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**Five Year Assessment
of the Specific Programme:**

**ADVANCED
COMMUNICATION
TECHNOLOGIES
AND SERVICES**

Report
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European Commission

Five Year Assessment
of the Specific Programme:

ADVANCED COMMUNICATION TECHNOLOGIES AND SERVICES

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Foreword

The development and deployment of advanced communications in Europe will have major impacts on business competitiveness and on employment. The economic and social impacts of a transition to an information society are already being felt.

It is now ten years since the Member States of the Union decided to work together at European level to harmonise regulatory developments and to support research, technology development (RTD) and standardisation. The first programme of European RTD (RACE) has now been completed, and a second programme (ACTS) is implemented.

The European Commission, responsible through DGXIII for the management of these programmes, has a comprehensive set of evaluation and auditing procedures to ensure that European resources are effectively used, that the work done is of the highest quality, and that the objectives and focus remain optimised in a rapidly changing environment. As part of this evaluation and auditing process, the Commission calls periodically on some of the most knowledgeable and senior personalities from industry and government to carry out a "Strategic Audit" of the situation in Europe and of European RTD.

This is the 3rd Strategic Audit report. It reflects the views of the independent panel and encompasses a critical review of the current status of developments; a 5-year retrospective review of the relevance, efficiency and effectiveness of EU RTD¹; and recommendations for further development and use of advanced communications in Europe.



Robert Verrue

4/7/96-

¹ Including a final evaluation of the RACE Programme, as required by Article 4.2 of Council Decision 91/352/CEC of 7th June 1991 : O.J. N° L 192/8 of 16.7.91.

Report on the 1996 Strategic Audit of Advanced Communications Developments in Europe

ADVANCED COMMUNICATION TECHNOLOGIES AND SERVICES EXECUTIVE SUMMARY

Europe has excellent first-generation digital communications, and a European information infrastructure is now urgently needed.

With the Euro-ISDN and GSM standards, Europe has an excellent set of first-generation digital communications infrastructures. In terms of the technologies used, they are as good as any in the world. However, it is vital for Europe to continue to develop communication technologies, standardise for interoperation and introduce a **European Information Infrastructure** combining telecommunications, data networking and broadcasting capabilities as quickly as possible.

Digital video services should be introduced as quickly as possible..

In particular, digital video services should be introduced as quickly as possible. The technology for digital video and television now exists, and **a programme to accelerate the penetration of digital services would liberate valuable spectrum for other services.**

Specific features of a European Information Infrastructure need also to be addressed at European level, taking account of the increasing importance of the developing Eastern European markets and the Mediterranean Countries.

with a coherent plan and timetable for the introduction of a European Information Infrastructure.

The cost then of providing broadband services to every household in the EU alone will be enormous. Some progress has been made in the installation of the core network, but a lot needs still to be done in extending this to all citizens and small businesses. **Europe badly needs a coherent plan and timetable for the introduction of a European Information Infrastructure.**

The key objectives of the European R&D have been met, but coherent deployment of multimedia services is slow.

The key objectives of the European R&D telecommunications programmes (RACE I / II) have been met. The programme has met its technological objectives, but the task of technology development is far from being completed. The ACTS Programme has created an awareness of the vast potential of digital technology. However, the deployment of advanced multimedia telecommunication services on the European market has not reached the level which could have been expected. The EU RTD has helped interconnectivity and interoperability, but legislation may be necessary in some cases to ensure coherent deployment. It is also necessary to improve access to venture-capital support for innovative high-tech enterprises and start-ups.

Further research and technology development is necessary

Further research and technology development is necessary: It will not be possible to realise an Information Society in Europe only with the technologies of today, and technology development must occupy a key position in future EU RTD. Preference should be given to projects that lead to improvement of an EII and/or to future concrete commercial applications, and should mainly include projects that could have major impact on the Union and its population.

but the focus must now shift from technical standards alone, to trials and volume deployment

The original rationale for European support to RTD in this area still applies, but the focus must now shift from defining technical standards alone, to enabling applications and volume deployment on the basis of unique and widely accepted standards. European standards are a strategic means to maintain the technological initiative in Europe and to get a better industrial position in the global marketplace. It is also essential that the time span between conceptualisation and the realisation of new developments be shortened. Mechanisms must be found to achieve real market impact.

EU RTD management needs improved contracting..

In terms of the management of EU RTD, contracting procedures need to be improved and the benefits of using a results-based contract should be reviewed, with more emphasis on technical achievement than on accountancy. Contracting should be faster and more transparent.

good programme integration...

Independent advice on programme integration and management should continue to be sought, and more use should be made of video-conferencing.

across programmes..

Stronger links should be established with the EU Training and Mobility, ESPRIT (information technology) and Telematics Application programmes. There is a need to enhance the transparency and co-operation, including potential joint projects, between these programmes.

and with enhanced National initiatives.

And the concept of National Hosts needs to be re-evaluated to enhance their use.

In the 5th F. P., there should be a focus on the Communication and Information Society, with a coherent strategy and more flexibility.

Work in the 5th Framework Programme should be around the theme of RTD for the Communication and Information Society. There must be a coherent overview of the whole information and communications technology development area, with a single coherent EU strategy, a single strategic advisory group and flexibility to move resources within the whole area as circumstances change. One possibility might be a Core Technology Programme and Focused Programmes in specific application areas, as described in Section 6.3.

The main objectives should be to overcome present technological and infrastructural constraints to the explicit and hidden needs of users and to stimulate trials to demonstrate "in-the-field" the effectiveness for users of proposed solutions. It is recommended that use of trial infrastructures be enhanced in each Member State.

Key requirements in communications will be seamless access, ease of access, quality of service, ubiquitous access and service customisation..

To enable market development, meeting users requirements, the key requirements are for seamless access; ease of access; quality of services; ubiquitous access, and service customisation. Particular efforts must be made to improve access facilities, improve connection facilities, and optimise the interaction between the "access intelligence" and the "network intelligence". Standardisation - first for parts and then the whole - should remain the primary task: ATM systems must also be completely and finally standardised, and multi-media standards must be developed jointly by various standardisation groups.

Enabling technologies and visionary concepts must both be covered.

Other key areas are in optoelectronics/photonics, microwave propagations, software, interactivity, service engineering, intelligence in networks, intelligent agents, mobile communications and in information security.

But visionary concepts must also be addressed, some examples of which are given in Section 6.5.

Recommendations

1. Europe needs a coherent European Information Infrastructure covering all new communication requirements emerging from telecommunications, data networking and broadcasting; it is the responsibility of the Commission to take the necessary initiatives.
2. To reach this goal, it is necessary that the process of liberalisation in the telecommunications and broadcasting infrastructures and services is speeded up.
3. As a counterpart, it is also necessary to strengthen and accelerate standardisation. Only unique European standards will protect the investments of industry and consumers.
4. Ways must be found to accelerate the volume deployment of digital TV and interactive multi-media services. In addition, opportunities must be sought for exploitation of global niche markets for high-value business services.
5. Access to financing for innovation must be improved. The Commission should take initiatives to create a better venture-capital financing environment; some options are indicated in Section 1 of the Report.
6. A flexible and functionally effective approach to EU RTD is needed from all European Institutions. The Commission must ensure co-ordination, co-operation and transparency in their management of programmes. In advanced communications, good programme integration should be continued, and with more co-operation with other programmes.
7. We must prepare now for the 5th Framework Programme, with appropriate and flexible provisions for Information and Communications Technology RTD; some of the key issues are highlighted in this Report and exploratory work in these areas should already be started.
8. It is vital to include visionary concepts, as a means of enhancing value chains, and as the seeds of future European competitiveness.

TECHNOLOGIES ET SERVICES AVANCÉS DE COMMUNICATION

SYNTHÈSE

L'Europe a d'excellentes communications numériques de première génération et il y a désormais un besoin urgent d'une Infrastructure Européenne d'Information.

Avec les normes Euro-RNIS et GSM, l'Europe dispose d'excellents systèmes de communications numériques de première génération. Pour ce qui est des technologies utilisées, elles sont aussi bonnes que partout ailleurs dans le monde. Toutefois, il est vital pour l'Europe de continuer à développer des technologies de communication, de normaliser pour permettre l'interfonctionnement et de mettre en place le plus vite possible une **Infrastructure Européenne d'Information** (IEI) associant des fonctions de télécommunications, de réseaux de données et de diffusion.

Des services vidéo numériques doivent être mis en place le plus vite possible

En particulier, des services vidéo numériques doivent être mis en place le plus vite possible. La technologie utilisée par la vidéo et la télévision numériques est désormais disponible et **un programme visant à accélérer la pénétration des services numériques permettrait de libérer une partie appréciable du spectre pour d'autres services.**

avec un plan cohérent et un calendrier pour la mise en place d'une Infrastructure Européenne d'Information.

Certaines caractéristiques de l'Infrastructure Européenne d'Information doivent être abordées au niveau européen, compte tenu de l'importance croissante des marchés des pays d'Europe orientale et méditerranéens.

La fourniture de services à large bande à chaque foyer, rien que dans l'UE, aura un coût énorme. Des progrès ont été faits en ce qui concerne l'installation du réseau de base, mais il reste encore beaucoup à faire pour l'étendre à l'ensemble des particuliers et des petites entreprises. **L'Europe a absolument besoin d'un plan cohérent et d'un calendrier pour la mise en place d'une Infrastructure Européenne d'Information.**

Les objectifs clés de la R&D européenne ont été atteints, mais le déploiement harmonieux des services multimédias est lent.

Les objectifs clés des programmes européens de R&D dans le domaine des télécommunications (RACE I / II) ont été atteints sur le plan technologique, mais la tâche de développement est loin d'être terminée. Le programme ACTS a suscité un intérêt pour l'énorme potentiel de la technologie numérique. Cependant, le déploiement des services avancés de télécommunications multimédias sur le marché européen n'a pas atteint le niveau qu'on aurait pu espérer. La RDT de l'UE a contribué à l'interconnectivité et à l'interopérabilité, mais des mesures législatives seront peut-être nécessaires dans certains cas pour garantir un développement harmonieux. Il convient également de faciliter l'accès au capital-risque pour les entreprises de pointe innovantes et celles qui démarrent.

Il est nécessaire de poursuivre la recherche et

Il est nécessaire de poursuivre la recherche et le développement technologique. Il sera impossible de créer une société de l'information en

le développement technologique

Europe avec les seules technologies dont on dispose aujourd'hui et, à l'avenir, le développement technologique doit occuper une position clé dans la RDT de l'UE. La préférence doit être accordée aux projets qui permettent d'améliorer l'IEI et/ou qui déboucheront sur des applications commerciales concrètes. La RDT doit essentiellement être axée sur des projets susceptibles d'avoir un impact important sur l'Union et ses habitants.

mais, désormais, l'accent ne doit plus porter sur les seules normes techniques, mais sur les essais et le déploiement massif.

La justification initiale de l'aide apportée par l'Europe dans ce domaine de la RDT est toujours valable mais, désormais, l'accent ne doit plus porter uniquement sur l'élaboration de normes techniques, mais sur les applications diffusantes et leur déploiement massif à partir de normes uniques et largement acceptées. Les normes européennes offrent à l'Europe un moyen stratégique de conserver l'initiative technologique et aux entreprises de renforcer leur position sur le marché mondial. Il est également essentiel, pour les nouveaux projets, d'écourter le délai entre la conception et la réalisation. Des mécanismes doivent être trouvés pour garantir un impact commercial effectif.

La gestion de la RDT de l'UE nécessite des procédures contractuelles plus efficaces

En ce qui concerne la gestion de la RDT de l'UE, il est nécessaire d'améliorer les procédures contractuelles et d'évaluer les avantages que présente l'utilisation de contrats fondés sur les résultats, en insistant sur les réalisations techniques plutôt que sur les aspects comptables. La passation de contrat doit être plus rapide et plus transparente.

une bonne intégration des programmes

Il faut continuer à faire appel à des experts indépendants en matière d'intégration et de gestion des programmes, et recourir davantage à la vidéoconférence.

une coopération inter-programmes

Des liens plus étroits doivent être établis avec les programmes communautaires "Formation et mobilité", ESPRIT (technologies de l'information) et "Applications télématiques". Le besoin se fait sentir d'une plus grande transparence et d'une coopération accrue, éventuellement sous la forme de projets conjoints, entre ces programmes.

et des initiatives nationales étendues.

Le concept de serveurs nationaux doit être réévalué pour en accroître l'utilisation.

Dans le 5^e P.C., l'accent doit être mis sur la société de la communication et de l'information, une stratégie cohérente et davantage de souplesse.

Les travaux du 5^e Programme-cadre doivent être axés sur la RDT au service de la société de la communication et de l'information. Il faut avoir une vision d'ensemble du développement des technologies de l'information et des communications, une stratégie communautaire unique et cohérente, un seul groupe stratégique consultatif et plus de souplesse pour pouvoir ventiler les ressources dans l'ensemble du domaine en fonction des circonstances. L'une des possibilités pourrait consister à élaborer un programme technologique de base, et des programmes ciblés sur des applications pratiques précises, comme cela est décrit au chapitre 6.3.

L'objectif principal doit être de surmonter les contraintes actuelles, en matière de technologie et d'infrastructure, en fonction des besoins apparents et sous-jacents des utilisateurs, et d'encourager les essais afin de démontrer "sur le terrain" l'efficacité des solutions proposées. Il est recommandé d'accroître l'utilisation d'infrastructures expérimentales dans chaque État membre.

Les exigences de base, en matière de communications, seront la continuité de l'accès sans interruption, facile et illimité, la qualité et la personnalisation du service.

Pour permettre au marché de se développer tout en répondant aux besoins des utilisateurs, les exigences à satisfaire en priorité seront la continuité de l'accès sans interruption; la facilité d'accès; la qualité des services; l'accès illimité et la personnalisation des services. Un effort particulier doit être fait afin de perfectionner les dispositifs d'accès et de connexion, et d'optimiser l'interaction entre "intelligence du point d'accès" et "intelligence du réseau". La normalisation - d'abord des éléments et ensuite du tout - doit demeurer la tâche essentielle: il faut aussi normaliser complètement les systèmes MTA, et des normes multimédias doivent être élaborées conjointement par plusieurs groupes de normalisation.

Technologies diffusantes et concepts novateurs ne doivent pas être négligés.

Parmi les autres domaines clés figurent l'optoélectronique/photonique, la propagation hyperfréquence, le logiciel, l'interactivité, l'ingénierie des services, l'intelligence des réseaux, les agents intelligents, les communications mobiles et la sécurité de l'information.

Toutefois, des concepts novateurs, dont le chapitre 6.5 donne quelques exemples, doivent également être imaginés.

Recommandations

1. L'Europe a besoin d'une Infrastructure Européenne d'Information cohérente qui satisfasse aux nouvelles exigences imposées par les télécommunications, les réseaux de données et la diffusion. Il appartient à la Commission de prendre les initiatives appropriées.
2. Pour atteindre ce but, il est nécessaire d'accélérer le processus de libéralisation des infrastructures et des services de télécommunications et de diffusion.
3. En parallèle, il convient également de renforcer et d'accélérer la normalisation. Des normes européennes uniques constitueront le seul moyen de protéger les investissements des entreprises et les consommateurs.
4. Il faut trouver les moyens d'accélérer le déploiement massif de la TV numérique et des services multimédias interactifs et, en outre, chercher des possibilités d'exploiter des niches sur le marché mondial des services commerciaux à forte valeur ajoutée.
5. L'accès au financement pour l'innovation doit être facilité. La Commission doit prendre des initiatives pour créer un environnement plus favorable au financement par capital-risque; des options sont proposées au chapitre 1 du rapport.
6. Toutes les institutions européennes doivent adopter une approche souple et fonctionnellement efficace de la RDT. La Commission doit gérer ses programmes dans un souci de coordination, de coopération et de transparence. En matière de communications avancées, l'intégration des programmes doit se poursuivre et la coopération avec d'autres programmes être développée.
7. Nous devons préparer dès maintenant le 5^e programme-cadre, et prévoir des dispositions souples et adaptées à la RDT en matière d'information et de communications; certains problèmes clés sont signalés dans le présent rapport et il faut d'ores et déjà entreprendre des travaux exploratoires dans ces domaines.
8. Il est primordial d'envisager des concepts novateurs comme moyen de renforcer les chaînes de valeurs et comme base de la compétitivité européenne de demain.

FORTGESCHRITTENE KOMMUNIKATIONSTECHNOLOGIEN UND -DIENSTE

KURZFASSUNG

Europa verfügt über ausgezeichnete digitale Kommunikationstechnologien der ersten Generation; eine europäische Informationsinfrastruktur ist heute dringend notwendig.

Mit den Normen für Euro-ISDN und GSM verfügt Europa über ausgezeichnete digitale Kommunikationsinfrastrukturen der ersten Generation. Die eingesetzten Technologien stehen anderen nicht nach. Allerdings ist Europa auf die Weiterentwicklung von Kommunikationstechnologien angewiesen. Wir müssen Normen für ihr Zusammenwirken erstellen und so rasch wie möglich eine **europäische Informationsinfrastruktur** (European Information Infrastructure) einführen, die Telekommunikation, Datennetze und Sendekapazitäten umfaßt.

Digitale Videodienste sollten so rasch wie möglich eingeführt...

Insbesondere digitale Videodienste sollten so rasch wie möglich eingeführt werden. Die Technologien für digitale Video- und Fernsehdienste stehen heute zur Verfügung; **ein Programm zur Beschleunigung der Marktdurchdringung von Digitaldiensten würde wertvolle Frequenzen für andere Dienste freisetzen.**

und ein einheitlicher Plan und Zeitplan für die Einführung einer europäischen Informationsinfrastruktur muß erstellt werden.

Ferner sind spezifische Merkmale der europäischen Informationsinfrastruktur auf europäischer Ebene zu behandeln, wobei die zunehmende Bedeutung der entstehenden osteuropäischen Märkte und der Mittelmeerländer zu berücksichtigen ist.

Die wichtigsten Ziele der europäischen FuE wurden erreicht,...

Die Kosten der Bereitstellung von Breitbanddiensten für alle Haushalte in der EU werden extrem hoch sein. Bei der Installation des Kernnetzes sind Fortschritte zu verzeichnen; vieles bleibt jedoch noch zu tun, bis dieses ausgebaut ist und alle Bürger und Kleinunternehmen erreicht. **Europa benötigt dringend einen einheitlichen Plan und Zeitplan für die Einführung einer europäischen Informationsinfrastruktur.**

die kohärente Nutzung von Multimediadiensten schreitet jedoch nur langsam voran.

Die wichtigsten Ziele der europäischen FuE-Programme im Bereich der Telekommunikation (RACE I/II) wurden erreicht. Mit der Verwirklichung der technologischen Ziele ist jedoch die Technologieentwicklung bei weitem nicht abgeschlossen. Mit dem Programm ACTS wurde uns das enorme Potential der Digitaltechnologie deutlich vor Augen geführt.. Fortgeschrittene Multimedia-Telekommunikationsdienste sind auf dem europäischen Markt jedoch noch nicht in dem Maße präsent, wie es der Fall sein könnte. Die europäische FTE hat die Interkonnektivität und Interoperabilität verstärkt: gelegentlich können jedoch Rechtsvorschriften erforderlich sein, um eine einheitliche Anwendung sicherzustellen. Ferner muß der Zugang zu Risikokapitalhilfen für innovative High-Tech-Unternehmen und Unternehmensneugründungen erleichtert werden.

Es bedarf weiterer FTE-Arbeiten,...

Es bedarf weiterer Forschungs- und technologischer Entwicklungsarbeiten. Die europäische Informationsgesellschaft kann nicht allein mit den heute existierenden Technologien aufgebaut werden; die technologische Entwicklung muß im Rahmen der künftigen Forschungs-, technologischen Entwicklungs- und Demonstrationstätigkeit der EU eine Schlüsselstellung erhalten. Es sollten die Projekte bevorzugt werden, die die europäische Informationsinfrastruktur verbessern und/oder zu konkreten kommerziellen Anwendungen führen; es sollte sich im wesentlichen um Projekte handeln, die sich auf die Union und ihre Bevölkerung maßgebend auswirken.

.. jedoch. muß der Schwerpunkt jetzt von technischen Normen auf Versuche und Masseneinführung verlagert werden.

Die ursprünglichen Gründe für eine Unterstützung der FTE in diesem Bereich durch die EU sind nach wie vor gegeben; der Schwerpunkt lag jedoch bisher ausschließlich auf der Festlegung technischer Normen und muß jetzt auf grundlegende Anwendungen und Masseneinführung auf der Basis einheitlicher und allgemein anerkannter Normen gelegt werden. Europäische Normen sind ein strategisches Mittel, um technologische Initiativen in Europa aufrechtzuerhalten und im internationalen Wettbewerb eine bessere Stellung einzunehmen. Ferner muß der zeitliche Abstand zwischen der Konzeption und Realisierung von Neuentwicklungen verkürzt werden. Es müssen Mechanismen gefunden werden, die einen durchschlagenden Erfolg am Markt ermöglichen.

Beim FTE-Management der EU müssen die Vertragsvergabe verbessert...

Beim FTE-Management der EU muß die Vertragsvergabe verbessert werden; die Vorteile ergebnisorientierter Verträge sollten geprüft werden, wobei der Schwerpunkt verstärkt auf der technischen Leistung und weniger auf buchhalterischen Aspekten liegen sollte. Die Vertragsvergabe sollte schneller und mit größerer Transparenz erfolgen.

und die Programme integriert werden,...

Zur Integration und zum Management der Programme sollten weiterhin unabhängige Berater herangezogen und häufiger Video-Konferenzen eingesetzt werden.

sowohl untereinander...

Es sollten engere Verbindungen zu den Gemeinschaftsprogrammen für Ausbildung und Mobilität, Informationstechnologie (ESPRIT) und Telematikanwendungen geknüpft werden. Transparenz und Zusammenarbeit zwischen diesen Programmen (gegebenenfalls auch im Rahmen gemeinsamer Projekte) müssen verstärkt werden.

als auch mit - intensivierten - nationalen Maßnahmen.

Das Konzept der nationalen Hosts ist erneut zu prüfen und sollte verstärkt angewandt werden.

Im 5. Rahmenprogramm sollte der Schwerpunkt auf der Informations- und Kommunikationsgesellschaft liegen; Ziel sollte eine einheitliche Strategie und größere Flexibilität sein.

