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EIH Foundation Study

“Emerging Health challenges for Europe by 2030” —
Synthesis

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Introduction

Healthcare in Europe has been very much on people's minds—and kept there by a debate largely focused on medication, hospitalization, and issues of responsibility, liability and financing. But now we are starting to make out the main features of the next twenty years, which will significantly broaden the whole healthcare field into a concept of “total health,” involving issues of nutrition and cosmetology, increased emphasis on prevention and the contributions of new technologies. These changes will be preceded by scientific breakthroughs and accompanied by new institutional and corporate players. The 2030 time horizon will see a truly new scenario for healthcare. Describing its main features is the aim of this report

This study is the first ever conducted by EIH. It marks the starting off point for EIH's 2009 agenda, and as such tries simply to give some structure and direction to the debate, rather than to lay out a fixed and infallible vision of European healthcare in 2030.

Accordingly, we have identified five major trends or developments which should profoundly alter the healthcare ecosystem over the coming years:

1. "Youthful aging" will become a common priority and goal among Europeans.
2. Health risks will be increasingly borne by the individual.
3. Patients will be at the center of a wider ecosystem involving more players.
4. The hospital will refocus on caregiving, due to a massive inflow of new technologies.
5. Healthcare will be an engine of growth for the European economy.

1. "Youthful aging" will become a common priority and goal among the citizens of Europe.

Living in good health is obviously a priority for Europeans. But living healthily or “growing old youthfully” *until what age?* Life expectancy for some Europeans could reach 120 years in 2030, according to some scientists. In fact, long-range statistics show that life expectancy has continued to grow in Europe throughout the past decades and nothing leads us to think this momentum will slow down or reverse anytime soon. And life expectancy in countries just entering the European Union has always caught up with that of the countries already in it.

- *With an aging population, a major issue for European policy-makers will be keeping older workers in good health*

The make-up of the population in the Europe of 2030 will therefore certainly be different from its make-up today. Extended life spans and a higher proportion of people in their old age, indeed advanced old age, will entail major changes, especially in terms of employment and healthcare.

Unless immigration policies become much more open, the working population should stay more or less at the same level over the next 10 to 15 years. This obviously means that, at constant rates of employment by age group, the burden that the non-working put on the workforce is going to grow considerably. In 1965 people over 65 represented one-quarter of the population aged 15-64 but will rise to 35% in 2025, to 45 % in 2035 and nearly 50% in 2045; that is, if hardly anyone over 65 is employed, there will be one non-worker for every two workers. An increase in workforce participation among those over 55, if not 65, will thus be inevitable. And it will require that people in these age groups be in good enough health to work longer than they do today and stay young, in terms of their lifestyle, as long as possible.

- *Healthcare and related expenditures will become a leading household budget item, and will start to include such things as nutrition, mentally stimulating games, sports, and so-called cosmeceuticals*

Under these circumstances, healthcare consumption will keep steadily increasing. And healthcare can be expected to become a leading consumer category for Europeans.

Increasingly, Europeans are deciding for themselves how they will consume products good for their health. Consumers making up their own minds will come to characterize a field which as of today is still largely under the influence of healthcare professionals. Europeans are already spending more and more on “self-medication” in the broadest sense, i.e., including vitamins and food supplements. They proclaim themselves ready to make lifestyle changes in order to stay in good health, even if that means doing more preventive analyses, exercising more and watching their diet.

Health foods occupy a growing share of European diets, and this trend should not reverse itself despite the recent sharp rises in food costs, as evidenced by the success of probiotic drinks. In this regard, it is interesting to note that the diets of northern and southern Europe are tending to converge.

To age youthfully we need to start early and make it a lifelong project. We also need to take advantage of the synergies available by combining pharmaceutical and other therapeutic products with products from the food industry (nutraceuticals) and cosmetics (cosmeceuticals). Players in these industries, once quite separate, are now occasionally linked and will in the future very likely be joined, even partly merged. Health is not just something physical, but mental and emotional as well. Here the computer and media industries will have a much more important role to play. The groundwork has already been laid by electronic games that provide physical and mental exercise. Once degenerative pathologies start to upstage the traditional cardiovascular illnesses, products for social and intellectual stimulation will become a part of healthcare.

Nutrition, physical activity, resistance to stress, pleasure, social network and activity are conventionally accepted as very influential levers as far as life expectancy is concerned. Genetics and molecular biology will allow us to better understand the impact of these levers and the interaction between them. Thanks to a deeper understanding of the ageing process and to a more “systemic” and fact based approach of health maintenance, clearer guidelines and more focused prescriptions will be delivered through various channels (including health coaches), enabling European citizens to better maintain their health. The food industry will benefit as well from this progress: the range of new product opportunities will be substantially expanded.

