Participation of Moldova in regional eInfrastructure initiatives

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www.asm.md www.renam.md

ELECTRONIC INFRASTRUCTURE

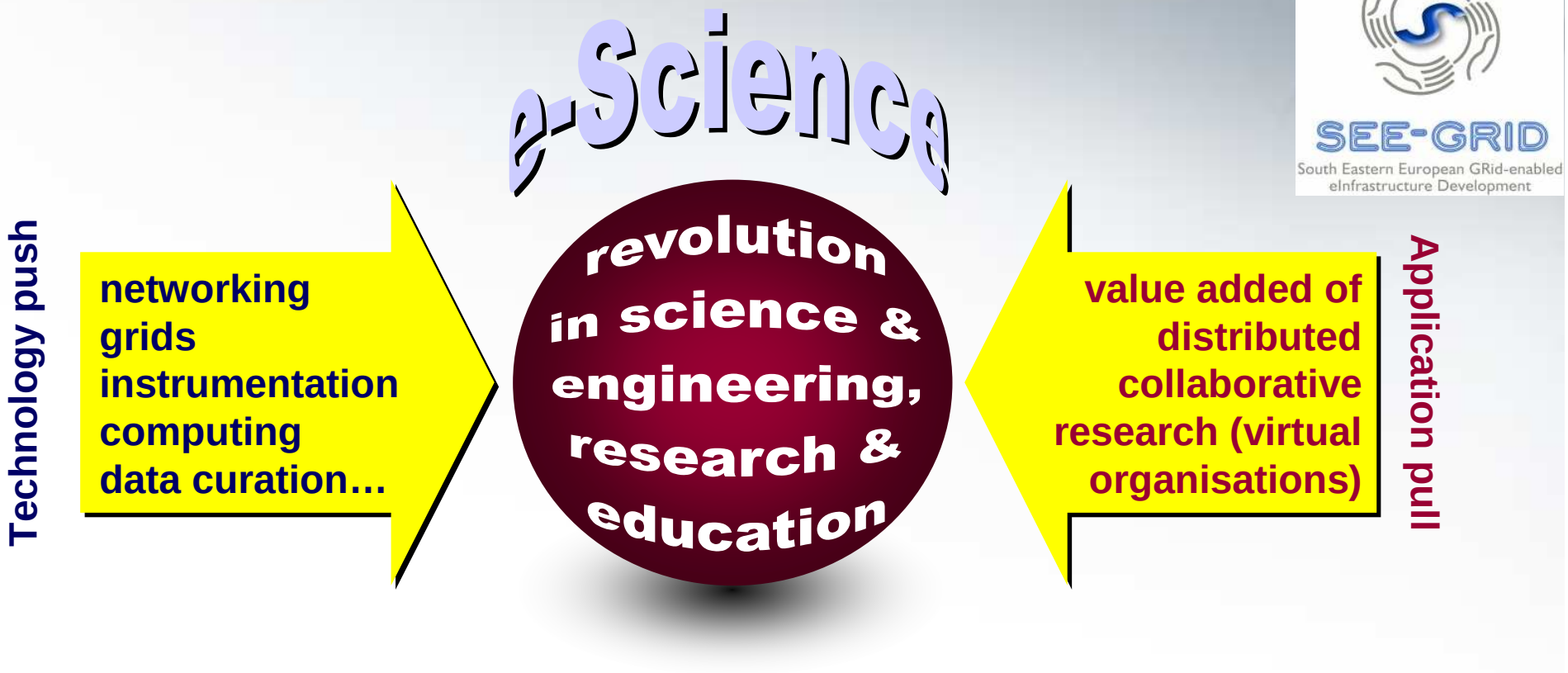
Enabling large-scale innovative research through collaboration of distributed teams of scientist across the European Research Area (ERA) paves the way towards a long-term vision of a *sustainable*, *transparent* and *ubiquitous* **electronic infrastructure (eInfrastructure)** open to a wide range of scientific user communities, providing the development of Information Society in Europe.

Importance of e-Infrastructure

What is eInfrastructure:

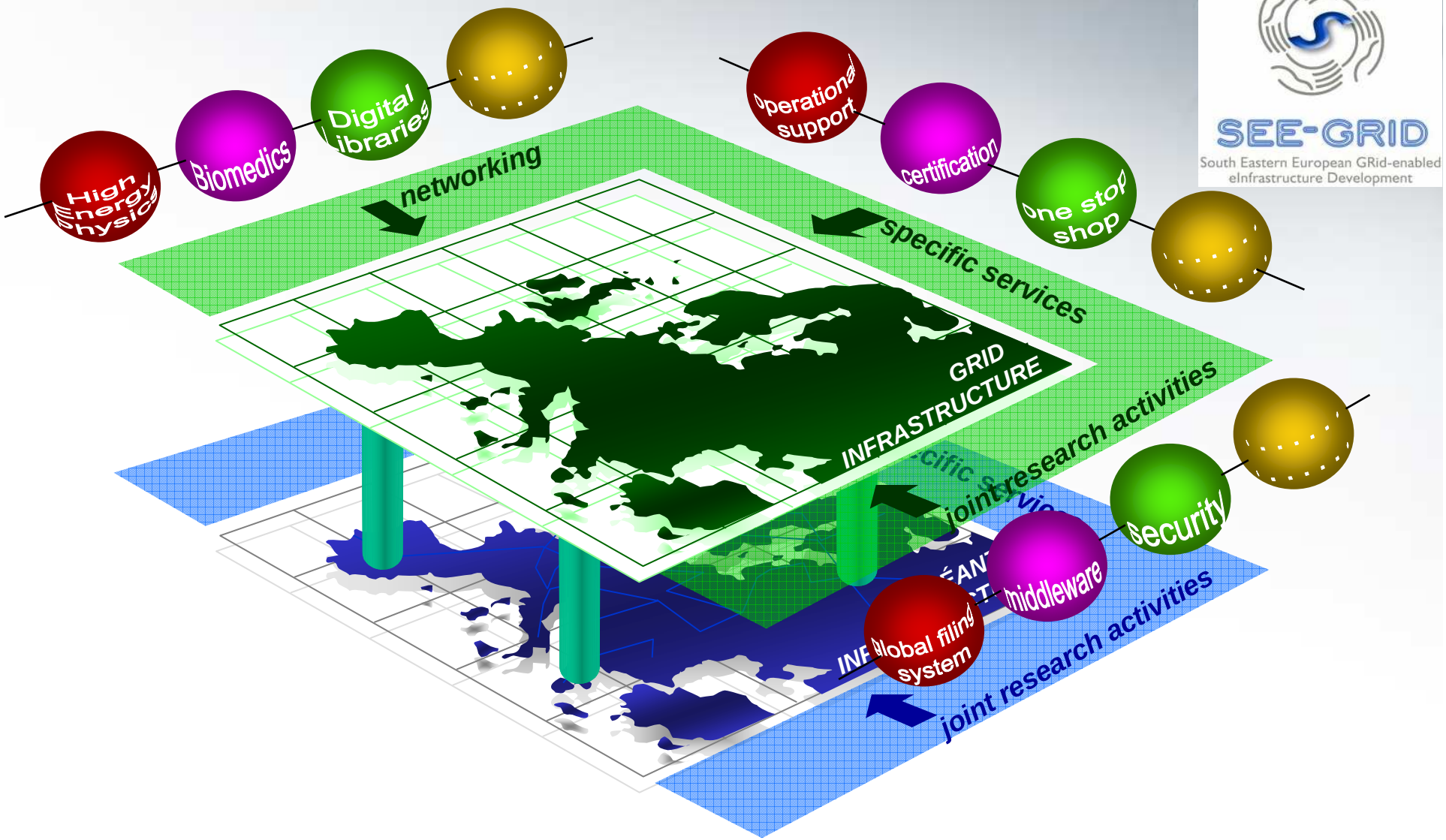
- e-Infrastructures developing worldwide will provide researchers and economy a common market of electronic resources, accessible on a 24-hour basis, regardless of the place, and a unique tool for the development of collaborating applications.
- The term e-Infrastructure refers to new research environment in which all researchers - whether working in the context of their home institutions or in national or multinational scientific initiatives - have shared access to unique or distributed scientific facilities (including data, instruments, computing and communications), regard-less of their type and location in the world.
- Research & Educational networking infrastructures
- Distributed environment based on Grid Computing

eInfrastructure - new way of doing Science

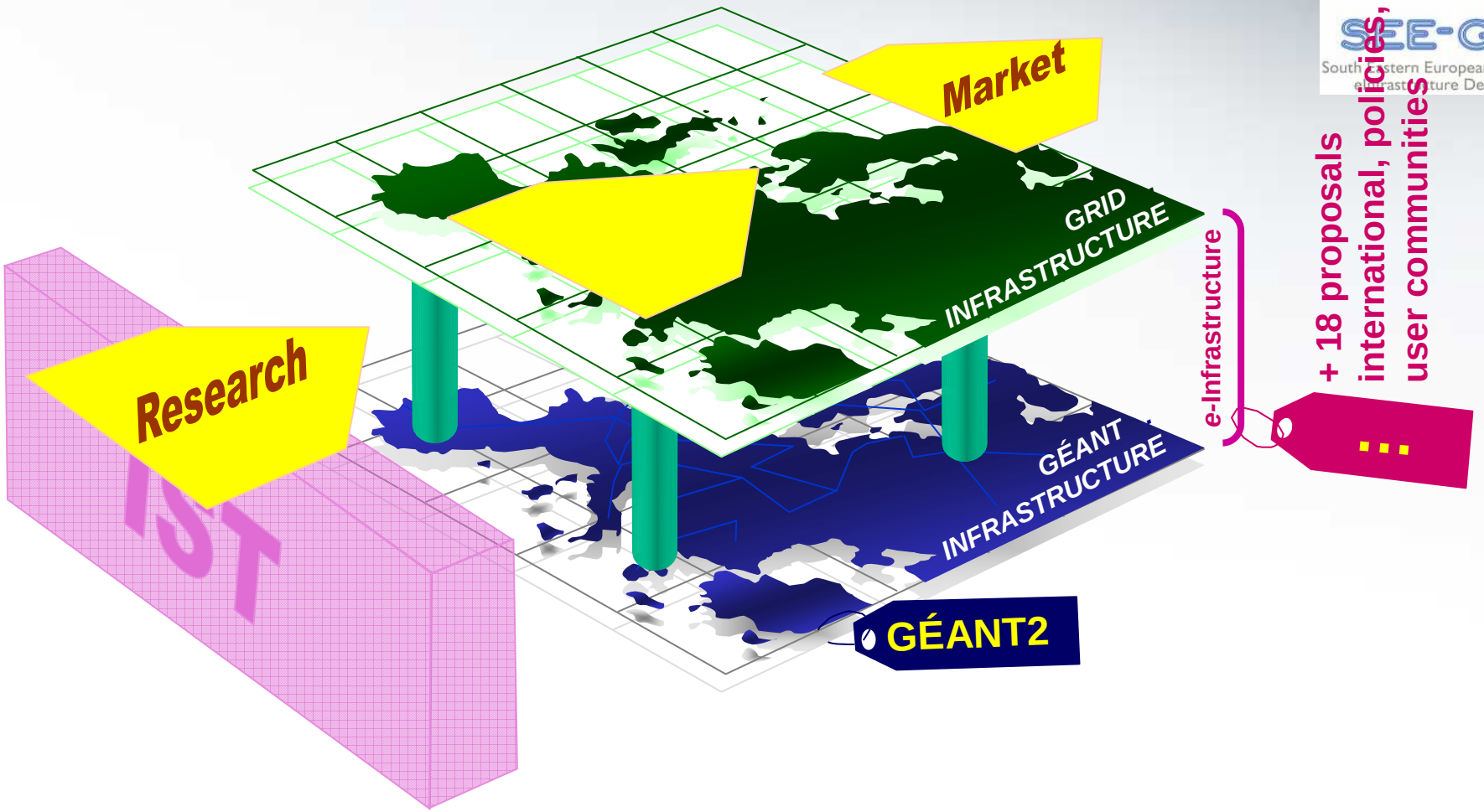


a new way for all scientists to work on research challenges that would otherwise be difficult to address