Die FTE-Arbeiten des 5. Rahmenprogramms sollten der Informations- und Kommunikationsgesellschaft gewidmet sein. Wir benötigen einen einheitlichen Überblick über die gesamte Entwicklung der Informations- und Kommunikationstechnologien, eine einheitliche Strategie der EU, eine strategische beratende Gruppe zu diesem Thema und einen flexiblen Einsatz der Ressourcen in diesem Bereich je nach veränderter Sachlage. Ein technologisches "Kernprogramm" und gezielte Programme für bestimmte Anwendungsbereiche wären eine Möglichkeit (s. 6.3).

In erster Linie sollten technologische und infrastrukturelle Hindernisse bei der Deckung des bekannten und unbekanntem Anwenderbedarfs beseitigt

und die Demonstration der Brauchbarkeit von Lösungsvorschlägen vor Ort gefördert werden. Es wird empfohlen, die Testinfrastrukturen in den Mitgliedstaaten stärker zu nutzen.

Die wichtigsten Anforderungen im Kommunikationsbereich werden ein nahtloser, bequemer Zugang, Dienstqualität und maßgeschneiderte Dienste sein.

Die Entwicklung des Marktes und die Deckung des Anwenderbedarfs erfordern vor allem: einen nahtlosen, bequemen Zugang an beliebigen Standorten, Dienstqualität und maßgeschneiderte Dienste. Insbesondere müssen die Zugangs- und Verbindungseinrichtungen verbessert und das Zusammenwirken von intelligenten Zugangs- und Netzeinrichtungen optimiert werden. Die Normung - zunächst von Teilen und schließlich des gesamten Systems - sollte die wichtigste Aufgabe bleiben. Auch ATM-Systeme müssen vollständig und endgültig genormt werden. Mehrere Normungsgremien müssen gemeinsam Multimedia-Normen erstellen.

Grundlagentechnologien und zukunftsweisende Ideen müssen berücksichtigt werden

Weitere Schlüsselbereiche sind: Optoelektronik/Photonik, Mikrowellenübertragung, Software, Interaktivität, Dienst-Engineering, Intelligenz in Netzen, "intelligente Agenten", Mobilkommunikation, Informationssicherheit.

Aber auch zukunftsweisende Ideen sind zu berücksichtigen (Beispiele s. 6.5).

Empfehlungen

1. Europa benötigt eine einheitliche Informationsinfrastruktur (European Information Infrastructure), die allen neuen kommunikationstechnologischen Anforderungen der Telekommunikation, der Datennetze und des Rundfunks entspricht. Es ist Aufgabe der Kommission, die entsprechenden Initiativen zu ergreifen.
2. Im Hinblick auf dieses Ziel muß die Liberalisierung der Infrastrukturen und Dienste für Telekommunikation und Rundfunk beschleunigt werden.
3. Eine Intensivierung und Beschleunigung der Normungstätigkeit ist in diesem Zusammenhang ebenfalls erforderlich. Nur einheitliche europäische Normen sichern die Investitionen von Unternehmen und Verbrauchern.
4. Es müssen Wege gefunden werden, die Masseneinführung von Digitalfernsehen und interaktiven Multimedia-Diensten zu beschleunigen. Ferner ist die Erschließung internationaler Nischenmärkte für hochwertige Dienstleistungen an Unternehmen anzustreben.
5. Der Zugang zu Finanzmitteln für Innovationen muß erleichtert werden. Die Kommission sollte Maßnahmen ergreifen, die ein besseres Umfeld für die Finanzierung von Risikokapital schaffen. Einige Möglichkeiten werden in Abschnitt 1 des Berichts aufgezeigt.
6. Alle europäischen Institutionen müssen sich im Zusammenhang mit der FTE flexibel und effizient zeigen. Die Kommission muß sicherstellen, daß das Programm-Management der Institutionen transparent ist und auf Koordinierung und Zusammenarbeit beruht. Bei fortgeschrittenen Kommunikationstechnologien ist weiterhin eine Programmintegration anzustreben und die Zusammenarbeit mit anderen Programmen zu intensivieren.
7. Nun müssen wir uns mit geeigneten, flexiblen Bestimmungen für die FTE im Bereich der Informations- und Kommunikationstechnologien auf das fünfte Rahmenprogramm vorbereiten. Einige der wichtigsten Themen werden in diesem Bericht genannt; in diesen Bereichen sollte bereits mit Sondierungsarbeiten begonnen werden.
8. Zukunftsweisende Konzepte sind unbedingt zu berücksichtigen, um einen Wertzuwachs bei den Mehrwertketten zu erreichen und die Grundlagen für die künftige Wettbewerbsfähigkeit Europas zu schaffen.

TECNOLOGIE E SERVIZI AVANZATI DI TELECOMUNICAZIONI

SINTESI

L'Europa dispone di eccellenti comunicazioni digitali della prima generazione e ha ora urgente bisogno di un'infrastruttura europea d'informazione.

Grazie alle norme Euro-ISDN e GSM, l'Europa dispone di una serie eccellente di infrastrutture per le comunicazioni digitali della prima generazione che, in termini di tecnologie utilizzate, sono efficaci quanto quelle utilizzate altrove. È tuttavia d'importanza vitale per l'Europa continuare a sviluppare le tecnologie di comunicazione, pervenire a una normalizzazione che favorisca l'interoperatività e introdurre al più presto un'**infrastruttura europea d'informazione** che associ telecomunicazioni, invio di dati su rete e capacità di radiodiffusione.

I servizi video digitali dovrebbero essere introdotti al più presto ...

In particolare, è necessario introdurre al più presto servizi video digitali. La tecnologia per i sistemi video e televisivi digitali è ora disponibile, e **un programma che ne acceleri la diffusione metterebbe a disposizione di altri servizi segmenti di spettro.**

... con un piano e un calendario coerenti per la realizzazione di un'infrastruttura europea d'informazione.

Si avverte inoltre l'esigenza di gestire a livello europeo alcune caratteristiche specifiche dell'infrastruttura informativa europea, tenendo conto della crescente importanza dei mercati in via di sviluppo nell'Europa orientale e nei paesi del Mediterraneo.

Nella sola Unione europea, la fornitura di servizi a banda larga ad ogni nucleo familiare avrà un costo enorme. Sono stati realizzati progressi nell'installazione della rete di base, ma rimane ancora molto da fare per poter estendere il servizio a tutti i cittadini e alle piccole imprese. **L'Europa ha urgente necessità di un piano e di un calendario coerenti per la realizzazione di un'infrastruttura informativa europea.**

Gli obiettivi principali della R&S europea sono stati realizzati, ma l'impiego coerente dei servizi multimedia si diffonde lentamente.

Gli obiettivi principali dei programmi di telecomunicazioni della R&S europea (RACE I/II) sono stati realizzati. Il programma ha raggiunto gli obiettivi tecnologici; il compito dello sviluppo tecnologico non si è tuttavia esaurito. Il programma ACTS ha posto in evidenza l'immenso potenziale della tecnologia digitale, ma la diffusione dei servizi avanzati di telecomunicazioni multimedia sul mercato europeo non ha raggiunto i livelli previsti. La RST dell'Unione ha contribuito all'interconnettività e alla interoperabilità, ma in alcuni casi sarà forse necessario emanare disposizioni legislative per assicurare una diffusione coerente. Bisogna inoltre agevolare l'accesso ai capitali di rischio, per favorire le imprese innovative di punta e il decollo di nuove imprese.

È necessario proseguire la ricerca e lo sviluppo tecnologico ...

È necessario un ulteriore sviluppo della ricerca e dello sviluppo tecnologico. Non è possibile dar vita a una società dell'informazione in Europa con le sole tecnologie disponibili attualmente; lo sviluppo tecnologico deve pertanto occupare una posizione fondamentale nei futuri programmi di RST dell'UE. Bisogna privilegiare i progetti che portano ad un miglioramento della infrastruttura europea d'informazione e/o a future applicazioni commerciali concrete, tenendo in considerazione soprattutto quelli che potrebbero avere un impatto considerevole sull'Unione e sulla sua popolazione.

... anche se ormai bisogna spostare l'attenzione dalle norme tecniche agli esperimenti e alla diffusione dei risultati.

Le motivazioni iniziali del cofinanziamento europeo alla RST nel settore sono ancora valide, ma l'attenzione deve ora spostarsi dalla sola definizione delle norme tecniche alle realizzazioni delle applicazioni e alla diffusione su vasta scala in base a norme uniche e universalmente accettate. Le norme europee rappresentano uno strumento strategico per mantenere l'iniziativa tecnologica in Europa e favorire un miglior posizionamento dell'industria europea, sul mercato mondiale. È inoltre essenziale ridurre il lasso di tempo che intercorre tra la progettazione e la realizzazione dei nuovi sviluppi e trovare meccanismi per conseguire un impatto reale sul mercato.

La gestione della RST dell'UE richiede procedure contrattuali migliori ...

In termini di gestione della RST dell'UE, è necessario migliorare le procedure contrattuali e riesaminare i vantaggi legati all'uso di contratti basati sui risultati e che privilegiano l'aspetto tecnico rispetto a quello finanziario. Le procedure contrattuali debbono essere più rapide e trasparenti.

... un'efficiente integrazione dei programmi ...

Bisogna continuare a consultare esperti indipendenti in materia di integrazione e gestione dei programmi, e utilizzare più frequentemente le videoconferenze.

... tra programmi diversi ...

Bisogna creare rapporti più stretti con i programmi comunitari "Formazione e mobilità". ESPRIT (tecnologie dell'informazione) e "Applicazioni telematiche", per i quali è inoltre sentita l'esigenza di accrescere la trasparenza e la cooperazione, inclusa la possibilità di progetti congiunti.

... e con un potenziamento delle iniziative nazionali.

Bisogna riesaminare il concetto di "organismi nazionali ospitanti", per potenziarne l'impiego.

Il Quinto programma quadro dovrebbe essere incentrato sulla società della comunicazione e dell'informazione, con una strategia coerente e maggior flessibilità.

Le attività nell'ambito del Quinto programma quadro devono concentrarsi sulla RST al servizio della società della comunicazione e dell'informazione. Bisogna avere una coerente visione globale di tutto il settore dello sviluppo della tecnologia dell'informazione e delle comunicazioni, un'unica strategia comunitaria coerente, un solo gruppo consultivo in materia di strategia e la flessibilità sufficiente per trasferire le risorse nell'ambito del settore in funzione della situazione. A tale scopo, si potrebbe mettere a punto un programma tecnologico principale e vari programmi mirati per settori applicativi specifici, come descritto nella sezione 6.3.

Gli obiettivi principali debbono essere il superamento degli attuali limiti tecnologici e infrastrutturali in funzione delle esigenze esplicite e implicite degli utilizzatori, e l'incentivazione di esperimenti che dimostrino "sul terreno" agli utilizzatori l'efficacia delle soluzioni proposte. Viene raccomandato un maggior uso delle infrastrutture sperimentali in tutti gli Stati membri.

I requisiti fondamentali delle comunicazioni sono: un accesso continuo e agevole, la qualità dei servizi, l'accesso universale e la fornitura di servizi personalizzati.

I requisiti fondamentali per favorire lo sviluppo del mercato e soddisfare le esigenze degli utilizzatori sono: un accesso continuo e agevole, la qualità dei servizi, l'accesso universale e la fornitura di servizi personalizzati. In particolare, è necessario fare il possibile per migliorare i dispositivi di accesso e di collegamento e per ottimizzare l'interazione tra "intelligenza del punto d'accesso" e "intelligenza della rete", anche se la normalizzazione - prima delle singole parti e poi dell'intero sistema - deve rimanere l'obiettivo principale. I sistemi ATM debbono giungere a una completa e definitiva normalizzazione, e differenti gruppi di normalizzazione debbono elaborare congiuntamente le norme per il settore multimedia.

Bisogna tener conto sia delle tecnologie di base che dei concetti innovativi ...

Altri settori fondamentali sono l'optoelettronica/fotonica, la propagazione di microonde, il software, l'interattività, la progettazione di servizi, l'intelligenza delle reti, gli agenti intelligenti, le comunicazioni mobili e la sicurezza dell'informazione.

Bisogna però tener conto anche dei concetti innovativi (il paragrafo 6.5 ne riporta alcuni).

Raccomandazioni

1. L'Europa ha bisogno di un'infrastruttura europea d'informazione organica che soddisfi tutte le nuove esigenze di comunicazione manifestatesi nel settore delle telecomunicazioni, della trasmissione di dati via rete e della radiodiffusione. Spetta alla Commissione adottare le iniziative necessarie.
2. Per conseguire tale obiettivo è necessario accelerare il processo di liberalizzazione delle infrastrutture e dei servizi nel settore delle telecomunicazioni e della radiodiffusione.
3. D'altro canto, è necessario anche rafforzare e accelerare il processo di normalizzazione. Gli investimenti dell'industria e dei consumatori potranno essere protetti solo grazie alla definizione di norme europee uniche.
4. È necessario trovare sistemi che permettano di accelerare la diffusione su vasta scala della TV digitale e dei servizi multimedia interattivi. Bisogna inoltre trovare il modo di sfruttare le nicchie di mercato per servizi commerciali di elevato valore che esistono a livello mondiale.
5. Bisogna agevolare l'accesso ai finanziamenti per l'innovazione. La Commissione deve prendere iniziative per creare condizioni più favorevoli ai finanziamenti con capitali di rischio; alcune possibilità sono riportate nella sezione 1 della relazione.
6. Tutte le istituzioni europee devono adottare nei confronti della RST un approccio flessibile e funzionalmente efficace. La Commissione deve garantire il coordinamento, la cooperazione e la trasparenza nella gestione dei programmi. Per quanto riguarda le comunicazioni avanzate, sarebbe opportuno continuare sulla strada di un'efficiente integrazione dei programmi e di una maggiore cooperazione con altri programmi.
7. È necessario prepararsi fin d'ora per il Quinto programma quadro, adottando disposizioni adeguate e flessibili per la RST nel settore delle tecnologie dell'informazione e delle comunicazioni: la presente relazione sottolinea alcuni problemi cruciali e sarebbe opportuno iniziare fin d'ora un'indagine esplorativa nei settori in questione.
8. È fondamentale includere i concetti innovativi, in quanto strumenti per rafforzare le catene di valore e per porre le basi della futura competitività europea.

GEAVANCEERDE COMMUNICATIETECHNOLOGIEËN EN -DIENSTEN

SAMENVATTING

Europa beschikt over uitstekende digitale communicatiemiddelen van de eerste generatie en er bestaat thans dringend behoefte aan een Europese informatie-infrastructuur.

Digitale videodiensten moeten zo snel mogelijk worden ingevoerd...

met een samenhangend plan en agenda voor de invoering van een Europese informatie-infrastructuur.

Er is voldaan aan de hoofddoelstellingen van het Europese O&O, maar een samenhangende invoering van multimediasdiensten vindt slechts langzaam plaats.

Met de Euro-ISDN- en GSM-normen beschikt Europa over een uitstekende verzameling digitale communicatie-infrastructuren van de eerste generatie. Technologisch gezien behoren zij tot de beste ter wereld. Het is voor Europa echter van vitaal belang om door te gaan met het ontwikkelen van communicatietechnologieën, te normaliseren ten behoeve van de interoperabiliteit en een **Europese informatie-infrastructuur** te introduceren, waarin telecommunicatie, data-networking en omroepmogelijkheden zo snel mogelijk worden gecombineerd.

Met name dienen digitale videodiensten zo snel mogelijk te worden ingevoerd. De technologie voor digitale video en televisie bestaat nu, en een **programma om de penetratie van digitale diensten te versnellen zou waardevol spectrum voor andere diensten vrijmaken.**

Er dient ook op Europees niveau te worden ingegaan op specifieke kenmerken van een Europese informatie-infrastructuur, rekening houdende met het steeds grotere belang van de zich ontwikkelende markten in Oost-Europa en de Middellandse-Zeelanden.

De kosten die zijn verbonden aan het leveren van breedbanddiensten in alle huishoudens van de EU zullen op zich al enorm zijn. Er is enige vooruitgang geboekt bij de installatie van het kernnetwerk, maar er moet nog veel werk worden verricht om dit uit te breiden tot alle burgers en kleine bedrijven. **Europa heeft dringend behoefte aan een samenhangend plan en bijbehorende agenda voor de invoering van een Europese informatie-infrastructuur.**

Er is voldaan aan de hoofddoelstellingen van de Europese O&O-telecommunicatieprogramma's (RACE I/II). Het programma heeft voldaan aan de technologische doelstellingen, maar de technologische ontwikkeling is verre van voltooid. Het ACTS-programma heeft geleid tot een bewustwording ten aanzien van het enorme potentieel van digitale technologie. De ontwikkeling van geavanceerde multimedia-telecommunicatiediensten op de Europese markt heeft echter nog niet het niveau bereikt dat kon worden verwacht. Het OTO in de EU heeft bijgedragen aan interconnectiviteit en interoperabiliteit, maar in sommige gevallen kan wetgeving nodig zijn om te zorgen voor een coherente invoering. Het is ook nodig de toegang tot kapitaal te bevorderen voor innovatieve high tech-bedrijven en startende bedrijven

Verder onderzoek en technologische ontwikkeling zijn nodig ...

Verder onderzoek en technologische ontwikkeling zijn nodig: een informatiemaatschappij in Europa kan niet alleen met de technologie van vandaag tot stand worden gebracht, en technologische ontwikkeling moet een sleutelpositie innemen in het toekomstig OTO van de EU. Daarbij moet de voorkeur worden gegeven aan projecten die leiden tot een verbetering van de Europese informatie-infrastructuur en/of tot toekomstige concrete commerciële toepassingen, met name projecten die grote gevolgen kunnen hebben voor de Unie en de Europese burgers.

maar het zwaartepunt van de aandacht moet nu worden verlegd van technische normen alléén naar proeven en invoering op grote schaal.

De oorspronkelijke reden voor Europese steun aan OTO op dit gebied is nog steeds van toepassing, maar het zwaartepunt van de aandacht moet nu worden verlegd van het definiëren van technische normen alléén naar het bevorderen van de invoering op grote schaal van toepassingen op basis van unieke en algemeen aanvaarde normen. Europese normen zijn een strategisch middel om het technologisch initiatief in Europa te houden en om een betere uitgangspositie voor het Europese bedrijfsleven op de wereldmarkt te bereiken. Het is ook van wezenlijk belang om de tijd tussen het eerste concept en de daadwerkelijke toepassing van nieuwe ontwikkelingen te verkorten. Er moet een mechanisme worden gevonden om rechtstreeks impact op de markt uit te oefenen.

Het OTO-beheer in de EU moet worden verbeterd, met name wat betreft de contracten, ...

Wat betreft het beheer van OTO in de EU dienen de contractprocedures te worden verbeterd en moet worden overgegaan tot een beoordeling van de mogelijke voordelen van op resultaten gebaseerde contracten, met meer nadruk op hetgeen technisch wordt bereikt dan op boekhoudkundige aspecten. Het sluiten van contracten dient sneller en doorzichtiger te verlopen.

de goede integratie van de programma's, ...

Er dient verder gebruik te worden gemaakt van onafhankelijk advies inzake de integratie en het beheer van programma's, alsmede van videoconferenties.

de contacten tussen de programma's, ...

Er dienen ook sterkere contacten te worden gelegd met de EU-programma's inzake opleiding en mobiliteit, informatietechnologie (ESPRIT) en Telematicatoepassingen. Er bestaat behoefte aan meer doorzichtigheid en betere samenwerking, met inbegrip van eventueel de gezamenlijke uitvoering van projecten, tussen deze programma's.

en betere nationale initiatieven.

Het concept van de nationale hosts, tenslotte, moet opnieuw worden geëvalueerd om het gebruik ervan te verbeteren.

In het vijfde kaderprogramma dient te worden voorzien in een aandachtspunt betreffende de communicatie- en informatiemaatschappij, met een samenhangende strategie en meer flexibiliteit.

De werkzaamheden in het vijfde kaderprogramma dienen vooral te zijn gericht op OTO ten behoeve van de communicatie- en informatiemaatschappij. Er moet sprake zijn van een samenhangend overzicht van de ontwikkelingen op het hele gebied van de informatie- en communicatietechnologie, met één samenhangende strategie van de EU, één strategische adviesgroep en flexibiliteit om binnen dit grote gebied middelen te verschuiven wanneer de omstandigheden veranderen. Een mogelijkheid daartoe zou kunnen bestaan in een kern-technologieprogramma met gerichte programma's voor specifieke toepassingsgebieden, zoals beschreven in punt 6.3.

De hoofddoelstellingen dienen te bestaan in het wegnemen van de huidige technologische en infrastructuur-beperkingen ten aanzien van de expliciete en verborgen behoeften van gebruikers, en om proeven te stimuleren waarmee de doeltreffendheid van voorgestelde oplossingen voor gebruikers 'in het veld' kan worden gedemonstreerd. Er wordt aanbevolen in alle Lid-Staten het gebruik van proef-infrastructuren te verbeteren.

De belangrijkste eisen op het gebied van communicatie zijn naadloze toegang, gemak van toegang, kwaliteit van de dienstverlening, universele toegang en aanpasbaarheid van de dienst.

Om een marktontwikkeling mogelijk te maken die tegemoet komt aan de eisen van de gebruikers, zijn de belangrijkste eisen naadloze toegang, gemak van de toegang, kwaliteit van de dienstverlening, universele toegang en aanpasbaarheid van de dienstverlening. Van bijzonder belang is het verbeteren van de toegangs- én aansluitingsmogelijkheden en het optimaliseren van de wisselwerking tussen de 'toegangsintelligentie' en de 'netwerkindelligentie'. Normalisatie - eerst voor de onderdelen en daarna voor het geheel - dient de primaire taak te blijven: ATM-systemen moeten ook volledig en definitief worden genormaliseerd en de verschillende normalisatiegroepen moeten gezamenlijk multimedianoormen ontwikkelen.

Er moet zowel aandacht worden besteed aan activerende technologie als aan visionaire concepten

Andere sleutelgebieden zijn opto-elektronica/fotonica, voortplanting van microgolven, software, interactiviteit, engineering van diensten, intelligente netwerken, intelligente agentia, mobiele communicatie en veiligheid van informatie.

Maar er moet ook worden ingegaan op visionaire concepten, waarvan in paragraaf 6.5 enige voorbeelden worden gegeven.

