Regional Development in the European Context - A Case Study for South East Europe

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HP-SEE

High-Performance Computing Infrastructure for South East Europe's Research Communities

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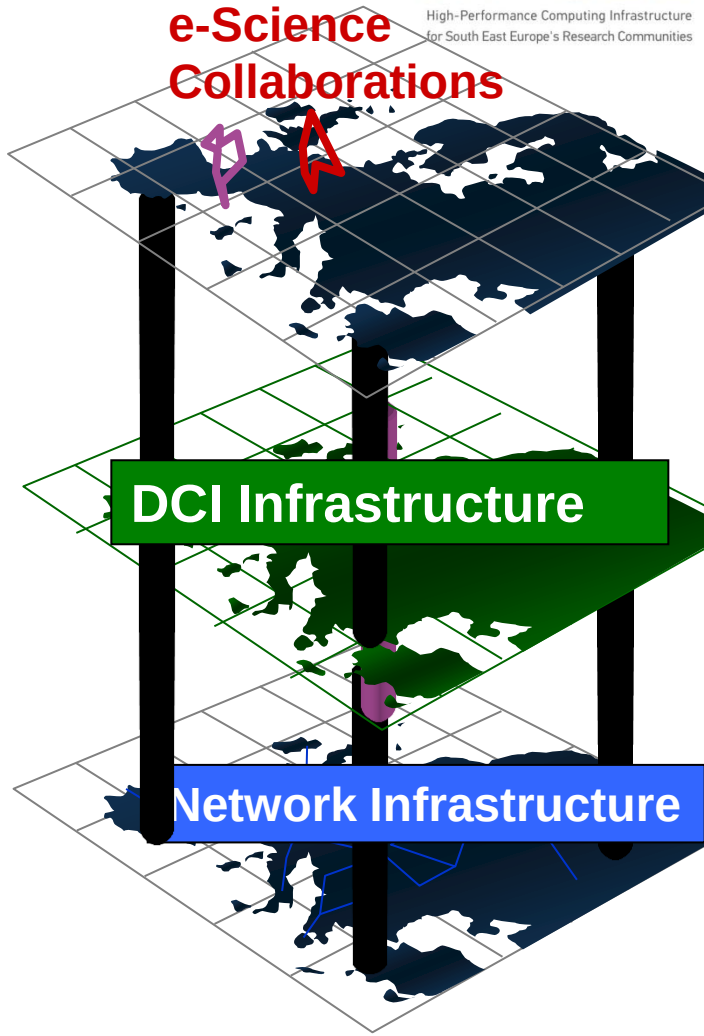
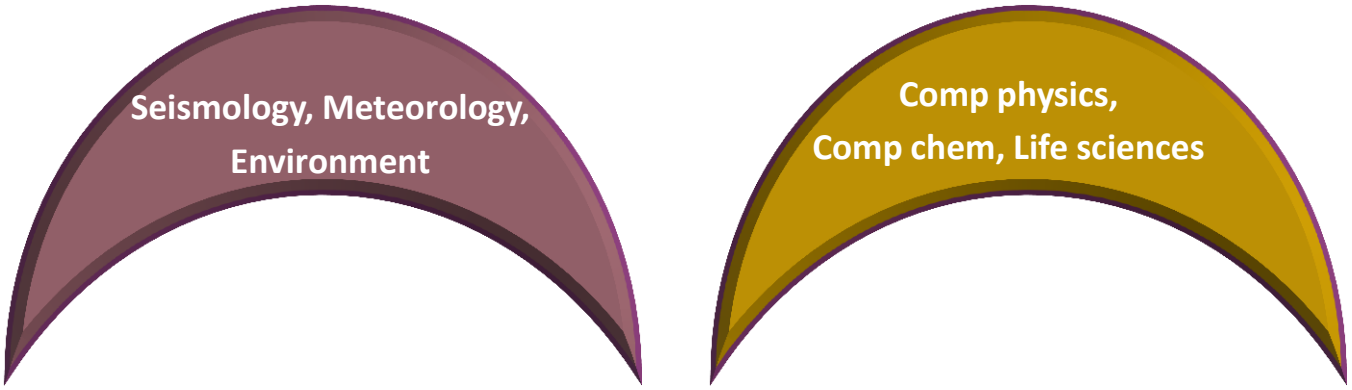
Pan-EU e-Infrastructures vision

