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Competitor Analysis Update & Technology Watch Report

The RITE Project

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SVENSKA INSTITUTET FÖR SYSTEMUTVECKLING

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The Swedish Institute for Systems Development

RITE är ett EU-projekt som syftar till att integrera och utvärdera teknik för datorstött samarbete och content management. Projektets användarparter representerar mindre företag inom europeisk musikindustri, vilka bla provar projektets resultat inom marknadsförings- och distributionsaktiviteter.

SISUs uppgifter i projektet har innefattat utveckling av en prototypillämpning såväl som genomförande av användbarhetsprover.

Denna rapport är en sammanfattning av den omvärldsbevakning som bedrivits inom projektets ram. Rapporten utgör en obearbetad version av en leverabel inom projektet.

COMPETITOR ANALYSIS

UPDATE AND TECHNOLOGY

WATCH REPORT

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Abstract

This report is intended to provide an overview of the competitive environment of the RITE project and its results, including relevant IT developments and industry trends that may have an impact on the future of the RITE project and the exploitation of its results. The report is based on the initial Competitor Analysis delivered in month 6 of the project. During the elapsed period the project has been forced to undergo changes in the technical approach and in the roles of partners.

We first characterise the competitive environment of the consortium and its partners. This is followed by a description of potential competition related to the results of the project, in terms of products, services and current development work. Initial considerations on the pricing policies for the RITE product are provided, and we conclude with some recommendations for the future work.

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1 INTRODUCTION

1.1 Objectives of the RITE Project

The various actors in the music industry communicate with each other in many ways and the effectiveness of that communication can significantly affect the efficiency and profitability of the companies concerned. The RITE project seeks to improve these communications by providing efficient and seamless access to information and easy to use exchange of views and documents. The key to improvement is the usability of the systems employed, the benefits to users must be tangible, significant and measurable.

The specific area of application is networked information management supporting companies collaborating in joint marketing, publicity and distribution tasks.

The objectives of the RITE project are:

- to pilot a low cost, feature rich multimedia client-server network configured so that the system has a clear price advantage and clear efficiency advantages for users.
- to implement database search and discovery tools drawn from the ESPRIT project INTUITIVE.
- to implement new presentation tools so that multimedia information is presented to different classes of users in the form most appropriate to their needs.
- to conduct extensive evaluation based on efficiency analysis and earned value analysis to demonstrate the techno-economic benefits of the proposed system.

The main end results of the project are,

- a comprehensive multimedia based communications system providing access to multimedia databases and supporting multiple modes of communication between its users.
- the know-how and guide lines for the implementation of such a system in user organisations and the plan for its exploitation

1.2 Characterisation of the RITE Product

The RITE system and its exploitation in terms of derived products is aimed at the creative and media industries, in particular the music industry. During the project, the demonstrators and pilot systems are focused on the independent music sector, defined as all music production and distribution not carried out by the largest six music distributors.

The users of the RITE system are people working in joint production, marketing and distribution activities. These users may be working in different geographical company locations, in-house or on the field, and they may communicate and exchange information both synchronously and asynchronously. These people work in a creative environment, where working relationships are informal (often with loud background music). The planning horizon varies and work is often driven by events, work load is unevenly distributed over time.

1.2.1 Functions Offered by the RITE System

The result of the project system pilot will be a product that provides a comprehensive co-work support system based on integrating multimedia database technology with a number of options for networked communications services. The system is based on commercially available PC software and on state-of

-the-art Internet technology. On a general level the system includes and integrates a set of functions for:

- Personal Information Management (incl. contacts mgmt with address data and communication channels)
- Unified Messaging Interface (email, fax and video conferencing)
- Generation of multimedia presentations of business data
- Shared workspaces for collaborative tasks
- Access to personal and shared databases
- Access to information sources and services on the Internet

1.2.2 Technical Base of the System

The overall technical base for the system includes,

- Leading industry standard PC hardware
- The Windows operating system with the Active Desktop extension
- Conferencing software based on ITU (International Telecommunications Union) standards (H-series and T120)
- Local and remote database management based on standard interfaces
- Advanced database search interface for relational DB access
- web-based access to shared workspaces

Optional extensions

- EURO-ISDN for client to client communications

1.2.3 Product Offerings

Given the RITE systems' functional provision and its technical base, a number of different product configurations can be provided. These product configurations reflect different uses of the RITE system, and each such usage is a potential source of revenue. In the consortium's initial exploitation plan (Deliverable no 4) the following configurations were considered,

1. *A Business Communications Tool.* Here the RITE system is made available as a tool for business communications and information sharing. Both intra- and inter-organisational use is of concern. This is a logical extension of the system pilot developed for the user partners in the project.
2. *A Distribution, Catalogue and Collaboration Service.* In this configuration the RITE product is used by a service provider, who would offer content providers in music industry the possibility to market and disseminate their products in digital form using the RITE technology, e.g., including access to a music catalogue and various tools for collaborative work. Typically, content providers could subscribe to a set of services and rent space in a RITE catalogue database.
3. *Consultancy Service.* The consortium partners will in the course of project develop and formalise knowledge and skills in designing multimedia databases and communications processes for music industry with the RITE system. One product configuration is thus also to offer such services on a consultancy basis, possibly in combination with the other product configurations. An example would be to design and deploy multimedia catalogues.

These product configurations are not mutually exclusive. They also serve an important purpose in explaining the business value of RITE to potential customers and users.

1.3 Identification of Competition

The project has an ongoing activity that follows and tracks technical developments considered relevant to the development of the RITE product. A natural element of this Technology Watch activity is to monitor the activities and actors that can be considered to be or become the competitors to, as well as potential partners of, the consortium.

We have divided the competitor analysis into two parts:

- The competitive environment for the consortium partners, i.e. who are the competitors to the user and supplier partners in the project and what developments can we expect in their market segments. This covered in chapter 2.
- The competitive environment for the intended project products, i.e. what products and services may pose a threat to, or opportunities for, the RITE products and what can we expect from ongoing research and development projects. This covered in Chapter 3 (Products), Chapter 4 (Services) and Chapter 5 (RTD projects).

The consortium does not intend to compete with the larger suppliers or with products addressing a wider application domain than that of RITE. We are positioning the RITE system as providing a complement to as a value-adder compared to products like stand-alone video conferencing systems.

It is also important to realise that some perceived competitors can become our potential partners and liaisons in the exploitation of the RITE product.

Chapters 3, 4 and 5 addresses products and technical development that may be considered as alternatives or complements to RITE, or which may develop into competing products. We have divided this overview into,

- Products that provide similar or complementary functionality to RITE
- Service Offerings, that may provide a similar or complementary customer value compared to RITE
- RTD Projects that address technology relevant to RITE or that might result in a competing product

We realise that a complete overview of these categories is beyond the scope of this competitor analysis report, and that they thus must be subject to continuous monitoring during the project period.

1.4 Focus of competitor analysis

The competitor and technology monitoring is an activity that will continue for the duration of the project. The projects own Technology Watch task in workpackage 2 is one important component in this monitoring, as is the knowledge provided by the project partners. The general sources for the competitor and technology monitoring thus include,

- News and information originating from media and companies in the IT and music industry
- European RTD-programmes and projects
- Music Industry Societies, Trade Shows and Conferences
- The RITE consortium partners

Another relevant source for following developments around the Internet and the Web, is the World Wide Web Consortium (W3C).

Most of this information can be collected and organised in electronic form. Numerous Internet information services are now available, highly suitable as sources in project intelligence activities, like the competitor and technology watch performed in this project. There are several commercial services that to a low cost (often subscription based) provide customised on-line news delivery on a regular basis (e.g., NewsPage, ZDNet, PointCast). They are normally based on user profiles or agents and in some cases also provide company tracking for following news around selected businesses. The figure below gives an indication of the areas the project has been covering within the technology watch and project intelligence activities.

	Music Industry	IT Industry	Products	Services	RTD projects	Standards
Groupware	x	x	x	x	x	
Databases	x		x		x	x
On-line Services	x	x	x		x	
Web architectures		x	x	x	x	x
Media stream technology		x	x			x
Video conferencing	x	x	x		x	x
Market & Economy	x	x		x		
Usability Issues			x	x	x	

Fig. 1: The focus matrix used to categorise information for RITE (x=relevant cells).

The matrix is managed by a specific Business Intelligence (BI) tool designed by SISU for electronic acquisition and classification of information in technology watch tasks in various projects.

2 COMPETITIVE ENVIRONMENT

2.1 The Music Industry

The music industry is the ultimate multimedia environment. It requires the transmission and communication of information in a wide variety of formats. These formats range from audio-actual recordings and soundbite samples, to video-either promotional or as commercial videos for sale or broadcast, to graphical information-such as CD covers and promotional material and as in every business, standard text. The music industry is a global industry in consumer terms, with many of the most recognised brand names operating successfully in all countries and regions of the world. In addition, each country and region has its own domestic industry with all the supporting infrastructure.

There are two distinct classes of company operating within the music industry. In each region there are six multinational record and distribution companies, who control 60% to 70% of the market between them.

In the UK, for example, where the music retail market has a turnover in excess of £4 billion per annum, the leading companies are EMI, Polygram, BMG, Warner Music, MCA and Sony Music. These companies offer an extensive but by no means complete, range of products and services in-house.

The rest of the industry consists of a large number of small and medium sized businesses, many of which will not have the resources, or ability, to develop services outside their normal day to day operations. In the UK there are over 4,600 such companies listed (source: Eurofile Music Industry Directory 94/95) In addition to this there are 4,000 retail outlets within the market, of which 2000 are independent specialists.

In the rest of Europe there are another 10,000 companies (Eurofile 94/95) excluding retailers.

One of the principal critical success factors for both the music distribution channels, and related services, is the ability of the various parts of the chain to communicate effectively with each other. This is particularly evident when a new recording is planned and then released. Co-ordination of promotion material throughout the industry is key to the successful release of a record.

Music Industry is by definition a multimedia market, employing a very high proportion of young people. Therefore leading edge technology should not encounter cultural barriers to success.

