

11.07.07

Deliverable DN3.0.3,2: Specific Support Actions - Earth Sciences Survey



Deliverable DN3.0.3,2

Contractual Date:	28/02/07
Actual Date:	11/07/07
Contract Number:	511082
Instrument type:	Integrated Infrastructure Initiative (I3)
Activity:	NA3
Work Item:	n/a
Nature of Deliverable:	R (Report)
Dissemination Level	PU (Public)
Lead Partner	DANTE
Document Code	GN2-07-168v2

Authors: Dale Robertson (DANTE), Ruth Kirkman (DANTE), Helga Spitaler (DANTE)

Abstract

This document describes an approach to targeted user communication based on the current and future network requirements of the European Earth Sciences (ES) community which was selected as a pilot group. It describes the methodology which consisted in a two-phase survey and provides an overview of first findings, including recommendations for follow-up activities.

Table of Contents

0	Executive Summary	iv
1	Background	1
2	Methodology	2
2.1	Selection of Earth Scientists as Pilot Group	2
2.1.1	Terminology and Scope	3
2.2	Initial stage of the survey – NREN Input	3
2.3	Second Step – User Follow-up Questionnaire	4
3	Analysis of Results	5
3.1	Research Tools/Applications	5
3.2	Network Requirements	13
3.3	GÉANT2 and its Services	15
4	Key Findings	18
5	Recommendations for follow up	20
Appendix A	NREN Input Questionnaire	21
Appendix B	User Follow-Up Questionnaire	22
Appendix C	Respondent Information	30

Table of Figures

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Figure 3.1: Methods of Communication	6
Figure 3.2: Large File Transfer	7
Figure 3.3: Compute and Data Intensive Models	8
Figure 3.4: Geographically Distributed Data Processing	9
Figure 3.5: Grid Computing	10
Figure 3.6: Access to Remote Databases	11
Figure 3.7: Visualisation	12
Figure 3.8: Importance of Network Requirements	13
Figure 3.9: Use of GÉANT2 Network	16
Figure 3.10: Use of GÉANT2 Services	17

0 Executive Summary

After analysing the results from previous surveys of users in the academic and research community and following a workshop session at the PR Network Meeting in Cambridge in March 2006, it was agreed that the Earth Sciences sector of the scientific community was likely to have potential for greater network usage and therefore it would be beneficial to gain a greater understanding of this area of research. The requirements identified could then be addressed with targeted communications and technical consultancy/support aimed at increasing network usage.

The Earth Sciences (ES) community was selected as a pilot group primarily due to the international and increasingly global scope of their research activities. A similar approach may be extended to other user groups in future.

There were two phases to this survey. The purpose of the first stage was to gain an initial insight into the ES community and gather contact details. A questionnaire was sent to the NRENs in July 2006. In November 2006, a more detailed questionnaire was sent to 47 contacts in the ES community. These included the coordinators of 20 collaborative projects. In addition to gaining a better understanding of international collaborative projects within Earth Observation/Sciences, this second stage of the survey assessed awareness and usage of GÉANT2 and the services available to support ES research activities. 14 user questionnaires were returned (30% response rate) during the second phase of the survey.

Key findings of the survey were

- Low awareness of GÉANT2 and its portfolio of services
- Higher bandwidth, followed by reliability and geographical scope respectively were identified as the most important network parameters in this community.
- Increasing demand for videoconferencing and VoIP
- VPN and P2P identified by various projects as being potentially useful to them.
- High resolution visualisation is important to this community, but its use can be restricted by network constraints.

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Follow-up calls, development of relations and appointing ambassadors to work within the Earth Sciences community to increase knowledge and understanding of the network, and exploitation of synergies between various international initiatives are some of the follow-up actions which will be pursued in future to maximise the benefits of the survey.

1 Background

The decision to perform a survey focused on one particular section of the scientific community was adopted as a result of an exercise conducted at a PR Network meeting in March 2006. If this approach proves successful with this pilot group it may be extended to other sectors of the scientific community. The exercise was conducted in parallel to the exercise to agree and adopt a segmentation model for the whole GÉANT2 user base with the aim of producing intelligence for marketing communications work in a shorter timescale than the segmentation exercise.

It is hoped that the preliminary findings of this survey will provide a more detailed understanding of network usage within the Earth Sciences sector of the scientific community. This in turn will facilitate the development of targeted dissemination activity aimed at marketing GEANT2 and its service portfolio to this particular user group.

2 Methodology

2.1 Selection of Earth Scientists as Pilot Group

Earth Scientists were selected as a pilot group to target for user communications work for the following reasons:

- Previous survey work has identified projects in the Earth Sciences area of research which make use of networking.
- Thanks to ongoing contact with some members of the Earth Sciences community over the last few years we knew that there are ambitions to obtain funding for projects which would make demanding use of networks.
- Earth and climate related matters are global. Researchers in this area are likely to be involved in pan-European and increasingly global collaborative research projects.
- Earth observation technologies are constantly evolving and call for a reliable network to allow near-real time data collection, analysis and sharing.
- They operate in an area with a potentially high deployment rate of grids.
- Numerous projects in this area benefit from EC funding (one of the funding priorities of 7th Framework Programme for R&D).
- There are opportunities for synergy with GMES (Global Monitoring for Environment and Security) (www.gmes.info), a joint initiative of the European Commission and the European Space Agency (ESA). The aim is to achieve by 2008 an autonomous and operational capability in the exploitation of geo-spatial information services. GMES is the EU's contribution to GEOSS (Global Earth Observing System of System), www.epa.gov/geoss/.
- They conduct research into issues of high societal impact with the potential for considerable PR activity.

Contacts and requirements were captured via a survey conducted in two stages. In the first instance, an input questionnaire was sent to the NRENs in July 2006. This was followed with a more detailed questionnaire sent to Earth Scientists in November 2006.

2.1.1 Terminology and Scope

A clear definition of the selected user group posed an initial challenge for this survey. 'Earth Sciences' is an all-embracing term for the sciences related to the planet Earth, ranging from geology and oceanography to meteorology.

The term 'Earth Observation' (EO), which appears in this report, refers to the activity of collecting information about the Earth's surface from a distance. In common practice, the term is used for remote sensing by instruments mounted on an airplane or a satellite. Various projects involved in simulation or modelling activities (e.g. climate research) pointed out that although crucial for the validation of their model results, Earth Observation is not the core focus of their research. They consider themselves 'Earth System' scientists – a name which does not necessarily cover researchers involved in remote sensing.

At the beginning of the exercise it was felt that adopting a broad approach would encourage input from a variety of disciplines. The term 'Earth Sciences' was adopted by us to describe the academic disciplines covered by the survey, and in this report should be understood to include Earth System scientists and those involved in Earth Observation.

2.2 Initial stage of the survey – NREN Input

To identify members of the Earth Sciences Community, the assistance of the NRENs was enlisted and a questionnaire was sent to members of the GÉANT2 PR Network Mailing list requesting the following information:

- List of Earth Science institutions in individual countries.
- Information on their connection status.
- Details of international projects they are involved with.
- Overview of current and future network requirements.

A total of 16 questionnaires were returned from the following organisations:

- 8 NRENs - GRNET, BELNET, UKERNA, CESNET, RESTENA, IUCC, RedIRIS, CARnet.
- 8 Earth Scientist organisations - the questionnaires were passed on by the NRENs.

The returned questionnaires provided a snapshot of the Earth Sciences community in 11 countries (out of a potential 34), also included contact details for identified institutions and details of 17 international projects (defined as having a minimum of 5 project partners in at least 2 countries). Three additional projects were

sourced by desk research. Direct feedback from researchers provided the first insight into current and future requirements:

- Fast access to and real-time analysis of large 2D-3D datasets.
- Grid-computing solutions for large-scale computations in climate modelling and processing.
- Idea of a GÉANT2-based European Earth System Grid, comparable to the US-ESG (www.earthsystemgrid.org)#

The questionnaire can be found at Appendix A.