Prevention and healthy living represent the soft path towards youthful aging. The other path deals with the basic mechanics of the aging process in order to lengthen our lives. It also employs new synergies among nanotechnology, biology, information science and cognitive science (termed “NBIC”) in order, for instance, to implant miniaturized devices for diagnosing, preventing and treating without the “host” even being aware.

- *The increased desire to maintain one's "health capital" will nevertheless co-exist with risky behaviors*

All in all, consumers who are better informed about health matters and ready to spend more to stay fit and “young” while they put on years can be expected to utterly transform the healthcare picture in Europe. These trends are already at work today in each of our societies. There are also other trends making an appearance, ones that go the other way, such as the development of obesity related to sedentary living and an overly rich diet. Three million school European children are classified as obese, a figure that is rising by 85,000 cases a year. It is estimated that fully one-third of Europeans with long-term illnesses are overweight. How will these trends play out in the next twenty years? There are multiple factors and their relative weight matters quite a bit. If the main trend is towards healthy eating and physical exercise, uniformly throughout Europe; if the concerns of sustainability hold; if the higher cost of meat, especially beef, leads people to consume more vegetable proteins and these become more available, then virtue will prevail and the obesity phenomenon might merely be seen as a temporary “accident”, in Europe as well as in the USA.

Right now some American companies run incentive programs to get their employees to take better care of their health. Some programs are more directive than others but can take the form of fitness programs (diet, physical exercise), wage bonuses for employees who have regular health check-ups, an insurance surcharge or even dismissal for employees with obesity or hypertension who do not follow a course of treatment with the support of a coach.¹

Another scenario could see some differentiation of habits by socio-economic level and some inequality in terms of managing health assets. However great or small the inequality in this second scenario may be, it will remain the case that people’s means will still restrict their access to the ever wider range of technology marketed for improved longevity and “youthful aging.”

2. "Health risks" will be increasingly borne by the individual.

Risk, uncertainty, liability and insurance underlie all healthcare issues in the developed economies. These are the critical concepts underlying the great sociological and economic questions that fuel the debates and the policies in the healthcare field. How much effort to put into prevention and insurance? Where to draw the line between prevention and treatment? Between group and personal insurance?

Though risks to health are as old as mankind, managing these risks is a relatively new idea. With life expectancy short and primitive medical care that could neither prevent nor treat

¹ According to a survey by the National Business Group on Health, 46% of large US corporations offer financial incentives to employees to improve their health.

raging epidemics, the value that society attached to good health or to a person's life was low. With progress in science and medicine, longer life expectancy, the expansion of democracy and fewer human lives lost in conflicts has come an increased sensitivity to health risks. Prevention and insurance have developed with a clear division of roles among educators (family and school), experts (the medical profession) and organizations set up to manage the social security. Individualism and the increasing effectiveness of scientific medicine have significantly increased the value of life and consequently the justification for using all therapeutic means available in caring for people.

Financed by mandated contributions, the health insurance system, and more broadly the protection of society, constitutes a "middleman" between the consumer of care and the payer (that is, the party that settles the bill, since the contributor remains in the end the final payer.) This middleman has more or less taken responsibility away from the contributor, in that the reality of what is at stake economically with healthcare remains, for most of us, rather abstract. The ballooning of healthcare expenditures and especially the deficit of the health insurance system in most of the countries of Europe have forced a public debate on the responsibility for these expenses.

At first the debate centered on limiting healthcare costs, a legitimate concern for government given the extent of its liability. The concern which is not rightfully government's, and which the authorities have no appetite for raising, makes up the other side of the equation: Inasmuch as healthcare costs are trending upward and do represent justifiable expense (apart from a tiny fraction of waste and misuse), how much of their own savings and income should citizens be prepared to allocate to their own healthcare? Which health risks should they assume? How will our "ecosystem" deal with this risk . . . and this opportunity to contribute our economic growth?

Signals of varying strength reveal possible trends in the three main controls we have over health risk: risk prevention, risk awareness and risk management.

➤ *Risk prevention*

Healthcare is becoming everybody's business, no longer reserved for the experts in the medical profession or for those who pay for it and administer it. As participants in our own care, prevention largely falls to us.

If the overriding trend is for Europeans to pay greater attention to their health, then they will tend to take on more responsibility for their spending in this area, to arm themselves against risk and so to invest in prevention. Today, many households are devoting a not insignificant part of their budget to computer and telecommunications hardware, software and subscriptions. It seems only likely that as these devices and services become more commonplace, they should eat up a smaller share of our budgets and leave more room for spending on health. Sociological trends and the habits we value usually have an economic impact.

All the economic players in a position to respond are developing strategies and products, with an energy that should only increase in the years to come. This may involve food companies in terms of their products, communications and diversification or acquisition strategies or new professions such as the booming one of coaching. We can expect risk prevention to be led by a public-private partnership with a heavier private involvement. The anti-tobacco campaign

has been public; the advertising and publicity on cholesterol-prevention and the benefits of Omega-3 by a food company is private; and campaigns by insurers on “subsidies” for the insured who can demonstrate good behaviors are private.