Over the past 20 years the product has moved from a vinyl disc to cd. Now we are starting to download music direct from catalogue data bases; the days of shopping for the product at a record shop are numbered. This will drastically alter the Music Industry. As the Rite project uses similar technology it should be well placed to integrate into the new market place.

2.2 Competitive Environment of the Users

Communication and information provision within the music industry is at a fairly low level, overall, there is an impression that IT in music making is received with great enthusiasm whereas IT in music business making or distribution is still embryonic.

The main user partner in this project is a distributor which also has its own labels, the main competitive environment is with other independent distributors. The company is represented in several territories (Belgium, Netherlands, France, UK). The UK market is the most fiercely competitive, where competition for distributed labels is intense. A label is in competition with all

other labels both independent and major. The user partners of RITE are in effect competing with the whole industry. Clearly any competitive advantage they can gain in terms of information dissemination will be critical, e.g.,

- Sales and marketing information to retailers
- Promotional information to media
- Information feedback to distributed labels, artists and artist managers
- Information to overseas licensees and export accounts

Suitable IT-support for all these factors will make them more attractive in a very competitive market and any internal improvements in efficiency will ensure their ability to be more competitive,

2.2.1 Majors

As for most large organisations today with multi-national reach, the major music industries use electronic mail globally. Sony, like many other large multi-national organisations is using Lotus Notes for world-wide collaboration and is also offering partners and customers access to its internal Notes network.

In addition, the most significant repertoire owning territories now have ISDN links which they use for transfer of artwork/films for production purposes. Most major territories also have some form of electronic reordering system. In the UK, EROS (the Electronic Re-Ordering System) was put together for the industry by AT & T.

Most information (e.g., pre release music, press releases, etc.) is transmitted to media, retail and remote sites on hard copy by courier and pouches. Some majors field forces are now using portable computers to present to retailers and are looking at week by week CD ROMs for new release information.

2.2.2 Independent Distributors

As to the independent distributors, these have always lagged behind the majors in terms of IT/information provision both to their distributed labels and to retail and media. A frequent problem is the poor management of internal information.

2.2.3 Independent Labels

The independent labels vary enormously in terms IT use. They range from very small organisations (with a few employees) with no IT at all, to sophisticated but no more so than the majors.

Most companies provide hard copy catalogues of their products renewed on an annual basis with either weekly or monthly updates. In the case of the UK, EROS is not used as well as it could be for information provision and is not liked by retailers.

2.3 IT Solution Providers/Consultants

In this section we discuss the potential competition to RITE as a consultancy service (product configuration number 3).

The RITE consortium is addressing a market which the larger suppliers of Information and Communications Technology up till now have shown modest interest in. The availability of multimedia databases and Internet based collaboration software (e.g., groupware, desktop conferencing) in combination with the emergence of the Internet as a music promotion, sales and

distribution infrastructure is gradually changing this. There is also an increased awareness in music industry of the efficiency gains to be made by implementing this technology.

Larger consultancy firms like Cap Gemini and Swedish VM-Data are today aggressively addressing the multimedia market. The main business so far is in multimedia-based training courses for large organisations. So far there is no established segment of the software consultancy market that is specifically focusing on the music industry.

It is not likely that larger consultancy firms will target the independent music sector with all its small companies. There is too much of a difference in both size and culture between these two types of organisations. If these consultancy firms start working with music industry it is most likely that it will be with the major companies like Sony and BMG.

Competition with regards to the independent music industry sector is more likely to come from some of the new companies in the web-market (in Sweden e.g., Spray, Icon MediaLab)

There are a number of similar companies in UK. These are young companies with a high profile that has managed to establish a brand image as Web-designers. In most cases these new companies have a background in the media and graphics design industry and therefore it would be natural for them to start providing solutions to music industry once the demands for IT-solutions start to grow.

Their strength today is their brand image as designers and creators of web-applications. Our impression is that they don't have access to state-of-the-art technology in the same way as the RITE consortium does, nor have the technological background to fully exploit the potential of new technology. Focus for these start-up companies is on the marketing aspect of using the web, i.e. their focus is on the design of attractive and advanced HTML-pages rather than the underlying technology and using web as a communications and collaboration platform. In the long run these companies might prove to be partners rather than competitors to the RITE partners.

3 PRODUCTS

RITE as a collaboration tool, is specifically focused towards the music industry which means it should be tailored to the work practices and users in that environment. As such it should perhaps not be directly compared to general groupware or collaboration products. However, such products may, in various combinations, still be considered as alternatives by potential RITE customers.

Below we give examples of some relevant products in the following categories,

- Enabling technology for groupware
- Multimedia streaming
- Desktop conferencing
- Database management

3.1 Enabling technology for groupware

The development of Internet based collaborative software, or groupware, has been one major trend in the software industry the past 2 years. The commercial acceptance of the Internet, initially seen as a threat for makers of groupware, has now become a lever.

One line of development focuses shared workspaces. A "workspace" can be seen as an information system intended to support workgroups or in general to allow people to communicate and exchange information. A workspace product can in principle include functions for,

- document archiving, sharing and distribution
- meeting management (such as scheduling, calendar and awareness support)
- synchronous communications (such as video conferencing, chats)
- asynchronous communications (such as email, discussion lists, alerts)

The commercially most well-known groupware product is perhaps Lotus Notes, originally based on a proprietary and closed system design. However, much of the current development is based on the WWW as an infrastructure for inter-organisational collaborative work. Thus, many vendors and developers of groupware has been retro-fitting web support to their existing products. Lotus and Microsoft are early examples of this trend. A number of smaller software providers have also appeared that specialises in web-enabled collaboration products.

These packages are now often referred to as *teamware applications*, and sometimes called *virtual-office* products. They offer many of the features of traditional groupware except the need for and investment in systems administration support (at least this is the intention). Most provide a central meeting place (a workspace) on the Internet where all of a work groups communications and documents can reside. The workspace is typically accessed via a dedicated URL from a standard web browser.

3.1.1 Lotus Notes/Domino and Instant!Host

The original *Lotus Notes* is a client/server based system for document management and communication. Primarily intended for and used by workgroups in larger businesses, it includes facilities for document-centric database management, data replication and application development. Lotus was considered at dead-end facing the competition from Internet-based collaboration software promising more open and cheaper systems for groupwork. After Lotus became a division of IBM, a

Notes version adapted to the web was released. The web-adapter, *Domino*, is an add-on to the Notes server providing HTTP services to Notes. This enables Notes applications to be run using web-browsers.

Domino Instant Host is a Domino-based platform for service providers that includes billing, tracking and maintenance for hosted applications accessible from any Web browser. The platform has been developed by Lotus and Interliant and includes system functions for application registration, user registration, usage tracking and reporting, and data synchronisation.

3.1.2 WebShare

Another product addressing web-based collaboration is *Webshare* from Radnet. After the spring 1996 introduction it was labelled a "Notes killer" offering Notes functionality to the web, but is now the main competitor to Domino. Webshare does provide many of the functions found in Domino, such as document databases, calendars, discussion lists etc. for access by conventional web-browsers. The product can be characterised as a specialised web-server for intranet applications.

Webshare thus includes a server which hosts the set of standard functions (or applications), and also provides interfaces to standard relational databases. Applications can be extended or modified through a design component which provides application design based on sample templates. A replication and synchronisation facility allows a Webshare client to be used off-line, a user with a portable computer can thus run Webshare applications with a browser when disconnected from the Webshare server.

3.1.3 Microsoft Exchange and the Active Desktop

Microsoft Exchange may be considered to have been the focus of Microsoft's groupware ambitions so far, providing basic functions such as email, form management and scheduling. Exchange is now being provided with collaboration facilities for the Internet, and should be seen in the light of the company's overall Internet effort which has produced a closer integration of Exchange with the *Office* suite. Another extension is replication of data folders and mail outside a local business and across the Internet.

Microsoft has pursued the path to provide an integrated environment giving the user a PC desktop interface in which web-access and tools for groupwork are included. This user interface, referred to as the Active Desktop, uses the *Internet Explorer* web browser to interact with the folders and documents in the *Windows* environment as well as with web sources. The *Internet Explorer 4* (released fall 1997) provides the user a seamless integration of a web-browser and the Windows file system. The browser becomes the user interface making the Windows desktop into a Web page. The Active Desktop is of limited value without a permanent Internet connection.

3.1.4 Netscape SuiteSpot

Netscape Communications offers a set of different components for intra- an Internet collaboration through its *SuiteSpot* product line of server software. This includes servers for messaging, directory catalogues, web-publishing, security etc. One of these components, the *Collabra Server*, essentially provides the functionality of the discussion databases within Lotus Notes and the public folders within Microsoft Exchange. Netscape maintains that the open architecture of SuiteSpot (i.e., its basis on Internet protocols and modular structure) is its main strength compared to other products like Notes and Exchange. However, with Lotus' promotion of Domino and Microsoft's focus on the Internet, this argument may not be that strong.

3.1.5 Teamware products

These are products that are intended to provide teamware functionality for smaller ad-hoc workgroups and over the Internet. One important objective is to simplify set-up and administration of the on-line workspaces for possibly geographically dispersed user groups. Overall, in this category some 40 products have emerged that to different degrees provide teamware solutions.

These are all designed to be used with a web-browser, although some products require a specific browser or version thereof. The products offer a combination of functions for document archiving and sharing, email, calendaring and scheduling. Primary differences between these products are typically to be found in the way they provide document management and in support for real-time functions such as conferencing.

Some current products are; *Involve Intranet* (from Changepoint, www.changepoint.com), *Instant TeamRoom* (from Lotus, www.lotus.com, see services below), *eRoom* (from Instinctive Technology, www.instinctive.com) and *HotOffice* (from HotOffice, www.hotoffice.com).

3.1.6 Comments

Most of these products are based on the Internet with web-servers as hubs (such as Lotus Domino or standard web servers). The general lack of quality-of-service for the Internet is an aspect to consider (e.g., for real time communications and for security) for extranet applications. The support for document sharing are in some cases based on sharing of email messages, i.e., documents are posted as attachments to emails, rather than store/retrieved in/from a shared archive structure (HotOffice and eRoom mentioned above are exceptions to this).

