



**NETWORKING SESSION**



# **e-IRG Workshop**

4-5 October 2006

Keilaniemi, Finland

# **Networking Session**

Chair: Lajos Balint

Co-Chair: Victor Castelo

- **Final goal:**

**Research in ERA to be best served & inspired  
by Research**

**Networking**

- **Session goals:**

- investigate some key Networking issues
- refine recommendations of the Linz workshop
- advise on how to meet the recommendations
- discover opportunities for co-operation
- determine crucial tasks for progress

## Main message:

### Research Networks

- are of excellent state in 2006
- are the result of 20 years intense efforts
- are managed by the scientific community
- are operated by NRENs (totally different from „normal” CSPs)
- are directly driven by the specific and advanced user's needs
- are characterised by a proven, well working governance structure
- have to keep the high standard
- need continuous development
- should fulfil the growing needs of scientific users
- need collaboration with most advanced user(s) (groups)
- should continuously aim at next generation technologies
- should step by step develop the next generation solutions
- need considerable financial support
- should be funded both nationally and on the European level

## Session outline:

- Introduction (~20 minutes):  
background and goals of the session
- 3 groups of key issues:  
presentation + discussion (~ 10-10 mins each)
- summary and conclusions (~ 20 minutes)

- **Background I. (e-IRG achievements):**
  - Networking section of the e-IRG White Paper - Austrian edition
    - <http://www.e-irg.org/publ/2006-Austrian-eIRG-whitepaper.pdf>
  - e-IRG recommendations tabled at the 4 October e-IRG Meeting
    - <http://eirgsp-wiki.grnet.gr/bin/view/Main/AustrianWhitePaperUpdatedRecommendations>
  - Networking section of the e-IRG Roadmap
    - <http://www.e-irg.org/roadmap>

- **Background II. (related activities):**

- related activities of TERENA, the NREN Consortium, DANTE ...

- **<http://www.terena.nl>**

- Projects (SERENATE, EARNEST, Compendium ...)**

- Task Forces (NGN, EMC2, ECS, ...)**

- **<http://www.dante.net>**

- GN2 JRAs**

- (Performance, Security, BoD / OVPN, Testbeds,  
Mobility)**

### Background III. (users):

## ESFRI Roadmap for European Research

### Infrastructure

WG): (Final Daft Report of the Phys.Sci.& Eng. Roadmap

## Major e-IRG recommendations

as seen / summarised by ESFRI-PSE:

- **single e-Infrastructure projects to be superseded by integrated sustainable services at national and EU levels**
- **pan-European infrastructure to be developed by integrating the national e-infrastructures**
- **integrated sustainable national/pan-European services to be offered to all user communities**

## Background III. (users, cont'd):

### **ESFRI Roadmap for European Research Infrastructure** (Final Daft Report of the Phys.Sci.& Eng. Roadmap WG):

#### **Observations / statements by ESFRI-PSE:**

- **availability of top computing RI's to researchers is  
a key European policy aspect**
- **ESFRI recognises the central role of networking  
to support scientific research**
- **European and national infrastructures are to be integrated**
- **goal: GRID-like Pan-European infrastructure for all user  
communities,  
across the full research spectrum**
- **pyramid-like service organisation and a European networked  
infrastructure is needed**



## Background IV. (networkers):

**K.Ullmann** The Future of Research Networking in Europe  
(Plenary presentation at the e-IRG Open Workshop, 4-5.10.2006):

### Special status / position of the European Research Networks:

- Role of VPNs, OVPNs ⇒ evolution (+ continuing liberalisation)
- No more bandwidth / speed problem
- Role and features of Grid applications (motivating RN development)
- Crucial network technology development needs (BoD/VPN mgmt, AAI, ...)
- Role and status of GEANT, future of 10G (40G, 100G) speeds
- Necessity of co-operating with the users in network development
- Need for network intelligence / flexibility / adaptivity
- Role, status, and future of NREN Consortium / Policy Committee

## Background V. (EARNEST):

### e-IRG vs. EARNEST: Parallel efforts – different roles

**e-IRG:** an advisory body in the area of building the future e-Infrastructure ( =EC, ...)

- top-down, more **political-strategic**
- looking mainly for **what is desirable**

**EARNEST:** a project within GN2 for investigating research networking and preparing the next RN generation ( =NRENs, ...)

