HEALTH IN THE REGIONS

Cross Border Health Care: Harmonization in European Regions

Task Force


Report to the Commissioners John Dalli and Johannes Hahn

January, 2012

Supported by

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Health in the Regions:

From national subsidiarity to a European endeavour

The European Institute of Health is proud to publish this report on “Health in the Regions” which contains opportunities for adapting modern health care in the Regions of Europe and ensuring Health for All. The commission is focusing with great interest on developing a regional approach. Commissioners Dalli and Hahn have requested this report in order to implement Health in the Regions, a project to be launched in 2013-2018. The proposed recommendations are aimed at accelerating the development of medicine, the quality and provision of health care in an era of growing costs and overcoming healthcare disparities in different European countries. At present there is no accepted concept for designing European medical care fit for the future. The concepts of a European Lead Market, iHealth Care and Cross Border Medicine provide new incentives to the Regions and represent a joint effort of the Commissioners Dalli and Hahn.

The European Institute of Health is grateful to its supporters, to all colleagues in the medical field and especially to those who have made this report possible: Commissioner Dalli who has given the decisive impetus to carry this project forth and to Commissioner Hahn for his endorsement of this project.

FELIX UNGER
President of the European Academy of Sciences and Arts

Salzburg, Jan. 2012
"Health in the Regions" - Cross Border Health Care: Harmonization in European Regions

Coming from a part of Germany that has borders with two countries of the EU, I am particularly aware of the implications of cross-border healthcare. This report comes at the right time, when more and more patients are seeking medical advice in neighbouring countries and border regions are faced with ageing and diminishing populations or insufficient medical care facilities.

Border regions are confronted with specific challenges such as wage gaps, differences in costs of medicines and treatments or language barriers, but they can also play the role of avantgarde for the ongoing European integration.

Even in regions that have experience in cross-border cooperation over several decades, the cooperation in the health sector is often lagging behind. Health inequalities between both sides of the border persist and information on available care is not communicated. We therefore need to close these gaps, to identify good practices, and to develop tools for the planning and realization of cross-border programmes and projects. At the same time, we need to build up capacity and enable mutual learning between the regions at infrastructure level, but also at patient level. Only informed and empowered patients are able to seek the best medical care available.

The goals for a stronger cooperation in health care between the European border regions outlined in this report can show the way towards more equal and more accessible health care for all European citizens.

Jo Leinen, MEP
Executive Summary

The European Academy of Sciences and Arts presents the report on “Health in the Regions”. The idea is based on the concept of “Cross Border Health Care in Europe”. The areas along the national frontiers are usually underdeveloped and underpopulated. This is aggravated by the trend of migration towards urban areas, especially in younger populations, resulting in a higher density of aged people and people with lower income in these border regions. These border areas also have a weak healthcare infrastructure. The concept “Health in the Regions” requires a new regional approach to revitalise bilateral border regions and provide a stimulus which has not been emphasized in the past. This regional approach consists of conceptualizing a zone of 25km on either side of two national borders to increase the population catchment area and to attract young families to the area and to provide greater access to healthcare.

When national frontiers can be erased physically and later on erased in the heart of European citizens, the European Union will get an enormous boost. This report highlights the obstacles for achieving this goal and proposes solutions to overcome them. The main challenges come from existing national regulations, bureaucratic medical regulations and the regulation of physician and patients. The issue of language proficiency poses an additional constraint and can be overcome when cross border healthcare provision is more synchronized on a European Union level.

It is clear that National Health Care Systems in Europe must be redesigned. The new European border regions can provide a new avenue to experiment with the development of new models of health care provision. A major obstacle is healthcare financing for which new concepts are needed. Monetary incentives lead patients to certain healthcare resources and this affects regional Medical Health Care provision. Establishing cross border regions for healthcare delivery would allow the testing of this new concept on a small bilateral basis. The concept has to show efficacy and quality, provide equal access to health care and eliminate disparities in health care delivery. The areas chosen in this report will be samples in regional healthcare provision in Europe.
History

In 2002, the European Parliament mandated the European Academy of Sciences and Arts to establish a “New Health Care Concept”, which the European Institute of Health developed through an interdisciplinary taskforce. The report “European Health Care for the 21st Century” was a result of this mandate and handed over in Brussels to the European Parliament in 2004. Based on this report Commissioner Verheugen and Commissioner Vasiliou mandated the Academy to develop another report on “European Lead Market in Health Care”. Health is subsidiary in the European Union. Within an adjusted competitive market system it might be possible to overcome all the national hindrances in a United Europe. Commissioner Verheugen saw possibilities to develop a “New Health Care Concept” in Europe based on market incentives provided a special impetus for this report, which was handed over in 2008.

In 2010 the Academy was again mandated by the European Union to develop a report entitled “Health in the Regions”. The European Academy focused on Cross Border Health Care. On request of Commissioners John Dalli and Johannes Hahn a specific emphasis was made to stimulate health care in the regions as an opportunity to develop regional health in the Regions and to overcome large healthcare disparities. The regions along the national frontiers are the specific targets of this new concept of healthcare provision with the hope of eventually scaling up at a European level.
Handover of the Report
„European Lead Market in Health Care”
Brussels, 2008

Commissioner Androulla Vassiliou, Felix Unger

Commissioner Günter Verheugen, Felix Unger

Mandating the new report
“Health in the Regions”
Brussels, 2010

Commissioner John Dalli

Commissioner Johannes Hahn
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Introduction

National border regions are historically underdeveloped and generally under populated. This is due to trends in urbanization which result in a higher density of elderly and lower income population being left behind in these regions. As a result, the infrastructure is poor as is the medical care. The concept “Health in the Regions” requires a new regional approach to revitalise bilateral border regions. It provides a stimulus which has not been highlighted enough in the past. This regional approach consists of conceptualizing a geographic zone of 25km on each side of two national borders thereby increasing the population size, attracting young families to the new area and providing greater access to healthcare. Considering that the health care market is the single largest market in Europe, health care politics is infrastructure politics. It has an important stabilizing factor for all domestic economies with regard to mass demand and job security.

This report outlines a plan to vitalize these neglected bilateral border areas as new regions; an approach which has not been represented in the past. One of the key challenges is the adequate provision of healthcare for which many obstacles exist.

In the spirit of a United Europe, a common market, according to the Lisbon and Maastricht criteria, is an indispensable prerequisite to foster healthcare as a lead market. A regional approach provides Europe with a new perspective which transcends cultural and national differences. Unfortunately National and European Health have been widely excluded in most European level decision making. Besides all national frontiers, healthcare is the largest single market in each nation. The hope is that using this regional/cross-border care concept, national health systems will find new ways to regulate and re-organize their health care policy.

In order to start this new regional/cross-border care concept, patient care should be introduced first in neighbouring European nations that share a border. This will attempt to create a single healthcare market for patients.

Currently, cross-border regions suffer widely from a deficit in medical provision where medical centres are geographically out of range. Gaps in medical provisions for border
areas can be resolved by grouping two neighbouring regions together, thus doubling the catchment area and increasing efficiency and improving quality of healthcare provision. In addition, it reinforces the concept of a united Europe enhanced by the Euro and the Schengen agreement.

In order to achieve this goal many obstacles must be overcome. The main mandate of this project is to devise a cohesive healthcare system in Europe. This is a contribution to a vibrant Europe and offers European citizens a new understanding of Europe. Only 30% of Europe’s population lives in rural areas. There exist regional social and environmental disparities which can be remedied by improving healthcare infrastructures.

This project provides recommendations on how to increase efficiency and quality of care as well as how to overcome the existing obstacles. Three geographic areas are presented as examples of how to achieve a regional/cross-border approach to providing healthcare and economies of scale.

The harmonization of medical care in two neighbouring national regions of European Member states allows a more natural patient flow. It allows the enlargement of the catchment area as well as a better use of healthcare provisions. This approach creates new incentives and a new competitive environment in healthcare and therefore improves quality and access to the system. It has the potential of optimizing and reducing the total costs with services being better utilized and maintained. Costs for new healthcare infrastructure can be shared so that the burden of investment is reduced. The overall concept in Health Care within a European Region has to be initiated by the people living in the two regions.

Patients ultimately benefit the most by having access to the most modern medicine within a short distance. However, for such conditions to arise, continuous healthcare education is necessary. Additionally, effective cross-border patient health information flow and communication between healthcare facilities is of the utmost importance and the use of E-Health is the most efficient tool to achieve this.
The political dimension of this initiative is to stabilize the rural areas by providing new employment opportunities for the labour force. In this context, it is proposed that health care, as the biggest entrepreneur, should be extended to 25% in the future.

In 2007 the project „The European Lead Market in Health Care” was requested by the former EU-Commissioners Verheugen and Vassiliou. At the end of 2008 the final report was delivered to both Commissioners. It was well received, widely disseminated, and broadly referred to in the political, scientific and public health field.

This new report requested by Commissioners Dalli and Hahn in 2011 contains enormous potential towards a uniform European Health Care regulation which transcends national interests. Presently, healthcare is still considered as solely a national task causing substantial misallocation of resources within each health care system. To overcome this, the idea of a Lead Market was introduce in 2008. Beside those limitations Health is embedded politically in a complex field in which many stakeholders try to gain advantage. In reality health care has to transition from a politically driven, fragmented system to a system with an adjusted comprehensive modern market structure. This is the basis from which a real European Health can start and deficiencies among the Member States can be overcome.

Most attempts at stimulating a European concept of a common Health Care system have failed due to national restrictions. Despite the rigid structures, there have been single cases where patients have been sent for specialized treatment to specific foreign centres. Due to the increasing mobility of European citizens, many people need medical treatment outside their country. Therefore, MEP Bowis stimulated in the last session of the European Parliament the topic “Cross border Health Care” to overcome national deficiencies in daily healthcare delivery by two major directives:

a) For rare diseases where highly specialized treatments are necessary, sending patients from one country to the other is more efficient. For example, patients requiring congenital heart surgery should go to one of the few centers of expertise within Europe. Those indications were fulfilled and the costs covered by the insurances.
b) For acute situations where patients have an acute disease or accident, it is necessary to be treated on location. Those actual services are the basis for the future development of regional/cross-border healthcare as it is done inside of a country.

In addition, harmonizing Cross Border health care issues comprise six other aspects:

1. Access: *Where, Who and How to access the system?*
2. Benefits: *What kind of service is included?*
3. Tariffs: *How to pay for it? (DRG, fee for service etc)*
4. Quality and safety: *How can we guarantee equal high standards in licensing, training, drug approval and clinical guidelines?*
5. Patients rights: *How to ensure patient rights, as the right to become a patient is NOT the same than the rights of a patient?*
6. Cross border collaboration: *How to increase cross border collaboration in data collection, diagnostic tool, treatment management and science?*
7. Finance: *Who is finally paying the bill?*

To overcome all the national burdens and to stimulate a new concept according to the agenda 2020, the concept of a common health care market has been introduced. In reality health care delivery is a complex market, not comparable to a potato market or a market in IT or the car industry. There exist asymmetric information, entry barriers, supply driven demand, and monopolistic tendencies to name a few which cause constant flaws and misallocations. A better, transnational, Europe-wide regulation can help to overcome these biases.

Because individual European countries have differing systems of health care organization, it is important to address harmonization of health care organization across borders. Harmonizing of healthcare organization can be done at many levels depending on the need including service provisions at primary, secondary and tertiary care level, but also at medical and nursing staffing levels. Systems to facilitate the transfer of patients and medical information are particularly relevant. For example, a patient coming from one country experiencing a heart attack while on vacation in another must have some mechanism to transmit his or her past medical information. This same mechanism of medical information transfer would allow the patient to inform the relevant institutions as to the course of his hospitalization when he or she returns home. Such information transfer
will avoid the costly duplication of medical interventions and tests in the long run. Medical and nursing staff with foreign language and cultural competency skills is also an essential aspect of information transfer and harmonization at the health organization level.

At present one of the greatest challenges in harmonizing EU healthcare is the financing of the system which would care for all people equally and provide “Health for All”. Currently, patients are paying for healthcare through their insurances, through taxes and/or through out of pocket payments. This financing structure should be changed to achieve affordable health care by introducing benchmarks, pricing incentives, and reimbursements on numbers as well as new complementary incentives, especially in prevention and in high risk groups.

The pricing is the task of all the medical organizations in collaboration with the insurance companies. It is evident, that some of the insured citizens are not able to afford the full insurance premium. These citizens need the support of the other members of the insurance – a mandatory system – or of the tax payer via direct financial transfers. A basic form of solidarity is an indispensable part of the whole system.

Cross border health care activities currently represent 1-2% of overall expenditures in EU. 27 Member States are doing similar things in different ways. Despite these data, the endeavor represents one of the greatest collective actions to harmonizing standards in health care systems in the world. Globalization, Tourism, Immigration, increased mobility, increased competition in a free health care market are the challenges which will require a regional approach to healthcare provision.

Creating and implementing health care delivery using a regional/cross-border approach provides the opportunity to pilot a new approach to the organization and delivery of health care in Europe.
A. Health in the Regions

Basic Considerations
1. HEALTH IS WEALTH

“Health is Wealth” has been a report requested by the European Parliament in 2002. This report contained different National models and inherited systems and consequently stimulated stakeholders and clinical leadership to achieve sustainable reforms. The common concern is the increasing cost of provision. Stabilizing costs in an environment of a decreasing working population is very challenging. By modernizing systems there is potential for controlling costs; the processes for this have to be identified. Most national reforms have failed due to massive political influence especially where Healthcare together with Welfare is operated as a state-monopoly.

A healthcare model has to be central; the patient becomes the focal point who nowadays is increasingly well informed and motivated.

The optimisation of Medical Arts and Sciences is an essential prerequisite for the Strategic Visions. This focuses on the basics of diagnosis, therapy and prevention. Conservative, invasive and prophylactic principles cover the whole range of possibilities including the prediction and prevention of diseases. To use Outcome Related Medicine (ORM) as a measure of effectiveness, medical conditions have to be classified. The capacity for purchasing has a direct effect on the access of patients and clinicians to all therapies and diagnostics. It is necessary to monitor the effectiveness of healthcare provisions, to perform quality control checks and to measure that of therapy by means of health technology assessment and outcome indicators. Assessment can be done by patients, clinicians, Healthcare organisations and providers of finance. Research, development and industry play indispensable parts in developing the medical arts. Europe has to encourage and promote innovation in new therapies and diagnostics.

Greater effectiveness in the organisation of healthcare can be achieved by the alignment of best practices and in boosting synergies in access and quality. The main nucleus in Healthcare is delivered by doctors for in- and out-patients in acute, chronic and long-term conditions. New educational concepts on healthcare provision will have to be introduced at universities and schools for nurses and paramedics. It will be essential in the future to create and to foster sustainable clinical leadership. There will be no sustainable reform in the future without a solid core of medical professionals. E-Health will play a major role in
medicine for information, transfer of findings and avoiding duplication of effort. A patient's "Health literacy" will gain in importance. It is foreseen that 80% of patients will perform "self-care" actions without the involvement of Healthcare professionals.

Healthcare financing must be patient-oriented too and makes use of several instruments: insurance premiums, co-payment systems, capitation, taxes, voluntary payments, out-of-pocket expenses etc. Covering Healthcare costs will need a combination of national Healthcare allocations (Taxes) and individual contributions to provide all citizens with equal access, responsiveness and to demonstrate fairness in financing. (Fig. 1)

Surveying Europe, a variety of systems are in operation; including the Anglo-Saxon (Beveridge) universal state centred tax-based social security system, and the continental "Bismarck" model financed by social insurance and corporate elements (Chassard and Quintin 1992). The private sector will gain increasingly in importance. In the future co-payment systems will be unavoidable, and the methods of financing by solidarity contributions will need to be redefined. There are different ways of managing the cost base, but there is an evident need to manage the cost of health care. (Fig. 2)

It has to be stressed out: we ourselves pay the system. Therefore only those therapists can be remunerated which meet the standards in terms of outcome and evidence.

Reflection to "Health in the Regions": (Fig. 3, 4, 5)

- To provide Healthcare for all European citizens in the regions
- To enhance transformation in Healthcare from national state-monopolies to an open European market, allowing mobility and better use of resources in the European border regions
- To identify potential for cost control and to start with a contemporary reimbursement concept in the European border regions.
HEALTH

- Health is the state in which people can actively participate in life without physical and mental constraint.
- Healthcare is the means of restoring the unwell citizen to active participation in life by medical interventions and to maintain personal health by active prevention measures.
- Healthcare is not social welfare.
Fig. 1 Structure of the System

- Taxes
- Insurance
- Lifestyle
- Patient
- M.D.
- Org.
- Supply
- Auxiliaries
- Contr. Management
- Pharmacy
- Med. Industry

- Literacy
- Education
Fig. 2 Money Flow

Insurance

Patient

Complementary conditioned transfer systems (CCT)

Taxes

Provision
Fig. 3

Health Care Cost:
A Direct Investment in the European Regions

- Health and quality of life for population
- Employment in the HC sector (public/private)
- Contribution to economic growth

Public and Private Health Spending

- 18% - 20% in 2000
- 25% by 2010

Health Care Cost: A Direct Investment in the European Regions
Overview of the European Healthcare Market

National Tasks
- Funding the European Healthcare Market
- Providing equal access, broad population coverage and high quality
- Setting reimbursement standards

European Tasks
- State-of-the-Art in Medical Sciences
  - Prediction, prevention, diagnosis, therapy
- Development of medical standards
- Efficacy and volume monitoring
- Quality control
- Research and development

Cluster I
- Medical Arts
- Organization of medical service providers
- In- and outpatient services
- For acute, chronic and long-term conditions
- Medical and paramedical education
- E-Health

Cluster II
- Medical Organization

Cluster III
- Financing

Fig. 4
Structural Reform for European Health Care

**Current: National Monopolies**

- Cost explosion
- Rigid public structures
- Unequal access to health care coverage
- Resource mismanagement
- Patient dissatisfaction
- Unsatisfactory outcomes

- No holistic view of the patients and their role in HC
- Diverging funding systems (public/private)
- Each country has specific, regulated HC organization
- Different principles of HC regulation
  - State-run
  - Self-administration with national regulation
  - Mixed forms
- Unclear distinction between health care and social welfare
- Diverging medical usages

**Future: European HC Market**

- National cost control and solidarity
- Health for all in open EU market
- Market arbitration of resources
- Responsible patient = decider
- Evidence-based standards

- The responsible and informed patient is at the center and drives the European HC market
- Funding systems aligned but maintained as national task
- HC organized as a European open market
- European HC regulation standards
  - Standards for state participation
  - Standards for self-administration
- Clear separation of HC and social welfare tasks
- Common European medical classification based on efficacy and evidence
2. Lead Market

“Lead Market” has been a report on “The European Lead Market in Health Care” required by the commissioners Verheugen und Vassiliou 2007, containing opportunities for adapting modern health care in the whole of Europe, and proposing actions ensuring Health for All. This is in consequence to the report “Health is Wealth”. These proposed actions are aimed at accelerating the development of medicine and the quality of health care and provisions in a field of growing costs, as well as to overcome the big gap in quality of care in the different countries of Europe. At present there is no accepted concept for designing European medical care fit for the future.

On a European level the national regulatory obstacles must be overcome. National health care today is dangerously provincial and therefore outdated. Those barriers have to be overcome in border regions.

The European Lead Market is different from other markets where the main endeavor is dedicated to life in a cultural environment. The future health status of each individual has intrinsic uncertainties, and no one—regardless of his or her current situation—knows when he or she will get sick in the future. This requires a collective commitment to design a health care system for all.

There are two parts: the citizens and patients on one side and medical arts, medical products and medical services on the other side. This market has an enormous potential for growth. Sciences and industries in health care have a great opportunity to lead the international market. (Fig. 6)

The driving factors behind a single European Health Care Market (EHCM) are changes in the demographic development, global market strategies and rapid growth opportunities in medicine, mobility of patients and the increase in identification of complex chronic diseases, as well as environmental burdens.

National health care capabilities for a European setup are becoming limited and presently are subsidiary to Europe. Most European countries complain of exploding costs while overlooking the great opportunities of investing in future health care. This single market in
Medicine has an overall volume of 25% of the GNP, including direct medical care, wellness, prevention and lifestyle changes. This market is supposed to be the largest single market, with huge job opportunities that are robust against outsourcing to other regions of the world. The market volume will increase up to 30% of the GNP in 2020.

Medicine is the largest entrepreneurial endeavor in our society. Besides the obvious benefits for patients, this industry provides income for thousands of families employed in all the auxiliary support organizations and industries. A study measuring the direct and indirect profitability of health care should be launched.

**Potential for cost reduction**

There is a potential for cost reduction given at 10%–15% of costs. (Fig. 7) However it should be taken into consideration that any costs reflect income and wealth at the same time. Investing in health care, especially in the regions has therefore the highest leverage for a sustainable development in the region. Classification and reimbursement are the core elements in bringing medicine to a standard in accordance to the 21st century. The market allows competition, which promotes innovation and creativity, brings mobilization, standardizes quality in Europe, and at the end of the day reduces costs in a magnitude of 10%–15% in total. This is desirable for future innovations leading to a real Lead Market.

The Aho Report has been an excellent stimulus for applying market criteria to health care, stimulating innovation and creativity and shaping the future. It contains two essential criteria, the Maastricht and Lisbon treaties, whereby “services of general interest” may have an impact on the treaty ratification and entry into force.

Three areas are challenged:
- the medical field
- insurance companies as financiers
- the politics that shape medicine for all citizens.

The main prerequisite is an adequately clear path of reimbursement, which follows market mechanisms. This market deserves control mechanisms to ensure quality and to give incentives for rational cost management and increased effectiveness.
Financing and Reimbursement

**Essential Arm:** Ambulant Care

- Competing Private Insurers
- Out-of-pocket (voluntary)
- Insurance premiums (voluntary)

**Expanded Arm:** Hospital

- Competing Social Ins. Funds
- Insurance premiums; co-payment

**Extended Arm:** LT Care

- National Health Fund
- Reimbursement according to the Classification A and B

**National Central Fund**

- Covers deficits of public health insurance

**Patients and Taxpayers**

* Coverage including level according to Classification A and B + additional elements as desired by the individual
## Cost and Quality Control in the EHCM

### Today in Europe:
- Budget limits
- Reimbursement limits
- Volume limits
- Price regulation
- Service limits

- Ineffective instruments to curb cost explosion
- Limited access to parts of the population

### Future: European HC Market
- Patients‘ choice from competing suppliers
- Cost control via classification of procedures ➔ set up by professional medical societies and implemented by EIH / NIH
- Key role of GP to avoid redundancy and abuse ➔ leadership of National Medical Association
- Process optimisation and specialization of hospitals
- Quality control, monitoring and audits:
  - Payers, i.e. public and private health insurers
  - National Institutes of Health
  - National Medical Association
Medicine can be shaped and reformed only via financing. The main core elements are guidelines and the classification of all medical provisions providing the proper basis for reimbursement. This will be established by the European Medical Societies and compiled by the European Institute of Health. With an effective reimbursement plan, medical institutions can develop independently in accordance with demand and quality standards. This forms the underlying basis for a comprehensive approach to medicine, which reimburses only those provisions that meet standards established by classification. The movement of medicine through the health care market in the 21st century is fueled in large part by competition.

An additional core element is the changing role of the public sector. We are all currently reimbursing this system through our taxes, premiums and copayments. This provides the framework for solidarity based on community interests, objectives, and standards. In this context it can be seen as a paradigm change, where the public sector demands “Health for All” from the medical field in exchange for their financial contribution to the health care system via taxes.

Today, national structural barriers are blocking an integrative European Health Care concept. Some of these barriers include national interests, a lack or mismanagement of finances and misalignments of possibilities.

This report on the lead market, points out the positive impact to be expected considering human, social and economic advances. The report should act as a road map with recommendations directed to all stakeholders (patient, doctor, industry, universities, medical associations and national and European parliaments).

The focus will be:

1) Patient benefit or “Health for All” as an act of solidarity with collective and equal accessibility in Europe. The guiding principle is that we pay for our health system and we demand that the medical system ensures “Health for All.”

2) Classification, guidelines and certification of medical provisions for quality of care and a basis for reimbursement.
3) Privatization and depolitization of medical hospitals and insurance in all European countries, where non-profit and profit hospitals play a larger role and regional collective insurance systems guarantee a higher quality and security for all patients.

4) Eliminating national fragmentation.

5) Improving innovation as part of the new European Institute of Innovation and Technology (KICs).

This single market, with its volume, and industrial and scientific impact, is a real European Lead Market.

The whole concept of medical provisions has changed entirely over the last few decades, making a paradigm shift from local providers to a single European market inevitably emphasizing:

1. The patients and their doctors are the core elements of the entire health care system.
2. A need for innovation according to the Lisbon recommendations.
3. A need for education according to the Bologna accords.
4. A need to convert medical provisions to a single market according to the Maastricht criteria, modernizing the system via Europe.
5. A need for a new paradigm in medicine. The present medical paradigm is outdated and based on Julien Offray de La Mettrie (1709–1751) in a mechanical and materialistic view of healthy and unhealthy. A paradigm shift based on an integrative view of different disciplines is demanded. This is based on scientific results of the last decades and acts as a basis for the 21st century.
6. We, the public, demand the system to provide “Health for All”.

The organization of medicine cannot be prioritized in the individual states or in the European Union itself. With a much needed paradigm shift, the long demanded changes can be accomplished, creating a European Lead Market in Health Care. Speaking of a Lead Market is a sign of change of the paradigm. This will have a profound effect on the modernization of medical care in Europe, based on established standards with guidelines
and quality control. This will also help to overcome the historic national burdens and severe differences that exist within Europe. The present systems are too localized and are sometimes xenophobic. The current provisions in medicine are too costly and less effective than they should be. We can no longer afford an outdated and narrow national concept of medical provisions where we pay the high costs. This is the basis for the task at hand and the motivation to provide people with medical care in keeping with what they are paying within the framework of solidarity of community interests, objectives and standards. Another aspect shows that medicine is an active investment for our society. This report envisions the year 2020 and elucidates new approaches to overcome old challenges. This vision reflects the reality of tomorrow.

As previously stated, medicine is a result of our culture, and the market is embedded in gigantic global macroeconomics. As a market, medicine (including home care, private use and prevention) comprises a total of 25% of the larger economy, making medicine the largest entrepreneurial endeavor of our economy and giving thousands of households their vocational and financial basis for daily life. Economy and medicine are parts of our society that are complementary to each other. Medicine has the specific task to care for and cure patients in as optimal a fashion as possible. In our modern lives, interdisciplinary approaches are giving the best answers and solutions for future strategies. The interdisciplinary approach reflects the cultural endeavor.

There are three types of markets relevant to medicine: the free market, the socioeconomic market and the planned economic market. (Table 1)
<table>
<thead>
<tr>
<th></th>
<th>Liberal</th>
<th>Socioeconomic</th>
<th>Planned market</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong></td>
<td>Limited</td>
<td>Health for All</td>
<td>Health for All limited</td>
</tr>
<tr>
<td><strong>Innovation</strong></td>
<td>High</td>
<td>Acceptable</td>
<td>Limited</td>
</tr>
<tr>
<td><strong>Cost Effectiveness</strong></td>
<td>High in some fields</td>
<td>Can be improved</td>
<td>Restricted</td>
</tr>
<tr>
<td><strong>Competition</strong></td>
<td>High</td>
<td>Can be improved</td>
<td>Limited</td>
</tr>
<tr>
<td><strong>Political Influence</strong></td>
<td>Limited</td>
<td>Severe</td>
<td>Total</td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td>Insurance</td>
<td>Insurance and Taxes</td>
<td>Taxes</td>
</tr>
<tr>
<td><strong>Industrial Influence</strong></td>
<td>High</td>
<td>Limited</td>
<td>Limited</td>
</tr>
</tbody>
</table>
Market Principles make it impossible for many to have coverage. In principle this free market system is extremely utilitarian. One outgrowth of this system of free market health care delivery is trailblazing research, which is remarkable and copied throughout the rest of the world. Medicine in the US has been admired all over the world since WWII. But despite all the glitter, a high percentage of people do not have access to the system and are unable to afford the high costs of carrying health insurance. The cost of medical treatment in the US is twice as high per capita in comparison to the European Union. Out-of-pocket expenses and co-payments are often additionally required payments for this system of health care. In the US, 30% of patients do not benefit from this system and are cared for through charity or are wealthy enough to pay for health care without insurance. However, the political influence on this health care system is relatively low and from time to time new legislation is signed to improve general care. This system is highly effective in provision, but has limited access that leaves those who can not pay with few health care options.

Moreover a free market system in the 21st century is under a huge influence of the globalized financial market. The deregulated, liberalized and privatized flows of money have a direct impact on any national health care system. High speculation, abrupt outflow of money from the domestic health care sector, shareholder mentality, short-term perspectives and increasing turbulences and instabilities are causing further risks for domestic health care, politicians, suppliers and patients. An adequate financial design should consider these challenges. (Table 2)
Table 2: Principles of a market

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Means</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair Access</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Financing</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Health Status</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Risk Protection</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Efficiency</td>
<td>+++</td>
<td>0</td>
</tr>
<tr>
<td>Commitment</td>
<td>+++</td>
<td>+</td>
</tr>
</tbody>
</table>
Dimensions of Health Care

The concept of a socioeconomic market is a specific approach developed in Europe based on the efforts of Bismarck, and can be seen as an act of solidarity. He saw clearly in 1875 that a healthy society needs adequate medical provision to provide political stability. The system in Central Europe is financed mainly through insurance and taxes, less so through co-payments, and rarely by out-of-pocket payments. This system has been mostly sufficient for many decades, and exists in many parts of Central Europe. Based on the efficacy of the system, politicians are promising Health for All, best medical practices, constant accessibility, and of course, free of charge services to patients. This comes under pressure now due to the rapidly changing environment of an aging population and costly medical procedures accelerating the gap between available funds and expectations. Further factors influencing an ongoing gap between GDP growth and increased health care costs are new technological innovations, wellness culture, and the institutional design. Along with the ongoing financial pressure of medical costs, the influence of politics is increasing. Distribution and provision of medical care are coming more and more under political control. This will be a step toward a planned market as seen in the former German Democratic Republic. Compulsory insurance is the field of most political influence, while private insurance has a volume of around 10%–15%. But despite all pressures and lamentations, Europe has for the most part an excellent medical system that is comparable to the US. However, this socioeconomic market system can be improved to increase innovation and access. To face a market according to the Maastricht criteria, we require a model that lies beyond traditional perspectives. In short, almost all sectors in health care can be deregulated and privatized with the exception of two: free access and universal coverage of individual health risks. This can be achieved by depolitization. The political framework is to ensure “Health for All” in a level of quality set according to standards and reasonable accessibility. This is to be understood as an act of our collective society.

“Health for All” has to be understood as a public order to the health system. Therefore the financial framework for medical delivery is a political task. There must be financial streams routed directly to the institutions where medical care is provided. Today, we have many detours and political influences in the monetary pathway. A socioeconomic plan organizes medical provisions according to a modern market concept, where the socio part ensures “Health for All.” This will have a high potential for being cost efficient and can be our major
contribution to the health potential of our society in the future. As previously stated, a shift toward the liberation of the market is unavoidable. A step toward more control will have the undesirable result of a planned market of medicine. In comparing the US and the former Communist States, the middle ground of a socioeconomic market is the most reasonable and human concept, where the market and society are united in an endeavor for establishing social cohesion. The basic concept is the principle of co-financing through conditioning, meaning that although the health care sector (for example nursing) traditionally has a lower productivity than other sectors (for example the car industry), the economy as a whole must generate the money to transfer to the health care sector since the whole society benefits from its healthy members. The health care sector itself must also fulfill certain medical standards, including best medical practice, collective coverages, and “Health for All”.

The concept of a planned market is known from the eastern parts of Europe, in the former Communist States. This system is covered solely by taxes and therefore has the maximum amount of political influence and guidance. This system is not patient friendly, has limited incentives for innovation, restricts provision, and produces long waiting lists. There are incidents of patients waiting up to a year or more for a hip replacement or a cardiac bypass procedure. There is also discussion of an age limit for provisions such as hemodialysis. This system can be considered costly and ineffective as it has demonstrated inefficiencies in the past.

In an open market concept as described by the Maastricht criteria, planned market health care systems will become history. Modern medicine needs free market structures, considering social adjustments. Modern and efficient medicine is based on innovation, and creativity needs an adequately vital economy.

The market itself is characterized mainly by:

a) The patients as beneficiaries and doctors as gatekeepers of the different forms of medical and auxiliary care. Those who are not patients are healthy citizens embedded in their households and who will benefit from the system when they become sick.

b) The providers who deliver medical care primarily through doctors and their auxiliaries. They represent the medical services as a product. This product produces costs for devices, drugs, exams, therapies, rehabilitation, etc. In this context research,
development, clinical studies, education and continuous medical education are indispensable, ensuring modern medicine based on innovation. The medical product is delivered in offices for outpatient services and in hospitals. These costs are covered mainly by taxes and the compulsory fees. Everyone needs mandatory insurance, but selection of the insurance provider is up to the individual. A basic premium can be supplemented on an individual basis. Quality control, certification and assessment are indispensable prerequisites in the market and are the result of proper reimbursement.