These products are general purpose teamware tools targeting large scale markets. A differentiation is between products intended for in-house collaboration (an intranet type application) and those which would support shared workspaces for users from different organisations (an extranet application).

The RITE demonstrator system provides access to shared workspaces using a prototype teamware system (developed at SISU). This is simply seen as one of several different components in the RITE clients interface.

3.2 Multimedia Streaming

Streaming technology has evolved over the past years into a standard technique for real-time playback of audio/video over the Internet. Without streaming, sound and video files were stored and accessed like all other documents on the web, i.e., downloaded for later playback. Technically, using HTTP (Hypertext Transfer Protocol), a client issued a GET request making the server send the requested file within a HTTP response message. By inspecting the header of the message the client were able to determine the format of the sound file and launch the corresponding helper program required for playing out the sound or video file. A simple approach with a major drawback. The full file has to be downloaded before it can be played since HTTP uses TCP (Transmission Control Protocol). Using techniques similar to the incremental display of web pages would not work properly due to the properties of the TCP protocol. TCP retransmits lost packets which introduces pauses into the output of audio and video resulting in halts in the video and breaks in the sound output. Thus, new protocols were needed to reduce download time for sound and audio to the most out of Internets limited bandwidth and service

The basic notion of streaming is to reduce download time by starting the output of sound and video as soon as possible, i.e. when enough data has arrived. As mentioned above TCP is not suitable for this and thus additional protocols called streaming protocols are needed. The main idea is to add a second client/server system to the system and making the web client start an independent program that uses a

streaming protocol and plays the audio or video file. By this way, another protocol than HTTP can be used.

A simple usage scenario is this; a user with a web browser requests a sound or video file by clicking a link on a web page, the users web browser then issues a request to the web server using HTTP. The server answers the request by sending a response message containing the parameters (IP address, name of the file, content-type etc.) required by the helper application that the client launches. The player then connects to the audio/video server and the requested file can be transferred to the player application using a streaming protocol. The streaming software can also be used stand-alone without a web browser.

The Real-Time Transport Protocol (RTP) which has been developed by the IETF (Internet Engineering Task Force) is a standard protocol for streaming which many products builds on or extends.

Some products also provide the possibility of encoding IPR data in the audio or video stream such as watermarks.

3.2.1 RealNetworks

The company formerly known as RealAudio introduced its first audio streaming software with the same name in 1995. Now under the name of RealNetworks the company provides a comprehensive software suite for multimedia streaming and publishing over the Internet. The current product family include,

- the player client program, RealPlayer, co-developed by Macromedia and RealNetworks, free for individual download and plays live and on-demand audio, video, and animations.
- The encoding and publishing program, RealPublisher, for encoding and publishing audio and video in web pages.
- A presentation tool, RealPresenter, which is used to create streamed presentations combining slide shows (e.g., based Microsofts Powerpoint) with narrated voice.
- Different configurations of server software for delivery of simultaneous audio/video streams

The company also provides product configurations for intranet use, e.g., for applications in in-house training and courses. The RealSystem 5.0 is a client-server streaming media system including streamer players, servers and publishing tools, as well as commerce-oriented features for pay-per-view and advertising insertion.

3.2.2 Liquid Audio

Liquid Audio has now become a well-known product that provides streaming audio approaching CD quality over the Web. In this sense it is comparable to RealNetworks, Shockwave and Streamworks, but whereas e.g., RealPlayer is intended for general audio/video streaming over the net (e.g., for radio broadcasts), Liquid Audio is said to focus high quality distribution and production of music. Possible applications include consumers being able to by music on-line, get it delivered over the net and also being able re-produce on other media such as CD, using home CD-writers. Liquid Audio also exploits the ECD (Enhanced CD) idea, whereby the audio stream is complemented by additional info such as art and texts.

Liquid Audio consists of three components: The mastering software called the Liquifier transfers the sound from its original source to a Liquid Audio file. The Liquid Audio Server delivers these files over the net while simultaneously logging and protecting the copyrights. At the client end the Liquid Audio Player plays the audio stream on a user machine. The player works as a helper app to a web browser. The Liquifier also allows users to combine audio with multimedia information pertaining to

the music, such as liner art and lyrics, in order to create the "ultimate Internet music browsing experience".

The Music Server uses standard protocols (UDP and TCP) to deliver high-quality, scalable, Dolby-encoded audio and media over IP networks. The server can provide any number of simultaneous audio streams from Unix or Intel platforms.

Liquid Audio uses Dolby compression to enhance quality and save bandwidth. Unfortunately they do not provide any technical background on their streaming technique. An interesting property of the Liquid Audio protocol is the possibility to embed IPR protection data in the audio stream. The server is said to be able to encode digital watermarks as well as user identities in the audio stream. The encoding is to be based on a watermarking technology developed by Solana Technology Corp. called Electronic DNA (E-DNA).

Liquifier for Windows is priced at \$995 (US), while the Liquid Music Server is being introduced at \$20,000 (US) per server. The Liquid Player is currently free of charge.

The company has entered into partnerships with major music companies like BMG as well as with Microsoft.

3.2.3 AudioSoft

A European alternative is represented by AudioSoft (formerly EuroDat) (www.audiosoft.com). Similar to LiquidAudio, this company provides software for encoding and streaming (as well as download) of audio over the Internet with support for copyright enforcement. The company provides a free trial version of its encoding software which can be used to convert files in wav-format¹ to Audiosofts own format (ASFS). The player software is freely available.

3.3 Desktop Conferencing

PC based conferencing software for the Internet continues to be an active area although a wider application of especially video conferencing is yet to be seen. The two main barriers, relating to bandwidth and usability, have still to be overcome before the users initial expectations can be met. The bandwidth barrier is of course primarily critical for delivering real time video with acceptable quality. If video quality is not a prime requirement, there are a number of conference products that provide audio conferencing and data conferencing (i.e., talk and share documents in real time). The range of conferencing products include those providing full audio/video and data conferencing, those that sacrifice video and combine audio with data conferencing, and, those that are pure video telephones.

Another divider is the number of users the software supports; point-to-point or multipoint. This varies between the functions supported, e.g., sharing of whiteboards may be multipoint whereas the video and/or audio function is point-to-point. Multipoint capability may also require specific server software (reflectors).

The problem of using the Internet for video conferencing is that quality-of-service is difficult or in practice impossible to guarantee with the current suite of Internet protocols. Although data- and application sharing and audio conferencing can be done, video conferencing over the Internet is still not mature enough for professional purposes. Conferencing based on ISDN has been evaluated in the RITE project with reasonable performance for data and application sharing, but with a still questionable video quality. Good quality real time video (e.g., just below VHS) requires broadband communications such as that supported by ATM, but this technology is still expensive and out of

¹ A common audio format on the Internet originally developed by IBM and Microsoft.

reach for ordinary PC based desktop computing users. De facto standards like the Resource Reservation Protocol (RSVP) and the Real-time Transport Protocol (RTP) are now being tried in order to reserve enough Internet bandwidth. Reserving bandwidth through priority is one alternative, but prioritising certain types of traffic over the Internet will probably require some form of tariff system to be introduced.

Conferencing is seen as one, of several alternative, communications components in the RITE system. In this context, low-bandwidth "real time" video will be an option but is not seen as critical to the systems usability.

3.3.1 The ITU Standards

Most products of interest are or will be complying with the conferencing standards from the Intentional Telecommunications Union (ITU). The standards are grouped in the following suites of specifications.

- H320 is one of the first conferencing standards (established 1990), it specifies the audio/video services for switched networks and specifically over ISDN connections.
- T120 is the standard that specifies the services for data conferencing. This includes functions for the sharing of applications, shared whiteboards and file transfers among conference participants.
- H323, is an extension of H320 which in addition specifies services for conferencing over IP-networks (Internet) and for local networks (LANs).
- H324, specifies services for point-to-point modem connections over standard telephone nets.

The purpose of these standards is to provide a basis for interoperability of products from different vendors and they also specify the required level service for the functions. However, since this area is under rapid development, interoperability is still weak. This applies for example to data sharing based on T120, where vendors implement different subsets of the standard and also propose their own subsets as standards. Some products support additional standards or bridge between them through the use of gateways or with the addition of separate server software, like reflectors.

3.4 Sample products

NetMeeting

Microsoft's *NetMeeting* has evolved into one of the leading products for Internet/LAN based video conferencing. The product provides video, audio and application sharing over local area networks and the Internet. Application sharing allows users on different machines on a network to share simultaneously a whiteboard program or perhaps other office programs such as annotating the same document by sharing a word processor program. Application sharing was first promoted by Intel's video conferencing product *ProShare*, described below. In this respect *NetMeeting* being a program developed for the Windows platform provides applications sharing of any native MS Windows application. The program also includes a chat function, allowing multiple participants to exchange synchronous text messages, an alternative when the network limits the quality of audio/video.

NetMeeting has been chosen for the conference component in the RITE demonstrator, simply because it is currently the most comprehensive PC based conferencing product.

CU-SeeMe

CU-SeeMe from White Pine Software has received very positive reviews and trade press awards. The product is intended for person-to-person as well as group conferencing over TCP/IP networks. The product complies with ITU standards and provides a reflector, *MeetingPoint*, allowing for multipoint

audio /video conferencing, with the current version up to 12 active video windows can be managed. The *MeetingPoint* reflector is intended to run on a server machine. CU-SeeMe provides sharing of whiteboards and file transfer based on the T120 standard, it does not however provide the full application sharing of NetMeeting. But as with the latter, CU-SeeMe also includes a multipoint chat function.

ProShare

Conceived before the Internet boom, the ProShare Video Conferencing system was notably introduced in 1994 by chip maker Intel in order to advance sales of the company's micro processors. ProShare is normally used over point-to-point ISDN connections with acceptable quality (up to 15 frames/sec). It also provides sharing of applications and white boards (similar to NetMeeting). Versions of the product can run over local area networks, and future versions are said to be intended for Internet usage, but will face the same bandwidth problems as the other Internet conferencing products do. ProShare has been used by partners in the RITE consortium for project meetings.

