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MUPPET

Multi-Partner European Test Beds for Research Networks

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Plan for using and disseminating knowledge for the first 18 months

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Abstract

This Deliverable provides an overview of the plan for using and disseminating knowledge for the first 18 months of IST Integrated Project MUPPET (“Multi-Partner European Test Beds for Research Networking”).

The document contains an overview of the approach taken by project MUPPET and gives an indication of the publishable results. It also describes the current plans for

- co-operation with other projects
- co-operation with standardisation bodies and forums
- dissemination of results to the general public

This document will be updated during the project life time, with new versions being published as new deliverables according to the project deliverables plan (see also Section 2.2).

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1 Introduction

1.1 Purpose and scope

This Deliverable provides an overview of the plan for using and disseminating knowledge for the first 18 months of IST Integrated Project MUPPET (“Multi-Partner European Test Beds for Research Networking”).

1.2 Reference Material

1.2.1 Reference Documents

- [1] MUPPET project deliverable D0.1, “Project Summary”
- [2] R. Sabatino, M. Enrico, ECOC 2004, “Dealing with Emerging Research Requirements: The Evolution of GÉANT”, paper We2.2.2

1.2.2 Acronyms and Abbreviations

ASON	Automatically Switched Optical Network
E-NNI	External Network-Network Interface
GGF	Global Grid Forum
GMPLS	Generalised Multi-Protocol Label Switching
IETF	Internet Engineering Task Force
I-NNI	Internal Network-Network Interface
IP	Internet Protocol
ITU-T	International Telecommunication Union – Telecommunication Standardisation Sector
MPLS	Multi-Protocol Label Switching
NNI	Network-Network Interface
NREN	National Research and Education Network
OIF	Optical Internetworking Forum
TMF	TeleManagement Forum
UNI	User-Network Interface
WP	Work Package

1.3 Document History

Version	Date	Authors	Comment
0.1	19/10/2004	Ronald Müller	Initial version
0.2	27/10/2004	Ronald Müller	Contributions from partners included, sections re-ordered
0.3	28/10/2004	Ronald Müller, Jan Späth	Editorial corrections, preparation of final version
1.0	29/10/2004	Jan Späth	Approved final version.

1.4 Document Overview

The document is structured as follows.

Section 2 provides a general overview on how knowledge and results achieved by the project will be used and disseminated.

Section 3 gives an overview of the publishable results during the first 18 months of the project

Section 4 explains current and potential future co-operations of project MUPPET with other projects.

Section 5 describes how the activities in MUPPET are based on close co-operation with relevant standardisation bodies and how the results achieved by MUPPET could be used for contributions to standardisation activities.

The final section illustrates the current plans for dissemination of knowledge and results to the general public.

2 MUPPET’s approach for Using and Disseminating Knowledge

This section provides a general overview on how knowledge and results achieved by the project will be used and disseminated.

2.1 Using knowledge

MUPPET is implementation oriented and as such the theoretical work is rapidly converted to experimental and practical applications when possible. As a goal of the project is to participate in defining the architecture and protocol mechanisms of the future communication networks, the knowledge of the project is of little value if not used and disseminated to the rest of the community working on similar issues and to those developing applications and application layers.

Therefore, the knowledge build up within this project will be quickly available to the interested community. In addition to that, the knowledge and experiences from practical experiments will also be used by the MUPPET partners themselves, mainly to define the next generation of products, services or strategic orientation for the MUPPET participants.