2.3 Second Step – User Follow-up Questionnaire

To obtain a detailed understanding of the network requirements of the ES community, a follow-up questionnaire was circulated among 47 contacts, identified during the first stage of the survey. These included the coordinators of the 20 identified collaborative projects. In addition to gaining a better understanding of international collaborative projects and identifying the network requirements of the research tools and applications these projects build on, the second stage of the survey set out to assess awareness and usage of GÉANT2 and the services it offers in support of ES research activities.

A copy of the questionnaire is attached at Appendix B.

3 Analysis of Results

The user questionnaire was divided into a number of sections. Respondents were asked to provide information about themselves, the project(s)/activities they are involved with and their research tools/applications, their network requirements and degree of awareness/use of GEANT2. They were also asked if they were prepared to be contacted for further information.

Respondent details appear at Appendix C and Appendix D.

3.1 Research Tools/Applications

In this section of the questionnaire respondents were asked to outline the tools of research collaboration their project relies on.

Q1. Which of the following methods of communication do you use with project partners who are not at the same institution?

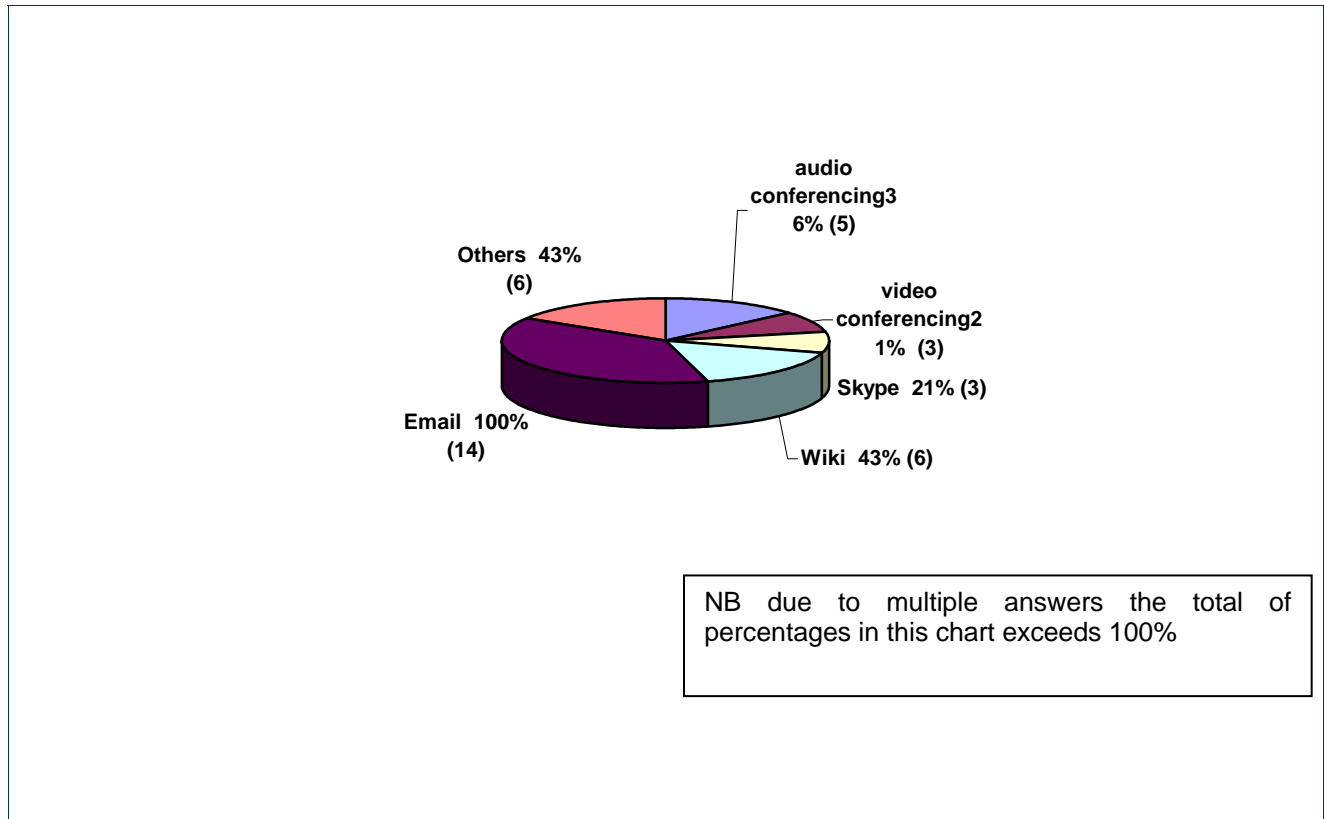


Figure 3.1: Methods of Communication

All respondents use email. Video-conferencing appears to be on demand; however some projects (e.g. CLARIS) indicate that they were constrained by limited bandwidth. Some projects (COSMOS, MILLENNIUM) use VoIP (e.g. jajah) to liaise with project partners aboard. Workshops, conferences and face-to-face meetings were listed under 'Others' as a method of communication.

Q2. Does your project involve large file transfer over a data communication network?

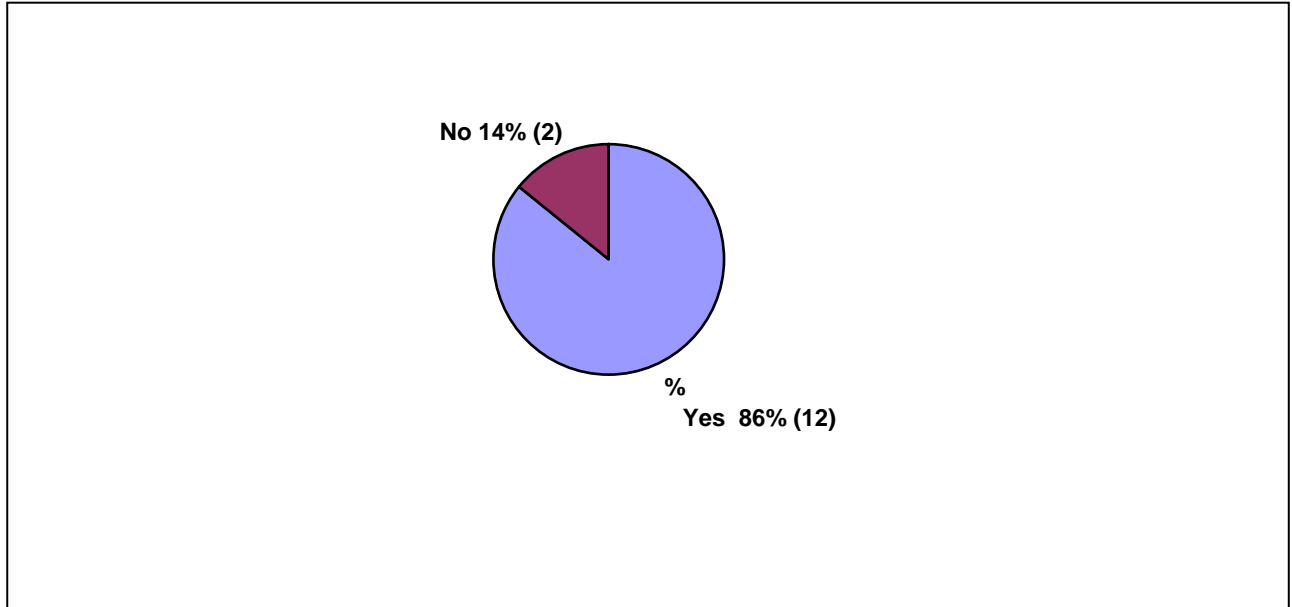


Figure 3.2: Large File Transfer

A typical file size ranges from 500 MB to 10-100 GB whilst some climate modelling datasets are in the order of terabytes.

Q3 Does your research rely on compute and data-intensive models?