e-Infrastructure - Implementation blocks

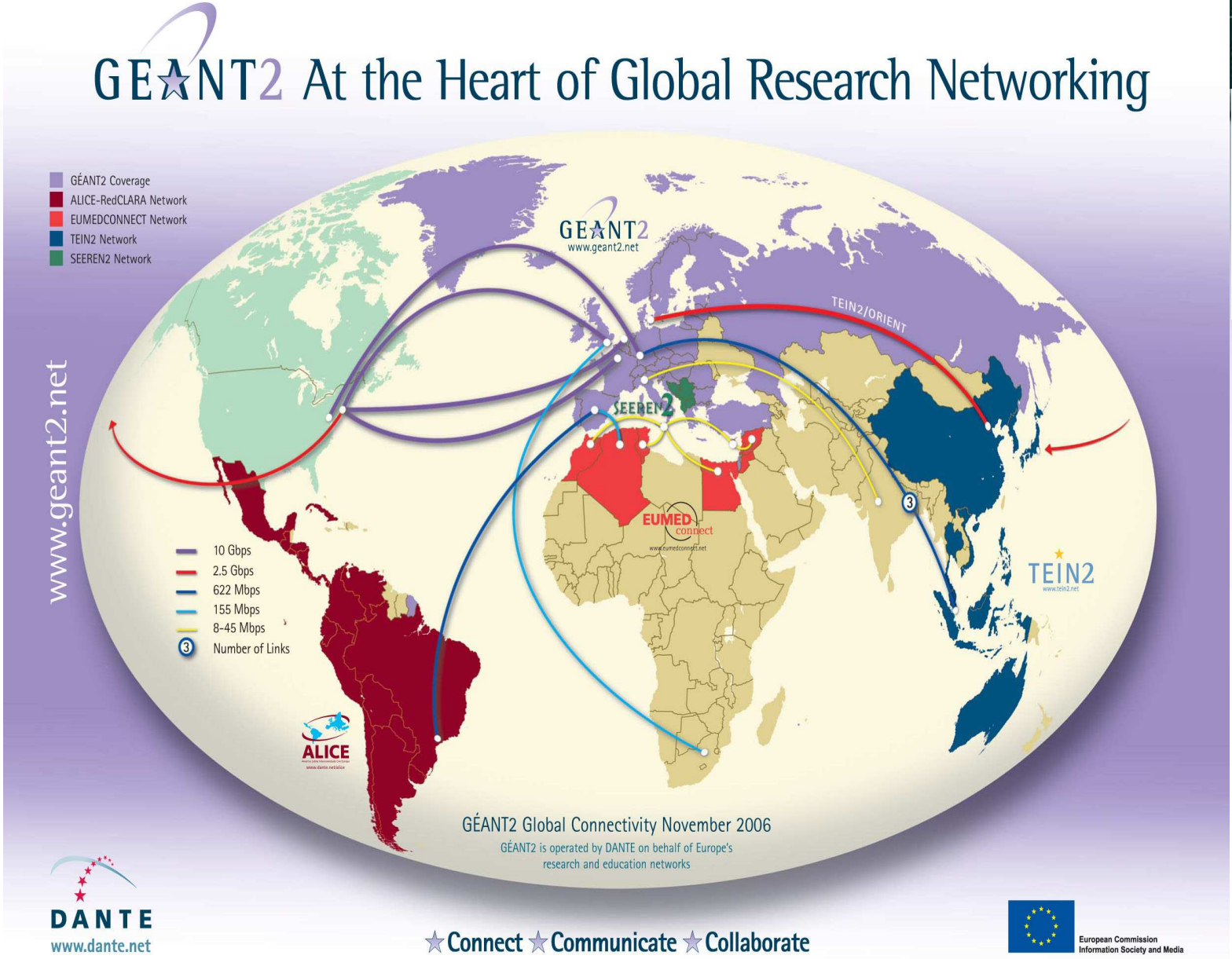


e-Infrastructure - Strategic building blocks



Research & Educational networking in Europe

- Since 1993 European Commission started development of common Pan-European networking infrastructure with the aim to unite all research and educational institutions.
- R&E network development passed several stages. Now Trance-European infrastructure is named GEANT2 and has became one of the most developed Internet segment in the world.
- The fundamental principle of common R&E infrastructure building in Europe lay on development of National Research and Educational Networks (NREN).
- GEANT Network uses common approach – it joins one NREN from every country and these NRENs ensures interrelation and provides access of national R&E institutions to GEANT resources.


GÉANT2 At the Heart of Global Research Networking
GÉANT2 Coverage
ALICE-RedCLARA Network
EUMEDCONNECT Network
TEIN2 Network
SEEREN2 Network
www.geant2.net
GÉANT2
www.geant2.net
TEIN2/ORIENT
SEEREN2
EUMED connect
www.eumedconnect.net
TEIN2
www.tein2.net
ALICE
10 Gbps
2.5 Gbps
622 Mbps
155 Mbps
8-45 Mbps
3
Number of Links
GÉANT2 Global Connectivity November 2006
GÉANT2 is operated by DANTE on behalf of Europe's
research and education networks
DANTE
www.dante.net
★Connect ★Communicate ★Collaborate
European Commission
Information Society and Media

Advancing the Information Society in East and South-East Europe

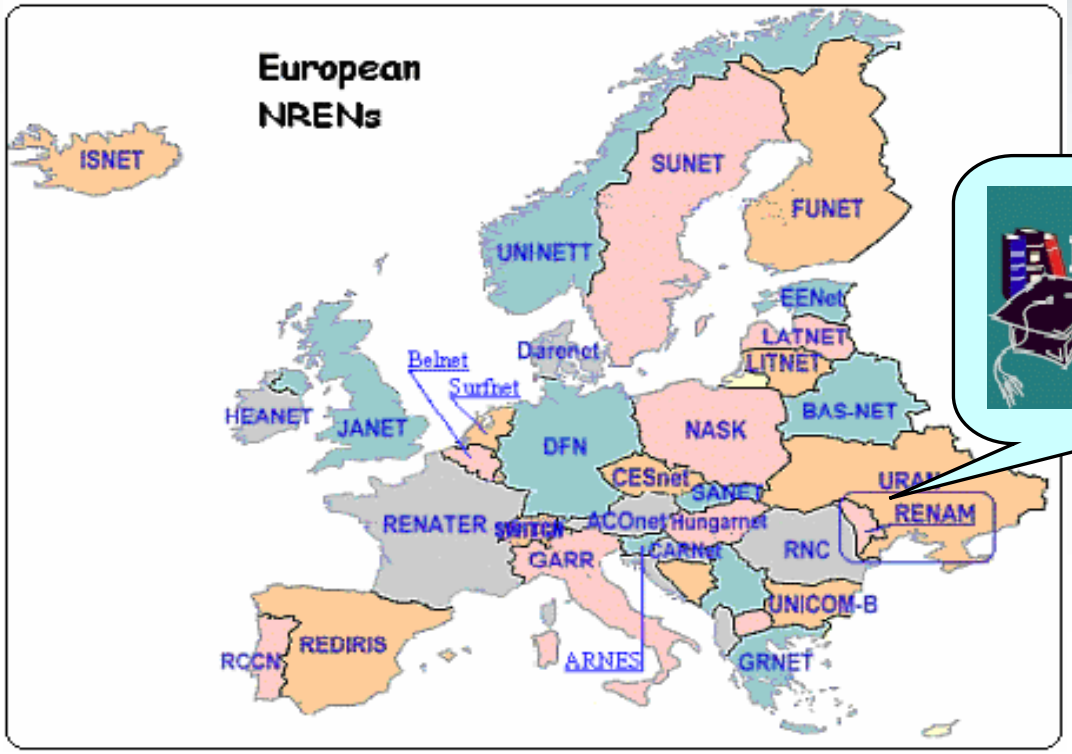
In the past 5 years a number of targeted initiatives funded by the European Commission programs have contributed to ameliorating the state of eInfrastructures in the Eastern Europe and in SEE region:

- **SEEREN**
- **SEE-LIGHT**
- **SEE-GRID, SEE-GRID2 and SEE-GRID-SCI projects**
- **Porta Optica Study project**

The aims of these initiatives are:

- **to provide wide access** to modern infrastructures and services,
- **to activate** new user communities and
- **to enable** collaborative research activities**.**

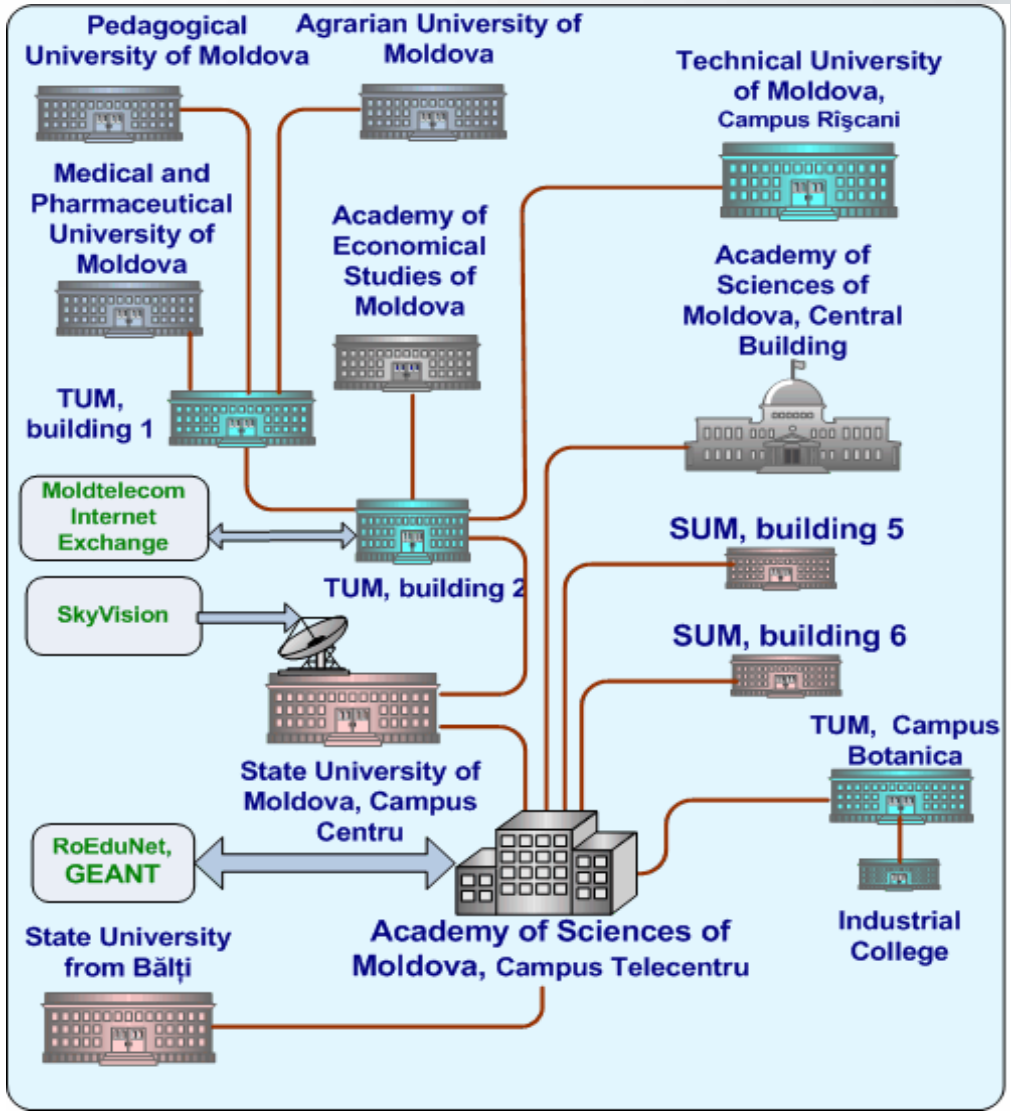
RENAM: Research and Educational Networking Association of Moldova



ASM

TUM

RENAM network general information



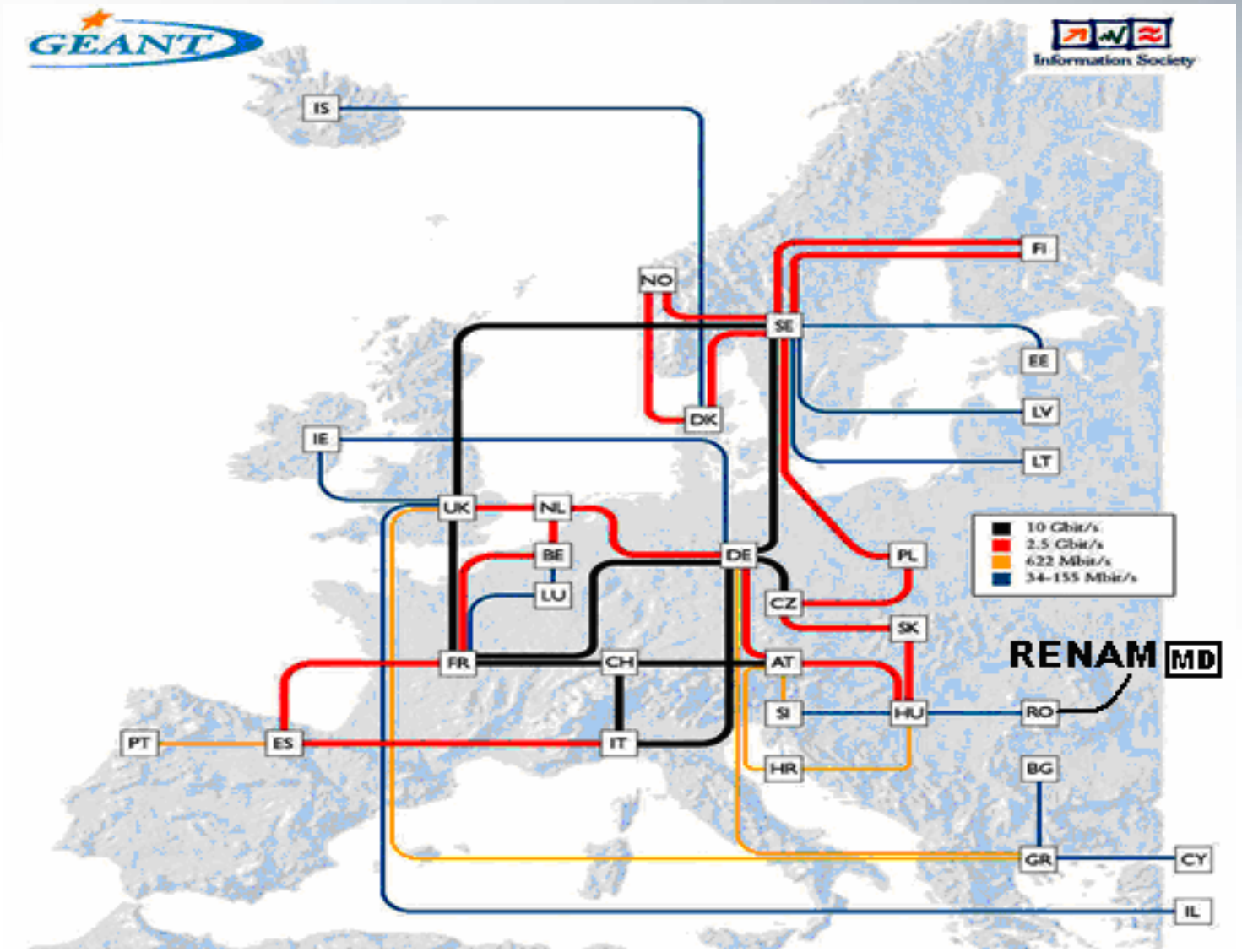
RENAM networking infrastructure joins:

- **40 research institutes,**
- **10 universities and**
- **5 colleges.**
- **about 5000 scientists and professors,**
- **1000 Ph.D. students and**
- **more than 80 000 university students.**

RENAM infrastructure provides connectivity to the universities and organizations placed in Chisinau and other localities of Moldova.

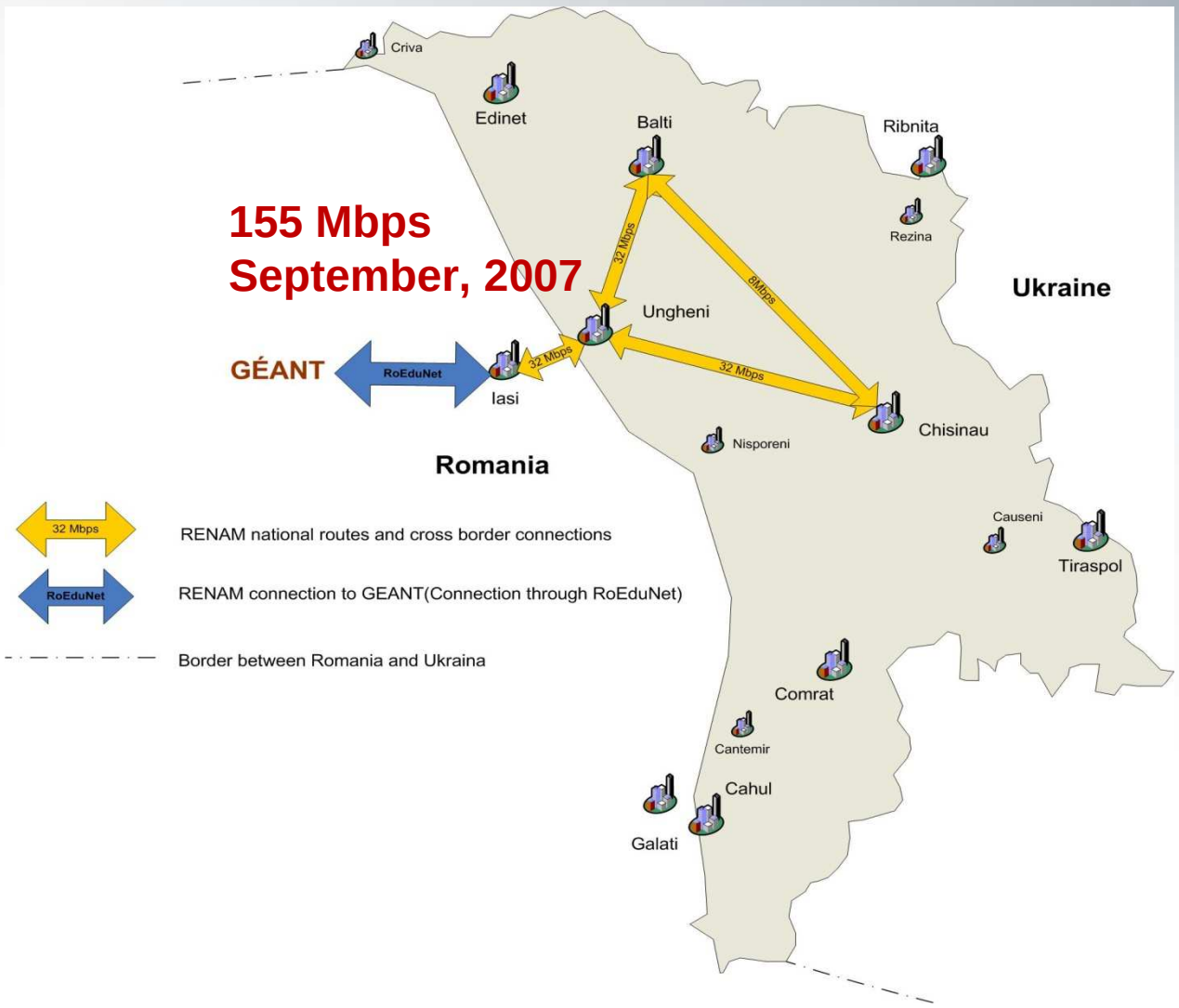
The network node was realized in Balti State University, which joins also 4 technical colleges from Balti City.

Connection of RENAM to GEANT2



SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

Territorial and external connections of RENAM network



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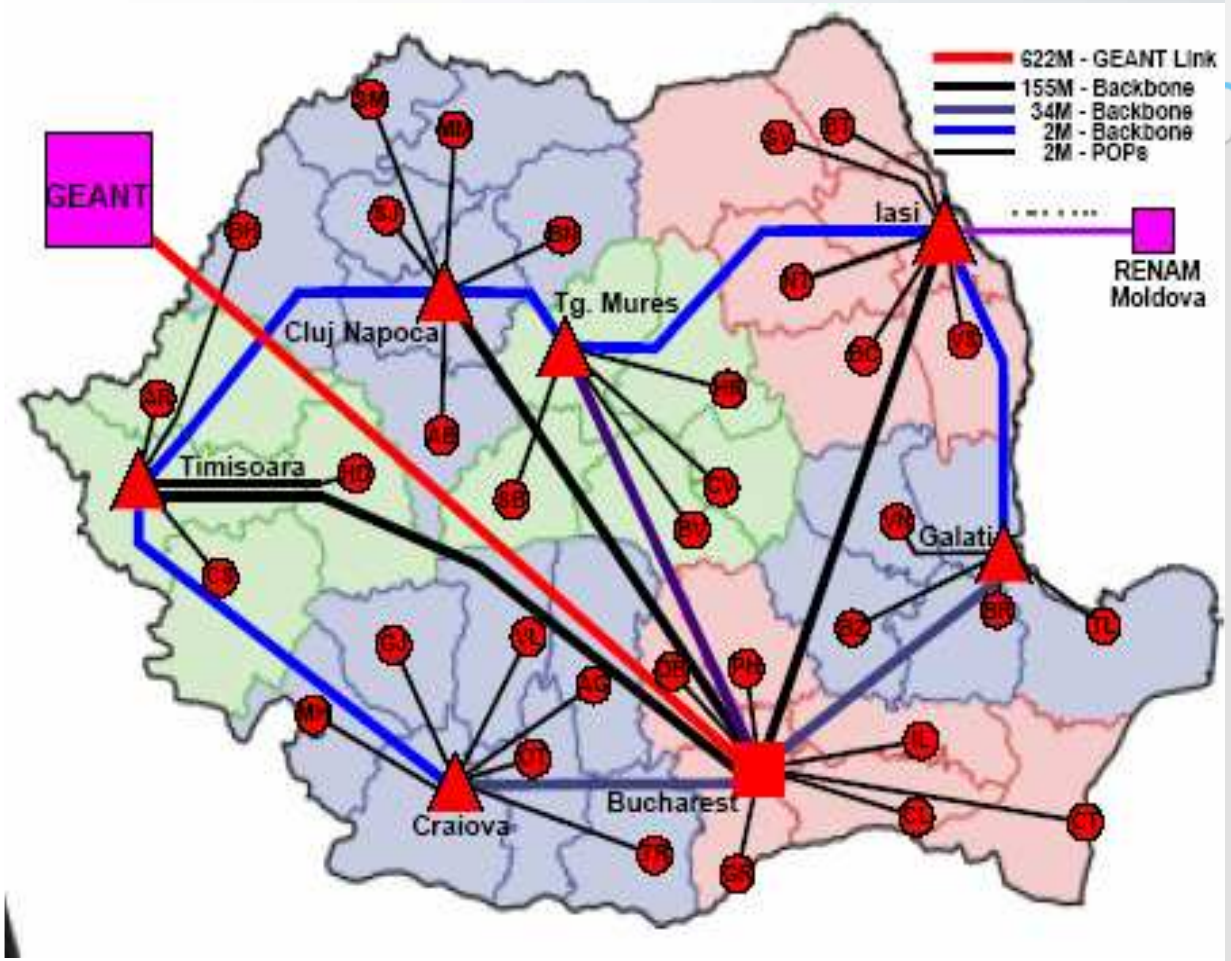
RoEduNet extension to RENAM



RENAM – RoEduNet - GEANT fiber connection

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Prospects of regional cross-border fiber infrastructure development for research and education support:

- EC FP6 Porta Optica Study project - DISTRIBUTED OPTICAL GATEWAY TO EASTERN EUROPE
- BLACK SEA INITIATIVE
- NATO project - NEW RENAM-ROEDUNET GATEWAY BASED ON CWDM TECHNOLOGIES IMPLEMENTATION
- EC FP7 SEE-GRID-SCI project – SA1 activity, task SA1.3 - Network Resource Provision

FP6 EC “Porta Optica Study” project

- “Porta Optica Study” is an European Commission co-funded Specific Support Activity Project.

- Its ultimate goal is stimulation and consolidation of initiatives to ensure the successful, dark-fiber based research network deployment in the Eastern Europe, including Republic of Moldova, Baltic states and Southern Caucasus regions.

http://www.porta-optica.org

Porta Optica Study project - Overview

- 9 beneficiary countries
  total area: 1 206 258 sq km
  (area of UE: 3 976 372 sq km)
- 3 main regions:
  - ***Eastern Europe:*** *Belarus, Ukraine, Moldova*
  - ***Baltic states:*** *Estonia, Latvia, Lithuania*
  - ***Southern Caucasus:*** *Armenia, Azerbaijan, Georgia*
- 12 project partners

