

# Guide on effective and efficient management of eHealth investments

**Final**

Version 1.0

December 2008



### About Financing eHealth

The Financing eHealth study was commissioned by DG INFSO and Media, unit ICT for Health, with the aim to assess different financing opportunities against the financing needs of eHealth investment. The overriding goal is to provide assistance to Member States and the European Commission in their efforts to meet the eHealth Action Plan objective of "supporting and boosting investment in eHealth".

### Full project title

Assessment of financing opportunities available to Member States to support and boost investment in eHealth

### Contract details

Contract number: 30-CE-0121896/0042

Starting date: September 01, 2007

Ending date: August 31, 2008

### Number and title of deliverable

This report is deliverable D4.2: Guide on effective and efficient management of eHealth investments, of the Financing eHealth study. It addresses the practical questions that need to be addressed by investment executives in order to secure success and sustainability of eHealth investment.

### Authors

Tom Jones, TanJent, UK

Alexander Dobrev, empirica, Germany

### Contact

For further information about the *Financing eHealth* study, please contact:

	
<p><b>empirica</b>          Communication and Technology          Research          Oxfordstr. 2, 53111 Bonn,          Germany          Fax: (49-228) 98530-12  <a href="http://www.empirica.com">www.empirica.com</a>  <a href="mailto:info@empirica.com">info at empirica dot com</a></p>	<p><b>TanJent</b>          Hereford          UK          Tel: +44 7802 336 229  <a href="http://www.tanjent.co.uk">www.tanjent.co.uk</a>  <a href="mailto:tomjones@tanjent.co.uk">tomjones@tanjent.co.uk</a></p>

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# 1 Objectives

Report D4.1 of the Financing eHealth study deals with the effective and efficient healthcare management support needed to boost eHealth investment. It identified many development needs of organisations and managers. The guidelines presented in this report comprise a set of questions for organisations and managers, drawn from the issues identified in D4.1. Policy makers and potential investors on the micro level can use them with report D4.1 to steer boosting eHealth investment. Given the large variations in eHealth investments<sup>1</sup>, it is impossible to provide detailed answers to these questions for each potential investment initiative within the scope of one report. Even if done for today, such a guide will be outdated tomorrow, when the strategic healthcare context of the investment changes, or when new technology opens up new opportunities. Thus, we believe that the best guidelines on effective and efficient management of eHealth investments are a set of questions that allow investors to steer their decision making and post-decision management towards sustainability and success.

As discussed in D4.1<sup>2</sup>, availability of finance is not the biggest constraint to eHealth investment. Instead, the emphasis should shift to better eHealth investment decisions and activities. These include better:

- Integration of eHealth with healthcare strategies
- Benefits realisation
- Risk management and mitigation
- Procurement
- Skills and knowledge for eHealth investment decisions and implementation.

Previous reports for the Financing eHealth study show that increasing finance for eHealth investment as a means to boost eHealth investment should not be a priority on its own. The goal should be to boost successful eHealth investment as part of healthcare strategy and development. Current methodologies, skills, knowledge and capability shortages are critical inhibitors to successful eHealth investment across the European Union (EU). Three core requirements for boosting investment in eHealth are:

- Fix the capability shortfalls as a prerequisite
- Improve current eHealth investment decisions and performance
- Seek increased finance for eHealth from a sound platform for success.

These emphasise improvements needed to the eHealth investment skills, knowledge and capabilities of executives, healthcare professionals, managers and information and communication technology (ICT) staff. As this improves, access to increased finance for eHealth can be justified. The need to improve managerial knowledge of eHealth in

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<sup>1</sup> **Financing eHealth**, D1.3: Report on conceptual framework, healthcare and eHealth investment context and challenges; [www.financing-ehealth.eu](http://www.financing-ehealth.eu)

<sup>2</sup> **Financing eHealth**, D4.1: Report on effective and efficient healthcare management support for eHealth investment; [www.financing-ehealth.eu](http://www.financing-ehealth.eu)

*D4.2: Guide on eHealth investment management*

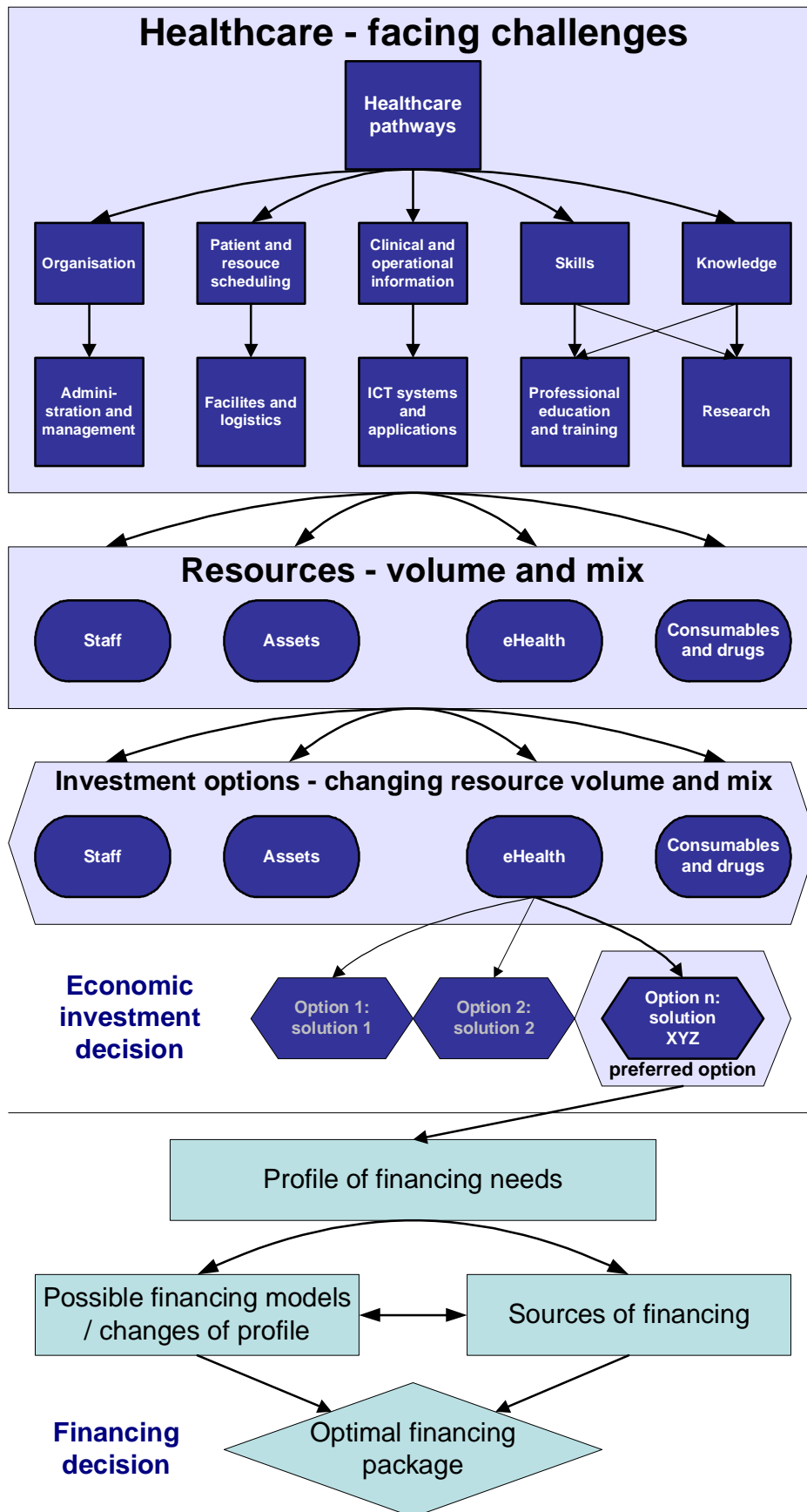
dealing with eHealth investment reflects a critical skills gap identified in the specifics of the eHealth domain in all Member States that impedes progress. Shortfalls in the real resources for eHealth are significant lack of skills and capabilities in the workforce to deal with all the eHealth requirements and a limited view of the potential of eHealth by many healthcare professionals, executives and managers leading to narrowly defined eHealth investment plans.