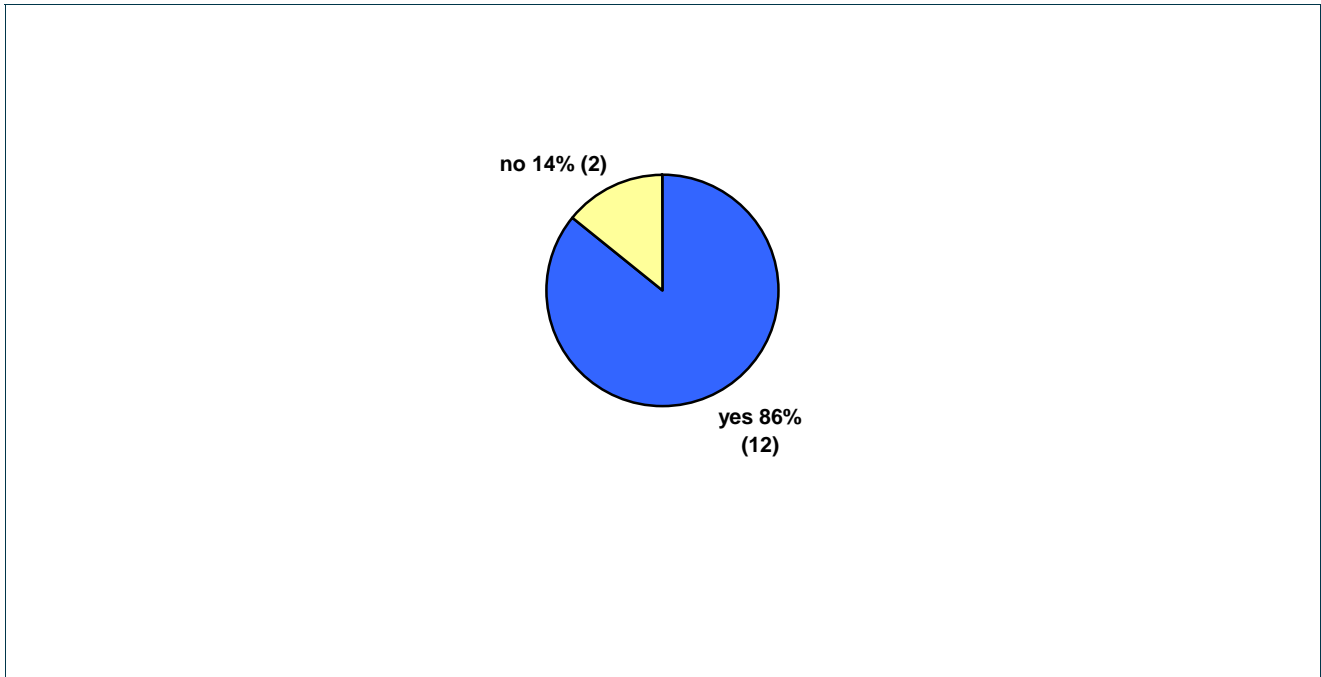


Figure 3.3: Compute and Data Intensive Models

Various climate research projects (e.g. ENSEMBLES, EURAINSAT) are concerned with numerical prediction models on seasonal, decadal and centennial timescales. The fact that the predictions span a long time period means that climate prediction forecasts are run on high performance computers across Europe. Large amounts of data are required for each individual prediction which indicates how computationally intensive these projects can be.

HYGEIA lists 2-D and 3-D seismic and radar data modelling and inversion as computationally intensive.

Q4 Do you build on geographically distributed data processing?

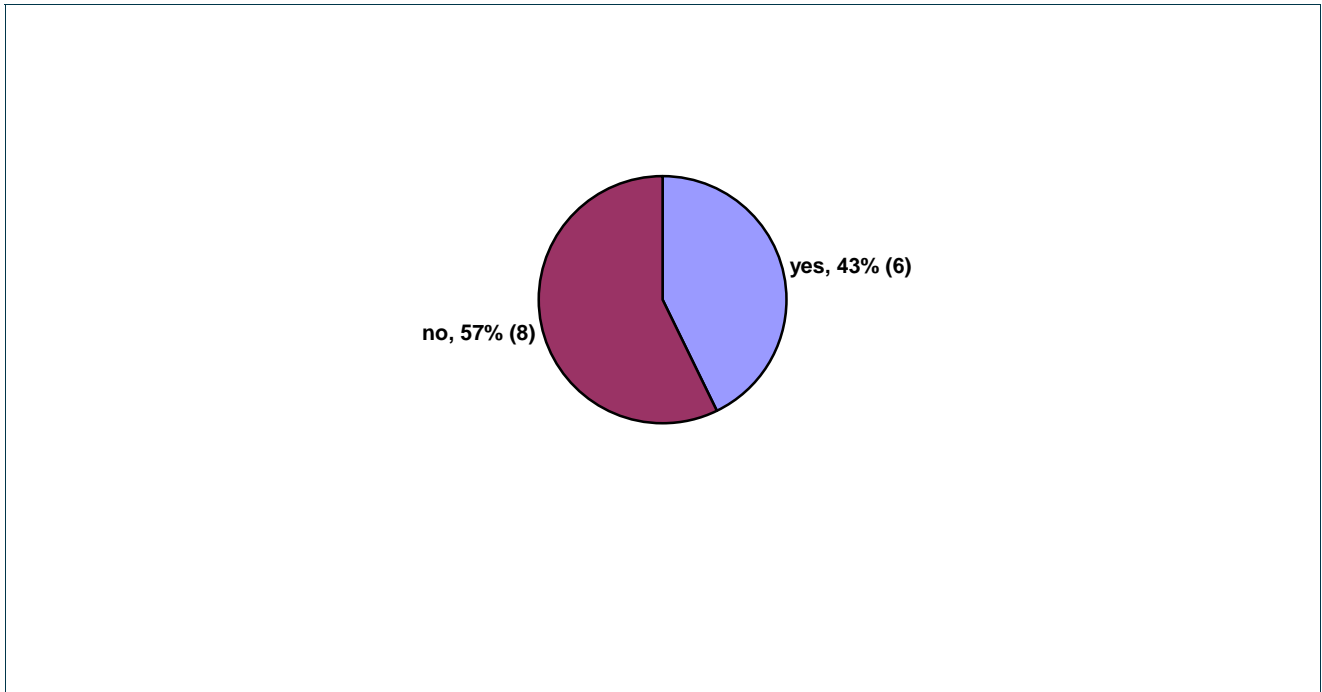


Figure 3.4: Geographically Distributed Data Processing

Some projects, like COSMOS, pointed out that they currently do not build on distributed data processing but would like to do so in the near future. In that context, the C3-Grid initiative was mentioned (see 3.1.5). DEISA was referred to as being equally of great interest.

Data processing within the ENSEMBLES project builds on large supercomputing facilities distributed across 19 European countries.

Q5 Is your research supported by grid computing?

