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The “issue analysis” was one of the main activities of the network and aimed at identifying and analysing “key emerging issues” which are relevant for European future S&T policies. With a focus on public health systems, the EFMN Issue Analysis 2008 addressed a topic of high importance in foresight activities at national or regional level. Future challenges, such as an ageing population call for reforms of public health systems that exceed national borders.

This paper exploits how the topic of “healthy ageing and the future of public healthcare systems” features in most recent forward looking exercises and prospective studies around the world focusing on the most important emerging challenges for the future. It consolidates the global perspective on healthy ageing and the future of public healthcare systems and how the issue is displayed by various communities/nations/regions.

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Special issue on healthcare
Healthy ageing and the future of public healthcare systems
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Aim of this paper

The EFMN Issue Analysis aims at identifying and analysing ‘key emerging issues’ which are relevant for European future (S&T) policies. With a focus on public health systems, the EFMN Issue Analysis 2008 addressed a topic which has been without doubt of high importance in foresight activities at national or regional level for a long time. However, future trends and challenges – such as ageing, increasing mobility, increasing globalisation of R&D and innovation activities in the health sector, the labour market becoming increasingly global, EU enlargement, etc. – which call for reforms of public health systems go beyond national borders. This makes it necessary, first, to address the European dimension of the issue of public health systems, and second, to explore the means for European action to contribute to overcoming future challenges.

The relevance and transformative potential of an ageing society for the healthcare sector has been frequently projected in foresight exercises and prospective studies around the world. Even though healthy ageing is an issue in many foresight exercises, the statements made on public healthcare systems in prospective studies are very limited and somewhat ad hoc.

Many foresight exercises set out some techno-economic intelligence relating to healthy ageing and in most studies this issue seems to play a role in visions for cross-cutting areas, such as healthcare systems change – rather than representing a visionary field in itself.

This paper exploits how the topic of ‘healthy ageing and the future of public healthcare systems’ features in most recent exercises and prospective studies around the world focusing on the most important emerging challenges for the future.

It consolidates the global perspective on healthy ageing and the future of the public healthcare systems and how the issue is displayed by various communities/nations/regions.

- **Chapter 1** provides an overview about demographic, social, economic and technological factors that are likely to have an influence on future healthcare and healthcare systems.
- **Chapter 2** focuses on the special topic of healthy ageing and innovations for the elderly population.
- **Chapter 3** gives an overview about trends, challenges and visions in regard to health, healthcare and healthcare systems as depicted in foresight studies.
- The **conclusions** provide an overview of the main issues to be addressed at EU level and with regard to future research policy.
- **Annex I** shortly introduces the European Foresight Monitoring Network and the annual EFMN Issue Analyses.
- **Annex II** clusters chronologically the statements and visions on healthy ageing and the future of the public healthcare systems made in international foresight studies.
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Introduction

Against the background that the concept of life expectancy alone is not sufficient to address the well-being and quality of life of an ageing population, the European Commission, together with other partners, developed the Healthy Life Years indicator (also called Disability Free Life Expectancy), measuring the number of years that a person of a certain age can expect to live without ill-health. (1) The promotion of healthy ageing therefore implies increasing the number of Healthy Life Years without any activity limitation and disability or disease. Healthy Ageing is more than that, however, and can be defined as “the process of optimising equal opportunities for health to enable older people to take an active part in society and to enjoy an independent and good quality of life” (2).

Policies and strategies to promote healthy ageing therefore include policy directed at ageing but also wider policy actions including a focus on promotion and prevention across the lifecycle, and work across all sectors of government (3). Healthy ageing requires making sure that sickness, chronic illnesses, including dementia and depression and loss of functional ability can be better treated or can even be prevented or deferred until later in life. This calls for efficient and sustainable healthcare systems allowing coverage of the healthcare needs of the whole population and especially of the elderly. Healthy ageing also goes along with handling the challenges of an ageing society, improving quality of life of the elderly as well as promoting social participation, care, self-fulfilment and dignity of older people. This requires for instance adapting the labour-market so as to offer better opportunities for late careers, life-long learning and flexible continuance in employment (4) or developing policies to improve health, self esteem, and independence before dependence emerges, as formulated by the WHO as one of the 21 aims for ‘Health for all in the 21st Century’ for the European Region (5).

“‘Healthy Ageing’ is [therefore] a broad concept including physical as well as mental health and social well-being and is most likely to be achieved when physical environments and communities are safe, and support the adoption and maintenance by individuals of attitudes and behaviours known to promote health and well-being; and by the effective use of health services and community programmes to prevent or minimise the impact of acute and chronic disease on function (6).”

Within the overall framework of the EU approach to healthy ageing some common key challenges for the European Union and its Member States have been identified:

- managing the economic implications of ageing in order to maintain growth and sound public finances;
- adjusting well to an ageing and shrinking workforce;
- ensuring adequate, sustainable and adaptable pensions;
- achieving access to high-quality healthcare for all while ensuring the financial viability of healthcare systems.

The ultimate goal of healthcare policy planning is to optimise the health system while simultaneously reducing costs.

Achieving a balance between the three objectives of broad and equal access, high quality healthcare and sustainable reimbursement systems poses a major challenge for the overall management of healthcare systems (7).

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(1) http://ec.europa.eu/health/ph_information/indicators/lifeyears_en.htm
(2) Definition used in the EU-funded Project ‘Healthy Ageing’: www.healthyageing.nu. In this project, the term ‘older people’ means all people older than 50 years. However, fixing a threshold for old age is always arbitrary (see Legaré, J. (1999). ‘The Demographics of Ageing in Relation to Social Security Program Reforms in UNICEF Countries’, revised edited version of a background paper prepared for the UNICEF Spring Seminar on the Economic Implications of Population Ageing in the ECE Region, Geneva, May 3, 1999.). A common practice in Western societies is to consider people as old when they reach the ages of 65-70, and secure their pension entitlement.
(6) Definition of ‘Healthy Ageing’ from the Centers for Disease Control and Prevention, Prevention Research Center, Healthy Ageing Research Network, USA.
The future of public healthcare systems within demographic, societal and technological changes
The future of public healthcare systems within demographic, societal and technological changes

The United Nations have declared health as a basic human right. Nowadays, especially in post-industrialised countries, the meaning of health has already become more than the mere absence of illness. By many, health is regarded in a holistic approach that includes the body, mind, soul and environment, and over half a century ago the World Health Organization (WHO) defined health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”, a definition that is still most commonly used (WHO, 2005)(1).

A (public) health system is regarded by the WHO as consisting of “all organisations, people and actions whose primary intent is to promote, restore or maintain health” (WHO, 2008)(2). This definition is also used by the World Bank and the European Union. The WHO has identified six building blocks characterising good health systems, which can also serve as orientation for assessing health systems and identifying future challenges (WHO, 2007)(3).

- Effective, safe and quality service delivery to those that need them, when and where needed and with a minimum waste of resources;
- a health workforce working in responsive, fair and efficient ways to achieve the best possible health outcomes, given the available resources and circumstances – this requires for instance that there are sufficient competent and productive health workers and that they are fairly distributed;
- a well-functioning health information system ensuring the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance, as well as health status – supporting management, leadership and governance;
- equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness;
- a good and efficient health financing system, providing incentives for providers and users of health services to be efficient while ensuring that people can use health services without facing the risk of impoverishment linked with having to pay for them;
- strategic leadership and governance (stewardship) based on effective oversight, coalition building, regulation, attention to system-design and accountability in order to protect the public interest in health.

It is acknowledged that the healthcare sectors consist of a variety of players, e.g. clinicians, hospitals and other healthcare facilities, insurance companies, purchasers of healthcare services, pharmaceutical and device industries and, with the growing emphasis on self-responsibility, also even the healthy individual. All of them are operating in various configurations of groups, networks, and interdependent practices. Some are based in the public sector; others operate in the private sector as either for-profit or non-profit entities. These various players are generally referred to collectively as the ‘healthcare system’ (although this term suggests an integration that does not necessarily exist)(4). Healthcare financing that can be conducted in different ways, e.g. through social insurance, private insurance, out-of-the-pocket payments or taxation, can have a large influence on costs and accessibility and is dependent of demographic and technological developments.

The broad definition of ‘healthcare system’ as mentioned above and as used in this study allows for looking at the issue from different perspectives such as those of patients, technology providers and system financiers, who might all face future challenges due to demographic, economic, societal, legal and technological changes.

1.1 Factors influencing future healthcare systems and spending

1.1.1 Ageing Society

The effects of the ageing society are predicted to become the highest burden for healthcare expenditures. Projections made for Europe and the US are predicting an increase in cases of Alzheimer’s and Parkinson’s disease due to ageing. “These costs and the overall healthcare costs for age-related diseases are likely to rise due to rises in life expectancy throughout all countries.” (Bock, A. K. et al., 2003)

The report ‘Financing Demographic Shifts: Pension and Healthcare Scenarios to 2030’ by the World Economic Forum has drafted four scenarios for future healthcare and pension costs and financing options with an in-depth analysis for Italy and China as contrasting examples (World Economic Forum, 2008). These scenario comparisons show the complexity of the issue as well as the interplay of different factors like economic growth, demography, technological progress and general health conditions that can lead to different outcomes.

1.1.2 Life-style factors promote rising healthcare costs

Not only do age-related illnesses represent a factor contributing to rising health costs: so-called civilisation illnesses, due to changes in nutritional habits, unhealthy diets, smoking, alcohol and drug consumption as well as the lack of physical activity lead to an increased demand for care of patients with e.g. obesity, diabetes or coronary heart disease. These life-style related diseases have been recognised as one of the main causes of avoidable illness. The British foresight report “Tackling Obesities: Future Choices” (2nd Edition) mentions obesity as one of the major challenges for the UK and predicts that by 2050 half of the UK population might be obese. The report further estimates that “[t]he NHS costs attributable to overweight and obesity are projected to double to £10 billion per year by 2050. The wider costs to society and business are estimated to reach £49.9 billion per year (at today’s prices).” The report further provides in-depth analysis about origins, costs, scenarios and solutions to the problem of obesity. However, tackling the obesity problem seems to be very complex and may have different causes, ranging from genetic disposition over eating habits to changes in general life-style which requires fewer calories.

Furthermore, urban life-style, individualism, the increase of single households in Europe, as well as the migration of people within and to Europe, affecting the synthesis of nations, will have an impact on future needs for health and social care and therefore on the design of future public health and social systems. Also changes in family patterns, in particular the fact that older people increasingly do not live with their children under one roof anymore, as well as the increase in female employment and families with both parents working, will lead to the decline of informal care provided within the family and an increased demand for formal care (e.g. day-care centres, kindergartens, senior homes), putting an extra burden on public social and health systems. In contrast to the consequences of ageing on healthcare, which are well anticipated, the impact of the other demographic and social changes on future healthcare needs and related health costs have not really been explored and require further investigation and R&D activities.

1.1.3 Patient empowerment and responsibility

Patients also increasingly demand better information about their condition, the treatment options and the performance of clinical teams. The ‘Sector Futures study’ introduces the concept of the ‘consumer patient’ to reflect the notion that people are increasingly expecting to receive the health services they require at an affordable price. Linked to developments in information and communication technologies (ICT), patients are increasingly (better) informed about healthcare services. This reduces their dependence on professional ‘gatekeepers’.

Also the number and influence of vocal patient groups and self-help groups is likely to increase and the trend

(9) Zukunftsradar: www.zukunftsradar2030.de
towards internationalising health interest groups is set to grow. The result may be that consumer organisations might monitor health services from the patient’s perspective and finally be able to confront the interests of the health and pharmaceutical industries at national and international levels (16).

As people actively take ownership of their own health, public health improves with a sharp decline in key risk factors such as smoking and obesity. Moreover, reductions in risk factors are largest where these are currently highest, among people in the most deprived areas. This contributes to further reductions in socio-economic inequalities in health (19). Self ownership of one’s health is also likely to lead to an increased responsibility for one’s own health in form of direct information, of self-monitoring (portable blood pressure meter, pulse meter, etc.) and self-treatment to a much higher degree than is currently the case. This active involvement of the population, regardless of age and functional ability, is expected to become an integrated part of the health system of the future as it is outlined in the Danish national foresight study ‘The Ageing Society 2030’ (16).

(Social) informal care is a paradigm to stimulate the wealth of vital, social relationships (17). New social societies bloom in the vicinity of community centres, in city quarters and districts. Internet technology, especially that which constitutes a semantic web (18), enables virtual communities to form and operate. Voluntary, charitable care must be nurtured, because it is indispensable for encouraging autonomy, self esteem and eloquence in the elderly. The opportunities and advantages of informal care by family, friends and social networks particularly should receive more support.

1.1.4 Promotion of prevention, public engagement and self-responsibility

Measures for preventing health problems are being increasingly promoted and supported, especially in post-industrialised countries. Indeed, in the future the focus might/should lie much more than today on the prevention of diseases instead of spending too many resources on curing them (cost reduction). Also the rapid developments in information and biomedical technology in the field of remote monitoring, interventions, rehabilitation and nursing care are expected to move care from hospitals into home and community settings as stated in the 2030 vision report (19).

The following health promoting measures are proposed which might be initiated by public authorities, health services or by the employers: regular check-ups for all, prevention campaigns at school and at the workplace (e.g. against obesity; against alcohol and drugs abuse; non-smoking campaigns, etc.), fitness centres and physical exercise programmes, workplace design adapted to an ageing workforce, prevention through functional food and food supplementation, new preventive treatment regimes, employing both new medicines and changes in behaviour during illness, mental health prevention measures, etc.

Also new research areas that analyse the relation between environmental factors like nutrition and changes in gene expression, i.e. epigenetics and nutrigonomics, are becoming emerging topics. In the future, health-related issues and prevention will also become more important in the context of food and nutrition. In its paper ‘Food for Life – The vision for 2020’ the CIAA has defined “improve health, well-being and longevity” as a major research issue for the food and beverage industry (CIAA, 2005) (20).

Especially the advancement in genetics allows for an increasing and broad use of genetic screening in the prevention of diseases. However, this presumes that on the one hand the costs of genetic screening have declined and on the other hand that primary care doctors have developed skills in interpreting the data and providing guidance on the basis of genetic indicators and matching treatments to the patient’s genetic profiles (21). Ethical aspects and the problem of possible discrimination resulting from the results of the screening have to be solved, too (22). Currently, the issue of interpreting genetic data in regard to health dispositions is still a major research topic with much controversy and open questions.
Preventive care and disease management programmes are deemed as very promising to enhance the health status while at the same time reducing costs, but they require support and integration across the industry for their benefits to be realised. The current lack of integration between all stakeholders of health systems seems to be a major problem in this regard. However, prevention can also raise new ethical and legal issues, e.g. with respect to the question if payment should be adjusted to lifestyle risks and possible conflicts with personal freedom and choice. The call for more prevention could also make genetic diagnostics and embryo-screening more attractive, leading to questions about possible consequences for society, personal choice and discrimination issues. Furthermore, plenty of hoax and unserious work is being offered in the area of genetic testing and diagnostics and nutritional advise, which calls for better surveillance and protection.

As depicted in various foresight studies, the focus on prevention instead of cure also leads to an increasing involvement of the public and individual in healthcare matters, especially in regard to strategies for healthy ageing. Patients are no longer ‘passive recipients’ of care but are getting more involved and willing to take actions to improve their health. This might be furthered by (financial) incentives for health-promoting behaviours (wage, health insurance contribution rate, etc.). This evolution is associated with and driven by broad and efficient information campaigns to enhance health-promoting behaviour and by widespread access to information through media such as the Internet and digital television. As people actively take ownership of their own health, public health could improve with a sharp decline in key risk factors such as smoking and obesity. Moreover, reductions in risk factors are largest where these are currently highest, i.e. among people in the most deprived areas. This contributes to further reductions in socio-economic inequalities in health.

Other points are:
- Increasing intake of fresh fruit and vegetables (lowering risks of cardiovascular diseases and some sorts of cancer).
- In general, increasing food awareness, reducing for instance obesity. However, this presumes ‘intelligent labels’, which inform consumers of food’s health and ecological values.
- Increasing practice of physical activity.
- Increasing use of non-technological aids to wellbeing, such as saunas, Turkish baths and ‘wellness studios’.
- Need for proper patient care processes involving self-monitoring and self-treatment, contributing to the prevention of the loss of functional ability from a range of chronic illnesses.
- Self-treatment due to the availability of comprehensive health information.

A potential problem is that people have immediate access to global health information, but don’t know which information they should/can trust. Therefore answers have to be found to the question of how to enhance public trust and confidence.

1.1.5 Novel citizens’ expectations

Citizens’ expectations regarding healthcare and the healthcare systems are also changing: Patients are more and more becoming ‘consumer patients’, meaning that they are increasingly expecting to receive the best quality healthcare whenever they require it and at an affordable price. This raises the challenge of providing equal and affordable access to modern health services for all. Furthermore, in a knowledge economy character-
is by the availability of various information and communication technologies, the civil society will increasingly become a ‘serious player’ influencing the political decision-making process (e.g. through bottom-up actions). Of course, this will be also the case in the health sector where patients are expected to become better informed about health issues and therefore less deferential to healthcare professionals; they may also organise themselves in consumer organisations allowing them, for instance, to have a share in reforms aiming at modernising the healthcare system, or to confront the interests of the pharmaceutical industry. Another driver for public engagement might be the increasing awareness about the costs of health services.