The questions addressed in this report can serve as a small step towards narrowing this knowledge and skills gap. The questions can guide potential decision makers through the conceptual framework of making sound eHealth investment decisions, summarised in Exhibit 1 below and discussed in more detail in other reports of the Financing eHealth study<sup>3</sup>.

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<sup>3</sup> **Financing eHealth**, D1.3: Report on conceptual framework, healthcare and eHealth investment context and challenges; D4.1: Report on effective and efficient healthcare management support for eHealth investment; [www.financing-ehealth.eu](http://www.financing-ehealth.eu)

Exhibit 1: The process of economic and financing decisions



Source: © TanJent / empirica 2006

There are many different types of eHealth. It includes clinical systems, networked system, telecare, secondary uses such as public health, personal health records provided on the internet, logistic support and billing. Each type has very different investment and net benefit characteristics. Adding the features of the healthcare system of each Member State and the organisational settings creates a vast range of possible scenarios of eHealth investments. Providing a guide on managing all these cannot reflect all the myriad of possible factors that need addressing. Generic questions that need answers by local executives, healthcare professionals and managers can fit most of these settings.

The result is a pragmatic guide on the questions that need answers and the issues that need addressing. It provides policy-makers with a framework that can help to establish the active support for efficient and effective eHealth investment. For decision takers and managers, the guide sheds light on, and draws the connection to, the overall decision taking and change management processes that are part of eHealth investment. Choosing financing options and sources of financing can fit within these processes.

Based on the answers to the questions in this guide, eHealth investment can bid effectively for resources within health services provider organisations (HPOs) and regional and national healthcare systems as part of general investment in healthcare development.

## 2 Guidelines on effective and efficient management of eHealth investment

The guidelines on effective and efficient management of eHealth investment are in the form of questions, Q, in a sequence reflecting the main steps of eHealth investment.

### 2.1 Stage 1 – Our health, healthcare, and eHealth strategies

"**Strategy is the direction and scope** of an organisation over the long-term: which achieves advantage for the organisation through its configuration of resources within a challenging environment, to meet the needs of markets and to fulfil stakeholder expectations"<sup>4</sup>. Giving the direction and scope, strategies are a central part of investment decisions. Too often, however, different strategies compete with each other, leading to a bad overall organisation strategy. For example, a health strategy may be focused on minimising the number of ill people, whereas a healthcare strategy may profit from more patients. eHealth strategies often focus on successful implementation from a technology perspective, regardless of the health related strategic objectives. The following questions provide a path towards an alignment between health, healthcare, and eHealth strategies.

#### 2.1.1 Q1.1 – What is our health and healthcare strategy?

The right perspective for this entry point is essential. Starting from the question, how much to spend on eHealth is the wrong question. It conveys an inappropriate perspective. A better question to ask is on which health and healthcare priorities should we spend our available money? If the eHealth investment is worth it relative to other healthcare

<sup>4</sup> Johnson, G. and Scholes, K.: *Exploring Corporate Strategy*, Prentice Hall Europe, 2002 (first printed 1998) ISBN: 978-0273651123

investment opportunities, providing the required, available finance becomes a supporting priority.

An inappropriate approach is to provide a big bag of money for eHealth, then decide how to spend it. Instead, eHealth should fit with all other potential healthcare investment and link to explicit strategic goals on matters such as:

- Quality improvements and the types of patients who benefit
- Priorities for improved access and the types of patients who benefit
- Changes needed to resources to meet increasing demand from various types of patients
- Performance and efficiency improvements needed to meet increasing demand from specified types of patients.

These goals could be analysed into demographic and disease groups, patient groups, medical specialties and sub-specialties. The specific strategic initiatives and health service changes designed need scheduling in response to these strategic goals. Initiatives could include more doctors and nurses, more and new drugs, expanded and better facilities and better information.

Within the healthcare strategy, each organisation should have an information strategy. This is a sub-set of the healthcare strategy integrated with other supporting strategies such as the human resource strategy, the strategy for the future range of healthcare activities, the change strategy and financial strategy. At this stage, integrating information with other strategies provides the foundation to integrate eHealth with other strategic initiatives.

### 2.1.2 Q1.2 – What benefits can we expect from better information?

Finance should not be available for eHealth where it does not show a better net benefit than other types of competing healthcare investment. People taking investment decisions must be able to estimate the benefits and values of the choices they face. Without these values, increasing finance for eHealth will not necessarily boost investment. What will is the potential and confidence that eHealth will add enough value to organisations' overall strategies.

Large proportions of economic benefits from eHealth are from quality, including patient safety, and time improvements. Smaller proportions of economic benefits are from narrower definitions of financial savings that result in longer-term reductions in cash flow<sup>5</sup>. eHealth is usually a net investment, with a negative financial return, so financial benefits must be realistic in their value and their timing. The distinction between the total economic benefits and those classified as financial is essential to set at the outset. Sustainable eHealth investment requires that all decision takers and financial stakeholders are clear about the distinction between economic benefits and financial savings.

<sup>5</sup> **EHR IMPACT:** Study on the socio-economic impact of interoperable electronic health record and ePrescribing systems; [www.ehr-impact.eu](http://www.ehr-impact.eu)

The task is to identify, define and describe all the benefits needed from better information for each strategic initiative. There are several examples, such as inform patients better, improve patient safety, improve timeliness, streamline healthcare, improve effectiveness by sharing patient information with other healthcare professionals that form the multi-disciplinary team providing patient care, and to modernise healthcare; all quality goals. Some citizens, such as those in remote locations, may need improved access to hospital and other specialist health services. Improving efficiency by saving time and cutting waste may be a priority. These benefits help to specify the information needed to support the healthcare strategy.

