their informal carers on an almost equal footing when it comes to making decisions.
- **Patients' quality of life**: Older people are constantly at risk of seeing their normal life disrupted, for instance by some unplanned hospitalisation. Better care at home reduces this risk, by improving care in the respective home environment and hence improving patients' quality of life.
- **Cost-effectiveness (only in the case of diabetes)**: Diabetes is characterised by co-morbidities, especially for Type II and older diabetes patients. Cost-effectiveness of the intervention relates mostly to reduction in emergency admissions for diabetic patients enrolled in the programme. Even in the case of hospitalisation, the average length of stay has decreased.

Evidence for the above impacts can be found in the literature, as a number of studies were carried out when eTrikala S.A. participated as a pilot organisation to test innovative home telemonitoring services under the framework of European-funded projects (Dafulas, Styfalya et al, 2013; Dafulas, Fissas et al, 2013; Dafulas, Gita et al, 2014; Dafulas, Mavrodi et al, 2014).

For example, a randomized control trial was carried out in 2011 for a period of 12 months with 154 Greek patients suffering from Type II Diabetes (Dafulas, Mavrodi et al, 2014). This trial had interesting results, both in terms of health outcomes, patients' quality of life, and the cost effectiveness of the home telemonitoring services.

The 154 patients capable of using the tele-monitoring device with an HbA1c > 53 mmol/mol (7.0 % according to NGSP), were randomly assigned to two groups: the tele-monitoring treatment group (I), (N=74) and the control group (C), (N=80).

In the telemonitoring group, patients' blood glucose profiles were weekly using a mobile phone health platform for the period of one year. Allocated health professionals provided the appropriate counselling on lifestyle and medication changes when required by phone. Patients in the control group received usual care with face-to-face consultations. HRQOL was assessed using a generic (SF36v2) questionnaire. The Short Form 6D (SF-6D) instrument was used in the analysis to obtain quality adjusted life years (QALYs) from the SF-36v2 for use in the cost utility analysis. The study was approved by the Institutional Review Board (Local Trial Registration NCT01498367).

After a year, the following statistically significant results were observed in terms of treatment and control group:

- A statistically significant decrease (p=0.001) in HbA1c levels. For the treatment group, the decrease was about 15.42 mmol/mol, whereas for the control group it was 9.29 mmol/mol.
- A statistically significant improvement in the generic HRQOL (Health-Related Quality of Life), both in the Mental Component Summary scores [MCS: (I) +3.46, (C) -3.24, p<0.001] and in the Physical Component Summary scores [PCS: (I) +1.17, (C) -1.26, p<0.01] for the telemonitoring group.
- For the telemonitoring group, health utility was increased by an average of 0.049 points, whereas in the control group a decrease of 0.048 points was observed. The mean difference between the two groups after 12 months favoured the treatment group that showed a significantly higher health utility (p<0.001). The average cost per patient was €986.26 for the telemonitoring group and €494.85 for the control group, based on prices applicable to the year 2011. The results of the trial showed that telemedicine is more expensive compared to usual care. However, the intervention is cost-effective. Given the health utilities calculated with the SF6D and the average costs, the incremental cost-effectiveness ratio (ICER) for the telemedicine intervention in the diabetic group was €5,460.11 per QALY, which is less than the national tariff used for calculating the ICER of the control group.

2.3 Drivers and barriers

The experts we consulted believed that the key drivers for the eTrikala telecare centre were:

- **Inter-professional teams across the continuum of care**: The current organisational model of health services provision requires the involvement of social care professionals at all levels. The main issue prior to the implementation of the telecare centre was the lack of formalised communication between the various professional categories, which has been resolved thanks to ICT as implemented in projects like the eTrikala's Telecare centre.
- **Policy leaders facilitating the participation of all stakeholders and fostering innovation in the health system**: The introduction of the new legislative framework "Kallikratis" (see Section 1.2) and the re-organisation of regional authorities that followed brought forward disruptive innovations within the health system. For example, the responsibility for primary health care services was

transferred to municipalities along with social care services. The latest policies show that this was not a random decision, but that there is strong belief in this type of innovation and a strong commitment to continue in that direction. The municipalities also made an effort to speed-up the integration processes.

