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RHINE

Policies and Strategies of Information and Communication Technologies for Regional Health Administrations

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Contents

Foreword

European organizations and enterprises are faced with the rapidly increasing challenge of competing in an international, world wide marketplace. Never before has the market been as global, open and, therefore, multicultural and multilingual as it is today.

New technologies and infrastructure enable new ways of cooperating and communicating, allowing participants in any business process – end-users, suppliers, producers – to be part of the process, interactively and simultaneously, from any number of geographically distributed locations. The emerging new policies and mentalities are having tremendous effects on the way we manage our human resources.

To encourage and support European organizations and enterprises in innovating and optimizing their ways of doing business, the Information Technology Programme of the European Commission has set up the Technologies for Business Processes (TBP) Cluster. The prime objective of the TBP Cluster is to stimulate innovation and application of new technologies and business processes in private and public enterprises, using a top-down as well as a bottom-up approach. The aim beyond this objective is, of course, to make Europe a globally competitive force that uses, participates and plays an increasingly leading role in the market place of the 21st century.

To facilitate this objective, the European Commission has set up groups of pilot projects, business innovation support activities, and awareness raising projects in which the interaction between development, experience and dissemination of information on results will catalyze new ideas, growth and impact.

Against this background, the project RHINE-AM aims to collect and disseminate best practice in regional health care organization and management. By applying Business Process Re-engineering methodologies, best practices, and advanced information technologies, health and quality of care can be improved and validated. Health policy thus can be based upon accurate and recent data, costs can be reduced and sickness related economic losses restricted.

RHINE-AM is embedded in a long tradition of Commission funded research on the improvement of health organization with the support of modern information technologies. The research started 10 years ago in RICHE, a project

bringing together for the first time the new concepts of patient centred care and open modular information systems. Since then, many applications have been developed and piloted and many results have been achieved.

This book describes a Framework for regional health care best practise and it gives some interesting examples. It doesn't prescribe how you should organize health care in your region or health care institution, but it tries to trigger your thinking on how to improve the processes in your organization and how information technology can support that. But don't forget your main asset: your people.

Fieny Reimann-Pijls
European Commission-ESPRIT

Part 1
Preface – The RHINE-Initiative –

1. Europe of the Regions

The Regional Health Administrations, abbreviated to ‘Regions’, play an essential role in the construction of Europe. The social, historical, and cultural diversity of its Regions is one of Europe’s strengths. Regions provide their citizens with a deep sense of identity – a feeling increasingly apparent in the different European countries. Unfortunately there is also economic diversity. In crude terms the 10 most prosperous Regions are three times as rich and invest three times as much in their economies as the 10 poorest Regions. Despite the financial resources to the health sector and the development of new, advanced medical technologies and new drugs, the level of health of the Europeans is lower than it could be and the existing inequalities in health across Regions have still to be met. The European Community is committed to reducing these gaps, ensuring that all Europeans will share in the benefits from the evolving European Union as it embraces a single market and contemplates economic and monetary union. The European Community has consistently recognized the need for special efforts both to help its less developed Regions and to encourage them to help themselves. For it are the Regions that must take the lead in meeting these challenges. In this matter the Assembly of the European Regions (AER), Strasbourg, is playing an important role, assisting its members to actively develop action plans for carrying out European policies at regional level and for initiating creative projects in different economic and social sectors, including in health care.

2. Health Care of the Regions

By law, the coordinating responsibility for health has been delegated to the Regions in most countries. The common issues in Europe are:

- Health implies equity. This means that the present inequalities between Regions and within Regions should be reduced as far as possible
- People should perceive health in a positive sense. The main emphasis should therefore be on health promotion and prevention of disease
- Health requires the coordinated action of all sectors concerned. The health authorities can deal only with a part of the problems to be solved, and multisector cooperation is the only way of effectively ensuring the prerequisites for health, promoting health policies and reducing risks in the physical, economic, and social environment
- Health will be achieved by people themselves, i.e. by community participation and action
- The focus of health systems should be on community care, provided as close as possible to where people live and work, easily accessible and acceptable to all.

Health policies transcend national and regional frontiers. Therefore European Regions collaborate on a trans-European basis to improve health and to increase quality of care and performance by reforming their health systems. Such initiatives are supported by the World Health Organization, Regional Office for Europe. Also the Assembly of the European Regions is assisting its members through joint action based on Partnership between the Regions, initiated and coordinated by its Committee IV, encouraging them to:

- Value and recognize individual rights and needs of all citizens regardless of race, age, gender, culture, language, nationality, disability, religion, or sexual orientation
- Ensure that all people in receipt of social welfare and health services have the right to choose and control their own services
- Ensure that there is a choice of such services
- Empower the service user as a citizen to be involved in the governance of service provision and planning
- Adopt and implement partnership in order to improve quality of life of all citizens and the social development of the Regions themselves

- Work in partnership with organizations for strengthening community care, in particular directed at long term sick people, elderly people, disabled people, and socially disadvantaged people [1].

3. The Environmental Challenges of the New Century

The environment of the European Region is changing rapidly in terms of demographic structure, human life styles, consumer goods, energy sources, modes of industrial and agricultural production, transportation, tourism and migration. All these factors can cause, and can interact to produce, major impacts on health. An important aspect of preventive health care is to ensure that socio-economic development is carried out in such a way as to protect, and where possible enhance, human health and wellbeing. In addition to safeguards in relation to socio-economic development, there is a need for improvements in the existing human environment, including the upgrading of housing, the reduction of longstanding pollution and the provision of better working conditions. Such measures involve many aspects of government, at central-, regional- and local levels, and require well integrated, multisectoral planning and management. Because many of the problems, such as air and water pollution and the transportation of potentially harmful materials, may affect more than one country, there is an on-going need for international collaboration across European Regions on surveillance and control measures.

4. The Population Challenges of the New Century

At present some 20 % of the EU-population is aged over 60 years. It is estimated that by the year 2000 almost 27 % of the population will be aged over 60 years. The percentage of very old people is also increasing. By 2020 those aged over 75 and 85 years will constitute 9 %, respectively 2.5 % of the population. This represents a three-fold increase in the age category 80 and over since 1960. As a result of the higher life expectancy of females, the population as it ages is

becoming increasingly a female population. By 2020 the absolute number of older people will have increased to 100 million. As we know, disability is strongly related to age. Some 70 % of people with disabilities are aged 60 and over. In addition to disabilities associated with age related pathologies, the prevalence of disability in general is increasing in society. This is partly due to advances in medical treatments, which reduce mortality rates for those with developmental disabilities and degenerative diseases, and to increases in accidents. In addition, emergency and trauma medicine, prenatal, perinatal and postnatal care enable people to survive injuries that were hereto fatal. It is clear from the demographic, economic, and social trends outlined above that society faces a number of significant challenges as we move into the new century. The population of Europe is ageing. In addition, the prevalence of disability is increasing. At the same time large numbers of immigrants from outside Europe are changing the composition of the European population. The informal capacity of society to care is also changing. These changes along with expanding expectations for more and better services result in increased demands being made on health and social service budgets.

5. Health Care: Its Future in the Upcoming Information Society

Information Technology (IT) has been developed rapidly in the last years of the 20th century, and the IT industry has been growing faster than any other sector of human activity. As a result, at the threshold of the 21st century, the IT industry is one of the largest and probably one of the most dynamic industries of our time, creating employment to millions of people. At the demand side, the developments to date have been as impressive as at the supply side. In many countries computers are now generally being used for education at elementary level for young children who learn to apply IT along with speaking, reading, and writing. The use of IT is widespread among adults, and they communicate increasingly by computers through networks, including Internet, making information available within and across countries at an extent that has never been considered to be possible in our lifetime. The year 2000 is at the threshold of the ‘information society’. The new technologies provide the European Regions with important tools needed to embark on some of the urgent tasks facing it – both

economically such as maintaining the Regions' competitiveness and reducing long-term unemployment, and socially such as protecting the environment, safeguarding its populations from health hazards and improving the health of their people.

The information society is at our doorstep. While the idea of information as a commodity predates the advent of the information society, the notion of value added in relation to information has been revolutionised by the new information and communications technologies. The falling cost of hardware (PCs, modems, telephones, etc.) and software has played a particularly important role in spreading the technology and increasing the number of users. The following factors are of primary importance:

- Inexpensive ways of recording large amounts of data on data mediums, e.g. via scanners
- Storage of information in mass stores, e.g. on hard disks
- Fast computers for processing information
- User-friendly software to enable users to find and cross-reference data
- Transmission technology enabling data to be transferred from A to B in the shortest possible time.

With access to information stored anywhere in the world and, above all, the ability to combine and analyse large quantities of data, it is possible to create new knowledge, which other people do not have and which has (added) value. In an information society, information is the most important commodity.

6. Health Care: An Intensive User of Information

Health care is by its nature an intensive user of information. The application of advanced technologies to the collection, storage, retrieval, and communication of this information will be one of the critical success factors for the health services in countries. Those responsible for the provision of health care begin to understand that it is possible to protect people from environmental health hazards, to improve the quality of patient care and to positively affect the cost-benefit equation by the effective introduction of information and communication technology (IT), which will ultimately transform the traditional structure of

health care provision. With a view to present developments in society in the field of IT, it may be anticipated that the present, and particularly the future new generations of health care workers will be 'computer literates', who expect to work in a computerised environment. These health care workers will push transformation forward and may become a strong force, driving change.

7. RHINE

Taken into account abovementioned factors and trends, a representative group of European Regions has decided to collaborate on a trans-European basis in order to improve health and patient care, and to increase quality of care and performance by reforming their health systems through the application of 'Information Technologies' (IT). In this respect 'Technologies for Business Processes' (TBP) are applied which focus on the improvement of health care and health care processes, as well as of administrative and managerial processes by IT.

Technologies for Business Processes recognize that implementation of information systems is 'not just about installing computers', but rather is concerned 'with changing the whole organization', with implications for everyone working within it. While IT cannot reform the system, health care cannot be reformed without it. Management of change is a key issue both to successful implementation and to obtaining value from IT investments.

This joint initiative of the European Regions is called 'RHINE', which is an acronym for Regional Health Information Networks in Europe, symbolising through the reference to the name of the river, the evolution towards European unification. The RHINE-Initiative should be considered within the context of Article 129 of the Treaty of the European Union 1992 – now Article 152 after the Amsterdam Summit – and related programmes of Community action in the field of health information and communication. The initiative is supported by the European Commission.

8. RHINE AM

A first step to achieve its objectives is a General Accompanying Measure, called RHINE AM, aiming at the creation of awareness about the availability and benefits of advanced information technologies (IT), for:

- the improvement of efficiency and effectiveness of administration and management in public health and health care at regional level, and
- the establishment of an on-going European Forum of the European Regions for exchange of knowledge and support to IT users.

RHINE AM is initiated by a core group of five Regions, consisting of:

- North Rhine-Westphalia, Germany as the Coordinating Partner
- Northern Greece, Greece
- Lombardia, Italy
- Stockholm County, Sweden
- Wales, United Kingdom

These Regions represent the different categories of health systems of Europe, both tax-based and insurance-based systems. The 2-year project (1997-1998) is co-funded by the European Commission DGIII/ESPRIT, and is registered under Nr 22669.

Part 2
Common Concerns Faced by Regional Health Administrations in Europe

1. Health IT: Characterized by its Failures rather than by its Successes

Information Technologies (IT) enable the provision of meaningful accurate information for:

- Epidemiological surveillance and health monitoring
- Health promotion and disease prevention
- Environmental health
- Early detection, diagnostics, cure and care of individual patients
- Analysis of and for health policy, and
- Health administration and management.

The higher quality of data can be achieved, the better health and care can be expected. In spite of this great potential of IT in health care, health IT is characterized by its failures rather than by its successes. These problems are of two kinds, namely those of the market in general, and those specifically of the Regions. The general problems facing the Regions arise in six main areas:

- Collection of data and use of information
- Quality of information systems
- Growing public expectations
- Security and confidentiality
- Lack of standards
- Procurement and implementation of systems.

Region-specific concerns can be found in the following areas:

- Different requirements of the different components of regional information systems and networks
- Region-wide coverage and interoperability
- Access by authorized users, independent upon their geographic position within the Regions
- Stepwise development
- Responsiveness to change
- Health monitoring and management of quality and cost
- Affordability.

2. General Market Characteristics and Concerns

Collection of Data and Use of Information

One of the main reasons for scepticism and poor use of information is that health professionals, in particular physicians and nurses, do not trust the data as they are generally not involved themselves in collecting them. The principal source of data in health care is the medical record. In most institutions this remains hand-written on paper and suffers from all the problems of 'static' text. Everything is mixed up together. Abstraction of data is consequently laborious, costly, and inaccurate. Administrative and financial computing systems have been developed largely in isolation from clinical information management, relying on the completion of forms for their data inputs. Asking staff to collect large amounts of data is likely to be viewed by them as burdensome. Information needs have to be clarified first. However, decisions are often based on the availability of data and the ease of collection, rather than on whether or not collecting it would create useful information. As a consequence, it often later becomes apparent that the wrong data have been collected, or that data have been classified in an inappropriate way or using an inappropriate system to meet the reporting needs.

Quality of Information Systems

The failure of much investment in health care information systems to deliver real benefit may be due in part to the nature of the systems themselves and how they are made. The lack of any coherent information strategy within most health care

institutions has resulted in piecemeal approaches to development, and often to poor design of the overall system configuration. Most systems, even those with patient administration details, cannot be linked to any other system, in other words they do not communicate. As pointed out before, there has been a bias towards administrative and financial systems, presumably because managers control budgets and have wanted reliable information with which to manage. The irony is that they have frequently failed to achieve this objective as the systems have not been fed by reliable data that are being used for medical, i.e. clinical purposes. Then many systems do not function very well as they may for example be too small or inflexible, or may be difficult to access, i.e. systems may be, and are often, badly designed. And, finally, many of the systems in widespread use are relatively old (the majority in the age of 8-12 years), and use 'outdated' software.

Growing Public Expectations

Empowerment of patients to take an active role in their own health care is recognized as of growing importance by patients as well as by professionals. Provision of appropriate information at the right times can ensure that patients are aware of the potential benefits and risks associated with options for their future care. Patients increasingly (and rightly) expect more from the health service. They want to be informed what is available, what they can expect and when they can expect it. Patient legislation in some European countries define patients' rights in this respect and set out rules which aim to ensure that patients receive timely and appropriate care. This creates further demands for accurate and timely health information. Appropriate IT to meet these expectations is hardly available.

Security and Confidentiality

Personal health information is highly sensitive to a large extent. Without proper control, and legislation, information stored in computerized information management systems is more readily accessible to outsiders than the same information stored in manual filing systems, and linkages between computerised records for the same person can be more easily established. This development has increased public and professional concerns with regard to security and confidentiality. It is in particular important to protect information that is exchanged in open informa-

tion systems and networks. Security of information and communication systems is generally defined as the combined set of three measures to preserve:

- Confidentiality: the prevention of the unauthorized disclosure of information
- Integrity: the prevention of unauthorised modification of information
- Availability: the prevention of unauthorized witholding of information or resources.

When paper as a bearer of information is substituted by electronic media in the health sector the legal arrangements and protection mechanisms may become inadequate. Uncertainty arises regarding acceptability and security of new technical solutions as e.g. electronic signatures as well as the proper legal treatment of these new approaches. Stimulated by the OECD, and the Commission of the European Union a rapid legislative development to cope with digital information has been initiated in Europe, but the results are still not satisfactory and a lot of work still has to be done.

Lack of Standards

The significant gains that are possible from health care information systems will only come about if systems are integrated. This will mean adoption of and adherence to certain agreed standards. There are two groups of standards that matter: technical standards and semantic standards.