### 2.1.3 Q1.3 – What information do we need to realise the benefits?

Information for quality gains could include decision support, such as information about allergies and adverse drug reactions for prescribing, access to the latest evidence on treatments, and sharing clinical information within multi-disciplinary teams. Decision support functionalities of eHealth systems further facilitate clinical processes, yet already the availability of such decision support information leads to better informed decisions. Access to healthcare can improve by transferring clinical information from remote locations to hospitals. Efficiency improves by providing information to help healthcare professionals improve their time scheduling and the scheduling of resources, such as operating theatres and diagnostic tests. Time savings are achieved when all medical records are complete, accurate and available when they are needed. Quality is improved and time saved when supplies such as drugs, dressings and prostheses are available when required. Billing improves when all the information needed is accurate, complete and available when needed.

Examples of information requirements are current information on patients about:

- Clinical information that can be shared between healthcare professionals, especially complete accurate and current medical records
- Recent history of diagnoses, including co-morbidities
- Allergies and adverse drug reactions
- Drugs prescribed and dispensed for patients
- Recent history of test results
- Recent history of operations
- Choices for treatment proposed by evidence-based medicine
- Resources, such as clinics, beds and theatre schedules, available for patients.

eHealth solutions, by definition, are supposed to address these information needs. There is, however, some confusion about the concept of eHealth. It has become an overused term with many meanings. For eHealth investment to meet strategic goals and integrate with other strategic investments, an eHealth definition that includes both ICT and organisational change is essential. Information to confirm the realism of the eHealth definitions used for investment is also essential. This needs a firm analytical link between the functionality and usability of the ICT through to the utilisation by healthcare professionals, the degree of change that this can support, and the time it will take to achieve. A lack of clarity about this link leaves success to chance, thus endangering the

increase in the number of success stories needed to improve confidence and boost investment in eHealth.

#### 2.1.4 Q1.4 – When do we need the information?

Healthcare professionals need some clinical information immediately at the time they are seeing patients and taking decisions about treatment. Other information may be less urgent because it supports a requirement in the future. The health and healthcare strategy should set the timing requirements. Some are clinical imperatives, some are logistical, and some are administrative.

#### 2.1.5 Q1.5 – Which eHealth investments offer a potential solution to providing the information we need?

This is more difficult to answer. It reflects the condition identified by Karl von Clausewitz, the 19th century Prussian military strategist that “In strategy, everything is very simple, although that does not mean that everything is very easy”<sup>6</sup>. For eHealth investment, there is likely to be a set of options for providing information, and these need generating and evaluating dispassionately. A review of proven eHealth in equivalent settings elsewhere and ICT solutions from suppliers are two good sources for this type of information. Examples of options are:

- A super nova, big bang, entirely interoperable ICT solution with very high costs, very high costs of organisational change and very high risks
- Work in partnership with a set of ICT suppliers to develop and implement a super nova, big bang, entirely interoperable ICT solution with a very long life cycle, very high costs, very high costs of organisational change and very high risks
- A set of small-scale, stand-alone, yet interoperable, ICT solutions that are relatively low cost, modest costs of organisational change, manageable risks and effective eHealth development paths, so low obsolescence, but needing continuous investment and change
- A set of small-scale, stand-alone ICT solutions that are relatively low cost, modest costs of organisational change, manageable risks and limited eHealth development paths, so high obsolescence, and needing high continuous investment and change.

It is unlikely that any option will offer a complete solution. eHealth promotes the phenomenon that answering question number 1 leaves question number 2 at the top of the list, and so on. The answer is to assemble all the possible answers, however incomplete and without judging any of them at this stage, then evaluate and compare them as part of a sequence of continuous investment with strategic benefits. Information needed for each option includes:

- Range of healthcare activities supported
- Recognised data and information standards complied with, and standards not complied with

<sup>6</sup> von Clausewitz, C. eds./trans. Michael Howard and Peter Paret, *On War*, Princeton: Princeton University Press, 1976

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- Data included and data excluded
- Links with other information outside the scope of the ICT option
- Functionalities
- Usability and so potential utilisation
- Potential impact on clinical and working practices
- Security and confidentiality performance
- Technical ICT features, such as standards, architecture, design, interoperability links and facilities needed
- Initial estimates of costs and benefits over time.

From this type of information, and assessment can be made of the different investment options, including eHealth. The most important requirement for leaders, executives and eHealth stakeholders is to be able to deal with eHealth investment as an integrated part of all healthcare investment. The analytical link through to the timing of benefits, addressed in section 2.1.3 above, offers an effective integration route. Yet on its own, it is insufficient. Managers need the capability to produce comparable economic assessments of projects. Executives need the capabilities to challenge these constructively and either change the proposals, or agree them, and so set the foundation to realise the benefits from eHealth.

## 2.2 Stage 2 – Our eHealth business case

The business case is set in the context of the strategy options to advance the strategy. **The purpose of a business case is to capture the reasoning for initiating a project or task**, e.g. investing in the development of a new service or changing the business model for supplying existing products. A business case says something about the expected overall performance over a period of time, typically between 2 and 10 years, depending on the particular project, risks, and expected timing of returns.

For a social service where prices are limited, such as healthcare and social care, an economic perspective is needed to estimate the impact on all stakeholders and the best value for money that can be afforded. The business case document from a public procurement perspective describes the project proposal including the cost benefit analysis, affordability and impact studies such as social, health, environmental, financial and public considerations related to a specific project<sup>7</sup>. It is difficult to compile a business case where strategies are not available or are incomplete. The following set of questions can guide decision makers through the processes of compiling a sound business case. One critical theme is that the answers to the questions should not be fixed towards a pre-defined outcome. Rather, they should provide a rigorous foundation for decision making. If an eHealth investment does not have a business case, it should not be pursued further.

<sup>7</sup> Cf. HM Treasury (2003): *The Green Book*, Appraisal and Evaluation in Central Government. Treasury Guidance, London: TSO, January 2003, [http://www.hm-treasury.gov.uk/media/785/27/Green\\_Book\\_03.pdf](http://www.hm-treasury.gov.uk/media/785/27/Green_Book_03.pdf)

## 2.2.1 Q2.1 – Which eHealth options offer the best fit to our healthcare and information strategy?

The challenge in choosing an investment option is to ensure that eHealth investment has, and sustains, a direct link with mainstream strategic goals for health and healthcare. This needs information about:

- The information needs of the organisation set by its information strategy, a prerequisite to eHealth investment
- What data will be provided by each ICT solution, derived from each option
- What changes to clinical and working practices will enable the data to be used to realise net benefits, also derived from each option?

Achieving a strategic fit for eHealth depends on the type and scale of eHealth and the number and type of actors, especially national bodies, HPOs and ICT suppliers. After identifying their scale and impact, initial estimates of costs and benefits over time need identifying and quantifying. At this stage, provisional, indicative values and their timing are enough. They will reflect a combination of ICT functionality, its usability and so potential utilisation, costs and benefits over time. Functionality partly determines the cost and range of benefits. For example, an ePrescribing solution that transfers prescriptions from doctors' offices to high street pharmacies has a narrower functionality than the equivalent that supports repeat prescriptions and offers up to date decision support on prescription choices. Potential benefits of the latter are greater, and the cost is likely to be higher too. Utilisation also determines benefits. If the solution is extremely complicated and cumbersome to use, it can be harder to achieve the users' utilisation rate needed to realise the required net benefits. After assessing these factors with appropriate healthcare professionals and identifying the best solutions, executives can review them and take preliminary decisions.

