

# NMMC3D - NUMERICAL MODELING OF MANTLE CONVECTION

[www.see-grid-sci.eu](http://www.see-grid-sci.eu)



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# Contents



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- SEE-GRID-SCI
- Seismology VO
- SZTAKI /GASuC
  
- **NUMERICAL MODELING OF MANTLE CONVECTION 3D**
  - General
  - Gridification process
  
- Using P-GRADE Portal to gridify
  - Workflow
  - Parameter Study mechanism
  - Application Specific Portlet
  
- Developed User Interface (video)
  
- Conclusion

# SEE-GRID-SCI

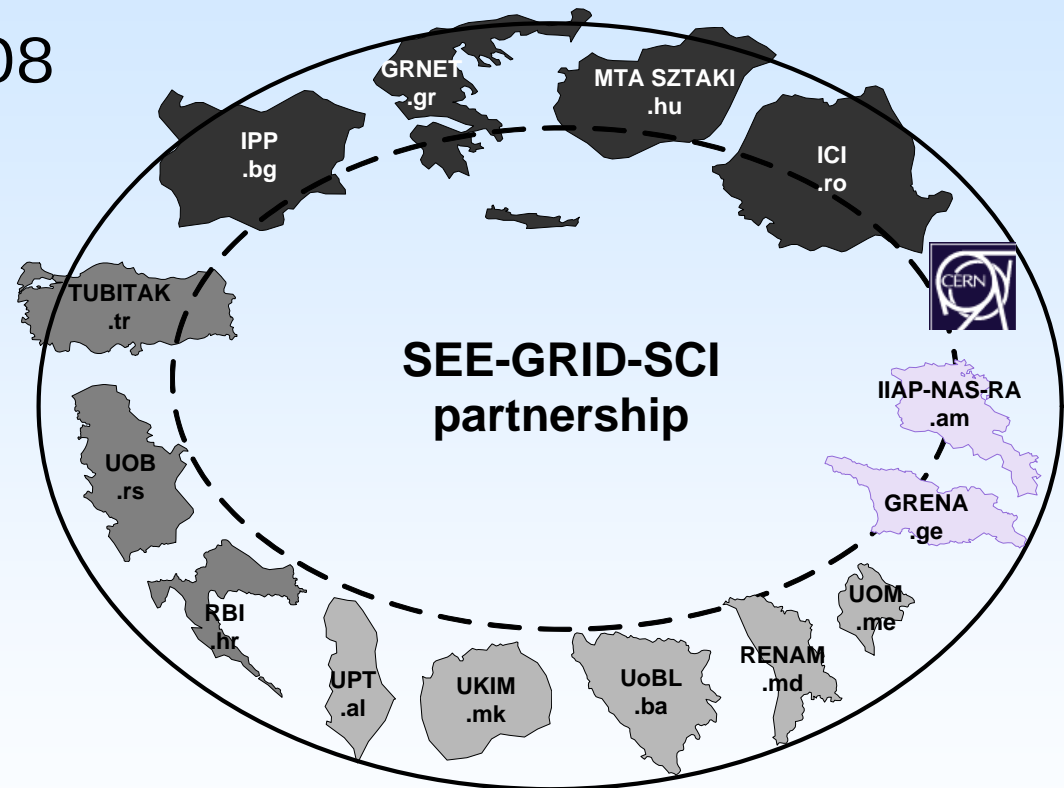


SEE-GRID-SCI  
SEE-GRID eInfrastructure for regional eScience

- **Start date:** 01/05/2008
- **Duration:** 24 months
- **Total budget:** 3.2 M€