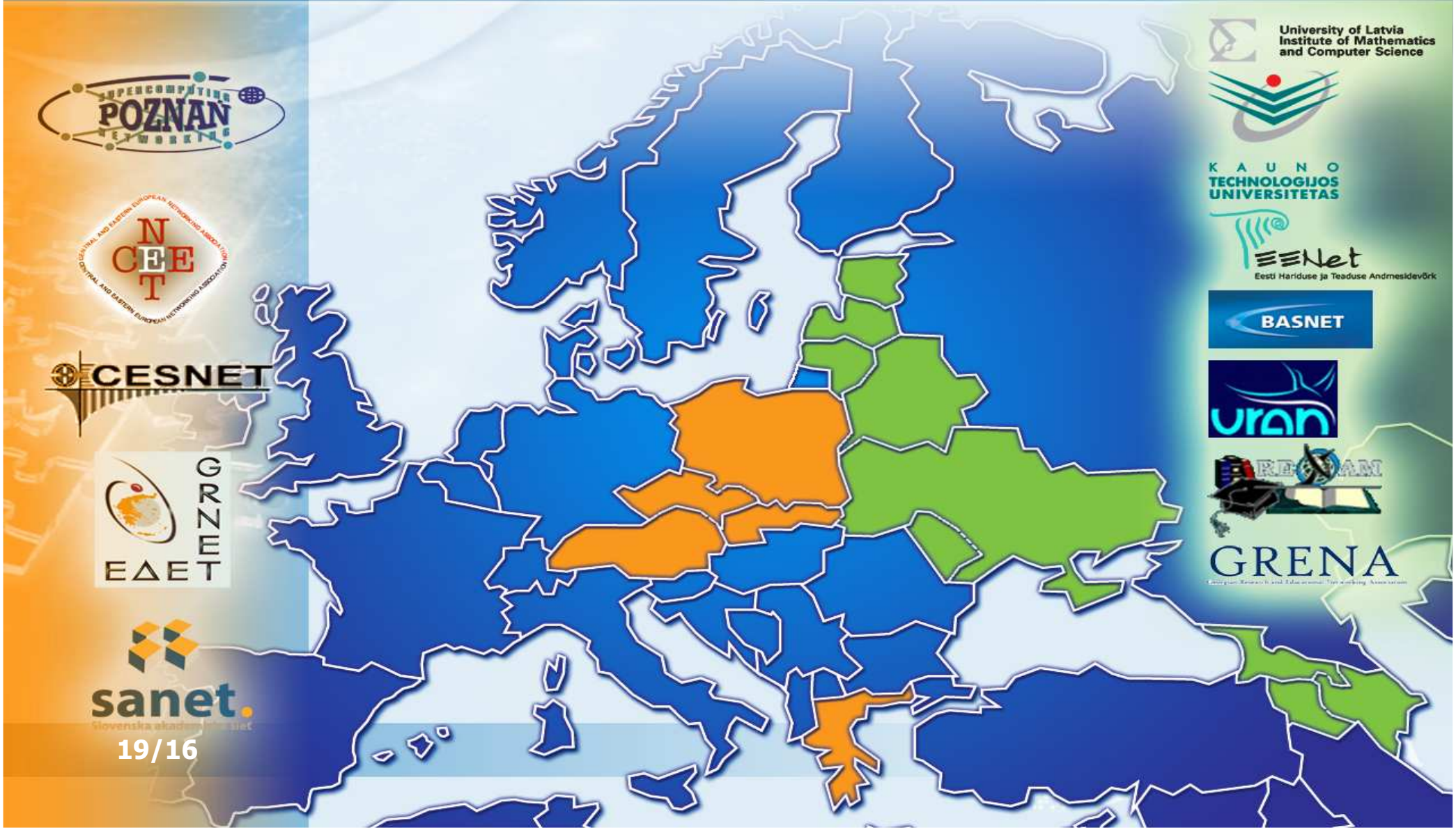
Information Society and Media

Porta Optica Study project - Partners

	Participant name	short name
1	Institute of Bioorganic Chemistry PAS – Poznan Supercomputing and Networking Center	PSNC
2	Central and Eastern European Networking Association	CEENet
3	Kaunas University of Technology	LITNET
4	Institute of Mathematics and Computer science, University of Latvia	IMCS-UL
5	Estonian Educational and Research Network	EENet
6	Center for European Integration Ltd.	URAN
7	National Center of Information Resources and Technologies of the Republic of Belarus	NCIRT
8	Research and Educational Networking Association of Moldova	RENAM
9	Georgian Research and Educational Networking Association	GRENA
10	Greek Research and Technology Network	GRNET
11	CESNET, z.s.p.o.	CESNET
12	Slovak Academic Network Association	SANET

PORTA OPTICA
distributed optical gateway to Eastern Europe

Partners



Moldova – parameters of the network development

2.5 Gbps GÉANT2 connectivity required for 2009
1 Gbps main backbone planned
Leasing lambda channel
About 1400 km of leased lambda lines
Possible construction of DF

Potential Impact

7 cities

50 scientific institutions

35 higher education institutions

78 500 university students

Information Society and Media

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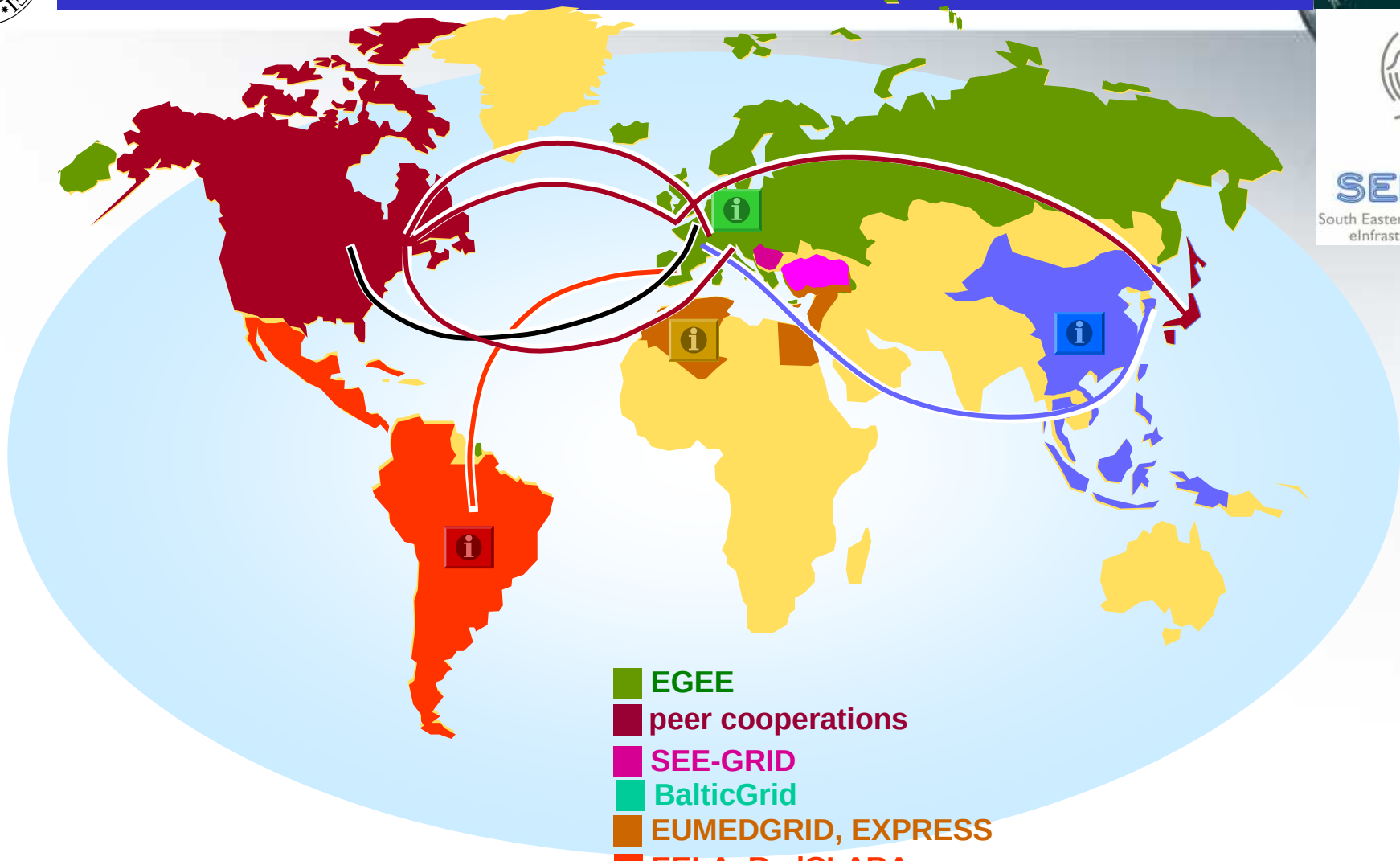
South Eastern European GRid-enabled eInfrastructure Development

Black Sea Initiative

- The aim of the BSI is interconnection of NRENs in countries of Black Sea region with fiber optic.
- Meetings of several NRENs were held in May and November 2006 in Istanbul and in August 2007 in Poznan.
- NRENs from Armenia, Azerbaijan, Belarus, Bulgaria, Moldova, Georgia, Greece, Poland, Romania, Russia, Turkey and Ukraine expressed interest to participate in BSI.
- Cooperation with BSUN – the Ukraine is now in the chair of this organization and intensively promote Black Sea networking initiative

Black Sea Initiative

Grids: regional expansion 2004-2008



SEE-GRID
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SEE-GRID-2 project

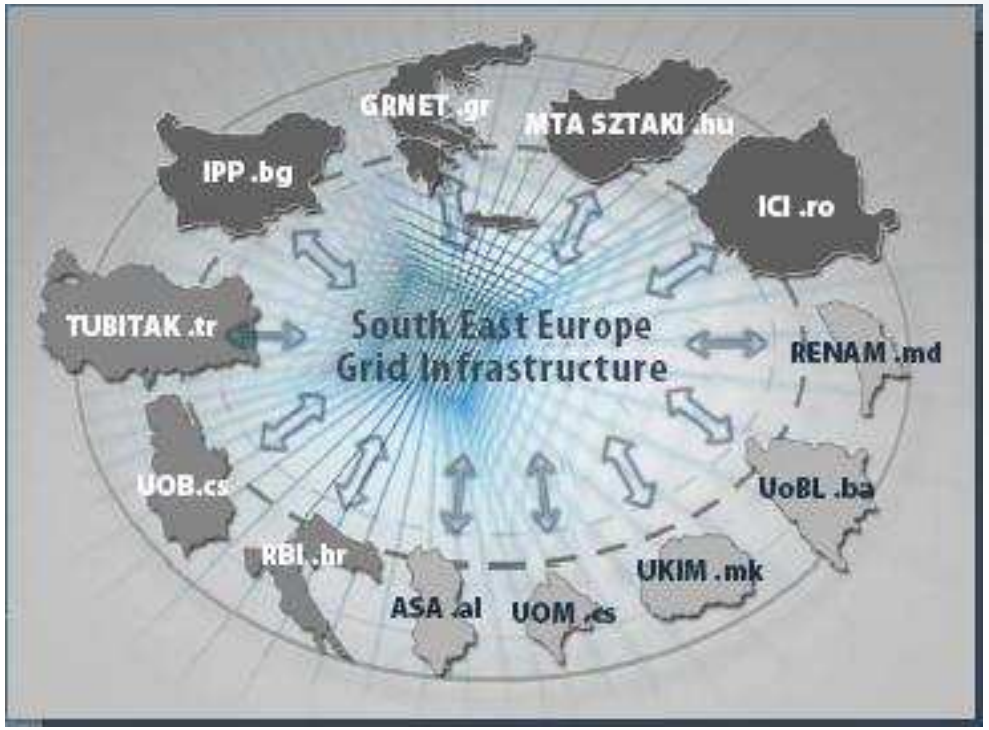
Contractors

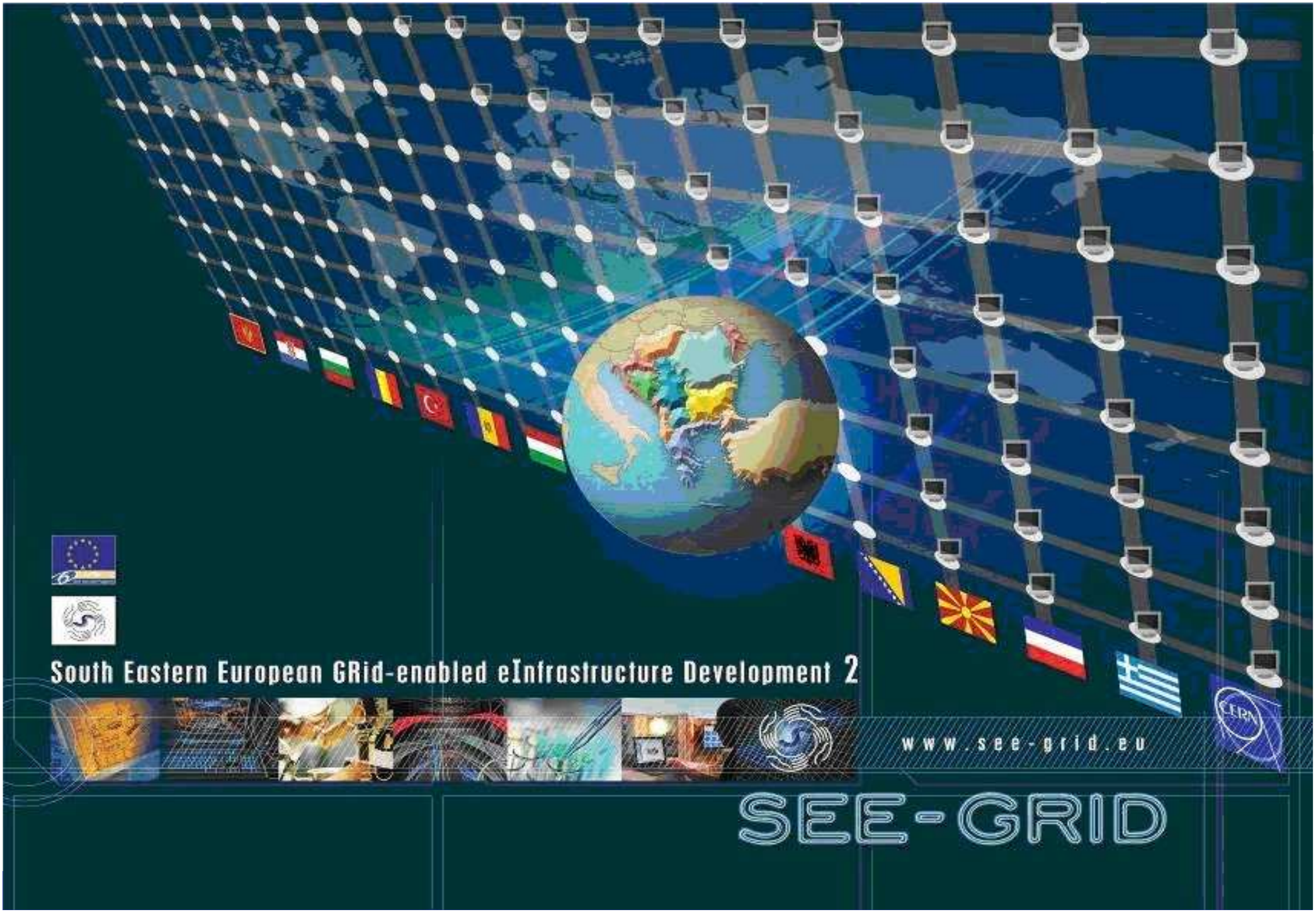
GRNET	Greece
CERN	Switzerland
SZTAKI	Hungary
IPP-BAS	Bulgaria
ICI	Romania
TUBITAK	Turkey
ASA/INIMA	Albania
UoBL	Bosnia-Herzegovina
UKIM	FYR of Macedonia
UOB	Serbia
UoM	Montenegro
RENAM	Moldova
RBI Croatia	