Technical standards allow dissimilar computers to communicate. There is no shortage of standards to adopt. However, generally health care institutions have no policy on common standards. Moreover, present systems on offer are largely proprietary systems developed without application of national or international standards. This is making it difficult to link systems and machines. In practice, many developers have created devices for linking technically unlike systems, and so the problem has been solved piecemeal. But, as the number of different systems grows, the cost of linking them will become prohibitive, unless common standards have been adopted.

Semantic standards relate to the meaningful exchange of data from different sources. This creates problems that are much less easy to solve, in particular if health care institutions have developed their own coding systems or – as most of

them do – have ‘passively accepted’ any coding system that may has been incorporated in the application software they have purchased.

System Procurement and Implementation
Most purchasers of systems have insufficient knowledge about possible vendors and of the distinguishing and unique features of the systems on offer. They will be involved in perhaps one procurement in their working lives. There are no safeguards to ensure that available software is fit for its purpose. Moreover, decisions on what system to acquire are often somewhat arbitrary, since no criteria for functionality have been agreed for evaluating alternatives. This often leaves cost as the main determinant, whereas other managers just purchase from the largest companies to feel safe without even understanding whether the software they acquire in this way is meeting their needs.

3. Region-Specific Concerns

Specific Needs of Different Units
As a Region is typically a distributed entity, its health IT system will also be distributed, creating information for users on different levels and in various geographical locations, using data spread all over the Region. The system will involve software running on different computers installed in different physical locations. Modularity and interoperability of these different modules are therefore major requirements.

Region-wide Coverage and Interoperability
As health is the combined result of the health sector itself and other health-related sectors (e.g. environmental agencies), data need to be exchanged between these entities. Such data exchange is taking place at the same horizontal level. However, there is also an exchange of data in a vertical direction between various administrative levels, both ‘above’ Regions with National Administrations as ‘within’ Regions with the Local Administrations, including City governing bodies and statistical offices.

Data exchange in health care is usually not so easy, as experience demonstrates in Regions where networks to link data already exist. Generally, systems are fragmented and existing data networks are based on a range of different technologies and standards. To make matters worse, the networks in different Regions are usually not interconnected so that they cannot support national (or local) applications without being upgraded or extended, with substantial additional cost. Regional information systems receive data input from health professionals, environmental agencies, health and social services institutions, and from financial bodies, both public and private. In return, they provide their data to these persons and organizations. Finally, Regions serve their citizens. Therefore good communication between the components of a regional information system must be seen as a paramount. Regional information systems should offer therefore Region-wide coverage and provide interconnectivity between the data bases concerned, i.e. interoperability. Similarly, Regions could protect their investments in existing products (legacy systems) if this would function satisfactorily and avoid replacement. Good communication between the components of a regional information system must be seen as paramount.It is essential that regional information systems offer region-wide coverage and provide interconnectivity between the data bases concerned, i.e. interoperability. Purchasing an integrated system from a single supplier is one way of achieving this. Interconnecting individual applications from different vendors is the other. There are pros and cons to each. In practice, fully integrated single systems have proved unsuitable in most Regions because of their high costs and long lead times. Regions should therefore seek to avoid replacing existing products (legacy systems) in order to protect their investments, provided these existing systems can be made to function satisfactorily within the regional context.

Hence, regional information systems should ideally be built on the basis of common ‘integration’ platforms, independent from machines and vendors, enabling the interconnection with already existing solutions using different technologies. Such an open information infrastructure should not only include networking aspects but also the basic ‘common’ software layers, and apply European standards.

Access

Within a regional information system and network, access should be arranged for authorised users, independent of their geographical location within the Region. For this purpose a region-wide (i.e. comprehensive) and consistent repository should exist at regional level. The regional health authority responsible for this repository should define the rules to which the different users must adhere when carrying out functions provided by the regional health information system. In addition, a standard mechanism should exist to check whether a user is authorised.

Stepwise Development

Regions are under constant budgetary pressure. Generally, available budgets are inadequate to pay the high one-time capital costs of complete new information systems. Therefore the regional authorities prefer to develop information systems stepwise, incrementally integrating additional applications in accordance with expressed needs and budgetary possibilities. Such a strategy would enable Regions to choose the best of breed software from different 'European' suppliers, and to optimize in this way the price performance ratio and quality of their information systems.

Responsiveness to Change

The health sector in most, if not all, European countries is in transition. These changes refer to all areas of the health systems: delivery of health care, organization, development and allocation of resources, economic support and financing, as well as administration and management. Such developments are putting therefore a high demand on the functionality, interrelationships and architectures of regional information systems and their responsiveness to change.

Health Monitoring and Management of Quality and Cost

From the viewpoint of health management regional information systems should enable monitoring (and surveillance) of health and disease, and support 'geographical epidemiological' analyses of the differences in the incidence and

prevalence of disease between and within Regions in all relevant areas. The health situation, quality of care, and costs can only be measured if the desired levels can be defined against which achievements can be compared. Regional information systems should therefore provide for such analyses, identifying reasons for variation. Knowledge-based and decision support systems should be part of regional information systems as well.

Affordability
Regional budgets of health are generally under great pressure to limit costs. For this reason it is not easy to invest in IT for benefits that may be expected in the long term. The one-time capital costs of implementation of appropriate regional information systems are out of reach of most of the European Regions, even in the richer Regions. Systems and networks should therefore provide value for money and be 'affordable', also to users with small budgets.

4. Past and Future Trend in Europe

The major IT policies and integration strategies and technologies for health care information systems since 1970 can be summarised as follows:

1970-1980:	National solutions initiated and supported by government IT policies and strategies, initially restricted to patient administration systems, billing and payments in hospitals
1980-2000:	Free choice, resulting in 'fragmentation', which is characterizing the European health IT market, both in demand and supply
Beyond 2000	Free choice, based on common (European) reference architectures and international (and national) standards.

National Solutions: Past
At the start of large-scale application of IT in health care, i.e. in the early 70s, governments in European countries tried to control development by the nation-wide introduction of a common patient administration system. This was

introduced in order to register and identify patients, and to facilitate billing and paying (or reimbursement). The required software was ordered centrally and provided by a single vendor for national use, or regional computer centres were introduced to serve large groups of connected hospitals on the basis of shared, proprietary central mainframe computers. However, connectivity to the national systems has proven to be rather difficult, and due to the progress of IT, the systems became rapidly out of date. Therefore these national solutions tended to hamper development rather than promoting it. Moreover, this strategy raised resistance amongst users as well as providers. The result was that this policy was abandoned in all western countries.

Free Choice: Present

Free choice, as traditionally applied in The Netherlands and the USA, seemed to be a more efficient and effective policy, and around 1980 this became the general rule in all of western Europe. Free choice initiated market growth but it also caused a high degree of fragmentation and incompatibility of data and of systems. Also the evolutionary integration of existing modules with additional applications available on the market tended to be expensive and was (and is) frequently not possible due to the adoption of proprietary architectures. Because European standards were not yet available it was hardly feasible to exchange data within and across organizations. The major weaknesses characterizing this situation were (and still are): lack of choice and flexibility, lack of inter-operability and connectivity of systems, limitations to develop systems stepwise, vendor dependence and high cost unrelated to benefits. Fragmentation in the health IT market has serious consequences for the European health IT industry as well. The limited scope of its market has restricted the exploitation of economies of scale, and European firms specializing in health IT therefore remained small.

Free Choice Based on Common Reference Architectures and Standards: Future

The disadvantages of fragmentation and small scale have first been recognized by the Commission of the European Union, and more recently also by national governments, notably: by the governments of the Nordic countries, UK and France, as well as by the governments of the Central and Eastern European countries. In the Nordic countries and the UK national policies are currently

directed at the establishment of national and even international telematics service networks to connect health care provider organizations, payment organizations and administrations for ‘open’ voice mobile and data communications. At institutional level the development towards ‘open’ information systems on common architectures and national standards is promoted to facilitate the introduction of electronic patient records. Sweden is currently leading these developments.

In Summary: the lack of interoperability, i.e. the inability to exchange data or interconnect health information systems at regional level, is currently one of the major concerns facing health policy-makers, administrators and managers in European Regions. New ways of thinking and new solutions are required to solve these problems.

Part 3
Looking for Solutions

1. Differences of Solutions for Different European Regions

The Extent of Responsibility for Health

Undeniably, the health system in any country is part of its social and political setting. Different ideologies, norms, and values are at the roots of the position placed by society on health, the choices made with regard to the balance between collectivism and individualism, and the decisions taken on the degree of equity in the distribution of services and resources. These social-political foundations of health systems are deeply rooted in society and do not change rapidly. Also the political-administrative organization and decision-making processes applied in countries are largely out of control of the health sector and cannot easily be changed. However, they may determine the extent of government regulation and intervention, the institutional framework of health administration, the possibilities of multisectoral coordination and the required balance between centralization and decentralization, and within this context they determine the extent of responsibility for health of the European Regions.

Tax-based Versus Insurance-based Systems

The countries of the European Union finance and organize their health systems in very different ways. Health systems belong to two groups: tax-based and finance-based. In the first group care is financed by taxation, controlled by parliament, free access for every citizen or resident, and managed and often delivered by state employees. Physicians are salaried employees or paid by means of a capitation fee, while hospitals receive an overall budget or ‘cash limit’. All of northern Europe (Denmark, Finland, Ireland, Norway, Sweden, United Kingdom) adopted or retained this model after the Second World War. The south of Europe (Greece,

Italy, Portugal, Spain) joined this group in the 1980s. It is this now the dominant model in advanced countries. In insurance systems care is financed by compulsory contributions paid by firms and employees to statutory funds, based for the most part on a particular profession and managed by representatives of the people insured. Citizens who do not have access to such funds are covered by taxation or private insurance schemes. Medical care, provided by so-called self-employed practitioners, is paid on a fee-for-service basis and hospitals receive an overall budget (as in Austria, Belgium, France, Germany, the Netherlands). Regions that operate under the regime of an Insurance Model may have limited responsibility, usually restricted to health promotion and disease prevention. Regions that operate under the tax-based National Health Services Model may have full responsibility for health, including cure and care of patients. As a result health information systems and networks differ across European Regions.

Health Care Reforms

National health systems have come under strong and growing pressures to institute major structural reforms. While conditions vary in different countries, the source of these reform pressures is remarkably common across most nations. They are confronted by externally generated demands from: demography, technology, and economy. National policy-makers are in turn insisting that existing patterns of health services be modified to achieve higher levels of responsiveness, efficiency, and effectiveness. In response to these demands, many countries have set out to develop a new health system framework, re-balancing the public/private mix. It is worth mentioning that countries are in a process of reform irrespective of their initial starting point: states with a tax-based national health service are moving towards market orientation and competition, whereas countries with a health insurance-based system are implementing more regulation and measures for cost containment. Regional health information systems and networks therefore change with the course of time.

2. Interoperability of Information Systems in Health and Health Care

IT: An Enabling Force for Improvement of Health and Strengthening of Health Care

IT enables the provision of meaningful, accurate information for epidemiological surveillance and health monitoring, for disease prevention and health promotion, for diagnostics and for cure and care of individual patients, and at all relevant levels of care and administration. The higher the quality of data achieved, the better health and care can be expected. IT will therefore become an enabling force for improvement of health and strengthening of health care. Health care should be organized in such a way that it optimally benefits from IT.

A health care organization in general, and in particular at regional level is a 'distributed' entity made up by a large number of different units with different functions. Therefore a regional health care information system is 'distributed' as well. A regional health care information system is an electronic information services system with the capability of exchanging data between its constituent parts and presenting information consistently to support health professionals collaborating to improve the health of the population and to deliver patient care, while simultaneously providing accurate and timely information for policy-making, administrative, and managerial purposes.

Integration Strategies

Interoperability of all health applications in a Region should be the ultimate target for health data management in most European Regions. However, a single integration strategy to achieve this does not exist. There are two main strategies. One is to produce an integrated system from a single vendor. These single supplier solutions generally deliver an integrated solution, enabling the entire organization to share a common data base with no duplication of data elements across specific applications. The other is to interconnect specific 'best of breed'

applications from a number of different vendors: interfaced multi-vendor solutions.

There are advantages and disadvantages to each:

- Integrated
  - Advantages
    Data integrity through tightly linked systems
    Common ‘look and feel’
    Training in one system only
    System operationally efficient

  - Disadvantages
    Modules may not be ‘best of breed’
    Modules may not use new technology
    Often inflexible, difficult, and costly to change
    High costs to tailor to needs of a site
    Centrally driven and often monolithic
    Previous investment in systems a write-off
    Lack of ownership by users
    High initial costs, by may be financed gradually
    Systems costly to maintain and operate
    Specialized skills required to support

- Interconnected
  - Advantages
    ‘Best of breed’ systems used
    Investment spread over time easier to manage
    Disruption when implementation staged over time
    Can often accommodate existing system investments as servers
    Easier to adapt and grow
    Evolutionary, can respond easily to needs of local users
  - Disadvantages
    May present data integration problems
    Likely to be architecturally complicated
    Needs meticulous planning and integration

Deployment of staff may be restricted by need to re-train them to use different systems.

In practice, and in spite of exceptions, fully integrated information systems at regional level from single vendors have proved unsuitable because of high costs and long lead times. Therefore most Regions prefer interconnected systems that enable a free, unrestricted exchange of information. The current method of linking systems is usually through point-to-point proprietary interfaces, which can be very costly. Massive expenditure can result, without guarantee of success. Interfaces might need to be amended if changes are made in the connected systems, and could threaten to cost more than many of the individual applications they join. In attempts to avoid the limitations of point-to-point proprietary interfaces in USA generic interfacing tools, so-called interface engines are introduced. Typically, interface engines provide many sophisticated facilities, including centralised management of interfaces and powerful messaging and data transportation capabilities.

Integrated Open Solutions, Based on European Standards

OECD (in 1997) recommended solving the problems of interoperability by means of 'open' modular solutions. [3] Such open information systems for health and health care are being built on common architectures. Specific applications, or software products, should fit such architectures, that are 'public' standards, and therefore available for both users and vendors. The applications are inter-connected through interfaces that are also 'public' standards. It is important to clearly distinguish between 'quasi openness' claimed by vendors for their proprietary systems and 'real openness' of systems based on public standards. The European Commission promotes open systems based on public standards, and supports all Research and Technology Development in this field. [4]

The European Commission is collaborating with the European Standards Organization CEN, and its specialized agency for health care, i.e. CEN/TC251: Technical Committee [5] that is developing European standards in collaboration with health care authorities, users and industries. Such standards enable compatibility and interoperability between independent health care information systems. The areas of work covers: translation of user requirements into information models including

1. Electronic patient records, and electronic patient data cards
2. Terminology
3. Security
4. Technology for interoperability.

The approved standards are important for the European Regions for building Electronic Regional Health Information Systems. In this document we only mention: The Health Care Information Systems Architecture (HISA) Standard, i.e. CEN Prestandard prENV12967-1 that is offering a standard approach and a common basis for health information systems. Patient records are the major source and input for most healthcare information systems. Collectivily, patient records could be a valuable tool for policy making, administration and management, research, education and consultation at all levels, including regional level. Therefore we also mention the CEN Prestandard prENV12965 of the Electronic Health Record (EHCRA).

Open modular health care information systems should be built on the basis of common reference architectures, as said before [3],[4] and [6], which should be 'standards'. The Health Care Information Systems Architecture (HISA) Standard provides such a common reference architecture that is available for the European Regions to build open, modular Electronic Regional Health Information Systems. This architecture will allow the 'interworking' of different, independent applications that can be interconnected through standard (i.e. public) interfaces, enabling the exchange of information within and across Regions. Examples of such applications are:

- Epidemiological surveillance information systems
- Disease prevention information systems
- Environmental health information systems
- Patient administration systems
- Patient care or clinical information systems
- Health policy information systems
- Health administration and management support information systems.

