

FACULTY OF BUSINESS ECONOMICS
Master of Management: Management Information Systems

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Masterproef

*Setting Performance Indicators for Health Care:
Conceptual Framework for Investment Decisions that
Manage the Unbalances between Challenges & Resources*

Promotor :
Prof. dr. Philip VERGAUWEN

Marc Lutsch

*Master Thesis nominated to obtain the degree of Master of Management , specialization
Management Information Systems*

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Preface

This master thesis makes up the final step in my education Master of Management, main subject Management Information Systems at the University of Hasselt. Having a full time job, it hasn't been always easy to combine work and education but I could rely on the support and efforts of a few people.

In the first place, I would like to express my sincere gratitude to my supervisor Professor Philip Vergauwen, for his professional counselling and suggestions but also for having encouraged me to finish this work. Without his moral support I would not have found the energy to finalize this thesis after a working day.

Furthermore, I would like to thank my student colleagues who have supported me during my student days and I am happy that some of them have become friends.

At last, a general thank to the University of Hasselt and its collaborators.

Marc

Summary

The changing context of health care organisations brings a lot of challenges in the health care sector. These changes consist mainly out of demographic changes, new medical technologies, and changes in patterns of disease and in the workforce.

Teamwork can meet the expected shortage of medical staff and what's more improves the delivered health care service. Re-engineering can help to find the right mix of medical staff. To attract and employ foreign employees can reduce the personnel shortage but has the disadvantage of language and cultural problems. It underlines the importance of good communication internally within the team as externally towards the patients and their families. Good teamwork and efficient communication are needed in a patient-care approach of which several studies have demonstrated that this method has positive outcomes.

Modern technologies offer a range of new possibilities. The medical technologies help to satisfy the changing health care needs for the ageing population. Information technology helps to improve the distribution of information. Literature research has shown that the implementation of information technology improves the quality of health care. The result of a survey among information officers in the health care organisations confirms this finding.

The health care sector has both a financial and a "reputation" interest in being environmentally friendly because of the rising energy prices and the growing awareness for the importance of green energy.

Financial techniques such as cost analysis, life-cycle economics and corporate performance management may help to obtain a better insight in the cost structure. They also give support in making budgets and for the measurement and improvement of the overall performance.

At first sight the changing context of health care organisations can be seen solely as a negative change. On the other hand it can also be seen as an opportunity to provide better health care services with fewer resources.

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1 Introduction

Looking back in history there have been a lot of changes in different periods of time. When some have lasted quite a long time, the more recent time periods have succeeded each other more quickly. Indeed, the world is changing faster and faster.

The industrial age is already behind us, we are now living in a society where the “computer” has taken a central position. Today’s information society offers many opportunities but faces also big social, economic and financial challenges.

Health care, an essential element in the society, is also confronted with the rapid ongoing changes.

This master thesis describes the challenges and opportunities in the health care sector and outlines a framework where the limited resources are matched to the challenges the sector is confronted with.

2 The changing context of health care organisations

The function of health care organizations has evaluated in the course of history (appendix 1). Now they have to adapt to the rapidly changing society where new challenges are emerging and resources are limited, some even shrinking.

2.1 Challenges

The hospitals in the industrialised countries stand for huge challenges [McKee and Healy, 2000]. They have to adapt to changing health care needs for ageing populations, and this in a world where public and political expectations are increasing.

Patients ask “better” care, politicians ask “less expensive” care and there is the awakening public opinion for a “greener” care.

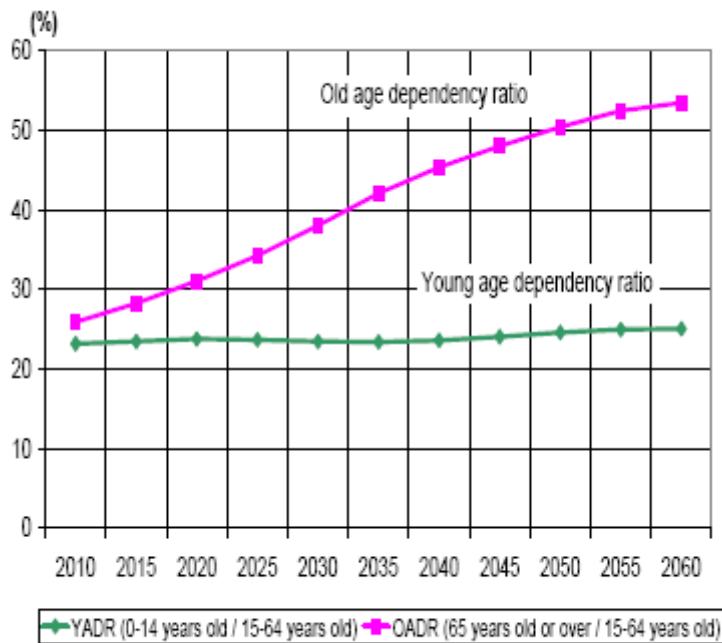
Demographic change

The end of the Second World War marks in the Western world a period of stability, prosperity and major developments in technology. With the baby boomers there was a very young, active population. The situation today is very different.

Because the fertility rates in Europe are low and people live longer than before, the share of older people in the European Union increases. Projection of this evolution is shown in following figure¹:

¹ The young-age-dependency ratio is the ratio of the number of young people at an age when they are generally economically inactive, (i.e. under 15 years of age), compared to the number of people of working age (i.e. 15-64).

The old-age-dependency ratio is the ratio of the number of elderly people at an age when they are generally economically inactive (i.e. aged 65 and over), compared to the number of people of working age (i.e. 15-64 years old).



Source: Eurostat, EUROPOP2008 convergence scenario

The share of people aged 65 years or over in the total EU population is projected to increase from 17.1 % to 30.0 %. And the number of 65 year olds is projected to rise from 84.6 million in 2008 to 151.5 million in 2060. Similarly, the number of people aged 80 years or over is projected to almost triple from 21.8 million in 2008 to 61.4 million in 2060 (EUROSTAT). Whereas, in 2008 there were four people of working age (15-64 years old) for every EU citizen aged 65 years or over, by 2060 the ratio is expected to drop to 2 to 1 (EUROSTAT).

On one hand there is the expected fast growing old age dependency ratio for the EU population (see graph above). On the other hand health care consumption increases disproportionately with age. Old people are simply more and longer ill than younger people. So the ageing process will bring along a huge rise of health care expenses that will weigh more and more on the shoulders of the active population.

Migration to Western countries has also an impact on demographic change. Advantage is that young immigrants² could lower the pressure on the shoulders of the active population. Disadvantage is that the health care needs of migrants often differ from those of the host population [Carballo et al., 1998 in McKee and Healy, 2002]. Culture and language differences could furthermore complicate health care delivery.

²Family reunion might bring in older people

Changed patterns of disease

The ageing of the population and changed lifestyle results in changing patterns of ill health [Rechel et al. (2009)].

Whereas health care needs for young people are mostly occasional and with single pathology, those for older people are more likely to be with multi-pathologies. The health care needs for older people are different as well than for younger people, e.g. more causes for fractured hips, dimension and cancer.

Changed lifestyles (e.g. unhealthy diets and fast food) are expected to lead to a rise of diseases (obesity, heart diseases, diabetes, cancer) among some population groups.

Worthy to mention is that the climate change, although at present difficult to predict, will also have health impacts on human beings (effects on skin and eye, immunity system, others) [World Health Organisation (a)].

Medical technologies

Continuous developments in medical technologies allow more and better health care services. These new technologies cover a wide range of fields, including surgery, laboratory diagnostics, transplantations, pharmaceuticals and screening [McKee and Healy (2000)].

Using this potential of better health care services in the future means making policy decisions and allocating the necessary budgets for the required investments now.

Changes in the workforce

Health care workers are on the list of “knelpuntberoepen” in our country. This shortage of health care workers is a problem for most hospitals. Some managers of health care organizations try to find a solution by hiring health care workers from abroad but this policy might entail communication problems between the foreign health care workers and patients (local health care workers as well) because of language problems.

The increasing feminization of the workforce is expected to continue and has implications for the organisation of the clinical work. The female workforce is more likely to take career breaks or to work part-time [Rechel et al. (2009)].

We are living in an increasing digitalised society where technology is becoming more and more important. Health care workers have to acquire the necessary competences to work in this increasingly specialised environment.

Public attitude and expectations

Public expectations in the western world about health care services keep on rising and are sometimes unrealistic [RUZB (2007)]. Patients are expecting smaller patient rooms, more convenient times for medical interventions and a wide range of medical services.

The patient of today is much better informed (Internet) about medical science and its applications. He is demanding more comfort.

The configuration of hospital services is not just a technical or managerial issue, but is to a large degree a political decision [Rechel et al. (2009)].

Certainly not to ignore is that public opinion is becoming also more energy conscious. More energy saving measures and environmental care is the message.

2.2 Resources

Financial

There are 5 different financial resources in the health care sector [WHO (2004)]:

- patients pocket
- various authorities
- social health insurance
- private health insurance
- donations

For most health care services there is a statutory minimum and maximum amount to pay for the account of the patient. Some medical interventions (e.g. aesthetic surgery) are completely at the expense of the patient.

The five resources are complementary and mostly there is a combination of these financial inflows for the health provider.

Within the health care systems of Europe, most of the financial resources for capital or services are ultimately supplied by the state [Dewulf & Wright (2009)].

Non-financial

Health care is very labour-intensive. Although modern medical equipment is relieving the tasks of the health care workforce and makes them work more efficient, there is no sign that human intervention in this field will be redundant.

In 2007 the average number of nurses and midwives per 100.000 inhabitants was around 882 for the EU-27³ [Eurostat (2010)]. This average number hides quite big variations among the regions.

The majority of OECD countries seem to be suffering from nurses' shortages [Simoens et al. (2005)].

Indeed, the above explained ageing process also has an impact on the health care workforce itself and this has a very negative influence on the shortage of the medical staff.

³ Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom.

2.3 Unbalance between challenges and resources

On the one hand there is an increasing demand for more and better health care services, on the other hand financial and medical staff resources are limited, the latter is even expected to be shrinking.

Besides there will be a demand for new kinds of medical services.

This growing problem can only be resolved by being creative. The magic word here is “innovation”.

In the following framework new ideas, both financial and non-financial, are developed that could give solace for the above formulated problem.

3 Conceptual framework for health care investments

Investing in health care is not just a matter of money. Even more important than the use of new technologies is the interaction of staff for optimal health services for the patient. Financial techniques can help in determining costs and can also assist management in preparing budgets. Other techniques can be used for determining the overall performance.

3.1 *Non-financial*

People and the way they work together play an extremely important role in providing good health care services for the patient. Furthermore, patient-care increases the health care service. New technologies create new possibilities on both medical and organizational fields. “Being green” is also becoming more important in health care organizations.