VDOPhone

This is one example of a low-bandwidth video phone product. This type of programs are mere point-to-point Internet based video telephones, and in most cases lack the sharing and conferencing features of other conferencing products. The *VDOPhone* product from VDOnet Corp. is compliant with ITUs H324 (and in future with the H323) standard and can run over TCP/IP networks, over the Internet or on a local network. The program is intended to operate over standard telephone lines, ISDN or a LAN connections. In an attempt to optimise Internet (or LAN) bandwidth, the program is designed to dynamically adapt to the available bandwidth.

Netscape Conference

Netscapes conferencing module is part of the Communicator web browser environment. This module combines audio conferencing with the possibility to share whiteboards (in compliance with H323 and T120). The product does not support video or application sharing.

3.5 Database Management

Key ingredients in current database product developments are support for multimedia data management, a seamless integration with web-based information, and provisions for decision support applications (OLAP). Several of the major database vendors have positioned their products as general information managers, or "universal servers". The term *content management* has been used to characterise the integration of database management systems with technology for inter-/intranet and the web.

The relevance to RITE with respect to this development lies primarily in the possibilities it brings for the management of structured multimedia data (an intrinsic aspect of music industry databases/catalogues) using industry standard products. The modular design of RITE ensures the possibility for accommodating different database products in the RITE architecture.

Of the database suppliers, Informix and Oracle were the ones that first adopted the universal server approach. Other players like IBM (with the *DB2* product) and Computer Associates (with their product *Jasmine*) have been moving in similar directions but with different technical solutions. Other vendors like Sybase are providing a set of SQL products within its *System 11* product family, and has announced its Sybase Adaptive Server. Microsoft is providing advanced support for transaction processing and data distribution/replication in its recent *SQL Server* product. In all, 1997 was a year of modest technical innovation and announcements from database vendors.

3.5.1 OR Databases

Great expectations were initially attributed to the idea of universal database servers including technology for object-relational (OR) extensions. One of the early proponents of OR technology was the US database vendor Illustra, with the Illustra Object *Relational DBMS*. Informix acquired this company with the intention to integrate their database system into the *Informix Universal Server* product scheduled for release at the end of 1996. The Illustra Object Relational DBMS, is integrating relational database management with multimedia and web. The Illustra DBMS is a hybrid between a relational and an object-oriented database manager, also called object-relational (OR) database. The OR-database combines the flexibility of the relational model in terms of query and search, with the structuring capabilities of object-oriented models. The interest in this type of technology sprung from the need for content management on the Internet. One aspect of content management is the integration of conventional structured databases with web based information in terms of hypertext (HTML/XML) structures. One of the early applications of the Illustra database was for a music application on the web, the Internet Underground Music Archive (IUMA).

The Illustra DBMS (now Informix) introduced an architecture based on components (or datablades) that partitions functionality for multimedia, web-documents, text searching etc. The components are used as extensions to the DBMS kernel. An interesting aspect of the datablade component architecture is the potential market for third-party add-on functionality in terms of specific datablades. One example of this is the NEC release of a datablade for electronic watermarks, to the Informix Universal Server, providing copyright protection directly to the database and hence rights protection for the distribution of multi-media content. The *Tigermark Image Datablade* from NEC provides encoding of document (database) objects with digital watermarks.

Despite initial difficulties in integrating the Illustra functionality with its Universal Server, Informix has reported a growing number of customers of the system. Critics have argued that the Datablade extensions to the kernel is an inherently insecure technology, making the DBMS product dependent on the reliability of third party software. However, the other DBMS vendors have pursued a similar approach and have coined their own component architectures (Oracles Cartridges, IBMs DataExtenders, and Sybase with its Snap-ins).

OR databases have been equated with the component based architecture employed by these developers of universal server DBMSes, and hence ORDBMSs have wrongly been equated to the Universal Server DBMSs. An OR database system should support the fundamental object-oriented modelling and processing mechanisms. This would include support of e.g., object type definitions, inheritance and user defined methods, and further to provide query processing based on an object-oriented SQL. The latter is under development as a result converging standardisation efforts on SQL-3 in ANSI and OQL in the Object Data Management Group (the latter a consortium of Object Database vendors).

The RITE project has used the Illustra DBMS for a implementation of the first RITE pilot database schema, but without the more advanced datablades for multimedia and watermarking. The Informix Universal Server implementation (including Illustra) has not been available to the project.

3.5.2 Microsoft SQL Server

Microsoft is announcing the release of version 7 of its *SQL Server* database product, which according to product data, trade press reviews and initial users provides impressive technical features. Although this product does not pretend to be a "universal server" database, it has gradually evolved into general purpose DBMS capable of competing with the major DBMS vendors (Oracle, Informix, IBM, Sybase). The product provides traditional database functionality in terms of transactions and data distribution by replication, including development support.

Microsoft provides web and multimedia object integration through other products in its Internet strategy. The *Internet Information Server (IIS)*, the company's web-server, can host various tools enabling users of web browsers to access existing databases. Examples of this are the *dbWeb* and the *Internet Database Connector (IDC)* publishing tools, for interfacing ODBC compliant databases with the web. The former a simple tool requiring no knowledge in SQL, the latter a more advanced publishing tool intended for web application developers with SQL and database design skills.

Today, most database vendors provide web connectivity through HTML interfaces and lately also XML. During this year Oracle, IBM, Progress, Sybase and Compuware have announced products for web database connectivity. Also worth noting is the interest in SunSoft's *Java* language also for database access, SunSoft's specification of the *Java Database Connectivity (JDBC)* is intended for developers that want to connect Java applications to relational databases.

The RITE system design is well-positioned to take advantage of developments in database technology, such as OR databases as well as conventional relational architectures. This is primarily due to a design where the RITE DB search and navigation tools are modular and employ de facto database standards like ODBC for remote database access.

4 SERVICES

In this section we describe on-line services that could offer a similar customer value to that projected by the RITE product, or that could be used/integrated into the RITE systems user interface.

A recent development is the provision of on-line services targeted to smaller organisations that may lack the necessary resources and skills to buy and administer their own collaboration software and the corresponding computing platforms. We also consider the various music related services and information sources that can be related to the functions and services to be provided with the RITE system.

4.1 Hosted Web Services

The concept of hosted web-services and application renting represents a fairly recent business model for software. Some of these services are based on a subscriber business model where a groupware application (e.g., a workspace on the Web) is rented by end-users from some service provider. Many of these are based on the groupware products described above, notably Lotus Domino. Up till now these services have been generic, not targeting any specific business sector.

A predecessor to this type of services was *Network Notes*, announced by AT&T and Lotus in 1994. The Network Notes product was intended as an architecture for use by telecom service providers to offer Notes applications as services to other businesses. The architecture was never a success due to the closed network solution it required. As a result of the Internet boom and Internet Service Providers (ISPs) looking for value-addition, more open services are emerging.

The intention here is that ISPs (or others), should be able offer services to small and medium sized businesses who would like to use the web as an infrastructure for collaborative work without having to bother with the complexity and costs of buying and maintaining their own servers. Users will be able to access the services through web-browsers like Netscape and Internet Explorer.

Several of the European telecom operators and ISPs have announced their intention to services offerings based on web host software like Lotus Domino.

4.1.1 Lotus Instant!Teamroom

Lotus Instant!Teamroom is the first in a series of Lotus Domino-based rentable applications available on the Web. Although it doesn't offer e-mail and real-time collaboration, the product promises simplified administration and it has tools for threaded discussion and document management.

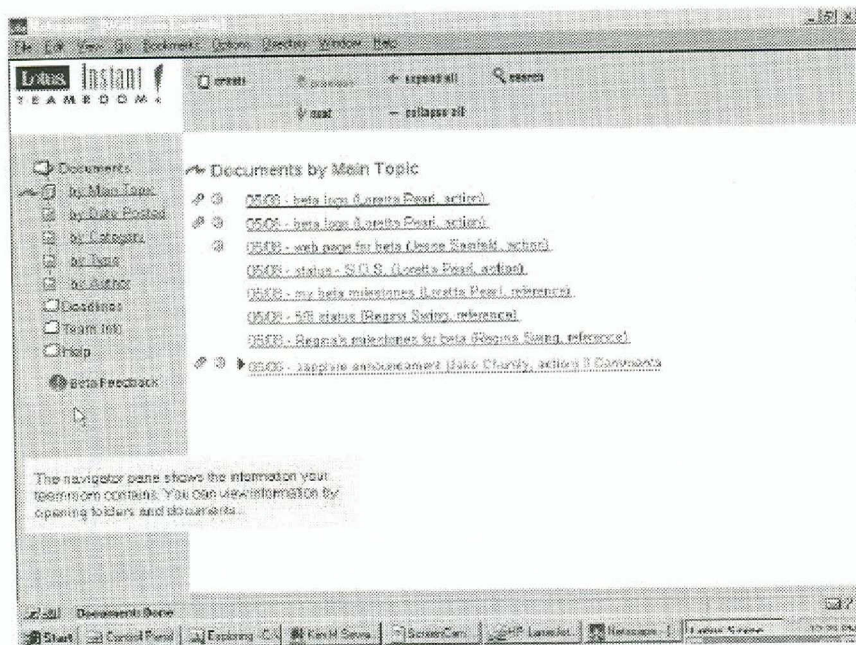


Fig. 2: Lotus web service Instant!Teamroom (source: www.lotus.com)

Lotus's approach to providing a teamware product is by offering subscriptions to the product through its "Alliance Partners", these are Internet service providers that offer public servers for Lotus Notes/Domino. An intranet version is however also expected, i.e., the same functionality is provided locally in an organisations Intranet.

Several US based network service providers currently offer this service and European s providers are expected to offer Instant!Teamroom as a service during this year (1998). The (US) cost for this service has been announced at \$14.95 monthly per user.

4.1.2 Netscape Virtual Office

Based on the SuiteSpot server family and the Communicator client software family, Netscape has introduced the Virtual Office (VO) service. The Netscape VO package is based on the web, mail, and NNTP² discussion servers from Concentric. VO is targeted to small businesses and project teams that need a basic set of basic communications tools for collaboration over the Internet. A business registers for the service at Netscapes home site, by choosing a "Virtual Office Plan" and pays by credit card on-line.