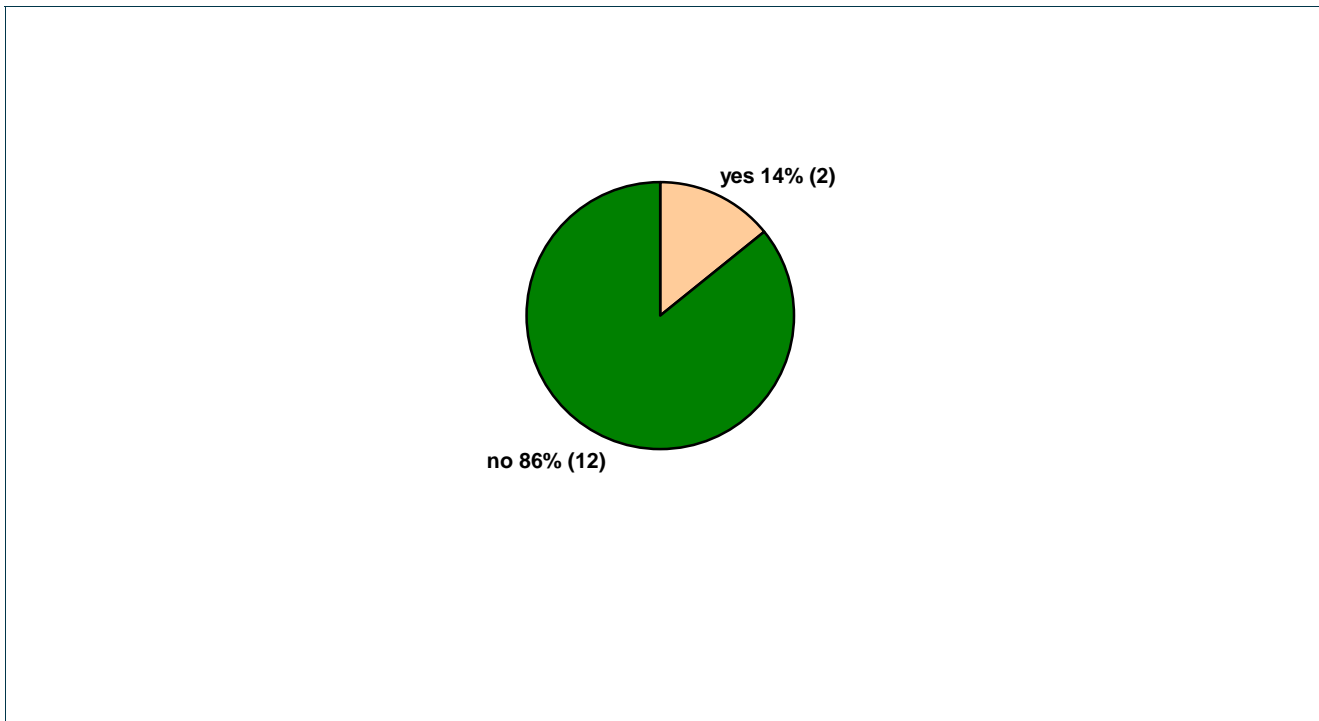


Figure 3.5: Grid Computing

Climate research involves a lot of data acquisition, complex models and supercomputing number crunching capabilities. Data is scattered across multiple research institutes making climate research a prime candidate for Grid computing.

The 'Collaborative Climate Community Data and Processing Grid' (C3-Grid) initiative, for example, which is funded by the German Government, proposes to link distributed data archives in various German institutions involved in Earth system sciences. It aims to develop a grid-based environment for the German Earth system science community in order to foster effective scientific analysis of the vast amounts of data resulting from modelling and observation programmes. This environment will be built on available grid technology but will require the development of a new generation system equipped with a meta-directory structure for consistent data description. Whilst currently confined to Germany, this initiative may prepare the ground for a European-wide Earth System Grid. Interconnections to other data centres (e.g./ ECMWF based in Reading, UK) could provide GÉANT2 with 'enabler' opportunities.

Prof Wolfgang Hiller (whiller@AWI-Bremerhaven.de), Director of the Computing and Data Centre at the Alfred-Wegener-Institute for Polar and Marine Research and Dr Reinhard Budich (reinhard.budich@zmaw.de) from the Max Planck Institute for Meteorology are the key people behind this initiative.

Various research projects coordinated at the Flanders Marine Institute (VLIZ) build on the Belgian BEGRID initiative.

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Q6 Does your research require access to remote databases?

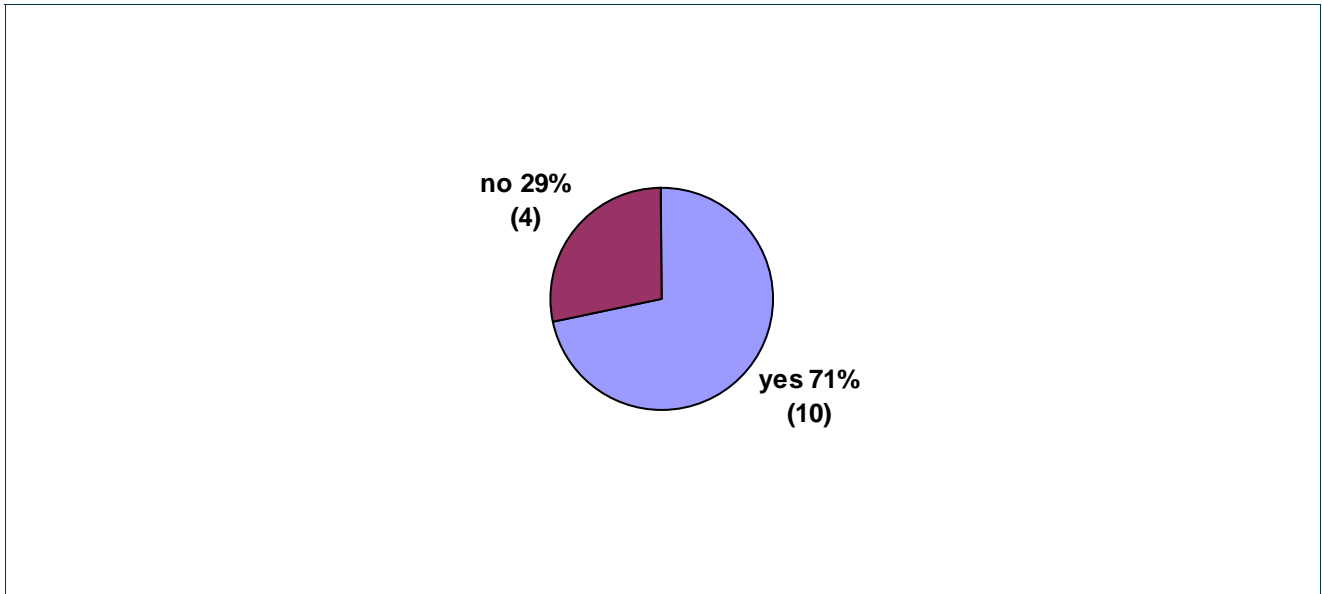


Figure 3.6: Access to Remote Databases

Various projects highlighted the need for seamless access to distributed archives, computer centres and satellite data. Francisco Hernandez from the Flanders Marine Institute (VLIZ) mentioned the Distributed Generic Information Retrieval System (DiGIR) and Paul Samuels from HR Wallingford (FLOODsite) the NOKIS system in this context.

Q7 To what extent does the project involve high-resolution visualisation of real or simulated data, including collaborative remote visualisation?

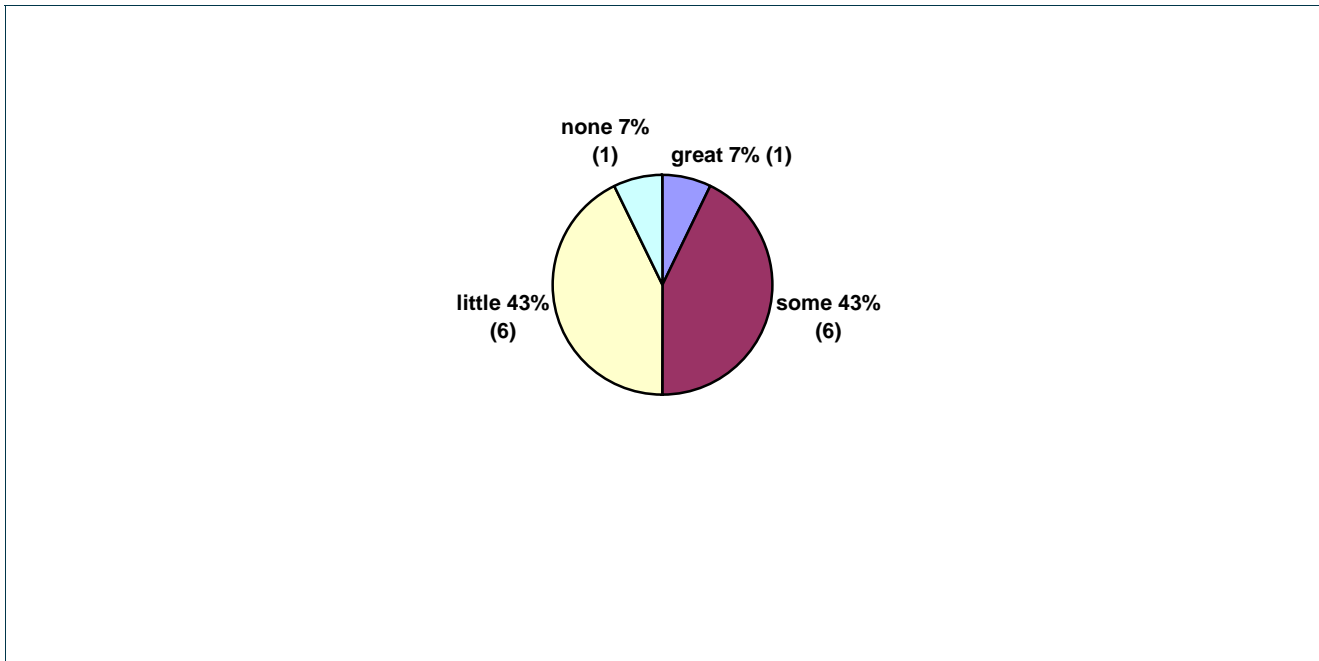


Figure 3.7: Visualisation

High-resolution visualisation of real or simulated data was cited by most projects (especially for land mapping and climate modelling). However, no project mentioned explicitly collaborative remote visualisation as a research tool currently applied.