1.1.6 Health Tourism

The practice of so-called health tourism is becoming increasingly popular and can already be observed at a European level: Many people from Western European countries choose to get medical treatment in Eastern European countries because of lower costs. East European health tourism sites advertise with costs being only half of that one has to pay in the UK or US without waiting lists. On a global scale, countries like Dubai, India, Malaysia, Thailand, Singapore and others are already offering exclusive medical services and facilities especially for the comparatively wealthy foreign tourists. In this sense there seems to be a gap between the treatment provided for well-off foreigners and the own poorer population of these countries. The main reason for health and medical tourism are the reduced costs abroad, especially for Westerners seeking treatment in South Asian countries or Eastern Europe. Lee and Spisto predict that ‘medical tourism is becoming a new and emerging international business that is gradually increasing in importance. [...] With higher costs and expertise, in the future, medical tourism is likely to be the new global trend for providing medical services. The rapid developments in medical tourism demands have left the policing and legislation behind.’ (Lee/Spisto, 2007). It might be useful to fully assess the advantages and disadvantages of medical tourism. Could it be a viable option to improve equity or even widen the gap between services for rich and poor?

Another reason, which might become more important in the future in regard to health tourism, is the availability of treatments. If, due to (research) policy or ethical considerations, some medical treatments like the use of human embryonic stem cells, pre-implantation diagnostics, genetic technologies, organ transplantation or some controversial procedures are not sufficiently available or allowed in one country, people may choose to have the treatment performed in other countries. This is already happening (e.g. in regard to pre-implantation diagnostics and organ transplants) and also relates to the ‘legal lag’ identified by Lee and Spisto. Health tourism, and particularly the latter category of it, poses new legal questions, e.g. in regard to insurance, financing, safety, fraud prevention and undergoing treatments that may be illegal in ones home country.

1.1.7 Increased Migration and Mobility

EU enlargement raises the challenge of ensuring equal access to modern health services, as well as providing the same quality of health services and healthcare in all EU Member States (MS). In particular, new MS which are still struggling with the consequences of economic and democratic transition might have difficulties to face rising expectations from their own populations related to the access to modern and high-quality healthcare. The reforms that have been initiated in the new MS have not yet caused the desired improvements, and the quality of healthcare systems still lags behind that of the old MS. However, “the equal right to healthcare cannot imply unlimited free access to any form of medical treatment or product that one can imagine. The right to healthcare as a social right implies that governments be instructed to become involved through legislation with the structuring and financing of the healthcare system and the maintenance of quality of care. However, more and more it is being acknowledged that there are limits to what can be financed collectively. In order to safeguard solidarity in areas where this is indispensable, a search has started for possibilities to give people greater responsibility in other areas where this can be justified.”

Furthermore, healthcare personnel are migrating from new MS to old MS, causing shortages in their home countries. Moreover, due to the increased mobility of

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(36) In the negative US-scenario ‘Stormy Weather’, consumers are still demanding access to the latest and most expensive drugs and medical technologies affected by pharmaceutical companies’ direct-to-consumer advertising – and the expectations of lower costs remain unfulfilled.
(37) www.discovermedicaltourism.com/eastern-europe
(38) www.asiamedicaltourism.com
patients within Europe, there is a growing need for the offer and provision of cross-border health services,\(^{(42,43)}\) calling for harmonisation of technical standards and health regulations within the EU\(^{(44)}\). As a result of the increased mobility of people at global scale, as well as at European scale within the Single Market, it has been suggested that national health services be adapted to different and multicultural population groups\(^{(45)}\).

It is also important to note that components of the health systems themselves are increasingly becoming global as the following examples show\(^{(46)}\):

- since the 1970s pharmaceutical companies have moved trials outside the US or the EU to countries where costs are lower, such as India;
- today, international recruitment of healthcare staff is providing an answer to the shortage of healthcare workers in many high-income countries: “Most of the international medical graduates in the U.S. come from India, Pakistan, the Philippines and other English-speaking countries”\(^{(47)}\) – leading, the other way around, to workforce shortages in these countries;
- in order to reduce costs, part of health services, which used to be provided by public sector hospitals, might be outsourced to foreign health service firms: “some American hospitals have turned to companies in Australia, Israel, India, Switzerland and Lebanon to read CT scans overnight”\(^{(48)}\).

1.1.8 Global health threats, epidemic surveillance and coping with new and re-emerging diseases

While risks for future pandemics might be manifold – ranging from growing urbanisation (in regions with bad hygiene conditions), environmental pollution, possible impacts of climate change and new threats that may occur due to unintended consequences of (advanced) biotechnology (biosafety and bio-security issues) or even bioterrorism as it is outlined in the ‘2007 State of the Future’ report of the WFUNA Millennium Project (Glenn/Gordon, 2007)\(^{(49)}\) – globalisation and the related increased mobility and migration are expected to exacerbate the spread of infectious diseases and epidemics. Globalisation may also lead to the emergence of new disease spectra or the re-emergence of old diseases in more virulent form (e.g. legionella, food pathogens, tuberculosis, diphtheria and cholera) – calling for appropriate and responsive health services. In the Canadian ‘Bio-Health Foresight’ the authors note that “scientists have been predicting a global pandemic for years and urge developed as well as developing countries to put in place an emergency plan that will prevent the propagation of a virus outbreak.”\(^{(Office of Technology Foresight, 2008)(50)}\).

The EU has the capacity to play a leading role in surveillance, preventing and countering health threats, pandemics and (re)emerging diseases and provide an important international contribution. Therefore the EU can play an important role in managing and preventing pandemics, (re)emerging diseases and bioterrorism as mentioned at the EFMOND annual issue workshop on public health systems changes in 2008. In order to be able to provide global and coordinated answers to global health threats, coordination and cooperation between health systems in the enlarged EU need to be ensured\(^{(51)}\).

1.1.9 Environmental threats to health

Public health systems and public health policy have to adapt to new threats posed by climate change and environmental issues. Today, there is reasonable understanding of cause and effect relationships between some environmental factors, e.g. effects of substances\(^{(42)}\) As defined by the European Commission recently, cross-border healthcare is either healthcare a patient receives in a Member State different from the Member State in which he or she is insured, or, healthcare that a health professional provides in a Member State different from the Member State in which he or she normally resides or works. “Concretely, cross-border healthcare occurs in many different ways. Health professionals train and practice abroad, citizens travel abroad to receive care – for example patients living in border regions or requiring very specialised treatment. This can also be patients receiving services from abroad while staying in their own country, for example through the use of telemedicine (for specialised surgery support, radiology diagnosis, etc.).” \(^{(Source: ‘Opening the Door to Better Healthcare Across Europe’, Proposal for a Directive of the European Parliament and of the Council on the application of patients’ rights in cross-border healthcare, Presented by the European Commission on 2 July 2008).}^{(52)}\)


found in the air and water on human health, studied for example by the emerging field of epigenetic research(53). However, many possible impacts and influences of environmental factors (e.g. from climate change or chemicals) are the result of very complex interactions between the environment and humans that are currently not sufficiently understood. For some chemicals, such as endocrine disruptors, the direct effects on humans are particularly difficult to unravel but substantial and negative impacts on wildlife have been observed, which also has implications for human health. In order to provide the basis for developing adequate health promoting measures, research on environmental health should therefore be strengthened, in particular regarding the health impact of allergens and pollutants(33).

1.2 New health technologies: an opportunity?

1.2.1 New technologies for better health

In recent years and for the foreseeable future, genomics and new biotechnologies have become important focus areas for health innovation, followed closely by nanotechnologies and robotics (or in combination with these two) and might revolutionise healthcare, despite concerns about spiralling costs(54). Developments in these areas are expected to lead – among others – to improved technologies and treatments for ‘typical’ age-related diseases, as well as to the means to prevent or retard the emergence of age-related illness or loss of functional ability.

In this context, regenerative medicine, tissue engineering and the development of biomaterials appear particularly promising(55). Regenerative medicine is an applied field of tissue engineering that holds the realistic promise of regenerating damaged tissues in vivo (in the living body) and for externally creating ‘tissues for life’ available for implantation. Tissue engineering, as defined by the European Commission’s DG SANCO in 2001, is the “regeneration of biological tissue through the use of cells, with the aid of supporting structures and/or biomolecules”(56). This technology has the potential to develop therapies for previously untreatable diseases and conditions(57). It offers, in particular, the prospect of extended healthy lifespans, as it may help repairing some of the damage caused by ageing, for instance by replacing tissues and organs to treat degenerative diseases and injury resulting from strokes, Alzheimer’s and Parkinson’s diseases, cardiovascular diseases, burns and spinal-cord injuries(58,59). One example for the application of tissue generation and biomaterials could be the use of cardiac vessel regenerative tissue implants for replacing clogged arteries without bypass surgery or angioplasty(60). In the context of an ageing society and the associated increase of age-related diseases, regenerative medicine and the use of tissue engineering and biomaterials may therefore help to reduce the very high socio-economic costs associated with age-related diseases.

Furthermore, European ageing populations are expected to benefit from progress in genomics that may lead, for instance, to methods for the identification of genetic disposition for age-related diseases or mental disorders, and of the early signs of chronic illness and loss of functional ability involving a number of biomarkers in new

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(53) www.3sat.de/dynamic/sitegen/bin/sitegen.php?query_string=epigenetic&days_published=365&scsrc=1
(59) There is also a lot of hope connected to this novel biotechnology development concerning the ability to overcome, in the long run, the constant shortage of donor organs for transplantation. [Source: WTEC Panel Report on Tissue Engineering Research, International Technology Research Institute, 2002. http://www.wtec.org/telfinal]
population screenings\(^{(6)}\). Genomics may also allow for the development of preventive medicines, follow-up treatments (e.g. new individualised drug treatments, incorporating the knowledge of the individual patient’s genetic profile) and even support services such as lifestyle counselling\(^{(62)}\).

As a result of developments in combinatorial chemistry, as well as of the results of the Human Genome Project, the pace of discovery of new chemical entities is expected to accelerate and the diversity of potential target applications of drugs is expected to increase. In particular, tremendous potential for increasing care efficiency is seen in moving from a generalised pharmacology to personalised medicine and a pharmacology that is tailored to individuals\(^{(63)}\). These developments will obviously benefit the whole of society. Other future drug developments may be so-called lifestyle drugs and ‘enhancement drugs’, such as drugs with anti-ageing properties, cognitive and mood enhancing drugs and other treatments, for which there could be high demand\(^{(64)}\).

All these advancements may contribute to improving quality of life throughout life and reducing the health costs related to the ageing of European populations. However, potential acceptance problems have to be faced: The admission of gene therapy and regenerative medicine into the treatment of widespread chronic disease by the year 2030 will, for instance, require a genuine legal and societal paradigm shift. Particularly, reservations over the widespread genetic profiling of large population groups and the use of sensitive genetic data based on the analysis of individuals have to be faced\(^{(65)}\). And ultimately the interpretation of genetic data has to become reliable.

A further promising approach for providing healthcare in the ageing society is the increasing use of telemedicine applications, including telemonitoring, telediagnosis, etc. As a result of the fusion of IT and knowledge systems with biotechnology, substantial sections of the health service will become partially independent of time and space: Consequently, teledicine and telemonitoring applications will emerge which might meet the special needs of an elderly population like tele-home care – allowing the elderly to live longer in their own home and more independently in spite of chronic illness or disability\(^{(66)}\). This might progress through new assistive technologies for the elderly and the disabled, emerging from new advances in robotics\(^{(67)}\). However, beyond the success of teledicine being, in general, conditioned by public acceptance, important issues have to be faced with regard to the older generations: new teledicine applications must be easy to use for the elderly and, even more important, they must take into account the preferences and experience of older people: In particular, no solutions should lead to the isolation of elderly people\(^{(68)}\).

1.2.2 Converging medical technologies

The principal technological opportunities for future healthcare and medicine are huge, manifold, inter-disciplinary and convergent and one of the main topics in many foresight studies\(^{(69)}\). Especially modern bio-technology, genetics, stem cell research, tissue engineering, nano(bio)technology, information and communication technology (ICT), e-health, personalised medicine, advanced prosthetics and anti-ageing are developments that also already raise many hopes, fears and controversies. The Spektrum Dossier ‘Medizintechnik der Zukunft’ (2007)\(^{(70)}\) also lists some examples for future technologies, among them biostasis, tissue engineering, medical computer simulations (e.g. for surgery or simulating the spread of epidemics, artificial organs, deep brain stimulation (DBS), neuroimplants and even cyborgs and human enhancement technologies (ibidem). Lab on a Chip\(^{(71)}\) modules, i.e. small chip-like devices that

\(^{(62)}\) See Danish national foresight study ‘The Ageing Society 2030’, 2006; www.zukunftsradar2030.de
\(^{(64)}\) See WHO scenario for health and care in 2022 (Europe); www.zukunftsradar2030.de
\(^{(66)}\) See WHO scenario for health and care in 2022 (Europe); www.zukunftsradar2030.de
\(^{(68)}\) Discussion at the EFMN Issue Analysis workshop 2006 on ‘Healthy Ageing’.
\(^{(70)}\) Spektrum Dossier: Medizintechnik der Zukunft. Vom Sehchip zum Mensch 2.0 (summary: www.wissenschaft-online.de/artikel/910426), last accessed: April, 2009.
See also: www.nature.com/nature/supplements/insights/labonachip/index.html
combine elements from biotechnology, nanotechnology and ICT, allow for fast, reliable and portable biological analysis and the detection of pathogens and medical testing.

1.2.3 Information and Communication Technology, ICT

ICT has become an important driver in medicine and will have a substantial influence on the future health system, medicine and costs. The example of genetic analysis can serve as an example, where further advances in computer technology have also contributed to great cost and speed reductions in medical imaging and early diagnostics, DNA sequencing and analysis. Computer technology also plays an important role in neurosciences, especially in the context of research on neurodegenerative diseases (e.g. ‘Blue Brain Project’) and in-silico simulations and bioinformatics for drug discovery, which may lead to time and cost reductions in pharmaceutical R&D.

The world is currently lacking around 2.4 million doctors, nurses and other healthcare professionals (WHO, 2007). Therefore, according to the WHO, telemedicine, tele-cooperation between doctors and technologies for self-diagnosis may become necessary, especially in the context of ageing populations (Glenn/Gordon, 2007).

According to several foresight studies, telemedicine and the telemonitoring of health status might also meet special needs of an elderly population like tele-home care, allowing the elderly to live longer in their own home and more independently despite of chronic illness or disability while reducing the costs for inpatient care. This might furthered by new assistive technologies for the elderly and the disabled emerging from new advances in robotics. Healthcare and clinical information systems and teledmedicine contribute to integrating care and improving care processes and outcomes (especially the quality of healthcare provision to rural populations), and help to reduce costs (cf. footnotes 76-77) when there is system wide and organisational commitment and investment. Despite the high initial costs of investing in hardware and software, this should ensure considerable savings in the long term. The following will provide an overview about some ideas and innovations in this area:

**Improved coordination through ICT**

ICT is not only likely to influence future health technologies as it has been outlined in the technology section about the fusion of biotechnology, teledmedicine and robots in healthcare, but also organisational structures and coordination, thus leading to improved long-term efficiency despite possible higher initial costs. Changing patterns of information sharing and patient/doctor relationships are expected to bring some fundamental changes to health organisations and the working relationships of health personnel. For instance, ICT systems are set to revolutionise information sharing between health professionals, e.g. through the development of seamless electronic patient records. A registered population of patient list system is furthermore seen as an important characteristic of general practice that emphasises the responsibility of the general practitioner toward the patient as a whole.

**E-health and Telemedicine**

Telemedicine is repeatedly mentioned as an important innovation and measure to make healthcare more

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(73) Cf: www.insilico-biotechnology.com
(77) Zukunftsradar: www.zukunftsradar2030.de
(80) Ibidem
(82) OP ÉEN LIJN – Toekomstverkenning eerstelijnszorg 2020 – A foresight study in the health sector for 2020.
(84) Zukunftsradar: www.zukunftsradar2030.de
effective, efficient and to improve quality. Telemedicine can improve the availability of care, especially in rural areas(90), improve training and expert communication over long distances and the quality of care for the elderly or chronically ill, e.g. via tele-monitoring, as well as contributing to equity(91). The availability of telemedicine and healthcare has already established itself as a common indicator for assessing and comparing healthcare systems.

The role and operation of hospitals may also become quite different from today due to e-health and telemedicine. In the future they will operate within an integrated service system (e.g. polyclinics), providing knowledge, diagnosis and advice by video and remote sensing to primary care practitioners. Telemedicine, including video-conferencing, emailing images, text and sound, is expected to facilitate the communication between home and clinical workers as well as between primary and specialist care professionals while the linkage between healthcare sites and ‘smart technologies’ through communication networks are expected to render e-health as the norm for patients (92). Hospitals are likely to be used most for cases where there is a need for especially complicated diagnosis and treatment as remote monitoring could allow patients to self-administer medication using automated drug delivery system(93).

**Automated health-data systems**

The study ‘Towards High-Performing Health Systems’ (published 2004) offers a synthesis of findings from recent OECD studies undertaken as part of the three-year health project, an initiative geared towards answering many of the key questions facing today’s health policy makers(94). It provides information and analysis on a wide variety of topics, such as new and emerging health-related technologies, long-term care, private health insurance, healthcare cost control, equity of access across income groups, health workforce planning and productivity, and waiting times for elective surgery. Building on international experience and grounded in new data on cross-country differences, this report offers an up-to-date road-map to performance improvement. In particular, the report identifies practices improving the performance of health systems and the quality of the healthcare services provided, for instance:

- using automated health-data systems (incl. electronic medical records and systems to automate medication orders in hospitals) for recording and tracking data on patients, health and healthcare;
- introducing economic incentives supporting cost-effective care;
- developing strategies and policies to prevent illness and disability and reassessing the share of health spending devoted to prevention;
- increasing hospitals’ surgical capacity or productivity in order to reduce waiting times.