- bottom-up, more **technical-organisational**
- looking mainly for **what is possible**

**e-IRG + EARNEST:** Origin: e-IRG WS 4-5.10.2006 **possibilities vs. desires ⇒ realities (?)**

## Background V. (EARNEST, cont'd):

### **e-IRG vs. EARNEST: Parallel efforts – different roles**

#### **→ Possible co-operation based on complementarity:**

##### – EARNEST:

- network technology
- network architecture
- geographic coverage
- org. structure (network)
- network user communities
- application demand analysis
- involvement of telcos
- sustainability (network level)

##### – e-IRG:

- e-resources
- repositories/archives
- disciplinary coverage
- org. structure (applications)
- appl. user communities
- network supply analysis
- involvement of industry
- sustainability (appl. level)

## Big questions to be answered:

- **User demands vs. networking options**
  - How to balance the everyday and the high-end user demands?
  - How to define RN policies and development/provision plans?
  - How to avoid the emergence of unrealistic user demands?
- **Responsibilities and duties**
  - How to ensure shared responsibilities of network provision and usage?
  - How to establish balanced governance roles?
  - How to define shared and joint duties of the RN users and providers?
  - How to jointly warrant permanent service provision?
- **Education and training**
  - How to inform the users about network capabilities and services?
  - How to inform the users on high-end e-Infrastructure (Grid, etc.)

## Big questions to be answered (cont'd):

- **Governance model of the European NRENs**
  - How to extend the proven governance model of pan-European RN?
  - How to apply the model for network-based applications?
  - How to move from network development / operation to network usage?
  - How to handle European scale high-end e-Infrastructure solutions?
- **Foresight and future planning**
  - How to investigate networking trends and emerging applications?
  - How to make joint development plans in the RN and the application area?
  - How to co-operate with other relevant initiatives/organisations?
  - How to jointly involve the developers, the providers, and the users?
- **Funding issues**
  - How to fund RN development/operation?
  - How to finance high-end e-Infrastructure applications?
  - How to determine the desirable level of EU/EC funding for RN?
  - What funding structure to apply for keeping leading edge position?
  - What funding mechanisms to apply for easing the digital divide?

## The 3 basic groups of issues to be investigated:

### Group A: RN Operation

- State of the Art, Service Provision, User Support

### Group B: RN Governance

- Organisational Structure, Policy Goals, Funding

### Group C: RN Development

- Global Role, Uniform Coverage, Collaboration

## 3 basic groups of issues to be investigated:

### Group A: RN Operation

- State of the Art, Service Provision, User Support

- A1 Research Networks: what, why, how
  - the European perspective
- A2 Permanent service provision
  - objectives, conditions, realities
- A3 Planning, building, operating, and using the RN
  - joint roles of developers-providers-users
- A4 User demands and provision of service
  - coincidence or discrepancies
- A5 Informing, training, educating, teaching
  - real users vs. potential users

### 3 basic groups of issues to be investigated:

#### Group B: RN Governance

- Organisational Structure, Policy Goals, Funding

- B1 Governing the RN – responsibilities and duties of the providers and the users
- B2 The hierarchical governance model of the European NRENs
  - extension towards applications
- B3 Funding structure, funding level
  - importance, role, influence

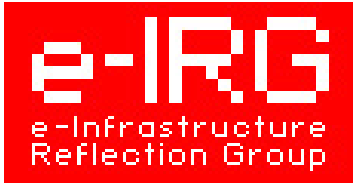


### 3 basic groups of issues to be investigated:

#### Group C: RN Development

- Global Role, Uniform Coverage, Collaboration

- C1 Leading edge position in global sense
  - complexity needs a differentiated approach
- C2 Handling the digital divide
  - widening coverage and narrowing gaps
- C3 Co-operation opportunities in evaluating development trends and preparing development plans



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## Group A issues

### 3 basic groups of issues to be investigated:

#### Group A: RN Operation

- State of the Art, Service Provision, User Support

- A1 Research Networks: what, why, how
  - the European perspective
- A2 Permanent service provision
  - objectives, conditions, realities
- A3 Planning, building, operating, and using the RN
  - joint roles of developers-providers-users
- A4 User demands and provision of service
  - coincidence or discrepancies
- A5 Informing, training, educating, teaching
  - real users vs. potential users

## A1 Research Networks: What, Why, How - the European perspective

After a period of

- networks of users (HEPNET) or
- proprietary protocols (EARN-BITNET) ⇒

⇒ **interconnected NRENs** (National Research and Education Networks)