Aanbevelingen

1. Europa heeft behoefte aan een samenhangende Europese informatie-infrastructuur die voldoet aan alle nieuwe communicatie-eisen in verband met telecommunicatie, data-networking en omroep; het is de verantwoordelijkheid van de Commissie om de noodzakelijke initiatieven te nemen.
2. Om dit doel te bereiken is een versnelling nodig van het liberaliseringsproces van de telecommunicatie- en omroepinfrastructuren en -diensten.
3. Tegelijkertijd moet ook de normalisatie worden versterkt en versneld. Alleen met behulp van unieke, Europese normen kunnen de investeringen van het bedrijfsleven en de consumenten worden beschermd.
4. Er moet worden gezocht naar mogelijkheden om de invoering op grote schaal van digitale televisie en interactieve multimediasdiensten te versnellen. Daarnaast moet worden gezocht naar mogelijkheden voor de benutting van wereldwijde niche-markten voor zakelijke diensten met hoge toegevoegde waarde.
5. De toegang tot financiering ten behoeve van innovatie moet worden verbeterd. De Commissie dient initiatieven te nemen om te zorgen voor een betere financieringsomgeving; enkele opties worden in deel I van het verslag aangegeven.

6. Er bestaat behoefte aan een flexibele en functioneel effectieve aanpak van OTO in de EU door alle Europese instellingen. De Commissie moet zorgen voor coördinatie, samenwerking en transparantie bij het beheer van de programma's. Op het gebied van geavanceerde communicatie dient de goede integratie van de programma's te worden gecontinueerd en de samenwerking met andere programma's te worden uitgebreid.
7. Het vijfde kaderprogramma moet nu worden voorbereid, met aangepaste en flexibele bepalingen voor OTO ten behoeve van de informatie- en communicatietechnologie; een aantal sleutelonderwerpen wordt in het verslag genoemd en op deze gebieden dient men reeds met de voorbereidende werkzaamheden te beginnen.
8. Het is van wezenlijk belang ook in te gaan op visionaire concepten, als een middel ter versterking van waardeketens en als basis voor de toekomstige concurrentiepositie van Europa.

AVANCEREDE KOMMUNIKATIONSTEKNOLOGIER OG -TJENESTER

RESUME

Europa har fremragende digitalkommunikation af første generation, og der er nu stærkt behov for en europæisk informationsinfrastruktur.

Med Euro-ISDN og GSM-standarderne har Europa en udmærket række digitale kommunikationsinfrastrukturer af første generation. Teknologisk set står de ikke tilbage for nogen i verden. Det er imidlertid af afgørende vigtighed, at Europa stadig udvikler kommunikationsteknologien, udarbejder standarder for samdrift og hurtigst muligt skaber en **europæisk informationsinfrastruktur**, der samler telekommunikation, datanet og transmissionsmuligheder.

Der bør indføres digitale videotjenester så hurtigt som muligt....

Ikke mindst bør der så hurtigt som muligt indføres digitale videotjenester. Teknologien til digital video og tv findes allerede, og **et program, der skal fremme udbredelsen af digitale tjenester, ville skabe værdifulde muligheder for andre tjenester.**

med en sammenhængende plan og en tidsplan for indførelse af en europæisk informationsinfrastruktur

Desuden skal en europæisk informationsinfrastrukturs særlige træk behandles på europæisk plan, idet der skal tages hensyn til de voksende østeuropæiske markeder og Middelhavslandenes stadig større betydning.

Omkostningerne ved at forsyne hver husstand i EU med bredbåndstjenester bliver enorme. Der er allerede sket visse fremskridt, når det gælder etablering af netkernen, men der skal stadig gøres meget for at udvide den til alle borgere og mindre virksomheder. **Europa har stærkt behov for en sammenhængende plan og en tidsplan for indførelsen af en europæisk informationsinfrastruktur.**

Den europæiske FU's vigtigste mål er blevet nået, men den konsekvente udnyttelse af multimedietjenesterne sker langsomt.

De europæiske telekommunikationsprogrammer (RACE I/II) har nået de vigtigste FU-mål. Programmet har opfyldt sine teknologiske målsætninger, men den teknologiske udviklings opgave er langt fra afsluttet. ACTS-programmet har skabt kendskab til den digitale teknologiske enorme muligheder. Udnyttelsen af avancerede multimedietelekommunikationstjenester på det europæiske marked har imidlertid ikke nået det forventede omfang. EU's FTU har bidraget til indbyrdes forbindelse og samdrift, men i nogle tilfælde kræves der lovgivning for at sikre en konsekvent udnyttelse. Også adgangen til risikovillig kapital skal forbedres for at støtte innovative højteknologiske virksomheder og iværksættelsesforetagender.

Yderligere forskning og teknologisk udvikling er nødvendig,

Yderligere forskning og teknologisk udvikling er nødvendig: Informationssamfundet i Europa kan ikke realiseres alene ved hjælp af den nuværende teknologi, og teknologisk udvikling må derfor indtage en nøgleposition i EU's fremtidige FTU. Hovedvægten bør lægges på projekter, der fører til forbedring af EII og /eller til fremtidig konkret erhvervsmæssig udnyttelse, og de bør især omfatte projekter, der kan få afgørende betydning for Unionen og dens befolkning.

men hovedvægten må flyttes fra tekniske standarder til afprøvninger og udnyttelse i større omfang

Den oprindelige begrundelse for europæisk støtte til FTU på dette område gælder stadig, men hovedvægten må nu flyttes fra opstilling af tekniske standarder til anvendelse og udnyttelse i større omfang på grundlag af fælles, alment accepterede standarder. Europæiske standarder er det strategiske middel, hvormed det teknologiske initiativ i Europa kan bevares, og en bedre industriel stilling på verdensmarkedet kan opnås. Det er også vigtigt, at tidsforløbet mellem planlægning og realisering af nye udviklinger gøres kortere. Der må findes midler, hvormed virkelig indflydelse på markedet kan opnås.

Styringen af EU's FTU kræver bedre kontraktforhold,...

Hvad styringen af EU's FTU angår, skal kontraktprocedurene forbedres, og der bør ses på fordelene ved at benytte resultatorienterede kontrakter med større vægt på tekniske resultater end på regnskaber. Kontraktprocedurene bør være hurtigere og mere gennemsigtige.

god programintegration...

Der bør stadig søges rådgivning om programintegration og programledelse, og der bør gøres større brug af videokonferencer.

på tværs af programmerne...

Der bør knyttes stærkere forbindelser med EU's programmer for uddannelse og mobilitet, ESPRIT (informationsteknologi) og telematikanvendelser. Der er behov for at øge gennemsigtigheden og samarbejdet mellem disse programmer, herunder eventuelt fælles projekter.

og bedre nationale initiativer.

Idéen med nationale værter må tages op til fornyet behandling og udnyttelsen af den gøres bedre.

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Men fremsynede idéer bør også behandles, og nogle eksempler gives i afsnit 6.5.

Henstillinger

1. Europa har brug for en sammenhængende europæisk informationsinfrastruktur, der omfatter alle nye kommunikationsbehov, som opstår i forbindelse med telekommunikation, datanet og radio- og tv-transmission. Det er Kommissionens opgave at tage de nødvendige initiativer.
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5. Adgangen til finansiering af innovation må forbedres. Kommissionen bør tage initiativet til at skabe et bedre klima for risikovillig finansieringskapital. Nogle muligheder angives i rapportens afsnit 1.
6. Der er behov for en fleksibel og funktionelt effektiv indstilling til EU's FTU i alle europæiske institutioner. Kommissionen må sikre koordination, samarbejde og gennemsigtighed i programledelsen. Inden for avanceret kommunikation bør programintegreringen videreføres, og der bør sikres samarbejde med andre programmer.
7. Vi må nu forberede os på det femte rammeprogram med relevante og fleksible bestemmelser for FTU inden for informations- og kommunikationsteknologi. Nogle af de vigtigste spørgsmål behandles i denne rapport, og det indledende arbejde på disse områder bør allerede sættes i gang.
8. Det er vigtigt, at fremsynede idéer medtages som grundlag for værdiforøgelse og forudsætning for fremtidig europæisk konkurrencedygtighed.

6. Er bestaat behoefte aan een flexibele en functioneel effectieve aanpak van OTO in de EU door alle Europese instellingen. De Commissie moet zorgen voor coördinatie, samenwerking en transparantie bij het beheer van de programma's. Op het gebied van geavanceerde communicatie dient de goede integratie van de programma's te worden gecontinueerd en de samenwerking met andere programma's te worden uitgebreid.
7. Het vijfde kaderprogramma moet nu worden voorbereid, met aangepaste en flexibele bepalingen voor OTO ten behoeve van de informatie- en communicatietechnologie; een aantal sleutelonderwerpen wordt in het verslag genoemd en op deze gebieden dient men reeds met de voorbereidende werkzaamheden te beginnen.
8. Het is van wezenlijk belang ook in te gaan op visionaire concepten, als een middel ter versterking van waardeketens en als basis voor de toekomstige concurrentiepositie van Europa.

AVANCEREDE KOMMUNIKATIONSTEKNOLOGIER OG -TJENESTER

RESUME

Europa har fremragende digitalkommunikation af første generation, og der er nu stærkt behov for en europæisk informationsinfrastruktur.

Der bør indføres digitale videotjenester så hurtigt som muligt....

med en sammenhængende plan og en tidsplan for indførelse af en europæisk informationsinfrastruktur

Den europæiske FU's vigtigste mål er blevet nået, men den konsekvente udnyttelse af multimedietjenesterne sker langsomt.

Med Euro-ISDN og GSM-standarderne har Europa en udmærket række digitale kommunikationsinfrastrukturer af første generation. Teknologisk set står de ikke tilbage for nogen i verden. Det er imidlertid af afgørende vigtighed, at Europa stadig udvikler kommunikationsteknologien, udarbejder standarder for samdrift og hurtigst muligt skaber en **europæisk informationsinfrastruktur**, der samler telekommunikation, datanet og transmissionsmuligheder.

Ikke mindst bør der så hurtigt som muligt indføres digitale videotjenester. Teknologien til digital video og tv findes allerede, og **et program, der skal fremme udbredelsen af digitale tjenester, ville skabe værdifulde muligheder for andre tjenester.**

Desuden skal en europæisk informationsinfrastrukturs særlige træk behandles på europæisk plan, idet der skal tages hensyn til de voksende østeuropæiske markeders og Middelhavslandenes stadig større betydning.

Omkostningerne ved at forsyne hver husstand i EU med bredbåndstjenester bliver enorme. Der er allerede sket visse fremskridt, når det gælder etablering af netkernen, men der skal stadig gøres meget for at udvide den til alle borgere og mindre virksomheder. **Europa har stærkt behov for en sammenhængende plan og en tidsplan for indførelsen af en europæisk informationsinfrastruktur.**

De europæiske telekommunikationsprogrammer (RACE I/II) har nået de vigtigste FU-mål. Programmet har opfyldt sine teknologiske målsætninger, men den teknologiske udviklings opgave er langt fra afsluttet. ACTS-programmet har skabt kendskab til den digitale teknologis enorme muligheder. Udnyttelsen af avancerede multimedietelekommunikationstjenester på det europæiske marked har imidlertid ikke nået det forventede omfang. EU's FTU har bidraget til indbyrdes forbindelse og samdrift, men i nogle tilfælde kræves der lovgivning for at sikre en konsekvent udnyttelse. Også adgangen til risikovillig kapital skal forbedres for at støtte innovative højteknologiske virksomheder og iværksættelsesforetagender.

Yderligere forskning og teknologisk udvikling er nødvendig,

Yderligere forskning og teknologisk udvikling er nødvendig: Informationssamfundet i Europa kan ikke realiseres alene ved hjælp af den nuværende teknologi, og teknologisk udvikling må derfor indtage en nøgleposition i EU's fremtidige FTU. Hovedvægten bør lægges på projekter, der fører til forbedring af EII og /eller til fremtidig konkret erhvervsmæssig udnyttelse, og de bør især omfatte projekter, der kan få afgørende betydning for Unionen og dens befolkning.

men hovedvægten må flyttes fra tekniske standarder til afprøvninger og udnyttelse i større omfang

Den oprindelige begrundelse for europæisk støtte til FTU på dette område gælder stadig, men hovedvægten må nu flyttes fra opstilling af tekniske standarder til anvendelse og udnyttelse i større omfang på grundlag af fælles, alment accepterede standarder. Europæiske standarder er det strategiske middel, hvormed det teknologiske initiativ i Europa kan bevares, og en bedre industriel stilling på verdensmarkedet kan opnås. Det er også vigtigt, at tidsforløbet mellem planlægning og realisering af nye udviklinger gøres kortere. Der må findes midler, hvormed virkelig indflydelse på markedet kan opnås.

Styringen af EU's FTU kræver bedre kontraktforhold,...

Hvad styringen af EU's FTU angår, skal kontraktprocedurene forbedres, og der bør ses på fordelene ved at benytte resultatorienterede kontrakter med større vægt på tekniske resultater end på regnskaber. Kontraktprocedurene bør være hurtigere og mere gennemsigtige.

god programintegration...

Der bør stadig søges rådgivning om programintegration og programledelse, og der bør gøres større brug af videokonferencer.

på tværs af programmerne...

Der bør knyttes stærkere forbindelser med EU's programmer for uddannelse og mobilitet, ESPRIT (informationsteknologi) og telematikanvendelser. Der er behov for at øge gennemsigtigheden og samarbejdet mellem disse programmer, herunder eventuelt fælles projekter.

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ΠΡΟΗΓΜΕΝΕΣ ΤΕΧΝΟΛΟΓΙΕΣ ΚΑΙ ΥΠΗΡΕΣΙΕΣ ΕΠΙΚΟΙΝΩΝΙΩΝ

ΠΕΡΙΛΗΨΗ

Η Ευρώπη διαθέτει εξαιρετικές ψηφιακές επικοινωνίες πρώτης γενεάς επείγουσα η ανάγκη για ευρωπαϊκή υποδομή πληροφοριών.

Οι ψηφιακές βιντεοϋπηρεσίες πρέπει να εισαχθούν το ταχύτερο δυνατό...

... με συνεκτικό σχέδιο και χρονοδιάγραμμα για την εισαγωγή ευρωπαϊκής υποδομής πληροφοριών.

Με τα πρότυπα Euro-ISDN και GSM, η Ευρώπη διαθέτει εξαιρετική δέσμη υποδομής ψηφιακών επικοινωνιών πρώτης γενεάς. Ως προς τις χρησιμοποιούμενες τεχνολογίες βρίσκονται στο ίδιο επίπεδο με τα υπόλοιπα μέρη του κόσμου. Είναι, ωστόσο, ζωτικής σημασίας για την Ευρώπη η συνέχιση της ανάπτυξης τεχνολογιών επικοινωνιών, η τυποποίηση για σκοπούς διαλειτουργικότητας και η εισαγωγή **ευρωπαϊκής υποδομής πληροφοριών** που θα συνδυάζει το ταχύτερο δυνατό τηλεπικοινωνίες, δίκτυα δεδομένων και δυνατότητες ραδιοεκπομπών.

Οι ψηφιακές βιντεοϋπηρεσίες, ιδιαίτερα, θα πρέπει να εισαχθούν το ταχύτερο δυνατό. Η τεχνολογία για ψηφιακό βίντεο και τηλεόραση υφίσταται ήδη, ενώ **ένα πρόγραμμα για την επιτάχυνση της διείσδυσης των ψηφιακών υπηρεσιών θα ελευθερώσει πολύτιμο τμήμα του φάσματος προς όφελος άλλων υπηρεσιών.**

Πρέπει επίσης να αντιμετωπιστούν σε ευρωπαϊκό επίπεδο ειδικά χαρακτηριστικά της ευρωπαϊκής υποδομής πληροφοριών, συνεκτιμώντας την αυξανόμενη σημασία που καταλαμβάνουν οι αναπτυσσόμενες αγορές στην Ανατολική Ευρώπη και τις μεσογειακές χώρες.

Η δαπάνη για την παροχή ευρυζωνικών υπηρεσιών σε κάθε νοικοκυριό της ΕΕ θα είναι τεράστια. Έχει πραγματοποιηθεί ορισμένη πρόοδος κατά την εγκατάσταση του κεντρικού δικτύου, απομένει όμως η πραγματοποίηση μεγάλου μέρους εργασιών για την επέκταση του εν λόγω δικτύου σε όλους τους πολίτες και τις μικρές επιχειρήσεις. **Η Ευρώπη έχει επείγουσα ανάγκη ενός συνεκτικού σχεδίου και χρονοδιαγράμματος για την εισαγωγή ευρωπαϊκής υποδομής πληροφοριών.**

Οι βασικοί στόχοι της ευρωπαϊκής E&A έχουν επιτευχθεί, αλλά καθυστερεί η συνεκτική ανάπτυξη πολυμεσικών υπηρεσιών.

Οι βασικοί στόχοι των ευρωπαϊκών προγραμμάτων E&A στις τηλεπικοινωνίες (RACE I/II) έχουν επιτευχθεί. Το πρόγραμμα κάλυψε τους τεχνολογικούς του στόχους, το καθήκον όμως της τεχνολογικής ανάπτυξης πόρρω απέχει από την ολοκλήρωσή του. Με το πρόγραμμα ACTS δημιουργήθηκε ευαισθητοποίηση σχετικά με το τεράστιο δυναμικό της ψηφιακής τεχνολογίας. Η ανάπτυξη, ωστόσο, προηγμένων υπηρεσιών πολυμεσικών τηλεπικοινωνιών στην ευρωπαϊκή αγορά δεν έχει ακόμα επιτύχει το αναμενόμενο επίπεδο. Η κοινοτική ETA συνέβαλε για την επίτευξη διασύνδεσης και διαλειτουργικότητας. Ενδέχεται όμως να απαιτηθεί σε ορισμένες περιπτώσεις νομοθετικό έργο για τη διασφάλιση συνεκτικής ανάπτυξης. Απαιτείται επίσης να βελτιωθεί η πρόσβαση του επιχειρηματικού κεφαλαίου για την υποστήριξη καινοτόμων επιχειρήσεων υψηλής τεχνολογίας και την έναρξη άλλων.

Απαιτείται περαιτέρω έρευνα και τεχνολογική ανάπτυξη...

Απαιτείται περαιτέρω έρευνα και τεχνολογική ανάπτυξη: Η πραγματοποίηση της κοινωνίας των πληροφοριών στην Ευρώπη δεν θα είναι δυνατή μόνο με τις σημερινές τεχνολογίες, ενώ η τεχνολογική ανάπτυξη πρέπει να καταλάβει νευραλγικής σημασίας θέση στη μελλοντική κοινοτική ETA. Θα προτιμηθούν έργα που οδηγούν στη βελτίωση της ευρωπαϊκής υποδομής πληροφοριών ή/και σε μελλοντικές συγκεκριμένες εμπορικές εφαρμογές, ενώ θα περιλαμβάνονται κατά κύριο λόγο έργα που μπορούν να έχουν μείζονες επιπτώσεις στην Ένωση και τους πολίτες της.

η εστία πρέπει όμως τώρα να μετατοπιστεί από τα τεχνικά πρότυπα στις δοκιμές και στην ανάπτυξη ευρείας κλίμακας

Η αρχική αιτιολόγηση για την ευρωπαϊκή υποστήριξη στην ETA στο πεδίο αυτό παραμένει ισχυρή, η εστίαση όμως πρέπει τώρα να μετακινηθεί από τον καθορισμό τεχνικών προτύπων αποκλειστικώς, σε εφαρμογές ευρείας διάδοσης και ανάπτυξη ευρείας κλίμακας βάσει ενιαίων και ευρύτερα αποδεκτών προτύπων. Τα ευρωπαϊκά πρότυπα αποτελούν στρατηγικό μέσο για τη διατήρηση της τεχνολογικής πρωτοβουλίας στην Ευρώπη καθώς και για την επίτευξη βελτιωμένης βιομηχανικής θέσης στην παγκόσμια αγορά. Είναι επίσης σημαντικό να μειωθεί το χρονικό διάστημα μεταξύ της σύλληψης της γενικής ιδέας και της υλοποίησης των νέων εξελίξεων. Πρέπει να ευρεθούν μηχανισμοί για την επίτευξη γνήσιου αντίκτυπου στην αγορά.

Για την κοινοτική διαχείριση ETA απαιτούνται βελτιωμένες διαδικασίες σύναψης συμβάσεων ...

Όσον αφορά τη διαχείριση της κοινοτικής ETA πρέπει να βελτιωθούν οι διαδικασίες σύναψης συμβάσεων και να αναλυθούν τα οφέλη από συμβάσεις που βασίζονται σε αποτελέσματα, όπου τονίζονται περισσότερο τα τεχνικά επιτεύγματα από τις λογιστικές καταστάσεις. Οι διαδικασίες σύναψης συμβάσεων θα πρέπει να είναι ταχύτερες και περισσότερο διαφανείς.

καλή ολοκλήρωση των προγραμμάτων...

Θα πρέπει να συνεχισθεί η πρακτική της αναζήτησης ανεξάρτητων συμβούλων όσον αφορά την ολοκλήρωση των προγραμμάτων και τη διαχείρισή τους, και να γίνεται εκτενέστερη χρήση των βιντεοδιασκέψεων.

**με άλλα
προγράμματα...**

Πρέπει να ενισχθούν οι δεσμοί με τα κοινοτικά προγράμματα κατάρτισης και κινητικότητας, ESPRIT (τεχνολογία πληροφοριών) και εφαρμογών τηλεματικής. Είναι ανάγκη να βελτιωθεί η διαφάνεια και η συνεργασία ενδεχομένως και η πραγματοποίηση κοινών έργων, μεταξύ των εν λόγω προγραμμάτων.

**... και με
βελτιωμένες
εθνικές
πρωτοβουλίες**

Πρέπει επίσης να επαναξιολογηθεί η έννοια των εθνικών υποδοχέων ώστε να βελτιωθεί η χρήση τους.

**Στο 5ο πρόγραμμα
πλαίσιο πρέπει να
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μεγαλύτερη
ευελιξία.**

Οι εργασίες του 5ου προγράμματος πλαισίου πρέπει να περιστρέφονται γύρω από το θέμα της ΕΤΑ για την κοινωνία των επικοινωνιών και των πληροφοριών. Πρέπει να υπάρξει συνεκτική εποπτεία ολόκληρου του αναπτυξιακού πεδίου για τεχνολογίες πληροφοριών και επικοινωνιών, με μία ενιαία και συνεκτική κοινοτική στρατηγική, ενιαία στρατηγική συμβουλευτική ομάδα και ευελιξία για τη μετακίνηση των πόρων εντός του τομέα ανάλογα με τη μεταβολή των συνθηκών. Μία από τις δυνατότητες είναι ενδεχομένως ένα πρόγραμμα κεντρικών τεχνολογιών και εστιασμένα προγράμματα σε συγκεκριμένους τομείς εφαρμογής, όπως περιγράφεται στο κεφάλαιο 6.3.