## 2.2.2 Q2.2 – Which investments will add most value to our enterprise?

Adding value is the difference between costs and benefits, so net benefit. It includes the cost of resources that rely on sustained, reallocated time of busy healthcare professionals. This captures some of the opportunity costs, essentially where the time spent on eHealth allocated away from other high priority initiatives.

Considering the value added by eHealth investment must include whole temporal characteristic of the investment. Appropriate timescales for eHealth extend well beyond the business and financial planning of most national health agencies and HPOs and the eHealth investment lifecycle must be set by the time needed to realise the required net benefit. For national and regional eHealth investments, lifecycles and timescales used by Member States' health entities and HPOs must be consistent. As an example, a step-by-step, slow burn eHealth investment builds continuously from relatively small scale successes, so will have a long lifecycle that can exceed ten years.

When the value added estimates are in place for all strategic initiatives, a short list of options from an economic perspective can be drawn. At this stage, affordability is excluded, but it is dealt with later. Many executives in healthcare are well versed in decision taking for investment that improves healthcare services. Examples are expanding the workforce by recruiting more doctors and nurses, consumables and

facilities. The impact on patients is often direct and explicit. Compared to this, eHealth is more nebulous and arcane.

Cost and benefit analyses over time can be challenging to compile comprehensively. They need dividing by citizens, healthcare professionals, the investing organisation, other organisations and third party payers. Benefits at this stage can rely on high-level, high value items. This is practical because detailed knowledge is seldom available at this stage, so precision on some costs and benefits is spurious. It avoids attempts at evaluating all the options in detail at this stage.

However, it is important to set the initial cost base in the area of the right scale and timing. Contingency increases are essential to reflect the degree of reliance on estimates and approximations. Similarly, the initial estimated benefits value must be set in the area of the right scale and timing, also adjusted for contingencies. Contingency adjustments can help to deal with effects of optimism bias in investment. Studies<sup>8</sup> show that a ten-year horizon is reasonable for estimating costs and benefits.

A critical cost, requiring resources from the early stages of eHealth investment, is supporting effective engagement with all stakeholders, especially healthcare professionals. Engagement is more than consultation. It enables stakeholders to participate and provide their requirements and constraints to be included in eHealth investment. Successful engagement is essential in achieving the required eHealth utilisation rates and organisational change after implementation of the ICT solution, which is critical to releasing the potential added value. Stakeholders' requirements can have a direct effect on the value and timing of costs and benefits, training and development of users and designing the eHealth solution.

It is essential to integrate the findings of these cost benefit analyses into the mainstream activity of the organisation. If they are not, eHealth investment becomes a parallel universe, and is so isolated and remote.

Completing an initial, realistic risk assessment is essential at this stage. It should identify all the possible events that could change and so deplete the net benefit, or added value, of the investment. The risks should be valued, their probability estimated and overall exposure identified. An important principle of risk management is that the further away in time the net benefits, the greater the risk in achieving them. A number of proven eHealth investments take more than four years, sometimes beyond ten years, to realise a net benefit, indicating that many eHealth investments are high risk investments. Executives have a responsibility to be vigilant in ensuring that a realistic estimate of the cost of risk is included in the initial cost benefit analysis.

Executives and stakeholders need to challenge, clarify and agree how proposed eHealth investments create the potential for benefits, and so value, that are not available by other means. All estimated costs should be scrutinised too. An important focus is to ensure that

<sup>8</sup> **eHealth IMPACT:** Study on economic and productivity impact of eHealth - developing a context-adaptive method of evaluation for eHealth, including validation at 10 sites - covering the whole spectrum of eHealth applications and services; [www.ehealth-impact.org](http://www.ehealth-impact.org)

**EHR IMPACT:** Study on the socio-economic impact of interoperable electronic health record and ePrescribing systems; [www.ehr-impact.eu](http://www.ehr-impact.eu)

estimated timings are realistic. Avoiding optimism bias is essential. Executives have a responsibility to be vigilant to ensure realism.

From this process, executives and representatives of stakeholders can compile a short list of options for further evaluation.

### 2.2.3 Q2.3 – How can we improve the estimates of costs and benefits and be clear on the net benefits and value added to our enterprise?

A start point is to develop planning processes. These need developing, because realistic eHealth investment decisions usually have longer timescales than other types of healthcare investment, sometimes more than ten years to reach a net cumulative benefit. Without an extended planning horizon, eHealth on shorter-term horizons of less than five years leads managers to focus on the investment in costs, which then become detached from the investment needed to realise benefits. Unrealistic, short time-scales increase risk and optimism, and result in weak business cases and decisions. The combined effect often obliterates any prospect of net benefits over time. Risk and optimism bias are common features of all investment plans, and eHealth is no exception.

Local estimates of costs and benefits have to be completed using indicative ICT costs from suppliers. Estimates of organisational change costs have to be compiled from the specific strategic goals and resources affected. Studies<sup>9</sup> show the range of costs and benefits, net benefits, time scales and relationships of eHealth factors. Most of these are retrospective, and offer good insights into the types of costs and benefit curves that to be expected. They do not offer information about the links between future functionality, usability, and benefits, the impact of risks, and the effect of optimism. These need reviewing directly by each organisation to assess the specific impact. There are few evidence sources for this because the nature of the resources in each organisation can differ markedly, so each investing entity must construct its own evaluation.

Examples of costs are:

- Time allocated by stakeholders for engagement
- Time of the ICT in assembling options
- Management time needed to evaluate and select options
- Time of stakeholders to contribute to development of the preferred option
- Time and costs for procurement
- Payments to ICT suppliers for ICT and services, including required sub-contracted ICT-suppliers
- Costs of trainers and time of trainees
- Time needed to redesign new clinical and working practices and to introduce them

<sup>9</sup> **eHealth IMPACT:** Study on economic and productivity impact of eHealth - developing a context-adaptive method of evaluation for eHealth, including validation at 10 sites - covering the whole spectrum of eHealth applications and services; [www.ehealth-impact.org](http://www.ehealth-impact.org)

**EHR IMPACT:** Study on the socio-economic impact of interoperable electronic health record and ePrescribing systems; [www.ehr-impact.eu](http://www.ehr-impact.eu)

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- Negative impacts on time needed for certain procedures
- Costs associated with new risks stemming from the implementation and use of new technology.

Benefits depend on the type of eHealth investment. Some generic examples are:

- Improved patient safety
- Better informed patients
- Better informed healthcare professionals
- More streamlined healthcare for patients
- More modern healthcare for patients
- More effective healthcare for patients
- Improved access for patients
- Reduced admissions to hospital
- Time savings for healthcare professionals
- Reduced duplication of direct healthcare activities and waste
- Improved working environment for healthcare professionals
- Improved productivity enabling more patients to access healthcare
- Reduced unit costs of healthcare
- Improved transfer of information for other purposes.