In our normal lives as consumers, we generally pay directly to the producer or provider. In Central Europe we have a third party in the form of compulsory medical insurance between the patient and provider. This third party handles reimbursement outside of those costs paid by taxes. The patients themselves do not know the costs. There is no transparency. As mentioned in the report Health is Wealth, in a health care market the insurance companies completely reimburse costs where they are generated. Only a full compensation of the real costs allows a true market, which stimulates open competition between providers. Competition leads to more efficacy, more quality, cost reductions and stimulation of innovation.

The European Lead Market is defined by Health for All due to innovation increasing the health potential of European society. To preserve human capital we must treat and respect the uniqueness of life. Industry and small and medium enterprises (SMEs) will profit and become hidden champions to a new market, which will go global. In medicine we can not outsource medical provisions; all our efforts with patients must remain in Europe. However, we can export the methodology of health care within industrial innovations and concepts. Especially SMEs will find new opportunities.

Instead of this historical dichotomous shown above, we propose to look more into the means and goals of the health care sector itself to overcome the opposition of a socioeconomic and a free market model. In this view, efficiency and commitment of all stakeholders are the most important factors in achieving the ultimate aim in health care where fair access, optimum health status and collective risk protection are the main goals. Note that financing and efficiency are simple intermediates here and are not ultimate goals in themselves. The existing expenditures must now be used more efficiently. Today’s circumstances require a concentration on evidence-based medicine. In total, this could
provide a potential savings of 10%–15% in medical care costs, and save an additional 10%–15% in the costs of organizing medicine, which would include financing. These savings are urgently needed to care for our aging population, whose individual cases will be costly. In addition to taxes and premiums, new sources of money are needed to support the system.

**Reflection to “Health in the Regions”:**
In the present situation a contemporary system for Health Care can be introduced via a Health Market to overcome the present hindrances. In a regional health care system new parameters have to be set up, which may influence the whole, changing the system toward a Health market.
The Euro Health Consumer Index (www.healthpowerhouse.com) has confirmed that there is a group of EU member states, which all have good healthcare systems seen from the customer/consumer’s point of view.

The EHCI’s total ranking of healthcare systems shows a landslide victory for The Netherlands, scoring 863 points out of 1000, 44 points ahead of runner-up Denmark with 819 points, closely followed by newcomer Iceland with 811 points, and 2007 winner Austria in 4th place with 795 points.

The Netherlands is the only country which has consistently been among the top three in the total ranking of any European Index the Health Consumer Powerhouse has published since 2005. The Dutch healthcare system does not seem to have any real weak spots in the other sub-disciplines, except for possibly some scope for improvement regarding the waiting times situation, where some other central European states excel (Figure 8):
### Total scores in Euro Health Consumer Index 2009

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>863</td>
</tr>
<tr>
<td>Denmark</td>
<td>819</td>
</tr>
<tr>
<td>Iceland</td>
<td>811</td>
</tr>
<tr>
<td>Austria</td>
<td>795</td>
</tr>
<tr>
<td>Switzerland</td>
<td>788</td>
</tr>
<tr>
<td>Germany</td>
<td>787</td>
</tr>
<tr>
<td>France</td>
<td>778</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>777</td>
</tr>
<tr>
<td>Sweden</td>
<td>762</td>
</tr>
<tr>
<td>Norway</td>
<td>740</td>
</tr>
<tr>
<td>Belgium</td>
<td>732</td>
</tr>
<tr>
<td>Finland</td>
<td>721</td>
</tr>
<tr>
<td>Ireland</td>
<td>701</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>682</td>
</tr>
<tr>
<td>Italy</td>
<td>671</td>
</tr>
<tr>
<td>Slovenia</td>
<td>668</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>667</td>
</tr>
<tr>
<td>Estonia</td>
<td>638</td>
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<tr>
<td>Cyprus</td>
<td>637</td>
</tr>
<tr>
<td>Hungary</td>
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<tr>
<td>Portugal</td>
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</tr>
<tr>
<td>Spain</td>
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<tr>
<td>Croatia</td>
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<tr>
<td>Greece</td>
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</tr>
<tr>
<td>FYR Macedonia</td>
<td>576</td>
</tr>
<tr>
<td>Poland</td>
<td>565</td>
</tr>
<tr>
<td>Malta</td>
<td>565</td>
</tr>
<tr>
<td>Slovakia</td>
<td>560</td>
</tr>
<tr>
<td>Lithuania</td>
<td>546</td>
</tr>
<tr>
<td>Albania</td>
<td>542</td>
</tr>
<tr>
<td>Latvia</td>
<td>512</td>
</tr>
<tr>
<td>Romania</td>
<td>489</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>448</td>
</tr>
</tbody>
</table>
3.1. Some interesting countries

The Netherlands!!!
The Netherlands is the only country which has consistently been among the top three in the total ranking of any European Index the Health Consumer Powerhouse has published since 2005. The 2009 NL score of 863 points is by far the highest ever seen in a HCP Index. The NL shares the sub-discipline victory with Denmark only on e-Health and Pharmaceuticals, and the large victory margin seems essentially due to the fact that the Dutch healthcare system does not seem to have any real weak spots, except for possibly some scope for improvement regarding the waiting times situation, where some central European countries excel.

Normally, the HCP takes care to state that the EHCI is limited to measuring the “consumer friendliness” of healthcare systems, i.e. does not claim to measure which European state has the best healthcare system across the board.

However, the fact that it seems very difficult to build an Index of the HCP type without ending up with The Netherlands on the medallists’ podium, creates a strong temptation to actually claim that the landslide winner of the EHCI 2008 could indeed be said to have “the best healthcare system in Europe”.

So what are the Dutch doing right?
It has to be emphasized that the following discussion does contain a substantial amount of speculation outside of what can actually be derived from the EHCI scores:

The NL is characterized by a multitude of health insurance providers acting in competition, and being separated from caregivers/hospitals. Also, the NL probably has the best and most structured arrangement for patient organisation participation in healthcare decision and policymaking in Europe.

Here comes the speculation: one important net effect of the NL healthcare system structure is that healthcare operative decisions are taken, to an unusually high degree, by medical professionals with patient co-participation. Financing agencies and healthcare amateurs such as politicians and bureaucrats seem farther removed from operative healthcare decisions in the NL than in almost any other European country. This could in itself be a major reason behind the NL landslide victory in the EHCI 2009.
So what, if anything, are the Dutch doing wrong?
The Netherlands scores very well in all sub-disciplines, except for Waiting times/Access, where the score is more mediocre. As was observed by Siciliani & Hurst of the OECD in 2003/2004, and in the EHCI 2005 – 2009, waiting lists for specialist treatment, paradoxically, exist mainly in countries having “GP gatekeeping” (the requirement of a referral from a primary care doctor to see a specialist).

The Netherlands has risen in healthcare spending to actually having the highest per capita spending in Europe (outside the three richest countries; Norway, Switzerland and Luxembourg, who have a GDP per capita in a class of their own).

Denmark
Denmark did gain a lot from the introduction of the e-Health sub-discipline. Denmark has been on a continuous rise since it was first included in the EHCI 2006. Denmark is doing particularly well on Patient Rights and Information, being one of only three countries (not the same three) scoring Green both on Free choice of caregiver in the EU and on having a hospital registry on the Internet showing which hospitals have the best medical results. Mainly for this reason, Denmark is outdistancing its Nordic neighbors in the EHCI, in spite of having a slightly lower score on Outcomes than these.

Germany – the “Mystery Country”
On the 6th place with 787 points, Germany probably has the most restriction-free and consumer-oriented healthcare system in Europe, with patients allowed to seek almost any type of care they wish whenever they want it. The main reason Germany is not engaged in the fight for medals is the mediocrity of Outcomes (and “Germany” and “mediocre quality” are rarely heard in the same sentence!). This is probably due to a characteristic of the German healthcare system: a large number of rather small general hospitals, not specializing.

The “mystery” is: how is it possible to operate a restriction-free system, and not have healthcare costs run wild? German healthcare costs are in the middle of the Western European countries.

Another speculative explanation: There are studies, which show that German doctors work harder; long hours and many appointments/operations per doctor per year. It is well known that hindering a German from working is difficult. Could the relatively good cost containment in German healthcare be simply explained by the “German work ethic”? Unfortunately, the EHCl does not provide the answer.
Ireland, Spain and Greece
On the 13th, 22nd and 24th place respectively.

For the EHCI 2009, the HCP has had much better contact with national healthcare bodies than in previous years. For that reason, the Patient View survey to patient organizations, which provides part of the data for the EHCI, has essentially not been used as a single CUTS data source, but mainly as a “reality check”.

These three countries seem to have a domestic “marketing problem” for their healthcare services. This is particularly striking for Ireland, which after its HSE reform has been steadily climbing in the EHCI, but where the responses from patient organizations on issues such as waiting times were still very negative in 2009.

Greece leads in Europe by a wide margin in the number of doctors per capita (Figure 9, on the next page). Still the picture of Greek healthcare, painted by the patient organization responses, does not at all indicate any sort of healthy competition to provide superior healthcare services.
Fig. 9

Physicians per 100,000 population (2007/l.a.)
**Albania**
30th place, 562 points. Albania is included in the EHCI at the request of the Albanian Ministry of Health. The country avoids ending up last chiefly due to a very strong performance on Access, where patient organizations confirmed the official ministry version that waiting times essentially do not exist. In fact, Albania tops the Waiting Times sub-discipline together with Belgium, Germany and Switzerland!

The ministry’s explanation for this was that “Albanians are a hardy lot, who only go to the doctor when carried there”, i.e. underutilization of the healthcare system. This is an oversimplification; Albanians visit their primary care doctor more than twice as often as Swedes (3.9 visits per year vs. 1.6)! It seems that Waiting Times in healthcare are more of a mental condition affecting healthcare administrators and professionals than a financial constraint!

**Sweden**
9th place, 762 points. Still the European champion on medical outcomes. For five years, it has not seemed to matter which indicators are tried on Outcomes (at least for rather serious conditions); Sweden keeps being the only country to score All Green.

At the same time, the notoriously poor accessibility situation seems very difficult to rectify, in spite of state government efforts to stimulate the decentralized county-operated healthcare system to shorten waiting lists. The target for maximum wait to see your primary care doctor (no more than 7 days) is underachieved only by Portugal, where the corresponding figure is < 15 days.

Another way of expressing the vital question: Why can Albania operate its healthcare services with practically zero waiting times, and Sweden cannot?

**Estonia**
The 1.5 million nation Estonia has dropped rather dramatically; from an impressive 11th place overall in the 2008 Index (score 669) to the 18th in 2009, with 638 points. What this might show is one of the few visible examples of the financial crisis hitting a healthcare system.

**Portugal**
21st place, 632 points. Also rather surprisingly to the sponsor of the e-Health indicators, the European Commission – DG Information Society and Media, Portugal emerges as the European champion on e-Health deployment, with widespread use of Electronic Patient
Records, electronic prescriptions and on-line booking of doctor appointments (at least for the 4 million inhabitants of the Lisbon area).

### 3.2 Bismarck Beats Beveridge

All public healthcare systems share one problem: Which technical solution should be used to funnel typically 7 – 10 % of national income into healthcare services?

**Bismarck** healthcare systems: Systems based on social insurance, where there is a multitude of insurance organisations, Krankenkassen etc, who are *organisationally independent from* healthcare providers.

**Beveridge** systems: Systems where financing and provision are handled within one organisational system, *i.e.* financing bodies and providers are wholly or partially within one organisation, such as the NHS of the United Kingdom, counties of Nordic states etc.

For more than half a century, particularly since the formation of the British NHS, the largest Beveridge-type system in Europe, there has been intense debating over the relative merits of the two types of systems.

Looking at the results of the EHCI 2006 – 2009, it is very hard to avoid noticing that the top consists of dedicated Bismarck countries, with the small-population and therefore more easily managed Beveridge systems of the Nordic countries squeezing in. Large Beveridge systems seem to have difficulties with attaining really excellent levels of customer value. The largest Beveridge countries, the U.K. and Italy, keep clinging together in the middle of the Index. There could be (at least) two different explanations for this:

a.) Managing a corporation or organisation with 100 000+ employees, calls for considerable management skills, which are usually very handsomely rewarded. Managing an organisation such as the English NHS, with close to 1.5 million members of staff, who also make management life difficult by having a professional agenda which does not necessarily coincide with that of management/administration, would require absolutely world class management. It is doubtful whether public organisations offer the compensation and other incentives required to recruit those managers.

b.) In Beveridge organisations, responsible for both financing and provision of healthcare, it seems to be a risk that the loyalty of politicians and other top decision makers could shift from being primarily to the customer/patient. Primary loyalty could become shifted to the
organisation these decision makers, with justifiable pride, have been building over decades (or possibly to aspects such as the job-creation potential of such organisations in politicians’ home towns).

3.3 Value for Money-adjusted scores

With all 27 EU member states and six other European countries included in the EHCI project, it becomes apparent that the Index tries to compare states with very different financial resources. The annual healthcare spending, in PPP-adjusted (Purchasing Power Parity) US dollars, varies from less than $400 in Albania to more than $4000 in Norway, Switzerland, and Luxembourg. Continental Western Europe and Nordic countries generally fall between $2700 and $3700. As a separate exercise, the EHCI 2009 has added a value for money-adjusted score: the Bang-For-the-Buck adjusted score, or “BFB Score” (Fig. 10):

The BFB scores, naturally, are to be regarded as somewhat of an academic exercise. The BFB method is also a shade too blunt to accommodate countries, who have a very low healthcare spend, such as Albania and FYR Macedonia; particularly Albania’s official healthcare spend is very modest. After the research work, however, it does seem that certainly the supreme winner in the 2007 and 2008 BFB scores, Estonia, keeps doing very well within its financial capacity. To some extent, the same could be said about Hungary and the Czech Republic.
Fig. 10

Bang-for-the-Buck scores in Euro Health Consumer Index 2009

- Albania: 763
- Estonia: 675
- FYR Macedonia: 619
- Netherlands: 619
- Croatia: 603
- Iceland: 586
- Czech Republic: 585
- Denmark: 579
- Hungary: 569
- Cyprus: 569
- Germany: 538
- Austria: 535
- Sweden: 532
- France: 526
- Slovenia: 524
- Finland: 518
- Poland: 514
- Switzerland: 509
- Lithuania: 484
- Belgium: 471
- Italy: 470
- Luxembourg: 460
- United Kingdom: 457
- Portugal: 451
- Ireland: 445
- Romania: 444
- Slovakia: 437
- Norway: 427
- Latvia: 417
- Spain: 406
- Malta: 406
- Greece: 370
- Bulgaria: 361
- Croatia: 322
3.4 Trends over the five years

From the point of view of a healthcare consumer, the overall situation is improving:

There seems to be a visible wave of legislation changes across the EU, which results in patients’ empowerment.

For example, in the past years Slovenia introduced changes in the domain of access to specialists, no-fault malpractice insurance, and the right to second opinion, together with considerable improvement in the area of access to information (register of legit doctors, pharmacopoeia, and even a nice attempt to construct a true providers’ catalogue with quality ranking); some of these changes being attributable to the introduction of an Act On Patients’ Rights of 2008. In the Czech Republic, a systematic reform of healthcare legislation had an impact on drug deployment speed; in Lithuania, the level of involvement of patient organisations increased over the past years to a level higher than the majority of the wealthiest countries in the West.

Hungary improved a lot in the field of patient information by introducing the Doctor Info service, with a register of doctors. Access to how much caregivers have charged for a person’s care has been introduced – this is the only example of a country with a “monolithic” financing system having done this, and also nice attempts on a provider catalogue, pharmacopoeia and other healthcare information have been made.

The example of Hungary is a good indication that an important improvement in EHCI scoring can be done in one or two years, without the need to increase healthcare spending in a dramatic way. Usually it costs very little to incorporate the patients’ rights in the national legislation or to make publicly available information already stored somewhere, such as a registry of doctors or information on pharmaceuticals. Also the newly included Candidate countries have adapted patients’ rights in their legislation.
Fig. 11: These results over the four years 2006 – 2009 have been normalized to all being calculated in the same way as the EHCI 2007 (with its five sub-disciplines).
In e-Health, some CEE countries have introduced applications, which are still rare in Western Europe. This is probably similar to the rapid uptake of mobile telephones in India – sometimes, it can be an advantage *not* to have had an ancient technology established.

*Reflection to “Health in the Regions”:*
There are in essence two systems for reimbursement, Beveridge versus Bismarck. They are historical. The reimbursement must carry all costs, so that the institutions where health is delivered can work and act as a normal enterprise. This requires severe changes when the insurances carry the whole costs. This is the political act which has waited almost 40 years for a solution.
4. European Border Regions

Border regions are defined as regions on the national frontiers. The new border regions entitled “European border regions” are on each state 25 kilometres from the frontier toward the inland so that the new European border region will be 50 kilometres wide.

In parenthesis the national member states are identified in Figure 12.

**Finland- Sweden (4, 5)**
Finland: Keski-Pohjanmaa, Pohjanmaa, Satakunta
Schweden: Västerbottens Län, Västernorrlands, Gävleborgs Län

**South East-sea-area (8, 14, 4):**
Lithuania: Klaipeda
Poland: Powiaty Szczecinski, Koszalinlki, Slupski, Gdansk, Gdansk- Gdynia-Sopot
Sweden: Läns Kalmar, Blekinge, Skane
Germany: Mecklenburg-Vorpommern (Greifswald, Rostock, Stralsund, Wismar, Bad Doberan, Nordvorpommern, Nordwestmecklenburg, Ostvorpommern, Rügen und Uecker-Randow)
Denmark: Borholms

**Belgium – France (11, 16)**
Interreg IVA France- Wallonie-Vlaandern

**Belgium- Netherlands (10, 11)**
INTERREG IV:
Vlaandern Nederland

**Romania- Bulgaria (24, 25)**
Romania: Mehedinti, Dolj, Olt, Teleorman, Giugiu, Calarasi, Constantia
Bulgaria: Vidin, Vratsa, Montana, Pleven, Veliko Tarnovo, Ruse Sinistra and Dobrich
Fig. 12: Member States of the European Union, Numbers for Reference only.

01 Republic of Ireland
02 Northern Ireland
03 United Kingdom
04 Sweden
05 Finland
06 Estonia
07 Latvia
08 Lithuania
09 Denmark
11 Belgium
12 Luxembourg
13 Germany
14 Poland
15 Czech Republic
16 France
17 Austria
18 Slovakia
19 Hungary
20 Portugal
21 Spain
22 Italy
23 Slovenia
24 Romania
25 Bulgaria
26 Greece
27 Cyprus

Cartography: IGM/Geospace, M. Fröhner, 2011
Greece- Bulgaria (25, 26)
Greece: Evros, Xanti, Rodopi, Drama, Thessaloniki and Serres
Bulgaria: Blaegoevgrad, Smolyan, Kanrdzhali and Haskovo

SYDDANMARK – Schleswig- K.E.R.N. (9, 13)
Denmark: Syddanmark
Germany: Schleswig- Holstein with Kiel, Eckernförde, Rendsburg, Neumünster

Öresund- Kattegatt- Skagerrak (4, 9)
Sweden: Öresund
Denmark: Skagerrak
Norway: Kattegat

Germany- Austria (17, 13)
Germany: Bavaria: Freyung- Grafenau, Rottal-Inn, Passau, Altötting, Traunstein, Berchtesgadener Land, Rosenheim, Miesbach, Bad Tölz- Wolfratshausen, Garmisch Partenkirchen, Ostallgäu, Oberallgäu, Lindau, Kaufbeuren, Kempten
Austria: Innviertel, Mühlviertel, Salzburg, Außerfern, Tiroler Ober- und Unterland, Rheintal- Bodensee, Bludenz- Bregenzerwald

Germany- Poland (13, 14)
Germany: Märkisch-Oderland, Oder-Spree, Spree-Neiße, Frankfurt/Oder, Cottbus
Poland: Powiaty Gorzowski, Zielonogorksi

Germany- Czechia (13, 15)
Germany: Cham, Freyung-Grafenau, Hof, Neustadt and der Waldnaab, Regen, Schwandorf, Tirschenreuth, Wunsiedel, Hof, Weiden, Amber-Sulzbach, Bayreuth, Deggendorf, Kronach, Kulmbach, Passau, Regensburg, Straubing, Bogen
Czechia: Plzensky kraj, Karlovarsky kraj, Jihocesky

Germany, Belgium, Netherlands (10, 11, 13)
Euregio Maas-Rhein
Belgium: Liege, Limburg
Germany: Aachen, Bitburg-Prüm, Daun
Netherlands: Limburg

**Germany, France, Italy, Austria, Slovenia, Liechtenstein, Switzerland (13, 16, 22, 17, 23)**

Alpine-Area

**Netherlands- Germany (10, 13)**

Netherlands: Achterhoek, Arnhem/Nijmegen, Delfzij en oimgeving, Midden Limburg, Nord Friesland, Noordoost, Noord Brabant, Oot Groningen, Overig Gronigen, Twente Tuidoost Drenthe

Germany: Aurich, Borken, Emden, Emsland, Bentheim, Kleve, Krefeld, Leer, Mönchengladbach, Steinfurt, Viersen, Wesel

**Germany- Austria- Liechtenstein- Switzerland (13, 17)**

Alpenrhein-Bodensee-Hochrhein

Germany: Bodenseekreis, Konstanz, Schwarzwald-Baar, Waldshut Lindau, Oberallgäu, Kempten

Austria: Vorarlberg

Liechtenstein

**Germany- France- Switzerland (13, 16)**

Oberrhein (Upperrhine)

Germany: Baden Württemberg, Rheinland-Pfalz

France: Alsac

Switzerland: Basel, Jura, Solothurn, Aargau

**Germany- Belgium-France- Luxembourg (13,11, 16, 12)**

(Large Region)

Belgium: Eupen

France: Lourain

Germany: Rheinland-Pfalz, Saarland

Luxembourg
Estonia- Latvia (6, 7)
Estonia: Lääne-Eesti, Louna-Eesti
Latvia: Kurzeme, Riga, Pieriga, Vidzeme

Estonia- Latvia- Finland, Sweden (6, 7, 5, 4)
“Middle East Sea Area”

Finland, Sweden- Norway (4, 5)
“Bottnic Sea- Atlantic”
Finland: Keski-Pohjanmaa, Stakunta,
Sweden: Västerbottens Län, Västernorrland län, Gävleborgs
Norway: Nordland fylke

Spain- France (16, 21)

Italy- France (ALCOTRA) (22, 16)
Italy: Aosta, Piemont, Liguria
France: Rhone-Alpes, Provence-Alpes- Cote d’Azur
Monaco

Belgium- France- United Kingdom (11, 16, 2)
France: Nord et Pas de Calais

United Kingdom: Norfolk, Soffok, Southend-on Sea, Essex CC, Brighton, East Sussex, West Sussex, Portsmouth, Southampton, Hampshire CC, Isle of Wight, Medway Towns, Kent CC, Bournemouth and Poole, Dorset CC, Cornwall, Isle of Scilly, Plymouth, Torbay, Devon CC

Belgium: Antwerp, Brügge, Ostende, Veurne, Eeklo, Gent, Sint-Niklaase

Netherlands: Delft and Westland, Groot-Rinjmond, Zeeuws-Vlanderen, Overig Zeeland, West-Nord-Brabant
France- Switzerland (16)
France: Doubs, Jura, Belfort, Ain, Haute Savoie
Switzerland: Bern, Jura, Neuenburg, Waadt, Geneva, Wallis

Belgium-France (11, 16)
France- Wallonie- Flandern

Greece- Cyprus (22, 27)
Greece: Samos, Lesbos, Chios, Dodekanes, Heraklion, Lasithi, Rethymo, Chania,
Cyprus

Greece- Italy (26, 22)
Greece: Aitoloakarnaia, Achia, Kerkyra, Lefkada, Kefallinia, Zakynthos, Ionnina, Prevezza, Thesprotia
Italy: Bari, Brindisi, Lecce

France- United Kingdom (3, 16)
France: Somme, Seine-Maritime, Calvados, Manche, Cotes d Armor, Finisterre, Ille-et Vilaine

Ireland- United Kingdom (1, 2, 3)
Ireland: East of Northern Ireland, Dumfries, Galloway, East Ayrshire, North Ayrshire Mainland, Lochaber, Skye, Lochash, Arran, Cumbrae, Argyll, Bute
Belfast
Wales: Isle of Anglesey, Gwynedd, Conwy, Denbigshire, South West Wales

Italy- Slovenia (22, 23)
Italy: Trieste, Gorizia, Udine, Venezia, Rovigo, Padova, Ferrara,
Slovenia: Goriska, Obalno-Kraska, Gorenjska

Italy- Austria (17, 22)
Italy: Bozen, Trento, Belluno, Udine,
Austria: Carinthia, Tirol
Latvia- Lithuania (6, 7)
Latvia: Kurzemi, Latgali, Zemgali,
Lithuania: Klaipedos, Siauliu, Telsiu Panemui, Utenos

Austria- Hungary (17, 19)
Austria: Burgenland, Niederösterreich, Oststeiermark
Hungary: Nyugat- Dunantul, Gyor-Moson-Sopron, Vas, Zala

Austria- Czech Republic (15, 17)
Austria: Upper-Austria (Mühl- Innviertel, Linz, Steyr-Kirchdorf), Lower Austria (Mostviertel, Waldviertel, Weinviertel, St.Pölten)
Czech Republic: Jihocesky kraj, Jihimoravsky kraj, Kraj Vysocina

Austria- Slovakia (17, 18)
Austria: Niederösterreich, Burgenland
Slovakia: Bratislava, Trnava

Austria- Slovenia (17, 23)
Austria: Steiermark, Kärnten
Slovenia: Osrednjeslovenska

Poland- Germany (13,14)
Poland: Zachodniopomorskie
Germany: Mecklenburg-Vorpommern, Brandenburg

Poland- Czech Republic (14,15)
Czech Republic: Liberecky kraj, Kralovehradecky kraj, Pardubicky kraj, Olomoucky kraj, Parduicky kraj, Moravskoslezsky kraj,
Poland: Jeleniogorskowalbrzyski, Bielso-bioáski, Psczynski

Poland- Lithuania (14, 18)
Marijampoles, Alytaus, Bialostocko- suealsi, Elcki

Spain-Portugal (21, 20)
Hungary- Romania (19, 24)
Hungary: Szabolcs-Szatmar-Bereg, Hajdu-Bihar, Bekes, Csongrad
Romania: Satu-Mare, Arad, Timis

Slovenia-Hungary (19,23)
Hungary: Zala, Vas
Slovenia: Pomurje, Podravje

Slovakia- Czech Republic (15, 16)
Slovakia: Trnavsky kraj, Trenciansky kraj, Zilinsky kraj
Czech Republic: Jihomoravsky kraj, Zlinsky kraj, Maravskosezsky kraj,

Hungary- Slovakia (16, 19)
Hungary: Györ-Moson-Sopron, Kamarom Esztergom, Pest, Nograd, Heves, Borsod-Abauj-Zemplen, Szabolcs-Szatmae-Bereg, Budapest
Slovakia: Bratislava kraj, Trnavsky kraj, Nitriansky kraj, Banskobystricky kraj, Kosicky kraj
5. Classification of the European Regions

Overviewing Europe, its regions are very different due to geography, language, currency and care system. The specific aim is to focus on those regions, which are bilaterally beside a national border with a total width of 50 kilometers (25 km each) and not inside a state.

In bi-national border regions the cross border concept is adjustable. The border has to be eliminated, erased out of the brain and the heart of the people. This is an experimental field for a possible new medical concept bilaterally and thinking. The border regions are characterised by a high deficit in everything: people living there, doctors and the usual environment as compared to the inside of a state.

Beside language barriers and fiscal problems, the border regions have a special demography too. The mentioned people are mostly retired and advanced aged while the density of doctors is lower as inside of a state. The young people are leaving those areas due to less professional possibilities.

Overall, the regions can be divided into 3 classes:

Class 0:

Very few people and no doctors living in areas due to the impassability of high mountains (Alps), sea (E, F, I), ice and desert (high northern area) in between. The type of medicine to be delivered is mostly disaster medicine with helicopters and telemedicine. Fig. 13 depicts such a situation on the example of Tyrol. There is the Wipptal facing the stony and fruitless Alps.

Class I:

Meets an area with a low population (100 people per km²), having almost little medical provisions in long distance. Mostly in villages up to 1.000 people a doctor is practising. Here telemedicine and helicopter services are appropriate too.
Fig. 13: New Border Region Austria and Italy, Countries 17/22, Detail „B“

Legend:
- Present State Boundary
- New Region - Country 17
- New Border Region
- New Region - Country 22

Cartography: IGM/Geospace, M. Fröhnor, 2011
Class II:

Meets an area with a middle density of population (- 5,000), there are specialists and hospitals not reachable in a proper time as well as a low density of doctors. Telemedicine, helicopter, motor services, outdoor services, the GP, Specialists and Medical Centres are feasible.

Fig. 14 depicts the geography between Austria and the Czech Republic, an area with small acres in the south and large ones in the north. There are small villages inside the areas. The differences in the substructures can be seen at a glance.

Class III:

Meets an area with a high density of population (over 10,000), where all types of care are appropriate. Here is the unique chance to concentrate all medical efforts of the bilateral regions to increase the efficacy. Hospitals are available. In a new European Regional Hospital all efforts could be concentrated, when the frontiers are eliminated. The area immediately becomes much larger (doubled) and is a source for implementing new concepts in medical provisions.
Fig. 14: Border Region Austria and Czech Republic, Countries 17/15, Detail 'A'
6. The new „European Border Region (EBR)‟

Fig. 15 depicts the present situation between state A and state B. The idea is to remove the frontier creating a new region which has a strip of 50 km binational in total (Fig. 16).

Now the exchange of medical care is given and deserves a new set up:

- defining the regions (the strip is 50 km wide and acts as a mutual homeland)
- organization of General Practitioners
- building medical centres mutually
- financing
- acceptance of education
- political environment.

In the Region Salzburg – Traunstein, in a small area, a mutual collaboration exists since 1985 in the field of Cardiac Surgery. Fig.17 depicts this area (and Fig.18 without frontiers). The small circles demonstrate hospitals of different sizes. Now the whole area can be reorganized completely according to the new demands. The main effort is to reduce hospitals by quantity. So it becomes clear, that this region can be completely rearranged in medical provisions. The catchment area is immediately larger - so investments are more efficient. Another example of how difficulties can be overcome is demonstrated by the Regional concept around Aachen.

The ultimate goal of this report is to prepare those new regions for a new Cross Border Health Care.

Additionally networks in long time care, education and medicine will be indispensable in order to create a real European Region. The size depends on the total catchment area and can be up to the size of a Central University Hospital.

Additional points should be considered to enhance the bilateral regions to grow together as a new unity with a common language, the Euro and the Schengen treaty. The area Germany, Netherlands and Belgium gives a marvelous example (Fig. 19). As example Fig. 17 shows the present political situation between Salzburg and Bavaria.
In Fig. 18 the frontier is removed and immediately a new European area arises.

Neighbouring Euroregions bilateral, bi-national have the potential of a new market with all consequences. Usually those areas suffer from low density in population and therefore less medical provisions. For those regions a new stimulus is given for investment and additional equipment. The catchment area is increased in every respect.

A specific emphasis is put on the age of the patients. Usually in those areas elder and retired people have in total less income. The picture of provision will be entirely different as in non-neighbouring regions. With a new bilateral Euroregion the area doubles and the furnishment in provision can be enlarged.

This makes only sense, when the medical set up is a modern recent medical concept. There is still hope, that from the neighbouring areas the national states are moving to a modern system compatible for Europe. This should grow as a nucleus of a general European healthcare concept starting from a border region over all the states. (Fig. 20)

A proven new concept can infiltrate the whole nation.

How to do it:

Pull out the frontiers and define a regional area, 50 km wide, as new EuRegio land, start to live and to move in new regions - a real European Region.

The profiles are:

- better provision for the patient
- lower distances
- better organization of General Practitioners
- better utilization of all medical services
- better initialization of investment.

The political will is indispensable, people are ready. In a few cases we see a free movement, which is supported by the insurances. If there is a will, it will work. The new Euro-Region must be lived by the people themselves, from the bottom up.
Reflection to “Health in the Regions”:

Because of Schengen, people live without frontiers. The main focus has to be drawn to the patient, offering him or her short distances for optimal help. The advantage of a larger market is the better facilitation of investment.

The main focus has to be on the reduction of investment and on an efficient use. The regions deserve a new model of GP, the model “Schwester Agnes”, where GP nurses are supporting the doctors. In such regions the duty the GP are on call.

It is evident that education of medical personnel has to be done bilaterally. They will have high flexibility and mobility. Services, day and night, are done bilaterally. For the patient, a medical provision in a close distance from where he or she lives is important. Overall those regions get a new quality of life and the most recent medical standard can be ensured.