Οι κύριοι στόχοι πρέπει να είναι η υπέρβαση των υφιστάμενων φραγμών στην τεχνολογία και την υποδομή προς όφελος διατυπωμένων και μη αναγκών των χρηστών καθώς και για την ενθάρρυνση δοκιμών για επίδειξη υπό πραγματικές συνθήκες της αποτελεσματικότητας προτεινομένων λύσεων για τους χρήστες. Συνιστάται να ενταθεί η χρήση δοκιμαστικών υποδομών σε κάθε κράτος μέλος.

**Καίριες
απαιτήσεις στις
επικοινωνίες θα
είναι η ομαλή και
εύκολη πρόσβαση,
η ποιότητα της
παρεχόμενης
υπηρεσίας, η
γενική πρόσβαση
και η προσαρμογή
των υπηρεσιών
ανάλογα με τις
ανάγκες.**

Για να καταστεί δυνατή η ανάπτυξη της αγοράς σε ανταπόκριση προς τις ανάγκες των χρηστών, ορίζονται ως καίριες απαιτήσεις η ομαλή και εύκολη πρόσβαση, η ποιότητα των παρεχομένων υπηρεσιών, η γενική πρόσβαση και η προσαρμογή της υπηρεσίας στις εκάστοτε ανάγκες. Πρέπει να πραγματοποιηθούν ιδιαίτερες προσπάθειες για τη βελτίωση των ευκολιών πρόσβασης και σύνδεσης καθώς και για τη βελτιστοποίηση της αλληλεπίδρασης μεταξύ "νοημοσύνης πρόσβασης" και "νοημοσύνης δικτύου". Η τυποποίηση, καταρχήν για τα μέρη και στη συνέχεια για το σύνολο - θα πρέπει να παραμείνει πρωταρχικό καθήκον: τα συστήματα ATM πρέπει επίσης να τυποποιηθούν πλήρως και οριστικά, ενώ πρέπει να πραγματοποιηθεί κοινή ανάπτυξη πολυμεσικών προτύπων από διάφορες ομάδες τυποποίησης.

**Πρέπει να
αντιμετωπιστεί το
ζήτημα
τεχνολογιών
ευρείας διάδοσης
όσο και
καινοτόμες,
οραματικές
αντιλήψεις**

Άλλα, νευραλγικής σημασίας πεδία βρίσκονται στην οπτοηλεκτρονική, φωτονική, τη διάδοση μικροκυμάτων, το λογισμικό, τη διαλογική λειτουργία, την τεχνολογία υπηρεσιών, τη νοημοσύνη δικτύων, τους ευφυείς μηχανισμούς τις κινητές επικοινωνίες και την ασφάλεια πληροφοριών.

Πρέπει όμως επίσης να επιδιωχθεί η προσέγγιση και καινοτόμων οραματικών αντιλήψεων, παραδείγματα των οποίων περιλαμβάνονται στο κεφάλαιο 6.5

Συστάσεις

1. Η Ευρώπη έχει ανάγκη μιας συνεκτικής ευρωπαϊκής υποδομής πληροφοριών που θα καλύπτει το σύνολο των νέων απαιτήσεων επικοινωνιών που προκύπτουν από τις τηλεπικοινωνίες, τα δίκτυα δεδομένων και τις ραδιοεκπομπές η ανάληψη των απαραίτητων πρωτοβουλιών αποτελεί αρμοδιότητα της Επιτροπής.
2. Για την επίτευξη του στόχου αυτού είναι απαραίτητη η επιτάχυνση της διαδικασίας ελευθέρωσης στις υποδομές και τις υπηρεσίες τηλεπικοινωνιών και ραδιοεκπομπών.
3. Αντίστοιχα, είναι απαραίτητη επίσης η ενίσχυση και επιτάχυνση της τυποποίησης. Οι επενδύσεις της βιομηχανίας και οι καταναλωτές θα προστατευθούν μόνο με ενιαία ευρωπαϊκά πρότυπα.
4. Πρέπει να εξευρεθούν λύσεις για την επιτάχυνση της μαζικής ανάπτυξης της ψηφιακής τηλεόρασης και των διαλογικών πολυμεσικών υπηρεσιών. Επιπλέον, πρέπει να αναζητηθούν ευκαιρίες για εκμετάλλευση σε παγκόσμια κλίμακα εξειδικευμένων τμημάτων της αγοράς για επιχειρηματικές υπηρεσίες υψηλής αξίας.
5. Πρέπει να βελτιωθεί η πρόσβαση στη χρηματοδότηση των καινοτομιών. Η Επιτροπή θα πρέπει να αναλάβει πρωτοβουλίες για τη δημιουργία βελτιωμένου περιβάλλοντος για τη χρηματοδότηση του επιχειρηματικού κεφαλαίου ορισμένες δυνατότητες υποδεικνύονται στο κεφάλαιο I της έκθεσης.
6. Απαιτείται να επιδειχθεί εκ μέρους όλων των ευρωπαϊκών οργάνων ευελιξία και λειτουργική αποτελεσματικότητα όσον αφορά την κοινοτική ΕΤΑ. Η Επιτροπή πρέπει να εξασφαλίσει το συντονισμό, τη συνεργασία και τη διαφάνεια στη διαχείριση των προγραμμάτων. Στις προηγμένες επικοινωνίες θα πρέπει να συνεχισθεί η καλή ολοκλήρωση των προγραμμάτων και να αυξηθεί η συνεργασία με άλλα προγράμματα.
7. Η προετοιμασία για το 5ο πρόγραμμα πλαίσιο επιβάλλεται να αρχίσει τώρα, με κατάλληλες και ευέλικτες διατάξεις για την ΕΤΑ στην τεχνολογία πληροφοριών και επικοινωνιών ορισμένα από τα νευραλγικής σημασίας θέματα τονίζονται στην παρούσα έκθεση ενώ θα πρέπει ήδη να αρχίσουν οι διερευνητικές εργασίες στα πεδία αυτά.
8. Είναι ζωτικής σημασίας η συμπερίληψη καινοτόμων, οραματικών αντιλήψεων ως μέσου βελτίωσης της υφιστάμενης αξιακής αλυσίδας καθώς επίσης και ως σπέρματα της μελλοντικής ευρωπαϊκής ανταγωνιστικότητας

TECNOLOGÍAS Y SERVICIOS AVANZADOS DE COMUNICACIÓN

RESUMEN

Europa cuenta con unas excelentes comunicaciones digitales de primera generación, y ahora precisa con urgencia una infraestructura europea de la información.

Con las normas Euro-RDSI y GSM, Europa dispone de un excelente conjunto de infraestructuras de comunicaciones digitales de primera generación. Tecnológicamente, están a la altura de las mejores del mundo. Sin embargo, es imprescindible que Europa siga desarrollando las tecnologías de las comunicaciones, elaborando normas de interfuncionamiento e introduciendo una **Infraestructura Europea de la Información** en la que se combinen las telecomunicaciones, las redes de datos y la radiodifusión lo más rápidamente posible.

Los servicios de vídeo digital deben introducirse lo antes posible...

En particular, conviene introducir lo antes posible los servicios de vídeo digital. La tecnología necesaria para el vídeo y la televisión digitales existe ya, y **un programa que acelere la penetración de los servicios digitales liberaría un valioso segmento del espectro que quedaría disponible para otros servicios.**

con un plan coherente y un calendario para la introducción de una Infraestructura Europea de la Información.

También es preciso abordar a nivel europeo determinados aspectos de la infraestructura europea de la información teniendo en cuenta la creciente importancia de los mercados de la Europa oriental y de los países mediterráneos.

Se han alcanzado los objetivos clave de la I+D europea, pero la implantación coherente de los servicios multimedia avanza con lentitud.

El coste de hacer llegar los servicios de banda ancha a todos los hogares de la Unión Europea será considerable. Se ha avanzado algo en la instalación de la red básica, pero todavía queda mucho por hacer para extenderlos a los ciudadanos y a las pequeñas empresas. **Europa necesita imperiosamente un plan coherente y un calendario para la introducción de una Infraestructura Europea de la Información.**

Se han alcanzado los objetivos clave de los programas europeos de I+D de telecomunicaciones (RACE I y II). Pero, aunque los objetivos tecnológicos se han alcanzado, la labor de desarrollo está lejos de haber concluido. Gracias al programa ACTS se ha cobrado conciencia de las enormes posibilidades de la tecnología digital. Sin embargo, la implantación de unos servicios avanzados de telecomunicación multimedia en el mercado europeo no ha alcanzado el nivel que cabía esperar. La IDT de la Unión Europea ha contribuido a mejorar la interconectividad y la interoperabilidad, pero en algunos casos puede resultar necesario legislar para garantizar una implantación coherente. También conviene mejorar el acceso al capital riesgo de las empresas de alta tecnología y de las nuevas empresas innovadoras.

Es necesario continuar la investigación y el desarrollo tecnológico ...

Es necesario continuar la investigación y el desarrollo tecnológico. No será posible realizar la sociedad de la información en Europa sólo con las tecnologías actuales, por lo que el desarrollo tecnológico debe ocupar una posición de privilegio en la futura IDT de la Unión Europea. Conviene dar preferencia a los proyectos que se centren en la mejora de la IEI y/o en futuras aplicaciones locales concretas, e incluir sobre todo los proyectos que puedan tener más repercusiones en la Unión y en su población.

pero no debe hacerse solamente hincapié en las normas técnicas, sino también en los experimentos y en la implantación a gran escala.

El argumento que justificaba en un principio el apoyo Europeo a la IDT en esta área sigue siendo válido, pero es preciso ahora centrarse no sólo en definir normas técnicas, sino también en hacer posibles las aplicaciones y la implantación a gran escala sobre la base de unas normas únicas y ampliamente aceptadas. Las normas europeas constituyen un recurso estratégico para mantener la iniciativa tecnológica en Europa y conseguir una mejor posición industrial en los mercados mundiales. Resulta así mismo esencial acortar el plazo que media entre la conceptualización y la realización de las innovaciones. Es preciso encontrar mecanismos que permitan lograr un verdadero impacto en el mercado.

La administración de la IDT de la Unión Europea debe mejorar la contratación...

En lo que se refiere a la gestión de la IDT de la Unión Europea, es preciso mejorar los procedimientos de contratación y reconsiderar, en particular, las ventajas de utilizar un contrato basado en resultados, más centrado en el logro técnico que en la contabilidad. El proceso de contratación debe ser más rápido y transparente.

la integración de los programas...

Debe seguir solicitándose asesoría independiente sobre integración y gestión de programas, y debe recurrirse en mayor medida a las videoconferencias.

y entre los programas...

Deben establecerse vínculos más estrechos con los programas de la Unión Europea sobre formación y movilidad, ESPRIT (tecnología de la información) y aplicaciones telemáticas. Es preciso reforzar la transparencia y la cooperación entre estos programas, con inclusión de posibles proyectos comunes.

y potenciar las iniciativas nacionales.

Y es preciso reconsiderar el concepto de "centro nacional" para potenciar su utilización.

En el V Programa Marco debe hacerse hincapié en la sociedad de la información y la comunicación, con una estrategia coherente y mayor flexibilidad.

Los trabajos del V Programa Marco deben centrarse en la IDT para la sociedad de la información y la comunicación. Hay que partir de una perspectiva general coherente del área de desarrollo de la tecnología de la información y las comunicaciones, con una única estrategia comunitaria coherente, un único grupo consultivo estratégico y suficiente flexibilidad para trasladar recursos de un sector a otro del área a medida que cambien las circunstancias. Una posibilidad es establecer un programa de tecnología fundamental y varios programas focalizados en áreas de aplicación específica, según se describe en la sección 6.3.

Los objetivos principales serán superar las actuales restricciones tecnológicas e infraestructurales que padecen los usuarios en cuanto a sus necesidades explícitas y ocultas y fomentar experimentos que permitan demostrar sobre el terreno la eficacia para los usuarios de las soluciones propuestas. Se recomienda potenciar la utilización de infraestructuras de experimentación en cada uno de los Estados

miembros.

Los requisitos clave en materia de comunicaciones serán: acceso sin discontinuidades, acceso sencillo, calidad del servicio, acceso desde cualquier parte y personalización del servicio.

Para facilitar el desarrollo del mercado y satisfacer las necesidades de los usuarios, los requisitos clave son: acceso sin discontinuidades, acceso sencillo, calidad de los servicios, acceso desde cualquier lugar y personalización del servicio. Hay que procurar ante todo mejorar las facilidades de acceso y de conexión y optimizar la interacción entre la “inteligencia de acceso” y la “inteligencia de la red”. La normalización, primero por partes y luego global, debe seguir siendo la tarea fundamental: los sistemas ATM deben quedar completa y definitivamente normalizados y deben elaborarse normas multimedios mediante la cooperación de distintos grupos de normalización.

Es preciso abordar tanto las tecnologías de capacitación como conceptos con más visión de futuro.

Otras áreas clave son la optoelectrónica, fotónica, propagación de microondas, *software*, interactividad, ingeniería de servicios, inteligencia en las redes, agentes inteligentes, comunicaciones móviles y seguridad de la información.

Pero también es preciso abordar conceptos nuevos y atrevidos, como por ejemplo los que se mencionan en la sección 6.5.

Recomendaciones

1. Europa necesita una Infraestructura Europea de la Información coherente que satisfaga todas las nuevas necesidades de comunicación de los sectores de las telecomunicaciones, las redes de datos y la radiodifusión; corresponde a la Comisión adoptar las iniciativas necesarias.
2. Para alcanzar este objetivo, es necesario acelerar el proceso de liberalización de las infraestructuras y servicios de telecomunicación y radiodifusión.
3. Como contrapartida, es necesario así mismo fortalecer y acelerar la normalización. Sólo unas normas europeas únicas podrán proteger las inversiones de la industria y los consumidores.
4. Es preciso encontrar la manera de acelerar la implantación a gran escala de la televisión digital y de los servicios multimedios interactivos. Además, es preciso buscar oportunidades que permitan explotar nichos del mercado mundial con servicios empresariales de alto valor.
5. Debe mejorarse el acceso a la financiación para la innovación. La Comisión debe adoptar iniciativas tendentes a mejorar las condiciones de financiación mediante capital riesgo; en la sección 1 del Informe se señalan algunas posibilidades al respecto.
6. Es preciso que todas las instituciones europeas se planteen la IDT de la Unión Europea de forma flexible y funcionalmente efectiva. La Comisión, al administrar los programas, debe garantizar la coordinación, cooperación y transparencia. En las comunicaciones avanzadas, debe proseguir la integración del programa y acentuarse la cooperación con otros programas.
7. Es preciso preparar ahora el V Programa Marco, con disposiciones adecuadas y flexibles para la IDT sobre tecnología de la información y de las Comunicaciones; en el Informe se subrayan algunas de las cuestiones clave y convendría que las actividades exploratorias en estas áreas se iniciaran de inmediato.
8. Es fundamental incluir conceptos con visión de futuro para potenciar las cadenas del valor y sentar las bases de la futura competitividad europea.

TECNOLOGIAS E SERVIÇOS AVANÇADOS DE COMUNICAÇÕES

RESUMO

A Europa tem excelentes comunicações digitais de primeira geração, e é neste momento urgentemente necessária uma infra-estrutura europeia da informação.

Os serviços de vídeo digital devem ser introduzidos o mais rapidamente possível...

com um plano e um calendário coerentes para a introdução de uma infra-estrutura europeia da informação.

Os principais objectivos da I&D europeia foram realizados, mas a implantação coerente dos serviços multimedia é lenta.

Com a Euro-RDIS e as normas GSM, a Europa dispõe de um excelente conjunto de infra-estruturas de comunicações digitais de primeira geração. As tecnologias utilizadas são das melhores em todo o mundo. No entanto, é fundamental que a Europa continue a desenvolver tecnologias das comunicações, aposte na normalização para efeitos de interoperabilidade e introduza **uma infra-estrutura europeia da informação** que reúna o mais rapidamente possível telecomunicações, redes de dados e capacidades de radiodifusão.

Os serviços de vídeo digital devem ser introduzidos o mais rapidamente possível. A tecnologia para o vídeo e a televisão digitais já existe e **um programa para acelerar a penetração dos serviços digitais libertará uma parte valiosa do espectro para outros serviços.**

Há que considerar também a nível europeu as características específicas de uma infra-estrutura europeia da informação, tendo em conta a importância crescente dos mercados em desenvolvimento da Europa de Leste e os países mediterrânicos.

O custo do fornecimento de serviços em banda larga a todos os agregados familiares apenas na UE será elevadíssimo. Realizaram-se alguns progressos na instalação do núcleo central da rede, mas muito há ainda a fazer para fazê-la chegar a todos os cidadãos e pequenas empresas. **A Europa tem necessidade urgente de um plano e um calendário coerentes para a introdução da infra-estrutura europeia da informação.**

Os principais objectivos dos programas europeus de I&D em matéria de telecomunicações (RACE I e II) foram realizados. O programa cumpriu os seus objectivos tecnológicos, mas a tarefa do desenvolvimento tecnológico encontra-se longe de estar concluída. O programa ACTS criou uma sensibilização para o vasto potencial da tecnologia digital. No entanto, a implantação no mercado europeu dos serviços avançados de telecomunicações multimedia não atingiu o nível que seria de esperar. A IDT da UE contribuiu para a interconectividade e a interoperabilidade, mas pode ser necessária, em alguns casos, legislação para garantir uma implantação coerente. É igualmente necessário melhorar o acesso ao capital de risco com o objectivo de apoiar as empresas de alta tecnologia inovadoras e o arranque de outras.

É necessário prosseguir a investigação e o desenvolvimento tecnológico...

Há que prosseguir a investigação e o desenvolvimento tecnológico. Não será possível realizar a sociedade da informação na Europa apenas com as tecnologias hoje existentes, pelo que o desenvolvimento tecnológico deve ocupar uma posição central na futura IDT da UE. Deve ser dada preferência aos projectos que conduzam à melhoria da infra-estrutura europeia da informação e/ou a futuras aplicações comerciais concretas, principalmente aos projectos que possam ter importantes repercussões na União e na sua população.

mas as atenções devem deixar de centrar-se apenas nas normas técnicas, para passarem a centrar-se nas experiências e na implantação em grande escala.

As razões iniciais para o apoio europeu à IDT neste domínio continuam a ser válidas, mas as atenções devem deixar de centrar-se apenas na definição de normas técnicas, para se centrarem nas aplicações e na implantação em grande escala com base em normas únicas e amplamente aceites. As normas europeias constituem um meio estratégico para manter a iniciativa tecnológica na Europa e para conseguir uma melhor posição industrial no mercado mundial. É igualmente essencial diminuir o prazo que medeia entre a conceptualização e a realização de novos desenvolvimentos. Há que encontrar mecanismos para produzir um efeito real no mercado.

A gestão da IDT comunitária exige que se melhorem os processos contratuais...

Em termos de gestão da IDT comunitária, os processos contratuais devem ser melhorados e devem ser analisadas as vantagens de utilizar um contrato baseado nos resultados, que ponha a tónica mais nas realizações técnicas do que na contabilidade. A celebração dos contratos deve ser mais rápida e mais transparente.

e a integração dos programas...

Deve procurar-se um aconselhamento independente sobre a integração e a gestão dos programas e recorrer-se mais frequentemente à videoconferência.

com outros programas...

Deve estabelecer-se uma maior ligação com os programas comunitários Formação e Mobilidade, ESPRIT (tecnologias da informação) e Aplicações Telemáticas. É necessário reforçar a transparência e a cooperação, inclusive na realização de eventuais projectos conjuntos, entre esses programas.

e com as iniciativas nacionais.

O conceito de "centros nacionais" deve ser reavaliado com vista a intensificar o seu uso.

No Quinto Programa-Quadro deverá ocupar posição de destaque a sociedade da informação e da comunicação e existir uma estratégia coerente e maior flexibilidade.

As actividades de IDT do Quinto Programa-Quadro deverão centrar-se no tema da sociedade da informação e da comunicação. Deve haver uma perspectiva coerente de todo o domínio de desenvolvimento das tecnologias da informação e das comunicações, com uma única estratégia comunitária coerente, um único grupo consultivo em matéria de estratégia e flexibilidade para transferir recursos dentro de todo esse domínio em função da alteração das circunstâncias. Uma possibilidade será a criação de um programa de tecnologias centrais e de programas específicos para certos domínios de aplicação, como descrito no ponto 6.3.

Os principais objectivos deverão ser a eliminação dos actuais condicionalismos tecnológicos e infra-estruturais que obstam à satisfação das necessidades manifestas e não manifestas dos utilizadores e o estímulo às experiências destinadas a demonstrar "no terreno" a eficácia para os utilizadores das soluções propostas. Recomenda-se que se intensifique a utilização de infra-estruturas experimentais em cada Estado-membro.

As principais exigências em matéria de comunicações serão: um acesso sem descontinuidades, a facilidade de acesso, a qualidade do serviço, o acesso generalizado e a personalização do serviço.

Para que o mercado se desenvolva dando resposta às necessidades dos utilizadores, exige-se sobretudo uma oferta de acesso sem descontinuidades, facilidade de acesso, qualidade dos serviços, acesso generalizado e personalização do serviço. Há que desenvolver esforços para melhorar os meios de acesso e os meios de conexão e para otimizar a interacção da "inteligência do acesso" com a "inteligência da rede". A normalização - primeiramente para certas partes e depois para a totalidade - deve continuar a ser a principal tarefa: os sistemas ATM devem também ser totalmente e definitivamente normalizados e devem ainda ser desenvolvidas normas multimedia conjuntamente por vários grupos de normalização.

Devem ser abrangidas quer as tecnologias horizontais quer os conceitos visionários.

Outros domínios fundamentais são a optoelectrónica/fotónica, a propagação de microondas, o *software*, a interactividade, a engenharia de serviços, a inteligência nas redes, agentes inteligentes, as comunicações móveis e a segurança da informação.

Mas há ainda que incluir conceitos visionários, dos quais se apresentam exemplos no ponto 6.5.