2.2 Disseminating knowledge

It is of strong interest to the MUPPET project and its partners to disseminate its ideas and result to a community as wide as possible – although being focussed on research network users and applications, the project outcome is of generic value and can be applied for other user communities. Dissemination is an important interactive interface for the project for getting continued feedback on ideas and concept refinement. Dissemination is performed whenever possible by exploiting the human network of the different partner, but more specific it will be done in the following relations:

- The training activity in using and understanding the potentials of the MUPPET concept is a very important way to disseminate the results and ideas of the project.
- Towards the IST consortium, dissemination will be based on the project deliverables. They are “knowledge sharing” driven, not only from a content point of view, but also from a “formal” point of view thanks to the “Public” status of all deliverables.
- Towards the global community dissemination will be pushed with the help of conferences, seminars, workshops etc. Obviously, this will also include participation in events organised for the IST community. On top of that, MUPPET demonstration activities will specifically focus on the dissemination towards potential users of the developed networking technologies.
- Finally, dissemination towards carriers and network operators is an important project goal. This includes specifically dissemination towards NRENs (National Research and Education Network). Their requirements are of high importance for MUPPET, and the achieved results will therefore be strongly disseminated towards that community. MUPPET is in close contact not only with the NRENs directly in the project, but as well to various other NRENs that have expressed strong interest in following the outcome of the project.

Plans for disseminating knowledge and horizontal activities as well as reports on related activities will be updated on an ongoing basis and also be made available in the following deliverables, to be published by MUPPET Work Package 0:

D0.1 Project Summary

This deliverable gives a brief presentation of the project, its work plan, and the planned key achievements. The deliverable is publicly available since October 1, 2004.

D0.2 Plan for using and disseminating knowledge for the first 18 months

This deliverable will report the plans for the use and dissemination of knowledge for the first 18 months of the project. This plan will be regularly updated, at least on a yearly basis (*note: this deliverable is the present document*).

D0.3 Plans for dissemination and horizontal activities

This deliverable will describe the plans of the project for dissemination, horizontal activities and contributions to standards.

D0.4 Dissemination and horizontal activities in Year 1

This deliverable will report the results of the dissemination and horizontal activities that occurred in Year 1 of the project. Contributions to standards will also be reported in this deliverable.

D0.5 Dissemination and horizontal activities in the first 18 months

This deliverable will report the results of the dissemination and horizontal activities that occurred in the first 18 months of the project. Contributions to standards will also be reported in this deliverable.

3 Publishable Results for the first 18 Months

The results achieved by project MUPPET will be documented in project deliverables. A list of deliverables planned for the first 18 months of the project is given below. All planned deliverables will have a dissemination level of “public” (PU). It is expected, that these deliverables contain a significant part of the project achievements and therefore dissemination activities will largely base on the results reported in these documents.

D1.1 Preliminary definition of a reference architecture for an intelligent optical network supporting advanced application in research environments

The deliverable will provide a preliminary definition of the overall architecture (of an European test bed) investigated by the Project, comprising a multi-layer network based on IP and ASON/GMPLS technologies and equipped with a unified control plane. Along with a functional description of the network, the deliverable will report on possible solutions for integrating the key research applications (computing and data grids, storage networking, high quality video communication, etc.) with the functions of the intelligent optical network. Particular attention will be paid to issues like a standardised interface to the network services, different transport services packet and circuit based, QoS assurance, and customer access to network management and configuration.

D1.2 Revision of the reference architecture according to the results of the project studies

Based upon the results of theoretical studies, simulations and experimental activities carried on in the Project test beds, the deliverable will specify a stable, robust and scalable architectural model to be proposed to the European research network. With respect to the preliminary architecture proposed at the beginning of the project, the main technical aspects will be further addressed, comparing alternatives for their solutions and selecting the reference ones. The list of topics to be investigated will be exactly defined after the result of the first phase of the Project studies and experiments, and could include: scalability properties of the reference architecture, harmonisation of the control functions of the network and application platforms, automatic layer-involvement and network service selection, multi-domain routing and discovery; AAA services; customer management interface, etc.

D2.1 Definition of application needs and scale of dynamics in research network infrastructures

The deliverable will define the usual performance needs made by research network applications (current and potential new ones). Based on this a ranking will be made and the potential gain in a dynamic infrastructure will be outline. In addition to the positive impact it will also be analysed if a too dynamic resource administration can have negative feedback to the applications.

