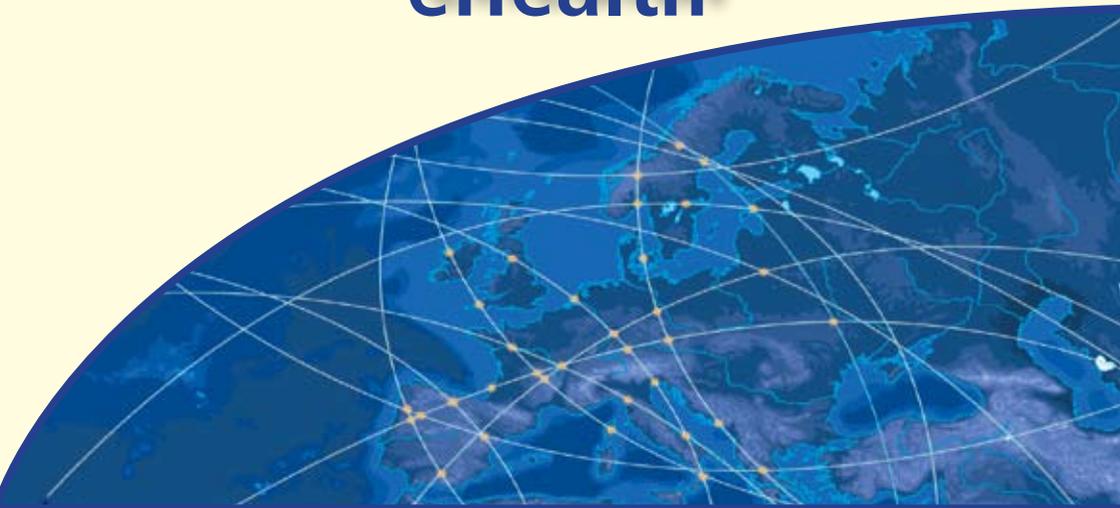




Guide to Regional Good Practice eHealth



Innovative Actions
Network for the
Information Society⁺

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IANIS⁺

Guide to Regional Good Practice eHealth

Regional Challenges and Impact

CONTENTS

FOREWORD	6
1. PREFACE	7
2. INTRODUCTION	8
3. GOOD PRACTICE OF eHEALTH	10
3.1 Evaluation of eHealth projects	10
3.2 eHealth IMPACT	10
4. PERSPECTIVES OF eHEALTH	12
4.1 The citizens' needs perspective	12
4.2 The perspective of healthcare delivery systems	13
4.3 The development of ICT tools perspective	14
4.4 The perspective of policies, rules, laws, and standards to cross-regional interoperability	14
4.5 The perspective of co-operation among healthcare actors for integrated care	14
5. THE REGIONAL DIMENSION ON eHEALTH	15
5.1 Equal access to healthcare	15
5.2 Healthcare delivery	15
5.3 eHealth economics	15
5.4 Regional funding of eHealth	17
6. CHALLENGES FOR REGIONAL eHEALTH	18
6.1 Essential prerequisites for eHealth	18
6.2 Meeting the challenges on all levels	20
6.3 Regional and national differences	21
7. REGIONAL CASES OF eHEALTH	22
7.1 The IANIS ⁺ collection of eHealth projects	22
7.2 Types of eHealth demonstrated by eHealth Cases	23
8. FACTORS FOR SUCCESS OR FAILURE	30
8.1 Important factors for a successful eHealth project	30
8.2 Important factors that can make an eHealth project fail	32
8.3 Summary of success and failure factors to be regarded as Good Practice	33

9. CONCLUSIONS	34
9.1 The coverage of the collection of eHealth projects	34
9.2 Visions versus reality in eHealth projects	34
9.3 Who needs regional experience of eHealth	34
9.4 Regional innovation as Good Practice	35
10. REFERENCES	36
ANNEX I: Factors of success and failure for eHealth projects	37
ANNEX II: eHealth Case Studies from Regions	41

FOREWORD

This “Guide to Regional Good Practice” is one of six such guides prepared in the frame of the IANIS⁺ work programme (2005-07) that has been co-financed by the European Commission, DG Regional Policy. IANIS⁺ has been an information society network programme under the Innovative Actions of the Structural Funds and is a follow-up to a predecessor programme, IANIS (2002-04). IANIS produced ten guides to good practice which were generally well received – and these are still available for download in PDF format from the Competence Centre at the eRegion Hub (www.ianis.net). In preparing and negotiating the work programme for IANIS⁺, it seemed therefore sensible to plan for a number of further guides to regional good practice.

The working methods of IANIS⁺ differed from those of IANIS, especially in two regards. First, at the request of the Commission, IANIS⁺ has always focused very much on information society projects (rather than on regional programmes or strategies) and this has the effect of somewhat narrowing the perspective of these six guides compared to those prepared by IANIS. Second, an important new element of the IANIS⁺ work programme (compared to its predecessor) has been the creation and operation of six thematic work groups. These six groups were charged with the collection and exchange of regional project experiences within their specific domain and for the preparation of these latest guides.

Each work group has been led and motivated by a chair person and we owe them a considerable debt of gratitude and appreciation for their hard work and perseverance. Each work group met on at least four occasions but much of their work has been conducted in virtual mode. Without the effort and contribution of the core membership of each of these groups we would not have the benefit of these guides. To all those who contributed, but especially to those who have acted as case study contributors, co-authors and/or editors for these guides, we are very grateful. These guides were ‘published’ in a first on-line version earlier this year and were presented and debated at the final IANIS⁺ Annual Conference (Bilbao, Spain, 13-15 June, 2007) and subsequently modified and updated for this final version.

We hope that these guides will shed some useful light on regional information society development and that the issues raised, the advice offered and conclusions reached in these guides will be helpful to others in other contexts – helping to avoid re-invention of yet more wheels! As always, we urge some caution in adopting ideas drawn from the experiences of one project in one region. These guides propose, suggest, recommend and offer advice and conclusions – but they are only advice and suggestions. Each reader needs to adopt that which is relevant to them and adapt it as appropriate to their own context. Of equal importance, perhaps, is the diversity of approaches represented by the projects and project experiences upon which these guides are based.

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1. PREFACE

This report shows the result of the work of IANIS⁺ eHealth work group (WG). The WG has collected regional eHealth experiences from around Europe through a number of activities:

- Regional eHealth case studies of which 17 (from 15 regions) are shown in this report
- Four joint meetings of the group of which one was a policy seminar with invited guests from the EU Commission, relevant organisations in the field of eHealth and regional authorities
- A meeting with the European Commission DG Information Society & Media, Unit H1 eHealth
- Collaboration with the eHealth network within the organisation Assembly of European Regions (AER)
- Attendance in recent major eHealth conferences:
 - Personal Health Systems arranged by the European Commission when launching the eHealth part of the 7th Framework Programme, 11-12 February 2007
 - The EU-US eHealth Policy Workshop, 10 May 2007
 - The final conference of the INTERREG IIIB project Baltic eHealth, 21-22 May 2007
- eHealth seminars at IANIS⁺ annual conferences in Blekinge 2006 and Bilbao 2007

The innovation perspective of eHealth in the regions has been the focus for the IANIS⁺ eHealth WG. Regional diversity regarding strategies, policies, and action plans for eHealth can act as a driving factor for successful eHealth projects, but leads also to challenges for interoperability, standardisation, integrity and security.

It is important to learn from others. It may be about how to choose the right technology or what methods to use for implementation. Depending on what area of eHealth, there are numerous projects and up-and-running services from which we can learn. Not to forget there are also many experiences from unsuccessful trials. Even if an eHealth solution has failed in one setting, it can be a success under different circumstances.

The aim of the IANIS⁺ eHealth Working Group was to share experience between regions belonging to the network, and bring up some issues of good practice for regional eHealth implementation. Projects brought up in the IANIS⁺ working group are projects in their own rights, with pros and cons. The projects cover different perspectives and types of eHealth. Some were difficult to evaluate while others are valuable comparable experiences from different settings and circumstances. In any case, we can learn something from all the cases as examples from reality and as a complement to formal evaluations and scientific studies of eHealth.

We would rather use the term good practice than best practice. There is always something good to learn from others while there is hardly any best practice that works under every circumstance.

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2. INTRODUCTION

Information and Communication Technology (ICT) has the potential of changing healthcare services. The use of ICT in the healthcare sector, eHealth, has in recent years started to change medical work in revolutionary ways but the expectations on future benefits of eHealth is constantly high.

The first IANIS project in 2004 described in the report on eHealth, that "eHealth is an umbrella term encompassing a broad range of ICT-driven activities that are transforming the delivery of healthcare"¹. The essence of eHealth, whatever the definition, is that it leads to improvement of healthcare services. Improving quality of care, increasing the efficiency of healthcare work, making healthcare services more accessible and improving the effectiveness of medical interventions and patient care.

In the eHealth Action Plan, 2004, the EU Commission defines eHealth as: "eHealth tools or solutions include products, systems and services that go beyond simply Internet-based applications. They include tools for health authorities and professionals as well as personalised health systems for patients and citizens. Examples include health information networks, electronic health records, telemedicine services, personal wearable and portable communicable systems, health portals, and many other information and communication technology-based tools assisting prevention, diagnosis, treatment, health monitoring, and lifestyle management."²

Many familiar terms are embraced by the concept of eHealth, e.g.:

- Telemedicine
- Telehealth/Telecare
- Healthcare Telematics
- Medical Informatics
- Health Information Management
- ICT in healthcare

All terms with a different perspective or approach to the common challenge of using advanced technology, in the cleverest way, to change and improve healthcare services and public health.

In the first IANIS eHealth report, about eHealth applications for regions, comprehensive definitions and examples of eHealth are presented. In this second report, the focus is on expectations, implementation challenges, benefits and good practice of eHealth based on real life examples from a number of regions around Europe.

eHealth plays a key role for patients but also for regional development. In the European strategy i2010, ICT is regarded as a means to achieving stronger growth and for creating highly qualified jobs in a dynamic, knowledge-based economy³. Since 1988, the European Commission (EC) has been initiating and funding research and development activities for eHealth at about 650 million Euros to approximately 450 projects. eHealth is now on the governmental agenda of EU Members States to be implemented on a broader scale.

¹ (IANIS 2004)

² (Commission of the European Communities 2004)

³ (Commission of the European Communities 2005)

In April 2004, the EU Commission published a European Union Action Plan for a European eHealth Area. Among others, the following missions are mainly addressed⁴:

1. Empowering health consumers (patients and healthy citizens) to enable citizens to manage their well-being through access to qualified sources of health information and active participation in illness prevention, enabling patients to participate, with better knowledge and responsibility, in the processes of care and rehabilitation, through intelligent monitoring systems as well as through relevant and personalised health information
2. Assisting health professionals by providing health professionals with access to timely relevant information at the point of need, new tools for better management of risk and systems to acquire up-to-date biomedical knowledge and
3. Supporting health authorities and health managers by helping health authorities to manage properly the ongoing re-organisation of health delivery systems.

In order to realise the EU Action Plan on eHealth, each Member State should develop national strategies for eHealth. In the recent eHealth ERA report, the EU Commission presents a follow-up of the progress at national level. In the majority of the EU Member States, eHealth is either a part of a national ICT strategy, along with eGovernment issues, or a part of a national health and social policy strategy⁵

Since healthcare in most countries is the responsibility of regional and/or local authorities, the EU Action Plan and national eHealth strategies will not be sufficient. For things to happen there is a need for regional strategies and regional decisions, because it is in the regions that eHealth services mainly should be realised. What is apparent is the need for concerted action and cross-regional and cross-country interoperability of eHealth. Healthcare needs to change and services should be accessible, efficient and of high quality in a Europe where people moves around and may have other preferences than before. eHealth should contribute to this.

⁴ (Commission of the European Communities 2004)

⁵ (Commission of the European Communities 2007)

3. GOOD PRACTICE OF eHEALTH

There are often high expectations on how new technology will change the world, or at least the target area or customer group. The introduction of information and communication technologies in the healthcare sector is no exception to this. As soon as it is possible to imagine what the technology under optimal circumstances can accomplish, there are also expectations that hospitals, healthcare authorities, regions and nations should realise this potential. However, the circumstances for change in healthcare are not always optimal. Healthcare processes are often complex and diverse and healthcare providers are pressed by financial constraints.

eHealth is not one single technology or application, which delivers immediate benefits. A huge amount of computer applications, systems and networking solutions used in healthcare can be regarded as eHealth. Also on-the-shelf products are eHealth if it is used to improve the delivery of care. Besides computer applications, eHealth is also about cognitive, information processing and communication tasks for medical practice, education and research⁶. The essence of eHealth is that it should facilitate the transforming of healthcare processes for the benefit of patients and the healthcare system.

3.1 Evaluation of eHealth projects

So far, there are not many comprehensive evaluations of eHealth implementations that tell a global truth on what is best practice. It is very common that implementation of ICT, be it in healthcare or elsewhere, is poorly evaluated. All too often, the realisation of the vision and expected outcome of the “eHealth solution” is more important than planning a thorough evaluation. Denis Silber says that there is unfortunately an evaluation paradox. Evaluation tends to be done during a trial or pilot period, when it is too early to measure a sustainable outcome of the project. Also, the larger the scale of implementation, the more expensive it is to measure⁷. Evaluation of ICT may also be complicated by a constant technological progress that changes the scenery of what is measured and by organisational change following the implementation of eHealth.

In a recent report on economic benefits of eHealth, Stroetmann et.al discovered that it takes four years, on average, to reach a level of benefits that exceed the costs⁸.

3.2 eHealth IMPACT

In the eHealth IMPACT report⁹ ten carefully selected cases of eHealth were evaluated with regards to costs and benefits. The main types of benefits measured were quality, access and efficiency.