Main problems which will occur:
- reimbursement
- patient flow
- recognition of recipe and distribution of drugs
- case histories and reports
- legal aspects
- quality control

Patients should have the chance to move as they are used to in their home country. The experiences in the past have been only punctual. This new concept is an exchange in all medical fields - an increase of the catchment area - from a home area to a Euro-Regional Area.
Proposal of a new European Region

Fig. 15

State A
- Class 0
- Class I
- Class II
- Class III

State B
- Population
- 1.000 – 5.000
- 5.000 – 10.000
- > 10.000

25 km

Frontier
Bavaria

Salzburg

Frontier

Hospitals in different sizes

European Region Salzburg – Berchtesgaden - Traunstein

Fig. 17
Bavaria

Salzburg

European Region Salzburg – Berchtesgaden - Traunstein
Fig. 19: Belgium (No. 11), with New Border Region.
Fig. 20  Growing Influx into the nations of a new concept providing modern medicine

expanding medical provisions

neighbouring european regions

geographical expansion

State A  State B

local

25 km  25 km
7. Demography:
Demographic Shifts in EU 27, Population and Dependency Ratio Forecasts until 2030

As the financial uncertainties continue to dominate daily headlines, the demographic shifts start to become another stress factor for Europe. The 2010 European Commission's Demography Report states¹: “The EU’s demographic picture has become clearer: growth is fuelled mainly by immigration, whereas the population is becoming older and more diverse”. So the question awaiting an urgent answer is: Europe’s population structure will definitely shift within the next decades – but how is it possible to maintain sustainable social structures, social welfare systems, pensions and healthcare funding? There is no doubt, these are critical factors which determine Europe's global competitiveness, the stability of its civil society and finally also the wealth of its citizens.

Population shifts until 2030

The population within all of Europe passed the 500 million mark as of 2010 with over 90 million retirees (aged 65 years and older). One can observe a continuing and significant increase of older people within the whole EU, Norway, and Switzerland over the next decades (figure 21). The group of people aged 65 years and older within the EU will grow by 36.1% from the current level of 87 million people to 124 million by 2030. For Norway, the increase is 451’000 people (plus 62.4%) from currently 723’000. In Switzerland, the picture is similar with plus 61% from 1.3 million to 2.1 million aged 65 years and older.

This leads to the “good-bye pyramid” syndrome – a phenomenon where the classical population pyramid is reshaping into a rectangle with a peak on the top.
Within the European Union, Germany is affected the most by the ageing of its society with a projection of a 28% proportion of people aged 65 years or older in the total population by 2030. The smallest increases in elderly people cohorts (4-5% to 17% of total population) can be observed in Cyprus, Ireland and Luxembourg. For further details table 3 serves as an in-depth resource.
**Fig. 21**: Ageing till 2030 in EU27, Switzerland and Norway expressed in % of total population. Data: Eurostat (Last update: May 27, 2011)\(^2\).
The transition towards ageing societies is even more dominant for the age group 80 years and older with an increase of 57% for the EU and 70% for Switzerland. Surprisingly, the growth rate for people aged 80 years and older in Norway (57.5%) is below the growth rate for people aged 65 years and older. The rationale therefore might be World War II, as the lack of young men prevented population growth, in contrast to Switzerland where the male population was not as affected by the war. Within Europe, the largest cohort of 80+ year olds until 2030 will occur in Sweden with 8.4% of total population.

The overall population size of a given nation is driven by life expectancy, fertility and migration. The increase in life expectancy is a matter of high living standards, balanced nutrition, and constantly improving health care and medical services. In hand with this, amelioration of personal wealth, higher education, and individual freedom in terms of family planning have contributed to fertility rates (amount of children per woman) below the replacement level of 2.1. Children no longer serve as insurance or pension in the second or third stage of life. Hence, Europe’s population has started to decline and relies more and more on immigration with the hope to remain stable or maintain slight growth even. Within the countries in question, we still observe a small total population growth for the EU with 4.3% until 2030 to 522 million (the annual population growth rate until 2030 in Europe is 0.3%). Bulgaria needs to handle the largest population decrease of over 14% until 2030, followed by Hungary and Germany with 9% and 5%, respectively.

The largest population increase in relative terms will occur in Lithuania and Ireland (+24%), followed by Cyprus and Belgium with approximately each 20%. Interesting again is Norway with 19.1% and Switzerland with 14.9% population growth up to 5.8 million and 8.9 million, respectively, by 2030 – clearly above the European average.

For the EU, there is a slightly positive trend in fertility rates up from lows of 1.3 children per women to 1.6. This is still significantly below replacement but contributes to a slower population decline. The positive upward trend in fertility rates is predicted to remain consistent as family structures might change in favor of more children. The latest EU report on demography states that fertility is rising again with wealth, after decades of decaying fertility. Hence, the observed postponement of childbearing to a later age is accompanied by higher
fertility rates and better public support for parents. This is in line with the surprisingly high fertility rate in Norway (1.92) compared to the rest of Europe and is driven by the relatively good parent support within the Norwegian society. Moreover, Norway never had to cope with very low reproduction rates since the fertility rate low in the 80’s was never lower than 1.6. By 2030, the fertility rate in Norway is assumed to be at 2.0. In Switzerland the fertility rate is currently at 1.46, indicating a slightly positive trend towards 1.7 by 2030. However, as fertility rates are clearly below replacement in both countries, the population growth is driven, next to higher life expectancy, by immigration. While Switzerland relies heavily on immigration in order to attain population growth and to balance the ageing effect, Norway’s high fertility rate makes them less dependent on immigration as the population’s replacement rate is almost met.

The decline of the working age group, defined as the age group between 20 and 64 years, is ongoing until 2030. In the EU, the reduction in labor market participants is forecasted at 12.5 million, a drop from 307 to 295 million (-4.1%). For Norway and Switzerland, the situation looks similar in relative terms as the working age group is also declining with -4.2% and -5.3% respectively.

Nevertheless, in absolute terms both countries show an increase of 313 thousand for Norway (+10.8%) and 249 thousand for Switzerland (+5.1%) as a result of the growing total population. Figure 22 shows the development of the working age cohort (20 to 64 years) in relation to the total population (left axis). The current levels are 61.3% for the EU, 59.6% for Norway and 62.2% for Switzerland. Until 2030, the working age group declines by roughly 5% to 56.4% of total population within the EU, to 55.4% in Norway and down to 56.9% in Switzerland.
Fig. 22: Working age population & age dependency ratio in EU 27, Switzerland and Norway. Data: Eurostat (Last update: May 27, 2011)
The age dependency ratio – the quotient of the population group aged 65 years and older to the working age group 20 to 64 year – provides a measure of the relationship of the productive or taxable to the pension-dependent (most not taxed or lower taxed) population groups. The axis on the right of figure 22 shows the increasing dependency ratio from currently 28% in the EU, 25% in Norway and 27% in Switzerland, up to 42% for the EU, 37% for Norway, and 41% for Switzerland. This means that by 2030, approximately 2.5 participants in the labor markets will finance one retiree through transfer payments. Such an unprecedented shift, from currently 4 workers financing one pensioner, down to 2.5 within two decades highlights the severity of the demographic challenge in the coming two decades. It is at hand that this structural change will force our society to re-think and potentially rebuild our social welfare & benefit systems in order to ensure a sustainable continuity.

The population histograms for Norway, Switzerland, and the EU for 2010 in the top line and the forecast for 2030 in the bottom line are illustrated in figure 23. It is obvious that the classical demographic pyramid is history and that we are currently observing a hexagon structure that should transfer into a rectangle by 2050 for most European countries. Two phenomena can be observed, the impact of low fertility and the effect of living longer. As Norway shows relatively high fertility rates, the evolution of their population basis (children and teenagers) is relatively constant. Switzerland, and more so the EU, are confronted with low fertility, resulting in a massive break-in of births, children, and teenagers in relation to the total population.

Furthermore, the largest generation (the baby-boomers) are retiring within the next decade, leading – as reflected in the changes in the dependency ratios – to massive population shifts towards more elderlies.
**Fig. 23:** Working age population & age dependency ratio in EU 27, Switzerland and Norway. Data: U.S. Census Bureau³.
There is no doubt that demographic ageing will occur all across Europe. The question if this transition becomes either a problem or an opportunity for civil societies, social welfare states, and their economies will be decided within the next years. One needs to discuss, without further delay and in a proactive manner, how to balance the unprecedented 20th century improvements in life expectancy with the so far untapped potential for longer individual productivity. The intergenerational dialog within our civil society, guided by policy makers, has to be centered on the following question: At what age should 21st century citizens retire since this sensitive age has to satisfy both the interests of young and elderly generations?

This discussion is urgent for the future fiscal health of each nation, and ultimately for each individual’s financial security. Europeans need to succeed in transforming the additional life years into some sort of measurable and taxable productivity. The key is therefore to establish a system that brings a benefit to all age groups. This means that the position and responsibility of elderly people in our society needs to be redefined without jeopardizing ethical standards, dignity and the principles of solidarity.

**Thoughts on the dependency ratio**

The “dependency ratio” provides a powerful insight into the economic impact of demographic changes as it provides a ratio for the dependent to the productive/taxable age groups within a society. But this measure is also somewhat misleading as it does not take unemployment rates into account. The retirement age is assumed to be 65 years, and the working age group is defined as people between 20 and 64 years. This makes the quotient a rather static tool. For example, it does not capture policy changes such as a postponement in retirement age and hence is no longer a really valid planning tool of the 21st century. In addition, it fails to capture any improvements in health or how good health could be translated in additional productivity.

In order to improve the planning impact of the dependency ratio, we propose to correct the working age group by considering
1. historical long term unemployment rates
2. a range for the dependency ratio depending on the retirement age
3. improvements in health status which makes working past the traditional retirement age a new and so far not maximized option

To make oneself familiar with the complex and diverse demographic shifts in EU 27, Norway and Switzerland, table 3 gives a comprehensive overview for the time period 2010 - 2030 about a country’s size, fertility levels, life expectancy at birth, relevant population cohorts and the resulting dependency ratios.
<table>
<thead>
<tr>
<th>Country</th>
<th>Population (in mio)</th>
<th>% of Europe</th>
<th>2010</th>
<th>2030</th>
<th>Change</th>
<th>Fertility 2010</th>
<th>2030</th>
<th>Change</th>
<th>Life Expectancy 2010</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>8.04</td>
<td>1.6%</td>
<td>8.08</td>
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**Table 3, part 1:** Total population, fertility rate and life expectancy at birth for EU 27, Norway and Switzerland during the time period 2010 – 2030. Data: Eurostat (Last update: May 27, 2011)^2.
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<td>46.6%</td>
<td>13.9%</td>
<td>24.8%</td>
</tr>
<tr>
<td>Max</td>
<td>20.6%</td>
<td>27.9%</td>
<td>5.9%</td>
<td>8.4%</td>
<td>54.0%</td>
<td>70.4%</td>
<td>31.2%</td>
<td>47.3%</td>
</tr>
</tbody>
</table>

**Table 3, part 2:** Percentage of total population aged 65+ and 80+ years, respectively, total dependency ratio and age dependency ratio for EU 27, Norway and Switzerland during the time period 2010 – 2030. Data: Eurostat (Last update: May 27, 2011)².
8. Example for Health Care in the Euregio Maas-Rhine

Traditionally, patients obtain medical treatments locally, mostly because the necessary medical infrastructure is locally installed. Language problems, hitherto existing legal and reimbursement differences and subjective perceptions of quality discrepancies in medical care have added to the foreclosure of the national health care systems. However, especially in border-zone areas with lower population densities it poses a significant financial threat to municipal healthcare providers to make the necessary infrastructure available, as more sophisticated medical care cannot be operated profitably only based on the homeland patient numbers. Consequently, today, patients located in border areas often do not have full access to all levels of medical care. This situation often occurs on both sides of the border, which strongly suggests setting up transboundary healthcare cooperation. In the long run, cross-border healthcare will enable competition between different healthcare systems, naturally leading to a subtle selection and improvement process of the medical structures involved. In the end, this process will culminate in a new European medical scheme that blends the best of its underlying parts.

“Euregio Maas-Rhine” – a success story

For several years now, the Euregio Maas-Rhine, a cross-border region situated between Belgium, The Netherlands and Germany around the city-corridor of Aachen-Maastricht-Hasselt-Liège with about 3.9 million inhabitants on an area of approximately 11.000 km², has been a European role model of such a cross-border health region. With three university hospitals in Aachen, Maastricht and Liège located in close proximity (~30 km) to each other, the region’s health care strategy emphasizes on establishing networks to install and improve transboundary health care and eldercare by cross-hospital allocation of tasks, cooperation in research and consolidated, specialized health centers. As a figurehead of the region, here the Health Card International, a groundbreaking product innovation for the European Union has been developed within the scope of the project IZOM.
For some years, the University Hospital Aachen (Aachener Universitaetsklinikum, UKA) and the academic hospital Maastricht (academisch ziekenhuis Maastricht, azM) have worked together on enabling border-crossing health. In the field of cardiovascular surgery their cooperation is currently most advanced. The Euregio Center of Vascular Disease Aachen/ Maastricht has been the first transnational vascular center to be certified by the German Association for Vascular Surgery. This success has been enabled by joining expertise, skills and resources. For example, both, the clinic of vascular surgery at the UKA and the “Hart en Vaat Centrum” at the azM are headed by the same person. Further, staffing is harmonized, so waiting periods for patients are shortened; and training and education of doctors are planned and carried out collectively, which allows for a knowledge transfer that both sites can profit from.7

Another important example of the successful cooperation of the two university hospitals in the health care market is the planned setup of the “Europe-Clinic”, which will be the first European university hospital – a joint venture of the UKA and the Maastricht Universitair Medisch Centrum, Maastricht (UMC+). The new European center of excellence shall be established at the European Science and Business Park AVANTIS, located right on the border between Germany and The Netherlands. The German-Dutch pilot project shall focus on selected, highly-specialized fields of competence, in particular a cardiovascular surgery center and a center for novel radiotherapy for cancer patients. The formation of the Europe-Clinic will be an important milestone on the way to intensified collaboration between the two universities and their dedicated goal of becoming a euregional reference center for leading-edge medical care. A feasibility study has shown that the planned further development of the existing cooperation in terms of the Europe-Clinic will have positive effects on quality, international competitiveness, clinical patient care, research and education.8 With the new institution, the hitherto unfavorable location with only unilateral catchment areas on each side of the border will be overcome. Additionally, the chance will emerge to share tasks and specialization in order to minimize costs for highly-specialized equipment and employees.9

In March 2010, the university hospital in Liège (Centre Hospitalier Universitaire de Liège, CHU) has joined the project corporation of the Particle Therapy Center “Euregio Maas-
Rhine” (PTC Euregio), in which the UKA and UMC+ have been cooperating for several years with the mission of creating a European center of reference in Particle Therapy, providing state-of-the-art radiation services for innovative research and treatment of cancer. Compassing three countries in its shareholder structure, the PTC Euregio is still one-of-a-kind, showing the successful development of cross-border healthcare.

In addition to the Europe-Clinic and PTC Euregio projects, starting in 2007, the UKA and UMC+ have further institutionalized their cooperation on the research and educational level by installing a rotation program for medical scientists. The program shall facilitate knowledge sharing and exchange of experiences thereby leading to top performances in research and education.  

The Euregio Maas-Rhine shows successfully that cross-border collaboration in healthcare is not only feasible and necessary on the way to an even more unified and harmonized Europe, it even has a multitude of positive effects on all parties involved: it drives innovation, improves patient-care and leads to an economic allocation of resources. But what kind of environment is necessary to foster the transnational cooperation, and what are the success factors that can be derived from the Aachen/ Maastricht example?

**Establish an environment of cooperation**
- Remove regulatory and reimbursement obstacles and promote cross-border initiatives
- Initiate cross-border integrated healthcare networks across all levels of care
- Establish specialized treatment and competence centers around care areas (oncology, cardiology, neurology)
- Allow for staff rotation and initiate collective research programs

**Promote a shift “from brick to technology”**
- Invest in technology for inside the hospitals that can improve clinical outcomes, process efficiency and increase quality
- Define the metrics – guidance from EU on minimum density levels for critical healthcare technology infrastructure
- Develop and use funding mechanisms for long term care and the use, maintenance and updating of equipment and the training of staff

*Position the Hospital within Integrated Healthcare Organisations*
- Organize Healthcare systems around local networks and territories
- Regroup and specialize treatment centres around care areas for optimal expertise and care: oncology, cardiology and neurology centres of excellence
- Enhance access to diagnosis by organizing HC infrastructure by territories network to mutualize primary care access
- Design and plan hospitals to ensure best clinical pathways and workflows – early referral from primary care to specialised diagnosis and treatment is critical
- Eliminate duplication and waste through use of IT
- Relevant long term technology planning and optimization of the workflow around it

*Leverage Healthcare IT*
- Use to improve medical consistency, patient safety, productivity and patient connectivity
- Many Pilots in Europe funded by EU & countries – be more proactive in showing to Mem States what works, how and why
- Connect hospital Depts and functions to each other, then connect hospitals to rest of healthcare system
- Promote faster uptake of homecare and telemedicine solutions to reduce need for patients to visit hospitals
- Resolve as a priority data privacy and transfer legislation in Europe that hinders optimal use of patient data for patient's and medical benefit

*Use EU money wisely and differently*
- Better use of EUSF, funds for the Digital Agenda and for training - these need to be integrated and made easier to use
- Support eligible EU Members to access available funds – often they are lacking resources to construct tenders
- Extend funds to allow for use and maintenance of capital equipment – ie partnership models over a longer time period
- Encourage innovative funding mechanisms – ie life cycle technology partnerships, including upgrades, service and training
- Encourage use of Digital Agenda funds in HCIT applications
- Funding mechanisms for training and education of medical and non medical staff and organisational management

Reflection to “Health in the Regions”:

Here is a Class III area, where it is possible to share and to live in the region as in the homeland.
B. Considerations for Realization for Health in the Regions
9. Beneficiaries in the European Regions or
Health for all people living in the Region

The top priority within “Health in the Regions” must be for the beneficiaries. The citizens and the patients stay in contact with the system through their life spans and most of the people in the border regions are of advanced aged. The Idea of Health in the Regions is to avoid longer distances in short time for medical care. A region gains attractiveness when the region has good medical provisions. Better provisions bring people to the area working there. Specific new medical establishments will generate new work for many people, especially woman remaining home in the regions (Fig. 24)

Low distances – optimal provisions

9. 1. Citizens
Citizens are paying for the system through taxes, insurance premiums, and quasi-taxes such as contributions to mandatory sickness funds. They pay regardless of their current health and expect coverage of appropriate care in case of personal need. The motivation for contributing to the system is high. The recognition of the need for wellness is an important indicator. Usually citizens know about the importance of health care when relatives, friends or others they know are ill or dying.

The Wellness segment is flourishing because people are especially motivated to contribute to their own health. When they are elderly they are motivated to make lifestyle changes such as smoking cessation and body weight reduction, which are measures that are generally accepted and adopted. Annual prophylactic tests are more accepted in the female population than among males. Those should be done in the Region. Movements to fight cancer and heart disease are on the rise and show good resonance. In parallel, our citizens greatly profit from prophylactic medicine through immunizations, hygienic standards, and protection in environment, traffic and work. Today people also commonly take a personal proactive approach to wellness, seeking information from the Internet.

Overall, there is an improving sense of readiness to contribute to one’s own health. People want to live as long as possible in the best condition possible, and are willing to care for
themselves by participating in preventative programs, which can be implemented in the new Euro-Regions.

9.2. Patients
The Health in the Regions is designed primarily for the Patient when he or she needs help from society as a whole. Today's ideal patient is emancipated, mobile and well informed, obtaining information from health care providers as well as by communication tools such as the Internet, lay-press, and the growing market of patient information resources. Patients can also gain information from their personal environment. The patients appreciate short distances and an optimal professional service within the regions he or she lives.

9.3. Education on Nutrition
The type and quality of the food we eat has an important influence on our personal lives. Unhealthy eating leads to diseases that could easily be prevented. In cases of high cholesterol, gout, and hypertension, nutritional changes are essential. The first changes are with diet, with pharmacological interventions following. Awareness of the dangers of overeating is increasing. The list of chronic disorders in which poor nutrition is the cause is long, ranging from obesity, diabetes and cardiovascular diseases to various forms of cancer and osteoporosis. All these diseases have a great social as well as economic impact. Therefore the inclusion of nutrition in all forms of preventive programs is essential. Educational programs are to be established in the Regions.

9.4. Prevention
Public health is a multicultural enterprise. In terms of medicine the purposes of social prevention are to control diseases (especially communicable diseases), to manage vaccination plans and to promote public health.

- The control of environmental factors is not a specific task of health care services, but there is a clear link to traffic, ambient microwave radiation, and air, noise, soil and food pollution.

- An increase in general levels of health education, focused on specific areas, can reduce the clinical manifestation of diseases.
Exposures to radiation and ionization (natural and artificial) are important risk factors to be identified. Public health services must define the overall levels of medical hazards observed in the environment.

Prevention is based on the accumulation of all medical observations and experience gained scientifically or empirically of the causes of disease. Predictors are categorized into four areas:

1. The individual area: Smoking and alcohol abuse are examples of risk factors that lead to diseases. Poor nutrition is also a factor.
2. The genomic area: There is increasing evidence for identifying genomic constellations that carry specific risks to the individual, such as for diabetes, Huntington chorea, etc.
3. The environmental area: Soil, water and air pollution both in traffic and at the workplace can stimulate specific diseases.
4. The social area: Social status, life events, conflicting situations and trauma, as well as a person's socioeconomic situation, have a significant impact on a person's vulnerability to disease, its severity and duration.

Predictors are indicators based on past experience and provide the basis for consequent prevention. Incentives are necessary to reward doctors for keeping people healthy rather than for curing them after they become seriously ill. It does not make much sense to lock the stable door after the horse has bolted. It would be better to pursue a timely avoidance strategy. The wisdom of preventing disease lies in our desire to continue enjoying a high quality of life in good health in old age. Prevention is the active application of prediction. Prevention by individuals includes all measures to correct lifestyle habits.

The patient usually takes responsibility for self-care, is interested in taking an active role in the decision making processes, and selects provisions based on his or her specific needs. Patients are easily motivated by their doctors. Compliance in keeping up with the recommendations is not always as good. For example, for patients with high blood pressure, cholesterol, or diabetes the compliance could certainly be improved. When both the patient and their doctors are challenged, there is a high potential to improve compliance. Problems may occur with patients who are illiterate, but modern information
technology might overcome this problem. Patient organizations help overcome these deficiencies too.

A stronger focus on patients and their families will lead to a paradigm shift from the current outdated model of curative medical procedures to prevention. The most important tasks of compulsory social health insurance schemes will be to provide more information and greater transparency in the delivery of quality medical treatment and care based on patient-oriented outcomes.

It must be emphasized that patient care must be based on effective modern medicine. In this context the patient is sometimes endangered by the system and must be protected against over care. Effective medicine implies that treatments are only done when indicated. Therefore, guidelines and consecutive classification will lead to a clear and transparent medical care concept. In creating transparency, the patient should see the bill of the provider, sign it and transfer it to the insurance company.

### 9.4.1. Prevention and Diagnostics in the Regions

The service portfolio is derived from the overall strategic concept of the health center. In the following, the maximum portfolio is presented which covers the lion’s share of the service portfolio of a nationwide outpatient care and can offer additional, specialized services. By means of this service range, the health center has the chance to regionally position itself as a medical center of excellence for German patients. In addition to the standard offerings of each specialization, various preventive check-up packages are offered.

Three typical check-up packages are provided by many centers, which can be complemented by additional offers. The portfolio can be further extended with wellness programs.

The basic package usually comprises a check-up of the patient's general physical condition and consists of the anamnesis, a physical exam, a detailed metabolism check based on in-vitro parameters including a stool test for concealed blood, and an ultrasound exam of the abdominal organs, thyroid and carotid arteries.
The extended package supplements the basic package with a fatty acid profile, the comprehensive analysis of the vitamin and mineral balance and a cardiovascular check with stress electrocardiogram, 24h blood pressure measurement and lung function test. Hence, this package represents a thorough check-up including the analysis of the cardiovascular state.

The comprehensive package embraces all medical services of the extended package plus specific supplemental preventive measures in the fields of cardiology, neurology, and oncology, so the screening tests are enlarged to include e.g. a 24h-electrocardiogram, a detailed analysis of the stool flora and an ultrasound scan of the heart.

The preventive measures often include a radiation-free radiologic exam (ultrasound or MRI). Ultrasound-scans are standard practice today while MRI-scans can be booked as supplement because of the significantly higher cost. Due to the radiation exposure, cardio-CT-scans are offered as part of a check-up package only in case of a previously diagnosed indication.

Further packages (e.g. diabetes, osteoporosis, athletes or traveler check-ups) are offered as add-ons to the three general check-up packages or as stand-alone check-ups.

In case the initial exams result in any diagnostic findings, the patient needs to receive immediate interdisciplinary treatment, which then might be the transition to outpatient or inpatient care in Germany.

9.5. Prediction and Early Detection

Prediction plays an important role in influencing risk-adapted behavior and in the prevention of diseases. This has become possible in the light of the enormous growth in knowledge. An individual can identify his or her own inherited risks by genomic investigation, and modern technologies provide promising indicators for new starting points in the fight against diseases such as diabetes or neurological disorders.

Predictors are inherited genetically or are acquired by lifestyle, environmental and social factors. Predictors can be identified by intensive studies in genetics, environmental hazards, social factors and lifestyles. Nutrition, smoking, alcohol, environmental pollution and a lack of exercise are already well-known risk factors.
Further intensive research at the molecular level, supplemented by clinical studies with regard to patients' compliance and tolerance patterns, is necessary to identify predictors for other specific diseases. Based on predictors, patients can be motivated toward prevention. Early detection can be done by screening of people at risk, as it is for women for mamma cancer, tuberculoses (x-ray) and retina for babies.

Benefits for labor.

9.6. Industry

Industry is a source of constant progress and innovation, as we are constantly seeking more efficient drugs with fewer side effects, better tools and devices, and better forms of diagnostic imaging in medicine. The transition of research to the clinic demands clinical studies. There are already existing industries for drugs, biomaterials, implants and devices. Industry will be challenged in a new Euro-Region. The pricing will be on both sides transparent and comparable.

9.7. Enterprises

In addition to the large industries, small enterprises are effectively dealing with niches, which are mostly welcome in the new Region. Those niches are important and are found in both small and medium enterprises. Although the market is large, it will only increase in size. This is one area where the potential for export is very large, and there are many hidden champions.
Fig. 24

A Lifespan in Health Care

Doctor / Medical Organization

Patient

Birth  Youth  Adulthood  Old Age  Death

- Active aging
- Professional activity
- Lifelong learning
- Education
- Life-long learning
- Prediction
- Retirement
- Rehabilitation
- Diagnostic and therapeutic interventions
10. Doctors and medical provisions in the Euregio

The medical provisions are in different levels known as Medical organizations (Fig. 25). In variant forms they can be applied in the regions.

10.1. General Practitioners (GP)

The General Practitioner (GP) plays a key role in the new Euro Regions, especially in Class I. He constitutes together with the patient the nucleus of the system. The GP is the first point of contact, cares for the patients over the duration of their treatment and is their “steward.” The role is defined partly as “primary care” or “family doctor.” This role has important social perspectives in the care for the patients, their family, the community and the integrated delivery system. In reality more duties are demanded in order to have the patient optimally cared for:

- In all situations, the GP evaluates the status of the patient, manages the provision of care at different levels and usually acts as the key provider.

- Additional tasks include the prevention and early detection of medical conditions observed in annual checkups, the coordination of referrals, medical advice, appropriate attention, advice on prevention, and building bridges between patient, family and the community.

- The GP provides care at home after hospitalization and for people for whom a hospital stay is not necessary.

In the past, the GP was the family doctor who attended a family over decades, giving recommendations and delivering health care at the home. In current conditions, health care is cheaper and more effective when a patient first visits a GP. Costs rise by 40% when a specialist or a hospital is used as the first contact by the patient.

The GP will play an increasingly important role in the future in the Regions. Costs can be reduced when patients visit a GP before seeing a specialist. Particular emphasis on organizing the bridges between GPs, specialists and health centers will be necessary.

The GP is subject to many demands and pressures. Providing care to patients at their homes requires the application of a wide range of techniques and services.
One example of this is that a modern practice should include the services of a trained nurse to provide significant assistance such as measuring blood pressure, establishing the patient's general condition and compliance to therapy. Nurses can make house calls and report when serious changes in the general condition are evident, enabling the GP to react properly. These services should be on call on a 24-hour basis where a group practice is present. This requires new regulation when a doctor sees patients over the frontier and act. Transfer of information could be enhanced by e-Health systems. The expanding role of GP services will require an adequate reimbursement per case.

GPs are normally registered with their national medical association, which monitors the quality of delivery of health care provided.

To facilitate the GP, the “Schwester Agnes Model” is excellent. The GP has 1-2 nurses assisting him. They make rounds, report to him and give him information when to go and see the patient. The assistant nurses make their rounds, blood pressure controls, control the compliancy of the patients, take blood samples etc. They will play an indispensable role, especially when the quantity of GPs is decreasing. They assist on overcoming the deficits.
10.2. Specialists

The development of medicine has resulted in an enormous amount of detailed information available for each specialized field. Specialists, by definition, provide expert care on specific problems and typically see patients only for a short period after referral by the GP or another specialist. When care at home is impossible, specialists often provide their services from special consulting rooms possibly linked to hospitals or clinics. They should be part of integrated services in hospitals. The specialists are specialized in the areas Class II - III.

Specialists deliver care mainly for outpatients in

- Ophthalmology
- Orthopaedics
- Plastic and reconstructive Surgery
- Clinical Genetics
- Gynaecology & Obstetrics
- Orthorhinolaryngology
- Dermatology
- Internal Medicine
- Cardiology
- Nephrology
- Pulmonology
- Infectology
- Immunology
- Haematology & Hemostaseology
- Oncology/Hepatology
- Diabetology
- Paediatrics
- Neurology
- Physical Medicine and Rehabilitation
- Psychiatry
- Lab Diagnostic Medicine
- Radiology – Imaging
- Geriatrics
Demography in the Euro-Regions (I,II) demands especially GP, Geriatric, Oncology, and Neurology.

Curricula for training in the specialist fields must be recognized Europe-wide. Within the 40 listed specialities there is a marked trend towards further subspecialisation. The subspecialization can be only delivered in Region Class III. Despite this development, there are still generalists in fields such as cardiology or gynaecology. In general, we need more GPs in Europe rather than more specialists.

Specialists are registered with their national medical associations, which monitor the quality of education and training of specialists. They act in this model beyond the frontiers. During their absence, specialists should have colleagues on call to ensure 24-hour service. The reimbursement of specialists should be decided on a case-by-case basis.

10.3. Medical Training

Education is a prerequisite for medical professionals in order to understand the whole market, and defining their own role within it is a central issue. They must base their role on clinical leadership. There is mutual medical training in the regions, they all learn from each other - this is a new chance for optimized health care.

University medical faculties have the responsibility of educating the next generation of doctors in the new demands for their professional services and in developing technologies. In particular, curricula of medical studies should emphasize the needs of both patients and society, as well as focus on process-oriented approaches recognizing that all diseases affect the whole patient. In the case of Aachen, a central Regional Medical School gives new intention.

10.4. Auxiliaries to Physicians

The doctor has additional support staff, such as nurses, technicians, or paramedics who can assist with therapy or care. They require special training too, in specific schools according to their specialty, with the opportunity for integration within universities.
Aside from medical doctors, cooperation and teamwork between nurses, nurse-practitioners, technicians and physicians’ assistants is extremely important in supporting effective medical care in the region.

An important part of the concept is the effective administration of health centers, which will be monitored by the medical associations and health authorities to assure required standards of quality are met and that patient needs and care are met, as well as to provide supervision of financial management.

Optimized workflow, competition, and preventive medicine are the most important approaches toward sustainable health care systems in the future. Modern information and communication systems are available for substantial support and have proven their feasibility already. For their efficient use, however, the necessary incentives and reimbursement systems are missing.

In addition to nurses and other support staff, there are a number of different types of medical institutions that help to provide health services for the population.
Fig. 25

Medical Organization

Professional Societies

NMA

National Medical Association

Universities
Medical Schools

Essential Arm

• Care for ambulant patients
• Home care
• GENERAL PRACTITIONER
• Specialists
• Round-the-clock availability

Training

Expanded Arm

• Care for in-patients
• Hospitals
• Various forms of hospital ownership

Extended Arm

• Care for in-patients
• Long-term hospitals
• Rehabilitation centers
• Care for the chronically ill, disabled, etc.
• Various forms of ownership

Schools for the Medical Professions

referral

Patient
Patient-Doctor Nucleus

- Responsible for their own lifestyle and habits
- Consults to assess medical needs
- Co-decides on therapy
- Gives informed consent
- Complies with medical recommendations
- Provides feedback
- Contributes financially

• Provides information
  Medical condition, treatment options and outcomes, cost of therapy, funding, patients' rights, patients' contribution to well-being and therapy, prevention, etc.