D2.2 Preliminary interface specification

This deliverable will make a preliminary specification of the architecture and related protocols (and constraints) of the interface structure between the application layers and the optical transport network layers.

D2.3 Specification on application enhancement procedures for selected applications to be verified in the MUPPET test bed

This deliverables will specify the needed enhancement (generic or application specific) needed to exploit a dynamic infrastructure with focus on the applications that have been selected for verification in the MUPPET project. The deliverables will specify how

application is made network aware and how they communication with the resource administration (directly or indirect).

D3.1 Test bed overview (M3)

The deliverable will describe the overall design, of the Southern-, Central-, Northern-, Western- and Eastern European local test beds. Based on the already gained experience of the partners with the still existing parts of test-beds the overall design, architecture and functionality of the MUPPET test-bed infrastructure will be preliminary defined in the starting phase of the project and described in this report.

NOTE: This deliverable has been available since October 1, 2004.

D3.2 Report on enhanced design and architecture of local test beds

Enhancements of the overall design will be derived by the results of the first reference architecture studies and the identified application requirements.

The general design of the test beds will also be extended to cover the integration of the IT platforms and relevant applications. In the process chain of “planning”, “implementation” and “operation” of the local test beds, the second deliverable of this WP will report about the “implementation” and “operation” of the individual local test beds.

D3.3 Report on interconnection and integration of local test beds

The third deliverable of this WP will report about the “implementation”, “integration” and “operation” of the MUPPET test bed. It will cover the experiences gained with the five local test beds, the vertical integration of application-, IT- and networking layer, as well as the experiences gained by the multiple interconnection types of the local test beds.

D4.1 Preliminary plan for demonstrations to be performed in test bed experiments during the first half of IP MUPPET

Based on identified features, services and applications from WP2 and WP3 that are suitable for demonstrations the deliverable provides a plan for demonstrations to be performed in test bed experiments up to M18. The plan will include proper test bed configurations in order to highlight project achievements to external user communities. Furthermore the organisation and running of demonstrations will be described.

D4.2 Demonstrations performed in the MUPPET test beds year 1

The deliverable is a report covering the demonstrations performed in the MUPPET test beds during the first year of the project. The outcome of the execution of the demonstrations will be described and feedback from external users will be included.

D4.3 Preliminary plan for demonstration to be performed in demonstrations during the second half of IP MUPPET

A plan for demonstrations to be performed in test bed environment during the second half of the project will be provided. The plan will include proper multi-test bed configurations and the organisation and running of demonstrations will be described. The demonstrations can involve integrating equipment and software from different sites, additionally to what is done in other WP's.

and importance for the activities within MUPPET, because both consider the future evolution of European research infrastructure.

- At a later stage of the project, the interconnection via NRENs and Géant will allow further users to be interconnected to the MUPPET test bed environment.

The co-operation between MUPPET and DANTE has already been set up at the beginning of the project. The first focus is on the interconnection capabilities between the local MUPPET test beds. In a second step, after DANTE and the NRENs finalised the work plan and objectives of GN2, a close alignment of theoretical research and investigation topics is agreed between the partners.

A joint meeting with representatives from DANTE is planned for the MUPPET plenary meeting from 17 to 19 November in Berlin.

4.2 MUPPET – NOBEL

Integrated Project NOBEL "Next generation Optical network for Broadband European Leadership" is a big Integrated Project within the IST 6th Framework. The main goal of NOBEL is to find and to validate (experimentally) innovative network solutions and technologies for intelligent and flexible optical networks, thereby enabling broadband services for all. From this overall goal it can be seen that NOBEL is more focussing on residential end-users and network technologies for broadband core and metro networks, while MUPPET is specifically concentrating on research networks, their infrastructure and application requirements.

