



# Report on national eHealth RTD programmes, approaches and institutions

Deliverable 3.1 in the framework of the eHealth ERA project

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## eHealth ERA

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## Part III: Executive Summary

The study described in this report was conducted as part of the European Commission (EC) eHealth ERA coordination action. The goals of this part of the project are to coordinate planning of national innovation-oriented eHealth research and technological development (RTD) and to gather information about the formal management aspects of eHealth RTD in European countries. This study particularly aimed to explore (i) programme structural approaches to RTD, (ii) the actors involved in RTD activities, key stakeholders and the national and international context for the RTD, and (iii) similarities, complementarities and barriers in the organisation of eHealth RTD in Europe.

The study comprised a detailed review, analysis and synthesis of information on eHealth RTD available in the public domain. Information was gathered on 31 European countries; however, data from two of these countries were excluded from the subsequent analysis due to lack of relevant information. The study did not seek to analyse or to critique the EC-level RTD programmes, since this exercise is generally undertaken by regular reviews that form part of Framework Programme *ante* and *post hoc* evaluation exercises. On the other hand, many of the study's findings may prove useful eventually in that more strategic, pan-European context.

A key difficulty faced by the researchers when designing the analytical framework and the methodological approach was the absence of a commonly accepted definition of what constitute RTD activities and which of the activities identified could be attributed to the area of eHealth. Existing classifications and terminologies used to describe RTD activities do not include detailed semantic schemes related to eHealth. Therefore, in many cases, the descriptions of the scope of available RTD programmes did not allow straightforward attribution of RTD activities to the eHealth domain. Additional efforts were needed to identify the context in which relevant research is carried out. There is therefore a need to develop a typology of RTD activities and its commonly agreed definitions so as to achieve a degree of standardisation that enables the integration of eHealth terminology. While this observation is particularly valid where RTD is concerned, there is also an important need to introduce health-related and eHealth-related terms into other existing semantic schemes. Such an achievement could enable the monitoring of eHealth RTD activities within and across Member States and facilitate exchange of information among the key stakeholders involved in eHealth RTD.

The review of different structural approaches to the organisation of eHealth RTD did not identify any national-level programmes that focused solely on eHealth. In all of the research programmes reviewed, eHealth was only one of many research areas covered and, in many cases, eHealth was not explicitly mentioned as a programme goal. Hence, it could be beneficial if EC-level activities that organise dedicated eHealth RTD programmes, despite their considerable progress to date, could further seek to address the existing gaps in this field and achieve further progress.

Analysis of the stakeholders involved in eHealth RTD identified eight key stakeholder groups:

1. National ministries and departments responsible for research
2. Implementation bodies, research councils and funds
3. Universities and research organisations
4. Advisory bodies

5. National government
6. Academies
7. Health authorities
8. Regional and local authorities

Exploration of relationships among these eight groups suggests that, at the country level, the relevant ministries and departments constitute the most important stakeholder group that could drive the shift of national RTD systems towards an eHealth area. At the national level, organisations included in this group should be the first point of reference when introducing changes in RTD policies and developing organisational structures that support eHealth RTD. A careful assessment may have to be made of the different ministries that are involved in eHealth RTD, in the different Member States, and how they cooperate and co-ordinate their activities both on an *intra* and *inter*-country basis. The ministries currently range across health ministries, research ministries, innovation or industry-related ministries, core public sector services' ministries, and education ministries.

Implementation agencies, such as programme implementation bodies and research councils, emerged as the most active stakeholder group in terms of the number of relationships with other stakeholders. In addition to their general functions related to the financing and implementation of RTD activities, these organisations act as networking and information hubs between all other key research-oriented stakeholders. This stakeholder group could be the most effective point of engagement in increasing the level of eHealth RTD activities in an eHealth area and in further developing research infrastructure within European countries.

Another important finding of the stakeholder analysis undertaken within this study is that the coordination of eHealth RTD activities is often performed by the actual organisations that conduct the relevant RTD at a much more local or regional level within each country, i.e. universities and other research organisations. There is therefore a potential for improvement of coordination at the national levels through the involvement of stakeholders that act at the higher levels of the research stakeholder hierarchy, particularly at the programme and strategy levels.

Analysis of the existing funding mechanisms for RTD suggests a high degree of disparity and a lack of coordination. Therefore, more strategic approaches which encourage a greater focus on cohesive programme-based funding<sup>1</sup> streams allocated to eHealth RTD activities could be beneficial for the further development of research capacities and the expansion of research in eHealth RTD. The study findings indicate that the countries that were studied tend to underutilise non-programme-based funding mechanisms (such as project- and institution-based<sup>1</sup> funding). These mechanisms could be exploited either as an effective tool to stimulate curiosity-driven research or to focus eHealth RTD activities into new, more unified strategically important eHealth RTD areas.

EC-sponsored and co-financed eHealth RTD has now been established for almost 20 years and has stimulated cooperation on eHealth RTD in Europe. While there are regular reports that emerge on the achievements of these RTD activities, and there is always an end-of-programme evaluation of concrete, research developments; there is, nevertheless, a lack of information on several, more organisational or process-related aspects of this collaboration: its extent, the gaps in collaborative activities, and the barriers that discourage collaboration. This

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<sup>1</sup> The definitions of funding mechanisms identified within this study are described in section 3.6 (page 45)

information gap has meant that it was not possible to conduct and present systematic cross-country comparisons.

Rather, this report describes several examples of good practice in eHealth RTD at the European level. These examples, which are presented as short case studies, can be used by Member States as indications of how to strengthen policy frameworks in relation to stakeholder collaboration in both national and international contexts. The examples highlight good practice and illustrate management and organisational approaches to implementing strategic initiatives in high-level eHealth RTD. Specifically, pan-European eHealth RTD projects (such as MyHeart, PIPS, and Netc@rds) illustrate the benefits of a) establishing effective research management instruments such as large Integrated Projects, b) committing substantial amounts of both financial and human resources to a particular scientific endeavour, and c) investing long time-periods to projects in order to secure concrete scientific, technical and organisational developments. These case studies suggest that the overall focus of investment should be less on achieving the involvement of a particular range of Member States than on making an appropriate choice of high-level research and industrial players. Further, the findings suggest that strong collaboration in large-scale projects occurs either in a given geographic area or in a grouping of countries. Essential pre-requisites for such collaboration include adequate funding and the involvement of key research and industrial players which share the common goal of achieving a strategic position in their specific field.

Another effective mechanism to enhance international collaboration is the article 169 instrument. It includes several important, key, selection criteria that involve the size and dimension of the programme, its substantial funding over a five-year period of activity, its support from the EC, European Council and European Parliament, its focus on strategic intentions, and its involvement of key industrial players. Of considerable interest is the wide range of different Member States involved.

In terms of eHealth and/or specific domains of eHealth RTD (such as bio-informatics) this report suggests the need to:

- Foster the emergence of innovative ICT-based products, services and systems
- Create a critical mass of research, development and innovation at the EU level in technologies and services
- Improve conditions for industrial exploitation

While resources should ideally still be found to encourage independent and anonymous research of a curiosity-based character, these could be provided at the national or regional levels in individual countries. It is evident that the overwhelming importance of eHealth RTD at a European level should mean that it has as its core intention the need to focus on research domains that hold certain key attributes and benefits for Europe as a whole.

Further actions at the EC level on organising dedicated eHealth RTD programmes would be beneficial for further progress in this area. It is proposed that even greater political commitment could be given to initiatives and studies that have already been initiated. Initiatives could be undertaken either uniquely within the sphere of the Information Society and Media Directorate-General, or could be more likely undertaken in the context of appropriate liaison with the Directorates-Generals on Research; Health and Consumer Affairs; Enterprise; Employment, Social Affairs and Equal Opportunities; Market, and so on. These include:

- Undertaking initiatives related to chronic diseases, personalised health systems, and homecare, such as the Lead Market Initiative on eHealth.

- Adapting mechanisms such as the article 169 concept and the 'intelligent pharmaceuticals' industrial mechanism to other appropriate areas of potential eHealth RTD.
- Building on the work already undertaken by such studies and support actions as RIDE, SHARE, and SYMBIOmatics.

The study suggests that a keen awareness of process is needed whenever a decision is made with regard to organising a dedicated eHealth RTD initiative for the whole of Europe. Most mechanisms need long and incremental periods of development in order to consolidate their foundation and to ensure their eventual success. This time span could be up to a period of 15 years – this was certainly the case of the time-lapse between the launch of eHealth as a research topic in Europe in 1988, and the beginning of eventual large-scale of deployment investment, implementation, and appropriate organisation at the European and various national levels in 2004. At the same time, a feedback mechanism would be required throughout the installation and functioning of the mechanism, since organisational changes need to be made over a lengthy time-period in order to respond to changing internal and external conditions. A purposeful set of incremental, individual research initiatives ('joint RTD research') could also be advocated in eHealth RTD, since most successful, individual research projects appear to need a lengthy period of research commitment (e.g., 48 months), and are possibly only successful as a result of a dedicated series of successive time and financial commitments.

A possible mechanism for the development of a pan-European view of eHealth RTD (a European eHealth RTD area) could include:

- Developing a Strategic European View of a European eHealth RTD Area. eHealth RTD should ideally be undertaken at a European level, have a Community perspective, and be supported by European-level funding matched by equivalent country-level funding from Member States.
- Joining Forces among Member States Across Europe, and Internationally. This is a new European partnering approach. eHealth RTD should involve a range of stakeholder partnerships that support the policy commitments cited here. There is a probable need to build synergistic relationships among relevant research-oriented committees e.g., the FP7-ICTC (formerly known as the Information Society Technologies Committee), and others.
- Ensuring appropriate funding. Clearly, great benefit can be drawn from careful, instrumental use of the 7FP funding mechanisms in terms of ensuring substantial amounts of funding to key strategic eHealth RTD domains.

Not every eHealth RTD domain chosen for high priority exploration would need to include all the Member States of the Union in its development and application. However, as initially indicated in this new European partnering approach, an incremental mechanism for the development of cross-European eHealth RTD could be based on a clustering approach which could have either a multi-lateral or a bi-lateral dimension. Such an approach could also be based on a notion of partnering countries that share a critical research mass in association with 'observer' or 'accompanying' nations. That is, other Member States could or should be included in an advisory or observatory capacity, so as to take optimum advantage of the research policy directions that are taken and the research outcomes that result.

Further development of good practice concepts in eHealth RTD need to be developed especially in terms of:

- Enhancing and enlarging community (stakeholder) development, i.e., developing communities of practice
- Creating effectiveness and efficiency of resulting benchmarking and indicators
- Creating more 'learning points' and outcomes that are transferable, e.g., asking partners in successful consortia to make observations on good resulting content, mechanisms, and process

As a result of this initial study, it is considered that further studies may be required in a number of areas that would involve a more detailed overall assessment than has been possible at this at this stage, such as: the types of ministries involved in eHealth RTD; comparisons with European-wide research undertaken on eHealth in the 4FP, 5FP, and 6FP; the ranges of stakeholder involvement; various geographic and regional models of eHealth RTD support; and eHealth RTD classificatory systems or schemes. These six concepts are described briefly in further detail in section 5.7 of this report.

## Part IV: Deliverable Content

### Acronyms and abbreviations

3C	Continuity, collaboration, and communication
COST	Cooperation in the field of scientific and technical research
CPME	Comité Permanent de Médecins Européens
EC	European Commission
EFN	European Federation of Nurses Association
EHR	Electronic Health Record
EHTEL	European Health Telematics Association
EPR	Electronic Patient Record
ERA	European Research Area
ERA-NET	European Research Area Network
ESA	European Space Agency
EU	European Union
EUREKA	Europe-wide network for market-oriented research and development
FP (4FP, 5FP, 6FP)	Framework Programme (Fourth Framework Programme, Fifth Framework Programme, Sixth Framework Programme)
HIS	Health Information System(s)
HOPE	European Hospital and Healthcare Federation
ICT	Information and communication technology
IPPA	Integrated Programme Portfolio Analysis
IRC	Innovation Relay Centres
NHS	National health service
PGEU	Pharmaceutical Group of the European Union
R&D	Research and development
RTD	Research and technological development
UEMS	Union Européene de Médecins Spécialistes
UK	United Kingdom
US	United States of America
WP	Work package
WRF	Weighted referencing frequency <sup>1</sup>
WT	Work task

<sup>1</sup> See section 2.3.2 for description

# 1 Introduction

Planning for national, innovation-oriented, eHealth research and technological development (RTD) initiatives in EU Member States could be better coordinated so as to enhance the development of a common European RTD roadmap and joint eHealth RTD activities. A more strategic approach aimed at creating Europe-wide research roadmaps and RTD activities could help enhance the technological competitiveness of Europe globally. Reducing the disparity in the planning which currently exists could help in establishing a more strategic approach to eHealth RTD. In turn, this could benefit the development of regional, national and trans-European eHealth RTD infrastructures aimed at improving the quality of health outcomes and the quality of life of European citizens.

The aim of this study was to identify the main trends in the organisation of eHealth RTD in Member States through a situation analysis. In particular, the study aimed to determine the strategic approaches and policies in place in the EU Member States, highlight gaps in organisation, and provide examples of good practice capable of tackling these gaps.

The three objectives of the study were to:

- Identify and describe national structural frameworks and mechanisms for RTD programme and roadmap formulation, implementation and exploitation
- Describe the stakeholders and key actor groupings involved
- Facilitate the exchange of experience and good practice in the eHealth RTD area among European Member States

According to the Description of Work for the project, this study was to be conducted within work package three (WP3). This work package was designed to explore the organisational and management aspects of eHealth RTD in European countries, but not the content-related issues of eHealth RTD activities. The work was organised according to three tasks, WT3.1, WT3.2, and WT3.3. The tasks focus respectively on programme structure, stakeholders, and programme similarities and barriers. They are described in detail below.

WT3.1: Programme structural approaches. This task focused on identifying and describing mechanisms and frameworks of RTD programmes in European countries. The analysis aimed to identify roadmap management and implementation of RTD programmes if and when they currently exist. The analysis started with a general overview of RTD mechanisms and frameworks whether related to eHealth RTD or not. Subsequently, the specificities of eHealth RTD mechanisms and frameworks are analysed.

WT3.2: RTD actors, stakeholders, and national and international context. This task focused on the identification of key stakeholders and actor institutions involved in the RTD and roadmap-related processes and in the mechanisms identified in the previous task and in WP2. This information was used to gain a better understanding of national-level initiatives, institutional structures and management approaches adopted in managing RTD programmes.

WT3.3: Similarities, complementarities and barriers. This work task aimed to analyse and synthesise the results from WT3.1 and WT3.2 to allow an integrated comparison of the relevant national RTD programmes, institutions and stakeholders involved, road-mapping of the programmes and, among other features, the management approaches used.

Section 2 of this report describes the methodological framework of the study, provides insight into some general methodological challenges related to the attribution of activities and organisations to eHealth and RTD, describes the analytical framework designed to overcome these challenges, and discusses the strengths and limitations affecting the interpretation of the

study results. Section 3 of the report describes eHealth RTD approaches in the 29 countries reviewed in terms of strategic priorities, key stakeholder groups involved in the process related to formulation of RTD policy and strategy at the country level, design and implementation of RTD programmes, and conducting actual research activities. Section 3 summarises the findings of earlier studies in this area, provides a detailed discussion of the results of a stakeholder analysis, and describes the general structure of stakeholder groups and their relationships. This is followed by two sub-sections that provide more details on the organisational structures related to the coordination and financing of national eHealth RTD activities. Section 4 provides case studies of good practice in eHealth RTD within the countries reviewed. In particular these case studies focus on international collaboration and collaboration between public and private sectors in eHealth RTD, the areas where detailed cross-country information was not available. The report ends with Section 5, which presents the study's conclusions and suggestions for a common RTD roadmap. The Annexes to the report provide details on the methodological approaches used as well as some detailed data generated by the study.

## 2 Methodology

This section describes the methodological approaches used in this study: firstly, identification and selection of key definitions; secondly, gathering information on national eHealth RTD programmes, approaches adopted and the institutions involved in these activities, and; thirdly, the proprietary analytical framework used and the various domains of analysis. This chapter also identifies the strengths and limitations of the study.

### 2.1 Key definitions

The project team (afterwards referred to as 'we') used a definition of eHealth RTD which was developed within the earlier stages of the eHealth ERA project. This is described in the deliverable D2.1 — PART I Analytical framework of this project (sections 1.2 and 1.3). A number of challenges emerged as regards definitions of RTD activity described in the existing literature and the choice of a definition that would be sensitive and specific enough to encapsulate RTD activities adequately.

The first methodological challenge faced by the study was the attribution of RTD activities to eHealth [1]. Hereafter, this issue is often referred to in the text simply as the 'attribution problem'. Despite the fact that this study did not have particular aim to explore the content of eHealth RTD activities, a review of the scope of RTD programmes was necessary to identify the ones that include eHealth-relevant RTD activities. eHealth is a cross-cutting category that covers a wide range of research topics and technology areas relevant to ICT. The attribution of RTD activities to eHealth by the technology domains being researched is not straightforward, as attribution is only possible if research on a particular technology is carried out in the context of healthcare. The Europe-wide remit of the study led to a focus on the breadth rather than the depth of the RTD activities explored, so that it was only possible to analyse activities at a programme level. Furthermore, it was difficult to determine whether research projects within a particular programme were healthcare-related. We also encountered difficulties as regards the definition of a 'programme', which varied by country.

The second methodological challenge for the study related to varied and inconsistent definitions of "activities" and "programmes" that are in use. Earlier studies had distinguished two general categories of research activities: (i) "programmes" and (ii) "other than programme"

activities. This division between types of research activities was based on the structure of financing. For example, the CISTRANA project adopted the following definition of a programme: *“National public funding given to companies, public research institutes or universities etc. through calls or similar procedures to be used for research and technological development (R&D) in the field of information and communications technology (ICT)”*. This definition excludes activities financed by institutions which do not use competitive tendering for allocating funds. Therefore, an additional category, “other than programme-based activities”, had to be introduced within the analytical framework of the study.

To overcome this lack of clarity with regard to definitions, we decided to use two different approaches to define a programme. First, when analysing research activities, we developed a definition of a programme that draws on project management literature: hence, *“A research programme is a portfolio of research projects aiming to achieve the same strategic goals”*. This definition covers a broader range of research activities at a higher organisational level than merely project structure. The RTD activities identified through the application of this definition are referred to as *“Research programmes”* or *“RTD programmes”*. When analysing the nature of research funding for eHealth RTD we used the definition adopted by the CISTRANA project, which we refer to as a *“Funding programme”*.

Using these various definitions, we were able to formulate more clearly our objectives for information gathering. By analysing the declared objectives of “research programmes”, we could in many cases ascertain whether the “funding” or “activities” were related directly to eHealth RTD.

## 2.2 Information gathering

Experience with the data collection activities conducted in WP2 of eHealth ERA (the weaknesses of which are explored further in section 2.4) suggested that the work on WP3 should focus more on gathering and analysing systematically the information available in the public domain rather than undertaking a data collection exercise involving respondents at a country level.

The initial set of information sources for this study was identified by (i) analysing the results of the WP2, and (ii) by undertaking a preliminary search of information available on the Internet. We expanded the information sources by “cascading” the references identified in the initial analysis. The analysis captured information from:

- Reports and publications from previous and parallel coordination action and support action projects, such as INNOCULT and CISTRANA
- Information portals of eHealth RTD programmes and relevant programme documentation
- Information portals of government and research institutions within the countries studied
- Various research publications related to eHealth and eHealth RTD

Operationally, the data collection exercise was designed as a continuation of work started within WP2. In WP2, each project partner had worked with a set of countries to gather information on the national eHealth policies and their deployment status. We decided to keep the same allocation of countries among project partners for data gathering within the study described in this report. This allowed project partners to make effective use of their existing networks and those they developed during WP2 activities. Using the data gathered in the preparatory work of WP2, the project team produced a set of short, instrumental, intermediate reports on eHealth RTD in each country. The project team developed a template to gather

systematic and consistent data on each of the countries studied. This template was piloted in the six countries represented by the partners in the coordination action, namely, Finland, Germany, Italy, Poland, Spain and the United Kingdom (UK). The piloting exercise enabled collection of information on these countries but also improved the structure and content of the information gathering template. The final version of the template used for information gathering is presented in Annex 1.

The countries for the second round of information gathering were identified using the results of CISTRANA project, which identified 14 countries that had indicated eHealth as a priority research area. These countries included: the Czech Republic, Cyprus, Finland, Hungary, Iceland, Italy, Poland, Portugal, Norway, Slovakia, Slovenia, Sweden, Switzerland, and the UK. The relevant CISTRANA report [2] mentions that most of the countries responded to the survey by identifying a single national research and development (R&D) programme. However, eight out of the 14 countries – Finland, France, Germany, Greece, Hungary, Italy, Poland and Switzerland – indicated the existence of several R&D programmes in the country. A review of these programmes enabled the project team to identify secondary information sources and additional eHealth RTD activities as well as to see links to international collaboration activities. These additional resources helped us to guide the information gathering for the rest of the countries involved.