• Guides therapy choices
  Gatekeeper for access to medical services, specialist referral, guide to cost and funding, etc.

• Provides medical services
  Examination, diagnosis, therapeutic prescriptions, psychological help, health monitoring, health education, prevention, etc.
11. Centres of Provision in the European Regions

11.1. The Hospitals

General

The greatest share of healthcare expenditure (~34 %) is on hospitals. There are big efforts underway to reduce this cost. In order to obtain a more sustainable and affordable health care system we need to get out of a supply driven health care system. An intelligent mixture of public hospitals and private hospitals (including for profit and not for profit hospitals) are necessary. Most hospitals in Europe are public and are under intensive scrutiny by politicians, insurance companies and other institutions. Public hospitals have evolved out of a social commitment of the state to its people but represent a monopoly and do not fit to a European Healthcare Market. Severe action is needed: firstly in defining the services they provide, secondly in optimising overall organisational processes, and thirdly in freeing the hospitals from being providers of welfare. A special type of a hospital is designed entitled: “Euregio – Hospital”. This can be the source of redesigning the structure from a national rim. In a Regional concept the costs can be reduced while the quality is increased. The investments are shared and utilized optimally.

Hospitals

There are three major types of hospitals depending on the catchment-area.

Type A: Basis with departments for Internal Medicine
General Surgery with Anaesthesia
Gynaecology and Obstetrics

Type B: Central, additional disciplines

Type C: All medical disciplines required for medical schools.

Each type provides a specific range of services to the patient. A critically ill patient needs different care compared to another who is chronically ill. Emergencies require different criteria compared to those for non-life threatening situations.
The hospitals must define the services they can offer. It is unreasonable that all hospitals provide the same services at varying levels of quality. Which kind of services can be offered should depend on the frequency of the services needed and the standard at which they can be delivered. This is monitored by National Medical Associations and federal authorities.

Every hospital has more or less the same basic structure. Anaesthesia, Lab, X-Ray and auxiliary services provide the basic structure. Specialized structures, such as Surgery or Neurology define the classifications. A Class I hospital will have surgery, gynaecology and internal medicine, Class II more specialities and Class III exclusively specialities. Auxiliary structures are composed of nurses, technicians, administration, maintenance etc.

A hospital can only provide services that meet quality standards, managed by self-regulation but continuously monitored.

Many small units can be transferred to long-term hospitals, which are mostly located near the homes of patients.

An inherited difficulty is that hospital wards are separated for each speciality. Many beds are unused, especially at weekends. In a modern structure, wards of the classical type should no longer exist. Specialist beds should be provided on demand, but separated to increase the efficiency of specialized care.

Hospital beds are a constant topic of discussion. In Sweden there are 3,800 beds and in Ireland 101,000 beds per one million inhabitants. However, Sweden has 2,600 and Germany has 6,500 beds per one million people for acute care. There is an enormous mix of social welfare and medicine, which has to be separated.

Public hospitals generally offer admission on a 24 hour basis. The profile of hospital admissions varies in Europe: In the Netherlands there are 107,800 annual admissions per one million people, in Austria 286,000 admissions, whereby 99,000 are acute in the Netherlands and 264,000 in Austria. This wide variation can be best understood by examining deficiencies in the essential arm of medicine.
There are serious considerations that public hospitals act as integrated centres, serving a mix of in- and outpatients under the management of physicians. Critically ill patients, acute or chronic, with intensive and invasive diagnostics and therapy are source of concerted specific actions in hospitals.

There is a significant trend to reduce the length of stay in hospitals. Medicine will be more intensive, allowing the stay to be reduced. A new trend is the increase in day-clinics for minor treatments, as already seen in surgery or oncology. The ambulant sector must be enhanced and integrated into a medical supply chain from in-patient to day clinic to outpatient to housing visits, but has no place in hospitals.

There is an urgent need to reorganize the whole internal management structure of hospitals. Effective organization of a hospital requires a strict identification and assessment of all processes, and a clear organizational concept. There is a great potential for cost savings. Hospitals must define the services they offer based on accepted standards. There is room for a reduction of acute beds in most European countries by transferring excessive acute beds in Class I hospitals for the treatment of the chronically ill.

Besides the public hospitals more hospitals are run by NGOS, which follow the rational of the market mechanism but have to reinvest their profits into the hospital.

Public hospitals represent a monopoly. These should be transferred from public ownership to private holders as foundations or trusts, which can be managed and operated in the market economy. This has already taken place in some European countries, such as in Germany and Austria.

All optimised structures depend on adequate financing. The hospitals have to be financed according to their expenditure for each patient. This creates an open market and brings free competition. Quality control, monitoring and audits are inevitable and must be done by national authorities, which are a subsidiary arm within the whole European concept.
11.1.1. The Euregio Hospital

A specific aim is to define a Euregio Hospital in order to optimize Health Care in neighbouring regions. The size depends on the catchment area and makes sense in all II and III regions.

**Type Euregio:** The basis hospital in European-neighbouring areas, with a catchment area of at least 10,000 – 15,000 people (Class II).

This type with 100 beds has three wards with 25 beds each and departments such as
- Internal Medicine (25 beds)
- Surgery (25 beds)
- Gynaecology and Obstetrics (25 beds) (incl. baby care)

With a basis of
- Anaesthesia with care and blood banking
- Laboratory
- X-Ray with CT
- Physiotherapy
- Maintenance
- Administration

Locally, consultants are demanded for
- Urology
- HNO
- Neurology
- Geriatrics
- Orthopaedics
- Psychiatry (because it has the highest prevalence in the regions by far!)
To bring new incentives to a region additional special unities are linked to a Hospital.
The specific offer of a Euregio Hospital is the additional availability of 25 beds for special offers as in
- Gerontology
- Neurology
- Metabolism
- Dialysis
- Aesthetic Surgery

A specific idea is to link a Medical Centre to the Euregio Hospital.

With 100 beds the efficacy for a small hospital is good. It is important to attract additional patients to the area by offering special care. The rooms should be equipped like five star hotel rooms, so that the partner of the patient can stay with him or her in a nice ambiance for the duration of the hospital stay.

**Architecture**

The basic concept in architecture is to have a model for 100 beds; according to the demand this model can be enlarged to a multidisciplinary hospital with up to 500 beds. This should be the maximum. Larger hospitals seem not to be required in such Euregios. But if a hospital is to be built as a new type C hospital up to 1.000 beds for a Central Hospital in the region. A layout has been shown in Aachen (D) and proposed to Salzburg, Austria.

**Holder**

Non-profit hospitals are the best business model because they have to reinvest their profits into the development of the hospital and therefore into the future state of well being in the region. The Regions can establish Limited Companies.
Management

The Euregio Hospital should be managed in a market principle by private managers as well as facility managers. Both units are important to start off with a new concept in Healthcare.

11.1.2.

European University Hospital – Cooperation between Maastricht Universitair Medisch Centrum+ (MUMC+) and Universitätsklinikum Aachen (UKA). In the annex, an attempt of creating a European University Hospital for the region Salzburg – Berchtesgadener Land – Traunstein is presented.

Aachen and Maastricht are located at the border of their respective countries, but centrally in the Euregion Meuse-Rhine (EMR). With three countries (Belgium, Germany and The Netherlands), three languages and a population of approximately 3.9 million people, the EMR is a true “Europe in miniature”.

In the last decennium, cross border care has achieved a rather successful level in the EMR. The development followed different paths: Driven through the cooperation of health insurances, the EMR plays a pilot role in the field of transnational patient mobility. Another focus lies on the cooperation of hospitals. Maastricht Universitair Medisch Centrum+ (MUMC+) and Universitätsklinikum Aachen (UKA) are pioneers in that field: Their first exchange of patients and staff took place in the late eighties and was continuously intensified. Based on this strong fundament, MUMC+ and UKA intend to intensify their cooperation by creating a joint entity, the “European University Hospital” (EUH).

UKA and MUMC+ are both maximum care providers for their cities and surroundings as well as for the western part of Germany and the southern part of the Netherlands. Both are the youngest university hospitals in their countries respectively in the state North-Rhine-Westphalia.
The UKA received the status of a university hospital in 1966. After moving into a new building in 1985, the idea of putting patient care, teaching and research under one umbrella has been implemented. In the field of top level care, UKA focuses on cardiovascular medicine, neuro sciences, oncology and intensive care medicine. In cooperation with the RWTH Aachen University, “Medicine and Technology” is a core research area.

Maastricht UMC+ is the result of a merger between Maastricht University’s Faculty of Health, Medicine and Life Sciences, and the University Hospital Maastricht. Within Maastricht UMC+, general, top clinical and top referral, last resort care is combined with a strong health sciences component, specialized academic training, and cutting edge scientific research. The central concept underlying Maastricht UMC+ are multidisciplinary ‘chains for care, education, training and research’ in five focusing areas: cardiovascular diseases; mental health and neuroscience; oncology, chronic diseases with public health and primary care functions as a linking profile.

Together, MUMC+ and UKA treat about 80,000 in-patients and 550,000 out-patients annually. Both hospitals belong to the major employers in their regions. The distance between the two locations is 30 km, which implies only 30 minutes travel time.

After years of informal cooperation, MUMC+ and UKA signed a cooperation contract in June 2004. In 2008, a feasibility study confirmed the objectives and chances of further intensifying the cooperation.

The ambition of the partners is to go one step beyond than working together on a contractual basis: They want to function as a European University Hospital (EUH), with joint governance and highly specialized excellence centers as daughter organizations (e.g. European Cardiovascular Center of Excellence (ECVC), see “Milestones”). The EUH will ensure sustainable, high level health care at the existing locations in Aachen and Maastricht. Defined spin-offs and add-ons will be jointly developed as cross-border entities.

The intention to form a EUH was confirmed in a letter of intent signed by the executive boards as well as RWTH Aachen University and Maastricht University in 2010. Since then, the road map for developing the EUH and, as a major joint project, ECVC is work in
progress: The development and finalization of such a new cross border structure is challenging and requires close and joint consultation with all involved authorities in both countries. Therefore, the boards are engaged in a dialogue with their respective ministries and political stakeholders as well as in negotiations with potential industrial partners.

**Medical cooperation areas**

Key elements of the medical strategy are the concepts of “center of excellences”, “complementarity” and “networks”. To establish a center of excellence, outstanding clinical strengths on both sides are a prerequisite. In this case, a joint structure will lever the competitive situation as well as acquisition of third party funds or high potential staff. Complementary means that clinical strengths and/or technical equipment are mainly focused on one site. Either staff or patients will travel between UKA and MUMC+. In case of a balanced expertise but a local market the cooperation focuses on a network structure. An example for excellence as well as for complementarity and also the first milestone of the cooperation was the opening of the Vascular Center Aachen-Maastricht in 2005. In Germany, it was the first center to be accredited as cross border institution. The center is organized according to a “one center – two locations” model, with the director of the center being a specialist/professor both at UK Aachen and Maastricht UMC+. Research, education and advanced training are combined. Modern technologies like videoconferencing and data transfer via secured networks were implemented from the beginning. For example, the thoraco-abdominal aorta aneurysma procedure requires high-level expertise and a critical number of patients to be performed successfully. During this operation, neurophysiologic monitoring is needed. The neurophysiologists are based at MUMC+, and while the surgery is being done at UKA, the patient’s data are transferred to MUMC+ and the neurophysiologists communicate with their colleagues at UKA in real-time.

In the field of cardiovascular diseases, MUMC+’s and UKA’s vision is to build a joint center, the European Cardiovascular Center of Excellence (ECVC) on a unique, cross-border location, the Dutch-German Avantis Business Park. Currently, the business plan for this major project is being finalized. The ECVC will make the cooperation more visible and open the door for more joint entities.
Up to now many more projects were successfully realized: the departments of nuclear medicine of both UKA and MUMC+ are directed jointly by one specialist/professor. For defined procedures, staff as well as patients travel cross-border, depending on the availability of high-tech technical equipment. Medical doctors are appointed cross-border to provide highly specialized treatments, (e.g. in the field of neurosciences, such as deep brain stimulation and movement disorders), the divisions of pediatric surgery have joined forces, with a jointly employed children’s surgeon, and recently the first Dutch patient received a liver transplant at UKA’s new transplantation unit. In return, UKA refers German patients to MUMC+ for stem cell transplantation.

**Success factors & lessons learned**

Developing a cross-border cooperation of such intensity between two hospitals has proven to be very complex. In workaday reality, the partners have to put great effort in finding solutions for a range of questions concerning every aspect of academic medicine:

- Governance: Which legal structure should be implemented for a joint entity?
- Legal issues: Safeguarding of national rights (e.g. constitutional principle of research & teaching and its funding), status of academic hospitals and therefore tasks to fulfil in the area of education and research, funding of investments
- Patient care: Planning not in national, but in euregional context. Safeguarding of national patient rights and protocols (e.g. MRSA, quality assurances). Chance: combining “the best of two countries”.
- Awareness of cultural differences, both national and corporate
- Communication: in literal sense – which language to speak with patients, colleagues? Guiding principle is that patients should have a native speaker as contact person. In figurative sense – it should be clear on how the alliance fits the corporate strategy
- Adequate supportive structure: do we have alliance capability/capacity?
- Employees: How to deal with salary differences and differences in professional qualifications/authorizations?
- Health insurers: authorization of treatment abroad, differences of the health care systems, e.g. concerning reimbursement.
What is the message for the ER at the borders?

Much has been achieved already, but much remains to be done to implement the vision of a truly European University Hospital. The activities leading to the establishment of the EUH can function as a pilot project and model for European hospital cooperation and set the direction for future activities in the European Union.

A strong EUH offers significant improvements regarding patient care, research and teaching, but also reduces economic risk through economies of scale. About 4 million people living in the EMR will benefit directly from top-clinical care and research offered to them close to their home. For professionals, working in a top-level, international environment is very attractive. The combined effects of the EUH will strengthen the health sector, technology and life sciences in the EMR and stimulate the overall economic development of the region.
11.2. Medical Health Centres (MHC)

The Medical centres in the new Euregio are designed for a population of 10,000 people. The centres should contain specialists in:

- Internal Medicine with metabolism, esp. diabetes
- Cardiology
- Pulmonology
- Ophthalmology
- Psychosomatics/ Psychiatry
- Neurology
- Paediatrics
- Geriatrics
- Urology
- Gynaecology
- Dermatology
- Natural Medicine
- Nutrition
- Prevention
- Day clinic

Outpatient Services - Day Clinics

There is a good bit of creativity allowed for single offices, groups of offices, and doctor centers known as medical centers. Day clinics are up and coming for small operations or invasive examinations such as heart catheterization. New types are medical centers which include clusters of many specialists.

The processes for progressing the patient through the system are not yet clearly defined. Significant work on process analysis is necessary to elaborate the real cost situation, which is necessary for developing, planning and financing models. A special need is the establishing of real work flowcharts.
During their lifetime everyone will consume medical services: in childhood, adolescence, trauma, vaccination or illness. In 90% of the cases, the general practitioner will render the essential medical assistance. In the other 10%, care will be demanded in an expanded medical environment, both outside and inside hospitals. The provisions of all medical services are to be seen and organized as processes.

The development of medicine has resulted in an enormous amount of detailed information available on each specialised field. Specialists, by definition, provide expert care on specific problems and see patients mostly for a short period after referral by the GP or another specialist. Specialists provide their services often from special consulting rooms possibly linked to hospitals or clinics, when care at home is impossible. They should be part of integrated services in hospitals.

The specialists can offer their consultations in those Medical Centers for a minimum of a half day twice a week, which has a special charm for female doctors. For this volume 12 offices are required with 6 aids and secretaries.

The laboratory and x-ray is central, as is the administration. A drug store is complementary.

A day clinic is feasible for infusions, therapy, small surgeries. Many other clinical procedures can be offered to patients. Whenever a patient with a chronic condition is admitted, it shows that the integrated chain of out–patient-treatment has failed.

Investors:

This Medical Centres are taking the changing structures in medicine in account. Especially lady doctors with children would appreciate very much to practice for half a day twice a week. The Euregions have a deficit in doctors, which can be overcome. The Medical Centre can be linked to a Euregio Hospital.
Medical Health Centres with enlarged clientele

The setup of diagnostic outpatient centers with focus on foreign patient clientele can form an interesting component in the strategic mix of individual care providers. In this regard, particularly bundling diagnostic and therapeutic outpatient treatments in so-called diagnostic centers can play a central role. These diagnostic centers need to be established and aligned according to the selected orientation. Relevant criteria therefore are in particular the organizational and legal form, the accompanying infrastructure and the market image and appearance.

Ideally, the organizational and infrastructural setup of the centers shall be done separately from the existing institution with the goal to establish the diagnostic center as figurehead without a ward. Nonetheless, optimal patient care is guaranteed as patients with the need for inpatient treatment can be assigned to the already existing inpatient treatment facility or to a cooperation partner. Therefore, diagnostic centers can serve as referring body. There is an option for a day-clinic as well.

Other advantages of outpatient treatment are the transparent and clearly defined scope of service, the minimal time needs and - in most cases - the fact that follow-up treatments are not necessary, which significantly reduces patients’ inhibition threshold to seek treatment in the new region.

Outpatient diagnostic centers can bear any legal form according to German law and may be operated by any medical service provider defined under the German Code of Social Law (SGB V), either as individual or group practice. Owners can be physicians, psychotherapists, pharmacists, hospitals, screening or rehabilitation centers as well as providers of medical sundries. However, every diagnostic center needs to be managed and supervised by a physician.
In Germany, the operator of an outpatient diagnostic center for foreign patients (the patients from the new region) mainly has to grapple with two fee schedules that allow him to calculate prices for the services rendered. For publicly insured patients (insured in the statutory health insurance) and foreign patients from EU countries, whose government-run health insurers approve of the treatment in Germany, either the doctor's fee scale (Einheitlicher Bewertungsmaßstab - EBM) or compensation arrangements of foreign health insurers which closely follow the EBM apply.

Services and treatments provided to all other foreign patients are liquidated by individual invoice for private patients. The medical service providers are basically bound to the medical fee schedule (Gebührenordnung für Ärzte - GOÄ), which allows for fees of up to four times the charges per service possible according to the EBM.

A license as panel doctor is not a prerequisite for the treatment of foreign patients. The treating physician needs a license to practice medicine accredited in Germany and a license according to §30 GeWO (Trade, Commerce and Industry Regulation Act).

**11.3. Organization**

Organizationally, a model with medical specialists guaranteeing the medical competence on-site combined with a shared-service-center has proven itself. The shared-service-center is responsible for the professional management and the organizational and administrative set-up on the one hand and for providing marketing services, acquiring patients and customers on the other hand. The segregation between management of the center and medical specialists for providing medical attendance is an essential aspect from a legal point of view.
Fig. 27: Structure of a Medical Health Centre
### Table 4: Rooms for a Medical Health Centre

<table>
<thead>
<tr>
<th>TYPE MHC</th>
<th>PROGRAM</th>
<th>b</th>
<th>l</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>[N']</td>
<td>[m]</td>
<td>[m²]</td>
</tr>
</tbody>
</table>

#### 1.1 OUTPATIENT SERVICES - Day Clinics

- **1.1.1. Ordinations**
- **1.1.2. Shared Medical Checkup Room**
- **1.1.C Circulation Space**

#### 1.2 OUTPATIENT SERVICES - Day Clinics

- **1.2.1. Ordinations**
- **1.2.2. Shared Medical Checkup Room**
- **1.2.C. Circulation Space**

#### 2. FUNCTIONAL SPACE

- **2.1. X.RAY / Changing Area**
- **2.2. MR / Preparation / Control Area**
- **2.3. CT / Preparation / Changing**
- **2.4. Endoscopy**
- **2.5. Equipment Storage**
- **2.6. Med.-Depot**
- **2.7. Technical Space**
- **2.8. Circulation Space**

#### 3. OPERATION & INTENSIVE CARE

- **3.1. Induction / Reversal**
- **3.2. OR**
- **3.3. Workspace septic laseptic**
- **3.4. Waste Disposal**
- **3.5. 6-Beds Intens.Care**
- **3.6. Laboratory**
- **3.8. Circulation Space**

#### 4. ADMINISTRATION

- **4.1. Secretary**
- **4.2. Offices**
- **4.3. Archive**
- **4.4. Tea Kitchen**
- **4.5. Staff Recreation Room**
- **4.6. Staff WC M / M**
- **4.7. Staff Changing / Bathrooms M / M**
- **4.8. Circulation Space**

#### 5. SERVICES

- **5.1. Reception & Entry**
- **5.2. Waiting Hall**
- **5.3. Patient WC M / M / HC**
- **5.4. Circulation Space**

### Total

- **b**: 12
- **l**: 16
- **Space**: 210 [m²]
Fig. 28: Structure of a Medical Health Centre
Fig. 30: Front View
11.3. General Practitioner

The General Practitioner play an important role. The “Schwester Agnes” model is optimal for the region.

A special impact can be achieved, if the GP has assisting nurses as help, who make daily visits to patients who are handicapped or have to stay in bed. After their rounds they report to the GP and when problems do occur they recommend a visit by him. In Germany this has been named the “Schwester Agnes” service. This service is much appreciated and gives a better survey of patients outside the office with a long-term surveillance need, as measuring blood pressure, establishing the patient's general condition and compliance to therapy. Nurses can make home calls and report when serious changes in the general condition are evident, enabling the GP to react properly. These services should be on call on a 24 hour basis, where a group practice is present. Transfer of information could be enhanced by e-Health systems.

This enlarged role of GP services will require an adequate reimbursement per case, besides being salaried.

The GP is subject to many demands and pressures. Being in charge of patients in their homes requires the application of a wide range of techniques and services. Therefore, a modern practice should include, for example the service of a trained nurse able to provide significant assistance, such as measuring blood pressure, establishing the patient's general condition and compliance to therapy.

GPs are normally registered at their National Medical Association, who monitors the quality of delivery of Healthcare provided.
11.4. What is required?

1) E-Health – Telemedicine to smoothen the information
2) Pricing of provisions on a new basis – involvement of insurances
3) Pricing of drugs and medical aids
4) Legal constraints in the mutual acceptance of MD and information
5) Education
12. Market and Competitive Environment in European Regions

This chapter deals with an enlarged environment – the nucleus still remains the border regions.

12.1. Medical Tourists

Around the globe, medical tourism has established itself as a lucrative market. In today’s global world, more and more people strive to obtain the best possible medical treatment available - beyond national borders - and they are ready to cover the cost out of their own pockets, mainly due to the insufficient medical care provided in their home country. These patients travel to Germany for specialized treatments and particularly for special diagnostic and preventive examinations. They expect first-class medical care, high-end equipment, supreme comfort and excellent service. According to the medical journal “Deutsches Ärzteblatt” (issue 20, May 19th, 2006, p A1358), about 60’000 foreign patients create annual revenues in the triple-digit-million range. Despite the growing and improved medical infrastructure in Arab and Eastern-European countries, going forward, annually about 100’000 foreign self-pay patients can be expected in Germany alone. An international study produced for the international travel tradeshow in Berlin (ITB Berlin) also predicts ever-increasing patient numbers in this market segment.

Addressing health tourists serves an existing and ever-strongly-growing market which can be structured according to the patient origins and hence the underlying reasons for medical tourism. The wealthy upper-class in Arab and Eastern European countries is seeking for best-in-class treatment and diagnostics, while European and in particular British patients are looking for prompt medical attendance, as in their home countries they have to deal with long waiting periods.
12.2. EU-Patients

Patients from EU countries, e.g. from Great Britain or Poland, often are confronted with long waiting times for diagnostic exams or elective medical interventions and hence look for possibilities to access treatment abroad.

Following a series of rulings by the European Court of Justice, in 2008, the proposal for a directive to clarify the rights of patients to receive healthcare in another member state was released by the European Commission. In March 2011, an EU law has been formally adopted by the European Parliament and the Council of Ministers which now clarifies access to healthcare in another EU country and rules on reimbursement (EU Directive on the application of patients’ rights in cross-border healthcare (Directive n°2011/24/EU)). It now is certain that patients have the right to cost reimbursement for cross-border healthcare at the same amount they would receive in their own member state. Thus, in principal, a patient from an EU-member state can claim cost reimbursement up to the same amount that would have been paid had they obtained the treatment in their home country. Any additional costs arising have to be covered by the patients themselves.

There are several reasons for EU-patients to seek cross-border healthcare:

- treatment in their home country is not possible (91%)
- increased quality of treatment abroad (71%)
- treatment by a renowned specialist (69%)
- treatment without waiting times (64%)
- treatment abroad is cheaper (48%)

Germany takes in a leading position particularly with regard to short waiting times, but is also ranked top in terms of the overall performance of the medical care offered.

As a result of the new EU law, the EU commission expects an increase in EU medical tourism of 780’000 patients.

Due to the convenient transport connection (also grace to no-frills airlines), but mainly due to short waiting times, excellent quality of care and a good reputation regarding medical
care in general, it is expected that a large part of the EU patients will access treatment in Germany.\textsuperscript{15}

12.3. Service Portfolio

To determine the service portfolio, a scientifically tested\textsuperscript{16} and established approach\textsuperscript{17} has stood the test. The ultimate goal is to create an optimized investment offer by carving out the individual competitive advantages. The method examines four criteria and six influencing factors (see figure 27). By means of a standardized questionnaire and a moderated workshop, the method enables to identify capital expenditure requirements as well as opportunities and threats and results in concrete recommendations for action and for the development of the service portfolio.

With the help of the six influencing factors – target market, target group, business model, international reputation, revenues, service portfolio – both, the as-is analysis and the to-be concept are compiled and documented on dichotomic scales. Already by using this matrix, discrepancies can be discovered and assessed. In the next step, the strategy necessary to achieve the desired target state is developed, followed by the evaluation of the medical specializations: on a three-step scale, the suitability of the specializations is rated. By means of a dual comparison the individual influence factors are weighted in relationship to each other. Finally, the results can be analyzed and diagramed.
Fig. 31: Systematic Approach

**INFLUENCING FACTORS**

**SUPPLY-INDUCED SELECTION CRITERIA**

- **Economic Criteria**
  - Revenues/ Expenditures/ Investments/ Economic Risk

- **Medical Criteria**
  - Elective vs. Emergency Healthcare/ Individual Services/ High-risk treatments

- **Social Structure/ Infrastructure**
  - Capacities/ Intercultural Staff/ Existing Contacts Abroad

- **Reputation**
  - Certifications and Licenses/ Scientific Reputation

- **Revenues**
  - Profitability of the Service Portfolio

- **Service Portfolio**
  - Extent of the medical services offered to foreign patients

- **Business Model**
  - Capacities/ Investments/ Strategy

- **International Reputation**
  - Ranking of the institution

- **Target Group**
  - Premium patients vs. all patients

- **Target Market**
  - Geographic focus

**EXTERNAL INFLUENCING FACTORS**
12.4. Pricing

12.4.1 Prices of Diagnostic and Check-up Packages

The diagnostic and check-up centers that are primarily treating foreign direct payers count between 500 and 5'000 check-up patients annually, each of which generates revenues based on the scope of service of between 500 EUR and 3'000 EUR.

The price for the basic check-up on average is calculated at about 2'000 EUR; however, this price is depending on the exact configuration of the package. The price for providing basic expert cardiologic diagnostic is calculated at approximately 790 EUR.

12.4.2 Income Statement

The center management usually receives an allowance for its marketing efforts, patient acquisition, scheduling of appointments as well as the overall administrative services provided. A 20% return on sales can be achieved by good management of the health center.

Moreover, floor space can be subleased to dentists or other service providers in the healthcare sector, e.g. pharmacists, physiotherapists, and health insurers, which generates additional revenues.

Investments in furnishing and equipment of the doctors’ practices vary widely and are depending on the size of the center and the number of specializations offered. Approximately 5 million EUR in capital is needed to set up a well-equipped, internationally targeted health care center (excluding buildings), as usually in the first year of operation a net loss for the year incurs, investments need to be made and working capital needs to be built up. Capital needs can be assumed to increase to an amount of 15 to up to 30 million EUR in case investments in buildings are necessary.

12.5. What does it mean

In times of increasing cost in the healthcare sector several alternative courses of action arise for suppliers and consumers which allow them to operate in an optimal way within the new frameworks. As an answer to the worldwide changing awareness and concern for
health issues, diagnostic and check-up centers arise as a quite attractive business model within Germany. Apart from the legal and regulatory requirements that need to be adhered to when establishing such a center, an accurately defined service portfolio for the target market is of vital importance. The portfolio essentially determines the funds needed for the first equipment and marketing on the one hand as well as the achievable earnings on the other hand.

The market will continue to change considerably within the next years. Especially with regard to EU-patients development opportunities are available - to be put into practice they are only waiting for the starting signal from the policy-makers.
Diagnostics are an indispensable prerequisite in healthcare. Implementing the highest quality of diagnostic tools and platforms brings medical benefit to the patients and at the same time saves costs by enabling precise and timely diagnosis and treatment decisions. To ensure all provisions in a region at short distance it is important to establish laboratory medicine as an integral part of patient care and to provide integrated and efficient solutions in order to benefit from synergies and to contribute to a broad healthcare coverage despite frontiers or distances.

Scientific progress, new technologies and changing demographics are among the trends expanding the healthcare market. On the other hand, there is mounting pressure on healthcare budgets and costs worldwide. Diagnostics can capitalise on all these trends by translating scientific insights into products that bring patients real medical benefit and, at the same time, contribute to significant cost savings. Enabling precise and timely disease diagnosis and treatments to be targeted at the patients most likely to benefit from, is of great value, both for the well-being of the patient and in allocating medical resources where they will be most effective. Performed in a laboratory or at the point of care on blood, tissue and other samples from patients, In-Vitro Diagnostics (IVD) tests are a critical source of objective information helping doctors detect diseases, select appropriate treatments and monitor patients’ responses to care. In addition, scientists use the diagnostic devices to gain a better understanding of the causes of disease and to discover new treatments. Diagnostics’ contribution to patient care and therapy guidance, its great potential in early diagnosis and prevention, and its role in drug discovery needs revaluation and should be getting more attention from all stakeholders. IVD testing is the basis for better decisions in healthcare and it also supports decision making of policy makers who want to offer the best healthcare for the money.

It is very important that reimbursement systems look at the level of innovation in a new product as well as at the benefit for patients. Reimbursement authorities need to recognise the value that Diagnostics brings to the overall healthcare system from an outcome and a cost perspective.
13.1. Improving testing efficiency

Testing efficiency is enormously important in a clinical laboratory. The streamlining and automating of lab processes means savings in resources and faster results, while the accuracy of the results remains uniformly high. Testing components, visualisation, analysis units and workflow management systems have been continuously improved to include new technologies and simplify processes, while meeting the requirements of all customers regardless of lab size, location or testing experience. Lab managers need guarantees of quality, reliability and safety. At the same time, they need to maximise sample flows to leverage maximum performance from their laboratories. Automated systems, such as continuous loading to simplify routines, cap-piercing for increased efficiency and safety, bar-coded and calibrated reagents to reduce hands-on time or interchangeable reagents and consumables for increased flexibility of use, increase efficiency and productivity, thus enabling lab managers to meet their targets and turnaround time as well as to provide rapidly high quality test results at low cost. In addition to streamlining and automating processes, comprehensive and personalised workflow solutions add value to the human aspect of laboratory workflows such as easy handling and flexible allocation of human resource.

13.2. Demonstrating medical value

Medical value is becoming the driver of differentiation in the diagnostics market, contributing to the revaluation of IVDs. Despite their fundamental impact on the majority of clinical decisions, IVDs currently account for less than 2% of medical spending\textsuperscript{20} and are clearly undervalued. There are two main categories of diagnostics that contribute to better healthcare decisions. On the one hand, diagnostic testing on a stand-alone basis offers not only value through the diagnosis itself, but also through screening for redisposition and prevention of disease, as well as for prognosis and therapy monitoring. On the other hand, companion diagnostics are tests that enable doctors to identify the patients most likely to benefit from a particular treatment and/or to monitor their responses to it.
13.3. Deploying diagnostic tests in drug development

Diagnostics is crucial to help increase Research and Development (R&D) productivity and develop more targeted medicines. Today sophisticated technologies and molecular insights are available to better understand the root causes of diseases, to develop and adjust treatment to the patients’ specific needs. The challenge is to manage the vast and continually expanding volume of molecular insights and to translate it into products with high medical value for physicians and patients. In pharmaceutical R&D, diagnostics has many uses, from identifying new therapeutic targets and screening out unpromising drug candidates to selecting appropriate patient populations for clinical trials. Biomarker tests increasingly provide invaluable information for early diagnosis as well as information about disease predisposition, prognosis and the likelihood of treatment response. For the first time in the history of medical science diagnosis and therapy are meeting on common ground – the molecular level. Today, molecular diagnostics and the discovery and validation of biomarkers are essential to realising the promise of Personalised Healthcare. As Personalised Healthcare strengthens its foothold, the diagnostic industry is confident to see recognition for the value of diagnostics from all stakeholders (See chapter 3, Personalised Healthcare).