European Research Intranet

- Know infrastructure
- Controlled infrastructure

**Economy of scale:** to national and European level, and global level

European interconnection:

**subsidiarity** principles, building the **common network**

Interconnection with **other regions** of the World

## A1 Research Networks: What, Why, How - the European perspective

### Basic questions:

**How to continue developing a pan-European common network?**

**How to keep subsidiarity in the long range?**

**How to further extend developing global connectivity?**

**The NREN Consortium has reached a **leading edge** network with GEANT  
Research networking in Europe should be based on **GEANT** in the long  
range**

**Both **regular** and **high demand** applications are well served**

****Subsidiarity** is an appropriate principle in operating the network**

**DANTE has proved that a **common operational unit** is the key of success**

**Suggested answer:** Joint efforts are to be continued in the  
developments

**The network has to cover all European countries  
Global extensions should remain an important goal**

Open e-IRG WS, 4-5.10.2006

## A2 Permanent service provision - objectives, conditions, realities

Continuously **improving** the services (from 64k to nx10G)

High **resilience** networks

**24x7** services (normally)

**Dedicated** to the users

**SLAs** and **AUP** environment

Users: **non profit** (and companies for projects)

Service **charges**: depends on the NREN and the service

Special user: some **dedicated BW or lambdas**

**Teaching** and **Research**

## A2 Permanent service provision - objectives, conditions, realities

### Basic questions:

**How permanent service provision can be maintained?**

**What are the main goals in serving the users?**

**What conditions are influencing permanent service provision?**

**How to take into account practical realities of network/service performance?**

**Scientific research** is characterised by **demanding users**

Continuous **high quality services** are widely required

**Mutual satisfaction** is only possible in case of close networker-user **co-operation**

Network developers and operators have to know **special user needs**

**Demanding users** have to know **practical limits** of the network and the services

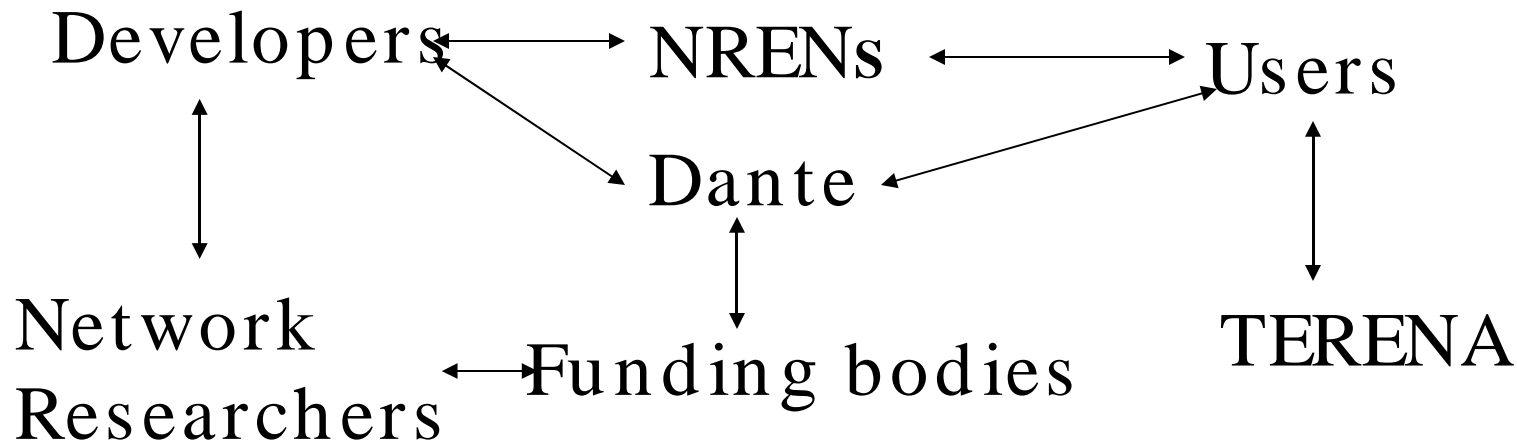
**Suggested answer:** **Permanent service provision should remain major objective**