Application software built on the basis of these standards, and successfully applied in one Region, can be used in other Regions. In this way risks of failure can be reduced or entirely be avoided, and considerable cost saving be made. Other benefits of real open systems are: flexibility, vendor independence, and positive scale effects.

Electronic patient records avoid the weakness of the traditional paper-based records that are complex and difficult to access. IT is making patient-related information accessible for all practical purposes. Contrary to a paper-based record, an electronic patient record is a set of data that 'independent of their actual place' can be retrieved, aggregated, and presented with regard to a patient in any form and content in accordance with the specific needs of authorized users. On this basis the CEN Prestandard prENV12965 of the Electronic Health Record (EHCRA) is defined. Users are not restricted by the physical place of a file of documents, but are free to select electronically the information that is required. This standard is fully consistent with the HISA (Architecture) Standard. Health care information systems based on the HISA (Architecture) Standard make data electronically available as required by the EHCRA (patient record) Standard and deliver in practice automatically the data input to 'electronic patient records'. This new technology is paving the path to new ways of working in the future.

The advantage of the application of standards is that they provide a common base for consistent exchange of data, and for connecting different software and different hardware from different vendors, without restricting the free choice of the users. At the same time the competition between vendors is also not restricted, but even enhanced. As these benefits are increasingly recognized in Europe, it is expected that 'open' systems on the basis of standard reference architectures and standard- i.e. public - interfaces will become the strategy of the next century.

Technology

As it is defined in the HISA (Architecture) Standard the concerns and requirements of health information systems, also at regional level, may be

effectively satisfied and supported by structuring the architecture of the information system through three cooperative layers, as shown in Figure 1:

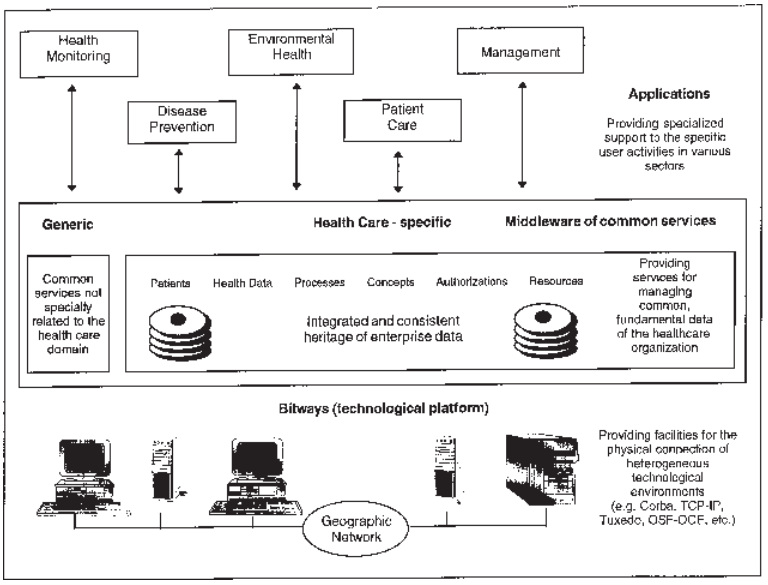

Figure 1: The 3-layers structure of the CEN TC251 Health Care Information Systems Architecture (HISA) Standard prENV 12967-1 (applications just representing examples)

Applications layer:	Consisting of a set of components responsible for interacting with the users, providing specific support to specific applications
Middleware layer:	Providing a set of services which support the entire system for the management of common data and procedures. The middleware layer enables the integration or interworking of the individual applications at the top layer
Bitway layer:	Representing the technological platform, providing facilities that enable the various modules of the information to interwork through common mechanisms.

The middle layer provides an open infrastructure, capable of 'federating' multi-vendor, heterogeneous applications that interact through a set of common health care specific components. These in turn, rely on a technological (or communication) platform for the interaction of the whole environment. The middleware constitutes the basic functional infrastructure environment of any health care

centre, fully independent of the technological requirements of the organization, and consists of a series of logically correlated services:

- Patient data
- Health data
- Activities, or processes
- Concepts and terminology
- Authorization control, security management
- Resources.

The number of services can be extended in accordance with needs.

The distinguishing and unique feature of the standard middleware for health care is its comprehensive data model. The data objects and data attributes pre-defined in the middleware, and tested in different sites in the majority of the European countries, support the general requirements of any health care information system. It is natively managing the following classes of health care data:

- Different users' authorization profiles
- Personal, epidemiological/statistical data on patients, contacts and cases patient care, administrative and organizational processes for the entire lifecycle from referral and non-referred requests for care up to discharge and follow-up
- Patient care, managerial and organizational classifications of data for all health care units, and at all levels of care and administration
- Patients' health data
- Resources: manpower, equipment, drugs, supplies, material, time and location
- administrative managerial data, cost, performance and financing from all sources, including insurance.

The standard middleware provides services for managing the common data, and for performing general procedures adopted by the health care organizations concerned. These services ensure the integration and consistency of the data, making data available when and where needed, and allows the integration – i.e. interoperability – of different applications from different vendors.

By using these basic services all information will be entered, selected, retrieved and modified by the applications through standard and public interfaces.

Although the data are pre-defined, the model can be extended by the users according to their needs, even autonomously, so that they can remain independent from vendors, if they would prefer to do so.

Information systems built on the standard middleware and its data model may:

- Inform patients
- Support health professionals, i.e. health care providers
- Inform financing bodies, including insurance agencies, i.e. the health care payers, and
- Support policy-makers, administrators and managers.

The data input to electronic patient records can be automatically provided, as well as epidemiological statistical data for health surveillance and health monitoring and policy-making.

The standard middleware can be applied at all levels of care and administration, built in telematics services networks from primary care level, institutional or secondary level up to tertiary level, and from municipality level up to district, regional, and national administrative levels.

The middleware-based architectural approach can be used for:

- The integration of application software
- The migration of existing legacy systems towards a new, open environment
- The development, respectively production of new application software.

Middleware systems can be built in accordance with the European standards (approved by the European standard organization CEN) for the architecture of health care information systems as mentioned before, i.e. HISA (ENV 12967) and EHCRA (ENV 12265).

Major Benefits

The major benefits of open standard middleware-based information systems to health care are:

- Full functionality, through a vendor independent, free choice from the best of breed software on offer or through in-house development of application software at low cost
- Flexibility, by making the best use of already existing systems, and to replace or add components in accordance with needs, and budgetary possibilities
- Stepwise implementation, incrementally integrating additional applications, taking into account time and money
- Interoperability within health care institutions and between primary health care services, hospitals, government and non-government institutions and agencies in health care, financing bodies and sickness funds, through interconnectivity on the basis of common architectures and public interfaces, i.e. on the basis of international standards
- Integrated systems that provide value for money and are affordable. The cost of integration, average 30 % of the total one-time capital cost of a large integrated information system can be saved. Then the cost of developing new applications can be reduced by 50 %.
- And, finally, the introduction of electronic patient records will be considerably easier and much cheaper than in traditional, proprietary information systems. [7]

3. Exploring the Information Society

The Information Society

One of Europe's most important contributions to the way people are thinking about the revolution in information and communication technologies is the name now attached to it, i.e. Information Society [8]. This term reflects European

concerns with the broader social and organizational changes that will flow from the information revolution. We expect that Europe will be steadily transformed into an essential new society, i.e. an information society in the most profound sense, because the individual citizen's relationship to information and to knowledge will be quite different from the past.

Disappearing Boundaries

In an already irreversible process, the nations of the developed world have travelled well down the path made possible by new electronic technologies. These provide a single means of processing huge quantities of information in digital form and then storing, retrieving, and communicating them. Steadily, technical boundaries between traditional forms of handling and distributing information are disappearing:

- Information presented in a written form, or by voice or by images can all be handled and processed simultaneously
- Information which was once distributed on paper, or by photographic film, by radio or audio-tape or video can now be transmitted, and responded to 'interactively', through the same 'multi-media' communication channel, be it a telephone line, a cable or radio waves, and satellite.

This revolution adds huge new capacities to human intelligence and constitutes a resource which changes the way Europeans work together and the way they live together [9].

Towards a Knowledge Society

In the information society knowledge is potentially much more of a universal resource than it has been in the past. Access to it will be so much easier: libraries and historical artefacts, technical data, expert judgement, entertainment, teaching – these and virtually every other store of knowledge will be available electronically, on demand for individual use and manipulation. Europe, which attaches a high value to solidarity, is keenly aware of the social risks and challenges which have to be faced in the information society. There is a particular preoccupation about the possible creation of a two-tier society in which part of the population can handle the techniques for a successful exploitation of all that

the society can offer, while the other part is marginalised and disadvantaged by alienation from the information culture. This is why public acceptance is so important to the process of mastering the risks and maximizing the benefits of the information society.

The Role of the European Union

The primary purpose of the European Union is to ensure that the development of the information society will be private-sector led which means doing everything possible to create the conditions in which investments, markets, and services can flourish. The work is being concentrated in the following areas: developing a regulatory and legal framework, stimulating applications of information and communication technologies, promoting the information society, and monitoring and analysing the societal, social, and cultural impacts of the information society. The regulatory network which is being developed at Union level is partly directed at making sure that all national networks are capable of operating as a single network of networks. This means that there has to be a seamless interconnection of networks and that application and services which use this network should be able to work together, achieving 'interoperability'. Open standards should therefore be established and promoted.

4. A Paradigm Shift in Healthcare Information Systems

Towards a Networking Knowledge Society

Spri, the Swedish Institute for Health Services Development, Stockholm, Sweden, has made a series of studies to investigate the limits and opportunities of the information society in healthcare. See in particular 'Introducing Computer-based Patient Records, Prerequisites and Requirements, Spri Report 477 [10]. Under the heading 'A Paradigm Shift in Health Information Systems', Spri is recognizing the trend towards a Networking Knowledge Society, in public health as well as in health care.

To date, computers have only added new technology superimposed on old technology. Just as the first cars looked like horse carriages, computers were first used as typewriters and calculators. In the same way computerized public health information systems were just 'digital statistical tables', and computerized patient

records were basically ‘electronic paper-based records’, i.e. they introduced nothing new, nothing that could not have been done manually. The initial use of new technology was reflecting the conceptual world of the old technology. This is changing. Moreover IT has evolved beyond the status of a tool to become a working environment that determines organizations and work.

One of the most important advances in information technology is object-oriented development methodology that has resulted in a completely new view of how organizations work, and has evoked a revolution in the development of large complex software systems. IT increasingly governs how activities are conducted and organized. New technology breeds new forms of work, which in turn breed new organizational forms. The differences between technological development in general and IT in particular are that IT manages information and thus ‘knowledge’. To refer to IT as computer support in health care is not any longer true, and is misleading today. IT is not about computers but about globally inter-linked collaborative information technology, which creates a networking knowledge society, applying Internet and Intranet. [10]

The Shift from the Industrial Society to the Information Society

The paradigm that forms the basis for the former industrial society – which we are now leaving to enter the information society – was formulated by Adam Smith in his book The Wealth of Nations (1776). According to Adam Smith all work should be divided up into primitive tasks, simple enough that any worker should be able to perform them with a minimum of training. This formed the basis for mass production. Adam Smith’s paradigm must now yield to the paradigm that expresses the new information society, meaning in general terms:

- Tailor-made solutions instead of mass production
- Highly educated staff, rather than unskilled labour
- Individual responsibility and initiative replacing unskilled labour.

Information systems are also the main tools for producing today’s goods and services. Information and knowledge also form an increasingly important part of the products themselves.

The continuing technological and economic shift from an industrial society to an information society is affecting health care and the way health care is provided, introducing new ways of working.

The new paradigm for health care information systems constitutes progressing:

- From function-oriented to process-oriented health care
- From hierarchical to networking health care
- From paper-based patient records to Web-based patient records.

Process-oriented Health Care

To meet the demand for rapid change and adaptability of organizations and activities, Technologies for Business Processes (TBP) are applied, also referred to as Business Process Re-engineering (BPR). Traditional organizations and activities are generally function-oriented, to promote specialization. In particular health care is structured on this basis with specialization at all hierarchical levels. This is a view that is totally contrary to process-oriented thinking, which focuses on 'what everyone' does, not 'with whom' (a target, population or a patient) or 'with what' (epidemiological surveillance or diagnostics). The key notion is 'process'. Considered from the systems point of view a process is a dynamic flow in time, subject to continuous change, as opposed to the traditional view of organizations where process constitutes an instantaneous picture of who reports to whom in the hierarchy. By fundamental rethinking and, if necessary, radical design of business (i.e. health and health care) processes dramatic improvements in critical performance measures may be achieved, such as input, cost, time, output, and quality. Modelling activities within health and health care information systems based on processes with a duration in time, a beginning and an end – input and output – makes it possible to exploit the same tools for simultaneously developing organizations and activities, and for analysing and shaping information systems. Thus, both information systems and organizations, and their activities are formed by one another. Each is mirroring the other. [10]

In this respect an appropriately designed information framework can be used as a change agent as well. The process of developing an information framework may in itself be the unifying force that would draw the actors in health care into

cooperative creation of an infrastructure designed to meet their needs on a continuing basis. Each actor has essential information to contribute, and each needs information from the others. Collectively their information would have even greater value. All actors should also understand that they own a very valuable resource, valuable not only to themselves and to health care but also to other sectors (Karen A. Duncan) [11].

Priorities of making transformation a reality are the realization of open, modular health care information systems that offer flexibility and vendor independence, as outlined before.

Much work on this basis is being done e.g. in Counties in Sweden. [6, 10]

Networking Health Care

The growth of information both in the field of public health as well as in the field of clinical knowledge is exploding. Single individuals are not any longer able to handle all available information they need. Therefore easily accessible health and health information is urgently necessary as well as adequate management of this information.

Health and health care in practice is increasingly an issue of multidisciplinary teamwork involving many, different professionals. The unification of Europe, the common responsibility for environmental health, the migration of people, the crossing of diseases over national and regional borders are only a few of the many factors that cause the need for international collaborative action in the field of health and health care. Polycentric activities and multidisciplinary teamwork within countries and Regions, and across Europe and European Regions are requiring a well-organized simultaneous access to meaningful information.

Relevant and appropriate information is needed at each point-of-service, and point-of-care in expanding and changing health systems. To support timely identification of health hazards in populations and to make adequate decisions, respectively to get a coherent overview and to enable rapid decision-making, up-to-date information should be available with regard to the complex processes throughout the entire healthcare chain in all its geographically, separated units.

Health and healthcare are clearly networked activities. Therefore, only by means of networking technology networked health and healthcare can be managed. [10]

Electronic, WEB-based Patient Records

The computerized patient records are the ‘diamonds’ of each health and health care information system. The key lies in its ability to transfer patient data where they are needed. Using traditional computer-based patient record systems (as opposed to those based on Internet technology) it was, and still is, very costly and technology intensive to transfer patient data between different data bases. This is what EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) and HL7 (Health Level 7, as in level 7 of the OSI model) tried to solve. For the health care provider, patient data must be presented as one uniform digital record, i.e. a virtual patient record, independent of the geographic place of the data. They may be scattered within Regions, countries, or even across Europe. Typically, the health care provider requires only a subset of the data about the patient at each visit or consultation. By means of distributed object technology these requirements can now be met, and WEB-based patient records have now come within reach. [10]

The Advantages of Internet-based information systems in health care are ‘access’ and ‘administration’. The World-wide WEB is accessible everywhere, providing access:

- For all policy-makers, administrators, managers, and health professionals in any health care organization (also regional)
- To and from all collaborating organisations and activities in health and health care
- For patients, and their caring families
- To and from all sources of information and knowledge in the world.