3.1.1 Hospital staffing

Health Care organisations are very labour intensive and depend on their staff to achieve high quality medical services in the most efficient way. The shrinking pool of workforce obligates to be creative. For health care managers this translates in a balanced skill mix of the staff to ensure the offered medical services and in good employment practices in order to execute them in the most effective way.

3.1.1.1 Skill mix

A solution to meet the expected staffing shortages can be found through teamwork. This requires in the first place a balanced composition of the medical team so that all necessary health care services are assured. This demands of course the needful medical knowledge and skills of the individual team members but also teamwork behaviours. The latter skills must be extra educated and trained. Teams make fewer mistakes than individuals do, especially when each team member knows his or her responsibilities, as well as those of the other team members [Baker et al. (2005)].

In this article⁴ Baker states furthermore that “Teamwork is not an automatic consequence of co-locating people together and depends on a willingness to cooperate for a shared goal. Teamwork also does not require that team members work together on a permanent basis. Teamwork is sustained by a commitment to a shared set of team KSAs⁵ rather than permanent assignments that carry over from day-to-day”.

Re-engineering in the health care organisations can help to find the right mix of medical staff in a cost effective way.

In the first place this aim can be reached with substitution. Some medical services can indeed be done by less expensive and less highly trained personnel. In countries where nursing is highly professionalised, there is considerable evidence that qualified nurses often achieve better results than physicians at some tasks, partly because they spend more time with patients [(Healy and McKee (2002) in Shum et al. (2000)].

Another way of re-engineering is to expand the task jurisdictions of existing staff. However this can involve a change in professional power and therefore can be contested. Nurses have altered their work jurisdiction in three areas, which often brings them into conflict with other occupational groups: technical tasks have been delegated from medicine; routine nursing tasks are increasingly delegated to aides; and psychosocial assessment of patient needs competes with social workers [Healy and McKee (2002) in Gardner and McCoppin (1989)].

The introduction of new technologies gives another possibility for re-engineering, namely the creation of new functions in the medical workforce.

The advantages of interdisciplinary team care for patients and the health care delivery system are summarized in following chart [UNC School of medicine (2011) in Grant et al. (1995)]:

- ➔ For patients
- Improves care by increasing coordination of services, especially for complex problems
 - Integrates health care for a wide range of problems and needs
 - Empowers patients as active partners in care
 - Can serve patients of diverse cultural backgrounds
 - Uses time more efficiently

⁴ Page 187

⁵ KSAs : Knowledge, Skills and Attitudes.

- ➔ For health care delivery system
- Holds potential for more efficient delivery of care
- Maximizes resources and facilities
- Decreases burden on acute care facilities as a result of increased preventive care
- Facilitates continuous quality improvement efforts

3.1.1.2 Staff

The shrinking of the health care workforce pool influences the strategy of the human resources management of health care centres.

Indeed, in order to recruit and maintain high-qualified and well-motivated staff, providing attractive and healthy working conditions seem to be a must.

The feminisation of the health care workforce makes the human resources management offering family-friendly work conditions. This includes part-time work and flexible work hours.

Nurses have a higher absentee and disability rate than almost any other profession, which results in significant costs to the health system and wider society [Rechel B. et al. (2009d) in Baumann et al. (2001)]. Investments in order to become “healthier” employees are economically clearly justified; it is the source of potential improvements in absenteeism and productivity.

The physical health of the health care workforce can be improved with better equipment. Patient handling, a cause for pain in the back for nurses, is an obvious example where investments for better working conditions loans. In the literature is mentioned that an initial capital investment for patient handling equipment was repaid after only 3,75 years, due to savings in occupational compensation and lost work days [Rechel B. et al. (2009a⁶) in Nelson et al. (2006)].

⁶ Page 87 in the article

The psychological health of health care workers is among others supported by architectural design and good communication and a pleasant work atmosphere.

Firstly there is the impact of the architectural design of the workplace. Four features of hospital buildings that have been traditionally been considered as components of healing environments are: nature, daylight, fresh air and quiet [Rechel B. et al. (2009)⁷] in Van den Berg & Wagenaar (2006)].

In the article “‘Healing architecture’: daylight in hospital design” [Aripin (2007)] the positive influence of natural light on human health and well being of patients and medical staff in a hospital environment is underlined. In the same article the author points also out that “good day lighting will obviate the need for artificial lighting, thus also lead for energy conservation”.

3.1.2 Patient-centered care

Patient-centered care is “an innovative approach to the planning, delivery, and evaluation of health care that is grounded in mutually beneficial partnerships among health care providers, patients, and families; Patient-and family-centered care applies to patients of all ages, and it may be practiced in any health care setting” [Australian commission on safety and quality in Healthcare (2011) in Institute for Patient-and Family Centered Care (2010)].

The core concepts of patient-centered care can be defined as [Institute for Patient-and Family-centered care]:

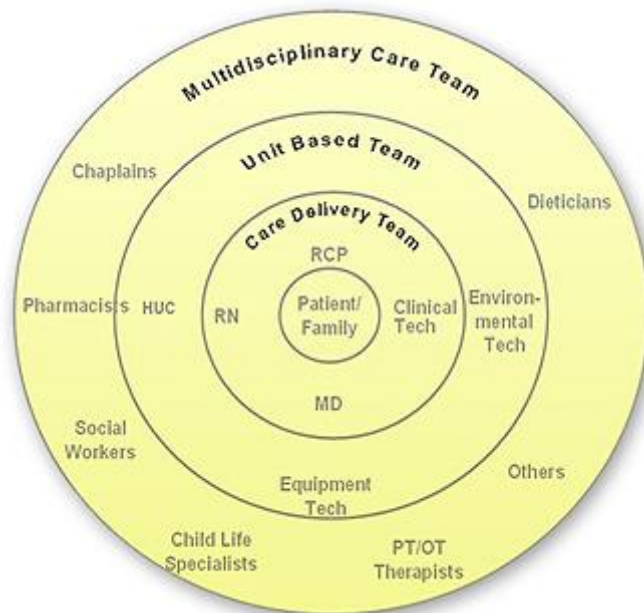
- Dignity and respect – Health care practitioners listen to and honor patient and family perspectives and choices. Patient and family knowledge, values, beliefs and cultural backgrounds are incorporated into the planning and delivery of care.
- Information sharing – Health care practitioners communicate and share complete and unbiased information with patients and families in ways that are affirming and useful. Patients and families receive timely, complete, and accurate information in order to effectively participate in care and decision-making.

⁷ Page 88 in the article

- Participation – Patients and families are encouraged and supported in participating in care and decision-making at the level they choose.
- Collaboration – Patients and families are also included on an institution-wide basis. Health care leaders collaborate with patients and families in policy and program development, implementation, and evaluation; in health care facility design; and in professional education, as well as in delivery of care.

As the name “patient-centered” care suggests, the patient stands central in this approach and around him (and his family) all care services are constructed.

Following chart shows a summarized presentation of this concept.



Source: Children’s Medical Center Dallas, Texas

It is obvious that patient-centered care requires good communication with the patient (and his family) about all aspects of health care. The patient (and his family⁸) is an important source of information and in consolation with the medical staff proposals can be made. When the patient knows what to expect he is more conscious about possible choices and risks.

The aspect of involving the patient in the decisions, a key core concept of patient-centered care, can be defined as “patient empowerment”. This concept is clearly described as follows.

⁸ In some eastern cultures, the family of the patient will stay 24/24 with the patient to feed, wash and support him. But nor the family nor the patient take part in the decision-making. This is not the patient-centered care explained here.

“Patient empowerment in the health care context means to promote autonomous self-regulation so that the individual’s potential for health and wellness is maximised. Patient empowerment begins with information and education and includes seeking out information about one’s own illness or condition, and actively participating in treatment decisions. Empowerment requires an individual to take care of one’s self and make choices about care from among options identified by the doctor” [Lau (2002)⁹].

In some way the patient has to be “educated” or at least be assisted in order to be an active partner in health care decisions him concerning and to have the capacity of taking part on his own care.

For that purpose a large range of possibilities exist like appropriate information folders and multimedia technology for obtaining relevant information for the patients needs.

But crucial in the patient empowerment approach is that one listens attentively to the patient in order to know his real needs and preferences.

Multiple studies have demonstrated that patients who are involved with decisions about their care and the management of their conditions have better outcomes than those who are not involved [Lau (2002)¹⁰ in Wagner et al., (2001) & Greenfeld et al. (1985)].

Important is that the exchanged information is truthful but simple in order to avoid misunderstandings and maximize the efficiency of the communication in time and transfer of knowledge.

Besides too much information could lead to the patient’s decision not having the necessary treatment.

The patient should also have enough time at his disposal to weight the expected advantages and potential disadvantages of the proposed treatment. So he has the opportunity to discuss his health situation with his family and ask for further information if necessary.

Informed consent is considered as a tool for patient empowerment and the different stages can be described as follows [Lau (2002)¹¹ in Edge and Groves (1994)]:

⁹ Page 372 in the article

¹⁰ Page 373 in the article

¹¹ Page 373 in the article

- Disclosure – the patient should be informed of the nature of the condition, the various options, potential risks, the professional’s recommendation, and the nature of consent as an act of authorisation;
- Understanding – information is provided at the patient’s level of understanding, using appropriate language;
- Voluntaries – the must be in a position to practise self-determination free from any coercion, manipulation, or constraint;
- Competence – based on the patient’s past experience, maturity, responsibility, and capacity for independent decision making; and
- Consent – a freely given authorisation to the medical or nursing intervention.

One doesn’t achieve patient-centered care with a snip of the fingers. Establishing the right culture is the basis condition for its potential success.

This supposes that hospital management and staff share common values, have both the willingness to achieve and that management supports staff actively.

The sensible red line in this story is communication and team collaboration.

3.1.3 Communication and Team Collaboration

Although more and more technological machines appear in the health care world human intervention in health care services keeps on playing the most important and biggest role. It is unlikely that the positive aspect of human intervention on patients can be equalled one day by automated intervention. The role of human in the health care delivery process remains an added value that can not be replaced by technology but this implies also risks of misunderstanding. Team collaboration requires good communication and this is not always a natural conception. Lack of communication or bad communication creates situations where medical errors can occur.

There are several barriers (appendix 2) to effective communication; difference in cultural background is one of them. “One study states that 93 percent of communication is more affected by body language, attitude, and tone, leaving only 7 percent of the meaning and intent based on the actual words said” [O’Daniel and Rosenstein in Allesandra and O’Connor]. One can ask questions about the obtained numbers in this study but it is clear that

communication is not just about words and that the cultural background plays an important role in communication. It is that in the future health care organisations will work more with staff and patients having different cultural backgrounds¹².