⁶ (Iakovidis, I., Wilson, P. et al. 2004)

⁷ (Silber, D. 2004)

⁸ (Stroetmann, K.A., Jones, T. et al. 2006)

1. Quality included factors such as informed citizens and carers, timeliness of care, safety and effectiveness, but also streamlining of healthcare processes
2. Access has to do with healthcare being available to all those in need, when and where they need it. Improved information flows and use of different forms of eHealth solutions may lead to better access both with regards to capacity and geography
3. Efficiency benefits consist of improved productivity and optimal use of healthcare resources. The authors state two common signs of improved efficiency i.e. time savings and cost avoidance

Proven or potential benefits of eHealth are related to all the above measures as values of improvements or savings. There are also direct economic benefits in the form of cost-savings for healthcare providers and patients, and indirect savings of costs that would have appeared in the future without the use of eHealth solutions. Sometimes an investment, e.g. in healthcare networks for electronic prescriptions, show a return on investment after quite a long time but the alternative cost of having not invested should have been enormously high. This is the case in both Sweden and Denmark shown in the eHealth IMPACT report¹⁰.

⁹ (Stroetmann, K.A., Jones, T. et al. 2006)

¹⁰ (Stroetmann, K.A., Jones, T. et al. 2006) pp. 35 and 45

4. PERSPECTIVES OF eHEALTH

eHealth is an interdisciplinary area that involves at least two complex disciplines, namely Information and Communication Technology (ICT) and Health Science. Therefore, the complexities of eHealth must be broadly approached from a social-technical perspective. It needs efforts from areas of trust, ethical, judicial, economic, political, informatics, spatial technologies, and methodologies. No organisation can manage a successful eHealth project without joint efforts by several disciplines. The most obvious being medicine and ICT.

The broad perspectives of eHealth can be described in many dimensions, which are also reflected in the cases included in the work of IANIS⁺, for instance:

- The citizens need perspectives
- The perspective of healthcare delivery systems
- The development perspective of ICT tools
- The perspective of policies, rules, laws, and standards to cross-regional interoperability
- The perspective of co-operation among healthcare actors in order to provide an integrated healthcare services to citizens

4.1. The citizens' needs perspective

Citizens' needs for healthcare services have changed just as society has changed. Even though people are healthier and live longer, the demand for healthcare services has increased. There is also a change in circumstances related to:

- Development of medical technology (increased possibilities)
- Ageing population (increased need)
- Increased mobility of people (changing the needs for healthcare delivery)

By studying eHealth projects and actions in Europe, in this project and by other initiatives such as the eHealth IMPACT study, we can get a hint on the trends in eHealth:

1. Monitoring:

- Continuous (on-line) monitoring of vital signs, such as EKG, blood pressure, blood glucose, body temperature, body alarm clock
- Monitoring and central switch-off for 'good night' 'good bye' functions, environment alarm

2. Communication /accessibility:

- All measured vital signs should be sent first to a database and if the value is abnormal compared to a preset value in the database a system should be directed to send an alarm to pre-defined care providers

- Access medical records from wireless portable computer that brings together at the point of care all information relevant to the care of patients, and even together with relevant knowledge and evidence.
- Renewal of prescriptions, booking appointments, and questions to care providers

3. Knowledge and decision making:

- Public medical advices and Q&A services armed with search engine FAQ
- 'My journal' in which patients medical history can be stored as a profile to decision support and advices from care providers
- Making diagnoses, detecting trends and react on it with devices as well as with professional services

4. Support for relatives and citizens' social life

- Provide psychological support to contact relatives by video chat
- 'Community' forum where people exchange experience and advice

5. Cross-boarder or cross-regional care

- Use of medical expertise wherever it is located for shortening waiting times
- Sharing resources from the ones with access to the ones in need, e.g. bridging lack of radiologists in some regions or countries

4.2 The perspective of healthcare delivery systems

Health and social service provision is still institution centred. To gain access to the services, people need to go to several services separately, because they are not synchronised nor delivered as patient-centred services in the home. Many elderly people have several diseases and varying needs and to run from one place to another can be very troublesome. In many countries, primary care is of high quality, but still there is a need of a new perspective to re-organise healthcare delivery systems from the institution centric paradigm to the home centric paradigm. ICT can make this paradigm shift possible, together with the re-organisation of the healthcare system.

To re-organise the healthcare delivery systems from the institution centric to citizens' and home centric does not mean to move all services to home. Instead, it means effective use of the resources in the hospitals to deal with those healthcare problems that cannot be dealt with at home even by use of advanced ICT tools. By reducing unnecessary visits to hospitals through use of ICT supported communication, remote diagnoses and monitoring, some serious healthcare problems such as surgery, complicated diagnoses, or face-to-face meetings can be effectively planned and performed.

4.3 The development of ICT tools perspective

ICT has changed our ways of living, doing business and services. For the healthcare services there is still much to improve. Often ICT solutions have a bad design, not adapted to the context of healthcare and not optimal for interaction throughout the healthcare chain. The development of ICT for healthcare is not always in line with the needs of health professionals and is not always taking into account the complexities of healthcare processes. The traditional way of designing ICT is mostly focused on technology and functions. To support healthcare, the design of ICT must adapt a social-technical approach. This social-technical approach requires the development process to be 'User centred' and 'Holistic'. The needs of users and the way that the users would like to use the ICT are very sensitive to the success or failure of an eHealth project. Involving the users in the development process (not only for accepting a given solution) is one vital factor identified by our studies of successful eHealth projects.

4.4 The perspective of policies, rules, laws, and standards to cross-regional interoperability

Regions are the most basic units in healthcare systems. The variety of regions regarding policies, strategies, and action plan for eHealth have been both a driving factor for successful eHealth projects, but also challenges for interoperability, standardisation, and security. Increased mobility of people because people now have more possibilities (or have to) to find a job, to live, and to travel, asks for the healthcare sectors to provide citizens with healthcare even across the border of regions and countries. However, this is far from reality. From citizen and patient's perspective, the system is too segregated and regionalised to achieve a holistic healthcare. Due to different interpretations of rules, laws, standards, terminologies, regulations, and business processes etc. in each region, the medical record of the patient cannot always be shared between different actors across regions. The interoperable healthcare from citizens' perspective will need high-level regulations (EU) but also regional willingness to meet the new reality.

4.5 The perspective of co-operation among healthcare actors for integrated care

The more complicated and specific knowledge about human health is, the more sub-specialised health care staff will have to be in order to meet the needs of the patients. When people have multi-diseases, especially elderly people, their multiple needs must be co-operatively handled by different specialists. This means that even though several actors from different units are involved there is a need for transparency between them. Otherwise, certain needs of the patients will be landed in a 'grey zone', i.e. no one care and no one knows who is responsible.

5. THE REGIONAL DIMENSION ON eHEALTH

5.1 Equal access to healthcare

Equal access to quality healthcare is an overall goal in many countries worldwide, and is a primary priority for the World Health Organisation. Already in the first WHO declaration on Health for All, in 1978, it was stated that “attaining health for all as part of overall development starts with primary health care based on acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and the country can afford”¹¹. eHealth is now becoming such an acceptable method and technology. Then the important issue is who will be responsible for the development, introduction, usage and, not least, funding of eHealth systems and tools?

5.2 Healthcare delivery

Healthcare systems vary between different EU Member States. In some, there are regional authorities in charge of healthcare services to citizens and in some others, there are national authorities, like NHS in UK. In many countries, there are also local authorities responsible for social services and elderly care, which is also embraced by the potential improvements of services by the introduction of eHealth. The actual delivery of services varies from public healthcare institutions to private healthcare providers.

Reimbursement for healthcare services also varies significantly from one country to another, from being covered wholly by national funding to a mixture of insurances and patients’ own payments.

5.3 eHealth economics

With regards to funding of eHealth there are several stages in the eHealth lifecycle that need to be funded (and drawn benefits from). The eHealth IMPACT report suggests three periods to be relevant for eHealth investments¹²:

1. Planning and development
2. Implementation
3. Routine operation

In real life this may in many circumstances be an iterative cycle since many eHealth applications are further developed, adapted and changed over time. Even though each step has to be financed and, not to forget, drawn benefits from. For industrial investments, there are easy investment business models that are used but in complex professional knowledge based organisations such as healthcare this seem to be not as simple.

¹¹ (WHO 2005)

¹² (Stroetmann, K.A., Jones, T. et al. 2006)

In a standardised production line, there is no option other than to use an equipment or system included in the production process. In the healthcare sector, doctors or other health professionals may have many options other than to use a tool, system or equipment they are not convenient with. Thus, usage is key in order to make a return on investment but in healthcare it's not as simple as in other sectors.

5.3.1 Planning and development

Planning and development of eHealth solutions is all too often done only with the local needs in focus. Even though active participation by users is essential, it is equally essential to look further than the local healthcare unit. Whatever the eHealth tool is, there is an obvious need to follow established standards and other requirements for interoperability. The world of implemented eHealth solutions is unfortunately full of "isolated islands". Technical development and research is actively supported by the European Union, for example in the seventh framework RTD programme, and by other national and international sources. When it comes to funding of regional eHealth development and implementation these needs are politically weighted in the same balance as other needs from clinics and healthcare units. Thus, proof of benefits is key to sufficiently high priority at the investment agenda.

5.3.2 Implementation

As will be shown later in this report most of the participants in the IANIS⁺ eHealth Work Group regard active user involvement essential for successful implementation of eHealth solutions. There is a cost for this in the form of "lost" working hours, perhaps loss of revenues for patients, problems in day-to-day operations and other disturbances during implementation.

More obvious, costs for implementation are the cost of IT consultants, hardware and software, enhanced technical support and training of users. The latter tangible costs are easier to take into account in the implementation budget than the costs representing "initial negative benefits". The eHealth IMPACT report discovered that on average there is a four-year period before economic benefits are positive, for the studied cases¹³. Thus, endurance is key to achievement of future benefits.

5.3.3 Routine operation

This period is when the positive benefits of the use of eHealth could be harvested, if it is used as intended (!). Often it is also in this period that lack of use, misuse or other problems arise. Sometimes this period is ended with a phase-out of the eHealth solution due to lack of benefits or simply non-use of the application. For justifying the costs of operations, such as server operations, systems management, technical support, security and adjustment and refining of the eHealth application, the presence of benefits is essential.

¹³ (Stroetmann, K.A., Jones, T. et al. 2006)

For this to happen, it is important to have strong incentives for using the system. For an eHealth application that leads to direct economic benefit for the individual doctor or the local healthcare unit this may be no problem. In the cases of eHealth where the main beneficiary is external to the core healthcare unit, e.g. the patient, other healthcare units or parts of society, the issue of incentives for use is somewhat tricky. Positive benefits and incentives for use are the keys to justifying cost of routine operations.

5.4 Regional funding of eHealth

Investments in eHealth is politically, in one way or another, always weighted against the potential impact and expectations on added value for money, in the same balance as other needed investments in healthcare. This situation is complicated by the common situation of lack of public resources that seem to be a law of nature.

In some countries where healthcare is a national responsibility, such as in UK, and in financially stable regions there are deliberate long-term ventures in eHealth.

In other regions where the sum of all needs exceeds available resources and the path to a mature eHealth infrastructure is too far away, decisions on investment in eHealth is not all too easy. In this situation, it may be even more important to be able to learn from examples of good practice, to have a dialogue with patients on their needs and to involve physicians and health professionals in the decision process.

6. CHALLENGES FOR REGIONAL eHEALTH

Obviously financing eHealth is a challenge but for the success of implementation of eHealth and for allowing eHealth to make a difference there may be a number of issues to be aware of. If they are not successfully handled, there will be no willingness to pay for eHealth and eHealth will not make the expected contribution to increased accessibility to quality healthcare services.

6.1 Essential prerequisites for eHealth

In a recent article Michael Rigby discussed the problem of eHealth often being tested and developed in sites (alfa-sites) where engagement and involvement are high but the next step is not followed by enough proofing of evidence (in beta-sites)¹⁴. The early telemedicine applications with peer-to-peer connections of video-conferencing between enthusiastic colleagues were indeed examples of this. There are numerous followers of widespread roll-out of telemedicine video-conferencing that did not succeed to replicate the success of the enthusiasts' attempts, or only partly so. Rigby argued that there is a need for:

- Empirical evidence
- Beta piloting or replication studies
- Appreciation of the magnitude of change for health professionals and systems in electronic working compared to paper-based systems

He suggests that since healthcare is currently fond of the e-prefix there are a number of factors to take into account for the successful implementation of eHealth:

- Evidence
- Evaluation
- Equipment
- Education
- Empowerment

¹⁴ (Rigby, M. 2006)

6.1.1 Evidence

In the previous chapter, the need for proven benefits for motivating regional or national decisions was treated. Rigby also holds this as important. Furthermore, he also lists a number of other issues where there are needs for evidence:

- Applications: what to choose, what is optimal at least risk
- Configuration: evidence from comparable situations is needed
- New style e-working: need for best practice and techniques
- Staff preparation: what are the best preparation methods
- Facilitating change: what are the best approaches in different situations
- Successful leadership: leadership styles for modernisation, and
- Benefits realisations: It is one thing to say that new systems will be better, it is another to achieve identified benefits, and this must start with benefits identification and move into a benefits realisation

6.1.2 Evaluation

Lack of comprehensive evaluation of eHealth has been mentioned in previous parts of this report. Rigby also says it is important to allocate funding for evaluation and that evaluation is as important as the original research to validate the technique.

6.1.3 Equipment

The equipment needed for the eHealth solution should be fit for the purpose. If not, it will not be used as intended or not used at all.

6.1.4 Education

By this, Rigby does not only mean simple training for use of applications and equipment. Furthermore, it has to do with how doctors and other health professionals undertake their duties. How they are educated (trained) to behave and work and how this could be improved with the use of new technology. There is obviously a need for specific training in technology and new working procedures but there is also a need to adapt the basic medical education to the new circumstances eHealth impose on healthcare delivery. The very last case in Annex II of the IANIS⁺ collection of eHealth cases, CMAT in Andalucia is an interesting example of using advanced ICT in the medical education and training of health professionals, which may have a high impact on both the actual training and the further use of technology.

6.1.5 Empowerment

Rigby stresses the importance of ensuring that the users of eHealth applications instill a feeling of empowerment. There are evidently examples of health care professionals being victims to eHealth, and this should definitely be avoided. What is not brought up by Rigby but has been treated in the IANIS+ eHealth group is the empowerment of the patients. Not least by all information being available on the Internet and databases, formerly exclusive to physicians, patients are better informed and ready to actively participate in the decisions regarding their own health and treatment. This empowerment of the patient is one of the most revolutionary effects of the "Health information society".