In Virtual Office, a web server provides a site to publish "broadcast" information, a discussion server provides a forum for one-to-many interactive discussion and file sharing (via email attachments), and an e-mail server provides team members with full messaging capability. A calendar function has also been announced (not available at time of writing).

User of VO need an e-mail client, newsgroup reader, and Web browser all of which are provided in Netscape Communicator 4.0 and Microsofts IE browsers. A separate administrators interface provides functions to add and delete users, manage discussion groups, and control server access. Administrators can inspect and different aspects of each server's operation and generate detailed reports on traffic, disk usage, and logging. The discussion server allows multiple discussion groups with varying degrees of user access to each discussion as well as private discussions. Both the

² NNTP - Network News Transmission Protocol, a de facto standard Internet protocol for newsgroup management.

discussion and e-mail servers support document sharing via file attachments. Apart from that Netscape VO has no document management features or central archiving for documents, of course, documents can be published on the web server. Messages, however, can contain a mixture of formatted text, graphics, and HTML code.

Netscape Virtual Office costs \$29 per month for one user with additional users at \$15. Total pricing depends on the type of Internet access and the amount of storage space required.

4.2 Comments

Although both Lotus and Netscape are building on the concepts of application renting they approach it differently. Lotus (Instant!Teamroom and Instant!Host) are environments for their business partners to build their own applications, so users have to deal with an intermediary. Netscapes approach is to provide a complete service to the end-user, available through standards Internet access and with Netscapes web client Communicator.

We can compare the type services mentioned here to the Catalogue/Database services to be offered using the RITE product. As for the collaboration products above, we believe that the hosted web service concept is not a direct competitor to RITE but rather a complement. A direct focus on services to the music industry is however taken in the MODE project (described below), where networked marketing and distribution services have been developed.

4.3 Music Related Services

4.3.1 Music Information Sources

The popularity of the Internet has of course resulted in many different music related sites and on-line services. The Yahoo search directory lists some 32 000 music related Internet sites. In addition to numerous Music Genre and Guides web sites, these also include professional business information services (e.g., .dotmusic.com from Miller-Freeman , webnoise.com, billboard.com), various archives and on-line magazines ("Zines"), on-line music retailers (with off-line delivery), and on-line sales and distribution.

4.3.2 Internet retailers

Now services are also emerging intended to support such on-line music retailers (like CDNow, CDUniverse, Tower Records, Microsoft Music Central, etc.). One such service is offered by Muzak through its MusicServer service (www.muzak.com/enso). The service provides a database with digitised music samples of 30-60 seconds length, Internet merchants can then offer thousands of original recording samples to their consumers in real time. The database is scheduled to contain 250,000 music samples to be delivered to customers sites on demand. The service also provides specific statistics such as correlations between sampling and frequency of purchase. It also reports on listening frequency and duration for specific samples.

MusicServer is based on Muzak's vast access to recording industry resources and it is intended to give on-line merchants the ability to provide their customers with samples of hundreds of thousands of popular recordings in real-time. The service can provide full operational support, including digitisation, encoding, storing and maintaining music samples. Muzak also offers bandwidth needed to serve multiple sampling requests simultaneously.

4.3.3 On-line promotion, sales & distribution

We now also see the emergence of a many services intended to host, maintain, and promote a music business' web presence. This includes fulfilling on-line orders, and digitally deliver the music for world-wide sale over the Internet.

Two recent examples are *muzic.com* and *Indie 1000* powered by the software of Liquid Audio products mentioned above. The service *muzic.com* will feature digitally distributed, downloadable music; a comprehensive, music-only database and search engine; international daily music news and reviews; and continuous streaming audio and video music content. The company's mission is to serve those in the music industry, as well as to entertain and inform an international audience and customers.

The second *Indie 1000* provides a sales and distribution services to music business, so that e.g., a smaller company can have its catalogue presented on a website (its own or one maintained by the service provider) and offer customers on-line ordering and sales of its music. According to the provider the services is targeted to independent record companies and artists. Subscribers to the service will also get access to the Liquid Audio Music Network consisting of a number of music related Internet sites for promotion and sales of music content. Consumers would in principle also have the possibility to record down loaded music on CD-Recordable or CD Re-Writable devices.

The Indie 1000 program package includes the Liquifier 2.0, Liquid Audio's encoding software for music, the Liquid Artist Server 2.0, which handles secure online music transactions and delivery, free placement on one of America Online's music channels for three months and full commerce hosting and support.

Another example of a music distribution service is the UK based *Cerberus Central Ltd (CCL)*. Cerberus provides an music database ("the Cerberus Digital Jukebox") from which customers can obtain free samples, and after registration also can buy songs for download over the Internet. The company claims to have copyright clearance for over 4.5 million songs based on agreements with a large number copy right collection societies. Cerberus provides its own software for downloading and playback of music files (obtained free from their web site).

AudioSoft, mentioned above, and its products are involved several on-line services for on-line music sales, one such service is the *City Music Network* (www.citymusic.com) connecting a number French music sites. The services can be hosted on different network technologies with a minimum requirement of 56Kbps for audio streaming. The service includes payment, sales audits and royalty reporting.

MODE

This is a service developed from an RTD project with the same name (see below). MODE is an online service for Music on Demand (MoD). It is to be provided by an international consortium (MODE International BV, Holland) structured as a network with local operators and providers in each territory: telecoms, R&D institutes, public radio stations, EU projects etc.

The MODE services include music distribution in real-time with pay per listen and downloading with pay per copy for home users as well as for business (e.g., retailers). MODE intends to offer guaranteed quality of services with alternative network technologies and the MODE providers explicitly state that their services are not provided over the Internet! They have their own network infrastructure which is operated by local providers (telcos) in each territory and provide broadband, ISDN and PSTN communication services.

ECMS support and secure payments are offered, as well as information editing and authoring tools for content providers and copyright owners. The latter will for example allow providers/owners to chose audio-formats (MPEG or Dolby).

MODE will also offer local, territory-based services for distribution and marketing campaigns and various marketing channels including mail-order CD services.

All in all, the MODE consortium market themselves as a very comprehensive music service. MODE is (February 98) running a pilot trial said to involve some 50 music businesses (labels). The trial is intended to be followed by commercial introduction mid 98.

5 RTD PROJECTS

Within this section we describe and analyse research and development projects which are of interest to the RITE project. The intention is not to give a complete overview of all possible research projects that could be relevant to RITE but to highlight different categories of projects that are especially interesting to watch and possibly collaborate with during the life-time of the RITE project. We will discuss and analyse research and development projects in the following categories.

- Music industry-oriented projects
- Groupware
- Publishing and Content Management
- IPR

5.1 Music Industry-Oriented Projects

The most important project category for RITE is other IT-projects that are focusing on providing solutions to the music industry. These projects might produce directly competing products but could also be interesting business partners to join with after the RITE project. So far we have only found a few such projects.

5.1.1 MODE

The objective of the MODE project (Music On Demand) is to develop, evaluate and commercialise an ISDN based telematics service for marketing, tele-publishing and tele-shopping of music provided by the music industry. The main target groups are private consumers, music retailers, radio stations (recorded music) and music schools (both recorded and printed music).

The project ended in July 1997 and the results are now used in a pilot trial for commercial service, to be launched during 1998 (See services above).

The overall objective of the MODE project is to test, evaluate and implement a viable commercial service for the promotion of the European music industry. The service will provide access to a telematics service targeted for both private consumers, radio stations, music schools and the music industry. The service will comprise electronic ordering, listening, purchasing and delivery of recorded music covering a broad spectre of music styles.

The content of the service will be delivered by independent record labels, and eventually, international labels associated with the International Federation of Phonographic Industry (IFPI). The MODE project will provide on-line access (ISDN and fast modems) to a distributed database system and generate off-line media products like CD-ROM. Regularly updated CD-ROMs, edited by the MODE network, will be useful alternatives for users who want to eliminate telecommunication costs during search and retrieval.

This project has a different focus than RITE but builds on similar technology. The relationship between a communications tool like RITE and an external marketing and distribution service like MODE is relevant to consider. The approach of MODE is to provide a service based on a system of distributed databases through which content providers in music industry can promote and distribute their productions. A system of "national" MODE servers will be set up. Local content providers will publish on these servers, and customers will pay for access. Worth noting is also that the Norwegian PTT is a partner. Possibly they will be able to base a service on the system, similar to the

"collaboration services" now emerging. The project will according to the project description use several technologies interesting to RITE:

- techniques for IPR
- electronic payment
- combined web and ISDN based remote access

5.1.2 MUSE

MUSE is a project within ESPRIT 4 which started in September 1996 and ends in February 1998. The project involves major actors in the music industry such as Sony, Warner Music, BMG, and Polygram. The objective of the project is provide a general model of a media management system for content providers in the music industry. Areas addressed by the project include: content identification, IPR protection, usage monitoring and payment as well as identification of infringement.

Other objectives of the project include surveying technology in order to recommend standards for encryption and electronic delivery formats (signalling).

The result of MUSE is a generic scheme which should enable the European music industry to safely offer in free competition recordings to professional and private users. The scheme is to consist of:

- conceptual design of a digital media management system.
- functional and syntactic specifications of the public interfaces which are part of a digital media management system.
- selecting an embedded signalling system suited for use as a world-wide standard.
- selecting encryption methods suitable for use as a world-wide standard.

The International Federation of the Phonographic Industry (IFPI) is the co-ordinating. The other partners in the consortium are BMG, EMI, Polygram, Sony Music, Warner Bros., MCA and Telstar. Project administration by Bakkenist Management Consultants in The Netherlands.