Valuing these types of costs and benefits relies on estimation techniques at this stage of the decision. These include:

- Timing of costs and benefits
- Linking ICT, functionality, performance and utilisation to benefits
- Unit cost of employees time
- Values of time of patients and citizens, including travel times
- Willingness to pay for improved quality, access, convenience and working environment
- Value, probability and exposure to risk
- Assessing and adjusting for optimism
- Sensitivity testing.

Data needed for these estimation techniques can include:

- Number of types of patients each year who benefit
- Number and types of patient episodes and contacts
- Number of types of users, such as doctors, nurses and pharmacists
- Number and types of stakeholders and time allocated throughout the eHealth investment lifecycle, including engagement and training

- Number of operations, diagnostic tests and prescriptions
- Estimates of the costs of the required ICT.

The final cost and benefit estimates of each option need converting to present values (PV), using discounted cash flow (DCF). The option with the highest net present value (NPV) offers the best investment. It offers the best value for money (VFM).

Sensitivity tests show the effect of each option for extreme events, such as significant potential changes in the overall cost position. The goal is to show executives the possible impact of extreme events. Examples are changes with a net impact that increase costs by, say, 50% 100% and reduce benefits by, say, 50% help to show the reliance on estimates. This informs decision takers of a range of outcomes that may occur. More detailed sensitivity testing may include testing different rates for clusters of assumptions and estimates, in order to identify possible indicators of critical significance.

The DCF and sensitivity methodologies should be entirely consistent across all proposed strategic investments, including staff increases, new drugs and new facilities. Then, decision takers can compare the reliability of each case when seeking integrated investment across a range of activities.

From the compiled business cases, executives' can take all the strategic initiatives and compare their potential net benefit. Their goal is to create a semblance of relative priority based on an initial assessment of the strategic impact of all the costs and benefits over time. It is likely that they will want to clarify specific parts of the cost and benefit assessment of each proposal, and this is where the decision-making starts to bite. Then, executives can select a preferred option for the next stage.

#### 2.2.4 Q2.4 – How do we deal with the risks of eHealth?

Over the last 28 years, skills and knowledge of risk have ossified<sup>10</sup>. A result is that plans for eHealth investment seldom evaluate the potential of risk realistically. The result is no recognition of risks as costs, no mitigation and no respective financial provision. This in turn leads to understated costs and overstated benefits, which is not a good foundation to boost eHealth investment. Dealing with risk is constrained by an extensive lack of research on risk exposures, impacts and probabilities in the context of eHealth.

Good eHealth investors often exhibit a common cause of increased risk. They tend to apologise for the extended timescales, understating the significant reduction in risk they have achieved by providing for the right amount of time needed to pursue effective collaboration, engagement, design, development, and testing and change, especially engaging healthcare professionals. Weak investment decisions invariably select timescales and lifecycles that are far too short, with the result that there is insufficient finance for the full, real timescale and projects exceed both their timetable and budget. Generally, the larger the scale and the bigger the bang, the greater the risks. A common result is the isolation and disconnection of costs from benefits, and so net benefits. This shows that risk is a cost that needs financing.

<sup>10</sup> Tranfield, D., and Braganza, A., *Business Leadership of Technological Change*, Chartered Management Institute, British Computer Society, The Change Leadership Network, London 2007 ISBN 0-85946-470-9

A risk inherent in benefits is where healthcare professionals do not exploit the full functionality of the eHealth system. It can be due to factors such as limited engagement from the outset, inappropriate functionality, poor usability, bad training and no real change. eHealth projects should be assessed to identify the variables that can either change without management intervention, or rely on several events to be delivered. Factors like these can then be valued, a probability assigned, exposure measured and risk mitigation designed and applied. As the investment progresses, risks can be reassessed. Generally, right up to implementation, risk can increase costs by more than 50% and reduce benefits by a similar amount. Where these occur, projects may be irredeemable and need stopping. This is where the role of executives is critical.

Generally for eHealth, executives in healthcare are risk averse mainly due to a lack of knowledge. However, this does not diminish the impact of unmitigated risk. Financial costs of risk can exceed the extra finance generated from an eHealth investment. A benchmark that executives and managers can use to test the risk-adjusted cost of eHealth investments is an additional cost in a range of 0.4% to 2.6% of total turnover of the investing organisation. At the high end of the range where risk mitigation is minimal, HPOs face a bill that can be more than the increased ICT spending that many so-called eHealth experts aspire to. Weak risk mitigation truly is a waste of money.

### 2.2.5 Q2.5 – Which eHealth investments can we afford?

The best eHealth investments include a combination of conventional resources and eHealth that support two main investment activities: ICT and organisational change. These have a combination of different financing models that need extra cash flow and the redeployment of staff time already financed. Affordability tends to deal with the need for extra cash flow. Financing and procurement models affect the amount needed. In particular, borrowing money for capital expenditure and leasing equipment increases the annual expenditure by repayments, depreciation and amortisation, and it is this impact on HPOs balance sheets and annual financial statements of financial performance that should be used to measure affordability.

Having selected an option that offers the best, appropriate fit to the organisations' strategic fit, the affordability needs assessing. The estimated costs and benefits provide a start point. The sets of data needed include:

- Effect of the procurement model on cash flow
- Initial financing requirements for internal reserves, loans, leases and PPP arrangements and the effect on cash flow
- All internal finance from reserves
- Estimates of availability of finance needed for investment humps in the earlier years of the investment lifecycle and recurring annual finance for the later, operational years of the lifecycle
- Estimates of interest payments, annual depreciation and amortisation
- Estimates of taxes not recoverable, such as value added tax (VAT)
- Estimates of the cash flow needed for the cost in each year of the lifecycle
- Estimates of the cash flow generated from the benefits in each year of the lifecycle

- Impact on statements of annual financial performance and balance sheets.

These adjustments provide a financial, or accounting, profile of the preferred option. After adjusting to net present values using DCF, they can show a financial return on investment, which can often be negative. This enables comparisons with the other strategic investments to identify relative affordability. They can be prepared at constant prices, so excluding estimates of future inflation. Adding the effects of future inflation and other changes in prices can wait until later stages when tenders are invited. If this stage includes the estimated future price changes, it is essential that any comparisons have the same price base.

An important comparison is between the financial provision for the eHealth strategy, an affordability envelope, and the financial requirement of the preferred option. Often actual affordability exceeds provision in the affordability envelope. Resolving this needs several iterations with the VFM estimate. Changes, usually reductions in costs such as cutting training spending, also change the eHealth investment profile. This, in turn, reduces the potential benefits, often reducing the NPV. This trade-off between VFM and affordability has to be dealt with extremely skilfully by executives.

It is unwise to embark on an unaffordable eHealth investment. It is equally unwise to embark on an initiative that does not offer the right value to the enterprise. Solutions need generating. Finding a balance between these competing perspectives is the critical role of executives and they need a range of choices. Deliverable D2.2 of the Financing eHealth study provides more details on ways to improve affordability<sup>11</sup>. However, this is not limited to eHealth investment. Other strategic initiatives are likely to be going through an equivalent process, so they all need reviewing together. Parallel reviews limit executives' knowledge, insights and choices and can knock the integrated links out of gear.