The main **barriers** appear to be related to:

- **Lack of a legal and regulatory framework**: The current legal and regulatory framework for clinical practice does not recognise ICT even as an enabler for improvements in the provision of health care. Remote diagnosis is currently not supported by legislation. This creates uncertainty about whether the results of this diagnosis could be used in medical practice or not. Additionally, no legislation exists for the introduction of ICT in social care provision. Officially public servants are not allowed to use the internet except for specific applications that have an administrative purpose.
- **Insufficient national investment and funding programmes**: The current financial situation in Greece is dire to say the least. National investment is rather limited and when it is directed to health care, it mostly covers infrastructure rather than reorganisation needs. Funding programmes are almost non-existent at national level, but there is at least limited access to European funds through mostly research-related programmes.
- **Lack of incentives for professionals involved**: Remuneration for the additional services offered through integrated care is not possible under the current system. As integrated care is not recognised to any large extent under current legislation, professionals from the health or the social care sectors are considered to be more or less volunteers in the implementation process, seeking personal fulfillment. In many cases professionals do not have the option to use the new applications nor to be paid extra for the service they offer.
- **Lack of innovation in reimbursement models**: Integrated care is not addressed as a different category of care when it comes to reimbursement models. These new models may affect payments by the end users, who in the current economic crisis may not be able to assume extra cost.
- **Insufficient policy support**: Despite the fact that policy leaders promote both innovation and participation of all stakeholders in the integrated care effort, the level of policy support can still be regarded as rather limited. There is considerable reluctance to increase investment in health care, even though a widely distributed information and communication network infrastructure, for example, could lead to cost reductions in the mid-term.

2.4 Organisation, health professionals and patients

The eTrikala's telecare centre covers only those citizens who are members of target groups defined by the municipality of Trikala. At this stage these include only a limited number of end users, which are mainly older people and diabetic patients. Provided the telecare centre continues to expand, the objective for the future is to actively involve the entire range of health and social care professionals at local level in the platform. The beneficiaries of the telecare centre as it stands today are the following:

- **Citizens.** They are the primary beneficiaries of the health and social care services offered by the telecare centre. They have access to all the information related to their case and they can delegate access rights to their relatives, GPs or social care workers. In the current settings, the citizens involved are older people suffering from mild cognitive impairment, their informal carers (family members included) and patients with Type II diabetes (Type II) enrolled in the diabetes monitoring programme.
- **Local hospitals.** They provide specialised doctors in the care pathway, namely neurologists (elderly care) and internists (elderly care and diabetics). Additionally, the hospital deals with emergency cases. The doctors have access to patient files and also generate patient data.
- **Home care units:** They fall into the category of primary health care provision. The unit consists of GPs, nurses, and complementary specialists such as work or occupational therapists, physiotherapists etc. They focus on elderly care. They also have access to patient files and insert patient data together with the patients e.g. when they assist them with handling the medical devices measuring vital signs.
- **Social care professionals (municipality):** They provide social care services to elderly and diabetic patients. They generate social care data and they have access to the part of the patient's integrated care record corresponding to their area of expertise.
- **eTrikala as the ICT provider and service operator**. it provides the infrastructure and the telecare centre. Technical staff from the telecare centre visit the homes of citizens registered for the services, install all relevant equipment according to the monitoring services to be used or to the person's circumstances, and provide training and technical assistance whenever required.