¹²The United States, one of the most ethnically and culturally diverse countries in the world, is more than any other country already confronted with this kind of (potential) problem.

3.1.4 Technology

3.1.4.1 New health technologies

Modern technology opens new ways for health care services and their development keeps on going with great strides. Does use of these technologies have a financial and organisational impact on health care?

These emerging technologies can be clustered into broad groups, each of which affects health services differently. The most important of these are as follows [Rosen (2002)¹³]:

- Screening technologies. Blood or tissue testing and image-based screening technologies.
- Drug technologies. Multiple new drugs, such as ulcer-healing drugs, have replaced the need for hospital-based intervention.
- Gene therapies. Artificial introduction of genetic material may replace deleted or defected genes.
- Laparoscopic and minimal-access surgical techniques. These techniques generally result in shorter admissions, more rapid recovery and reduced thresholds for intervention, with consequent increases in numbers treated.
- Organ transplant technologies. These use immunological techniques to reduce the rejection of human organs and, increasingly, of animal organs.
- Imaging technologies and interventional radiology. Digitized imaging allows image transfer between different clinical centres and increases the use of real-time imaging by interventional radiologists for biopsy and minimal-access treatments such as vascular stenting.
- Telemedicine links. Emerging telemedicine services include real-time clinical consultations between distant patients and a central clinician, and data and image transfer between community and hospital settings that allow general practitioners to manage selected patients under the supervision of hospital consultants and allows secondary and tertiary hospitals rapid access to expert advice.

¹³ Page 241-242

Based on a study of Murphe (1998), Rosen (2002) states that it is difficult to determine the financial impact of new technologies on hospitals. The various technological applications used in treating peptic ulcers (appendix 3) over the last 10-15 years are used in her explaining. Open surgery has been replaced by drug treatment. The latter is often a long term treatment and demands often repeated endoscopy intervention for some patients. Besides, the transition to frequent endoscopic diagnosis has required hospitals to invest in equipment and specialized medical staff.

Her conclusion is as follows: “Overall, the case of peptic ulcer disease demonstrates how a cluster of technological developments alters the use of hospital and community health services over time. It also highlights how intervention thresholds change when a new technology simplifies diagnosis and treatment, reducing the cost of treating individual patients but, in the absence of narrow patient selection criteria, increasing the number of patients treated and thus overall spending”¹⁴.

Where a hospital is defined today by its number of beds available, it might be defined tomorrow by its (possibility of) using telemedicine. A hospital’s “market” is nowadays largely determined by the distance between the (potential) patient’s home and the geographical location of the hospital. Telemedicine might shuffle this market because it allows health care delivery outside the hospital and rubs out the element distance in a patient’s choice for a hospital. This opens the way for a bigger (potential) market but even so for more competition. Today a hospital is partly defined by its number of beds available, tomorrow this might be rather by its capacity of using telemedicine.

¹⁴ Page 244 in the article

3.1.4.2 Information Technology

First a brief description is given about what is meant by information technology in health care, and then the drivers and barriers of investment in technology in the sector will be discussed.

What do we understand under IT in health care?

In the English version of Wikipedia (consulted on 28/04/2011) next description has been found (http://en.wikipedia.org/wiki/Health_information_technology): “Health information technology provides the umbrella framework to describe the comprehensive management of health information across computerized systems and its secure exchange between consumers, providers, government and quality entities, and insurers. Health information technology (HIT) is in general increasingly viewed as the most promising tool for improving quality, safety and efficiency of the health delivery system (Chaudry et al., 2006)”.

Health information technology can be roughly divided into three categories:

- administrative and financial systems: facilitate billing, accounting and other administrative tasks (e.g. patient registration, cost accounting systems, personnel and payroll)
- clinical systems: facilitate input into the care process (e.g. electronic monitoring of intensive care patients, clinical decision report systems)
- infrastructure: supports the above mentioned systems (e.g. desktop, servers and networks)

The challenge is to integrate applications in the health information system in order to improve quality and efficiency of health care. Purchasing technologies that are not integrative with the existing ones have little added value.

What are the drivers for obtaining health information technology?

Health care is growing increasingly complex and one of the primary motives to use health information technology is the belief that it has a positive impact on health care.

Literature search [Chaudhry et al., (2006)¹⁵] reveals that the implementation of a multifunctional health information technology system has the following effects:

1. Increased delivery of care in adherence to guidelines and protocols
2. Enhanced capacity to perform surveillance and monitoring for disease conditions and care delivery
3. Reductions in rates of medication errors
4. Decreased utilization of care
5. Mixed effects on time utilization

The first 3 listed effects have a positive influence on the quality of health care, the last two are affecting the efficiency.

Increased adherence to guideline- or protocol-based care is mainly expressed by decision support functions based on electronic health records and computerized provider entry systems. In the article “Improving Safety with Information Technology” [Bates et al., 2003] Bates makes following interesting remark: “One of the main benefits of using computers for clinical tasks is often overlooked is that it makes it possible to implement 'forcing functions' – features that restrict the way in which tasks may be performed”.

It is clear that health information technology offers more possibilities for surveillance and monitoring than can be done with paper-based information management. According to Bates et al., intensive care departments are particularly beneficial for monitoring applications. Firstly, because there is a shortage of internists. Secondary, because “smart” monitors can highlight signals that a human observer would often fail to detect. He refers to a study about remote monitoring in a 10-bed intensive care unit that was associated with a very significant reduction in mortality and where the average length of stay in the intensive care department and the related costs each dropped with about one third.

¹⁵ Page 744 in the article

Bates and his colleagues write further: “Computerized tools can also be used with electronic medical records to identify, intervene early in, and track the frequency of adverse events – a major gap in the current safety-related armamentarium – since, to improve processes, it is important to be able to measure outcomes”¹⁶ [in Larsen et al., 1989]. They refer to a study [Classen et al.] where an approach for combining clinical data bases to detect signals that suggest the presence of an adverse drug event in hospitalized patients, such as the use of an antidote, identifies 81 times as many events as did spontaneous reporting.

Chaundry is more critical. In his literature search, he came to the finding that automated quality measurement was found to be less labour intensive, but he records that 2 of the studies have found important methodological limitations that affected the validity of automated quality measurement.

Health information technology has clearly a positive impact on the reduction of medication errors because it decreases adverse drug events and improves medication dosing. Bates and his colleague refer to two studies where for the first one a reduction of 55 percent in serious medication errors has been noted [Bates et al., 1998], and where for the second one a reduction in the overall rate of medical errors has been observed [Bates, 1999].

These results are not surprising because medication errors are often due to a failure to provide sufficient specificity in an order, illegibility of handwritten orders, errors of calculation, and errors in transcription [Bates et al. (2003)¹⁷ in Leape et al., 1995]. Bates and his colleague state even that “Nearly half of serious medication errors have been found to result from the fact that clinicians have insufficient information about the patient and the drug”¹⁸.

A decreased utilization of care due to the use of health information technology has also been recorded. This is mainly due to computerized systems like automated calculation of pre-test probability for diagnostic tests, display of previous test results, display of laboratory test costs, and computerized reminders. The efficiency effects are principally observed in laboratory and radiology testing.

¹⁶ Page 2529 in the article

¹⁷ Page 2530 in the article

¹⁸ Page 2530 in the article

Health information technology results in mixed effects on time utilization. The literature search of Chaundry et al. reveals no unilateral change on efficiency. The studies which were gone through showed just slight increases or decreases on time related to health provision.

Literature search about data on information technology costs in hospitals and about the impact of information technology on health care organization's financial performances has yield in little result.

In spite of the absence of academic evidence we can presume that the return on investment in health information technology is bigger for large hospitals than for small ones due to economic scaling-up effects.

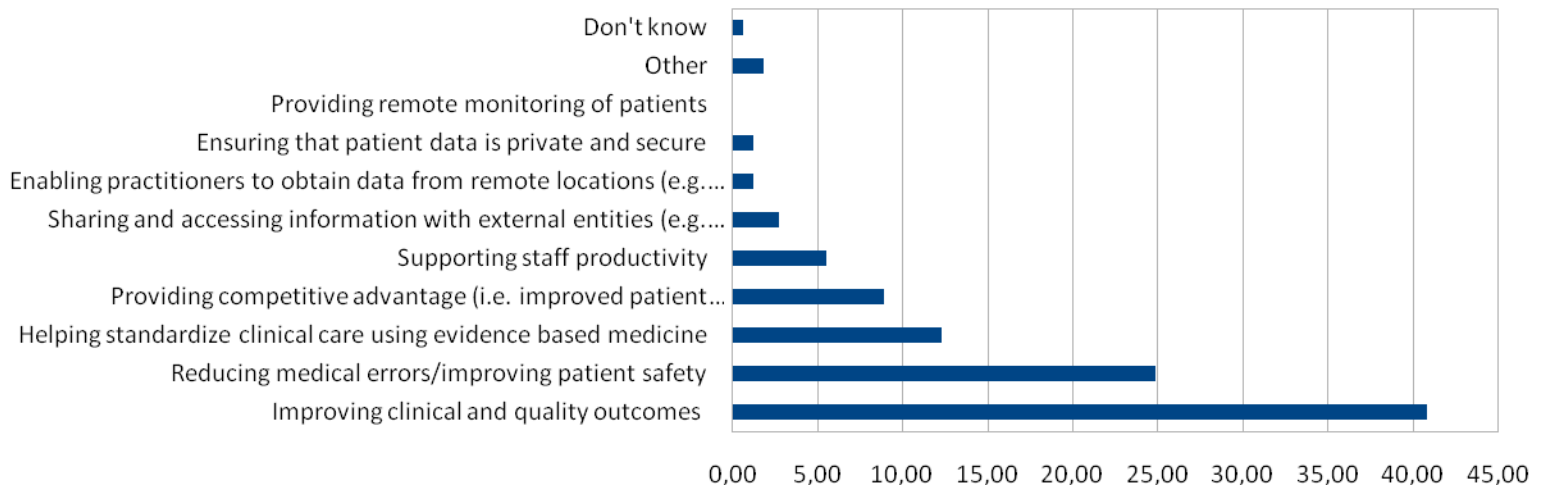
When calculating the return on investment for health IT not only the investment in the technologies (hard & soft) have to be taken into account, but even so the costs for implementing and supporting the system as well as the changing work processes.

It should be mentioned that there could be a negative impact on the quantity of delivered health care services by a hospital due to investments in health care technologies. Take the example of a well functioning health information system preventing a medication error. In this case the hospital might have missed income from a potential health care service that could have been necessary because of this medication error.