HP-SEE
High-Performance Computing Infrastructure for South East Europe's Research Communities

- The Research **Network infrastructure** provides fast interconnection and advanced services among Research and Education institutes of different countries
- The Research **Distributed Computing Infrastructure (Grid, HPC)** provides a distributed environment for sharing computing power, storage, instruments and databases through the appropriate software (middleware) in order to solve complex application problems
- This integrated environment is called **electronic infrastructure (eInfrastructure)** allowing new methods of global collaborative research - often referred to as **electronic science (eScience)**



SEE Model: Converged communication & service infrastructure for the region



User / Knowledge layer

SEE-GRID & EGI | **HP-SEE**

GEANT & SEE-LIGHT

SEE eInfrastructure partners

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- "Provider/manager" partners:
  - National Research and Education Networks – NRENs – bodies that provide network connectivity to universities, schools, research institutes, etc.
  - National Grid Initiatives – NGIs – consortium of computing providers in the country; includes HPC providers
- Affiliated "Stakeholder" partners:
  - Research institutes, universities
- Policy makers:
  - Ministries, agencies, research councils

- Western Balkans, Greece, Turkey, Bulgaria, Romania, Moldova, Southern Caucasus.

SEE eInfrastructure projects

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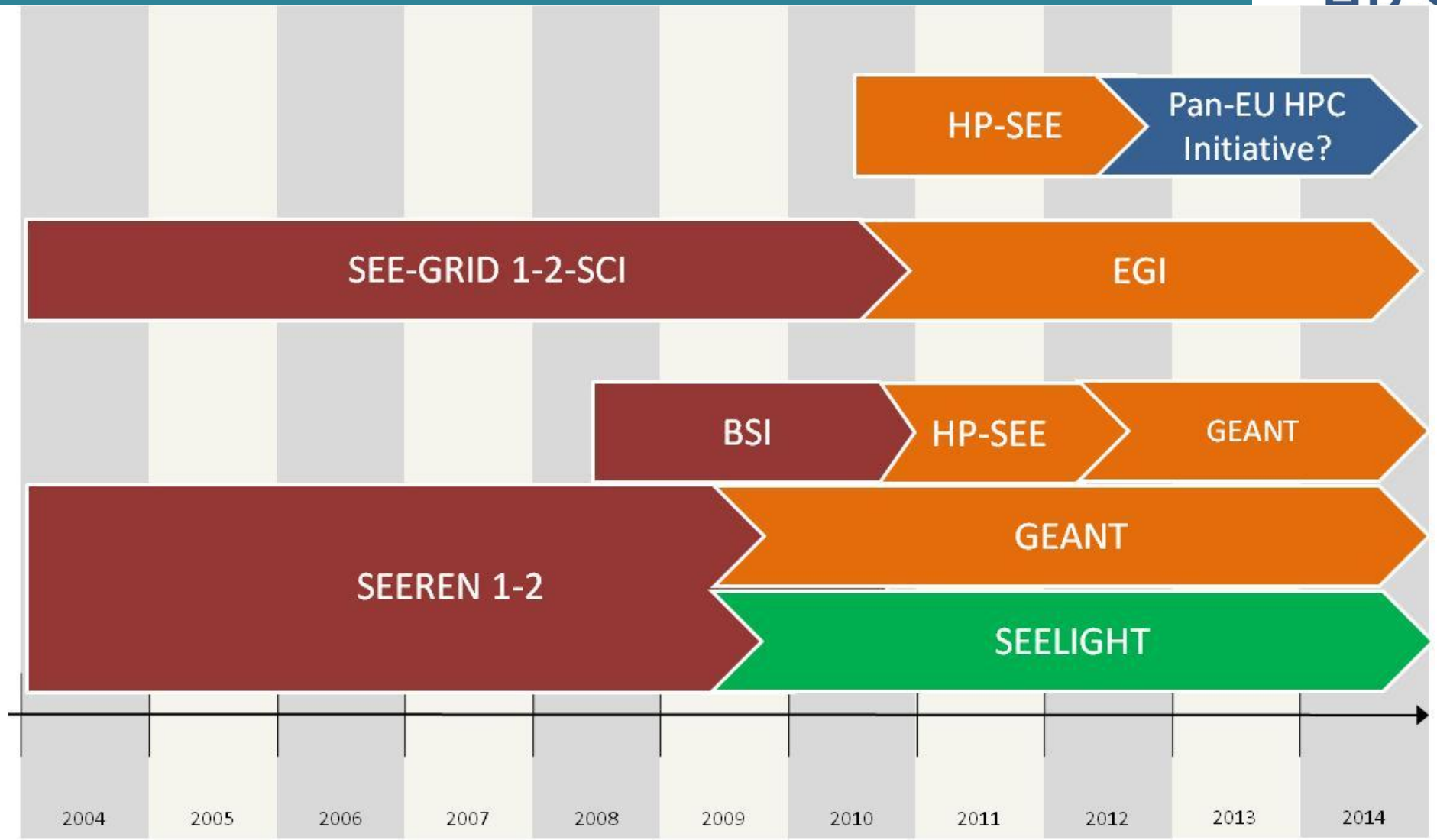
- **SEEREN1/2:** regional inter-NREN connectivity and GEANT links [DGINFSO]
- **BSI:** Southern Caucasus links [DGINFSO]
- **SEELIGHT:** lambda facility in SEE [Greek HiperB]
- *Result: sustainable national & regional networks, most countries in GEANT*