Third Parties
27 universities / research centres

SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

Start date:	**01/05/2006**
Duration:	**24 months**
Total Budget:	**2,028,886 €**

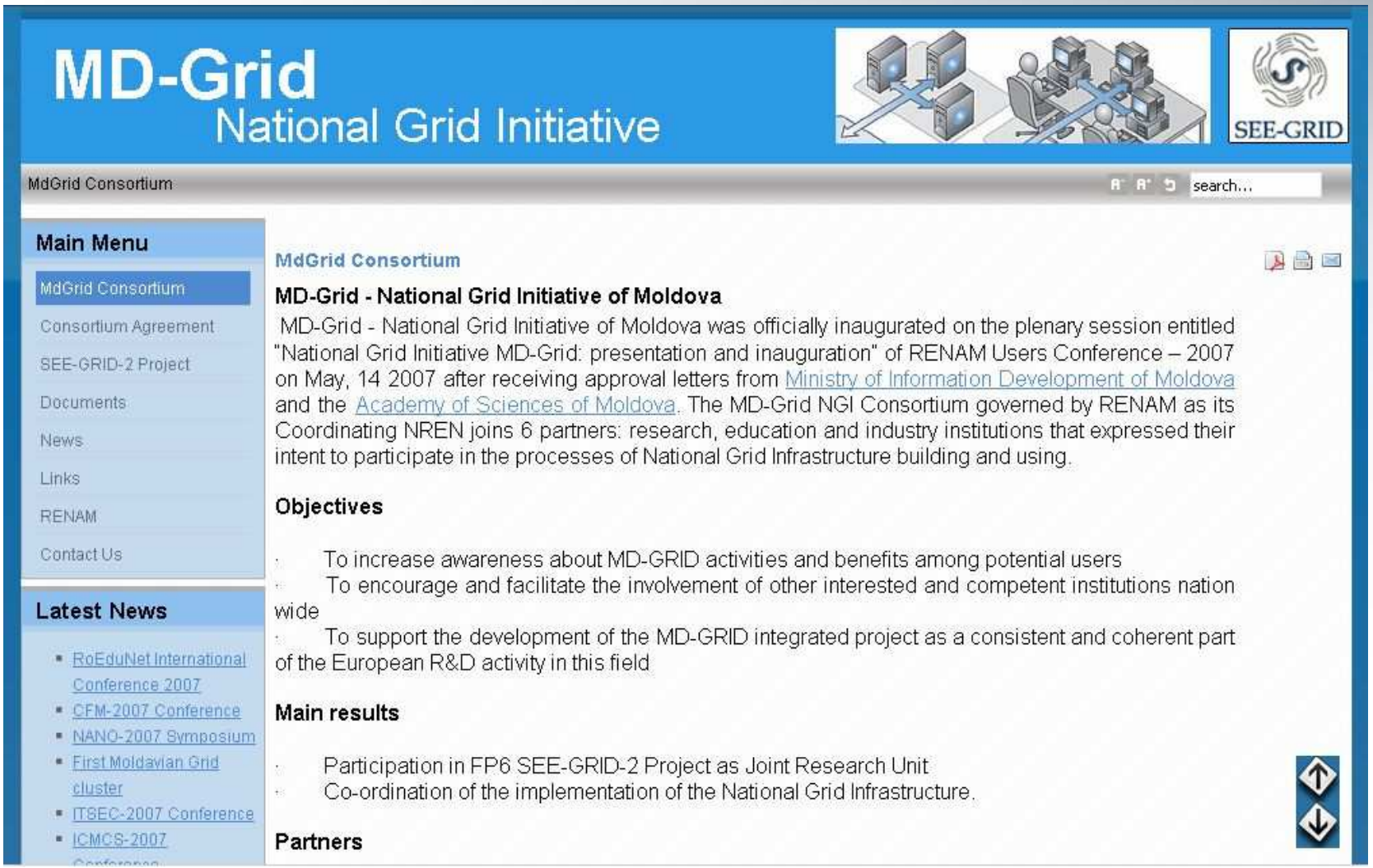



South Eastern European GRid-enabled eInfrastructure Development 2
www.see-grid.eu
SEE-GRID

eInfrastructures strategic priority: NGI

- **Formation of stable National Grid Initiatives** is the key to long-term sustainability
- **NGI concentrates efforts** at National level in order to deploy, operate, and expand grid infrastructures in a coherent and coordinated way
- **NGI involves interoperation** of Academic and Research resource centers under an umbrella of national programs aiming to integrate the available resources in order to establish an e-Infrastructure for the benefit of the R&E communities, and in the long-term - for the society at large
- **EGI – European Grid Initiative:** will join and harmonize the experience of almost all European NGIs

www.grid.md


MD-Grid
National Grid Initiative
SEE-GRID
MdGrid Consortium
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Consortium Agreement
SEE-GRID-2 Project
Documents
News
Links
RENAM
Contact Us
Latest News
RoEduNet International Conference 2007
CFM-2007 Conference
NANO-2007 Symposium
First Moldavian Grid cluster
ITSEC-2007 Conference
ICMCS-2007
MdGrid Consortium
MD-Grid - National Grid Initiative of Moldova
MD-Grid - National Grid Initiative of Moldova was officially inaugurated on the plenary session entitled "National Grid Initiative MD-Grid: presentation and inauguration" of RENAM Users Conference – 2007 on May, 14 2007 after receiving approval letters from Ministry of Information Development of Moldova and the Academy of Sciences of Moldova. The MD-Grid NGI Consortium governed by RENAM as its Coordinating NREN joins 6 partners: research, education and industry institutions that expressed their intent to participate in the processes of National Grid Infrastructure building and using.
Objectives
· To increase awareness about MD-GRID activities and benefits among potential users
· To encourage and facilitate the involvement of other interested and competent institutions nation wide
· To support the development of the MD-GRID integrated project as a consistent and coherent part of the European R&D activity in this field
Main results
· Participation in FP6 SEE-GRID-2 Project as Joint Research Unit
· Co-ordination of the implementation of the National Grid Infrastructure.
Partners

MD-Grid NGI/JRU actual Members

- **RENAM -** Coordinator
- **FRT -** Faculty of Radioelectronics and Telecommuni-cations of Technical University of Moldova
- **IMI/IMCS -** Institute of Mathematics and Computer Science of Academy of Sciences of Moldova
- **IGS -** Institute of Geophysics and Seismology of ASM
- **SHMS -** State Hydrometeorological Service
- **SPH -** School of Public Health. State Medical and Pharmacy University of Moldova
- **IAPh -** Institute of Applied Physics of ASM

MD-Grid NGI Aims and Tasks

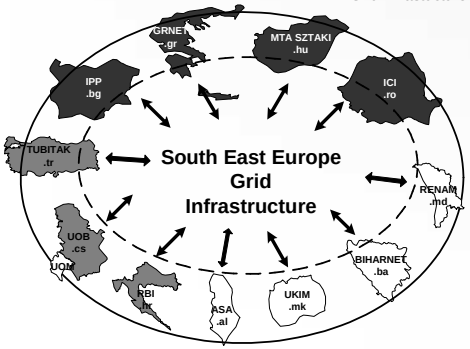
- **MD-Grid NGI** participates in strategic European Programs for the development of transnational grids and in initiatives for the completion of SEE eInfrastructures. The operation of the MD-Grid NGI implements the general EU policy on the development of national initiatives for the coordination of actions related to eInfrastructures and Grids.
- **The integration** of Grid actions (infrastructures, middleware and applications) with the broadband research and technology network into a standard e-Infrastructures system. Optimization of exploitation of advanced network resources and services of RENAM which can serve the new e-Science generation and will attract the greater users community of the Information Society to the mass adoption of advanced services provided by Grid architectures.
- **Permanent development** and administration of Grid sites infrastructure in Moldova

MD-GRID eInfrastructure

MD-GRID NGI site	Available CPU	Available storage	Network
Certificated sites			
MD-01-TUM	5 Intel P-IV 3,0 GHz CPUs	5 120 Gb equals to 500 Gb of storage	1 Gbit Ethernet
MD-04-REN	5 Dual Core Xeon 5130 CPUs	3 250GB SATAII Drives in RAID 5, equals to 500 Gb of storage	1 Gbit Ethernet
Installed cluster's equipment (not certificated yet)			
MD-02-IMI	9 Dual Core Xeon 5130 CPUs	5 250GB Drives in RAID 5, equals to 1 TB of storage	1 Gbit Ethernet
Plan to be integrated in MD-NGI			
MD-05-USM	4x2xAMD 275 Dual-Core 2.2GHz and 3x2xAMD 280 Dual-Core 2.4GHz CPUs	2x500GB 7.2k SATA and 4x80 GB 7.2k SATA	1 Gbit Ethernet
Planned to be installed till the end of year 2010			
MD-03-SPH	5 x CPU AMD Athlon 64 X2 6000+ (3.0GHz, 2x1MB, 1000MHz)	4*160 GB + 1*320 GB SATAII Drives	100 Mbps Ethernet

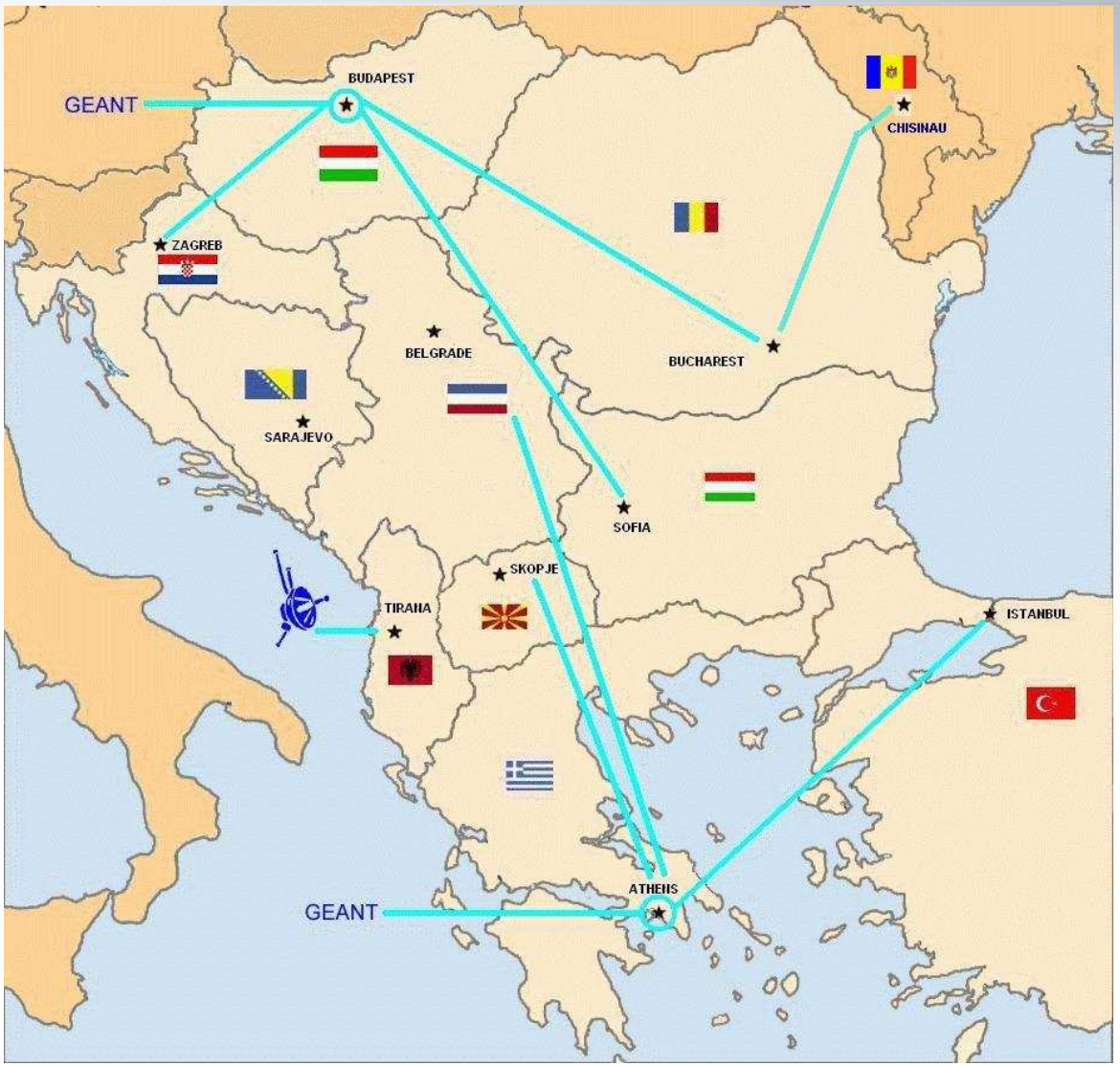
First GRID cluster in Moldova mounted at FRT TUM in April 2006