Naturally, a comprehensive data security infrastructure is needed to prevent patient data from getting into wrong hands. Security on the world-wide WEB is still unsatisfactory. Existing systems for authorization and log-in are designed for professional users, and are not adequate for wider freer use. This means that security must be built into the software at the data level where simple patient record objects and record object complexes reside. [10]

5. Electronic Regional Health Information Service

Comprehensiveness of Purposes
Electronic Regional Health Information Systems should serve recipients (users) in a comprehensive manner:

- Regional health administrations
- Health systems: organizations and professionals
- The public at large
- Trade and industry (Commerce).

Openness
Electronic Regional Health Information Systems should be 'open', i.e. built on public standards accepted and applied by as many European Regions as possible, ideally by all Regions. Such a common policy would enable Regions to apply a common basis for their systems that will however differ through different sets of applications in accordance with regional needs. Such a common basis will allow Regions to exchange data within and across Regions, and, if they wish to do so, to interconnect application software that is developed, tested and in use in one Region, also in other Regions. By this technology most of the concerns (Part 2), which are in fact requirements, can be met including interoperability of systems (Part 3).

Anticipating the Future
Electronic Regional Health Information Systems should be based on mature, proven technologies, but at the same time be future-oriented, anticipating the major trends initiated by the information society towards process-oriented healthcare, networking healthcare and electronic (and WEB-based) patient records (Part 3). Open systems will pave the way to the information society, and enable to make the first steps without great risk as they offer process orientation, ease networking and facilitate introduction of the electronic patient record.

Application of Process-oriented Methodologies

Process-oriented methodologies may be evident in patient care. They are equally important in public health. Public health information systems should be conceived and presented in process terms, comprising control and scheduling and feedback functions, as well as the ascertainment functions. This can be illustrated by imagining a communicable disease control programme which first assembles a register through the afferent flow of birth notifications, maintains it through accessing information on in-and-out migration, schedules the vaccination dates and sends out appointments, records completion, pays the doctor, maintains vaccine batch number deliveries, registers side effects, accepts and links disease notifications, maintains continuing records of population immune status, identifies imminent epidemics, issues warnings, and modifies the age schedules for vaccination in response to the situation.

Reforming and Improving Health Care by IT

As organization and management are more important than technology, technologies for business processes (TBP) are recommended, exploiting the 'same' tools for 'simultaneous' development of organizations and activities and for analysing and shaping information systems. In this respect a well-designed information framework can be used as a change agent.

Internet-based Regional Information Systems

Future Electronic Regional Health Information Systems will be Internet-based, and operate within and across Regions, and be equipped with security management. The first steps towards Internet-based information systems have already been made in practice. [10] Electronic commerce is an important extension of Internet-based regional information systems which deal with communication, for trade and industry. [12]

Data Warehouse at Regional Level

The electronic patient records, and all other complementary information systems should feed a specially designed distributed database or repository at regional

level, i.e. a data warehouse for storage of data. Retrieval of information from the regional data warehouse should be made as easy as possible to the users, applying only very simple tools.

Regional Data Analysis and Knowledge Discovery

Owing to the enormous progress in storage hardware and database software, Regions will be able in this way to retain vast amounts of information. Particular attention should however be paid to the interpretation of this information by specific software for (geographic) data analysis and knowledge discovery (data mining). Such tools are very well developed and on offer.

Stepwise Realization

First of all an overall vision, policy and a medium and long-term strategy is essential, as recommended in Part 4 Implementation: Getting Things Done. Please note that such a medium and long-term strategy can be made relatively easy if open system technologies are applied and the European standard architecture (HISA Standard) is used as a common base, as explained in Part 3, chapter 'Interoperability of Informatio Systems in Health and Health Care'. The standard middleware approach, that is presented there, provides a consistent guideline for policy-making and transparent pattern for future development. Generally, budgets in public health and health care are inadequate to pay the high one-time capital costs of complete integrated systems. Moreover, installation of such systems are found to be too risky. Therefore we recommended to choose open, modular solutions that can be introduced stepwise, incrementally integrating additional applications in accordance with expressed needs and budgetary possibilities. In most Regions existing (so-called legacy) systems have to be preserved as much as possible in order to protect past investments and to guarantee continuity of operations. Preserving existing systems or components of systems may indeed become a first step. This is made possible by the utilisation of the standard middleware approach that enables migration from existing systems towards open solutions, at moderate costs. An integrated open solution that is gradually completed in this way consists of a 'federated', but coherent unity. This technology enables Regions to choose the 'best of breed' products in Europe from different suppliers, and to optimise simultaneously the quality and price-performance ratio of Electronic Regional Health Information Systems. Such

a federation strategy allows users to make the best use of existing products and to replace or add components in accordance with their needs. Taking into account the existing situation as well as the selected future strategy, a starting point can be identified on this basis for initiating a stepwise process of realization of an Electronic Regional Health Information System.

Cost Benefits

The major benefit of an Electronic Regional Health Information Service is the enhancement of the services of regional administrations, and ultimately better health of the citizens. Moreover application of such systems by a public health authority will have a demonstration effect. Cost savings for the Region as a whole are difficult to calculate. As pointed out above, open, distributed systems however are cost effective and can be introduced stepwise and in accordance with regional needs, taking into account available budgets. Its many recipients may in particular enjoy the major benefits of an Electronic Regional Health Information Service. If the value of their time is included, savings of recipients may be substantial. Easier access to meaningful information may increase demand, so that from the viewpoint of regional administrations savings can be acquired in the long-term. The largest financial benefits may therefore prove to be the indirect ones. Large scale integrated systems are generally not cost effective, due to coordination costs.

Part 4
Implementation: Getting Things Done

The most important 5 factors that determine the successful implementation of an Electronic Regional Health Information Service are:

- Leadership
- Strategy
- Education and training
- Security and confidentiality, and
- Benefits management.

Leadership

Benefits of IT are not automatic. Organization and management are more important than technology. Chief executives, boards and senior administrators and managers often fail to appreciate the potential benefits of good information or the costs and negative impact of poor information. Generally there is still little understanding of the potential of better information management to improve the 'core business' of the Region and of regional health and health care. This lack of understanding derives in part from many managers' experience of introducing computers in the past. In other words, many Regional Administrations in Europe are held back by a vicious circle of information issues, negative attitudes and inadequate representation at the top of the organization. To break this circle, chief executives, boards and senior administrators and managers at top level must take responsibility and show leadership:

- Acquire a broad understanding of health and health care information and understand the key issues
- Openly acknowledge the importance of information and give a clear lead to other staff through active involvement, and
- Ensure that the information manager has proper executive representation at top level, and the top in turn takes full responsibility for it.

Top-level policy-makers, administrators, and managers must therefore first of all educate themselves about all key issues of IT.

Strategy

Overall vision and strategy is 'fundamental'. Regions must have an overall vision and strategic view on the development of their Regional Health Information Services. Successful implementation of a regional system is likely to entail significant reorganization. Regional administrations and their agencies must realize that providing public services through a Regional Health Information System requires the identification and promotion of the organization and information agenda throughout government. They should realize that fragmented, short-term planning is detrimental to, or even might thwart the development of a well-formulated policy. [13]

Just buying IT and introducing systems at the start will result in no more than reproduction of existing information and continuation of existing business processes. Therefore OECD warns: 'the benefits of automation can largely be nullified if the technology is simply overlaid on old ways of doing business, so that the costs of the latter are still incurred'. [14]

First and foremost, health care systems must therefore have a plan for their information technology that is firmly rooted in their organization and information strategy, and which is regularly reviewed and up-dated. Generally speaking the plan should be comprehensive and directed at medium and long term. The strategic information plan must make it clear which decisions can be left to local or departmental discretion and which require compliance with corporate rules. The integration of information within and beyond the Region requires common use of technical and semantic (data) standards. This is an area where corporate policy is essential to ensure that systems converge to permit complete integration of information over a period of time in order to guarantee interoperability of systems.

In according with good practice, existing processes should first be reviewed, with due consideration given to overall policy, and a strategy be selected for change of organization and activities - and for IT within this context. On this basis general commitment must be built of all parties involved, and at all levels of administration and of health care. Then a solution should be selected that fits. Buying IT is the end of strategy formulation, not a start. The resulting solutions

will produce necessary (i.e. meaningful) information, applied to new, more efficient and effective business processes. It is common experience that only in this way can significant benefits be achieved.

Education and Training

Most staff now use systems and the information from them. It is essential that they have the skills to make the systems do what they want. Lack of skills and knowledge are frequently compounded by negative attitudes towards information systems. Experience in other sectors has clearly shown that the key factor in whether an information system is successful or not is the attitude of the staff towards it. Even the best system will be a failure if staff are not committed. Education and training are therefore essential. It should be job-related, flexible, progressive, on-going, pro-active, non-threatening, effective and evaluated. Continuing user support should be arranged and adequate budgets allocated.

Security and Confidentiality

Successful implementation of an Electronic Health Information Service is also dependent upon security and confidentiality. The administrative top and senior management of a Region must accept full responsibility for ensuring the security and confidentiality of data. A clearly defined policy is needed as a platform for adequate measures with regard to security and data protection. Such a policy should take into account and respectively adopt formal and legal standards in this field as well as international directives of the Commission of the European Union and national legislation. The adopted security policy should be brought to the attention of all parties concerned within a Region, and refer to all components of an entire Electronic Regional Health Information System.

Benefits Management

The benefits of IT must be identified, with subsequent planning and effort put into their realization. This process needs to be managed, and to be useful it requires the visible personal support and commitment at senior management level. Administrators, managers at regional level, health professionals representing the health system and related bodies, as well as representatives of the citizens should be involved in the process throughout. Without this involvement there is no ‘ownership’ of the investment nor responsibility for

achieving benefits. As repeatedly said before, implementation of information systems is not just about installing computers, but rather is concerned with changing the whole organization, with implications for everyone working within it. Management of change is a key issue both to successful implementation and to obtaining value from IT investments.

The initial investment appraisal of available options requires an understanding of the costs and benefits that are specific to IT. This analysis should be consistent with the adopted overall organization and information strategy. The assessment of the options in the investment appraisal is linked with the choice of a supplier, and it is therefore important that those involved in the investment appraisal are maintaining close contacts with those performing the procurement.

The investment appraisal is only the first stage of this process. Fundamental to the success of an investment is the continuing and subsequent benefits realization analysis that must be carried out to ensure that a return on investment is indeed ultimately made. Benefits realization is often perceived as a threat. However, benefits do not necessarily have to be realized as ‘cash- releasing’: they may be ‘qualitative’, resulting in better decision-making, in better health or in improvement of the quality of care. Benefits management should include a plan for realization of the identified benefits, monitoring and control mechanisms to ensure the benefits are realized and mechanisms for change control should problems occur.

In each of the above mentioned areas - enhancement of leadership, strategy development, education and training, security and confidentiality, and benefits management - adequate expertise exists, and appropriate methodologies are available.

Part 5
Ways Forward: The Future of RHINE

In accordance with the mission, scope, and objectives of the RHINE-Initiative we propose to extend the present group of Regions, and invite other European Regions, including members of the Assembly of European Regions to join the RHINE-Initiative and to collaborate in the field of information and communication technologies. Within this context we would like to operate as a *Support Group*, providing expertise, services, and technical support to the members of the Assembly of European Regions, collaborating with and reporting to the chairman of AER Committee IV.

The mission of the RHINE-Initiative should be to assist European Regions to improve the efficiency and effectiveness of administration and management in public health and health care at regional level by information and communication technologies. Management of organizational change will be a key issue in this respect, both to successful implementation and to obtaining value from IT investments.

The scope of the activity should cover the needs of all European Regions with regard to public health and healthcare IT, dependent upon the political-administrative context and financing systems of the health sector in these Regions. Taking into account the trend towards integration of health and social welfare services in home care and in primary care in our greying society, social welfare services may be covered by the RHINE-Initiative as well. This means that the following areas will be included:

- Epidemiological surveillance and health monitoring
- Health promotion and disease prevention
- Environmental health
- Early detection, diagnostics, cure and care of individual patients
- Integrated health and social care for individual patients: long term sick people, elderly people, the disabled and socially less privileged persons
- Analysis of and for policy

- Administration and management at regional level, including allocation of resources and control of costs.

The objectives of the RHINE-Initiative include:

- To improve health, and the performance of health systems by IT at regional level
- To support the Assembly of the European Regions through partnership, i.e. *RHINE-Partnership*
- To add value to regional activities by complementary action, advice and service in the field of IT
- To exchange knowledge and experience
- To take stock of present IT policies and strategies, to analyse these, and to assist in the development of IT policies and strategies
- to identify the needs for organization and information technology
- To identify best of breed technologies and solutions for common use across Europe and to inform the Regions
- To initiate RTD and to raise the required funds
- To raise awareness and to transfer relevant technologies for application at regional level
- To provide for education and training
- To assist Regions in developing, testing, and implementing Electronic Health Information Systems
- To build a trans-European net (RHINE-NET) for exchange of data
- To make common support services available to European Regions.

In summary, the RHINE Consortium offers assistance to European Regions by complementary action, advice, and services in the field of IT on the basis of an on-going activity as a Clearing House of Knowledge, Training Centre and Technical Support Centre.

Part 6
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Part 7
Experiences of Regions

Regione Lombardia

Description of the Region

Lombardia is situated in the Northern part of Italy bordering on Switzerland. The Region is subdivided into 11 counties and it represents the fourth widest Region in Italy. With a population of about 8.9 million people it is also the most populated Italian Region. More than 15 % of Italian people reside in Lombardia, among these about 44 % are concentrated in Milan which is the capital of the region.

The Gross Regional Product was (in 1993) about 158 Billion ECU, representing 19.5 % of the Gross National Product. The unemployment rate in Lombardia is one of the lowest in Italy (6.2 %). Between seventies and eighties,

Lombardia became part of the so-called “information revolution” leading to a decreasing average size of enterprises and local units, and a growing weight of services. But still there is a characteristic wide range of sectors within Lombardia’s productive system, dominated. The Lombardy region was founded in 1970 and its bodies are the Regional Parliament, the Regional Council and the President of the Regional Council.

In Italy the health sector is a delegated matter to the Regions. They draw up Regional Health Plans and got the responsibility for the regulation of the health care market. About 86 % of Lombardia’s total budget is spend to run health care and hospital services.

In 1997, the Regional Council of Lombardia started a health care reform focussing on:

- Establishing registries for the main diseases
- Strengthening of the emergency call system
- Increase GP’s role in a continuity of care perspective
- Building up an unified booking centre for health care performances
- Revision and development of the information system
- Continuous monitoring of health care performance.

Information Systems

In the past an exchange of a large set of health care information already has been established between health care providers and public administration bodies. These information are collected by the regional and the national Health Department and stored into data banks including clinical data, administrative data, and other information able to produce key-indicators on health care provision.

Data for this regional health care information network are provided by hospitals (public and private) and certain other health providers and transfered to ‘Local Health Care Units’ managing the global funding for health provision (including hospitals, public laboratories, ambulatories, etc.), forwarding them to the regional bodies. At present the information flow is performed in a ‘conventional’ way exchanging paper forms or tapes/diskettes. About 10 % of the health care providers are able to provide regular data in a telematic way. The

actual scenario is essentially based on a centralized approach storing all information at the Regional Health Department.

Besides this an Local Health Care Units network was established for including patient's identification data (i.e. to choose the GP).

Concerns

The Italian health care market has been radically changed by recent reforms: the number of Local Health Care Units has brought down and like the larger public hospitals they became (indepedent) companies. The ongoing discussion on quality management, on the citizen's/patient's central position as a client of regional sanitary services, and on controlling health care expenditures rises the demand for transparency and better information supply in health care.