**Electronic patient records and dossiers**

Electronic patient records and dossiers or electronic medical/health records are about to replace the old system of paper-based files of a patient’s medical history. Due to the digitised format they hold many advantages in regard to information access, processing speed and communication (e.g. between different physicians) and can also prevent unnecessary and double examinations and treatments. However, in order to prove its advantage, interoperability has to be guaranteed as well as sufficient data security. So far the introduction of electronic health dossiers or electronic health/medical records has been limited due to the associated organisational restructuring it requires, difficulties in standardisation, legal issues (e.g. liability questions) and interoperability as well as patient’s resistance due to security concerns(95).

**1.2.4 Robotics and prosthetics**

Robotics is also an emerging issue for healthcare and care for the elderly. Japan and South Korea particularly are promoting the idea of developing and deploying robots in hospitals, nursing homes and as assistants for home care(96). The TNO Report ‘Robotics for Healthcare’ (TN, 2008a(97)) offers an in-depth overview about the diverse current and future possibilities as well as the societal and ethical issues of robots in the healthcare system.

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(93) Ibidem.
“Robotics can offer solutions […] for a significant proportion, especially for patient groups such as amputees, stroke sufferers or people with cognitive or mental problems. Many more innovations are expected by around the year 2025.” (TNO, 2008b(98))

Robotic technology and developments in prosthetics and implant technology are also closely related to each other and those two areas rely heavily on neuro- and information science. Brain Computer Interfaces (BCIs), prosthesis coupled to the nervous system, artificial vision, ICT implants and even neurochips (in an early stage) belong to the latest developments.

1.2.5 Advanced biotechnology and nanomedicine

Advanced biotechnology and nanotechnology, which are getting increasingly interrelated, also hold many promises for future medicine, especially in the area of developing treatments for cancer (e.g. through nanotechnology-based imaging procedures and targeted drug delivery), genetic interventions (e.g. gene therapy) and tissue engineering (e.g. as a substitution for organ transplants and for curing neuro-degenerative diseases). Tissue engineering particularly, which would allow for the cultivation of tissue and organs that match the recipient’s biological makeup exactly, holds the promise to solve the problem of lacking organ donors and long-term medications due to the rejection of foreign tissue. Nanotechnology also holds promises for new forms of medication, especially for brain-related diseases, because nano-particles can cross the brain-blood barrier. This property, however, could also pose new risks of nanotechnology(99).

1.2.6 Age-related medicine, research and neuroscience

As it has already been mentioned, age-related diseases are regarded as the major future cost factor for health systems. This has already led to a rapidly growing interest in research about age-related diseases and especially neurodegenerative illnesses. Here also emerging and converging technologies like interdisciplinary research between nano-, bio-, information and neuro-related disciplines play an important role. Many of the R&D initiatives that have been mentioned above are being initiated within the context of ageing. Even some research and proposals like neuro-imaging, neuro-simulations(100) and neuro-chips (e.g. FACETS(101) project)(102) get their backing in the context of treatments for (age-related) dementia and neurodegenerative illnesses. This has led to even bolder demands, requesting more investment in anti-ageing R&D and some even view ageing as such as a disease or biological disorder that might be treatable (Olshansky 2006(103), Wired, 2008(104)).

1.2.7 Human Enhancement Technologies, HET

Advances in medical technology, the problem of age-related diseases and the call for more prevention have raised a totally new issue in medicine: human enhancement technologies (HET), i.e. technologies that are not only used for treating diseases but also for improving the capabilities of healthy individuals. Here the traditional borders between prevention, treatment and improvement becomes increasingly blurry, causing new legal and ethical problems (e.g. in regard to genetic engineering, genetic testing or embryo selection) and pose new challenges to financing and equity. Although HET is still often associated with rather visionary and far-fetched ideas(105), the issue has already become a practical one (STOA, 2009(106)), because many technologies already exist or are currently under development, because HET might evolve as a ‘side effect’ from promoting preventative measures and because the cost-benefit and equity questions for public health could become a real issue(107).

(104) www.physorg.com/news156440026.html
(105) http://facets.kip.uni-heidelberg.de
(106) www.physorg.com/news136440026.html
1.2.8 Cost-effectiveness of new technologies and health treatments

Although new technological possibilities hold great promises for future medicine, they are costly to develop and initial prices will certainly be so high that neither social security is likely to be willing to finance them nor most individuals able to afford them. The OECD study ‘Measuring Up: Improving Health Systems Performance in OECD Countries’ (108) also acknowledges the issue of “accelerating advances in medical technology” that hold enormous potential for medicine and healthcare but at the same time pose much pressure on expenditure levels.

But new health technologies can also contribute to a decrease in costs, at least in the mid- to long run. E-health, electronic patients management systems, better early diagnostics (enabling cures in an early stage), self monitoring of health functions, robotic assistance (enabling the elderly to live on their own for a longer time or assisting medical and nursing personnel) and modern prosthetics (enabling disabled people to work more efficiently) can improve efficiency and reduce costs over time. The same could apply to investments into age-related disease R&D, because this, if successful and universally accessible, would solve many problems of age-related healthcare financing.

Another aspect to consider is that advanced medicine might become cheaper over time, as it can be seen in the context of genome sequencing which rapidly increased in speed and decreased in costs. One example is DNA-sequencing. While the first project to sequence the total genome of a human being (Human Genome Project) which started in 1990 and took over 13 years to complete and cost 2.7bn USD, in 2007 it took Leiden University (Netherlands) researchers only 6 months to sequence the whole genome (not including time or expenditure of the subsequent analysis) of the first female at a cost of USD 63,000 (Cell News 2008). (109) A California-based company aims at sequencing a total of 1,000 human genomes for USD 5,000 each in 2009 (Bio-Medicine Online 2008). (110) In 2009 a California company invented a technology to achieve gene sequencing for 48,000 USD (111).

Expenditures on pharmaceuticals could be reduced through the diffusion of information on the cost of treatment of different ailments, a greater use of generic drugs as well as the prohibition of expensive branded pharmaceuticals (112). However, especially in regard to pharmaceuticals there seems to be a conflict between innovation investments, patenting and cost reductions (e.g. through generic drugs). Most pharmaceuticals are not expensive in the sense of material costs, but the rather high prices seem to be necessary to cover the high R&D expenditures and long development periods which can take 10 to 15 years.

1.3 Quality and performance of public healthcare systems

1.3.1 Performance Indicators

Waiting times, length of hospital stays, re-hospitalisation, speed of recovery, patient’s/people’s satisfaction, quality adjusted life years (QALY), number of medical personnel per inhabitant, costs and financing schemes can serve as indicators for quality. Economic figures can serve as indicators for efficiency and cost-effectiveness. However different countries and studies are using different indicators, thus making comparisons difficult. Perhaps medical tourists who go abroad for medical treatment are already voting with their feet and indicate where they see the best price/performance ratio. But the situation for medical tourists may differ substantially from the situation of the local population in the respective destination countries.

The OECD study ‘Measuring Up: Improving Health Systems Performance in OECD Countries’ (113) addresses the questions of how to measure the performance of different health systems, and how to use such information to support ongoing health systems improvement. Health policy makers have a growing interest in finding ways of encouraging health systems to improve their performance, where performance is measured against quality, efficiency or equity goals. Improving performance has the potential to reduce the tensions between...
As noted in ‘Healthcare: Key Technologies for Europe’ (114), achieving a balance between the three objectives of broad and equal access, high quality healthcare and sustainable reimbursement systems poses a major challenge for the overall management of healthcare systems. Therefore a major challenge for the design of healthcare systems can be seen in achieving equally affordable quality.

The OECD study ‘Towards High-Performing Health Systems’ (published 2004) (115) offers a synthesis of findings from recent OECD studies undertaken as part of the three-year Health Project, an initiative geared towards answering many of the key questions facing today’s health policy makers. It provides information and analysis on a wide variety of topics, such as new and emerging health-related technologies, long-term care, private health insurance, healthcare cost control, equity of access across income groups, health workforce planning and productivity, and waiting times for elective surgery. Building on international experience and grounded in new data on cross-country differences, the report offers a roadmap to performance improvement. In particular, the report identifies practices for improving the performance of health systems and the quality of the healthcare services provided, for instance:

- developing strategies and policies to prevent illness and disability and reassessing the share of health spending devoted to prevention;
- increasing hospitals’ surgical capacity or productivity in order to reduce waiting times.

As specified in the report, some of these measures may require some initial investments or lead to increased cost pressure in the short run; however, they might result in savings in the long run. The report also stressed that there is no one-size-fits-all approach to improving the performance of health systems and that the countries’ unique circumstances should be considered when developing appropriate policies. Other issues like lacking personnel, coping with current patients in need, current costs and legal and ethical issues associated with care and prevention might be difficult to solve in the short run.

### 1.3.3 How to assess efficiency of health policies

The three-year OECD Health Project (OECD, 2004) (116) investigated ways to improve the performance of OECD health systems. The results of the Health Project were discussed by OECD Health Ministers at their first-ever meeting at the OECD on May 13-14, 2004. A final report ‘Towards High-Performing Health Systems’ (ibidem) emanated from the meeting. Ministers also mandated the OECD to carry out future work on health. The Health Project covered several topics, including health systems-reforms, private health insurance, long-term care policies, waiting times, health-related technologies, human resources for healthcare, equity of access to healthcare.

The OECD Review of Healthcare Systems – Korea (OECD, 2003) (117) explores the question about how the performance of the Korean healthcare system can be improved and what effects the health sector reform of July 2000 did have on the system’s performance. Since the system relies to a large extent on consumer responsibility for health spending it has also been asked how the equity of finance and equity of access can be maintained within this setting, and if consumer responsibility alone maintains expenditure growth along a sustainable path. The study also addresses questions about what kinds of government intervention are needed to stimulate value for money from health expenditure growth as well as evidence-based practice in a system that is dominated by the private sector.

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1.3.4 Transparency: accountability of funders and providers, self-regulation of professionals

In order to achieve cost effectiveness and good quality in healthcare as well as reducing medical errors, it has to be made transparent which procedures are being performed and how costly and effective they are. This requires universal standardisation for better comparison and more emphasis on evidence-based research and practice. Since modern healthcare systems are very complex with many different parties involved, each performing a diversity of activities, defining clear accountability is necessary.

1.3.5 Country comparison: Learning from each other – opportunities and barriers

There are several studies that analyse the healthcare systems of different countries. The OECD has published a series ‘Reviews of Health Systems’ which are available for different countries, among them Turkey, Switzerland, Finland, Mexico and Korea. The Polish Science Ministry has also performed the first foresight exercise on a national level entitled ‘Polish Foresight Pilot on Health and Living 2013’. The main goal of the exercise was to contribute to research and policy for public health by:

- defining priorities in the area of research and technological development by detecting potential opportunities;
- encouraging participation in the debate on the future;
- presenting the significance and achievements of scientific research in the area of health (also for economic growth); and
- changing the focus of the scientific and innovative policy from a traditional economy to a knowledge-based economy.

The Health Systems in Transition (HiT) reports provide country-based profiles with a detailed description of each healthcare system and of reform and policy initiatives in progress or under development. Each profile is produced by country experts in collaboration with the Observatory's research directors and staff. In order to facilitate comparisons between countries, the profiles are based on a template, which is revised periodically.

Although there are many detailed reports about the health systems in different countries and their specific advantages and challenges, more research is needed to enable useful comparisons for practical applications. Quam and Smith (2005) have noted in their study ‘What can the UK and US health systems learn from each other?’ that in contrast to medical/clinical knowledge that is often quickly adapted around the world, the global information exchange and mutual learning in regard to organising health systems seems to be far slower and far less extended. In their view the main barriers are due to the fact that health systems are culturally, socially and politically rooted in their respective countries, that there exists ignorance and that health systems are so complex that only few people can manage a profound analysis of them. In this sense, future activities might focus more on improving the learning processes between different countries for improving health systems.

1.3.6 Institutional and managerial barriers for improvement

Healthcare systems have also evolved within certain social, demographic and economic settings which have already changed over time and will undergo further changes in the future. Therefore adapting these established systems towards demographic changes (declining birth rates and an ageing society), economic issues (unemployment rates and changes in income) and advances in medicine (new therapies) poses many challenges due to system-inherent inertia and different stakeholders. Scenario-based planning or even social (systems) simulations could provide added value for future projections and planning.

Controlling costs while guaranteeing equal access to quality healthcare, as well as a fair distribution of costs and risks, poses a challenge. A first step would be a solid analysis to identify unnecessary costs, e.g. in regard to bureaucracy and unnecessary or double examinations and treatments as well as more emphasis on evidence-based analysis and solid cost-effectiveness studies between different treatments. Such considerations could, however, also raise ethical problems, for instance if life-extending treatment should be provided, despite not improving quality of life and actually lengthening the time of needed care.

(118) www.oecd.org/document/49/0,3343,en_2649_33929_35481393_1_1_1_37407,00.html
(119) For instance: Snapshots of Health Systems (16 countries) www.euro.who.int/observatory/HiTs/20060518_1
(120) Quam/Smith (2005), ‘US and UK healthcare: a special relationship? What can the UK and US health systems learn from each other?’ (www.bmj.com/cgi/content/extract/330/7490/530), last accessed: April, 2009.
1.4 Promotion of New Financing Structures

1.4.1 Equity of care / equity of finance

Equity of healthcare remains a major demand but also a major challenge, because it also concerns the question of just distribution and sharing of costs. Whereas on the one hand, most people would find it unjust if only the wealthy could afford sufficient healthcare, people may also find it unjust if they would be forced to pay for the ‘avoidable illnesses’ of others or costly treatments that only affect a few. Also in healthcare neither a free-market system nor pure state-regulation (which can also be very costly) can be regarded as solutions and there are different modes of financing (social insurance, private insurance, taxes, direct payments and mixed forms) which are all getting criticised. In regard to equity of care the question arises, which kind of care and treatments ought to fall under equal access? This question becomes even more relevant as technology progresses, which also causes higher costs but also higher expectations. The equity of care and the finance issue also poses ethical questions, e.g. if it concerns access to life-saving, health/life-span extending or advantageous treatments.


1.4.2 Private vs. public and mix models

In most countries, neither a pure private-funded nor a public-funded healthcare system seems to be appropriate and private-public mix systems have emerged as a useful alternative. However, the question about the perfect mix between funding from social insurance and taxation on the one hand, and private health insurance and out-of-the-pocket payments on the other remains a challenge. And as soon as the element of private payment comes into play, the question about equity arises, since better private payment could be coupled to better quality. Also with every change in the balance of the public/private-mix, new winners and losers are likely to arise, which makes consensus difficult. The report ‘The Future of the Finnish Healthcare – Strategies and Scenarios to secure future healthcare in Finland’ suggests that a private/public mix model where the public sector has a dominating responsibility for financing and control although both private and public stakeholders supply health services may be a promising way of structuring future health systems.

In particular, issues such as the role in national health systems of the private sector (e.g. the pharmaceutical industry) or the process of privatisation of public hospitals or of voluntary organisations undertaking welfare services, as well as tasks distribution between public and private stakeholders of the health systems are rarely dealt with. Sweden, however, banned the privatisation of hospitals in 2004 “amid fears that the expansion of private healthcare could destroy the principle of a fair and free public health service.”

1.4.3 Public-private partnerships

Public-private partnerships (PPP), i.e. partnerships between a government and at least one private sector company, which have been initially introduced in many infrastructure projects to reduce public debt, are also becoming an increasingly common practice in other areas like healthcare. One prominent example is hospital construction and operation (cf. McKee et al., 2005).

A private/public mix model where the public sector has a dominating responsibility for financing and control although both private and public stakeholders supply health services could be a promising way of structuring future health systems – as noticed in the Finnish study ‘The Future of the Finnish Healthcare – Strategies and Scenarios to secure future healthcare services in Finland’.


(123) As stated during the Workshop on Future skill needs in healthcare, organised by Cedefop on 22-23 May 2008, this process is already taking place in Germany as a mean to cut costs.


According to a survey carried out by PWC among health leaders and experts (PWC, 2005)\(^{(127)}\), there is a “wide support for a health system with shared financial risks and responsibility among private and public payers versus the historic cost-shifting approach.” Even more, “only a minority of industry leaders in the U.S., Canada and Europe think that a sustainable system is one that is mostly tax-funded. [...] Even in systems where healthcare is primarily tax-funded, such as in Europe and Canada, only 20% of respondents favoured that approach.” Coming along with the increasing active role of patients as empowered consumers of health services, there is also a “growing interest in pay-for-performance and increased cost sharing” (ibidem). The emergence of public-private partnerships as new means of financing projects is expected also to affect the financing of health-related projects and to provide valuable results\(^{(128)}\).

The PWC survey among health leaders and experts also yielded the following common characteristics of sustainable health systems\(^{(129)}\):

1. Vision needed to balance public versus private interests in building an infrastructure and in providing basic health benefits within the context of societal priorities.

2. Better use of technology and interoperable electronic networks accelerate integration, standardisation, and knowledge transfer of administrative and clinical information.