The geographic focus of the study included 27 EU Member States plus the Candidate Country of Turkey as well as Iceland, Norway, and Switzerland. Table 1 provides a complete list of the 31 countries included initially in the study.

**TABLE 1 THE COUNTRIES INCLUDED IN THE REPORT AND THEIR ABBREVIATIONS<sup>1</sup>**

Austria	<b>AT</b>	Finland	<b>FI</b>	Italy	<b>IT</b>	Poland	<b>PL</b>	Switzerland	<b>CH</b>
Belgium	<b>BE</b>	France	<b>FR</b>	Latvia	<b>LV</b>	Portugal	<b>PO</b>	Turkey	<b>TR</b>
Bulgaria	<b>BG</b>	Germany	<b>DE</b>	Lithuania	<b>LT</b>	Romania	<b>RO</b>	United Kingdom	<b>UK</b>
Cyprus	<b>CY</b>	Greece	<b>GR</b>	Luxemburg	<b>LU</b>	Slovakia	<b>SK</b>		
Czech Republic	<b>CZ</b>	Hungary	<b>HU</b>	Malta	<b>MT</b>	Slovenia	<b>SI</b>		
Denmark	<b>DK</b>	Iceland	<b>IS</b>	Netherlands	<b>NL</b>	Spain	<b>ES</b>		
Estonia	<b>EE</b>	Ireland	<b>IE</b>	Norway	<b>NO</b>	Sweden	<b>SE</b>		

<sup>1</sup> According to ISO 3166-1 and the corresponding ISO 3166-1-alpha-2 code elements

## 2.3 Analytical framework

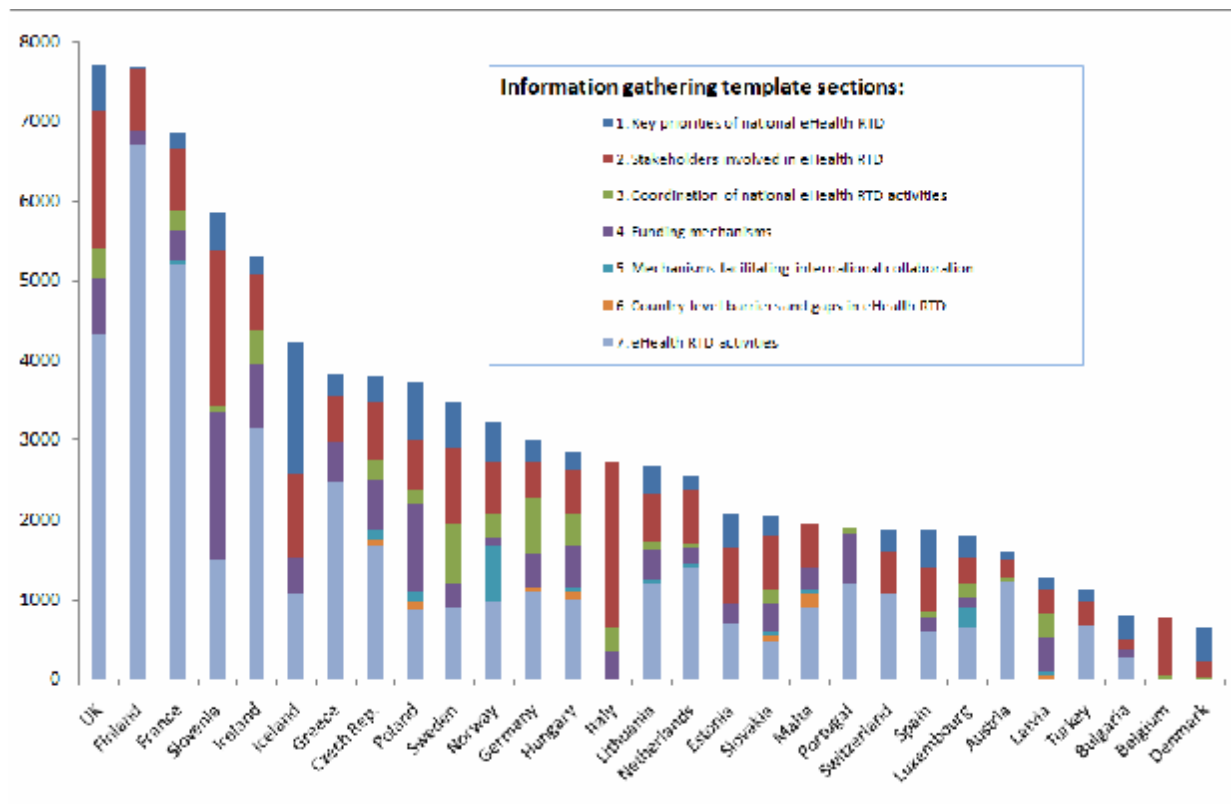
The information gathered was analysed inductively using a validated content analysis approach [3],[4]. Data captured by the research template used in each country (Annex 1) was loaded into an analytical software package QSR NVivo, version 7<sup>1</sup>. Using this software package, the content of the reports was coded to identify and classify key concepts mentioned in the information sources for further use in content analysis.

The main research questions for the thematic analysis were defined theoretically by the structure of the research template used for information gathering, and included seven categories of information that covered a range of issues that are important at the country level:

- Key priorities of national eHealth RTD
- Stakeholders involved in eHealth RTD
- Coordination of national eHealth RTD activities
- Funding mechanisms
- Mechanisms facilitating international collaboration
- Barriers and gaps in the organisation of eHealth RTD
- eHealth RTD activities.

Figure 1 (below) represents the number of words coded by theme-level codes in each country RTD report. It shows that the amount of information gathered varies significantly among the countries.

**FIGURE 1 NUMBER OF WORDS BY SECTIONS OF COUNTRY INFORMATION GATHERING TEMPLATES<sup>2</sup>**



<sup>1</sup> [http://www.qsrinternational.com/products\\_nvivo.aspx](http://www.qsrinternational.com/products_nvivo.aspx)

<sup>2</sup> Countries are presented in the order of decreasing of the total number of words coded

This range may be explained by two factors: (i) the relative lack of availability of information in the English language and (ii) the actual level of eHealth RTD activity in the countries. The same two factors impact the distribution of information among different sections of the available reports on eHealth RTD. Most of the information available was related to four specific areas: the descriptions of eHealth in RTD activities (~46% of the total number of words coded), stakeholder involvement in eHealth RTD (22%), funding mechanisms (~13%) and national eHealth RTD priorities (~11%).

Very limited country-level information was available on eHealth RTD in Cyprus and Romania. Review of the information gathered within the WP2 of eHealth ERA, and other sources, suggested that most of the eHealth activities in these countries focused on eHealth implementation rather than RTD. Therefore, these countries were excluded from further analysis.

### 2.3.1 Analysis of eHealth activities

In spite of the considerable number of research projects in Europe in areas relevant to eHealth [1], eHealth is rarely mentioned as a goal or a focus of the research programmes<sup>1</sup> within which these projects are implemented. We were unable to identify any EU research programme which focused solely on eHealth.

Analysis of the information gathered identified 80 research programmes<sup>1</sup> that are potentially relevant to eHealth. Three classes of codes were used for the content analysis of descriptions of these programmes: (i) theme codes, section-level codes that identify the sections and subsections of information sources according to the structure of the information gathering template, (ii) content codes, word- or phrase-level codes that identify key concepts and emergent themes, and (iii) context codes, paragraph-level codes that define the context in which the concepts and themes appeared in the information sources.

The first two classes of codes were created manually by marking relevant parts of text. The third class was created by using automatic text search coding on the basis of a set of search criteria defined throughout the process of manual coding. This coding strategy allowed the use of matrix-coding queries to explore the frequency of appearance of content codes in paragraphs marked by the context codes as a proxy for the relevance of the concepts to the context. The theme codes were used as filters for the creation of various matrices.

A number of matrices were produced and examined for each theme with the intention of spotting the possible clustering of countries according to emerging themes characterised by intersections of context and content codes at a paragraph level. The mapping exercise aimed at identifying similarities and differences in approaches to managing eHealth RTD in the countries included in the study.

### 2.3.2 Stakeholder analysis

Direct references to more than 400 stakeholder organisations and institutions were coded in the information sources included in the study. The full list of these organisations is presented in Annex 5. The analytical frame also included approximately 50 categories of indirect references to different groups of stakeholders. These categories of stakeholders referred to: (i) general groups of stakeholders, such as “industry”, “research community”, or “researchers working in universities and hospitals”, and (ii) stakeholder groups within the organisations,

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<sup>1</sup> See section 2.1 for the definition of research programmes

such as “rectors of the Universities”, and “Board of Directors”. Codes identifying references to stakeholders were classified into eight broad categories described in detail in section 3.3.2 below.

The roles of stakeholders were coded using NVivo automatic coding queries. The search criteria for these queries emerged from the analysis of the results of manual coding of the stakeholder roles. The list of search criteria and the number of references generated by coding queries is presented in Table 2 below. The coding queries were designed to generate paragraph-level codes. This approach allowed the use of these codes to identify the context in which the references to stakeholders appeared in the original information sources.

**TABLE 2. SEARCH CRITERIA USED FOR AUTOMATED PARAGRAPH-LEVEL CONTEXT CODING OF STAKEHOLDERS’ ROLES**

Stakeholder role	Short label <sup>1</sup>	Search criteria	Compound criteria <sup>2</sup>	Number of references
Funding, financing, investing, budget	Funding	financ* <sup>3</sup> or fund* or invest* or budget*		641
Policy and strategy	Policy	Polic* or strateg*		535
Management and administration	Management	manag* or administ*		219
Implementing, undertaking activities, research, R&D, RTD	Implementing	implement* or undertak*	activit* or research* or R?D <sup>4</sup> or RTD	214
Advice and recommendations	Advice	advic* or advis* or recommend*		161
Coordination	Coordination	co*ordinat*		148
Monitoring, evaluation, assessment	Monitoring	evaluat* or monitor* or assess*		111
International cooperation and collaboration	Int. collab.	internation*	cooperat* or collaborat* or co-operat*	13

The frequency of the references to stakeholder organisations was used as a proxy measure to determine the relevance and importance of stakeholder groups for eHealth RTD within the broader RTD context in each country. To account for the effect of differences in the amount of information across the countries studied, the referencing frequencies were weighted at the country level by the number of stakeholder groups with the same role as well as the number of roles played by each stakeholder group.

A methodological note in Annex 6 explains the mathematical approach used to calculate the relative weights using an example. Charts in Annex 7 and Annex 8 show the effects of application of weighting on the distributions of referencing frequencies by countries, stakeholder groups and stakeholder roles. Weighting had little effect on the distribution of stakeholder groups and roles among top rated categories; however, it did change the relative positions of key players within and among the countries. This allowed the team to use weighted referencing frequency (WRF) as a proxy for the relative importance of stakeholder groups in relation to the particular context of each country.

<sup>1</sup> Short labels will be used below to simplify the presentation of material in tables and graphs

<sup>2</sup> Within same paragraph

<sup>3</sup> “\*” - means any number of any characters

<sup>4</sup> “?” – means any single character

## 2.4 Strengths of the study

To our knowledge, this is the first comprehensive study of eHealth RTD within the EU or in any other region. Earlier studies have provided partial coverage of the RTD in general (for example the INNOCULT study) and eHealth RTD (for example, the CISTRANA study). Hence, our study is a significant advance on earlier studies and the comprehensive data set, which has been systematically gathered and analysed, provides a wealth of information that will be available publicly for the EU and other parties. Clearly, our study is an advance on the CISTRANA project which, due to its comprehensiveness and large-scale coverage of European information technology-related research, was impressively informative, but could not cover specific research fields, such as eHealth, in detail.

Overall, this study provides the first systematic scoping of the eHealth RTD field in Europe. Thus, it provides a strong platform and a rich resource for more detailed research, assessment, and evaluation of the domain. The study findings can be used to inform more structured discussions by researchers and policy-makers at international, European and national levels about future collaborative activities among European Member States.

This report should be treated as a strategy-level analysis of the European eHealth RTD landscape. It should also be considered as a complementary document to a number of European Commission-financed publications on eHealth support actions such as RIDE, SHARE, STEP, and SYMBIOMATICS, and can be understood as providing additional useful information to the eHealth action plan strategies/roadmaps [5], and the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis undertaken by eHealth ERA [6].

However, all studies have their weaknesses. These are described in some detail in the next section.

## 2.5 Limitations of the study

The project team aimed to collect as much information as possible on all the countries included in the scope of the study; however, time and resource constraints, as well as limited country-level data, means that the level of detail in the information gathered varies from country to country. Several factors limited the quality of the information collected.

The instrument used in WP2 for data collection included a section on eHealth RTD; however, the material collected in this section was limited and its quality was not adequate for the purpose of this study. Although similar surveys were conducted by other international projects<sup>1</sup> in this area during the same time-period, these studies focused on RTD in general or eHealth deployment but not on eHealth RTD. These surveys also had a low response rate. Therefore, the probability of an inadequate response to any additional survey was judged to be extremely high, and a decision was taken not to undertake an additional survey for this study.

Implementation of a systematic literature review in all European languages was not possible due to the practical difficulty of analysing information in all these languages and the limited resources available to the project team. Instead, as background, we used the findings of and built on two earlier surveys, namely, the INNOCULT and CISTRANA studies.

In addition, the limited timeframe of the study did not allow verification of the information gathered with the representatives of stakeholder organisations within the countries included in the study. The team, however, would value in-depth critique of this document to validate its findings fully.

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<sup>1</sup> e.g., An international survey was undertaken on eHealth implementation and availability globally by the WHO in late 2005.

As explored in some detail earlier, we encountered methodological challenges implicit in the choice of the inductive content analysis method for this study: there were the lack of systematic definitions for the explored categories of activities, and the consequent difficulty of attributing either funds or activities to eHealth RTD. However, through the methodological rigour that we adopted in our research, we tried to address these challenges systematically.

Finally, these limitations have not compromised the added value of this part of the eHealth ERA coordination action. The strengths of the study described in section 2.4 are considerable in relation to the study's weaknesses.

## **3 eHealth RTD approaches in European countries**

This chapter first introduces two earlier initiatives, the INNOCULT and CISTRANA initiatives, which provide a comprehensive overview of European RTD approaches (section 3.1).

With specific reference to the eHealth ERA exploration of eHealth RTD, the chapter then explores in detail the four main factors identified as important: the principal programmes and key priorities of eHealth RTD in European countries (section 3.2); the main stakeholders involved in eHealth RTD (sections 3.3 and 3.4); the coordination of national eHealth RTD (section 3.5); and the funding mechanisms (section 3.6).

### **3.1 Existing research on RTD in European countries**

We analysed and describe here a brief description of two main initiatives, the INNOCULT and CISTRANA studies that offer overviews of European RTD approaches. These are intended to provide a background understanding of eHealth RTD approaches in Europe.

As the focus of our study and the level of analysis are at Member State level, we do not make any reference here to presentation of findings in the European Commission's analyses of eHealth research undertaken in its research Framework Programmes (FP).

#### **3.1.1 INNOCULT**

The INNOCULT project<sup>1</sup> was "a comparative study of policy-styles in RTD policy-making in the EU", co-financed by the European Commission's Directorate-General on Research in the late 1990s. As described in its final report [7], which was later published as a book [8], the project's aims were to identify strategies for the internationalisation of research and development in Europe, to explain the emergence of such trends, and to spot opportunities for collaboration. Concentrating mainly on the public sector and academic institutions, INNOCULT's research examined the science and technology potential at Member State level, innovation in public institutions, and various socio-cultural challenges to European research.

This research was conducted before the European Research Area concept was broadly accepted and institutionalised, and relied on observations that related to FP4 and FP5. The research contexts in northern, southern, and central European countries (including Austria, Finland, France, Germany, Netherlands, Portugal, Sweden, and the UK) were analysed. The project methodology included analysis of national study reports supported by a number of interviews.

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<sup>1</sup> See <http://www.iccr-international.org/innocult/> and <http://www.iccr-international.org/research/projects/innocult.html/>

The five prime themes covered by the INNOCULT research team were (i) the historical context of the evolution of national research systems and international research and technology development (RTD) collaboration, (ii) national research policies and a perceived shift from government to what was termed 'governance', (iii) institutional innovation and university research, (iv) the importance of research organisations, and (v) networking of European research.

The overall conclusions of the project are multiple and complex to analyse. Specific fields of research are not covered, and there is no treatment of any domain that can be said to parallel eHealth. However, among the generic policy implications of the findings, the following four were considered to be important:

- The 'governance' of research: research directions can be influenced by various levers including incentives, negotiation, funding, the creation of particular career patterns and evaluation.
- Policies which encourage bilateral and multi-lateral research endeavours.
- Priority-setting in universities and research organisations: evaluation of research; offering core funding; and developing employment strategies, qualification processes, and carefully designed incentive structures.
- Policy coordination among Member States: building on successful, sustainable research networks while showing openness to new researchers and institutions.

Overall, research organisations (whether academies, public research institutes, national research establishments, international institutes, or private research institutes) were seen as being potentially more influential in the eventual internationalisation of European research than universities, which were considered as a separate form of institution by the INNOCULT study. Research networks were identified as having a strong potential role in creating effective and efficient research in Europe. Among the sample researched, France, Germany, and the UK were identified as the three lead countries in Europe [7] but the Nordic countries were also identified as having a strong position.

### **3.1.2 CISTRANA**

Following the setup of the Sixth Framework Programme, the CISTRANA Project (2004-2006) report analyses national research and technology development (RTD) priorities and programmes, with a particular focus on Information Society Technologies [9]. As the project was undertaken more recently than the INNOCULT study, and after the formulation of the notion of the European Research Area initiative, the findings of the survey undertaken as part of this project has more contemporary relevance. Although, the CISTRANA Project targeted the eHealth domain as a key area of focus, its findings on eHealth RTD are limited.

Among its various activities, the project conducted a questionnaire survey in 2004-2005, and tested its results in workshops in 2006. The survey and subsequent meetings identified technical capacity to develop new healthcare processes, medical equipment, and web-based eHealth services. A table (included in the eHealth part of the survey, p84-88) presents all the research programmes that selected healthcare, medical equipment and assistive devices as being of importance. Of the 31 programmes in 12 countries identified by CISTRANA, only 12 programmes in five countries (Finland, France, Germany, the Netherlands, and Switzerland) extend beyond 2007.

It is interesting to note that the list of fourteen countries identified by the CISTRANA project as having nominated eHealth as a core RTD topic does not match the six strong research

countries identified by the INNOCULT study. For example, while France and Germany are missing from the CISTRANA list, a larger number of southern or Mediterranean countries, new EU-10 (but not EU-12), and European Economic Area countries are mentioned by it. This may indicate a broader involvement of European Member States in eHealth RTD in recent times.

### 3.2 Principal programmes and key priorities of eHealth RTD in European countries

The information sources that were reviewed in this part of the eHealth ERA coordination action included descriptions of 80 research programmes considered to be potentially relevant to eHealth. A summary of the key characteristics of descriptions of activities is presented in Annex 2. No descriptions of RTD activities relevant to eHealth were found in the reviewed information sources on Belgium, Denmark, Estonia and Latvia. It is, however, not known whether this was due to there being no eHealth RTD activity in these four countries or purely a lack of information provided to the eHealth ERA research team (the latter is a plausible explanation). The key parameters of all the identified activities are presented in Annex 3.

In the information sources accessed from the different countries reviewed, the level of detail in describing specific eHealth RTD activities varied considerably. Table 3 demonstrates the number of words coded for the 10 research programmes with the most detailed descriptions of eHealth RTD activities.

In the information sources reviewed, we were unable to identify any references to national programmes that focus specifically on eHealth RTD. However, in many of the RTD programmes in the ICT area, health or health-related themes were often present among other research topics. As described above, the attribution of RTD activities to the eHealth domain at the programme level has been methodologically challenging. Analysis of the terminological schemes used to describe thematic areas within the reviewed RTD programmes suggests that attribution to eHealth cannot be made on the basis of the technological content of RTD programmes. In many cases, the same technological areas either could or could not be attributed to eHealth depending on whether the application of these technologies related to health or healthcare.

