

# RHINE-AM

## An Inter-Regional Health Information Network for Europe

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**Abstract:** RHINE is an inter-regional network in Europe having as an aim, the promotion of know-how transfer in the area of Information Technology methods and tools in the regions involved. The RHINE network's significance will be demonstrated in the health sector. Within the main scope of the project, the aims and objectives of RHINE and the participating partners encompass the extension of the nucleus network and the furtherance of Information Technology research. Application areas include distributed data base and knowledge base technologies for open regional information systems supported by other technologies for business processes.

### 1. Introduction

The health policy framework and its basic strategies - first published by WHO in 1985 - has been adopted by all Regions of the European Union[1]. Major areas of health data and indicators that have been recognised are: lifestyles and health, risk factors affecting health and the environment, reorientation of the health care system itself, and, finally, the political, management, technological manpower, research and other support necessary to bring about the desired changes in the patient management and provision of quality health services in Europe[2].

Within this framework, a number of projects have been initiated in the European Union in order to provide the necessary infrastructure for medical information system development and to promote the application of information technology in the European Health System[3-7]. Examples of such projects are: the IRIS, for the promotion of Information Technology in a number of sectors including the environment and health in less favoured regions; EURO-ISDN for Health Care network to support local administrators and care providers; SHINE and STAR for the development of open systems frameworks for telematic services networks at community level; DIABCARD for the provision of smartcards with telematics functionality; I4C for the development of a platform for distributed databases demonstrated in cardiology and other.

RHINE has found a niche in the midst of all the European projects in that it aims at the formation of a European network for the dissemination of the results and

the integration of theoretical structures and methods for the development of a composite set of tools for applying Information Technology in important sectors such as that of health[8,9]. The co-ordinating responsibility for particular sectors, including health, has been delegated to the Regional Authorities in most European countries. A representative group of Regions has therefore been formed in order to collaborate on a trans-European basis in the field of Information Technology applied to the health system in a joint action, called 'RHINE'. This paper outlines the scope, objectives and expected impact of RHINE in the European health system and it provides a detailed presentation of the results at each stage of the project development.

## 2. Scope, Mission and Objectives

The major target groups of RHINE Accompanying Measure (AM) are Europe's 250 Regions, as well as the IT, telematics and services industries, in particular SMEs in these Regions. Although health is taken as the focal point for the AM, the results will be applicable in other sectors such as environment, social and economic affairs, social services, social security, education, public administration, and resource management. In this way a substantial repeat business potential for the participating IT industries and spin off activity will be created.

The long-term ultimate goal or mission of RHINE is the achievement of appropriate unlimited information exchange and interoperability of data systems within and across European Regions. This project is a first step towards such a goal, and its scope and objectives are therefore restricted to a **General Accompanying Measure (RHINE AM)** consisting of a **European User Group** in which European Regions (i.e. the users) collaborate with IT industries combined with a **Concerted Action for stimulating the effective and efficient uptake of distributed data base technologies** for open regional information systems **supported by technologies for business processes**[8,9]. Health has been selected as the major application area of this AM.

## 3. Information Systems Objectives for the Health Sector within RHINE

Health data and indicators have been recognised by the Regions as crucial input for regional action in health and health related sectors. Major areas of health data and indicators are health status (life expectancy, mortality, morbidity etc.), diseases and prevention, population groups (children, elderly, disabled etc.), life styles (nutrition, tobacco consumption, sexual behaviour, alcohol abuse, etc.), environment (pollution, working environment, accidents etc.), socio-economic (education, income, pharmaceuticals, cost, etc.).

The objectives of information systems for Regions are to support regional authorities, their representative bodies and communities in providing the information needed for their decisions, in the areas as indicated above.

#### 4. Health Information Systems - Basic Requirements-Applications

The major general requirements of information systems are the following:

First, to meet specific needs of different units. The deliverable of the RHINE project is an integrated distributed information system for data and knowledge interchange among users at different levels (medical doctors/patients) and in various geographical locations all over the regions. The systems will comprise software installed on computers in different physical locations. **Modularity and interoperability** are therefore major requirements and the application of distributed software technologies is implemented. Regional information systems should therefore offer **Region-wide coverage** and provide **interconnectivity** between the data bases concerned. Similarly, Regions could protect their investments in existing products (legacy systems) if this would function satisfactorily, and avoid replacement. 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 information infrastructure should not only include networking aspects, but also the basic 'common' software layers.**

Second, stepwise development. This is because regions are under constant budgetary pressure. Therefore the Regional authorities prefer to develop information systems stepwise, incrementally integrating additional applications in accordance with expressed needs and budgetary possibilities.

