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The Promise

The Promise of Medical Informatics in Europe

1. Introduction

The field of Information and Communication Technology (ICT) is expanding rapidly and its application to the health care sector, through medical informatics and telematics, is very promising. Throughout Europe, governments are encouraging managerial and professional leaders to embrace this new technology to provide equitable access to high-quality and cost-effective health care. Totally new applications and services emerge, while boundaries between the different kinds of health information systems are disappearing. Some of the major shifts in healthcare information systems are summarized in Table 1.

In recent years, integrated hospital systems, regional health information networks and value-added network services have been gradually intro-duced; the central role of electronic patient records has become evident; a new generation of lifelong electronic records, more patient-oriented, distributed and shareable, has been promoted. To support day-to-day clinical practice, the secure and efficient electronic transfer of patient data between independent record systems is being encouraged [1].

As knowledge is vital, access to and management of information have become critical issues as well. Clinicians and managers, having the right information, when and where needed, will be able to make better decisions. As the Global Information Infrastructure Society has no center, knowledge will be routed in numerous ways, and even patients and citizens will begin to play a mediating role in the healthcare process.

This has led to the expectation that the information needs of policy makers and healthcare professionals and the requirements of patients and citizens may simultaneously be fulfilled with the help of health informatics and telematics.

Consequently, progressive re-engineering of the healthcare delivery systems is under discussion in several European countries. Critical analysis, including the study of future patterns of changes, is necessary to verify whether the new integrated information flows in healthcare are valid and the expectations realistic [2].

Because the organization of the various national health and social systems is diverse, information strategies can also differ significantly. In Europe many cultural, linguistic, legal, ethical and educational challenges still need to be addressed.

2. Research and Development

Much ICT-research and development in health care in Europe is conducted at a supra-national level and is funded by both the Commission of the European Union and industry. The Commission has sponsored a vast number of healthcare informatics and telematics projects during the so-called second, third and fourth Framework Programs (1988-1998).

These projects have been given approximately 300 million ECUs via Unit C4 of Directorate General XIII. Considering that the majority of such R&D projects only receive funding on

Table 1. Trends in Healthcare Information

FROM	TO
Administrative systems	Medical systems
Provider-oriented systems	Patient-oriented systems
Centralized systems and mainframes	Distrbuted systems, client-server computing
Monolithic software	Component software
Islands	Integrated systems, mobile systems
Home-made systems	Vendor-made systems
Proprietary-driven	Standard-driven
Technology-driven	User-driven
Data-driven	Knowledge-base driven
Text based	Multimedia
Informatics	Telematics (incl. Internet)
Regional level	International level

a 50% basis, at least 600 million ECUs have been invested over the last 10 years in healthcare-related ICT research in Europe (the annual resources in the EU can be estimated at 550 billion ECUs) [3].

In the above programs, the initial emphasis was on scientific research in health informatics, but from the Fourth Framework Program onwards, the focus has clearly been re-oriented to deployment of telematics solutions and to a stronger involvement of industry.

Thus, about 130 projects and consortia have been funded within the 1994-1998 Telematics Application Program (TAP) in the health sector. The projects have been organized according to a specific model (the 3-dimensional red cross model), which covers seven blocks: (1) electronic healthcare record projects (the center of the cross), (2) "continuity of care" and "regional healthcare network" projects, (3) telematics services, (4) telemedicine, (5) new ICT technologies, (6) the "healthcare information for the citizen" projects, and (7) issues common and integral to all on-going

project work (e.g., legal, regulatory, and educational aspects).

These continuous European R&D efforts have resulted in a number of real telematics solutions. Suppliers have already initiated (with or without the support of health policy makers) the implementation of regional or even national healthcare information networks and value-added network services.

What have always been considered as typical challenges for Europe, (that is, regulatory obstacles, security problems, or language processing), have now become its strength. Europe is even increasing its lead over other regions in specific domains such as security [4], or natural language processing in medicine [5].

3. Standardization

To coordinate the development of standards in health informatics, the European Standardisation Committee (CEN) created in 1990 Technical Committee 251 (CEN/TC 251), which is an

open forum where participants (representing industry, the users and the authorities from each country) develop standards through activities in working groups, project teams and national mirror groups. CEN/TC 251 covers 19 member countries and 11 affiliated countries and its/TC 251 standards can be considered a long-term memory, consolidating the past European R&D efforts in health informatics and telematics standards. Information on the approved CEN/TC 251 pre-standards, or standards and descriptions of all on-going work, can be found in [6].