However, the present information coverage seems to be complete but not integrated as in the past the various systems for information storage grew separately without common approach.

Therefore the Lombardian Health Care Department has delivered a plan for the improvement of the health care information network. Identified priorities are:

- Redesign of health information flows
- Implementation of telematic infrastructure
- Introduction of In*Net-Technologies – using a public network in a 'private' way –
- Application of smart card
- Improvement of interoperability for all regional services, inc. emergency and integration of local booking systems to improve information and services access to citizens.

Solutions

In January 1997, the Regional Government of Lombardia launched a wide project to redesign and carry out a new Information System for Health Care aiming to improve the level of services provided and the management of regional Health expenditures. This project named 'Regional Health Care Information System' (Sistema Informativo Socio-Sanitario - S.I.S.S.) has the goal to obtain a modular open system able to grow with the needs of the health care environment.

The S.I. S.S. project will establish a 'virtual health care network' bringing together citizens/patients, health care professionals like GPs, specialists, pharmacists, diagnostic centres -, hospitals, and services providers. Each citizen will be provided with a smartcard including his/her identification data and a set of basic personal health data (i.e. emergency data, last hospitalization, etc.). On the other hand each health care professional will receive a professional smartcard and the combined use of these two cards will allow to access to the virtual network and to obtain services like: booking, prescription of drugs, ambulatory or hospital performance, etc. Information on all services requested will be collected, stored and analyzed at the central regional level.

The added value of this new information system will mainly be to raise quality of data by avoiding duplication in data entry, by real time information on who requested from whom for what, and by integrity of information and integrated system interoperability.

Loredana Luzzi
Walter Cossutta

Future

All health care suppliers became involved in this project, and starting from the beginning a business process analysis of health care redesigned was carried out.

In April 1998, this analysis has been completed and Lombardia has decided to pilot the system in the County of Lecco. During the year 1999, the pilot will start and on the basis of evaluation and feedback obtained the extension to the whole regional area will be prepared.

The aim of the project should be the definition and the implementation of a logical and technological architecture for a communication and cooperation system that equally involves health professionals, health care structure at local and at central level, and patients/citizens in the optimized process of request/offer/provision/acquisition of health care services available in the Lombardia region.

Northern Greece

Description of Region

The Region of Northern Greece includes the provinces of Imathia, Thessaloniki, Kilkis, Pella, Pieria, Serres and Halkidiki. It covers a total area of 19.146 square kilometres. It is located in the Northern boundaries of the country and is adjacent to Bulgaria and to Former Yugoslavia and it makes up 14.5 % of the total country area.

Northern Greece has 1.7 Mio. inhabitants, which represent 16.9 % of the population of whole Greece. The Region produces 19,9 % of the GNP of the country in the primary branch, 17,3 % in the secondary branch and 14,8 % in the tertiary. Examination of the basic financial rates of the region in general and of Thessaloniki, the capital, in particular shows that the growth indicators are considerably higher than the country's average.

Greece is moving from a highly centralized system, where the central government in Athens was the controlling authority, to a decentralized system with the regional authorities playing a vital role in the decentralization effort.

The process of decentralization of health services from the central government to the regional authorities is in the initial stage of setting the strategy and infrastructure requirements to support regional health networks. The Depart-

ment of Life Quality (standard of living), is responsible for planning and applying the environmental policy in the context of principles and directions for the viable development, the planning, the programming and the specialisation of full-scale policy programmes concerning health, welfare and hygiene and working conditions.

Information Systems

In Northern Greece the Laboratory of Medical Informatics (Aristotle University of Thessaloniki) is connected via one of the most advanced networks in the country with the AHEPA General Hospital which in fact is located on the campus of the Aristotle University (FDDI and ISDN under development).

Statistical data concerning patient management are held at most public and private hospitals. These data are either kept centrally or in a decentralized way in individual outpatient clinics or hospital departments. The information has mainly been recorded manually by the responsible medical expert of the outpatient clinic or the assistant nurse. In Greece a bank of information is also kept at some medical societies which are now starting with the automation phase, for example the Diabetological Society of Greece. The most important function of a HIS is to provide communication among the many health care professionals who cooperate in the management of patients. Also, to organize and present patient specific data so that medical experts can interpret and utilise the data for most effective and efficient decision-making.

Concerns

From an administrative point of view, the most pressing information needs are those related to the daily operation and management of the hospital-bills. Information is a necessary tool in the hand of hospital high level management for long-term strategic planning of hospital activities and short-term operational and tactical decision-making.

Clinical and administrative data have mostly been managed separately by groups of people with totally different educational and professional backgrounds and distinct areas of responsibility performing their tasks in separate environments. Thus, traditionally administrative and clinical data have been managed separately by individual Information Systems in local computer environments. These computer terminals may also be managed separately in the

various hospital departments, in this way avoiding conflicts about prioritising services and investment. This situation has given rise to an enormous problem: a lack of integration of data from diverse sources and therefore an ineffective exploitation of the data collected. This of course produces inefficiency in terms of wasted man-hours in redundant and duplicate data entry and maintenance as well as information inconsistency. These inconsistencies can result in ineffective patient management from clinical, administrative, and financial points of view as well as in inappropriate resource-allocation decisions.

Solutions

An integrated computerized patient record is extremely important encompassing a number of functions such as effective clinical decision-making, efficient and accurate billing process, quality assurance activities, and longer-term resource planning. The integration of data from multiple hospital departments will produce a bank of knowledge which when filtered and processed appropriately will aid the decision-making of medical and administrative hospital professionals. These data will also be a useful input to other specialized purpose-directed information systems.

The information network platform of the 30 strategic hospitals of the country will be completed as soon as these will be connected with one another, with the medical centres for which they are administratively responsible and also with the Ministry of Health and Social Welfare, the National Centre of First Aid and the National Pharmaceutical Organization. This project, which requires the development and implementation of up-to-date and state-of-the-art Telecommunications in the Health Sector is part of the STAR EC programme. It is hoped that this will aid the information exchange between hospitals with respect to bed availability and the effective management of patients both in first-grade medical care (medical centres) and second-grade medical care (hospitals).

Future

Using the outcomes of the EDITH and the HANSA EU projects and different descriptions produced within CEN / TC251. The description of EDITH as well as the HANSA project is thus part of the background material for preparing the technical requirements for interoperability.

George Vakaros
Sotiris Zigiaris
Elisabeth Petsetaki

In the framework of programmes for the promotion of the Information Society, a very important project is currently under development in Northern Greece. The programme IRIS - Inter Regional Information Society Initiative. Administratively, the programme belongs to the Ministry of Public Affairs and Decentralisation with coordinator, the Region of Central Macedonia-Greece. The programme IRIS has just started its implementation, following the successful proposal studies that have been submitted for individual application areas. Most of the ten application areas that have been selected have a direct or indirect impact in the health sector.

A major initiative was carried out by the Ministry of Health Welfare and Social Security. Its long-term strategy has been the introduction of Hospital Information Systems in the Health and Social Security Sector. This has been a goal during the last decade and has continued during this decade. The realization of this plan has been part of the Mediterranean Complete Programmes (MCP) in information technology. With respect to the project of the introduction of Hospital Information Systems (HIS) as part of the MCP programmes, 15 hospitals belonging to the National Health System (ESI) have installed and started operating the computerized patient record and administrative and financial software systems.

North Rhine-Westphalia

Description of the Region

North Rhine-Westphalia (NRW) is situated at the Western side of the Federal Republic of Germany, with common borders to the Netherlands and Belgium. With 18 million inhabitants it represents the state with the highest population in Germany (i.e. about 19 % of all Federal citizens) and the largest regional administration in Europe.

Formerly marked by its 'coal and steel' image, the Region has undergone a thorough structural change: New industries such as chemistry, mechanical engineering, food processing and beverage industries, electrical industries, vehicle construction, and above all environmental technologies have long since

taken the lead. The services sector now representing 55 % of the employed population as well has considerably increased, namely the growing 'health industry' seems to be one of the forthcoming factors for employment characterizing the future economy of NRW.

Düsseldorf, the capital of the North Rhine-Westphalian region, is the location of the State Government who's competencies in the public health sector primarily cover planning, regulation, and financing of the in-patient sector. At the lowest administrative level in the public health sector 54 local health authorities got the responsibility for a great variety of tasks. Two major problems are becoming more and more pronounced for the medical services: chronic diseases and an aging population and prevention on community level. Following the enforcement of the new North Rhine-Westphalian legislation in the field of public health now the coordination of public health in the region and health concerned reporting has been delegated to the local communities.

Birgit Weihrauch

Information Systems

The situation of information technology in the health sector is intransparent and heterogeneous. A variety of health related databases like infectious diseases, cancer registry, and hospital treatment currently exists in the North Rhine-Westphalian region. However, at the moment no regional health information infrastructure to connect these databases has been built up yet in NRW.

Significant mass data are above all produced in three major data circuits:

- Regional Office for Data Processing and Statistics (in accordance with the institutional structuring statistics exist on hospital care, outpatient and inpatient nursing, outpatient curative care, public health and health management)

- Statutory Sickness Funds (covers almost 90 % of the population and keeps statistics on membership, finances, services, and other)
- Health services in general (data on diagnosis, patient treatment, drug prescriptions, charges, etc.)

The degree of digitalization and/or automation varies between electronic networking via ISDN and the exchange of manually produced data carriers (forms). Up to now these data circuits have not been systematically linked and therefore not been integrated technologically. Interoperability presently has to be regarded as problematic, both with regard to contents and technical aspects.

Concerns

The ten health targets for NRW adopted by a consorted action of all relevant authorities represented in the North Rhine-Westphalian health care system explicitly include improved information structures. This reflects the growing awareness of the importance of information technology at health organizations.

Cross-sectional tasks like coordination and cooperation of all parties concerned are becoming more and more pronounced both at regional and at local level. Newly developed health policy instruments like “Round tables” to achieve agreements on common recommendations for action in health-related questions are depending on transparency in all areas of health care. However, isolated data bases do not allow to analyse the multitude of structural interdependencies within the health system. So before formulating new needs for information, the integration of already existing data circuits should be persued.

Core idea is that it is highly desirable to have a complete and uniform access to all relevant information, but it is not necessary to store all the information in one place. The solution to this antagonistic demands is the concept of starting with the implementation of a metainformation server, which stores information about the location, the structure, and the semantic of knowledge oriented (factual) and spatio-temporal health information. The second step should be to extend the application to a network combining all 54 local health authorities of the Region.

Solutions

A Project on “Local Coordination of Health and Social Care” was implemented in September 1995 by the Ministry of Women, Youth, Family and Health North Rhine-Westphalia. Its aim is to support the local health authorities especially in communication and the supply of information. It exemplifies the interdependence of political re-engineering by forming new patterns of interaction (“The Round Table”) and of software re-engineering by providing the necessary means (the so-called “OKO server”) to make those interactions comfortable and effective.

Prerequisites for achieving the aims and objectives of the project are the development of methods for collection and application of data material to analyse the actual state of affairs and future demands, planning support for process and project management, the planning of tasks as well as common agreement on further developments.

Together with the telecommunications system, an infoserver for all partners of the ‘Local Coordination’ (in German: **O**rtsnahe **KO**ordination) project has been installed at the Institute of Public Health NRW. The Intranet Server provides all important information and data for quick retrieval. Documents which formerly had to be copied and sent out to all participants can now directly be downloaded from the project offices.

Ralph Menke
Berutha Bentlage
Helmut Brand

From the moment on they are provided on the server, data for planning of activities, referencies to further literature or even original documents or additional software tools for data analysis and presentation can be retrieved by the users in the local communities. All modules have further categories which mention contact partners or facilitate the request for materials.

The complete software of the Intranet server for the project “Ortsnahe Koordinierung” is based on open

standards, especially on the standards within the Internet and the World Wide Web.

Future

According to the intentions of the Instute of Public Health, the OKO server is to become an open forum for communication and exchange of information but also for criticism. Further extensions or alterations will be carried out in accordance with the requests of the participants and requirements of daily work. Therefore ideas and suggestions will of course be appreciated at any time.

For the Institute of Public Health and local communities the infoserver has a pilot function: A new service offer is being tested from which later on all cities and counties in North Rhine-Westphalia will benefit.

County of Stockholm

Stockholm County Council operates within the region of Stockholm County, which is subdivided into 25 municipalities. The region is inhabited by 1.8 million people, it spreads a surface area of 6,500 km^2.

Every fifth inhabitant of Stockholm County has some kind of immigrant background. About 170 different nationalities are represented. It is noticeable in many ways how Stockholm County has today become multicultural.

Looking at Stockholm County Council at first sight good conditions for managing the health care sector are provided: The political power is regional, the system is locally taxfinanced and comprehensive, the responsibility for Health care provision is at the region and organized in a decentralized way. Current objectives set for development of the health care system are:

- More value for money (or less money)
- Put the patient in focus
- Continuity of care, more accessibility at each step
- Creating competition between different concepts of care
- Improving health and reducing inequalities in health within the population.

A health care reform („The Stockholm Model“) which started during the nineties introduced an ‘internal market’ in order to increase productivity, to improve service for the patient, and to improve the internal organization of hospitals.

Information systems

The electronic support for monitoring health care activities and costs seems to be well developed. A routine information flow has been established through all health care units of within the Region and also in some extent to the Swedish authority (Socialstyrelsen). Within the Stockholm County Council itself there is a lot of information regarding patient flow, billing, financing data, etc. Most of the information are exchanged in an electronic form.

A broad latitude has been given to the local units to choose the systems to expexted to support their operations in the best way. Recommendations for the selection of local applications are provided by the County Council:

- Standard packages that offer the desired functionality
- Open systems that can be integrated with other systems
- Systems that reduce long-term costs (e.g. maintenance, new versions).

Local units deciding not to follow recommendations have to study the consequences and bear any increased integration costs. Some standard packages have required extensive customization. In such cases a reduction of costs can be obtained by using packages throughout Stockholm County on local computers connected to a network.

Concerns

Health care is in transition and struggling for understanding the effective use of information technology in supporting its future state: The definition of health care is expanding towards promotion of healthy individuals and healthier communities. Emotional, economic, or social issues must be adressed in assessing the health status of individuals and populations. Health systems can no longer afford to deal only with payers, institutions, and physicians but have to include pharmacists, clinics, home health agencies, social services agencies, emergency medical services, imaging centres, alternate care providers, and suppliers as part of the "health value chain".

The expanded value chain carries significant implications for information systems which in the past were developed as independant systems for each link of the chain. Each system has now to provide the capability to be electronically connected and to exchange information with each organization in the value chain. Moving towards process and work-flow oriented organizations will demand quick and safe ways of exchanging information between those who provide care.

General standards need therefore to be further developed to create IT-services enabling seamless integration and communication to support more process-oriented and managed care, new telemedicine requirement and the education area all over the region.

Solutions

In short the existing electronic support for managing and monitoring purposes are very poor at all levels of organization. To increase the efficiency and effectiveness of both health care delivery and the information technology support we want to promote open systems, based on common components and common terminologies and definitions. This process will take time and will be expensive. In order to initiate a development in the direction we intend to use information mainly extracted from existing systems.

For example based on existing (or new) applications/databases health care events will be extracted and brought together for the individual patient on a longitudinal/logistic axis (care chain). These health care events, reflecting medical praxis will be cost-evaluated using financial calculations. In addition to practice and costs this system should also be able to show variables indicating medical, functional, and quality of life results.

Using the system, it should be possible to follow up practice, results and costs by patient, diagnosis, DRG, clinic/unit, hospital, health care district, County Council, etc..