5.1.3 Harmonica

The Harmonica project (Harmonised Access & Retrieval for Music-Oriented Networked Information Concerted Action) is a concerted action in the Telematics/Library sector. The main aim of the HARMONICA initiative is to improve access through libraries to music collections of different types, while taking into account the needs of various groups of users in the evolving world of networked information and interactive multimedia. The aim of the concerted action is to provide a solid strategic framework for networked access to music and related multimedia services. This covers for instance the following:

- examination of state-of-the-art technology and practice for access to digital music and related multimedia services;
- assessment of emerging standards issues for encoding sheet music, digital music (including compression techniques), incorporating music in multimedia products (CD-ROM, etc.) and interfaces with commercial products and services;
- exploring networking options (Internet, web, ISDN);
- user-friendly interfaces (GUIs) for search and retrieval services, integrating related requirements such as the drafting, editing and printing of sheet music, copying/downloading of recorded music;

- integrated services giving librarians and end-users access to digitised musical resources (text, sound, sheet music, multimedia, etc.);
- cataloguing requirements and integration of music catalogues etc., given the difficulty of documenting items such as tracks in recorded music;
- fostering consensus between music publishers, music libraries, rights holders, broadcasters, etc., for sheet music, sound and reference;
- consideration of copyright issues and mechanisms for covering copyright fees (and related costs) in networked access.

The Harmonica project will start December 1996 and run for 36 months. The consortium seems to consist mainly of libraries and academic partners. The project is not targeting the same area of the music business as RITE but will be working on similar technical issues, therefore it is important for us to establish links with the project to exchange experiences and knowledge gained during the project life time.

5.2 Groupware

Projects focusing on collaborative software in general are important for us to study and follow closely. There is a potential risk that such a project might come up with a substitute product that could replace the RITE product offering.

The RITE project has established close co-operation with the CoopWWW project described below. This project is focusing on developing and evaluating collaborative software for group work over the Internet. The project has a well functioning competitor watch for themselves and our close co-operation with the project gives us updated and timely information about state-of-the-art in the areas of Internet-based collaborative software and video conferencing.

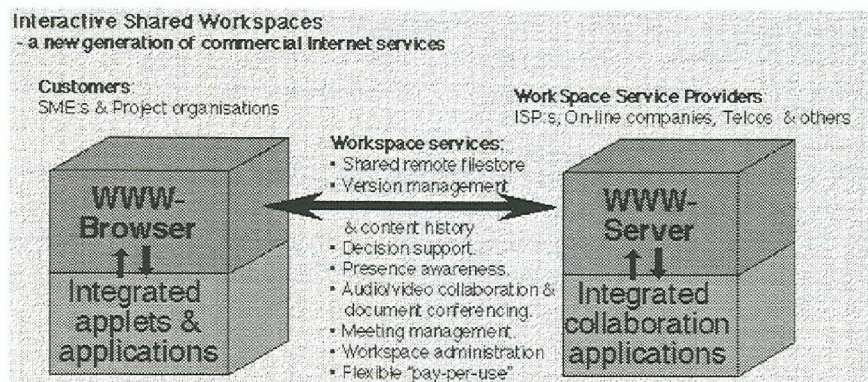
Discussions with CoopWWW representatives have also suggested a possibility of including their collaborative software as part of the RITE product offerings. These possibilities are being evaluated during the last year of the RITE project. At the moment the RITE project is using the CoopWWW software (BSCW, mentioned above) as part of our internal work for sharing and exchanging documents over the Internet/web.

See also the section above on existing commercial offerings in this area which at the moment is moving very rapidly.

5.2.1 CoopWWW & Cesar

CoopWWW, is a recently finished European research project that developed a framework for extending web-sites with collaboration services for widely-dispersed working groups or virtual organisations. The services implemented in the CoopWWW-system are derived from user studies on the co-operation requirements of technical and management professionals, working in different organisations and using heterogeneous technical environments.

The kernel of CoopWWW is based on an extension of BSCW - a CGI-based system for integrating web-based collaboration services. BSCW has been developed by the German research institute GMD and basically extends a web-server with workspace capabilities. The intention being to recreate the physical office workspace but on the web using an object model that defines documents, files, folders, meetings, web-resources, people etc. A user can create such a workspace for web-access, and define members, authorisation and the overall structure. BSCW provides its own proprietary database storage. The CoopWWW architecture is shown below.



As a result of this project, Telcos and ISPs have the opportunity to exploit the CoopWWW system as a platform for trials of a new class of commercial web-based collaboration services. These services will enable small businesses and project organisations to set up temporary co-operative computing environments on the Internet that can be accessed through a web browser and used to create, manage and share information. Typical business applications are project management, management of tenders and procurements or planning an event. The CoopWWW system could also be used to implement collaboration services for consumers, e.g. for planning an anniversary celebration, sharing of family gathering among relatives or private study circles.

5.2.2 Virtual Workplace Service

This is a pilot service based on the results of the above CoopWWW, performed by SISU in an attempt to assess the user acceptance and the commercial potential of a hosted web service for collaboration over the Internet. The Virtual Workplace service is explained as an "intranet-for-rent" targeted to small businesses. It provides a coherent set of functions for document and file sharing, discussion lists, document conversion and version management. In addition to other similar (and commercial) services it also provides event tracking, presence awareness as well as multi-point video conferencing. The video conferencing part is of course constrained by the bandwidth available on the Internet.

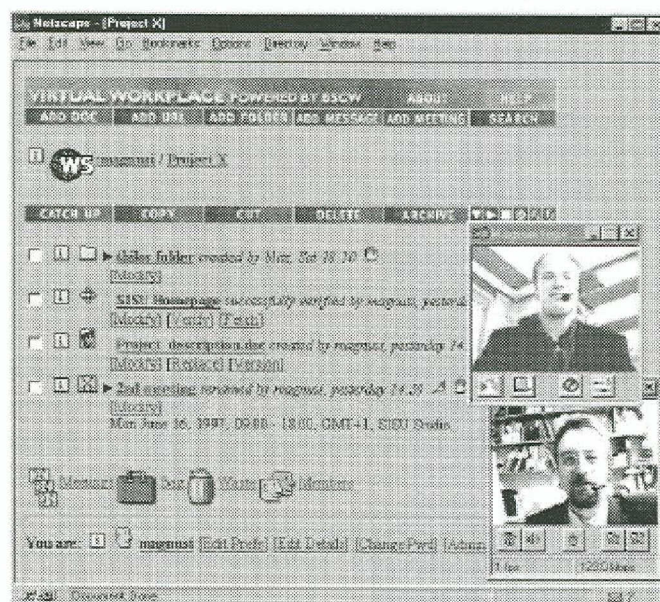


Fig. 3: A shared workspace in the experimental Web-service "Virtual Workplace" provided by SISU. (<http://vw.sisu.se>)

Users buy space and time for a workplace and pay using the Cybercash credit cards payment system. The service has been used by some 300 subscribers, including software companies and project groups that use the service for project management as well as individuals that use the service for personal tasks.

The developers of CoopWWW and this service believes that it is necessary to focus on specific user or business segments (c.f. music industry focus in RITE) in order to make this type of service commercially mature. Such an attempt will be made in a new RTD project (Cesar), in which additional multimedia functionality will be added to CoopWWW/BSCW and the user domain will be European research groups.

5.3 Publishing and Content Management

A new emerging category of projects are focusing on developing the concept of brokers in open network environments. These projects mainly affects RITE as a distribution service (product configuration number 2). So far these projects seem focused on the publishing industry and on exploiting ATM technology. The projects also seem to be working at a fairly general level defining protocols and interfaces for general brokerage services. In the long run these research results should be of importance to the music industry.

5.3.1 Multimedia Broker

Multimedia Broker is an EU funded research project that will provide a suite of technical support software tools for the development of a multimedia publishing and information access system in several areas including medicine, transport and children's books. The Multimedia Broker project is part of the European Commission's Telematics Programme/Information Engineering (IE 2093). This is a three year (36 month) project which began in January 1996 and will end in 1999.

Multimedia Broker aims to integrate a number of multimedia tools into an infrastructure which will support publishers with new means of structuring, disseminating and selling content and information products, while also providing end-users with new facilities for enjoying and employing these interactive products creatively and efficiently.

5.3.2 Multimediator

The ACTS project (AC096) Multimediator will demonstrate the use of an intelligent multimedia brokerage service for European customers and suppliers in the publishing and electronic commerce areas. Services offered will include specialised video-on-demand, hypervideo, videorating, conventional publishing services, and electronic commerce on virtual gallery and education. For that purpose the project will integrate existing technology and its own project developments. Unlike RITE this project is targeting a broadband solution based on ATM technology, as well as ISDN and Internet based solutions, where possible.

The procedure for the customers to obtain services or to buy information will consist on a sequence of steps such as to look for suppliers, to select the ones that fit into their needs, to negotiate the job or purchase, to order it, to control the work progress, and to accept it. In parallel, accounting and billing will be performed.

Content will be stored at the customer and supplier site. Any transaction and communication always happen through the broker machine, there is never a direct communication customer-supplier. Users have boxes in the broker machine to pick up order tenders or orders answers. Interactively: order negotiation, and information presentation (change of requests, control of ongoing product production) and final acceptance.

5.3.3 ABS

The ABS project (Architecture for Information Brokerage Services) which is part of the ACTS programme (project AC206), is focusing on the design, specification, implementation and validation of an open broker system to permit the efficient provision of on-line information services over the forthcoming European Information Infrastructure. The application context is electronic commerce. Like the Multimediator project described above this project targets a broadband solution based on ATM technology.

The project has three main objectives:

- To design, implement and validate a prototype of the broker system by conducting significant international trials. The trials will involve co-operation with representative end users through the participation to the project of a large number of National Hosts (France, Germany, Spain, Finland, Portugal and Greece) and several Internet-based information providers such as Wanadoo and Degriftour in France or Point Of Presence in Germany.
- To contribute to relevant standardisation activities, especially on the topics of Broker/Trader services, Broker architecture, Federation of broker systems, Broker information model. The emphasis is on the standardisation of common interfaces and protocols between the broker platforms and between a broker platform and broker clients to permit the inter-national deployment of the services.
- To exploit the trials results in order to produce a comprehensive technical-economic evaluation of the potential market development in different business areas.

