

GARR the User community

The GARR network and its services are dedicated to the Italian Academic, Research and Education community. Currently, about 450 user sites, including Research Organizations, Universities, Observatories, Laboratories, Institute for Research in Health Care (IRCCS), Music Conservatories and Academies of Art, Libraries, Schools, Museums and other Scientific and Educational Facilities of national and international relevance, for overall more than 2 Millions end users.

This vast and diverse user community belongs to:

- GARR founding members: (CNR, ENEA, INFN and Fondazione CRUI on behalf of the Italian Universities);
- Research institutes under the authority of the Ministry of Education, University and Research (MIUR)[R 8], including ASI, INAF, INGV, and other Organizations.
- University supercomputing consortia (CASPUR, CILEA and CINECA).
- Research and heritage institutes under the authority of other Ministries, such as the Ministry of Cultural Heritage and Activities (MiBAC – Ministero dei Beni e delle Attività Culturali) or the Ministry of Healthcare.
- Other institutes of cultural or scientific relevance, including Music Conservatories and Academies of Art (AFAM), National Libraries and Archives, Museums, schools.
- International education, research and heritage organizations based on the national territory.

Users in this vast community may widely differ from one another in terms of their use cases, demands and expectations.

GARR Founding Members

GARR has four founding Members: CNR (National Research Council), ENEA (National Agency for New Technologies, Energy and Environment), Fondazione CRUI (the Conference of Italian University Rectors Foundation), INFN (National Institute of Nuclear Physics). GARR Founding members are represented in the Consortium GARR Board of Directors and in its Technical-Scientific Committee. They contribute directly to GARR budget and share the financial risks related to its activities, and they actively participate in defining its strategy. The associate institutions, instead, contribute only to GARR budget in proportion to the services they receive from GARR.

CNR

The National Research Council (CNR) is a public organization whose mandate is to carry out, promote, spread, transfer and improve research activities in the main sectors of knowledge and of its applications for the scientific, technological, economic and social development of the Country.

To this end, the activities of the organization are divided into macro areas of interdisciplinary scientific and technological research, concerning several sectors: biotechnology, medicine, materials, environment and land, information and communications, advanced systems of production, judicial and socio-economic sciences, classical studies and arts.

CNR is distributed all over Italy through a network of institutes aiming at promoting a wide diffusion of its competences throughout the national territory and at facilitating contacts and cooperation with local firms and organizations.

ENEA

The Italian National Agency for New Technologies, Energy and Environment (ENEA) is a public agency operating in the fields of energy, the environment and new technologies with the aim of supporting the Country's competitiveness and sustainable development.

The Agency's activities are carried out in four main areas: Clean Energy, Technologies for the Territory, Future Technologies and Advanced Technology Applications, and include the following:

- Conducting large R&D projects in the mentioned fields;
- Evaluating the status and perspectives of new technologies, also in terms of social and economic impact;
- Promoting international collaboration towards the definition of common technical regulations, and the participation in large R&D technology programmes;
- Supporting the uptake of innovative technologies in the National production sector, with special reference to SMEs, also in collaboration with regional and local administrations;
- Promoting technology transfer and knowledge dissemination, also in cooperation with Universities.

Fondazione CRUI

Established in 1963, CRUI, is the association bringing together the Rectors of Public and Private Italian Universities. Since 2001, CRUI promotes and manages projects and services for the academic community through a Foundation, whose aim is to shape CRUI strategic guidelines into concrete initiatives. The Fondazione CRUI main goals are to implement initiatives for sustaining the Italian Universities' competitiveness at an International level, to offer advanced services to the academic community and to mobilise resources for the implementation of such actions.

INFN

The National Institute of Nuclear Physics is an organization dedicated to the study of the fundamental constituents of matter, and conducts theoretical and experimental research in the fields



of subnuclear, nuclear, and astroparticle physics. Fundamental research in these areas requires the use of cutting-edge technologies and instrumentation, which the INFN develops both in its own laboratories and in collaboration with the world of industry. INFN also actively promotes scientific and technological knowledge transfer in these domains. Such activities are conducted in close collaboration with the academic world and they often require very high bandwidth network, advanced services and features.

GARR Associate Members

Besides the founding members, GARR counts a variety of associate institutions, that widen and enrich its user community. Amongst associate members, it is worth mentioning:

- **The Italian Space Agency (ASI)**, that coordinates Italian efforts and an investment in the space sector and is involved in several research activities in the domains of telecommunication, earth observation and space infrastructures. ASI is involved in several international collaborations, including the construction and activities of the International Space Station.
- **The inter-University consortia CASPUR, CILEA and CINECA**, cater for Supercomputing, developing and providing advanced Application services for Universities, Research and Public Administrations.
- **The European Space Agency (ESA)**, that established one of its five major European centres, ESRIN (European Space Research Institute) in Frascati, near Rome. ESRIN is currently the ESA headquarters for Earth Observation, and carries out important research activities in the field of space telecom infrastructures.
- **The National Institute for Astrophysics (INAF)**, whose activity covers all branches of astrophysics, planetology and cosmology. INAF counts 21 local institutes spread over the national territory and of the "Galileo" observing facility located in La Palma, Canary Islands. INAF is actively engaged in national and international programmes aiming at empowering the astronomers' daily work through the exploitation of distributed computing and storage systems, cutting-edge network infrastructures.
- **The National Institute for Geophysics and Volcanology (INGV)**, currently the largest European body dealing with research in Earth Sciences. INGV has its headquarters in Rome and important facilities in Milano, Bologna, Pisa, Napoli, Catania and Palermo. Its main objective is round-the clock monitoring of geophysical phenomena in both the solid and fluid components of the Earth through state-of-the-art networks of geophysical sensors, whose data are analyzed for research and civil defence purposes.
- **The AFAM institutes, including Music Conservatories, Academies of Art and Performing Arts institutes** all around the country. According to the Italian law, AFAM institutes are equivalent to Universities in the Education system. Although they are comparatively young as GARR members, many of these institutes are already making a pioneering and creative use of the network facilities, for example exploiting real-time multimedia applications, DVTS, grid technology.
- **45 Institute for Research in Health Care (IRCCS)**, located all around the country. IRCCS are excellence centres of national and often international scientific relevance, engaged in a number of European research projects. They are younger GARR members, but they have nevertheless mobilized an active community, interested applying the newest telemedicine and distributed computing technologies to their research works.
- **National libraries, Archives, public record offices and other documentation centres** located in the whole country for about 53 sites. Such centres should not be regarded as simple users, but as an important resource for the whole community as they make available an invaluable heritage of digitalized documents, manuscripts, multimedia materials, as well as data and findings of their researches.