- **SEEGRID1/2:** regional Grid infrastructure, building NGIs and user communities
- **SEE-GRID-SCI:** eInfrastructure for large-scale environmental science user communities: meteorology, seismology, environmental protection. Inclusion of Caucasus. [DGINFSO]
- *Result: sustainable national Grids, regional coordination, all countries within European Grid Initiative*

- **HP-SEE**: regional HPC interconnection and 2nd generation Caucasus link
- *Expected result: stable national HPC centers, (hierarchical) model in collaboration with PRACE and DEISA*

- **SEERA-EI:** regional programme managers collaboration towards common eInfrastructure vision, strategy and regional funds [DGRTD]
- *Result: influencing national agendas, setting common regional policy, identifying regional funds to complement EC funds*

Timeline & funding modalities



Network: SEELIGHT

- SEEREN projects set up regional NREN connectivity and GEANT links
- SEE-LIGHT: South-East European Lambda Network Facility for R&E
- Deployment of an advanced regional network infrastructure, fibres and equipment
- Under the Hellenic Plan for the Economic Reconstruction of the Balkans – HiPERB (80-20)
- Serbia implementation stage, Bulgaria tender stage, Romania on own funds, FYR of Macedonia ongoing
- SEENet: a management body for SEELIGHT

Network: regional benefits

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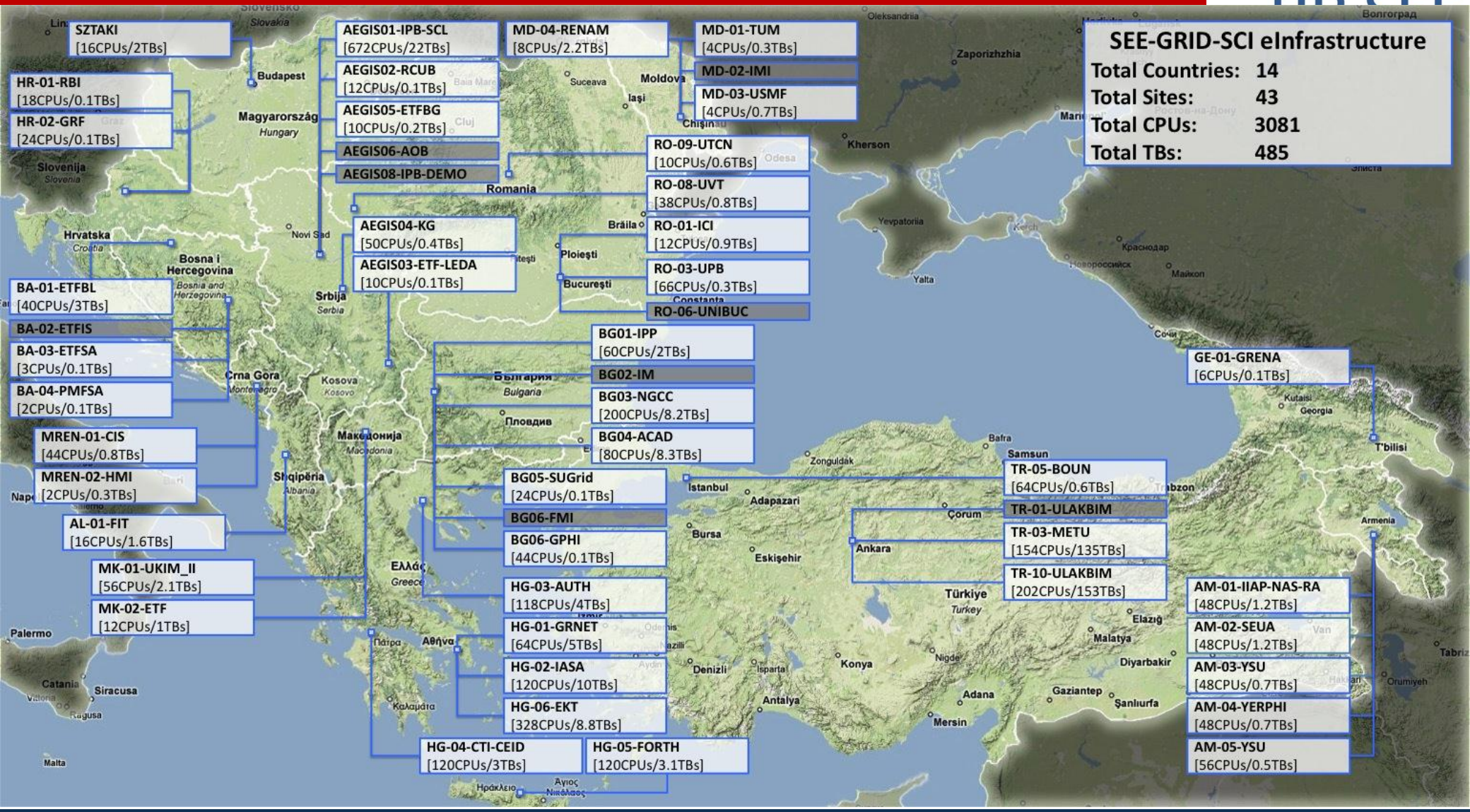
- Exploit economy of scale
  - Connectivity
  - Common operations
- Common development path for ICT
- Joint platform for advanced services (including computing)

- Policy support for cross-border links by governmental agencies through SEERA-EI

Grid: the SEE-GRID series



Grid: the SEE-GRID series

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- Regional infrastructure and operations built through 3 projects
- User community buy-in secured
- National structuring via NGIs
- All countries in European Grid Initiative
- Key to success: distributing operations and supporting cross-border communities; joint lobbying strategies

Grid: regional benefits

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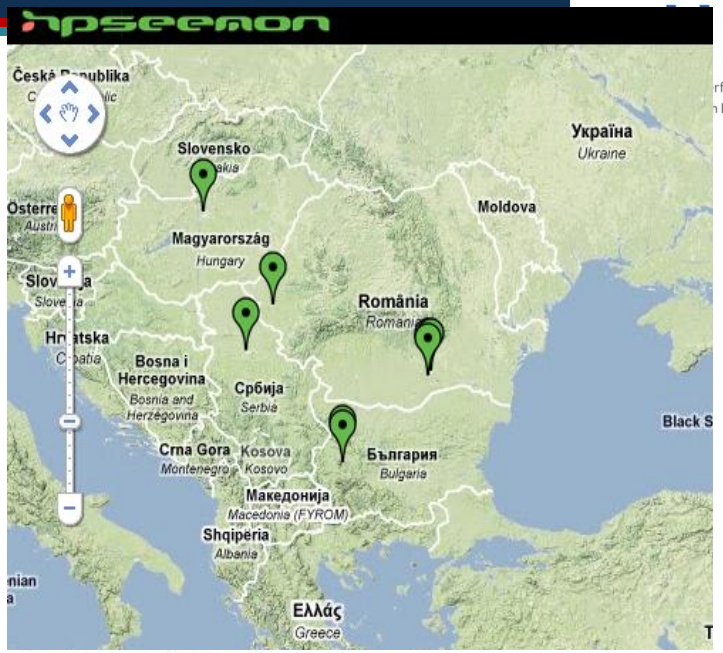
- Know-how exchange through regional operations and user support
- Know-how exchange for national-level organization models
- Common development path for computing
- Strong regional user communities

- Policy support for regional resource sharing by governmental agencies (through SEERA-EI)
- Stimulation of national-level projects
- Joint lobbying for national contributions to EGI