Some projects, among others COSMOS and MILLENNIUM pointed out that network constraints limit the use of visualisation tools. Due to bandwidth constraints, the CLARIS project implemented the Live Access Server (LAS) as a tool for visualisation with little success.

Q8 What other interactive remote applications do you engage in, if any (e.g. access to remote instrumentation sites)?

- CLARIS: Live Access Server (LAS).
- MERSEA: real-time transmission from in situ instruments and observing platforms at sea (from buoys , ships, drifter) and from ground segments of EO satellites.
- EURORISK-PREVIEW: remote access to local receiving stations for lightning detection.
- FLOODsite: weather radar and satellite imagery used in research on flash flood forecasting.
- SEADATANET: links to GTS (Global Communication System).

3.2 Network Requirements

In this section of the questionnaire respondents were asked to describe their network requirements and to illustrate limitations.

Q1 Which network parameters are important to you?

Respondents were encouraged to describe these requirements in relation to specific applications.

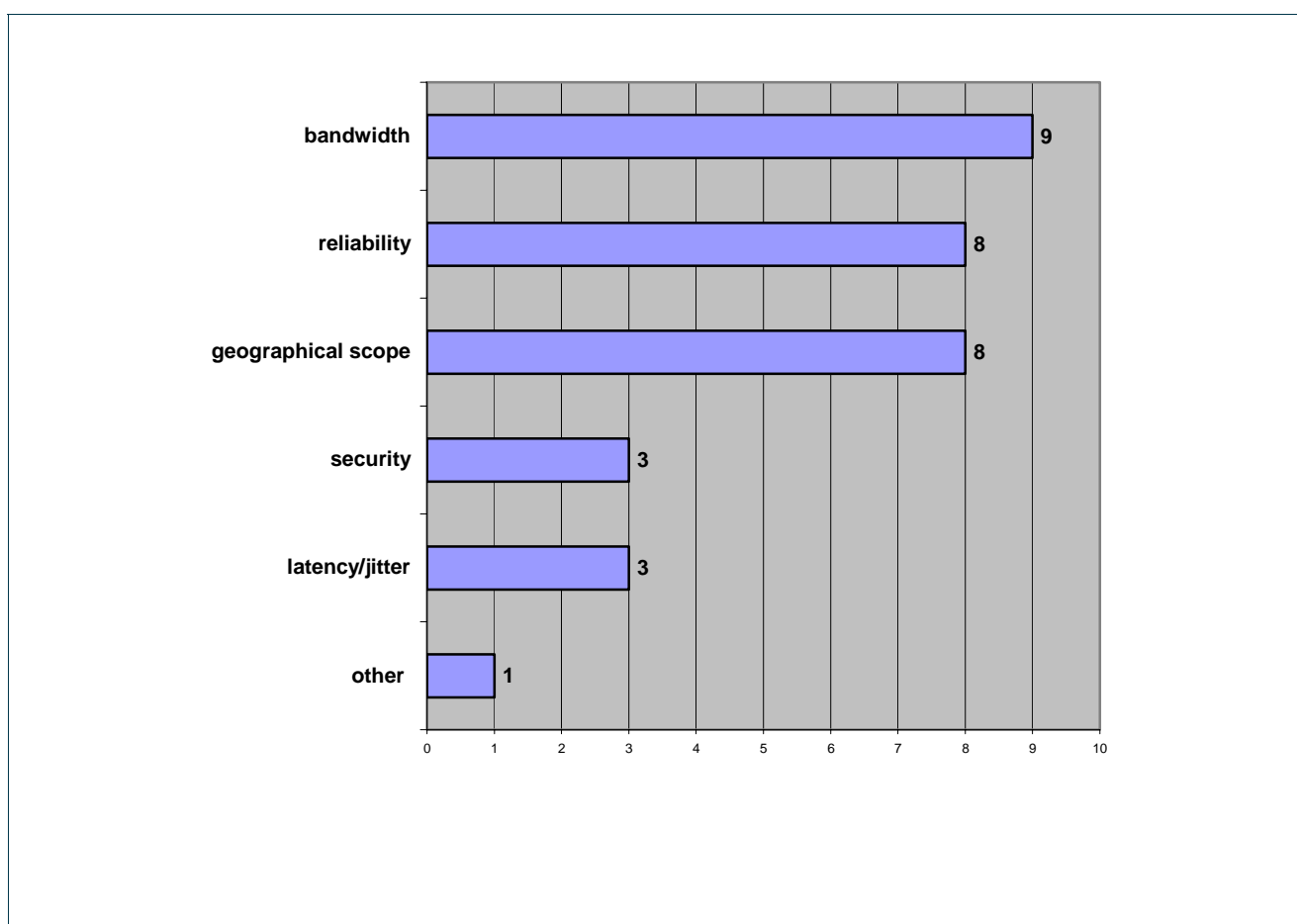


Figure 3.8: Importance of Network Requirements

Higher bandwidth to support demanding and bandwidth-hungry applications and data transfer is top of the wish-list for most projects. This is followed by reliability and pan-European/global connections. As far as security is concerned, most projects seem to be comfortable with the 'normal' security arrangements (firewall, SSL VPNs, authentication, antivirus etc). SEADATANET referred to spam-free emails as 'nice-to-have'.

Reinhard Budich (MILLENNIUM/COSMOS projects) stressed the need for a more robust and resilient network as ftps break down too frequently.

Q2 Please describe any ways in which your research is currently limited by the available network facilities.

- CLARIS: poor connectivity with outside world (especially Argentina).
- C3-Grid: no uniform access to distributed data archives.
- COSMOS/MILLENNIUM: too long transfer times and low reliability.
- Polar DOVE: distributed CPUs in parallel processing.
- HYGEIA: large datasets transfer.
- EURORISK-PREVIEW: bandwidth constraints for transfer of boundary data from the USA.
- ENSEMBLES: bandwidth is limited and supercomputing facilities are financially constrained.
- GLOWA Jordan River: connectivity to PA and Jordan is not always reliable.
- SEADATANET: connectivity in developing countries (Africa, Asia, South America) which limits collaboration.

Q3 What changes, if any, would you like to see implemented to enable your project to make better use of network facilities?

- ENSEMBLES: Better bandwidth across Europe.
- COSMOS/MILLENNIUM: need for QoS on demand (i.e. a dedicated link between the DKRZ (German High Performance Computing Centre for Climate- and Earth System Research, Hamburg) and the ECMWF in Reading to enable the transfer of 10s of TB complete datasets in weeks as opposed to days.
- C3-Grid: X-WiN core net nodes at C3-partner institutions; VPN.
- CLARIS: better connectivity with the outside world.

Q4 Thinking about the future, are you able to identify research issues that are currently not limited by the network facilities, but will become so in the future?

- C3-Grid: Security ('High-Performance Firewalls').
- PolarDOVE: Exchange of boundary conditions in global modelling.
- MERSEA: Implementation of the World Meteorological Organisation (WMO) Information System (WIS).
- HYGEIA: modelling, inversion, interpretation and processing of large data sets by geographically distributed teams.
- EURORISK-PREVIEW/EURAINSAT: increase of satellite data to be processed.
- GLOWA Jordan River: internet-based joint applications of software tools during a web conference.
- SEADATANET: projects with developing countries, grid computing.