A survey among chief information officers in health care organizations [HIMSS, 2011] confirm the great lines of the findings in the literature search about the drivers of using health information technology.

In following chart of that survey we see clearly that “Improving clinical and quality outcomes” are believed to have a very big impact on patient care. Less but still very significant is “Improving patient safety”.

In what area do you feel that IT can have the most impact on patient care?



What are the barriers for obtaining health information performance?

Investment in information technology is not cheap and the eventually investment has to compete with other investments decisions (like structural alterations and the purchase of medical instruments) inside the health care organization. The availability over sufficient financial resources overall and always plays an important role when investments have to be taken and is here also a big barrier.

The total cost of implementation (hardware, software, and training of staff) and maintenance can rise very high. The costs of integrating the existing applications in the health care organization have even so to be taken into account. This part is often be underestimated, the planned time span of the work as well as the budgeted part of the work.

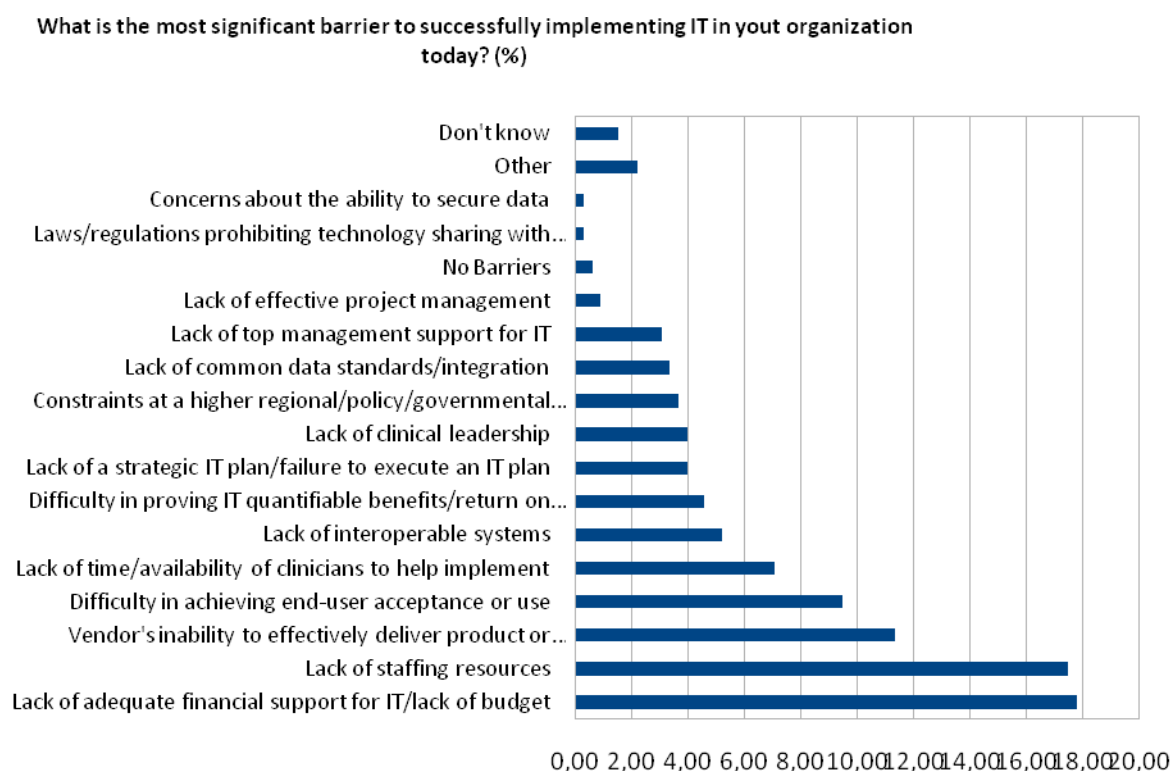
Change (in work process and culture) encounters always resistance. This is not different in health care organisations. The fact that mainly high educated people, persons who are generally not easy to steer, work in a hospital doesn't make it easier. Very good communication is here the message.

The lack of cost data needed to determine the total cost of ownership of a system or the return on investment [Chaudry et al., 2006] is not supporting when taking investments decisions. Chaudry and colleagues write further “Without these data, the costs of health information technology systems can be estimated only through complex predictive analysis and statistical modelling methods, techniques generally not available outside of research. One of the chief

barriers to adoption of health information technology is the misalignment of incentives for its use [Miller & Sim, 2004, Poon et al., 2004]¹⁹.

In the survey of HIMSS among chief information officers in health care organizations the financial barrier is not surprisingly confirmed as can be seen in the picture below.

The barrier “lack of staffing resources” is even so not unexpected given the scarcity of high-qualified personnel on the labour market. The outsourcing of the implementation and/or maintenance might give solace. This solution is not obvious in a complex organisation like a hospital. Besides, organizations don't like to give out hands the treatment and the storage of delicate data²⁰.



Another question used in the same survey is worth to be mentioned (see picture below).

It shows clearly that the absence of measurement tools and adequate staff is recognized but the barrier of user acceptance strikes as well.

¹⁹ Page 749

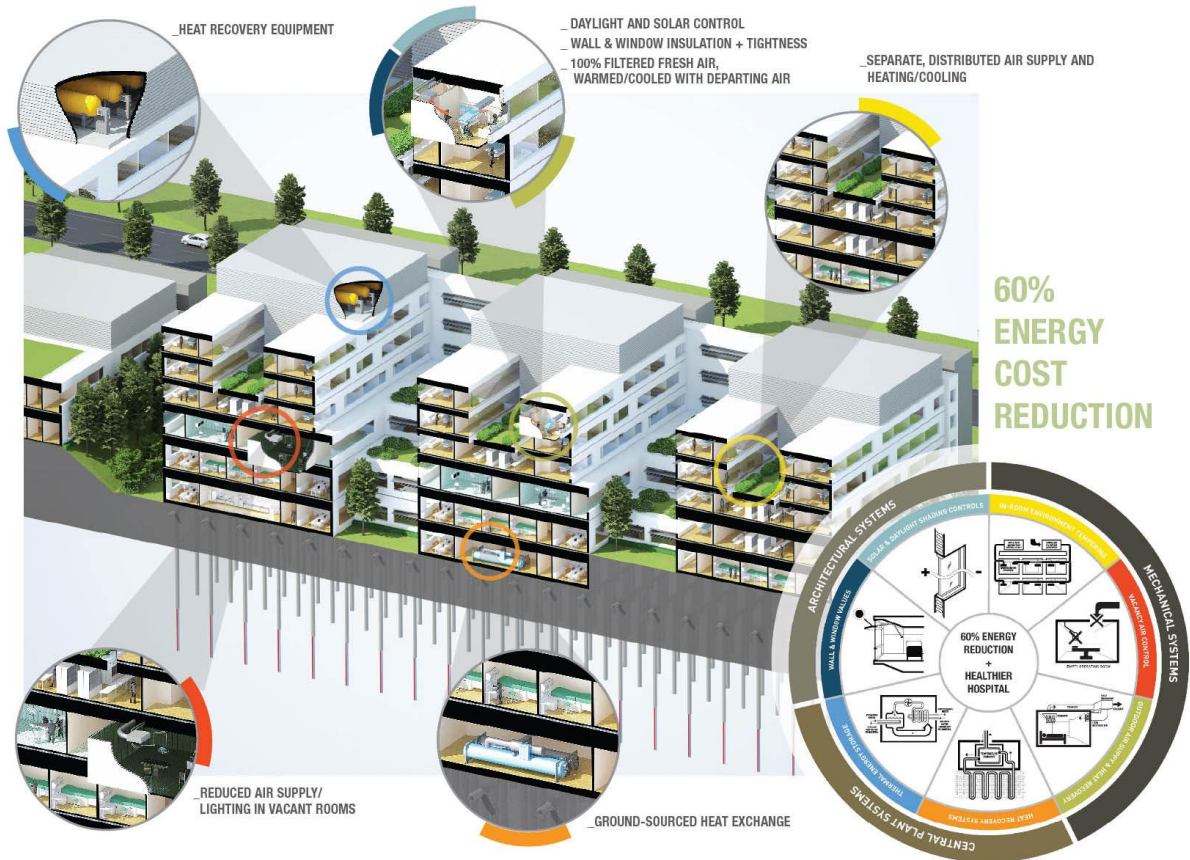
²⁰This is a personal opinion. I think further that the generation who is more familiar with IT is more open for outsourcing the treatment and storage of data.

The implementation of an IT system is not only a matter of technology and resources but also a matter of culture in the organization.

What is the biggest barrier to achieving measurable outcomes at your organization at this time?

Lack of data metrics and measurement tools/process	28,85%
Achieving end user acceptance	22,15%
Lack of adequate staffing resources	22,15%
Lack of funding	7,69%
Inability to complete requirements in time to meet stage one meaningful use	5,54%
Lack of adequate technology	4,92%
Lack of understanding of the meaningful use requirements	4,92%
Other	7,08%
Don't know	2,77%
No Barriers	0,62%

3.1.5 Green accent



Source: Betterbricks

Health care organizations are very big consumers of energy, e.g. heating the building, warm water or patient care, lighting.

The rising prices for energy are putting pressure on the financial results of hospitals. Besides there is the growing awakening in the society about the global climate change what leads to a more critical attitude towards big energy wasting organizations.

Thus a health care organization has both financial and “reputation” interests to consume as little brown²¹ energy as possible.

²¹Brown energy: energy that is considered as not clean energy and refers to sources of energy that use non-renewable resources or are sources of energy that contribute to environmental pollution.

The long term effects of investments in efficiency and renewable energy will result in reduced energy costs, so that the freed resources can be allocated to medical equipment and medical care.

Sun and wind are free and unrestricted accessible. Thus, investments in equipment for wind and solar energy generation seem to be the appropriated policy.

The formulation of an energy management plan seems indispensable for addressing in a practical way the energy problems. In the first place such a plan has to identify and scrutinize all the elements that have an influence on energy consumption like doors and windows, roof, ventilation, lighting system and elevators.

The next step is to collect data about the energy consumption or energy isolation effects of these elements. Installation of new permanent or temporary sensors might be necessary to obtain the necessary data.

Further, the collected data have to be benchmarked. This will allow (energy) managers to identify immediately the weakest spots in the hospital's energy system.

Finally, based on a cost-benefit analysis, potential energy investment decisions have to be taken by management.

ISO-labels are more and more necessary to be allowed to compete for obtaining contracts in the business world and they play an important role for image building as well.

Therefore investment decisions for energy saving measures should not be based purely on financial reasons.

A green energy project from the European Commission to reduce energy consumption at the hospital of Szeged in Hungary has resulted in gas consumption reduction of 43% and a generation of 20% energy saving.