Recomendações

1. A Europa necessita de uma infra-estrutura europeia da informação coerente que responda a todas as novas exigências de comunicação impostas pelas telecomunicações, redes de dados e radiodifusão; compete à Comissão tomar as iniciativas necessárias.
2. Para atingir esse objectivo, é necessário acelerar o processo de liberalização das infra-estruturas e serviços de telecomunicações e radiodifusão.
3. Em contrapartida, é também necessário reforçar e acelerar a normalização. Apenas normas especificamente europeias protegerão os investimentos da indústria e os consumidores.
4. Devem encontrar-se formas de acelerar a implantação em grande escala da TV digital e dos serviços multimedia interactivos. Além disso, devem tentar encontrar-se oportunidades para explorar os nichos de mercado mundiais para os serviços empresariais de elevado valor.
5. Há que melhorar o acesso ao financiamento da inovação. A Comissão deve tomar iniciativas para criar um melhor ambiente de financiamento com capital de risco; na secção 1 do relatório indicam-se algumas opções.
6. É necessária, por parte de todas as instituições europeias, uma abordagem da IDT comunitária flexível e funcionalmente eficaz. A Comissão deve assegurar a coordenação, a cooperação e a transparência na gestão que fazem dos programas. No domínio das comunicações avançadas, deve continuar a fazer-se uma boa integração dos programas, com maior cooperação com outros programas.
7. Temos agora que preparar-nos para o Quinto Programa-Quadro, com disposições adequadas e flexíveis para a IDT em matéria de tecnologias da informação e das comunicações; algumas destas questões-chave são realçadas no presente relatório e os trabalhos exploratórios nestes domínios deveriam estar já iniciados.
8. É fundamental incluir conceitos visionários como meio de reforçar as cadeias de valor e como sementes da futura competitividade europeia.

KEHITTYNEET VIESTINTÄTEKNOLOGIAT JA -PALVELUT TIIVISTELMÄ

Euroopan ensimmäisen polven digitaalinen viestintä on erinomaisella tasolla, ja nyt tarvitaan pikaisesti eurooppalaista tietoinfrastruktuuria.

Euro-ISDN:ssä ja GSM:ssä Euroopalla on erinomainen ensimmäisen sukupolven digitaalinen viestintäinfrastruktuuri. Teknologian kannalta ne ovat hyvää kansainvälistä tasoa. Euroopan olisi kuitenkin ehdottomasti jatkettava viestintätekniikoiden kehittämistä, standardoitava yhteentoimivuuden turvaamiseksi ja otettava mahdollisimman pian käyttöön **Euroopan tietoinfrastruktuuri**, jossa yhdistettäisiin televiestintä, tietoverkkojen rakentaminen ja radio- ja TV-lähetystoiminnan mahdollisuudet.

Digitaaliset videopalvelut olisi saatava käyttöön mahdollisimman pian...

Eryteisesti digitaaliset videopalvelut olisi saatava käyttöön mahdollisimman pian. Digitaaliseen videoon ja televisio toimintaan tarvittava teknologia on nyt saatavilla, ja **digitaalisten palveluiden yleistymisen nopeuttamisohjelma vapauttaisi arvokasta taajuuspektriä muita palveluja varten.**

ja Euroopan tietoinfrastruktuuria varten on laadittava johdonmukainen suunnitelma ja aikataulu.

Joitakin Euroopan tietoinfrastruktuurin piirteitä on myös pohdittava Euroopan tasolla, koska Itä-Euroopan ja Välimeren maiden markkinat kasvavat yhä merkittävämmiksi.

Laajakaistapalvelujen tarjoaminen pelkästään kaikkiin EU:n kotitalouksiin tulee valtavan kalliiksi. Perusverkon rakentamisessa on edistytty jonkin verran, mutta vielä on paljon tehtävää, ennen kuin se voidaan ulottaa kaikkien kansalaisten ja pienyritysten luo. **Eurooppa tarvitsee kipeästi johdonmukaista suunnitelmaa ja aikataulua Euroopan tietoinfrastruktuurin käyttöön ottoa varten.**

Euroopan t&k:n päätavoitteet on saavutettu, mutta... multimediatelepalvelujen johdonmukainen leviäminen on hidasta.

Euroopan televiestinnän t&k-ohjelmien (RACE I ja II) päätavoitteet on saavutettu. Ohjelmassa on saavutettu teknologiset tavoitteet, mutta teknologian kehittämistehtävää ei ole läheskään saatu valmiiksi. ACTS-ohjelma on tuonut tietoisuuteen digitaalitekнологian valtavat mahdollisuudet, mutta kehittyneiden multimediatelepalvelujen leviäminen Euroopan markkinoilla ei ole edennyt odotetulla tavalla. EU:n TTK-toiminta on edistänyt yhteenliitettävyyttä ja yhteentoimivuutta, mutta joissain tapauksissa johdonmukainen leviäminen saattaa edellyttää lainsäädäntöä. Lisäksi on parannettava innovatiivisten korkean teknologian yritysten ja aloittelevien yritysten mahdollisuuksia saada käyttöönsä riskipääomaa.

Tutkimusta ja teknologista kehittämistä on jatkettava...

Tutkimusta ja teknologista kehittämistä on jatkettava. Euroopan tietoyhteiskuntaa ei voida toteuttaa pelkästään nykyisellä teknologialla, ja teknologian kehittämisen on oltava avainasemassa tulevassa EU:n TTK-toiminnassa. Etusija on annettava hankkeille, jotka edistävät Euroopan tietoinfrastruktuurin kehittämistä ja/tai johtavat tuleviin konkreettisiin

kaupallisiin sovelluksiin. Niiden tulisi olla pääsääntöisesti hankkeita, jotka vaikuttavat huomattavasti Euroopan unioniin ja sen väestöön.

mutta niissä ei enää voida korostaa vain teknisiä standardeja vaan kokeiluja ja levittämistä suurelle käyttäjäkunnalle.

Alkuperäiset perustelut tuelle, jota Eurooppa antaa tämän alan TTK-toiminnalle, ovat yhä voimassa, mutta painopistettä on siirrettävä pelkästä teknisten standardien määrittämisestä sovellusten ja laajan levittämisen mahdollistamiseen yhtenäisten ja laajasti hyväksytyjen standardien pohjalta. Eurooppalaisstandardit ovat strateginen keino säilyttää tekninen aloite Euroopan käsissä ja saada Euroopan teollisuudelle vahvempi asema maailmanmarkkinoilla. Tärkeätä on myös lyhentää viivettä käsitteellisen suunnitteluvaiheen ja uuden kehityksen toteutuksen välillä. Euroopassa on löydettävä menetelmiä, joilla saavutetaan todellista markkinavaikutusta.

EU:n TTK-toiminnan hallinnossa on parannettava sopimusmenettelyjä...

Euroopan unionin TTK-toiminnassa on parannettava sopimusmenettelyjä ja tarkistettava tuloksiin perustuvien sopimusten käytön etuja. Teknisiä saavutuksia on korostettava enemmän kuin tilitystä. Sopimusten tekoa olisi nopeutettava ja tehtävä avoimemmaksi.

ohjelmia on yhdenmukaistettava...

Ohjelmien yhdenmukaistamisesta ja hallinnosta on edelleen haettava riippumattomia neuvoja, ja videoneuvottelujen käyttöä olisi lisättävä.

ohjelmien välillä on tehtävä yhteistyötä...

Seuraavien yhteisön ohjelmien välille on luotava vahvemmat siteet: Koulutus ja liikkuvuus, ESPRIT (tietotekniikka) ja Telematiikan sovellukset. Näiden ohjelmien välillä on tarvetta lisätä avoimuutta ja yhteistyötä, ja myös yhteishankkeita voitaisiin toteuttaa.

ja kansallisten aloitteiden tehoa on lisättävä.

Kansallisten isäntäkoneiden käsitettä olisi arvioitava uudelleen, jotta niiden käyttö lisääntyisi.

Viidennessä puiteohjelmassa on painotettava viestintä- ja tietoyhteiskuntaa, johdonmukaista strategiaa ja suurempaa joustavuutta.

Viidennessä puiteohjelmassa on keskityttävä viestintä- ja tietoyhteiskunnan TTK-aihepiiriin. Siinä on oltava johdonmukainen näkemys koko viestintä- ja tietotekniikan kehityksestä, yksi yhtenäinen EU:n strategia ja yksi ainoa strategista neuvontaa antava ryhmä, ja ohjelman on oltava riittävän joustava, jotta resursseja voidaan siirtää aihepiiriin sisällä tilanteen kehityksen mukaan. Yksi mahdollisuus olisivat perusteknologiaohjelma ja eri sovellusaloja varten laaditut painopisteohjelmat, kuten jaksossa 6.3. esitetään.

Päätavoitteena olisi oltava poistaa tekniikan ja infrastruktuurin nykyään käyttäjien tunnetuille ja tuntemattomille tarpeille asettamat rajoitukset ja edistää kokeiluja, joilla demonstroidaan kentällä ehdotettujen ratkaisujen toimivuutta käyttäjien kannalta. Koeinfrastruktuurien käyttöä suositellaan lisättävän kaikissa jäsenvaltioissa.

Avainvaatimuksia viestinnässä ovat saumaton käyttömahdollisuus, helppokäyttöisyys, palvelun laatu, käyttömahdollisuus kaikkialta ja palvelun räätälöinti.

Käyttäjien tarpeiden mukaisen markkinoiden kehityksen avainedellytyksiä ovat palvelujen saumaton käyttömahdollisuus, helppokäyttöisyys, palvelujen laatu, käyttömahdollisuus kaikkialta ja palvelujen räätälöinti. Erityisesti on nähtävä vaivaa käyttömahdollisuuksien ja yhteyksien parantamiseksi ja "käyttöliittymä-älyn" ja "verkkoälyn" välisen vuorovaikutuksen optimoimiseksi. Standardoinnin (ensin osien ja sitten kokonaisuuden standardoinnin) olisi pysyttävä ensisijaisena tehtävänä. ATM-järjestelmät on myös standardoitava kokonaan, ja multimediasstandardeja on kehitettävä yhteistyössä useiden standardointiryhmien kanssa.

Käyttöönottotekniikoita ja tulevaisuuden näkemyksiä ei saa unohtaa.

Muita avainaloja ovat optoelektroniikka, levittäminen mikroaalloilla, ohjelmistot, vuorovaikutteisuus, palvelujen suunnittelu, verkkoäly, älykkäät agentit, matkaviestintä ja tietoturva.

Näiden lisäksi on myös käsiteltävä tulevaisuuden näkemyksiä, joista esitetään esimerkkejä jaksossa 6.5.

Suosituksia

1. Eurooppa tarvitsee johdonmukaista Euroopan tietoinfrastruktuuria, joka käsittää kaikki uudet viestinnän tarpeet, jollaisia syntyy televiestinnässä, tietoverkoissa ja radio- ja TV-lähetystoiminnassa. Tarvittavien aloitteiden tekeminen on komission vastuulla.
2. Tämä tavoite voidaan saavuttaa vain nopeuttamalla televiestinnän ja radio- ja TV-lähetystoiminnan infrastruktuurin ja palvelujen vapauttamista.
3. Vapauttamista täydentää standardoinnin lisääminen ja nopeuttaminen. Vain yhteiset eurooppalaiset standardit voivat suojata teollisuuden ja kuluttajien investointeja.
4. Digitaalitelevisioiden ja vuorovaikutteisten multimediapalvelujen leviämistä suurten joukkojen käyttöön on nopeutettava, ja keinot tätä varten on keksittävä. Lisäksi on etsittävä mahdollisuuksia hyödyntää maailmanlaajuisesti kapeiden segmenttien lisäarvoisten yrityspalvelujen markkinoita.
5. Rahoituksen saantia innovaatioihin on helpotettava. Komission olisi tehtävä aloitteita paremman toimintaympäristön luomiseksi riskipääoman sijoittamiselle. Kertomuksen jaksossa 1 esitellään joitakin vaihtoehtoja.
6. Kaikkien Euroopan unionin toimielinten on suhtauduttava unionin TTK-toimintaan joustavasti ja käytännöllisesti. Komission on vastattava koordinoinnista, yhteistyöstä ja avoimuudesta ohjelmien hallinnossa. Kehittyneen viestinnän alalla ohjelmien toimivaa yhdentämistä olisi jatkettava ja yhteistyötä muiden ohjelmien kanssa lisättävä.
7. Nyt on jo aika valmistella viidettä puiteohjelmaa ja liittää siihen aiheellisia ja joustavia määräyksiä tietojen ja viestintäteknologian TTK-toiminnasta. Kertomuksessa otetaan esille joitakin avaintekijöitä, ja alustavat tutkimukset olisi jo aloitettava näillä aloilla.
8. Uudet näkemykset ovat ehdottoman tärkeitä, sillä niillä voidaan vahvistaa arvoketjuja ja ne voivat osoittautua Euroopan tulevan kilpailukyvyn perustaksi.

KOMMUNIKATIONSTEKNIK OCH KOMMUNIKATIONSTJÄNSTER

SAMMANFATTNING

I Europa finns utmärkta första-generationens digitala kommunikationssystem och en europeisk informationsteknisk infrastruktur är snarast nödvändig.

Digitala videotjänster bör införas som snabbt som möjligt...

med ett samordnat program och en tidsplan för införandet av en europeisk informationsteknisk infrastruktur.

De viktigaste målen för europeisk FoTU har redan uppnåtts men en samordnad spridning av multimediatjänster går långsamt.

Med Euro-ISDN och GSM-standarder innehar Europa en utmärkt uppsättning av infrastrukturer för första generationens digitala kommunikationssystem. När det gäller användbara teknologier är dessa bland de främsta i världen. Det är dock oerhört viktigt att Europa fortsätter utveckla kommunikationsteknologier, standardisera för interaktivitet och införa en **europeisk informationsteknisk infrastruktur** för kombinerade system för telekommunikation, datanät och radioförbindelser så snart som möjligt.

Framförallt digitala videotjänster bör införas så snart som möjligt. Teknologin för digitalvideo och digital TV existerar redan och **ett program för att påskynda genombrottet för digitala tjänster skulle frigöra värdefulla spektrum för andra tjänster.**

Speciella inslag i en europeisk informationsteknisk infrastruktur måste även behandlas på europeisk nivå med hänsyn till den ökande betydelsen av de växande marknaderna i Östeuropa och Medelhavsländerna.

Kostnaderna för att tillhandahålla bredbandstjänster till varje hushåll inom enbart EU kommer att bli betydande. Ett del arbete har redan åstadkommit för att bygga ett kärnnät, men det behövs fortfarande stora insatser för att utvidga detta till alla medborgare och småföretag. **Europa behöver snarast ett samordnat program och en tidsplan för att införa en europeisk informationsteknisk infrastruktur.**

De viktigaste målen för de europeiska FoTU-programmen för telekommunikation (Race I och II) har uppnåtts. De uppställda målen i programmet på detta område har uppnåtts, men arbetet med att utveckla teknologier är lång ifrån slutfört. Acts-programmet har skapat en medvetenhet om digitalteknikens oändliga möjligheter. Spridningen av avancerade telekommunikationstjänster med multimedia har dock inte nått den omfattning som kunde förväntas. EU:s insatser inom FoTU-området har skapat möjlighet till sammankoppling av och driftskompatibilitet mellan näten men lagstiftning kan bli nödvändig i vissa fall för att säkerställa en samordnad spridning. Det är även nödvändigt att öka tillgången till riskvilligt kapital för innovativa högteknikföretag och nystartade företag.

Mer forskning och teknologiutveckling är nödvändig

Mer forskning och teknologiutveckling är nödvändig: Det är inte möjligt att realisera ett informationssamhälle i Europa med enbart dagens teknologier och utvecklingen av nya teknologier måste därför vara av högsta prioritet inom EU:s framtida FoTU-verksamhet. Projekt som leder till en bättre europeisk informationsinfrastruktur eller till konkreta kommersiella tillämpningar bör prioriteras och bör huvudsakligen vara sådana projekt som kan vara till stor nytta för unionen och dess befolkning.

men fokuseringen måste nu vändas från enbart tekniska standarder till pilotförsök och ökad spridning

Den ursprungliga grunden för europeiskt stöd till FoTU på detta område gäller fortfarande, men inriktningen måste nu vändas från enbart definiering av tekniska standarder till en ökad spridning av tillämpningar och ökad användning på basis av enhetliga och allmänt godkända standarder. Införandet av europeiska standarder är en strategi för att bibehålla det teknologiska initiativet i Europa och att skapa en bättre position för industrin på den globala marknaden. Det är även viktigt att tidsperspektivet mellan själva idén om och realiseringen av en ny teknologi minskas. Mekanismer för att uppnå en verklig marknadseffekt måste hittas.

EU:s förvaltning inom FoTU måste förbättras avseende kontraktsförhandlingar...

EU:s förvaltning på FoTU-området måste bli bättre i fråga om kontraktsförfaranden och fördelarna med att använda ett resultatbaserat kontrakt bör ses över för att ge större vikt vid tekniska framsteg än vinstredovisning. Kontraktsförhandlingarna bör ske snabbare och vara mer öppna.

god programintegrering...

Oberoende rådgivning om integrering och förvaltning av program bör fortsättningsvis användas och en ökad användning av videokonferenser.

tvärs över olika delprogram..

Starkare kopplingar bör införas mellan EU:s särskilda program för forskares utbildning och rörlighet, Esprit (informationsteknologi) och Telematiktillämpningsprogrammet. Insynen i och samarbetet mellan dessa program måste öka, innefattande möjligheter till gemensamma projekt.

och med ökade nationella initiativ.

Konceptet för nationella kontaktpunkter måste ses över för att öka deras användning.

Det femte ramprogrammet bör fokuseras på kommunikations- och informationssamhället och en samordnad strategi och större flexibilitet.

Det femte ramprogrammet bör inriktas runt temat FoTU för kommunikations- och informationssamhället. Det måste göras en samordnad översyn av hela utvecklingen inom informations- och kommunikationsteknologier för att få en enda konsekvent EU-strategi, en enda strategisk rådgivande grupp och flexibilitet att flytta resurser inom hela området, allteftersom förhållandena förändras. En lösning kan vara ett kärnteknologiprogram och specialinriktade program inom specifika tillämpningsområden, i enlighet med avsnitt 6.3.

Huvudmålet bör vara att övervinna nuvarande hinder i form av teknologier och infrastrukturer, som begränsar användarnas uttryckta och dolda behov, och att främja pilotprojekt för att "på fältet" demonstrera för användarna effektiviteten i de föreslagna lösningarna. Ökad användning av testinfrastrukturer rekommenderas i varje medlemsstat.

Viktiga krav på kommunikationsområdet skall gälla kontinuerlig åtkomst,

För att skapa en större marknad och möta användarnas krav krävs framförallt kontinuerlig åtkomst, lättillgänglighet, kvalitetsmässiga tjänster, allmän tillgänglighet samt kundanpassade tjänster. Särskilda åtgärder bör vidtas för bättre tillträdes- och inkopplingsmöjligheter och för optimal kompatibilitet mellan användargränssnitt och kommunikationsnät. Standardisering - först för

lättillgänglighet, kvalitet i tjänster, allmän tillgänglighet samt kundanpassade tjänster.

delområden och sedan för alla delar - bör vara den högst prioriterade uppgiften. ATM-system måste även bli fullständigt och slutgiltigt standardiserade och standarder för multimedia måste införas gemensamt av olika standardiseringsgrupper.

Utveckling av teknologier och visionära koncept måste stödjas.

Andra nyckelområden är optoelektronik och fotonik, mikrovågsutbredning, mjukvara, interaktivitet, underhållsteknik, intelligenta nätverk, intelligenta hjälpmedel, rörlig kommunikation och informationssäkerhet.

Framtidskoncept måste även stödjas och några exempel på dessa ges i avsnitt 6.5.

Rekommendationer

1. Europa behöver en sammanhängande europeisk informationsteknisk infrastruktur som täcker alla nya krav inom telekommunikation, datanät och radiosändning och det är kommissionens ansvar att vidta de nödvändiga åtgärderna för detta.
2. För att uppnå detta mål krävs att avregleringen av infrastrukturer och kommunikationstjänster inom telekommunikation och radiosändning genomförs snabbare.
3. På motsvarande sätt är det även nödvändigt att förstärka och påskynda standardiseringsarbetet. Endast unika europeiska standarder kan skydda investeringar av industrin och konsumenter.
4. Man måste finna vägar för att öka spridningen av digitala TV-system och interaktiva multimediatjänster. Dessutom måste möjligheter skapas för att exploatera globala marknadsnischer för utveckling av tjänster till värdefulla marknader.
5. Tillgång till finansiering av innovationer måste förbättras. Kommissionen bör vidta åtgärder för att skapa bättre möjligheter till riskkapitalfinansiering; några möjligheter anges i avsnitt 1 i rapporten.
6. Ett flexibelt och effektivt tillvägagångssätt vad gäller unionens FoTU-verksamhet krävs av alla europeiska institutioner. Kommissionen måste säkerställa en samordning, samarbete och öppenhet i deras förvaltning av programmen. På området avancerad kommunikation bör integrationen av program fortsätta och med ökat samarbete med övriga program.
7. Vi måste nu förbereda det femte ramprogrammet med lämpliga och flexibla FoTU-möjligheter i fråga om informations- och kommunikationsteknologier; några av de viktigaste områdena behandlas i denna rapport och pilotarbete på dessa områden bör redan inledas.
8. Det är absolut nödvändigt att inlemma framtidskoncept i arbetet för att höja målsättningen och som en sporre för europeisk konkurrenskraft i framtiden.

MAIN REPORT

Introduction

This Strategic Audit has been carried out between March and June 1996, at the request of the Director General of DG XIII of the European Commission, and with the support of Direction B of DG XIII.

It has been carried out by the following panel of independent personalities:

- **Mr. Stelios Argyros MEP**
Member of the Committee on Research, Technological Development and Energy of the European Parliament.
- **Mr. Max Artigalas**
General Manager Recording Programme Administration of THOMSON multimedia.
- **Dr. Hans Baur**
Former Executive Vice President of Siemens AG, and advisor to Mr. Bangemann on the Information Society.
- **Mr. Umberto de Julio**
Joint General Manager of STET, the major Italian telecommunications company, assisted by Mr. Giovanni Perucca, Director of R&D.
- **Mr. Aimo Eloholma**
Vice President of Telecom Finland Ltd., assisted by Mr. Timo Rajamaki, Director of the Research Centre of Telecom Finland.
- **Dr. Francisco Pinto Balsemão**
CEO of SIC in Portugal, assisted by Mr. António Trigo de Sousa, Technical Director.
- **Dr. George T. Waters**
Director of the Technical Department of the European Broadcasting Union.

This report reflects contributions made by all participants, structured to match the Terms of Reference, on which the Management Committee of Government representatives for this area of EU RTD gave a unanimously favourable opinion. The Terms of Reference are given in Annex I.

This report reflects the consensus view of the Panel.