The relationship between MUPPET and NOBEL has multiple aspects, ranging from an exchange about network architecture concepts up to joint experiments and joint usage of network and test bed infrastructure. The relationship between these two IST projects is illustrated in Figure 2. Note that this diagram includes for NOBEL a second phase, which is planned but not yet confirmed.

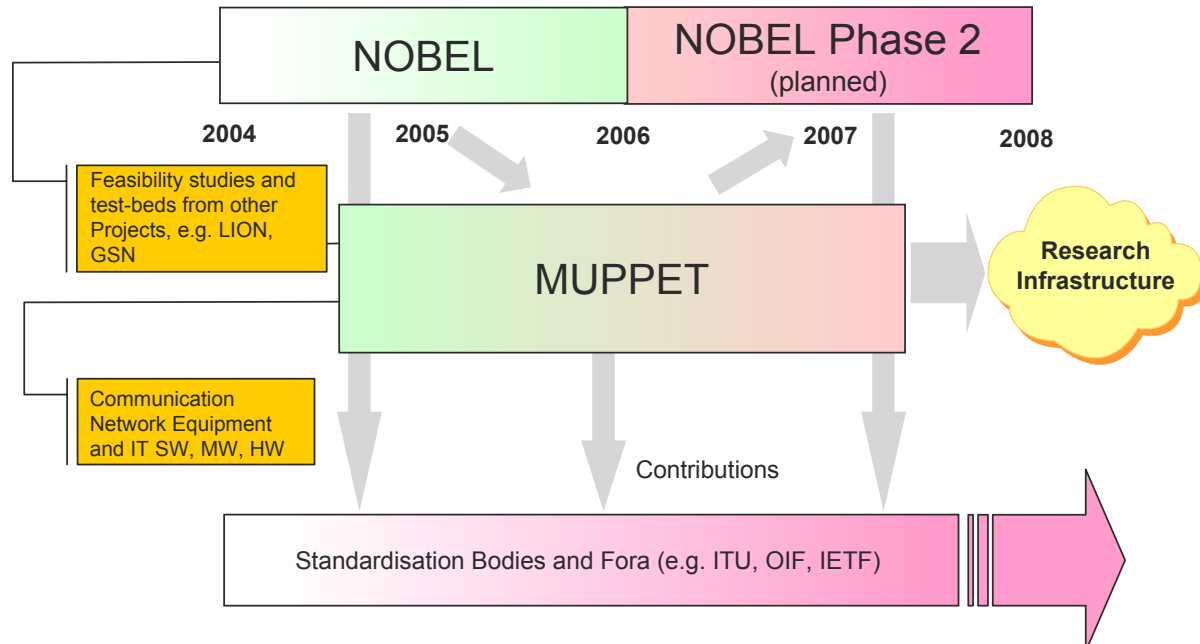


Figure 2: Relationship of IST projects MUPPET and NOBEL

At the current point in time, the following co-operation opportunities and plans have been identified. During the course of both projects, this matter will be further extended and refined in more detail.

Investigation of services and applications

The two projects NOBEL and MUPPET focus on complementary services and applications: NOBEL is focusing on “Broadband for All”, therefore having a focus on residential and business end customers and network services to support their applications. MUPPET is focusing on ultra-broadband research applications such as GRID computing or high-quality video transfer. An interesting aspect is that many applications may first occur in the research environment, but will later on transfer towards residential and/or business end users.

The network requirements that occur from these applications can be very different. The co-operation between the projects will lead to a comprehensive understanding of future services and network requirements. This is of high relevance for network operators because in many cases all services (residential, business, and research customers) need to be supported by a common transport network platform.

Definition of network architecture and network evolution

Based on the point above, it is obvious that also the derived network architectures and the corresponding network migration and evolution paths that will be derived by the two projects can be expected to cover complementary application scenarios. An interesting subject for co-operation between the projects will be to identify similarities and differences between these architectures and then to work on an overall framework, covering all aspects.