Q5 Do you envisage any specific applications you think will emerge as highly in demand in the future? Are you able to describe what impact these might have on your network requirements?

- COSMOS/MILLENNIUM: high bandwidth on demand to facilitate more practical application sharing; being able to move around datasets in the order of 10s of TB.

- Polar DOVE: Coupled modelling (atmosphere, ocean and ice) require heavy data transfer depending on special scale resolution. Time resolution will be CPU power dependent, whilst spatial resolution will be network dependent if parallel distributed numerical models are to be used.
- HYGEIA: 3D prestack imaging, tomographic velocity model reconstruction, alternative focusing techniques (CRS, MPDS).
- MERSEA: improved networking across Europe would improve data exchange.

Q6 Can you provide details of any major international/global collaborative projects in your research area, which are to start in the near future and might be associated with particular network needs?

- Analysis of extended model datasets for the next assessment report of the IPCC (Inter - government Panel on Climate Change) of the WMO.
- Projects involved in current meter mooring data exchange.
- Projects involved in Lagrangian floating instrument satellite tracking.
- Implementation of the future Marine Core Services of GMES.
- Satellite-based Global Precipitation Measurement (GPM) Mission which will involve several European research institutes, Met offices and space agencies.

Q7 Does your research involve collaboration between groups that come partially from the non-profit sector and partially from the commercial sector? If so, what problems, if any, are there in regards to networking?

Most projects involve only non-profit partners. Exceptions are C3-Grid, FLOODsite and ENSEMBLES. Below are some comments of interest.

- SEADATANET: collaboration is with non-profit sector only; however, most partners in developing countries have no access to research networks.
- C3-Grid: firewalls; higher level of AAI.

3.3 GÉANT2 and its Services

This section of the questionnaire assesses the awareness and usage of GÉANT2, its global reach and of its service portfolio. It included the website link to the interactive demo and the new GÉANT2 DVD to provide an introduction to GÉANT2 and to explain its differentiating features compared to the commodity internet. Copies of both multimedia products were sent to the survey participants by post in advance of the survey being sent to them.

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Q1 Are you currently using the GÉANT2 network?

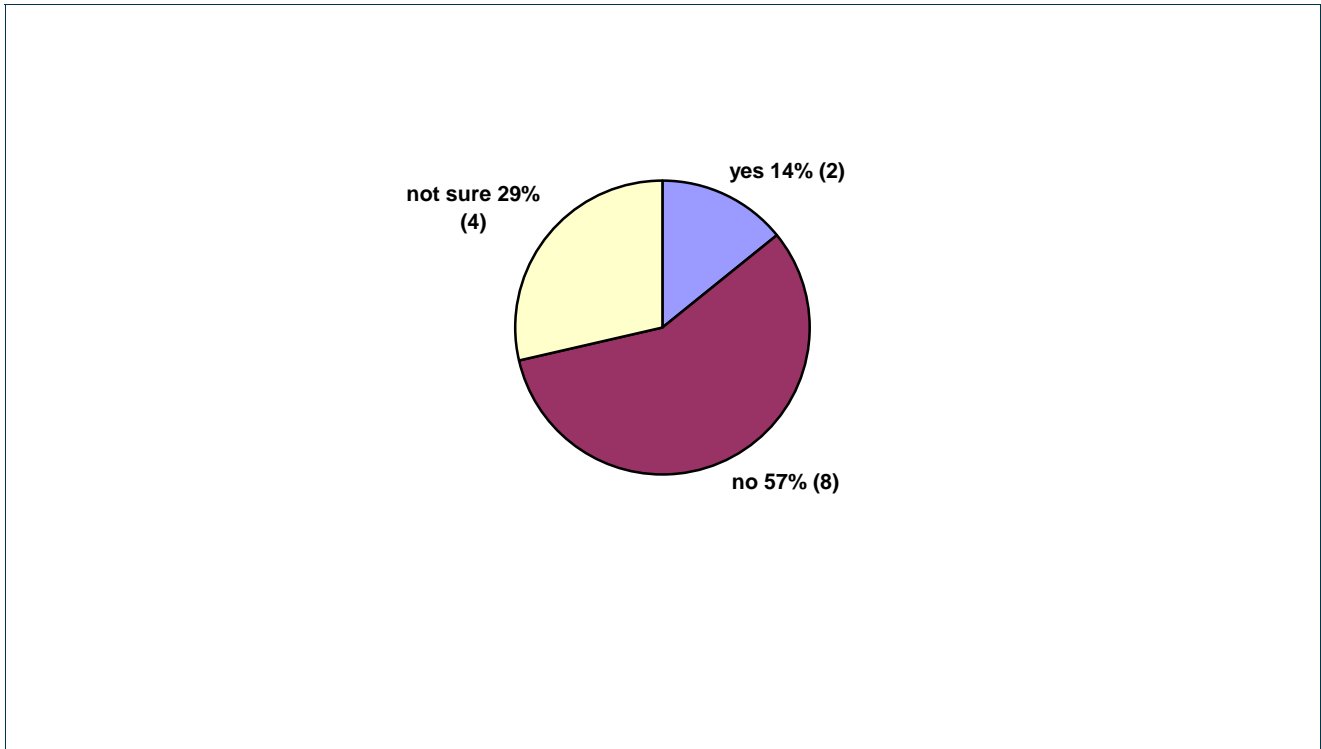


Figure 3.9: Use of GÉANT2 Network

Surprisingly, more than 50% of the projects claim not to use GÉANT2, although most partner institutions appear to be connected to the respective national R&E network. It can therefore be concluded that awareness of the GÉANT2 network or its relevance is relatively low in the EO community. It is indicative that Reinhard Budich (MILLENNIUM/COSMOS projects) and Wolfgang Hiller (C3-Grid) who are familiar with GÉANT2 and its benefits ticked the 'not sure' box explaining that researchers usually do rely on their NREN and have no real visibility of what is 'beyond' that level. Hiller added that for C3-Grid, some connections between partner organisations still need to be established by DFN.

CLARIS and SEADATANET appear as the only projects aware of using GÉANT2.

Q2 Are you currently using or considering using any of the listed services offered by the GÉANT2 network?