The telecare centre enables all these actors to cooperate better through continuous information-sharing, thereby ensuring cooperation between different tiers of care. Unfortunately, the reorganisation of the services that would be required to fully realise the potential of the ICT infrastructure has not taken place. All current efforts are targeted at safeguarding an acceptable level of care continuum between primary and secondary health care services supported by social care interventions. This set-up seems to be working better with the home care units. The telecare centre is currently managing the following services:

- **Integrated home care management process**: Sharing of information and generation of relevant alarms to all involved stakeholders.
- **Booking appointments for services:** Standard part of the ICT infrastructure.
- **Filing complaints relative to health and social care services**: Standard part of the ICT infrastructure.
- **Management of all information related to electronic care record (health and social care data):** Standard part of the ICT infrastructure.

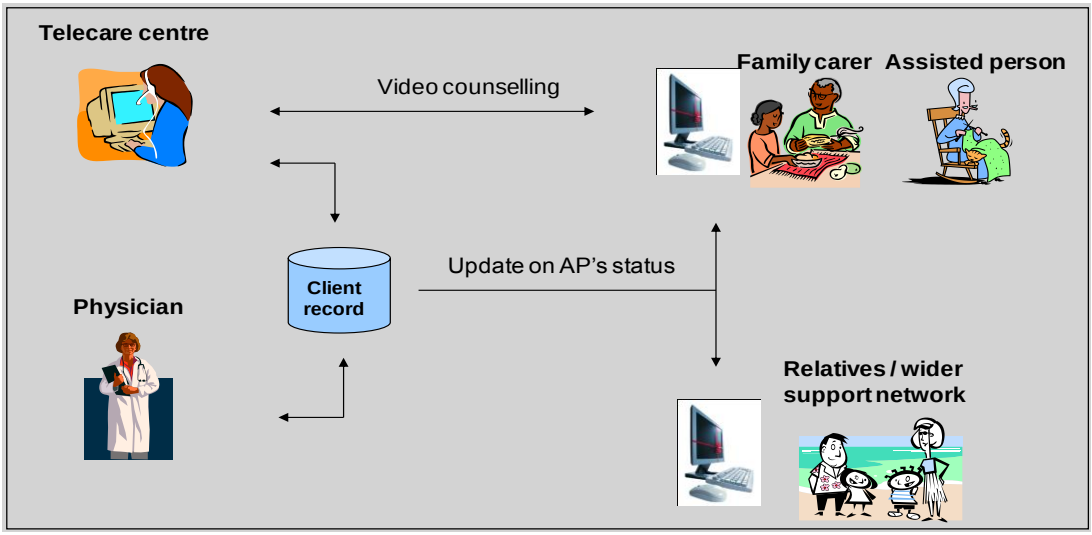
2.5 Information and Communication Technologies

The core function of the telecare centre is the generation and management of electronic care records for all citizens of the municipality. Currently, this functionality is operational for the following patient categories:

- Patients with diabetes type II, hearth failure, and COPD.
- The services for elderly people suffering from mild cognitive impairment has been suspended due to lack of human resources. However, all ICT devices continue to be fully functional and are therefore considered in the description below on the ICT developed by the case study.

Figure 2 depicts how the electronic care records of elderly citizens are managed by the centre, together with its relation to video-counselling services. Assisted patients (APs) and their families, and informal carers, have access to the patients' care record database managed by the eTrikala Telecare Centre and can see the clinical history and social care needs. Health care professionals of the General Hospital of Trikala (neurologists and internists) can have access to the same care record database for both consultation and updating the clinical history of their patients.

Figure 2: Video-counselling and management of health and social care patient database



Source: Authors elaboration

Social care providers and the psychologists of DEKA (the Municipal Enterprise of Social Development) access patients electronic care records and update them with the information extracted from the questionnaire collected by the "Demosthene" service (see section 1.2) managed by the eTrikala centre on their behalf.

On the basis of the information collected and other data provided patients' health records, the DEKA care providers keep updated about patient needs and establish structured communication with patients. All data gathered feeds into the platform to ensure continuity of care and supports the provision of psychological support through counselling.

This allows the creation of a common knowledge base, shared among all the health and social care actors, the patients and their relatives which leads to a significant improvement in the quality of the services provided to patients.