Pan-European
Production-level
Grid Infrastucture



SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

SEEGRID infrastructure - connectivity scheme



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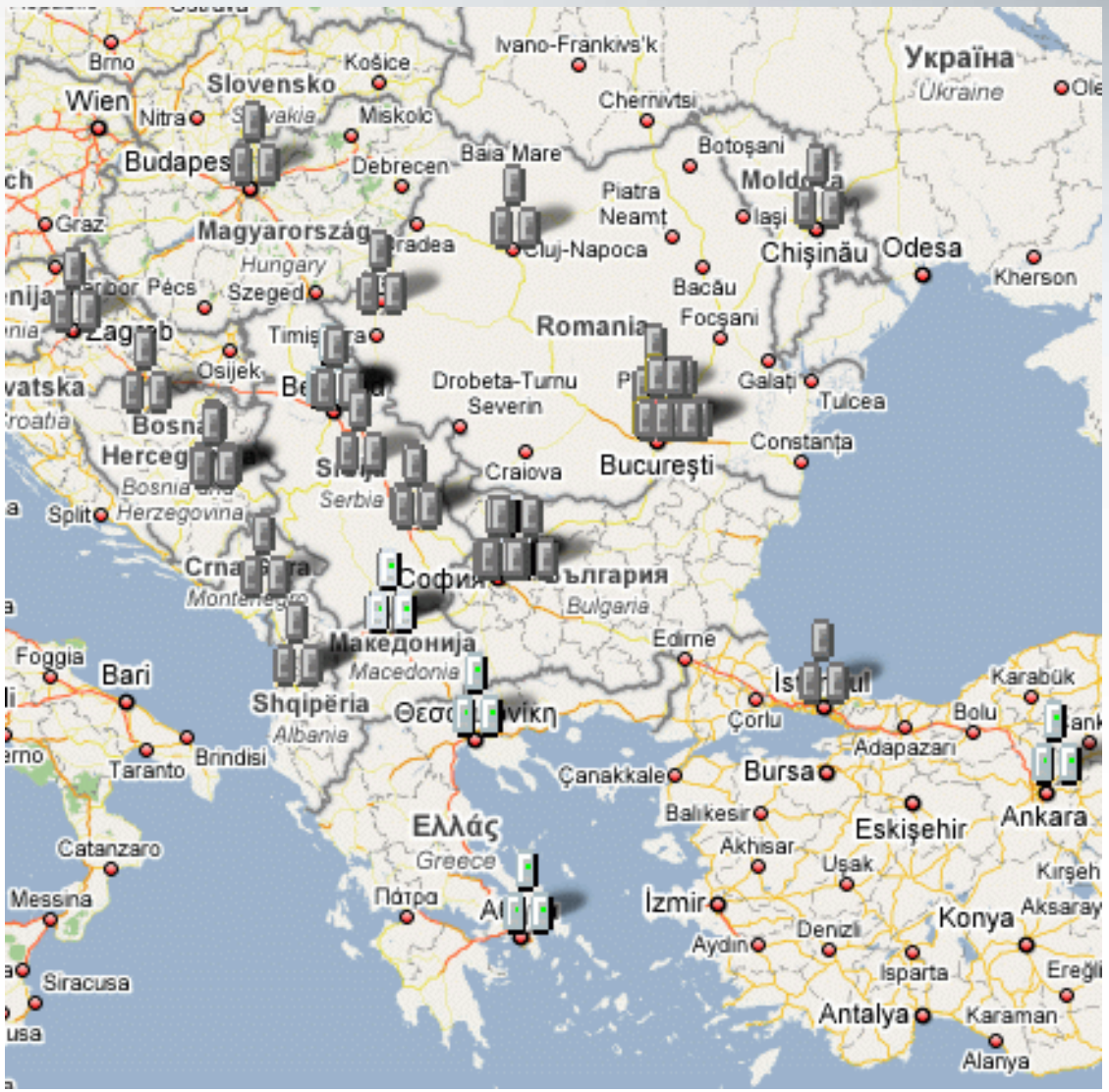
SEE-GRID infrastructure nodes



SEE-GRID-SCI: e-Infrastructure for regional e-science

SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

SEE-GRID-SCI Participants

Participant organisation name	Short name	Country
Greek Research and Technology Network	GRNET	GR
European Organization for Nuclear Research	CERN	CH
Institute for Parallel Processing - BAS	IPP	BG
National Institute for Research & Development in Informatics	ICI	RO
The Scientific and Technological Research Council of Turkey	TUBITAK	TR
Computer and Automation Research Institute	SZTAKI	HU
Polytechnic University of Tirana	UPT	AL
University of Banja Luka	UoBL	BA
SS. Cyril and Methodius University of Skopje	UKIM	MK
University of Belgrade	UOB	RS
University of Montenegro	UOM	ME
Research and Educational Networking Association of Moldova	RENAM	MD
Ruđer Bošković Institute	RBI	HR
Institute for Informatics and Automation Problems, National Academy of Sciences of Armenia	IIAP-NAS-RA	AM
Georgian Research and Educational Networking Association	GRENA	GE

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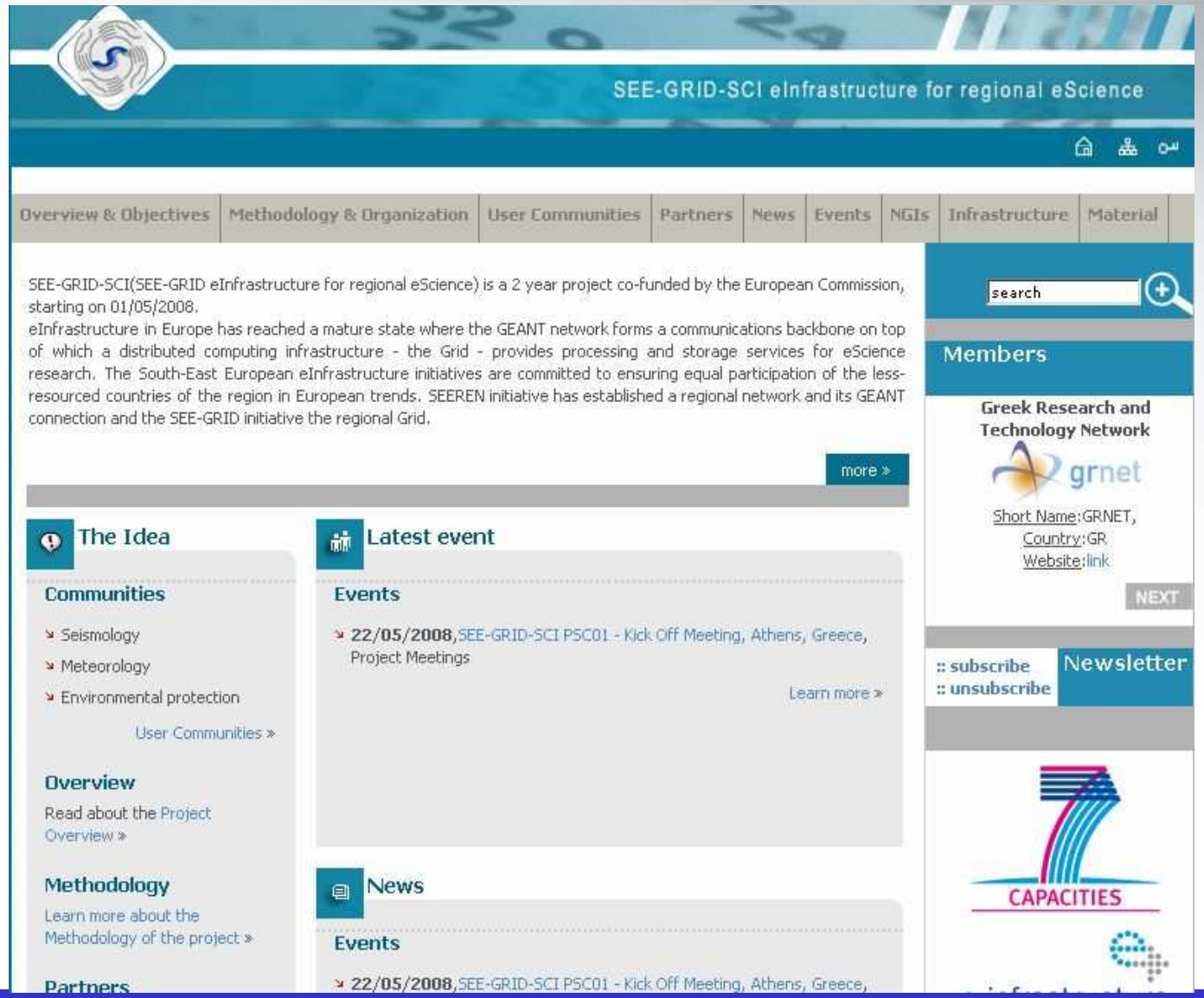
www.see-grid-sci.eu



SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

SEE-GRID-SCI Main Areas of Activity

- **Stimulation** of regional eInfrastructure development by opening up its use to target scientific communities and specifically encouraging the cross-border user communities, scientific collaboration and use of the eInfrastructure in South-East Europe as a whole.
- **Expansion** towards new user communities
- **Strengthening** of existing user communities in the region by specifically supporting of the non-EGEE countries through maturing their NGIs for inclusion in the envisaged European Grid Initiative

SEE-GRID-SCI Main Objectives

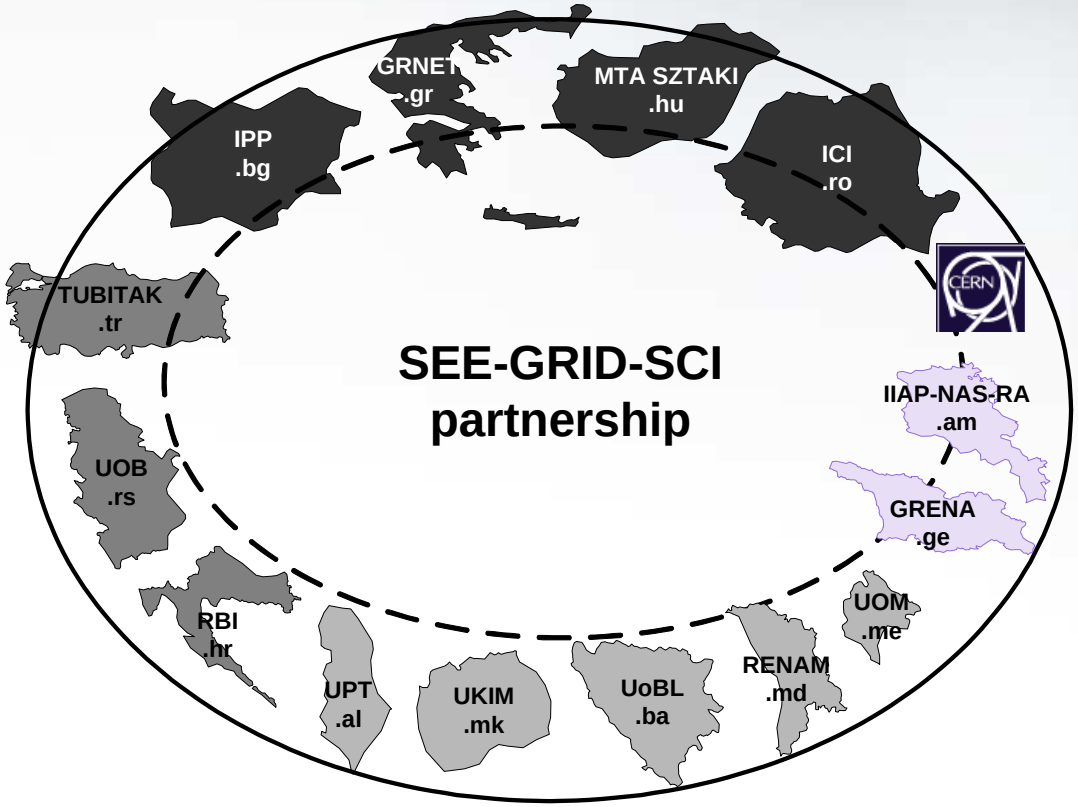
- **Engaging** international user communities and providing application-specific service extensions
- **Providing** infrastructure for new communities. This objective has a special sub-objective:
  - **provision of the network link to Moldova,** so as to cater for immediate connection to Romania and thus to the rest of the region and Europe. The link will be co-funded by NATO and local entities.
- **Consolidating** actions toward long-term sustainability and EGI inclusion
- **Strengthening** the regional and national human network