3. Incentive Realignment: incentive systems ensure and manage access to care while supporting accountability and responsibility for healthcare decisions.

4. Quality and Safety Standardisation: defined and enforced clinical standards establish mechanisms for accountability and enhanced transparency, thereby building consumer trust.

5. Strategic Resource Deployment: resource allocation appropriately satisfies competing demands on systems to control costs while providing sufficient access to care for the most people.

6. Climate of Innovation: innovation, technology and process changes are a means to continuously improve treatment, efficiency and outcomes.

7. Adaptable Delivery Roles and Structures: flexible care settings and expanded clinical roles provide avenues for care centered on the needs of the patient.

### 1.4.4 Private health insurance

Various projects have been completed to investigate variations in health system performance across the OECD and explore the causes of these variations. These have included work on waiting times for non-emergency surgery; work on the microefficiency of utilisation of medical resources; and work on evaluating alternative mixes of private & public health insurance. The OECD Health Division also carries out work on health and ageing. As populations age, an increasing number of citizens need long-term ameliorative care. We have studied the organisation and financing of long-term care services for older persons, in conjunction with pension and healthcare arrangements. And we have looked at how to provide older and disabled persons with a continuum of care.

### 1.4.5 Shift to ambulant care and reduction of hospital stays

Ambulant care which requires no hospital stay or care outside the hospital would also reduce overall costs. Advances in medicine like minimally invasive surgery as well as telemedicine and self-monitoring already lead to the minimisation of hospitalisation time. Ambulant care also gets increased attention in the frameset of the ageing society. Quality issues also have to be considered in regard to ambulant care and reduction of hospitalisation time.

It has been mentioned at the EFMN annual issue workshop on public health systems changes in 2008 that a general progressive shift in care from inpatient to ambulatory-care settings is being expected, especially due to the ageing society. Therefore governments may need to consider whether the relative share of overall resources allocated to the ambulatory sector is in line with the new patterns of demand. This has been mentioned as a key area for reforms.

### 1.5 Coordination and Organisation of Healthcare

#### 1.5.1 Coordination of care

The report ‘Improved Health System Performance Through Better Care Coordination’ (OECD, 2007)\(^{(130)}\) attempts to assess whether – and to what degree better care coordination can improve health system performance in terms of quality and cost-efficiency.

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\(^{(128)}\) Cedefop, Workshop on Future skill needs in healthcare, 22-23 May 2008.


Coordination of care refers to policies that help create patient-centred care that is more coherent both within and across care settings and over time. Broadly speaking, it means making healthcare systems more attentive to the needs of individual patients and ensuring they get the appropriate care for acute episodes as well as care aimed at stabilising their health over long periods in less costly environments. These issues are of particular interest to patients with chronic conditions and the elderly who may find it difficult to 'navigate' fragmented healthcare systems that are often found in OECD countries.

During 2006 and 2007, work in the area of efficiency has focused on coordination-of-care policies as a tool for improving both cost and quality outcomes. The OECD Health Division has released a Health Working Paper ‘Improved health system performance through better care coordination’ (OECD, 2007). This report covers OECD countries and those EU Member States that are not members of the OECD. The main objective of this study was to assess the potential for higher efficiency through better care coordination policies, and to identify how governments in OECD countries promote coordination of care. In regard to future needs and developments, the following aspects have been mentioned here:

1. Care coordination would be facilitated by better information transfer and wider use of ICT for collecting, updating, disseminating and processing information on patients and provider performance.

2. The balance of resources going to ambulatory care may need to be reviewed.

3. New ambulatory care models need consideration.

4. Care coordination may benefit from greater health system integration between healthcare sectors and between providers, as well as between the health and social sectors.

1.5.2 Evidence-based development

The Oslo National Institute of Public Health has defined evidence-based healthcare as follows: “Evidence-based healthcare is the conscientious use of current best evidence in making decisions about the care of individual patients or the delivery of health services. Current best evidence is up-to-date information from relevant, valid research about the effects of different forms of healthcare, the potential for harm from exposure to particular agents, the accuracy of diagnostic tests, and the predictive power of prognostic factors.” (National Institute of Public Health, 1996) In this sense, evidence-based healthcare can be regarded as an extension of evidence-based medicine, a development that is more and more required in medical practice.

The report ‘Ten statements on the future of public health in Europe’ of the European Public Health Association (EUPHA, 2004) notes that public health has not been on the agenda of policy-makers until rather recently and it still does not get prioritised in focus because of its long-term orientation. The report emphasises that “[n]ew public health should therefore encourage researchers to examine the long-term benefits of public health interventions. Evidence-based research could be a basis for this. Another basis could be long-term morbidity and mortality studies. Policymakers should combine different strategies to achieve one goal. Investment for the long-term benefits of such strategies should not be subject to short-term budget cuts.”

The European Observatory on Health Systems and Policies supports and promotes evidence-based health policy-making through comprehensive and rigorous analysis of the dynamics of healthcare systems in Europe. They work mainly on the following topics: Chronic diseases, European Union law and enlargement, funding healthcare, healthcare reform, policy and performance, health impact assessment, human resources for health, hospitals, mental health policy, pharmaceuticals, primary healthcare, public health policy, purchasing, regulation, regional studies, and targets for health. The European Observatory is regularly publishing different studies in the health field and policy briefs directed to ‘busy policy-makers’. Examples of policy studies in the field of health systems are:

- capacity planning in healthcare: a review of the international experience, 2008;

(131) www.oecd.org/document/32/0,3343,en_2649_33929_36415008_1_1_1_37407,00.html
(135) Cf: European Observatory on Health Systems and Policies.
1.5.3 Guidelines for reporting, quality and safety standardisation

Often quality improvements in quality and safety of healthcare are inadequately reported, which makes it difficult to learn the effects. To make this situation better, a revised version of the 'Standards for Quality Improvement Reporting Excellence (SQUIRE)' has been introduced in the effort to improve completeness, accuracy, and transparency of studies (Annals of International Medicine, 2008) (136).

1.5.4 Communication

In order to reduce the burden placed on future social systems by increasing health needs – and for instance to reduce avoidable costs due to a fragmented and duplicated health service (137) – it is important to improve communication and coordination between all stakeholders of health systems: “Hospitals and physicians, public sector agencies, governments and other commercial health-related entities must view the benefits of working together and connect by formal partnership or informal business affiliations to deliver health services to consumers (138).”

Contracting the entire primary care at the local level as a cohesive package could be a way to avoid duplication of services provided. Furthermore, the restructuring of the healthcare sector should be supported and influenced by social dialogue among all interested and involved stakeholders (139). Lastly, strengthening transnational research is presented in the Luxembourg Foresight as a way to make sure that new treatments are implemented quickly into clinical practices – improving the efficiency of care (140).

1.6 Improvement of Training for Health and Social Care Professionals

1.6.1 Workforce

As a consequence of population ageing and of the increasing prevalence of chronic disorders, the demand for general practice, pharmaceutical services, home care services as well as emergency help services is expected to increase and evidence suggests that the supply of general practice care will not be able in the future to keep up with the growth of the demand. The Dutch Foresight study ‘OP ÉEN LIJN: Toekomstverkenning eerstelijnszorg 2020 – A foresight study in the health sector for 2020’ expects for instance the supply of general practice care in the Netherlands to grow by 11.5 %; however, the demand for it is expected to increase by 13 to 20 %, leading to serious workforce shortages (141,142). This trend might be reinforced through the transition to retirement of large age groups of the current healthcare workforce.

Also medical personnel are increasingly complaining about inadequate payment and bad working conditions. In Eastern Europe, but also in developing countries, medical professionals are migrating to other countries with better payment and conditions, thus causing a ‘brain-drain’ and worsening the situation in their countries of origin. The unfavourable working conditions for medical workers are also being caused due to efforts for cost reductions. With the interests of healthcare professionals, even a new dimension adds up to quality of care, equity, efficiency and cost reduction which requires balancing.

1.6.2 Future skills of health system professionals

The aim of the knowledge triangle ‘research-innovation-education’ of the Lisbon strategy is to provide a framework for developments and partnerships at European, national and sectoral level; therefore it has to be considered as crucial also for the health sector. Education and training policies and strategies in the forthcoming years should integrate institution-based and work-based learning; balancing the demand and supply side between jobs and qualifications; focus on

quality assurance mechanisms and recruit and enhance cooperation between teachers and trainers. It is therefore essential to ensure that education and training systems provide analytical skills, leadership skills and allow current and future professionals to appropriately comprehend the transformative nature of technology. This type of education system needs to effectively combine classroom teaching and real-life experiences in the realities of the health sector. The growing field of specialised healthcare education in the sector is an example of a significant critical response to these intense challenges facing Europe. On the other hand, the management of health and social care sectors are characterised by massive challenges and opportunities for sectoral businesses and employees. Managers in the health and social care sector have to be effective in all traditional quantitative and qualitative skill areas of business management, e.g. influenced by New Public Management. However, they must also be able to deal effectively and efficiently with the role of government and the continuous transformation of the industry through the innovation in technology, research and demographic developments, while understanding how to operate as entrepreneurs. In order to cope with these tasks they need a sophisticated and powerful combination of skills. Furthermore, nurses will need to be trained on administrative and communication areas, so as to allow the delegation of more duties to them. Communication will need to be an integral part of all health and social care training and education system, as the focus of the respective systems will be on patients rather than cases, as is today. Nevertheless, special attention should be paid so as to avoid having managers of health and social care institutes that lack clinical skills and knowledge of the entire spectrum of services provided by the sectors (143).

Some major strengths, weaknesses, opportunities and threats have been identified in a SWOT analysis about scenarios, implications and options in anticipation of future skills and knowledge needs in the health and social services sector conducted by TNO, SEOR and ZSI for the EU DG-employment. Labour shortages with growing demand, budget constraints and suboptimal working conditions have been named as major threats and the complexity of processes and products as well as bureaucracy and lengthy procedures as weaknesses. Labour-saving technologies, quality-improving technologies and the emphasis on prevention have been named as major opportunities (144).

1.7 Ethical issues

Although new developments in healthcare technology, medical advances and innovations in public health hold many opportunities, they also raise new ethical questions. The spectrum of issues is broad, ranging from data security and privacy protection over economicalisation of healthcare to even philosophical questions about humanity, identity and life.

1.7.1 Ethics and information security

Digital transfer and storage of people’s medical information raises questions in regard to data security and also legal and ethical issues, e.g. who is allowed to have access to the data, who controls the information flow and how will data protection and fraud protection be implemented? Telemedicine and e-health can also change the relationship between patients and physicians. Telemedicine and e-health should not negatively affect the relationship of trust and respect between patient and physician and it must ensure certification and qualification of the physician as well as proper documentation and privacy protection. Also issues of cross-border consultancy have to be regulated. Another issue relates to surveillance. How far can the surveillance of people for preventative or protective reasons be justified, especially if the subjects are children or elderly people with dementia who are not able to give their full consent?

1.7.2 Ethics and economisation of health

A concentration on economisation and cost reduction could lead to a couple of ethical questions like the justification of expensive life-extending procedures without hope for a cure, tendencies towards a two-tier medical system, health- and age-related discrimination due to costs (e.g. for insurers or employees) or even peripheral issues like pre-implantation diagnostics (PID), embryonic screening, abortion and euthanasia.

1.7.3 Ethics and prevention and freedom of choice

The growing emphasis on prevention could also lead to ethical (and legal) questions relating to personal freedom of choice. In how far can people be ‘forced’ to adhere to specific life-style choices to avoid life-style diseases that are likely to be related to eating habits, smoking, alcohol consumption or a lack of exercise? Can it be justified that people with unhealthy life-styles should pay more into social security or is it socially acceptable that others have to pay for preventable illnesses?

1.7.4 Ethics and genetics

The growing advances in genetics and genetic analysis are leading to a growing number of claims that correlate genetic disorders to diseases (including obesity, psychological disorder, cancer) and disabilities. Currently, however, most assumed relations between genetic data and potential illnesses are far from clear and require much further research. If adding an economic dimension, such tendencies could perhaps lead to gene-related discrimination. Genetics also leads to new legal questions about patents, e.g. on DNA sequences, plants and genetically-modified organisms.

1.7.5 Ethics and neurotechnology

Neuroscience and neurotechnologies are getting increasingly important, especially in the context of ageing and dementia. Progress in this area also raises new ethical questions about interfering with a human’s brain, nervous system and even thoughts and personality. Already today, some techniques that are applied to treat psychological or neuronal disorders or traumatic stress syndrome can lead to personality changes or even manipulation of memories. New developments in the treatment of phobia and traumatic stress disorder even aim at deliberately ‘deleting’ memories from the brain (145).

1.7.6 Ethics and emerging medical technologies and the concept of humanity

Some promising trajectories in medical research and technologies are raising profound ethical questions and concerns. This applies to current practices like human embryonic stem cell research, pre-implantation diagnostics and the creation of human-non-human chimera (for research purposes), but even more to potential future developments like advanced neurotechnology, medical implants, anti-ageing and ‘radical health-life extension’, tissue engineering and the related ‘danger’ of cloning as well as advanced nano(bio)technology and so-called human enhancement technologies. The new questions are even going so far as questioning the traditional concepts of life entities and ‘being human’ (cf. e.g. Nordmann, 2004 (146) and Coenen, 2008 (147) who provide a summary of the debate (148) and the role of artificial or partly-artificial entities (cf. Leis, 2006 (149)). Also the prospect of health and life extension leads to philosophical and ethical questions and controversies like the role (and importance) of illness and death for humanity.

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The need for ‘Healthy Ageing’ as a major driver of healthcare systems change
The need for ‘Healthy Ageing’ as a major driver of healthcare systems change

The demographic projections about population numbers and life expectancy are quite robust and can therefore serve as a reliable basis for foresight analysis. By 2045 to 2050, people will live longer as life expectancy in Europe is expected to rise to 81.0 years from the currently estimated average of 74.6 years (UN, 2006)(1). Up to 2050 the share of the above 60 age group will be around 37% in Europe, compared to only 27% in North America, where population growth will continue to be relatively strong. Within the 60+ age group, there will also be significant growth in the number of the ‘very old’, i.e. people aged 80 years and over. Whereas the very old constitute 3% of the European population today, 11 of the former EU-15 Member States will have at least 10% of their population aged 80 or over by 2050. Gender differences in ageing are considerable. In Europe women’s life expectancy is currently more than 6 years higher than for men. In the age group of 60 years and over, there are 50% more women than men. Of people living alone at the age of 75+ more than 70% are women. The process of enlargement of the European Union is not expected to have a significant impact on the ageing process of the Union’s population (2).

Population ageing will have significant socio-economic implications (3). There are serious concerns about the viability of pensions systems in many countries (particularly where pension payments depend on current contributions from people in work), about public sector budgets (particularly for healthcare), about the care implications of a larger population of frail older people, and about the possibility of a growing marginalised and socially-excluded older population – or the domination of elderly over a much smaller share of young people. Population ageing is seen as a challenge to the European model of social welfare and protection.

The rapid ageing of the population in OECD countries over the next few decades is expected to increase the demand for, and hence expenditure on, long-term care services.

One of the main policy implications [...] is that it would not seem prudent for policy-makers to count on future reductions in the prevalence of severe disability among elderly people to offset the rising demand for long-term care that will result from population ageing. Even though disability prevalence rates have declined to some extent in recent years in some countries, the ageing of the population and the greater longevity of individuals can be expected to lead to increasing numbers of people at older ages with a severe disability. [...] (4)

One factor that might help mitigate this ‘pure’ demographic effect of population ageing on the demand for long-term care would be some steady improvements in the health and functional status of people aged 65 and over, which would enable them to live independently as long as possible. (4)

The concerns are justified, but pessimistic conclusions should not be drawn too quickly. This report presents a perspective in which demographic change is seen as a positive opportunity for the innovative technological, social and organisational responses to the challenges of an ageing population. Through innovation it may be possible to not only avert potential economic problems, but also to enhance the quality of life of older people, and develop new business possibilities for European industry.

This chance depends in part on how the European industry adapts to the changing composition of demand, and whether or not it can produce innovative solutions in response to the actual and potential needs and demands of older age groups. It should be emphasised that many of the goods and services which are likely to emerge can be internationally traded: There will be international

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2) http://ec.europa.eu/health/ph_information/dissemination/diseases/age_en.htm
competition in the development and supply of such goods. However, adaptation to the new patterns of demand is not simply a private-sector issue – government also has a role to play in the development and diffusion of new technologies and in the creation of markets, through:

- development of relevant technological infrastructures;
- actions to create markets for new age-appropriate technologies;
- development of relevant standards and regulations (both technological and organisational);
- diffusion of best practice.(6).

2.1 Ageing: Increasing costs on health and social services provision

Demands placed on healthcare systems will increase since in general an ageing population uses more healthcare services than a younger one. This leads to increased costs and raises important challenges in terms of the availability of sufficient general practice care, pharmaceutical services and emergency help. For instance, the total (direct and indirect) costs caused by Alzheimer’s disease are estimated in the range from EUR 2,470 to EUR 32,000 per patient per year. For Parkinson’s disease, these estimates average EUR 13,800 per patient. These costs and the overall healthcare costs for age-related diseases are likely to rise due to potentially increasing number of cases given the expected demographic shifts in all countries.(7). Especially bad are the projections for the US, where in 2008, healthcare spending [... ] reached USD 2.4 trillion, and is projected to reach USD 3.1 trillion in 2012. Healthcare spending is projected to reach USD 4.3 trillion by 2016” (NCHC, 2009 (8)). Medical costs in the US are a major reason for the financial problems of individuals and individual households and “[f]or retiring elderly couples [in the US] will need USD 250,000 in savings just to pay for the most basic medical coverage” (ibidem). Thus, the pure demographic effect of an ageing population is projected to push up healthcare spending by between 1 and 2 % of GDP in most Member States between 2004 and 2050(9).