6.2 Meeting the challenges on all levels

Healthcare is no longer a local concern. Concerted actions in the development and implementation of eHealth are needed for many reasons, for example:

- People move within countries and abroad
- Healthcare staff moves
- Specialists are needed at many places
- Specialists need to collaborate

The eHealth Action Plan from 2004¹⁵ supports the EU i2010 strategy¹⁶, and aims for the improvement of healthcare, with the use of eHealth. The i2010 Strategy has three priorities:

- To create a Single European Information Space, which promotes an open and competitive internal market for information society and media services
- To strengthen investment in innovation and research in ICT
- To foster inclusion, better public services and quality of life through the use of ICT

The i2010 and the eHealth Action Plan were followed by agreements between all the EU Member States to develop national strategies. In 2006 most EU Member States had developed national eHealth strategies, either as separate eHealth strategies or integrated as parts of national health strategies or national ICT strategies. In a recent follow up report¹⁷, the different national strategies for eHealth are presented.

In those countries where healthcare is a regional responsibility it will not be enough to only have a national eHealth strategy. It has to be followed by regional plans and roadmaps for how to proceed with the development of eHealth.

¹⁵ (Commission of the European Communities 2004)

¹⁶ (Commission of the European Communities 2005)

¹⁷ (Commission of the European Communities 2007)

6.3 Regional and national differences

Healthcare is either a national or a regional responsibility and thus organisation and funding of healthcare differs from country to country. In the same way, the use of ICT in healthcare differs and the level of use of eHealth application differs. In some EU Member States such as the Scandinavian countries and UK their national healthcare networks have been developed. In an increasing number of regions throughout Europe, there are regional healthcare networks for facilitating the use of interclinical/interhospital eHealth applications, patient record systems and medical communications. The availability of broadband connections between hospitals is essential for the use of eHealth between hospitals.

For citizens to use eHealth applications from home or eHealth for elderly care, the availability of broadband to homes is an important issue, where there are significant regional differences throughout Europe¹⁸.

The trends and needs for eHealth applications are fairly common throughout Europe even though priorities vary and the level of utilising eHealth differs from nation to nation and region to region. The fact that the development and implementation are not the same everywhere makes it possible to learn from each other. Even though there is perhaps not an ultimate best practice, there are definitely many good practices to learn from.

¹⁸ The issue of infrastructure and broadband is treated by another IANIS+ working group

7. REGIONAL CASES OF eHEALTH

7.1 The IANIS+ collection of eHealth projects

The IANIS+ eHealth Work Group collected 17 cases¹⁹ of various kinds of eHealth projects from the participating regions. By necessity, they are quite different but some factors were requested for inclusion in the collection of case studies:

- The focus of a case study should be on innovation, rather than on impact. ‘What makes a project innovative?’ is the crucial question. When a project is highly innovative and learning points can be drawn from it, the project does not necessarily have to be successful in the broader sense
- The regional dimension is crucial
- The projects should fit in the definition of eHealth²⁰

7.1.1 Geographical spread of submitted cases

The chosen eHealth cases come mainly from IANIS+ and eris@ (European Regional Information Society Association) member regions, and their distribution is shown in the map.



¹⁹ A summary of each case is provided in Annex II of this report

²⁰ According to e.g. the EU Commission eHealth Action Plan.

7.2 Types of eHealth demonstrated by eHealth Cases

The 17 cases were sorted into categories for the sake of comparison, even though some of them can be regarded as belonging to more than one type of eHealth. The categories were:

- Health information sharing and seamless care – 5 cases
- eHealth product development and implementation – 4 cases
- Medical networks and hospital applications – 3 cases
- Cross-boarder eHealth – 2 cases
- Security infrastructure – 1 case
- eHealth for training and education (eLearning) – 2 cases

The group has also come across a number of related cases, e.g. cases submitted to other IANIS⁺ WGs that comprises some eHealth, but also Regional Innovative Actions Programmes (RIAP) that includes actions or projects in the field of eHealth. The boundary between eHealth and other types of “e’s” is not and cannot be distinct. Some of the most interesting cases are not only eHealth, such as the Spanish CMAT, which is by definition, both eHealth and eLearning and cases concerning eHealth networks can be regarded as both eHealth and infrastructure.

7.2.1 Health information sharing and seamless care

The five cases included in this category span a wide spectrum of health care services. The cases are

Project acronym / name	Country	Region name
Emergency Service Zeeland e.a	NL	Zeeland
E-care	IT	Emilia-Romagna
Seamless healthcare chain supporter by ICT - OVK	SE	Blekinge
e-Heart Failure	IT	Trento
Eava	FI	West Finland

In these projects, the most common objectives are the improvement of quality and/or efficiency of care through sharing medical information between several actors in the chain of care. Different parts of this chain are covered by the projects. For instance, the RIAP project of Emergency Service Zeeland is about sharing information between ambulances and emergency departments and thus improves the quality and security of acute care. E-care from Emilia-Romagna is a wide project covering the sharing of information between primary care and specialists as well as services to the patients such as medical call-centre service and booking of appointments.

The OVK project from Blekinge, Sweden was the first project in Sweden developing a system for sharing information related to patients' admission to hospital between the hospital and primary care and home care. e-Heart Failure was a proof-of-concept project in Trento for testing a diagnose specific Electronic Health Record for sharing information about patients with heart disease between different actors involved in the care process. The project Eeva from West Finland aimed for similar objectives but in the care of patients with dementia.

Examples of good practices:

- User driven projects often initiated by needs from users and/or patients
- Tangible effects in the form of increased quality of care and improvement of care processes
- Strong political support

The importance of having the right people i.e. health care staff involved in the development and implementation is raised by most of the projects.

Issues and problems:

- Organisational barriers between different healthcare actors/clinics
- Lack of infrastructure and necessary clinical systems. In some case the opposite, availability of good infrastructure was a strength
- Lack of common healthcare processes

Issues to be dealt with in these types of eHealth projects are most often related to organisation, management and processes.

7.2.2 eHealth product development and implementation

The EU Innovative Actions Programme funded half of the cases in this category. They are all innovative and experimental, but not necessarily implemented solutions

Project acronym / name	Country	Region name
Health Account - Patient's Record on the Net	FI	Turku
Mobile Applications for Healthcare	DE	Bremen
Wireless protocol for the cardiological monitoring	IT	Emilia-Romagna
Mobinet - Pilot network implementation for the effective health monitoring in remote areas	GR	Central Macedonia

The Health Account product from WM-data in Turku, is an example of the trend of personalised patient centred health records on the internet.

Mobile Applications for Healthcare in Bremen was a research project for studying, testing and validating mobile applications and devices for healthcare use. The cardiological monitoring project from Emilia-Romagna included technical tests and some implementation of cardiological monitoring using mobile technology. Mobinet from Central Macedonia tested a range of medical mobile devices and vital signs monitoring devices sending data to primary care and specialists.

Examples of good practices:

- Involvement of users, which is a key factor, for testing applications and devices
- Commitment of project management
- User attractiveness of the products tested, developed or implemented

Issues and problems:

- It was not easy to arouse interest of the users: usually, they have other problems at the moment
- Conflicting interests between various actors in health care sector
- Overcoming organisational barriers and problems with engagement of hospital staff when using telemedicine applications from remote sites.
- Compatibility and technical issues

It seems that these types of projects heavily rely on commitment of people on different levels, managers, and project staff and very much on users for testing and implementation. Most of these projects have raised the need for the engagement of healthcare staff and problems with the same.

7.2.3 Medical networks and hospital applications

All of these projects aim for efficient communication of medical data, at a broad regional level including several actors within and between hospitals.

When it comes to medical networks there are both infrastructure issues, e.g. the availability of broadband, and an application or service component, e.g. issues of interoperability and inter-organisational collaboration.

Project acronym / name	Country	Region name
The networking of health services in the Valle del Chiese	IT	Trento Province
RIM - Image Medical Network	FR	La Reunion
PACS - Picture archiving and communications systems	CZ	Vysočina

The Networking project in Valle del Chiese was part of the Regional Innovative Actions Programme in Trento. It aimed at establishing a networking infrastructure as well as certain healthcare services, such as telecare and telemedicine, sharing of medical records between certain actors and electronic prescriptions to the pharmacy. Also, communication of medical reports after hospital care (such as the OVK project in Blekinge) was included. The objectives of the networking project in La Reunion were to enable different forms of medical communication between the hospitals on the island, especially teleradiology. The PACS project in Vysocina was a project for the implementation of digital radiology in the Jihlava hospital, with planned communication to other hospitals in the Czech Republic.

Examples of good practices:

- Reduction of time for accessing medical data, e.g. clinical reports in Valle del Chiese and accessing radiology images in La Reunion and Vysocina.
- In La Reunion the first real healthcare infrastructure that will allow for more applications and benefits in the future
- In Vysočina, using innovative technical solutions led to half the normal cost of similar projects

Communication of medical data within a region, within a hospital or within a clinic is often essential for process development in healthcare. These three projects are all samples of the needs and benefits of these projects. The technology used is often state of the art but the innovation lies in utilising the potential of streamlining the healthcare services.

Issues and problems:

- Interoperability between systems
- Lack of time compared to estimate/demand in the RIAP programme
- Initial lack of broadband in the case of La Reunion

When it comes to communication between systems from different vendors and managed by different organisations/hospitals there are very often interoperability problems. It can be due to different technical standards but as often due to different set up or different use of terminology, i.e. semantic interoperability problems. Interoperability is a common challenge in many eHealth projects.

7.2.4 Cross-boarder eHealth

Cross-boarder eHealth services is about taking communication one step further, with potential benefits but also with certain problems with interoperability, technical solutions, legal regulation, reimbursement etc.

Both the projects in this group are about radiology readings services.

Project acronym / name	Country	Region name
EURAD	DE	Baden-Württemberg
Telemedicine Clinic - Offshore Spanish teleradiology for Swedish hospitals	SE	Västernorrland

EURAD was an eTEN project with the objectives of establishing a decentralised teleradiology service for cross-boarder as well as national sharing of radiological competence. The national service is established but the international part will be established later than expected.

Telemedicine Clinic is a service that started from the beginning as an international service with its base in Barcelona. The first customer was a small hospital in Västernorrland, in northern Sweden, and the second one was the larger hospital of Borås in southern Sweden. The service was then rapidly expanded to large-scale readings from the United Kingdom. The Telemedicine clinic is chiefly specialised in MR and CT imaging but reads also conventional radiology, and it makes use of a decentralised structure of contracted radiologists from different countries around Europe.

Examples of good practices:

- Reducing waiting times for radiology due to lack of radiologists
- Allowing for high quality using the best available specialists
- Productivity gains allowing for competitive pricing.
- Functional work-flow is absolutely essential

Issues and problems:

- Interoperability problems between different radiology systems
- Quality assurance of readings essential for trust of cross-boarder services
- Suspiciousness and lack of trust from local physicians occurs
- Uncertainty of legal regulations.

The legal situation concerning this type of medical cross-boarder communication seems to be solved but nonetheless, trust is an important issue. It is expected that the need for cross-boarder healthcare of different kinds will increase in the near future. At the end of 2007, the EU Commission is expected to present a proposal for the regulation of cross-boarder care and patient mobility.

7.2.5 Security infrastructure

The issue of secure access to medical data and/or storage of some medical data with use of secure digital cards is exemplified with one case from Germany.

Project acronym / name	Country	Region name
eHealth Card Schleswig - Holstein	DE	Schleswig - Holstein

The project Gesundheitskarte Schleswig-Holstein is a large project involving a large number of health professionals and citizens, and is based on secure certificate technology and VPN solutions for access to medical data. From the start, trials were conducted with 150 health care personnel and 1000 citizens but later the project was expanded to 500 staff and 100 000 citizens. The project has the potential to be expanded to the rest of federal Germany and possibly to be used as a model for European Union initiatives in this field.

Even though only one case is purely about secure health cards, several of the other submitted projects have also used this technology, such as the Emergency service in Zeeland and the Networking service in Valle del Chiese.

Examples of good practices (for this project):

- All regional players in healthcare were involved, so use-cases could be optimised from end-to-end and discussions could be made without national political “overhead” and influence
- Bottom-up development in small steps ensured participation by users, so targets could be reached in a short time with high acceptance
- Political support helped getting the right people involved, so communication and decisions-management could be made very efficient

Issues and problems:

- The agreeing of common targets between health-insurance organisations and health-professionals is tricky when discussing funding-themes and cost/usage
- Some health-professionals dislike evaluation, because they are afraid of being benchmarked in medical topics
- Industrial partners try to place their specific products to be used as “standards”

The issues encountered in this project are probably general in regard to different stakeholders and financing of solutions. Also, the other issues raised would be general for many eHealth projects. The “good practice” and benefits of starting this kind of project that should in the end be national on a regional scale is worth mentioning.

7.2.6 eHealth for training and education

This category could equally be defined as eLearning, in healthcare. Using ICT for training and education of health care staff is included in the most common definitions of eHealth and telemedicine, even though not explicitly in the EU definition referred to in the preface of this report. Healthcare, being wholly dependent on knowledge, experience and evidence, is by definition dependent on continuous development and training of healthcare staff. Therefore, it is also sometimes difficult to separate the actions of the medical staff from continuous training.

Project acronym / name	Country	Region name
EDU - HEALTH	IT	Abruzzo
CMAT	ES	Andalucia

The EDU-HEALTH project in Italy developed an eLearning multimedia platform for use by the 16000 health care staff in the region. The intention is to expand the service with different types of courses that will be accessible from the local sites in hospitals and health care units.

The CMAT project (Complejo Multifuncional Avanzado de Simulación e Innovación Tecnológica) built up an advanced centre for education and training of physicians and medical staff, in the Health Science Technological Park in Granada. It comprises e.g. robotic simulation, virtual simulation, actor-based simulation, video analysis and eTraining for different medical situations and purposes. Even though the centre is technically advanced, it is, as far as possible, based on low cost open source technology.