## ■ **Infrastructure:**

- 14 countries
- 35 sites
- 3000 CPUs



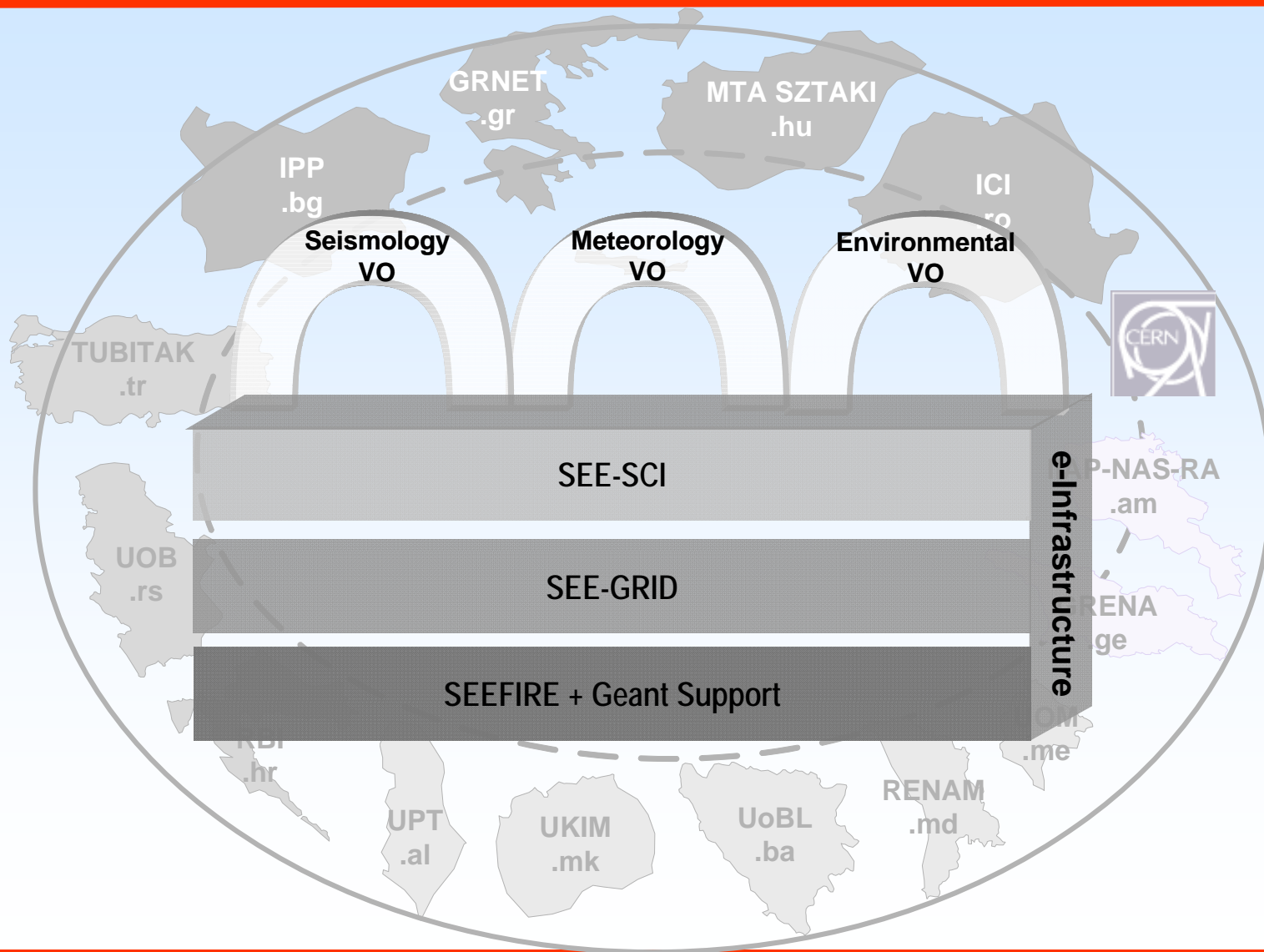
- **Web site:** [www.see-grid-sci.eu](http://www.see-grid-sci.eu)



# Converged communication and service infrastructure for SEE region



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# Seismology VO (aims)



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- Seismology VO offers the researchers:
- Main components:
  - **Seismic Data Repository:** Earthquakes, stations and sensor information, seismic waveform files from various countries in Southeastern Europe. Seismic Data Server Application Service (SDSAS) provides tools to upload seismic data and iterators to access data.
  - **Seismology Applications:**
    - Earthquake Location Finding (ELF)
    - Fault Plane Solution (FPS)
    - Massive Digital Seismological Signal Processing with the Wavelet Analysis (MDSSP-WA)
    - **Numerical Modeling of Mantle Convection (NMMC3D)**
    - Seismic Data Server (SDS)
    - Seismic Risk Assessment (SRA)