Whenever possible, communication between patients, caregivers and relatives, and the health and social care providers are managed by the eTrikala telecare centre through tele-(video) counselling. The call service is managed by the service operator at the local call centre of the telecare centre. They work in shifts, covering 12 hours 6 days a week. They answer calls from the citizens, register cases for both new users and those already registered with the services offered. They communicate all relevant data to the relevant

professionals (health or social care). An online call works as an alarm between the informal carer and the service operator.

For the target population, this service represents an enhancement of the existing one. It is usually combined with a physical visit to patients' houses from the district nurses, who perform various measurements and make clinical assessments.

This platform is accessible through the internet and the information can be viewed by users depending on their credentials. For example, technical staff of the eTrikala Telecare centre have database administrator rights, physicians can insert comments e.g. after a videophone conference with either the senior user or the formal care provider, care providers can comment on the current status of the person cared for, and the patients' families can view any comments about their relatives.

The clinical part of the integrated record /platform consists of physical parameter measurements through lightweight handheld devices as shown in Figure 3. These measurements are part of a standard telemonitoring protocol, and are transmitted via Bluetooth and Internet/GPRS to the treating physician for further assessment and feedback to the patient.

Figure 3: Example of telemonitoring sequence with handsets

2.6 Governance

The municipality of Trikala owns 99% of the share capital of eTrikala S.A (the remaining 1% is owned by the local Chambers of Commerce), which is in charge of running the ICT services for citizens. The municipality also runs the Municipal Enterprise for Social Development (DEKA). This organisation fosters the economic, cultural and social development of the municipality and prefecture of Trikala by promoting the exploitation of European and local resources, undertaking productive initiatives, delivering better services and fostering more qualified manpower.

In addition to these two organisations run by the Trikala municipality, two other organisations are involved in the initiative: the Centres for Open Protection of the Elderly (KAPI) and the General Hospital of Trikala. KAPI provides social support and entertainment to members of the community over 60 years old through many forms of organised recreation, medical care, physiotherapy treatment, occupational therapy, and many kinds of practical and psychological services. The General Hospital participates in the eTrikala with two clinics: Neurology (for the older population suffering from mild cognitive impairment) and Pathology (internists) for assessing and prioritising the needs of the chronically ill.

All these stakeholders work in close collaboration providing health and social care services to the elderly, but there is no specific organisational structure that promotes coordination across settings and levels of care. Here, the municipality acts as an enabler using eTrikala

as a public technological provider undertaking, which facilitates integrated care and IT infrastructure services to DEKA, the entity responsible for providing the telecare centres to KAPI end-users with support from specialists at the hospital.

2.7 Organisational processes

As discussed earlier, eTrikala's telecare centre aims to integrate information about the health/clinical, administrative and social care status of all citizens in the municipality. However, this is not an easy task, especially in light of the current dire financial situation and the nationwide budget cuts.

At this stage, the organisational and ICT integration processes consist of the following elements:

- Appointment booking for all services through a dedicated line of the telecare centre.
- Management of all complaints, queries and requests from citizens (health and social care included).
- Single point registration to services offered by the telecare centre and creation of each patient's profile (unique identifier per person, connected with the national insurance number – AKMA).
- Automatic identification of a patient's profile (see point above) when he/she contacts the telecare centre for new bookings.
- Management of appointments with health professionals and facilitation of profile study since these are automatically uploaded on the daily schedule.
- Management of the home care process with emphasis on the logistics from the care provider's side.
- Statistics per service showing levels of performance and relative outcomes (not yet completed for all services offered).

The original plan for the organisational processes to be implemented at the telecare centre included performance indicators for health and social care professionals, both qualitative and quantitative. However, this functionality was never implemented and it does not seem to be considered in the current development plans, although cost issues remain of utmost importance in Greece.

In terms of technology, the telecare centre is very flexible when it comes to adding new processes to the existing ones, but the issue of prioritisation and selection of processes to be implemented is a political one.