1: The status of advanced communications deployment in Europe

Digital communications technologies have spread throughout Europe without any significant time lag. European countries have digitised up to 70 percent of their communication systems. By 2000, full digitisation can be expected in many countries.

Euro-ISDN is of major importance;..

The Euro-ISDN standard is of major importance to the development of Europe's economy because it creates a highly cost-efficient, high-performance, and versatile infrastructure for services and above all an infrastructure that already allows multimedia communications (PC communications with data, image and speech transmission).

GSM is a great European success;...

A second Europe-wide standardised network is the **cellular digital mobile radio network (GSM)**. This has developed into the second major mass network based on a uniform digital standard and using uniform basic services. Today, mobile phone systems are growing at 25 to 50 percent a year. The GSM system is not only extremely efficient, but also offers fax and data transmission. Here, too, a EU decision paved the way for this uniform, Europe-wide, network.

Digital data networks are of crucial importance for the European economy as well as for other industrial nations: They are essential for the large and widespread information processing systems used by banks, insurance companies, manufacturing industry and the growing information service sector.

Europe is at the leading edge....

but we need world markets and faster innovation....

In terms of the technologies being used today, **European data networks do not lag behind the U.S. or other countries.** However, the technologies come largely from the U.S. because that country has a huge market and the most rapid pace of innovation. **Market volumes in Europe are too small to permit viable commercial implementation and the pace of innovation in Europe does not match that in the U.S.**

One example is the **Internet**, originally created as a research network and today accessible to the public world-wide. The Internet was not based on the international OSI (Open Systems Interconnect) standards, but uses protocols created by the Internet Society in the U.S. As a result, Internet infrastructures and technologies are primarily supplied by American companies. Today Internet connects millions of public databases, many of which are now also being created in Europe, interfaced by the "world wide web" created by CERN in Europe. As this system is built up, Europe faces a particular problem: its diversity of languages severely hinders the creation of uniform databases.

and a European Information Infrastructure (EII)...

Access to Internet via European ISDN is especially attractive. **A first step towards a European Information Infrastructure (EII) could be developed on the basis of ISDN, and could be a major improvement, offering fast access, and secure, high quality transmission.**

Another important asset is the **European cable television network**, again a U.S. invention and largely based on U.S. technologies. However, these networks are not homogenous and were originally designed only for one purpose - the one-way distribution of television. These networks will now be supplemented by **direct transmission satellite TV, and terrestrial microwave systems (MMDS)**. However, a new category of services, marrying the high bandwidth of broadcasting to the dedicated channels of telephony is appearing and it will drive the deployment of the future telecommunication infrastructure; these services are often referred to as **interactive multimedia services**. The

terminals for such kinds of services are still unclear but good interworking between the different PCs, TVs, set top boxes, and specific terminals (such as for Minitel) and a good user-friendliness will ensure a wide deployment of these services.

with state of the art technologies and coherent standards for interoperation.

We should learn from the lessons offered by these examples (Euro-ISDN, GSM, Internet, cable television, data networks): When a country or continent rigorously develops a good technology and brings it to market first, this innovation brings enormous economic advantages. **It is vital for Europe to continue to develop communication technologies, standardise for interoperation and introduce a European Information Infrastructure as quickly as possible.**

The key objectives of European R&D have been met...

Looking back over the past 5 years it is evident that EU RTD has been effective in addressing the basic technological requirements for a global network infrastructure. Many of the development issues pertaining to the advanced technologies have been addressed and solved. **The key objectives of the European R&D telecommunications programmes (RACE I / II) have been met and RACE did much to stimulate R&D.** Although the EU investment was only 4% of the total R&D spent in Europe it did have a synergetic effect by bringing together disparate groups of researchers of different disciplines. This was particularly important in relation to the convergence of technologies which the digital era is bringing about. It has also succeeded in creating a re-orientation in the mental approach, so necessary when changing from analogue to digital technologies. A review of the status of standardisation and interoperability is in Annex IV and a Final Report on the RACE programme is separately published.

but deployment of multi-media services is not fast enough.

The ACTS Programme has created an awareness of the vast potential of digital technology. However, the deployment of advanced multimedia telecommunication services on the European market has not reached the level which could have been expected. In general, commercial exploitation of European RTD has fallen behind expectations.

we need better innovation financing...

One of Europe's major weaknesses lies in its inferiority in transforming the results of technological research and know-how into commercial successes, largely because of the ineffectiveness of its innovation-financing system. **It is necessary to improve access to financial support for innovative high-tech enterprises and start-ups, with partnership between the public and the private financial sectors.**

linked to EU RTD

The venture-capital investment approach is the principal source of funding R&D activities in the USA, but it is still scarcely present in Europe. Although the growth of raised venture capital over the past ten years in Europe has been spectacular (funds raised quadrupled over eight years to some ECU 40 Billion in 1994), this growth is paralleled by a worrying relative fall-off in high-tech investment (from 34% in 1985 to less than 10% in 1994). Start-up investment also shows a decline (25% of funds in 1985 compared with only 6% in 1994). To remedy this situation, several options could be considered:

- **RTD programmes could be linked to hi-tech financing initiatives;**
- **A European Institute for High-Tech Financing could be founded;**
- **European Public Administrations could stimulate innovation through their public contracts; and**
- **Support could be given for turning university research into commercial prototypes and researchers into entrepreneurs.**

2: The effectiveness and impact of EU RTD in advanced communications (1991 - 1996)

EU RTD has been effective.

The EU RTD Programme in advanced communications has, on the whole, been effective. It has achieved a wide range of results and contributions to standardisation and applications experiments. However, its real value will not be finally evident for some years yet, when the technological advances made are fully realised. This will depend on policy at the level of the EU, national policies, the economic situation throughout the 15 Member States and global communications developments. Deregulation is a key factor in this development.

It has helped ensure interconnection and inter-operation...

The RTD has helped interconnectivity and interoperability, but legislation may be necessary in some cases to ensure compliance with standards. RACE projects have made enormous contributions to standardisation, but this effort has not yet been sufficiently followed through to market implementation with unique solutions.

and has stimulated EU-wide co-operation.

EU RTD in the RACE and ACTS programmes has been very effective in creating **Europe-wide co-operation**. It has formed a European RTD-society in telecommunications with all players. However, it is still too early to assess its economic and social impact, and **a focused continuation is required.**

A focused continuation is required.

3: The validity of the objectives

Technical objectives have been met, but new ones have emerged;...

The original objective of the RACE Programme was to assist European industry to provide, in a reasonable time scale, an advanced communications infrastructure. **The programme has met its technological objectives, but this task is far from being completed.** Indeed several of the applications now being contemplated could not have been foreseen in the mid 1980s when the RACE Programme got underway.

the focus has changed;...

The original rationale for European support to RTD in this area still applies, but the objectives may have to be reviewed due to technological developments and may require further review as time progresses. The RACE focus was on **standardisation**: The ACTS focus is on **trials**. This is necessary, but not sufficient. A new focus must be given to **volume deployment**. This is needed to keep Europe as a leader in world-wide competition. It has to replace an engineering-driven "cost-performance" thinking.

and the pace of innovation has accelerated.

The rapid advances in technology are manifesting themselves in a requirement for a more urgent approach to the development of new services and products. **It is essential that the time span between conceptualisation and the realisation of new developments be shortened.**

Therefore we need new frameworks for faster standardisation.

In standardisation, **mechanisms must be found to achieve real market impact.** The approaches adopted by the most successful voluntary collaborative frameworks such as DAVIC and the DVB Project should be developed and supported.

4: Value for money and strengthening international competitiveness.

The full value of RACE is yet to emerge.

The programmes have certainly stimulated innovation in the communications field and have led to important results without which progress could not have been made. It is however difficult to assess whether or not the programmes have been "good value for money". When the new advanced communications infrastructures are finally in place a better estimate of cost/benefit can be made. Business and investment cycles are too long for the full impact of the RACE programme to be yet visible.

Most participants report improved competitiveness

Nevertheless the RACE Programme made a major impact on Europe's world position in mastery of advanced communications technologies. About 70% of participating companies report an improved competitive position in Western Europe and over 50% report improved competitiveness with respect to the USA and the rest of the world. 44% report an improved competitive position with respect to Japanese competitors as a result of RACE work. 568 companies have expressed their intent to develop new products and advanced services; in about 22% of these cases, plans already exist or are in preparation. About 140 new patents were registered and a further 48 are planned within the next 3 years.²

Substantial contributions were made in standardisation

European standardisation, for coherence and interoperability, has been accelerated and strengthened. Over 860 technical specifications were submitted to official standardisation bodies, and major contributions were made in Industry-led groups such as the Digital Audio Visual Industrial Council (DAVIC); the European Launching group on Digital Video Broadcasting (DVB) and the ATM Forum. The projects concerned with second- and third-generation mobile communications had a significant impact on European standards adopted by ETSI. Of the total of 508 contributions to standards at European level, 265 were taken up in whole or in substantial part in world standards.

Consensus reduced risks and improved economies of scale

The consensus development through RACE "concertation" and co-operation reduced investment risks, accelerated product and service development, improved economies of scale and scope, helped companies to better focus business strategies, and reduced barriers to market entry by new service and product providers. Over 750 cases of positive impact in the above areas were identified by commercial companies involved in RACE.

Pilot applications showed real business benefits

Pilot applications of advanced communications services involved approximately 500 organisations and sites, and over 7000 individual users. The reported benefits include cost reduction, time savings, easier access to information, increased flexibility, and new job creation, particularly in remote and rural areas (see Table II, Annex II of the Final Report of RACE Phase II).

²

A survey of 1000 RACE participants described in Annex II of the Final Report on Phase II of RACE (1992-1995) and included herewith as Annex V.

5: The overall management of the programme

Contracting needs improvement...

5.1. It is the view of the Group that **there is room for improvement in the overall contract procedures, particularly:**

and a results-based approach should be promoted...

a) Even though the deliverable-based contract (D-C) does not replace the cost-based contract, it is recommended that the details regarding the D-C should be reviewed, in order to make it more amenable to participating companies, and that the Commission should make additional efforts to promote it.

with more emphasis on technological aspects ..

Recognising that this option will require additional staff and expertise, nevertheless it is our view that there should be a **greater shift from the purely financial (cost accounting) aspects to the technological aspects of the contract.**

faster, more transparent procedures;...

b) It is also recommended that the Commission speeds up the overall process of issuing contracts and the Commission's Financial Services should make an early announcement of the levels of man-month funding.

Programme integration;...

5.2. The Commission should continue using independent experts in "Programme Integration and Management" (PIM) reports. These reports are valuable for the Management Committee and they do not interfere with the evaluation process.

Consideration should be given to video-conferencing as a tool in more effective use of this procedure.

more visiting scientists;...

5.3. Links should be established within the measures in ACTS for seconding scientists and engineers to on-going projects and Activity Four of the Fourth Framework Programme (Training and Mobility of Researchers).

more co-operation across ICT;...

5.4. Given that Information Technology and Telecommunications are becoming more integrated with time (software, standards, markets, etc.), there is a need to enhance the transparency and the co-operation (including potential joint programmes) between the ACTS and the IT and Telematics programmes.

and more open 'National Hosts'

5.5. The concept of the National Hosts, as a co-operation and interconnection platform, needs to be re-evaluated with a view to a better consolidation between people who do not "share" developed knowledge.

6: Key issues for the further development and use of advanced communications in Europe

In a new communications and information environment, many new and exciting services will bring substantial benefits to the professional and private lives of all European citizens: Examples of the key applications are given in the 'Bangemann Report': Teleworking, telemedicine, teleconferencing, distance learning and many others.

6.1 A coherent plan and timetable for the introduction of a European Information Infrastructure

An EII for a wider Europe...

The governments of the United States, Japan and Europe have committed themselves to early development of advanced Information Infrastructures. In Europe, the Bangemann Report urges private industry to invest in an infrastructure that will allow the public to access and use new services at the earliest possible time. This objective must be considered in the context of a wider Europe. To be truly effective, such a network will have to embrace all European countries, east and west. Specific features and needs of European Information Infrastructures, stemming from the increasing importance of the developing Eastern European markets and the vicinity with the Mediterranean Countries, need also to be addressed at European level, particularly as far as radio, satellite and undersea cable technologies may be concerned.

will require enormous investment...

The enormity of this task can be grasped when it is considered that Europe (33 countries) has some 243 million households (140 million within the European Union (15)). Estimates of the cost of connection vary but the average seems to be of the order of 1000 ECU per household. The cost then of providing advanced services to every household in the EU alone could be of the order of 140 billion ECU. Even if this financial investment is made, it will take 15 to 20 years.

but needs to allow access by everyone...

Research and Development, under the RACE Programme and other innovations have provided the tools and the know-how to allow the physical development of the networks. Some progress has been made in the installation of the core network, but a lot needs still to be done in extending this to all citizens and small businesses.

and will require coherent guidelines...

It is not clear that a purely market-led approach will generate a coherent and interoperable infrastructure throughout Europe, without undesirable disparities. Perhaps we should look at the Information Superhighway as a second European road and motorway network. Europe badly needs a coherent plan and timetable for the introduction of a European Information Infrastructure.

particularly for accelerated provision of digital video services.

In particular, it is undoubtedly in the interest of Europe that digital television services be introduced in the shortest possible time. The technology for digital terrestrial, cable and satellite delivery now exists for all three media and will be standardised before the end of 1996. The VHF and UHF spectrum in Europe is saturated in most European countries and near saturation in the others. Digital television will allow a much more efficient usage of the spectrum eventually freeing some capacity for other services or other usage, and a programme to accelerate the penetration of digital services would liberate valuable spectrum for other services. Such a programme would have a number of advantages:

- The public would benefit from a greater choice of programme, at a higher technical quality.
- Scarce spectrum would be released for additional broadcasting services, data and telephony.
- The cost of transmission would be considerably reduced.
- The consumer electronic manufacturing industry would be greatly stimulated.

6.2 The impact of globalisation

Global competition..

Globalisation in the telecommunications industry is making rapid strides. In Europe, the decision to liberalise infrastructure and service provision is forcing European operators to think in terms of global competition.

and inter-operability requires open standards...

The market will move along two axes: on the one hand, a requirement to have services available world-wide, without being constrained by geographical boundaries - on the other hand, the emergence of many "niche" markets satisfying specific requirements. The former implies agreements at international level to reach network interconnectivity also in services. The latter requires the opening of networks to a variety of services. A careful balance will be needed between global harmonisation and the constraints of de facto protocols supported by powerful actors outside the European Union.

and Europe must lead in their development.

Deregulation will create competition at all levels, and in an environment of increased competition, global technical solutions will be an attractive way to reduce costs. European standards are a strategic means to maintain the technological initiative in Europe and to get a better industrial position in the global marketplace.

6.3 General orientations for future EU RTD

Further EU RTD is needed...

EU RTD programmes have a stabilising effect in industry: The general consensus about the basic lines of technical developments allows work on them to continue unimpeded. In addition, further research and technology development is necessary: It will not be possible to realise an Information Society in Europe only with the technologies of today.

Since mastery of technology is the key, **technology development must occupy a key position in future EU RTD.** The objectives should mainly be focused on new technological developments, rather than on the development of specific applications. However, it will have to associate the short and medium term end-user needs and requirements in order not to increase the gap between the availability of the technology and its market deployment. **Preference should be given to projects that lead to improvement of an EII and/or to future concrete commercial applications, and should mainly include projects that could have major impact on the Union and its population.**

All efforts should be made to enlarge the source of ideas from laboratories, universities, manufacturers, service providers and users. RTD Consortia will need a good balance between PNOs, major industrial companies, universities and high tech SMEs, but the idea of a minimum quota of SMEs should be abandoned. The partnerships within the projects should resemble as much as possible normal business partnerships.

Programme structure

on the Communication and information society...

Work in the 5th Framework Programme should be around the theme of RTD for the Communication and Information Society. This sector of the 5th Framework Programme should have a coherent strategy, with a comprehensive workplan to ensure that there are no gaps or overlaps. However, **a clearly defined communications section is desirable.** A unified administrative approach will avoid that different submission and auditing procedures and evaluation criteria are applied to different areas of work with a consequent unnecessary burden for participants.

with a clearly defined communications section...

but with a coherent overall strategy, and flexibility to re-allocate resources.

There must be a coherent overview of the whole information and communications technology development area, with a single coherent EU strategy, a single strategic advisory group and flexibility to move resources within the whole area as circumstances change. One possibility might be a **Core Programme** ensuring a balanced coverage of all significant information and communication advanced technologies and a set of **Focused Programmes** addressing large-scale applications in thematic areas of specific interest (health care, education, etc.). Such a Core Programme could ensure that a comprehensive state-of-the-art information and communication technology base is maintained and used in Focused Programmes whenever appropriate. Focus Programmes could temporarily strengthening specific research areas of the Core Programme rather than compete with it for funding and resources.

One option could be a core technology programme and focused application programmes...

but, co-ordinated management will be essential...

Co-ordinated management will be essential, as well as flexibility to launch large-scale application projects at appropriate times, and to match and synchronise them with technology development activities.

with enhanced use of National trial infrastructures.

To reduce the cost associated with the size of field trials, it is recommended that enhanced use is made of trial infrastructures created and maintained by each Member State. Different infrastructures with specific characteristics might be needed for specific applications. Furthermore, as applications and content are necessarily dependent on local language and culture, different infrastructures might have to be established in different regions. For these reasons, the creation of test infrastructures (possibly an extension of the National Host concept) and research in specific areas should be left to the initiative of Member States.

Objectives and key issues

The main objectives of future EU RTD should be to overcome present technological and infrastructural constraints to the explicit and hidden demands of users and to perform the required trials to demonstrate "in-the-field" the effectiveness for users of proposed solutions.

In order to support these objectives two conditions are needed:

- Stimulation of service creation, deployment and use. This includes the making available of new technologies, infrastructures, test beds and field trials.
- A framework to pull together a variety of actors - telecommunications, information, consumer electronics providers - and for them to interact with a large user community.

Key issues for market development and widespread use are...

To enable market development, meeting users requirements, special attention should be paid to:

Seamless access..

1. Seamless access to and use of services, independently of the technologies, physical infrastructures used and of the specific service components and providers involved;

Ease of use...

2. ease of access and use of services by a broad community of users. Specific technologies may be required to improve in usability and may need to be tailored to the variety of services, from transport to applications, including broadcasting and interactivity, mono and multimedia, without any constraints due to distance or location;

Quality of service...

3. quality of service, including security, dependability: this quality should be an integral part of services and the user may wish to select the appropriate quality of service required;

Ubiquitous access...

4. ubiquitous access to services, overcoming current limitations such as location dependent bandwidth, access costs, technology for people on the move, etc.;

service customisation.

5. service customisation, through an improvement in the flexibility in the service offering and in the provisioning of user manageable capabilities to self-customise the service.

More specifically, RTD is needed to:

- improve access facilities; (more bandwidth; more user-friendly; more location independent; intelligence sharing between networks);
- Improve connection facilities; (faster transit and routing to the proper address; effective internetworking of a variety of networks to give rise to a

network of networks; more distributed architecture; more intelligence in the network and increased processing capabilities) and

- **Optimise the interaction between the “access intelligence” and the “network intelligence”;** *(more interplay between the customer terminal and the network at the application level; non specific telecommunication software; basic flexible platforms at the customer location to interact efficiently with the evolving components of the network intelligence).*

6.4 Specific issues:

6.4.1 Standardisation

Standards are vital at EU level...

Standardisation is the primary task of the EU today. Only when standards are agreed will investment be put in new networks, for only then will investments be secure. Only when standards have been agreed can we hope for a new multi-media network for Europe. For multi-media, standardisation is also the best protection for the consumer in a deregulated market. Only with early standardisation can we secure political and economic success for Europe. **Standardisation - first for parts and then the whole - should be the primary task of the EU RTD programmes.** There should be concrete goals and timetables, and the EU Council of Ministers should be invited to endorse clear guidelines so that networks be introduced simultaneously in the EU to create a homogeneous whole.

for ATM...

In particular, **ATM systems must be completely and finally standardised**, including for user access. Only when this is done, can we expect ATM technology to be used to its full potential. The development of communication services requires high bandwidth capabilities to the end users. Such bandwidth is now being installed to large business (interconnection of LAN's) and will progressively migrate to small business and to consumers. A unified ATM protocol set would enable generalised service to adapted terminals equipped with the relevant interfaces. A large market for on-line services will then open.

and multi-media services.

Multi-media standards must be developed jointly by various standardisation groups. It may be most practical to consolidate them into one multi-media standardisation project, under the control of ETSI. This project should be supported by EU RTD up to the point where unique standards can be implemented.

6.4.2 Affordable access

Fibre and radio access can be affordable...

Reasonably priced optical fibre access to households and homes is vitally important for the future. This technology has no significant bandwidth limitations, and can therefore allow for highly flexible services far into the future. This development would provide a major boost to the fibre-optic industry and research in the field of optoelectronics and photonics.

Radio broadband access is also extremely attractive because it offers alternative network operators new access to customers. This must naturally be cost-effective. And since the access can be at low power, there would be few problems with suitable radio frequencies. A specific effort should be devoted to technologies enabling microwave communications (40GHz).

The evolution of the architecture of the access networks will be one of the key factors of the coming period. The final aim will be the provision of a range of various service and media independent access networks which will deliver a full range of services and will support a multiplicity of techniques.

6.4.3 Usability issues

but usability needs more effort.

More research into the sociological behaviour needs to be undertaken and the results of this research should be used in the design and standardisation of terminal equipment. It will be crucial to define an ergonomic access to many services to users who do not know the technical arrangements of service provision. A simple and attractive interface will determine the commercial success of multi-media services. **The interface must be as easy and convenient as a normal telephone.** A generic solution should be encouraged.

Key enabling technologies are...

6.5 Key enabling technologies

6.5.1 Opto-electronics

Opto-electronics

Optoelectronics/photronics offer unsurpassed transmission speeds. **Extraordinary progress has been made and research must be intensified in this field.** Greater resources should be devoted to further work on optoelectronic components and materials (including electro optics and lasers in order to maintain European R&D in these domains to a level comparable to that of the U.S. or Japan).

6.5.2 Software

Software

Software is increasingly becoming the limiting factor in the development of new products. There is urgent need for improving productivity, a particularly difficult feat, since software these days defines the product itself. Today, between 70 and 80 percent of development engineers in electronic firms work on software. **Every effort must be made to rationalise this sector as quickly as possible.**

6.5.3 Interactivity

Interactivity

Interactivity is probably the common denominator of all future applications. A basic level, dealing only with text and data, will be enough for some applications such as home banking but other applications will need the increased sophistication of 3D graphics and image processing.