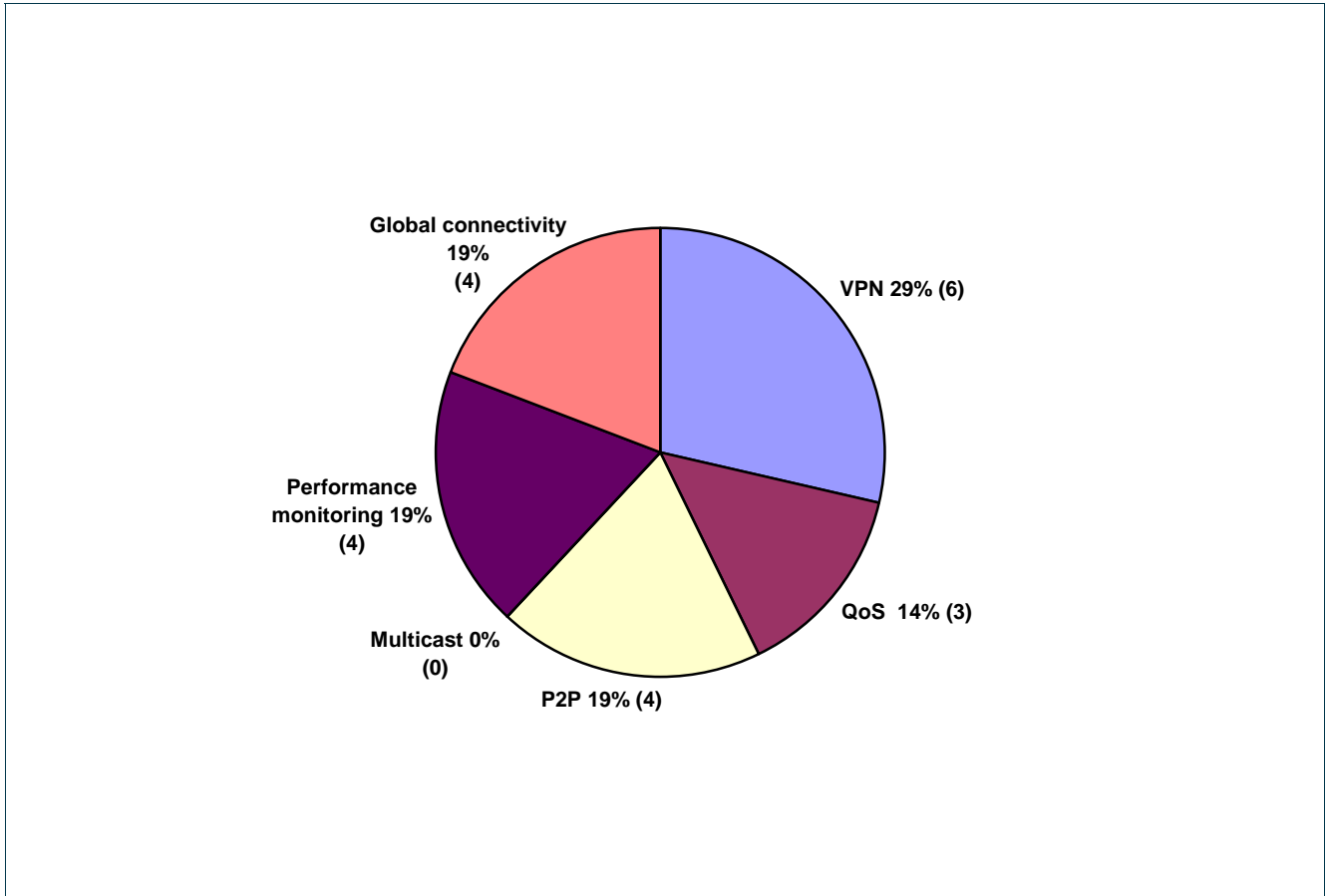


Figure 3.10: Use of GÉANT2 Services

In the light of the illustration in 3.10, the response to this particular question could be interpreted as ‘I would be interested in using this service’ rather than ‘I am already using it’. In this context, some respondents (e.g. Reinhard Budich) admit needing advice and best practice experience.

It is also worth noting a comment by Budich regarding QoS: “To put it very simply: We would rather like to use the network instead of sending disks back and forwards to overcome our data exchange problems. So please help!”.

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

4 Key Findings

- Awareness of GÉANT2 and its service portfolio in this community is low. Although most institutions participating in the identified projects are connected to the national R&E network, only 2 respondents were aware that they were using GÉANT2 for their international data communications needs. In this context, it is worth noting the comment from Paul Samuels, project coordinator of FLOODsite: “I am afraid that my return of your questionnaire will not show much apart from my ignorance of your area of science – and possibly the need to be persuaded of its relevance to our work”.
- Video-conferencing and VoIP are gaining momentum as an effective method of communication between project partners across Europe and beyond. However, whilst appreciating the money- and time-saving potential of virtual meetings, some respondents expressed concerns about the total loss of human networking (and the impact this might have on their travel budget). Other projects mentioned bandwidth constraints as a reason for not embarking on video-conferencing.
- Whilst most researchers do not currently operate in a grids-based environment, various respondents consider grid technologies as an effective solution for large-scale computations and for seamless access to data stored at geographically distributed data centres. See Footnote 1 for examples.
- There are opportunities for synergy between various projects and GMES - see Footnote 2 for more information about GMES.
- Various international collaborative initiatives were identified (e.g. the satellite-based Global Precipitation Measurement (GPM) Mission) which will involve several European research institutes, Meteorological offices and space agencies.
- High-resolution visualisations are an important research tool for most projects, especially for land mapping and climate modelling. However, its use appears to be restricted by network (i.e. bandwidth) constraints.
- Higher bandwidth to support demanding and bandwidth-hungry applications and data transfer tops the network wish list of most projects, followed by reliability and global connections.
- Projects with partners located in developing countries (particularly Africa) highlight the issue that poor connectivity hampers collaborative efforts.

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

- VPN appeals to many projects. Some respondents pointed out that they would need further advice on this and other services offered by GÉANT2.
- Dedicated P2P connections, which offer guaranteed QoS, are a requirement for links between climate data centres, such as the German Climate Computing Centre (DKRZ) in Hamburg and the European Centre for Medium-Range Weather Forecasts (ECMWF) in Reading, UK.

Footnote 1

This is reflected by initiatives, such as the 3C-Grid, which aims to establish a 'Collaborative Community Data and Processing Grid' to link data centres located at various Earth System institutions in Germany: Max-Planck-Institute for Meteorology, German Remote Sensing Data Centre of the German Aerospace Centre (DLR), German Climate Computing Centre (DKRZ), Centre for Marine Environmental Sciences (MARUM), Alfred-Wegener-Institute for Polar and Marine Research (AWI), GeoForschungsZentrum Potsdam. Currently confined to Germany, this initiative has the potential to be internationalised by establishing links to other data centres, such as the ECMWF in Reading, UK. It is expected to prepare the ground for a European-wide Earth System Grid, comparable to the US-ESG (www.earthsystemgrid.org).

Footnote 2

Global Monitoring for Environment and Security - (www.gmes.info), a joint initiative of the European Commission and the European Space Agency (ESA) aimed at achieving by 2008 an autonomous and operational capability in the exploitation of geo-spatial information services. It seeks to bring together the needs of society in the fields of environment and security with the advanced technical and operational capability offered by terrestrial, airborne and space-borne observation systems. It is a direct response to the growing concerns amongst policy-makers to ensure access to information on the environment at global, regional and local levels. GMES is the EU's contribution to GEOSS (Global Earth Observing System of System), www.epa.gov/geoss/. The specific objective of the MERSEA project, which participated in the survey, is the implementation of the future Marine Core Services (MCS) of GMES.

5 Recommendations for follow up

In addition to providing a summary of the results to both respondents and non-respondents, the following follow-up activities are recommended:

- The low awareness level of GÉANT2 and the lack of understanding of its benefits among the respondents call for further information and user support activities. Follow-up calls to the 14 respondents will be an initial action to generate more visibility and interest. It is certainly worth contacting the relevant personnel for a discussion relating to specific requests for P2P and VPN etc, for example, Reinhard Buddich of COSMOS, Wolfgang Hiller of C3-Grid, and Dr. Vincenzo Levizzani, EURAINSAT.
- Some respondents have very clear network requirements and appear to see the potential of GÉANT2. Attempts will be made to establish closer relationships with them to assess their suitability as GÉANT2 ambassadors in the ES community. It is recommended that Reinhard Budich (MPI for Meteorology), Wolfgang Hiller (AWI) and Adrian Board (Met Office UK) are initially targeted for this.
- Synergies between various international initiatives can be exploited (see section 4 – key findings). Active involvement in a workshop proposed by the European Commission to facilitate a better understanding between GÉANT2, ESA and the GMES ground segment will be discussed with the European Commission. Another interesting initiative to focus on may be the Global Precipitation Measurement (GPM) Mission.
- The idea of creating a Europe-wide Earth System Grid will be discussed further with Reinhard Budich and Wolfgang Hiller.

Appendix A NREN Input Questionnaire

Thank you for taking the time to provide us with this input. We would be grateful if you could return this questionnaire (please send it to helga.spitaler@dante.org.uk) by **3rd July 2006**.

Name: _____ Organisation: _____
 Position: _____ email: _____

- 1) Are you or your colleagues aware of any organisations in your country engaged in earth observation (incl. oceanography, climate modelling, weather forecasting etc.), and can you name them?
- 2) Are these institutions connected to the national research and education network in your country?
 If not, would you be able to provide reasons?
- 3) Which, if any, European / global collaborative projects are these institutions involved in?
- 4) Do you envisage greater demand for particular services from earth scientists in the future? Are there any specific applications you think will emerge as highly in demand?
- 5) Could you provide details of your contact at these institutions so that we can circulate a brief set of questions among them?
- 6) Are you aware of any earth science conferences in your country and/or at European/global level?
- 7) Can you think of any other opportunities for awareness-raising and relationship-building in this area?

