

# Connecting European Research



Published in May 2000, this brochure presents DANTE, its history, and the projects it's been involved in for the past 7 years. We hope it will help you get a better understanding of who we are, what we do, and what our goals are.

Please do not hesitate to contact us, should you have any further questions.

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## ***Research & Communication***

Research is vital for the development of all aspects of society, both technical and human. Initially this was carried out among individual groups of researchers co-operating on a single site. Communications between such groups was limited by poor telecommunications and high costs. The revolution in electronics which provided the personal computer has been paralleled by a similar revolution in telecommunications, where ever reducing costs and ever increasing performance first transformed national and more recently international communications. The Internet is the obvious manifestation of this telecommunications revolution.

This revolution has had a similar effect on the way research is carried out. No longer is it necessary for researchers to be located together. Modern telecommunications allows researchers in different continents to work together as if they were on the same site. The developments in telecommunications, particularly data communications, led to the establishment of "National Research Networks" in countries around the world, which connected together universities and research centres.

In Europe most countries developed such networks in the early 1980's; Janet in the UK, SURFnet in the Netherlands, and WIN in Germany were examples of such pioneering research networks.

As the research benefits of such networks became apparent nationally there was considerable pressure to extend their scope to allow international co-operation among researchers. International partnership has long been a feature of co-operative Research and development sponsored by the European Union. Thus it was that in the late 1980's the National Research Networks in Europe, as part of the Eureka programme and with support from the European Commission, established the Cosine project to develop a pan-European approach to research networking.

The project was responsible for creating two generations of pan-European network to interconnect the European National Research Networks. The second of these networks, EuropaNET, was the first truly ubiquitous pan-European research Internet. The research networks involved recognised the need to have a permanent organisation geared to providing international high-quality network services to the European research community, to manage and develop the network that provided European connectivity between them and established DANTE as the organisation to fulfil this role on their behalf.



After two years of preparation, DANTE was set up in 1993 and, as a result of an international competition for its location, was established in Cambridge. It has been granted "Research Association" status by the UK Department of Trade and industry. It is owned by the Research networks responsible for its establishment and organises, manages and builds international networking services on their behalf.

The mandate of the company is:

"... to rationalise the management of otherwise fragmented, uncoordinated, expensive and inefficient transnational services and operational facilities."

Research networks have two primary objectives. They are there as a infrastructure support to researcher. In addition they have a research role in their own right, implementing new services in advance of the general marketplace for telecommunications. They are ideally placed to do this as their users are generally computer and communications literate and are prepared to experiment with new technology. DANTE, which is an acronym for "Delivery of Advanced Network Technology to Europe", is an active participant in the development of new networking services to support European research.

### **DANTE's European dimension**

It has always been one of DANTE's policies to recruit its employees in all countries connected to its networks and this European dimension has been reflected in its staff from the date of its creation. Today, DANTE counts members of staff and consultants from eight different countries: the Czech Republic, France, Hungary, Italy, the Netherlands, Russia, Spain and the United Kingdom.

This diversity in personal backgrounds contributes to bringing a fresh view to the company's perspectives and enables DANTE to better understand and stay in closer touch with its customers' expectations.

### **The projects**

DANTE has a life-long history of participation in European programmes and projects, whether aimed at developing European research infrastructure, or oriented towards interconnectivity with the rest of the world.

Between the early nineties and 1998, EuroCAIRN and TEN-34 fell within the first category: both projects were aimed at enhancing trans-European computer networks for universities and research through the creation of a high-speed network.

There are three objectives to the current QUANTUM project, which is implemented through the TEN-155 network: the continuation of this international 'best efforts' IP service, but at access capacities up to 155 Mbps; the provision of the Managed Bandwidth Service; and advanced technology testing in the

Quantum Test Programme. DANTE acts as the co-ordinating partner in the QUANTUM consortium.

Q-MED is a complementary project to QUANTUM; it aims to offer high-quality network services to Eastern Mediterranean countries and to provide a reliable gateway to the trans-European network infrastructure via a high-speed access to the TEN-155 network.

But DANTE also played an active role in programmes and projects directed towards other regions of the world.

After 1989, the PHARE Programme was the main channel for the European Union's financial and technical co-operation with the countries of Central and Eastern Europe (CEECs). Set up in 1989 to support economic and political transition, PHARE had by 1996 been extended to include 13 partner countries from the region, and has also evolved to keep pace with political developments over the period. A result of PHARE and of a support contract which DANTE managed during the 1993-1995 period is the successful integration of several of the CEE countries into QUANTUM.