6.5.4 Service engineering

Service engineering

It is important, and urgent, to agree on a minimal set of features, logically ubiquitous. The key word is "minimal": This is what made the success of the World-Wide Web: the existence of a very limited set of HTML primitives allowing documents to be formatted in a terminal-independent way. This will happen to services as well. The minimal set of features should comprise ownership characterisation and measurement parameters.

6.5.5 Intelligence in networks

Intelligence in networks

A mix between network-centric and peripheral distributed intelligence paradigms is very likely to emerge; the former with a broader penetration in the residential market, the latter in the business sector. The important point is to have open network intelligence, able to allow us to use whatever is available. A high performance network would allow intelligence to be plugged in at one of its gateways making it accessible to anybody. The concept of a service gateway in the future may include both the provisioning of a service externally to the network and internally, making use of inner network processing capabilities.

6.5.6 Intelligent agents

Intelligent agents

The new "intelligent agents" technology, which is emerging from the IT sector, should also be analysed for its impact and utilisation in networks and services. In particular, the possible technical options (like: inference mechanisms, transfer and remote interpretation of programming scripts, automatic learning) should be evaluated, their applicability at different levels (user, management, network) assessed, the possibility of standards identified, the impact on the market and on the service platform considered.

6.5.7 Mobile communications

Mobile communications

In the light of the multiplicity of channels which will be made available by the use of digital technology, urgent attention needs to be given to the radio frequency spectrum and its future use. As any fundamental change in usage involves a long time span, studies are urgent and should commence immediately.

Particular attention should be given to evolution of mobile services and networks. In this field Europe has to capitalise on the leadership acquired with GSM in steering the evolution towards UMTS. The establishment of the European UMTS Task Force is a good starting point, and its recommendations on the timing and strategy for evolving beyond GSM towards a new global standard should be the framework for future European research in this field.

6.5.8 Security technologies

Security technologies

Particular attention should be paid to guaranteeing the secure transmission of information. If this is not achieved, interactive multimedia services will be limited.

and others...

There are other key enabling technologies in the information technology area, such as signal processing and micro-electronics, as well as others in materials use, such as battery technologies, which will also be important to cover, in a coherent approach, the whole Information and communications domain. Only ones important to the communications dimension are highlighted here.

6.6 Pioneer technologies

Visionary concepts and pioneering technologies include...

In addition to enabling technologies, greater attention should be given to visionary concepts and pioneering technologies that offer the prospect of high returns, and can be the seeds of competitive advantages in the next century. Some examples are:

6.6.1 Visual programming

Visual programming

The development of applications will shift from the software specialist to the end user. Visual programming environments will allow people to develop an application programme by selecting icons, connecting arcs, pruning a graphical tree and zooming on icons, instead of by the traditional method of using a programming language. Visual programming tools associate graphical icons with software objects. From the IT market lots of generic objects will appear, as each company will propose its own Business Objects representing the building blocks of the services they will offer to their customers. The same approach could be used by Telecom Operators in defining specific telecommunications business objects.

6.6.2 Self-repairing services

Self-repairing services

Some layers of the network, the lower one (technology) and the upper one (service), will become more and more self-managed. Technology is more and more self-checked and self-repairing. Services will have management as part of the service itself, no longer an external entity. This may make the entire concept of TMN obsolete. As a consequence, today's competing protocols (CMIP and SNMP) could no longer exist, because protocols used for distributed processing (the sibling of RPC and CORBA) could be utilised.

6.6.3 Satellite systems

Satellite systems

GEOs, LEOs, MEOs and GPS (Geo stationary, Low Earth and Medium Earth Orbit Satellites, and Global Positioning Systems) are in the hands of American companies, because satellite technology was needed in the huge spaces of the United States and Canada from the very outset, and not in Europe. However, both satellite and terrestrial transmissions must now be seen as an integral part of the Information Superhighway providing the essential links to cable systems and the extension of the network to uncabled homes and mobile receivers.

6.6.4 Future video and 3D imaging

and future video and 3D imaging.

Japanese manufacturers have demonstrated large solid-state television displays, no more than 5cm thick which hang on the wall like a picture. Flat-panel displays will be a consumer item in time for the Winter Olympic Games in 1998. These developments will create a new interest in advanced and high-resolution imaging, and Europe should be ready for it. A new programme of work, building on the DVB and Cinenet Projects, should be inaugurated. The future of the cinema may well be the "electronic cinema" where movies are no longer distributed on film but rather by satellite or cable to individual cinemas.

Annex I

Terms of Reference

- 1: To review the status of advanced communications deployment in Europe and its impact on European integration and economic development.**
- 2: To assess the effectiveness and impact of EU RTD in advanced communications during the past 5 years (1991 - 1996), including industrial, economic and social benefits.**
- 3: To determine, in the light of EU and international developments, whether the objectives and rationale for the programmes are still valid.**
- 4: To examine whether the programmes give good value for money, strengthen international competitiveness and fulfil the wider policy objectives of the Community.**
- 5: To assess the overall management of the programmes.**
- 6: To identify key issues for the further development and use of advanced communications in Europe; to clarify the rationale and priorities for further support at European level for research, technology development, standardisation or generic service demonstrations.**

Annex II

The Participants

Mr. Stelios Argyros MEP

As a Member of the European Parliament, Stelios Argyros sits on the Committee on Research, Technological Development and Energy and the Committee on Economic and Monetary Affairs and Industrial Policy. He has served on the Board of numerous companies in Greece, has been Chairman of the Board and President of the Federation of Greek Industries and is currently a Vice President of UNICE.

Mr. Max Artigalas

General Manager Recording Programme Administration of THOMSON multimedia. After being technical manager of Thomson Broadcast, he joined THOMSON multimedia where he is also recording domain manager for Corporate Research and Advanced Development.

Dr. Hans Baur

Former Executive Vice President of Siemens AG, and now acting as an advisor to several national and international bodies and to Mr. Bangemann on the Information Society. During his career with Siemens AG, Dr. Baur was a member of the Corporate Executive Office and was responsible for the business groups dealing with telecommunications and electronic components. He also served as President of the Supervisory Board of Siemens Nixdorf Informationssysteme AG.

Mr. Umberto de Julio

Co-General Manager of STET, with responsibility for strategic planning, technology and development of new service, prior to joining STET in 1995, Mr. de Julio held the position of Director of the Network of Telecom Italia in 1994. His earlier career with SIP began in 1972, where, in 1986, he was appointed Director of the Network. He is a Member of the Board of Telecom Italia, Telecom Italia Mobile, CSELT, STREAM, STET International and is also President of the General Assembly of EURESCOM and Vice-General President of AEI. Mr. de Julio was assisted by Mr. Giovanni Perucca, Director of R&D of STET.

Mr. Aimo Eloholma

Vice President of Telecom Finland Ltd., Sales and Marketing, since 1995, Mr. Eloholma was formerly Vice President of Telecom Finland, Business Services, and has held a variety of positions within the PTT in Finland. He is Chairman of the Board of Tele Yritysviestintä Oy (provider of PBX's) and Yritysverkot Oy (Corporate Networks Ltd.) and serves on a number of Committees in Finland. He is also a member of Information Society Forum (European Commission). Mr. Eloholma was assisted by Mr. Timo Rajamäki, Director of the Research Centre of Telecom Finland.

Dr. Francisco Pinto Balsemão

Chairman and majority share holder of IMPRESA, S.G.P.S., a holding company with major positions in newspapers, printing, advertising and a Portuguese private television channel. He is Professor of Communication Science at the New University of Lisbon, Chairman of the European Institute for the Media, Vice-President of "Fondation Journalistes en Europe" and Member of the Board of the Media Business School. He was one of the founders (1974) of the Popular Democratic Party (PPD), now the Social Democratic Party (PSD) and from 1981 to 1983 he was Prime Minister of Portugal. Dr. Pinto Balsemão was assisted by Mr. António Trigo de Sousa, Technical Director in SIC.

Dr. George T. Waters

Director of the Technical Department of the European Broadcasting Union since 1986, Dr. Waters has been involved in broadcasting for more than 35 years. He completed a seven-year term as Director General of RTE, Ireland's national broadcasting organisation, and was a Director of the International Council of the Academy of Television Arts and Sciences (USA) and Vice President of the European Broadcasting Union. In 1993 he was appointed President of the International Academy of Broadcasting (IAB).

ANNEX III

Recommendations of previous Strategic Audits

Indicated on the following pages

1st Strategic Audit : 1988/89

A) Governments should collaborate to define by 1992 the conditions and regulatory provisions for ... pan-European advanced services.

Agreement was reached on competition in advanced services in 1993 : and on competition in all services in 1995 (for implementation from 1.1.1998). Outstanding regulatory issues relate to service provision and functionalities : confidentiality and security; universal service; and content restrictions (violence and pornography in interactive and broadcast services); etc.

B) A concerted approach to, and timetable for, IBC development and use?

Technology issues were addressed in RACE, but no wider framework was put in place by TOs, CATV operators and service providers to develop a concerted approach by all interested parties. The EURESCOM framework is limited to joint strategic research by some TOs; the ACE 2000 framework is only for information exchange.

C) A Memorandum of Understanding on intra-European long-distance operations.

Largely because of a perceived possible conflict with EU competition policy, the METRAN and GEN initiatives for limited sets of common long-distance services were delayed.

D) Service providers to specify requirements, conditions and provisions for IBC services.

Work was carried out in RACE projects and in other frameworks, with some major achievements : common requirements and provisions for digital TV broadcasting; for interactive multi-media service provision (DAVIC); for UMTS mobile service provision, etc. Nevertheless, many key service providers are not European and no wide industrial consensus has emerged at world level on all IBC issues, and is perhaps now unlikely in the new competitive environment.

E) A Memorandum of Understanding for pilot introduction of some IBC services on a European scale?

The ATM Trial and the current agreements for inter-operation of National Hosts and trials associated with the ACTS programme are major steps in this direction, but four years later than requested.

F) Collaborative R&D on Service Engineering?

This area of R&D was introduced in RACE in 1991 and has now matured to a significant part of the ACTS programme (Area 5).

G) Reinforcement of standards co-ordination? *An agreed schedule for ATM?*

Both recommendations were taken up by ETSI. A second phase of consolidation in standardisation is now underway, both within ETSI, and between standards organisations. ATM standards were adopted in 1993.

H) Rationalisation of frequency allocations to reflect evolving needs and priorities?

Action has been taken in some EU Member States, in the CEPT and European Radio Communications Committee, and in the WRC, but no coherent European strategy yet exists to cover all the competing demands of digital TV, digital audio broadcasting, mobile communications (GSM and UMTS) and satellite communications (VSATs, LEOs, DECT, etc.). With rapidly growing demand from the civil communications sector, military radio spectrum allocations are a constraint in Europe.

All of the 88/89 recommendations reflected a common view at that time that European consensus, particularly within the TO and service provider community, is a pre-condition to coherent deployment. A balance must be struck between coherence and the pace of innovation, and the balance differs between public and private networks/services. The shift to competition and private-sector investment since 1988 has made several of the recommendations less appropriate.

2nd Strategic Audit : 1992/93

A) A new financial framework for usage innovation, procurement and stimulation?

The Commission has proposed (in 1995) a framework and implementation rules for Trans-European networks in advanced communications, with a strong focus on coherent Trans-European services and their use. A common position has been reached by Member States, and the framework should be operational in 1996.

B) Removal of constraints to integration of services?

Little progress has been yet made in removing regulatory constraints on integration of communications, interactive services and broadcasting in most EU countries.

C) Action on inter-operability of networks?

At the technical level, inter-operability of ISDN, GSM and ATM has been proven and implemented across the EU : See Annex IV.

D) A global perspective in research and standardisation?

By unanimous Decision of the Council of Ministers, the ACTS programme is open to global participation; with participation from non EU organisations on the basis of mutual interest. Organisations from 38 countries propose to participate in ACTS.

E) Eastern and central European participation in ETSI? ETSI is open to these participants.

ERBD and World Bank support for communications developments in eastern and central Europe? This is now a major area for financing from both the ERBD and the World Bank.

F) EU RTD to stimulate standardisation and selected areas of communications technology development?

The contributions of Phase II of RACE to standardisation, and to digital interactive video services (DAVIC and DVB) were re-inforced in 1994. Over 1400 contributions to standardisation were made by RACE projects to 12/95.

A strengthened management link with PNOs, industry, regulators and governments?

The G28 Advisory Group was set up in 2/94 : It helped develop the concepts for the ACTS programme, notably the National Host concept, and has assured the independent monitoring of ACTS implementation.

Annex IV

Progress towards inter-operability, common interfaces and standards in Advanced Communications

In a world of analogue telephony, inter-connection of networks assures inter-operability of services. In the digital world, where a communication may consist of text, voice, diagrams or images, and combinations of them, inter-operability must also be assured separately at the level of equipment, services and applications.

While traditional telecommunications standardisation bodies have proved effective in ensuring inter-operability in transmission and switching, new types of industrial groupings and "consensus development frameworks" have proved necessary to progress inter-operability in image coding, in end-to-end management of interactive video services, and in network and service management. These new groupings, such as the Digital Audio Visual Council (DAVIC), the European launching group on Digital Video, the ATM forum, the INTERNET society, TINA-C etc. have proved more flexible and faster in response to technology and market changes, but depend on the voluntary commitment of participants and other commercial actors to their agreements.

Beyond even these technical consensus frameworks, new inter-operability requirements are now emerging at the level of service content, accounting, management and use. This level of inter-operability is just as important to users, but requires an even larger and more varied constituency of commitment; it concerns issues like choice and inter-operability of payments systems in electronic commerce and home-shopping, security and confidentiality, multimedia call forwarding for teleworkers and common practices for content descriptions and common directories, whether these concern EDIFACT-type specifications for electronic trade, medical data in telemedicine services or taxonomies for museum and art gallery information.

One way forward is shown by the X-400, X-500, INTERNET and World-Wide-Web protocol sets, and their further development to cover multimedia mail, voice communications and electronic commerce. Nevertheless the fast pace of development in this area generates a public concern about a perceived lack of inter-operability in the new diversity of services.

The RACE programme made an enormous contribution to technical standardisation. In the first phase to 1992, over 570 contributions were made to European and world-wide standards bodies. In Phase II, from 1992 to 1995, over 850 contributions were made. RACE projects were the backbone of work on MPEG2 in image coding, on ATM specifications, on Digital Video Services (in DAVIC and the European Launching Group), on Terrestrial Digital Video Broadcasting, and on UMTS mobile services. Of the RACE contributions to official European standards (through ETSI and CEN/CENELEC) over half have been taken up at world-wide level.

1. Inter-operability and standards in access, transmission and switching

The first generation digital communication systems now have Pan-European inter-operability and stable standards. ETSI has played a major role in the adoption of EURO-ISDN and GSM specifications.

The technology basis and consensus development frameworks are in place for 2nd generation systems:

- The basic ATM standards are adopted, and the ATM forum has completed most of its specifications to enable coherent ATM deployment. The ATM trial in Europe brought together the 18 major network operators to validate operational protocols, and these will be the basis of further pre-commercial service trials in the ACTS programme (the JAMES project).
- 2nd general mobile (radio access) services have been explored and specified in the RACE programme. Most major industrial interests will participate in the UMTS Task Force through a Memorandum of Understanding to be signed in 1996.

In terms of inter-operability between ISDN, GSM, ATM and other systems, the situation is now good. The telephony and packet-switched systems (X-25) inter-operate well in Europe, allowing anyone to access INTERNET using a telephone line: ISDN and GSM also inter-operate with the packet-switched networks allowing faster WWW access and access from lap-top mobile terminals. ATM and ISDN inter-operate, as do ATM and Ethernet for LAN applications.

2. Image coding and interactive digital video services

The H320 image coding standards for ISDN video telephony are now stable and widely adopted in most manufacturers' products. Agreement is also now reached on shared application protocols (for groupwork by teleworkers) and commercial products will soon be available.

For high quality images, the MPEG2 standards for digital video are now taken up as the major world standard for digital video and TV. These standards are supported by ATM, CATV and broadcast transmission protocols. They allow video to be processed on desk-top computers and will be incorporated into most chip-sets for set-top boxes for video-on-demand.

3. Service inter-operability

Network & service management

One of the most daunting problems in interoperation of services is the integration of Operations, Administration, Maintenance and Provisioning systems (OAM&P) with current billing and network management systems. Largely through work in RACE, Telecommunications Management Network (TMN) systems are now widely accepted as the way to go. TMN is an ITU-T devised platform, but ad-hoc industry groups (notably TINA-C) and the Network Management Forum, have done much complementary work.

WWW & JAVA

The WWW set of protocols, based on HTML, enable interoperability between a large variety of different access systems and database systems. Even if an accessed file cannot be read by application software on a users terminal, the access can be routed through a server on which it can be read, or the necessary software downloaded when the file is accessed.

VRML and JAVA take this concept even further, allowing users to down-load standard elements of application programmes to do on their own computer terminals whatever is required at that moment of use. Currently over 800 "applets" or re-usable elements are available.

The concepts of re-usable service modules was the basis of Service Engineering, pioneered in RACE, following the 1st Strategic Audit in 1988/89. The current developments of the concept in JAVA point the way to a wider application in the original purpose of ad-hoc communications service inter-operation, rather than simply in ad-hoc applications on user terminals.

EDIFACT/Electronic Commerce

For electronic commerce, interoperability in access, in security systems, in payment clearance systems, in taxation systems and in IPR protection for paid information services will be essential if an open electronic marketplace is to be established (as proposed at G7 level). Some foundations have been laid : the EDIFACT standards are now widely used in proprietary EDI, but relate only to the content and formatting of transaction data. The COMMERCE NET initiative in the US has established common protocol sets for access and information security, but these are not exportable outside the US. Some industrial groups like MicroSoft/Visa and IBM/Europay have proposed secure payment systems, but inter-operability is yet to be agreed. One possible framework for a wider consensus (a Memorandum of Understanding open to all interested parties) is under discussion in the context of the G7 initiative on a "Global Marketplace for SMEs".

Annex V

Impact and Exploitation of Results

**(Results compiled from the assessment designed by the
FRAUNHOFER Institute and answered by about
1000 RACE II Participants)**

Contents

- 1 Introduction
- 2 Products, Services & Know-How
- 3 Technology Transfer & Commercial Exploitation
- 4 Technological position relative to competitors &
economic/organisation impact
- 5 Consensus building: Impact of standards and agreements
on commercial enterprises

1. Introduction

The RACE programme has had a significant impact on the development of new products, services and manufacturing/process techniques. In turn these have been used in further research, development, applications, and in systems and sub-systems demonstrators, providing strong indicators of substantial technology transfer and exploitation of know-how. An earlier expert assessment of RACE made the observation that there was “massive internal dissemination of results and exploitation” of these results by other RACE projects. This active “internal dissemination” has been a strong feature of the programme and the enclosed results show further and substantial strengthening of “internal” exploitation.

The second phase of RACE (1992-1995) included 122 projects, each part of an integrated programme of pre-competitive RTD and Application experiments, validating advanced communication technologies and services. The combination of all efforts in the different project lines, and the results of a major European collaboration are separately described, but each project and each participant has its own particular impact. These have been identified by means of a questionnaire to which over 1000 participants have responded.

The Exploitation and Impact Questionnaire was designed as an additional assessment tool to assist with quantitative overviews of results, their usage and impact. It addressed results, technology transfer and commercial exploitation; as well as views on the impact on business sectors and key economic issues. The questionnaire had three main approaches:

- ◆ quantification of new product and service developments, including application experiments, service and generic developments. It was addressed to **project coordinators** (of which there are about 100 in total);
- ◆ technological position relative to competitors and consensus building impact (addressed to **about 500 partners from commercial enterprises**);
- ◆ goals (economic and know-how) and achievements, exploitation of results and commercial plans; knowledge acquisition, organisation impact, future plans (**all partners**, of which about 1000 have answered).

The results of the survey indicate positive and clear examples of results and exploitation of results, and that significant benefits from the RACE programme have been widely achieved.

It should be noted however that it is difficult to immediately exploit pre-normative and pre-competitive research and development in a visible way, or to measure results and impact while research is ongoing and shortly after termination. The results and impact of the programme are positive, but are still likely to significantly underestimate achievements, particularly with respect to intangible issues such as consensus building and risk reduction, whose benefits become readily apparent only in the longer term.

1.1 Overview

The results show that the RACE programme has had a significant impact on the development of new products, services and manufacturing/process techniques: These have also been used in prototypes demonstrating connectivity and developing a wide range of know-how relevant to emerging products/services. A quantitative overview is given in the table below. For user testing and generic applications, there have also been major achievements in the area of applications experiments, illustrated also by approaching 500 organisations on different sites involved and the 7000 individual users.

RACE Products	No. Examples & Man-Months (rounded)	Services and Know-How Developments	No of Examples
Components	1065 (ave.16.5mm each)	New & Enhanced services	125 (75% ATM or ISDN)
Methodologies	368 (ave.29mm each)	Applications Experiments	225 (over 60% using 2-140 Mbps)
Sub-systems	460 (ave 34mm each)	Generic Applications	109 (over 60% using 2-140 Mbps)
Systems	210 (ave 100 mm each)	Publications	3100
Patents	140 (+ 48 planned)	Contributions to Standards	860

Exploitation and Technological Position with Relation to Competitors

There is evidence of substantial exploitation and usage of systems, sub-systems, components and methodologies in other EU or RACE applications or in product/service development, and a substantial number of places for future commercial exploitation are in existence (Section 3). RACE II work has resulted in substantial improvements in technological position with relation to competitors (Section 4) and concerning economic impact there are significant numbers of responses confirming turnover increase, increased market share, opening of new markets, improved product quality and productivity gains and joint ventures/acquisitions.