Population ageing will also lead to an ever accelerating epidemiological shift from communicable diseases to more non-communicable diseases and chronic conditions (including asthma and diabetes mellitus), neurodegenerative diseases as well as mental health disorders, expected to absorb a growing share of total healthcare costs(10). Therefore, although an increasing life-expectancy is actually something positive, it gets problematic if two factors come together: failing health...
with old age and fewer people to financially and socially support the healthcare services due to declining birth rates. In such a setting, an increasing number of older people would require more treatment, which means higher costs and the requirement for more personnel, which cannot be supplied if there will be fewer young people who will finance the costs (through the insurance system) and serve as caregivers.

Hence, the growing and changing demand for health services, mostly provided today by the public sector in many Member States of the EU, is creating unprecedented pressures on health and social care systems. The implications of triple ageing for health and social services are especially profound, with long-term care expenditure as a proportion of GDP expected to almost triple over the coming 50 years. For example, it is estimated that healthcare costs for 65-75 year olds are 2.5 times greater than those for people under 65, whilst the costs for those over 75 are estimated to be 4.5 times greater (14).

There is also a need, for instance, to improving the quality and efficiency of care provided for the elderly and the chronically ill while, at the same time, limiting costs (resulting for example from unplanned hospitalisation) by improving the architecture of healthcare systems and the way that the chronically-ill population is cared for (15).

Ensuring the viability of and sustainability of public health systems is a challenge for European countries because the countries and companies that are better in managing the challenges of an ageing society will gain social, economical and competitive advantages (16). In particular, it is necessary to rethink the way healthcare is funded, in order to maintain and improve the high quality of care, to promote equal access to new – and often costly – medical technologies and treatments and to ensure that all share the benefits of advancement in medical research and technology. Furthermore, the role and responsibility of all stakeholders of healthcare systems (public and private stakeholders as well as the patients) has to be redefined (16).

2.2 Ageing: Increasing pressure on the labour market / pensions system

Ageing has a huge impact on the labour market as well as on the pensions system in two ways. First and foremost, the workforce is becoming smaller and older on average (19). This may lead to new challenges in terms of labour supply and skills shortage, which may be exacerbated by the increased competition for skills and competencies in the knowledge and service economy: The increase of knowledge work, together with the availability of ICT applications making work increasingly independent of time and location, lead to the globalisation of the market for competent workforce and labour market mobility is therefore expected to increase (20). Attracting competent professionals into the country, retaining them, and retaining valuable knowledge and expertise in the face of the transition to retirement of large population groups will therefore become a necessity, particularly in fields where national skills and competencies could still be improved or where a shortage of skilled labour is anticipated (18).

Secondly, and concurrently, the number of people outside the workforce will rise and longer life expectancy means that pensions will be paid for a longer period than at present, thus increasing future spending (19). As a result, a shrinking workforce will have to support a growing number of retired people, which will increase the burden on public pensions systems.

Economic growth and the financing of the welfare system will therefore depend on having many people in employment and it will be necessary for society to be able to make best and flexible use of all labour resources (20).

There are good grounds for scientific investigation into two major questions. The first one deals with the question about what will enable elderly people to remain and let them want to remain on the labour market in the future, either as wage-earners or self-employed individuals. The other question concerns finding the best

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(17) (18) See for instance FinnSight 2015.
ways to retain and manage knowledge within multi-generational settings. In this regard, a discussion is needed about the importance of the knowledge/experience of the elderly for the knowledge society, as well as the related needs for changes within organisations and companies (‘corporate social responsibility’) to cope with this knowledge.

As a consequence of population ageing and of the increasing prevalence of chronic disorders, the demand for general practice, pharmaceutical services, home care services as well as emergency help services is expected to increase. Evidence suggests that the supply of general practice care will not be able to keep up with the growth of the demand in the future. It will be therefore necessary to find ways to improve the match between supply and demand of general practice. In the course of health system reforms, attention should be paid to the fact that doctors and nurses may also face skills problems, increasingly being asked not only to perform their medical but also administrative tasks, for instance, due to the restructuring of hospitals.

Finally, due to increased mobility at international scale (globalisation), as well as within the EU (Single Market), the labour market for healthcare professionals has become increasingly international. Regarding European health systems, there is a risk of exodus of healthcare workers leaving new Member States to take up jobs in the EU15 countries with better salaries, working conditions and career perspectives – leading to serious implications for healthcare systems and workforce shortages in their home countries.

How to maintain an equitably balanced distribution of the health workforce in the EU and avoiding a workforce shortage in new Member States will both become crucial issues.

2.3 Cost-benefit analysis of measures and research for “healthy ageing”

Long-term care and dementia are the most feared social and economic consequences of the ageing society. This is the reason why ‘healthy ageing’ or increasing the amount of years in good health (‘health span extension’) are seen as important issues and the solution to the problem within most foresight studies. Significant medical research is often dedicated to this issue. Finding cures for dementia and age-related diseases is stated as the main goal of many medical and technological R&D activities. In this respect, technological foresight studies play an important role in identifying trends and advances in research and development that could contribute to the better prevention or even cure of age-related diseases. The whole ageing debate has also contributed, for example, to the growing interest in brain- and neuroscience. If the negative health effects of ageing could be diverted, most of the pressure would be taken off the healthcare and social security systems. In the magazine ‘New Scientist’, biodemographer Jay Olshansky explores future scenarios on human ageing and anti-ageing technologies and comes to the conclusion that “[a]ccording to studies undertaken at the International Longevity Center and at universities around the world, the extension of healthy life creates wealth for individuals and the nations in which they live. Healthy older individuals accumulate more savings and investments than those beset by illness. They tend to remain productively engaged in society.” (Olshansky, 2006). Therefore, he even calls for a “paradigm shift” to prioritise investments in anti-ageing R&D, because of the huge long-term payoffs and cost-savings and asks the US Congress to invest at least 1 % of the US medical budget into this effort. On the other hand, medical research on age-related diseases is expensive and its success is uncertain, requiring an in depth cost-benefit analysis that as yet has not been taken up by mainstream thinking. Besides medical research, social and economic analysis about costs and specifically mid-term to long-term benefits of investments in healthy-ageing should be conducted in a broader and more systematic way.

Although initial and short-term costs of R&D in ‘health-span’ extension may be high, long-term benefits might be worth the investment. Such conclusions, however, require more detailed investigation.

2.4 Threats to societal inclusion

Besides its obvious impact on healthcare and social systems, as well as on the labour market, the ageing of the European populations may also give rise to serious challenges to social cohesion / inclusion and may, for instance, lead to intergenerational tensions linked to different values and political behaviours. Indeed, the ageing electorate in the EU countries will, for example, increase the imbalance in the political representation of young and old people, which may lead to politics shaped by interest organisations and lobbyists with special interest in issues affecting older persons. Politicians may become increasingly dependent on older voters, which may lead to the design of policies mostly serving the older electorate – e.g. aiming at increasing employer pension contributions (‘grey politics’) (27).

In terms of social inclusion and ageing, gender issues may also play a role: While women have a higher life expectancy than men, they mostly save less for their pensions (either because they occupy less remunerated positions or because they, more often than men, interrupt their employment to take care for children or for elderly relatives), leading to a higher risk of poverty for women in old age (28).

While the foresight studies considered in the issue analysis all tackle the issue of ageing and healthy ageing from various angles and independently address different questions around healthy ageing, some issues related to social cohesion and the spatial dimension, however, are not addressed in great depth. If the welfare state undertakes the care of the elderly, will the family still stay close to each other or will there be more mobility? Will the elderly prefer to stay with other elderly people if their families go away, or will the number of single households with older people increase? What challenges will this present in terms of housing and town planning? Where will such movements lead, e.g. to a revival of the countryside? Finally, a discussion is needed about the role that the elderly have to play in society and how to ensure their active participation in all spheres of public life (29).

Undoubtedly, the drop in birth rates and the ageing of the population are seen in foresight studies as the main health challenges that Europe will face in the future, as well as one of the most important drivers – if not the main drivers – of public health systems change in Europe. However, other demographic and social developments, which will be focused on in the following sections, also play an important role, leading to new healthcare needs and new citizens’ expectations regarding healthcare and healthcare systems.

2.5 Market opportunities for the ageing society

Ageing should not by any means be only seen as a threat to European systems of social welfare and protection in general and to public health systems in particular. New healthcare services – based on technological innovation – which are likely to emerge in the near future might lead to the creation of new markets and therefore new business opportunities (30). These opportunities also come up in growing markets related to healthcare, e.g. the market for products for holistic health and health promotion (31).

More generally, substantial business opportunities are arising from ageing, as well as the foreseen demographic and social developments, for example based on new demands for products and services adapted to older people’s needs, ranging from elderly tourism, elderly wellness services, cultural services for older people, to assisted living products and services. Technological innovation must therefore be based on the fact that society is undergoing an ageing process and that technology, which, through dynamic interaction, both influences and is influenced by society and can contribute to the ageing society not becoming a problem but an opportunity to be embraced (32). Indeed, in the UK for example, there is a broad market targeted at people older than 50. ‘Inclusiveness’ is the key concept in designing

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(29) EFMN Foresight Brief No. 84: Preventative Healthcare Mecklenburg-Western Pomerania.
(30) However, the participants of the EFMN issue Analysis Workshop 2006 underlined that though technology can be an enabler to improve quality of life in every age-group (and to increase accessibility of healthcare particularly in old age), low-tech solutions and the human factor should not be underestimated.
new products and services adapted to the needs of the elderly\(^{\text{33}}\).

Of course, the so-called ‘silver market’ focusing on senior citizens as consumers will only flourish when the purchasing power of the elderly is strong\(^{\text{34}}\). However, at least in Germany, the opportunities should not be underestimated against the background of the purchasing power of the elderly: The large potential of the ‘silver market’ has been underlined in a study carried out by the German Institute for Economic Research, for example, which estimates that the purchasing power of the 60+ generation in Germany amounts to some EUR 316 billion, contributing to nearly one third of the total private consumption. According to this study, this share will increase to 41% by 2050\(^{\text{35}}\).

Beyond the ‘silver market’, the foreseen increase of single-person households, regardless of age, is expected to lead to new opportunities for lifestyle services that can also be attractive for the elderly, such as delivery or cleaning services, as well as ‘life manager’ services helping people to solve all kinds of personal problems\(^{\text{36}}\).

### 2.6 Housing innovations / Clothing / Town planning

Older people will benefit from the design and development of technical solutions for every day life, helping them to remain self-reliant and not dependent on assistance, so that they can remain in their own homes for as long as possible – even if they experience either a major or a minor loss of functional ability. This may, in turn, contribute to reducing the costs for long-term health and social care. In this area, developments within information and communications technology (apart from telemedicine services, already addressed in §1.2.3) and biotechnology will be critical for the development of the age-integrated society. These technological developments will be integrated into everyday devices, from ‘IT everywhere’ through to flexible housing and new types of products, such as\(^{\text{37}}\):

- the development of attractive and functional clothing designed with particular regard for older persons with chronic diseases;
- the development of ‘fall safe’ floors;
- the design of intelligent textiles and ‘smart’ clothing, featuring new properties (e.g. soiling and odour repellent) and incorporating IT and communications solutions directly into the garment\(^{\text{38}}\).

The local supply of social contributions and healthcare must be adjusted to the needs of an ageing and shrinking society\(^{\text{39}}\):

- assisted living facilities, senior care retirement facilities;
- drugs and food delivery services;
- barrier-free access to public transport, and so on.

Against the backdrop that decreasing functional capacity and increased social isolation are some of the risk factors for depression in old age, particular attention should certainly be given to developing new living structures (housing, urban planning, etc.) to help avoid isolation and depression in old age\(^{\text{40}}\).

Technologies and solutions to improve the health and wellbeing of elderly people are therefore very important and can provide huge opportunities for innovation, the economy and scientific and technological progress. Approaches and opportunities are manifold and range from preventative and ‘anti-ageing’ measures and improved medicine over targeted markets and services to advanced technological aids and assistance systems.

\(^{\text{33}}\) Discussion during the EFMN Issue Analysis 2006 on Healthy Ageing.
\(^{\text{36}}\) See ‘Ageing Society 2030’, Teknologisk Fremtids, Danish Foresight; www.zukunftsfokus2030.de
3 Visions and prospects from international foresight exercises
3 Visions and prospects from international foresight exercises

This section will summarise the major findings from foresight studies about future healthcare systems and ageing.

While population ageing will become more of a universal trend in the coming decades, there is a wide diversity in terms of the timing and speed of demographic change, the social and economic contexts and the perception of the challenges posed. Among the developed countries, Europe and Japan will experience the most pronounced ageing trends up to 2050 – the share of the ‘above 60’ group as well as the number of ‘very old’ people aged 80 years and over being expected to rise (1).

While there is a broad consensus in (foresight) studies on the need for reforms to restructure (public) health systems and make them sustainable and especially financially viable, particularly against the background of population ageing and the related expected increase of age-related diseases and chronic conditions, the nature of the reforms needed is rarely explored. Indeed, most studies relate to the future of public health and not that much to the future of public health systems.

The issue of ‘ageing’ and the related problems of pressure on health and social care prominently featured among the most frequent topics in recent foresight studies (2).

The following foresight studies were particularly important:

- Zukunftsradar / The Challenge of Demographic Change: Scenarios and Recommended Actions for Communes in Rhineland-Palatinate, completed in 2007;
- FNR Luxembourg National Foresight (2007);
- Danish national foresight study ‘The Ageing Society 2030’ of Teknologisk Fremsyn (3) (2006);
- EMCC Sector Futures, ‘The biomedical healthcare sector’, European Monitoring Centre on Change (2006);
- ‘HealthCast 2020: Creating a Sustainable Future’, Price Waterhouse Coopers Health Research Institute (2005);
- OP ÉÉN LIJN – Toekomstverkenning eerstelijnszorg 2020 – The Netherlands foresight study in the health sector for 2020 (2005);
- The Future of Finnish Healthcare – Strategies and Scenarios to secure future healthcare services in Finland (2005);
- Greek Technology Foresight, Report of the Working Team on Health and Quality of Life, Athens (2004-2005);
- Preventative Healthcare, Mecklenburg-Western Pomerania (2004-2005);
- European meta-studies ‘Sector Futures’ carried out by the European Monitoring Centre on Change on the future of the health and social services sector (completed in 2004) (5);
- Sector Futures, ‘The Health and Social Services Sector’, European Monitoring Centre on Change, (2003-2004);
- UK Foresight study on ‘Ageing Population’ (6) (even though already completed in 2000).

(1) http://ec.europa.eu/health/healthhph_information/dissemination/diseaseslagesebral.diseaseslagesebral_en.htm
(2) “Recent foresights” includes prospective studies which have been completed within the last 5 years.
(4) For more information, see: www.zukunftsradar2030.de
(5) For more information, see: http://www.eurofound.europa.eu/emcc/sector_futures.htm
The concrete foresight statements relating to healthy ageing and healthcare system changes emerging from these foresights are displayed in Annex II.

### 3.1 Trends and challenges

The following section provides an overview about the major trends and challenges depicted in recent foresight studies.

#### 3.1.1 Promoting prevention and rehabilitation

Against the backdrop of the expected rise in healthcare costs due to population ageing, the foresight studies highlight the fact that effective strategies promoting healthy ageing should aim at the prevention of diseases instead of spending too many resources on curing them. The following measures are proposed which might be initiated by public authorities, health services or employers:

- regularly check-ups for all (by GPs, at school, or by the company physician) (7);
- prevention campaigns at schools and in the workplace against alcohol and drugs abuse; non-smoking campaigns, etc. (8);
- health promotion measures in the workplace: medical counselling; counselling on balanced diet and diet programmes; fitness centres and physical exercise programmes (9);
- workplace design adapted to an ageing workforce, promoting health and preventing illness and accidents at work; design of rest rooms, ergonomics (10);
- given the fact that family structures have been changing / have changed and have been more unstable, the German study ‘Zukunftsradar2030’ emphasises the role of the workplace in preventing mental health of the employees by providing counselling on time and stress management, burnout, mobbing, work-life-balance, etc. but also beyond business matters. Addressing psychosocial problems at work also contributes to making mental disorders no longer a taboo, avoiding stigmatisation and isolation and, at the same time, facilitating access to therapy. Furthermore: relaxation techniques and yoga courses, social and recreational activities, etc. which might also have positive consequences on the pensions systems (11);
- (worldwide) vaccination programmes against viral infections (12);
- prevention through functional food and food supplementation (vitamins, folic acid, iodine, etc.) (13). New preventive treatment regimes, employing both new medicines and changes in behaviour during illness (14).

#### 3.1.2 New concepts for the labour market

As highlighted in the Danish foresight study (15) the realisation of the vision of an age-integrated market will help make flexible use of all labour resources and therefore mitigate the negative economic effects of a shrinking working population. Due to the shrinkage of the European workforce as a result of population ageing (and declining birth rates) and the anticipated shortage of expert workforce in specific domains, common retirement notions are expected to be abandoned (16).