Requirements and solutions for a transport network control plane

A key enabler for future dynamic broadband networks is a control plane, efficiently using network resources while in parallel allowing a high flexibility for the users to access these resources. It is expected that within NOBEL the current state of the art for control plane technology will be further progressed and several open issues will be tackled and solved. The purpose of MUPPET is to investigate the applicability of such control plane technology in the framework of research network infrastructure, thus leveraging on the technological progress in NOBEL. This investigation shall be done in a Europe-wide experimental network. The results and experiences from these practical activities will on the other hand give a valuable feedback towards NOBEL to further improve control plane technologies.

Deployment and usage of network infrastructure

A key part of the MUPPET project will be the deployment of a network infrastructure, interconnecting multiple test beds across Europe. It is planned that this infrastructure can be used for experimental activities within NOBEL. The spectrum of such activities, probably being part of NOBEL Phase II, could cover a broad spectrum from providing interconnectivity between test beds up to joint experiments in the area of control plane and end-to-end service provisioning. The potential activities depend on the work plan and progress of both projects and have to be defined in detail during the course of NOBEL Phase I.

4.3 Other co-operation plans and opportunities

In addition to the aforementioned co-operations, MUPPET is open for further collaborations. The extent of such activities has to be discussed and agreed on a case-by-case basis, but can in principle range from an active exchange of information up to interconnection to the MUPPET test bed and joint experimental activities.

Already, several other activities or bodies have been identified to which later contact looks very promising from a MUPPET perspective:

- DRAGON (Dynamic Resource Allocation via Generalised Multi-Protocol Label Switching (GMPLS) Optical Networks Project) [<http://dragon.east.isi.edu/>]: This project is run by the Mid-Atlantic Crossroads, a consortium of universities and agencies that include NASA's Goddard Space Flight Center, the National Oceanic and Atmospheric Administration, and the National Institutes of Health. Other collaborators include the University of Southern California Information

Sciences Institute, George Mason University, the University of Maryland and the Massachusetts Institute of Technology Haystack Observatory in Westford, Mass. The

- EGEE (Enabling Grids for E-science in Europe) [<http://www.eu-egee.org>]: EGEE will integrate current national, regional and thematic Grid efforts to create a seamless European Grid infrastructure for the support of the European Research Area. Since Grid computing is one of the most important applications to be supported by future research networks, the activities of this large IST project (with 70 partners) will be also important for MUPPET.
- TERENA (Trans-European Research and Education Networking Association) [<http://www.terena.nl/>]: TERENA's main goal is to promote and participate in the development of a high quality international information and telecommunications infrastructure for the benefit of research and education. Since this organisation includes many NRENs across Europe and has already established a close co-operation with DANTE, a co-operation looks also very interesting for MUPPET.
- VIOLA (Vertically Integrated Optical Testbed for Large Applications in DFN) [www.viola-testbed.de]: The main objectives of VIOLA German national project are the practical evaluation of NG Ethernet and SDH network elements and architectures, of ASON/GMPLS network functions and of interworking aspects between ASON/GMPLS networks and future broadband applications, topics which are closely related to the MUPPET work

Some of the initial contacts have already been set up, while for others further information is needed and/or first MUPPET achievements should be reached before a productive co-operation can be started.

5 Co-operation with Standardisation Bodies and Forums

This section describes how the activities in MUPPET are based on close co-operation with relevant standardisation bodies and how the results achieved by MUPPET could be used for contributions to standardisation activities.

5.1 Relevance of MUPPET achievements to standardisation activities

Concerning contributions to standards, the main goal of MUPPET is to achieve a common European position on several issues related to the various interoperability aspects that are relevant to research networking. The two main areas of investigation will be:

- Interworking between network domains (different vendors and different operators)
- Interaction between IT platforms and network.

Both aspects have a strong impact on the definition of the control plane of ASON/GMPLS networks (e.g.: UNI and NNI interfaces, signalling, routing, etc.), but also on other aspects, such as network management.