The technical structure is based on the use of a general infrastructural platform for collecting, processing and following-up the costs, availability, quality and care methods.

Rolf Qwärnström
Bengt Blomberg

Future

IT alone cannot change health care but in many ways it can be a positive factor in the process of change. To fulfill the targets and visions for both the operational development and IT common health care strategies are necessary. In simple terms, standards and collaboration are required to fully utilize IT so that information and electronic communication flows freely between care providers within the region. The requirement for collaboration and standards is thus central to design a common health care IT strategy.

Certain prerequisites for this common strategy will be created at the Council level, other will be provided by the overall responsibility of the County Council central office with regard to:

- The common County Council IT strategy and IT policy (responsibility for design and updating of the common County guidelines, including ADP technical platforms etc.)
- Administration of the common infrastructure (administration of the infrastructure is an absolute prerequisite for the operations to be able to use services such as e-mail)
- Administration of common County Council administrative systems (e.g. salary systems, financial systems, registration handling etc.)

Wales

Description of Region

Wales occupies a broad peninsula on the Western side of the island of Great Britain, and is almost entirely mountainous except for narrow, low-lying coastal regions, mainly in the south and west. It is part of the United Kingdom of Great Britain and Northern Ireland and administratively it forms part of England.

The population of Wales in 1995 was just over 2.9 million. Both English and Welsh are official languages, with English spoken by most of the population. More than one-quarter of the population also speak Welsh.

Cardiff, the capital of Wales, is also the location of the Welsh Office, which provides regional administration. The Secretary of State for Wales heads the Welsh Office and is responsible for the majority of Government policies as they apply to Wales and is a member of the Cabinet of the National Government. During 1999, the Welsh people will elect members to a new Welsh Assembly, which will take authority over much of the regional administration.

A great deal of the heavy industry that previously flourished in Wales has now closed, leaving areas of high unemployment and poverty. This has also left a legacy of ill health and higher than average mortality. Central to the new government's strategy for the National Health Service (NHS), local authorities, and government agencies in Wales, is the tackling of inequalities in health, with a new focus on the determinants of ill health.

The NHS is tax funded and has three tiers of management, central government (The Welsh Office), Health Authorities and Providers (General Practitioners and Hospitals). The five Health Authorities in Wales are responsible for achieving health gain through the setting of priorities and strategies and commissioning of health services on behalf of their resident populations. Health hazards such as air pollution, insanitary housing, contaminated land, food poisoning, infectious diseases, and water quality are the responsibility of 22 unitary local authorities and a variety of government and non-government agencies.

Information Systems

In the mid-1980s, the NHS had an information technology (IT) development programme with a philosophy of rolling out a series of national standard systems. Whilst this philosophy provided the benefit of standard data, the client organizations were offered few product choices, and technological innovation was curtailed owing to the lack of competition.

With the changes in the organization of the NHS in Wales, the responsibility for the provision of IT services was placed more and more down to local level. This has meant a growth in locally-provided IT systems from a range of suppliers. Whilst the local health organizations have benefited from greater product choice and tailoring to their needs, the requirements of regional data standards has tended to be allocated a low priority. This has resulted in a variety of systems

being introduced, especially within operational areas of hospitals, and presents difficulty in terms of sharing information between different systems.

NHS Wales is fortunate to have in place an integrated telecommunications infrastructure encompassing data, voice, and multimedia services, and this provides the main vehicle for electronic communication. This network (DAWN) replaced the preceding X.25 network with an IP (Internet Protocol) network instead. It is used to access bureau-type services using interactive screens. Reports are printed remotely and files are transferred to and from operational systems. Information in the form of e-mail also makes use of DAWN. More recently, the use of Intranet services is becoming increasingly important and the recent link to the Internet has shown a significant growth in Web/SMTP-e-mail services in general. The local authorities do not have the equivalent of DAWN, nor do they have access to DAWN.

Medical computer systems currently in operation within NHS Wales make use of national and international coding regimes such as READ codes and ICD9/10.

Concerns

Historically the ability to share information easily with other systems has tended not to be considered during the design of health care applications (legacy systems). This means that the problem of system inter-operability has not been adequately addressed, so that procedures for data exchange are becoming ever more complicated as more and more systems have to be linked. Furthermore, this may make it difficult to achieve some regional health targets – the 'healthy environments' initiatives, for example, since there is practically no linkage between public health data in health service information systems and environmental health data in local authority and other agencies' information systems.

In Wales, for the Health Service, there is still a centrally coordinated Information Management & Technology Programme that formulates the overall strategy for information requirements in terms of defining the minimum data sets. The emphasis has rightly been on agreeing information requirements to be provided locally and presented in a standard format. However, this has not tackled the issue of inter-operability of systems, so that not all data needs have been met. Also it has proven to be very difficult, if not impossible, to meet the needs of new and unforeseen data requirements.

For instance the pressing need for health information in order to investigate claims of ill health associated with landfills sites could only be partially fulfilled. This was despite the fact that much of the required data did exist, but was locked away in Provider health systems that did not easily give up the data or lacked a common data standard.

If regional policy makers are to plan health´care services effectively, then access to reliable and up-to-date information is a key requirement. The inability to exchange data, or inter-connect health care systems is now one of the major problems facing regional public health policy-makers in Wales.

Solutions

Over the last year an innovative approach to the problem of inter-operability of laboratory information systems has been adopted by Public Health Laboratory Service Wales - the IMAGINE project. IMAGINE uses Lotus Notes to automatically exchange specimen results between laboratories. Although the IMAGINE project could be extended to provide results to General Practitioners, a great deal more work would need to be done to fulfil the wider needs of data exchange within the parent hospital and to regional policy-makers. This would require the extension of the IMAGINE database to replicate all data in the pathology laboratory information system, so that hooks to other systems could be written to this ‘middleware’ database rather than directly to each of laboratory information systems. In this way pathology data could be made more readily available using standard procedures, and access would become independent of the laboratory information system vendors.

Such a development should be designed to comply with European standards and health care information system architectures. Unfortunately, it is by no means certain that Lotus Notes would be the best vehicle for such a wider development. Despite this, IMAGINE does point us in the right direction. It introduces us to the concept of middleware and it makes use of IP communications (across DAWN) - both of which support open systems as promoted by ESPRIT (European Strategic Programme for Research in Information Technology).

Future

Gary Coleman, Ray Henry, Peter Stansfield

The replacement of existing operational health care systems to solve the information requirements of the regional policy-makers cannot be achieved within reasonable time-scales and budgets. What is required is the adoption of a platform that will allow these systems to be interconnected, and also one that will facilitate migration to health care information systems that are based on standard architecture. Such architecture has already been established by the EU HANSA (Healthcare Advanced Network Systems Architecture) project, along with a demonstration of health applications inter-operating through middleware solutions.

It is recognized in Wales that a middleware solution may be used to provide:

- a means to integrate legacy applications into the overall health care information system, and by this means gain access to otherwise isolated data
- a consistent environment for the development of new health care applications which are inherently capable of integrating with other applications
- a method of integrating environmental and health data.

It is proposed to test the validity of applicative middleware in the health care environment of Wales.

Part 8
Annex

Publications and Presentations of RHINE AM

1. Poster presentation at 42. Annual Conference of Deutsche Gesellschaft für Medizinische Informatik, Biometrie und Epidemiologie, 15 - 18 September 1997, Ulm

2. Ketikidis P H, Ambrosiadou B V, van der Werff A, Maglaveras N, Pappas C. RHINE-AM: An inter-regional health information network for Europe, (Pappas C, Maglaveras N, Scherrer J-R, Edts) Medical Informatics in Europe 97, Health Technology and Informatics Series, vol. 43, IOS Press, pp. 94 - 98, 1997

3. Brand H, Menke R. Regional Health Information Network for Europe (RHINE-AM) - Project Description - In: Conference Documentation Competing in the Information Society - New ways of working and doing business, 24 - 26 June 1998, Genova/Italy, June 1998, pp 625 - 631

4. Poster presentation at Conference on Competing in the Information Society (CIS) - New ways of working and doing business. 24 - 26 June 1998, Genova/Italy

5. Brand H. Regional Health Care Reforms and Information Technologies - Regional Health Information Networks for Europe (RHINE AM), Gesundheitswesen 60, A34, 1998

6. Brand H. Regional Health Care Reforms and Information Technologies - Regional Health Information Networks for Europe (RHINE AM) Speech at the Wissenschaftliche Jahrestagung der Deutschen Gesellschaft für Sozialmedizin und Prävention (DGSMP) und der Deutschen Gesellschaft für Medizinische Soziologie (DGMS), Marburg 29 September - 01 October 1998

7. Brand H, Coleman G. RHINE: Regional Health Information Networks for Europe. Speech at: A Partnership on Social Health and Community Care. Committee IV, Assembly of the European Regions. Seminar and Workshop. Torino/Italy 29 - 30 October 1998

8. Levett J. Speech at XX ASPHER Annual Conference. Quality in Public Health Training: A Pedagogical and a Public Health Issue, Torin, 10 - 13 October 1998

9. RHINE Consortium. RHINE Regional Health Information Networks for Europe, EURO-Brochure. Institute of Public Health NRW. 1998

10. Menke R, Brand H, Coleman G, Henry R. The Impact of Information Technology on Recent Health Care Reforms in Selected European Regions. submitted to "Das Gesundheitswesen". Issue February 1999. In print

11. Workshop on "Policies and Strategies of Health Information Technologies for Regional Administrations submitted for MIE '99 - Fifteenth International Congress, August 22 - 26, 1999, Ljubljana, Slovenia

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Presentation of Project Partners

Cable & Wireless Communications

Mercury Communications Ltd, Bristol, UK is a PTO established in 1982, and is granted its licence to operate by the DTI in 1986. The company currently employs 9500 people and is a subsidiary of Cable and Wireless PLC. The company is supplying a whole range of voice and data related products and services in a variety of sectors as health, social services, public administration, education, police, both at 'regional' and 'local' levels. Mercury has just been jointly awarded the NHS WAN by the National Health Service (NHS) in England. The company has expressed interests in a number of CEU initiatives including EuroSTEP of Sweden. The company will assist Wales, and other participating Regions by consultancies and the provision of network services.

Deutsches Gesundheitsnetz Service GmbH DGN

DGN Deutsches Gesundheitsnetz Service Ltd. (German Health Network) was founded in 1997 by o.tel.o communications (a new German telecommunications operator; 50 % share) and by APO-Bank (the Bank of German Pharmacists and Doctors; 50 % share). DGN works closely together with the Bundesärtzekammer (Federal Association of Doctors) and with the Kassenärztlichen Bundesvereinigung (Federal Union of Health Care Insurances), for example in the TEN-TELEMED EU-funded project. DGN offers three intranets: for doctors, pharmacists and dentists. Using modern telecommunications networks of o.tel.o communications DGN offers web-based services, encryption, serveral contents in cooperation with content providers, and a flexible platform for new organizational structures in the medical field, like joint-venture companies of GP´s.

Enator Trigon AB

The Enator Group is one of the largest IT companies in the Nordic Region. Annual revenues amount to approximately SEL 5 billion, with over 5,000 employees in some 60 cities in the Nordic countries and Germany.

Enator is active in all segments of the IT market and accodingly can offer integrated total solutions. Our core business is to deliver competitive solutions whereby the customer is assured of optimal IT utilization.

Enator has an extensive customer base in all client segments: private sector, local authorities, health care, government and defense. Enator is characterized by the ability and willingness to understand the customer's opertions and corporate culture in terms of both strategic development and daily activities.

However, breadth of products and serices alone is not enough. To be competitive, the Company requres market-leading expertise in each segment. From a standpoint of expertise and market cultivation, Enator is a leader in each product and service segment in the IT market.

Enator strives to combine the advantages of a large group, in terms of resources, economy of scale and stability, with the speed of action, proximity to the market, dynamics and creativity of a small company. To this end, the group is subdivided into about 80 independent business units, each with profit responsibility. With offices in 60 locations, Enator is always in close proximity to the customer.

Enator's operations are based on individual aptitute and commitment. The company's business and corporate culture based on consciously encouraging, individual initiative, since our employees' expertise and commitment are among our most important competitive tools.

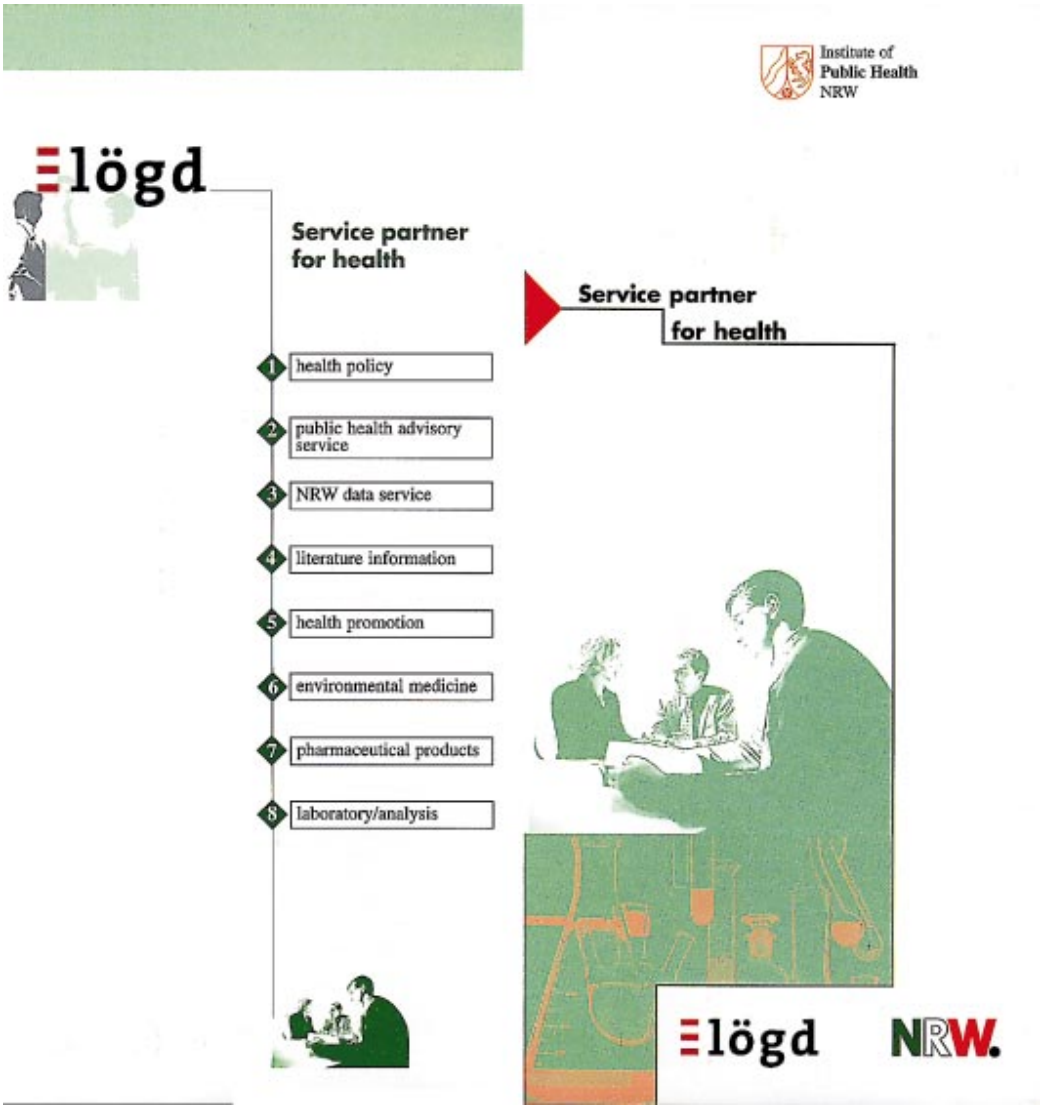
INFODOMI

Infodomi is situated in Thessaloniki Greece providing services and end-user products in the following areas:

- Business Process Reengineering (BPR)
- Telecommunications and Information Processing (TIP)
- Distributed Information Processing (DIP)

One of the strengths of InfoDomi is to enable clients to best integrate various technologies to meet their business requirements. InfoDomi's team of experts have practical experience in providing clients with innovative solutions including systems analysis, design, development, technical support, distributed computing, and technology planning.