2.8 Reimbursement model and economic flow

Among the various health and social care actors that are engaged in the integrated care services provision through the eTrikala telecare centre, only the health practitioners are paid according to a reimbursement model. The social care professionals are public servants and paid from the municipality's staff budget.

The health professionals employed at the General Hospital of Trikala, who are public servants under the jurisdiction of the Ministry of Health, receive a monthly salary that includes a contribution for their interaction with the eTrikala telecare centre based on a Diagnosis Related Group (DRG) model. They are also paid a small fee for coordination of cases.

The health professionals employed by the municipality involved in the eTrikala telecare centre are paid on outcomes for the limited number of cases that they can accept. They also receive a small amount for the coordination of cases.

This reimbursement model is directly linked to the model of reimbursement implemented in health care in general and is not an ad hoc model generated for the eTrikala integrated care initiative. Furthermore, reimbursement is provided as part of a national stimulus package which will come to an end.

Under this framework, all the experts consulted agreed that the amount of national and local funds allocated to ensure adequate resources for sustainable change and up-front costs are insufficient to properly sustain the eTrikala integrated care initiative for a wider target population. Moreover, the lack of common outcome-oriented incentive schemes for the care managers and healthcare and social care professionals involved reduces the effectiveness of care integration in the eTrikala initiative.

As to patients, provided they are covered by a national insurance scheme, they get all their expenses reimbursed at a standard percentage, which can reach 100% depending on the severity of their condition (e.g. degenerative conditions, including Alzheimer).

3 Transferability

One of the main drivers for enhanced transferability is the interoperable technology platform upon which the applications/ services are based. eTrikala's telecare centre complies with the HL7 interoperability framework, which is also used as a national standard. Additionally EPSOS was used for a standardised version of the Electronic Health Record implemented in the telecare centre. The above standards are the most commonly used between EU countries and beyond, which makes eTrikala's technology platform fully interoperable.

eTrikala with its telecare centre forms an integral part of the municipality's structure, facilitating transferability at a national level, due to the common organisational and functional framework for the municipalities. This is one of the main drivers of the initiative. One of the main obstacles, however, is the lack of resources, both human and financial, to duplicate and run the infrastructure and network of services that eTrikala currently offers to citizens to other contexts. Another key enabler is broadband internet, which covers most of the municipality's geographical area.

The most successful paradigm of transferability within a Greek context is the Digital Cities initiative in central Greece. 11 Municipalities in central Greece, representing more than 1 million citizens, joined forces to formulate a Digital Community in order to establish telehealth services for patients with chronic diseases. The project was based on the experience of the Trikala telehealth centre. A coordination centre was set up through a framework agreement signed by the 11 Municipalities of central Greece. This telehealth centre provides telemonitoring services to chronic patients and the elderly, and social services to all citizens.

At an international level, efforts devoted to the transfer of experience and best practices have focused mainly on partners which participated in various European projects geographically located around the Mediterranean basin and characterised by strong cultural

affiliation. To date, there are no bilateral projects, but eTrikala continues to be a strong and reliable partner in various consortia. This facilitates the dissemination about its progress among a wider European audience, and there are still opportunities for future collaboration of mutual interest and benefit.

From a technological perspective, the eTrikala experience can be easily transferred with limited investment to those EU countries where broadband communication infrastructure is already in place. The same holds true for the rest of Greece, where the digitalisation effort has enabled the availability of broadband internet in most places. This alleviates the main technical barriers for implementation and puts Greece at a comparable level with other EU Member States. However, there are other highly important parameters that affect the successful transfer of the eTrikala experience both to the rest of Greece and the EU28. These are cultural or even political elements and include:

- Strong commitment from policy makers at a national level.
- Strong commitment by local authorities (municipal or regional, depending on the level of organisation).
- Citizens' awareness of the new services and the benefits they bring.
- Cultural and organisational changes that allow information sharing across different tiers of care and between health care professionals in the same tier.