A few mechanisms being adopted in other segments of healthcare are showing the way. Some insurers, for instance, are starting to adopt plans that allow lower premiums for drivers who buy commutation tickets on mass transit or who do not drive at night (as verified by a data reader in the vehicle.) It is easy to imagine ways to match premium adjustments very closely to people’s behavior, a real-time bonus much like the airline miles earned on purchases. In a way, yield management² also represents the same trend of giving consumers more responsibility for their choices (in this case, for their expectations).

Once the collectivity assumes a portion of treatment costs, risk prevention is not just an individual matter. For example, should there be automatic screening for breast cancer if the business case is negative—that is, if it is less costly to treat a few cancers? At present, drawing the line between treatment and prevention is a judgment seldom made, for political and ethical reasons. But the next ten years are likely to feature debate on this topic.

➤ *Risk awareness*

Risk is a threat, an uncertainty and a probability. Acting on one of these terms means reducing the risk. If the threat goes away, the risk goes away. For example, in 2020 a patient reaching age 40 is identified as a high cardiovascular risk and is implanted with a device able to detect the onset of a cardiovascular incident and to treat it in real time. Technology eliminates the threat. We can expect diagnostic and epidemiological technologies to play a vital role in improving risk awareness, by producing information unavailable today through more evolved analytical techniques or through “on-board” systems, implanted and not.

The stakes for prevention are high and just as high for precisely assessing risk and consequently the cost of the risk assigned to the individual. The recurring problem here is asymmetry of information: I can have information on my condition and my risks that my insurer does not have. If such information is prejudicial to my profile and thus to the cost of my coverage, it is not in my interest to give out this information. Today such information, produced by check-ups and questionnaires, is occasional and incomplete. Tomorrow technology can be expected to enable insurers to zero in on the actual risk associated with every insured.

Beyond the risk awareness and the information asymmetry, which influence the “relationship terms and conditions” between insurers and individuals, the attitude of the European community of citizens toward risk will significantly influence health policies. The higher the risk sensitivity, the higher the price the community has to pay to protect itself, the more innovation adverse it can be in certain fields. Whether the precautionary principle will be expanded across Europe, and how it will be interpreted will be a crucial question in this regard. Will the precautionary principle ensure that uncertainties leading to high risk exposure are taken into account in a timely manner, involving the right stakeholders, with a strong responsibility ethic. Will it be considered on the contrary as an unfailing umbrella promising European citizens to live in a sterile bubble, potentially affecting our ability to bear the risks inherent to any innovation in life sciences?

² Variable pricing in terms of supply and demand

➤ *Risk management*

Europeans care more about their health than they did in the past. They invest time, money and emotion—and will keep investing more—in risk prevention. And they will be more inclined to do so if their personal responsibility is more engaged than it is today.

Today, in the majority of European countries, things work as though every insured had unlimited credit, with no justification for the reasons for the expense. Is the collectivity obliged, under a standard health policy, to take on repairs to the mogul skier's knee or the hang-glider's multiple fractures? Within the trend to transfer the social burden (the contribution system) to individual responsibility, a greater number of risks will likely fall to the individual.

And what is true for the European patient will also be true for European doctors. The latter base their diagnoses on judgment and take their risks without any directives (taken to the extreme, a scan would be required for anyone with a headache). In the USA, the investigation protocols are stricter, with systematic and documented forms, certain answers entailing certain tests and so forth. Litigiousness in medicine is already a noticeable trend, particularly in the United States, and will likely continue, especially as a consequence of the increased litigiousness in numerous businesses (such as publishing) and a general increase in the number of lawyers on company payrolls.

At least two professions are likely to benefit from the individualization of health risk: coaches and risk managers whose job it will be to evaluate and manage health risks associated with individuals or groups over time.

3. Patients will be at the center of a wider ecosystem involving more players.

The world of healthcare will widen as we ask more and more of it. The world of patients will be structured around the same actions historically taken in response to illness: diagnosis, prescription, audit of prescriptions, filling of prescriptions, intervention and follow-up. However, the landscape of this chain of activity will be very noticeably different, as new players will appear, others will disappear and roles will change.

➤ *Diagnostic and communications technology will shorten the diagnosis loop, which will alter the role of physicians and favor the development of new information-processing centers for remote, real-time consultation*

Technology is one of the fundamental causes of change in the cast of characters. It especially impacts diagnosis and the role of those involved in that activity. The technologies that will reshape things are those to do with diagnosis and communications.

Traditionally, diagnosis is a sequential operation: the doctor follows a branching of symptoms and causes, either at one time and in one locale or in a diagnostic loop entailing a succession of steps more or less spread over time and calling on various specialties.