**TABLE 3. RESEARCH PROGRAMMES WITH THE LARGEST NUMBER OF WORDS CODED IN DESCRIPTIONS**

RTD activity	Country	Collaborating countries	Start	Finish	Words coded
Healthcare technology programme (Finnwell)	Finland		2004	2009	1,560
Programme for the development of industrial research and technology in new enterprises (PAVET-NE)	Greece		2004	2006	1,368
Science Foundation Ireland (SFI)	Ireland	Northern Ireland, USA	2007	2008	1,257
Institute of Biomedical Informatics	Slovenia	Austria, France, USA			1,254
Programme for the development of industrial research and technology (PAVET)	Greece		2005	2007	1,100
Emergence	France				1,076

RTD activity	Country	Collaborating countries	Start	Finish	Words coded
INRIA	France				1,047
China-Ireland Science and Technology Collaboration Research Fund	Ireland	China			967
New and Emerging Applications of Technology (NEAT)	UK				824
TecSan	France		2006	2007	800

The research areas covered within the RTD programmes analysed were grouped into the 15 categories presented in Table 4. In total, the reviewed information sources contained descriptions of 80 eHealth RTD programmes implemented in 25 countries<sup>1</sup>. Of these, descriptions from seven countries referred specifically to health informatics, health information systems, and other forms of eHealth.

All research areas that were considered as not relevant to eHealth, such as “agriculture” or “engineering”, were grouped into a single category labelled as “Non-eHealth”.

**TABLE 4 CLASSIFICATION OF RESEARCH AREAS**

Research areas	Number of references	Number of countries
<b>eHealth-related</b>	<b>380</b>	<b>25</b>
Health and medical sciences	59	16
Bio-informatics, neuro-informatics, biotechnology	51	17
Micro-systems, sensors, embedded systems, agent technologies, robotics and automation	34	11
Health informatics, Health Information Systems and other eHealth	29	7
Knowledge and information management	33	15
Software engineering, middleware and computing architecture	26	7
Visualisation, virtual environments and image processing	27	6
ICT and internet technologies	26	13
Optimisation tools and decision support systems	21	8
Communication systems and technologies	18	7
Micro- and opto-electronics, signal and data processing	14	6
Information Society Technologies	12	6
No topic restriction <sup>2</sup>	12	7
Trust and security	11	9
Language and speech technologies, human-computer interaction	7	3
<b>Non-eHealth</b>	<b>87</b>	<b>18</b>

Annex 4 presents the frequency of coding references to the groups of research areas by countries as described above. Most frequently, the descriptions of RTD activities included detailed lists of research topics. However, for some countries the details on activities not

<sup>1</sup> No descriptions of relevant programmes were found for Belgium, Denmark, Latvia and Slovakia

<sup>2</sup> Typically, in non-programme type financing and in some programmes the funding organisation evaluates research proposals and allocates funding without setting restrictions on selection of research topics

related to eHealth were omitted. The latter was characteristic of the information summary reports for the Czech Republic, Germany, Iceland, Luxembourg, Poland, and Spain.

It is noticeable that the themes related to “Health informatics, Health Information Systems and other eHealth” were less frequently referenced than the ones in the “Health and medical sciences” and “Bioinformatics ...” groups. This can be explained by the attribution problem. The latter two categories include a much wider range of research topics than “Health informatics...” This results in a higher probability of inclusion of research areas not directly related to eHealth. For example, in the descriptions of priorities of RTD programmes, bioinformatics, which can be considered highly relevant to eHealth, is often mentioned together with biotechnology. The range of applications included in biotechnology comprises such areas as food technology and agriculture, which are definitely not attributable to eHealth. However, such activities could not be separated into the “non-eHealth” category due to the low granularity of the available information describing activities at programme level.

In some cases, the use of imprecise phrasing in descriptions of RTD activities further distorted the frequency of referencing to research areas. For example, a description of the German NextGenerationMedia programme included the following phrase: *“The range of subjects extends from wireless networking of production facilities through to the measurement of personal vital functions with the help of radio-based miniaturized sensors.”* Despite the fact that this phrase implies a much wider range of research topics, it has generated only three topic-related references: *“wireless networking”*, *“measurement of personal vital functions”*, and *“radio-based miniaturized sensors”*. These references fell into the following three categories respectively: “Communication systems and technologies”, “Health and medical sciences”, “Micro-systems, sensors, ...”<sup>1</sup>.

The tendency to describe eHealth-related research domains in broad terms was characteristic of the descriptions of activities in the countries with a relatively high number of activities. This could suggest that well-established capacities in eHealth RTD influence the policy process and encourage the expansion of research topics by setting wider research agendas. This suggestion is also supported by the higher proportion of non-programme type of funding in the countries with the larger-scale eHealth RTD activity. For example, the English Department of Health defines the mission of its research strategy as following: *“We aim to create a health research system in which the NHS supports outstanding individuals, working in world-class facilities, conducting leading-edge research, focused on the needs of patients and the public.”*<sup>2</sup>

In the descriptions of research programmes which used standardised classifications and taxonomies of RTD activities, such as IPPA<sup>3</sup> technology categories, the areas of research were described in much greater detail. However, the attribution of these activities to eHealth was still difficult, as it could not be based solely on particular technology areas. Rather, it depended on the context in which a relevant technology area was mentioned.

A detailed content analysis of sources coded within categories with the highest frequency of referencing was conducted to establish cases where the high level of referencing reflected the high level of potential eHealth RTD activity. The results of this analysis are presented in Table 5. The five topic groups with the highest referencing frequency presented in this table were later used to analyse activities at the programme level.

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<sup>1</sup> This example also demonstrates the difficulties in the attribution of RTD themes to the eHealth area: for example, the concept of “wireless networking” has been used here in the context of “production facilities”, however, mentioning “vital functions” makes the whole phrase attributable to eHealth. In this particular case, the attribution of the “wireless networking” theme to eHealth has been considered correct. The concept of “radio-based ... sensors” implies the use of wireless data communication for “measurement of ... vital functions”, which is attributable to eHealth.

<sup>2</sup> <http://www.dh.gov.uk/assetRoot/04/12/71/52/04127152.pdf> Last accessed 20/03/2007

<sup>3</sup> <http://cordis.europa.eu/ist/cpt/ippa.htm>

**TABLE 5 RESEARCH AREAS IN WHICH HIGH LEVEL OF REFERENCING REFLECTS THE POSSIBILITY OF HIGH LEVEL OF EHEALTH RTD ACTIVITY<sup>1</sup>**

Research area	Country (Number of references)
Health and medical sciences	Finland (8), France (11), UK (12), Luxembourg (7)
Bio-informatics, neuro-informatics, biotechnology	France (12), Sweden (10)
Health informatics, Health Information Systems and other eHealth	Finland (6), France (10), Sweden (6), UK (4)
Micro-systems, sensors, embedded systems, agent technologies, robotics and automation	Finland (16), France (5)
Knowledge and information management	Slovenia (5)
Visualisation, virtual environments and image processing	Finland (6), France (13)
Software engineering, middleware and computing architecture	Finland (9), France (4), Spain (6)
Optimisation tools and decision support systems	Finland (5), France (6)
Communication systems and technologies	Finland (11)
Micro- and opto-electronics, signal and data processing	Finland (6)
Information Society Technologies	Netherlands (5), Bulgaria (3)

Table 6 presents the mapping of RTD activities attributed to eHealth as a result of detailed content analysis of the top relevant research areas. The table shows that descriptions of research programmes in Finland and France mention all the identified relevant research fields. The coding of broad descriptions of topical priorities of research programmes that is described here suggests that, in the case of the UK and Germany, the number of research domains that are presented in Table 5 is rather underestimated. Detailed examination of relevant programme descriptions rather implies the presence of well-developed research infrastructure and strong networks of research institutions working in the areas attributable to eHealth.

The low level of detail regarding the content of the programmes in the information sources that were reviewed together with the attribution problem did not allow the research team to make reliable cross-country comparisons. Hence, it was not possible to identify clustering of eHealth RTD activities in terms of research priorities. However, there are strong qualitative indications that suggest that Finland, France, Germany and the UK are Europe's leaders in terms of the breadth of the research topics that are being pursued in these countries and that are potentially relevant to eHealth. This observation also complements the findings of the INNOCULT study.

<sup>1</sup> Research areas are presented in the order of decreasing referencing frequency as shown Table 4

**TABLE 6 PRINCIPAL RTD PROGRAMMES OR FINANCING ORGANISATIONS BY COUNTRIES<sup>1</sup> AND TOP RESEARCH AREAS**

Country	Activity	Health informatics, HIS and other eHealth	Bio-informatics, neuro-informatics, biotechnology	Health and medical sciences	Knowledge and information management	Micro-systems and sensors, systems ...	Software engineering, middleware and ...	Number of areas covered
France		6	5	4	2	3	3	6
	TecSan 2006 & 2007	X	X	x		X	X	5
	RNTS 2000-2005	X	X	x		X		4
	Emergence	X	X	x		X		4
	INSERM - Technologies Applied to Medicine	X	X	x	X			4
	INRIA			x	X		X	3
	RNTL						X	1
	EuroRec Institute, France			x				1
	Techno-Vision	X						1
Finland		3	2	2	2	3	3	6
	Research Programme on Proactive Computing (PROACT)	X	X	x	X	x	X	6
	Sitra's Health Care Programme		X	x			X	3
	Healthcare technology programme (Finnwell)				X	x	X	3
	Intelligent Automation Systems (ÄLY)	X						1
	National electronic database management for social affairs and health			x				1
	Miniaturising Electronics (Elmo)					x		1
Sweden		4	4					2
	VINST programme	X		x				2
	The Swedish Governmental Agency for Innovation Systems (VINNOVA)	X		x				2
	BIOIT programme	X		x				2
	Technology exchange for the development of business programme (TUFF)	X		x				2
Spain				1	1	1	2	4
	National Programme on Service Technologies for the Information Society			x	X	x	X	4
	National Programme on Informatics						X	1
UK		1	2	2				3
	NIHR National Horizon Scanning Centre			X				1
	Biotechnology and Biological Sciences Research Council	X						1
	NIHR Programme Grants for Applied Research			X				1
	Economic and Social Research Council (ESRC)		X					1
	New and Emerging Applications of Technology (NEAT)		X					1
Luxembourg			1	1	1			3
	Biotechnology and Health Programme (BIOSAN)	X	X		X			3
Slovenia			1		1			2
	Institute of Biomedical Informatics	X			X			2
Total		16	14	9	7	7	8	

<sup>1</sup> Countries are presented in the order of the decreasing total number of RTD activities

### 3.3 Stakeholders involved in eHealth RTD

This part of the study was aimed at identifying stakeholders which would have the largest potential impact in achieving a step change in development of the area of eHealth RTD at a country level. The analysis permits consideration in countries with an as yet not well-developed field of eHealth RTD research particularly with regard to the importance of certain stakeholder groups. Identification of stakeholder involvement is important to catalyse development of RTD activities towards the eHealth domain, especially in those countries where these activities are at present relatively undeveloped.

The information gathering exercise used descriptions of organisations involved in financing of RTD activities as the starting point for determining further references to other stakeholder groups. This resulted in a sample of organisations that may be directly attributable to RTD and that are involved in the areas potentially relevant to eHealth. Detailed descriptions of organisations directly involved in eHealth-related RTD were available from the information sources from countries that provided a relatively high amount of information on eHealth RTD activity. For the countries with a relatively low level of RTD activity in the eHealth area, more information was gathered on general RTD structures.

The use of weighted referencing frequencies<sup>1</sup> in this study is an attempt to find a reliable proxy for the importance of stakeholders in the overall European eHealth RTD stakeholder landscape adjusted to the context of each particular country. The weighting was designed to minimise the effect of a potential dominance of larger countries in terms of numbers of activities and stakeholders, and aimed at identifying stakeholders that could have the largest potential impact in achieving a step change in the area of eHealth RTD at a country level.

Section 3.3.1 below describes the key stakeholder roles and the ways in which these are attributed to the eHealth RTD area. Section 3.3.2 provides descriptions of key stakeholder groups, and section 3.4 describes the structure of stakeholder relationships identified in this study.

#### 3.3.1 Key stakeholder roles and attribution to eHealth

In the stakeholder analysis, attribution to eHealth RTD was less problematic than that of attribution to the analysis of RTD programmes due to the nature of stakeholder relationships within the eHealth RTD area. Information on relevant stakeholders and their roles in those countries with a relatively high level of eHealth RTD activity was easier to locate and when available fairly detailed. For the countries with a relatively low level of eHealth RTD activity, more information was collected on the stakeholders involved in general RTD policy and strategy. Although there is a limited direct connection of these stakeholders to eHealth, their involvement could be extremely important in any future shift in the RTD activity of their particular countries towards the eHealth domain.

In terms of relevance to eHealth, it is relatively easy to classify stakeholders involved in technology transfer and implementation of eHealth applications. This is the focus of the WP2 of the project and hence it is outside of the scope of this particular report. However, the higher the level of relevance to RTD, the more difficult it is to classify stakeholders in terms of their relevance to eHealth. As with the analysis of RTD activities, the most precise identification of key stakeholders relevant to eHealth could have been achieved by exploring the hierarchy of

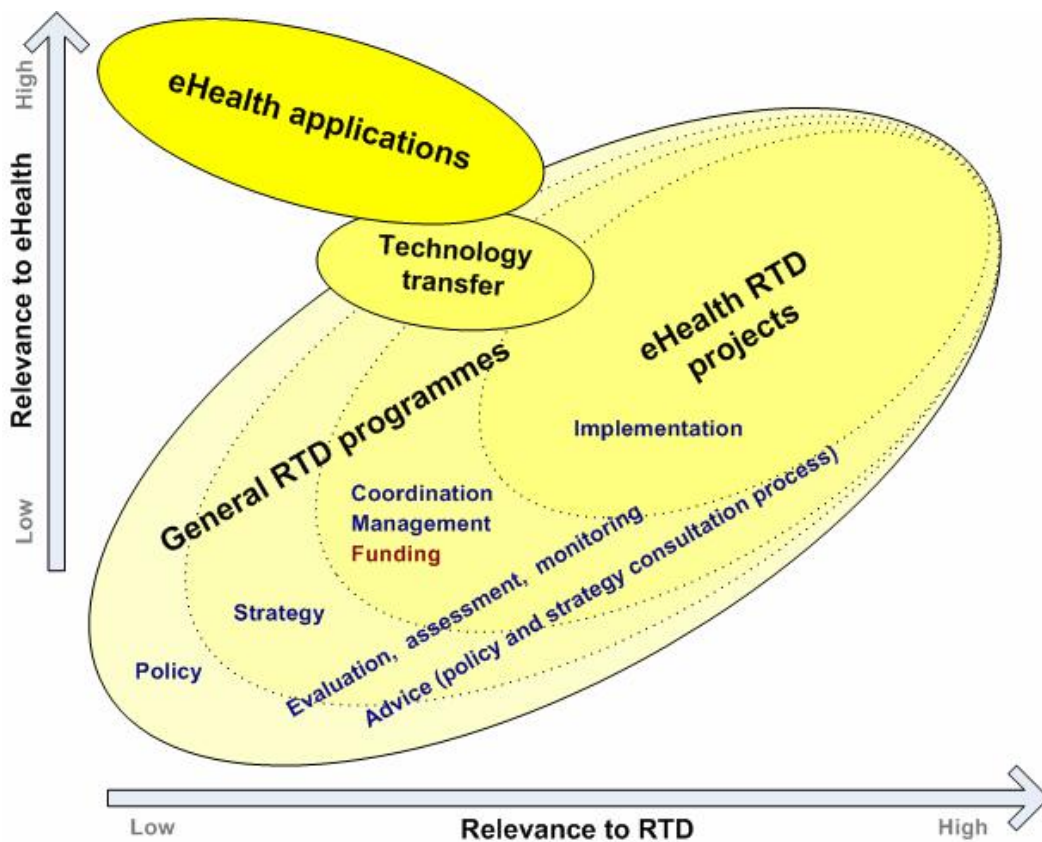
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<sup>1</sup> The methodology for calculation of relative weights is described in section 2.3.2 and Annex 6

stakeholder relationships that would start at the research project level. However, this approach was not possible in this study due to limitations described in section 2.5 above. The stakeholder analysis therefore focused on the exploration of stakeholder interactions at the research programme<sup>1</sup> level.

As shown in Figure 2, the relevance of key stakeholder roles in terms of eHealth and RTD can be represented schematically. The figure shows that eHealth-related RTD is most frequently conducted within broader research programmes represented by the general RTD programmes (that are represented by the largest ellipse shape in the diagram). Analysis of descriptions of stakeholders involved in the design and implementation of these programmes suggests a wide spectrum of roles that range from involvement in formulation of the countries' general RTD policy to actual implementation of research projects. Four levels of stakeholder engagement are presented in Figure 2 (as shown by a series of embedded oval shapes).

**FIGURE 2. STAKEHOLDER ROLES IN EHEALTH RTD<sup>2</sup>**



Analysis of descriptions of policy frameworks available in the reviewed information sources suggests that eHealth is included in the RTD policy and strategy processes in the context of broader research agendas that cover all or many strategic priorities that are important in a particular country. Therefore, these levels are represented by the two largest ovals in the diagram which include roles that are directly attributable to eHealth together with roles that are unrelated to both eHealth and RTD. The interaction of stakeholders at the management level was described in the information sources as involving such roles as: funding, coordination,

<sup>1</sup> See the definition of research programme in section 2.1

<sup>2</sup> For simplicity short labels of stakeholder roles were used in this diagram, full description of identified stakeholder roles can be found in section 2.3.2 and Table 2

management, and administration of research programmes. The management level is presented as the third largest shape in the diagram. Stakeholder roles related to the implementation of eHealth RTD activities are concentrated at the research project level. These are shown in the diagram “eHealth RTD projects” that is denoted by the largest inner ellipse. The relative size of this ellipse reflects the fact that activities at this level were seen to have the highest relevance in terms of both eHealth and RTD.

The information sources reviewed contained a significant amount of information about stakeholder interactions at policy and strategy levels, but the content of activities at these levels was more often described as related to general RTD policy, and had fewer direct references to eHealth. The policy formulation process was often described as being based on the monitoring and evaluation of current RTD activities as well as monitoring and assessment of opportunities for further development of strategically important areas of research. Policy formulation also involved continuous consultation processes carried out through various advisory bodies with the representation of stakeholders that act at all the four levels (policy, strategy, management and implementation) described above.

The following subsections of this report describe key stakeholder groups and stakeholder relationships in the areas presented in Figure 2.

### 3.3.2 Key stakeholder groups

Analysis of referencing frequency for stakeholder organisations coded in the reviewed information sources identified eight distinct stakeholder groups:

1. National ministries and departments responsible for research
2. Implementation bodies, Research councils and Funds
3. Universities and research organisations
4. Advisory bodies
5. National government
6. Academies
7. Health authorities
8. Regional and local authorities

Two key criteria were used to define these stakeholder groupings: (i) the similarity of types of organisations and (ii) the similarity of roles of stakeholder organisations included in the same group. The first criterion indicates that organisations of a similar type were included in the same group(s). The second criterion allows for a distinction to be drawn between organisations that play different roles within the countries’ eHealth RTD process. For example, on the basis of the first criterion, the group named “national government” could include “national ministries and departments responsible for research”. However, the analysis of referencing frequency in the context of stakeholder roles revealed strong indications that the organisations in the former group were more frequently mentioned in relation to general research policy. In the latter group, organisations were mentioned as being active in all the analysed roles, with the most frequent referencing related to the context of funding of research activities.

The following subsections of this report describe in detail the organisations included in the eight groups listed above and their roles within countries' eHealth RTD. Stakeholder groups are described in order of decreasing total weighted referencing frequency.

### National Ministries and Departments Responsible for Research

National ministries and departments responsible for research were the most frequently mentioned stakeholder group in the reviewed information sources. As the reviewed information sources contained a large number of government documents, the references to this stakeholder group were present in the RTD descriptions for all 29 countries included in the analysis. The matrix in Table 7 shows a mapping of the weighted number of references (WRF) to the roles mentioned in relation to this stakeholder group by countries. The table detailed information on fourteen countries descriptions of which contain ~81% of the total WRF on this stakeholder group. The information on the other thirteen countries is collated into a single subtotal. The five countries with the highest numbers of references to national ministries and departments responsible for research are the Czech Republic, France, Germany, Ireland, and Slovenia. Nevertheless, the countries seem to differ considerably in the relevant percentages of references that are made to the ministries/research departments' roles vis-à-vis policy, funding, implementation, management, coordination, advice, and monitoring.

National ministries and departments responsible for research were mentioned in the RTD descriptions for all 29 countries included in this study. Reviewed information sources most frequently mention national ministries and departments responsible for research in the context of funding of RTD activities (as sources of government funding), policy and strategy related to the implementation, management, and coordination of RTD activities. This stakeholder group is also mentioned as active in the monitoring of RTD policy implementation in eleven countries: the Czech Republic, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Portugal, Slovakia, Slovenia and Switzerland.