4 Conclusions

The eTrikala case involves an ICT infrastructure that facilitates patient-centred integrated care services, potentially for the entire population of the city. Due to limited resources and lack of investment capacity, however, the services are currently only offered to patients suffering from type II diabetes, chronic heart failure and COPD. The initiative had extended its services to cover more areas, such as services for older patients suffering from mild cognitive impairment, but these services were suspended in 2013 due to the lack of specialized professionals (e.g. psychologists).

From the beginning, eTrikala SA has promoted the design, development and management of ICT public services for the benefit of the local population on behalf of the municipality. The main promoter in the eTrikala case was the municipality itself, which, in 2008, transformed the office dedicated to the ICT initiatives into eTrikala SA, an ICT company owned by the Trikala municipality and by the local Chamber of Commerce.

The company manages ICT public services and the highly important eTrikala telecentre. This centre aims to provide health and social care to the target patients wherever they are in the territory, integrating health and social care providers in a continuum of care.

The core functionality of the eTrikala telecare centre is the generation and management of electronic care records for all the municipality's citizens. Despite ambitious original plans to cover the whole population, it currently covers only people suffering from Type II diabetes, chronic heart failure and COPD. Efforts have been made in the past, mostly through national- or European-funded projects, to extend the service provision to other socially vulnerable groups, including the Roma population and also other diseases such as mild cognitive impairment. Unfortunately, these services were not sustainable and ceased when funding stopped. Nevertheless, the vulnerable groups supported by the telecare centre are a good example of integration of primary and secondary care together with social care. In

this context, patients, as well as their informal caregivers receive support by means of tele-(video) counselling through structured communication or telemonitoring services. Patients receive care in accordance with their care needs, which are continuously updated in their Electronic Health Records. In addition, the health and care professionals communicate through a well-established and structured channel based on the citizen's Electronic Care Record. This is the real innovation brought about by the approach, as prior to eTrikala, professionals were not formally obliged to communicate with each other and in many cases they were not even aware of each other's practices, which led to fragmented and less efficient care provision.

Despite the lack of counterfactual evidence on the impacts produced by the eTrikala initiative on the local health system, significant impact measures show the benefits of the system in an integrated care context:

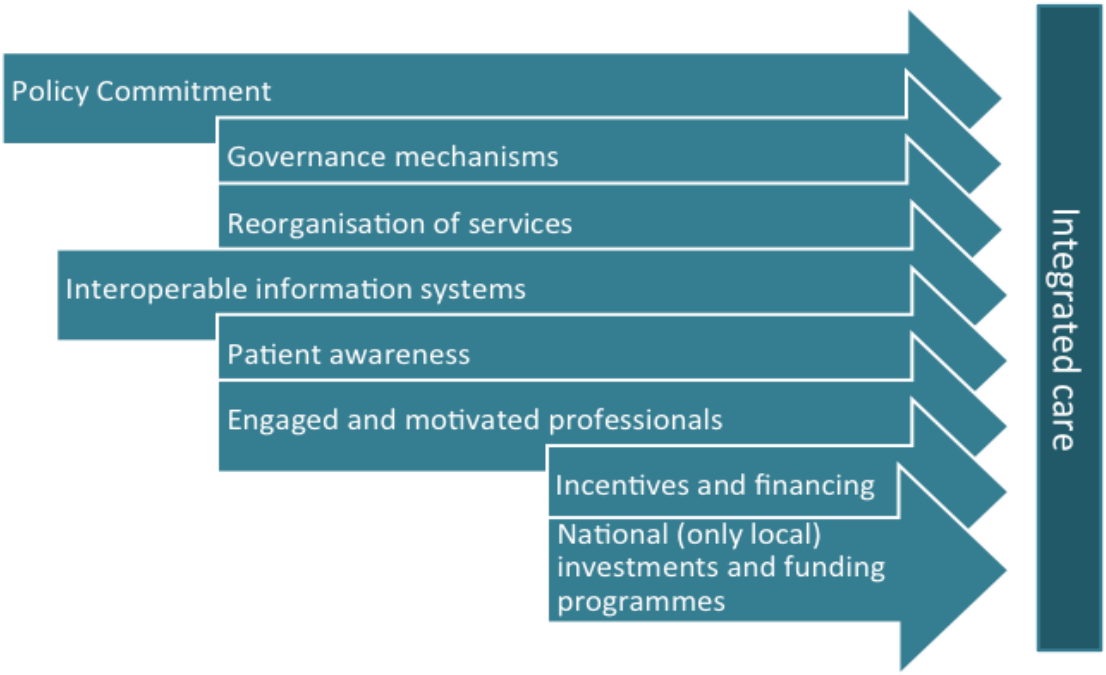
- **Inter-professional teams are available across the continuum of care**. The current organisational model of health services provision requires the involvement of social care professionals at all levels which has been enabled by the eTrikala communication platform managed by the telecare centre.
- **Policy leaders have facilitated the participation of all stakeholders and fostered innovation in the health system**. The introduction of new legislation and the re-organisation of regional authorities that followed have enabled disruptive innovations within the health system, such as the transfer of responsibility for primary health care services to municipalities, alongside social care services.