Examples of good practices:

- eLearning for healthcare staff allows for flexible training as well as accessibility for staff otherwise not reached by training
- For CMAT integration in the Regional Innovation, Information Society and Health Innovation Strategies, guarantees continuous funding
- Wide impact in the quality of public health services, as an engine for productivity and growth

Issues and problems:

- Technical issues may occur due to multimedia compatibility
- Funding. High quality multimedia and eLearning can be very expensive to develop
- For CMAT specifically the degree of innovation was too high for the private sector ICT solutions to provide on the shelf products, and therefore in-house development was necessary for most applications

8. FACTORS FOR SUCCESS OR FAILURE

When and how is it possible to measure success or failure of an ICT project? This has been discussed in the IANIS⁺ eHealth WG and also what constitutes a success or a failure. There is no ultimate answer to this, since a seemingly unsuccessful project can deliver a valuable learning experience necessary for the success of following projects. The eHealth IMPACT report, referred to previously, stated that economic benefits are shown on average after four years. Other benefits may appear at other intervals and that depends on types of application. Infrastructure such as regional or national eHealth networks takes much more time to develop and thus the benefits are to be seen much later. However, when the infrastructure is in place, it may facilitate benefits from added eHealth applications faster than if the infrastructure was not present.

What makes an eHealth project a success with tangible benefits or a failure where the application is not used as intended or does not show expected benefits? Probably there is no distinct boundary between success and failure. It may be a matter of degree or a matter of perspective. No projects are similar to others due to differences in local circumstances, human factors, technology or financing. Even though it is possible, by experience, to identify a number of factors that may constitute prerequisites for success or failure, the outcome of a project can very well be the result of coincidence or luck/bad luck. Whatever determines success or failure, the common view of the eHealth WG is that the experiences drawn from many projects are the most important source of information for further successful implementation of eHealth²¹.

At a round-table meeting, the participants of the eHealth working group were asked to list the three most important factors for success and failure. These were grouped according to the type of factor. However, there are often not distinct boundaries to which group a certain factor belongs, and several factors can belong to more than one group. The success/failure factors may also depend heavily on local circumstances.

8.1 Important factors for a successful eHealth project

User/Organisation

- Innovative projects work only with a well defined, small group of actors to collect experiences
- Discussion/Survey with requests of the users, for the final acceptance of the solution
- Involve the medical staff (nurses, doctors), Importance of training
- Users' need must be in focus
- Involvement of citizens/patients
- Professional esteem
- Clinical need and strong patient focus

²¹ The factors grouped by project are enclosed in Appendix

Management/Decision

- Political and social support is a must
- Bottom up strategies have to be preferred
- Long-term view on projects
- Commitment of clinical leadership and policy support
- Active participation of regional healthcare actors, hospitals and municipalities
- Predefined goals for investment

Economy/Incentives

- Health benefits have to be combined with business benefits
- Political support and feasible funding
- Attractiveness – project solves problems + IMPACT
- Check who will pay (how much) for the eHealth service in question
- Technical solution is secondary to workflow organisation/money
- Incentives important (economic and organisational) – “what’s in it for me?”

Project management

- Involvement of all key stakeholders
- Multidisciplinary approach that involves politicians, specialists, researchers and business
- Real motivation
- Bottom-up ↔ Top Down Together (tactical ↔ strategical)
- Public-private partnership
- Helicopter view
- Bottom-up approach
- Commitment
- Talk to experts, establish relationships

Application/System

- Meeting an explicit or latent demand – solve a real problem
- User-centred design

Technical

- Choosing the right technology, continuous technical support
- Interoperability and open standards
- Lack of prestige with regards to technical choices

8.2 Important factors that can make an eHealth project fail

User/Organisation

- Inability to adapt the strategy to changing needs/environment
- Do not reorganise healthcare processes while establishing new technologies
- Lack of involvement of actors – because the solution means “new organisation”
- Isolation from the organisation and potential users
- Failure to adapt planning to change in needs / knowledge gained
- Resistance to change

Management/Decision

- Lack of political commitment
- Lack of private partners for sustainability of solution
- The short term thinking of government, also “territory gates”
- Lack of commitment from users and managers
- Lack of long-term view

Economy/Incentives

- Insufficient ratio cost/benefits
- Short term expectations of eHealth project
- Economically driven projects
- Investment cost

Project management

- Trying to solve all problems 100% before getting started
- All actors in eHealth project have not reached a clear labour division
- Do not understand health care processes and ongoing changes in medical environments
- Not enough planning and too quick in ending projects (and lack of evaluation)

Application/System

- Big steps – big expectations
- Lack of market analysis, comparing the solution to existing ones
- Legislation context / importance of interoperability
- Lack of existing information systems (e.g. clinical information systems)
- Developing the project in artificial environment
- Poor clinical relevance

Technical

- Technology risk / inflexibility of chosen solution
- Supply or technology orientation
- Technophobia – organisational/legal barriers
- Bad communication about technical problems in the project
- Interoperability
- Technology driven

8.3 Summary of success and failure factors to be regarded as Good Practice

Even though some of the factors may be important in one setting but not in another there are some common factors that can be generally regarded as prerequisites for good practice:

- Commitment at all levels and user involvement
- Projects based on real needs and clear objectives
- Incentives for use of solution (e.g. clinical, economical, personal)
- Human interaction and communication within the project
- Follow technical standards as far as possible for interoperability
- Long-term approach, endurance and sustainability

Both for the factors of success and failure it seems that even if technology may fail it is often not regarded as the most prominent issue. Rather, it is human factors and issues related to the (complex) healthcare organisation that seem to be critical for the success of eHealth implementation.

9. CONCLUSIONS

The main objective of the IANIS⁺ eHealth Work Group was to study the practice of eHealth in regional innovative projects, preferably financed by the EC Innovative Actions Programme. Of the studied cases, five were financed within that programme and many of the others by the EU Structural Funds. Some were financed by national funds and a few purely by private investments. In the same way as the source of funding differs so does the size and scope of the projects. Some projects implement eHealth in local settings at one hospital and some are introducing cross-boarder eHealth. From all of the projects it is possible to learn something.

9.1 The coverage of the collection of eHealth projects

The 17 projects studied by the eHealth WG come from different parts of Europe and represents a vast amount of knowledge and experience. Even though there are some parts of Europe not represented in the collection, where there are evidently interesting developments going on in the field of eHealth. Such areas include the United Kingdom (NHS), Ireland, Denmark, The Netherlands and mainland France. To some extent, this lack of coverage has been bridged by close collaboration with the authors of the EU eHealth Impact report. Their contribution to the eHealth WG meetings has been extremely valuable.

9.2 Visions *versus* reality in eHealth projects

All of the eHealth projects included in the collection have been collected through project templates from the actual projects²². Most of the projects are thoroughly reported and some are more briefly described. In some cases, the honesty in describing drawbacks and failure, for learning purposes, is praiseworthy. In other cases, it may be difficult to value the degree of success compared to the described intentions of a project.

9.3 Who needs regional experience of eHealth

This Guide to Good Practice eHealth – Regional Challenges and Impact, does not provide any ultimate answer on the issue of how to best exploit the potential of eHealth or how to best conduct an ICT project. For the latter there are many excellent books on project management, for the ones in need. For the issue of exploiting the potential of eHealth we have to count on much longer term actions, but this report is intended to be a contribution to this.

In fact, eHealth is a growing research subject in its own respect, not only from a technical point of view but furthermore as an interdisciplinary area of research. For the progress of eHealth, experience of practical implementation is needed, but also for further development of new software applications and health care services for the improvement of quality and efficiency of care.

²² A summary of all the cases is provided in Annex II to this report

The experience of the 17 projects included in the case collection in this report may be useful for:

- The EU Commission for further actions and promotion of eHealth research and implementation
- Regional authorities and health care providers, for exploiting eHealth making use of experience from others
- The ICT industry for the further development of high quality eHealth software, hardware and solutions
- All those, including ourselves, who are trying to improve healthcare by the implementation of ICT in different forms

9.4 Regional innovation as Good Practice

Even though most of the studied cases are not similar to each other there are some common themes and conclusion to be drawn from the collection:

- Political and organisational commitment is most important
- User involvement and development based on actual needs
- The regional experiences shown in the studied cases confirm the current trends in eHealth

All the regional cases represent innovations even though they follow the current eHealth trends. Innovation is not only about creating new technology but furthermore about development of the healthcare services, with use of information technology.

From the discussions in the work group at the policy seminar and the final conference some of the conclusions are:

- eHealth projects contribute to regional development and improvement of healthcare services, but it takes a long time to achieve visible results
- Social-technical approach to eHealth projects with a systemic view is a key to successful eHealth projects
- Regions must integrate eHealth in their development strategies and apply a holistic view that includes the inter-regional and cross-boarder level

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ANNEX I:
Factors of success and failure for eHealth projects

ANNEX I: Factors of success and failure for eHealth projects, from the eHealth Round Table meeting, 13th March 2007, Brussels

	Success factors for eHealth projects	Failure factors for eHealth projects
Veli Stroetman, eHealth Impact, empirica GmbH, Germany	<ul style="list-style-type: none"> • Involvement of all key stakeholders • Commitment of clinical leadership and policy support • Choosing the right technology, continuous technical support 	<ul style="list-style-type: none"> • Ability to adapt the strategy to changing needs/environment • Big steps – big expectations • Technology risk / inflexibility of chosen solution
Jan Meincke Gesundheitskarte, Schleswig-Holstein, Germany	<ul style="list-style-type: none"> • Innovative projects work only with a well defined, small group of actors to collect experiences • Health benefits have to be combined with business benefits • Political and social support is a must, bottom up strategies have to be preferred 	<ul style="list-style-type: none"> • Ability to adapt the strategy to changing needs/environment • Big steps – big expectations • Technology risk / inflexibility of chosen solution
A C Lefebvre, Critt Santé Bretagne, Bretagne, France	<ul style="list-style-type: none"> • Discussion/Survey with requests of the users, for the final acceptance of the solution • Involve the medical staff (nurses, doctors), Importance of training • Political support, long-term projects 	<ul style="list-style-type: none"> • Lack of market analysis, comparing the solution to existing ones • Lack of involvement of policy, medical and societal community – because the solution means “new organisation” • Legislation context / importance of interoperability
Luis Lozano, iAVANTE, Andalucia, Spain	<ul style="list-style-type: none"> • Meeting an explicit or latent demand – solve a real problem • Involving from the outset, all key players • Political support and feasible funding 	<ul style="list-style-type: none"> • Supply or technology orientation • Isolation from the organisation and potential users • Insufficient ratio cost / means to expected results
Guohua Bai, OVK, Blekinge, Sweden	<ul style="list-style-type: none"> • Multidisciplinary approach that involves politicians, specialists, researchers and business • Users’ need must be in focus • Active participation of regional healthcare actors, hospitals and municipalities 	<ul style="list-style-type: none"> • Short term expectations of eHealth project • Economic driven • All actors in eHealth project have not reached a clear labour division

	Success factors for eHealth projects	Failure factors for eHealth projects
Bertie Augustijn, Emergency service in Zeeland, Zeeland, The Netherlands	<ul style="list-style-type: none"> • Real motivation • Bottom-up ↔ Top Down Together (tactical ↔ strategical) • Helicopter view • Public-private partnership 	<ul style="list-style-type: none"> • Bad communication about technical problems in the project • The short term thinking of government, also "territory gates" • Resistance to change
Stefano Forti, eHeart Failure, Emilia-Romagna, Italy	<ul style="list-style-type: none"> • User-centred design • Bottom-up approach • Involvement of citizens/patients 	<ul style="list-style-type: none"> • Lack of existing information systems (e.g. clinical information systems) • Lack of political commitment • Lack of private partners (e.g.) for sustainability
Pantelis Angelidis, Mobinet, Central Macedonia, Greece	<ul style="list-style-type: none"> • Motivation • Commitment • Attractiveness – project solves problems+ impact • Professional esteem 	<ul style="list-style-type: none"> • Technophobia – organisational/legal barriers • Resistance to change • Investment cost • Interoperability
Stefan Baur, Curagita, Germany	<ul style="list-style-type: none"> • Check who will pay (how much) for the eHealth service in question • Technical solution is secondary to workflow organisation/money • Talk to experts, establish relationships 	<ul style="list-style-type: none"> • Developing the project in an artificial environment • Failure to adapt planning to change in needs / knowledge gained • Not obeying points 1-3 above (success factors)
Jari Forsström, WM-data, Finland	<ul style="list-style-type: none"> • Interoperability and open standards • Predefined goals for investment • Clinical need and strong patient focus 	<ul style="list-style-type: none"> • Poor clinical relevance • Technology driven • Does not understand health care processes and ongoing changes in medical practice
Gustav Malmqvist, Telemedicine Clinic, Västernorrland, Sweden	<ul style="list-style-type: none"> • Managers' commitment (both clinical and hospital/organisation) • Lack of prestige what regards technical choices • Incentives (economic, organisational or personal) = "what's in it for me?" 	<ul style="list-style-type: none"> • Lack of commitment from users and managers • Lack of long-term view • Not enough planning and too quick in ending projects (and lack of evaluation)

ANNEX II: **eHealth Case Studies from Regions**

Case Study 1	Emergency Service Zeeland e.a		
Region	Zeeland, The Netherlands		
Contact person	Ms. Bertie Augustijn-Vos, Order of Medical Specialists Tel: +31 6 51794369 Email: b.augustijn@gmail.com		
Category of eHealth	Health information sharing and seamless care + eHealth product development and implementation + Medical networks and hospital applications		
Project partners		Public	Private
	Order of Medical Specialists		X
	Provincial Government of Zeeland	X	
	CIBG	X	
	Nictiz	X	
Status of the Project	01.06.2004 – 31.05.2006 Completed		
Cost and funding	Total cost: € 809,367 57,6% EU Structural funds 9% Order of Medical Specialists 6% Regional public funds/Province of Zeeland 20,4% Private sector investment 7% Anticipated income CIBG & NICTIZ		
RIAP	Yes		
Aims and Objectives	<ul style="list-style-type: none"> • To develop a uniform registration of patient information in electronic patient file (EDP) to enable patients transported by ambulances (> 6.000 emergency calls and >10.000 non-emergency patient transportations per year) and health care suppliers (3 hospitals and 1 Ambulance organisation) to make optimal use of ICT in the inter-organisational chain • To optimise the supply of information for traumatology and the first aid services (together referred to as emergency services) 		
Beneficiaries	The hospitals in Zeeland, all medical specialists and the regional ambulance service Zeeland. Furthermore, the cooperation between hospital pharmacies and private pharmacies has been intensified. The cooperation between the family doctors will be expanded. Also, cooperation between health care institutes and suppliers (various ICT companies, Dutch Telecom et.) has been created. Last but not least of course the patients in each one of the 16.000 ambulance trips a year		