13.4. Laboratory medicine as integral part of patient care.

The landscape of medical laboratories is diverse. There are established laboratories of different sizes, networks of laboratories, university facilities, hospital laboratories and associations of university and hospital laboratories. This diversity is important as it is a sign of healthy development and a very good basis to serve different customer needs. Whether it is a commercial lab, hospital lab or a hospital network, they provide a broad range of innovative diagnostic tests and analysers that play an essential role in integrated healthcare solutions. Efficient laboratory diagnosis includes not only providing reliable test results in terms of a technical service. The dialogue with the doctors from hospitals and practices is essential, too. Laboratory medicine with its specific core competencies must be established as a consultant to the doctors: Which marker brings a real added value for the patient? What conclusions are derived from the measured values? The dialogue between laboratory and clinic needs to be intensified in the future, because both sides will
be making together not only the diagnosis but also common treatment decisions especially under the aspect of personalised medicine and companion diagnostics.


Particularly hospitals as key healthcare providers, experience the gap between the funding opportunities guaranteed by the sickness funds or government taxes and opportunities for innovation provided by the industry to their doctors and thus indirectly to patients. Innovation is nowadays more and more assessed on the basis of whether it means progress for the insurance companies. From an insurance company's perspective progress is understood not only as increased medical efficacy, but also as improved cost-effectiveness. From the point of view of the treating physician it is only the medical value that is important. Nevertheless, higher quality of care, patient satisfaction and profitability do go hand in hand. This correlation may seem surprising at first glance, but it can be illustrated with examples from laboratory diagnostic.

For example, preeclampsia is a condition in pregnant women that affects about 3 to 7 percent of all pregnancies. It is responsible for about 18 percent of maternal deaths in the U.S. alone, and has a large impact upon healthcare systems. An automated test has been developed to diagnose women with preeclampsia by measuring two biomarkers: PIGF (placenta growth factor) and sFlt-1 (Soluble fms-like tyrosine kinase-1). This test was launched in Europe in January 2009. Before that, no specific test was available. These two markers identify pregnant women most likely to progress to preeclampsia at an earlier stage. It allows for closer prenatal monitoring, early diagnosis and timely intervention in order to potentially reduce mortalities.

This example shows that the earlier an accurate diagnosis can be made, the sooner patients can be treated effectively. The first is an important factor for patient satisfaction; the other is the initiation of appropriate therapeutic measures at the earliest possible point in time and therefore cost effective.

Both public and private hospitals must be measured against criteria such as efficiency, quality and patient satisfaction. Modern laboratory diagnostics can help in two ways:
Firstly, early and accurate diagnosis increases the quality of care and patient satisfaction because patients receive the right treatment more quickly. Secondly, it leads to greater efficiency because of reduced resource consumption and increased performance. Thereby, hospitals can do a great step towards cost savings.

It is important that quality in laboratory medicine is maintained and that doctors and patients can benefit from high quality diagnostics. Therefore, it must be ensured that laboratory medicine can progress by implementing new parameters and innovative analyzing systems.
Benefits of innovative solutions for diagnostics in hospitals

Medical Value
- Increasing Quality of Care

Efficiency
- Decreasing Use of Resources

Increasing Patient Satisfaction
- Recommendation
- Better Reputation

Decreasing Labour and Material Costs
- Better Performance
- Higher Output

Rising Expectations of Patients

Rising Financial Pressure

Fig. 32: Benefits of innovative solutions for diagnostics in hospitals
13.6. Sustainable improvement in quality and capacity laboratory diagnostics:
Optimized laboratory organisation in the Region

Laboratories are expected to perform consistent reliable and high-quality diagnostics, while achieving optimum workflow and maximum throughput. Lab managers have strict quality standards, but also demanding productivity targets. Diagnostics solutions have to help lab managers to run their laboratories more efficiently using a combination of advanced technology and intelligent workflow while reducing opportunities for human variability.

Laboratory organisation means more than optimising the technical processes. The focus of laboratory organisation is the development of an individual concept for sustainably increased capacity, economic efficiency and quality. Here providers of diagnostic solutions become close partners of medical laboratories. Together they define targets of the optimisation, such as the organisation and structure of the laboratory (processes, lab platforms, IT-infrastructure, pre- and post-analytics as well as interconnectedness), planning of resources (technical expenditures and human resources, including training of the lab personnel), spatial planning and cost reports.

13.7. Close collaboration and the creation of laboratory networks increases competitiveness and ensures broad medical care coverage in the Region

Competition in the hospital market forces individual clinics to move closer together. Today there are hardly any hospitals that do not yet collaborate with other clinics. The cooperation possibilities range from maintenance and administration services to diagnostic disciplines as well as to core medical services. The advantages of laboratory networks are diverse:

- **Market orientation:**
  - Competitive advantages and increased revenue through patient care based on high quality laboratory diagnostics.
  - Better support of clinics, including better management of their requests by laboratory diagnostic expertise.
− **Process optimisation:**

  o Quality and efficiency gains through consolidation with useful allocation of parameters and systems, as well as high-capacity IT.
  o Compatible overall concept for all individual clinics with comparable data of patients and flexible allocation of human-resources.

− **Purchasing bundling:**

  o Exploiting potential volume discount through product harmonisation and reduction of expenses through electronic order processing.

Another positive outcome is the so-called “satellite-structure-laboratories”. They contribute to a broad healthcare coverage and especially foster healthcare coverage in rural regions. Within such networks, local hospitals and comprehensive care centres can focus on their role in the healthcare system. Comprehensive care centres and smaller hospitals and/or group practices and laboratory networks carry out the basic healthcare in remote regions. Additionally, doctors have direct access to specialised healthcare in a central hospital with fully equipped laboratories and specialist doctors.

One result of the emergence of networks is the increasing demand in smaller hospitals, emergency rooms and doctors’ offices for a solution between the point-of-care testing with handy tools and the extensive facilities of a routine laboratory.
Fig. 33: Example of a laboratory network: optimised structures and processes through standardisation, quality management and common IT platform
<table>
<thead>
<tr>
<th>Description</th>
<th>Central laboratory</th>
<th>Basic laboratory</th>
<th>Emergency-laboratory</th>
<th>Point-of-care-Diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxim</td>
<td>Cost efficiency</td>
<td>Speed</td>
<td>Speed, no sample preparation</td>
<td></td>
</tr>
<tr>
<td>Categorisation</td>
<td>- Main lab in the network</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Bigger hospital</td>
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</tr>
<tr>
<td></td>
<td>- Academic head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Smaller hospital-lab in the network with strong throughput</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- economically advantageous length of sample series</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Smaller hospital-lab in the network</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Ward diagnostics, no laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- No sample preparation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of parameter</td>
<td>Routine- and specific parameter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Selective routine parameter</td>
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<td></td>
<td>timecritical parameter</td>
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<td></td>
<td>Emergency parameter, Vital diagnostic</td>
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<td>Turnaround time</td>
<td>&gt;2h</td>
<td>&gt;2h</td>
<td>&gt;1h</td>
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<td>Adapted</td>
<td>Low</td>
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</tr>
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<td>Professional lab personnel</td>
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<td></td>
<td>Professional lab personnel</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Ward personnel</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Tab 5:** Modules of a laboratory network (addendum fig. 34)
13.8. Point-of-Care testing vitally completes the mix of diagnostic healthcare solutions

Point-of-care (POC) testing is the term for near-patient testing. This means that tests can be conducted directly by a doctor or at the ward and do not have to be sent to a central laboratory. The handling of these tests is easy, since they can be carried out without extensive sample preparation and results are available within a short time. The results of POC testing can be instantly discussed with the patient and any necessary actions are taken immediately. Because of the rapid results, point-of-care products are often used in emergency rooms, intensive care units or by private practitioners. Parameters that indicate heart disease, metabolic disorders, kidney or liver disease (e.g. blood glucose, cardiac markers and blood gases) are usually tested this way.

The main benefits of POC testing are diverse. Firstly, it leads to better patient outcomes. Immediate diagnosis enables treatment to begin without delay, while early therapy intervention and subsequent disease monitoring help to reduce complications. Secondly, it improves the workflow because rapid availability of the test results enables both patient testing and consultation in a single visit, and office efficiency can be improved by reducing administrative work associated with lab testing. And finally, it helps leveraging IT. Point-of-Care Analyzers can be integrated into the hospital network by using specific software applications. This allows efficient POC quality assurance from a central location. Thanks to web-based applications, the documentation of all relevant data is ensured and data are accessible from anywhere in the hospital network.

13.9. Diagnostic devices for Patient Self-Management (PSM)

In various countries the concept of Patient-Self-Testing is employed, while in some countries even Patient-Self-Management is being practiced. Here the patients do not only test themselves at home, but they are also trained to adjust their lifestyle and medication based on their results (e.g. blood glucose monitoring, oral anticoagulation management). PSM, based on precise, simple and fast diagnostic devices, increases the time patients are in range and reduce adverse events. For example, coagulation monitoring devices are used when patients need to take oral anticoagulants, e.g. to reduce their risk of thrombosis. Especially for patients who must be treated continuously (e.g. persons with
atrial fibrillation), it is helpful to monitor their own coagulation values and to adjust the dose of the medicine on their own every week instead of every month at the doctor’s office. Thereby, they can more easily keep their values within the therapeutic range and avoid complications. Recent studies\textsuperscript{22} have shown that PSM contributes to improved quality of life of patients and is more cost effective than other methods of coagulation monitoring. Hence, this brings savings effects for the entire healthcare system.

\textbf{13.10. Personalised Healthcare (PHC): Fitting the treatments to the patients}

Personalised Healthcare is based on the observation that patient groups with the same diagnosis react to the same treatment in different ways: While a drug can be highly effective for one patient, the same drug might not show the desired results when given to another patient group with the same diagnosis. Disease-related as well as disease-independent individual characteristics influence the way drugs work with the consequence that conventionally practised healthcare is not as effective as it could be. Considerable numbers of patients receive treatment that is suboptimal for them or that may cause adverse reactions in some cases. PHC thus has the potential to increase the efficacy and safety of treatment. It is an approach which capitalises on our increasingly sophisticated understanding of differences among patients, the molecular basis of disease and of how medicines work. This has enormous potential to make healthcare better, safer and more effective for patients, physicians, payers, and society at large.

People in the Regions are elder on average. Greater life expectancy means a rise in age-related diseases such as cancer, diabetes, rheumatoid arthritis, Parkinson’s and Alzheimer’s disease. This is not only true for the industrialised world but increasingly for developing countries and emerging markets too. Moreover, there are still no effective therapies for some 5,000 diseases, and patients’ response to existing drugs is often unsatisfactory. Consequently, there is a substantial unmet medical need and an increasing demand for more targeted diagnostics and more effective and better-tolerated therapies.

Targeted and cost-effective therapies can play a key role in overcoming current challenges in the healthcare sector. State-of-the-art diagnostics will also become increasingly significant in a rational healthcare system. However, diagnostics currently account for only
around 2% of healthcare spending, yet around 70%\textsuperscript{23} of all medical decisions depend on accurate and fast diagnosis.

Personalised Healthcare adds true medical value to healthcare by providing targeted treatments, increasing the quality of life and by being more cost-effective. While the full potential of Personalised Healthcare will only be realised in a stepwise fashion, there are already a number of successful examples that show a clear shift away from the "one size fits all" approach, towards more targeted medicines and response-guided therapies. By taking the individual characteristics of patients and their diseases (e.g. cancer subtypes) into account, PHC has the potential to:

- Improve understanding of disease diversity and subtypes;
- Identify patients who are at increased risk of suffering from a certain disease and create opportunities to begin preventive measures before the disease develops
- Allow a more precise diagnostic and prognostic assessment of patients with the chance of earlier and more specific treatment
- Provide the diagnostic tests which help to identify patients who are most likely to respond to a specific treatment – helping to avoid treatment without benefit ("trial-and-error prescribing")
- Allow a faster, less burdensome and less expensive drug approval process by conducting trials on smaller patient subgroups qualified by specific biomarkers
- Aid in the development of safer treatments, thus reducing the risks and costs of adverse events and thereby improve the overall cost-effectiveness of care.
13.11. Diagnostics in the future:

“Integration of In-Vitro and In Vivo Diagnostics“

Over the recent years technological developments like genome sequencing, gene and protein array, new biomarkers, circulating tumor cells, microfluid devices for diagnostic applications, laser diagnostics, “metabolomics“, Liquid chromatography - Mass Spectroscopy, biosensors, as well as optimized imaging tools e.g. developments in computertomography, magnetic resonance tomography, new tracers for PET CT, nanoparticles for imaging and therapy and new software solutions have offered improvements and new directions in patient needs and management.

In addition to this, today the integration of diagnosis and treatment is becoming more and more state of the art. One of the first examples is the characterization of a subset of breast cancers as being “HER-2 positive“ and based on this the initiation of a therapy with Herceptin (trastuzmab), a humanized monoclonal antibody that has been cleared by FDA for treatment of these breast cancer patients

The improvement of patient diagnosis at an early point in time of a disease is triggered by the generally accepted assumption that early diagnosis and intervention improve the patient outcome. This has been proven for e.g. breast cancer, where early detection reduces expenses for therapeutic intervention by up to 85 % on one side and increases survival rates up to three times. In cases of cardiac disease early intervention after a clear cut diagnosis reduces the annual treatment cost by around $ 60 billion US dollars.

Having in mind the fact of upcoming demographic changes there will be more and more elderly people in more or less all countries of the world and knowing the fact that the main treatment costs arise later in life, early diagnosis could impact this medico-economic burden by demographic changes.

Furthermore improvement in diagnosis stands in the focus of healthcare providers to improve management and process efficiency in order to control/reduce today’s increasing healthcare costs.
Besides the integration of diagnosis and treatment in days of an increasing number of personalized/individualized therapeutic tools, the integration of in-vitro diagnostics tests and imaging tests will become important and the goal has to be to link existing and new diagnostics opportunities in the most efficient way in order to improve patients care at any time point of a disease within the range of the financial situation of healthcare systems.

The pillars of an integrated diagnostics should be:

− Detection of a disease at the earliest time point and therefore before it has progressed or produced symptoms with high sensitivity and specificity
− Opportunities for improved characterization of the disease in order to trigger – if possible – individualized/personalized therapies
− Opportunity to investigate the disease throughout the whole time-course of the disease
− Opportunity to guide therapies and therefore to stratify patients with regard to the probability to respond to certain therapies
− Integrated diagnostics should be reachable to all patients at acceptable costs and easy to access
− Genetic methods to identify patient’s predisposition or increased risk to develop diseases
− Biomarkers link with the pathogenesis of diseases
− Biomarkers of the future should become available as POC assay that fit to the results of laboratory tests
− Integrated diagnostics should give answers to:
  o Disease predisposition
  o Detection of disease
  o Molecular characterization of the disease
  o Prediction of response to therapy
  o Prognosis of the patient with a specific disease
  o Monitoring the effect of therapy

According to the World Health Organization the annual global healthcare expenditure costs are estimated to be approximately 4.7 trillion USD. It is believed that a huge amount
of these costs are generated by duplicate or even triplicate diagnostic analyses. In certain cases these are not necessary. Nevertheless, a differentiated view is important. For example In-Vitro-Diagnostics have a fundamental impact on the majority of clinical decisions (therapy guidance, early diagnosis and prevention), but IVD currently account for less than 2% of medical spending.

In addition to this it is common knowledge that ineffective treatment and adverse drug reactions generate a great amount of costs. Here, effective diagnostics of high quality contributes to overall cost savings and will have an impact on the quality of life of patients.

The range of diagnostic devices is broad and covers full automated laboratories for specialised big hospitals as well as Point-of-Care tools for smaller hospitals and general practitioners as well as solutions for Patient Self-Management. On the basis of common IT-platforms laboratory networks can be established which connect the know-how of big hospitals with smaller ones as well as general medical practices fostering health care in general and especially in remote areas.

Because the optimal way of integrating In-Vitro and In Vivo diagnostics might become possible in centers focusing on specific diseases only, and as there are publications proving that diagnosis and therapy in centers is the most beneficial way to improve patient care it should be considered to build centers following up patients after initial diagnosis by the broader basis of the medical community.
14. Metabolic Syndrome - Diabetes - Obesity

14.1. Managing Diabetes as example – working towards a response to the chronic disease challenge

Chronic diseases are on the rise, obesity and diabetes are typical examples. Containing the damage caused by diabetes means strengthening the patient’s role and supporting the doctor-patient relationship. A closer look at current management practices reveals that individualized diabetes management could bring significant benefit, as individual patients’ disease patterns can differ markedly. Simple tools and e-based decision support can help in individualizing diabetes management while supporting family practitioners in their duties and integrating nurses and other caregivers into diabetes management. This could enhance diabetes care particularly in remote areas.

Managing chronic diseases is a challenge which is faced by all health systems in Europe. The European Commission estimates that 86% of all deaths in Europe are attributable to major and chronic diseases, including cardiovascular disease, cancer, mental health problems, diabetes mellitus, chronic respiratory disease, and musculoskeletal conditions. This presents a particular challenge to remote areas, where most of the medical care is provided by family doctors.

Diabetes mellitus is in many ways a typical example of the challenges caused by chronic diseases, and of possible solutions in support of those providing chronic care. Diabetes is among the leading chronic diseases in Europe, with the number of people with diabetes in EU expected to rise from approximately 55.2 million in 2010 to 66.2 million people in 2030. Diabetes is dangerous due to its secondary complications and co-morbidities. If not properly managed, the disease can lead to rising blood glucose levels and result in long-term damage to tissue and organs, causing cardiovascular, renal, neural, and eye disease. Less known to many, diabetes is also suspected to be a risk factor of dementia.

If patients develop secondary complications, their prognosis deteriorates as the risk of further severe complications or even death can rise significantly. For instance,
cardiovascular disease is the most common complication and major cause of death in people with diabetes. In most populations at least 50% of people with diabetes die from cardiovascular disease. They are two to four times more likely to develop cardiovascular disease than people without diabetes, and they have the same risk of heart attack as people without diabetes who have already had a heart attack. People with diabetes are also 15-40 times more likely to require a lower limb amputation compared to the general population. Diabetes is also linked to renal disease. In many countries it has become the single most common cause of end-stage renal disease or kidney failure, a condition requiring dialysis or kidney transplantation.

Complications are also an important economic factor. Healthcare expenditures on diabetes are expected to account for 11.6% of the total healthcare expenditure in the world in 2010. About half of this cost can be attributed to managing diabetes-related complications.

**Diabetes can be managed**

Diabetes-related complications are dangerous, but they are preventable by keeping blood glucose levels near to norm. Current standards are focused on long-term blood glucose levels as measured by a patient’s HbA1c value as the average blood glucose over an eight-to twelve-week period, together with other secondary parameters such as lipids. Fact is that only a small portion of patients with type 2 diabetes achieve good glycaemic control even after years of therapy. HbA1c is a “surrogate” marker for the risk of future diabetes-related complications and thus only a substitute for a clinically meaningful endpoint. Recent research has highlighted the importance of glycaemic variability or the degree to which blood glucose levels vary over the course of a day. Fluctuating glucose levels have been shown to have a negative effect in patients with type 1 diabetes. Glucose variability was predictive for diabetes-related complications. Glycaemic peaks
after meals have been demonstrated to be a direct contributor and independent risk factor to developing cardiovascular complications. But these would not be identified by measuring HbA1c. In fact, two individuals can have the same HbA1c level but different glycaemic profiles, if one person’s glycaemic load is fairly balanced over the course of a day while the other experiences glycaemic peaks and dives after meal, during exercise, under stress etc. In that case, person number two would have a less favourable glycaemic profile and require a different therapeutic approach than person number one.

Assuming that both patients in the above example have type 2 diabetes not treated with insulin – representing the majority of people with diabetes – a general practitioner would most likely recommend similar therapy for both and focus on monitoring with no further action required at this stage.
Figure 34: Two patients with diabetes presenting the same HbA1c, but different “glycaemic variability”
Blood glucose monitoring reveals individual patterns

With the introduction of self-monitoring solutions in the 1970s, people with diabetes have gained considerable freedom and quality of life, by no longer having to check into a hospital or doctor's office for the monitoring procedure. Today, people with diabetes can check their blood glucose levels at work, while travelling, when exercising, and even make the necessary therapy adjustments. This is a prerequisite to being able to lead close-to-normal lives, and particularly so in remote regions with limited access to medical care.

The benefit of self-monitoring of blood glucose is established and supported by evidence for people with type 1 diabetes\textsuperscript{39,40} and type 2 diabetes treated with insulin\textsuperscript{41,42}. However, studies on the benefit of it in people with type 2 diabetes not treated with insulin have produced mixed results, with some showing significant benefits\textsuperscript{43,44,45} and others showing no significant benefits\textsuperscript{46,47}. Given the population in question and the need to deploy scarce healthcare resources in the best possible way, it is important to gain clarity on whether or not self-monitoring of blood glucose is worth its investment in people with type 2 diabetes not treated with insulin\textsuperscript{48}.

Self-monitoring blood glucose is an essential addition to HbA1c-measurement because it can distinguish among fasting, pre-prandial (before meal) and postprandial (after meal) elevated blood glucose levels. Thus assessing the glycaemic variability and documenting hypoglycaemic events\textsuperscript{49} if properly used.

Given the fact that blood glucose levels vary before and after eating or during exercise and thus depending on the time of day, it may be worth to adapt the timing and structure of self-monitoring to the daily routine. This is what a team of US scientists have done in the STeP (Structured Testing Protocol) study with poorly-controlled people with type 2
diabetes not treated with insulin. Study participants were asked to use a specific blood glucose monitoring device and a paper-based data form to record and graphically visualise their blood glucose data at seven time points per day over three consecutive days every three months, along with comments on what and how much they had eaten, information on exercise etc. In quarterly appointments with their physicians, the data sheets were used to discuss individual glucose patterns and to optimize therapy. Therapy outcomes after 12 months were compared to those of a control group which received usual care (but no structured testing) and quarterly doctor visits. After 12 months, the structured testing group showed significantly greater improvement in their long-term glucose (HbA1c was 0.3 percentage points lower, in per-protocol analysis 0.5 %-points lower, compared to control group) as well as significantly fewer glucose peaks. Physicians in the structured testing group used the individual glucose profiles to initiate treatment earlier and more aggressively than in the control group throughout the study, which can be seen as a sign that they identified more need for action when using the structured seven-point profile. Interestingly, structured blood glucose monitoring required about 25% fewer test strips per day than monitoring in the usual care group.

The long-term effect of structured testing was also confirmed in an observational study in which people with non-insulin-treated type 2 diabetes were asked to perform a structured 12-week lifestyle intervention including self-monitoring of blood glucose. In a follow-up after 18 months the results of this study showed a significant and persistent improvement in glucometabolic control; patients reduced their weight and, when continued to self-monitor their blood glucose daily, improved their HbA1c.

**Structured Testing can improve Chronic Disease Management**

Structured testing seems to provide multiple benefits to family practitioners. Most importantly, it does not just gather more data but it provides a means to interpret the patterns behind the data. In view of the individual differences in glycaemic profiles, understanding a patient’s glycaemic pattern is a prerequisite to successful individualized diabetes management. The fact that doctors in the STeP study group adapted therapy faster and more aggressively is a benefit, because early management is a key to
successful prevention of diabetes-related secondary complications. The effect of structured testing on treatment decisions is supported by findings of the DECIDE study which showed that the use of an automated decision support system in combination with structured blood glucose monitoring can effectively support doctors in interpreting the monitoring data and thus contribute to improved therapy results. Beyond this, structured testing can help in developing a strong doctor-patient relationship on the basis of which doctor and patient can work together to achieve individually agreed therapy goals. According to the physicians’ feedback in the STeP study, the visualisation in the data sheet was helpful in conducting the quarterly patient visits, for instance by showing at what time of day blood glucose levels typically rise in an individual patient.

This in turn helped patients in implementing the necessary lifestyle changes. According to the feedback after completing the STeP study, patients appreciated having the visualisation together with the own comments on the data form. Seeing how their behavior impacted on their blood glucose levels provided a simple but effective way of learning. For instance one patient noted that eating two peanut butter and jelly sandwiches made his sugar count soar, and still another concluded that he needed to take his medication regularly. Patients seem to finally understand how their behavior can influence their diabetes. This type of learning may often be more effective than hearing their doctor explain it to them.
**Fig. 35:** data sheet with graphic visualization and comment
Patients take an active role

In managing diabetes, a pivotal role is played by the patient who has to change lifestyle in a sustainable way. This is a typical of chronic diseases which are linked to common, preventable risk factors such as smoking, lack of exercise, unhealthy diet and alcohol abuse causing elevated blood pressure, overweight, hyperglycemia and hyperlipidemia. Successful therapy of these chronic diseases entails understanding the role of the patient in managing the disease, and strengthening the patient's self-responsibility, with the ultimate goal being too make them active participants in the therapy process.

The keyword here is patient empowerment. The term patient empowerment is increasingly being discussed in science and politics, and it has become a central element of health policy in the European Union over the past years. Empowered patients are better able to look after themselves, aim to be well-informed about their health status and take responsibility for their well-being. By taking an active role in the health process, they can contribute to enhancing the efficiency of health delivery. Critics have argued that the idea of empowering patients might be used to realize savings in the disease management process by shifting responsibility to the patients; for instance when patients are encouraged to self-monitor in order to increase quality of life but the ultimate goal is to save medical staff time. Should this ever be an intention pursued under the label of patient empowerment, it would certainly have to be objected to. But in light of the recent study findings discussed above, it seems that the benefits of patient empowerment in terms of motivation and enhanced therapy outcome are far more interesting.

As mentioned before, chronic patients and their caregivers face a special challenge. Chronic diseases differ from acute conditions in that they require continuous care and a lot of coordination across various disciplines. Managing chronic patients involves a whole network of parties, possibly even including social support when patients get unemployable due to disabilities or long treatment periods. Chronic patients and caregivers have no prospect of cure but can at best aim for maintaining the status quo and preventing deterioration. But regardless of these challenges, patients have to stay disciplined day in
day out, adhere to their treatment protocol, implement lifestyle changes, and hardly ever let go. In short, chronic patients need to show strong discipline in managing their condition.

Given the fact that our health systems are designed to treat acute conditions, there is a need for chronic care models or approaches. European countries have initiated various responses to the challenge of chronic disease management. These include case managers who act as the central coordinator of specialist and social care; community nurses who provide much of the primary care and education; or disease management approaches. Disease Management Programs (DMPs) have been introduced in Austria and Germany. These programs are typically structured around a coordinating physician, usually a general practitioner, and built on evidence-based guidelines with the overriding goal to improve the quality and efficiency of chronic care. Evaluations of German Disease Management Programs have repeatedly produced positive results. For instance, in a type 2 diabetes DMP the mortality rate and occurrence of major complications such as myocardial infarction, stroke, chronic renal insufficiency, and amputation of lower leg or foot, were lower among DMP participants compared to type 2 diabetic patients not enrolled in a DMP. In other surveys, DMP patients voiced higher satisfaction with their care and gave their doctor-patient relationships higher ratings than non-DMP patients; main reasons mentioned were better information and advice, followed by tighter control; patients also mentioned their self-management had improved since enrollment in a DMP.

The role of e-health solutions in monitoring patients with diabetes

Much attention has been paid recently to e-health as a response to some of the key challenges facing European health systems. In fact, e-health solutions may have the potential to enhance chronic disease management and healthcare delivery in remote regions. A strong doctor-patient relationships is certainly a key prerequisite for taking healthcare services online, be it remote monitoring or web-based visits. Today, doctors and patients can use information management tools and software to record and analyse
data, for instance as part of a structured testing approach. A pilot study evaluating an intensive monitoring, educational and pharmacological interventions program of poorly controlled people with type 2 diabetes resulted in dramatic improvement of glycaemic control in only 6 weeks. Glucose data were downloaded and analysed using a data management tool, the Accu-Chek 360° software. These results cannot be obtained by targeting treatment only to HbA1c.

In the future, doctors will increasingly use these tools in a web-based setting to communicate with patients remotely. Doctors can ask their patients to record data and submit them online, they can send automatic reminders to patients for regular monitoring, and they can discuss monitoring data and, to a certain degree, therapy adjustments online.

An evaluation of interactive computer-assisted technology in diabetes care has pointed at a potential positive impact of these technologies on therapy outcomes, but has also shown that further research is needed to determine the best possible use of these technologies. Other studies have looked at individual solutions and their contribution to diabetes care. For instance, in a clinical study modem transmission of glucose values appeared to be as effective when integrated into a program of diabetes care as three-month clinic visits, and this at significantly lower cost; these findings should be of particular interest to healthcare providers in remote regions, facing staff shortage or focusing on cost aspects. In another study, the concept of web-based monitoring was applied to the doctor-patient interaction: people with type 2 diabetes reported their blood glucose data online together with additional information on medication, diet, etc.; based on this information, every two weeks their doctors sent recommendations online; blood parameters were taken at three-monthly lab visits. In an evaluation after 30 months, the patients’ glycaemic control improved significantly compared to a control group with standard three-monthly outpatient visits, and this with reduced contact time with their physician. This study seems to show that informed online doctor advice can offer patients more frequent contact points and closer motivation while enhancing time-effectiveness for their physicians. Similarly, in a Spanish study a tele-assistance system was used for real-time transmission of blood glucose results

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including an option to make telephone consultations, demonstrating its feasibility as a support tool for family practitioners in their follow-up of people with type 2 diabetes.

14.2. The Overweight and Obesity: Pandemic in Europe – a Public Health Issue

The obesity pandemic, which started in the US in the 60th and 70th, has reached all countries of the European Union. In Europe the prevalence is in the 27 EU countries in the adult- and childhood population. Following are recent findings on causative factors, obesity associated diseases, and preventive and therapeutic strategies which are important for member states.

The importance of the food environment

The development of socioecological models of health behaviors in the last two decades has promoted “the environment” as a key theme in our thinking about obesity prevention and treatment. This means increasing interest in identifying the characteristics of neighborhood or local environments (physical, social, economical) that might favor unhealthy dietary - and physical activity patterns - leading to excess weight and obesity at the population level. Dietary behavior may indeed be influenced by spatial accessibility to food through the patterns of implantation of various types of food outlets and services. Access to food services represents however a complex concept that associates different dimensions related to accessibility: proximity, diversity, availability, affordability as well as perception, with ‘diversity’ referring to the types of food outlets and ‘availability’ referring to the food supply at the food outlets.

Assessment of characteristics of the built environment in relation to food - and physical activity - has greatly improved in recent years. Various methods have been used, based either on assessment of the perceptions by individual residents of their neighborhood or on an objective assessment of the actual built environment. Among objective approaches, spatial analysis methods based on geographic information systems (GIS) have opened up a new era of research in the field of public health nutrition. Using GIS tools, analyses can be carried out to model spatial interactions between different types of information.
According to recent systematic reviews, current literature in adults shows more consistent evidence of associations between environmental factors and weight status than between environmental factors and obesity-related dietary intakes. Greater accessibility to supermarkets and less access to take away outlets were associated with lower BMI or prevalence of overweight/obesity. No consistent association was found between fruit and vegetable consumption and access to supermarkets or take away outlets, or availability/shelf space of fruits and vegetables. In contrast, area-level socioeconomic status was more consistently associated with healthier dietary behaviors. In children, based on objective measures of environmental factors, available data suggests that weight is positively related to spatial accessibility to convenience stores, but findings with other food retail outlets and restaurants appear mixed.

Significant advances have been made in recent years regarding the theories and methods used to study the food environment. However, we have to acknowledge that major challenges are ahead to better understand the complex pathways through which attributes of the built environment may impact weight status, in conjunction with neighborhood and individual socio-economic characteristics. Since most studies were performed in the US, the UK or Australia, there is a need for data from more European countries. In addition, defining the size of the neighbourhood in which the relation between environment and behavior operates remains a methodological issue, as much as ways to combine refined objective spatial measures with assessment of how residents perceive their environment. Designing and implementing longitudinal studies and “natural experiments” are on the list of priorities. To integrate findings about the ‘foodescape’ in a global picture including the social and policy environments appears very much in line with the current thinking on the prevention of non communicable diseases. The translation of findings from such transdisciplinary research will not be possible without the input from all potential stakeholders.
<table>
<thead>
<tr>
<th>Country</th>
<th>Adults aged ≥ 15 years who are overweight (%)</th>
<th>Adults aged ≥ 15 years who are obese (%)</th>
<th>Adults achieving the physical activity guidelines (%)</th>
<th>Children &gt;5 who are overweight (%)</th>
<th>Boys aged &gt; 5 years who are overweight (%)</th>
<th>Boys aged &gt; 5 years who are obese (%)</th>
<th>Girls aged &gt; 5 years who are overweight (%)</th>
<th>Girls aged &gt; 5 years who are obese (%)</th>
<th>Children &lt; 5 years who are overweight (%)</th>
<th>Children &lt; 5 years who are obese (%)</th>
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</tbody>
</table>

**Table 6: Table of obesity patients**
Brain reorganization following weight loss. Stored energy (fat) is important to reproductive efficiency and survival in circumstances of restricted access to food. Evolutionary pressures have likely favored enrichment of human genomes for alleles favoring energy ingestion, storage and conservation. The predicted consequences of this allelic selection would be what almost anyone who has lost weight knows: “Weight loss is difficult, but it is even harder to keep it off.” For those individuals successful at sustained weight loss the “price” is a lifetime of conscious effort to decrease energy intake and increase expenditure beyond the respective levels required in individuals who are “naturally” at the same weight.