# SZTAKI/Geo Institute: Gridification in general



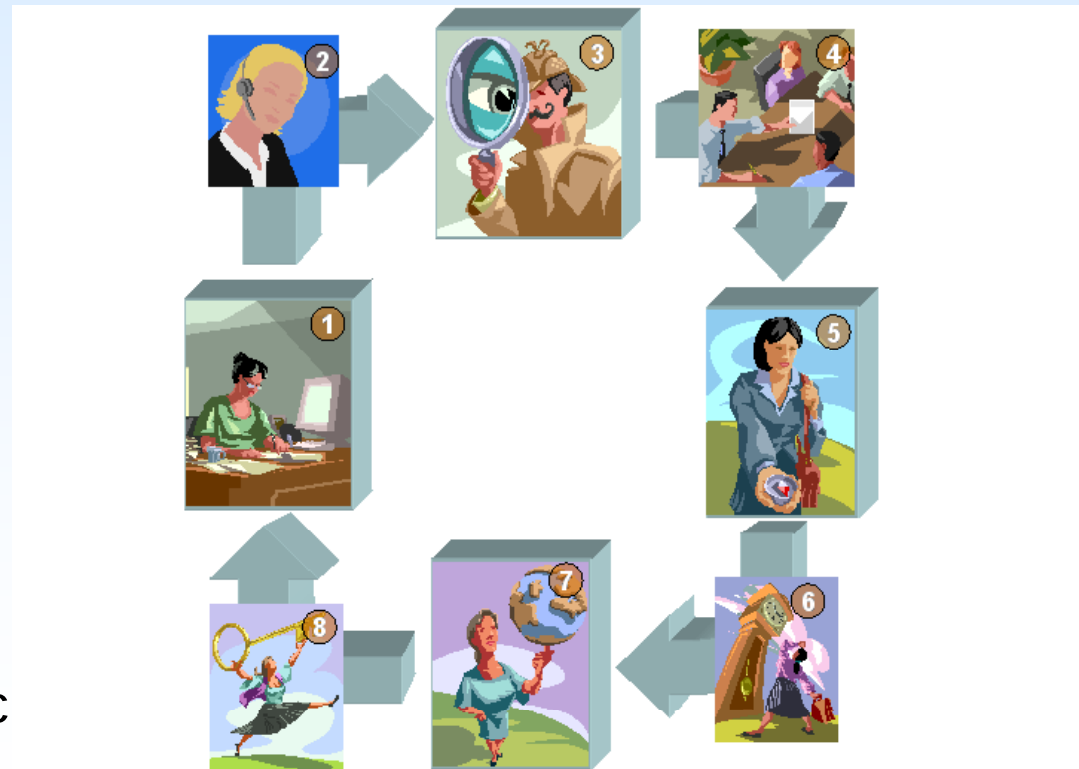
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- Grid experts must support application developers in order to create the grid-enabled version of their applications.
- GASuC : **Grid Application Support Centre** helps application developers on gridifying.

## How?

- Contact phase
- Analysis phase
- Planning phase
- Prototyping phase
- Testing phase
- Execution phase
- Feedback phase

- [www.lpds.sztaki.hu/gasuc](http://www.lpds.sztaki.hu/gasuc)