**TABLE 7. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

Country	National ministries and departments responsible for research							
	Funding	Policy	Implementing	Management	Coordination	Advice	Monitoring	Total
Germany	13%	11%	15%	8%	18%	16%	11%	<b>12%</b>
Czech Rep.	20%	4%	1%	20%	13%	9%	5%	<b>12%</b>
Slovenia	8%	18%	7%	0.3%	8%	2%	46%	<b>11%</b>
Ireland	13%	6%	2%	9%		24%	3%	<b>9%</b>
France	1%	11%	6%	0.3%	22%			<b>6%</b>
Estonia	6%	4%	5%			1%		<b>4%</b>
Greece	4%	1%	7%	23%	1%		16%	<b>4%</b>
Sweden	1%	8%	8%			3%		<b>4%</b>
Slovakia	2%	4%	7%	9%	1%	7%	9%	<b>4%</b>
Latvia	6%	2%				3%		<b>3%</b>

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

Country	National ministries and departments responsible for research							
	Funding	Policy	Implementing	Management	Coordination	Advice	Monitoring	Total
Iceland	1%	6%	10%					3%
Malta	1%	6%	1%		1%	18%	2%	3%
Italy	3%	2%	2%	9%			3%	2%
Luxembourg	1%	3%	7%	0.4%	2%			2%
Other countries	20%	15%	23%	20%	34%	17%	5%	19%
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Table 8 shows a list of the most frequently mentioned stakeholder organisations that cover more than 50% of the total number of references to organisations in the “National ministries and departments responsible for research” group. High numbers of reference to the organisations listed in Table 8 is likely to indicate their importance within the eHealth RTD stakeholder environment of their countries.

**TABLE 8. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

National ministries and departments responsible for research	Country	% of WRF
Federal Ministry of Education and Research (BMBF)	Germany	7.19%
Ministry of Higher Education, Science and Technology	Slovenia	5.68%
General Office for Research and Innovation (Direction Générale de la Recherche et de l'Innovation - DGRI)	France	5.45%
Ministry of Education, Youth and Sports	Czech Rep.	4.96%
Ministry of Science and Higher Education	Poland	4.78%
Ministry of Industry and Trade	Czech Rep.	4.09%
Federal Ministry of Economics and Technology (BMW)	Germany	3.55%
Higher Education Authority (HEA)	Ireland	3.43%
Ministry of Economy	Slovenia	3.37%
General Secretariat for Research and Technology (GSRT)	Greece	2.60%
Ministry of Education, Research and Culture	Sweden	2.49%
Ministry of Education, Science and Culture	Iceland	2.18%
Ministry of Economic Affairs and Communications	Estonia	2.07%
Other organisations in this group		48.16%
<b>Total</b>		<b>100.00%</b>

National ministries and departments responsible for research are the most frequently mentioned stakeholder group in relation to policy, strategy, and management of implementation of research activities. As mentioned above, these latter two groups of references relate more to the relevant policy process rather than actual management and implementation of activities, apart from those activities that are directly financed from organisations included in this group.

The results of this analysis suggest that national ministries and departments responsible for research is one of the most important stakeholder groups in the area of eHealth RTD. These organisations control government RTD funds, manage policy and strategy development processes (that are guided by research advisory boards and are formulated in consultation with organisations implementing research projects) and coordinate programmes.

## Implementation Bodies, Research Councils and Funds

This stakeholder group included organisations and institutions responsible for distribution and management of RTD funding at the national level. Table 9 provides a list of most frequently mentioned (>50% of the total WRF) organisations included in this group.

Several interesting observations arise from these findings. Firstly, most of these countries are medium- or small-sized in scale; in general, they are not the larger EU countries – these may indicate therefore a certain concentration on more implementation-oriented research and a concentration on the needs of smaller research-based organisations or even their small- and medium-sized enterprises. Secondly, many of these organisations are innovation- or exploitation-oriented. Thirdly, it is perhaps not surprising to see the focus on northern/Nordic countries in this stakeholder grouping considering what is known of their focus on innovation-related research (see section 4). Fourthly and finally, these findings seem to reflect a general trend on the part of European Member States and the European Commission itself to focus increasingly on the implementation aspects of RTD, so as to ensure that there is both take-up and technology transfer of research.

**TABLE 9. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

Implementation bodies, Research councils and Funds	Country	% of WRF
Malta Council for Science and Technology (MCST)	Malta	5.38%
Research Council of Norway (RCN)	Norway	4.89%
Science Foundation Ireland (SFI)	Ireland	4.60%
Slovenian Research Agency	Slovenia	3.95%
Finnish Funding Agency for Technology Development and Innovation (TEKES)	Finland	3.62%
Swedish Agency for Innovation Systems (VINNOVA)	Sweden	3.14%
Sitra	Finland	3.09%
Icelandic Centre For Research (Rannis)	Iceland	3.02%
Swiss National Science Foundation (SNSF)	Switzerland	2.47%
Swedish Research Council (VR)	Sweden	2.45%
Research and Technology Innovation Fund	Hungary	2.03%
Scientific and Technological Research Council of Turkey (TUBITAK)	Turkey	1.99%
Agency for Research Fund Management and Research Exploitation	Hungary	1.73%
Innovation Platform	Netherlands	1.71%
Research Agency	Slovenia	1.66%
Institute for the encouragement of Scientific Research and Innovation of Brussels	Belgium	1.66%
Technology Foresight Investment Fund in biotechnology and Information and Communication Technologies (ICT)	Ireland	1.47%
The Finnish Work Environment Fund (Työsuojelurahasto)	Finland	1.26%
Other organisations in this group		49.90%
<b>Total</b>		<b>100.00%</b>

The “Implementation bodies...” stakeholder group was the second most frequently mentioned in reviewed information sources. Table 10 shows the distribution of WRF of this group by stakeholder roles and countries. Again, the table refers to the key findings in fourteen countries, and sums together the findings for the remaining thirteen.

References to this stakeholder group (implementation bodies, research councils, and funds) were present in the descriptions of RTD in all countries apart from Spain. It is assumed that this was determined by the structure of RTD financing in Spain. A review of information sources suggests that the majority of RTD funding in this country comes from regional authorities. Regional authorities were analysed in this study as a separate stakeholder group; therefore, a low amount of information on stakeholder interactions in RTD financing at the national level could be expected in the case of this particular country.

**TABLE 10. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

Country	Implementation bodies, Research councils and Funds								
	Funding	Policy	Management	Implementing	Advice	Coordination	Monitoring	Int. collab.	Total
Sweden	13%	10%		0.4%	6%	6%			<b>10%</b>
Norway	6%	16%	0.3%		31%	3%	13%	94%	<b>9%</b>
Slovenia	6%	12%	2%	37%		9%	17%		<b>9%</b>
Finland	13%		2%				8%		<b>8%</b>
Malta	1%	19%	12%	3%	18%	1%	13%		<b>6%</b>
Ireland	6%	0.3%	24%		1%	1%			<b>6%</b>
Iceland	6%	6%	0.3%	11%			13%		<b>6%</b>
Switzerland	3%	10%	6%	13%	18%	4%	1%		<b>5%</b>
UK	6%	4%	10%				8%		<b>5%</b>
Turkey	6%		2%	21%			10%		<b>5%</b>
Czech Rep.	6%		0.3%		7%		3%		<b>4%</b>
France	2%	1%	2%	7%		57%			<b>4%</b>
Belgium	3%	6%	0.2%	1%	1%	3%	3%		<b>3%</b>
Hungary	3%	1%	15%				5%		<b>3%</b>
Other countries	21%	14%	23%	7%	18%	16%	5%	6%	<b>18%</b>
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

References to organisations included in this group most frequently appeared in the context related to funding, management, monitoring and coordination of eHealth RTD activities. Another category of relevant references relates to the interaction of this stakeholder group with national ministries and departments responsible for research within the policy and strategy development processes.

Interestingly, in Luxembourg (5% of the total WRF in the group) and Norway (95%), organisations included in this group were mentioned in relation to international coordination and collaboration. These references appeared in the descriptions of activities of Luxembourg's research fund "Promotion of international cooperation" (INTER)<sup>3</sup> and the International Unit of the Research Council of Norway (RCN)<sup>4</sup>.

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

<sup>3</sup> [www.fnr.lu](http://www.fnr.lu)

<sup>4</sup> <http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1146561044487&pagename=ForskningsradetEngelsk%2FPPage%2FStandardSidemal>

Implementation bodies and research councils play a central role in eHealth RTD and interact with the largest number of stakeholder groups involved in financing, management, implementation and coordination of RTD activities. This stakeholder group is also an important player in the internal country processes of formulation of RTD policy and strategy.

### Universities and Research Organisations

The universities and research organisations stakeholder group consists of a large number of organisations mentioned infrequently in the reviewed information sources. The distribution of WRF in the group is dominated by an extensive network of research institutions mentioned particularly in the descriptions of the French RTD system. The critical mass of such a network can have significant effects on the policy process both within the country and internationally. However, the differences in the level of detail in the descriptions of RTD systems in other countries as well as the attribution problem described in section 2.1 do not allow the research team to establish causal links within the context of this study's analytical framework. Nevertheless, these may be worth exploring in the future. Information sources from other countries mention between one and five organisations per country that can be allotted to this particular stakeholder group of universities and research organisations.

**TABLE 11. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

Country	% of WRF
<b>Universities and research organisations</b>	
<b>France</b>	
CEA, INSERM, LCPC, BRGM, INRA, INRIA, Institut Pasteur, CEE, IRD, CEMAGREF, ONERA, CIRAD, INRETS, CNRG, INRP, CNRS, Institut Curie, CSTB, IPEV, IFP, IRSN, IFREMER, MNHN, INED, ANDRA, INERIS	43.84%
<b>Germany</b>	
Fraunhofer-Gesellschaft (FhG)	2.86%
Max Planck Society (MPG)	2.86%
Helmholtz-Association of National Research Centres (Helmholtz-Gemeinschaft Deutscher Forschungszentren - HGF)	2.86%
Deutsche Forschungsgemeinschaft (DFG)	0.83%
Leibniz Association (Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz - WGL)	0.83%
<b>Hungary</b>	
National Institute for Strategic Health Research (ESKI)	3.04%
National Institute and Library for Health Information (MEDINFO)	3.04%
Cooperative Research Centres	1.27%
<b>Switzerland</b>	
Federal Institutes	1.00%
EPF Lausanne	1.00%
Federal Institutes of Technology (ETH)	1.84%
ETH Zurich	1.00%

<b>Country</b>	<b>% of WRF</b>
<b>Universities and research organisations</b>	
<b>Norway</b>	
Norwegian EHR Research Centre (NSEP)	1.27%
Norwegian University of Science and Technology	1.27%
Department of Neuroscience	1.27%
Higher education institutions (HEIs)	0.60%
World Health Organisation Collaborating Centre for Telemedicine	0.17%
Norwegian Centre for Telemedicine (NST)	0.17%
<b>Other countries</b>	<b>28.98%</b>
<b>Total</b>	<b>100.00%</b>

Table 12 shows the distribution of WRF for “Universities and research organisations” group by roles and countries. In the context of the coordination and implementation of RTD activities, this stakeholder group was predominantly mentioned in France, unlike in the other countries. In other countries, this group was referred to consistently in the context of the funding received from the ministries and departments, as well as RTD programmes and research councils. Universities and research organisations were also frequently mentioned in relation to consultation processes within the formulation of countries’ policy and strategy.

The Norwegian Centre for Telemedicine (NST) was the only organisation mentioned explicitly in relation to international collaboration. This centre was chosen as a World Health Organisation Collaborating Centre for Telemedicine in 2002.<sup>1</sup> Reviewed information sources contain some indications that, in many cases, international collaboration and coordination exist at the level of research organisations that work in collaborative research projects. However, a more detailed exploration of the structure of international collaboration at the level of organisations conducting eHealth-related research was not possible due to the time and resource limitations of the eHealth ERA study.

**TABLE 12. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>2</sup> AND COUNTRIES<sup>3</sup>**

<b>Country</b>	<b>Universities and research organisations</b>								
	<b>Funding</b>	<b>Policy</b>	<b>Coordination</b>	<b>Implementing</b>	<b>Monitoring</b>	<b>Management</b>	<b>Advice</b>	<b>Int. collab.</b>	<b>Total</b>
France			92%	91%		7%			<b>33%</b>
Germany	30%	6%				9%	32%		<b>11%</b>
Slovenia	16%	8%	2%	2%	15%		2%		<b>8%</b>
Hungary	0.2%	21%	5%	1%	9%				<b>6%</b>
Switzerland	1%	4%		2%	57%	2%	6%		<b>5%</b>
Norway	8%					44%		100%	<b>4%</b>
Latvia	10%	3%			2%	4%	9%		<b>4%</b>
Iceland	11%	3%				5%			<b>4%</b>
Malta		12%	1%				35%		<b>4%</b>

<sup>1</sup> [www.telemed.no/index.php?cat=43160](http://www.telemed.no/index.php?cat=43160)

<sup>2</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>3</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

Country	Universities and research organisations								
	Funding	Policy	Coordination	Implementing	Monitoring	Management	Advice	Int. collab.	Total
Other countries	25%	43%		4%	17%	28%	16%		20%
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

References to the involvement of universities and research organisations in the policy process were much less frequent than for advisory councils, national ministries and departments responsible for research, and organisations managing RTD funding. Given that many universities are dependent on all the above for their own sources of funding, this finding is scarcely surprising. Nevertheless, representation from the organisations involved in implementing the research was indicated quite often in the descriptions of universities or university representatives' involvement in advisory councils, a finding which would seem to indicate their stakeholder role in the advisory process.

### Advisory Bodies

Table 13 (below) provides a list of most frequently referenced representatives in the advisory body stakeholder group. It shows that councils for science and technology in Ireland and Malta dominate the rest of group by WRF.

**TABLE 13. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

Advisory bodies	Country	% of WRF
Advisory Council for Science, Technology and Innovation (ACSTI)	Ireland	33.89%
Malta Council for Science and Technology (MCST)	Malta	25.11%
Health Research Board (HRB)	Ireland	8.33%
National Council on Science and Technology	Slovenia	5.00%
Government Council for Science and Technology	Slovakia	3.40%
Slovak Government Council for Science and Technology	Slovakia	3.08%
Council for Science and Technology Policy	Iceland	2.57%
Other organisations in this group		18.62%
<b>Total</b>		<b>100.00%</b>

As it could be expected, organisations included in this advisory bodies stakeholder group were most frequently mentioned in the context of funding policy and implementation strategy. The Malta Council for Science and Technology (MCST) was also mentioned as an important player in coordinating the country's eHealth RTD activities (see Table 14).

**TABLE 14. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

Country	Advisory bodies							
	Policy	Funding	Advice	Implementing	Coordination	Management	Monitoring	Total
Ireland	29%	40%	37%	49%		7%		<b>32%</b>
Malta	38%	0.4%	31%	7%	82%	40%	12%	<b>30%</b>
Slovenia	5%	15%	3%	1%	3%		56%	<b>6%</b>
Iceland	6%	1%		22%				<b>5%</b>
Slovakia	5%	0.4%	6%	10%		1%	32%	<b>4%</b>
Sweden	5%	3%	4%		5%			<b>4%</b>
Lithuania	5%		8%					<b>4%</b>
Netherlands	3%	4%	5%			23%		<b>4%</b>
Turkey		11%		5%		8%		<b>2%</b>
Other countries	4%	26%	6%	5%	10%	21%		<b>9%</b>
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

### National Government

Table 15 provides a list of categories, that are sometimes overlapping, under which institutions included in the “National government” stakeholder group were coded. Table 16 shows that this stakeholder group was most frequently mentioned in relation to general funding policy and implementation strategy for countries’ RTD systems. The information presented in section 3.2 suggests that the group of countries presented at the top of the list in Table 16 constitutes a group of countries with a medium to low number of registered eHealth RTD activities. This list of countries also includes some of the smaller European countries by size of population. Germany’s and Poland’s inclusion in the list has no clear explanation, however. The table suggests that the stakeholders which act at the level of RTD policy and strategy may be able to play an important role in expanding the eHealth research in these countries.

**TABLE 15. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

National government	Country	% of WRF
Government	Czech Rep., Estonia, Finland, Hungary, Italy, Lithuania, Malta, Slovakia, Slovenia, Spain, Sweden, UK	52.50%
Parliament	Czech Rep., Estonia, Germany, Lithuania, Netherlands, Poland, Slovakia, Sweden	16.83%
Chamber of Industry and Commerce	Slovenia	8.88%
National Assembly	Slovenia	7.82%
Federal Government	Germany	5.07%
Enterprise Strategy Group	Ireland	3.24%
Cabinet Sub-Committee on Science, Technology and Innovation	Ireland	2.21%

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> The list of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

<b>National government</b>	<b>Country</b>	<b>% of WRF</b>
Parliament Office for Evaluation of Scientific and Technological Choices (Office Parlementaire d'Evaluation des Choix Scientifiques et Technologiques - OPECST)	France	1.54%
Government Cabinet Committee	Ireland	0.94%
Permanent Committee for Education, Culture and Science	Netherlands	0.75%
Council of State	Finland	0.22%
<b>Total</b>		<b>100.00%</b>

**TABLE 16. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

<b>Country</b>	<b>National government</b>							<b>Total</b>
	<b>Policy</b>	<b>Funding</b>	<b>Advice</b>	<b>Management</b>	<b>Implementing</b>	<b>Monitoring</b>	<b>Coordination</b>	
Slovenia	22%	42%	10%		34%	37%		<b>27%</b>
Lithuania	27%		20%					<b>13%</b>
Czech Rep.	7%	14%	41%	15%	16%	4%	10%	<b>12%</b>
Slovakia	6%	13%	3%	28%	1%	8%		<b>10%</b>
Sweden	2%	10%		38%	9%			<b>7%</b>
Ireland	6%	6%	18%		2%			<b>6%</b>
Portugal	7%				4%	35%	23%	<b>4%</b>
Germany	1%	7%	5%	3%				<b>4%</b>
Malta	7%	0.4%	3%					<b>3%</b>
Poland	4%	1%		3%	7%			<b>3%</b>
Other countries	12%	6%		13%	27%	16%	68%	<b>11%</b>
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

## Academies

The list of national academies mentioned in the reviewed information sources is presented in Table 17. The Academy of Finland<sup>3</sup> is the stakeholder most actively mentioned in this group. In addition to involvement in policy and strategy and coordination processes (see Table 18), the Academy manages several large research programmes which include projects related to eHealth RTD. This possibly suggests a centralisation of activities under one umbrella organisation in Finland, whereas in other nations roles may be more widely distributed, particularly according to research or scientific specialisation. In the other countries, academies were most frequently mentioned in relation to provision of policy and strategy advice to relevant national-level stakeholders as well as coordination of RTD activities. However, references to academies in this context were not as frequent as for the other stakeholder groups described above.

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

<sup>3</sup> [www.aka.fi](http://www.aka.fi)

**TABLE 17. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

Academies	Country	% of WRF
Academy of Finland	Finland	50.48%
Academy of Science	Czech Rep.	19.04%
Latvian Academy of Sciences	Latvia	9.93%
Royal Netherlands Academy of Arts and Sciences (KNAW)	Netherlands	4.52%
Academy of Sciences	Bulgaria	3.39%
National Academy of Science and Arts	Slovenia	3.33%
Royal Irish Academy (RIA)	Ireland	3.00%
Hungarian Academy of Sciences	Hungary	2.47%
Lithuanian Academy of Sciences	Lithuania	2.03%
Slovak Academy of Science	Slovakia	1.13%
Academy of Medical Sciences	UK	0.68%
<b>Total</b>		<b>100.00%</b>

**TABLE 18. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

Country	Academies							
	Funding	Policy	Monitoring	Management	Implementing	Advice	Coordination	Total
Finland	60%	7%	97%	69%	9%		25%	<b>47%</b>
Czech Rep.	24%					9%		<b>13%</b>
Latvia	7%	34%				38%		<b>13%</b>
Slovakia	2%	7%		3%	52%		30%	<b>6%</b>
Netherlands	1%	9%		5%		12%		<b>3%</b>
Lithuania		8%				29%		<b>3%</b>
Hungary		9%					45%	<b>3%</b>
Estonia		7%			22%			<b>3%</b>
Other countries	5%	18%	3%	23%	18%	12%		<b>10%</b>
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

### Health Authorities

Health authorities were not mentioned as active in the area of eHealth RTD in most of the countries that were reviewed. It is possible that this finding was due to the lack of information provided; however, there are strong indications in the information sources that in many countries health authorities focus on the issues related to deployment of eHealth applications rather than on eHealth RTD. A characteristic example is the Ministry of Social Affairs and Health of Finland. As shown in Table 19, the reviewed information sources include the most detailed description of this organisation among all the health authorities in all the countries covered. An analysis of this description suggests that the ministry is active in a number of

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

areas relevant to eHealth and technology development, such as: financing of the development of a national system for database management, developing national eHealth communication architecture, creating the framework for interoperable EPR, supporting the implementation of a regional EHR-system, steering the national ePrescription pilot, developing a regulatory framework for the management of personal digitalised health information, and coordinating of the development of the Finnish national eHealth roadmap. However, there were no references found relevant to any research in the eHealth area. Table 20, however, shows that health authorities in some European countries were mentioned consistently in the context of the financing of RTD activities (for example, in Bulgaria, Finland, Germany, Ireland, Italy, and the UK).