Diagnosis requires serious expertise in the interface between patient and healthcare professional. The system is set up to ensure that the general practitioner or the referral doctor is best suited to carrying out the diagnosis.

In the next several years, there will be a broader range of pathologies for which a real-time diagnosis can be made. Not because the expertise of the professional in contact with the patient will be significantly greater but because diagnostic and communications technologies will make it possible to shorten the diagnostic loop. Thanks to sensors attached to parts of the home (doors, mattresses, toilets, etc.) or integrated into objects that we always carry around (like watches), a portion of diagnosis may be on-going. The expert system providing data analysis or alarm or action will be on-board if it is not too complicated or if an existing pathology requires immediate attention.³ In some other cases, the data will be tele-transmitted and processed by off-line expert systems.

In yet others, the diagnosis will be made through a professional. While in contact with the patient, the professional will be able to concentrate on entering and transmitting the patient parameters defined in a protocol. These data will be transmitted in a short loop, practically in real time, calling up a long or short chain of people, with the potential, depending on the seriousness of the pathology, of making a real-time diagnosis and creating a treatment protocol. Diagnoses will be supported by expert systems whenever the assessment of the professional in contact with the patient is different from that of the primary care physician at the time. The point of contact may be the nursing staff or, in a different arrangement, the primary care physician. The contact may be face-to-face or by media.

Technology can head in two directions. In one case, the role of the referring physician disappears into a new chain of care. In the other, the referring physician's role becomes greater, precisely to the extent that data and decisions flow through him or her in a short loop, and do so even though physician and patient are in different places (consultation or visit).

The first scenario prevails if the technical act of consultation becomes commonplace, if the quality and certainty of the diagnosis are assured and if they are superior to those seen under the arrangement we are familiar with today (with, by analogy, an error rate equivalent to that typical of thoroughly monitored industrial processes). Tele-consultation, tele-radiology, tele-monitoring and other components of telemedicine take center stage. Whatever the scenario, the expansion of information processing operations is the new fact which is figuring more largely in this new "ecosystem". Certain data will be processed by the detection devices in contact with our body, while others will be processed remotely and require very high processing and storage capacity.

Jobs related to managing these processing centers are experiencing rapid growth. The location of processing and storage centers has been under debate for several years. At the forefront of this debate are the protection of personal data, ensured system reliability, and the qualifications of operators and analysts, and collaterally, of security operators. These questions naturally favor data analysis done by healthcare institutions (public or private hospitals) for the time being, but will gradually shift it over to diagnostic and processing centers as these are developed.

³ As we are already familiar with in certain pacemakers

The progression could occur as follows: development of self-medication (already under debate today), the expansion of self-testing and tele-diagnosis (technically possible today and emerging in some countries), prevention-based coaching and individual assistance/advice under contracts and programs built on the "life maintenance" concept. Life maintenance programs with contractual arrangements, will involve a multiplicity of contributors organized in a "life maintenance value chain" providing guidelines, advices, prescriptions, evaluation protocols, logistics services, etc.

Such a new model based on a large scale and long term prevention policy will strongly impact the traditional positioning of the pharmaceuticals and the food industry. Change constraints on the way should not be underestimated.

In 2030, a remote or long-range relationship between patient and professional will have been widespread for many years. This does not mean that non-virtual, face-to-face relationships are not valued: some patients do not only ask their primary care physician for a diagnosis of particular symptoms. Advice and dialogue can have varying degrees of importance for the interaction. However, we will be very flexible about using the two channels, the virtual and the in-person.

- *New businesses will emerge, particularly that of "health coach", who will play a critical role with consumers*

In order to preserve our health assets and our financial assets, which are related, we use the services of health coaches. Their role is to advise us about, even to take systematic control of, our health assets and the financial assets related to it. Like an athletic coach, the health coach suggests plans of action for us, which when carried out are tracked on a factual data base.

We use the services of a health coach for a variety of reasons. We live in a region whose population is increasingly sensitive to high healthcare expenditures and which attaches great value to living into old age by staying active and independent. We also find it financially attractive, since our insurers have offered us a reduction in our health insurance premiums for having a health coach.

The health coach represents the fourth age of progress. First there was the age of office visits for everyone, then the age of selective screening for all (through campaigns), and then, still to come, will be the age of regular check-ups for everyone in certain defined segments of the population. The health coach represents the age of pro-active management of health assets.

Once we have a health coach and the technology to make diagnoses on-line rather than through a visit, the general practitioner/primary care physician can become the health coach.

If the primary care physician becomes the health coach, this broadens the scope of his or her function and introduces new challenges. The quality of advice given will depend on the doctor's knowledge and on the information he or she has at hand on a wider range of topics. Today, only pharmaceutical laboratories offer doctors information about healthcare products and promote them through office calls. The health coach will be besieged with solicitations from everyone with a health product or service to sell, from foods to fitness services.