The Lisbon Summit set very ambitious targets in the field of retirement policies, namely “to promote active ageing, notably by fostering working conditions conducive to job retention – such as access to continuing training and flexible forms of work organisation – and eliminating incentives for early exit from the labour market, notably by reforming early retirement schemes and ensuring that it pays to remain active in the labour market”. In this context, the participants of the Issue Analysis Workshop 2006 pointed out, for instance, that the current tax system is very punitive for older people wanting to work part time after retirement (17).

In the EUFORIA Delphi (18) participants were asked to assess the impacts of the trend that a widespread abandonment of conventional notions of retirement will enable the elderly to continue working if they wish to. The Delphi results show that job creation would slightly

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(7) See e.g. German Futur-Foresight Study; UK Wanless Scenarios, Scenario ‘Fully Engaged’; www.zukunftsradar2030.de  
(8) (9) (10) (11) (12) (13) www.zukunftsradar2030.de  
(16) See Danish Teknologisk Fremsyn.  
increase if more flexible retirement notions emerge. In addition, participants were confident of the positive impact that new retirement options would have on entrepreneurship and innovation, economic growth and wealth creation(26).

However, while experts agreed during the Issue Analysis Workshop 2006 on the fact that retiring later in life might have a positive impact on economy and finance, they underlined that it is still deemed by the individual as a negative consequence of an ageing population. The policy-makers could therefore play an important role in helping to achieve a shift in mentality in that respect, since regulations alone will not be successful in increasing retirement age as long as there is no shift in mentality. Likewise, the success of the age-integrated labour market depicted in the Danish foresight study (distributing education, leisure and work throughout life) is dependent on mentality (perception), economic opportunities (adequate income) and attitudes in the labour market. In addition, aspects related to the work-life balance throughout life should not be underestimated. Furthermore, it was also emphasised that a longer working life is much easier to achieve in the services sector than, for instance, in the manufacturing sector(27).

While changes in pension terms and incentives through public retirement schemes are a necessary condition for persuading older people to remain on the labour market longer, such efforts might not be sufficient(28). In parallel with changes in public sector schemes for retirement patterns, a strategic senior’s policy for companies should be developed, with a focus on job-related factors which motivate older people to remain in work either as wage-earners or self-employed(29).

In particular, the foresights highlighted the need to adapt the workplace, as well as the working conditions to the needs of the ageing workforce: It will be necessary to develop ergonomic solutions for the ageing workforce, helping to overcome physical limitations related to ageing, for example(30), and to introduce measures for elderly people to promote health and safety at work as well as new flexible work models(30). For instance, this could be based on flexible working time or allowing older workers to take leave from their jobs for health reasons for a temporary period or even to develop new kinds of jobs for people older than 60-70(25).

In order to foster the inclusion of older age groups on the labour market, it is also necessary for companies to promote a corporate culture that effectively values and highlights older workers and older workers’ skills: in particular, prejudices concerning age and skills (such as those implying that the elderly are less innovative and adaptable) should be eliminated and, on the contrary, the insight, knowledge and experience of the older workforce should be highlighted(30):

“Seniors have an understanding that there are many considerations, perspectives and interests involved in the workplace (diversity) and, through greater independence from social norms, they are often more creative and better problem-solvers than juniors. Furthermore, seniors have built up a great store of patterns of insight and experience as well as an ability to recognise patterns in new knowledge and combine them with what they have already assimilated. Within their fields of knowledge and skills, seniors are very effective problem-solvers and fully capable of adapting to new tasks”(31).

Furthermore, the role of professional training and lifelong learning is expected to increase in the (future) knowledge society in general, since the innovation capacity in the knowledge economy – no matter whether regarding technological or organisational innovation – will increasingly rely on having access to knowledge and being able to manage it(30). More specifically, with regard to the ageing workforce, lifelong learning is seen qua non to improving older peoples’ qualifications for remaining in work and to enable them to adapt to an ever changing working environment – in particular as older workers (despite other skill advantages compared to young workers, as depicted above) seem to be in a slightly weaker

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(29) See Euforia.
(30) according to the Danish Foresight, four categories of factors determine whether older persons want to stay on or retire from the labour market: 1) Individually determined factors (e.g. gender, health, education); 2) Financially determined factors (e.g. retirement schemes and income); 3) Factors related to the connection to the labour market (e.g. type of position, seniority); 4) Job-related factors conditions (e.g. company culture, flexible working hours). [Source: Danish national foresight study ‘The Ageing Society 2030’, 2006].
(32) See Euforia.
(33) www.zukunftsradar2030.de
position than younger ones with regard to innovation and adaptability outside their field of knowledge and expertise. Developing learning technologies to support learning of the older workers and overcoming the situation that training and professional development are currently mostly gradually downgraded with age, are therefore particularly important. (29,30).

3.1.3 Hospital of the Future—Scenario Netherlands 2015

The study ‘The Future of Hospitals in the Netherlands in 2015’ (31) has been drafted against the backdrop of the following setting: “Medical cost and demand in healthcare are swelling. An intensifying dissatisfaction among patients, government officials, insurers, employers, clinicians and healthcare executives is noticeable. The soaring prices paid to treat the growing volumes of demanding, ageing patients are prompting payers to search for more efficient ways of treatment and care. Next to that the government in Holland has introduced the new healthcare payment system with a new insurance system and diagnosis treatment combinations. The main aim of this transition is the development from a budget oriented system to a more market oriented healthcare system. The belief is that a market oriented system will create more incentives for efficiency, quality and innovation (32).”

3.2 Ethical aspects

The considered foresight studies highlighted that a broad range of controversial issues still have to be addressed before designing any health-promoting measures (33,34):

- how does our society define the concepts of ‘good years of life’ or ‘quality of life’?
- how can the consequences of ‘medical ageism’ and biomedicalisation – involving pathologisation and treatment of signs of ageing which are not considered symptoms of disease – be faced?
- how do we ensure – and under which conditions – that everyone remains free, on a well-informed basis, to either undergo or reject life-prolonging treatment?
- on the other hand, how do we ensure that the elderly benefit from the best quality care and treatment, even if their costs are high?
- how do we avoid inequality and polarisation in health behaviour, health, functional ability and life expectancy determined by social, gender-related and ethnic factors?

3.3 Research needs

3.3.1 Strengthening research on ageing mechanisms and health risk factors

Designing effective public health policies aimed at promoting healthy ageing presumes first and foremost more knowledge about the fundamental biological, psychological and social ageing mechanisms. Diverse and divergent factors might affect healthy ageing and especially those factors contributing to preventing illness and the loss of functional ability have to be identified. Further research needs were particularly

(30) More generally, if tomorrow’s older workers are to keep pace with an ever changing technological and scientific environment, as well as an ever increasing amount of knowledge to deal with, the education system should, already today, be improved in order to face future challenges: Learning to learn will become the best guarantee for people to cope with tomorrow’s working (and living) environment. Basic education will therefore take on a new meaning since it no longer refers solely to an amount of knowledge that each individual should possess at a certain time of their lives, but also to general skills allowing people to continue learning throughout their lives and to adapt to new knowledge. Tomorrow’s training and education systems should therefore be reinvented with the aim to integrate formal and extra-institutional learning and to promote lifelong learning opportunities. Special attention should be paid to the risks of social divides and social exclusion as a result of unequal access to education and lifelong learning. [For more details on this issue: see Rijkers-Defrasne, S., Korte, S. et al., ‘Emerging Knowledge-Based Economy and Society’, EFMN Issue Analysis 2007 – Final Report. Available on: www.efmn.eu].
specified in the Danish foresight study (35). Among the future research needs identified in the Luxembourgish foresight study (36) in the domain of public health are also aspects related to the foreseen ageing of the population. According to these studies, further research is particularly needed on:

- the determinants of health (37) – social and economic environment, physical environment and the person’s individual characteristics and behaviours – and the contexts in which these determinants operate – values, beliefs, and traditions of individuals and communities. Above all, the determinants for an active and healthy life, i.e. for good extra years of life without loss of functional ability and without long-term illness, should be in the focus of research;

- identification of critical phases of life, stressful events and risk factors, which in a whole-life perspective are of significance for the development of chronic illness and early loss of functional ability;

- health behaviour, lifestyle, social networks and other preventive initiatives as determinants for the age-related onset and severity of diseases, and for cognitive function over the course of life. In particular, risk factors and genetics aspects of so-called lifestyle diseases such as obesity, as well as cardiovascular diseases – which are the main cause of illness and premature death in the EU, accounting for approximately 40 % of deaths in the EU – should be addressed by research (38);

- the development of early functional markers for biological and psychological ageing and for surviving without loss of functional ability; and

- biological and clinical research of age-related functions and diseases as a basis for new forms of treatment.

The knowledge of health determinants, risk factors and ageing mechanisms is crucial for effective public health policy and a precondition for developing adequate measures preventing illness and disability.

### 3.3.2 Research on future social models

Against the backdrop of population ageing, the Danish national foresight highlighted the need for social research aiming at a better understanding of the risks for possible generational tensions and social exclusion, in order to better prepare for these challenges and build an age-integrated society. The following topics were identified as particularly significant (39):

- the concept of social cohesion in an ageing and in an age-integrated society;

- the concept of ‘social capital’ in an ageing and in an age-integrated society;

- the electorate’s ageing and consequences for political processes and potential political outcomes;

- coordination of the concepts of political and economic sustainability;

- studies of the population’s preferences concerning prioritisation between ‘the major cash transfer incomes’ and services (health, care, education) as core provisions in the age-integrated society;

- potential risks for intergenerational tensions;

- the implementation of the unwritten social contract in an age-integrated society;

- the future older persons’ financial situation, including the elderly of other ethnic origins;

- age functioning simultaneously as an inclusion and an exclusion mechanism. The welfare state and the over 65s (the ‘policy on the elderly’ from a whole-life perspective);

- studies of the professionalised elderly groups’ influence on the political processes; and

- studies of gender differences and ethnicity in interaction with cohesion in an age-integrated society (40).

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(36) According to the WHO, the determinants of health include: Income and social status; Education level; Physical environment; Employment and working conditions; Social support networks; Culture; Genetics; Personal behaviour and coping skills; Health services; Gender. [Source: http://www.who.int/hia/evidence/doh/en/index.html].
Furthermore, since new family models have a marked influence on the availability of informal care within the family and the household and also on the future demand for formal health and social care, the anticipation of developments in regard to family models is therefore closely linked to anticipating future health and social needs (41).

3.3.3 Research on the labour market

To realise the vision of an age-integrated market where old people wish to remain on the labour market and all labour resources can be integrated due to flexibility, research should address and identify the factors that enable and – even more importantly – provide incentives for older persons to actively remain in the labour market either as wage-earners or self-employed (42). In particular, the following research topics were highlighted in the Danish foresight study:

- the significance of formal age limits for early retirement or flexible continuance on the labour market;
- the creation of norms for retirement from and flexible continuance on the labour market, including older persons’ attitude to life-long learning;
- the wage structure’s significance for realising the opportunities for flexible continuance on the labour market;
- age-specific work skills, including seniors’ skills;
- making the value of employees to companies visible;
- initiatives for promoting flexibility and adaptability linked to the ageing society;
- special ‘seniors’ duties seen in the light of the development potential of mature life;
- the relationship between ‘running down’ and preceding working environment; and
- analyses of late-life career patterns among wage-earners or the self-employed (43).

(42) See e.g. FNR Luxembourg National Foresight, 2007; Danish national foresight study ‘The Ageing Society 2030’, 2006.
Conclusions for EU policy
4

Conclusions for EU policy

This section will highlight and summarise some of the relevant topics for EU policy.

Despite the problems of European healthcare systems, the situation in (western) European and EU countries is still far better than in most other countries in the world. Therefore the EU could play an important role in drafting best practice models and setting international standards.

Under the EC Treaty(1), EU action must aim to improve public health, prevent human diseases, and identify sources of danger to human health. This has led to integrated health-related work at EU level, aiming to bring health-related policy areas together.

In 2006, the European Council adopted a statement on common values and principles in EU healthcare systems regarding the values of universality, access to good quality care, equity and solidarity(2). On 23 October 2007, the European Commission adopted a new Health Strategy, ‘Together for Health: A Strategic Approach for the EU 2008-2013’(3). The Strategy is supported by DG SANCO (Directorate-General for Health and Consumer Affairs) and in other sectors, such as the 7th Framework Programme for Research and Technological Innovation, and Regional Policy funding. With this the European Commission aims to set out “a coherent framework – a first EC Health Strategy – to give direction to Community activities in health”(4).

4.1 Public health systems change

The issue of ‘public health systems change’ is high on the European policy agenda, particularly against the backdrop of the new Programme of Community Action in the Field of Health 2008-2013 that came into force from 1 January 2008. This Programme aims to improve the level of physical and mental health and wellbeing of EU citizens and reduce health inequalities throughout the Community. In particular, the programme supports health-promotion and preventive actions that address the major health determinants. While health is a competence of EU Member States, Community actions taken under the Programme complement Member States’ national health policies on, for example, cross-border health threats, such as influenza. The Programme’s objectives are as follows(5):

To improve citizens’ health security and safety

- developing EU and Member States’ capacity to respond to health threats, for example with health emergency planning and preparedness measures; and
- implementing actions related to patient safety, injuries and accidents, risk assessment and community legislation on blood, tissues and cells.

To promote health to improve prosperity and solidarity

- action on health determinants such as nutrition, alcohol, tobacco and drug consumption, as well as social and environmental determinants;
- measures on the prevention of major diseases and reducing health inequalities across the EU; and
- increasing healthy life years and promoting healthy ageing.

To generate and disseminate health knowledge

- action on health indicators and ways of disseminating information to citizens;
- focus on Community added-value action to exchange knowledge in areas such as gender issues, children’s health, or rare diseases.

In this respect, the EU can play an internationally leading role by enabling new methods of analysis and practices which not only improve the European situation and the EU integration process, but can also serve as international role models.

4.2 Coordination and communication

The EU health policy already focuses mainly on strengthening cooperation and coordination, supporting the exchange of evidence-based information and knowledge, and assisting with national decision-making. To this end, the EU is developing a comprehensive health information system to provide EU-wide access to reliable and up-to-date information on key health related topics, and therefore a basis for a common analysis of the factors affecting public health.

However, in general, the mutual learning processes and exchanges between different countries in regard to public health system improvement are still difficult and suboptimal as has been mentioned by Quam and Smith (2005) (6). But due to its political and structural setting, the EU can play an important role for improving this situation and enabling real cross-country information exchange, analysis and co-ordination of efforts. Coordination of a general kind will be necessary in the context of further European integration and the still existing gap between new and old Member States, as well as the growing medical tourism from west to eastern Europe.

4.3 Safety, protection and medical evaluation

Health and consumer protection policies are also very important in the EU. The safety of products and services – including food safety and rapid food alerts – are key priorities. The EU can play a leading role in the areas of protection against workplace risks, work accidents and occupational diseases, as well as environmental health-related issues, approval for medicines and treatments, and evidence-based evaluations by setting standards and providing best-practice models.

4.4 Mobility of employees and patients / cross-border provision of health services

Due to increased mobility within Europe, there is a growing need for the offer and provision of cross-border health services, calling for harmonisation of technical standards and health (7). Population ageing, but also coping with the consequences of factors like globalisation, EU enlargement, environmental threats, etc. on health systems and health services will remain challenging and sets constraints on national financial resources allocated to healthcare expenditure, are all factors leading to a call for reforming EU systems to improve their efficiency and effectiveness, while retaining their responsiveness to citizens’ needs and expectations as well as an equitable and fair funding basis (8).

As a result of the increased mobility of people at global scale, as well as at European scale within the Single Market, national health services should be adapted to different and multicultural population groups (9).

Open points for further discussion
5

Open points for further discussion

5.1 Coping with demographic change
Ageing and the expected growing medical costs are seen as a major problem for European countries. Different strategies are already being thought of, ranging from structural changes in regard to financing and distributing the burden to medical solutions and developments in advanced medicine and technologies. Equity, costs, financing and even ethical questions (e.g. in regard to life-extension within poor health) have to be addressed and evaluated. It has to be noted that it is not ageing as such, but rather failing health, which becomes more probable as we age, that is the actual cause of the problem.

• How do we counter the problem of age-related diseases?
• Conducting long-term social and economic cost-benefit analysis of investments into preventative measures for age-related diseases, health-span extension and anti-ageing research.
• Improvement of healthcare systems and financing options through the use of scenarios and social simulations.

5.2 Balancing Equity and cost efficiency
Although the ideal would be equal access to affordable high quality healthcare, this goal is very difficult to achieve, especially in face of growing costs that come with higher quality, greater expectations of patients, a shrinking financing base due to fewer contributors, and the call from medical professionals for better payment and working conditions.

• How do we optimise cost reductions without compromising quality and how do we improve quality without compromising equity?
• Initiation of better cross-country exchanges of experiences and improved methodologies for comparing such complex issues like healthcare systems should be implemented.

5.3 Cost-benefit analysis in regard to emerging medicine and preventative measures
Emerging medical technologies and efforts in anti-ageing research are often criticised as being overly expensive and putting additional stress on healthcare systems and may even lead to more inequality in regard to future access. On the other hand, these R&D initiatives may hold great promises for reducing long-term future costs, e.g. with regard to age-related diseases, dementia and disabilities. Preventative measures are very much encouraged, but could also lead to additional costs, especially if the real preventative effect is unclear. Similar questions in regard to effectiveness also apply to natural medication and ‘soft’ preventative practices, such as yoga, meditation, T’ai Chi, etc., which are sometimes reimbursed by health insurers.