Landesinstitut für den Öffentlichen Gesundheitsdienst NRW, loegd



Our range of services

1 NRW health policy

Both at state and local level the lögd provides facts for planning tasks and assists with their implementation to establish a local and state health policy geared towards integration as stipulated in the new Public Health Care Act.

Examples:

- Assisting with the development and implementation of the NRW health targets
- Coordination and office management for the project on "Local Coordination of Health and Social Care"
- Organization of a health monitoring system for decision-making bodies and the public
- Assistance for the "Local/Regional Agenda 21" from the health point of view.

2 Public health advisory service

The lögd supports the local public health authorities in NRW. We offer services the public health authorities need for the future-oriented implementation of their innovative functions in the fields of coordination, moderation and management of local health processes.

Examples:

- Clearing and advisory office for first contacts
- Local information and data service
- Assisting with the establishment of local services structures
- Advice in questions concerning infectious epidemiology and vaccination prophylaxis
- Assisting with the application of epidemiological methodology
- Expert advice on hospital hygiene and hygiene in other public institutions, for analytics and quality assurance
- Expert advice on water hygiene and -analytics, quality assurance
- Expert advice on health aspects in connection with tests to determine the ecological impact of chemical products and substances (UVP).

3 NRW Data Service

The lögd provides health data as a basis for decisions and developments both at state and local level.

Examples:

- Health indicators for all areas of health and health care
- Data for local health monitoring
- Data from the paediatric medical services
- Management of the drinking water database

4 Public health literature information

The lögd allows access to more than 300.000 documents from the fields of occupational health and environmental medicine, epidemiology, health promotion, health policy, public health service, drug addiction and health monitoring.

Examples:

- SOMED Public Health Database on CD-ROM, as printed periodical or access through qualified, individual searches
- One of the biggest public health libraries with open access for the public

5 Health promotion

The lögd initiates measures for health promotion in NRW, provides assistance with the development of media and materials and accompanies the implementation of these activities.

Examples:

- Campaign to reduce the pre-hospital phase "Recognize cardiac infarction and react adequately"
- Conception of exhibitions, information material and audiovisual media including on-site service
- Conception of the telephone service of the Ministry for Women, Youth, Family and Health
- Development of the media for the "Healthy Land NRW" consortium

6 Environmental medicine, hygiene / NIS

The lögd coordinates epidemiological analyses in the field of environmental medicine and hygiene. It supports the municipalities and the Land NRW in the assessment of problems concerning environmental health. For the public health service and doctors additionally qualified in environmental medicine a Noxious Chemicals Information System (NIS) is being provided.

Examples:

- Advisory function in environmental health-related questions for authorities and institutions
- Advisory function in the carrying out of quantitative risk analyses
- Instruction and training for users in the field of environmental medicine/hygiene.

7 Analysis and assessment of pharmaceutical products

As official authority of the Land NRW responsible for analysing pharmaceutical products the lögd regularly tests and examines the quality and safety of pharmaceutical products in accordance with the consumer protection for retail trade, wholesale trade and the pharmaceuticals industry in NRW. These analyses are carried out in cooperation with the regional administrations and health departments as well as customs office, police and judicial authorities.

Examples:

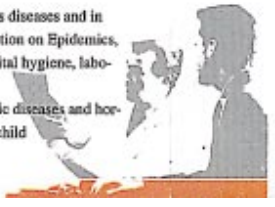
- Chemico-physical analytics of pharmaceutical products such as identity and content determination of the substance
- Inspections in the pharmaceuticals industry (GMP, GLP)
- Advisory and information providing function for ministries and monitoring authorities with regard to questions concerning the safety and policy of pharmaceutical products.

8 Laboratory work and analyses

Analysing human and environment samples is also part of the wide range of functions performed by the lögd. The department for infectious epidemiology and hygiene as well as the departments for environmental medicine and environmental hygiene fulfil an advisory role and are responsible for the carrying out of corresponding analyses and further training.

Examples:

- Laboratory tests in case of infectious diseases and in accordance with the Federal Legislation on Epidemics, in case of questions relating to hospital hygiene, laboratory safety and immunity
- Tests to identify congenital metabolic diseases and hormonal imbalances of the new-born child
- Drinking and bath water analyses



Contact us:

Are you interested? Then phone us. If you are interested in services for which no contact has been given, please address colleagues from related areas.
Or contact our operator:
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Public health systems and their changing role

As a result of changed symptoms and an increase in chronic diseases the Public Health Service (ÖGD) constantly has to redefine its functions. Moreover, the increasing cost pressure caused by economic stringency necessitates more coordination and cooperation in order to employ resources as efficiently as possible.

This changed situation is also reflected in the Public Health Care Act (ÖGDG) which came into force on January 1st, 1998. The Public Health Care Act provides a new setting for experiences and knowledge gained over decades to establish an integrated health policy at local and state level. Only by joint efforts can the protagonists of the health systems such as health insurance funds, Statutory Health Insurance (SHI) physicians, hospitals, charitable organizations, municipalities and others perform their functions in the interest of the population with the required quality and economic viability and provide their services in a way attentive to the preoccupations of the citizens.

In the planning, implementation and management of innovative activities the Public Health Service is supported by a competent partner offering a qualified range of services: the Institute of Public Health (lögd).

The lögd as service provider

As an institution of the Ministry for Women, Youth, Family and Health of the State of Nordrhein-Westfalen the lögd has been commissioned to provide a contribution to the maintenance, restoration and improvement of the people's health in the region. It contacts decision-making bodies and multipliers in politics and administration - at local and state level.

The competence of the lögd is also appreciated outside NRW. This is confirmed by a multitude of inquiries from other German Länder and project partners in various European countries where the institute enjoys international confidence.

The lögd sees itself as a demand and user-oriented service provider whose services are also available to public health professionals in general and interested citizens. As a transfer medium between science and practice the lögd is in a position to profit from many years of experience gained by its preceding institutions, the Hygienic-Bacteriological Laboratories, the Pharmaceuticals Testing Institute and the Institute for Documentation and Information (idis).

From practice for practice

About 200 employees from all relevant health professions are your partners when it comes to finding a solution to your problem. Practicians who have given up the traditional mentality of administrative bodies and do not withdraw into the ivory tower of science. In this context the setting up of multidisciplinary teams is the overriding working principle.

Cooperation partners from science (among others the University of Bielefeld, faculty for health sciences, medical institutions of the University of Münster), from politics, administrations as well as committees and associations ensure quality, relevance to practice and scientific evaluation of the results. In addition, the lögd is a WHO documentation centre.

Implementation of concepts based on state-of-the-art communication technologies

The lögd communication technology is oriented towards user needs. So for example special DP-work stations have been set up for the recording of data from diagnostics and laboratories as well as for the multimedia presentation of information, the preparation of data for infographics or the printing of comprehensive publications. Cooperation partners may contact the lögd via e-mail.

For the project on "Local Coordination of Health and Social Care" an intranet with video conference system and information server was set up in cooperation with the involved municipalities. The NIS Noxious Chemicals Information System, the SOMED Public Health database as well as NRW health monitoring data can also be found on the Internet.

Structure of the lögd

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Head: Dr. Gabriele Rössler

Department 3 Principles of local health policy, health promotion
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Department 4 Environmental medicine, environmental hygiene
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Department 5 Hygiene, infectiology, neonatal preventive care laboratories
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Department 6 Pharmaceutical products
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June 1998

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Lombardia Informatica SpA

Lombardia Informatica, Milan, is an internationally operating joint stock company, founded by the Region Lombardia. The company employs at this moment about 370 people and has a yearly turnover of approx. 32 M ECUs. Its mission is, to design, test and supply an entire range of information systems as well as the infrastructure that provide the distributed environment on the basis of which services to the Public Authorities in general, and to the Regional Government of Lombardia in particular, are being rendered. To all sectors including health care, Lombardia Informatica provides its services. Outside the European Community the company has relations to countries in Southern America and in the CCEE. The services Lombardia Informatica offers of special interest for this project are:

- Design and development of distributed architectures and technologies for regional information systems
- Services with regard to the improvement of organizational effectiveness in relation to techniques for business processes at regional level.

Lombardia Informatica has a broad experience in participating in innovative international R&D projects in DG III (ESPRIT) and DG XIII (AIM) i.e.:

RICHE:	Development of an open systems framework for hospital information systems
SHINE and *STAR:*	Development of an open systems framework for telematic services networks at community level
NUCLEUS:	Design of models and development of a prototype of an electronic multimedia patient-dossier
EDITH : (Italy)	Development of a distributed information technology for health care
TRILOGY:	Establishment of a common environment for telematic services networks in different countries and sectors
CARDLINK:	Provision of smartcards with telematics functionality.

Ministry of Women, Youth, Family and Health NRW

The *Ministry of Women, Youth, Family and Health North Rhine-Westphalia* (Ministerium für Frauen, Jugend, Familie und Gesundheit für das Land Nordrhein-Westfalen, MFJFG) is located in Düsseldorf which is the capital of North Rhine-Westphalia (NRW), a region at the Western side of Germany. Inhabited by 18 million people NRW represents the most populated state of the Federal Republic of Germany and the largest regional administration in Europe.

Part of the Ministry's tasks are the policy for equality of women and men, the responsibility for youth, family and senior citizens as well as health policy.

Mrs. Birgit Fischer,
Minister of Women, Youth,
Family and Health, NRW

The MFJFG and its Departments

The MFJFG NRW is a Ministry which deals with the social relations between people, social groups, organizations and institutions. It is about elementary human interests and needs.

Department I: Central Affairs

Budget, organization and personnel as well as legal matters

Department II: Women

Areas of responsibility are promotion of women at work, social security, women at family and work, violence against women and girl labour

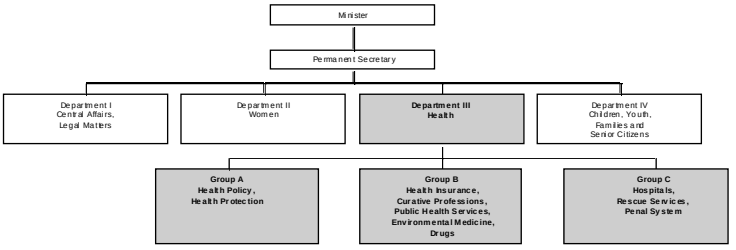
Department III: Health

Areas of responsibility are health policy, health promotion, curative professions, public health services, environmental medicine, drugs and hospitals

Department IV: Children, Youth, Families and Senior Citizens

Additional areas of responsibility are innovative youth policy, kindergarten 2000, family policy, media competence

Ministry of Women, Youth, Family and Health North Rhine-Westphalia
(For simplification Groups only shown for Department III, Health)



The Health Department – Its Main Fields of Work

The Department III 'Health' is subdivided into three Groups representing the main fields of work the health division deals with:

Group A: Fundamental questions of health policy, addiction and drug policy, preventive health policy, medical rehabilitation, self-help, HIV and communicable diseases, hospices, psychiatry, and penal system

Group B: Public health service, nursing, professional and examination regulations, legal supervision of provider associations, professional jurisdiction, burial law, psychotherapist law, environmental medicine, pharmacists, drug policy, saftey of drugs, medical products, blood and blood products

Group C: fundamental questions of need planning and financing of hospitals, investment aid for hospitals, hospital charges, hospital and homebuilding, rescue services, penal system, disaster control, and civil defence.

Projects of Special Importance for the Near Future

The following projects are regarded to have special importance for the near future:

- to strengthen the orientation on civil needs at health authorities
- to start a state programme to control addiction

- to draft a framework health resorts (Handlungsrahmen Kurorte) for the regional health spas haunted by demand falling off
- to improve local coordination (Ortsnahe Koordinierung) in health care
- to assess the consequences of the so-called „Dritte Stufe der Gesundheitsreform“
- to pass a revised version of the North Rhine-Westfalian hospital law
- to develop general aspects of health reporting.

In 1992, the NRW Health Conference was founded which comprises all important decision-making authorities represented in North Rhine-Westphalia’s health system with its self-governing structures. This conference was set up to promote a continuous exchange of views among its participants and to agree on common recommendations for action in health-related questions of fundamental importance. For the annual health conferences key issues to be discussed are chosen. The topics of the last years are listed in the table below. These health conferences are prepared and evaluated afterwards by the Preparatory Committee of the NRW Health Conference and/or its working groups which meet every two months. These bodies agree on the topics for discussion and the way these are presented at the conference, they discuss expert opinions given on these issues and evaluate them with a view to the recommendations to be given.

In this way a forum for discussion has been set up where different views on complex issues are expressed and compromises and joint decisions in major health-related political issues are developed. Given the fact that at this conference opinion-forming and decision-making processes are based on the consent of all partners, this health conference fulfills an important function. Due to the fact that its members commit themselves to their intentions and objectives this conference strives for trustworthiness and reliability/ this conference has a binding character.

Year	Key Issues of the NRW Health Conference
1992	oupatient psychiatric care
1993	environmental medicine in NRW
1994	health promotion in NRW
1995	patient oriented development of the health care system in NRW

1996 quality assurance in health care systems oriented toward competition
1997 health as a locational factor and driving force for job creation
1998 towards an citizen oriented health care system in NRW

Contribution to Trans-European Activities
The process towards European unification and political integration covers healthcare as well. The Ministry of Women, Youth, Family and Health, NRW is committed to various trans-European projects exchanging experiences in safeguarding health between European regions, e.g.

- the European Public Health Centre, NRW
- the WHO Regions For Health Network in Europe (RHN)
- the Regional Health Information Networks for Europe (RHINE).

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NATIONAL SCHOOL OF PUBLIC HEALTH
ÁÓÇÁÌS SCHOOL OF PUBLIC HEALTH 1929- 1994
RESEARCH COMMITTEE SPECIAL RESEARCH ACCOUNT

National School of Public Health (NSPH), Athens, Greece

(Parliamentary Law No 2194/ 1994)

Legal Status

Autonomous, non - profit, public sector organization reporting to Ministry of Health.

The Institution was first established in 1925, reestablished in 1929 as the Athens School of Hygiene, modernised in 1981 by Presidential decree as the Athens School of Public Health, and upgraded in 1994 by parliamentary law and renamed the National School of Public Health. The institution is managed by a governing board chaired by a Dean.

Aim of Organization

The National School of Public Health, Athens is a firmly established institution with a rich history covering more than seventy years in the service of the Greek state. The main aims of the School are:

1. To provide continuing educational opportunities, post-graduate training and specialized training for health professionals. Post-graduate training programmes cover the following fields:

   - Public Health for doctors, dentists, pharmacists, veterinary specialists and biologists
   - Public Health Management for graduates in law, economics, social and, political sciences
   - Occupational and Industrial Hygiene for doctors who have already specialized in occupational medicine
   - Health and Environmental Engineering for engineers who are members of the Technical Chamber of Greece
   - General Medicine for doctors undergoing specialized training

2. To study all scientific and technical questions directly or indirectly connected with public health
3. To carry scientific research in all the fields of public health and preventive medicine
4. To conduct public health and laboratory investigations and testing in matters of public health
5. To supply the Ministry of Health, Welfare and Social Services and other sections of the civil service with expert opinion on matters which fall within its competence.