The activities and expected results of project MUPPET have a high potential for contributions to standards. This is due to the current state of progress and development of the technologies that the partners are going to explore.

5.2 Standardisation approach within MUPPET

From a technical point of view, MUPPET aims at being active in all international standardisation groups and forums relevant for the aspects mentioned in the previous subsection, in particular¹

- ITU-T,
- OIF,
- IETF
- and TMF.

The MUPPET consortium identified a standardisation approach in order to be very effective in following and driving the standards. The approach is based on the following three basic rules:

- Those MUPPET partners joining standardisation bodies/forums should feed-back the project with the status of development of the standardisation process;
- The consortium should identify those areas where the project's results may contribute to the standards;
- Those MUPPET partners joining standardisation bodies/forums should contact their reference-person/people joining the standardisation bodies/forums to inform them (to get the internal approval) on the MUPPET contributions.

Already at the start of the project it was identified, that one of the standardisation forums whose activities and achievements have both a clear impact on and may be influenced by the activities within MUPPET is the OIF. The background for the planned co-operation with the OIF is described in some

¹ Various partners of the MUPPET project consortium are active in these standardisation bodies. In addition to that, some key people (e.g. Working Group chairpersons) from different standardisation bodies and forums actively participate in the MUPPET consortium. This close personal relationship to the relevant standardisation groups not only ensures awareness of all relevant aspects, but will also be an excellent basis for an efficient participation in standardisation work.

more detail in the following subsection. In a similar way, close cooperations with other bodies shall be realised in future as well.

5.3 Co-operation with the OIF

The OIF network architecture is compliant to the ASON/GMPLS architecture. This architecture is already partly implemented in the Southern and Central European test beds and will be completed during the first 18 month. It is based on multiple, independent network domains with standardised interfaces (data plane and control plane) between them. In this model, there are three substantially different reference points, the User-Network-Interface (UNI), Internal Network-Network Interface (I-NNI) and External-NNI (E-NNI), see Figure 3. The OIF has defined Implementation Agreements for the UNI and E-NNI (based on ITU-T recommendation G.7713.2), while the I-NNI is regarded as internal to the network domains.

As described in deliverable D3.1 already, the MUPPET partners Marconi, TILAB and T-Systems/Deutsche Telekom have participated at the OIF World Interoperability Tests and Demonstration at SuperComm 2004 and will further continue to implement the OIF Implementation Agreements related to the control plane interfaces UNI and E-NNI in this project, but maintaining this high level world wide interoperability reached in June 2004. By doing this, practical experiences enable these partners to provide substantial feedback to the OIF specification work.