Conventional wisdom on this point is that "behavioral" issues related to persistence of "bad habits" that provoked weight gain in the first place, account for much or all of the overwhelmingly tendency towards weight regain. There is, however, a substantial body of evidence that there are strong biological forces - reflected in both energy expenditure and ingestive behaviors - that resist the maintenance of a reduced body weight. Thus, the difficulties in sustaining with reduction by obese or never-obese individuals are largely due to a physiology favoring weight maintenance that has been finely tuned over many millennia but that is no longer healthful in this environment rather than to psychological weakness indicating that someone is poorly tuned to their health.

Responses to sustained weight loss of 10% or more were evaluated while regulating such potentially confounding factors as diet composition, weight stability, and physical activity. Reduced weight maintenance in lean or obese individuals is associated with coordinate decreases in energy expenditure below those predicted by changes in body composition, and increases in neuronal activity encouraging energy intake above what is required to sustain that reduced weight. These changes are summarized below:
### Table 7: Energy balance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect of Weight Loss</th>
<th>Variable</th>
<th>Effect of Weight Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Expenditure</td>
<td></td>
<td>Energy Intake</td>
<td></td>
</tr>
<tr>
<td>24 hour energy expenditure</td>
<td>Decreased (~15%)</td>
<td>Satiation</td>
<td>Decreased</td>
</tr>
<tr>
<td>Resting energy expenditure</td>
<td>Slightly decreased</td>
<td>Perception of amount eaten</td>
<td>Decreased</td>
</tr>
<tr>
<td>Thermic effect of feeding</td>
<td>Unchanged</td>
<td>Emotional and cognitive response to food*</td>
<td>Increased</td>
</tr>
<tr>
<td>Non-resting energy expenditure</td>
<td>Decreased (~30%)</td>
<td>Executive decision making function*</td>
<td>Increased</td>
</tr>
<tr>
<td>Skeletal muscle efficiency</td>
<td>Increased (~20%)</td>
<td>Emotional and Cognitive Control*</td>
<td>Decreased</td>
</tr>
<tr>
<td>Neuroendocrine Function</td>
<td></td>
<td>Autonomic Nervous System Function</td>
<td></td>
</tr>
<tr>
<td>Thyroid stimulating hormone</td>
<td>Decreased (~18%)</td>
<td>Sympathetic nervous system tone</td>
<td>Decreased (~40%)</td>
</tr>
<tr>
<td>Triiodothyronine</td>
<td>Decreased (~7%)</td>
<td>Parasympathetic nervous system tone</td>
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<tr>
<td>Thyroxine</td>
<td>Decreased (~9%)</td>
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</tbody>
</table>

*based on fMRI studies

The failure to reduce energy intake to match the decreased energy output following weight loss reflects decreased satiation and perception of how much food is eaten and multiple changes in neuronal signaling in response to food which conspire with the decline in energy output to regenerate body fat stores. A credible “model” for the molecular mechanics of this regulation is based on the concept of a neurally encoded “threshold” for minimum body fat, below which the compensatory physiology of the weight-reduced human (or mouse) is invoked. The threshold is simply set “higher” in the obese and...
determines the intensity of signaling required to register fully in these brain centers. Circulating leptin – by virtue of its proportionality to fat cell mass - is a critical signal in this context. The achievement of higher levels of adiposity, and their defense in the obese, constitutes – teleologically – the organism’s mechanism for raising the signal(s) from leptin, and perhaps signals other molecules as well, to “sufficient” levels. Once this level is attained, a “eumetabolic” state is achieved wherein energy intake and output tend to vary directly. In contrast, dynamic (weight loss) and static (reduced weight maintenance) therapeutic reductions of body fat are resisted as circulating signals become insufficient relative to this “threshold.”

The Cutting Edge: The composition of the gut microbiome is hypothesized to be an environmental factor that contributes to obesity. Mechanisms by which the gut microbiome may influence metabolism and energy homeostasis include: regulation of energy uptake from diet, interaction with signaling molecules involved in host metabolism, modification of gut permeability, release of gut hormones, and sub-chronic inflammation, the latter being a hallmark of obesity-related diseases. Results of several small human studies suggest that obesity is associated with differences in the gut microbiota, as well as reduced bacterial diversity, and altered representation of bacterial genes and metabolic pathways. Some studies report a “bloom” of a specific genus of bacteria and suggest that the obesity-associated microbiome may be metabolically specialized for increased energy harvest from the diet. However, such findings in humans have not been reported consistently, and the contribution of inter-individual dietary differences to some of the obesity-related findings of the cross-sectional studies also remains a concern. Some, but not all, intervention studies of weight loss in humans also show changes in gut microbial populations as a result of gastric bypass and subsequent dietary change or with use of hypocaloric diets; however, these results may be confounded by effects of diet composition.

Studies in experimental animal models support the hypothesis that gut microbes play a critical role in energy regulation. For example, axenic (i.e., “germ-free”) mice are protected against developing diet-induced obesity. Colonization of axenic mice with a gut microbiota derived from conventional mice results in a 60% increase in fat mass and development of insulin resistance. Further, transfer of gut microbiota from genetically obese ob/ob mice to
lean, axenic mice resulted in greater body fat gain in these lean animals than in lean axenic mice colonized with microbiota from conventional lean mice.

The obese phenotype is associated with increased microbial fermentation and energy extraction from non-digestible food components; however, until recently it was not clear how relatively small increases in energy extraction could contribute to the large and rapid weight gain observed in the animal studies. Gut microbial fermentation of non-digestible carbohydrates to short chain fatty acids (SCFA) provides additional energy, but signaling effects of gut microbial metabolites, such as SCFA, may also play an important role.

Bacterially-derived SCFA have been shown to increase: 1) uptake and transfer of monosaccharides to hepatic portal vein circulation, 2) lipogenesis in adipocytes, and 3) carbon flow to the liver and adipose tissues. Microbes may also directly modulate host energy homeostasis and metabolism by increasing deposition of triglycerides in adipocytes via suppression of a lipopolysaccharide lipase inhibitor, altering fatty acid oxidation in liver and peripheral tissues, and changing secretion of gut hormones that influence satiety. In addition, the gut microbiota produce proinflammatory molecules that increase adipose tissue inflammation and macrophage recruitment by signaling through the innate immune system. Expressed by macrophages and epithelial cells, Toll-like receptors (TLRs) are integral parts of the innate immune system. TLRs in the gut epithelium may alter gut microbial composition and conversely bacterial endotoxin activates the immune system through gut epithelial TLRs. Gut microbiome composition also has been associated with altered systemic and adipose-tissue expression of inflammation biomarkers, such as adipokines, C-reactive protein, monocyte chemotactic protein-1, and tumor necrosis factor-α.

In summary, the gut microbiome may contribute to altered energy storage and obesity through several mechanisms and the interaction of gut microbes with the host innate immune system may influence inflammatory and metabolic processes associated with obesity and important to human health.
Targeting Adipose: Tissue Inflammation to Treat the Metabolic Complications of Obesity

Obesity is associated with numerous metabolic diseases including type 2 diabetes (T2D), cardiovascular disease, fatty liver disease and even some forms of cancer. Despite the well-known link between obesity and increased morbidity, the mechanism of this remains elusive. Thus, the question “why does increased body fat cause increased metabolic co-morbidities” remains unanswered. By understanding the underlying basis of obesity-associated metabolic diseases, different therapies could be designed to target relevant pathways. Although we lack a full understanding of the underlying mechanisms that result in disease, several putative explanations exist for why fat affects metabolic health. One such theory is the anatomic location of fat deposition and ectopic fat accumulation. Specifically, current literature suggests that liver and skeletal fat accumulation affects organ function and contributes to the development of insulin resistance, fatty liver, and the metabolic syndrome. However, even in subjects matched for body fat and fat distribution, significant differences can exist in metabolic outcomes, and the phenomenon of metabolically healthy obese has been well described. More recent data suggests that adipose tissue contributes to a state of chronic inflammation, which promotes development of insulin resistance as well as other metabolic complications by stimulating NF-κB and Jun N-terminal kinase pathways in fat cells and the liver.

It was once believed that fat cells were only involved in the storage of triglycerides, but recent studies have demonstrated that they also act as endocrine organs and also fat cells themselves contribute to an inflammatory response. Additionally, some adipose derived cytokines recruit macrophages to adipose tissue. These cytokines and chemokines activate intracellular pathways that promote the development of insulin resistance, type 2 diabetes and other metabolic complications associated with obesity.

Despite the observed link between body fat, non-alcoholic fatty liver disease, and type 2 diabetes, some individuals exhibit “metabolically benign obesity” and are protected from the metabolic consequences of excess adiposity, possibly due to differences in adipocyte tissue metabolism and macrophage infiltration. In obese adults, the degree of adipose tissue inflammation is closely associated with increased metabolic risk for type 2 diabetes, cardiovascular disease and fatty liver disease, whereas obese adults without adipose
tissue inflammation have metabolic risk factors in the healthy range. Given these observations, the disparities in metabolic diseases among obese individuals may be explained by the degree of chronic low-grade inflammation of adipose tissue. Therefore, targeting adipose tissue inflammation has become an important new strategy in treating the metabolic conditions typically associated with obesity.

One of the few effective anti-inflammatory treatments for these metabolic diseases is weight loss. However, since weight loss is difficult to achieve and maintain, and metabolic benefits are not always observed, alternative strategies aimed at adipocyte inflammation present a unique target in which to modify metabolic health. Studies using mice models have successfully used anti-inflammatory treatments, such as aspirin, Resolvin D1 and omega-3 polyunsaturated fatty acid (n-3 PUFA), to target adipose tissue inflammation. Human studies examining n-3 PUFA supplementation have shown mixed results in its ability to target systemic inflammation while high-dose aspirin treatments have decreased plasma markers of inflammation. Since the therapeutic potential of high-dose aspirin is limited by bleeding risk, several recent studies, mostly in Caucasian adults, used an alternative anti-inflammatory drug Salsalate to address its efficacy and tolerability as a new treatment for insulin resistance and type 2 diabetes. These trials noted improvements in insulin sensitivity, fasting glucose, CRP, and NF-κB activity with a four week high-dose Salsalate treatment of 4.0 g/day. These data support the hypothesis that utilizing a non-steroidal anti-inflammatory drug, such as Salsalate, to target adipose tissue inflammation may provide a therapeutic route for treating obesity related diseases.

**Obesity Prevention during Infancy**

Obesity prevalence among infants and young children has increased rapidly during the past 4 decades, a particularly disturbing trend given early obesity’s association with later life obesity and its co-morbidities. Fortunately, infancy is a period of great behavioural and metabolic plasticity offering numerous targets for preventive interventions. Two growth trajectories can result in early life obesity. First, through prenatal influences, babies can be born large and then stay large during the postnatal period. Second, babies can be born at normal or low weights but can gain weight more rapidly than those that grow along a consistent growth chart percentile curve. This “accelerated” or “rapid” weight gain during infancy predicts obesity and its co-morbidities later in the lifespan, even after adjustment
for birth weight. These findings suggest that, contrary to popular belief, a chubby baby is not necessarily a healthy baby who will “grow out of it” but may be more likely to “grow into” obesity later in life. Despite these findings and the possibility that infancy may be an optimal time to intervene to prevent obesity, few attempts have been made to moderate rapid growth in infancy. In a recent review, Paul and colleagues identified several modifiable factors that may affect early rapid weight gain and subsequent obesity risk. These include infant feeding mode (breast milk or formula), infant sleep duration, timing of the introduction of solid foods, parental feeding practices, sweetened beverage consumption, the transition from bottle to cup, the introduction of table foods, and finally, sedentary behaviour and physical activity. It has been calculated that 13% of adolescent obesity can be prevented by breastfeeding or providing new infant formulas with low protein content.

A recent pilot intervention focused on helping new mothers to develop parenting skills to address three areas of infant behaviour hypothesized to affect weight gain and early obesity risk: infant sleeping, crying, and feeding. First-time mothers who intended to breastfeed at infant birth were randomly assigned to receive either a Soothe/Sleep intervention, an Introduction to Solids intervention, both interventions, or no interventions (control group). One hundred and ten mostly White, higher income mothers and their infants completed the one-year study. The Soothe/Sleep intervention focused on strategies to lengthen infant sleep and taught parents other soothing strategies to use rather than indiscriminately feeding in response to infant fussing and crying. The Introduction to Solids intervention focused on “when,” “how,” and “which” foods to introduce to infants and provided infants with systematic experiences with new foods between ages 4-6 months. The interventions were delivered via home visits at ages 3-4 weeks and 4-6 months. At age 1 year, infant weight for length and several behavioural measures, including acceptance of new foods, were assessed. Mothers also reported on infant behavioural states (sleeping, fussing/crying, awake/calm, and feeding) in 15 minute intervals over 4 days at infant ages 3, 4, 8, and 16 weeks. Infants receiving both interventions had significantly lower weight-for-length percentiles at 1 year compared to other groups. In addition, breastfed infants who received the Soothe/Sleep intervention slept longer at night and had fewer nightly feedings from 3 to 16 weeks, compared to control infants. The Soothe/Sleep intervention also promoted infant self-soothing and increased the likelihood that alternative soothing strategies were tried prior to feeding to
soothe infant distress. Infants who received the Introduction to Solids intervention were less likely to reject novel foods at 1 year. These results provide initial evidence that behavioural interventions designed to modify parenting practices can decrease early weight gain through changes in parenting and in infant lifestyle, including sleeping, crying, and feeding. While this is a promising start, additional research is needed to determine the generalization of these findings.

Physical activity and Weight Loss (John M. Jakicic) Behavioural weight loss interventions involving diet and physical activity typically result in 8 to 10 percent weight loss within 6 to 12 months after initiating treatment. While energy restriction appears to contribute to the greatest portion of weight loss during this period, physical activity is a key component of these interventions for a variety of reasons. Physical activity of sufficient dose can result in weight loss of approximately 1-3 kg without prescribed changes in dietary intake. Results reported by Jakicic et al in a study of overweight adults across an 18 month intervention support these conclusions and are shown below. When combined with a reduction in dietary intake, physical activity can add an additional 1-3 kg of weight loss to what is achieved with this reduction in dietary intake in overweight and obese adults. Of interest is that an additional 1-3 kg of weight loss resulting from physical activity is also observed adults with severe obesity, defined as having a body mass index (BMI) of >35 kg/m2). Thus, the effects of physical activity on weight loss appear to be additive to what is observed with dietary restriction alone.

Of significant importance is the observation that physical activity is an important behaviour for prevention of weight regain and maintenance of significant weight loss resulting from dietary restriction. A recent review concluded that there is sufficient scientific evidence available to support the recommendation to include approximately 60 minutes per day of moderate-to-vigorous intensity physical activity for this desired outcome. Moreover, physical activity also appears to be an important behaviour for enhancing long-term weight loss in patients who have undergone bariatric surgery.

The effect of physical activity on both short and long-term weight loss may be attributed to the increase in energy expenditure resulting from the activity, which results in an energy deficit. However, the altered energy expenditure resulting from an increase in physical activity does not appear to fully explain the observed changes in weight loss. This may
suggest that there is intentional or unintentional compensation in energy balance that accounts for the difference in expected versus observed weight loss in free-living adults. This compensation may be a result of alterations in components of total daily energy expenditure (i.e., resting energy expenditure, non-physical activity activity thermogenesis, etc.). However, there is also some evidence that physical activity can influence mechanisms that assist with appetite regulation, resulting in alterations in energy intake that can affect body weight regulation.

While the short-term effects of physical activity on weight loss can be quite modest, this magnitude of weight loss is additive to what is able to be achieved with dietary restriction alone. Moreover, physical activity appears to be a key behaviour to sustain weight loss and prevent weight regain. Thus, physical activity should be recommended as a key behaviour in long-term body weight regulation with interventions including strategies to promote the adoption and maintenance of this behaviour.

**Dietary Strategies for Weight Management**

We are surrounded by large portions of palatable, inexpensive, energy-dense foods that facilitate positive energy balance. In this “obesogenic” environment, finding ways to encourage people to eat appropriate amounts is challenging. One approach is to direct consumers towards foods that control hunger, promote satiety, and help them to eat less. Short-term studies have demonstrated that a number of properties of foods including nutrient composition, portion size, and energy density can affect satiety and intake. However, the emphasis in most food-based weight loss trials has been primarily on effects of variations in proportions of macronutrients. The results show that the percentage of fat, carbohydrate, or protein in calorie-restricted diets has little impact on long-term weight loss or maintenance of lost weight. With these disappointing results, some health policy recommendations have shifted away from macronutrient-based advice to a food-based approach with an emphasis on portion control and total calorie intake.

The importance of portion size has been demonstrated in a number of studies in which the amount of food available had significant and sustained effects on energy intake. Large portions of energy-dense foods in particular facilitate overconsumption. Despite the robust effects of portion size, there is little information from long-term studies on the specific
contribution of portion control to weight management or on optimal ways to encourage portion control.

Strategies to moderate excess consumption associated with large portions include education, clearer labels on foods and menus, and portion-controlled foods. However, strategies that rely on people simply eating less may not be sustainable. Research indicates that the amount of food people eat over a day is more consistent than their energy intake. If people are accustomed to eating a particular amount of food to feel satisfied, a more sustainable approach than urging smaller portions may be to encourage consumption of foods lower in energy density. When limiting calorie intake, people can continue to eat their usual amount of food if they selectively substitute low-energy-dense foods for foods higher in energy density. Moreover, serving larger portions of foods low in energy density can be used strategically to encourage consumption of such foods in place of more energy-dense choices. Increased intake of low-energy-dense foods has been shown to be associated with a decrease in energy intake while maintaining satiety. This new understanding of how portion size can be used positively to control intake of energy-dense foods and enhance satiety has the potential to help people achieve sustainable improvements in their food choices and body weight.

The energy density of foods is of interest for weight management not only because it allows people to eat satisfying portions while limiting calories, but also because reductions in energy density are associated with improved diet quality. Another advantage is that energy density can be lowered in a variety of ways, for example, by adding water-rich vegetables, fruits, soups, and cooked grains to the diet, and by reducing the diet’s fat content. Low-energy-dense dietary patterns have been associated with successful weight loss in several clinical trials and with the avoidance of weight gain in longitudinal and epidemiological investigations.

If people were to adopt lower-energy-dense eating patterns, they would be able to eat satisfying amounts of foods appropriate to meet both energy and nutrient needs. However, long-term compliance with any diet that requires deliberate and sustained changes in established eating habits is difficult. The key question is how the food environment can be modified to help people lower the energy density of their diets and to eat appropriate amounts in order to prevent the development of obesity and facilitate weight management.
Actionable, science-based strategies that increase the accessibility of affordable nutrient-rich, lower-energy-dense foods are urgently needed.

The importance of the food environment

The development of socio-ecological models of health behaviours in the last two decades has promoted “the environment” as a key theme in our thinking about obesity prevention and treatment. This means increasing interest in identifying the characteristics of neighbourhood or local environments (physical, social, economical) that might favour unhealthy dietary - and physical activity patterns - leading to excess weight and obesity at the population level. Dietary behaviour may indeed be influenced by spatial accessibility to food through the patterns of implantation of various types of food outlets and services. Access to food services represent however, a complex concept that associates different dimensions related to accessibility: proximity, diversity, availability, affordability as well as well as perception, with ‘diversity’ referring to the types of food outlets and ‘availability’ referring to the food supply at the food outlets. Assessment of characteristics of the built environment in relation to food - and physical activity - has greatly improved in recent years. Various methods have been used, based either on assessment of the perceptions by individual residents of their neighbourhood or on an objective assessment of the actual built environment. Objective measures mainly rely on pre-existing inventory databases and business directories or, in some cases, on environmental audits, which consist of sending trained raters with checklists to document specific aspects of the physical environment. Among objective approaches, spatial analysis methods based on geographic information systems (GIS) have opened up a new era of research in the field of public health nutrition. Using GIS tools, analyses can be carried out to model spatial interactions between different types of information.

According to recent systematic reviews in adults, current literature shows more consistent evidence of associations between environmental factors and weight status than between environmental factors and obesity-related dietary intakes. Greater accessibility to supermarkets and less access to take away outlets were associated with lower BMI or prevalence of overweight/obesity. No consistent association was found between fruit and vegetable consumption and access to supermarkets or take away outlets, or availability/shelf space of fruits and vegetables. In contrast, area-level socioeconomic
status was more consistently associated with healthier dietary behaviours. In children, based on objective measures of environmental factors, available data suggests that weight is positively related to spatial accessibility to convenience stores, but findings with other food retail outlets and restaurants appear mixed.

Significant advances have been made in recent years regarding the theories and methods used to study the food environment. However, we have to acknowledge that major challenges are ahead to better understand the complex pathways through which attributes of the built environment may impact weight status, in conjunction with neighbourhood and individual socio-economic characteristics. Since most studies were performed in the US, the UK or Australia, there is a need for data from other countries and settings. In addition, defining the size of the neighbourhood in which the relation between environment and behaviour operates remains a methodological issue, as much as ways to combine refined objective spatial measures with assessment of how residents perceive their environment. Designing and implementing longitudinal studies and “natural experiments” are on the list of priorities. To integrate findings about the ‘foodscape’ in a global picture including the social and policy environments appears very much in line with the current thinking on the prevention of non-communicable diseases. The translation of findings from such transdisciplinary research will not be possible without the input from all potential stakeholders.

The importance of systems thinking to address obesity
The problem of obesity has been framed for many years within the context of the deeply held belief that the solution is about “individual responsibility”. With the introduction of social ecological models, the framing has shifted in some dialogues to the importance of the environment; however, the resulting approach has mostly focussed on understanding the role of environmental factors in causing obesity. We remain rooted in the dominant paradigm that interventions need to be based on the proposed causes of the problem. While the difficulty of proving causality in complex systems has itself provided fertile ground for dialogue and debate, its continued emphasis hampers real progress. Adherence to the notion that determining causality is essential before tackling solutions inhibits action based on other ways of understanding how systems function. The introduction of the Foresight Obesity System Map in 2007 has helped to initiate a dialogue
about the complexity of obesity and how systems thinking and systems science can help to change the way we approach solutions.

The Obesity System Map is a causal loop diagram which helps communicate a view of the system as a whole and the importance of feedback loops to the development of obesity. The map, a product of a stakeholder engagement process, illustrates the many connections between important subsystems including food production, social psychology and physical activity environments. The map was built both on available evidence and the experience of the stakeholders involved in its construction, so the specific linkages illustrated in the map may not reflect all real links, especially given the context in which some individuals live, learn, work and play.

Regardless of the validity of the hundreds of connections and feedback loops illustrated in the Foresight map, the map clearly communicates that reversing obesity trends is a complex or “wicked” problem. Meadows suggests that there are 12 different places or levels to intervene in complex systems. These 12 levels fall into 5 main categories: paradigm, goals, structure, feedback loops, and structural elements. Most research and many programs and policies are focused at the level of structural elements, which are the easiest changes to make, but at the same time the least effective in moving the system as a whole in a new direction. Bar-Yam also suggests that there are a number of approaches that have worked in different types of complex problems including creating networks and teams, capitalizing on the relationship between competition and cooperation, and supporting individuals and ensuring the complexity of the challenges they face is commensurate with their capacity.

Both Meadows and Bar-Yam approach complex problems by accepting the complexity of the problem and the difficulty imposed by the characteristics that make them complex, as opposed to simple or complicated. Included in this acceptance is an understanding that demonstrating absolute causality might not be possible in complex systems, but should not hinder the development of appropriate solutions. New streams of research rooted in this paradigm are needed to help us understand how the characteristics of complex problems impact the effectiveness of interventions, and how these features can be used to build novel approaches to intervention.
15. Communication in the Euroregions

E-Health in Europe

The importance of information and communication technology (ICT) progress in the healthcare domain was recognised as a pillar for European prosperity in the 2006 Aho report on “Creating an Innovative Europe”, which identified eHealth as a “lead market” with considerable potential and the necessity for specific and timely attention. In the complex world of new medical developments, information load and rapid change, Health ICT and eHealth solutions can address rising costs, improve productivity and patient care and provide better clinical outcomes. Policymakers and care providers who want to successfully meet the future needs of healthcare, therefore, have compelling reasons to embrace cutting edge technology such as:

- Clinical information systems and specialised tools for health professionals within the care institutions (hospitals) such as the electronic patient record system (EPR), order entry systems, medical documents management systems, knowledge/decision support systems, radiology information systems, nursing information systems, surgery training and planning system, etc.

- Clinical information systems for primary care and/or for outside the care institutions such as general practitioner and pharmacy information systems.

- Regional/National Health Information Networks and advanced Electronic Health Record (EHR) systems allowing continuity of care across care providers, through sharing of personal medical data, which prevents errors, improves diagnosis, avoids duplication of examinations and supports the development of new services such as eprescriptions, e-referrals, etc..

- Disease-oriented solutions for integration across the healthcare chain, and more personalised health systems and services, such as disease management services, remote patient monitoring (e.g. at home), tele-consultation, tele-care, tele-medicine, tele-radiology, etc.
• Systems for health education and health promotion of citizen-patients such as health portals, special online health information services.

In a US survey conducted by Hillestad and colleagues, $81 billion or more could be saved annually through improvements in healthcare delivery efficiencies by using Electronic Patient Record systems. Anthony Bower even suggests that these savings could be more than double – to $346 billion or more annually– if healthcare were transformed sufficiently into Health Information Networks supported by advanced EHRs frameworks. There is no reason to believe that similar benefit projections could not be expected in Europe.

eHealth can be defined as the delivery of healthcare services through the use of Information and Communication Technologies (ICT) in a situation where the actors are not at the same location. The actors can either be two healthcare professionals (e.g. teleradiology, telesurgery) or a healthcare professional and a patient (e.g. telemonitoring of the chronically ill such as those with diabetes and heart conditions, telepsychiatry etc). Telemedicine includes all areas where medical or social data is being sent/exchanged between at least two remote locations, including both Caregiver-Patient/Citizen as well as Doc-to-Doc communication. It includes:

• Telehealth and Remote Patient Management
• Telecare
• Teledisciplines (including teleradiology, teledermatology, telescreening, etc)
Fig. 36

Telemedicine

Telehealth
(Clinical content, educational programs)

Ambient Assisted Living

Telecare
(social alert)

Telemonitoring
(Vital signs)

Teledisciplines
- Teleradiology
- Telescreening, etc

Focus Doc-Doc
Focus Doc-Patient
Focus Care/Social
What is telehealth?

The term telehealth covers systems and services linking patients with care providers to assist in diagnosing, monitoring, management and empowerment of patients with long-term conditions (chronic patients). Telehealth solutions use devices (interactive audio, visual and data communication) to remotely collect and send data to a monitoring station for interpretation and to support therapy management programs and to improve patients’ knowledge and behaviour. Telehealth solutions comprise systems and components (patient interfaces in hardware and software; sensors/peripherals; operating software and applications intended for care provider usage; clinical content and intelligence; data transmission, storage and intelligent routing) as well as supporting services (system operation; logistics; financial services etc). Input data sources are typically patients’ self-assessments (“subjective data”) as well as dedicated peripherals to measure vital parameters (“objective data”). Telehealth solutions address healthcare delivery, diagnosis, consultation and treatment as well as education/behavioural modifications and transfer of medical data.

Benefits of telehealth

Telehealth with an interactive health support platform will fill a crucial gap in the continuum of care. Flexible telehealth solutions are designed to support a multi-dimensional model of care for individuals with chronic conditions, particularly those with multiple, complex needs who are often either elderly and frail and/or disabled. For this purpose telehealth provides a clinical management model with clinical-intelligence capabilities based on underlying algorithms: a telehealth program based on a timely and evidence-based knowledge for physicians and supporting care providers to make appropriate interventions.

The benefits of telehealth listed below are of immediate, tangible and significant benefit to clinical staff, patients and society.

• Reduced Mortality: Telehealth patients live longer, compared to people receiving usual care (15–55% compared to people receiving usual care)
• Reduced Hospitalisations: The use of telehealth results in a more stable population in which enrolled members in programmes utilise less acute healthcare resources: reduced hospitalisations (30-50%), and reduced hospital length of stay (24-48%).

• Increased quality of life of patients: Patients in telehealth programmes have a better quality of life. This is due to improved and stabilised health as well as peace of mind, better connection to their care team and involvement in the healthcare process.

• Early detection of exacerbations, impairment of health: The system regularly gathers information from various sources on vital signs, symptoms, behaviour and the patient’s knowledge about their condition, as well as environmental status and psychosocial context. This information is analyzed and risk-tagged, allowing care coordinators to triage and facilitate targeted, expedited, interventions that can prevent acute-care-related emergency room visits and hospitalisations (up to 35% reduction of exacerbations).

• Individualized interventions: Because of the regular assessment of the patient’s vital signs and symptoms, and disease specific knowledge and behaviour, clinicians can target interventions to the exact situation and aspect of the patient’s illness, behaviour, understanding of symptoms and psychosocial/home situation. Interventions can be individualized both in terms of content and timing to maximize the impact of the intervention to immediately improve the member’s health status and stabilise their condition/avoid future degradation.

• Patient empowerment, education, behavioural reinforcement and motivation: Information delivered via the telehealth system is targeted to specific knowledge deficits or areas of recommended behavioural modification. This information is tailored to the individual patient’s need and directly delivered to the home of the patient, thus reducing the amount of time clinicians must spend on the phone or road delivering content and reinforcing necessary behavioural change. Patients understand their medical condition and treatment better and become empowered to manage their chronic conditions. Positive feedback and a personalised approach are important for the patient’s motivation in relation to their treatment.
• Efficient, exception-based interventions: Telehealth systems enable clinical staff to be in regular contact with larger member caseloads compared to standard telephonic models for individuals with complex chronic conditions. On the patient side, each member is connected to the telehealth system, is assessed, given feedback and positive reinforcement when needed – a model that is not feasible by traditional models of telephonic clinical management (because of personnel capacities necessary and related costs), even for individuals at high acuity levels.

Barriers hindering the development of telehealth

While the potential benefits of telehealth are enormous, a number of barriers continue to hinder the introduction of telehealth, or prevent them from achieving optimal benefits.

• Lack of reimbursement and sustainable funding: Many programmes are stopped after a successful testing period due to a lack of reimbursement for services.

• Lack of efficient business model: Telemedicine providers have not yet established successful business models enabling them to maintain telehealth programmes after the initial trial phase. This is also due to the current infrastructure of care in existing healthcare systems.

• Lack of recognised IT standards for telehealth: Telehealth applications and infrastructure have been developed and tested throughout Europe for at least a decade in isolation. The result is an innovative field, however only with isolated applications that have challenges of interoperability. Such systems, when in place, must have the capability of exchanging data with other systems, at least countrywide. Resolving interoperability is no longer a technical issue as the technical standards are emerging e.g. IHE3 or Continua4. The remaining challenge is a political, behavioural and acceptance issue which requires promotion to overcome.

• Insufficient awareness and confidence: Many patients as well as medical experts are not convinced yet by the benefits of telehealth. To ensure a high level of acceptance from
physicians and patients, the content has to be developed with medical experts following and supporting medical guidelines. Also the intuitive use of the telehealth solution ("usability") for both patient and medical personnel is a key requirement.

• Need for integrated solutions: Industry needs to develop end-to-end telehealth solutions in cooperation with the medical community to cover all the needs for a full home care service. However this is not always an easy task when patients do not understand the direct link between fully integrated solutions and the quality of the care/attention they receive.

• Need to integrate telehealth services into care delivery structure: One of the primary challenges confronting telehealth today is the lack of effective workflow integration into existing care delivery structures. In order to enable payers, providers and patients to fully benefit from telehealth, it needs to be seamlessly woven into existing delivery structures. Best Practise concepts still need to be identified.

• Uncertain legal responsibility: The lack of legal clarity in the area of telehealth is an obstacle to its wider use. This is a major challenge in particular with regard to liability, jurisdiction and to licensing, accreditation and registration of telehealth services and professionals. In addition, cross-border provision of telehealth services also require legal clarification with regard to privacy. These issues are primarily the responsibility of the Member States, and thus require action at their level. Member States will be supported by the Commission at Community level, e.g. by a European platform to share information on current national legislative frameworks and proposals for new national regulations relevant to telehealth.