## 2.2.6 Q2.6 – What are the characteristics of our preferred option?

Ideally, the preferred option offers the right VFM and is affordable. The business cases enable the choice between different options. An iterative approach is suitable, as it becomes more rigorous as more details and information become available. The preferred option should be explicit about:

- The strategic fit
- The case for change
- Barriers to success
- Types and groups of stakeholders
- ICT functionality and usability needed
- Components of the ICT needed and its estimated cost, including obsolescence, over the investment lifecycle for each option
- Procurement arrangements
- Components of the required organisational change and its estimated costs over the investment lifecycle for each option

<sup>11</sup> **Financing eHealth**: D2.2: Report on financing opportunities available to Member States to support and boost investment in eHealth; [www.financing-ehealth.eu](http://www.financing-ehealth.eu)

- Estimated benefits, mainly quality, access and efficiency over time and their components for each type of stakeholder
- Dependencies for realising the benefits
- Estimated annual and cumulative costs, benefits and net benefits over time
- Risks, their values and probabilities for each option and the adjustment to estimated costs, benefits and net benefits over time
- Arrangements to manage and mitigate risks
- Adjustments for optimism bias
- The costs and benefits after discounting, to show the NPV
- Detailed programme and project management requirements and how they will be delivered
- Requirements and arrangements for extra finance showing affordability.

### 2.2.7 Q2.7 – How is the preferred option moved onto the next stage?

When the executives and other decision takers have selected a preferred option, the next stage is to improve the business case with firm data from procurement and financing. This data changes the initial VFM and affordability estimates.

Firm statements of requirements, functional specifications, usability, ICT architecture, ICT systems and facilities, and the performance needed from ICT suppliers and their sub-contractors need completing. Firm tenders invited from appropriate ICT suppliers provide this information. After their submission, their evaluation includes a match to the affordability envelope. When they are within the affordability envelope, the firm cost estimates replace the previous estimates in the business case, resulting in new cost, benefit and net benefits estimates. Again, executives review the proposal and the usual changes to the ICT specifications are made to keep the eHealth investment affordable. Where there is a need for additional finance, and the net benefits justify this, executives can expand the affordability envelope, usually by reducing the finance available to other strategic initiatives.

Completing the financing arrangements, in principle, at this stage is essential. Tenders to meet the requirements must be affordable and financed. The information needed to complete this is from the initial business case. Where affordability is finalised, but it is not possible to finalise any loan applications needed, the status and plans at the time of invitation to tender must be explicit in the documents. When tenders are affordable, any loan applications needed can use the agreed prices from ICT suppliers and be finalised.

This information enables the final business case to be completed and become a core of the programme and project management arrangements.

### 2.2.8 Q2.8 – What are the procurement issues that we need to deal with?

A common failing is that procurers do not always set requirements effectively, making the lives of ICT vendors more difficult and increasing the risks to themselves. Conversely, on many occasions, ICT suppliers are not in the position to supply the solutions needed for

D4.2: Guide on eHealth investment management

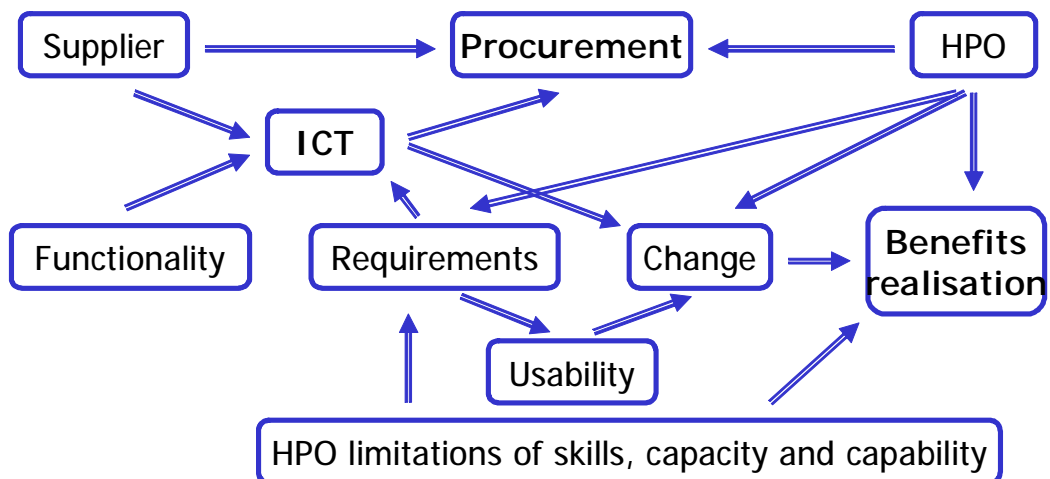
benefit realisation. Both issues are the responsibilities of procurers. They should assess their own, and their bidders' performance.

ICT suppliers' compliance with standards and certifications is essential, although these are not mature measures. Again, procurers are responsible for establishing bidders' performances.

Where established proprietary solutions are available, substantial financial benefits are available from appropriate joint and aggregated procurement. All procurers must test their procurement proposals to ensure that collaboration is maximised and so prices minimised.

Procurement stands between planning and implementation, so has a close impact on the next stage of benefits realisation. An increasing aspiration is linking procurement to benefits, but the route is long and complicated, as shown in Exhibit 2.

**Exhibit 2: Links between procurement and benefits**



Source: © TanJent / empirica 2006

However, this route does reveal the scope for procurement to disconnect from benefits. In this setting, procurers must identify and maintain the relationships depicted in Exhibit 2 above. Engagement with the main types of stakeholders offers a good practice. This provides procurement staff with the information they need to be sure that the specifications will allow the procured systems to meet the procuring organisation's needs. They also need direct knowledge of risk transfer and sharing, as illusions often prevail.

Arrangements for payment deduction for penalties also need to be realistic. A common wrong approach is for deductions for underperformance that can be less than the cost of improving performance. Contracts for eHealth can be very complex, but where projects envisage small manageable steps, with performance linked to payments, then contracts should be set to expand at the same rate.

Most importantly, HPOs must be able to cancel contracts with minimal cost and disruption. Whilst this may appear to be a disaster scenario, the contract cancellation itself should not trigger a disaster.

## 2.3 Stage 3 – Management check before our eHealth investment starts

Once the eHealth investment option is set firmly in the overall strategy of the investing organisation and the business case for the investment is established, investment can begin. Nevertheless, the following questions should concern executives before large volumes of resources are committed to the investment. The issues addressed can be included into a risk mitigation strategy.