Open e-IRG WS, 4-5.10.2006

**Network performance has to meet user demands**

**User demands have to take into account practical**

## A3 Planning, building, operating, and using the RN - joint roles of developers-providers-users





## A3 Planning, building, operating, and using the RN - joint roles of developers-providers-users

### Basic questions:

- How to ensure shared responsibilities of network provision and usage?**
- How to define shared and joint duties of the RN users and providers?**
- How to jointly warrant permanent service provision?**

**The NREN Consortium and DANTE keep **continuous contact** with the users**

**TERENA represents the **interests** of the Research Networking communities**

**Funding bodies take special care of **harmony** between networks and users**

### Suggested answer:

- NRENs and DANTE should jointly be responsible for network services**
- User communities should jointly be responsible for realistic demands**
- Permanent service provision is warranted by joint responsibilities**

## A4 User demands and provision - coincidence or discrepancies

General services for **normal users**

**Intermediation** of NRENs - Regional networks - Institutions

International groups or projects: **DANTE** and the local **involved NRENs**

**Networking Research** using the infrastructure

⇒ Is it time to do it?

Special **services on demand**

## A4 User demands and provision - coincidence or discrepancies

### Basic questions:

**How to balance the everyday and the high-end user demands?**

**How to define RN policies and development/provision plans?**

**How to avoid the emergence of unrealistic user demands?**

**User demands depend on applications**

**Different user groups are characterised by lower or higher demands**

**Both network development and operation are responsible for performance**

**Network parameters and services should meet both everyday and special needs**

### Suggested answer:

**Everyday and high-end demands to be balanced by due RN policy**

**Short-medium-long range development/provision plans needed**

**Network performance should develop together with growing demands**

## A5 Informing, training, educating, teaching - real users vs. potential users

Difficult work

Using the pyramid DANTE – NRENs – Institutions - Users

Dissemination to all the levels

How is the network operating

AUP

SLAs

The existence of the Intranet Research

Applications and services

Special cases

World connections (inside the Research Intranet)

### A5 Informing, training, educating, teaching - real users vs. potential users

#### Basic questions:

**How to inform the users about network capabilities and services?**

**How to inform the users on high-end e-Infrastructure (Grid, etc.) options?**

**How to feedback user findings about network services/applications?**

**How to organise training and education in the RN and applications area?**

**Complex information** not acceptable by **average users**

**More demanding users** accept/require more **detailed information**

**Special user groups** are prepared to **feedback experiences**

**Optimum** amount of training and education is not easily determined

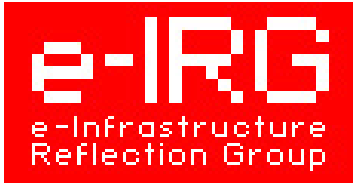
**Suggested answer:** **Different forms and detailedness of information needed**

**High-end applications should receive more detailed**

**information**

**Co-operation should involve bidirectional information flow**

**Different levels of training and education is to be provided**



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## Group B issues

### 3 basic groups of issues to be investigated:

#### Group B: RN Governance

- Organisational Structure, Policy Goals, Funding

- B1 Governing the RN – responsibilities and duties of the providers and the users
- B2 The hierarchical governance model of the European NRENs
  - extension towards applications
- B3 Funding structure, funding level
  - importance, role, influence

## B1 Governing the RN – responsibilities and duties of the providers and the users

Basic organisational / governance unit: **NREN**  
(National Research and Education Network)

Typical NREN governance **models** (all non-profit):

- membership association / bottom-up democracy
- public (gov't) or private (inst.) organisation / top-down control

**Decision making:** members / users → represented / interviewed

Members: institutes, universities, ... involved / neglected (?)

European level: NREN Consortium (NREN PC) – **democracy**

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Sub-NREN level: regional centres ... campuses ... labs



## B1 Governing the RN – responsibilities and duties of the providers and the users

**Basic question:** How the users can be involved in NREN issues?

National level:

Paradox: normally the users are the NREN members ...