Previous surveys had shown the interest of the European research community in Asia. In this perspective, DANTE initiated in 1998 the CAPE study, the main objective of which was the analysis of the feasibility of a direct Internet connectivity between Europe and the Asia/Pacific region to support current and future co-operative research of scientists at universities and research institutions across these continents.

DESIRE is a major international project aiming to build large-scale information networks for the research community and has taken place in two phases. DANTE has participated in the DESIRE II project, with the responsibility of designing a referral index service for LDAP directories.

DANTE is also active in the security arena. In the past, it participated as a co-manager in the SIRCE Pilot EuroCERT, which was intended to solve a number of co-ordination problems related to computer security in Europe. It has also been a member of FIRST (Forum of Incident Response and Security Teams) since 1996, and has developed security services specifically aimed at its network users.

DANCERT is the Computer Emergency Response Team (CERT) serving DANTE customers. It deals with computer and network security incidents related to hacking and infrastructure vulnerabilities that involve services operated by DANTE - for example the TEN-155 Network. In addition DANCERT deals with large-scale "spam" attacks involving the networks operated by DANTE. The main aims of DANCERT are to provide DANTE customers with co-ordination for handling of network security incidents and a focal point for security related activities, in connection with DANTE services.

## **The networks**

Since its creation in 1993, DANTE has been responsible for three consecutive generations of European research networks, and is active in the ongoing development of European research networking.



After EuropaNET and TEN-34, TEN-155 is the current European research network, and has supplied researchers in 19 countries with access capacities of up to 155 Mbps since 1 December

1998. Information on TEN-155 is available on the DANTE.

TEN-155 enables European scientists to compete on an international stage by providing them with a world class backbone that offers the bandwidth and the Quality of Service required for research and development activities at this level. Thus TEN-155 represents the beginning of support for the 'virtual laboratory' and the 'virtual institute' in Europe.

Each of the earlier networks was severely constrained by the high price and poor availability of bandwidth on a pan-European basis; as a result, each previous network was completely replaced with its successor. TEN-155, however, benefits from the liberalisation of the European telecommunications market, and it is now possible to use an evolutionary approach towards development and to consider replacing individual elements of the network.

It is this spirit that guides DANTE in the conception of the successor to TEN-155, as the future network will be based on evolution from its predecessor.



Preparations have already started on the future Gigabit-network. On behalf of the European university networks and with the European Commission, DANTE has produced a blueprint for the further development of the TEN-155 network. This sets out the way pan-European research networking should be progressed in the next several years.

The activity, known as GÉANT, advocates an evolutionary approach to the development of TEN-155 based on the existing structure to create a shared multi-Gigabits core network available to all of the national research networks across Western, Central, and Eastern Europe. This will be complemented by a continuation of the Managed Bandwidth Service and the technology and service test programme which are currently part of TEN-155.

In addition, for the first time, it is proposed to provide global connectivity between GÉANT and other world regional research networks as an integral element of the pan-European service.

More details on the GÉANT proposal as well as related documents are available on the DANTE website.

## **Interconnectivity**

No scientific community can progress without exchanges with similar communities throughout the world. This is why DANTE has paid special attention to the interconnectivity of TEN-34 and TEN-155 with other regions, and has developed a range of agreements with other national research networks, such as ESnet, Abilene and the Internet2 project in the United States, NACSIS in Japan, and CANARIE in Canada.

## **DANTE's own organisation**

DANTE's staff are divided into three different groups which all work closely with one another.

The administrative group is responsible for providing general support in the functional areas of finance, office computer systems, personnel and administration, as well as public and external relations, and

has proven its skills in project and financial management over the years.

The Network Engineering and Planning team is responsible for the engineering of all network-related issues and for the introduction of new services. Initially, new services undergo a pilot phase, after which they are handed over to the Operations group. This team also leads the Quantum Test Programme (QTP) and its members have proven expertise in various fields such as Multicast, Multi-Protocol Label Switching (MPLS),...

The Operations group has final responsibility for the installation, good operation and performance of network services provided or managed by DANTE. Its members are also in charge of the traffic-reporting activities of DANTE, as well as of such services as statistics collection and the proper functioning of the Managed Bandwidth Service (MBS).