### 2.3.1 Q3.1 – What skills and good practices do we need to have in place from the beginning?

From the outset, organisations should have in place all recognised governance, good practices, agreement of all types of stakeholders, programme and project management methodologies and financing arrangements. All the people needed for the eHealth investment to succeed should be in place and have high levels of appropriate skills, especially the users. Six core good practices have to be in place to enable the others. They are:

- Effective executive and medical leadership of ICT-enabled change
- eHealth strategies and investment decisions dealt with in the context of all strategic initiatives and developments
- Management of all strategic developments, including eHealth, as a single programme of change that comprises several projects
- Meeting concrete needs
- Development in small, manageable steps
- Investment in ICT and change as an integrated eHealth project.

These should already be in place because decisions in previous stages need the equivalent attributes. In this case, it is vital that they stay in place. A psychology of eHealth investment is that it starts with good intentions, but drifts along the road to hell as fatigue sets in, due to the inevitable long timescale and increasingly awkward decisions. When this occurs, executive leadership is critical in sustaining organisational stamina and making the changes needed.

When almost everything is in place, an executive can sign the contracts with the ICT suppliers. Then the project begins and the risks begin to materialise and increase.

### 2.3.2 Q3.2 – How do we keep control over the lifecycle of the eHealth investment?

The final business case is a core document. The VFM, affordability, steps and milestones provide the information needed by executives to retain control over the eHealth investment. Programme and project management should reflect these, and ensure all the plans reflect all the changes needed and occurring. Executives can then test the impact on the overall strategy of the organisation. Two perspectives match. Project management tends to focus from the current point in time and look forward. The business case model enables executives to focus from the end-point, where benefits are realised, and look back to the present. Where the investment looks as though its heading in the wrong

direction, such as cost and time overruns, executives can take the corrective action they deem necessary.

Links between executives and appropriate stakeholders are an important part of controlling the investment. Chief executives, medical directors and nursing directors should meet routinely with the representatives of these professions. This enables issues identified from engagement to link to project management. It also helps to take the knotty decisions promptly needed from executives by project managers.

Part of control is effective risk mitigation. Executives must always retain the ability to stop the project if it strays off-track and so disrupts the integrated strategic initiatives.

HPOs can only control activities within their ranges of responsibilities. ICT suppliers face the same position. The contract between them should set out their discrete roles and responsibilities and the requirements on sub-contractors and partners. It is essential that boundaries between ICT suppliers' and HPOs roles are explicit to achieve effective assignment and management of eHealth finance and control the potential for spending to drift.

### 2.3.3 Q3.3 – How can we integrate project management into routine management?

Governance, accountability and reporting by the programme office for eHealth should integrate with the equivalent arrangements for other investment programmes. This gives the programme office the critical link between the management of individual projects and general management. Routine reports to the executive team should set out:

- Progress to date on each project, including budgetary position
- Project components that are going wrong
- Decisions needed but not yet taken
- The impact on other projects of delays
- What action executives should take about delays
- Management action and decisions taken that turned out to be inadequate
- Implications of stopping each project
- Forecast position for each project in three months and six months time.

All eHealth projects throw up questions unspecified or unrecognised at the business case stage. These issues must be resolved promptly. Deferring decisions and action leads to a backlog, and the eHealth investment drifts into trouble. Executives must track the status of these issues formally and contribute to their resolution. Where delays are inevitable, the project plan is adjusted and extra finance provided as needed. If extra finance is not available, it means tough decisions to scale down the investment. These are easier to make when the opportunity cost to other strategic initiatives are seen in direct consequence as part of programme management.

These actions are critical to good financial management. Having set the affordability and financing arrangements for eHealth investment, costs exceeding finance beyond the levels of contingency takes finance away from other strategic initiatives. A continuous drain on finances has a high opportunity cost, and should be minimised.

## 2.4 Stage 4 – Switching on

At this stage, the eHealth investment switches from being a virtual activity to a being a real resource that affects the everyday lives and activities of healthcare professionals, informal carers, patients and other stakeholders. There are a several questions that need answering just before and during implementation, but also in routine operation.

### 2.4.1 Q4.1 – Why should we confirm ICT performance, functionality, and usability before switching on?

Testing eHealth solutions fully before going live is elementary. Full double running is a great advantage, with the findings reported by the project team to stakeholders and executives. Where issues arise, they need fixing and testing. It will be much cheaper to fix them before going live than after. Certainty about performance, functionality and usability are essential. Without it, there is possible disruption of over 20% of the organisations activities, with an extra bill of up to 2.6% of the organisations' total income. Executives need to be certain that the eHealth solution works as required.

### 2.4.2 Q4.2 – When and how should we train users?

It is essential that initial training is completed successfully by the time of full implementation. Investment in training should provide for people to be trained several times, and interactively, rather than in a passive, lecture-based course. Training should include not just people entering new inputs, but also people using new outputs. There is only one good time to train: when you need to know. Training before and after is less effective, so users should have many opportunities to train and repeat training until they have it.

### 2.4.3 Q4.3 – Why should we avoid too many changes at once?

Most users will have enough to do to learn how to use the new ICT, and it will take them some time to acclimatise. This is not a good time to begin an extensive change to processes. Proven eHealth investments that have realised net benefits tend to time organisational change at a point when ICT has become an integral part of professionals' lives. Changing too many things at once can lead to disruptive resistance not because any of the changes is too radical, but because there are too many at once. This leads to confusion between causes of disruptions, with ICT often being blamed for irritations stemming from process change not directly related to the eHealth investment.

eHealth needs two sets of changes. First, using new ICT needs to achieve a high level of utilisation. Second and new clinical and working practices need implementing. Experience shows that these are likely to be more successful if the occur in sequence. This enables actual, real knowledge of the ICT impact to be in place, and so provide the foundation form which to build organisational change. Some eHealth investments plan these two changes as simultaneous, integrated events. They can be too much for users to cope with successfully, and carry a risk of organisational change built on ICT utilisation that is theoretical and unproven.

### 2.4.4 Q4.4 – How do we realise benefits?

The first step is to learn from history, especially the experiences of botched eHealth investment. It usually shows a lack of, or inappropriate engagement; silo organisations

with weak teamwork; inappropriate people in highly skilled eHealth roles; inability to recruit, train and retain the skilled people needed; and the wrong kind of leadership. Such cultural conditions need changing in order to realise benefits and before allocating finance to eHealth investment.

When users are proficient, then three initiatives can start. One is strategic change required by the health and healthcare strategy. Another is organic change, where users' ingenuity and innovation flourishes so they can exploit their own potential. The third is formal process change. Generally, strategic and organic change offer benefits for quality, access and efficiency, whereas process change tends to improve efficiency. They all need to work together, but respecting the rule of avoiding overburdening.

An additional role for ICT staff is a combined role of change manager and trainer. Successful eHealth investments often rely on this role. Equipping ICT staff so they can work with healthcare professionals as a team to achieve successful engagement and change is essential. It is also essential for healthcare managers to acquire the same skills.

Incentives need to be in place to drive benefits realisation. New reimbursement models are often a common component, especially where eHealth results in changes to services and business models. These need designing and implementing as a single package, but new reimbursements can often take much longer. Changes need information about old and new variable, and semi-variable costs and the ways that cash flows through the healthcare system reach users, and citizens, where they are reimbursed directly. The goal is to ensure that the eHealth investors receive the cash incentives where actors in other healthcare sectors enjoy some of the benefits. These are usually very knotty problems. They need collaboration and time to solve, so the earliest possible start is essential.