Standards Agreements and Future Collaboration

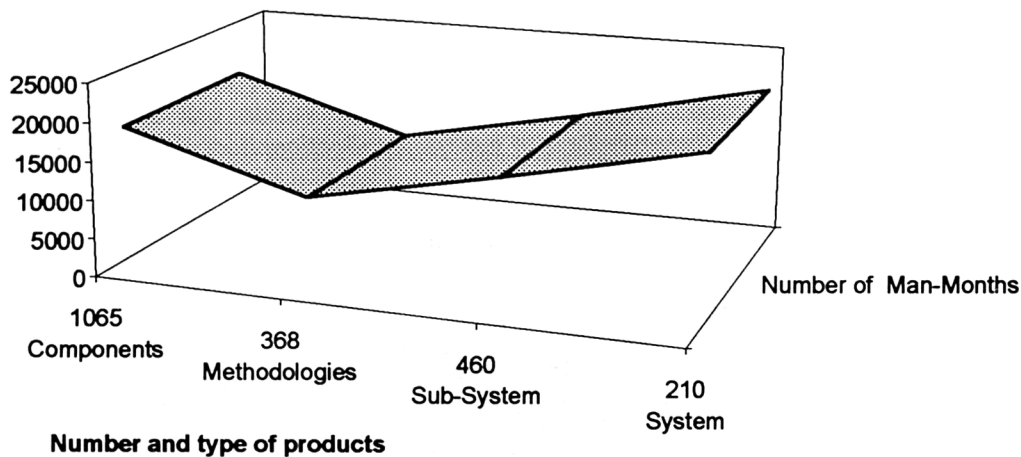
An important goal of the RACE programme has been to encourage co-operation and harmonisation in standardisation and technical specifications of emerging technologies. To-date, there has been a total of over 860 contributions to standards, which have made a substantial impact both on the European standards body ETSI and on world standards bodies, as shown in Section 5. For future collaboration in commercial development and research among European commercial enterprises, there were over 200 cases of partners who were aiming at further collaboration with other RACE partners in commercial development and/or marketing, and 800 in further research collaboration (Section 6). This confirms a highly positive view by participants concerning their achievements in RACE and their wishes to continue collaboration in some form or another.

2. Products, Services & Know-How

The RACE programme has had a significant impact on the development of new products, services and manufacturing/process techniques. The results and their impact have been illustrated through demonstrators, prototypes and examples of connectivity. Table 1 gives an overview of results from RACE technologies, including systems, sub-systems, methodologies and components developed. As the effort required to produce the latter varies greatly from one to the other, the man-month effort associated with each item is also indicated.

Table 1: Components, Systems & Sub-Systems, Methodologies (prime partners only)

Type of Product	Number of Product	Number of Man-Months	Average Man-Months per Product
Components	1065	17541	16
Methodologies	368	10662	29
Sub-System	460	15670	34
System	210	21097	100



There has been substantial transfer and usage of these results in system and sub-system demonstrators. These demonstrators combine results from a range of different projects. They integrate and test emerging technologies, user interfaces, protocols and standard recommendations. Applications experiments have also made extensive use of emerging technologies and of the agreements reached in the consensus development on emerging specifications and standards.

2.1. Results from Applications Experiments

Applications experiment test services within a wide range of business sectors and involving many individual users. A total of 225 Applications experiments, involved about 471 organisations on 515 different sites and included almost 7000 individual users: 40 of the experiments used Local Area Networks LANs; 33 used Wide Area Networks WANs; 8 CATV networks; 12 used satellite connections; 2 cellular radio, and 9 used others. For the transport mode, 39 used ATM; 32 used ISDN; 3 used frame relay; 6 used CBDS/SMDs, and 16 used other types of infrastructure. Communications speeds are shown below:

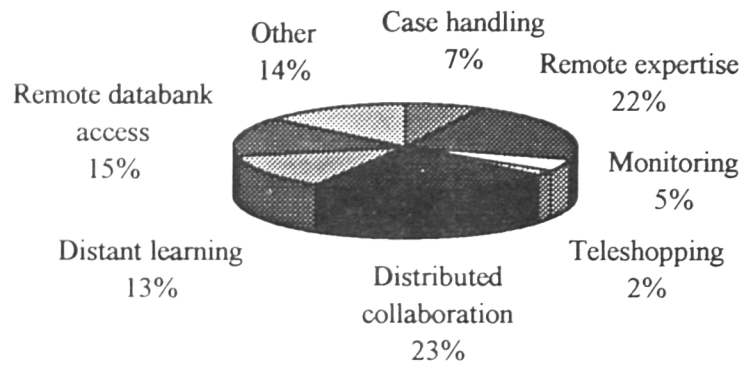
Table 2: Applications Experiments: Communications Speed

Cross-border	National	In-house	Total
2 expts. at 140 Mbps	10 expts.at 140 Mbps	12 expts.at 140 Mbps	24 expts.at 140 Mbps
17 expts at 34 Mbps	15 expts.at 34 Mbps	7 expts.at 34 Mbps	39 expts.at 34 Mbps
11 expts.at 2 Mbps	13 expts at 2 Mbps	10 expts.at 2 Mbps	34 expts.at 2 Mbps
18 expts.at nx64 kbps	15 expts at nx64 kbps	8 expts at nx64 kbps	41 expts at nx64 kbps
16 expts at <64kbps	15 expts at <64 kbps	10 expts at <64kbps	41 expts at <64kbps

- **Generic Applications**

Moving towards commercial exploitation, it is extremely important to develop and test generic applications which can have a wide range of uses in diverse business sectors. The applications experiments have developed and tested a total of 109 generic applications, of which the main applications are: 25 in distributed collaborative work; 24 in remote expertise, 16 in remote data bank access; 8 in case handling and 5 in monitoring and surveillance. The results are shown hereafter.

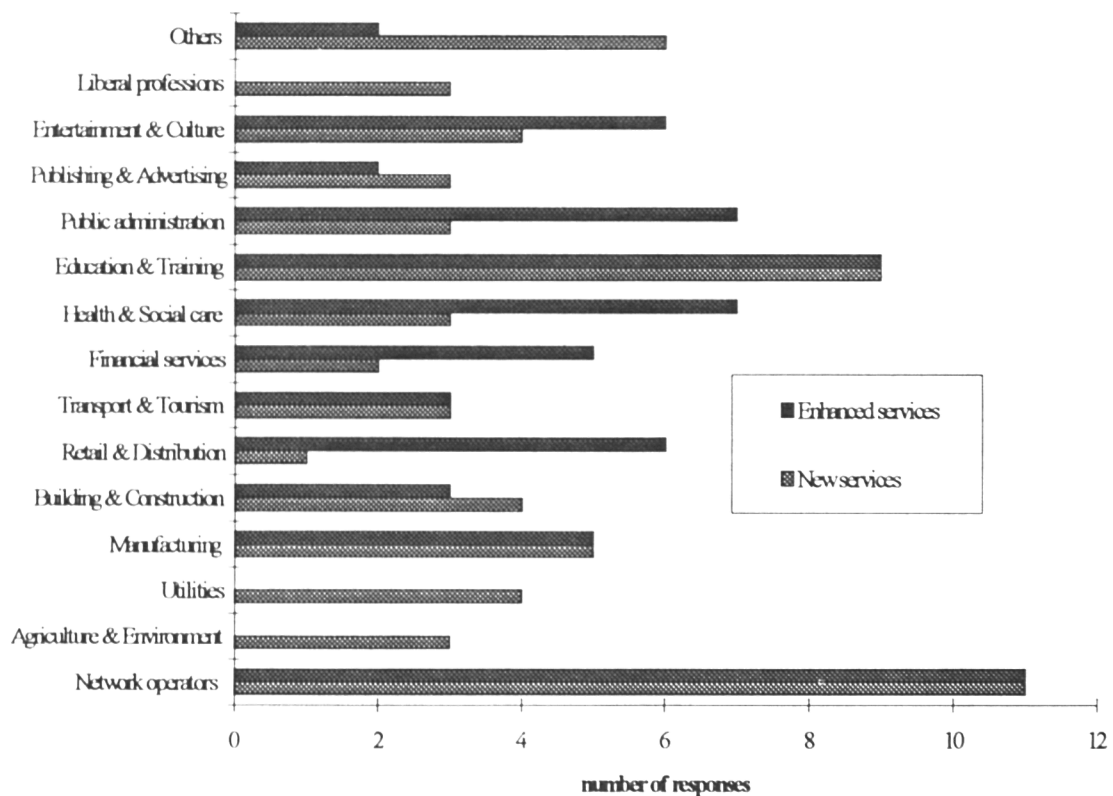
Table 3: Type of generic application



New And Enhanced Services

New and enhanced services, involving transfer of data, voice and images for a range of applications were summarised by the Prime partners. In total, 64 *New Services* and 66 *Enhanced Services* have been developed, in the following business sectors:

Table 4: Sectors of new and enhanced services



2.2. *Know-How and Enhanced Experience: Patents, Publications, Standards*

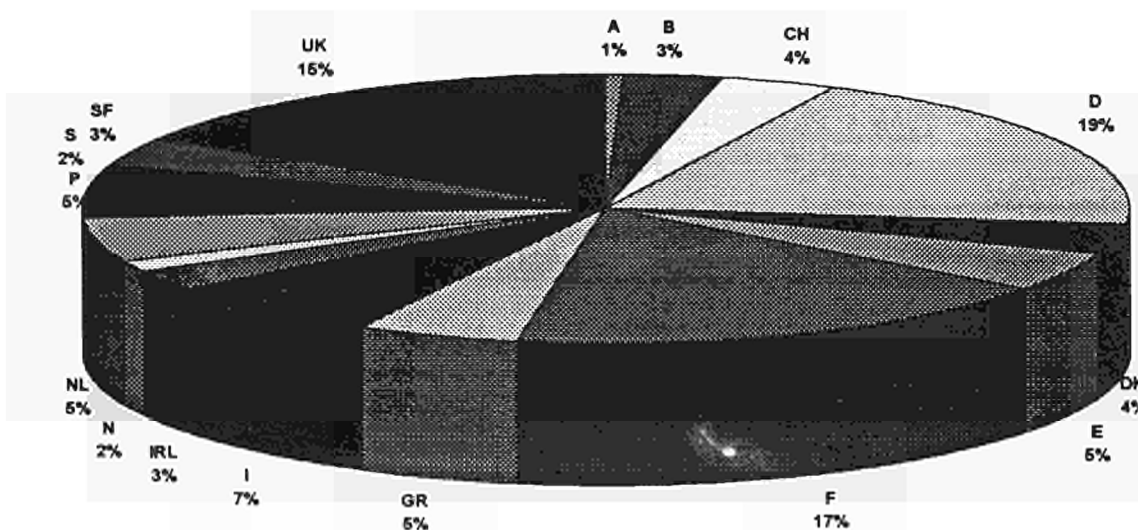
A substantial number of responses indicated improved technical and scientific know-how, management skills and ability to implement services/products. There were over 3000 publications, 860 contributions to standards and 140 patents and estimates of an additional 48 to be registered within the next three years. There were 723 examples of improved relations with (other) R&D labs and universities; 814 examples of improved cooperation with (other) European companies.

Table 5: Know-How and Skills

Know-how and Skills	Number of Examples
Technical know-how	906
Scientific know-how	638
Ability to implement products/services	526
Project Management know-how	320
Ability to manage European co-operation	324
Awareness/knowledge of new services/products	767

In addition, in 573 cases there was evidence of wider participation in EU research programmes; 717 examples of additional qualifications and experience for R&D employees, including 161 cases of support for Ph.D. students. There were 164 cases of increase in the total numbers of R&D employees.

*Table 6: All Participants in Race II — Responses to Questionnaire
Headquarters of Organisation.*



3. Technology Transfer and Commercial Exploitation

Information was requested concerning the number of components, sub-systems, methodologies and systems which were being used in applications or research by projects themselves and by other users. With respect to usage by "others" (i.e. other EU projects or other RACE projects) and for "own" usage, the results are shown below. As Table 6 illustrates, there is substantial exploitation of know-how among RACE projects, in EU applications and in the development of products and services.

Table 7: Technology Transfer

Used in Other RACE Projects	Used in Other EU Applications	Used in In-house R&D	Used in Own Products & Services
264 components	1185 components	732 components	255 components
204 sub-systems	135 sub-systems	458 sub-systems	204 sub-systems
80 systems	82 systems	238 systems	119 systems
165 methodologies	6224 methodologies	558 methodologies	223 methodologies

3.1. Commercial Plans (all partners)

Over 500 participants confirmed interest in commercial plans to develop components, subsystems, methodologies and systems. Of these, about 22% already had commercial plans (104) or were planning to develop without further improvement; most of the remainder planned to exploit after further improvement.

With respect to Advanced Services, 234 participants confirmed intentions to exploit commercially or sell new services: in 47 cases (20%), commercial plans already exist or development will be carried out without further improvements. For the remainder, plans will be developed to exploit commercially after further improvements.

Table 8: Plans for Commercial Exploitation of New Products and Services

Plans	New Products n° of products confirmed	Advanced Services n° of services confirmed
Commercial plans exist	104	34
Commercial plans without further improvement	21	13
Commercial plans after further improvement	440	234
TOTAL	568	281

The significant achievements and exploitation of results is further supported in the table below showing goals of the RACE projects and success in fulfilling these goals.

Table 9: Goals and Achievements

	Aim achieved within the project	Aim will be achieved within 3 years after project end	Aim not achieved/not achievable
New product development	161	192	26
Product improvement	155	103	19
New services	192	206	25
Service improvement	166	144	17
Devpt. new mftg/ /process techniques	94	48	23
Improvement mftg/ process techniques	114	46	18
Provision of connectivity (gateway, interw. unit,...)	194	42	19
Installation of a demonstrator or pilot	522	34	11
Prototype construction	501	21	7
Acquisition of gen. appl. methods and instruments	403	39	11
Access to new products	241	69	16
Access to new services	203	115	19

3.2. Commercial Exploitation of Services: Expected Impact on Business Sectors

With reference to the new or enhanced services developed and described in the previous section, information was requested on what benefits these new services could offer in different business sectors. These reported benefits include cost reduction, time savings, easier access to information, increased flexibility, geographical independence and jobs in peripheral regions. The responses are tabulated below.

Table 10: Types of Impact

Business Sector	Numbers of Examples Confirmed					
	Cost Reduction	Time Savings	Easier Access to Information	Increased Flexibility	Location Independence	Jobs in peripheral Regions
Educ. & Training	29	51	80	67	56	27
Manufacturing	34	31	34	33	27	10
Publ. & Advertising	31	33	43	31	27	13
Health & Social Care	33	44	53	45	43	14
Transport & Tourism	27	28	45	31	28	12
Culture. & Entert.	19	28	51	39	29	6
Network operators	70	53	70	98	45	20
Financial Services	26	27	34	33	22	8
Retail & Distribution	20	28	33	26	29	7
Public Admin.	24	35	36	29	27	13
Agric. & Environmt	10	19	27	17	15	13
Utilities	14	15	22	19	12	3
Bld & Construction	13	15	15	14	11	3
Liberal Professions	4	4	8	6	4	3
Others	19	22	26	25	16	5
Total	371	433	575	507	389	155

4. Technological Position Relative to Competitors and Economic/Organisation Impact *(Answered only by commercial enterprises)*

RACE II work has resulted in substantial improvements in the technological position of European companies in relation to competitors. According to responses, about 70% of participating enterprises improved their technological position relative to competitors in their "own country"; and to "West European" competitors; the others had remained constant. For the technological position relative to the US, 52% had improved and 47% remained constant. In comparison with Japan, 44% had improved and for 55% the technological position remained constant. Relative to the "rest of the world", 51% had improved, 49% remained constant. For the US, Japan and the rest of the world there was about 1% who indicated a deterioration of technological position. The quantitative results are shown below. For deterioration of technological position the overall percentage was 0.05%, or 15 cases out of 2,133 responses.

Table 11: Relative Technological Position

Technological position	Your own country	Western Europe	USA	Japan	Rest of World	Total Responses
Has improved	401 (74%)	340 (68%)	206 (52%)	152 (44%)	181 (52%)	1280
Has remained constant	137 (25%)	158 (32%)	189 (47%)	190 (55%)	164 (47%)	838
Has deteriorated	1	2	4	5	3	15
Total Responses	539	500	399	347	348	2133

4.1. Overall Impact on Organisations and Economic Impact

The complete overview is given in Table 12. Particular highlights are in terms of improved product quality and productivity gains; increase in flexibility, new business, technology strategy impact, use of advanced techniques and impact on R&D employment and know-how. Significant turnover increases are predicted or already achieved; cost and time savings are significant and new markets are opened for many participants. The impact on joint ventures and licensing also appears substantial.

Table 12: Impact of RACE on Your Organisation

Impact Area	Numbers of Cases Confirmed			
	Impact Already Achieved	Within 3 Years	After more than 3 Years	Total
Turnover increases (absolute)	75	175	49	299
Increased market share in EU	36	182	52	270
Increased market share in USA, Japan	15	79	52	146
Opening of new markets	60	269	72	401
Improved product quality	154	143	30	327
Productivity gains	85	107	22	214
Cost savings	67	144	34	245
Time savings	91	139	26	256
Increase in flexibility	175	175	34	384
Income from licensing	14	64	27	105
Start of joint ventures	60	120	13	93
Acquisition of other forms	12	16	0	28
Change in Technology strategy	165	134	29	328
New business or research areas	416	216	23	655
Offering of project management as a service	40	29	5	74
Use highly advanced IT & T techniques/services	338	125	22	485
Better recruitment of EU scientists	114	37	3	154
Increased number of R & D employees	278	35	5	318
Increased number of management employees	57	10	2	69
Increased number of technical employees	149	32	8	189
Increased number of supporting staff	68	18	7	93
Increased contract research	339	94	3	436
Improved scientific performance	508	61	5	574
Improved corporate image	559	69	23	655
Improved scientific reputation	499	84	4	587

The substantial impact on organisations shown here is given further support in the results of Section 5.

5. Consensus Building: Impact of Standards and Agreements on Commercial Enterprises

An important goal of the RACE programme has been to encourage co-operation and harmonisation in standardisation and technical specifications of emerging technologies, and in RACE II alone there were over 860 contributions to standards. Of these, 59% of the total standards contributions had a significant impact on standards, compiled and proposed at European level; 31% on standards at world level.

Table 13: Impact at European and World Level
(Total RACE II Contributions = 866)

Impact	European Level	World Level
High impact already achieved	330	115
Moderate imp. already achieved	178	150
Total	508	265

Economic Impact of Race II on Commercial Enterprises

Consensus on standards and emerging technical specifications is also extremely important for commercial enterprises. Commercial partners in RACE have confirmed the importance of consensus building in the RACE programme for reduced investment risks; faster product/service development; more focused business strategies, improved economies of scale or scope, and reduced barriers to market entry. There is positive confirmation of significant impacts on the competitiveness of commercial enterprises in more than 750 separate cases.

Table 14: Impact on Commercial Enterprises

Impact Area	Number of Cases Confirmed
Faster product/service development	189
More focused business strategies	177
Reduced investment risks	171
Reduced barriers to market entry	121
Improved economies of scope & scale	95
Total Examples of Impact (incl. 17 others)	770

5.1. Future Collaboration in Commercial Development and Research

In questions directed to all partners there were 203 partners who confirmed their intention to pursue further collaboration with other RACE partners in commercial development and/or marketing. Collaboration in related research was positively confirmed in 681 cases (with collaboration in unrelated research in 114 cases).

Annex VI

Glossary of Terms

- ACTS** - Advanced Communications Technologies and Services; The second EU research programme in Communications technology development; Part of the 4th Framework Programme.
- ATM** - Asynchronous Transfer Mode; A technique for fast and flexible digital signal switching and transmission.
- CERN** - The European Centre for Nuclear Research.
- DAVIC** - The Digital Audio Visual Industrial Council: A voluntary association set up to develop unique standards for inter-operation of interactive multi-media services.
- DVB** - The Digital Video Broadcasting group set up to co-ordinate the introduction of Digital TV and video services in Europe.
- ECU** European Currency Unit.
- EII** - European Information Infrastructure, combining telecommunications, data networking and broadcasting capabilities.
- ESPRIT** - European Strategic Programme of Research in Information Technologies; Part of the 2nd, 3rd, and 4th Framework Programmes.
- ETSI** - The European Telecommunications Standards Institute.
- E.U.** - European Union.
- F.P.** - The European Union's Framework Programme for research, technology development and demonstration actions. The current 4th Framework Programme runs from 1994 to 1998. The 5th will run from 1999 to 2003.
- GSM** - General Systems for Mobile communications; The standards adopted in Europe for the first generation of digital mobile communications.
- GHz** - Giga Hertz; Frequencies of 1000 million cycles per second or more.
- ISDN** - Integrated Services Digital Network - the common standards for digital communications over the existing telephony networks.
- HTML** - Hyper-Text Mark-up Language; the basis used for linking information on the World-Wide Web.
- LAN** - Local Area Network, usually within an organisation allowing the high-speed interconnection of computers.
- MMDS** - Multipoint Microwave Distribution System.
- National Hosts** - Trial infrastructures set up by Member States of the EU to support advanced communications service trials, initially in the EU ACTS programme.
- OSI** - Open Systems Interconnect - a set of internationally agreed standards for inter-operability in the information technology area.
- PC** - Personal computer.
- PNOs** Public Network Operators of telecommunications services - Now known more generally as TOs - Telecommunications Operators.
- RACE** - Research on Advanced Communications in Europe; The first EU programme in Communications technology development (1988 - 1994).
- RTD** - Research and Technology Development
- Set-top box** - a set of electronics to convert digital multi-media signals into a form usable by standard television receivers, and to allow access to pay-per-view services.
- SME** - Small or Medium-sized Enterprise.
- Telematics** - The combination of information and telecommunication technologies.
- TV** - Television receiver
- UHF** - Ultra High Frequency - Used for terrestrial television broadcasting.
- UMTS** - Universal Mobile Telecommunications System; a second generation digital communications system, currently under development in Europe, to provide mobile multi-media services.
- VHF** - Very High Frequency - used for terrestrial radio and television broadcasting.

European Commission

**EUR 17602: Five year Assessment of the Specific Programme:
ADVANCED COMMUNICATION TECHNOLOGIES AND SERVICES**

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This report reflects the views of the independent panel charged with the critical review of the current status of advanced communications in Europe; a 5-year review of the relevance, efficiency and effectiveness of EU RTD, and advice on further development and use of advanced communications. It concludes that Europe has excellent first-generation digital communications, but that a European "Information Infrastructure" is now urgently needed: Digital video services should be introduced as quickly as possible, with a coherent plan and timetable for the necessary infrastructure deployment. The panel notes that the key objectives of European RTD over the last 5 years have been met, but coherent deployment of multi-media services is slow. Further research and technology development is necessary, but the focus must now shift from technical standards, to trials and volume deployment. EU RTD management needs improved contracting, good programme integration - both across EU programmes and with enhanced national initiatives. In the 5th Framework Programme, there should be a focus on the Communication and Information Society, with a coherent strategy and more flexibility. Key requirements will be seamless ubiquitous access, ease of access, quality of service and service customisation. Eight key recommendations are presented to the Commission to strengthen future European actions.

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