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Appendix B **User Follow-Up Questionnaire**

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Questionnaire

The purpose of this survey is to gain a better understanding of international collaborative projects in the field of earth observation (EO) and to capture the network requirements of the research tools and applications these projects build on. In addition, it sets out to establish awareness and usage of the pan-European research and education network GÉANT2 and the services it offers in support of EO research activities.

*Thank you for taking the time to provide us with this input. We would be grateful if you could complete this questionnaire and return it to helga.spitaler@dante.org.uk by **20 November 2006**.*

A. Your details

Please provide us with your contact details.

Name:

Organisation:

Position:

Email:

Telephone:

B. Your project

In this section we would like you to briefly describe your research area and the project you are coordinating. Please use separate questionnaires should you coordinate more than one EO project.

1. Please confirm the name of the project and outline its topic and main objectives.

Project Name:

Topic/Subject Area:

Objectives:

2. Please provide details of the project partners.

Name of partner institution:
(Please list)

Country where based:
(Please list)

C. Your research tools/applications

In this section we would like you to outline the tools of research collaboration the project relies on. Please sketch details where applicable.

1. Which of the following methods of communication do you use with project partners who are not at the same institution? (please tick as appropriate)

- Audio conferencing
- Video conferencing
- Skype
- Wiki
- Email
- Other (please specify)

2. Does your project involve large file transfer over a data communication network?

Yes No

If yes, what is the typical size of such files?

3. Does your research rely on compute and data-intensive models?

Yes No

If yes, please provide details.

4. Do you build on geographically distributed data processing?

Yes No

If yes, please provide details.

5. Is your research supported by grid computing?

Yes No

If yes, please provide details.

6. Does your research require access to remote databases?

Yes No

If yes, please provide details.

7. To what extent does the project involve high-resolution visualisation of real or simulated data, including collaborative remote visualisation?

Great extent Some extent Little extent None

If applicable, please provide an example.

8. What other interactive remote applications do you engage in, if any (e.g. access to remote instrumentation sites etc.)?

D. Your network requirements

In this section we would like you to describe your network requirements and the facilities currently available to you to support the above applications/tools and to illustrate any limitations.

1. Which network parameters are important for your research? If possible, please describe these requirements in relation to specific applications.

a) Bandwidth [indicate if your application(s) is/are bandwidth-hungry]

b) Latency/Jitter [indicate if the time delay between data being sent and received is important for a specific application]

c) Reliability [indicate if your application(s) require(s) a robust and resilient network able to accommodate outages and minimize downtimes]

d) Geographical scope [indicate whether pan-European and/or global connections are required]

e) Security [describe your requirements for security/privacy of data or resources]

f) Others [please specify]

2. Please describe any way in which your research is currently limited by the available network facilities.

3. What changes, if any, would you like to see implemented to enable your project to make better use of the network facilities?

4. Thinking about the future, are you able to identify research issues that are currently not limited by the network facilities, but will become so in the future?

5. Do you envisage any specific applications you think will emerge as highly in demand in the future? Are you able to describe what impact these might have on your network requirements?

6. Can you provide details of any major international/global collaborative projects in your research area, which are to start in the near future and might be associated with particular network needs?

7. Does your research involve collaboration between groups that come partially from the non-profit sector and partially from the commercial sector? If so, what problems are there as regards networking?

D. GÉANT2 and its services

In this section we would like to gauge your awareness/use of the pan-European research network GÉANT2, its global reach and the way its service portfolio can support your research activities. An interactive introduction to GÉANT2, its differentiating features compared to the commodity Internet and its services is available at <http://www.geant2.net/server/show/nav.1793> and <http://www.geant2.net/server/show/nav.743>

1. Are you currently using the GÉANT2 network?

Yes No Not sure

If no/not sure, please provide reasons.

2. Are you currently using or considering using any of the listed services offered by the GÉANT2 network? Please elaborate and relate to the requirements of your research and applications.

- a) VPN
- b) Quality of Service
- c) Dedicated point-to-point connection
 - switched sub-wavelength services
 - full 10Gbps wavelength
- e) Multicast
- d) Performance monitoring
- f) Global connectivity

3. Any other comments on the GÉANT2 network?

D. GÉANT2 user support

If you wish to discuss your network requirements further, please contact our User Support Manager John Chevers at john.chevers@dante.org.uk or +44 (0)1223 371300.

E. Follow-up

1. Would you be willing to be contacted for further information?

Yes

No

Appendix C Respondent Information

Respondent	Project	Topic	Objectives	Partners
Jean-Philippe Boulanger, CNRS (F)	CLARIS http://eolo.cima.fcen.uba.ar/	Climate research	Collaborative research on climate change between European and South American researchers	13 institutions in 9 countries http://eolo.cima.fcen.uba.ar/partners.html
Hernando Francisco, VLIZ (B)	SeaDataNet http://www.seadatanet.org	Marine and coastal research	Creation of a virtual ocean data centre	49 institutions in 35 countries http://www.seadatanet.org/partners.htm
Reinhard Budich, MPI for Meteorology (D)	MILLENNIUM	Climate research & Earth System Modelling	Development of model for millennial-scale simulations	5 institutions in 2 countries
Reinhard Budich	COSMOS http://cosmos.enes.org/	Climate research & Earth System Modelling	Development of Community Earth System Models	13 institutions in 5 countries
Wolfgang Hiller, Alfred-Wegener-Institute for Polar and Marine Research (D)	C3-Grid https://www.d-grid.de/index.php?id=46&L=1	Climate research & Earth System Modelling	Creation of a collaborative climate community grid	14 institutions and 3 associated commercial partners in Germany* * intention to internationalise the initiative
Andrea Bergamasco, CNR ISMAR (I)	Polar DOVE http://flux.ve.ismar.cnr.it/~RossSea/ross/info/DOVE/Summary.htm	Oceanography/ climate research	Study of polar bottom water production variability and its link with climate change	6 institutions in 4 countries
Yves Desaubies, IFREMER (F)	MERSEA http://www.mersea.eu.org	Oceanography	Develop ocean and marine applications for GMES	50 institutions in 14 countries http://www.mersea.eu.org/ProjectOverview/participants.html

Project:	GN2
Deliverable Number:	DN3.0.3,2
Date of Issue:	11/07/07
EC Contract No.:	511082
Document Code:	GN2-07-168v2

Michele Pipan, University of Trieste (I)	HYGEIA http://www.hygeia-eu.org/html/project.php	Environment & Sustainable Development	Development of geophysical tools for non-invasive characterisation of contaminated sites and brown fields	7 institutions in 5 countries http://www.hygeia-eu.org/html/partners.php
Vassiliki Kotroni, National Observatory of Athens (GR)	EURORISK-PREVIEW – Cluster Flash-Floods http://www.preview-risk.com/	Numerical weather prediction and risk management	Improve the short- range forecast of Mediterranean flash floods based on the next generation European high- resolution NWP model	45 institutions in 15 countries http://www.preview-risk.com/
Adrian Broad, Met Office (UK)	ENSEMBLES http://www.ensembles-eu.org/	Climate research	Develop an ensemble prediction system for climate change	67 institutions in 19 countries http://www.ensembles-eu.org/
Vincenzo Levizzani, ISAC-CNR (I)	EURAINSAT http://www.isac.cnr.it/~eurainsat/	Climate research	European satellite rainfall analysis and monitoring at the geostationary scale	7 institutions in 4 countries
Holger Hoff/Katja Tielbörger, Tübingen University (D)	GLOWA Jordan River http://www.glowa-jordan-river.de/	Sustainable development/land and water management	Scientific support for adaptive management of water and land in the Jordan basin	30 institutions in 4 countries
Paul Samuels, HR Wallingford (UK)	FLOODsite http://www.floodsite.net/	Sustainable development/risk management	Deliver an integrated European flood risk analysis and management methodology	36 institutions in 13 countries http://www.floodsite.net/html/project_team.htm
Olivier Francis, University of Luxembourg (L)	-----	-----	-----	-----