## 3 Conclusions

The questions stated and discussed in this report present a guideline for decision makers on how best to address potential eHealth investments from the very beginning through to implementation and routine operations. The set of questions is designed to help executives make the right decisions based on the right information. There are two significant themes that need to be drawn as a conclusion. First, despite the importance of changes to the role and work processes of doctors, nurses, and other health professionals, the changing role of executives is often understated. Executives have the obligation to seek and provide answers to the questions listed in this report. However, this is often not the case as eHealth continues to be a less-well understood phenomenon entering executives' lives as a separate, extra item rather than as part of their overall job features. This points to the second conclusion, which reflects the need for more resources being devoted to the development of skills and knowledge.

### 3.1 The new jobs of executives

As already stressed, the most important requirement for leaders, executives and eHealth stakeholders is to be able to deal with eHealth investment as an integrated part of all healthcare investment. When the investment is complete, the executives will have a

different organisation to lead and manage. It is feasible for eHealth to change clinical and working practices, and so the performance of the organisation, and for executives to continue to manage the previous model. A result is executives who are out of touch. Avoiding this requires executives to use the new information that is available to improve their leadership and management.

Finance executives and managers have a more specific role. First, they need to understand the value and impact of eHealth, so they can extend and develop financial planning to deal with eHealth investment timescales. Second, they need to extend their financial management skills to be able to develop ways to invest in better value. This has to be alongside, and does not necessarily have to replace the current focus on continuous cost containment. Applying long-standing principles of good management deals with this. Executives should:

- Establish and maintain a communication system with the stakeholders
- Secure essential services from individuals who are new users
- Formulate the organisation purpose and objectives<sup>12</sup>.

In this setting, organisations knit together by information, not ownership or command, and focus on opportunities. New information now available from the eHealth investment requires executives to review their own performance. This could include a series of changes:

- Switch from problem solving to taking opportunities
- Extend a focus on short-term performance to a longer-term view<sup>13</sup>
- Look for information that can diagnose improved allocations of resources and add more value<sup>14</sup>
- Constantly test the theory of the organisation and its ability to change<sup>15</sup>.

This expands the principle of organisational change from healthcare professionals who use the eHealth investment directly, to the whole organisation. It is just as uncomfortable for executives as it is for healthcare professionals. As healthcare professionals use new information to improve quality, access and efficiency, executives have a different organisation to run. They must do more than keep up. They must be ahead, looking for new opportunities, leading on to their second new job: using the knowledge and experience of the eHealth investment to construct and plan the next one.

With these two changes in place, executives can be sure that the finance allocated has proved beneficial, and should be continued. This will facilitate the boost to eHealth investment that is needed.

<sup>12</sup> Barnard, C.I., *The Functions of the Executive*, Harvard College Copyright, USA, 1938, 1968 ISBN:0-674-32803-5

<sup>13</sup> Drucker, P.F., *Managing for Business Effectiveness*, Harvard Business Review, May to June 1963, USA

<sup>14</sup> Drucker, P.F., *Managing for Business Effectiveness*, Harvard Business Review, May to June 1963, USA

<sup>15</sup> Drucker, P.F., *The Theory of the Business*, Harvard Business Review, September to October 1994 USA

## 3.2 Resources for developing skills and knowledge

The requirements for wider spread skills and knowledge of eHealth and eHealth investment management combine into three main initiatives needed on European and country level:

- Find and appoint centres, either in each Member State or across Europe, that can hold and build the eHealth information and knowledge required to expand the skills, knowledge and capability needed to boost eHealth investment
- Ensure that the centres support healthcare professionals, executives, managers and ICT staff directly in providing the techniques needed for plans, strategies, business cases, financial plans and programme and project management
- Develop reimbursement schemes to match services that rely on eHealth investment.

An essential goal is that learning from the experience and history of eHealth is in place and sustained. A worrying survey finding is that the failure of ICT projects is about 74%, the same rate as the 1980s<sup>16</sup>. It seems that learning is limited. Part of the resources needed is some kind of shared, central or virtual resource that compiles good practices, proven performances and risk mitigation for the proposed centres to draw from, and for this learning to be passed on to eHealth investors. It is then up to the eHealth investors to listen, learn and apply.

Only when these conditions are in place and are effective, can access to finance increase and boost successful eHealth investment.

## 4 Disclaimer

This report is part of a study on financing opportunities available to Member States to support and boost investment in eHealth ([www.financing-ehealth.eu](http://www.financing-ehealth.eu)) commissioned by the European Commission, Directorate General Information Society and Media, Brussels. The content of this paper reflects solely the views of its authors. The European Commission is not liable for any use that may be made of the information contained in the report.

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<sup>16</sup> Tranfield, D., and Braganza, A., *Business Leadership of Technological Change*, Chartered Management Institute, British Computer Society, The Change Leadership Network, London 2007 ISBN 0-85946-470-9

## References

### European Commission studies:

**eHealth IMPACT:** Study on economic and productivity impact of eHealth - developing a context-adaptive method of evaluation for eHealth, including validation at 10 sites - covering the whole spectrum of eHealth applications and services; [www.ehealth-impact.org](http://www.ehealth-impact.org)

**EHR IMPACT:** Study on the socio-economic impact of interoperable electronic health record and ePrescribing systems; [www.ehr-impact.eu](http://www.ehr-impact.eu)

**Financing eHealth:** Assessment of financing opportunities available to Member States to support and boost investment in eHealth; [www.financing-ehealth.eu](http://www.financing-ehealth.eu):

- D1.3: Report on conceptual framework, healthcare and eHealth investment context and challenges
- D2.2: Report on financing opportunities available to Member States to support and boost investment in eHealth;
- D4.1: Report on effective and efficient healthcare management support for eHealth investment.

### Other literature

Barnard, C.I., The Functions of the Executive, Harvard College Copyright, USA, 1938, 1968 ISBN:0-674-32803-5

Drucker, P.F., Managing for Business Effectiveness, Harvard Business Review, May to June 1963, USA

Drucker, P.F., The Theory of the Business, Harvard Business Review, September to October 1994 USA

HM Treasury (2003): The Green Book, Appraisal and Evaluation in Central Government. Treasury Guidance, London: TSO, January 2003, [http://www.hm-treasury.gov.uk/media/785/27/Green\\_Book\\_03.pdf](http://www.hm-treasury.gov.uk/media/785/27/Green_Book_03.pdf)

Johnson, G. and Scholes, K.: Exploring Corporate Strategy, Prentice Hall Europe, 2002 (first printed 1998) ISBN: 978-0273651123

Tranfield, D., and Braganza, A., Business Leadership of Technological Change, Chartered Management Institute, British Computer Society, The Change Leadership Network, London 2007 ISBN 0-85946-470-9

von Clausewitz, C. eds./trans. Michael Howard and Peter Paret, On War, Princeton: Princeton University Press, 1976