3.2 Financial

3.2.1 Cost analysis and cost centres

Accurate costs data are not always available. Complementary information can be obtained through a management information system and medical records or by interviewing medical staff (time allocation, activities...).

Two management tools can help provide the necessary data on which decisions can then be made for operations and infrastructure investments. These tools are called cost-finding and cost analysis. They basically allocate direct and indirect costs.

The idea is to reallocate the data or information in existing accounts in order to obtain the costs of the services provided by the hospital. Once the cost data has been allocated to cost centres, a comparison can be made with the planned budgets. The result of this comparison can induce management to take action if necessary and allow them to make better budgets for the future.

With accurate cost data, management can set rates that are realistically related to costs and by doing so avoid bad (financial) surprises in the future.

Computing unit costs can be obtained in following way [Shepard et al., (2000) in Hanson & Gilson, (1996)]:

1. Define the final product
 2. Define cost centres
 3. Identify the full cost for each input
 4. Assign inputs to cost centres
 5. Allocate all costs to final cost centres (compute total allocated costs)
 6. Compute unit cost for each final cost centre
 7. Report results
-
1. The purpose of the analysis and the type of available data will determine the final product of the cost analysis. Comparison of costs related to certain departments, demands unit

costs for each department separately. When comparing on a higher level, the unit cost may than be computed on a higher level as well²².

One can follow different approaches for computing a separate unit cost for a certain activity or allocate its costs somewhere else, as long as one remains consistent.

The purpose of the analysis and the type of data available will also determine the data period that will be analysed²³.

2. Cost centres are in fact the centres of activity in a hospital. A unit of output is allocated to a final²⁴ cost centre to which direct (mostly salaries, supplies) and/or indirect (mostly depreciation and allocated costs of other departments) costs are assigned.

Examples of a unit of output for a cost centre are: number of tests for laboratory inpatient-days or admissions for inpatient care.

They are chosen by management and should best match with the organizational structure of the hospital so that a representative picture of the cost flows can be obtained.

We can distinguish 3 types of cost centres:

- Patient-care: for direct patient services
- Intermediate: for ancillary services to support patient care units
- Overhead: for support services to both patient care and intermediate cost centres (e.g. laundry, security)

The choice of a cost centre could be influenced when management is considering outsourcing certain in-house services and would like to compare the cost of these services with the market-price.

3. About identifying the full cost for each input Shepard and colleagues note rightly: “the conceptual issue of determining which expenditures should be counted as costs based on an economic sense of resources used up during the production of health care, and the actual measurement of true costs using available data (which may be incomplete or untrustworthy)”²⁵.

Some line items are briefly discussed:

²²The same applies for lower level (if possible to compute)

²³Utility costs are generally only available once a year. One could allocate these to a smaller period in time if taking into account the consumption pattern.

²⁴Final cost centres represent patient-centred activities, see further in the text

²⁵ Page 5 in the article

Salaries

The total cost of the salary should be taken into account. This includes among others social security contributions.

The idea is that all costs related to hospital staff are taken into account according to the proportion of time spent in the hospital (department of it)²⁶.

Fringe Benefits

Fringe benefits received by personnel should always be included as part of total payroll costs. Examples of this kind of benefits are: health care insurance, vacation bonus and sick pay.

Unpaid work (e.g. internship) at the hospital should also be included in the calculation of the total cost of salaries. Not including this could give a wrong picture of the levels of productivity and efficiency and could thus send wrong signals to management for correction of planning and of budgets.

Donated items

In some countries donations to health care organizations appear frequently, in others they are very rare. If it happens they should be included in the calculations of the hospital unit costs. The idea is again to obtain the most realistic picture of the real costs in the health care organization. This enables maximum possibility for efficiency comparison among health care organizations and avoids financial surprises in the future²⁷.

4. Some inputs can be assigned directly to certain cost centres. But inputs are mostly used by several cost centres and they should be allocated to them according to their use. There are several methods for assigning the cost of staff to cost centres. One can use administration data to calculate the part to be allocated or one can use direct measurement where the real time spend is measured. The latter has the advantage giving more detailed information and can reveal easily sources of inefficiency but its implementation is quite costly.

5. The idea of this step is that all costs have to be allocated to the final cost centres. The indirect costs (e.g. administration, laundry) include all the costs that are not allocated directly

²⁶If an employee spends three days working in hospital (department) A and 2 days a week in hospital (department) B, his 60 % of his total salary should be attributed to hospital (department) A, the rest to hospital (department) B.

²⁷Donations may be used up one day and could be necessary to replace them.

to the final cost centres. They have to be reallocated to them and the amount is based on the part of use of these indirect costs.

The same rule applies for ancillary services.

6. The total costs of the final cost centres are known now. In this step the unit cost for each cost centre has to be calculated. Therefore the utilization has to be determined. For example: x bed-days, x visits, x treatments.

Once these utilization data are obtained, the unit of cost can be computed.

7. The report should include an explanation about how the unit costs have been calculated and contain any other interesting information so that the reader (manager) can have a clear idea about the situation and take action if necessary.

3.2.2 Cost data for improving management

The cost analysis report allows managers to compare the internal cost of services with potential contracting services. Besides the cost of the service one should take into account several other aspects like the quality of the service and the employment security of the service in the in-house service (and the potential cost of lay off staff).

The report can also be used to establish rates²⁸ for services and help to construct budgets.

For benchmarking the report is also a very helpful instrument.

²⁸If not legally determined.

3.2.3 Capital financing model

The ageing of the population, the changing patterns of diseases, the rising of new medical technologies and the growing public expectations are putting health care budgets heavily under pressure.

A strategy for asset investment²⁹ and corporate performance management can bring here some relief.

3.2.3.1 Life-cycle economics

Maintaining an old building is often more expensive in the long run than building a new one. In the rapidly changing health care context it is not the initial investment that has to be taken into account but the costs of the building over its life-cycle. This includes maintenance costs, adaptability costs and a potential residual value³⁰.

The life-cycle costing model is a tool that allows calculating the cost of the asset on the basis of different strategic scenarios.

This means that for all these scenarios the whole life of the building should be taken into account: from design and building throughout the “operational” life of the building to the demolition of it. The accounting includes all possible costs and incomes during the existence of the building³¹ and the calculation has to consider depreciation rates and interest rates as well.

Elaborating multiple scenarios can reveal that a bigger investment in high-quality materials can have less life-cycle costs, due to lower maintenance and operation costs, than a less “expensive” investment would entail.

²⁹In the EU countries health capital assets have been mostly free for health care organisations, the cost/risk was carried by government. This will be less the case in the near future.

³⁰Could be negative, e.g. In case of heavy pollution

³¹Life-cycle value involves above also the analysis of the social and environmental impact of the project

The same reasoning applies for investing in adaptability where an extra initial investment leads to reduced upgrading costs in the future. This is particularly important in the rapidly changing health care context.

Bjørberg and Verweij (2009) distinguish 3 major dimensions for adaptability:

- Flexibility: the possibility of changing layout
- Generality: the possibility of changing functions
- Elasticity: the possibility of changing volume

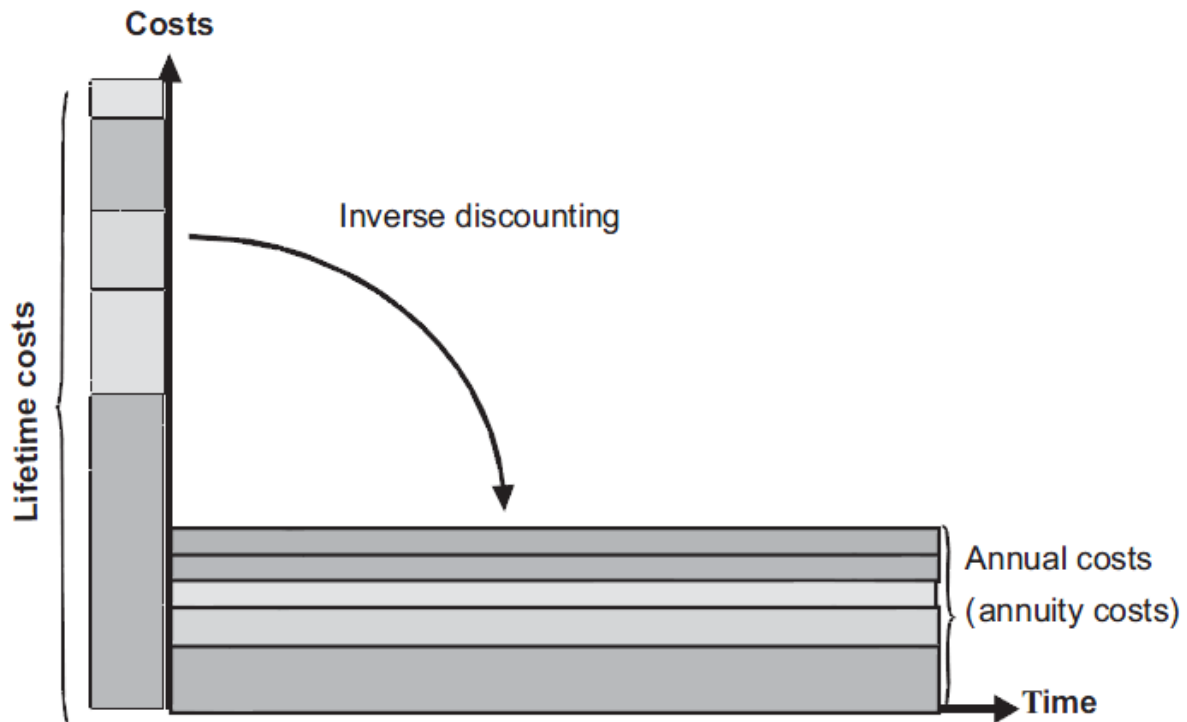
A service life period is a time span within the life-cycle that is demarcated with a refurbishment. It is obvious that for short service life periods within a life-cycle, adaptability is important and therefore investment in it worthwhile.

A definition of some terms is useful for explaining the picture below [Bjørberg & Verweij, 2009]:

- Annual expenses: what needs to be paid each year (annual variable)
- Life-cycle costs: investment costs plus annual expenses plus residual costs (demolition)
- Lifetime costs: net present value of life-cycle costs
- Annual costs: annuity of lifetime costs

Costs related to the building occur at different times throughout its lifetime. The idea about the picture above is to show that all future costs have to be presented at today's value. It should be noted that the result of the calculation of the net present value is particularly sensitive to the used interest rate and also, but in a less important way, to the estimated lifetime of the building.

The calculated net present value and the capital costs together form the lifetime costs. Based on this amount the annual costs are calculated. The inverse discounting is shown in following picture [Bjørberg & Verweij, 2009]:



Source: Thorsnes T, Statsbygg, Norway, personal communication, 2007.