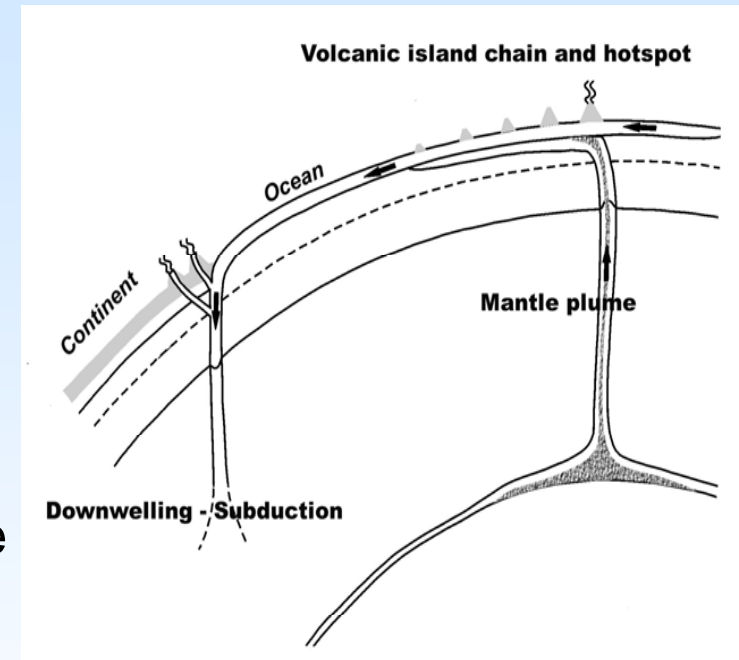


# NUMERICAL MODELING OF MANTLE CONVECTION - NMMC3D



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- The outer part of the Earth consist of moving, rotating and interacting plates.
- The motion of these plates suggest a large convective system in the Earth's 2900 thick layer, the mantle.
- The numerical calculations suggested that the convective cells are formed by sheet-like elongated downwellings (subduction zones) and narrow, cylindrical upwellings (mantle plumes, at the hotspots).



Contact: Bálint Süle, [suba@seismology.hu](mailto:suba@seismology.hu)

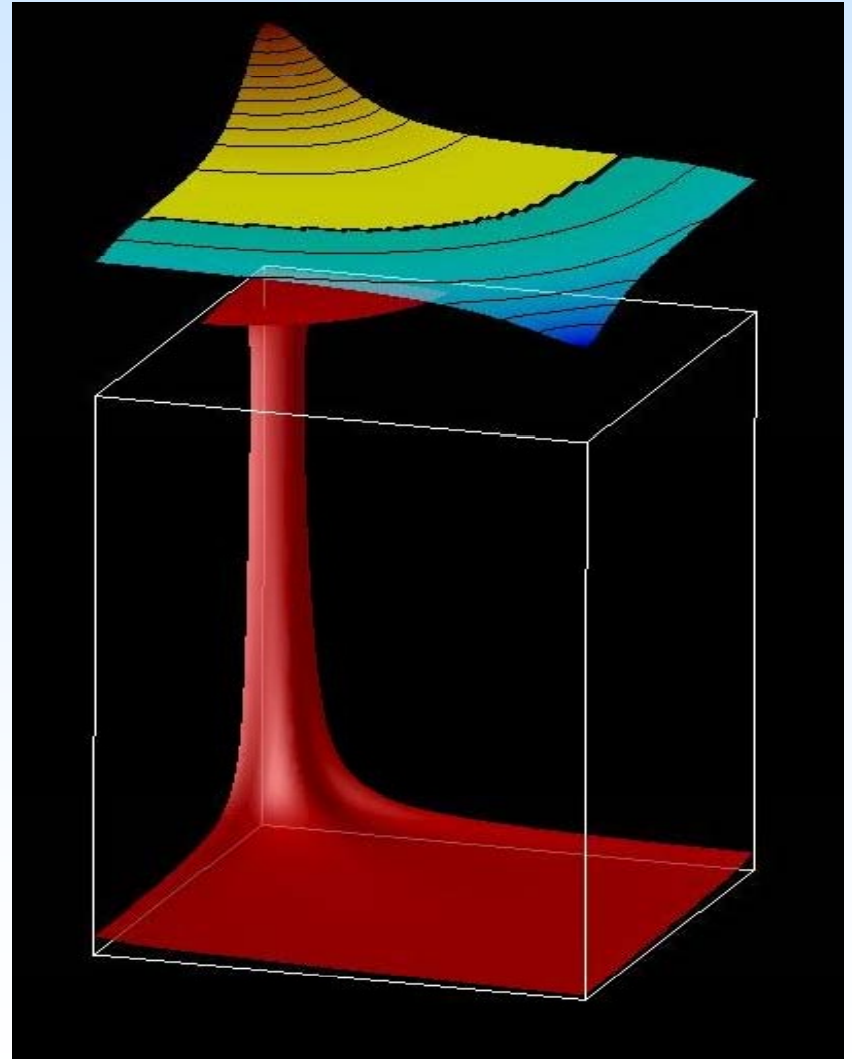
# Mantle Convection



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Theoretical modelling of thermal convection using Fortran programs in 3D