Finally, 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 cost can only be measured if the desired levels can be defined, against which achievements can be compared. Regional information systems should therefore provide information for such analyses, **identifying reasons for variation. Knowledge base and decision support systems should be part of regional information systems as well.**

#### 5. RHINE and the Region of Northern Greece

Northern Greece (2-3 million inhabitants) is considered by many historians and politicians as Europe's gateway to the Balkans, Eastern Europe and Asia. Thus, due to excellent economic and political perspectives, telematics have started developing already at both regional and local levels. In particular, in Thessaloniki, the Aristotle University has one of the most advanced networks in the country (FDDI with perspectives to become ATM broadband in the next year). Also in Thrace the University is developing its network, and the two Institutions are part of the Greek National Host for ACTS named HESTIA. Because of the recent development, certain health indices pertinent to quality and management of health care and epidemiology can now be measured for the whole area of Northern Greece through the use of telematics. More specifically, the four areas proposed for implementation in this telematics proposal are the following: hospital efficiency monitoring system for better health care management; accident monitoring for the continuity of health care; health

monitoring system for measurement of health inequalities across the region; health monitoring system for health condition of moving people (e.g. tourists);

The priority areas of the RHINE project will therefore be the development, and validation of: health education of the public; improvement of linkage between the health services at primary and secondary level; connectivity with the outside world, and interregional and cross-border health issues of the population.

Common base, open architecture will be applied to provide for Europe-wide interworking, and Internet World Wide Web-applications will provide for European retrieval services. With regard to administrative and professional use 'security servers' will be built in for confidentiality and data protection and for separating access. The basis for the public network will be multi-channel ISDN, whereas in addition also users of X-25 networks (PSDN) and other networks should be offered the opportunity of sharing the services. Furthermore, common base, open architectures will be applied to provide for Europe-wide interworking, and Internet World Wide Web- applications will be provided for European retrieval services.

The approach that will be adopted by the project covers the following areas: data bases, documents bases, image bases; new generation of information systems oriented towards health outputs and outcomes; easy to use technologies, and open, configurable screens; modular applications in conformance with user requirements and open systems technology offering vendor independence, flexibility, scalability and interoperability; use of basic telecommunication services, including E-mail, file transfer, interactive digital multimedia transmission; choices on physical infrastructure made from ISDN (include EURO-ISDN), ATM.

## **6. The RHINE Information System Platform**

The result and technologies used in the RHINE internetwork should be downward compatible to existing health networks. In the regions of the consortium usually PSDN-networks are used to exchange Text-Data. Actually some of the networks (Bearer services) used in national health of administrative networks are upgraded to ISDN speeds. The partners will contribute the results of RHINE to national activities concerning multimedia communications.

### *6.1 Technical basic concept of RHINE*

Basic concept of the "RHINE" network is a "two level" network[7]. That means, that there are different access levels provided for professional users from the health and administrative area and a public community (interested citizens).

For this reason security facilities inside the network guarantee the privacy of distinct health data have to be installed and used. To make use of bandwidth higher 64 kbps, ISDN and multichannel ISDN is foreseen as the basic public network technology to be used. But besides, also users with X.25, leased lines and other networks in use, must be integrated into the user scenario. EURO-ISDN seems feasible as it provides an integrated PSDN access.

After setting up the regional parts of the RHINE network, the construction of transeuropean network connections has to be done. This is a very important topic : to achieve a high degree of acceptance the Transeuropean Network supporting RHINE must be easy-to-use, and offer a high availability, reliability and security. Possible

Networks used will be, public ISDN (include. X. 25), ATM-Services (later) or special private network services.

## 6.2 The Technical Aspects of RHINE

**Specification and development of Database System and User Application Software** - it is planned to base the information system on concepts of "Open Systems".

**Network architecture and specification and development of Multinetwork Access Facilities** - network access via different public available networks must be provided. Security facilities must be foreseen in the network level by use of mechanisms like encryption and authentication.

**Specification and implementation of a Remote Operating Centre for the RHINE services and for "Help-Desk" Support** - during the user-trials, user-validation phase, and demonstrations-phase the network must be operated. This should be done most efficiently by means of a "remote operating centre".

**Technical Systems Integration and operating services** - the work of systems Integration covers the following topics: network and systems configuration plus management system; setting up the network (ordering PNO services,...) national / international; integration with applications;

## 7. Summary

This paper has outlined the RHINE project which aims at providing a European group of Tele Health Regions. The User Group will act as a permanent platform for collaboration between Regions and IT-Industries which will be further expanded and used for transfer of know-how and IT products as applied in the areas of business process reengineering and distributed database technologies, demonstrated for the European health system. The project RHINE will also serve as a pilot for new initiatives in the European medical informatics area.

## References

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