Building evidence on the effectiveness of telehealth

The situation today: a limited but growing evidence base

Although an increasing number of studies and clinical trials demonstrate the effectiveness of telehealth solutions (see figures below), the lack of reliable scientific evidence remains a barrier to the wider deployment of telehealth. Indeed many clinicians, patients and payers,
partially question the evidence available and do not trust telehealth applications to support and improve the delivery of good quality healthcare.

This lack of trust is based on the fact that the results of existing studies are only partly known and many of the results are not directly comparable, because of the size, duration or overall design of the respective studies.

Summary of relevant studies

There are a growing number of good large-scale scientific telehealth evaluations reaching completion and publication in peer reviewed journals. These studies will, over time, help establish telehealth within routine care. In general, most of these studies indicate that telehealth has a positive effect on reducing hospital admissions, length of stay, mortality, and improving patients' quality of life. The actual economic benefits differ, depending on the respective care delivery systems, and thus needs to be evaluated in reference to the associated care delivery structure.

Given today's sources of information for patients with heart failure (e.g. Meta-analysis of telemonitoring and structured telephone support), the indications are that telehealth will:

• Reduce mortality (in the range of 15–55%)
• Reduce hospital admissions (for cardiovascular reasons 50%)
• Reduce hospital length of stay (broad range of values taken from various studies -26%-48%)

Three recent studies for telehealth systems (two with medical content) in the field of Chronic Obstructory Pulmonary Disease (COPD) show the following results
• 35% reduction of exacerbations
• Between 15% to 43% reduction of hospitalisation
• Detection of exacerbations
• Reduction of costs (up to 52%)
• Improvement of quality of life

Positive results of a systematic review (17 studies with different telehealth systems) for
patients with diabetes:

- Reduction of HbA1c
- Reduction of complications
- Good receptiveness by patients and patient empowerment
16. Financing in the Euroregions

Although we are living in one European Union, the health care systems in the EU countries employ a large number of different pricing, reimbursement and financing schemes. In different countries we have different payer organizations. Most dominant are sickness funds and public and private health insurers. The distinction between sickness funds and health insurers is that the sickness funds use a pay-as-you-go financing scheme and the health insurers require actuarial calculated premiums taking into account the individual risk profile.

However, in a number of countries, such as Italy, Spain and Sweden, health care is financed by a National Health Services. We do not mention Great Britain because of its island situation. The payers will have to cover all cost in the regions according to their rules. The National Health Services are financed by general taxes and contributions of the employers.

In addition part of the health care cost is paid out of pocket by the patient. Either certain services are not covered at all. Or the patient has to pay a pre defined percentage of the cost or has to pay a fee for a visit in a physician office, for a hospital day or to the pharmacist for receiving a prescribed drug.

The price levels for pharmaceuticals differ in the European Union countries. The reasons are manifold. There are differences in the regulation of pricing and reimbursement of pharmaceuticals in various countries. Some employ a very structured evaluation process on the basis of a value dossiers, others rely more on negotiations between the payers or nationwide institutions and the suppliers or market forces. Also the value added tax on drugs does differ significantly.
Table 8: Organization of the Health Care System in Selected EU countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Principal financial institution</th>
<th>Principal institution providing health services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Competing social sickness funds</td>
<td>private office based</td>
</tr>
<tr>
<td></td>
<td>Supplementary and full private health insurance</td>
<td>physicians, public and private hospitals</td>
</tr>
<tr>
<td>The Nether-</td>
<td>Competing social sickness funds organized as private insurers</td>
<td>private office based</td>
</tr>
<tr>
<td>lands</td>
<td></td>
<td>physicians, public and private hospitals</td>
</tr>
<tr>
<td>Austria</td>
<td>Not competing social sickness funds</td>
<td>private office based</td>
</tr>
<tr>
<td></td>
<td></td>
<td>physicians, mostly public hospitals</td>
</tr>
<tr>
<td>France</td>
<td>Not competing social sickness funds</td>
<td>private office based</td>
</tr>
<tr>
<td></td>
<td></td>
<td>physicians, public and private hospitals</td>
</tr>
<tr>
<td>Belgium</td>
<td>Social insurance with partial tax financing</td>
<td>private office based</td>
</tr>
<tr>
<td></td>
<td></td>
<td>physicians, mostly public hospitals</td>
</tr>
<tr>
<td>Luxemburg</td>
<td>Social insurance</td>
<td>private office based</td>
</tr>
<tr>
<td></td>
<td></td>
<td>physicians, mostly private hospitals</td>
</tr>
<tr>
<td>Portugal</td>
<td>National Health Service, partly financed by contributions of the insured</td>
<td>Mostly public</td>
</tr>
<tr>
<td>Greece</td>
<td>National Health Service, partly financed by contributions of the insured</td>
<td>Mostly public</td>
</tr>
<tr>
<td>Spain</td>
<td>National Health Service, partly financed by contributions of the insured</td>
<td>Mostly public</td>
</tr>
<tr>
<td>Italy</td>
<td>National Health Service, partly financed by contributions of the insured</td>
<td>Mostly public</td>
</tr>
<tr>
<td>Sweden</td>
<td>National Health Service, financed by county taxes, internal market</td>
<td>Mostly public</td>
</tr>
<tr>
<td>Denmark</td>
<td>National Health Service, internal market</td>
<td>Mostly public</td>
</tr>
</tbody>
</table>
The financing of hospitals is different, too. However most countries employ some kind of Diagnosis Related Group payment system with an additional fee for services or per diem payments for certain services. Office based physicians are paid by fee-for services in all countries. But the regulations are quite different. Some countries for instance use floating fees or maximum service volumes or other measures to contain cost and to provide disincentives for supplier induced demand.

We do not expect that the project Health in the Regions will lead to a uniform health financing scheme in the participating countries. For this, the differences are still too large and the political process will not allow major conversion processes in the short run. But the establishment of Health in the Region will teach some valuable lessons to the participating countries and their health care financing institutions. It will – and that is our strong believe – contribute to a harmonization of health care systems which means, that health care systems coexist and that the patient is the focal point.

In the Health for the Region we propose that the payers pay for those for whom they provide coverage. If someone who lives in Germany is covered by a German sickness fund, this fund has to pay for all services provided to the insured, regardless of whether he or she is treated on one or the other side of the boarder (within the defined areas).

For health care providers, those fees apply which are accepted, negotiated, set by the payers or which are reasonable in the country where the provider has its office. A system of treaties between the EU countries will lead an arbitration mechanism to equalize the payments used in the neighboring regions. In the end, we will be able to define mutual budgets and mutual remuneration schemes for the institutions which take care of the patients living close to the boarder.

To start with and to solve these issues in a practical way one could introduce health insurance cards (HIC) for the insured living in the region, which is 50 km or less from the boarder. These HIC are accepted by all health care providers in those well defined European Regions. Health insurers or National Health Service organizations will then pay directly to the providers according to the reimbursement schemes used in the respective
country. The patient only needs his HIC to receive services from physicians and hospitals on both sides of the boarders.

The next step after the introduction phase will be the definition of European Health Care Services Units (EHS). The definition describes the typical structure and the typical services provided by a standard and general hospital and by an outpatient medical service center (specialist center and primary care center). The remuneration scheme will be uniform for all patients according to the weighted average of fees applied in the neighboring countries. The rural regions will establish a mobile medical outpatient service (in Germany called “Schwester Agnes”), normally a nurse visiting patients at home, providing standard diagnostics and providing standard care.

In a cross border health concept the biggest challenge is the remuneration, whereby the remuneration in offices is earlier in comparison to hospitals. In regional hospitals the partner must found a common “Limited” so that revenues and expenses can be shared mutually.

16.1. Reimbursement
Proper and adequate reimbursement is the main issue - medical provision must be fully compensated where it takes place. As each member of the European Union has its own health care system with its own particularities, we must look for a common pattern feasible for all.

Adequate reimbursement is essential for the providers according to:

- Primary costs
- Secondary costs
- Tertiary costs, which are investment, education, innovation, reserve funds, etc.

The market must move toward clear reimbursement and transparency. This opens the door for competition and is, therefore, saving costs in the long run. Only those costs that meet the medical classifications are reimbursed. The basis for reimbursement is a clear classification according to effectiveness and long-term outcome. Our solidarity has a limit, and therefore clear defined provisions deserve reimbursement by the solidarity.
16.2. Financing in cross border regions

The enforcement of a different kind of power in the market is mandatory. But overall, free competition is a crucial criterion of the market. This is an acute emergent issue for everyone.

For an effective operation, a Lead Market in Health Care will require a well-defined financing system. We can learn from the US health care system that it is not only a matter of money injected into the health care system, but rather a matter of its institutional design. In essence, there will be in essence a dual system, made mandatory by premiums and taxes. However, some of the challenges in financing health care in Europe will be the rising costs due to medical possibilities and an increase of chronic diseases in an aging society. Different institutional designs are in parallel to taxation and premiums, alternative conditioned transfer payment systems (like bonus programs or a conditioned cash transfer system), and optimizing self responsibility in order to tackle the rising expenditures needed in the EU to provide quality health care for all.

Health is an emotional issue and deserves transparency. The outcome is a measure of transparency. What is essential?

1. Premium-based systems paid by employers and employees (Bismarck-type)
2. Systems combining taxes and premiums
3. Complementary conditioned transfer systems (CCT)
4. Opening of the market

Another topic is the specific payment mode based on the functioning of the market and growth, or the “internal” financing, remuneration or allocation of health care services:

- in hospitals
- in nursing homes
- in rehabilitation facilities
- for outpatient treatment in medical and nursing care
– in home care
– at surgery-based doctors
– at dentists
– in pharmacies (prescription drugs, over-the-counter market)
– for remedies (physiotherapy, speech therapy and occupational therapy)
– for medical appliances (eyeglasses, hearing aids, etc.)
– for accident rescue
– for patient transport
– for medical products
– Adequate coverage of the population against the most important risks to life
– Prohibition of arbitrary discrimination
– As much transparency as possible
– Optimal prevention and rehabilitation
– Promotion of self-responsibility
– Equitable distribution of burdens
– Maximum efficiency
– Minimization of administrative costs.

16.3. Proposal
The reimbursement must be done where the provision has taken place. There are special contracts with the insurances necessary. But it is a core element to enroll this method all over Europe.
Medical progress is inextricably linked to innovation in associated technologies. This is the present status of Medical Arts (Fig. 33). Both innovation and medical progress are a source of improved public health outcomes and the development of a dynamic “Lead Market” in the European Union. Medical assessment and classification should be a guiding framework for systematically (re-)evaluating medical treatments and technologies (including medicines, medical procedures, diagnostic tests and therapy-delivering devices) and for supporting decisions related to funding and reimbursement of health care. With periodic (re-)evaluations, treatments and technologies that are not effective should be de-emphasized. Resources should then be reallocated toward other treatments and technologies that deliver enhanced outcomes for patients and health care systems in general. The European Institute of Health is focused on this issue and has proposed a process for accomplishing this.

Any assessment and classification of medical treatments and technologies should appropriately address the specific characteristics of medical innovation. Innovation in medical processes and technology is the single most important driver of improvement in health care. New and better techniques and methods are appearing all the time, and many of these help clinicians in their efforts to diagnose, treat and prevent diseases. Innovation is a result of a continuous effort, which needs to be sustained in order to fully support the improvement of a society’s health. Medical progress can occur through a radical innovation or as a constant “evolutionary” improvement in small, but multiple steps. Both of these paths of medical innovation should be encouraged and are needed to improve our health care systems over time. Such progress improves not only the quality of treatment, but ultimately patients’ quality of life.

Truly innovative technologies must be given the market freedom to demonstrate their clinical value. In some cases, this may require collecting clinical data from real world use to supplement the limited data from clinical studies submitted for initial regulatory approval. In this regard, innovative treatments and technologies that are medically assessed and classified as Class A (classification described below) should remain in this category for a period of five years, with subsequent re-evaluation and reclassification as appropriate.
This is necessary to ensure that new technologies are given an opportunity to be meaningfully assessed under conditions of actual clinical use, as well as being fully reimbursed by health care systems, thus providing a viable incentive for innovation. As certain treatments and technologies are determined to deliver inferior outcomes, their use should be phased out.
### Medical Arts

- All procedures and therapies are classified according to their effectiveness and evidence
- All interventions are tailored to the individual patient’s needs
- Standardized indications, procedures and therapies are the basis for an informed choice of the patients
- Optimal use of resources avoids redundancy (key role of GP, e-Health)

### Principles

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Prevention</th>
<th>Diagnosis</th>
<th>Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Individual</td>
<td>• Individual attempts for healthy lifestyle</td>
<td>• Physical exam. &amp; verbal exploration</td>
<td>• Prefer non- or minimal invasive techniques</td>
</tr>
<tr>
<td>• Genomic</td>
<td>• Nutrition</td>
<td>• Non-invasive tools</td>
<td>• Non-invasive: Nursing, medication, self-therapy, psychotherapy, physical therapy, radiation/ionization, etc.</td>
</tr>
<tr>
<td>• Environmental</td>
<td>• Social prevention</td>
<td>• Invasive techniques</td>
<td>• Invasive: Surgery, implants, devices, artificial organs, ventilation, transplantation, etc.</td>
</tr>
<tr>
<td>• Social</td>
<td>• Vaccination</td>
<td>• Genetic testing</td>
<td>• Gene-Therapy</td>
</tr>
<tr>
<td></td>
<td>• Health education</td>
<td></td>
<td>• Alternative medicine</td>
</tr>
<tr>
<td></td>
<td>• Identification of environmental and natural hazards</td>
<td></td>
<td>Homeopathy, natural medicine,</td>
</tr>
</tbody>
</table>

### Medical Outcome Studies

Measure effectiveness and quality of medical procedures

### Research

• Understand diseases and find new cures
• Process-oriented, outcomes-oriented research to improve results and reduce costs
18. Classification

18.1. Purpose of Assessment and Classification
Medical assessment and classification are core elements in a Lead Market, and are tools to assist health care policymakers, payers and providers decide on the coverage, reimbursement or adoption of new medical treatments and technologies. This is important to the Regions too. Specifically, these tools can help decision makers balance clinician and patient demands for access to new technologies with finite health care resources by informing decisions on the use, reimbursement, coverage and adoption of medical treatments and technologies. Medical assessment and classification can help support clinician and patient access to innovative, clinically effective treatments and technologies, as well as disinvestment in treatments and technologies that are ineffective. This helps free up resources for other treatments and technologies in the sense of a broad interdisciplinary patient-centered approach. Assessments and classifications that do not focus on the patient, but rather only on the payer perspective, fail to recognize that when one stakeholder overrides the perspective of others, the whole health care system loses. (Fig. 34)

Medical assessment and classification are core elements in the Lead Market and should not be positioned as regulatory barriers to the market. Regulatory approvals should continue to focus on safety and function or performance. In addition, considerations of the cost effectiveness or value of new medical treatments and technologies are inevitably context-specific and dependent on a number of socio-political factors, such as health care funding levels. Therefore medical treatments and technologies should always be assessed in the context of the applicable health care system, taking into account organizational and structural aspects, as well as the epidemiology of a disease. Neither assessments nor resource allocation decisions can be transferred automatically from one system to another.

18.2. Classification
Once an assessment of a medical treatment or technology is conducted, it will be classified according to the following grading mechanism:
- **Class A—Strongly recommended**, based on compelling evidence and general agreement that a given medical treatment or technology is generally beneficial, useful and effective.

- **Class B—Recommended**, based on evidence and opinion that a medical treatment or technology is generally beneficial, useful and effective.

- **Class C—Neutral**, based on limited evidence and opinion that a medical treatment or technology is beneficial, useful and effective.

- **Class D—Not recommended**, based on evidence and opinion that a medical treatment is not beneficial, useful or effective.

In this assessment process, the EU professional medical societies define and update outcomes- and evidence-based standards. The European Institute of Health then coordinates and compiles the standards and forwards these to the National Authorities of Health in different European member states. These institutes take on the role of providing information to local stakeholders through continuing medical education (Fig. 34).

Medical need should always be the guiding force in assessing innovation. It is therefore very important that assessments taken at one point in time should not be regarded as definitive. Criteria for innovativeness have to be flexible enough to account for rapid technological change. Furthermore, it is essential that acceptance of uncertainty be built into decisions based on the assessments.

**18.3. Implementation of Assessments and Classifications**

All stakeholders, especially the payers, should put mechanisms in place (including audits by independent bodies) to support the implementation of medical assessments and classifications, whether they are positive or negative.

In order to support timely access to promising treatments and technologies that have limited effectiveness data to support their use at launch, alternative funding mechanisms such as patient co-financing and coverage with evidence development need to be considered by policymakers and payers. Coverage with evidence development allows a technology to be covered for a period of time, during which effectiveness evidence is generated.
Improvements in medical care are the result of much more than just scientific development. The quality of medical care often reflects cultural and economic development, resulting in an aging and healthy society, which can be considered a sign of wealth. Genetic technology and other current innovations have entirely changed the popular image of medical care. But not all innovations are sufficient or effective. For the European Community, only those items that are classified as effective can be reimbursed.

Process-oriented approaches have been generated within natural sciences already, and are now infiltrating medicine. However, the patient must be viewed as a whole entity in consideration of their own personal dignity and destiny. The outcome of a patient is not only determined by a genetic program, but is also influenced by environmental factors such as education, nutrition, life events, etc. Improved knowledge of the causes of disease, which is supplemented by information from continued research into available predictors, has engendered in patients a sense of personal responsibility for health care and prevention in order to achieve a long and healthy life.

Medical progress is inextricably linked to innovation: Both innovation and medical progress are sources of improved public health outcomes, and a dynamic Lead Market Development. Classification should be a guiding framework to systematically evaluate or reevaluate treatment provisions of modern medicine. This should also support decisions in investment and reimbursement of health care. With constant reevaluation, outdated concepts are removed, freeing up resources for the financing of new and improved concepts.

18.4. Promoting Innovation
In addition to the effects of technologies on individual patients, assessments should take into account a broad societal perspective, considering impact of technologies on broader societal costs such as productivity and social care costs, as well as the inherent benefits of medical progress and the development of innovations.

Reflection to “Health in the Regions”:
Classification is indispensable for reimbursement in the Euroregions, where different financing systems exist. This gives a basis for both sides.
Classification of Medical Procedures

Standards

• Class A: Highly effective and evident
• Class B: Effective, limited evidence
• Class C: Effective, no evidence
• Class D: Ineffective, no evidence

Establishments

- EU professional medical societies
- European Institute of Health
- National Institutes of Health in Member States

Established for all medical procedures, therapeutic interventions incl. drug Rx, devices, etc.

Define & update outcomes and evidence-based standards

Coordinate and compile standards, forward to NIH

Provide to local stakeholders, continuing medical education

Reimbursement

• Class A: Reimbursed
• Class B: Reimbursed
• Class C: Reimbursement questionable
• Class D: Not reimbursed

Control of HC system

• Medical quality control
• Cost and volume control
• Auditing, monitoring
• Planning, pricing, contracting
19. Risk management

19.1. Safety in Medicine in the Region
The health and hospital sector is vast and complex, employing about ten percent of EU health workers. This sector is probably the largest employer in Europe, covering a huge range of jobs and responsibilities. This means, however, that it presents an equally broad range of complex risks and problems related to occupational safety and health management. Strategies for prevention and protection of workers’ health are a basic part of a systematic approach to this question in health care structures.

Prevention measures currently applied cover a range of occupational risks: biological, chemical, ionizing and non-ionizing radiation, psychosocial, anaesthetic gases, chemotherapeutic agents, etc. A qualified medical practitioner, working closely with other parties involved in prevention (company management, safety managers, etc.), is responsible for their application and is influential in critical safety factors. A health prevention management system for health care workers is outlined, and how it fits into a risk management approach is described.

19.2. Risk Management in Health Care
Adverse events in hospitals have become a problem of public health all around the world. It is not acceptable that patients are harmed by the same health care system that is supposed to offer healing and comfort. Governments have developed strategies to ensure safe conditions for patients, but the credibility of the health system also depends on the ability and capacity that the health structures have to respond in a safe way to health needs.

The concept of safety is becoming an integrated element within the whole system, and is no longer seen as a punctual phenomenon. Now it is necessary to take into account the adverse event as a complex occurrence where it is necessary to evaluate numerous factors including technical, organizational, process, human factors and error. Errors, especially in the medical field, are currently a focal issue in the context of safety. On a worldwide level, interest has increased in developing interventions and taking initiatives to mitigate these adverse events. To actively make the needed changes, it is necessary to
use risk management to revise the flow of the system and processes that move toward the patient.

Risk management in adverse events is defined as all the processes involved in identifying, assessing and judging, assigning ownership, taking actions to mitigate or anticipate them, and monitoring and reviewing progress. Good risk management helps reduce hazards and builds confidence to innovate. The actions and activities contained in risk management transverse the health care functions and structures according to a systemic approach. This approach is intended to improve the quality of sanitary performances and guarantee patient safety. To be effective, risk management must address all the areas in which the error expresses itself during the clinical process of the patient. Only an integrated management of the risk can lead to changes in clinical practices and promote the growth of a health culture. This health culture will be nearer to the patients and operators, decrease costs and develop organizations and sanitary structures that are safe and efficient. This is important too in order to assure that proper medical care is done on both sides.
C. What to do - How to do it
20. Prerequisites for Establishing a Master Plan

20.1. Objective

The model project of a master plan for a border region is intended to sustainably support the achievement of the objectives defined by the EU Commission for the improvement of the health care structures in border regions and to provide concrete results for the creation of the health care systems in health care regions.

The master plan is oriented towards the objectives of the project contained in the policy paper “Health in the Regions”, which is formulated on the initiative of EU Commissioners Dalli and Hahn by the European Academy of Sciences and Arts.

- Harmonisation and optimisation of medical services in EU border regions
- Demand-oriented and patient-oriented planning of offers and concerted use of capacities while respecting and increasing standards of quality assurance
- Illustration of encouraging and impending factors for the realisation of project objectives within individual EU Member States and their health care systems respectively
- Creation of conditions for cross-border mobility of patients with regard to the use of health care and hospital services
- Contribution to cost reductions, e.g. by means of improved coordination of services and by reducing and/or transforming acute care beds and improved cross-institutional cooperation
- Establishment of a fundamental European pilot project in the health care sector
- Coordination/reconciliation of project results with the respective hospital planning systems of the countries concerned
- Identification of evaluation approaches for measuring the success of the project on a long-term basis

Within the framework of the master plan for the model project, an ideal typical approach regarding the provision of health care institutions is initially to be developed. The result is thus a target image enabling the concrete border regions to be selected to derive and develop specific measures.

The following description is focused on the services and process steps necessary for stage 1 and stage 2.
20.2. Selection of the Border Region for the Model Project

Border regions are defined as sections along two EU Member States comprising a depth of approx. 25 km into the respective inland. With regard to population density, different clusters will be defined.

For the model project a border region of class 3 is chosen, whereby an overall population of approx. 120,000 inhabitants is assumed for the model approach. The selection of such a model region enables the development of a comprehensive approach for the provision of hospital and health care institutions and is thus suitable to represent a substantial benchmark for comparable border regions.
20.3. Planning the Health Care System for the Model Region

The ideal typical planning is made for a border region with 120,000 inhabitants with an age and morbidity structure that is based on the EU average. The foundations for this are relevant statistical evaluations of Eurostat regarding socio-demographic data and the European health report of the EU.

To establish the ideal typical planning of offers, benchmarks and reference values are used which are geared to the European average and planning values. The following table illustrates this approach.

Alternatively and for simplification purposes, the Austrian reference and planning values could be taken as a basis for the ideal typical border region. This step is used to receive a parameter for necessary hospital and health care institutions.

Due to the different financing systems (DRG, per capita, budget-oriented, etc.), different health insurance schemes and national health care systems in the individual EU countries as well as the different organisations of primary care and the outpatient sector (integrated models, parallel systems), assumptions will have to be made, according to which the selected planning values will be valid. Regarding the first approach, the model region is based on a German-Austrian border region. For the purpose of further implementation and especially the roll-out in step 3, the preparation of a planning model is recommended, which allows integrating different input parameters regarding the above-mentioned factors.
Besides the planning of offers and capacities, the essential framework conditions and premises are analysed and interpreted in terms of harmonisation, which are to be taken into account as success and implementation factors for the establishment of cross-border projects. They include, in particular:

- Compensation for different wage levels on the basis of personnel groups
- Modification regarding fundamental financing
- Adaptations with respect to the different pay systems for hospital services (cf. German DRG, Austrian LKF model)
- Regulations regarding different structure quality criteria
- Differences with regard to hospital infrastructure regulations, differences in approval and licensing procedures, in the economic governance of hospitals
- Standards of professional organisation, representations of interest
- The analysis of the framework conditions should also include the evaluation of experiences gained from previous cross-border health care projects, e.g.:
  - Braunau/Simbach (critical care, cardiology care)
  - Gmünd
  - EU-Regio projects

The results of the ideal typical planning process are available.
20.4. Master Plan for Two Selected Border Regions

It is proposed to first select two specific border regions, the size and type of which are similar to the ideal typical border region.

The process for each border region is then oriented towards the following approach.

In order to implement the measures oriented towards the project objectives set out under point 1, there should be the possibility to highlight the chance of EU subsidies for cross-border projects.

The results of the master plan are then available as follows.

**In the target/performance comparison**

- Quantitative comparison regarding the necessary capacities according to the ideal typical model of stage 1 and the actual performance and capacity profile of the region; this leads to over-provisions and under-provisions
- Quantitative comparison of the essential structure qualities regarding the assumed and actual supply structure, e.g. access of the population to health care institutions;
minute values regarding the reachability of different health care levels (primary health care, hospitals for standard and specialised care, etc.)

Figure 43: Procedural concept master plan

<table>
<thead>
<tr>
<th>Analysis of the actual situation</th>
<th>Target/performance comparison</th>
<th>Plan of measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number / type / status of health care institutions</td>
<td>Target/performance comparison regarding the essential capacities (e.g. number of beds available, outpatient care places, etc.)</td>
<td>Necessary structural, organisational and other measures</td>
</tr>
<tr>
<td>Analysis regarding target parameters for patients (accessibility, quality)</td>
<td>Target/performance comparison regarding the qualities of the health care structure</td>
<td>Costs for system and administration changes</td>
</tr>
<tr>
<td>Quantitative framework conditions and requirements of the health care system</td>
<td></td>
<td>Need for investments incl. costs for de-investments</td>
</tr>
</tbody>
</table>

Plan of measures

- Listing of any and all necessary structural, organisational and other measures to achieve the target value of stage 1
- Demonstration of measures and costs necessary for system and administration changes (adaptation of the different health care systems)
- Estimation of need for investment by means of space reference values for the necessary adaptation of capacities including de-investment costs
- Rough estimate of follow-up costs and comparison with the actual costs for the existing border region without harmonisation → Evaluation of cost advantages
- Establishment of a system for the ongoing results monitoring (examination of the functional chains of the measures, evaluation of cost effects, etc.)
- Upon presentation of the master plans for two border regions, an evaluation of the basic model developed in stage 1 for a border region is also available. The results of stage 2 thus also result in an update of this planning model.

This feedback is especially necessary with regard to the further roll-out of the master plan in stage 3 (inclusion of further border regions).
Figure 44: Feedback process

Stage 1
Development of the ideal typical planning model

Stage 2
Application for two border regions

Feedback
Implementation measures
21. Concept for a Regional Hospital

In the framework of the European Cross Border Project a Master Plan has been proposed to develop sustainable solutions for cross border areas within the EU in the health care sector. In order to demonstrate one important pillar of the project, VAMED was invited to propose an overall concept for a regional hospital serving a cross border area with about 120,000 inhabitants.

The following concept shows a draft of a hospital with its medical and non-medical functions and calculated capacities for the inpatient services and selected outpatient services. It is important to mention, that a hospital always has to be considered in its regional context due to the coordination of medical workloads with other hospitals and with the primary health care sector as well as the availability of other non medical functions (e.g. CSSD, linen services) to determine the service profile.

The proposal for the regional cross border hospital therefore only aims to indicate a potential service profile as well as the size and a rough cost estimate of such a hospital based on a Greenfield approach.

For the functional programming the following assumptions have been applied:
- catchments' population: 120,000
- Austrian /middle European planning standards
- Provision of main medical services required for the population
- Collaboration with Center of Excellences in the neighbored countries in terms of specialized diagnostic and treatment services (e.g. cardiac surgery, neurosurgery, radiation center, inpatient psychiatric services, advanced diagnostic facilities like PET-CT, specialized laboratory services)
- “Usual” range of non medical services
- Austrian Benchmarks to estimate space and cost demand

21.1. Functional structure, estimated investment cost

Medical functions

- Inpatient area / bed facilities: general and special wards
- Emergency and outpatient department separated from the bed facilities
- Medical support centers
The bed facilities comprise **general care wards** as well as **specific wards** for intensive care, day care, remobilisation/post acute treatment, psychiatric ward and obstetric ward. Gynaecology patients are part of the interdisciplinary used general ward.

We suggest implementing day care facilities for the paediatric patients (part of the paediatric ward) and psychiatric adult patients. The ophthalmology and the E.N.T. should be provided solely on day care base using the **day care intervention unit**. Other surgical disciplines such as general surgery, orthopaedic and traumatology are performed as inpatient as well as day care workload. The day care intervention unit is designed for patients, who experienced surgical, endoscope or other interventions and are scheduled to be discharged on the same day. We recommend locating it close to the operating theatre, because of the functional proximity. Furthermore it should be located in the proximity of the endoscopy to take advantage of shared room facilities (e.g. observation of patients after endoscopy).

The **ICU and IMCU** is a combined area with shared facilities. It should be located adjacent to the operating theatre and the emergency department.

**Emergency and outpatient department**: At the emergency department traumatological patients and patients of all disciplines are examined and treated. It acts for all acute and emergency cases as well as not scheduled patients. It should be located very close to the radiology. A direct connected observation ward serves for patients with a length of stay of up to 24 hours. If a longer stay is necessary patients are allocated to the appropriate department and ward. Separate pathways for outpatients and inpatients are necessary.

The **outpatient department** is the central facility for examinations and treatments (including pre- and post inpatient admission) including the functional diagnostic for all specialities. As such, this department plays a central role in the guidance of patient flows. The outpatient department will treat patients primarily on an appointment system. Optionally the outpatient department could also contain procedure-rooms. The **physical medicine** should perform mainly for inpatients.

The **medical support centres** consist of the radiology, the endoscopy, the clinical laboratory, the pathology and the anaesthesiology as well as the operating theatres and the delivery suites.
The **endoscopy** acts as a centrally interdisciplinary unit mainly used by surgical and conservative disciplines. To achieve room and personnel synergies we recommend a neighboured position to the day care clinic. The dimensioning is based on experience data.

The **radiology** contains units for conventional diagnostic, CT-scan and MR-scan and optionally an interventional angiography. It should be located adjacent to the emergency department and the outpatient department.

The **operation theatre** is the central unit for all elective and not elective surgeries (also for planned caesarean sections). The dimensioning of the operation theatre is calculated on the average number of surgeries carried out for inpatients in the surgical disciplines. The operation theatre should be located in good adjacency to the intensive care and the surgical wards.

The **delivery suite** contains 3 places (on basis of calculations) with additional labour/recovery rooms. We recommend implementing an emergency section room in the delivery suite. The delivery should be located in good adjacency to the obstetric ward. The clinical laboratory can also cover the blood depot respectively the bloodbank.

**Pathology**: we suggest to outsource the pathology laboratory services and to implement only autopsies.

**Further medical functions outside the hospital:**
Optionally a **doctor’s center** can be implemented close to the hospital. It could provide complementary disciplines as e.g. dermatology, dental services and private doctor’s offices which can be organised by time sharing models. It could also act as a base for physiotherapeutic, nursing and social services as well as where information is provided to patients and relatives.

The hospital does not provide departments which are part of a central hospital such as heart surgery, transplantation medicine, etc.
21.2. Non medical functions
The non-medical functions comprise the administration and the support functions such as CSSD, kitchen, pharmacy, supply and disposal, linen supply, patient transport/pick-up and delivery services, technical services, cleaning and hygienic services. Furthermore there are facilities at the main entrance of a hospital like shops, cafeteria, a reception and the patient registration and administration. A staff dining-hall and staff wardrobes should be available.

21.3. Functional concept and bed capacities
The following charts give an overview of the suggested bed capacities as well as the medical and non-medical functions of the proposed hospital according to the DIN 13080. The bed capacities have to be finally determined on the basis of the coordination of workload between the hospitals of the region. The outsourcing of support functions such as CSSD, pharmacy, linen supply as suggested in the concept is dependent on the availability of these functions in the closer neighbourhood and on adequate accessibility.