Theoretically the calculation of life-cycle costs is not that difficult but applying it in practice is another pair of sleeves. Bjørberg notes correctly in his article³² that in order to obtain good estimate of the life-cycle costs in an early stage one should focus on next important cost elements:

- Capital costs: always have to be viewed in the context of operational and maintenance costs, planning for future reconstructions, expansions and new technical installations.
- Operational and minor maintenance costs: quality materials, technical installations and easy access to components are essential factors influencing this type of costs.
- Cleaning services: there should be surfaces and materials that facilitate cleaning, limited disruption of floor space by walls, columns and other dividers, and an entrance area designed to allow removal of dirt on the way in.
- Energy costs: several measures can be implemented to reduce energy use and therefore also energy costs. Different sources of energy can be considered. The design of façades and windows will play a major role in energy efficiency.

³² Page 161 in the article

- Development costs: if the building will have a short service life period, as in the case of “hot floors³³” in hospitals, it must be highly adaptable. This will often require additional investments and have a major impact on business costs.

3.2.3.2 Corporate performance management

Corporate performance management can be useful here because it allows measuring the overall performance in the health care organization.

The main process of corporate performance management is quite simple:

1. Set standards
2. Measure the current situations
3. Analyse the observed situation by comparing with the desired situation
4. Take action on the basis of the emerged differences in the analysis

It is not only a matter of just collecting and reporting numbers. A corporate performance management system forces management to think first about the appropriate strategy for the organization and then supports the various processes for implementing and monitoring the chosen strategy. This implies a collaborative planning process that aligns business strategies, business measures and business actions.

Doing so performance management can be done in the entire organization without focusing only on the financial figures and that is the power of corporate performance management. Big advantage for management is that the overall business performance of the organization will be shown with a single image.

Several tools for measuring organizational performance exist. The most widespread instrument for corporate performance management is called the Balance Scorecard.

The term Balanced Scorecard appears in an article of Robert Kaplan and David Norton in the Harvard Business Review in 1992 but it had already been applied before by General Electrics.

The Balanced Scorecard includes the following four perspectives:

- Financial perspective: includes measures that the traditional financing accounting systems don't supply such as risk assessment and return on employed capital.

→ How do we look to look to our shareholders?

³³Hot floor: capital intensive functions that are specific for a hospital. e.g. Operating rooms, intensive care

- Customer perspective³⁴: includes measures such as customer satisfaction, customer retention and target market segments for customer groups.
→ What are the expectations of our customers?
- Internal business process prospective: includes measures such as cycle time, productivity, cost and quality.
→ How do we have to organize our internal processes in order to fulfil the two previous perspectives?
- Learning and growth perspective: includes measures such as employee satisfaction, employee retention, training, skill sets.
→ Can we continue to improve and create value?

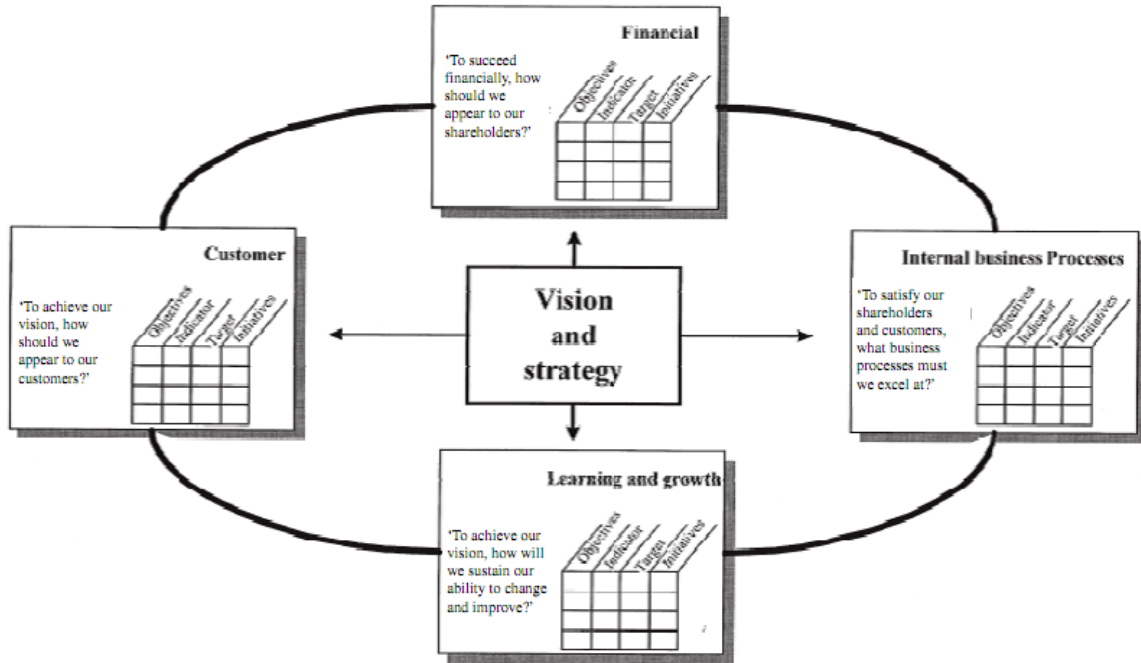
These four business areas are not simply a collection of independent perspectives but should be regarded as a whole. There is a logical connection between them: learning and growth result in better internal business processes which leads to increased value for customers and this leads to improved financial performance for the organization.

Starting from the chosen strategy, the objectives (critical success factors) for each perspective have to be chosen. In order to measure progress towards reaching the objective, observable parameters (key performance indicators) are determined. Finally, a standard should be set for each key performance indicator so that the performance can be verified.

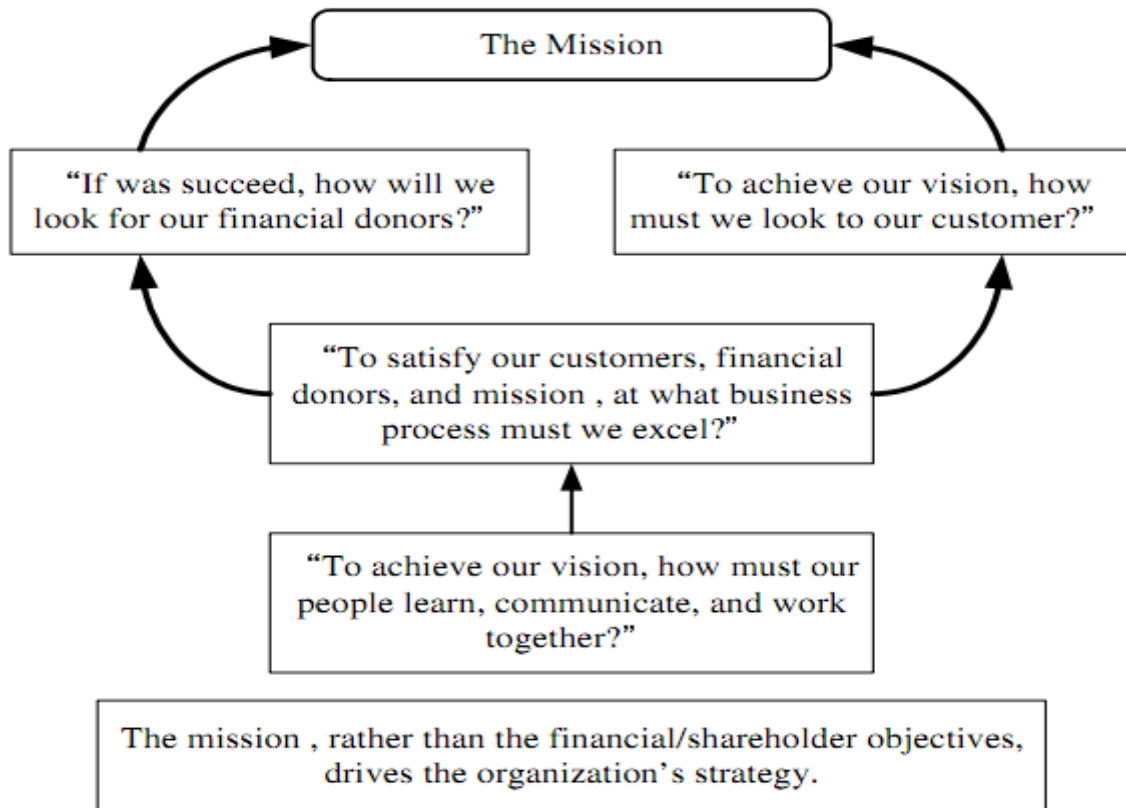
A strategy map is the visual presentation of the organization's strategy and its architecture is largely based on the architecture of the Balanced Scorecard. It articulates the strategy in a series of performance targets and it is a very useful instrument to explain very clearly the strategy.

The Balanced Scorecard has been developed to measure performance and improves management of profit-organizations. Kaplan and Norton have revised the Balanced Scorecard to include performance perspectives for non-profit organizations and they have proposed two generic models as shown below.

³⁴There is increased realisation of the importance of customer satisfaction in any business. A satisfied customer doesn't run away to a competitor but stays with the company and can bring new customers in.



The framework of Balanced Scorecard. Source: Kaplan and Norton (1996)



Balanced Scorecard framework of non-profit organizations. Source: Kaplan and Norton (2001)

It is interesting to note that the model for non-profit organizations has no financial final issue as is the case in the profit sector.

Another important difference is that the mission is more important in a non-profit organization than in a profit one.

It should be mentioned that in profit-organisations a customer both pays for the service and receives that service. This is not the case in non-profit organizations where donors “pay” for the service and the customer receive the service.

4 Conclusion

It is clear that health care organisations need to prepare themselves to the huge challenges they are facing, namely: demographic changes, changed patterns of disease, emerging of new medical technologies and growing public expectations.

The purpose of this thesis was to outline a framework where the limited resources are matched to these challenges.

Literature research has shown that with adequate skill mix, a team performs better.

Re-engineering in the health care organisation, possibly completed with the employment of foreign employees can help to find the right mix of medical staff. The consulted scientific articles articulate the importance of healthy working conditions and good communication for the medical staff, and indirectly for the patient. Further literature research reveals that patient-centered care results in better outcomes for the patient.

The consulted literature emphasizes also the importance of modern technology for new and improved medical outcomes. This is confirmed by people working in the field.

The constantly rising prices for energy invites for energy saving investments with remaining positive long term energy effects.

Literature research reveals also that the use of financial techniques is helping management in defining the policy and benefits even so the overall performance.

Based on the above findings we can conclude that it should be possible to “realize more with less”. Viewed from this perspective we can state that the mentioned challenges for health care organisations are also an opportunity.