High-Performance Computing

- 120 Tflops aggregate
- 2 BlueGene machines
- Larger procurements coming - Greece and Serbia
- 26 applications in 3 VRCs
- Envisaged as bridge to PRACE
- Joint operations centre studied and assessed
- Balance of national & EC funds



HPC: application examples

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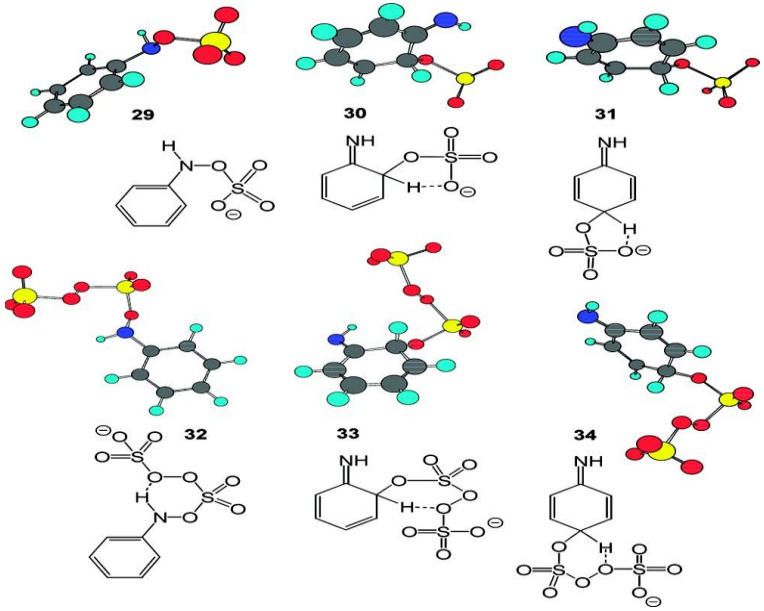
- Numerical study of ultra-cold quantum gases
- Quantum Mechanical, Molecular Mechanics, and Molecular Dynamics computation in chemistry
- Searching for novel miRNA genes and their targets tems



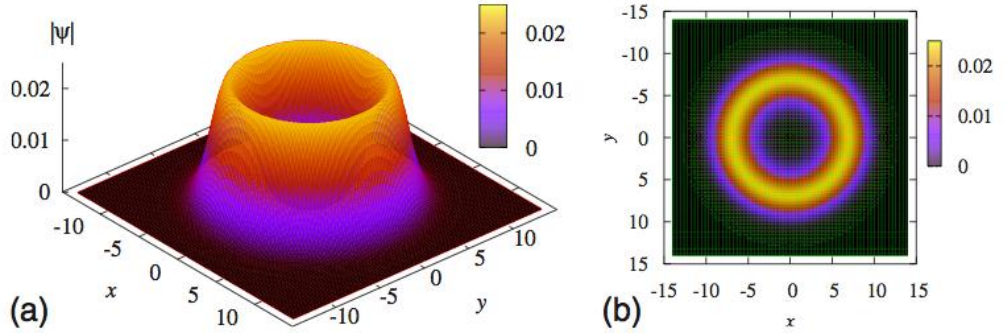
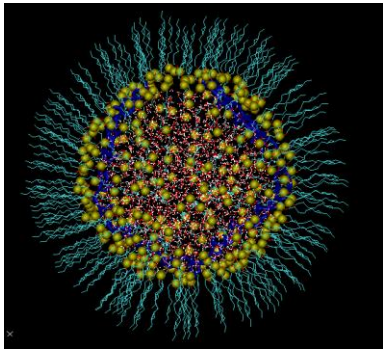


FIG. 6. (Color online) Ground state (as a three-dimensional plot on the left, and as a density plot on the right) of a rotating gas of ^{87}Rb atoms in a $d=2$ anharmonic trap obtained using $p=21$ effective action. The parameters are $r=1.05$, $g=g_{exp}$, $L=20$, $\Delta=0.25$, $t=0.2$.



HPC: regional benefits

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- Know-how exchange through regional operations, procurement know-how
- Know-how exchange for national-level organizational models
- Continuing the Common development path for computing
- Regional user communities
- Platform to entry-level for PRACE

- Policy support for regional resource sharing by governmental agencies (through SEERA-EI)
- Concrete support of hosting agencies materialized through a common pilot call for applications
- Stimulation of national-level projects

Crucial for regional cooperation: policy development and political support

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- **Project:** South-East European Area for eInfrastructures
- **Area:** "INFRA-2008-3.1: ERA-NET supporting cooperation for research infrastructures in all S&T fields"
- **Start:** 1 April 2009
- **Duration:** 36 months
- **Project type:** Coordination and support action
- **Core Objective:** Develop and strengthen the coordination and cooperation of national eInfrastructures programmes in the region of South-East Europe.