21.4. Space demand and rough estimate of investment cost
Based on space related benchmarks the total space demand of the hospital (total gross area) is estimated with approximately 40,000 square meters. This leads to an overall investment demand in a Greenfield solution of appr. EUR 150 mio. (excluding cost for site and VAT; +/- 20%)
**Fig. 45:** Functional structure

- **Departments**
  - **Inpatient & day care workload:**
    - Internal Medicine*
    - Neurology incl. B+C
    - Surgery
    - Urology
    - Orthopaedics & Traumatology
    - Gynaecology
  - **Paediatrics**
  - **Obstetrics**
  - **Adults Psychiatry**
  - **Solely day care Workload:**
  - **Ophthalmology**
  - **E.N.T.**

- **Bed Facilities**
  - General wards beds
  - Intensive Care beds
  - Pediatric ward inc. day care
  - Obstetric ward
  - Psychiatric ward
  - Adult Psychiatry places
  - Day Care Intervention places

- **Medical support centers**
  - X-Ray & Sonography
  - CT / MR
  - Functional Diagn. e.g. ECG, EMG
  - Endoscopy
  - Clinical Laboratory
  - Autopsy
  - Physical Medicine
  - Anesthesiology
  - Operating Theatres
  - Delivery Suites

- **Emergency and Outpatient**
  - Emergency Department
    - Resuscitation
    - Examination/Treatment
    - Observation Ward
  - Medical offices
  - Outpatient Department
  - Supply & Disposal
    - CSSD (outsourced)
    - Kitchen (outsourced)
    - Pharmacia (outsourced)
    - Linen (outsourced)
    - Supply & Disposal

*Medical key aspects have to be defined such as Nephrology, Cardiology, Rheumatology in order to local requirements
Table 9: Functional concept, space and investment demand

<table>
<thead>
<tr>
<th>DIN-Code</th>
<th>Functional Units</th>
<th>Number of beds/places</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diagnostic and Treatment Services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emergency Department</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outpatient Department</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Functional Diagnostic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Endoscopy</td>
<td>2 places</td>
</tr>
<tr>
<td></td>
<td>Clinical Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Autopsy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radiology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X-Ray and Sonography</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT/ MR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating Theatres</td>
<td>5 OT’s</td>
</tr>
<tr>
<td></td>
<td>Delivery Suites</td>
<td>3 places</td>
</tr>
<tr>
<td></td>
<td>Physical Medicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical Offices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Head of department, doctors offices, doctor on duty, etc.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Inpatient Services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Care</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Ward, interdisciplinary Wards</td>
<td>213 beds</td>
</tr>
<tr>
<td></td>
<td>Obstetrics and Newborn Care</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obstetric Ward</td>
<td>10 beds</td>
</tr>
<tr>
<td></td>
<td>Intensive Care</td>
<td>12 beds</td>
</tr>
<tr>
<td></td>
<td>ICU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IMCU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adults Psychiatry</td>
<td>25 beds</td>
</tr>
<tr>
<td></td>
<td>Remobilisation/post acute treatment</td>
<td>20 beds</td>
</tr>
<tr>
<td></td>
<td>Palliative Care</td>
<td>6 beds</td>
</tr>
<tr>
<td></td>
<td>Paediatrics</td>
<td>18 beds</td>
</tr>
<tr>
<td></td>
<td>Observation ward</td>
<td>12 beds</td>
</tr>
<tr>
<td></td>
<td>Day care Intervention</td>
<td>24 beds</td>
</tr>
<tr>
<td></td>
<td>Day Care Paediatrics (part of the paediatric ward)</td>
<td>2 beds</td>
</tr>
<tr>
<td></td>
<td>Day care Adults Psychiatry</td>
<td>15 beds</td>
</tr>
<tr>
<td></td>
<td>Sum beds / places</td>
<td>357 beds</td>
</tr>
</tbody>
</table>
### DIN-Code Functional Units

<table>
<thead>
<tr>
<th>DIN-Code</th>
<th>Functional Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Administration</td>
</tr>
<tr>
<td></td>
<td>Administration, Reception</td>
</tr>
<tr>
<td></td>
<td>(incl. registration &amp; administration, hospital management, writing services, etc.)</td>
</tr>
<tr>
<td></td>
<td>Data Centre</td>
</tr>
<tr>
<td>4</td>
<td>Public Amenities, Staff Facilities</td>
</tr>
<tr>
<td></td>
<td>Facilities at the Main Entrance (incl. shops and a cafeteria)</td>
</tr>
<tr>
<td></td>
<td>Staff wardrobes</td>
</tr>
<tr>
<td></td>
<td>Staff dining-hall</td>
</tr>
<tr>
<td>5</td>
<td>Support Services</td>
</tr>
<tr>
<td></td>
<td>Pharmacia Outsourcing</td>
</tr>
<tr>
<td></td>
<td>CSSD Outsourcing</td>
</tr>
<tr>
<td></td>
<td>Kitchen</td>
</tr>
<tr>
<td></td>
<td>Linen supply Outsourcing</td>
</tr>
<tr>
<td></td>
<td>Supply (incl. Logistics – Manipulation Area)</td>
</tr>
<tr>
<td></td>
<td>Technical services option. Outsourcing</td>
</tr>
<tr>
<td></td>
<td>Disposal</td>
</tr>
<tr>
<td></td>
<td>Patient transport / pick-up and delivery services</td>
</tr>
<tr>
<td></td>
<td>Cleaning and hygienic services option. Outsourcing</td>
</tr>
</tbody>
</table>

#### Space demand

| total gross area (appr.) | 40.000 |

#### Investment cost

| overall estimate (without site) +/-20% | EUR 156 mio |

### Table 10: Bed allocation per discipline

| Inpatient & Day care | Internal Medicine | 100 |
|                      | Neurology incl. B+C | 34 |
|                      | Surgery | 40 |
|                      | Urology | 20 |
|                      | Orthopaedics & Traumatology | 25 |
|                      | Gynaecology | 10 |
|                      | Obstetrics | 10 |
|                      | Remobilisation/aftertreatment (RNS) | 20 |
|                      | Palliative Care | 6 |
|                      | Adults Psychiatry | 25 |
|                      | Paediatrics | 18 |

#### Day care

| Day care | Ophthalmology | 4 |
|          | E.N.T. | 4 |
|          | Paediatrics | 2 |
|          | Adults Psychiatry | 15 |

#### Intensive Care

| Intensive Care | ICU, IMCU | 12 |

#### Functional beds

| Functional beds | Observation ward | 12 |

## Sum beds / places

| 357 |
21.5. Architecture

REGIONAL HOSPITAL

Architectural Concept:

The presented design shows a conceptual layout for a 350 bed hospital, which is conceived for regions with about 120,000 inhabitants. It provides medical services for Internal Medicine, Neurology, Surgery, Urology, Orthopaedics & Traumatology, Gynaecology, Paediatrics, Obstetrics, Psychiatry, Opthalmology and E.N.T.

The hospital is designed as a six-story building, the first and the second floor are basically dedicated to diagnostic and treatment services, the four floors above to general care within the specific wards. Total gross area is estimated with about 40,000 m², and total costs with about 156 Mio. € (+-20%).

The design is reflecting these initial ideas:

1. Modular and flexible building system:
    Building a regional hospital means to create a flexible structure, which allows a maximum of functional variety in future. All building elements and the structural raster have to follow up an intelligent measure system, so units can be enlarged or reduced, added or displaced, if functional requirements are changing.

2. Simple orientation and short distances:
    The hospital’s shape should describe a clear form, which is self-explanatory. This will offer an easy orientation for users. The shape itself reflects the form of a star, where all five wings are accessible from the central core, the main hall.

3. Compact building layout and optimization of functional space:
    Building hospitals means also respecting economical aspects. Building costs can be saved by reducing functional space (combining operative synergies) and compressing the functional program into a compact building shape (using a minimum
Operating costs can be reduced by running small internal circuits and also by maximum use of daylight. Furthermore the “star-form” is combining all these aspects. By the wing-rotation of 45°, all rooms will have a free view and maximum sunshine.

4. Green building design:
Green building is a design philosophy, which is based on the maximum use of natural energy. This is the use of solar, wind and geothermal energy, a high-grade insulation for exterior walls and natural ventilation for internal rooms. It is evident, that the influence of light, green zones, simple orientation and short distances are the most important factors supporting the healing process. It is dealing with the main effect, what architecture is able to contribute.
Fig. 46: Architectural concept of a Euregio Hospital
<table>
<thead>
<tr>
<th>REGIONAL HOSPITAL</th>
<th>total gross area</th>
<th>N° of beds/places</th>
<th>m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Diagnostic and Treatment Services</td>
<td>25%</td>
<td>10.000</td>
<td>places</td>
</tr>
<tr>
<td>Emergency Department incl. observation ward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional Diagnostic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endoscopy</td>
<td>2 places</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autopsy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiology / X-Ray and Sonography / CT &amp; MR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Theatres</td>
<td>5 OT’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery Suites</td>
<td>3 places</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Medicine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Offices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head of department, doctors offices, doctor on duty, etc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Inpatient Services</td>
<td>45%</td>
<td>18.000</td>
<td>357 beds</td>
</tr>
<tr>
<td>General Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Ward, interdisciplinary Wards</td>
<td>213 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstetrics and Newborn Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstetric Ward</td>
<td>10 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensive Care</td>
<td>12 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMCU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult Psychiatry</td>
<td>25 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remobilisation/post acute treatment</td>
<td>20 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palliative Care</td>
<td>6 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paediatrics</td>
<td>18 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observation ward</td>
<td>12 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day care Intervention</td>
<td>24 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day Care Paediatrics (part of the paediatric ward)</td>
<td>2 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day care Adults Psychiatry</td>
<td>15 beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Administration</td>
<td>5%</td>
<td>2.000</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration, Reception</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(incl. registration &amp; administration, hospital management, writing services, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Centre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Public Amenities, Staff Facilities</td>
<td>5%</td>
<td>2.000</td>
<td></td>
</tr>
<tr>
<td>Facilities at the Main Entrance (incl. shops and a cafeteria)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff wardrobes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff dining-hall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum Public Amenities, Staff Facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Support Services</td>
<td>20%</td>
<td>8.000</td>
<td></td>
</tr>
<tr>
<td>Pharmacia</td>
<td>Outsourcing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSSD</td>
<td>Outsourcing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linen supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply (incl. Logistics – Manipulation Area)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical services</td>
<td>option. Outsourcing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disposal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient transport / pick-up and delivery services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning and hygienic services</td>
<td>option. Outsourcing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL space demand (appr.)</td>
<td>100%</td>
<td>40.000</td>
<td>Investment cost</td>
</tr>
</tbody>
</table>
D. Hindrances to overcome
1 Hindrances to overcome

Although the harmonization of European national health care systems is a vision shared by many, it is rather a long term goal than something to be expected in the near future. A pilot project cannot wait for this harmonization to come. Too urgent is the need for action for the European citizens living in the bordering regions. A concept for a European cross border hospital in a model region must thus be strong enough to cope with differences in financial and organizational structures of health care provision. Therefore the focus should be on building bridges between the national health care systems of the neighboring member states too.

To follow the Commission’s idea of developing new concepts of health care that are based on market incentives, inefficient market distortions need to be abolished. Consequently, negative financial affects on casual bystanders resulting from the inner European trade of health care services should be avoided.

Three important obstacles in the context of financing cross border health care shall be outlined in brief:

1.1 Basic financing structure of cross-border health care

Today, the import of health related services under the roof of public health care proceeds in two different ways. On the one hand medical treatment in other European member countries can be based on the European Council regulation 883/2004. If the insurant is on holiday or job-related business in a foreign country he has claims for in kind allowances in kind to the same degree as local insurants. This is also the case for patients deliberately crossing the border for treatment if their home insurances consented to the treatment prior to the import of health related services. The health insurance in the country of medical attendance (country of export) pays for the services claimed and subsequently recalls the amount from the patient's insurance in his home country (country of import).

On the other hand, imports on health related services can be based on the patients directive 2011/24/EU. Generally, refunds of health expenses have to be granted largely independently from an ex-ante permission. If not entitled to 883/2004 in kind allowances, at first the patient himself has to pay the bill for the imported services. Later he will be refunded to the same extent as the treatment would have cost on average in the home country. However, the hospital sector is not comprised to a satisfactory, fully comprehensive extent in the patients directive. Without a prior permission of his insurance,
the patient might lose all entitlement of refund when being treated in a hospital outside the
country.

In a European border hospital, intentional health care utilization is rather the rule than an
exception. For the pilot project, ways must be found to insure access for all patients in the
region – regardless of individual permissions. Otherwise – especially with respect to
national price differenties - insurances would deny permission based on the regulation
883/2004 when medical treatment is more comprehensive or cost intensive in the other
country. Patients, importing medical services based on the patients directive would
probably get the permission needed much easier. However, they would have to bare
potential cost differences themselves what again would hamper free access to medical
treatment.

1.2 Externalities from bypassing national rationing systems

Health Services differ in some way from other services traded within the European Union.
Since from the patient’s perspective an additional medical treatment is due to the
intermediate insurance mostly free of cost, the market cannot provide optimal allocation of
goods and services. Thus, in every European country the health sector belongs to the
most regulated fields of the economy. Due to an excessive demand and supply for health
related services in many countries the costs of health care have been rising, leading to
higher contributions or taxes. In order to cut the increase of costs various rationing-
systems have been implemented as national answers to financing problems. Particular
measures taken in the EU member states vary significantly: Some countries try to reduce
the supply of services by limiting the number of providers or by lowering the providers' benefits. Others focus on attempts to cut the demand for services, either by introducing
co-payments or by reducing the catalogue of services covered.

Unfortunately, foreign patients are frequently excluded from these regulations. In many
countries marginal financial benefits of physicians decrease with the number of services
offered for nationals but not so for services provided for foreign patients.68 Also, in some
countries like in Germany hospitals can choose freely whether to treat foreign E-112
patients that deliberately entered the country to receive hospital care outside the national
rationing systems69 - which of course they usually do. As a consequence, sometimes
treating foreign patients is financially more rewarding than treating national patients, as the

68 So for instance in the ambulant sector in Austria or in the hospital sector in Germany.
69 See §4 (IV) KHEntgG (German Krankenhausentgeltgesetz).
former is not subject to regressively declining remuneration. For the home insurance this frequently leads to higher costs than a comparable treatment at home.

The import of health-care services should not undermine domestic rationing systems, as otherwise the individual's decision to import services could cause additional expenditures for the insured persons at home.

Two different approaches to solving the problem can be thought of. Either in individual contracts between the domestic insurances and the European Hospital it is agreed on extending domestic rationing systems to the imported health-care services. Or the domestic rationing systems should be applied not only to national patients but to foreign patients, too. Whereas in the first case the hospital would have to charge the patients in accordance with the distinctive regulations in their home country (i.e. the country of insurance), in the latter case foreign rationing systems would have to be accepted as equivalent to the one at home.

1.3 Externalities from imports of tax financed services

The extent to which health care is financed either by taxes or by contributions to social security systems differs throughout Europe. Whereas in England basic treatment is completely covered by the taxpayer in Germany only some investments in the hospital sector are paid for by means of taxes. Similar differences exist in continental Europe, too. Direct comparisons of regulations in neighbouring German and Austrian federal states show that the tax payers' engagement in the fields of hospital care or rescue services can be roughly tenfold higher in Austria than in Germany.\(^{70}\) Unfortunately, some problems of cross-border health care result from European Union regulations disregarding these national differences in financing health care. Frequently, health insurances are obliged to bear the expenses of foreign treatments, even if in the home country not the insurance, but the taxpayer would have had to cover them. Likewise, when importing services from a country where health-care to a great extent is paid for by the taxpayer only that part of the cost of treatment that is left to the insurance in the exporting country has to be refunded. The underlying problem is that whenever services are financed by taxes and by contributions European Court of Justice decisions rigorously disclose the percentage covered by taxes from reimbursement.\(^{71}\) Apparently it is feared that taking into account the

\(^{70}\) Allinger / Lüdeke (2005), Grenzüberschreitende Leistungen im Gesundheitswesen - Band 3: Der Krankenhausbereich, Passau 2005 (http://www.inwiso.de/images/Downloads/Band3Krankenhaus.pdf)

\(^{71}\) Compare ECJ C-411/98 (Ferlini).
tax financed services would entail different prices for national and international patients. This again could be seen as discrimination. However, from an economic point of view it makes no difference whether the money to finance healthcare comes from taxes or contributions. In other words: When financing structures differ, importing health care services based on the regulation 883/2004 causes financial losses to either the taxpayer or the health insurance premium payers.

_Prof. Dr. Hanjo Allinger, München_
<table>
<thead>
<tr>
<th>Advantages</th>
<th>Hindrances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Short distances</td>
<td>1) Overcome the national barriers</td>
</tr>
<tr>
<td>2) Free selection of doctors</td>
<td>2) Languages</td>
</tr>
<tr>
<td>3) Improvement of provision and quality</td>
<td>3) Financing - Insurances</td>
</tr>
<tr>
<td>4) Overcome shortage of doctors</td>
<td>4) Law - practising</td>
</tr>
<tr>
<td>5) Financial efficiency</td>
<td>5) Doctor Associations</td>
</tr>
<tr>
<td>6) Market competition</td>
<td>6) Lack of will</td>
</tr>
<tr>
<td>7) European cohesion</td>
<td>7) Medical Information</td>
</tr>
</tbody>
</table>

The Reality: Cross Border Health Care in European Regions can be implemented immediately according to market structures and depolitization. The European Regions can function as an experimental microstructure. The main prerequisite is good will in all leach assisting the will of the patients. They know what is optimal for them.
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Stephan Unger, Mag. Arch., Vienna
Heinrich von Wulfen, Dr., Erlangen


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References:

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18. Assumption based on internal data resulting from successfully completed projects.
19. A peak of 1.9 mEUR p.a. due to accumulating accounts receivables against cost units/ health insurers (based on a conservatively estimated payment term of six months).
20. Earnings before interest, tax, depreciation and amortization.
21. Earnings before interest and tax.
34. A. Ceriello et al: Oscillating glucose is more deleterious to endothelial function and oxidative stress stress than mean glucose in normal and type 2 patients. Diabetes 2008;57:1349-1354.
53. H.W. Rodbard et al: Decision support tools dramatically improve clinicians’ ability to interpret structured SMBG data. Poster presentation at the 71th Scientific Sessions of the American Diabetes Association (2011); 0024-LB.
54. Oral information from William Polonsky, principal investigator of the STeP study.
57. Ibid.
69. The value of laboratory screening and diagnostic tests for prevention and health care improvement (2009) prepared by The Lewin Group Inc. for the American Clinical Laboratory Association and Advanced Medical Technology Association (AdvaMed).
72. See http://www.roche.com/media/media_releases/med-cor-2011-08-17.htm
73. See http://www.roche.com/media/media_releases/med_dia_2009-01-06.htm
74. E.g. in Germany, the “Qualitätssicherung und Richtlinie der Bundesärztekammer zur Qualitätssicherung laboratoriumsmedizinischer Untersuchungen (RiliBÄK) ensures a systematic and regular external controlling procedure whereas the standard „ÖNORM“ in Austria deploys no consistent quality control and the procedure depends on the specific POC device.
75. E.g. 2010, a study of JOANNEUM RESEARCH, health-institute of biomedicine and health sciences, on behalf of Roche Diagnostics Vienna demonstrates medical benefits of patient self-management for oral coagulation management and the positive economic impact on the entire health system.
76. The value of laboratory screening and diagnostic tests for prevention and health care improvement (2009) prepared by The Lewin Group Inc. for the American Clinical Laboratory Association and Advanced Medical Technology Association (AdvaMed).
77. see www.roche.com/about_roche/personalised_healthcare.htm
78.

Books:

24. List of Supporters

Pfizer
Siemens
Medtronic
Roche
Vamed
Appendix A

Meeting on “Health in the Euregio Salzburg – Traunstein – Berchtesgaden” -
Summary of the presentations

Univ.Prof.Dr.Dr.h.c. Felix Unger
Vorstand der Universitätsklinik für Herzchirurgie Salzburg

Harmonisierung medizinischer Leistungen
und gemeinsame Zielplanung der medizinischen Versorgung in der
EuRegio Salzburg – Berchtesgadener Land – Traunstein

BERICHT

an

Frau Staatsminister
Christa Stewens
Bayerisches Staatsministerium für Arbeit
und Sozialordnung, Familie u. Frauen

Frau Landeshauptfrau
Mag. Gabi Burgstaller
Landesregierung Salzburg

27. September 2005

Verteiler:
Ministerialdirigenten Dr. Gerhard Knorr
Landrat Georg Grabner
Landrat Hermann Steinmaßl

Projektteam:
HR Dr. Alois Grüner
Stefan Nowack
Dr. Max Laimböck
Thomas Degott
MR Jörg Haggenmüller

Alle eingeladenen Ärzte, Kreisverbände Berchtesgaden, Traunstein, Ärztekammer Salzburg, alle eingeladenen Kassen.
Harmonisierung medizinischer Leistungen
und gemeinsame Zielplanung der medizinischen Versorgung in der
EuRegio Salzburg – Berchtesgadener Land – Traunstein


Projektziele sind:

- Harmonisierung und Optimierung des medizinischen Leistungsangebotes in der EuRegio
- Patientengerechte Angebotsplanung und abgestimmte Kapazitätsnützung unter Einhaltung und Erhöhung von Standards zur Qualitätssicherung
- Schaffung der Voraussetzungen für die Mobilität der Patienten in Bezug auf die Inanspruchnahme von Gesundheits- und Krankenhausleistungen
- Beitrag zur Kostendämpfung z.B. durch Reduktion bzw. Umwandlung von Akutbetten und bessere trägerübergreifende Kooperation
- Etablierung eines grundlegenden europäischen Pilotprojektes im Gesundheitswesen
- Koordination/Abstimmung der Projektergebnisse mit dem ÖSG (Österreichischen Strukturplan Gesundheit) bzw. mit analogen Regionalplanungen in Bayern.

Projektkonzeption:

Über ein gemeinsames Projekt sollen wesentliche Inhalte und zukunftsorientierte Maßnahmen erarbeitet werden. Komponenten des Projektes sind:

- Analyse der kooperationsfördernden Rahmenbedingungen unter Einbezug einer Auswertung bereits bestehender länderübergreifender Zusammenarbeitsformen.
- Bestandsaufnahmen der wesentlichen Einrichtungen zur Gesundheitsversorgung in der EuRegio - Durchführen einer Patientenstromanalyse
- Entwicklung möglicher Kooperations- und/oder Verbundmodelle
  - in der Spitzenversorgung
  - im Bereich der stationären und ambulanten Krankenversorgung
  - in den vor- und nachgelagerten Bereichen z.B. Rehabilitation, Pflege

Die Konzeption von Kooperations- und Verbundmodellen umfasst u.a.
- Erarbeitung von regionalen Leistungsschwerpunkten, regionale Abstimmung der Leistungsangebote nach Maßgabe von definierten Kriterien (Zugang zu Leistungen, Erfüllung von Qualitätsstandards und Verbesserung der Wirtschaftlichkeit)
- Grundsätze der Zusammenarbeit im Bereich Telematik bzw. im Austausch relevanter Patientendaten
- gemeinsame Führungsmodelle sowohl im Bereich medizinischer Leistungen (z.B. Laborverbund) als auch im Bereich der Serviceeinrichtungen (z.B. Einkauf, Instandhaltung/Wartung, Sterilisation)
- Grundsätze einer aufeinander abgestimmten Investitionspolitik hinsichtlich erforderlicher Neu- und Umbauten

- Erarbeitung der erforderlichen Begleitmaßnahmen rechtlicher, gesundheitspolitischer Art
- Konzeption von Pilotprojekten
- Szenarienentwicklung der Kooperation
- Investitionsplan
- Wirtschaftlichkeitsberechnung, Abschätzung möglicher Kostendämpfungseffekte
- Wechselseitige Einbindung in Projekte und Lenkungsausschüsse
In der 1. Sitzung der Steuerungsgruppe am 26. April 2005 wurde Prof. Unger beauftragt, ein Gespräch mit den leitenden Krankenhaussärzten zu initiieren, in dem vier Punkte herausgearbeitet werden sollen:

I. Derzeitiges medizinisches Angebot.
II. Was kann gemeinschaftlich in der Region getan werden.
III. Gemeinschaftliche Ziele für die Zukunft in der EuRegio.
IV. Kassen in der Region

Es wurden alle leitenden Chefärzte oder Primarärzte der EuRegio eingeladen sowie die Vertreter aller Kassen (siehe Liste).

Es gibt beispielgebende Kooperationen in der Euregio, die man intensivieren und ausbauen soll. Dabei dürfen keine Einbahnstraßen entstehen, sondern ein wechselseitiger Austausch in der Region soll für alle ein Win-to-Win sein.

I. Derzeitige Leistungen in der EuRegio in der Spannung zwischen Wien und München.

Die leitenden Ärzte berichten über den Ist-Zustand, der die doch sehr gute Versorgung der Bevölkerung in der Region aufzeigt.


Die PMU könnte auch ein sehr guter Kristallisationspunkt sein, wobei aber von Traunstein moniert wird, dass seitens der PMU die Resonanz ausbaubar ist. Hier wäre es wichtig, dass eine Zusammenarbeit mit den Kliniken in der Region vonstatten geht, dass man sich gegenseitig informiert und aufklärt, die Kliniken in den Lehrbetrieb einbezieht und auch daran denkt, analog zu amerikanischen Modellen einen Klinikverband macht (University Circle), wo auch die teilnehmenden Abteilungen in Traunstein zur Universitätsklinik der PMU erhoben werden. Derzeit ist Traunstein und Bad Reichenhall Lehrkrankenhaus der LMU München.

Darüber hinaus besteht die Empfehlung, für alle Ärzte der Region ein Büchlein zu entwickeln, wo ersichtlich ist, wer und wo medizinische Leistungen anbietet.

II. Gemeinschaftliche Zusammenarbeit

1. Am Beispiel der Herzchirurgie zeigen sich neue Potentiale einer wechselseitigen Zusammenarbeit. Auf dem Gebiete der Unfallchirurgie

2. Die gesamte Region hat viel zu wenige Intensivbetten. Es ist ein eklatantes Defizit gegeben, welches man unbedingt ausgleichen soll.

Die Notarztversorgung hat in der gesamten Region Lücken, die zu schließen wären. Bei allen Patiententransporten ist die rechtliche Situation nicht geklärt. Es ist auch der Wunsch der bayerischen Kollegen mit der Blutbank zu kooperieren.


7. Bei Engpässen, z. B. in der Neurologie, kann man freie Kapazitäten in der Region auf bayerischer Seite nützen, besonders bietet sich dazu Trostberg an. In Bad Reichenhall entsteht ein Schwerpunkt der Thoraxchirurgie

III. Gemeinschaftliche Ziele

Als gemeinschaftliche regionale Einrichtungen könnte man in Freilassing Regionsschwerpunkte für Onkologie und Kardiologie setzen. Ein besonderer Wunsch ist die Errichtung einer Transplantationsmedizin, beginnend mit der Stammzellentransplantation bis später zur Organtransplantation.

Telemedizin ist ein großer Wunsch, die Region untereinander medizinisch zu vernetzen.

Es wird besonders auch darauf hingewiesen, dass Berchtesgaden große Kapazitäten für die Orthopädische Versorgung frei hat, wobei man sich eine komprehensive Versorgung vorstellen kann, wie Operation mit anschließender Rehabilitation.
Wichtig ist, dass man langsam beginnt, Centers of Excellence gemeinschaftlich zu entwickeln, wo gemeinschaftlich der Benefit im Sinne einer Win-to-Win Situation entsteht.


IV. Kassen:


Sie befürworten eine

- gemeinsame Planung medizinischer Einrichtungen in der Region,
- Schaffung der Rahmenbedingungen,
- Schaffung der gesetzlichen Grundlagen.

Zusammenfassend kann man mit Freude berichten, dass die ersten gemeinsamen Runden auf total positives Echo gestoßen sind. Viele haben sich nicht gekannt, viele wissen nicht, was die anderen tun. Die regionale Entwicklung schafft völlig neue Möglichkeiten der Patientenversorgung und des Austausches des medizinischen Wissens. Jedenfalls kann man mit gemeinsamen Zielen viele Lücken schließen. Das Vorhaben ist letztlich für die Patienten äußerst positiv zu bewerten. Im Zuge der Europäisierung und der Regionalisierung können schrittweise regionale Einrichtungen aufgebaut werden bis hin zu einem an der Grenze stehenden Gesamtneubau, mit dem man eine völlige regionale Neustruktur mit Personaladaptierung und Bettenabbau erreichen kann. Ein echtes visionäres und zukunftsorientiertes Gesamtprojekt kann in dieser Grundstimmung verfolgt werden.

Besonders ist die positive Resonanz der Kassen hervorzuzeichnen.

Salzburg, 27. September 2005

Felix Unger

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The European Institute of Health (EIH) was established in 2003 to promote modern medicine and the equal delivery of health care to all European citizens. In concept it is the counterpart of the National Institute of Health of the United States.

The mission of the EIH is to ensure and promote Health for All. In our changing environment, medicine and the delivery of health care must constantly adapt to serve the evolving needs of our population. Our endeavors are patient centered and strive to identify, establish and promote state-of-the-art standards in health care.

The Health is Wealth report, outlining the strategic vision for European health care in the debut of the 21st century, was submitted to the European Parliament in 2004. The report describes a modern concept of medicine that fosters a broad interdisciplinary patient-centered approach encompassing medical professionals, industry and stakeholders. In this concept the hierarchy from the patient’s point of view is the personal relationship with the physician, which stands at the nucleus and serves as the primary point of care. Secondarily, medical arts support patient care by promoting research, education, and the establishment of best practices. The third factor in care relates to selecting and identifying the medical organization best suited to deliver necessary treatment. And lastly, financing the cost of care is the ultimate concern of the patient.

Medical doctors rely on the medical arts to provide the best guidelines for prevention, diagnosis, treatment, rehabilitation and long-term care. Industry plays a key role by developing and marketing new technologies in every medical domain while doctors seek to standardize care based on efficiency and reported long-term outcomes. This evidence-based approach creates a financially sound model for reimbursement. Medical organizations also must establish appropriate settings to deliver care for differing needs, such as acute, chronic, long-term situations in and out of hospitals, and hospices.
How to finance and fund **Health for All** is a complex political matter. Taxes, insurance, fees, out-of-pocket expenditures and complementary conditioned transfer (CCT) systems are the sources of financing. To leverage funds and optimize the concept of equal and available health care delivered to all European citizens, clear policies and standardized best practices must be developed.

The EIH represents a unique network uniting all stakeholders for the benefit of patients. The network includes

- doctors and their auxiliary health care teams,
- industry to bring innovation and new technology to medical care,
- political decision makers to set the environment for health care delivery,
- and universities to ensure ongoing research, development and education.

Medicine enormously impacts our society, with 25% of the gross national product (GNP) spent on health care and prevention. In almost every country comprising the Organisation for Economic Co-operation and Development (OECD), health care costs are increasing faster than gross domestic product (GDP). To ensure innovative medical advances in the 21st Century and support the Lisbon criteria and the Maastricht criteria, Europe must accelerate its competitive performance and establish a **European Lead Market in Health**.

Presently, the European Institute of Health works closely with the European Parliament via the SME-Union. Establishing an Inter Group is already in process for the next session of Parliament. The EIH functions within the European Academy of Sciences and Arts, which has 1,300 members that serve as a think tank and broad scientific and political network to lobby concepts at the European level.
Goals

The European Institute of Health represents a unique network comprising:

- Medical professional societies for doctors, patient organizations, nurses and professionals organizations
- Medical industry including pharmaceutical, medical devices and supplies
- Stakeholders such as policy makers and insurance organizations

The goal is to promote and accelerate innovation based on science. This can be achieved by:

- producing a report for the European Union entitled: **Health is Wealth: Creating a European Lead Market in Medicine.** This report, similar in size and concept to the 2006 Aho Group Report submitted to the European Union to make proposals for boosting creativity and innovation in Europe, will focus on medicine for the upcoming decade. Taking a broad interdisciplinary approach is inevitable. This report will set targets for new developments in medicine, sciences such as nanomedicine, and new concepts in quality control and distribution of care, with an emphasis on preventive measurements and new financial incentives to overcome constraints within the health care system.

- developing **principles of standardization** to guide the establishment of standards and concepts that are important for all doctors and stakeholders. Proper and full reimbursement of medical provisions become market driven and allows innovation and quality control. Supporting mobilization of these concepts is also desirable.

- developing concepts for public and institutional financing to define the framework for the shared aims of **medicine in solidarity.**
- establishing the EIH as an **Institute of the European Parliament**, with a Surgeon General at the helm to represent the voice of the patient and their needs.

All these endeavors share a patient-centered orientation to ensure **Health for All**.

The European Institute of Health is governed by a Board of Directors, a Board of Trustees and a Board of Advisors, which meet regularly. The Board of Directors are responsible for the day-to-day activities and report to the Board of Trustees. The Board of Advisors meets on a regular basis and provides strategic advice to the Institute.

Members:

Medical Societies in Europe: transport their experience to develop standardization and reimbursement strategies that have direct influence on the establishment of new concepts.

Medical industry: bring their developments and goals directly to the standardization process for transmission to the European Parliament.

Medical stakeholders: provide input for developing market criteria.

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