- quantitative study of the structure and surface manifestation (hotspot swell, geoid anomaly) of mantle plumes
- **systematic investigation of the parameters** (Rayleigh-number, viscosity, phase transition...etc.) influencing the convection



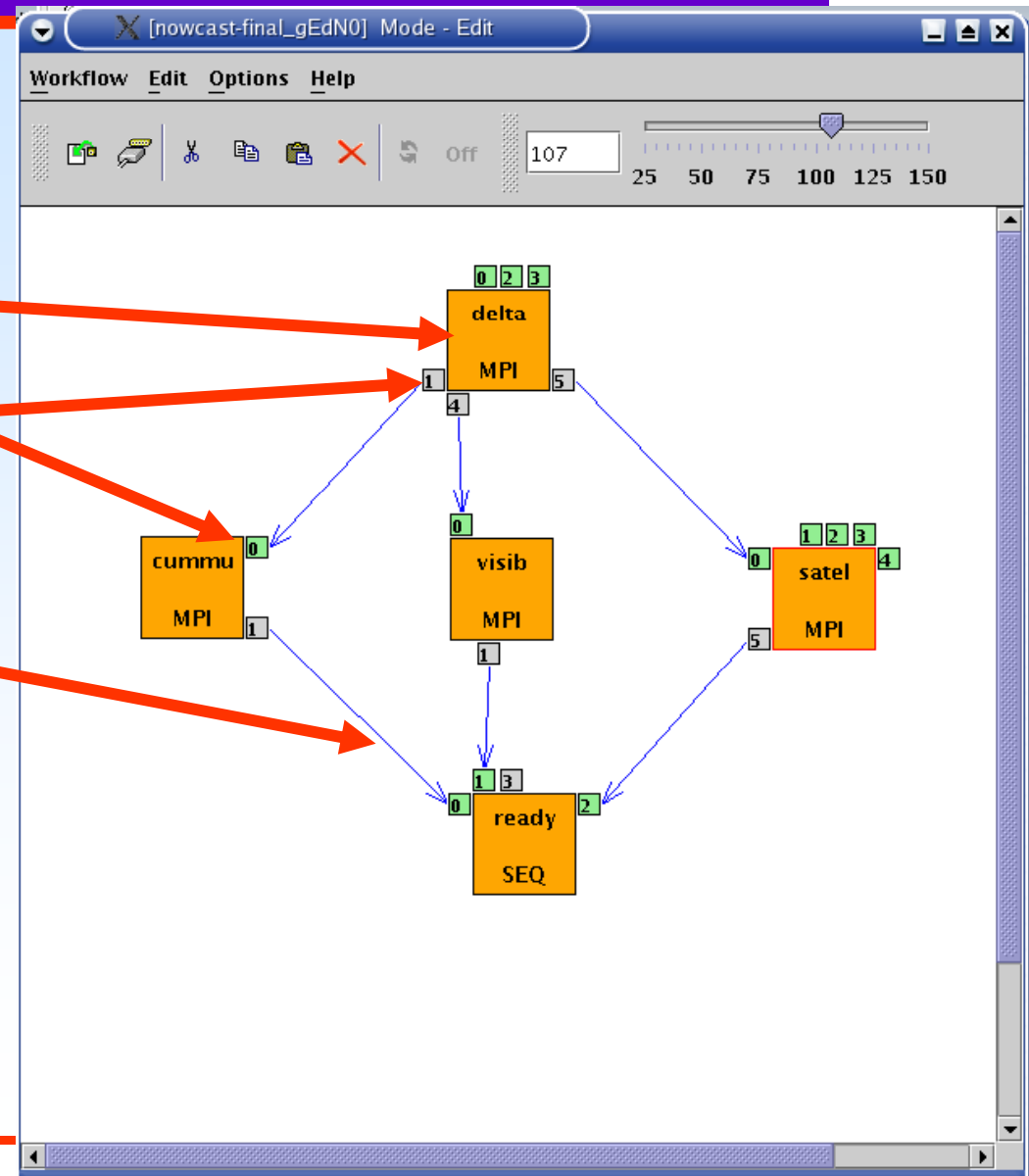


# P-GRADE Portal : Workflow



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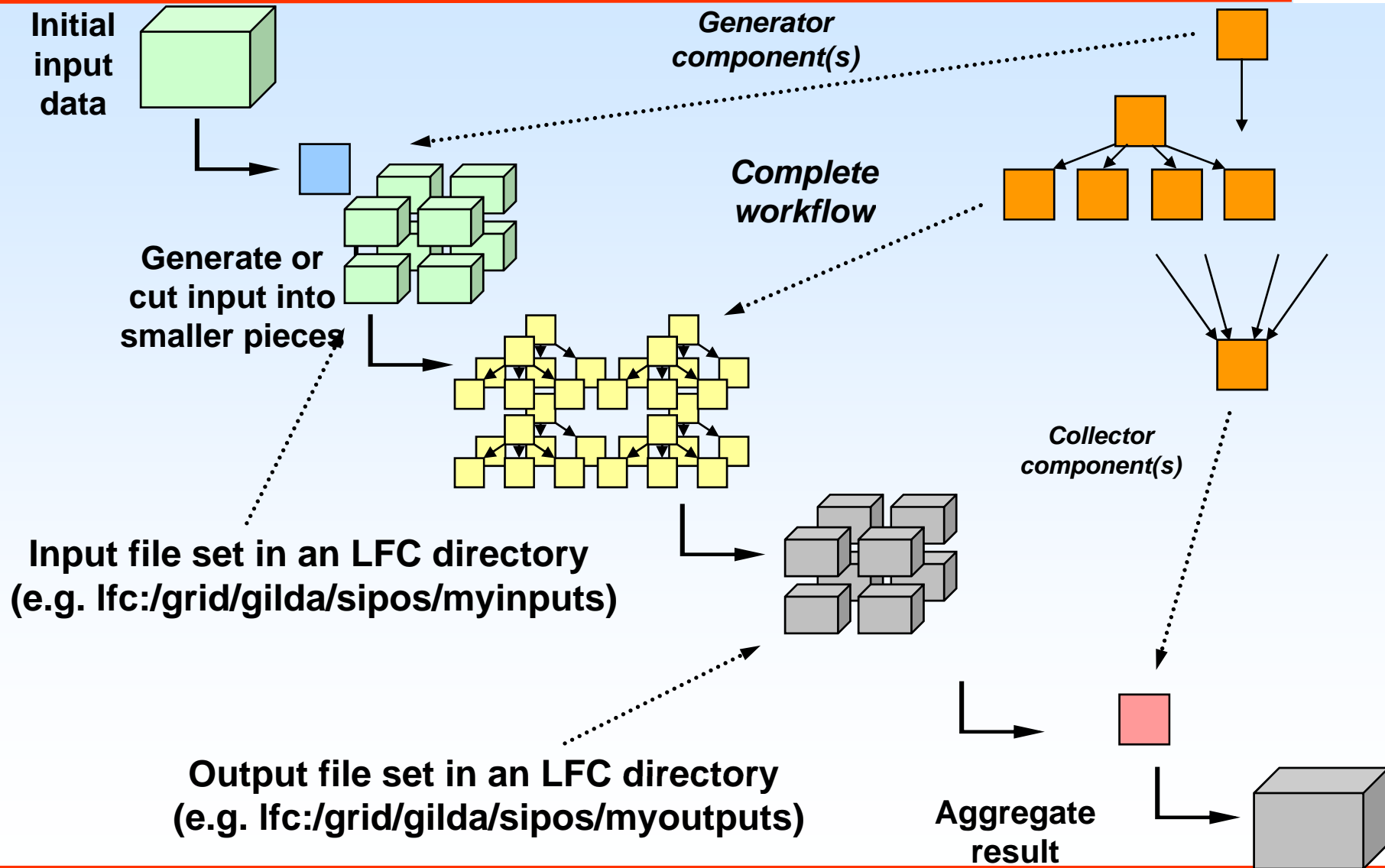
- a directed acyclic graph where
  - **Nodes** represent jobs (batch programs to be executed on a computing element)
  - **Ports** represent input/output files the jobs expect/produce
  - **Arcs** represent file transfer operations
- semantics of the workflow:
  - A job can be executed if all of its input files are available