**TABLE 19. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

Health authorities	Country	% of WRF
Ministry of Social Affairs and Health (MSAH)	Finland	58.73%
Department of Health (DH)	UK	13.83%
Ministry of Health	Italy	9.02%
Department of Health and Children	Ireland	7.93%
Ministry for Health	Germany	3.79%
Health Information and Quality Authority	Ireland	3.06%
Health Protection Agency	UK	1.44%
Agency for the Regional Sanitary Services (Agenzia per i Servizi Sanitari Regionali - ASSR)	Italy	1.33%
NHS	UK	0.89%
<b>Total</b>		<b>100.00%</b>

**TABLE 20. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

Country	Health authorities							Total
	Funding	Management	Policy	Advice	Monitoring	Implementing	Coordination	
Finland	15%	98%	17%		14%			<b>42%</b>
UK	70%		22%			57%		<b>35%</b>
Ireland	5%		49%	9%	29%			<b>11%</b>
Italy	6%	2%		91%	57%			<b>9%</b>
Germany	2%		12%			43%	100%	<b>4%</b>
Bulgaria	2%							<b>1%</b>
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

### Regional and Local Authorities

Despite the fact that the stakeholder group of regional and local authorities was not frequently mentioned in the RTD descriptions for the majority of countries studied, the role of regional authorities was presented as very important in the information sources in two particular countries: that is, Belgium and Spain. Institutions included in this stakeholder group were

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

mentioned as managing and funding bodies for eHealth RTD activities in both countries. In Belgium, this stakeholder group was also mentioned in the context of all other roles presented in Table 22. It is known that in some other countries regional and local authorities can play important roles within the RTD stakeholder environment, and particularly in those countries with strong regional representation and activities. The small number of references to the stakeholder organisations in this group in Austria and Germany could suggest that there is a room for increasing the role of regions in eHealth RTD in these countries.

**TABLE 21. DISTRIBUTION OF WRF FOR STAKEHOLDER ORGANISATIONS INCLUDED IN THE GROUP**

Regional and local authorities	Country	% of WRF
IWT (Regional - Flanders)	Belgium	42.93%
Regional governments	Spain	12.70%
French Speaking Community	Belgium	7.23%
Ministry of the French-Community	Belgium	7.12%
Regions	Belgium	7.12%
Walloon Government	Belgium	7.12%
Brussels-Capital Region	Belgium	7.12%
Ministry of the Flemish Community	Belgium	7.12%
Länder	Germany	0.72%
Federal states	Austria	0.72%
Scientific Research Foundation – Flanders	Belgium	0.11%
<b>Total</b>		<b>100.00%</b>

**TABLE 22. DISTRIBUTION OF WEIGHTED NUMBER OF REFERENCES BY ROLES<sup>1</sup> AND COUNTRIES<sup>2</sup>**

Country	Regional and local authorities								Total
	Funding	Policy	Management	Coordination	Int. collab.	Monitoring	Implementing	Advice	
Belgium	79%	100%	93%	100%	100%	100%	100%	100%	<b>85%</b>
Spain	19%		7%						<b>13%</b>
Austria	1%								<b>1%</b>
Germany	1%								<b>1%</b>
<b>Column total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

### 3.4 General structure of stakeholder relationships

A qualitative model was constructed to describe the overall structure of stakeholder relationships in European eHealth RTD. The model is based on the analysis of weighted frequency of references (WRF) to stakeholder organisations that are organised in the same context in the descriptions of RTD activities. The context was determined by the concepts identifying stakeholder roles described in section 2.3.2. The WRF was used as a proxy for determining the relative importance of the identified relationships.

<sup>1</sup> Roles are represented by their short labels for simplicity, full role labels can be found in Table 2 above.

<sup>2</sup> List of countries includes countries descriptions of which include more than 81% of the total weighted number of references in this category. Countries are presented in the order of decreasing of the total WRF.

The matrix in Table 23 shows the four most frequently mentioned stakeholder groups for each of the key stakeholder roles identified in this study. The proportion of total WRF is provided in brackets for each role and for each stakeholder group. The higher this number, the more frequently the stakeholder group was mentioned in relation to the role shown in the first cell of each row. For example, the first row of the matrix describes different stakeholder groups involved in the funding of eHealth RTD activities. In the context of stakeholder roles, references to this role account for 44.8% of the total weighted number of references to stakeholder organisations. This role is the most frequently mentioned among other identified roles. Not surprisingly, the organisations included in the “implementation bodies,...” stakeholder group were most frequently mentioned in relation to this role (18.1% of total WRF). The other three stakeholder groups shown in this row of the matrix account for 21.6% of total WRF. Only 5.1% of total WRF relates to relevant organisations not included in the matrix. This means that the descriptions of organisations included in the matrix can explain a significant majority of stakeholder relationships related to funding. The same argument is applicable to other groups of stakeholder roles presented in Table 23.

Of prime importance in terms of stakeholder interaction are the eight categories of role which the various stakeholders performed, that is, funding, policy making, implementing, managing, coordinating, advice giving, monitoring, and collaborating internationally.

**TABLE 23. STAKEHOLDER INTERACTION MATRIX**

Role label (% of total WRF)	Stakeholder group (% of total WRF)			
Funding (44.8%)	Implementation bodies, Research councils ... (18.1%)	National ministries and departments ... (17.4%)	Universities and research organisations (2.7%)	Academies (1.5%)
Policy (30.2%)	National ministries and departments ... (14.6%)	Implementation bodies, Research councils ... (5.9%)	Advisory bodies (4.7%)	Universities and research organisations (1.9%)
Implementing (6.6%)	National ministries and departments ... (3.4%)	Universities and research organisations (1.3%)	Implementation bodies, Research councils ... (1.2%)	Advisory bodies (0.3%)
Management (6.2%)	National ministries and departments ... (2.3%)	Implementation bodies, Research councils ... (2.0%)	Health authorities (0.7%)	Universities and research organisations (0.4%)
Coordination (5.0%)	Universities and research organisations (1.9%)	National ministries and departments ... (1.7%)	Implementation bodies, Research councils ... (0.9%)	Advisory bodies (0.2%)
Advice (4.54%)	Advisory bodies (1.3%)	National ministries and departments ... (1.3%)	Implementation bodies, Research councils ... (1.1%)	National government (0.3%)
Monitoring (2.24%)	Implementation bodies, Research councils ... (0.7%)	Universities and research organisations (0.6%)	National ministries and departments ... (0.5%)	Academies (0.2%)
Int. collab. (0.33%)	Implementation bodies, Research councils ... (0.2%)	Regional and local authorities (0.1%)	Universities and research organisations (0.01%)	

Other roles for the organisations included in the “implementation bodies, research councils, and funds” group relate to the management of implementation, coordination and monitoring of RTD activity both within the countries and internationally.

The “National ministries and departments of research” group was the second most frequently mentioned in the context of “funding, financing, investing, budget”. An exploration of the text as it was coded by relevant coding nodes suggests that there are two categories of references to national ministries and departments responsible for research. The first category relates to the involvement of these stakeholders in the process of the formulation of overall RTD financial policy. The second category includes references related to the actual financing of institutions and programme implementation bodies which implement RTD activities that are potentially relevant to eHealth.

The matrix in Table 23 shows that, compared to other stakeholder groups, universities and research organisations were most frequently mentioned in relation to coordination, implementation and monitoring of research activities. In the context of funding, these organisations were mentioned as receiving funds from implementation bodies, research councils, and, in some cases, from the national academies of science.

Not surprisingly, the most frequently mentioned role of advisory bodies was to provide policy and strategy advice to the national ministries and financing organisations. Universities and research organisations were mentioned in this context in relation to the representation of their members on various advisory councils and boards.

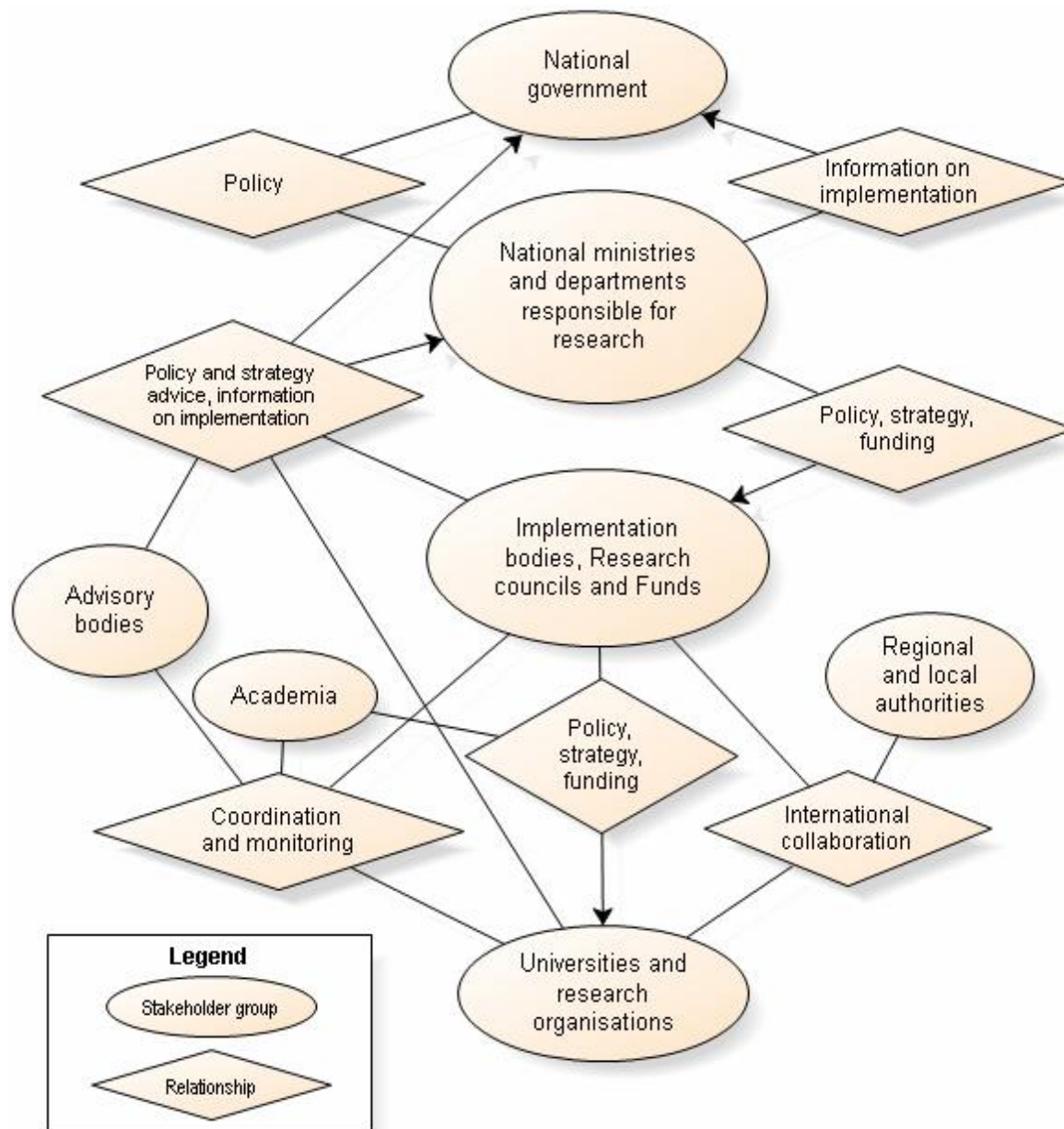
References to the national governments were not as frequent as references to the list of stakeholders groups described above. This finding could, however, be expected as governments tend to take important top-level decisions that affect the whole RTD system in a country; on the other hand, the main stakeholder interactions relevant to eHealth as well as other RTD areas appear to take place at more specific, and lower, levels of the stakeholder hierarchy.

It is noticeable that the “health authorities” group was not as frequently mentioned in relation to eHealth RTD as could perhaps have been expected. Analysis of references to this stakeholder group in the information sources suggest, however, that in many cases ministries of health and other healthcare organisations focus their efforts and funding more on the implementation of ICT in actual healthcare and its provision rather than on research in this area.

Another noticeable fact represented in the matrix is the very small amount of information on international collaboration in the eHealth RTD area. Only three stakeholder groups were mentioned in relation to international collaboration, and the total WRF in this category was below 0.4%. Such a gap can most probably be explained by a general lack of available information in this area. However, some qualitative indications suggest that there is potential for further reinforcement of collaboration and co-operation in the future in important eHealth RTD-related specialist domains.

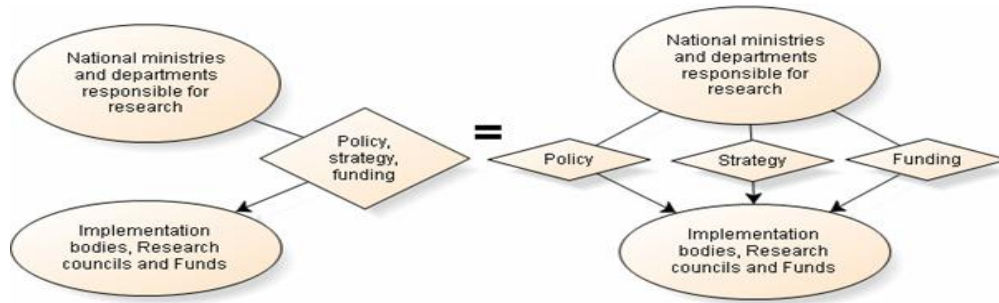
Figure 3 shows a simplified graphical representation of the model of stakeholder relationships based on the above-mentioned analysis. In this diagram, ellipses represent the groups of stakeholders and diamond shapes and connecting lines represent the relationships between them. The direction of the arrows represents the direction of relationships, and lines without arrows represent associative relationships.

**FIGURE 3. A MODEL OF MOST FREQUENTLY MENTIONED RELATIONSHIPS**



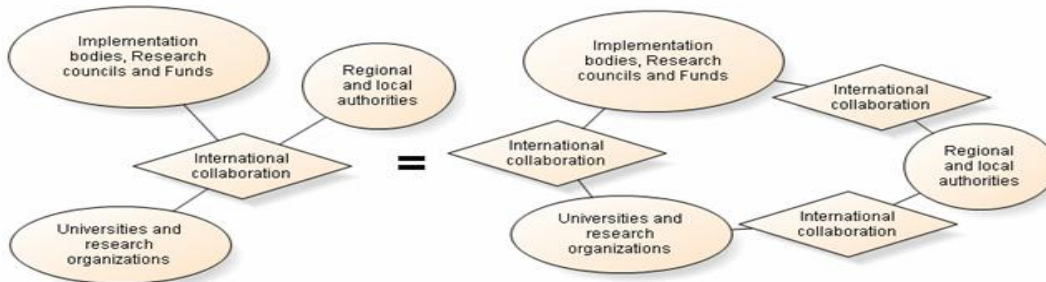
To improve the presentation of these figures – in order to facilitate its understanding and comprehension – some simplifications were made to the diagram’s presentation. In many cases, several different relationships are combined in the diagram into a single relationship; for example, three different relationships, “Policy”, “Strategy” and “Funding”, between “national ministries and research departments” and “Implementation bodies, research councils, and funds” are represented in the diagram by a single diamond shape (Figure 3.a):

Figure 3.a



Another simplification made was the representation of several relationships of the same type between different stakeholder groups by a single diamond shape as presented in Figure 3.b.

Figure 3.b



The diagram in Figure 3 shows that RTD policy is formulated by the ministries of research with the involvement of national governments. National governments were most frequently mentioned in the context of approving and adopting of country’s RTD policies. As could be expected, organisations in the “implementation bodies...” stakeholder group were mentioned in the context of policy implementation.

Another group of stakeholder relationships relates to the policy consultation process, which is most frequently described as conducted through various advisory bodies and councils. Representation in these bodies allows participation of other stakeholder groups in the policy formulation process through provision of policy and strategy advice to relevant ministries or national governments. This group of relationships also includes processes related to information flow on policy implementation from organisations involved in research to the higher levels of the stakeholder hierarchy. In Figure 3 this group of relationships is presented in diamond shapes denoted as “information on implementation”.

The low amount of information related to international collaboration does not allow the formulation of reliable conclusions regarding the composition of stakeholder relationships in this area. The information available in the reviewed information sources suggests the involvement of three key groups of stakeholders in this area: implementation bodies, research organisations, and regional authorities. As mentioned above, for some countries, such as Belgium and Spain, the role of the regional and local authorities in financing, management and coordination of RTD activities was described in the information sources as extremely important. However, in terms of overall picture of stakeholder relationships these roles could not be traced due to the relatively low number of written references.

The diagram in Figure 5 represents a generalised scheme of stakeholder relationships in the areas of coordination and financing of RTD activities. These areas are explored in greater detail in the following two subsections of this report.

### 3.5 Coordination of national eHealth RTD Activities

Little information directly related to the structure of coordination of eHealth RTD was found in the reviewed information sources. Therefore, the results of the same context analysis are used here to explore the stakeholder relationships in the area of eHealth RTD coordination. Analysis of the data in Table 24 suggests that, in most of the countries, coordination was mentioned as a function performed by the national ministries and departments of research. In the information sources on Denmark and Netherlands, no other stakeholder group was mentioned in relation to this coordination function, and a very high proportion of referencing frequency for this group (98%<sup>1</sup>) was also registered for the Czech Republic. In Ireland, Lithuania and Switzerland this function was mentioned as performed by only organisations in the “Programme implementation bodies and research councils” group.

**TABLE 24. DISTRIBUTION OF WRF FOR STAKEHOLDERS GROUPS MENTIONED IN THE CONTEXT OF COORDINATION OF EHEALTH RTD ACTIVITIES BY COUNTRIES**

Country	Coordination									
	Universities and research orga...	National ministries and Depart...	Implementation bodies, Researc...	Advisory bodies	Regional and local authorities...	Interministerial and interdepa...	Academies	National government	Health authorities	Total
France	66%	13%	20%			1%		0.3%		100%
Portugal		88%				8%		4%		100%
Hungary	24%	57%		7%			7%	5%		100%
Germany		64%	32%						4%	100%
Slovenia	13%	39%	45%	2%						100%
Malta	16%	20%	4%	60%						100%
Czech Rep.		98%						2%		100%
Belgium			12%		88%					100%
Norway		63%	16%	14%		7%				100%
Sweden			84%	16%						100%
Switzerland			100%							100%
Ireland			100%							100%
Netherlands		100%								100%
Denmark		100%								100%
Luxembourg		67%	33%							100%
Greece		29%	71%							100%
Lithuania			100%							100%
Finland							100%			100%
Slovakia		43%					57%			100%

The Academy of Finland was only mentioned in relation to its coordination function in the description of the country’s RTD system. Information sources for other countries listed in Table 24 describe the coordination function as distributed among several organisations with the highest weighted referencing frequencies for the following five groups: universities and research organisations in France (66%<sup>2</sup>); implementation bodies and research councils in

<sup>1</sup> of total number of coded references related to coordination function within information sources on the country

<sup>2</sup> of total number of coded references related to coordination function within information sources on the country

Slovenia (45%<sup>1</sup>), Sweden (84%<sup>1</sup>), and Greece (71%<sup>1</sup>); advisory bodies in Malta (60%<sup>1</sup>); regional authorities in Belgium (88%<sup>1</sup>); and the Academy of Science in Slovakia (57%<sup>1</sup>). The fact that reviewed information sources frequently mentioned research organisations as the most active group in coordination of eHealth RTD activities could suggest either a lack of coordinated national or international approach to eHealth RTD.