Two main trials will be organised and conducted during 1998. The first trial will focus on the fundamental aspects, notably the interfaces and protocols regulating the interaction between the broker and the users. The final trial will involve several interconnected brokers installed in different countries and a larger number of content providers will be connected to the system.

Beyond testing and validating the system's functionality, it is an important objective of the trials, to provide the Specification and Evaluation process for the final Broker version with results and feedback.

5.4 IPR

The fast expansion of information networks like Internet and the introduction of digital broadcasting technology have made explicit the problems of media copyrights, author rights, access control and payment for digital multimedia material. Once published it is difficult to control the use, manipulation and distribution of digital information and to guarantee related rights.

Copyright owners are currently reluctant to move into electronic publishing without suitable means of protection because they know that it would make them vulnerable to significant loss of revenue.

The electronic publishing market - brought into being by combining multimedia technology with the world-wide distribution capability of electronic information networks - has a large potential for growth, but it will not develop until there is an effective electronic means of safeguarding copyright internationally. The same situation applies to the entertainment industry, and in particular the music business. Whereas other industry and business sectors now have reached a point where web and multimedia technologies provide added-value to business, the music industry risks losing revenue primarily due to lack of IPR controls in this technology.

There are a number of RTD efforts that focus on IPR management at the moment, such as CITED, CopyCat, CopySmart, ERCOMS, Copearms, Imprimatur. Projects like Copearms and Imprimatur act as co-ordinators assisting other projects that need to handle IPR issues. Imprimatur has been one of

the more comprehensive IPR efforts conducting awareness workshops as well as pilot trials. An overview of this project follows below.

Imprimatur

IMPRIMATUR (Intellectual Multimedia Property Rights Model and Terminology for Universal Reference, ESPRIT 20676) was established to study how to meet the challenge of multimedia rights clearance in networks. The project has had two main, related goals. The first goal is to act as a forum to establish a mutual understanding of the problems arising at the interface between IT, telecommunications and IPR concerns. The second goal is to identify and develop a set of tools to address those problems in the business, technological, standards and legal areas. The project intends to deliver a commercial software prototype (the rights model) that will work across all platforms together with internationally agreed standards.

Clearing rights in the multimedia environment is an issue which creates difficulties for both content providers and users. Content providers wish to preserve their traditional rights structure and business models while users wish to have a system of rights clearance that is both simple and cost-effective for the production of new multimedia products. Also involved in the debate are the IT and telecom providers whose products and services are both enabling the multimedia revolution and profiting from it.

The IMPRIMATUR project will design a methodology for a series of Special Interest Groups (SIGs) in the business, legal, technical and standards areas that will solicit opinion from a very wide range of players in the information society. The outcomes of the SIG meetings will in turn be passed to a series of major international conferences aimed at building consensus in the four SIG areas. From these activities will emerge a series of reports and recommendations.

The project has developed its own model of IPR, The Imprimatur Common Reference Set (ICRS), which is a framework to assist the analysis of information trading in which IPR is an issue. The framework is intended to provide an informative and educational resource for people involved in IPRs for digital media.

Within this framework falls the development of an Imprimatur Business Model for different IPR contexts. Specific business model scenarios have been developed such as scenarios for licensing within the music industry. The Business Model identifies the roles involved in the creation and distribution of multimedia content as well other main functions involved in an ECMS (see

Fig. 4).

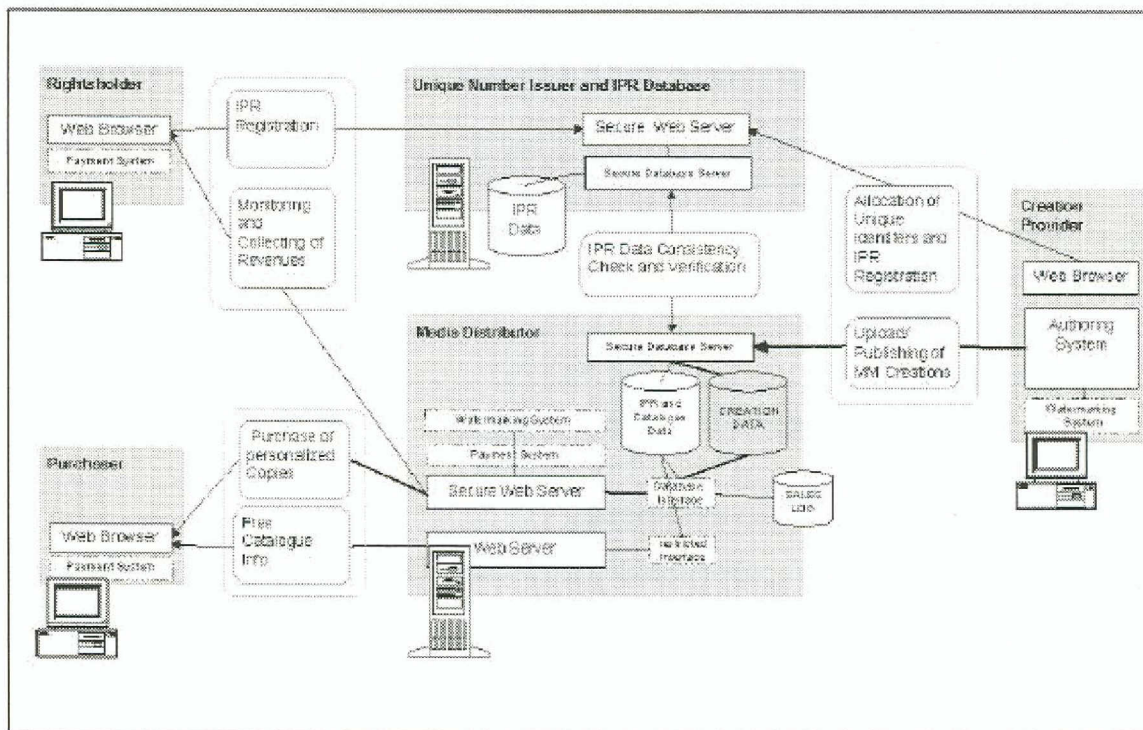


Fig. 4: The IPR trading scenario developed by Imprimatur (from Imprimatur Business Model version 2.0)

The model is intended to provide mechanisms by which purchasers (e.g., buyers of on-line music) can legally acquire IPR protected content and at any time determine whether a specific piece of content was legally acquired or not.

Test trials are performed within the project in which the business model is applied to different applications. The projects thus provides a demonstrator software in terms of an ECMS server and an authoring client, as examples of the technology required to conduct secure electronic trading of intellectual property rights. Trials are being conducted between members of the consortium and commercial partners who specialise in the distribution of different types of intellectual property, among them LiquidAudio (on-line music distribution software mentioned above).

The project is co-ordinated by the (ALCS), (UK), and Swedish TELIA is one of the partners. The project has been presented at SISU, and links have been established. The RITE project is considering a test trial with Imprimatur. The IMPRIMATUR project started in December 1995 and ends in November 1998.

The business model and demonstrator scenarios of Imprimatur are relevant to consider for applications of the RITE project, since users of a RITE product could in principle take on the various roles identified in the Imprimatur scenarios.

6 POSITIONING AND PRICING STRATEGIES

In this chapter we analyse different positioning and pricing strategies for future RITE offerings. We do this based on the three different product configurations identified in section 1.2.3.

- Business Communications Tool
- Distribution, Catalogue and Collaboration Service
- Consultancy Service

6.1 Business Communications Tool

6.1.1 Competitive Environment

General business tools for communication and collaboration are emerging quickly. We have pointed to various product options for web based groupware, both for intranet and extranet use. Major players like Lotus, Microsoft and Netscape are all acting in addition to numerous start-ups. We here also have the distinction between acquiring a product for in-house installation and that of buying a service hosted by a service provider. It can also be assumed that video conferencing not only will become an integrated part of collaboration and groupware products, but also a standard PC accessory. For Internet conferencing, the bandwidth problem is still the largest issue, other requirements that remain to be met include transmission security to guarantee the privacy of conference sessions, standards and interoperable equipment. However, the possibilities of e.g., document sharing and meeting management are perhaps of larger value than current low-bandwidth video conferencing.

6.1.2 Competitive Advantage of RITE

- Developed for and with users in SME music industry
- Flexible database access support (form based and visual queries)
- Open web-based architecture
- Optional ISDN communications

6.1.3 Pricing

Since many products announced in this field are early versions and the variety of products and services is great, we can only get a rough indication of the pricing situation.

If we consider the general groupware and collaboration products, a representative example may be the NetScape SuiteSpot product line for intranet collaboration. The coming version has been listed at 4000 US\$ for a basic configuration of server software, e.g., including servers for messaging, document sharing/distribution and discussion lists. This is also predicted to include ca 100 end-user licenses. This is only the cost for the software and not for hardware, configuration and communication. Additional costs can also be expected for the development and customisation of user applications.

The pricing of the new type of hosted teamware products described earlier typically lies between \$25-35 per user and month. Additional costs may follow with the type of Internet connection and the amount of storage space required.

If we consider desk top video conferencing tools, many of the Internet based conferencing products sell for a few a hundred US\$ or are included in the operating system like Windows (depending on client/server configuration and video equipment), whereas more high-end products like Intel's Proshare are priced 10 times that price, which in the case of ProShare also include ISDN communication cards.

6.1.4 RITE Positioning

It is of course not likely that RITE as a general business communication tool will be able to compete with the large software companies mentioned above and their product offerings. Therefore, if this path is to be pursued, RITE must focus on offering tailored functionality to its users.

The essence of this is to make sure that RITE as a software tool can preserve the prevailing work culture, as it is perceived in the independent music sector. This work culture includes strong elements of artistic creativity and processes are often ad hoc or in many cases "chaotic" as pointed out by the projects user partners. One implication of this is that software tools should be designed with a focus on maintaining "relations" rather than "structure" and "data flows". It is doubtful whether traditional so called enterprise-wide groupware solutions would do this.

Equally important is the fact that RITE now is based on a standard state-of-the-art web architecture which implies adaptability and possibilities for enhancement.

An alternative is also to position a RITE product as a complement to the existing general collaboration tools based on Lotus Notes/Domino, Netscape Suitespot or Microsoft Exchange based applications.