- *Changes in the value chain will also affect pharmacists and the delivery of the prescription*

Prescriptions made in the course of family medicine are now written out on slips of paper. Filling such a prescription is done exclusively by the local pharmacy, who serves both a logistical and a medical function.

In 2030 we will have forgotten about prescriptions on paper. The prescriber will enter his prescription on line. Though human audits of prescriptions appear indispensable, that will not always be the case. A computerized comparison of the prescription with our electronic medical file will replace whatever the pharmacist does in the way of accounting. And expert systems will also be able to audit the appropriateness of prescribed dosages. Finally, information systems will be programmed with "red flags" currently used in industry, such as quantities or associations that are impossible or that require confirmation.

Will medications come to the patient or the patient to the medications? There is more than one answer. Filling a prescription when treatment needs to begin right away requires the patient to go to the medication. As to renewing a prescription, the determining factors are the alternatives and the marginal cost of distribution (last-mile logistics). Depending on circumstances, the patient will go to the medication or the medication will come to the patient.

Non-compliance primarily involves a fraction of the elderly. Just as some retailers have automatic re-stocking procedures with their suppliers, triggered by the supplier (VMI⁴), radio-frequency devices in addition to reminder alarms for taking medications will, in the case of non-compliant patients, trigger reminders or renewal orders, either for home delivery or by mail.

Lastly, a certain amount of treatments made today with medications will be administered by different means, some implemented relatively easily, such as therapeutic clothing, miniaturized medical devices (smart implantables, molecular machines) and others less so, such as cellular therapy. The easier methods will open a new area between the pharmacy and the hospital unlike what we have today. This area will consist of service centers (diagnostic and treatment centers) where we will be able to re-load our therapeutic clothing or our implanted diffusers, to reprogram our pacemakers, etc. These centers will represent an unbundling of the hospital's value-added; they will be specialized and operated by staff with different qualifications. Yet again, technology will make it possible to simplify a part of the chain of care, in this case by miniaturizing medical devices and thus requiring an infrastructure that is less cumbersome and skills that rely on shorter and less costly training than current medical training.

Whenever a diagnosis or real-time intervention can be performed remotely—i.e., whenever a unit of time can be unlinked from a unit of space—then there is room for a redistribution of roles and a revision of each participant's type and level of expertise.

- *As different lines of work evolve so too will training of professionals, which will have to change extensively*

The content of training will be impacted. As jobs become redefined so will the training that leads to them. The new jobs heavily involved with tools that support diagnosis and the

⁴ Vendor-managed inventory: the decision to restock the customer is passed back to the vendor

"easier" interventions will need skilled, qualified people. The emergence and growth of operational jobs should represent a major aspect of the technological revolution in healthcare. Medical training and medical careers as we know them will be significantly changed. Entry-level training periods may be shorter; but then one's career path, or gradual acquisition of skills, will be highly linked to one's progression from simple operations to more complex ones, complete with certification procedures, and therefore entail a high degree of on-going training. The on-going training will be both to obtain new certifications and to keep up with changes in operating techniques and with tools that come on the market. Simulators will, of course, be very commonly used in training programs.

Everyone involved in the chain of care will be affected by a complete shake-up in training and in the development of standards and protocols. The pharmacist or nurse will be able to prescribe and follow up a protocolized illness like diabetes, as the explosion of technologies supporting each link in the chain of care will result in a revision of all supports and all training tools.

➤ *Social networks will work on behalf of health*

In Europe today treatments and protocols matter to three groups: the pharmaceutical industry, including the biotechs, care institutions in their capacity of running clinical studies and payment-setting bodies. For several years now, with certain serious publicized illnesses such as AIDS, patients, through highly effective organizations, have joined the process. This increased influence and activism on the part of patients could spread and become more common with the help of the social networks. The media, with the right approach and oversight, could greatly increase the public's knowledge about treatments. Just as the power of digital computation increases by using networks instead of single machines, the personnel involved in developing treatments will be able to exploit data generated by broad groups of patients, allowing them to conduct Phase IV-type tracking at lower cost or to do meta-studies.

➤ *How fast will it go?*

All the trends enabling the reconfiguration of the patient ecosystem do not progress at the same pace. Diagnostic and monitoring techniques are on the fastest track. These techniques are boosted by a continuous innovation flow in electronics and in information technology, with a specific focus on concentrating more sophisticated functions in smaller smart devices.

The regenerative medicine is close to the front-runners with impactful innovations in tissue engineering, biomaterials: regenerating skin and cartilage today, "building" organs tomorrow⁵.

Early diagnostic and degeneracy diseases treatments make progress. Gene therapy and cell therapy are very promising, however the pace remains slower.