Project Description	<p>Implementation of an information supply application for the Emergency Services in Zeeland. This application should comply with present national legislation and regulations. First focus would be the information on medication (possible allergies, use of medicines etc.).</p> <p>The disclosure of data and data-entry both in a mobile way (e-rides application) as well as on different locations (by the general practitioner/ ambulance/ First Aid Station/ hospital/ medical specialist). For the Netherlands this means a unique co-operation between hospitals and the regional ambulance service in the province of Zeeland</p>
Main Achievements	<p>Emergency services (hospitals), the Regional Ambulance Service and the Ambulance Control room have a new tool to support and deliver care at a qualitative higher level.</p> <p>Schooling for first aid services, ambulance nurses and ambulance control room officers (in phase 1 about 60 persons)</p> <p>An insight in costs, coverage e-Infrastructure, adaptation of ambulance according to laws and regulations, (EU-legislation, occupational health and safety Act) but also in a number of bottlenecks in present legislation, which with the help of this project can be amended to eventually result in an Order in Council</p>
Lessons Learned	<p>The people on the "work floor" (doctors and nurses) played a very important role in the project because of the wish to contribute to a reliable and efficient development of the emergency services. That is: involving all actors.</p> <p>Important to keep an eye on the project targets, the art to steer a middle course (in view of all personnel and political changes), creative determination, loyalty, having a helicopter view, having knowledge of the forces and powers that play a role in health care.</p>
Issues	<p>The e-Infrastructure and technical problems in the ambulance with respect to e-Infrastructure and the effects on the equipment in the ambulance. For example the laptops used for the data transmission between the ambulance and the hospital had to be fixed in the ambulance, to avoid hurting patient and/or nurse in case the ambulance had an accident. Also, the supply of electrical power for all the medical equipment turned out to be a problem. The ambulance manufacturer and the factory that equips the ambulances deal with these problems. The solution requires – quite rightly – a very careful execution, for example an EMC (Electro Magnetic Compatibility)-test and a crash test</p>
Additional comments	<p>The objectives of this project have been achieved. A further roll-out of the project is being expected in the course of 2006.</p> <p>The possibilities of a follow-up are being discussed with representatives of the ministries of VWS (National Health, Wellbeing and Sport) and BZK (Internal Affairs and Kingdom Relationships). However these two ministries differ on opinion with respect to the development of a casualties monitoring system</p>

Case Study 2	E-care		
Region	Emilia-Romagna, Italy		
Contact person	Ms. Licia Mignardi, CUP 2000 SpA Tel: +39 051 4208411 Email: licia.mignardi@cup2000.it		
Category of eHealth	Health information sharing and seamless care		
Project partners		Public	Private
	CUP2000 SpA	X	
	PHARMACOM	X	
	Comune di Bologna	X	
	AUSL Bologna	X	
Status of the Project	01.04.2003 – 30.06.2004 Completed		
Cost and funding	Total cost: € 336,000 38% EU Structural funds 62% Public funds		
RIAP	Yes		
Aims and Objectives	<ul style="list-style-type: none"> • To build an integrated network of health and social services (e-Care) for the assistance of elderly and disabled people • To empower citizens by keeping the beneficiaries knowledgeable about the resources of the health care system at their disposition and the most responsible way to utilise them • To create a health care network that allows direct communication between first and second level health care structures, general practitioners, pharmacies, unified booking centres and consumers, thereby: <ul style="list-style-type: none"> • Supporting organised access to health care services by citizens • Directing clients to the appropriate health care centre • Improving the standard of quality • Limiting the costs of running health care and social assistance systems 		
Beneficiaries	The final beneficiaries are about the 30.000 elderly and disabled persons living in the Bologna city who need access to the e-care system		

Case Study 3 Seamless healthcare chain supported by ICT – OVK

Region	Blekinge, Sweden		
Contact person	Mr. Guohua Bai, Blekinge Institute of Technology Tel: +46 457 385848 Email: gba@bth.se		
Category of eHealth	Health information sharing and seamless care		
Project partners		Public	Private
	Blekinge hospital	X	
	Ronneby municipality	X	
	Karlskrona municipality	X	
	Olofström municipality	X	
	Karlshamn municipality	X	
	Sölvesborg municipality	X	
Frontec		X	
Status of the Project	1997-2000 Completed		
Cost and funding	Total cost: Not available n/a% Regional Public Funding n/a% The Swedish Knowledge Foundation		
RIAP	No		
Aims and Objectives	<p>To document and communicate all necessary information about a transferred patient in a quick and secure way between different levels of healthcare organisations to guarantee a seamless healthcare process (chain). The key targets was:</p> <ul style="list-style-type: none"> • To build up a digital platform to support necessary information • Implement a working routine that can be synchronised by different levels of healthcare organisations • To fulfil the new regulation issued by Swedish Board of Health and Welfare (SOSFS 1996:32) about the building up of a structure for transmitting information and cooperation between different care providers 		
Beneficiaries	All 150.000 citizens in Blekinge region benefit from the OVK when they are transferred from hospital care to secondary or primary care.		

Project Description	<p>The project (1997-2000) started as a response to the then newly issued regulation by the Swedish National Board of Health and Welfare (Socialstyrelsen) about the requirement to share patient information among different care organisations. The objectives of the regulation are 'to create a structure for information transmitting and cooperation between different care providers.' It is also stated that 'it is proper that routines for transmitting information between hospital and social services and between hospital and open health-medical care can be decided locally and together with other healthcare organisations'. In the same year, Blekinge discussed how to apply ICT to follow the above regulation, and project OVK started officially in 1997. Blekinge hospital and three areas of primary healthcare (one in Karlskrona and two in Ronneby municipalities) were involved in the project as pilot test sites.</p>
Main Achievements	<ul style="list-style-type: none"> • Improvement of healthcare planning by usable IT platform for transmitting patients' information among different care organisations • The OVK system is used for transmitting patient information between organisations, and care planning is done much more efficiently • According to a report (IT I Kommunal Vård och omsorg), OVK is one of the two most successful projects in Sweden about ICT supported healthcare. • Secure healthcare improved
Lessons Learned	<p>Needs driven (needs from regulation, needs from patients, needs from the employees are all working together, and all are winners.</p> <p>OVK was developed under close integration with daily work. This integration guaranteed the acceptance later when OVK started to operate.</p> <p>The team agreed the same vision and shared the same objective, and each part of the project had very clear labour division and own financing. Face to face meeting worked well to synchronise the whole consortium.</p>
Additional comments	<p>The region has adopted the system and other Swedish county councils have started to develop or procure similar systems for seamless care.</p>

Case Study 4	e-Heart Failure		
Region	Trento Province, Italy		
Contact person	Mr. Stefano Forti, Istituto Trentino di Cultura-Center for Scientific and Technology Research, Trento, Italy Tel: +39 0461 405307 Email: forti@itc.it		
Category of eHealth	Health information sharing and seamless care		
Project partners		Public	Private
	Istituto Trentino di Cultura, Center for Scientific and Technology Research	X	
	Institut BioMedizinische Technik (IBMT), Fraunhofer Institute, Germany	X	
	Health Care Service Trust of the Province of Trento, Italy	X	
	University of Trento, (Department of Sociology and Social Research and Department of Juridical Sciences),Italy	X	
	University of Pavia (Department of Computer Engineering and Systems Science), Italy	X	
	University of Firenze (Department of Medical Surgical Critical Care Area), Italy	X	
Status of the Project	1997-2000 Completed		
Cost and funding	Total cost: € 1,417,932 100% Public funds		
RIAP	No		
Aims and Objectives	<ul style="list-style-type: none"> • To design and develop a web- based platform of eHealth services supporting a shared and evidence-based care for heart failure patients, and • To test the feasibility of the platform 		
Beneficiaries	During the feasibility study the following healthcare operators were involved: 27 General Practitioners 34 Visiting nurses 18 Hospital specialists 15 Hospital nurses In the end patients with heart failure should be the main beneficiaries.		

Project Description	<p>The project started in may 2002 and finished in December 2005. During the phases of the project, both applied and basic research activities were carried out. It follows a list of the activities developed.</p> <ul style="list-style-type: none"> • Hearth Failure Virtual Patient Record (HF_VPR) This activity was the design and implementation of a web-based virtual patient record for supporting the integrated and shared care of patients with heart disease. A homecare module (from the Fraunhofer Institute) for acquisition of vital parameters (weight, blood pressure, oxygen saturation, body temperature) at the patient's home has been integrated into HF_VPR and tested in laboratory setting • Co-operative work system integrated into HF_VPR This activity was dealing with the integration into HF_VPR of an asynchronous teleconsultation system for supporting communication among HCPs involved in the care process of heart failure patients (hospital specialists and nurses, visiting nurses and family practitioners) • Computerised guidelines integrated into HF_VPR This research activity was mainly devoted to design and implemented a prototype module of a guideline-based decision support system supporting the delivery of evidence-base care • Security infrastructure Because the family physicians access the HF_VPR using Internet through a Web server (IIS), security issues were carefully addressed. A security infrastructure and the access procedure were designed in close collaboration with the Law Department of the University of Trento
Main Achievements	<p>This was a proof-of-concept project mainly focused in exploring the potential of eHealth solutions for supporting multidisciplinary disease management involving both hospital and community health operators.</p> <p>Although the project had a minor impact on clinical aspects, it has allowed the assessment of the potential of some innovative ICT-based solutions in supporting the integrated management of chronic patients (i.e. disease-specific virtual patient record, security infrastructure, guideline-based decision support system, graphic visualisation of clinical history, etc) and to draw important learning points that should be taken into consideration for future eHealth projects</p>
Lessons Learned	<p>Using a human-centred computing paradigm allowed to involve the final users and the domain experts in the design and implementation of solutions centred on end-users needs.</p>
Issues	<ul style="list-style-type: none"> • Lack of clinical information system and lack of integration with existing clinical information systems (e.g. digital record of family physicians) • Unforeseen delay due to coming into effect of National Legislative Decree on Personal Data Protection Code • Lack of involvement of healthcare policy decision makers
Additional comments	<p>The methods used within the project (i.e. data models, user-centred design, services analysis) have been used in other eHealth projects currently going on</p>

Case Study 5 Eeva - A customised safety net for people with dementia																						
Region	West Finland, Finland																					
Contact person	Ms. Merja Hedberg Tel: +35 8 6 4298 800 Email: merja.hedberg@eptek.fi http://www.eptek.fi/																					
Category of eHealth	Health information sharing and seamless care																					
Project partners	<table border="1"> <thead> <tr> <th></th> <th>Public</th> <th>Private</th> </tr> </thead> <tbody> <tr> <td>South Ostrobothnia Telemedical Centre</td> <td>X</td> <td></td> </tr> <tr> <td>South Ostrobothnia Health District</td> <td>X</td> <td></td> </tr> <tr> <td>The Dementia Society of Ostrobothnia Region</td> <td>X</td> <td></td> </tr> <tr> <td>Six municipalities of South Ostrobothnia</td> <td>X</td> <td></td> </tr> <tr> <td>Tampere University of Technology</td> <td>X</td> <td></td> </tr> <tr> <td>LifIT Plc</td> <td></td> <td>X</td> </tr> </tbody> </table>		Public	Private	South Ostrobothnia Telemedical Centre	X		South Ostrobothnia Health District	X		The Dementia Society of Ostrobothnia Region	X		Six municipalities of South Ostrobothnia	X		Tampere University of Technology	X		LifIT Plc		X
	Public	Private																				
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South Ostrobothnia Health District	X																					
The Dementia Society of Ostrobothnia Region	X																					
Six municipalities of South Ostrobothnia	X																					
Tampere University of Technology	X																					
LifIT Plc		X																				
Status of the Project	01.09.2004 - 28.02.2006 Completed																					
Cost and funding	Total cost: € 120,000 <table border="1"> <tbody> <tr> <td>70%</td> <td>EU Structural funds</td> </tr> <tr> <td>20%</td> <td>Regional public funds</td> </tr> <tr> <td>10%</td> <td>Private sector investment</td> </tr> </tbody> </table>	70%	EU Structural funds	20%	Regional public funds	10%	Private sector investment															
70%	EU Structural funds																					
20%	Regional public funds																					
10%	Private sector investment																					
RIAP	No																					
Aims and Objectives	Development of a complete safety net for persons with dementia and their caregivers in South Ostrobothnia. The purpose of this safety net is to help in taking care of individual's basic needs in daily life																					
Beneficiaries	Target group: Thirty people with dementia and their caregivers. Chosen from among the patients of the South Ostrobothnia Health District The criteria of selection is that the subjects are living at home and they have Alzheimer's disease.																					
Project Description	Development of a safety network. Social network increases a demented person's feeling of security while technology decreases the burden on the family. A complete dementia safety network supports technology utilisation in a demented person's daily life.																					
Main Achievements	Creation of individual safety net for people with dementia. Increase of safety to individuals. Appropriate use of technology <ul style="list-style-type: none"> • The project has been able to delay admission into a nursing home of people suffering from dementia • Thirty-three different technologies were tested • The choices of technology were based on individual needs 																					
Lessons Learned Issues	Strong demand, Excellent participation by users and developers and Availability of expertise from a broad range of areas. <ul style="list-style-type: none"> • The role of technology is particularly significant when a demented person has a risk to wander and get lost • Lack of financing to disseminate the project • Need for training of caregivers in technology issues • Long term support of project solutions 																					
Additional comments	The solution is implemented for the target group																					