6.2 Promotion and Collaboration Service

6.2.1 Competitive Environment

If RITE is positioned as a collaborative service rather than has a shrink-wrapped product the competitive environment is more heterogeneous and diversified. The competition here comes from the hosted web services (such as those based on products from Lotus and Netscape) that target general business communications (often SMEs), but also from the emerging music services such those (to be) provided by the MODE consortium.

6.2.2 Competitive Advantage of RITE

- Database support.
- Local music content.
- Open web-based architecture

6.2.3 Pricing

One way of getting an idea of how much companies might be prepared to be for a RITE service is to compare with subscription fees for media and marketing services like *PR Newswire* and *Business Wire* which today are two dominant press release services for the Internet. They offer companies to send in their press and news releases and then they take care of exposing them to different Internet services, for instance Newspaper and Farcast. Business Wire uses a basic subscription fee of 100 US\$ dollars/month. In addition to that there are a number of extra fees depending on the frequency of press releases and to which services these releases are exposed.

We should also compare with the pricing for the above mentioned hosted web services although non of these currently are focusing the music or media industry.

More directly related to RITE are novel services like Indie1000, the music web publishing service from LiquidAudio mentioned above. This has been priced at \$5000 which includes the LiquidAudio software products and a three months web service for a companies music content. This also includes support for on-line sales. Promotion price for the service was set at \$1000.

6.2.4 RITE Positioning

In this context RITE needs to be focused on the music industry. A good way of doing that is to employ open (Internet based) protocols to access to other music-related sources and services. Ideally, a RITE product or service could be offered by an independent music business as a tool for promotion and sales of its own and its partners' music content.

6.3 Consultancy Service

6.3.1 Competitive Environment

In this area the competition will be much more local and will not only depend on available technology and service offerings but also on established customer base and local brand names. Larger consultancy firms will not address the same market as the RITE consortium partners, however as was described earlier weREF expect small web start-up consultants to be possible competitors.

6.3.2 Competitive Advantage of RITE

- Extensive knowledge of music industry.
- Small and flexible partners in the consortium. Well equipped to serve music industry needs, especially in the independent sector.
- Access to start-of-the-art technology.

6.3.3 Pricing

Pricing depends on the local market situations.

6.3.4 RITE Positioning

In this context the RITE consortium needs to profile themselves as specialist consultants with extensive industry knowledge. The high-tech profile should be maintained.

7 CONCLUSIONS

There are a number potential barriers to the market entry of a product based on the RITE system, in this report we have discussed some of these in terms of,

- the competitors to the consortium, i.e., IT solution providers to music industry and other music industry companies (independents as well as majors).
- the products and services that could be substitutes for the RITE technology and services, primarily emerging Web-based services for workgroups.
- current RTD work that may result in direct competing products, primarily projects in the areas of multimedia information brokering and collaboration.

However, our position is that some perceived competitors can become future partners and that substitute products or services may become value additions to the future RITE product. Also, so far we do not know of any current product or project running with a similar technical approach and the same intended music industry focus as RITE. However, the project must carefully consider the following points,

- the Internets technical and commercial acceptance in the music industry.
- how to reassure the products' music industry focus, in terms of support for users business processes and provision of music related database content.
- the continued development of products for collaboration and communication based on Web technology.

Given the development of the Internet, a first inevitable observation is that any software product claiming to support inter-organisational collaboration and communications, must be compliant with Internet technology and products. Another observation is that collaborative workspace technology continues to be a very active area, not only in terms of products but also in terms of services offered. The latter, in many cases targeted to smaller businesses lacking the skills and resources needed for adopting traditional enterprise-wide groupware technology.

We also note that desktop conferencing has yet to attain commercial acceptance. The video part is perhaps not such a vital component in a business communications system or service, as was first projected by industry (due to low quality). However, other functions in conferencing products such as application sharing and audio conferencing have proved to be usable despite limited bandwidth.

Given this situation, the RITE project cannot claim to offer a general purpose collaboration tool without risking to be regarded as a direct competitor to Lotus, Microsoft, Netscape and many others to come. Yet, we believe that it is important to include, or have possibility to include, both conferencing and workgroup functionality in a final RITE product. Since it is not realistic to build (or re-inventing) this functionality within the project, it should be provided as third party components.

We believe that a key to a stronger focus on the music industry application domain is to provide value added services and user customisation. This implies an open system design which successively can incorporate new or replace existing services, most of which will be offered through Internet based services and techniques and in terms of third party commercial products. To meet these requirements we have designed the user client software as a set of replaceable components based on a state of the art Internet architecture (the ActiveDesktop from Microsoft).

Finally, the RITE product must also be attractive for SMEs since they are the target for the first phase of the product launch. This will imply,

- a low-cost solution
- attractive functionality at the time of RITE release, when more music businesses will have experience with multimedia databases and network communication tools.

8 REFERENCES

The following tables summarises references to products, services and RTD-projects in this report.

8.1 Products

Name	Description	Supplier/Source
ActiveDesktop	The collective name for Microsofts integration of its Windows operating system with the Internet Explorer 4 web browser.	www.microsoft.com
AudioSoft	Streaming audio software from French AudioSoft.	www.audiosoft.com
CU-SeeMe	Desktop video conferencing product. Intended for local area networks and the Internet.	WhitePine Software. www.cu-seeme.com
Illustra OR DBMS	Object-Relational (OR) DBMS. One of the first products to exploit the OR-technology. Architecture based on components ("datablades") for extended functionality. Product merged with Informix.	Informix. www.informix.com
Informix Universal Server	Universal database from Informix including the Illustra object-relational DBMS.	www.informix.com
Intel Proshare	Video conferencing product from Intel. Originally ISDN-based.	www.intel.com
Internet Database Connector (IDC)	Database web server interface and publication tool for the web.	www.microsoft.com
Internet Explorer (IE)	web-browser from Microsoft. The currentnext version (IE4) is integrated with the Windows operating system, referred to as the Active Desktop. Active Desktop is used to implement the RITE client tools. .	www.microsoft.com
Internet Information Server (IIS)	web-server from Microsoft.	www.microsoft.com
LiquidAudio	Client & server software for streaming of audio. Based on Dolby compression and can encode IPR data in the audio stream.	www.liquidaudio.com
Lotus Notes/Domino Lotus Instant!Host	Lotus web server extension to the Domino server. Instant!Host is specialisation of this server for hosted web applications.	www.lotus.com
Microsoft Exchange	Groupware product providing basic functions such as email, form management and scheduling.	www.microsoft.com

NetMeeting	The video conferencing product from Microsoft. Provides voice communication and application sharing over local area networks and the Internet.	www.microsoft.com
Netscape Conference	The audio desktop conferencing component in the Netscape browser client.	www.netscape.com
Netscape SuiteSpot	Collection of server software from Netscape for messaging, security, web-publishing, directory catalogues..	www.netscape.com
RealNetworks: RealPlayer, RealPresenter, RealPublisher, RealSystem 5	A comprehensive software suite for multimedia streaming and publishing over the Internet or for intranet applications	Real Networks www.real.com
SQL Server 7 (beta)6.5	Relational Database product from Microsoft.	www.microsoft.com
Tigermark Datablade	Datablade component for the Informix Universal Server providing copyright protection for database objects.	Informix and NEC
VDOPhone	Video telephoneconferencing product intended for local area networks and the Internet.	VDOnet Corp. www.vdo.net
WebShare	Collaboration Server for the web. Competitor to Domino.	Radnet Inc. www.radnet.com

8.2 Services

Name	Description	Reference
.dotmusic	Business information service for music industry. web-based.	www.dotmusic.com
Cerberus	UK-based music sales and distribution service. Provides an on-line "juke-box" for sales over the Internet with IPR and collection.	www.cdj.co.uk
City Music Network	Music sales and distribution network based on software from AudioSoft	www.citymusic.com
eRoom	Web-based groupware product. Advanced user interface based on Microsoft ActiveX technology. Users can buy or subscribe to a service based on the product.	Instinctive Technology www.instinctive.com
HotOffice	Web-based groupware product similar to eRoom, subscription based.	HotOffice www.hotoffice.com
Indie1000 muzic.com	Two music services powered by LiquidAudio software. Promotion and sales targeted to SMEs & artists	www.liquidaudio.com http://smokin.muzic.com/

Involvement Intranet	Web based collaboration product based on the Lotus Domino server.	Changepoint, www.changepoint.com
Lotus Instant!TeamRoom	Web based groupware service from Lotus based on the Domino server. Subscription based, intranet version forthcoming.	www.lotus.com
MusicServer	Music sample server database for the Internet provided by Muzak.	www.muzak.com/enso
Netscape Virtual Office	Web based collaboration service from Netscape and Concentric. Subscription based.	www.netscape.com www.concentric.net

8.3 RTD Projects

Name	Description
ABS	Development of a European information brokering infrastructure. ATM-based. Project web site: b5www.berkom.de/ABS/
CoopWWW & Cesar	Web-based Collaboration, an extension of the BSCW workspace server from GMD CoopWWW finished 1997. Cesar is a new project that extends CoopWWW results with multimedia services. Project web site: www.sisu.se/current/cesar_frame.html
Harmonica	Concerted Action. Improvement of access to music collections in libraries. Project info: dick.tucker@svb.nl
Imprimatur	One of the main projects on technology and business models for IPR Project web site: www.imprimatur.alcs.co.uk
MODE	Music industry marketing and sales. ISDN-based. RTD phase finished, now in commercial trial service. Project web site: www.mode.net/
Multimedia Broker	Multimedia information brokering for the publishing industry. Project web site: www.sisu.se/projects/mmbroker/index.html
Multimediator	Brokering infrastructure for publishing industry. ATM-based. Project web site: www.infowin.org/ACTS/RUS/PROJECTS/ac096.htm
MUSE	Development of a general model of a media management system for content providers in the music industry. To end early 1998. Network for music industry. Major players involved. Prime contractor: IFPI Secretariat, London.
Virtual Workplace	Virtual Workplace is an experimental web service developed based on CoopWWW. Web site: vw.sisu.se