### 3.6 Funding mechanisms

The types of funding mechanisms referred to in the information sources were classified into the following three categories:

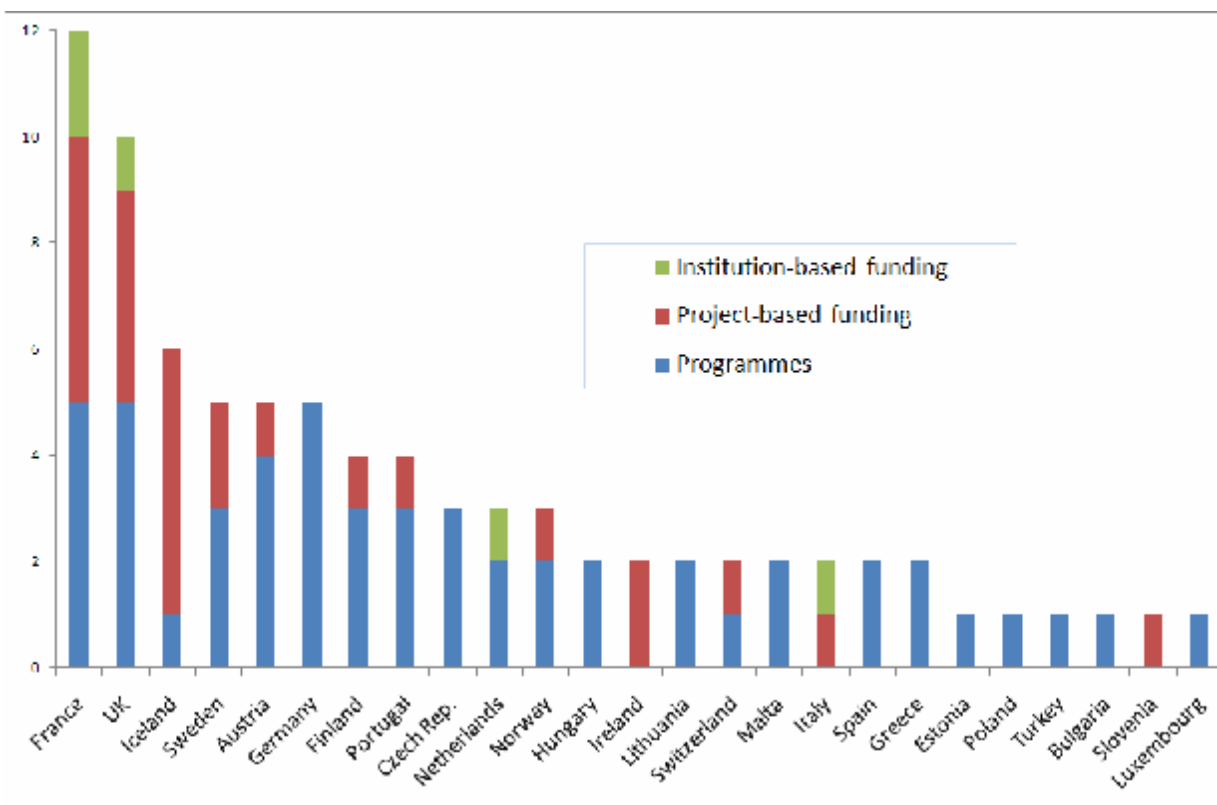
- Programme-based funding – financing organisation (an implementation agency or research fund) that clearly defines the research areas for which funding is made available. This mechanism was most frequently mentioned in the information sources.
- Project-based funding – financing organisation (typically a research council) that does not set limits on selection of research areas or else defines them very broadly. Funding is made available on the basis of evaluation of project proposals against a predefined set of criteria. Programme descriptions, which explicitly state no restrictions on research topics, were also included in this category.
- Institution-based funding – financing organisation (typically a ministry or a department) that funds subordinate research institutions which define their own research agenda(s) in consultation with the financing organisation.

Figure 4 represents the frequency of referencing of these types of funding by countries. Programme-based funding is the most frequently mentioned mechanism. Due to the explicit definition of research areas supported by the programmes, their attribution to eHealth is easier than for the other two types of funding. Estimating the amount of funding allocated to the eHealth RTD activities was not possible within this study due to the attribution problem described in section 2.5. However, there are strong indications in the information sources that the amount of funding resulting from programmes is also larger than through the two other types of funding (that is, project-based or institution-based funding).

An analysis of the information in Annex 2 suggests that the six countries with the largest numbers of activities, Austria, Finland, France, Iceland, Sweden and United Kingdom, have a mix of programme- and non-programme funding types of activities. Only programme-funded RTD activities were identified as relevant to eHealth in the following fifteen out of the 29 countries: Bulgaria, Estonia, Germany, Greece, Hungary, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Spain, the Czech Republic and Turkey, thereby implying that it has a greater level of importance overall. Non-programme types of funding mechanisms are known to exist in many of these countries in other RTD areas. However, the reviewed information sources did not contain any references to these mechanisms in the eHealth RTD context. On the other hand, only non-programme-type funding was identified for eHealth RTD in these four countries: Ireland, Italy, Slovenia and Switzerland. These findings would seem to indicate that, in descending order, the most important forms of funding mechanism are: programmes, a mix of programmes and non-programmes, and non-programmes.

Overall, the qualitative nature of the source data does not allow the team to draw particularly robust conclusions regarding the correlation between the level of eHealth RTD activity in the country and the types of actual activities. However, it would be logical to suggest that the larger the number of eHealth RTD activities in a particular country, the more diverse could be the range of organisational and financial arrangements.

**FIGURE 4. NUMBER OF REFERENCES TO TYPES OF FUNDING MECHANISMS IN DESCRIPTIONS OF EHEALTH RTD ACTIVITIES BY COUNTRIES<sup>1</sup>**



Stakeholder analysis identified five groups of stakeholders that were most frequently referenced in relation to the financing of eHealth RTD activities: national ministries and departments responsible for research; various implementation bodies/research councils; universities and research organisations; advisory bodies; and academies. By far the two most important of these were the national ministries or departments and the implementation bodies/research councils.

**TABLE 25. DISTRIBUTION OF WRF AMONG STAKEHOLDER GROUPS INVOLVED IN FINANCING OF EHEALTH RTD ACTIVITIES**

Funding, financing, investing, budget	% of WRF
Implementation bodies, Research councils and Funds	39.89%
National ministries and departments responsible for research	38.34%
Universities and research organisations	6.28%
Academies	3.56%
Advisory bodies	3.36%
Other stakeholder groups	8.57%
<b>Total</b>	<b>100.00%</b>

<sup>1</sup> The countries are presented in the order of decreasing of the total number of references

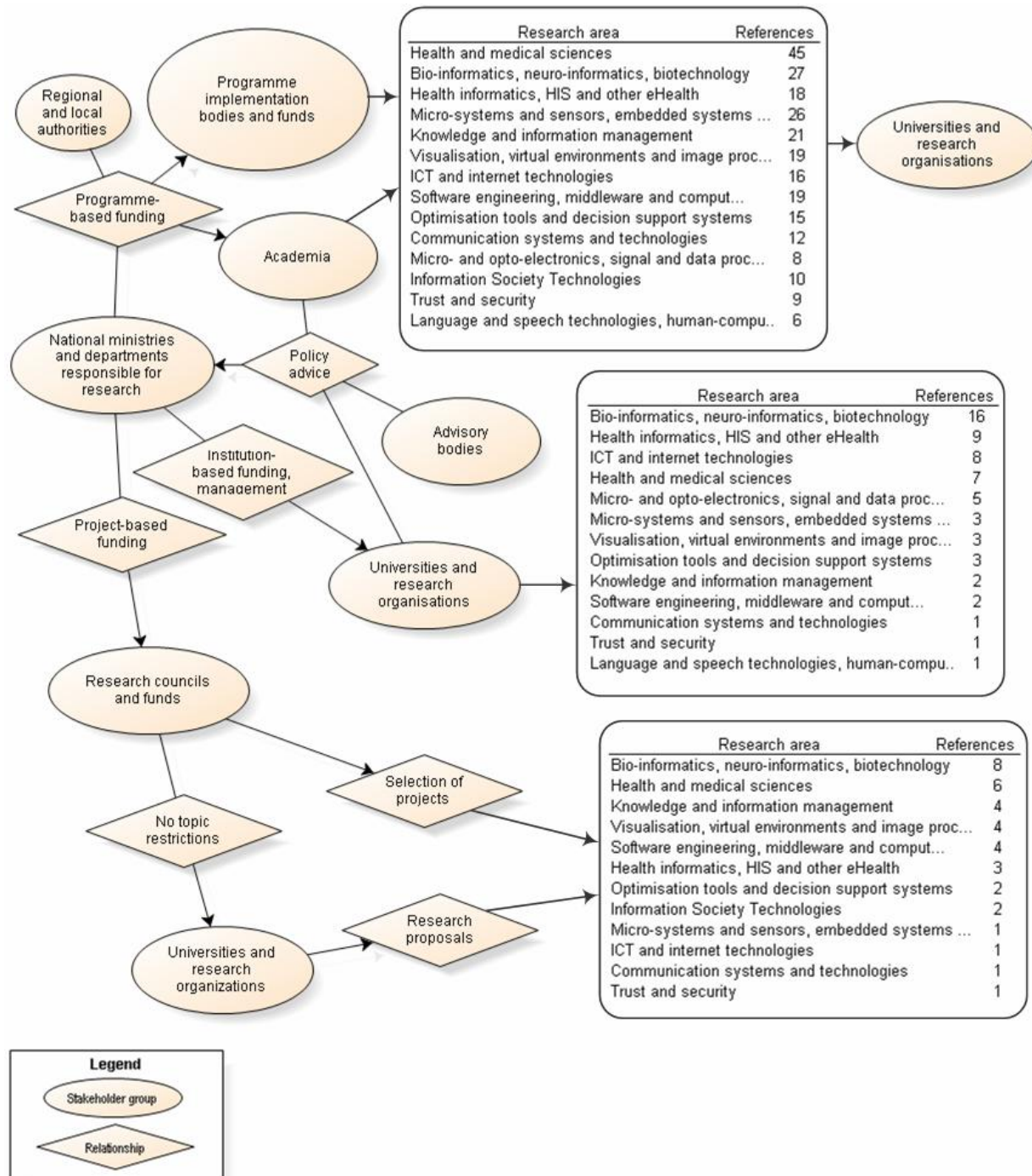
Figure 5 shows a model of the relationships that have been identified between the coded concepts representing the six stakeholder groups specified in Table 25 in the reviewed information sources. Notation within this model follows the same principles as described in section 3.4 above. The model also provides mapping to the key research areas described in section 3.2 (Table 4). The frequency of references to the research areas in the context of the coding nodes that represent the types of financing mechanisms is shown in the rectangular shapes in this figure as an indication of the level of activity in each research domain.

National ministries and departments responsible for research were mentioned as the main source of funding for programmes and projects potentially relevant to the area of eHealth RTD. Programme-based funding is administered by implementation bodies responsible for the administration of one or several RTD programmes in various research areas. The range of funded research areas in this case is determined mainly by the definitions of the programmes. Research institutions apply for this kind of funding most often in the form of competitive proposals. As mentioned specifically above, in Finland, the National Academy of Science administers several research programmes. Figure 5 includes indication of a funding stream that comes from the national ministries and departments responsible for research to the academies. There are qualitative indications in the information sources that the majority of funding for eHealth RTD activities emerges from the programme-based mechanism.

The second most frequently mentioned stream of funds has its source in the project-based mechanism administered by research councils and research funds. Figure 5 shows relationships between national ministries research, funding agencies (research councils and funds) and research organisations. Within this mechanism, funding agencies set either no or very broadly defined restrictions in terms of the research areas to be funded. The research organisations which apply for project funding to these sources define the set of research topics and questions in their proposals. These topics and questions are finalised during the process of evaluation of research proposals. This sort of process allows research organisations to be successful in gaining funding for curiosity-driven research. Analysis of information sources suggests, however, that the potential exists for countries, and certainly for international collaboration on research, to coordinate or centralise much more strategically the selection of eHealth RTD topics to be handled.

Institution-based funding is most frequently mentioned as a mechanism for the financing of research institutions that conduct problem-driven research in the specific areas of responsibility of those national ministries and departments particularly responsible for research. Figure 5 shows that, within this mechanism, the range of funded research topics is determined by research institutions in consultation with funding organisations. Research institutions that receive institution-based funding from the ministries are often related to those ministries administratively. However, in the case of Switzerland, this scheme is also used to fund the country's university system. The institution-based mechanism can be considered as a tool used by relevant ministries to develop certain strategic areas within the eHealth RTD at the country level.

**FIGURE 5 RELATIONSHIPS BETWEEN MOST FREQUENTLY REFERENCED STAKEHOLDERS, FUNDING MECHANISMS AND RESEARCH AREAS IDENTIFIED WITHIN INFORMATION SOURCES**



## 4 Good practice in eHealth RTD

Identifying good practice is a well-established activity in the European Union. The case studies of good practice provided here indicate an understanding of what works well and how these practices can be used to support interaction among the Member States – enabling them to share and understand their mutual experiences and circumstances. The case studies can also be used to influence common European policy development, particularly in those domains where the Member States have traditionally had the domain of competence. The current focus of case studies is now on ‘good practice’ rather than, as previously, on perceived ‘best practice’, which is today criticised because of its deterministic overtones. These activities have also taken place in the field of eHealth RTD where success stories (rather than ‘good practice’) are identified, based on interim or final assessments made of eHealth research projects that are either in progress or have been completed. In terms of eHealth RTD, attention is drawn to the eHealth research strategy document published in 2006 (13).

In the health policy area, open method of coordination among Member States was identified in 2004 as the preferred approach [10]. As one of a trio of Communications that focused on the health domain, the most well-known of these in relation to ICT was the so-called eHealth Action Plan [11]. The approach continues to hold considerable sway, and is being strengthened in two directions, as the i2010 Initiative and the Public Health Programme expand their activities. Case studies of good practice allow development of benchmarks and indicators for improving efficiency and effectiveness and encourage stakeholder involvement.

The cases of good practice outlined in this chapter were selected by the eHealth ERA team to illustrate the range and diversity of approaches in the eHealth RTD field. This chapter seeks to outline five areas of good practice in eHealth RTD. The first area (section 4.1) draws directly from the country reports developed by eHealth ERA, contains detailed information on all 29 of the countries covered by the study, and covers the research programmes of three specific nations. The second area (section 4.2) explores a number of key examples of RTD projects that are currently or recently co-financed by the European Commission and that involve multi-national consortia. The third area (section 4.3) outlines a focus on international collaboration that combines near-Europe including European Economic Area (EEA) countries in the north of Europe and some of the European Member States. In section 4.3.2 a mechanism that permits the enhancement and growth of European-wide RTD is described,— Article 169 mechanism. The fourth area (section 4.4) describes good practice of collaboration with two groups of stakeholders, industrialists and eHealth users.

In section 4.5, the chapter examines the common themes which emerge from these selected cases of good practice.

### 4.1 Member State research programmes

This section outlines short case studies from three Member States that illustrate good practice in different areas in relation either to RTD generally, consolidated RTD programmes, or specifically for eHealth RTD. The country-specific examples include England, Finland and Germany; countries identified by both the INNOCULT [7] and CISTRANA [2] studies, as having a keen interest in eHealth RTD.

Each of the country’s programmes illustrates a different view of good practice. Interesting approaches to RTD support can be seen in each specific case. The countries, and their eHealth RTD descriptions, are presented in alphabetic order.

### 4.1.1 England

The available evidence from the eHealth ERA country reports allows us to examine a wide range of approaches to RTD funding in relation to eHealth RTD in England, one of the UK's four home countries.

The main actors involved in RTD policy-setting in England are the UK Government; the Department of Trade and Industry; two of the nation's Research Councils – the Medical Research Council and the Economic and Social Research Council; and the Department of Health which has an overall budget for health R&D of £753m in 2006-07. The Department's research and development strategy is delivered through a National Institute for Health Research.

There are at least nine main groups of institutions that are involved or are currently undertaking health-related RTD activities in England. These include the National Institute for Health Research; the National Health Service (NHS) Institute for Health and Clinical Excellence; the NHS Institute for Innovation and Improvement; some 130 higher education institutions; the United Kingdom Clinical Research Collaboration; several industrial actors, such as, within the pharmaceutical industry – the Association of the British Pharmaceutical Industry, the Association of Healthcare Industries, the BioIndustry Association; and, finally, a range of charitable organisations.

While there are no particular target areas for research, and research in all areas can be funded, an overview of some of the current developments and ongoing telemedicine programmes in the UK is given in an article entitled *Telemedicine in the UK* [12]. In addition, the NHS Faculty of Health Informatics aims to develop a national community of practice for health informatics learning and development, applied research and professional services. The faculty acts as a national focal point for the study and facilitation of informatics learning and research on behalf of the NHS, working with partners including further and higher education institutes on related interests.

### 4.1.2 Finland

Finland is a nation that has devoted considerable efforts to important domains of research and has the highest level of research funding in Europe. TEKES (the Finnish Funding Agency for Technology and Innovation) is one of its research funding bodies.

TEKES<sup>1</sup> is the main public funding organisation for research and development in Finland. Its technology programmes provide nearly €200 million financing a year to specific sectors of technology or industry. It funds not only industrial projects but also projects involving research organisations; it also tends to promote areas of research that are innovative and risk-intensive. It is involved in more than five European research programmes (such as COST<sup>2</sup>, ERA-NET<sup>3</sup>, ESA<sup>4</sup>, EUREKA<sup>5</sup>, and the IRC<sup>6</sup>), in which it encourages foreign partners to link up with Finnish partners. It also has considerable aspirations with regard to international research

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<sup>1</sup> <http://www.tekes.fi/>

<sup>2</sup> European Cooperation in the field of scientific and technical research (COST) <http://www.cost.esf.org/>

<sup>3</sup> The ERA-Net Scheme <http://www.cordis.eu/coordination/era-net.htm/>

<sup>4</sup> The European Space Agency <http://www.esa.int/>

<sup>5</sup> A Europe-wide network for market-oriented R&D (EUREKA) <http://www.eureka.be/home/>

<sup>6</sup> Innovation Relay Centres (IRC) <http://irc.cordis.lu/>

collaboration. TEKES undertakes a notable amount of public presentations so as ensure its high profile in terms of awareness on the European scene.

### 4.1.3 Germany

Germany's focus is on large-scale programmes, such as the research supported by the Federal Ministry for Education and Research, Federal Ministry of Economics and Technology, and the Federal Government's "Information Society Germany 2006" KnowledgeMedia Programme. The total amount of funding is difficult to quantify as the figures for each scheme are not publicly available. However, it is estimated that the total amounting of funding is at more than €4000 million over a period of several years, with differing time spans, for both project and institutional support.

The German Federal Ministry for Education and Research structures most of its funding around longer-term programmes focusing on particular RTD fields deemed to have key relevance for the German economy and society. In this context, some of the most interesting are: ICT applications, bioinformatics, technologies related to genomics and proteomics, nanotechnologies, micro-devices, and new materials (including bio-materials).

The Federal Ministry of Economics and Technology also finances RTD programmes that focus on high impact applications of advanced technologies in support of various manufacturing and service industry sectors. Within the *NextGenerationMedia* initiative cooperative RTD projects are supported that involve various actors along the value chain and which concentrate on new techniques and standards for intelligent objects and their networking. Projects cover four innovation fields,<sup>1</sup> among them intelligent systems for health care provision. The two projects funded concern monitoring and prevention support via mobile devices (ImPrimo; for which there is funding of €3.9m over three years till 2008) and a tele-homecare system for postoperative and chronic care (PfH - Partnership for the Heart; €3.6m till 2008).<sup>2</sup>

*Knowledge Management* was already identified in 2003 as a priority RTD field in the Action Programme of the German Federal Government "Information Society Germany 2006". Its KnowledgeMedia Programme ("WissensMedia") supports the development and piloting of new techniques for knowledge management in small- and medium-sized enterprises and public administration.<sup>3</sup> Among the projects partially funded in 2004-2006 is one that relates to the health sector – Knowledge Communities in the Hospital (Know-IT). This project was developing a model and support software for integrating knowledge management in hospital administration to optimise work flow processes and cost allocation, and took into account both quality assurance aspects and the need for risk management.<sup>4</sup>

The goal of "Fit for Knowledge Competition" is to transfer proven concepts and methods of knowledge management into practice and to support implementation-oriented pilot applications.<sup>5</sup> In this scheme, one project has a focus in the health field concerned with the *Application of Knowledge Management Tools to Access Knowledge in the Field of Medical Technologies* (Wiki-Med). The project goals are the integration and implementation of proven tools, like blended learning or knowledge databases, for application in the field of medical technologies, including those for home care. The piloting of reference implementations (based

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<sup>1</sup> The three others are intelligent logistics networks (including RFID applications which are also relevant for the health sector), intelligent networking of manufacturing facilities, and consumer electronics in networked environments.

<sup>2</sup> <http://www.nextgenerationmedia.de/projekte.htm>

<sup>3</sup> <http://www.wissenmanagen.net/Wissenmanagen/Navigation/Wissensprogramme/wissensmedia.html>

<sup>4</sup> <http://www.wissenmanagen.net/Wissenmanagen/Navigation/Wissensprogramme/Wissensmedia/Know-IT.html>. See also <http://www.know-it.org/>

<sup>5</sup> <http://www.wissenmanagen.net/Wissenmanagen/Navigation/Wissensprogramme/wissenswettbewerb.html>

on a Wiki approach) and good practice cases is envisaged.<sup>1</sup> Finally, the ICT 2020 research programme is the contribution of the Federal Ministry of Education and Research for the aspect of "Research Support" identified in the high-tech strategy and in the action programme "iD2010 – Information Society Germany 2010". The funding programme encourages science and business to join forces in devising the future of ICT research. The support provided by the Federal Ministry of Education and Research and the Federal Ministry of Economics and Technology aims to consolidate and expand Germany's technological lead in the ICT sector.

## 4.2 EU projects involving multi-national consortia

Since the Second Framework Research Programme (1988-1990) eHealth applications (which were then known as health telematics applications) have been co-financed by the European Commission. Almost two decades of such co-financing have led to considerable European leadership in this field, and a wide diversity of involvement of different Member States, European Economic Area partners, and wider international involvement. Over this period, it is estimated that over €500 million have been dedicated to co-financing the Commission's series of research programmes on eHealth.