Nevertheless, in order to exploit the full potential of the eTrikala initiative, the following barriers should be tackled:

- **Lack of a legal and regulatory framework**. The current legal and regulatory framework for clinical practice does not recognise ICT even as enabler for further improvements in the provision of health care.
- **Insufficient national investment and funding programmes**. The current financial situation in Greece is dire to say the least. National investments are rather limited and when they are directed to health care, they mostly cover infrastructure rather than re-organisation needs.
- **Lack of incentives for the professionals involved**. Remuneration for the additional services offered through integrated care is not possible under the current system.
- **Lack of innovation in reimbursement models**. Integrated care is not addressed as a different category of care when it comes to reimbursement models, which affects the end users such as patients and their carers, and causes problems of acceptance.
- **Insufficient policy support**. Despite the fact that policy leaders have facilitated both innovation and participation of all stakeholders in the integrated care effort, the level of policy support can still be regarded as limited, given the low investment in the area.

These barriers have been partially addressed by the eTrikala facilitators, which have pushed forward the development of integrated care services in the eTrikala case. Figure 4 depicts the main facilitators of the eTrikala case.

Figure 4 eTrikala Integrated Care facilitators



Source: Author's elaboration.

Policy commitment and the existence of the MAN infrastructure, the ICT network covering the Trikala Metropolitan area and connecting the public authority buildings, have been the main facilitators of this case. In addition, the political authorities in Trikala have been pushing for the implementation of the ICT infrastructure across the health system, facilitating governance mechanisms to involve all stakeholders in the platform.

Reorganisation of services and participation by professionals could also be considered as important facilitators. The eTrikala initiative has facilitated the cooperation between tiers of care, including patient access to the care continuum through multiple access points. This kind of reorganisation would not have been possible without the involvement of health and social care professionals, especially social care providers and the psychologists of DEKA (the Municipal Enterprise of Social Development), and the General Hospital of Trikala, who have become the gatekeepers of the system. Thus, engagement by professionals has been at the centre of the initiative.

On the other hand, incentives and financing issues are not seen as a main driving force, but appear to constitute the main barriers to unleashing the full potential of the initiative.

eTrikala's telecare centre complies with the HL7 interoperability framework, which is also used as a national standard, together with the EPSOS that is used for a standardised version of the Electronic Health Record implemented in the telecare centre. As these standards are the most commonly used between EU countries and beyond, the eTrikala's technology platform is fully interoperable and could easily be applied in other contexts, provided that all the stakeholders involved are strongly strong committed and there is sufficient investment in the area. Those Greek territories and EU28 Member States where broadband communication facilities are already in place, making the required investment level much lower would be particularly suitable for the implementation of the eTrikala experience.

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