Country by country analysis may check if users are really involved

European level:

**NREN PC members = NREN representatives ⇒**

**⇒NRENs = NREN member (user) representatives**

**If / where members are involved, then / there users are welcome ...**

**Suggested answer:** Institutional coverage of the NRENs to be surveyed

- B2 The hierarchical governance model of the European NRENs  
– extension towards applications

Bottom-up model:

**campus ⇒ reg.center ⇒ NREN ⇒ Association & Consortium & Op.Unit**

Role of the **NREN**:

- **Keeping contact with all users + providing service for all users**
- **Representing the users in the Ass. / Cons. (+ TFs, JRAs...)**

Role of the **Association**: representing the NRENs' interests / policies

Role of the **Consortium**: representing the NRENs in contracts

Role of the **Operational Unit**: develop / operate **GEANT** (with the NRENs)  
(**\_the\_ network for European research / ERA**)

Basic task of the NRENs:

- **loyalty with the Association / Consortium**
- **avoidance of "non-GEANT" solutions (damaging to co-operation + funding)**

- B2 The hierarchical governance model of the European NRENs  
– extension towards applications

Basic question:

**appropriateness of hierarchical RN governance model for applications !?**

Background:

- **NRENs cover in most practical cases the (demanding) user communities**
- **ESFRI-PSG stresses necessity of overall pan-European e-Infrastructure**

Building an **Association**: representing the NRE users' interests / policies

Building a **Consortium**: representing the NRE users' in contracts

Establishing an **Op.Unit**: to develop/operate the high level e-Infrastructure

**( \_the\_ Grid ... for European research / ERA )**

Suggested answer:

Open e-IRG WS, 4-5.10.2006

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National and European organisations of high level e-Infrastructure users:

– proven **RN model (TERENA, NREN Consortium, DANTE) to be followed**

## B3 Funding structure, funding level

– importance, role, influence

European co-operation depends on funding level (EU)

Local (national) funding level depends on EU funding level

Relative state of RN (qualitative / quantitative features) closely related

to combined funding level (EU / national)

Maintaining global leading edge position assumes improving impetus  
(however, measuring global position / state not easy)

Funding level determines funding structure  
(operation / development, widening / narrowing)

Many aspects, many viewpoints, many policies, many practices

## B3 Funding structure, funding level

- importance, role, influence

### Basic questions:

**How funding level can cope with increasing use of RN?**

**How financing the RN can take special care of high-end usage?**

**How to keep global position while extending coverage?**

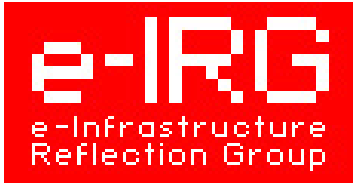
**European level: FP7 should increase annual funding (SFs could help)**

**National level: uncertainty in granted matching moneys to be eliminated**

**Aggregate funding: sustainable funding scheme to be introduced (sustainable EU funding might also allow sustainable local funding)**

**Suggested answer: Proportional funding level (+ sustainability) enables**

**supported service for average and high-end users**



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## Group C issues

### 3 basic groups of issues to be investigated:

#### Group C: RN Development

- Global Role, Uniform Coverage, Collaboration

- C1 Leading edge position in global sense
  - complexity needs a differentiated approach
- C2 Handling the digital divide
  - widening coverage and narrowing gaps
- C3 Co-operation opportunities in evaluating development trends and preparing development plans

C1 Leading edge position in global sense  
– complexity needs a differentiated  
approach

Europe claims **leading RN position** in global sense

**Major features justify** the correctness of the claim

(coverage, complexity, overall management, user base, etc.)

However, no definite measure, no stable state, **no granted position**

Importance of global RN position: crucial **innovation factor**

Special **European feature**: global extension of GEANT access

Maintaining leading edge position is a difficult / **complex task**

(technology, services, applications, geographical coverage,  
organisational coverage, uniformity / homogeneity, ...)

Many aspects = **complex approach**



- C1 Leading edge position in global sense  
– complexity needs a differentiated approach

### Basic questions:

**How to maintain global position in RN?**

**How to achieve overall global leadership in e-Infrastructure?**

**How to approach uniform pan-European leading edge position?**

**Widening pan-European **co-operation** is the key to success**

**Joint efforts** by all actors of e-Infrastructure development / usage  
needed

**Altruistic **collaboration** parallel to overseas **competition** is the secret**

**Suggested answer:** Joint efforts of network developers, operators, and  
users help maintaining (global) leading edge  
position of EU RN.

**Global leadership in RN may substantiate global  
position**

Open e-IRG WS, 4-5.10.2006  
**of pan-European e-Infrastructure in general.**

## C2 Handling the digital divide

### – widening coverage and narrowing gaps

Double (**complementary**) pan-European task

Coverage: **macro and micro** extension (**geographic & disciplinary**)

Digital divide: **local and regional** issues

Role of local / regional (general) **infrastructure** (telcos, fibre, ...)