Three recent ICT and health-related projects have been selected for special attention: all coordinated by acknowledged leaders in the 'ICT for Health' field. These projects have already received considerable emphasis in public relations initiatives that aim to focus on successful European research and development, and deployment projects (e.g., projects of the month; Europa website successful results; ICT success stories). The first two of the projects are research and technological development projects, and have been co-financed through the European Commission's Research and Technological Development Sixth Framework Programme. The third project has a deployment, and pre-market orientation, and has been selected from among the leading eHealth-related projects in the eTEN programme (a separate European funding programme which has concentrated on market definition in the ICT field).

### 4.2.1 MyHeart

MyHeart<sup>2</sup> has focused on creating progress in the field of personalised health systems, that is, smart electronic equipment and sensors, often embedded in clothing, to enhance citizens' understanding of personal health conditions especially heart-related or cardiac conditions. Since its establishment in December 2003 with almost €33 million co-financing allotted through the first call of the Information Society Technologies Programme, the project has been one of the leading lights of the eHealth programme of activities. Its lead partner and coordinator, Philips Research Laboratories from Eindhoven in the Netherlands, is one of Europe's major electronics and appliance companies. The project has brought together many other major and important industrial, research institute, academic, and hospital partners from eleven European countries. These partners have covered sectors from the entire value chain in the personal health systems research field. The project has included textile research, fashion, electronic design, medical applications, and home-based technical applications. The project, which ends in August 2007 after 43 months of activity, illustrates the benefits of a) having created the research instrument of the very large Integrated Projects, b) the commitment of substantial amount of resources both financial and human to a particular scientific endeavour, and c) the importance of lengthy time-periods to secure concrete scientific, technical and organisational

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<sup>1</sup> <http://www.wissenmanagen.net/Wissenmanagen/Navigation/Wissensprogramme/Wissenswettbewerb/Wiki-Med.html>

<sup>2</sup> <http://www.hitech-projects.com/euprojects/myheart>

developments. Overall, the focus of this large project was less on the particular range of Member States involved in it than the appropriate choice of industrial and research players. Such an approach should be considered when reflecting on the choice of Member State involvement in eHealth RTD projects.

In the eHealth area, personal health systems and telemedicine have evolved as two pillars of activity in Europe with potential deployment and implementation. Support of the European Commission for these areas is shown by the renewed commitment through initiatives such as the Lead Market Initiative [13]. At the European Parliament level, there is an appeal for telemedicine to be investigated more attentively by all the Member States; and on the industrial front there is continued keen interest in this technology sector by the Continua Alliance (see section 4.5.1).

#### 4.2.2 PIPS

PIPS<sup>1</sup> is another large Integrated Project funded through the first call of the Sixth Framework Programme Information Society Technologies programme. The title reflects the project's aim of building a personalised information platform for life and health sciences, by creating a collaborative environment to facilitate sharing of health-related technologies and knowledge to improve health. Its seventeen partners combined policymakers, researchers, information systems designers, healthcare providers, and hospitals, but also food companies, and large pharmaceutical companies such as GlaxoSmithKline and Astra Zeneca. Its members came from five Member States but also from countries outside the European Union such as Canada, China, Israel, and Switzerland. Co-financing on the part of the European Commission includes almost €10 million from a total budget of €14,330,660. The project, which is forty-eight months in duration, is still being implemented.

Within the range of ICT for Health research projects currently or recently underway, the project is considered to be of considerable importance in building interoperable health systems in Europe, and assisting individuals to make an appropriate choice of healthy personal lifestyle.

#### 4.2.3 Netc@rds

Netc@rds<sup>2</sup> has as its core a focus on trans-European access to health services for mobile citizens. Its aim has been to improve the possibilities of access to European health services for European citizens who are on the move for whatever reason (work, study, retirement, and holidays). Because of the importance of the current 2008 aims to establish and implement the European Health Insurance Card (often referred to simply as the EHIC), the project's concentration has been on the role of eHealth cards in supporting these aims. Pilot initiatives have occurred in over ten countries, and – in several cases – have focused on trials at well-known international events such as the Olympic Games and the World Cup in football.

The partners number fifteen EU and European Economic Area countries (including Liechtenstein and Norway), and a wider range of subcontractors and supporters. The EU partners represent both EU-15 and the new EU-12 Member States. They represent largely northern, western, and eastern European geographic areas.

The objective of learning from large-scale cooperation was set when designing the new Competitiveness and Innovation Programme Policy Support Programme. The Netc@rds

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<sup>1</sup> <http://193.178.235.132/>

<sup>2</sup> <http://www.netcards-project.com/>

experience offers a number of important pointers in relation to the management and planning of European coordination and collaboration of deployment initiatives, and the potential range of roles that Member State partners can play (in decision-making; analysis and design; and implementation).

A more recent eTEN project, TEN4Health, that deals with the validation of the use of the European Health Insurance Card in eleven hospitals in six countries throughout Europe: Austria, Belgium, the Czech Republic, Germany, Italy, and the Netherlands – an opportunity which can add support to the area of growing interest in cross-border healthcare services provision.<sup>1</sup>

### 4.3 International collaboration

There is a relatively limited but growing international collaboration on research in Europe which appear to share two approaches: (i) fostered by groups of European Member States and countries which decide to collaborate among themselves, or (ii) instigated by the European Commission initiatives to create certain opportunities to interested Member States. The first approach can be illustrated by the Nordic Council and the second through the recently initiated Article 169 initiative on Ageing Well in Europe.

Both of these initiatives are relatively new and the resources required to establish them considerable, as they involve multiple stakeholders whose interests need to be aligned to secure agreement on principle to design and implement innovative approaches. While the first initiative involves gaining consent among a smaller number of countries (in the Nordic Council, there are eight countries in close geographic proximity), the latter involves engagement of sixteen countries. The second initiative also includes provision of matched funding from the European Union, adding a new dimension of complexity. The prospective success of the programmes is yet to be tried and tested. However, the expectations of them and the anticipated return on investment potentially due to them are high and strategic.

#### 4.3.1 The Nordic Council

A largely regional model of research collaboration – involving several countries – is illustrated by the Nordic Council<sup>2</sup>. The key foci of the Council's initiative are the promotion of Nordic research, and the development of collaboration among countries in the Nordic region of Europe. Its aim is to develop a critical mass of excellent researchers and research institutions to be able to compete with the larger European nations. This is an interesting development of the situation in 2000 [8], when the most dominant European nations in the research field were France, Germany, the United Kingdom, and the Scandinavian countries. The Nordic region clearly has ambitions beyond Europe. On June 11, 2007, in an article in *Helsingin Sanomat*, the former Finnish prime minister, Mr Esko Aho, proposed the setting up of joint technology centres outside Europe (i.e., in Japan, China and elsewhere).

Nordic cooperation on research was restructured in 2005 when NordForsk (Nordic Research) was set up<sup>3</sup>. This is an independent institute, founded under the Nordic Council for Ministers for Education and Research. The institute is responsible for all northern research and researcher training. Its main stakeholders are the national universities and national research

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<sup>1</sup> [http://ec.europa.eu/information\\_society/activities/eten/](http://ec.europa.eu/information_society/activities/eten/)

<sup>2</sup> <http://www.norden.org/>

<sup>3</sup> <http://www.nordforsk.org>

councils, and other research organisations, in the Nordic countries. Within the health-related area, among other specialist areas, there is a focus on molecular medicine, bioethics of stem cells, and a food initiative, and although only two years old, the feedback on the current achievements of the NordForsk is positive.

Key characteristics of this collaboration are that collaboration that takes place on a number of specific themes either in a given geographic area or a grouping of countries, involves a number of key research players with adequate research funding and with the intention of gaining strategic importance advantage in the field.

### **4.3.2 Article 169: Ageing Well in Europe**

After development of the concept over a four-year long period, a proposal has now emerged for large-scale research collaboration on ageing well in Europe, based on the principle of Article 169 of the Treaty.

On June 14, 2007 a proposal for a decision by the European Parliament and Council was presented by the European Commission [14] on the participation by the Community in a research and development programme undertaken by several Member States, aimed at enhancing the quality of life of older people through use of new information and communication technologies (ICT).

The overall objective of the Ambient Assistive Living (AAL) joint programme is to enhance the quality of life of older people and strengthen to the industrial base in Europe for ICT technologies through the use and application of ICT. The programme has three specific aims, which are to:

- Foster the emergence of innovative ICT-based products, services and systems for ageing well
- Create a critical mass of research, development and innovation at the EU level in technologies and services for ageing well in the information society
- Improve conditions for industrial exploitation in this field

The joint programme provides the legal and organisational framework for a large-scale European initiative to take place between sixteen countries (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Hungary, Italy, the Netherlands, Poland, Portugal and Spain and Israel, Norway and Switzerland) on applied research and innovation in the area of ICT for Ageing Well in the Information Society. The countries have agreed to coordinate and implement jointly activities aimed at contributing to the programme. The overall value of their participation is estimated to be a minimum of €150 million during the period 2008-2013.

To increase the impact of the programme and create a critical mass of research, the Community will participate in the programme by making a financial contribution of up to €150 million; subject to efficient implementation and financial commitments by Member States in line with the criteria laid down. Legally, the proposal for the joint programme is based on Title XVIII of the Treaty, Article 169, that concerns the participation of the Community in research programmes undertaken jointly by several Member States, and includes participation in the structures created for the execution of those programmes.

Key observations include the size and dimension of the programme, its substantial funding over a five-year period of activity, its support from the Commission, Council and Parliament, its focus with clearly defined strategic intentions, and involvement of key industrial players. Of considerable interest is the range of different Member States involved.

## 4.4 Good practice collaboration with different groups

Over the last twenty-year pan-European eHealth initiatives have concentrated on two aspects of partner involvement. As with almost all Information Society Technologies programme research instruments, eHealth RTD projects have involved multiple Member States (with an emphasis on more than two countries being partners in each project), and a variety of types of partners, institutions or organisations. In eHealth RTD, these partners have comprised technical, industrial, health authorities, and users (including hospitals, clinics, representative organisations from different disease groupings, and clinicians and patients).

With a more deployment-related orientation to research and eHealth activities, efforts have been made since 2005 to garner dedicated input from users to the eHealth area. An industry user stakeholder group has been launched and a user group established. Both groups are active in providing advice and feedback on research and on implementation strategies.

The background information provided here outlines three current initiatives that are taking place in the constituency for industry and other stakeholders to collaborate independently – admittedly, in more application-oriented environments rather than research. In all three cases, the initiatives appear to be taking place independently of any direct instigation of the activity on the part of the European Commission.

### 4.4.1 Degree of collaboration with industry

Two examples of industrial collaboration on a comprehensive scale in areas considered to be of interest to the stakeholders involved in eHealth RTD are cited here. These are Continua Alliance and Integrating the Healthcare Enterprise.

Continua Alliance<sup>1</sup>, whose mission is to ‘establish a system of interoperable personal telehealth solutions that empower people and organisations to better manage health and wellness’, was founded in June 2006. The Alliance aims to enable a shift from care provided in traditional, institutional settings to people’s everyday environments. Its leading partners and members include major international companies that cover such areas as electronics, infrastructure, middleware, healthcare, insurance, and sensors. Leading European companies and organisations in the telecare and homecare field are also involved and include Philips Medical Systems, Tunstall Ltd. and the English National Health Service (NHS). The Alliance has held a European launch and has been present at a number of European meetings despite its more international flavour.

One of the Alliance’s main aims is to initiate, by the end of 2007, a set of guidelines on interoperability in relation to telehealth connectivity (in particular wireless connectivity). These guidelines will be available by 2008, but it is not yet known when the appliances and equipment manufactured by the relevant companies will be produced.

A similar organisation, Integrating the Healthcare Enterprise<sup>2</sup> (frequently referred to only by its initials, IHE) has a focus on medical imaging devices, radiology, cardiology, and health information systems and is exploring such fields as pathology, ophthalmology, pharmacology and patient care devices. IHE aims to accelerate the adoption of the standards needed to support exchange of electronic health records between different actors. In Europe, more than 75 companies and many end-user societies (such as radiology, laboratory, and cardiology

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<sup>1</sup> <http://www.continuaalliance.org/>

<sup>2</sup> <http://www.IHE-EUR.fr/>

societies, other national, health-related organisations and universities) are participating in the validation and testing process in five separate technical domains. For users, the key benefit of Integrating the Healthcare Enterprise is that it is a consensus-based and transparent process that engages companies in the implementation of the protocols and infrastructures developed inside their products. The main benefit for the vendors is that is the development of a single European market which will reduce, country specificities.

Both of these schemes illustrate the will of a large number of stakeholders, that includes both industry and end-users, to work together in programmes of substantial importance in the health and ICT-related domain in a combined effort to achieve coherent and market-oriented approaches to eHealth.

#### 4.4.2 Degree of collaboration among stakeholders

There is a growing awareness from the stakeholder community on the need to collaborate in eHealth RTD to increase the voice of the diversity of users to be heard. This approach is strongest on the part of such stakeholder organisations as CPME, EFN, EHTEL, HOPE, PGEU, and UEMS<sup>1</sup>, which represent a variety of healthcare professionals, including doctors, nurses, and community pharmacists.

Increased awareness of this need was apparent in the drafting of a declaration that resulted from a conference held in Rome on 24-25 May 2007 with a focus on continuity, collaboration, and communication among stakeholders in the eHealth field.<sup>2</sup> Point 9 of the draft declaration articulated that 'policy makers should involve health professionals in concrete action plans to improve 3C<sup>3</sup> in the healthcare provision and governance, by re-engineering specific clinical processes with a joint deployment of organisational changes and suitable Connected Health solutions'.

### 4.5 Observations on good practice collaboration in eHealth RTD

Many of the initiatives described in section 4 are less than five years old, and indeed, less than two years old. There is hence very limited evaluation of what good practice looks like, what actually works and what is successful. However, the initiatives to date appear to indicate clearly the kinds of eHealth RTD domains on which European Member States wish to concentrate: such as electronic health cards, personalised health systems, and telemedicine as well as more forward-looking basic areas of work in the eHealth field insofar as it relates to bio-sensors and ICT used to explore the fields of genomics and proteomics.

The examples used here would also seem to indicate strength – at least so far – on the part of mainly northern European research institutions in terms of designing organisations to initiate, enhance, and further the promotion of the research process in the eHealth field.

The degree of funding devoted to the eHealth domain by the European Commission to date has been substantial; and it is possible that the reason that the counterpart funding at the national level in the countries involved appears as low as it does is that much of the co-funding comes from research institutions, industrial companies (large, small- and medium-sized), and user-related not-for-profit associations rather than from specific health authorities or research

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<sup>1</sup> The full names of all these organisations can be found in the Acronyms and abbreviations section.

<sup>2</sup> <http://www.strategiestm.com/>

<sup>3</sup> 3C refers to continuity, collaboration, and communication.

ministries/councils. Contemporary initiatives, such as the Article 169 initiative, seem to indicate a greater contemporary encouragement of pan-European activities.

## 5 Conclusions

This study advances the two earlier pan-European studies which offered overviews of European-wide RTD and eHealth RTD. The study provides the first, systematic scoping of the eHealth RTD field and establishes a possible structure and content for high-level, strategic discussions on European-wide eHealth RTD activities. It identifies (i) the opportunity to move ahead strategically on further European eHealth RTD, (ii) the need to assess and evaluate regularly progress in eHealth RTD, and (iii) the need for further studies on eHealth RTD.

This report provides a strategy-level insight into the European eHealth RTD landscape. It complements and builds on earlier studies (such as the eHealth SWOT analysis of patient summaries and patient empowerment, and a number of roadmapping exercises that are the outcomes of European Commission co-financed eHealth support actions in such fields as bio-informatics, eHealth semantics and ontologies, and eHealth grid initiatives).

At this stage of the study, this deliverable should be further scrutinised in five areas: (i) analysis of the findings by the partners in the coordination action (Finland, Germany, Italy, Poland, Spain, UK) to ascertain validity of the findings for their own countries, (ii) validation by the members of the coordination committee (in parallel with submission to the European Commission), (iii) internal critique of the report by personnel from the European Commission; (iv) a review of the findings by external reviewers at the Final Technical Review; and (v) eventual publication of the findings by the European Commission and resultant feedback from a wider readership.

As an outcome of the study, it is suggested that the European Commission might wish to hold an eHealth RTD-related symposium (for example, within the context of a major eHealth event) that enables brainstorming at the most strategic level future possible scenarios for European-wide eHealth RTD, including the launch of a European eHealth RTD Area. Such a foresight and brainstorming exercise could test out the proposals and suggestions put forward in this chapter.

This chapter takes the perspective of those aspects of the study that are of crucial importance principally at the European-level, but also for national-level, eHealth RTD policy-makers. It reviews briefly the important methodological aspects of this inductive content-based analysis. It also outlines the salient findings of this eHealth RTD overview at both European and national levels that have emerged from the data analysis and the literature review.

### 5.1 National eHealth RTD approaches

As illustrated by the INNOCULT study, eHealth RTD appears to be one of the key eleven priority areas of research in Europe. Finland, France, Germany and the UK appear to be Europe's leaders in terms of the breadth of the research topics that are being pursued in these countries that are potentially relevant to eHealth. Generally, however, this study shows that a wider spread of countries is involved in eHealth RTD than was first identified by either the INNOCULT or the CISTRANA studies.

This study demonstrates an absence of national-level programmes that focus solely on eHealth. In all the descriptions of national eHealth RTD research programmes reviewed,

eHealth is only one of the many research areas covered. In many cases, there is no explicit mention of eHealth among programme goals. Instead, there exists a considerable heterogeneity in the levels of programme description available from country-to-country. The study identifies a number of countries that are significant players in eHealth and have not been previously unidentified by earlier studies. These include Belgium, Denmark, Estonia, and Latvia.

Use of standardised research classifications, in this case the IPPA, helps to ground the analysis of the topics of eHealth-related RTD, but does not go far enough in this support.

The extent to which country-specific information can be extended or extrapolated to European levels of observation is questionable. Nevertheless, it is important to consider that any approach to a pan-European eHealth RTD area should cover all the European Member States.

More than four hundred stakeholder organisations are involved in support of national eHealth RTD. This constitutes an average of over fifteen eHealth RTD stakeholders in each country in Europe (sometimes many more; frequently less). A review of stakeholder relationships in this study suggests that at the country level the relevant ministries and departments are the most important stakeholder group in creating any shift in RTD focus towards a European eHealth RTD area. This stakeholder group plays at least two key roles: in the formulation of countries' general policy and strategy, and in the determination of the level of funding allocated to eHealth RTD. Implementation agencies, such as programme implementation bodies and research councils, are the most active stakeholder group in terms of the number of relationships with other stakeholders. In addition to their general functions related to financing and implementation of RTD activities, implementation agencies act as key networking and information hubs between all the key stakeholder groups. The coordination of eHealth RTD activities is the function most frequently performed at the level of those organisations that conduct the relevant RTD, i.e., in universities and other research organisations.

Of prime importance in terms of stakeholder interaction are the eight categories of roles which various stakeholders perform. These roles are related principally to funding but also to policy-making, implementing, managing, coordinating, advice giving, monitoring, and collaborating internationally. Funding appears to be among the most important of these roles.

Eight distinct stakeholder groups are identified at national level in eHealth RTD: national ministries and departments responsible for research; implementation bodies, research councils and funds; universities and research organisations; advisory bodies; national government; academies; health authorities; regional and local authorities

The reviewed information sources contained detailed descriptions of stakeholder interactions at the policy and strategy levels. Mostly, these activities were described in relation to general RTD policy, and referred less frequently and less directly to eHealth. The policy formulation process is based on the monitoring and evaluation of current RTD activities, and the monitoring and assessment of opportunities for further development of strategically important areas of research. Policy formulation also involves continuous consultation processes carried out through various advisory bodies with the representation of stakeholders, which act at all four levels of strategy formulation (policy, strategy, management and implementation).

The primarily important stakeholder roles and relationships appear to be between the national ministries, implementation bodies, and the universities. It is feasible that all these stakeholders may be able to play an important role in expanding eHealth RTD in the different European countries. However, the following observations can be made about the remaining five stakeholder groups.

Advisory councils appear to have considerable influence particularly in two of the smaller European Union countries (Ireland and Malta); the extent to which this finding is applicable to a wider range of European Member States would need to be further verified. The stakeholder group of national government is most frequently mentioned in relation to general funding policy and implementation strategy for countries' RTD systems, again very often – with the exception of Germany and Poland – in relation to some of the smaller European countries by size of population. Academies have a major influence in the eHealth RTD field in only one Member State, Finland. Health authorities are only mentioned rarely in terms of eHealth RTD. There are qualitative indications in the reviewed information sources that health authorities are more frequently involved in eHealth deployment and implementation rather than RTD. However, in some European countries, such as Bulgaria, Finland, Germany, Ireland, Italy, and the UK health authorities are consistently mentioned in the context of the financing of RTD activities. Despite the fact that regional and local authorities are not frequently mentioned in the RTD descriptions for the majority of countries studied, the role of regional and local authorities is presented as being very important in the information sources relating to two particular countries: Belgium and Spain. This could suggest that there is room for increasing the role of the country's regions in eHealth RTD in at least these two countries, and perhaps others besides.