Considering the little literature that is available about the impact of information technology on health care organisation’s financial performances, and the important health care expenditures in most developed countries, makes of this topic an interesting area of analysis for future research.

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Appendix

Appendix 1: Historical evolution of hospitals (Source: Healy J. and McKee M.)

<u>Role of hospital</u>	<u>Time</u>	<u>Characteristics</u>
Health care	7 th century	Byzantine Empire, Greek and Arab theories of disease
Nursing, spiritual care	10 th to 17 th centuries	Hospitals attached to religious foundations
Isolations of infectious patients	11 th century	Nursing of infectious diseases such as leprosy
Health care for poor people	17 th century	Philanthropic and state institutions
Medical care	Late 19 th century	Medical care and surgery; high mortality
Surgical centres	Early 20 th Century	Technological transformation of hospitals; entry of middle-class patients; expansion of outpatient departments
Hospital-centred health systems	1950s	Large hospitals; temples of technology
District general hospital	1970s	Rise of district general hospital; local, secondary and tertiary hospitals
Acute care hospital	1990s	Active short-stay care
Ambulatory surgery centres	1990s	Expansion of day admissions; expansion of minimally invasive surgery

Appendix 2: Common Barriers to inter-professional communication and collaboration

- Personal values and expectations
- Personal differences
- Hierarchy
- Disruptive behaviour
- Culture and ethnicity
- General differences
- Gender
- Historical inter-professional and intra-professional rivalries
- Differences in language and jargon
- Differences in schedules and professional routines
- Varying levels of preparation, qualifications and status
- Differences in requirements, regulations and norms of professional education
- Fears of diluted professional identity
- Differences in accountability, payment and rewards
- Concerns regarding clinical responsibility
- Complexity of care
- Emphasis on rapid decision-making

Appendix 3: Technological developments in the management of peptic ulceration

[Rosen, 2002]

1970s an early 1980s: Open surgery to bowel and/or associated nerve supply was the main treatment.

Mid-1980s: Widespread use of new H₂ antagonist drugs to diminish acid secretion dramatically reduced surgical treatment and increased management by general practitioners.

Mid-1980s: Rapid developments in endoscopy, short-acting anaesthetics and muscle relaxants precipitated a switch of diagnostic technique from X-ray (barium swallow) to gastroscopy or duodenoscopy. Hospitals allowed direct referral for endoscopy by general practitioners without specialist referral, thus increasing numbers of patients and the use of hospital day-case facilities.

Late 1980s and early 1990s: *Helicobacter pylori* was recognized as a common cause of peptic ulceration. Blood tests were developed to identify the organism and the recommended antibiotic therapy, avoiding the need for hospital services in some patients and improving the treatment of those diagnosed through endoscopy.

Mid-to late 1990s: Increasing use of long-term proton-pump inhibitor drugs to control residual symptoms after initial treatment.

Appendix 4: HIMSS Leadership Survey 2011

Question One

Which title best describes the position that you hold at your organization?

Corporate CIO/Director of IS/IT	63.80%
Facility CIO/Director of IS/IT	16.26%
Department Head/Director	7.36%
Chief Medical Information Officer	5.83%
Other	3.37%
Manager (e.g. Project Manager)	2.45%
Staff (e.g. Applications Analyst)	0.61%
Senior Staff (e.g. Senior Network Analyst)	0.31%

Question Two

Which of the following best describes the type of healthcare organization for which you work?

Stand-Alone Hospital	34.66%
Healthcare system (employed at corporate level of multi-hospital system)	31.29%
Outpatient Setting (e.g. ambulatory facility/physician office)	10.74%
Hospital as part of Multi-Hospital System/Network	9.82%
Other	4.91%
Long-Term Care/Skilled Nursing Facility	3.07%
Alternate Health Care Facility (e.g. Home Health Agency)	2.45%
Mental/Behavioral Health Facility/Psychiatric Hospital	1.84%
Health Information Exchange	0.61%
Regional Extension Center	0.61%
Don't Know	0.00%

Question Three

Which of the below best describes your hospital environment?

Community Hospital	70.61%
Academic Medical Center	18.37%
Critical Access Hospital	13.88%
Rural Hospital	12.65%
General Medical/Surgical Facility	10.20%
Other	5.71%

Question Four

For how many hospitals do you oversee the information technology decisions?

One	52.24%
Two	16.33%
Three	8.16%
Four	6.53%
Five	2.04%
Six	2.04%
Seven	2.45%
Eight	1.22%
Nine	1.22%
More than Ten	7.76%

Question Five

How many licensed beds are at the primary hospital at which you work?

Average	512
Median	330

Question Six

In which state do you work?

East North Central	18.40%
South Atlantic	18.10%
Mid Atlantic	14.11%
Pacific	11.96%
West North Central	9.20%
New England	8.28%
West South Central	7.36%
East South Central	7.06%
Mountain	5.52%

Question Seven

What is your organization's annual gross operating revenue?

Less than \$2 Million	1.53%
\$2 Million to \$10 Million	6.13%
\$11 Million to \$50 Million	9.51%
\$51 Million to \$200 Million	21.47%
\$201 Million to \$350 Million	11.35%
\$351 Million to \$500 Million	9.51%
\$501 Million to \$1 Billion	14.42%
More than \$1 Billion	18.40%
Not Applicable	0.92%
Don't Know	6.75%

Question Eight

Please identify the business issue you believe will have the most impact on healthcare in the next two years?

Healthcare reform (e.g. new care models and payment structures)	35.89%
Policy mandates (e.g. compliance with regulations like ARRA/ICD-10/HIPAA-5010)	16.87%
Financial considerations (e.g. demand for capital/creating new revenue sources)	13.50%
Technology considerations (e.g. pressure to adopt new technology/impact from Meaningful use)	12.88%
Health Information Exchange (HIE) and healthcare data interoperability	6.13%
Shifting healthcare landscape (e.g. increased competition from non-traditional sources/demand for homecare/globalization of healthcare/aging population)	5.52%
Staffing issues (e.g. availability/retention of IT or clinical staff)	3.37%
Consumer/patient considerations (e.g. quality of care/patient satisfaction/demand for health services information by patients)	2.15%
Concerns related to privacy/security issues (e.g. security breaches)	1.53%
Hospital infrastructure needs (e.g. facility upgrades/mergers/consolidation)	0.31%
External threats (e.g. terrorism)	0.00%
Don't know	0.31%
Other	1.53%

Question Nine

What is your organization's top IT priority over the next two years?

Achieving meaningful use	49.08%
Focus on clinical systems (e.g. CPOE/EHRs/ePrescribing)	22.39%
Optimizing effective use of currently installed systems	10.74%
Leveraging information (e.g. data warehouse/business intelligence/evidence-based medicine/clinical decision support)	8.59%
Focus on ambulatory systems (e.g. practice management/ambulatory EMR)	2.45%
Interoperability	2.15%
Demonstrating the ability to exchange information with other entities (e.g. government agencies)	1.23%
Providing patient-centric solutions (e.g. web self services/PHR/mobile devices)	0.92%
Focus on RCM solutions	0.00%
Focus on supply chain systems	0.00%
Integration of IT and medical devices	0.00%
Securing patient information	0.00%
Other	2.15%
Don't know	0.31%

Question 10

With regard to clinical IT at your organization, what is your primary focus?

Ensuring the organization has a fully operational EHR in place	24.23%
Installing a CPOE application	19.63%
Focus on physician systems (e.g. CDS environment/physician documentation)	11.35%
Linking clinical system with quality measures and outcomes	10.74%
Certification of our EHR system and modules	7.67%
Focus on data warehouse/business intelligence	7.36%
Establishing clinical protocols for use within the clinical decision support systems	3.07%
Focus on nursing systems (e.g. CDS environment for nurses/nursing documentation)	2.15%
Installing or upgrading Ancillary Applications (laboratory/radiology/pharmacy)	1.84%
Installing or upgrading a Clinical Data Repository	1.53%
Focus on closed loop medication administration	1.23%
Creating clinical documentation flow sheets	0.61%
Installing PACS (radiology and/or cardiology)	0.31%
Other	7.67%
Don't know	0.61%

Question 11

With regard to financial IT at your organization, what is your primary focus?

Implementing CPT10/ICD10	47.85%
Upgrading the patient billing system	13.80%
Upgrading the patient access system (registration/ADT)	4.29%
Implementing medical necessity checking applications to support registration and scheduling functions	3.68%
Implementing an enterprise-wide patient scheduling system	3.37%
Implementing eligibility transactions with payers	3.37%
Implementing claims transactions directly with payers (no clearing house support)	2.45%
Web enabling the registration process to improve patient self service functions	2.15%
Web enabling the bill payment process to improve patient self service functions	2.15%
Upgrading the encoding systems	1.53%
Web enabling the patient scheduling process to improve patient self service functions	0.31%
Other	11.04%
Don't know	3.99%

Question 12

With regard to the IT infrastructure at your organization, what is your primary focus?

Servers and virtual servers	22.09%
Security systems (e.g. encryption/PCI/data loss prevention/authentication)	15.34%
Desktops/laptops and virtual desktops/laptops	13.80%
Storage and backup (e.g. NAS/SAN/disk storage)	12.27%
Mobile devices (e.g. smart phones/iPhone/USB devices/PDAs)	11.66%
Wired and wireless networking	9.51%
Telemedicine	3.99%
Cloud computing	3.68%
Other	5.21%
Don't know	2.45%

Question 13

What is the key business objective that your organization is trying to achieve in the next 12 months?

Achieve Stage One meaningful use	25.46%
Improve patient care/quality of care/outcomes	20.55%
Improve operational efficiencies and lower operating costs via process re-engineering (e.g. Six Sigma/CQI/TQM)	17.18%
Sustain financial viability or survival	16.87%
Increase market share/Ability to compete successfully in market	10.12%
Improve patient satisfaction	4.60%
Attract qualified staff	0.92%
Improve supply chain dynamics (e.g. contracts/processes)	0.31%
Other	3.37%
Don't know	0.61%

Question 14

What is the most significant barrier to successfully implementing IT in your organization today?

Lack of adequate financial support for IT/lack of budget	17.79%
Lack of staffing resources	17.48%
Vendor's inability to effectively deliver product or service to our satisfaction	11.35%
Difficulty in achieving end-user acceptance or use	9.51%
Lack of time/availability of clinicians to help implement	7.06%
Lack of interoperable systems	5.21%
Difficulty in proving IT quantifiable benefits/return on investment	4.60%
Lack of a strategic IT plan/failure to execute an IT plan	3.99%
Lack of clinical leadership	3.99%
Constraints at a higher regional/policy/governmental level	3.68%
Lack of common data standards/integration	3.37%
Lack of top management support for IT	3.07%
Lack of effective project management	0.92%
No Barriers	0.61%
Laws/regulations prohibiting technology sharing with referring providers	0.31%
Concerns about the ability to secure data	0.31%
Other	5.21%
Don't know	1.53%

Question 15

In what area do you feel that IT can have the most impact on patient care?