Other organizations

Institute and Museum of the History of Science (IMSS), continuously involved in research on topics connected with the history of science and technology and of scientific instruments, collections and museums. One of the primary fields of research is that of Galilean studies, a subject on which IMSS has published innumerable original studies, produced innovative multimedia applications and promoted interesting initiatives for exhibitions.

The European University Institute (EUI) set up in 1972 by the six founding Member States of the European Communities to provide advanced academic training to PhD students and to promote research at the highest level.

New York University in Florence, NYU's largest study abroad program, offers a Fall and a Spring semester plus two six-week summer sessions each year and is set on a 57-acre estate, overlooking the city of Florence.

National Institute of Statistics (ISTAT) collects and produces information on Italian economy and society and made it available for study and decision-making purpose.



Network Users and uses of the network

As it plainly appears from the brief outline of GARR founding and associate members provided above, the GARR user community brings together a variety of heterogeneous communities, each of which has its peculiarities, requirements and expectations. Network usages span from simple web browsing and e-mail, up to much more sophisticated applications such as telemedicine, distributed computing, e-Learning up to data transfer in the order of the Gigabit per second.

Notwithstanding these obvious differences, however, GARR policy is not to offer different service packages to different segments, but to provide all users with the full service portfolio. In this way, the needs of those users who make a moderate use of the network are easily anticipated and more innovative usages are encouraged. On the other hand, there are a few communities that, because of their participation to particular activities and projects, are given specific assistance. These communities exploit leading-edge applications, with very demanding network requirements in terms of dedicated services, and often require specific (if not tailored) technological solutions. A few remarkable examples include the e-VLBI, DEISA and LHC communities, as well as cross-domain communities involved in distributed computing projects.

LHC

LHC (Large Hadron Collider) is the new particle accelerator to study collisions between protons and heavy ions, built at CERN in Geneva and started operations in September 2008. The project foresees the interconnection of CERN (Tier0) with 11 computation centres (Tiers1) through an Optical Private Network (LHC-OPN) with links at capacities of 10 Gbps. The links form a mesh that is used not only to transfer data from CERN to the other centres, but also to exchange experiment data between the Tier1 centres, thus providing high reliability to the infrastructure. In Italy, INFN takes part to the experiment thanks to 10 Gbit/s dedicated optical paths interconnecting the regional computation centre at CNAF (Tier1) with CERN (Tier0).

e-VLBI

e-VLBI (Electronic Very Long Baseline Interferometry) is a radio-astronomy technique that allows correlating interferometric data collected by different radio-telescopes, simulating one giant telescope and thus greatly improving the definition of the resulting observation. The European e-VLBI infrastructure is run by the EVN (European VLBI Network) that involves INAF as a partner. Radiotelescopes located across Europe interconnect at high speed with a central correlator in the Netherlands (JIVE), which synchronize and analyse their data in quasi-real time. Of the three main INAF Radiotelescopes, the one located in Medicina (BO) is connected since 2004 with a dedicated 1Gbps circuits.

DEISA

DEISA (Distributed European Infrastructure for Supercomputing Applications), is a distributed high-performance computation infrastructure, whose objective is to support researchers through the provision of a wide set of scientific and technological tools. In Italy, the project counts the supercomputing consortium CINECA that interconnects to a 10GE Switch in Frankfurt with a 10Gbps dedicated optical circuit.

GRISU

GRISU (GRIGlie nel SUD- GRIDs in the SoUth) is a collaboration between different supercomputing projects operating in the Southern Italy, whose single aim is to create a shared platform for distributed computing and databases. Universities and Research Centres on the territory are deeply involved in the implementation of this environment, which is mainly intended for the use of the Research and Academic community, but is open to the private sector as well. The GRISU collaboration involves the CRESCO, CYBERSAR, PI2S2 and SCOPE projects, which have recently obtained Government funding, and other initiatives such as SPACI.

The planned distributed infrastructure has very demanding requirements in terms of performance and throughput: hence, the links between the participating facilities need to provide high capacity, resilience, efficiency and redundancy. During 2008, GARR carried out a network study for the direct interconnection between CyberSAR, PI2S2, CRESCO and SCOPE, on demand by an interoperability committee set up by the four projects. A dark fiber 1Gbit/sec link between the CRESCO facility and the GARR PoP in Naples was implemented. Redundancy is ensured by another existing 1Gbit/sec connection. CRESCO and SCOPE were also interconnected through a 1Gbit/sec dedicated circuit built on the same dark fibre. This can be regarded as the first step towards the creation of a dedicated OPN to interconnect the centres that will be triggered by the implementation of GARR-X.