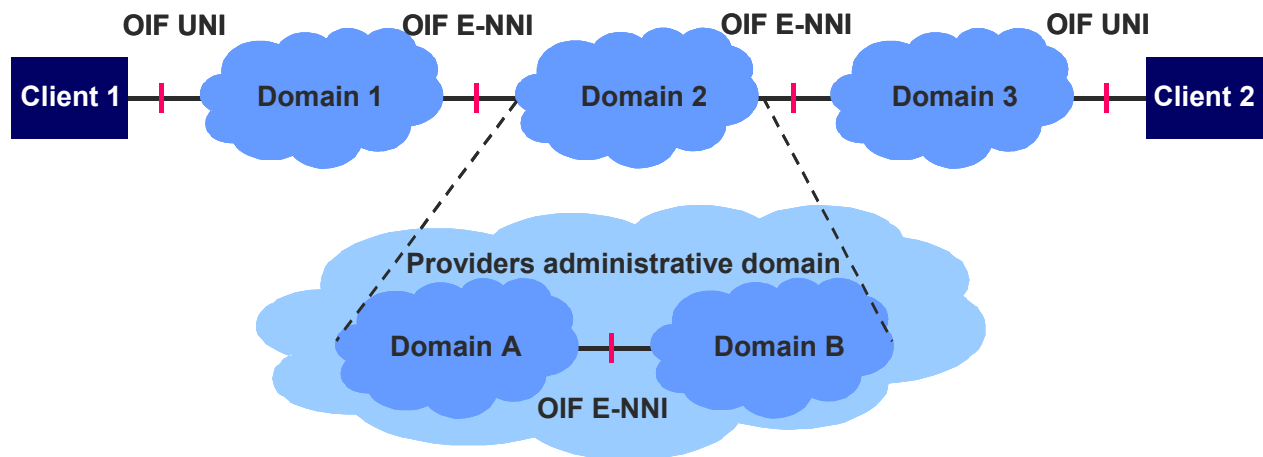


Figure 3: Control plane interfaces of transport networks partitioned into multiple domains and different hierarchy levels

Details of a next OIF interoperability test event in 2005 are currently being discussed within the OIF. From the MUPPET consortium, there are plans to participate in this test event, mainly related to the implementation of UNI2.0 Ethernet, enabling Ethernet (client) network domains to request by using an Ethernet interface connections from transport networks in the same manner as they can do it today with SONET/SDH signal formats. Details of a MUPPET involvement will be discussed as soon as the OIF plans become more stable.

5.4 List of relevant standardisation bodies and forums

This section shall give a short overview of the standardisation bodies mentioned above that are of specific importance for MUPPET. The following short overview already reveals that there are many areas of importance for the project, and also various opportunities were the project results can influence standardisation work.

5.4.1 ITU-T

In general, ITU-T is carrying out studies in the various Questions on the many aspects of Optical Networking, leading to a series of planned or published Recommendations, as described in Recommendation G.871, addressing: (a) Optical Transport Network architecture; (b) functional characteristics; (c) structure and mapping aspects; (d) management aspects; (e) physical layer characteristics. Particularly, the concept of ASON networks is one of the key topics currently being investigated by ITU-T

Considering the current organisation of ITU-T, the main contributions produced by the MUPPET project will address the following Study Groups:

- SG13 “Multi-protocol and IP-based networks and their interworking”
- SG15 ”Optical and other transport networks”

Within these Study Groups, many Questions will be monitored and contributions will be provided to them on the basis of pieces of work developed in the project. Table 1 lists the relevant Questions.

Question	Title
10/13	Core network architecture and interworking principles
9/15	Transport equipment and network protection/restoration
11/15	Signal structures, interfaces and interworking for transport networks
12/15	Technology Specific Transport Network Architectures
14/15	Network management for transport systems and equipment
19/15	General characteristics of optical transport networks

Table 1: Questions of ITU-T SG13 and SG15 relevant to MUPPET activities

5.4.2 Optical Internetworking Forum (OIF)

The OIF is an open industry organisation of equipment manufacturers, network operators and end users dedicated to promote the global development of optical internetworking products and foster the development and deployment of interoperable products and services for data switching and routing using optical networking technologies. The Technical Committee is divided into six working groups, focussing on specific areas. Currently the Working Groups are:

- Carrier
- Architecture & Signalling
- OAM&P
- Interoperability
- Physical and Link Layer

The results planned in the MUPPET project will impact on OIF activities of almost all Networking Working Groups (Carrier, Architecture, OAM&P and partly Interworking WG). In particular, contributions are foreseen on the definition of architectures, requirements for inter-carrier E-NNI and UNI 2.0 control plane interfaces and their interoperability evaluations. Furthermore, during the negotiation phase of this project, a few of the MUPPET participants are already actively involved in OIF interop tests on interfaces which are building a bases for the Muppet test bed functions (UNI 1.0 and intra-carrier E-NNI).

5.4.3 Internet Engineering Task Force (IETF)

The IETF is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. The actual technical work of the IETF is done in its working groups, which are organised by

topic into several areas (e.g., routing, transport, security, etc.). Particularly, GMPLS protocols have been mainly developed by IETF.

The activities that will be carried out within MUPPET can give potential contributions to the Sub-IP area and, in particular, to the following working groups:

- Common Control and Measurement Plane (CCAMP)
- IP over Optical (IPO).