SEE-GRID-SCI project partners

Contractors

GRNET	Greece
CERN	Switzerland
SZTAKI	Hungary
IPP-BAS	Bulgaria
ICI	Romania
TUBITAK	Turkey
ASA/INIMA	Albania
UoBL	Bosnia-Herzegovina
UKIM	FYR of Macedonia
UOB Serbia	
UoM Montenegro	
RENAM	Moldova
RBI Croatia	
IIAP-NAS-RA	Armenia - *new*
GRENA	Georgia - *new*

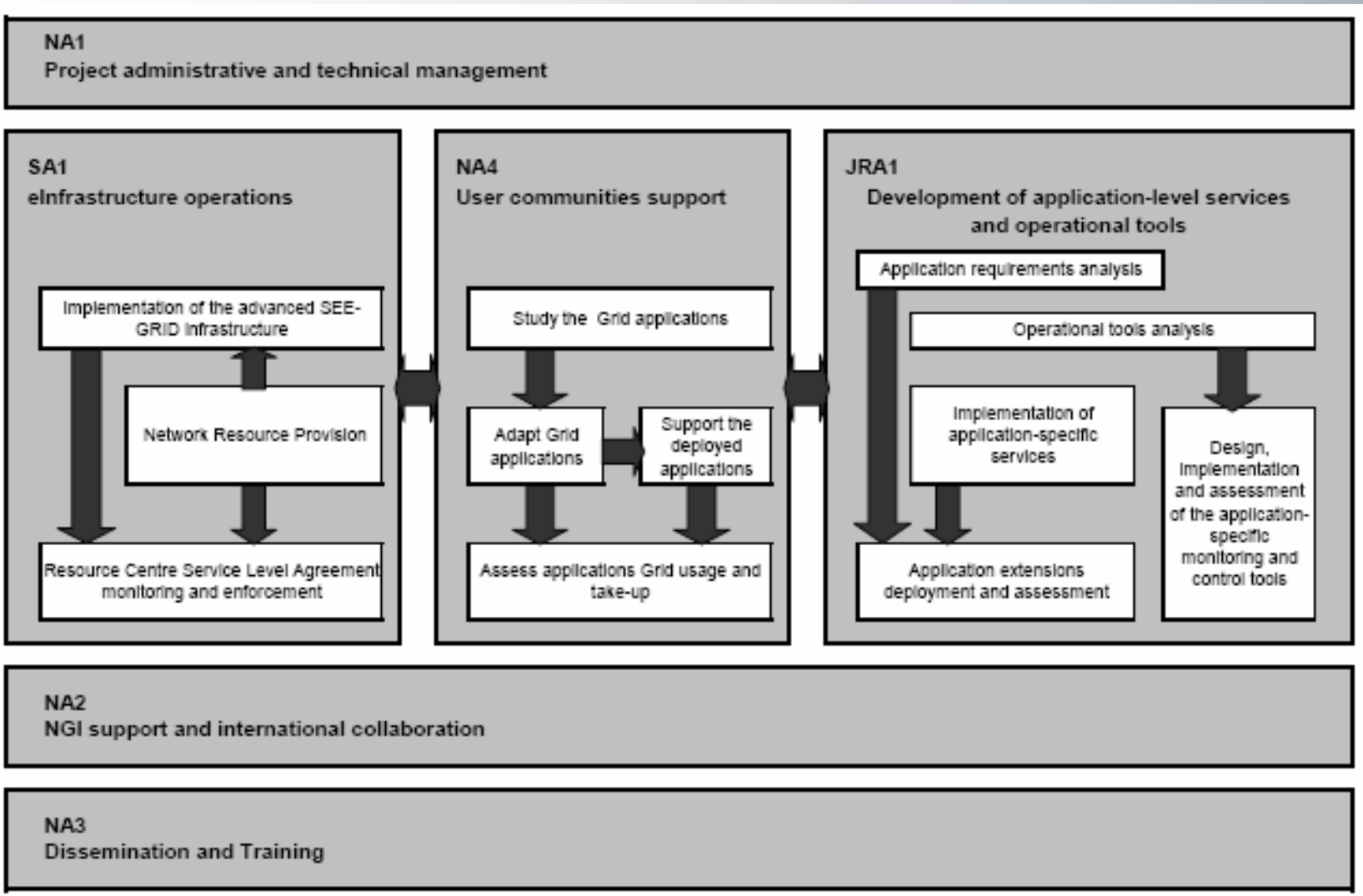
Start date: 01/05/2008
Duration: 24 months
Total Budget: 2,499,969 €



Third Parties

30 universities / research centres

Project overall structure and work plan



Applications area

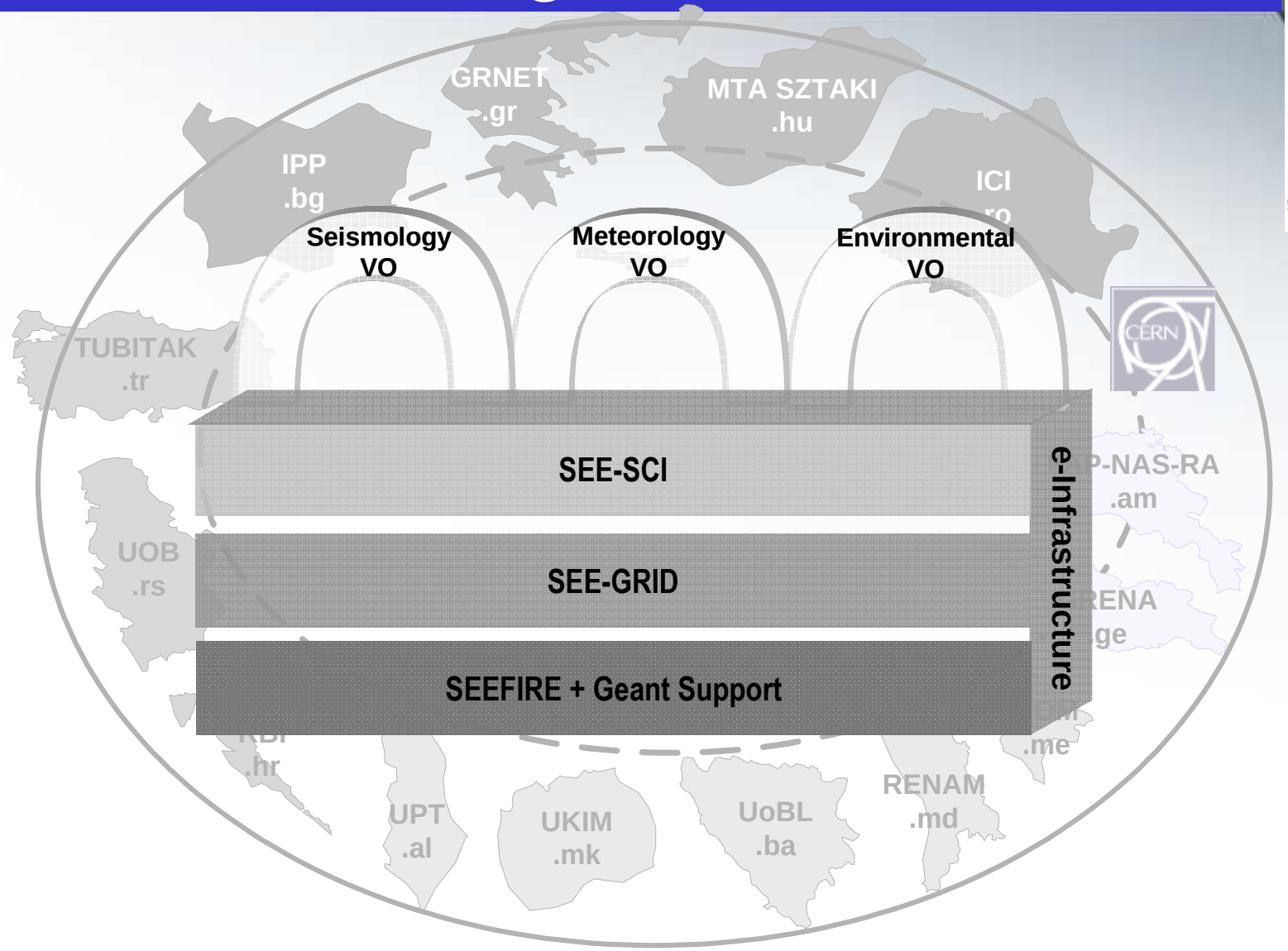
The project is focusing on forming regional research teams that are engaged in elaboration large scale applications of common interest. Three SEE-wide user communities were proposed:

- Seismology VO
- Meteorology VO
- Environmental VO

The work programme envisages analysis of the mentioned VOs requirements, their gridification and run-time support of the target applications.

These three strategic Virtual Organisations will bring together users across the region within a common research space, enabling them to share data, applications, tools and results of their work.

New communities integration in the regional eInfastructure



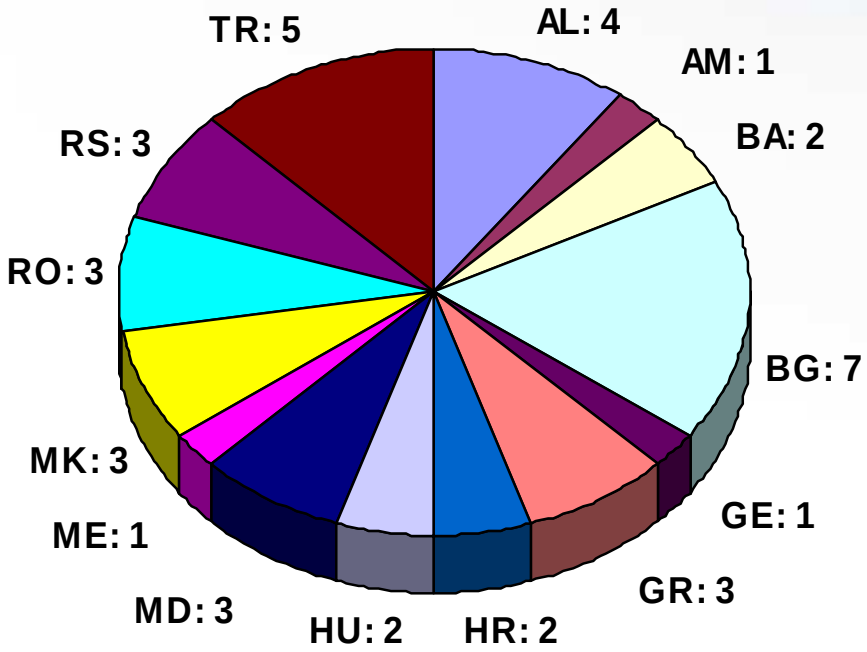
SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

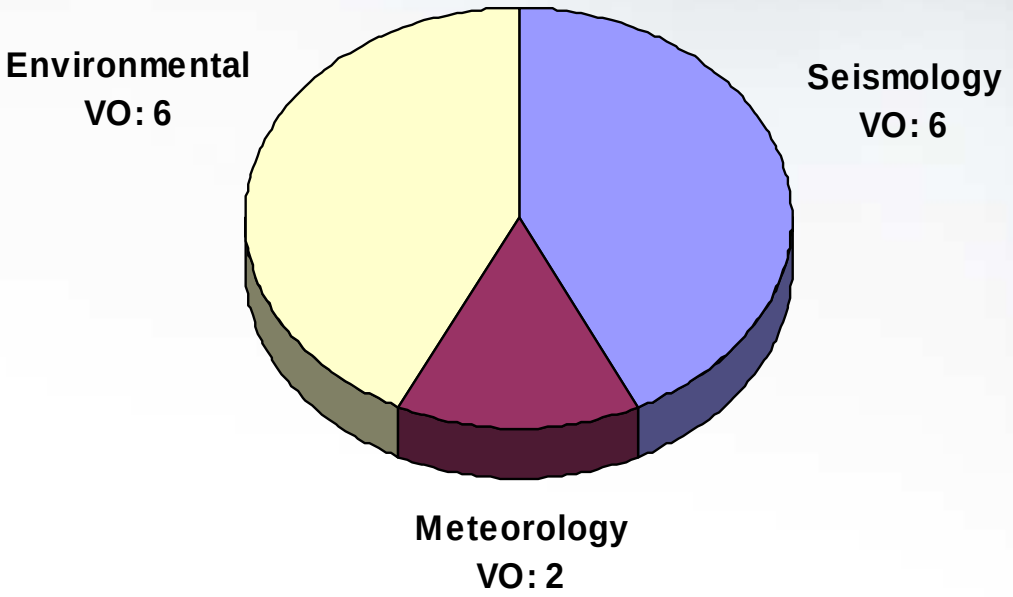
MD-Grid Consortium in SEE-GRID-SCI

Moldova participates in the project as MD-Grid JRU Consortium with **RENAM** as Contractor and following third parties - JRU members:

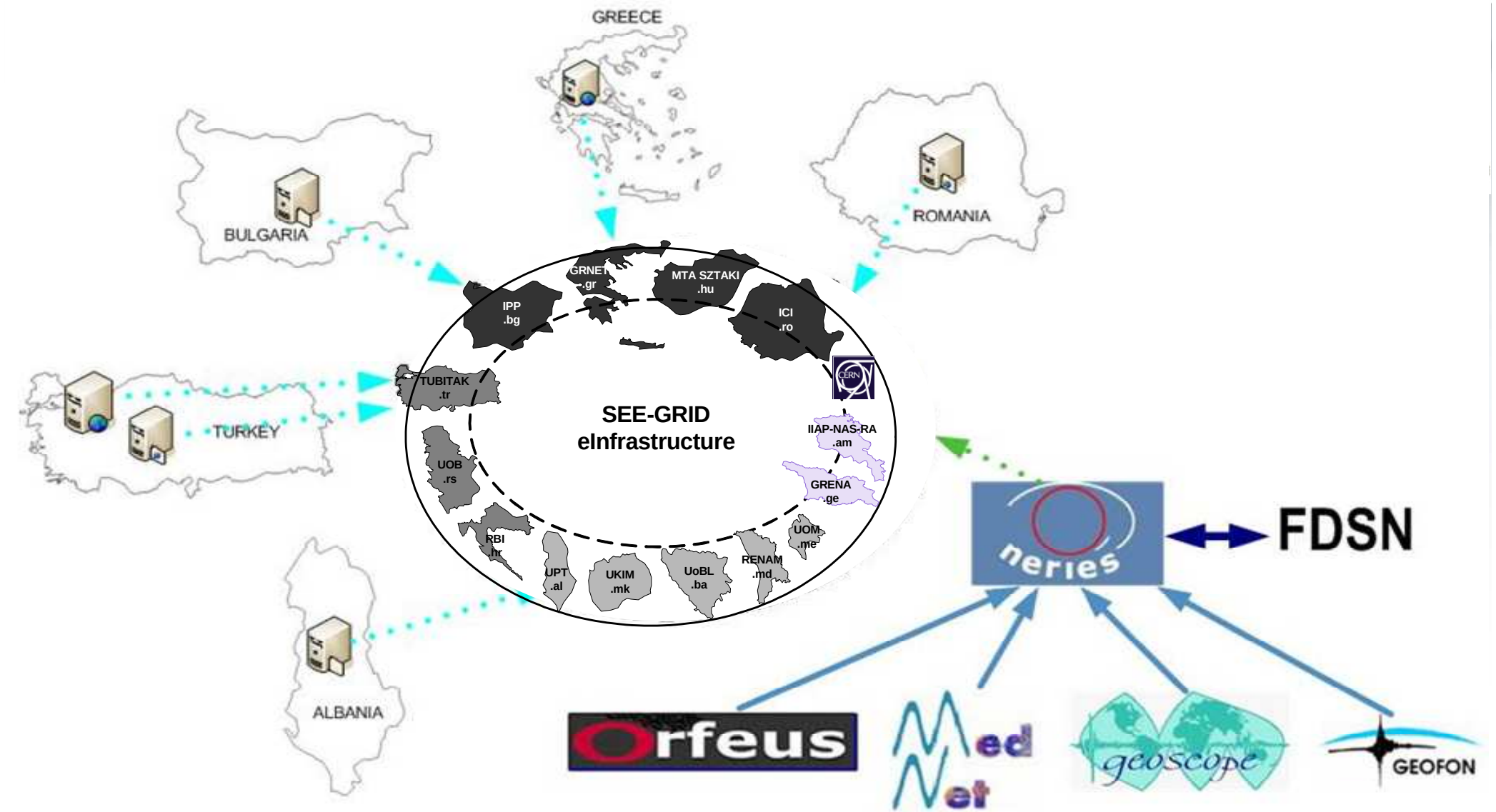
- **FRT TUM** - Faculty of Radioelectronics and Telecommunications of Technical University of Moldova
- **IGS ASM** - Institute of Geology and Seismology of Academy of Sciences of Moldova
- **SHMS** - State Hydrometeorological Service of Moldova

Distribution of applications according to VOs and contributing countries

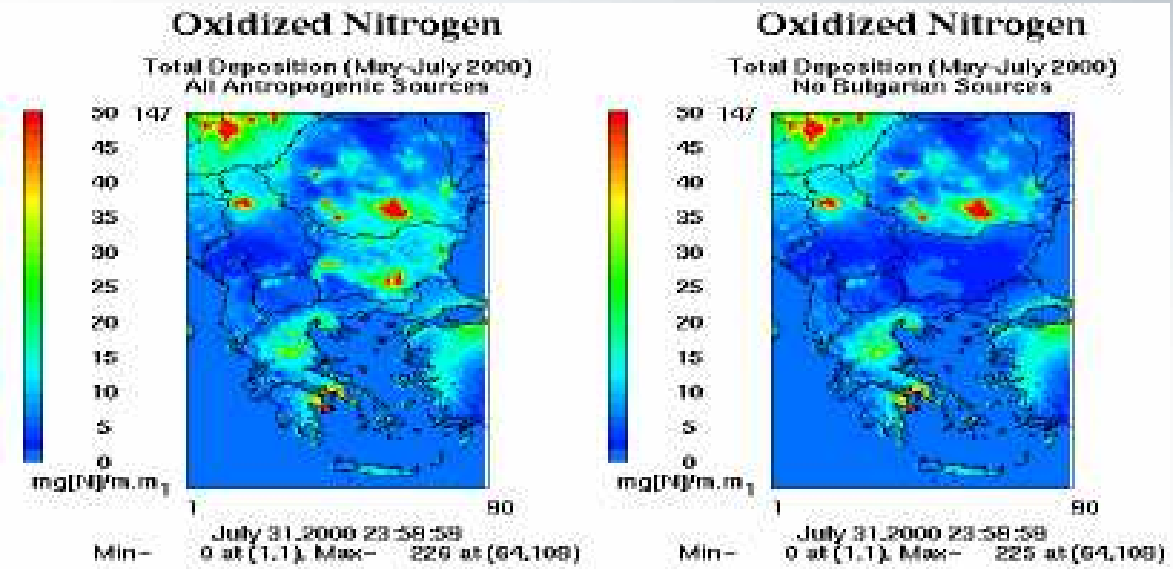


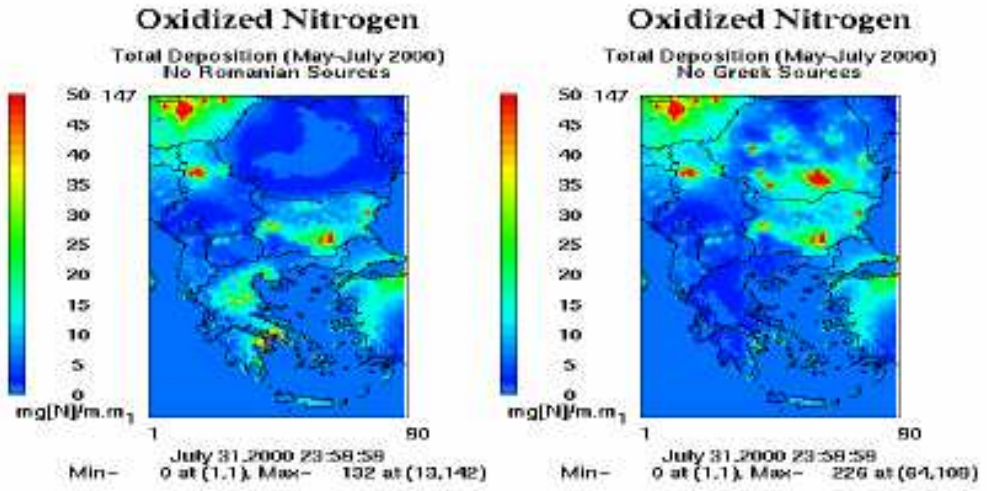


Seismology VO relationship with other initiatives



Total (dry+wet) oxidized nitrogen deposition [mg/m^2], 4 scenarios





SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

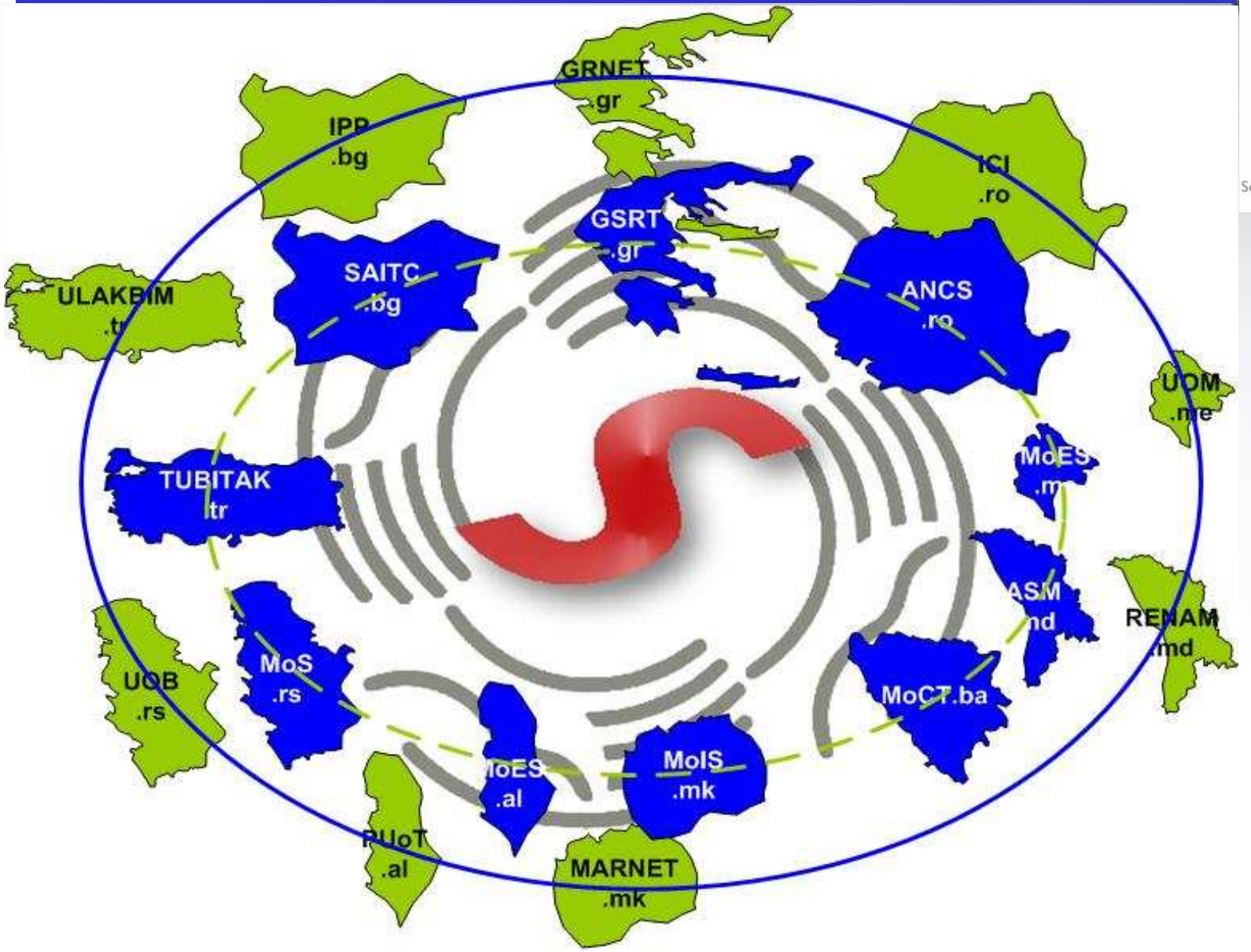
SEE Research Area for eInfrastructures

New project **"South East European Research Area for eInfrastructures" - SEERA-EI** was elaborated and positively evaluated by EC in 2008.

SEERA-EI General Information:

- Integrating Activities – Support for policy development and programme implementation – ERA-NET supporting cooperation for research infrastructures in S&T fields
- 10 participating countries representing SEE region
- Every country is represented in the project by National eInfrastructure programmes owner – respective ministry or governmental agency and national eInfrastracture implementation partner – NREN and/or NGI
- Duration 3 years
- Planned budget – 2 070 000 Euro

The project partnership



SEE-GRID
South Eastern European GRid-enabled eInfrastructure Development

SEERA-EI Project objectives

- Engaging national program owners in common dialogue and planning
- Analyze the state of the art of national eInfrastructure activities and identify commonalities and complementarities;
- Structuring and harmonizing national policies and producing related guidelines;
- Identifying areas for potential joint activities and implementing pilot activities;
- Promotion of international collaboration

CONCLUSIONS

- elfrastructure projects are ensuring deployment of sustainable basic infrastructure, which, coupled with human networking activities will be of particular societal, educational and political importance to the Eastern Europe countries and especially for Moldova.
- Such modernization is a key goal of eEurope - which aims on accelerating the development of the Information Society in Europe and ensuring its availability to everyone.
- Regional networking and GRID infrastructures will have a significant impact on the regional R&D cooperation by helping the participating countries to achieve this goal and align their national priorities with the EU recommendations and guidelines.

Thank you!

Questions?

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