4. The hospital will refocus on care, due to a massive inflow of new technologies

The hospital is one link in the chain of care. As such, its role depends on the other parts of the chain. Today, a hospital admits patients who have had an accident or trauma of any size (in

⁵ see J. de Rosnay, *Et l'homme créa la vie*, LLL, 2010

the emergency room), patients seeing their doctor or nurse, and patients there for an operation or other intervention. Whatever our health problem may be, big or small, the hospital is open to us. The hospital is also a center for teaching and research. It brings under one roof the technology needed for diagnosis, interventions and serious post-operative care.

- *Diagnostic centers and treatment centers, along with home hospitalization, will serve to refocus the hospital on direct care*

With coming changes in the chain of care, the hospital will be repositioned in a narrower scope of operations. Technology will take certain activities out of the hospital. With the diagnostic and treatment centers, home-hospitalization will be a leading cause of hospitals' refocusing. Even discounting the rising cost of diagnostic and treatment techniques, the dispersion of activities now assumed by the hospital will make it possible to lower hospital costs.⁶ The organizations and processes for dealing with illness will become more segmented, and the hospital itself will become a specialized locus of centralized technical platforms.

Alongside these pools, local centers will handle certain phases of diagnosis and care, now simplified by technology, and specialized institutions will handle certain pathologies.

The development of networks, of home-hospitalization and more generally of all alternative arrangements to classic hospitalization is a part of a broader movement towards refined responsibilities depending on the level of care needed. The specialization of the largest regional institutions, both in and out of universities, which possess sophisticated technical platforms and multiple competencies will be accompanied by a progressive repositioning, in terms of their responsibilities, of local and pathology-based institutions.

Advanced diagnostic techniques will enhance prevention and planning when an intervention is necessary. Advanced diagnosis will make it possible to limit the resources reserved for emergencies. At that point the situation for patients will be quite different.

- *With online surgery, the choice of a bricks-and-mortar treatment center and the choice of a practitioner do not have to be connected; robotic surgery will be employed in numerous instances*

Due to tele-surgery we will be able, with certain interventions, to uncouple choosing the actual treatment center from choosing a practitioner.

In 2030, every operating room will be equipped with a robot. Robotic surgery, based on proven technology and lower materials costs, is just coming into its mature phase. In May 2008, a team from the Calgary medical faculty used a robot to ablate a brain tumor. Intuitive Surgical, a California company, has sold over 800 robots for help with operations for heart and cancer patients. R&D labs are working on robots able to follow the movements of an organ and thus to operate on a beating heart. "Beating heart" operations will become common practice. In 2015 a scientific journal might publish the first experiments with prototype surgical intervention systems that are totally robotized under human surveillance. It might mention the successful ablation of a dog's spleen. In 2030, certain interventions will be completely robotized with no human intervention but surveillance.

⁶ Studies put at 1:8 the ratio of the cost of a home-hospitalization to that of a traditional hospitalization. (Source: Alcimed)

- *Making use of hospital services outside one's country will create keener competition among institutions.*

When there is no hurry, we will choose the institution where we would like to undergo an intervention, within or beyond our own country or continent, with numerous possibilities of varying cost, quality and reputation.⁷

As a consequence, some insurers will include out-of-country services in their coverage, even offering incentives for costly interventions where the cost differential is significant.

The globalization of the supply side of the healthcare market and the resulting competition could go in different directions: (a) competition sees the emergence of low-cost centers of excellence in new geographic areas or (b) competitiveness brings down costs, improves quality of service and increases effectiveness in the interconnected networks of Western Europe, reducing the differential with the low-cost regions.

The ratio of outpatients to admitted patients gets reversed. With the development of non-invasive techniques along with the uncoupling of intervention centers from care centers, the fraction of outpatients will increase and lengths of stay be considerably shortened.⁸ Thus the hospital of the future is both an institution and an interconnected network of centers specialized by function: diagnosis, intervention, rehabilitation (follow-up care and recovery) and so forth.

- *In 2030, the hospital will exploit technological advances to make stays more pleasant, with not only better treatment of pain but also access to recreation and hospitality services*

The hospital as we know it today is focused on treating illness. It is far less focused on treating the person. A comfortable hospital is first a hospital that knows how to treat pain. Bringing technology to bear on substitutes for surgery and on non-invasive surgery will have a powerful impact on reducing pain. Improvements in anti-pain treatments will have an effect as well.

In most consumer markets the quality of products and services tends to get better, partly due to lower costs from scale economies and competitive pressure. Treatment and care centers will be no different. In 2030, the centers will make good use of multimedia equipment not only for technical purposes—co-coordinating the ecosystem of patient management—but also for offering patients access to services not directly related to medical care, such as hospitality services (e.g., ordering meals, with gradated privileges according to the patient's condition) and above all, to communicate with their family and friends at all times (here again with gradated privileges according to the patient's condition). This standard will extend to all centers where we stay as patients.

⁷ The Bumrungrad Hospital in Thailand is a leading example of the new industry of “medical tourism”. In 2004, the hospital treated 350,000 foreign patients and expects to treat 400,000 in 2005 – a 14% increase in one year. Meanwhile, US-based treatment of foreign patients declined 2.5%.