Improving clinical and quality outcomes	40.80%
Reducing medical errors/improving patient safety	24.85%
Helping standardize clinical care using evidence based medicine	12.27%
Providing competitive advantage (i.e. improved patient satisfaction/improved reimbursement)	8.90%
Supporting staff productivity	5.52%
Sharing and accessing information with external entities (e.g. government agencies)	2.76%
Enabling practitioners to obtain data from remote locations (e.g. home)	1.23%
Ensuring that patient data is private and secure	1.23%
Providing remote monitoring of patients	0.00%
Other	1.84%
Don't know	0.61%

Question 16

Which individuals have access to secure, on-line clinical patient information from remote locations (i.e. home based office, office of non-staff physicians)?

Physicians	94.79%
Physician extenders (physician assistants/nurse practitioners)	76.38%
Non-clinical staff (e.g. finance staff/transcriptionists)	62.58%
Nurses	56.44%
Other clinical professionals (e.g. occupational therapist)	54.60%
Patients	18.71%
Other	3.07%
None	0.61%

Question 17

Please describe the status of your organization's current use of an electronic health record (EHR) system?

We have not yet begun to plan for the use of an EHR system	2.15%
We have developed a plan to implement an EHR system	7.06%
We have signed a contract to install EHR hardware and software but have not yet begun the installation process in any organization	2.45%
We have begun to install EHR hardware and software in at least one facility within our organization	34.36%
We have a fully operational EHR system (e.g. complete automation of all clinical orders and documentation for all acute care services) in place in at least one facility within our organization	26.07%
We have a fully operational EHR system (e.g. complete automation of all clinical orders and documentation for all acute care services) in place in all organizations	26.99%
Don't Know	0.92%

Question 18

Please describe the status of your organization's current involvement in a Health Information Exchange Organization, defined as an organization which brings together healthcare stakeholders that oversee and govern the exchange of health-related information according to nationally recognized standards. It could include a state designated Health Information Exchange.

I am unaware of what a HIE is	2.15%
We have not yet begun to plan to participate in a HIE	30.98%
There is a HIE/HIEs in our area but we do not participate	20.55%
We participate in at least one of the HIEs in our area	44.48%
We participated in an HIE but it failed	1.23%
We are required to participate in a state HIE	7.06%
Don't Know	1.23%

Question 19

What are your primary concerns regarding the security of electronic medical information at your organization?

Internal breach of security	35.78%
Compliance with HIPAA security regulations and CMS security audits	30.35%
Inadequate funding/support for security process	16.93%
Data leakage (e.g. patient data inadvertently sent via e-mail)	16.29%
External breach of security	10.86%
Limits of existing security technology	9.58%
Unauthorized use of data by third parties	8.31%
Inadequate security systems in place	7.99%
Patient's lack of confidence in the security of information	6.71%
Connecting IT at hospital and remote clinics	6.39%
I don't have any concerns	3.99%
Lack of compliance with business associate agreement	2.88%
Other	4.79%
Don't Know	0.64%

Question 20

Has your organization experienced a security breach in the past six months?

Yes	18.40%
No	78.22%
Don't know	3.37%

Question 21

Has your organization experienced a security breach in the past 12 months?

Yes	26.38%
No	69.02%
Don't know	4.60%

Question 22

Are you a member of the organization's executive committee (the senior leadership team that drives overall organization strategy and direction)?

Yes	65.03%
No	34.97%

Question 23

To what extent is IT integrated into your organization's strategic operating, clinical and capital plans?

Our organization does not have an IT strategic plan	3.68%
Our IT strategic plan is not at all integrated with our organization's overall strategic plan	7.98%
Our IT strategic plan is integrated with the strategic plan but the 2 plans are separate	36.20%
Our IT strategic plan is a component of our strategic plan	51.23%
Other	0.92%

Question 24

What role do clinicians play in IT in at your organization?

They participate in IT system evaluation/selection	79.14%
They act as project champions in educating and leading other clinicians	76.69%
They participate in the development of policies related to clinical information systems	59.82%
They are involved in the development and implementation of clinical training	53.99%
We employ hospitalists who use our clinical applications to manage patient treatments/care	44.17%
They are employed by the IS department to support existing clinical applications	43.25%
They act as business project leaders during clinical implementation	41.72%
They explore innovative ways to use IT in this clinical arena	41.72%
We have a CMIO who orchestrates the clinical aspects of our organization's IT strategy	29.75%
Clinicians who are department managers may select the IT systems needed to support their departments but they are also responsible for ensuring that business objectives and goals are met by implementing the IT systems	14.72%
We have a CNIO who orchestrates the clinical aspects of our organization's IT strategy	7.67%
No role	1.84%
Other	1.53%

Question 25

Which of the below responsibilities do you assume as a regular part of your job?

Drive value from IT investments	91.95%
Support business and clinical process owners	90.04%
Contribute to overall business strategy	89.27%
Enable the CEO and executive team to improve management through information technology	87.74%
Responsible for process change management to be supported by IT	83.14%
Manage the IS department operations	80.46%
Other	3.07%

Question 26

What is your organization's approach to IT spending in light of HITECH?

We are not making any investments at this time despite the opportunity for incentives	2.45%
We are not making any additional investments at this time because we believe we qualify for Stage One meaningful use	11.04%
We are making additional investments to position ourselves to qualify for incentives	68.40%
We are identifying gaps in our systems but waiting to make these investments	13.50%
Don't know	1.23%
Other	3.37%

Question 27

Will your organization qualify for meaningful use within the time period allotted for Stage One in 2011 or 2012?

Yes	81.29%
No	10.74%
Don't know	7.98%

Question 28

Approximately how much money will your organization spend to achieve Stage One of meaningful use?

No additional funds spent	8.28%
Under \$250,000	11.96%
\$250,000 to \$499,999	6.13%
\$500,000 to \$999,999	9.20%
\$1 Million to \$2 Million	14.42%
\$3 Million to \$4 Million	8.90%
\$5 Million to \$9 Million	9.51%
\$10 Million to \$14 Million	2.76%
\$15 Million to \$19 Million	1.23%
\$20 Million or More	5.52%
Prefer not to disclose	8.28%
Not applicable	2.76%
Don't know	11.04%

Question 29

Approximately how much money do you anticipate that your organization will receive for meeting Stage One meaningful use requirements?

None	1.22%
Less than \$2 Million	15.92%
\$2 Million to \$3 Million	12.24%
\$4 Million to \$5 Million	15.92%
\$6 Million to \$7 Million	9.39%
\$8 Million to \$9 Million	7.76%
\$10 Million or More	20.00%
Prefer not to disclose	8.98%
Not Applicable (e.g. military)	1.63%
Don't Know	6.94%

Question 30

What is the biggest barrier to achieving measureable outcomes at your organization at this time?

Lack of data metrics and measurement tools/process	25.85%
Achieving end user acceptance	22.15%
Lack of adequate staffing resources	18.15%
Lack of funding	7.69%
Inability to complete requirements in time to meet stage one meaningful use	5.54%
Lack of adequate technology	4.92%
Lack of understanding of the meaningful use requirements	4.92%
Other	7.08%
Don't know	2.77%
No Barriers	0.62%

Question 31

By what percentage do you expect your organization's IT staff to change in the next 12 months?

Increase by less than 10 percent	35.89%
Increase by 10 to 20 percent	19.33%
Increase by more than 20 percent	8.90%
No change	30.06%
Decrease by less than 10 percent	2.15%
Decrease by 10 to 20 percent	1.23%
Decrease by more than 20 percent	0.92%
Don't know	1.53%

Question 32

How many IT FTEs has your organization budgeted to add in the next 12 months?

None	0.00%
One	6.44%
Two	10.74%
Three	7.06%
Four	4.60%
Five	4.91%
Six	2.76%
Seven	1.84%
Eight	1.53%
Nine	0.31%
Ten	1.84%
More than Ten	9.82%
Don't know	19.14%

Question 33

Which of the below items most accurately characterized the areas in which your organization has the most critical information technology staffing needs?

Clinical application support	38.65%
Clinical informaticists (RN/MD)	23.62%
Network and architecture support	20.86%
Process/workflow design	16.87%
Clinical transformation	14.72%
Systems integration	14.42%
User training	14.42%
Clinical champions	12.27%
System design and implementation	11.96%
IT security	11.96%
Database Administration	9.82%
Help desk	8.59%
PC/server support	7.36%
Programming	7.06%
Financial application support	7.06%
We don't currently have any needs	4.91%
Data security	4.60%
IT management	3.99%
Regulatory	3.68%
IT planning	3.07%
Internet/Intranet	1.84%
Other	4.91%
Don't know	0.92%

Question 34

In addition to IT functions, what functions at your organization do you manage?

Telecommunications	83.52%
Medical/clinical informatics	41.76%
Health information management (HIM)	26.82%
Biomedical/clinical engineering	18.77%
Other	10.73%
No Other Areas	3.83%

Question 35

Please select the statement that best describes the projected change, if any, in your organization's IT operating budget for 2011 compared to 2010.

It will definitely increase	46.32%
It will probably increase	29.75%
There will be no change	14.42%
It will probably decrease	5.52%
It will definitely decrease	3.07%
Don't know	0.92%

Question 36

Why did you expect an increase in your organization's IT operating budget in 2011?

Overall growth in number of systems and technologies	45.09%
Additional staffing or consulting services needed to comply with governmental regulations	42.02%
Overall budget increases	30.06%
Need to upgrade IT infrastructure	27.61%
Need to comply with regulatory changes	26.69%
Increase called for in a long-term IT or organizational strategic plan	24.23%
Addition of a facility or clinical/business unit	14.72%
Ability to prove IT return-on-investment	6.75%
A recent merger or partnership with another organization	6.44%
Competitive market threats	6.44%
Business requirements to invest in e-business	4.91%
Other	2.15%
Don't know	0.61%

Question 37

Why did you expect a decrease in your organization's IT operating budget in 2011?

Overall budget decreases	60.71%
Reduction in hospital revenues	46.43%
Deteriorating financial conditions related to cutbacks in Medicare/Medicaid	42.86%
Change in strategic plan related to IT projects	17.86%
Closing of a facility or clinical/business unit	10.71%
Outsourcing of IT services to low cost provider	7.14%
A recent merger or partnership with another organization	3.57%
Inability to prove IT return on investment	0.00%
Other	17.86%

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