Case Study 6	Health Account – Patient’s Record on the Net	
Region	Turku, Finland	
Contact person	Dr. Jari Forsström Tel: +358 40 5441809 Email: jari.forsstrom@wmdata.fi	
Category of eHealth	eHealth product development and implementation	
Project partners	Public	Private
	WM-data Oy., Finland	X
Status of the Project	n/a	
Cost and funding	Total cost: n/a	
RIAP	No	
Aims and Objectives	<ul style="list-style-type: none"> • To improve information flow between care providers in health care • To improve quality of care • Reduces overlapping examinations • Give patients better access to their health data and motivate them to take more responsibility on their health care • Encourage health care customers to use electronic communication tools in health care 	
Beneficiaries	The application is targeted at the whole population using health care services	
Project Description	The project was part of R&D in WM-data. It is enabling technological shift from hospital based medical records to personal health records. The project was defined together with existing customers in the healthcare sector	
Main Achievements	Concept is ready, but so far no customer implementations	
Issues	<ul style="list-style-type: none"> • Slow change Health care professionals are reluctant to open their documents to patients. Overcome: better training of health professionals in eHealth • Difficulty in identifying correct payer The concept has several beneficiaries but none is willing to take all the costs themselves. Since savings come with large-scale use, starting the service is difficult. Overcome: Pilots with evaluation and reporting of benefits • Competing political strategies National model in Finland is aimed at a centralised state-owned database. Health Account model has been seen as a competing project, which has discouraged the public organisation from utilising the concept 	
Additional comments	The solution also supports cross-boarder care	

Case Study 7	Mobile Applications for Health Care		
Region	Bremen, Germany		
Contact person	Dr.Ing. Ingrid Rügge, TZI-Mobile Research Center Tel: +49 421 218 2731 Email: ruegge@mrc-bremen.de http://www.tzi.de/index.php?id=204&L=1		
Category of eHealth	eHealth Product development and implementation		
Project partners	Center for Computing Technologies (TZI), Universität Bremen	Public X	Private
Status of the Project	2002-2004 Completed		
Cost and funding	Total cost: € 127,000 50% EU Structural funds 50% Regional Public funds		
RIAP	Yes		
Aims and Objectives	<p>The initiation of a dialogue between users in health care and developers of mobile IT solutions leading eventually to a development of innovative projects was the essential objective of this measure. Systematically sensitising potential users to mobile solutions and providing them with specific information should help to discover possible fields of application.</p> <p>Proceeding from an overview of current tendencies of development and application potentials, the aim of the first project was to identify and to evaluate those groups, which were actively involved in mobile health care services including the roles they play and their chances within this network. Special attention was given to a survey of suppliers and service providers in the economic area Bremen/Bremerhaven, and to the identification of future users, with priority given to regional fields of application</p>		
Beneficiaries	<ul style="list-style-type: none"> • Users in health care (experts in the application domain) • Developer of conventional ICT-solutions for health care • Producer of medical technology • Developer of mobile ICT-solutions (experts in developing mobile solutions for other application domains) 		

Project Description	<p>The project was carried out in the framework of the RPIA "Mobile Bremen Initiative" (MBI). MBI's main task was to raise awareness about new mobile technologies and to support the development of Mobile Solutions. The project "Mobile Applications for Health Care" described as follows is one part of the thematic focus "Mobile Health Care".</p> <p>Two closely linked project parts were carried out. After the first part of the project it was decided to carry out a follow-on activity, because the application area Health Care needs long term information support about mobile solutions:</p> <p>The TZI (Center for Computing Technologies at the University of Bremen) was commissioned with a survey of mobile ICT in health care. In the second part of the project, a congress on the state-of-the-art of "Mobile Solutions for Health Care" combined with open discussions about practical applications and experiences and a mobile solutions presentation was organised by the TZI</p>
Main Achievements	<ul style="list-style-type: none"> • Market survey: compilation of regional mobile ICT solutions for the health care sector • Involvement of relevant players: all relevant groups (developers, users and deciders) were involved. However, it was hard to arouse the interest of the users • Sustainability/follow up activities: the amount of follow-up activities (cp. No. 8) exceeded the expectations
Lessons Learned	<ul style="list-style-type: none"> • Involvement of developers, users and deciders (key factor success) • Integrated approach (survey, workshops, final congress) • Bottom-up approach (involvement of users)
Issues	<p>1. Interest of users</p> <p>It was not easy to arouse interest in the users. Usually, they have other problems at the moment, mainly regarding work organisation and resource management. They were only interested in the topic on personal talks.</p> <p>2. Name advantages of new technologies</p> <p>It was difficult to point out advantages and disadvantages of technologies to the public. This problem was solved by using practical examples in form of demonstrators.</p> <p>3. Conflicting interests of players in health care sector</p> <p>A clash of interest between the various health care occupational groups was identified during the first project. The development of a special moderation concept made it possible to reveal these conflicts</p>
Additional comments	<p>The project itself will not be continued in the same way. However, some follow-up activities are:</p> <ul style="list-style-type: none"> • The University of Bremen founded a Mobile Research Centre in July 2004 which has "Mobile Solutions for Health Care" as one focus • Bremen now funds a demonstration centre for mobile solutions, which has one focus on Mobile Health Care

Case Study 8	Mobile Applications for Health Care		
Region	Emilia-Romagna, Italy		
Contact person	Mr. Fabio Rangoni, Mortara Rangoni S.p.A Tel: +39 051 6654327 Email: info@mortara.it		
Category of eHealth	eHealth Product development and implementation		
Project partners		Public	Private
	Mortara Rangoni S.p.A.		X
	Laboratorio Fondazione Guglielmo Marconi S.p.A.		X
	Azienda USL Modena	X	
Status of the Project	Dates n/a Completed		
Cost and funding	Total cost: € 414,000 19% EU Structural funds 15% Regional Public funds 66% Private sector investment		
RIAP	Yes		
Aims and Objectives	<p>The general objective of the project was to develop and market a new technology for patient cardiological monitoring based on a standard wireless protocol for the communication of patients' physiological functions.</p> <p>The specific objectives of the project were the following:</p> <ul style="list-style-type: none"> • To develop technical solutions for the transmission of continuous physiological signals, repetition of signals for consultation and transmission of alerts generated by the control station • To develop a solution able to be compatible with the existing instruments from an electromagnetic point of view • To allow immediate applicability on all monitoring stations already installed, thus contributing to the improvement of the organisation of the hospital departments 		
Beneficiaries	Citizens, mostly elderly people and cardiac patients. In 2006 the system realised was already installed in about 170 cardiological monitoring stations at hospital sites		

Project Description	<p>The activities carried out included:</p> <ul style="list-style-type: none"> • Definition of the system specifications, identification of the most appropriate solutions and tests • Software development and customisation • Validation on site, including the collection of statistical and qualitative data on the system functionality • Dissemination of results, through presentation at conferences, international magazines, etc <p>The actual implementation of the project was organised along three axes:</p> <ol style="list-style-type: none"> 1. Analysis of electromagnetic compatibility considering the use of wireless technologies in the hospital environment 2. Sub-project "Nurse", to enable hospital operators to monitor the patients' conditions remotely using wireless communication systems 3. Sub-project "Patient", devoted to the feasibility study of a non-proprietary wireless technology for telemetry
Main Achievements	<ul style="list-style-type: none"> • Product development: Achieved as planned; the subproject 'nurses' was successfully implemented • Feasibility study for a new technology for a patient transmitter: Study yielded negative results; current technology is not yet able to achieve the desired features. The subproject 'Patient' was stopped at the test bed level • Safety aspects of new wireless technology in hospitals: Clinical engineering group obtained know-how of the safety aspects of wireless technologies in the hospitals, specifically detrimental effects on existing devices and associated risks. However, this has not lead to wide-scale diffusion of the know-how to other clinical engineering / biomedical support groups
Lessons Learned	<ul style="list-style-type: none"> • Positive with the direct involvement of possible end-users of the device being developed • The outcome of the project leads, at least partially, to an immediately marketable product • The project is completely integrated in the normal R&D of the company, and is not something handled "on-the side"
Issues	<ul style="list-style-type: none"> • Difficult to involve a representative sample of end-users • Resources for industrialisation of the product... • This was all solved by the project
Additional comments	<p>The prototype was industrialised and the product is now available on the market</p>

Case Study 9	Mobinet - Pilot network implementation for the effective health monitoring in remote areas		
Region	Central Macedonia, Greece		
Contact person	Mr. Pantelis Angelidis, Vidavo SA Tel: +302311999955 Email: pantelis@vidavo.gr www.health-telematics.gr/Bdtype		
Category of eHealth	eHealth Product development and implementation		
Project partners	Vodafone Hellas SA 2nd Regional Healthcare Authority of the Region of Central Macedonia Vidavo SA	Public X	Private X X
Status of the Project	Dates n/a Completed		
Cost and funding	Total cost: € 238,000 100% Private sector investment		
RIAP	No		
Aims and Objectives	<p>In general, the pilot network implementation for the effective health monitoring in remote areas aims at the:</p> <ul style="list-style-type: none"> • Provision of advanced healthcare services, regardless of geographical limitations • Preventive medicine • Efficient human resource management (for the healthcare providers) • Scientific personnel facilitation and diffusion of specialised knowledge <p>• The project generates significant social benefits and enables healthcare professionals to allocate their time in an efficient and effective manner, as they are able to manage more patients, since telemonitoring allows the simultaneous monitoring of the health status of multiple patients</p>		
Beneficiaries	<ul style="list-style-type: none"> • Chronic patients in remote areas and citizens in need of health services, as they are able to receive at the place of their residency specialised healthcare services. • GPs in remote areas, as they enjoy simultaneous consultations with specialised healthcare professionals • Specialised doctors in hospitals, as they are able to treat more patients in the same time from their office 		

Project Description	<p>The main implementation scenarios include:</p> <ul style="list-style-type: none"> • Monitoring of chronic patients with pulmonary diseases • Utilisation of the Mobinet service for the annual health check up of students, in order for them to be authorised to participate in the school athletic events • Use of the equipment at the emergency department for real-time consultation and support (future scenario)
Main Achievements	<ul style="list-style-type: none"> • Five health units of the region have been equipped with telemonitoring equipment and one hospital has been equipped with advanced eHealth applications • Five GPs and two specialists have received training regarding eHealth applications. In addition, the GPs have been trained for proper conduction of the spirometry medical test (100%) • So far 1500 medical tests have been wirelessly transferred via the Mobinet system; these tests correspond to two-hundred patients of the region; total number of patients examined is 1200 cases
Lessons Learned	<p>Selecting the right people to be involved is a critical success factor to every project implementation, especially, when it comes to applying new methods or systems, as in the Mobinet GP-model project.</p>
Issues	<p>Overcoming organisational barriers</p> <ul style="list-style-type: none"> • Some health units due to legal and organisation complications restricted their participation in the project. The team proceeded in the project implementation with the participation of “appointed health units,” a fact that limits user willingness • Resistance to change from the selected participants and dealt with, by trying to provide motives, as the provision of bulk anonymous data from the project data base to the participants, so that they later will be able to present papers in scientific conferences and journals <p>Effective involvement of the hospital</p> <ul style="list-style-type: none"> • Provision of resources and motivation for the project implementation at the specialist side <p>Technical issues</p> <ul style="list-style-type: none"> • Unavailability of the network (in regards to the medical data transfer via GPRS) • Problems arising due to the improper use of the medical equipment, and system smooth work flow disturbance due to installation of incompatible modules to the hospital workstation. Incompatibility issue
Additional comments	<ul style="list-style-type: none"> • The adoption of the project technology and systems in everyday activities of the hospital is expected to generate cost reductions and more efficient allocation of resources • As mentioned in the previous paragraph the 2nd RHA-CM aims to continue the project and fund it via the European Structural Funds. In addition, the 2nd RHA-CM aims to expand the project scope and collaborate with healthcare actors of the neighbouring country FYROM in order to initiate programmes for cross-border preventive medicine and patient education

Case Study 10		The networking of health services in the Valle del Chiese	
Region	Trento Province, Italy		
Contact person	Mr. Ugo Pitton, PHS for Giudicarie and Rendena District Provincial Health Service of the Autonomous Province of Trento Tel: +39 0464 902998 Email: ugo.pitton@apss.tn.it		
Category of eHealth	Medical networks and hospital applications		
Project partners		Public	Private
	Provincia autonoma di Trento – Servizio Rapporti Comunitari	X	
	Provincial Health Service of the Provincia autonoma di Trento	X	
Status of the Project	2003 – 2005 Completed		
Cost and funding	Total cost: € 557,426 50% EU Structural funds 35% National public funds 15% Regional public funds		
RIAP	Yes		
Aims and Objectives	<p>The main objectives aimed at satisfying the needs of the population involved in the project, which will have advantages in terms of gaining access to health services, with a streamlining of bureaucratic procedures and a more immediate and continuing relationship with the various services.</p> <ul style="list-style-type: none"> • The objective of the project was to offer a series of differentiated and integrated services throughout the area, allowing the best possible quality of life for the elderly person, maintaining a balanced relationship between the family and social environments • The project also had the objective of improving nursing and hospital services, making information on the clinical conditions of the patient available at the time of admission, through linking with the clinical data of the general practitioner and with area services 		
Beneficiaries	The entire population of the Valle del Chiese and of the Bassa Valsugana and Tesino. Individual patients and citizens are the primary beneficiary. Advantages are also envisaged for the family doctor who, by a better knowledge of the clinical conditions and the services supplied to his patient by other health service departments		

Project Description	<ul style="list-style-type: none"> · A telecommunication link has been created between users and services through a TeleCentre, with 20 provincial teledesks linked together in a network in order to supply teleservices for the population resident in specific areas identified for the phase of experimentation. There will also be functions facilitating purchasing of medicines. Through the service, it is possible to book/purchase the prescribed medicines at the nearest chemist. <p>The project has been organised into the following main phases:</p> <ul style="list-style-type: none"> · Analysis of computer services and of existing telecommunications networks in the area · Completion of computer networks, with particular attention for the guarantees required for the secure transmission of sensitive data · Linking the computer networks with the hospitals of Trento and Rovereto. · Extension of the telecommunications network to general practitioners, to freely chosen paediatricians and to RSAs in the area · Project trials in terms of sharing information between actors in the area and the hospital, with the realisation of medical records · Implementation of telecommunications infrastructures and development of applications, development, purchase and integration of applications
Main Achievements	<ul style="list-style-type: none"> · Every surgery and every doctor received the necessary instruments in order to realise a specific network between them and the Provincial Health Service. · The sending by e-mail of the clinical reports to the family doctors. · Training and digital education of the doctors. Doctors of other Valleys ask for the implementation of the project in their activity environment
Lessons Learned Issues	<ul style="list-style-type: none"> · Accessibility <ul style="list-style-type: none"> - With a streamlining of bureaucratic procedures and a more immediate and continuing relationship with the various services - Thanks to the new technology, family doctors had a better knowledge of the clinical conditions and of the services supplied to their patients by other health service departments · Interoperability Family doctors had different types of software, and there was a difficult communication between them and the systems used by the Provincial Health Service · Organisation The project had to face a very long development time of the software used by the Provincial Health Service · Time of development The time imposed by the Commission didn't respect the time needed for the development of the project · Infrastructure The diffusion of the project in the entire provincial territory depends also on the diffusion of the broadband infrastructure. This project gives an important contribution to the actions that the Provincia autonoma di Trento is implementing in order to infrastructure the entire province
Additional comments	<p>After the results gained in Valle del Chiese, it was decided to transfer the solution to another disadvantaged area of the Province. A collaboration with the region Emilia-Romagna has also started</p>