SEERA-EI: types of cooperation

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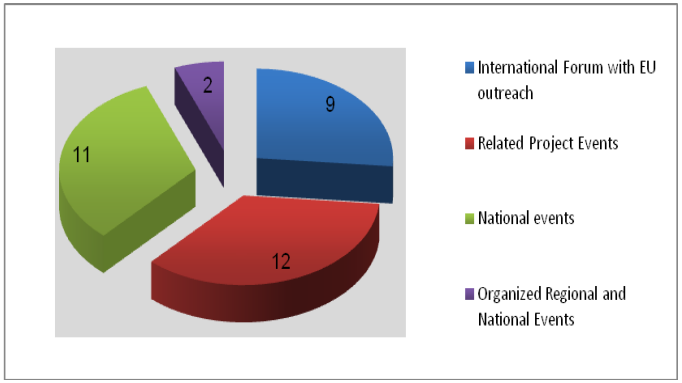
- Online communication platform in place, regular programme managers' meetings
- Analysis of current programmes and RIs

- National programme Best Practices identification
- National programme Cookbook

- Joint training events
- Bilateral meetings
- Large number of dissemination events for policy-makers
- Cooperation of South-East European and global RIs



SEERA-EI: types of cooperation

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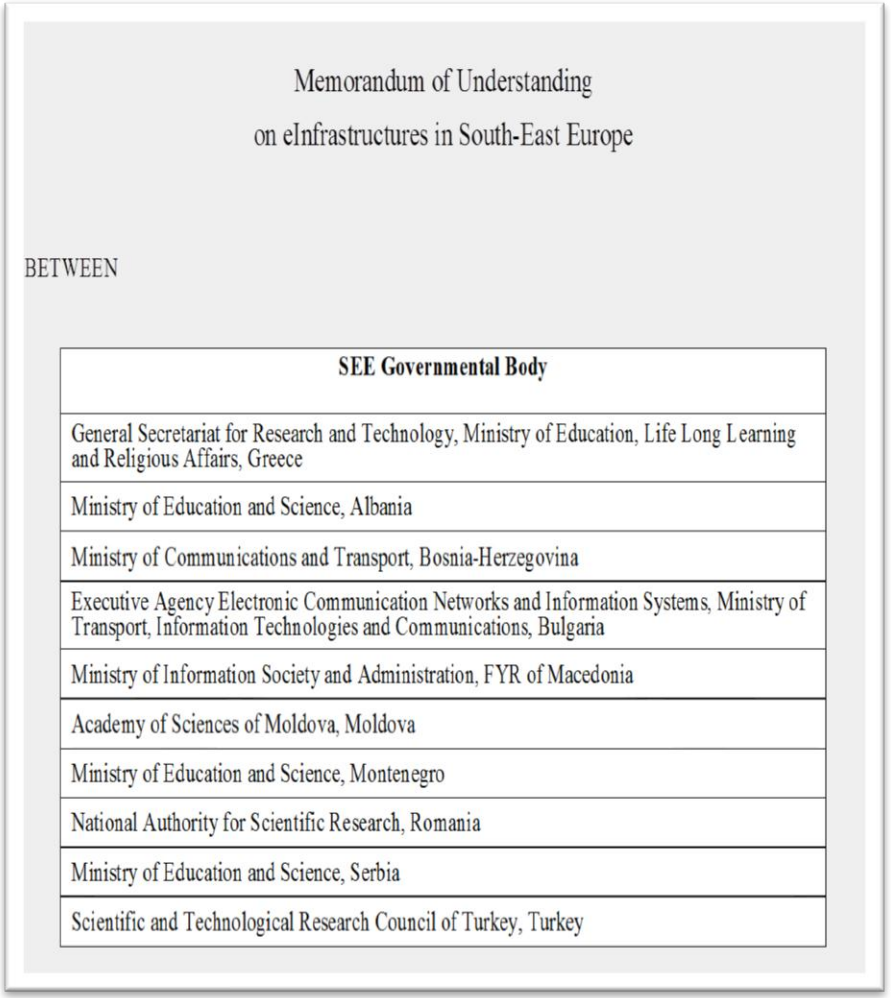
- Long-term MoUs signed in Grid, HPC (resource sharing included), Network
  - Aspect of pursuing international agreements on the reciprocal use, openness or co-financing of RIs
- Long-term strategy defined and MoU signed between Ministries
- Detailed Studies for joint operations centers for network, HPC (including organizational models)
- Joint pilot call between Ministries in cloud computing