Basic problems: **financing, expertise, density** of user community

**Promising signals**: CEF / CBF

An everlasting issue?

Additional element of the picture: **global extensions**

EU / EC: **inspiring emphasis** on both issues → also key funding aspect

## C2 Handling the digital divide

– widening coverage and narrowing gaps

### Basic questions:

**How to solve the double task of coverage and divide?**

**Financing dilemmas: subsidiarity and solidarity**

**Pan-European e-Infrastructure: where are the borders?**

**EU enlargement ⇒ West-to-East shifting of coverage / gap issues**

**Funding level maintained: both good news and bad news**

**Diverging views about progress (qualitative / quantitative development)**

**Suggested answer: No way of neglecting either goals**

**Solidarity aspect to supersede subsidiarity aspect**

**Research networking: a forerunner of political**

**relaxation**

**Pan-European research networking goes global – let it**

**be**

C3 Co-operation opportunities in  
evaluating development trends and  
preparing development plans

**e-IRG operates as a neutral (?) advisory body in the area of  
building the future e-Infrastructure (providing input to the EC,  
...)**

**e-IRG is a top-down organisation of delegated government  
representatives**

**e-IRG is a political-strategic body looking mainly for what is desirable  
co-operation needed for matching desires with possibilities ⇒  
realities**

**possible partners in the field of RN: NRENs, PC, DANTE, ENPG (,  
ESFRI)**

**possible obstacles of co-operation & difficulties in joint efforts:  
counter-interests, competition, overlapping, mismatch, lack of  
motivation,**

**lack of contacts, lack of energy, lack of feedback, ... (to be checked)**

C3 Co-operation opportunities in  
evaluating development trends and  
preparing development plans

### Basic questions:

**Which parallel organisations / bodies to approach?**

**What co-operation goals and forms to offer / request?**

**What mutual benefits / advantages can be recognised / utilised?**

**Common goal: leading edge e-Infrastructure for the ERA**

**Possible forms: exchanging ideas, joining expertise, joint outputs**

**Mixing views of directly / indirectly interested parties**

**Suggested answer: NREN PC, TERENA, DANTE, ENPG to be approached  
Joint actions in analysis, foresight, planning to be  
started**

**Obstacles / difficulties of co-operation to be  
eliminated**

**Optimum collaboration forms to be selected / applied  
Benefits of common lobbying to be exploited**

### Summary: Conclusions

- **overlapping of activities (e-IRG, EARNEST, ...) requires co-operation**  
(coverage to be agreed)
- **integrating the efforts (e-IRG, TERENA, ...) increases efficiency**  
(efforts to be joined)
- **matching approaches results in clear / unambiguous messages**  
(approaches of providers / users to be harmonised)
- **balanced view of needs allows harmony in provision / usage**  
(balanced view to be attained)
- **proven organisational / governance structure of RN widely extendable**  
(extension to entire e-Infrastructure theoretically possible)
- **lack of appropriate funding causes losing impetus**  
(annual FP7 funds to be considerably elevated)
- **sustainability is a common key goal**  
(sustainable operation & sustainable funding)

### Summary: Suggested Next Steps (others may follow):

- e-IRG – TERENA – DANTE co-operation  
**to survey demand / supply in network service**  
**(user / provider forecasts to allow realistic balancing)**
- E-IRG – TERENA – NREN PC- ENPG co-operation  
**to survey funding needs in view of European and global goals**  
**(necessity / availability of European and national funds to be investigated)**
- E-IRG – TERENA – NREN PC- ENPG co-operation  
**to survey operational / financial sustainability**  
**(conditions of complex sustainability to be analysed, corollaries to be derived)**

**Templates / questionnaires: do they help?**

## Main message:

### Research Networks

- are of excellent state in 2006
- are the result of 20 years intense efforts
- are managed by the scientific community
- are operated by NRENs (totally different from „normal” CSPs)
- are directly driven by the specific and advanced user's needs
- are characterised by a proven, well working governance structure
- have to keep the high standard
- need continuous development
- should fulfil the growing needs of scientific users
- need collaboration with most advanced user(s) (groups)
- should continuously aim at next generation technologies
- should step by step develop the next generation solutions
- need considerable financial support
- should be funded both nationally and on the European level

Leading edge RN to be maintained, extended,  
improved!