Programme Evaluation

The School's training programmes have been reviewed by a special committees of the European Health Management Association (EHMA), the WHO and by the Association of Schools of Public Health of the European Region (ASPHER) with participation of the AUPHA (USA). All post-graduate programmes are approved by the Ministry of Health.

Structure

The National School of Public Health is divided into 12 Departments which cover a wide range of areas of study. In addition, within the School function the following special reference centres:

- National Salmonella and Cholera Centre
- National AIDS Reference Centre
- National Nutrition Reference Centre
- WHO Associate Nutrition Reference Centre
- National Hepatitis Centre
- Malaria Centre
- National Environmental Issues Management Centre
- WHO European programme on Occupational Hygiene Associate Centre
- Control Center for Infectious Diseases.

An Office of International Affairs has been inaugurated and plans are currently underway to renovate the entire building complex and to establish a Center for Balkan Public Health and Biomedical Technology Assessment.

Number of Staff : Permanent full time fifty two (52) employees

Temporary part- time fifteen (15) employees

Secondary Staff: 10

Total : sixty seven (77) employees

Public Health Laboratory Service

The Public Health Laboratory Service (PHLS) protects the population from infection by detecting, diangnosing, and monitoring communicable diseases. It provides evidence for action to prevent and control infectious diseases threats to individuals and populations.

The evidence comes from expert analysis and assessment of data generated from the PHLS's own microbiological and epidemiological investigations and from many other sources.

Its activities include microbiological testing of specimens, surveillance, research, evaluation and training, and education.

Its customers include local, regional, national and international clinicians and public health professionals and policy-makers.

Its products include advice on effective management of infected patients, advice on policy development for population based interventions, support for incident and outbreak control, and application of new technologies and improved methods.

The unique strength of the PHLS lies in the integration of microbiology and epidemiology at every level within a national organization comprising a network of Public Health Laboratories organized into 9 Groups in England and Wales, the Communicable Disease Surveillance Centre, including the regional epidemiology service, and the Central Public Health Laboratory based with the PHLS Headquarters in Colindale, north London.

The PHLS Board is chaired by Sir Leslie Turnberg.

Regione Lombardia

1. Lombardia's regional health care information system: the pilot

In January 1997, the Regional Government of Lombardia launched a wide project to redesign and carry out a new Information System for the Health Care aiming to improve the level of services provided and to manage with with a better control the Regional expenditure. This project named „Regional Health Care Information System" (or, in Italian '**S**istema **I**nformativo **S**ocio-**S**anitario' - S.I.S.S.) has the goal to obtain a modular open system able to grow with the needs of the health care environment.

All the health care actors (general practitioners, pharmacists, specialists, hospitals, etc.) were involved in this project starting from the beginning a business process analysis of health care environment.

In April 1998, the analysis phase has been completed and Lombardia Region has decided to pilot the system in the County of Lecco. During the 1999, the pilot will start and on the basis of evaluation and feedback obtained, the extension to the whole regional area will be evluated.

The S.I.S.S. project is based on the implementation of a **V**irtual **N**etwork able to support all the communications among the different health care actors ensuring, through the use of a 'public network', the necessary level of privacy and confidentiality in sensitive information, i.e.:

- security of the information exchanged & cryptation techniques
- identification of the users & electronic signatures
- data protection.

The security mechanisms are based on the use of smartcards both for the citizens and for the health care professionals.

2. The Global Scenario

The project has a solid basis constituted by the availability of a large amount of information already stored at Regional level such as:

- Identification data (general practitioners, patients, health care structures)
- Payment for GPs
- Drugs and medicines prescriptions
- Pharmacies provisions and reimbursements
- Local health care unit information flows: internal activities, laboratories, private hospitals, ambulatory activities
- Hospitals information flows: activities, ADT ...

The S.I.S.S. project supports the improvement of the processes related to the data collection and the integration of the different local applications, safeguarding all the investment already made.

In the design phase, requierements have been split in three main groups of priorities, according to the following schema:

- Technology
  - New upt to date telematic infrastructure
  - In*Net technologies to provide information access to citizens and data distribution
- Applications
  - Smartcards
  - GPs, Local Health Care Units, hospital systems integration
  - Unified booking systems integration
  - Integration of emergency system
- Organization
  - Redesign of health care information flows.

3. The Virtual Network

From the technical point of view the expected scenario includes four main items to be built, renewed or integrated:

- Applications
- HW/SW systems
- Middleware platform
- In*Net infrastructure.

combined in a logical infrastructure based on a two level network: the first level supports the interconnections among providers and central regional level; the second level works as a mediator between local applications and regional services incorporating and using ‘providers’ that are also distributed ‘points of presence’ for assuring physical connection.

4. Base Services Provided

With the new S.I.S.S. each citizen will have a smartcard with his/her identification data and the main information on health (i.e. emergency data, last hospitalization...), on the other side each professional will have his/her professional smartcard and the joint combination of these two cards (security and authorization) in the application will give the possibility to enter in the Health Care Virtual Network and to obtain services like: booking, prescription of drugs, ambulatory or hospital performance. All the services provided will be validated and recorded at the central regional level. The added value of this new system consists mainly to have an high quality of the data collected, to avoid duplication in data entry, to know in real time who requested, for whom and about what, and finally, integrity of information and integrated system operability.

The SOCRATES Network

The SOCRATES Network/SOCRATES W2 is a newly formed (1992) independent consultancy group, specializing in 5 major areas of activity: Europe, health, innovation and management of change, information technology and business development. The network is based on a group of professionals from different fields, who have taken the network approach in order to add value to their individual expertise. At this moment the SOCRATES Network Consultants and their associates are represented in all 15 EU Member States. They have also entry to the countries of Central and Eastern Europe (CCEE), and can rely on excellent contacts in the USA. The SOCRATES Network Consultants have an outstanding combination and depth of experience in European Health IT. They have been instrumental in many of the initiatives in this field, particulary those undertaken under the auspices of the EC's DG III: Industry and DG XIII: Telecommunications, Information Industries and Innovation.

Stockholm County Council

The Stockholm County Council (SCC) operates within Stockholm County, Sweden. It comprises an area inhabited by 1.8 million people, spread over 25 municipalities and a surface area of 6,500 km^2.

Every fifth inhabitant of Stockholm County has some kind of immigrant backgound. About 170 different nationalities are represented. It is notaceable in many ways how Stockholm has today become multicultural.

Stockholm County is well-known for its beautiful archipelago with its 24,000 islands stretching from Arholma in the north to Landsort in the south. Around 150 of the islands are inhabited all year round and more than 4,000 people are living on islands where there are no bridge links with the mainland.

What does the County Council do?

Stockholm County Council represents one of 23 Swedish County Councils. It acquired its present form in 1971 but it is looking back on a history of more than 130 years of existence. When it met for the first time in 1863, agriculture and fishing were the main items on the political agenda. Nowadays the SCC is dealing with the issues of a modern administration:

- Health and medical care
  Including emergency hospitals with their highly specialized clinics, primary care provided at health centres and general practitioner's surgeries, psychiatric and geriatric care
- Dental care
  All children and young people up to the age of 19 are entitled to the free Public Dental Service, treating about 500,000 every year
- Special care
  Special care is provided for handicapped children, young people with social or psychological problems and mentally retarded people, psychally handicapped, etc.
- Culture and education
  Provision of vocational health care education, cultural activities aimed at children, young or handicapped people, 'Culture in Care' activities at

hospitals or health centres, co-financing of Stockholm's Concert Hall and of Eugenia, the Museum of Medical History

- Public transport
  Public transport comprising underground, buses, computer trains, and archipelago boats, managed by Stockholm Transit Company (SL) and the Waxholm Shipping Line
- Regional planning
  Coordination of the region's building planning and land-use throughout the county. In conjunction with Sweden's entry into the EU, the SCC has also started various cooperations with European Regions.

With more than 66,ooo people on its payroll (of these, 82 per cent are women) Stockholm County Council today is one of Sweden's biggest employers and in 1995 its overall expenditures amounted to just over 34 billion Swedish kronor.

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Thessaloniki Technology Park Management & Development Corporation S.A.

Chairman of the Board :
Mr. N. Efthimiadis

Background
TTP /MDC S.A. was founded in 1994 with the participation of FORTH/CPERI and major industries of Central Macedonia. The company promotes and enhances the activities of the Thessaloniki Technology Park in close cooperation with the Association of Industries of Northern Greece, Universities and research centers. TTP/MDC is member of: The International Association of Science Parks (IASP), and a partner of the Hellenic Innovation Relay Center (H-IRC) belonging to the network of Innovation Relay Centers, run by the European Commission's Innovation Programme.

Activities

1. Regional Development

TTP/MDC promotes activities which contribute to the increased competitiveness of the Greek industry with special emphasis on Chemical Technology, Material Technology, Food & Drink, Textiles and Energy & Environment. It does this by participating in many European and national regional development programs. Furthermore, TTP/MDC identifies present, future and latent industry needs within Northern Greece and links them with technological innovation. An information network has been established and is continuously expanding encompassing research institutes, industries, and regional development initiatives.

2. Technology Transfer

The Technology Transfer Unit serves as Industry-Research Liaison, performs partner searches, executes assessment and exploitation of research results, assists with RTD proposal preparation, submission and project management.

Furthermore, it ensures information dissemination concerning research results, technological developments, and the emergence of new technologies.

Technology brokerage, technology search & assessment, technology transfer agreements, assistance for technology implementation are also provided. Finally measurements and testing quality control through promotion of analytical services (of CPERI and other laboratories) are also undertaken.

3. Contract Research

The Park promotes closer links of industry with local Universities/research centers by raising funds for basic and applied research related to local industry needs through joint research projects both locally and internationally.

4. International Technology Transfer

TTP/MDC is promoting technology transfer between Greece, the EU, the USA, Eastern Europe, and the Balkans.

5. Contract Education

TTP/MDC undertakes a leading role in contract education of industry personnel by serving as a link between Greek industry and internationally recognized experts in new fields of technology.

The TTP/MDC also organizes, implements, and participates in national and European training programs. TTP/MDC studies issues pertaining to professional training and prepares training workshops on the use of technologies.

Other Services Provided by TPT/MDC for the *Incubator Building*. The Incubator Building is for companies, natural persons, or legal entities interested in transforming innovative ideas into new technology, products or services leading to a successful business.

TTP/MDC promotes the Incubator and the companies of the Incubator. The provision of services to the companies include - secretarial support, fax photocopying, ISDN networking, internet, e-mail and assistance for participation in European and National programs.

University of Wales
Faculty of Community Health Sciences
School of Biomedical Sciences, School of Health & Community Studies, School of Environmental & Human Sciences, National Focus, WHO Collaborating Centre (CIMSU)

The Faculty was established in its present form in September 1993 and provides one of the largest portfolios of education and training in the areas of Health, Community Care, Human Sciences, Environmental Sciences, and Biomedical Sciences. Thus, one of its particular strengths is its diversity of activities. It is located on the Llandaff Campus, Western Avenue, Cardiff.

The Faculty programmes are primarily focused at undergraduate and post-graduate level, many of which offer both an academic and professional qualification. There are a range of specialist programmes validated by BTEC and NVQ.

In line with the Faculty strategy there is an increasingly high profile in terms of Research, Consultancy, Relevant Practice, and Continuing Professional Development. Staff are encouraged to develop particular interests and there exists well-established networks and partnerships through which activities emanate and develop. These activities occur in Wales, the UK, EC and seceral countries overseas.

Within the Faculty there is a high commitment to ensuring participation of staff and students and a corporate management style has been adopted. This is reflected in the Faculty Management Group which meets on a regular basis to determine overall policies and procedures. The membership of the Group is:

Prof. Tony Hazell	Dean of Faculty
Prof. Thelina Parry	Dean of Academic Affairs
Hellen Warren	Faculty Manager
Prof. Gary Coleman	Director, WHO Collaborating Centre
Anne Cleverly	Head of School
Dr. Maureen Bowen	Head of School
Dr. Pam Harris	Head of School

Dr. Sian Munro	Professional Leader
Gwynath Statham	Professional Leader
Bryan Isaac	Professional Leader
Ann Bryan	Professional Leader.

Whilst each School is managed by a Head of School inter-School activities are encouraged.

Welsh Office Health Department
(Publisher's Remark:

The Welsh Health Common Services Authority, represented by Peter Stansfield, is a signatory to the RHINE Project as part of the Wales team.

WHCSA as an organization will cease to exist of 1st April 1999. In parallel with this, Mr. Stansfield and his team have transferred into Health Strategy 5 Branch (HS5) of the Welsh Office Health Department (WOHD), together with his currenct role and responsibilities.

Therefore, as of 1st april, HS5 Branch will formally be taking on the continued responsibility for input to RHINE.)

The Director
The Director of the Welsh Office Health Department is responsible, and accountable to the Secretary of State (via the Permanent Secretary), for the management and performance of the NHS in Wales. The Director is, under the Permanent Secretary, the Secretary of State's principal policy adviser on matter relating to the NHS. In this capacity he works closely with each head of health profession in the Welsh Office, but especially the Chief Medical Officer and Chief Nursing Officer.

The Director is also the Accounting Officer for the resources voted for the NHS in Wales and is the main respondent to enquiries from the Public Accounts Committee on matters relevant to the proper stewardship of public monies in NHS Wales.

The Welsh Office Health Department comprises five divisions:

- Health Financial Management (HFM) –
  is responsible for securing and distributing appropriate resources for the NHS in Wales through the Public Expenditure Survey, supply estimates and the process of making financial allocations to health authorities. It is also responsible for monitoring the financial planning and performance of both health authorities and NHS trusts, and for providing them with general financial advice. The division is also responsible for liaison with the Welsh

Risk Pool and for the development of policy relating to the Private Finance Initiative. It is also responsible for compilation of the summarized accounts for the NHS Wales; liaison with the Audit Commission and National Audit Office in respect of their duties in relation to the NHS; and for general advice and guidance on corporate governance issues within NHS Wales.

- Health Services and Management (HSM) –
  is responsible for the development of NHS Trusts in Wales; Trust reconfiguration for monitoring and overseeing their performance and for assessing their Strategic Business plans. It is also responsible for the capital programme; human resource and NHS education and training issues; and NHS pay and conditions of service matters; for devolution and National Assembly for Wales issues for NHS Wales.
- Health Strategy (HS) –
  is responsible for the strategic management of NHS Wales and for the White Paper „Putting Patients First". The strategic management includes strategic planning; planning and priorities guidance; health authority performance reviews; contracting policy and the internal market; Patients Charter and waiting times; sponsorship of CHC's; NHS complaints; information management and technology; R&D; health promotion and emergency planning. It also provides secretariat support to the Secretary of State's Health Policy Board as well as Health Commissioning Board and the Executive Committee.
- Primary and Community Health (PCH) –
  is responsible for the development and implementation of primary and community care policy in NHS Wales. This includes primary medical and dental services; general ophthalmic services and the community pharmaceutical services; GP fundholding scheme; indicative prescribing; community health services; palliative care; health care policies for the elderly, disabled, mental health and learning disabilities; and the Mental Health Review Tribunal. Also, health services aspects of the North Wales Child Abuse Enquiry.
- Public Health Division –
  is responsible for delivering the Government's agenda to improve the health of the people of Wales. There will be a major consultative paper in the Spring 1998, followed by an Action Plan delivered by local authorities, the Health

Service and other agencies. In addition, Public Health Division leads on a range of public health matters; clinical effectiveness; health promotion, including Health Promotion Authority Wales; R&D, including the Wales Office; children's and women's health issues; and implications for the NHS arising from the North Wales Child Abuse Inquiry.

All correspondence for Peter Stansfield should now be forwarded to the address below:

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