⁸ The average length of stay in EU hospitals declined from 12 days to 8.5 days between 1980 and 1998. Though the timelines vary, the downward trend in average lengths of stay represents a basic trend in most developed countries. (Source : "Hospitals in a Changing Europe" European Observatory on Health Care Systems, 2002)

In this reconfigured chain, jobs and skills will evolve to handle new needs. With patient management taking an increasingly important place alongside the treatment of illness, a certain amount of co-ordination and integration will be called for. One integrating factor will be the patient file, where all the information from the various players will be brought together. The health coach has an integrative role for the various ingredients that go into maintaining good health. The health coach will integrate the various medical, social and psychological components of taking care of patients, especially in regard to elderly patients and those among them stricken with degenerative disease. He or she will coordinate the network of patient care, a more specialized network than today.

Progress in biomedical technologies and differentiation and specialization of institutions should bring greater specialization of personnel, at least in the "technical pools."⁹ Training courses will have to adapt to this new state of affairs, not just for entry-level training but also on-going training, the outcome of which should be new avenues of professional mobility for personnel who will be perhaps less versatile than today.

5. Healthcare will be an engine of growth for the European economy

- *By 2030 healthcare will become one of the leading industries in the economy of Europe, reflecting both increased demand in traditional healthcare segments and a broadening of the field.*

Healthcare spending has increased by 2 percentage points of GDP of the wealthiest European nations in the last twenty years, from 7.6% of GDP in 1985 to 9.7% in 2005, and the trend is only expected to accelerate. In 25 to 30 years, spending in these countries may reach the level already found in the USA today of about 15% of GDP.¹⁰ Such acceleration is predictable no matter what the rate of GDP growth, for the increasing attention paid by European households to preserving their health assets, together with increased life expectancies, are central trends that have begun to radically transform the healthcare ecosystem.

A major issue will be keeping a handle on cost increases, largely through productivity gains and changes in how healthcare is financed, particularly the assumption by households of an ever greater share of costs.

There will also be qualitative changes in demand. A great many households will directly finance a portion of their health maintenance, and those better off and more open to globalization could quickly foster international as well as national competition in the healthcare market. Simultaneously, the significant broadening of healthcare to include spending on cosmetics, beauty aids, fitness, even to some extent intellectual stimulation and mental health—expenses already handled by households as things are—will reflect a sharp shift in attitudes and in the portion of the household budget devoted to health.

⁹ As opposed to centers for follow-up care or gerontology.

¹⁰ In France, the authors of the report by the Attali Commission on Unrestricting Growth in France (*Commission de Libération de la Croissance Française*) felt that demand for healthcare might even reach 20% of GDP by 2030.

A continuation of recent cost trends would result in untenable financial, economic and social situations; but a few alternative paths suggest other possible outcomes, whose likelihood depends on how necessary they are seen to be and how quick the various players are to adapt.

- *Greater use of new technologies, boosted by insurers, will foster personalized medical care, which will enjoy increased productivity thanks to the industrialization process and increased competitive intensity*

The system's change agents will primarily be the insurers and the technology companies who react positively to the needs and wants of consumers and help to redefine the healthcare ecosystem in Europe.

Much improved prevention will play a key role. Between now and 2025-2030 the issue for European countries is to make significant increases in the financing of prevention by making use of co-financing, such as through mutual insurance companies, extended policies or pharmaceutical manufacturers. Insurers will play a vital role in the emergence of new mechanisms for evaluating, insuring and, to a degree, sharing the requirements of individuals.¹¹ In order to set their premiums more accurately, they will directly encourage the use of technologies that make it possible to anticipate certain physical or mental illnesses. They will provide incentives for the development of health coaches.

Suppliers of technology and related services will, by enabling increased individualization of health services, make a significant contribution to improved quality of care, not to mention better productivity. The development of new forms of diagnosis, prevention and treatment will be critical.

If insurers and technology vendors succeed in sustaining broad-scale implementation of new technologies, prevention will be stimulated, enabling us to anticipate certain illnesses and ailments, and the insurers will be able to tailor their products to offer customized coverage of the broader and broader risks that consumers will wish to cover. Greater and greater use of robots and new technologies will lead not only to improvements in the quality and delivery of certain modes of care but also to productivity gains. By being more precise and individualized, care and treatment will be more effective. While today they are merely in prototype, often less than fully developed or adopted, the new technologies are most probably going to follow the same path as their predecessors. Operating efficiencies and volume effects arising from competition in the industry will significantly lower average costs.