Memorandum of Understanding

on eInfrastructures in South-East Europe

BETWEEN

SEE Governmental Body
General Secretariat for Research and Technology, Ministry of Education, Life Long Learning and Religious Affairs, Greece
Ministry of Education and Science, Albania
Ministry of Communications and Transport, Bosnia-Herzegovina
Executive Agency Electronic Communication Networks and Information Systems, Ministry of Transport, Information Technologies and Communications, Bulgaria
Ministry of Information Society and Administration, FYR of Macedonia
Academy of Sciences of Moldova, Moldova
Ministry of Education and Science, Montenegro
National Authority for Scientific Research, Romania
Ministry of Education and Science, Serbia
Scientific and Technological Research Council of Turkey, Turkey

Pilot Joint Call in cloud computing

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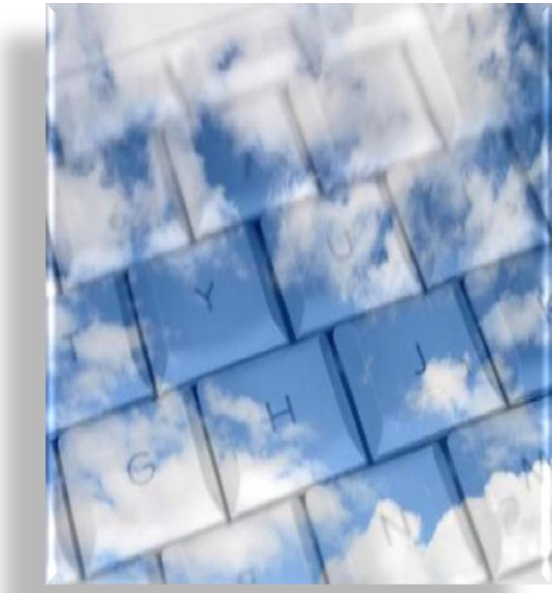
- Theme: Cloud Computing for Research
  - State of the art studies, infrastructure trials, applications, leveraging with e-Gov and e-Sci, etc
- Type of projects: Joint collaborative research projects
- Budget: 700ke (Virtual Common Pot)
- Supported documents created
  - Implementation Agreement
  - Guide for Applicants
  - Evaluation Guidelines
- Call announced in May 2012



Ministerial-level strategy MoU

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By 2020 South-East European region will:

- have in place a regional fiber networking backbone, consisting of interconnected NRENs, with cross-border fibers between the countries, and with a strong level of at least peer-peer operations
- be an equal partner within European ESFRI infrastructures, while a number of regional infrastructures will be established in the relevant research fields specific for the region
- have a state-of-the-art HPC infrastructure, consisting of interconnected National HPC Initiatives; joint operations will be promoted and the resources will be shared according to clear access policies
- SEE public research and education clouds will be federated between them, similar to the current Grid federation models, either within a wider European landscape or within a dedicated SEE cloud
- have a state-of-the-art high-throughput (e.g. Grid-like) computing infrastructure, consisting of interconnected National Grid Initiatives, where joint operations will be promoted and the resources will be shared

Contributions to setting national and regional agendas

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- From:
  - National contributions to GEANT, EGI, PRACE
  - Support for National-level projects
  - National policy best practices, programme guidelines, organizational aspects of NRENs and NGIs
- To:
  - Memoranda on regional cooperation and sharing, cross-border fibers
  - One-off and more strategic regional funds

Conclusion

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- A concrete example of regional cooperation – best practice
- Regional technical cooperation brought forward significant results and a stable, sustainable research infrastructure
- Further policy-makers collaboration leverages these results with concrete long-term sustainable support for eInfrastructure activities in all countries in the region; as well as longer-term regional activities, investments and programmes

- Regional layer as added value and development opportunity
- Synergy and complementarily between national, regional and EU actions and funds