The project can exploit the results obtained to reinforce the European representation within the IETF, which is often dominated by US companies' views.

5.4.4 TeleManagement Forum (TMF)

The TMF is a non-profit organisation including service providers, network operators and suppliers of equipment and software to the information services and communications industry. Its main goal is to help service providers and network operators automate their business processes in a cost- and time-effective way. It uses a business and customer services driven approach to achieving end-to-end automation using integrated Commercial Off-the-shelf (COTS) software.

The MUPPET result will be mainly related to the following TMF initiatives:

- New Generation OSS (NGOSS): intend to provide the operators with systems integration framework to improve their processes automation level
- MultiTechnology Network Management (MTNM): defines an interface to manage transmission network, including technologies like SDH/SONET, WDM and ATM.

5.4.5 Global GRID Forum (GGF)

The Global Grid Forum (GGF) is a community-initiated forum of thousands of individuals from industry and research leading the global standardization effort for grid computing. GGF participants come from over 400 organizations in over 50 countries, with financial and in-kind support coming from GGF Sponsor Members including technology producers and consumers, as well as academic and federal research institutions.

GGF's primary objectives are to promote and support the development, deployment, and implementation of Grid technologies and applications via the creation and documentation of "best practices" - technical specifications, user experiences, and implementation guidelines.

GGF efforts are also aimed at the development of a broadly based Integrated Grid Architecture that can serve to guide the research, development, and deployment activities of the emerging Grid communities. Defining such architecture will advance the Grid agenda through the broad deployment and adoption of fundamental basic services and by sharing code among different applications with common requirements.

Wide-area distributed computing, or "grid" technologies, provide the foundation to a number of large-scale efforts utilizing the global Internet to build distributed computing and communications infrastructures. As common Grid services and interoperable components emerge, the difficulty in undertaking these large-scale efforts will be greatly reduced and, as importantly, the resulting systems will better support interoperation.

6 Dissemination to the General Public

This section describes the current plans on how MUPPET will reach the maximum level of awareness and public participation and achieves a high usage of its services.

6.1 Public pages on MUPPET web page

Public pages on the MUPPET web page <http://www.ist-muppet.org> will be used to make information about MUPPET available to the public. This includes or will include:

- Overview of the project and project related news
- Information on progress and achieved results as well as plans for the future
- Demonstration events, project related activities at conferences, exhibitions, etc
- Information about the project consortium and its individual partners
- Links to the IST programme, related projects and activities

6.2 Press releases and periodic bulletins

A press release publishing an overview of the project including links for further information will be published as soon as possible after project start.

Further press releases are planned in order to

- report on relevant progress and achievements of the project
- report on participation in demonstration events etc.

6.3 Conferences

It is planned that MUPPET participants will contribute to various conferences, such as:

- Optical Networks oriented conferences: ECOC, OFC, OECC, APOC, NOC, ONDM
- Conferences on Internet topics, MPLS conferences, research networking events: e.g. MPLS World Congress (a contribution to the “MPLS World Congress 2005” has already been accepted); TERENA TNC 2005 (MUPPET has been invited to give a presentation)
- Workshops organised by IIR or Marcus Evans
- Conferences on broadband applications (GRID, multimedia)

6.4 Articles in science magazines

It is planned to publish major progress and achieved results in appropriate magazines to address both, the scientific community and the general public.

6.5 National workshops and events

National workshops and participation in national events with multimedia-oriented demonstrations which are open for the public in general are planned in various countries of the MUPPET partners. Events that are currently being investigated for contributions are for example:

- “Week of Science” (Madrid, Spain)
- “ExpoInternet” (Madrid, Spain)

- “Long Night of Science 2005” (Berlin, Germany)
- “Internationale Funkausstellung 2005” (Berlin, Germany)
- “ITG Workshop 2005” (Leipzig, Germany)