Case Study 11	RIM - Image Medical Network		
Region	La Reunion, France		
Contact person	Denis Fabregue, Regional Council Tel: +262 262 92 29 29 Email: d.fabregue@protel.fr		
Category of eHealth	Medical networks and hospital applications		
Project partners		Public	Private
	Hospitals at La Reunion	X	
	The Regional Council of La Reunion	X	
	GIE Telemedecine	X	X
Status of the Project	2002 - Completed		
Cost and funding	Total cost: € 4,200,000 60% EU Structural funds 20% National public funds 20% Regional public funds		
RIAP	No		
Aims and Objectives	<ul style="list-style-type: none"> • To generalise the use of technologies of transfer of medical imagery to all health actors on the Island • To renew the equipment and facilitate the exchange of images (radiology, angiography, MRI) between experts in Reunion Island • The installation of this interconnected network between the establishments of health will facilitate the development of eHealth applications 		
Beneficiaries	Patients and healthcare professionals		
Project Description	<p>A first pilot project made possible the transfer of medical images between three hospitals. This first phase authorised a regular transfer of images, confirming the interest of these technologies to minimise displacements of patients.</p> <p>The project of network of medical imagery is the natural extension of this first project towards a transfer and a filing of more complex medical information</p>		
Main Achievements	<ul style="list-style-type: none"> • 7 Conventions signed with health establishments in March 2002 • Equipments implemented in 2003 • Creation of a new structure specialised in eHealth • Creation of a regional high speed network 		
Lessons Learned	<ul style="list-style-type: none"> • It is the first real network between the public establishments and it will open to all the health community (public and private actors) 		
Issues	<ul style="list-style-type: none"> • Important to define in this type of project the management and the management must be done by a neutral actor • Creation of a neutral structure (GIE Télémedecine), for managing development of eHealth 		
Additional comments	eHealth development in La Reunion will continue under the management of GIE Télémedecine		

Case Study 12		PACS - Picture archiving and communications systems	
Region	Vysočina, Czech Republic		
Contact person	Mr. David Zažímal, Hospital of Jihlava City Tel: +420 56715 7855 Email: zazimald@nemji.cz		
Category of eHealth	Medical networks and hospital applications		
Project partners		Public	Private
	Hospital of Jihlava City	X	
	Fomei		X
Status of the Project	Dates n/a. Completed		
Cost and funding	Total cost: n/a		
RIAP	No	100%	Regional public funds
Aims and Objectives	<ul style="list-style-type: none"> • Lowering operational cost of X-ray section of the hospital • Speed up diagnostic procedure in the hospital • Facilitate communication between hospital and special clinics about difficult cases 		
Beneficiaries	Medical staff and ultimately the patients		
Project Description	<p>Project influences all technological equipment of the hospital such as computers, network, software and hardware for diagnostic purposes.</p> <p>Two basic technologies was implemented:</p> <ul style="list-style-type: none"> • Disc field for the X-ray pictures deposit • "Fusion" software for the communication with the X-Ray database 		
Main Achievements	<p>Full digitalisation of radiology, but some following activities are planned (ICT connection of the Jihlava hospital with polyclinic and future connection with IT institute in Brno – provision of the co-operation between the data from Jihlava Hospital and Masaryk's oncological institute in Brno. This co-operation could have positive effect in solving oncological cases in the Jihlava city</p>		
Lessons Learned	<ul style="list-style-type: none"> • The solution has positively influenced the ICT literacy at the hospital 		
Issues	<ul style="list-style-type: none"> • The possibility of low interest from the side of ICT staff was expected but the reality was different. All target people accepted this solution very positively • No technological problems were met while implementing the project, risk analysis has been made for the technological failures 		
Additional comments	Users did not participate in the development but they have accepted this service as very useful. The digitalisation of radiology will open up for co-operation with other hospitals and regions		

Case Study 13	EURAD		
Region	Baden-Württemberg, Germany		
Contact person	Mr. Stefan Baur, Curagita AG Tel: +49 6221 50250 Email: sab@curagita.com		
Category of eHealth	Cross-boarder eHealth		
Project partners		Public	Private
	Curagita AG		X
	Cirra+		X
	MK Conseil		X
Status of the Project	2003 - Ongoing, but changed focus.		
Cost and funding	Total cost: € 350,000 49% Other EC funds 51% Private sector investment		
RIAP	No		
Aims and Objectives	<p>The project was an eTEN phase one = market validation / feasibility study. The long-term objective was to leverage, verify and deploy teleradiology services on an international scale. In order to support that long-term objective, the project itself aimed at:</p> <ul style="list-style-type: none"> • Market evaluation (demand, supply, volume) • Evaluation of legal, practical, technical and other potential obstacles • Ways to overcome obstacles • Practical tests • Business plan for scale-up <p>The project aims at setting up a cooperative Trans-European network (EURad) that integrates teleradiology service into daily medical routine. The network will facilitate</p> <ul style="list-style-type: none"> • Emergency (tele-)radiology services • Additional diagnosis capacity for regular care • Second opinion/expert consulting • Local referrers' and colleagues' connectivity <p>The services will be provided both by teleradiologists located in a central reading room and suppliers connected to the EURad network. Thus, shortages and surpluses in radiology capacities across Europe may be balanced at the highest level of quality..."just a click away"</p>		
Beneficiaries	<ul style="list-style-type: none"> • Patients undergoing radiology examinations • Radiologists and radiology clinics <p>The driving force for the project was that there are regions with too much (radiological) reading capacity and those with a demand for reading capacity</p>		

Project Description	<p>The project started in January 2002 with a one year market evaluation phase, with the aims being to:</p> <ul style="list-style-type: none"> • Verify the proposed market situation: Collect reliable information on radiology coverage, modalities and software systems used, fees charged and legislation established directed toward teleradiology in ten European countries • Gain test sites to verify and test the proposed services, adjust services, prices, technical infrastructure and the overall business planning to the results of the market evaluation • Refine the proposed business planning according to the results achieved <p>In order to achieve these targets, a work plan with work packages and milestones was defined and successfully processed. Most important milestones have been</p> <ul style="list-style-type: none"> • A detailed market study on ten European countries • The establishment and operation of a test network • The refinement of the original business planning according to market study and test results <p>Besides these results, numerous contacts were established, potential co-operators and customers have been involved and potential competitors identified</p>
Main Achievements	<ul style="list-style-type: none"> • Market study (still valid) • Technical and practical approach for teleradiology with many partners (not centralised) • Operating network, although non-international
Lessons Learned Issues	<ul style="list-style-type: none"> • <i>Make it work, tune it later:</i> Teleradiology is a complex matter – in order to get something up and running, don't ask for perfection • <i>Don't fool yourself:</i> Having practitioners as participants is helpful. If they accept a workflow / technique / business model, it's because it really helps, not because it's politically desirable or somebody gets subsidies for it • <i>Recycling:</i> Use existing techniques, workflows, standards, legal frameworks whenever possible. Supports very much aspect 1 • <i>Procurement:</i> It is very demanding, time- and resource-consuming for an internationally unknown group of small companies to promote services like teleradiology. This became the most important problem • <i>Big players require a lot of time:</i> The only remedy we could think of – a partnership with an international player with a good reputation in the targeted countries – was impossible to implement within 12 months • <i>References required:</i> Although the consortium already practised teleradiology on a local scale, we did not implement an international reference customer immediately, thus being unable to scale up at the end of the first 12 months
Additional comments	<p>The project has continued for two years now by establishing regional teleradiology connections for various purposes. We expect to start cross boarder teleradiology soon</p>

Case Study 14	Telemedicine Clinic – Offshore Spanish teleradiology for Swedish hospitals		
Region	Västernorrland, Sweden		
Contact person	Mr. Gustav Malmqvist, County Council of Västernorrland Tel: +46 70 6630442 Email: gustav.y.malmqvist@lvn.se www.telemedicineclinic.com		
Category of eHealth	Cross-boarder eHealth		
Project partners		Public	Private
	Telemedicine Clinic, Barcelona, ES		X
	Sollefteå Hospital, County of Västernorrland, SE	X	
	Södra Älvsborgs Hospital, Borås, SE	X	
	Alliance Medical, UK		X
	CIDEM-Generalitat de Catalunya	X	
Status of the Project	2002 – 2004 Completed (ongoing full scale service)		
Cost and funding	Total cost: € 350,000 10-20% Regional public funds (Spanish) 80-90% Private sector investment Public and private reimbursement for services		
RIAP	No		
Aims and Objectives	<p>The main objective for the founders of Telemedicine Clinic was to provide European hospitals/clinics with subspecialist radiology diagnostic service through telemedicine solutions. The rationale was to bridge the problem of shortage of radiologists in many European regions.</p> <p>The Key targets was to:</p> <ul style="list-style-type: none"> • Create a functional remote radiology diagnostic service aimed at hospitals with long waiting lists and a shortage of radiologists • Gradually increase the services, starting with MRI diagnostics • Optimal business processes, organisation and return on investment • Build optimal workflow for referral, allocation of examinations to contracted specialists and rapid answer to referring clinics 		
Beneficiaries	<ul style="list-style-type: none"> • Patients: shorter waiting lists to examinations • Radiology clinics: cost-efficient alternative to hiring radiology locums for diagnostic work • County Councils and hospital administrations: better economy for radiology • Researcher: Potential for Telemedicine Clinic to become a centre of reference in radiology 		

Project Description	<p>TMC was founded in Barcelona 2002 by a group of Swedish physicians and entrepreneurs. Their first customer clinic was Sollefteå Hospital in northern Sweden, which started sending MR images for interpreting in March 2003. In the summer of 2003 the hospital of Borås started to use the services of TMC and in the autumn of 2004 the biggest customer Alliance Medical signed a contract with TMC. Recently, in the spring of 2006 the University Hospitals of Huddinge and Malmö in Sweden have been added as customers.</p> <p>The focus in the project has been to create an attractive service aimed at solving the problem of:</p> <ul style="list-style-type: none"> • Lack of radiologists • The need for subspecialisation <p>The build up of Telemedicine Clinic is a combination of</p> <ul style="list-style-type: none"> • Creation of a working business model for telemedicine • Integration of PACS and RIS systems and communication between service provider and customers and • Creation of a functional workflow that allows as short a time as possible between request and final diagnosis <p>For communication, TMC is connected to the Swedish Healthcare Network (SJUNET). By this TMC can easily be connected to any hospital in Sweden connected to Sjunet. For English customers TMC is in the same way connected to the NHS network</p>
Main Achievements	<p>At the TMC centre in Barcelona, there are 6-8 radiologists, conducting mainly second readings. The lion part of primary readings is done by contracted radiology specialists all over Europe. Chiefly they are situated in Spain, Germany, UK and Sweden. At TMC there are several co-ordinators who decide who should read what images based on availability, licensing, skill and language. Thus, the workflow is telemedicine in a double sense. Images are sent to Barcelona but are worked with remotely from different places in Europe</p>
Lessons Learned	<ul style="list-style-type: none"> • Having the right combination of key personnel • Logistics, workflow and quality assurance • For success, it is essential that promises for delivery of diagnoses are kept within stated time limits. Otherwise it would be difficult to get a critical mass of examinations and attract new customers • Double-reading of examinations and use of a QA-system integrated with the RIS. • Non-technical approach and strong incentives
Issues	<ul style="list-style-type: none"> • Even though the project has had to deal with very difficult integration issues, the approach has been to use what is possible and available, try new technology and "everything could be solved". This has been possible due to a very small project team and high competence of technical staff
Additional comments	<p>The Telemedicine Clinic is a full-scale up-and-running commercial service gradually expanding with more customers and widened range of services, e.g. emergency and on call diagnostics</p>

Case Study 15	eHealth Card Schleswig-Holstein		
Region	Schleswig-Holstein, Germany		
Contact person	Mr. Jan Meincke, ARGE eGK.SH Tel: +49 431 8868711 Email: j.meincke@medisoftware.de		
Category of eHealth	Security infrastructure		
Project partners		Public	Private
	Public Administration	X	
	SMEs		X
	Foundations		X
	University	X	
Status of the Project	2001-2006 Completed		
Cost and funding	Total cost: € 1,000,000 70% Regional public funds 30% Private sector investment		
RIAP	No		
Aims and Objectives	The eHealth card project is located in Flensburg (Schleswig-Holstein), next to the border to Denmark. It is a classic “bottom up” structured healthcare project, where health professionals from all (in Germany usually highly separated) healthcare sectors (net-) work together to increase efficiency in medical processes and healthcare. The focus in this best practice project is on the integration and optimising of “over-all” workflows and processes to reduce treatment-costs and minimise rehabilitation-time for the patients		
Beneficiaries	Patients, health care staff, research and industry as well as regional and national authorities responsible for healthcare. Also other regions and nations may benefit by using the results of the project for a future standard for eHealth cards		