## 5.2 Funding mechanisms for eHealth RTD

The most important forms of funding mechanism that emerge from this study are: funding programmes, project-based funding, and institutional funding<sup>1</sup>. In detail, an analysis of the information reviewed suggests that six countries with the largest numbers of activities, Austria, Finland, France, Iceland, Sweden and UK, have a mix of programme- and non-programme funding types of activities. Programme-funded RTD activities only has a greater level of importance overall, since it is identified as relevant to eHealth RTD in more than half (15) of the 29 countries: Bulgaria, Estonia, Germany, Greece, Hungary, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Spain, the Czech Republic and Turkey. Non-programme types of funding mechanisms are known to exist in many of these countries in other RTD areas. However, the information sources reviewed did not contain any references to these mechanisms in the eHealth RTD context. Only non-programme-type funding was identified for eHealth RTD in these four countries: Ireland, Italy, Slovenia and Switzerland. Logic suggests that the larger the number of eHealth RTD activities in a particular country, the more diverse the range of organisational and financial arrangements.

The second most frequently mentioned stream of funds comes through the project-based mechanism administered by research councils and research funds. In applying for project funding, research organisations participate in defining the set of research topics which is then finalised during the process of evaluation of research proposals. This process allows research organisations to be successful in gaining funding for curiosity-driven research. Analysis of information sources suggests that the potential exists for countries, and certainly for international collaboration on research, to coordinate or centralise much more strategically the selection of eHealth RTD topics intended to be supported financially.

Institution-based funding is most frequently mentioned as a mechanism for the financing of research institutions that undertake problem-driven research in the specific areas of responsibility of the particular national ministries and departments that head up research. The range of funded research topics is determined by research institutions, but in consultation with

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<sup>1</sup> See section 3.6 for definitions

funding organisations. Research institutions that receive institution-based funding from the ministries are often related administratively to those ministries.

Stakeholder analysis identified five groups of stakeholders that were most frequently referenced in relation to the financing of eHealth RTD activities: national ministries and departments responsible for research; various implementation bodies/research councils; universities and research organisations; advisory bodies; and academies. By far the two most important of these are the national ministries or departments and the implementation bodies/research councils.

### **5.3 Possible opportunities for future research**

A small number of observations can be made in four particular areas with regard to: information available on international collaboration; a lack of common terminology for describing eHealth RTD; the methodological challenges of the study itself and the opportunities that these present for future research; and methods for identifying eHealth RTD activities. These provide possible opportunities for future research.

The relatively low amount of information on international collaboration in the reviewed information sources suggests the need for the EC's attention to this domain; at least, in terms of understanding why EC co-financed initiatives were perhaps so little mentioned in the literature or else appear to have had so little impact to date. This study has, however, identified good practices existing in the eHealth RTD area in several countries. Experience of these countries could be useful for enhancing the Europe-wide cooperation in the eHealth RTD area.

Another gap in the organisation of eHealth RTD is the lack of a common terminology for describing eHealth RTD activities. As was frequently mentioned in this report, the relevance of research in eHealth – that is, in areas related to many different forms of ICT and information systems – depends frequently on the context surrounding the RTD rather than purely the content of the research itself.. Some degree of standardisation of eHealth terminology could facilitate both the exchange of information among stakeholders as well as the monitoring of developments in this domain, which would in turn support further expansion and extension of eHealth RTD activities.

The methodological challenges related to definitions of RTD activities and attribution of these activities to eHealth faced by this study allowed only qualitative conclusions to be made. Quantitative conclusions could be drawn only on the basis of a review of eHealth RTD activities at a project level, where the attribution problem could be resolved more easily. The results of this study could, however, be used as a basis for designing such a quantitative survey in the future. Annexes to this report provide lists of organisations and institutions which could be used as a comprehensive sample for future research. The methodological notes can provide insights in the approach that is needed potentially to address the attribution problem.

Several possibilities for the identification of potential eHealth RTD activities exist. They involve the geographic and regional character of strategy development, and the levels of funding; the nature of international challenges; and the kinds of supporting decision-making and funding mechanisms required. It is perhaps too early to gain a full picture of the main process-related advantages in building good practice in research promotion in terms of Member State involvement. Nevertheless, this should be considered as an important potential activity on the part of Member States. Research consortia themselves, in finalising their projects, could be asked to reflect on how greater or more effective Member State involvement could take place; what worked well from this perspective; and what did not work well, in order to provide more

effective information for *post hoc* programme analysis and evaluation. The focus on larger-scale and well-funded coordinated activities in northern Europe is of some concern with regard to other areas in the EU, and it would be important to assess the potential for growing strengths on the part of southern and eastern European geographic areas. The question is also moot whether it is possible not only to sustain, but also to increase, European funding in RTD especially in the face of international challenges. (At a national level, in 2007 China, for example, is about to hit the European average for commitment to RTD funding: see the *Financial Times*, June 12, 2007.)

## 5.4 Good practices in European eHealth RTD

Two main sets of findings result from the brief, qualitative assessment of good eHealth RTD practices: (i) how to undertake good eHealth projects, and (ii) how to organise strategic-level initiatives to undertake high-level eHealth RTD.

Long past are the days when only two or three institutions from a similar number of European Member States could be involved in an RTD project. In terms of pan-European eHealth RTD, the specific projects examined (which were MyHeart, PIPS, and Netc@rds) illustrate the benefits of a) having created a research instrument such as the very large Integrated Projects, b) committing substantial amount of resources both financial and human to a particular scientific endeavour, and c) the importance of lengthy time-periods to secure concrete scientific, technical and organisational developments. Overall, the focus should be less on the particular range of Member States involved (although a representation of countries north, south, east, and west may always be advantageous) than on an appropriate choice of high-level industrial and research players.

In addition to the well-established 20-year development of EC-sponsored and co-financed eHealth RTD (for example, Iakovidis, Dour, and Karp, 2007), in terms of international eHealth collaboration, there is a growing, body of cooperation on eHealth RTD in Europe. These new eHealth RTD activities appear to be undertaken in two ways. Like activities promoted by the Nordic Council, they may be fostered by groups of European Member States and countries, which decide to collaborate among themselves. Or, like activities now being supported by the Article 169 mechanism, they are instigated by initiatives taken by the EC in order to open up certain opportunities to interested Member States.

Clearly, collaboration in large-scale projects a) takes place either a given geographic area or in a grouping of countries; b) involves key research and industrial players, with c) adequate research funding; and d) an intention to gain strategic importance in the field.

With regard to the article 169 mechanism, important criteria involve the size and dimension of the programme; its substantial funding over a five-year period of activity; its support from the EC, European Council and European Parliament; its focus on strategic intentions; and its involvement of key industrial players. Of considerable interest is the wide range of different Member States involved.

In terms of eHealth and/or specific domains of eHealth RTD (such as bio-informatics), it could be appropriate, for example, to:

- Foster the emergence of innovative ICT-based products, services and systems
- Create a critical mass of research, development and innovation at the EU level in technologies and services
- Improve conditions for industrial exploitation

Finally, in terms of stakeholder involvement, these initiatives have involved multiple Member States (with an emphasis on more than two countries being partners in each project), and a variety of types of partner, institution, or organisation. In eHealth RTD, these partners have comprised technical, industrial, health authorities, and users (including hospitals, clinics, representative organisations from different disease groupings, and clinicians and patients). With a more deployment-related orientation, efforts have also been made over the two-year period since 2005 to re-launch a dedicated input to the eHealth area on the part of users. On the one hand, an industry user stakeholder group has been launched; and, on the other hand, a user group has been initiated.

## 5.5 Policy development to enhance European-wide eHealth RTD

The virtuous circle of involvement and influence between basic research and innovation- and market-oriented research may be of crucial importance in sustaining and enlarging eHealth RTD in Europe over the next decade, and longer. While researchers need to be aware of market opportunities, policy makers must also be conscious of the more futuristic research possibilities that may affect actual healthcare provision some ten, fifteen, or twenty years down the line.

The following set of observations identifies, on the one hand, that there may be a number of concrete policy mechanisms that could already be put into place to initiate a European eHealth RTD area. On the other hand, there may be a range of further possible studies that could be undertaken to supplement the policy-makers' understanding of the field. A further option would be to ensure that, at the same time, as policy decisions begin to be made, more investigatory studies continue to be undertaken.

While resources should ideally still be found to encourage independent and anonymous research of a curiosity-based character, these could be provided at the national/regional levels in individual countries. It is evident that the overwhelming importance of eHealth RTD at a European level should have as its core intention to focus on research with certain key attributes for Europe as a whole.

### Political commitment to findings of initiatives already undertaken

Further actions at the EC level on organising dedicated eHealth RTD programmes would be beneficial for further progress in this area. It is proposed that higher political commitment could be afforded to initiatives and studies that are already underway. These initiatives could be undertaken either uniquely within the sphere of the Information Society and Media Directorate-General, or could be more likely undertaken in the context of appropriate liaison with the Directorate-Generals on Research; Health and Consumer Affairs; Enterprise; Employment, Social Affairs and Equal Opportunities; Market, and so on. They include:

- Undertaking initiatives related to chronic diseases, personalised health systems, and homecare, such as the Lead Market Initiative on eHealth.
- Adapting mechanisms such as the article 169 concept and the 'intelligent pharmaceuticals' industrial mechanism to other appropriate areas of potential eHealth RTD.
- Building on the work already undertaken by such studies and support actions as RIDE, SHARE, SYMBIOmatics.

The study suggests that a keen awareness of process is needed whenever a decision with regard to organising a dedicated eHealth RTD initiative for the whole of Europe is made. Most

mechanisms need long and incremental periods of development in order to ensure their solid foundation and eventual success. This time span could be up to the period of 15 years. (This was certainly the case in terms of the time-period required between the launch of eHealth as a research topic in Europe in 1988, and the beginning of eventual large-scale of deployment investment, implementation, and appropriate organisation at the European and various national levels in 2004). At the same time, a feedback mechanism would be required throughout the installation and functioning of the mechanism, since organisational changes need to be made over such a lengthy time-period in order to respond to both altering internal and external conditions. A structured set of incremental, individual research initiatives (what could be called 'joint RTD research') could also be advocated, since most successful, individual research projects appear to need a lengthy period of research commitment (e.g., 48 months), and are possibly also only successful as a result of a dedicated series of successive time and financial commitments:

A possible mechanism for the development of a pan-European view of eHealth RTD (a European eHealth RTD area) is outlined below:

### **Developing a Strategic European View of a European eHealth RTD Area**

eHealth RTD should ideally be undertaken at a European level, have a Community perspective, and be supported by European-level funding matched by equivalent country-level funding from Member States. Whatever the eventual content, the domains of eHealth RTD to be undertaken should be:

- of strategic importance
- driven by appropriate areas of importance from the perspectives of health policy (Information Society Policy Link Initiative, 2006), ICT policy, and research policy
- large-scale
- high-risk
- highly innovative
- with high impact, so as to support implicitly Europe's advanced manufacturing and service industries, and/or knowledge management within the health service sectors.

### **Undertaking a Roadmapping Exercise for a European eHealth RTD Area**

The relevant Member State and stakeholder partners could together develop ideas for:

- A common roadmap or roadmaps for a European eHealth RTD area that would cover both research content and the appropriate processes involved.
- Additional joint eHealth RTD activities.

The research topics for consideration could involve personalised health systems, telemedicine, bio-sensors, gene-related research supported by ICT, photonics, and other domains of research that are currently being identified (see e.g., the potential results of the ongoing IPTS-sponsored Scenarios4Health study<sup>1</sup>).

### **Joining Forces among Member States Across Europe, and Internationally**

eHealth RTD should involve a range of stakeholder partnerships that support the policy commitments cited above. There is a probable need to build synergistic relationships among relevant research-oriented committees e.g., the FP7-ICTC (formerly known as the Information Society Technologies Committee), and others.

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<sup>1</sup> <http://www.scenarios4health.eu>

The range of forces joined together could include the following:

- All Member States (subject to their own choice and availability) should be involved in the various domains of the research lifecycle (policy, funding, decision-making, validation, testing, and implementation). A critical mass of countries and high-level research institutions needs to be developed.
- Initial core groupings of Member States (e.g., 8-15), could involve incremental enlargement of the numbers of Member States involved. Small sub-groupings of Member States (from 2-6 in size) could research specialist sub-domains in which they have specific expertise. Validation exercises should certainly be considered cross-European throughout the Union's entirety. If and when appropriate, they could/should focus on high-level European and international level events for testing and validation e.g., the World Cup (International Federation of Association Football – FIFA, World Cup), and the Olympic Games.
- Further pan-European support for such an initiative could occur through a) a pan-European RTD advisory group mechanism, and b) a not-for-profit eHealth RTD researchers' representative network or association.
- International collaborating partners outside Europe (e.g., from Australia, Canada, Japan, China, India, Latin or South America, and the US).

### **A Clustering Approach among Member States**

Not every eHealth RTD domain chosen for high priority exploration would need to include all the Member States of the Union in its development and application. However, as initially indicated in the European partnering approach outlined above, an incremental approach to cross-European eHealth RTD development could be based on a clustering approach which could have either a multi-lateral or a bi-lateral dimension. Equally, such an approach could be based on a notion of partnering countries that share a critical research mass in association with 'observer' or 'accompanying' nations. That is, other Member States could or should be included in an advisory or observatory capacity, so as to be able to take optimum advantage of the policy directions that are taken and the research outcomes that result.

Policy development in the European eHealth RTD area would nevertheless require feedback and input from all the Member States. All potential initiatives could involve a form of steering committee/advisory group that involves representation from the appropriate research arms of all Member States. Hence, the benefit to any country for which a particular eHealth RTD field is not yet considered important or well-developed is that they would nevertheless be party to obtaining key information on any results or findings that form part of the eHealth RTD research. Generalisable topics as well as the specificities of particular Member States could be explored, and – presumably – adaptation to the research requirements and orientations of both the larger and smaller countries, and those which are more nationally-organised and those which are more regionally-organised.

Large countries (examples could include France, Germany, and the UK), with important and considerable numbers of research institutions and researchers, may be able to build on their well-organised and internal, domestic eHealth RTD domains.

Countries with geographic, historical, and cultural links (examples could include the Nordic countries and the Baltic countries) could develop logical and coherent areas of eHealth RTD with synergy and importance for the several countries involved.

## Partnering at the National Level(s)

At the European level, there needs to be the involvement of:

- Leading research institutions.
- Core industry sectors and associations that represent the role of Europe's key industries, support its key policy domains, and that also ensure ongoing commitment to its economically-important supporting small- and medium-sized enterprises. The exemplars uncovered by this study relate to homecare, medical imaging, and several other sectors. To be specific, these sectors include: (i) Homecare: electronics, infrastructure, middleware, healthcare, insurers, and sensors), (ii) Medical imaging: radiology, cardiology, and health information systems, and (iii) Miscellaneous: Pathology, ophthalmology, pharmacology, and patient care devices.
- Associations of pure and basic research bodies with deployment and implementation-oriented bodies.
- Core user-related stakeholder groupings that represent e.g., a range of key health professions and occupations at all levels and in all sectors of the healthcare process.

The overall aim should be to ensure a degree of coherence and consistency among pan-European, national, regional, and institutional levels of eHealth RTD.

## Core Stakeholders at the National Level

At the national level, organisations included in the national ministries group should be the first point of reference in introducing changes into RTD policies and organisational structures that support eHealth RTD. A careful assessment may have to be made with regard to the range of appropriate ministries that are involved in eHealth RTD. These may range across health ministries, research ministries, innovation or industry-related ministries, core public sector services' ministries, and/or education ministries (see proposals for studies, below).

Implementation agencies (such as programme implementation bodies and research councils) could be the most effective point of engagement in increasing the level of eHealth RTD activities and developing research infrastructure within European countries. There is therefore a potential for improvement in coordination at the national levels, for example, through the involvement of those RTD stakeholders that act at the higher levels of stakeholder hierarchy, particularly at the programme and strategy levels.

## Ensuring Appropriate Funding

Clearly, great benefit can be drawn from careful, instrumental use of the 7FP funding mechanisms in terms of ensuring substantial amounts of funding to key strategic eHealth RTD domains. These could/should involve:

- Continuing dedication of EC funding initiated in the 7FP (i.e., around €200 million over each two-year period per strategic topic).
- At the national level, an aggregation and focusing of programme-based funding<sup>1</sup> streams allocated to eHealth RTD activities could be beneficial in the further development of research infrastructure and expansion of research in this area.
- At the national levels of funding, project- and institution-based funding could also provide additional tools to stimulate curiosity-driven research and to focus eHealth RTD activities in new strategically important areas.

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<sup>1</sup> The definitions of funding mechanisms identified within this study are described in section 3.6 (page 45)

## 5.6 Continuing evaluation and assessment of progress

Further development of good practice concepts in eHealth RTD need to be developed especially in terms of:

- Enhancing and enlarging community (stakeholder) development, i.e., developing communities of practice
- Creating effectiveness and efficiency of resulting benchmarking and indicators
- Creating more 'learning points' and outcomes that are transferable, e.g., asking partners in successful consortia to make observations on good resulting content, mechanisms, and process

## 5.7 Further studies

Further studies may be required in a number of complex areas that involve a more detailed overall assessment. These may include the types of ministries involved in eHealth RTD; comparisons with European-wide research undertaken on eHealth in the 4FP, 5FP, and 6FP; the ranges of stakeholder involvement; various geographic and regional models of eHealth RTD support; and eHealth RTD classificatory systems or schemes. These six concepts are described briefly in further detail below in relation to either a series of associated or stand-alone studies.

(i) a study to determine those areas which require further study and analysis (which could take place through such instruments as coordination actions, support actions, studies through both the EC and its associate research bodies e.g., IPTS).

(ii) a study or survey of the numbers and types of ministries involved in each Member State in the different aspects of eHealth principally including research. Other domains covered by eHealth, apart from research, that might be considered for survey coverage would include: public and private sector partnerships; legal and regulatory mechanisms; data privacy and security; implementation and deployment; education; and the social service sector.

(iii) a study to compare the findings of this study with materials (including statistical) available from the EC on the eHealth components of former Framework Programmes (particularly 4FP, 6FP, and 6FP).

(iv) a study to assess appropriate stakeholder representation at European level; appropriate mechanisms of liaison between the European level and the country-specific level; and consideration at country-specific levels of appropriate coordination mechanisms. Consideration could be given to the various models available for eHealth RTD stakeholder involvement including e.g., France, Finland, Germany, and the UK.

(v) a study of countries with a regional model of eHealth RTD support. Such an assessment could examine the research support mechanisms appropriate in different national and institutional settings, particularly in relation to Member States with important regional orientations. Such an undertaking could be undertaken in relation with either the Committee of Regions or with other important regional-based or city-based organisations, such as the European Regional Information Society Association (ERISA)<sup>1</sup> or the WHO Healthy Cities Network<sup>2</sup>. Consideration could be given to the various models available in such countries as Belgium, Finland; France, Ireland; Malta; and Spain.

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<sup>1</sup> <http://www.erisa.be/>

<sup>2</sup> [http://www.euro.who.int/healthy-cities/natl/20040714\\_1](http://www.euro.who.int/healthy-cities/natl/20040714_1)

(vi) a study to assess the need for the development of a registry of systematic and standardised classification and recording scheme for eHealth RTD domains and/or further development of the IPPA classification scheme with respect to the relevant eHealth RTD domains.

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## **6 Annexes**

See separate files for Annex 1 and Annexes 2 – 8.

**ANNEX 1. INFORMATION GATHERING TEMPLATE**

**ANNEX 2. CHARACTERISTICS OF DESCRIPTIONS OF RTD ACTIVITIES BY COUNTRIES**

**ANNEX 3. KEY PARAMETERS OF RTD ACTIVITIES INCLUDED IN THE STUDY**

**ANNEX 4. NUMBER OF REFERENCES TO RESEARCH AREAS BY COUNTRIES**

**ANNEX 5. LIST OF STAKEHOLDER ORGANISATIONS MENTIONED IN THE INFORMATION SOURCES**

**ANNEX 6. METHODOLOGICAL NOTE ON WEIGHTING OF REFERENCING FREQUENCIES WITHIN THE STAKEHOLDER ANALYSIS FRAMEWORK**

**ANNEX 7. EFFECT OF WEIGHTING ON THE DISTRIBUTION OF STAKEHOLDER GROUPS**

**ANNEX 8. EFFECT OF WEIGHING ON THE DISTRIBUTION OF ROLES**