# P-GRADE Portal : Parameter Study



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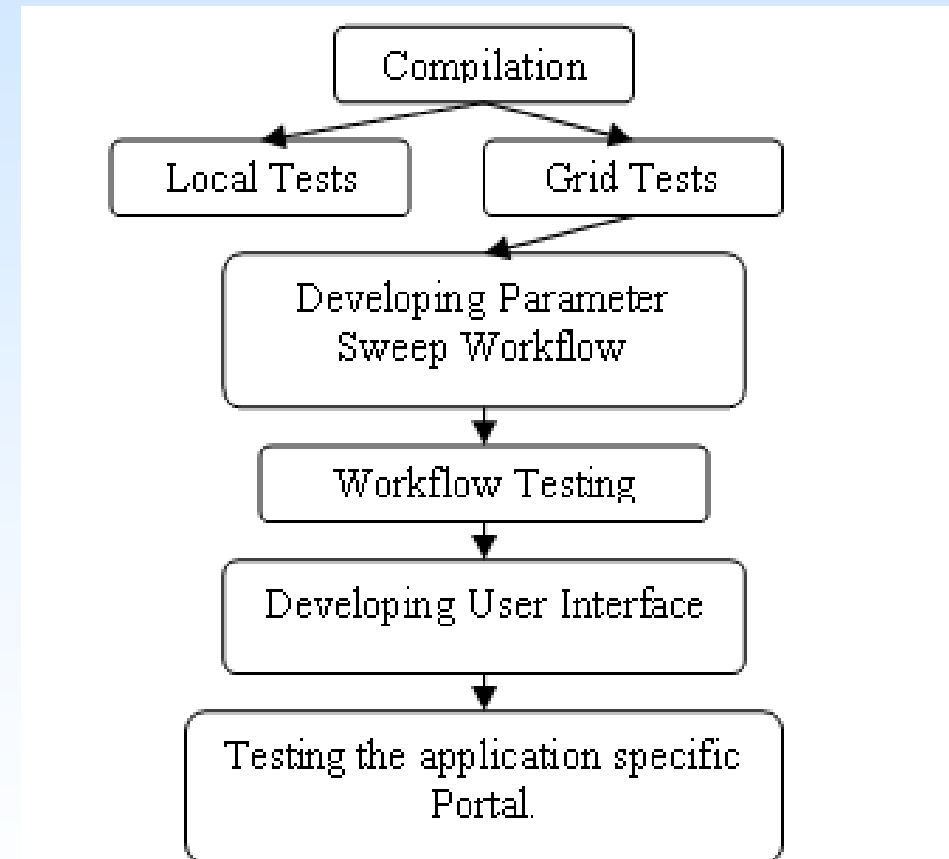


# NMMC3D – gridification process



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<b>Application name</b>	<i>NMMC3D</i>
<b>Size of inputs</b>	<i>~ 1 MB</i>
<b>Size of outputs</b>	<i>~100MB</i>
<b>Size of binary</b>	<i>~0.5MB</i>
<b>Communication</b>	<i>No</i>
<b>Claimed VO</b>	<i>SEE-GRID SEISMO</i>
<b>Number of used CPU</b>	<i>Depends on inputs</i>
<b>Language</b>	<i>Fortran</i>
<b>Method of gridification/parallelization</b>	<i>Parameter Study</i>