In 1997, the internal organization of the work was redefined in four Working Groups (WGs): WG1 on information models (including the models of electronic healthcare records and messages), WG2 on terminology and knowledge, WG3 on security, safety and quality, and WG4 on new technologies for interoperability. CEN/TC 251 has also actively contributed to the establishment of the ISO/TC215 for health informatics [7]. The formation of the official ISO/TC215 in 1998 is to be seen as a clear sign of a worldwide commitment to international health informatics standards.

4. The Market Place

It should be recognized that the healthcare sector will never be a simple market place. Healthcare policy makers and citizens must always expect the quality of healthcare to be driven by factors other than that of commerce alone. Public authorities and national insurance systems play a highly regulating role in Europe and have an enormous impact on this market (Fig. 1).

The healthcare informatics industry in the EU primarily comprises small to medium-sized enterprises (SMEs). Those SMEs are now confronted with new dilemmas and challenges. In the European market, which is still very fragmented, vendors have to ensure
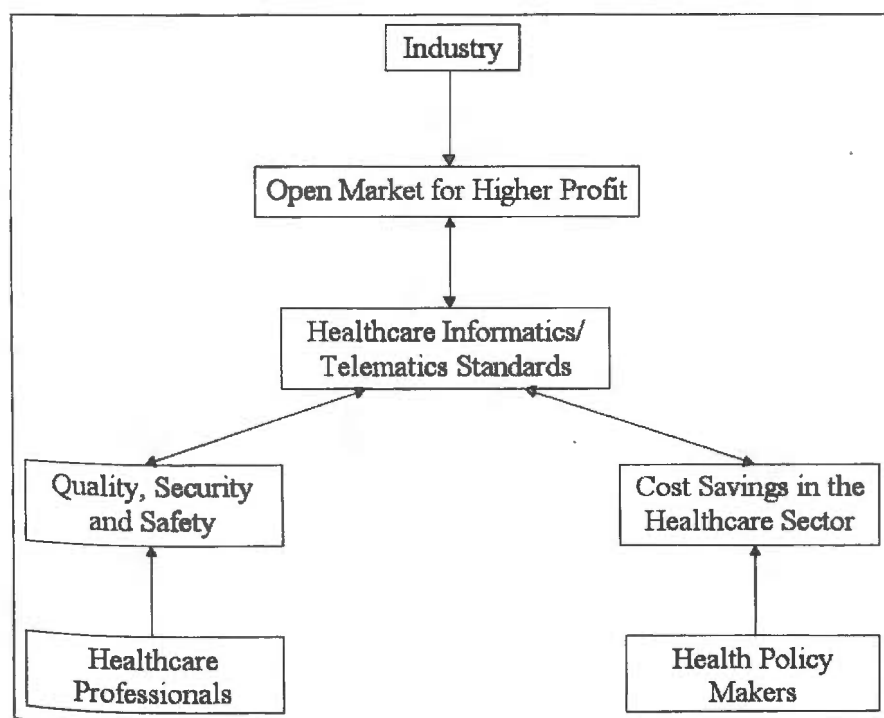

Fig. 1. Interaction between industry and the healthcare sector.

return on investment and have to cope with innovation as well as with the short life cycle of their products. They try to satisfy the needs of healthcare professionals and other end users with high expectations. Existing standards help provide these vendors with a stable environment for product development, allowing economies of scale and access to larger markets. The existence of standards (de jure and de facto) lowers the risks and costs of market entry, which is particularly important for European SMEs.

As integration within and between organizations begins to drive the market, also larger companies (including telecom operators and the pharmaceutical industry) are now also aiming to enter the market while the SMEs form more and more alliances. There is also a growing number of developers who have started networking and establishing groups around emerging new technologies (e.g., Microsoft Healthcare Industry User Group-Europe, MS-HUGe) [8].

5. Conclusions

Western Europe is about to take its next evolutionary step in healthcare ICT, i.e., integration of information, organisation-wide and nation-wide.

Realistic targets are the lifelong electronic but distributed health records of all EU citizens, the exchange of patient data through virtual private networks, and the fast access to information and knowledge through on-line information services.

This development could directly benefit patients and facilitate provision of equitable access to higher quality and cost-effective care. However, this process will be progressive and can only be successful, if the new systems deliver services which will really support day-to-day clinical practice. To accelerate this process, active involvement of the healthcare professionals is crucial.

There is much evidence that the next generation of healthcare systems will operate globally and focus on integrated access to patient data and medical knowledge. While ICT will continue to develop rapidly, the difficult process of the formalization of knowledge will become even more specialized and complex, and will require serious efforts on many fronts.

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