• Science-based medical and economic analysis about the effects of traditional and natural medicine and methods for prevention.
• Long-term comparison of different health strategies.
• Investigation of cost savings through declining birth-rates (to balance age-related expenditures).
• Investigation of societal and economic productivity gains through health improvements.

5.4 Policy-making processes
The financing and provision of healthcare is also embedded within other policy issues like employment, safety and evaluation of treatments and medication, taxation and social security systems. It is also a complex process with many different actors and stakeholders being involved. Therefore some relevant questions have to be addressed on various dimensions:

Policy development

• What are the issues associated with the policy topic, e.g. employment in the EU?
• How was the policy initiated and developed?
• Who was involved, e.g. policy networks? How were decisions made when finalising the policy content?

**Policy content**

• What are the policy's proposed aims, objectives, interventions, targets, timescales, funding?
• Who does the policy affect?
• Does the proposed policy address the identified issues?
• Are the proposals evidence-based?
• What are the values and theoretical model underpinning the policy?

**Policy implementation**

• What are the opportunities and challenges facing the effective and efficient implementation of the policy, e.g. communication, synergy between policies, adequate resources, supportive culture, political will?
• What are the political ramifications of the policy's implementation, e.g. electoral?

**Health in policy planning**

• What considerations regarding the health effects of the proposed policy were taken into account?
• What is the relationship model of action between the policy theme, e.g. employment, and health outcomes?

5.5 General further research

There is a broad consensus in (foresight) studies on the need for reforms to restructure (public) health systems and make them sustainable and financially viable. Particularly against the background of population ageing and the related expected increase of age related diseases and chronic conditions, however, the nature of the reforms needed is rarely explored. Indeed, most studies relate to the future of public health, and not that much to the future of public health systems. In particular, issues such as the role in national health systems of the private sector (e.g. the pharmaceutical industry) or the process of privatisation of public hospitals, or of voluntary organisations undertaking welfare services, as well as the tasks distribution between public and private stakeholders of the health systems, are rarely dealt with.

5.5.1 Mutual learning

The information exchange and mutual learning processes between different countries in regard to healthcare systems is still not sufficiently developed, which to a great degree is attributed to cultural, social and political factors, as well as the complexity of the research field(1). It is therefore necessary to admit that different countries can learn from each other or provide information about successful and less successful strategies and experiences.

• Better exchange of experiences in different countries and best practices through mutual learning.

5.5.2 Sustainability

Reforms should be lasting and sufficiently robust against demographic or economic fluctuations. Preventative measures could contribute much to preventing diseases and illness and spreading the associated costs across other entities, such as schools, the food industry, and individuals with their day-to-say activities (e.g. by not smoking). The common definition of sustainability as ‘meeting the needs of the present without compromising the ability of future generations’ also applies to healthcare.

• Long-term strategies to improve health and health-care systems.
• Health education programmes (e.g. about nutrition, prevention, life-style) as sustainable strategies.

5.5.3 Free market and competition

Putting more emphasis on privatisation and introducing free-market into healthcare systems is regarded (by some) as positive for cost reductions. However such a shift could also endanger equity and increase costs in some areas, or make the ability of payment an essential factor for service (e.g. for avoiding waiting lists, getting improved treatment, etc.). This has also been the principle reason why Sweden banned the privatisation of hospitals in 2004.

• Further research about the ‘pros and cons’ of privatisation and free-market competition and equity.

5.5.4 Development of new medical treatments and technologies

Emerging medical technologies will bring about new opportunities for improving health and (public) health systems, but also new challenges and questions. For example, the possible admission of gene therapy and regenerative medicine into the treatment of widespread chronic disease by 2030 will require a genuine paradigm shift. In particular, reservations over the widespread genetic profiling of large population groups have to be faced.

- The health risks associated with nanotechnology are as yet undetermined.
- How do we adapt current regulations to new technologies based on e.g. genomics?
- How do we assess the cost-effectiveness of new medical technologies?
- A social, ethical and economic (long-term) cost-benefit analysis of emerging medical technologies and practices.

Related ethical issues

New medical treatments and technologies could also bring about ethical questions:

- How could preventative medicine impact the individual’s freedom of choice?
- What should happen with genetic data and what implications can its use have on society?
- What could be the impacts of neurotechnology on the freedom of choice and a human’s identity?
- Ethical and legal questions about privacy protection, information security, bio-patents.
- Emerging medicine and ethical and philosophical questions about humanity (e.g., end-of-life debate, anti-ageing debate, ‘cyborgisation’ debate, human enhancement technologies, etc.)
- How do we ensure the security of health information?
- How do we increase public acceptance regarding new e-Health applications?
- How do we avoid inequalities between people able to master the use of e-Health applications and those that cannot?

5.5.5 Prevention

Although more prevention in medicine and health is desirable, some questions and challenges remain to be tackled:

- How do we avoid turning a major part of the population into patients when using presymptomatic diagnostics?
- Earlier detection of disease does not depend only on better quality imaging; it also depends on patient access. How do we improve the imaging capabilities available at point of entry into the healthcare system in order to enable doctors to make earlier, more accurate, diagnoses?

The emergence of the empowered consumer of health services or ‘expert patient’ also requires solutions for the following issues:

- How do we ensure the availability of comprehensive health information?
- How do we ensure that people know which information they should / can trust?
- How do we avoid socio-inequalities and enhance ‘health literacy’?

5.5.6 New skills required for health and social care professionals

The number of healthcare personnel may decline relative to the number of patients, while their work gets more demanding due new technologies, increasing complexity, time pressure and higher expectations. Therefore the knowledge and skills requirement for healthcare workers at all levels – from physicians to care assistants – are about to change. In order to undertake the necessary steps for adaptation, the future needs have to be assessed in the context of current practices:

- What are the characteristics of a national education system that provides and promotes appropriate career pathways and a future oriented approach to skills needs in healthcare?
• Which partnerships are/should be established to gain benefit from the knowledge triangle?

• How can the European Qualifications Framework (EQF) become a reality in the health sector?

• How do we balance medical and non-medical staff and skills at top and middle management level?

• What should the requirements be for the recruitment of managers in the health and social care sector? Cross-border perspectives and opportunities for the healthcare sector?

• How do we ensure that primary care doctors have developed skills in interpreting and providing guidance on the basis of genetic indicators, matching treatment to patient genetic profiles?

• How to prevent brain-drain and off-shoring in this sector to countries investing heavily in education and offering a wage advantage in the R&D sector?

• How do we analyse the benefits and challenges of informal (social) care?
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Zukunftsradar: www.zukunftsradar2030.de
Annexes
Annex I: The European Foresight Monitoring Network (EFMN)

The European Foresight Monitoring Network (EFMN) is one of a coordinated series of initiatives funded by the European Commission to support the professional development of foresight practitioners in Europe, called the Foresight Knowledge Sharing Platform. The EFMN is a network of policy professionals, foresight experts and practitioners, as well as analysts of Science, Technology and Innovation related issues. Its primary aim is to develop foresight related content and to gather information about foresight projects from all over the world by means of a mapping process carried out by an international consortium.

The European Foresight Monitoring Network provides support to policy professionals by monitoring and analysing foresight activities across the European Union, its neighbours and the world. The monitoring and analysis is made available in a series of briefs and reports published on a regular basis at www.efmn.eu. Monitoring, as well as analysis, relies on the efforts of a network of correspondents that continuously gather and communicate information regarding ongoing foresight related initiatives. The objective of EFMN is to establish a broad international foresight network, which aims at the identification of emerging issues and facilitates information exchange on foresight activities. The project has three main results:

- Foresight Briefs: About 30-40 short policy-oriented briefs on current and recently completed foresight exercises are to be produced annually. In principle, there are two types of briefs. The Single Issue briefs focus on a single Science and Technology (S&T) panel, sector or subject. The Overview briefs cover all fields within a particular region or the entire territory of a country, comprising a range of different topics.

- Mapping of foresight: A broad overview of recent and ongoing foresight activities will be mapped into a database to facilitate information dissemination and to gain new insights. An annual foresight mapping report will be made to inform policy professionals, foresight experts and other interested users on foresight.

- Issue Analysis: The EFMN issue analysis aims at identifying and analysing key emerging science and technology issues that are relevant for European Union policies. Each year, a selection is to be made of the international foresight themes, issues and activities that offer the highest potential to support European Science and Technology policies. The information gathered by the network will be analysed on emerging issues. Each year an Issue Analysis Workshop will be organised in which experts discuss a specific topic common to several foresight exercises and debate with a view to knowledge-sharing and networking across Member States. Each year, a selection of the international foresight themes, issues and activities that offer the highest potential to support European Science and Technology policies is made.
Annex II: Roadmap for Healthy Ageing and Healthcare Systems Change

The table below summarises recent forecasts (2004+) forecasts from a pool of around 50 prospective studies that display Healthy Ageing and/or Healthcare Systems Change. The exercise was undertaken in April 2008.

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<tr>
<th>Foresight exercise</th>
<th>Country</th>
<th>Year</th>
<th>Summary</th>
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<tr>
<td>European Monitoring Centre on Change (EMCC) Sector Futures – The biomedical healthcare sector</td>
<td>EU-25</td>
<td>2006</td>
<td>The biomedical healthcare sector comprises biotechnologies dedicated to the treatment of human beings. The first of three articles in the Sector Futures series on biomedical healthcare looks at key features of the sector, including the size and structure of its market, the nature of employment, the main trends and drivers shaping the present and future of the industry and the principal issues and uncertainties at stake in the industry. <a href="http://www.europafound.europa.eu/emcc/content/source/0603a.html?1=sector&amp;p2=Health_and_Social_Work">http://www.europafound.europa.eu/emcc/content/source/0603a.html?1=sector&amp;p2=Health_and_Social_Work</a></td>
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<td>The Future of Mental Health – A Vision for 2015</td>
<td>UK</td>
<td>2006</td>
<td>By 2015, mental wellbeing will be a concern of all public services. Undoubtedly there will still be people who live with debilitating mental health conditions, but the focus of public services will be on mental wellbeing rather than on mental ill health. The Vision for 2015 requires some very significant shifts in the way mental health services work and in public policy as a whole. Some of the key challenges for public services to implement the vision include: Look at where services are located and how accessible they are; Examine how health and local government work together and with the voluntary and independent sectors; Diversify provision of acute care; Reduce the number of people from black and ethnic minority communities being admitted to hospital; Extend the use of direct payments for social care; Review their own employment practices to extend opportunities for service users and ensure discrimination is tackled; Find creative new ways of recruiting, retaining and ‘skilling’ staff. This vision for mental health in 2015 includes some far-reaching changes to the way services are managed and delivered. At the heart of the vision for 2015 is the premise that the focus of services will be shifting from mental healthcare to promoting mental wellbeing. Promoting mental wellbeing has, to date, been low down the policy agenda. <a href="http://www.scmh.org.uk/pdfs/mental+health+futures+policy+paper.pdf">http://www.scmh.org.uk/pdfs/mental+health+futures+policy+paper.pdf</a></td>
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<td>Top Ten Impediments to Better Health &amp; Healthcare in the United States [SR-900]</td>
<td>US</td>
<td>2005</td>
<td>Healthcare is a central ‘good’ to use the economists’ term, and makes up a large and ever growing part of the U.S. economy. Unfortunately, despite much to be proud of, there is ample room for improvement. Indeed, some would argue that, with its skyrocketing costs, uneven access and quality, misaligned incentives, and uninsured patients, the U.S. healthcare system is nowhere near what the world’s richest and most powerful country should be able to achieve. This report examines that gap. In its health-related research projects, the Institute for the Future (IFTF) usually looks at emerging trends and discontinuities in order to understand what these mean for clients. For this report, Top Ten Impediments to Better Health and Healthcare in the United States (SR-900), we decided to ‘invert the lens’ and look not directly at the futures of health and healthcare, but rather at impediments to those futures. By better understanding these impediments, we hope to shed light on future risks – and opportunities. <a href="http://www.iftf.org/node/769">http://www.iftf.org/node/769</a></td>
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Foresight exercise

The Future of the Finnish Healthcare – Strategies and Scenarios to secure future healthcare services in Finland

Summary

Was launched during the autumn session period 2003, as technology assessment conducted by the Department of Health Policy and Management of the University of Kuopio (Dean Juha Kinnunen etc.) with PhD Osmo Kuusi participating and communicating with the National Advisory Board on Healthcare and Ethics (ETENE).

This preliminary report has been drawn up on the initiative of the Committee for the Future (Tulevaisuusvaliokunta) of the Finnish Parliament (Eduskunta). The preliminary report is not an actual futurological analysis; its purpose was to describe potential scenarios for the public health service, the factors affecting them, and their possible consequences. This preliminary study is an introduction to the actual study on the future of the public health service. Variables, which will be used in the actual analysis, are described qualitatively. The reader is challenged to evaluate the probabilities of the phenomena and their connection points with the public health service and the community. A report on this will be planned for the years 2012-2020. The public health service is examined as a part of the society and welfare policy. A lot of futurology for medicine from a technological point of view has been dealt with in other connections. In this report, the technology used in the public health service is dealt with only from the point of view of how this technology affects the healthcare system. We do not state what future would be desirable or what should be done to reach it. Instead, we present factors and developments that we consider to be possible or probable in today’s world. The most important factors affecting the future of healthcare are as follows:

1. Strong pressures to change are connected to health services and to their supply, demand and usage, even in the short term. The present Finnish healthcare system cannot be expected to meet these future challenges. The return to centralised planning and control does not seem to be credible. A system built purely on the market and competition also seems to be excluded, due to the scarce population and to the already existing monopoly organisations producing health services. One major solution could be a network welfare mix model, in which the public sector has a dominating responsibility for financing and control, although both private and public producers will be supplying services.
2. The development of Finland’s public health service will be determined by the EU’s specifications of the pan-European welfare policy. Globalisation can bring new, significant challenges such as new epidemics, new disease spectra or multi-cultural customers.
3. The coming changes in the needs of the ageing population are well anticipated. The changes, which are related to an urban lifestyle, a higher education level, individualism and living alone, can cause unexpected pressure on social and health services.
4. The transition of the large age groups (born between 1946 and 1953) to retirement causes serious recruiting problems for new staff.
5. Bio-medical breakthroughs lead to new possibilities in examining and treating patients. Medicotechnological developments will continue, cycles will accelerate and the expectations of the population will increase.
6. Several routine services will be performed via electronic transactions (appointments, laboratory consultations, handling of prescriptions, consultation with medical experts).
7. An open rationing will be needed to restrict the increasing demand for services. All rationing systems must be transparent, fair for everyone and based on medical principles (mostly on the cost-effectiveness of the treatment). The Finnish 15D quality-of-life scale has become a national standard in measuring the effectiveness of healthcare.
8. The number of multi-problem patients will increase, especially with children and adolescents. Their needs for medical, social and educational services will increase.
9. Every citizen’s own role and responsibility to his or her own health will increase.
10. The financing of healthcare services comes from several different sources; state, municipal healthcare systems, KELA (the Social Insurance Institution), employers, insurance companies and the private sector). The financial system must be clarified.
Foresight exercise

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<tr>
<td>Health and Safety Executive’s</td>
<td>UK</td>
<td>Ongoing</td>
<td>Following the Phillips BSE inquiry, the Government’s response encouraged government departments to undertake horizon scanning and to do so in a structured and auditable manner. As part of the ‘Modernising Government’ programme a new horizon scanning ‘centre of excellence’ is being established in the Office of Science and Technology (OST) to support departmental horizon scanning and facilitate cross-departmental collaboration. A recent stock take by Strategy and Intelligence Division (SID) on horizon scanning across Health and Safety Executive (HSE) revealed that it is done in an essentially ad-hoc manner often reactively and with limited co-ordination or exchange of intelligence between directorates, except on sector specific issues. Effective horizon scanning has been identified by the Strategic Programme Directors as an essential ingredient of the support they need to manage the programmes effectively. The Delivery Board have also noted the need for a more coordinated approach to the subject if the organisation is going to manage its response to emerging issues and not just react to external pressures. HSE has recently reviewed Environment Agency (EA)’s horizon scanning process in detail and a variant on this is one of the options for taking forward horizon scanning in HSE.</td>
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What are the problems of adjusting supply to demand in primary care until 2020, and what measures are likely to succeed in coping with such problems? Due to the many facts and figures, this report not only gives a forecast, it is also a useful reference work for everyone who is involved in primary healthcare.

Method: Interviews and workshop.
Audience: Policy makers.

This report concerns the future of primary healthcare in the Netherlands. With the year 2020 as a time horizon, we present perspectives on demand, supply and the organisation of primary care. How many caregivers will be needed, and what will the organisation look like? The report offers a wealth of information about current and future primary care. In the autumn of 2004, the Ministry of Public Health, Welfare and Sports and the parties in the field declared themselves in favour of a 'reinforcement of primary healthcare' as a common ambition. This study intends to provide a contribution to this goal. The report is the result of a joint project of the Netherlands Institute for Health Services Research (NIVEL) and the National Institute for Public Health and the Environment (RIVM), and it is part of the series of Public Health Status and Forecasting 2006.