Project Description	<p>The project was launched in the year 2000.</p> <p>Technical backbone is a virtual-private-network (VPN) based on standard-equipment using IPSec-protocol for en-/decryption. The VPN-platform integrates all the different IT-systems of the engaged health professionals through a logical integration layer called "connector". This component (implemented as software-only-solution or dedicated embedded system as combined hardware/software-solution) forces all IT-systems to adapt standardised message- and document-formats based on the HL7V3.0 RIM / CDA2. It also manages and unifies the communication with the smartcards of health professionals and patients and implements on this way automatically the whole protection profile/access control/smartcard based RSA en-/decryption given by law for handling the health records of patients in Germany.</p> <p>Especially in Flensburg the patient-data-cards (PDC) carry next to the RSA-keys for authentication and encryption the emergency-records structured in ISO/Netlink format on the chip, so that international interoperability and high availability is given at the same time.</p> <p>All health professionals in the project identify themselves with health-professional-cards (HPC), with are issued by government authorised institutions. Only these cards allow the cardholders to get access to the VPN and the intranet server-based patient health records. In most use-cases, access to patient health records is only granted, when HPC and PDC are present in the same place at the same time. Through this "two-face-commit" procedure, the data privacy of the patients is also achieved as access is restricted to health professionals only</p>
Main Achievements	<ul style="list-style-type: none"> • More than 150 health-professionals and 10.000 patients are trained on processes and technologies, when implementing the eHealth cards and the infrastructure for this. • Agreements between regional partners in healthcare are a result of evaluation, giving the base for national discussions in the complex German healthcare funding. • The region is technologically and organisationally leading in Germany. Most experts in national boards started their work and experiences in the regional project. More than 50 jobs have been created
Lessons Learned	<ul style="list-style-type: none"> • All regional players in healthcare are involved, so use-cases can be optimised from end-to-end and discussions can be made without national political "overhead" and influence • Bottom-up development in small steps ensures participation by users, so targets can be reached in short time with high acceptance • Political support helps getting the right people involved, so communication and decisions-management can be made very efficient
Issues	<ul style="list-style-type: none"> • The agreeing of common targets between health-insurances and health professionals is very tricky when discussing funding-themes and cost/usage • Some health-professionals dislike evaluation, because they are afraid of being benchmarked in medical topics • Industrial partners try to place their specific products to be used as "standards"
Additional comments	<p>The scale of the implementation of this eHealth card is growing and is likely to become standard for Germany and possibly for the whole of Europe</p>

Case Study 16	EDU-HEALTH		
Region	Abruzzo, Italy		
Contact person	Mr. Nello Ventresca, Abruzzo Region – Information and communication department Tel: +39 862 363212 Email: neve@regione.abruzzo.it		
Category of eHealth	eHealth for training and education		
Project partners		Public	Private
	ABRUZZO REGION	X	
	University of L'AQUILA /	X	
	Local Health Body		X
	Local General Doctor Association		X
Status of the Project	2004-2005 Completed		
Cost and funding	Total cost: € 1,493,000 (estimate) 100% National Public funds		
RIAP	No		
Aims and Objectives	<p>EDU-HEALTH has the general objective to start-up the "Regional Plan of digital Training for Health Operator being in Abruzzo Region" through the planning and the carrying out of oriented training courses.</p> <p>More specifically EDU HEALTH aims to:</p> <ul style="list-style-type: none"> • Promote and support the Health long life training in correspondence to the strategies of the National Health Ministry, by the use of broadband infrastructures, as well as by the use of the e-Learning platform and digital contents • Support the e-Inclusion, in other words the cutting of the digital divide within the health community through computer science educational program <p>EDU-HEALTH consists of planning, the carrying out and the supplying of training courses through an e-Learning platform for the development and the support of the eHealth across Abruzzo Region. This investment promotes support of life long training for all the health operators in the region involving the public bodies, the public and private hospitals, the associations of category, the training providers and so on</p>		
Beneficiaries	Potentially about 16000 health employees in the region.		

Project Description	<p>EDU-Health will develop :</p> <ul style="list-style-type: none"> • A multimedia e-Learning platform • Co-operation services at national and inter-regional level, in accordance with the Ministry' platform • The Digital Training Plan- detailed content for the education of the health operators oriented toward the life long training • The implementation of multimedia sites inside the health and sanitary structures <p>The project is divided into three different areas: educational, technical and administrative. For each of these subjects resources will be provided by the regional administration and by the University of L'Aquila.</p> <ol style="list-style-type: none"> 1. Educational Area: setting up and management of e-Courses. The development of contents and the activities of on-line tutoring will be taken in charge by the University of L'Aquila, Faculty of Medicine. 2. Technical Area, the ICT infrastructure, acquired by the Region , and the Web Laboratory. The latter implies job seats, computer science and software tools, plus scientific contents elaborated by the teachers. 3. Administrative Area, it consists of employees who follow the administrative organisation and the on-line management of secretary activities
Main Achievements	<ul style="list-style-type: none"> • The e-Learning platform was developed and established • A considerable share of learning units was developed and tested • e-Learning contents are under construction
Lessons Learned	<p>One of the strengths of EDU-HEALTH is the educational methodology, developed by the e-Learning research area of the university. The methodology implies the concentration on the learning objectives of a set of training tools, which will operate in a synergic way during the course. The scientific support and continuous monitoring of the contents is guaranteed by the academic department belonging to the University of L'Aquila. It is also foreseen a subsequent attribution of formal credits to the staff that attend the course.</p>
Issues	<ul style="list-style-type: none"> • Server technology. The technological and development standards are already in evolution. Some problems have been partly solved; others can be foreseen in the future, which have to be dealt with. • Didactics. The didactical quality of the materials depends on the didactical expertise of the respective teacher. A good solution may be the setting up of agreement between Abruzzo region and the University. • Compatibility. Underestimation of the risks linked to the compatibility between accessibility and technical standard. Accessibility requires agreements on certain technical development standards
Additional comments	<p>The methodology and technical platform has been developed but the future development has not yet been decided</p>

Case Study 17		CMAT - Advanced Multi-functional Centre for Simulation and Technological Innovation	
Region	Andalucia, Spain		
Contact person	Mr. Luis Lozano Tel: +32 (0)2 762 46 66 Email: Luis.Lozano@brutele.be http://cmat.iavante.es/		
Category of eHealth	eHealth for training and education		
Project partners	Health Regional Ministry	Public	Private
	EPES	X	
	IAVANTE Foundation	X	
	More than 40 Collaboration Agreements with other institutions.	X	X
	Nearly 100 APHS professionals collaborate in the pedagogical activity	X	
Status of the Project	The CMAT Centre was inaugurated 03/10/2004 Completed		
Cost and funding	Total cost: € 11,000,000 29% EU Structural funds 71% Regional Public funds		
RIAP	No, but it has been conceived in the framework of the Regional Innovation, Information Society and Health Innovation Strategies		
Aims and Objectives	The aim of CMAT is to be an exclusive centre in Europe for professional development and a point of reference in Research, Development and Innovation in new training methodologies in the Health sector. The main objectives are:		
	<p><u>A) Training and Knowledge Management</u></p> <ul style="list-style-type: none"> • To improve the training offer to the professionals of the Andalusian Public Health System (APHS) (more than 18.000 in primary care and more than 66.000 in specialised care) • To develop massive training programmes The territorial dispersion (90.000 km²) and size of the APHS with around 1.500 primary care centres and 34 public hospitals, allows scale and scope economies in the use of the high tech equipment of CMAT • To optimise and enhance disperse knowledge within the APHA The interconnection of CMAT with all the Regional Healthcare Centres allows converting them in "virtual classrooms" 		

B) Development, validation and exploitation of Information and Communication Technologies

- **To be a demonstrator of the use of multimedia technologies** and last generation simulation for its further application in the real healthcare activity
- **To facilitate innovation and research in new technologies**

CMAT facilitates research and innovation in the fields of simulation, robotics, pedagogical methodology and ICT. In particular, CMAT is involved in leading projects in the field of application of image technologies for the creation of virtual environments and new communication and information access platforms for pedagogical use and for real application in the APHS

- **To develop and supply technological solutions and applications of utility** to other healthcare centres and beyond.

The training and validation offer responds to concrete needs focussed on the development of professional competences (knowledge, skills, and attitudes) for the continuous improvement of healthcare activities. CMAT will promote the identification of innovative practices in the APHS and their appropriation and diffusion within the system, through collaborative working systems

Beneficiaries

The potential targets are the 91.000 professionals of the Regional Public Health System. At the timing of reporting 15.000 of them have already received training by iAVANTE (CMAT centre)

Project Description

CMAT is an Advanced Multi-functional Centre for Simulation and Technological Innovation.

The Centre is situated in the Health Sciences Campus Technology Park of Granada, which specialises in the health sector. The building contains different simulation areas for teaching and has a total of more than 2,000 square metres dedicated exclusively to training activities; these areas include operating theatres, virtual simulation classrooms, a trauma tunnel, casualty and specialisation consultation rooms, a critical room, a rehabilitation room, etc. There are also classrooms for in-person training and e-Training. All training rooms have audio and video recording systems, which can codify and send information to any point in the building, to the Corporate Network of the Regional Andalusian Government or to the Internet. The building is equipped with a high-speed data network with both wire and wireless connections, which are connected to the Corporate Network of the Regional Andalusian Government and Internet.

CMAT main characteristics are the following:

- An exclusive centre in Europe for professional development and training
- CMAT is owned by the Andalusia Ministry of Health, was promoted by EPES (the Public Company for Health Emergences), is managed by the foundation iAVANTE (Foundation for Technological Advance and Professional Training), and was co-financed by the ERDF

- The centre is located in the Health Sciences Technological Park in Granada and is a perfect test-bed for validating innovative technologies and methodologies, creating virtual environments and new platforms for didactic communication and access to information and their application to the Andalusia Public Health System

Training methodologies are carried out in different settings, which simulate real-life healthcare environments at various points of the health care process:

- Specialised Classrooms: The highly versatile classrooms are equipped with state-of-the-art technology in order to facilitate the knowledge transfer process
- iAVANTE also provides its students with tele-workstations from where they can access e-Training tools, do exercises, consult tutors and access chats related to training events. Consequently, access is provided to students who lack the necessary equipment to connect to everything IAVANTE has to offer on-line
- Out-of-hospital area: urban and domestic settings. The complex has a simulated urban area where accident and emergency professionals can train in health care processes and techniques for patients located outdoors
- The reproduction of a small-sized home environment has been constructed where access difficulties and limitations of space are similar to those encountered by accident and emergency teams in their daily activity outside a hospital or health centre.
- Hospital area: casualty and consultation area

The hospital area is designed exactly as any real hospital: a double circuit corridor with consultation rooms on both sides where patients receive assistance in different consultation rooms according to their pathologies

- Surgical area: split-level operating theatres with robots and virtual simulators. Nine multi-purpose operating theatres have been installed where specialisation depends on the pathology to be treated. The methodologies most frequently used in the operating theatres are robotic and virtual simulation in order to train students to deal with diagnosis and surgical techniques

As in the consultation or out-of-hospital areas, the training activities can be observed live or previously recorded by means of the complex system of cameras and microphones installed in all the rooms. This activity is used for analysis and feedback.

Main Achievements

1) To improve the training offer to the professionals of the Andalusian Public Health System:

- 15.000 trainees have been trained by IAVANTE using advanced methodologies, virtual and robotic simulation and intensive use of ICT
- 91,7% of trainers consider adequate or very adequate the degree of satisfaction of training activities; and 87,4% of trainees consider adequate or very adequate the degree of global satisfaction of training activities
- 4 innovative training methodologies have been demonstrated and used in training: virtual, scenic and robotic simulation and e-Training

- Seven virtual simulators have been demonstrated and used in training: Gastroscopy, Bronchoscopy, Urology, Intra abdominal Ecography and Laparoscopy
- 4 advanced robotic simulators have been demonstrated and used in training
- 50 mannequins have been demonstrated and used in training

2) Relating to the objective “To optimise and enhance disperse knowledge within the APHS”:

- It has been developed, and is 100% operative, the Innovative Practices Bank (<http://www.saluddinova.com/>) a unique tool integrating knowledge management and exploitation and collaborative working tools (video conferencing, SMS, etc.)

3) Relating to the objectives “ To facilitate innovation and research in new technologies / To develop and supply technological solutions and applications of utility to other healthcare centres and beyond:

- CMAT is developing a large number of tools and all of them have been liberated as “Free Software” and can be of immediate use in the virtual FLOSS Community
- CMAT has direct contact with the daily reality of the regional healthcare system and with the academic community, together with its staff expertise on ICT, allows the development of innovative solutions, of low cost, using some times developments already available on Internet and integrating and applying them to the health sector
- Some examples can be the development of a tele-training platform. CMAT is also working in projects such as the multimedia transmission of health information through Internet and 3G, integrated systems for collaborative work (directories, videoconferences, SMS, VoIP, document management. . .), telemedicine (e-Operating Theatre), etc

Lessons Learned

1. Integration in the Regional Innovation, Information Society and Health Innovation Strategies CMAT is not an isolated project

It is fully integrated into Regional Strategies on Innovation, Information Society, and Health Innovation

2. Wide impact in the quality of public health services, as an engine for productivity and growth

The Health sector has not only to be perceived as a social service, but together with Education should be seen as a key element for social welfare and economic growth and jobs creation

3. Leverage effects of ERDF funding

It may be that without ERDF funding, some of the objectives of CMAT could have been much more difficult or even impossible to achieve. In this way CMAT is a good example of Good Practice in using the leverage effects of public funding and, in particular, of Community Instruments

<p>Issues</p>	<p>1. Insufficient funding for a project of this magnitude Available funding has been really below the normal cost of this kind of project. This problem has been solved (or minimised):</p> <ul style="list-style-type: none"> • Using very low cost technology • Collaboration agreements with the Malaga and Granada Universities, allowing the participation of low cost professionals • Free Open Source Software (FLOSS) has been exhaustively used • Sponsoring Agreements with electro medical hardware and equipment enterprises. • "In House" design and development of almost all ICT tools <p>2. Lack of "references" of similar experiences There are no similar centres to CMAT</p> <p>3. Lack of awareness in the private sector In general, it has been difficult to find technological partners with an open attitude to "understand" the objectives to achieve and to contribute to their consecution</p>
<p>Additional comments</p>	<p>The project will continue and operational funding is ensured by the "Contrato Programa 2005-2008" of the Regional Ministry of Health with the IAVANTE Foundation. The experience of CMAT is going to be transferred to the Health Calgary Region in Canada through a Strategic Agreement</p>





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