Healthcare professionals will have to adapt by accommodating and exploiting these new changes. Nurses will be able to operate with greater independence as a result of specialization, and the US example of protocols used by primary care physicians in office visits could become more widespread. The results of these changes will be a new distribution of labor among the various parties. This need to adapt also applies to traditional organizations. For hospitals this will mean confronting profitability and return on investment; for organizations and divisions of organizations this will mean gradually becoming part of a network; for pharmacies, it could mean seeing their role broaden to include a certain amount of prevention and treatment. The challenge for the health professions in terms of training is huge. But it heralds a wave of growth and energy for the sector that will in time involve all the parties, even if some segments of the profession do try to fight it. A new crop of jobs and professions

¹¹ *"Une brève histoire de l'avenir"* (A Brief History of the Future), Jacques Attali, 2007.

will spring up by 2030, including operators of care centers, tele-medicine and experts in preserving the investment in health.

The healthcare sector in Europe is thus going to be among the most promising for the continent, in terms of creating both value-added and employment. Jobs in this field will grow much more steadily and rapidly than in most other sectors. Its contribution to improved European competitiveness will be especially important in that it will not be limited to healthcare in the narrow sense but will impact the entire economy. Europeans bent on youthful aging will make a much more productive labor force than Europeans whose health is questionable. Innovation in the health field will have indirect effects on several other areas such as food, insurance or IT.

In twenty years' time, the individual European's health will not just depend on how smoothly the organism is functioning but also on a broader understanding of the goals and realities of complete wellness—the concept of total health.

Thus, eating will no longer mean simply obtaining all the foods the organism needs but rather a way to optimize the body's functions in order to "age youthfully" without illness. The practice of medicine will be increasingly predictive. Foods themselves will increasingly be functional foods provided by a re-invented food industry.

Life involves health risks; but as these become better understood, they become less random and more manageable. The individual, who has the most at stake, will make use of individual, tailor-made preventive measures. The economics of risk will be handled less and less collectively, trending toward a system of individualized insurance.

The healthcare sector will show significant growth. New jobs, such as coaching, will appear. Scientific and technological progress will continue apace, with greater repercussions than ever before. Healthcare will no longer be viewed as a financial drain, but as one of the dominant factors in renewed economic growth.

Main trends and potential discontinuities in European healthcare to 2030: economic impact and change in the value chain			
Parties concerned	Trends	Wildcards	Comments
Households	<ul style="list-style-type: none"> • Longer life expectancy and older workers • More attention paid to health ("youthful aging") • Increased risk for individuals • Diffusion and greater accessibility of information making consumers more involved in managing their health • Increased costs 	<ul style="list-style-type: none"> • Desire by the elderly for greater independence (development of self-managed retirement homes) • Households foster international as well as national competition in the healthcare market • Relative increase in costs financed directly by households, i.e. new awareness of need to take responsibility for one's health, along with new technologies on the market for cure and prevention • New bird-flu-type pandemics 	<p>Occurrence of some of these "wild cards" would highlight wealth disparities among Europeans and could have social repercussions.</p> <p>Moreover, with the development of competition and specialization, health could gradually become an economic good, with increased branding among other things</p>
New players (in food, insurance, IT and related services, etc.)	<ul style="list-style-type: none"> • A large portion of the food product category in the health category • Increased role for insurers • Increased impact of technology companies 	<ul style="list-style-type: none"> • New partnerships prompted by insurers, reconfiguring the value chain and enabling a massive in-flow of new technology • IT companies instigate rapid & widespread development of robots, leading to improved quality and productivity • New positions of Health Coach and Health Investment Advisor • Development of web-based social networks acting as lobbies and emergence of new businesses 	<p>Players highly heterogeneous</p> <p>The area in which insurers operate will depend on the regulations European governments work out</p>
Health professions (physicians, nurses, etc.)	<ul style="list-style-type: none"> • Towards a new allocation of roles among doctors and other caregivers; i.e. focusing of doctors on their core business and expanding the role of nurses and other caregivers. • Hospitals run like businesses, professionalization of management staff • Nearly universal accessibility of pharmacies, health superstores and first-rate prescribers 	<ul style="list-style-type: none"> • Commonplace use of protocols by primary care physicians in office visits • Development of telemedicine and independence of nurses • Diversity of caregiving experiences (operations, care, re-education for new locales, including the home) • Specialization and virtual networking of hospitals to maximize centers of specific expertise 	<p>Diversity of baseline cases across Europe</p>
Governments (European, national, regional, etc.)	<ul style="list-style-type: none"> • Willingness to rationalize and control government spending • Increased direct financing by households • Gradual convergence of the different European systems, spurred by new standards and regulations 	<ul style="list-style-type: none"> • Prevention becomes a priority, particularly due to progress in health education • Incentives for wide-scale implementation of new technologies, creating greater effectiveness and productivity; over all, healthcare becomes a source of public debt reduction and new jobs 	<p>Given the complexity and diversity of the various baseline cases, the analysis focused on the wealthiest countries of Western Europe, assuming a scenario of convergence with the other countries in the time frame studied</p>

Source: Accenture 2008