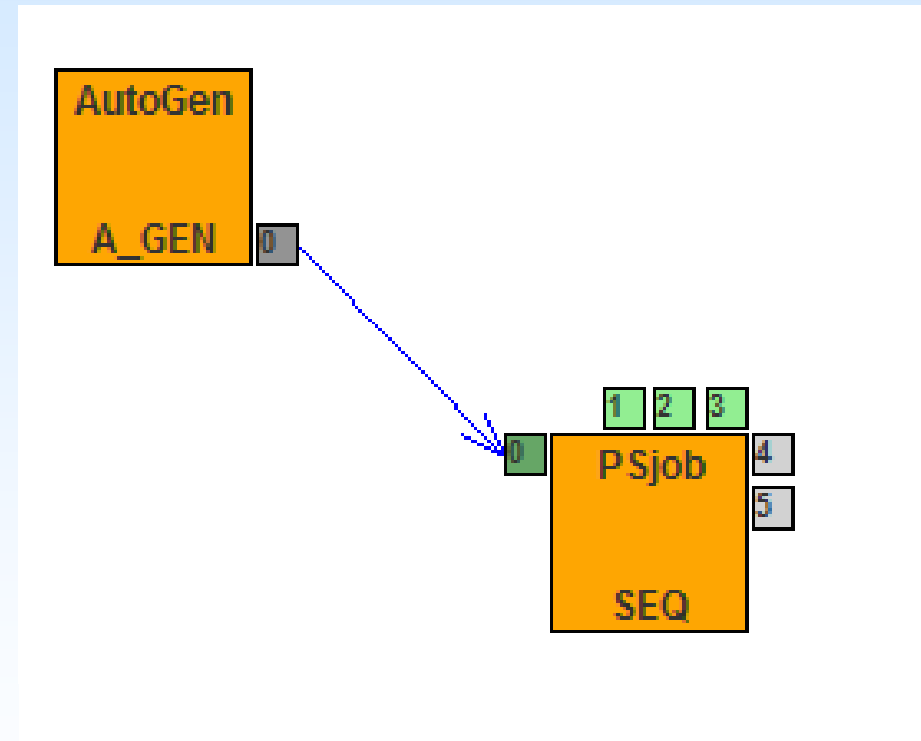
# NMMC3D – Developed Workflow



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Most suitable workflow for NMMC3D is really simple:

One *Autogenerator* and one *Parameter Study* job with several parameters



# P-GRADE Portal: Application Specific Portlet



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- NMMC3D users would like to :
  - run measurements via a comfortable interface
  - set inputs / download outputs easily



- Suitable interface is developed using the Application Specific Module of P GRADE Portal 2.7
  - Requirements to use:
    - users must have certificate
    - access to the portal.

# User Interface (video)



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- Advantages of using Application Specific Portlet:
  - Users cannot see or modify the developed workflow
  - Only parameterizing and execution
  - Notifications via E-mail
  
- See the following video about the usage...

RELEASE 2.7



**P-GRADE**  
portal



English

GridSphere

Home

## Welcome to seegrid Portal!

If you wish to get a valid certificate for this VO, please contact the VO support team. Once you have the required certificate, please, contact the portal administrator and apply for a portal account. If you wish to get an account for this Portal please follow this link: [get access](#)

If you need any assistance please e-mail to the support team: [portalreq@lpds.sztaki.hu](mailto:portalreq@lpds.sztaki.hu)

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*"you can use this portal under the condition that you only perform non-commercial research and education activities. By using your account on the this portal you hereby warrant that you understand that contravention of this clause may result in a liability arising for historic, current and future license payments under the terms of the prevailing commercial license that was in effect during the time period of the contravention. If you are in any doubt please contact [portalreq@lpds.sztaki.hu](mailto:portalreq@lpds.sztaki.hu)."*

This portal is based on **P-GRADE Grid Portal** technology, which was developed by the Laboratory of Parallel and Distributed Systems at MTA-SZTAKI, Hungary. The **P-GRADE Portal** is a workflow-oriented Grid portal that enables the creation, execution and monitoring of computational workflows in Grid environments through high-level, graphical Web interfaces. The **P-GRADE Portal** serves various Grid Communities in research and industry.

This site is built with **P-GRADE Portal** version 2.7 software. This Portal has been tested with Mozilla 1.6, Netscape (4.x, 6 and higher) and Internet Explorer (5 or higher) with JRE 1.4.2\_x and 1.5.0\_06 Java plug in. Using other versions of Web browsers or Java Virtual Machines may lead to visualization problems.

The portal has been continuously developed and hence any feed-back, comment advice, request concerning the portal features is highly appreciated. Please, send your comments to [portalreq@lpds.sztaki.hu](mailto:portalreq@lpds.sztaki.hu)

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powered by gridsphere

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**Thank you !**

**→ Miklos Kozlovsky  
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