Main findings:

1. People do not call upon primary care for the greater part of their health problems. There is little unnecessary use of care. Even in recent years, this has diminished rather than increased.
2. Within primary care it is especially the general practitioner as the gatekeeper who plays an important role in the efficiency of Dutch healthcare.
3. Demographic projections indicate that we can expect a substantial increase of demand for general practice care, pharmaceutical services and home care. Epidemiological trends will increase the demand even further, at least in the areas of general practice, pharmaceutical services, and emergency help. This is caused by a rising trend in the prevalence of chronic disorders (including asthma and diabetes mellitus) and injuries. Due to prevention, there is a trend of decreasing incidence of back and neck problems, such that the demographic demand for physical therapy can be expected to abate.
4. An important issue is whether the demand for care can be curbed. In the short term, this could be achieved by preventing disease. In the longer term, prevention will contribute to population health, but not necessarily to a reduction of the healthcare demand. Primary care offers a good infrastructure for organising prevention. Choosing this road for the strengthening of prevention will result in a heavier workload in primary care.
5. Healthcare demand could also be curbed by financial contributions from the patients, but this mechanism only works when the contributions are large and cannot be re-insured. While package measures do influence the financial flow, the effect on the demand will be minimal due to the transfer of the excluded services to supplemental insurance.
6. Our inventory of the organisation of primary care reveals that there is a tendency toward an increase in scale. Nevertheless, for the most part, primary care (with the exception of home care) is still typified as monodisciplinary small business. The growing desire for normalisation of working hours and part-time work has consequences not only for the capacity required in primary care, but also for the organisation because part-timers prefer to work in larger-scale organisations.
7. According to the estimates, if policy remains unchanged, the supply of general practice care will not be able to keep up with the growth of the demand. In the period 2005 to 2020, the supply is expected to grow by 11.5%, while demand will increase by 13 to 20%. Because of the sharply increasing demand in home care, there is also cause for concern about the adequacy of the future supply of nurses and other caregivers in this area.
8. The expected shortage of general practitioners is less than calculated in previous estimates, especially if we keep in mind that increasing demand in the past has been offset by organisational changes and improved efficiency. Nonetheless, there will still be a shortage if no measures are taken. Although the future supply of nurses and other caregivers is difficult to predict, a shortage of home care looms due to the sharp increase of demand.
9. Possible measures to improve the match between supply and demand of general practice are: task delegation, task reshuffling, reduction of the rate of leaving the profession and the application of Information and Communication Technology (ICT). Within general practice, the delegation of tasks to assistants contributes to a more efficient provision of care. Delegation of tasks to practice nurses has led to improvement of the quality of care for the chronically ill and additionally to a certain lightening of the general
practitioner's workload. The strengthening of primary mental healthcare has reduced the pressure of work among general practitioners. There is no scientific evidence about the effects of other measures yet.

10. There is a looming prospect of fragmentation of primary care across several categories of caregivers, several disciplines, and several forms of organisation. This creates a risk of a lack of coordination and continuity in primary care provision.

11. Cooperation is becoming more and more important and has unmistakable qualitative advantages. This is evident from research on cooperation among general practice stations and first aid departments in hospitals, the chain of care for the chronically ill, and psychosocial care.

12. The combination of data from many sources in this study offers a new and integrated perspective on primary care. At the same time, this integrated view sheds light on the fact that the supply of data still has some prominent gaps.

The significance of the findings with respect to policy:

1. Policy measures for resolving capacity shortages and lightening the general practitioner's workload should be evaluated with consideration of the contribution they make toward a better and more cohesive provision of primary care.

2. The system for financing primary care should discourage fragmentation of supply, for example, by contracting the entire primary care at the local level as a cohesive package.

3. Prevention should be forcefully promoted, especially in primary care, which has outstanding facilities for this purpose.

4. A registered population of patient list system is an important characteristic of general practice that emphasises the responsibility of the general practitioner toward the patient as a whole. Furthermore, it is a circumstance within which the delegation of tasks has been able to thrive during the last 15 years, and it offers the necessary environment for goal-oriented prevention.

5. The further development of the electronic patient file is indispensable, both technically and with regard to content, to maintain cohesion and the overall picture in primary care. Extension to a multidisciplinary file is desirable and it is logical to give the general practitioner a central role, in consultation with the patient.

6. To do justice to the importance of primary care to public health and to maintain it as a cohesive sector in relation to the rest of healthcare, the provision of information must be improved on the following points:
   - existing general practice registers should be extended to include morbidity registration for all of primary care;
   - gaps in the registrations of supply and use of care should be closed;
   - there should be a monitoring instrument for determining whether cohesion is being developed; and
   - data provision should acquire a continuous nature.
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<th>Foresight exercise</th>
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<th>Summary</th>
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| Foresight Project in the field Health and life | Poland  | 2005 | In order to become knowledge-based society we decided to use foresight as an important element of the process of rational prediction of the development paths. This activity serve as the grounds for determining the paths of scientific and technological policies related to economic priorities, for building a wide consensus around complex social issues, for influencing the country’s educational model. We selected ‘Health and Life’ for our analysis, to meet the common expectations because the biological and medical sciences are developing very quickly nowadays. The choice of this research area was dictated by a large public support for this subject matter, because of a change in the demographic structure of Polish society (the problem of societal ageing), the Polish traditions of producing clean food, and by attempts to find niches on the Polish pharmaceutical and medical markets. To carry out this exercise we chose the Steering Committee whose role was to accept the activities, evaluate the results and to enable the implementation of the results. We also nominated the Project Executive Team responsible for making contacts with experts, organising experts activities, planning next steps, and reporting. The Pilot Foresight Project was comprised of the following stages:  
- selection of the experts for the project, including the experts for the main ‘Health and Life’ topic panel, based on nominations of institutions and organisations authorised to name the candidates. This stage comprised of completing a questionnaire by nominees and co-nomination, determination of 11 topic areas in the ‘Health and Life’ research area by the main topic panel, preparation of a draft list of experts to work on 11 topic panels by the main topic panel;  
- preliminary determination of the key research and technology development areas by the main topic panel and verification thereof by specific topic panels;  
- commencement of work by the topic panels and selection of over 100 of research and technology development areas for Poland in each topic area and preparation of partial reports;  
- selection of 26 priority research and development areas by the main topic panel with a view to holding a public discussion on them;  
- public consultations held to verify the choice of priority science and technology areas for Poland by the Pentor Institute for Public opinion and Market Research;  
- preparation of a final report by the main topic panel based on the partial reports and the results of social consultations. |
| Danish Technology Foresight 2015 (Brief No. 5) | Denmark | 2005 | The Bio & Health Panel identified the following critical areas:  
- health problems related to ageing, nutrition, and lifestyle;  
- healthcare structure, including shortage of health workers, costs- & management;  
- patient relations, focusing on better quality, treatment of inter-related illnesses, personalised care, and more responsibility to the patient;  
- ethical issues arising from new technologies and new procedures.  
To address these issues the following technologies will play a key role in the future:  
- human genomics and proteomics (including products such Personal Genetic ID Cards, prenatal analysis, gene therapy, etc.): In the field of human genomes and proteomes, the mapping of the human DNA has paved the way for a paradigm shift towards individualised and preventive forms of care based on genetic disposition, targeted screening, diagnostics and innovative medical treatments. These include: screening for genetically determined characteristics, more individualised and targeted treatment of diseases and improved prevention of human pathogens (viruses and bacteria transmitted by humans);  
- stem Cells (for the treatment of neurodegenerative illnesses, traumatic brain and spinal cord injury, etc.): The research in stem cells from early-stage human embryos, as well as from various types of tissue from adults, aims at engendering many exciting perspectives for developing new forms of treatment in which stem cells are used to replace malfunctioning cells or tissue (stem cell-based cell therapy);  
- bio-electronics (such nano-robots, biological computing, biosensors, biochips, electronic implants, etc): Bioelectronics presents many interesting opportunities for fields such as medical equipment technology (including the development of electronic implants for rehabilitation, etc) and biosensors for monitoring purposes. Recent research in cell properties, and the way they interact with their surroundings, has paved the way for new forms of integration and interaction between biological material and electronic systems, and nanotechnology has permitted the examination and understanding of systems right down to the atomic level;  
- pervasive Healthcare (such as automatic and mobile monitoring, virtual hospitals, etc): Pervasive healthcare could be used to give patients, relatives and staff better access to information as and when they need it. There are also many possibilities for home care – healthcare and treatment in the home. Pervasive healthcare can be seen as a way of improving care, communication and the use of resources, and thus has the capacity to optimise the health sector in many areas. |
Foresight exercise | Country | Year | Summary
--- | --- | --- | ---
Greek National Technological Foresight Exercise (Brief No. 12) | Greece | 2005 | Given that the society is characterised by demographic change and ageing of the population, there is a need for a reorientation of the health system from treatment to prevention and to the provision of high-quality services. This shift gives rise to new priorities, organisational schemes and research goals. Prevention, innovation and information will be the key areas for the future of healthcare, in parallel with providing information to the public and with the social debate on important bioethics issues.

**Necessary Conditions**
Effective disease prevention requires:
- familiarisation of the public with health matters;
- availability of information on vulnerable individuals and population groups;
- appropriate and timely warning about the effectiveness of actions to maintain health;
- deployment of cross-sectoral actions in sectors affecting health.

The possibility of widespread use of scientific guidelines for a way of life which will secure disease prevention in adults, the mapping of the mechanisms of ageing (estimated implementation before 2012), and the dominance of preventive medicine in medical science (2020), will form the basic guides in the R&T fields, in the area of health and quality of life.

**Action Lines**
- coordination of RTD with the aim to meet the needs for maintaining, promoting and restoring the health of the general population, vulnerable groups and patients;
- incentives for the establishment of clusters, such as a primary healthcare cluster based on e-Health, rehabilitation and health promotion systems in special tourist resorts where herbal therapy, spa therapy/thalassotherapy, and healthy/Mediterranean dietary habits are practiced (with related RTD activities also taking place) with intensive use of ICT;
- immediate adoption of inexpensive, effective and efficient technologies by Public Sector bodies (e.g. simple ICT applications across all sectors involved).

Key Action Lines for RTD Development: e-Health and Health Intelligence; disease prevention; health and safety; convergence of bio-nano-ICT.

FISTERA (Brief No. 9) | EU-25 | 2005 | - eHealth and tele-medicine (costs reduction);
- tremendous potential in moving from a generalised pharmacology to one that is targeted to individuals. Aim: to understand the individual patient and their specific pathology and develop a target drug;
- the advances in genomics and in the fast determination of the specific proteins for a given individual, tissue engineering, the huge processing power becoming available, new monitoring techniques, ubiquitous communications are all factors paving the way to a revolution in controlling ailments. A process to develop specific medicine would also be helpful in the fighting of rare ailments that today are not addressed because of economics. (Concept of one person – one medicine, no longer concept of ‘rare’ ailment);
- the ultimate goal is to reduce the development cycle of a drug from 10-15 years we have today to a few weeks. It is unlikely this goal may be reached within the next decade although much progress will be made;
- increasing use of drugs delivery/monitoring.
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<tr>
<td>UK National Foresight: Exploiting the Electromagnetic Spectrum (Brief No. 23)</td>
<td>UK</td>
<td>2004</td>
<td>- development of novel non-intrusive imaging techniques driven by greater demand for healthcare, particularly for an increasingly aged and affluent population and by the necessity of cost reduction, faster image acquisition times and higher resolution and/or sensitivity; - better prevention: Earlier detection of disease does not depend only on better-quality imaging, it also depends on patient access. Improving the imaging capabilities available at point of entry into the healthcare system would enable doctors to make earlier, more accurate, diagnoses.</td>
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<td>Dynamo 2004 (Brief No. 18)</td>
<td>NL</td>
<td>2004</td>
<td>No information about the foresight results.</td>
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<td>Swedish Technology Foresight 2004 (Brief No. 2)</td>
<td>Sweden</td>
<td>2004</td>
<td>Healthcare Technology seen as a priority. General statements not all necessarily or explicitly related to Ageing Population / Healthy Ageing; - need for a funding reform of the healthcare system, because of increasing ageing population / risks groups (obesity, diabetes, etc.). More and more services will be demanded from a sector that fewer and fewer will be financing; - development of more individually tailored pharmaceuticals; - great potential for developing systems including already existing IT, e.g. to streamline handling of patient records, patient administration and follow-up of activities; - need for technology to expand home healthcare. (e.g. telemedicine, including interactive communication of sounds, images and medical data, along with potential for patients themselves to collect samples that are sent to a laboratory for analysis, followed up by a consultation on the results via the Internet); - need for preventive health services in a more long-term way, because of a strong connection between changing living habits and increasing obesity, as well as greater incidence of diabetes. Eating habits and attitudes are largely established at a young age. To stop the spread of bad eating habits, preventive measures and lifestyle changes are needed; - in order to reduce the number of people with chronic illnesses, there is a need for functioning collaboration between patients, employers, social insurance offices and the medical care system; - need for an adaptation of laws and rules for creating opportunities for individual treatment plans.</td>
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Research Priorities identified in Healthcare Technology:
- stem cell research
- large-scale DNA analysis
- gene chip technology
- protein research and engineering
- proteomics
- nanotechnology in medicine
- chemical analysis and synthesis
- conventional/advanced biological synthesis
- drug delivery
- cancer, heart failure
- chronic diseases
- rheumatic diseases
- Alzheimer’s disease
- need for lifestyle changes
- consumer health tools
- technical aids for improved quality of life
- computer-aided surgery
- organ transplants.
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<tr>
<td>OECD Towards High-Performing Health Systems</td>
<td>Worldwide</td>
<td>2004</td>
<td>The OECD Heath Project has involved contributions from various OECD Directorates, including inter alia, social and health policy, economics, insurance-related issues and technology, science and industry. The aim was to integrate different perspectives within the OECD on how to measure and analyse the performance of healthcare systems and factors affecting their performance. The collected reports and analyses form an important body of information that can be used to help formulate new, evidence-based, policy options to improve healthcare systems. The project has enabled the Organisation to strengthen its collaboration with other international organisations.</td>
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<td>Future scenarios for housing and health</td>
<td>NL</td>
<td>2004</td>
<td>To forecast future developments in healthcare and in housing of the elderly people in the Netherlands due to the birth increase after the second world war. Reason: So policy makers are prepared for what future developments we are facing. Method: Scenarios. Audience: Policy makers in the health-sector.</td>
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<td>Future scenarios for the public government and healthcare</td>
<td>NL</td>
<td>2004</td>
<td>In this study, four long-term scenarios are presented for the Dutch public, government and the healthcare sector. Result: In the two scenarios that stress the importance of collective provisions (Regional Communities and Strong Europe), the share of government production (public administration, defence and subsidised education) will increase from 10.5% of GDP in 2001 to about 12% in 2040. In the other two scenarios (Transatlantic Market and Global Economy) the government sector will decrease in size to 8% of GDP in 2040. Due to higher growth rates of GDP per capita, the growth of government services per capita is only marginally smaller than in the more collective scenarios. Healthcare expenditure as a percentage of GDP will increase in all scenarios from 8.7% in 2001 to between 13.3% and 14.6% in 2040. In all scenarios ageing and progress in medical technology are major driving factors of the growth in health expenditures. Method: Scenarios. Audience: Policy makers.</td>
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<td>WHO – Seventh Futures Forum on unpopular decisions in public health</td>
<td>Worldwide</td>
<td>2004</td>
<td>Launched in 2001, the Futures Fora are a series of meetings for policy-makers. They provide an impartial environment for directors-general of health, chief medical officers and senior advisers to debate difficulties in policy-making. WHO’s Seventh Futures Forum of High-level Decision-makers aimed to identify tools for making public health decisions more acceptable and popular. The objective of this session was to share difficulties in closing hospitals and ideas on how to maintain the policy chosen while taking into account public concerns and anxieties. Method: Expert discussions. Audience: Policy makers in healthcare.</td>
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<td>Health Sciences. The future of Biomaterials</td>
<td>Spain</td>
<td>2004</td>
<td>Within the concept of biomaterials, a wide variety of substances that interact with biological systems are included. Biomaterials can be used for diagnosis, monitoring or treatment. Their design and production is a multidisciplinary area that involves engineering, robotics, medical imaging, nano-biotechnology, microsystems or telemedicine. The importance of this sector is increasing all over the world, and in Spain, it has been included as a priority area within the Strategic Plan for R&amp;D (2004-2007).</td>
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<tr>
<td>Health Sciences. The future of Minimally Invasive Surgery</td>
<td>Spain</td>
<td>2004</td>
<td>Minimally invasive surgery is a fundamental topic in the field of health since it provides a way to reduce drastically the post-operative impacts of surgery on the patients. The study comprises an overview of the main advantages, impacts and disadvantages of these technologies. After that, the most important of these technologies, identified by the experts, are summarised and explained. For all of them the keys are given to understand the present barriers found when trying to apply these innovations, along with the estimated time for their implementation. In the conclusions chapter, all the barriers to overcome are listed. As a multi-disciplinary subject, the development of minimally invasive surgery will come through improvements in different aspects such as professional awareness, basic research, instrumentation, educational aspects and demand by the patient.</td>
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<td>Teknologisk Fremsyn – Bio- and Healthcare</td>
<td>Target country: Denmark</td>
<td>2004</td>
<td>The technological foresight in the biotechnology and health technology sectors is one of the outcomes of this project. The foresight was prepared for the ministry by a panel of experts employed in research, the business sector and various organisations. In order to ensure that the technological foresight, in all its complexity, was realistic and properly anchored, the panel consisted of members from a wide range of sectors and disciplines.</td>
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