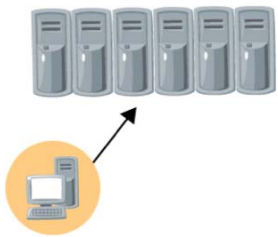


Grid computing in Europe and neighbouring countries

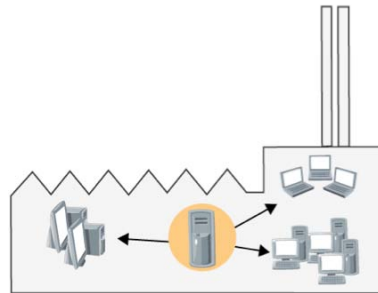
*Vincent Breton
Institut des Grilles du CNRS
LPC Clermont-Ferrand*

From a single PC to a grid

Farm of PCs



Entreprise grid:
mutualization of
ressources in a
company



Example:
Novartis

**Volunteer
computing:**
CPU cycles
made available
by PC owners



Examples:
Seti@home
Decryphon
World Community Grid
Africa@home

Grid infrastructure:
Internet + disk and storage
resources + services for
information management
(data collection, transfer
and analysis)



Example:
EGEE

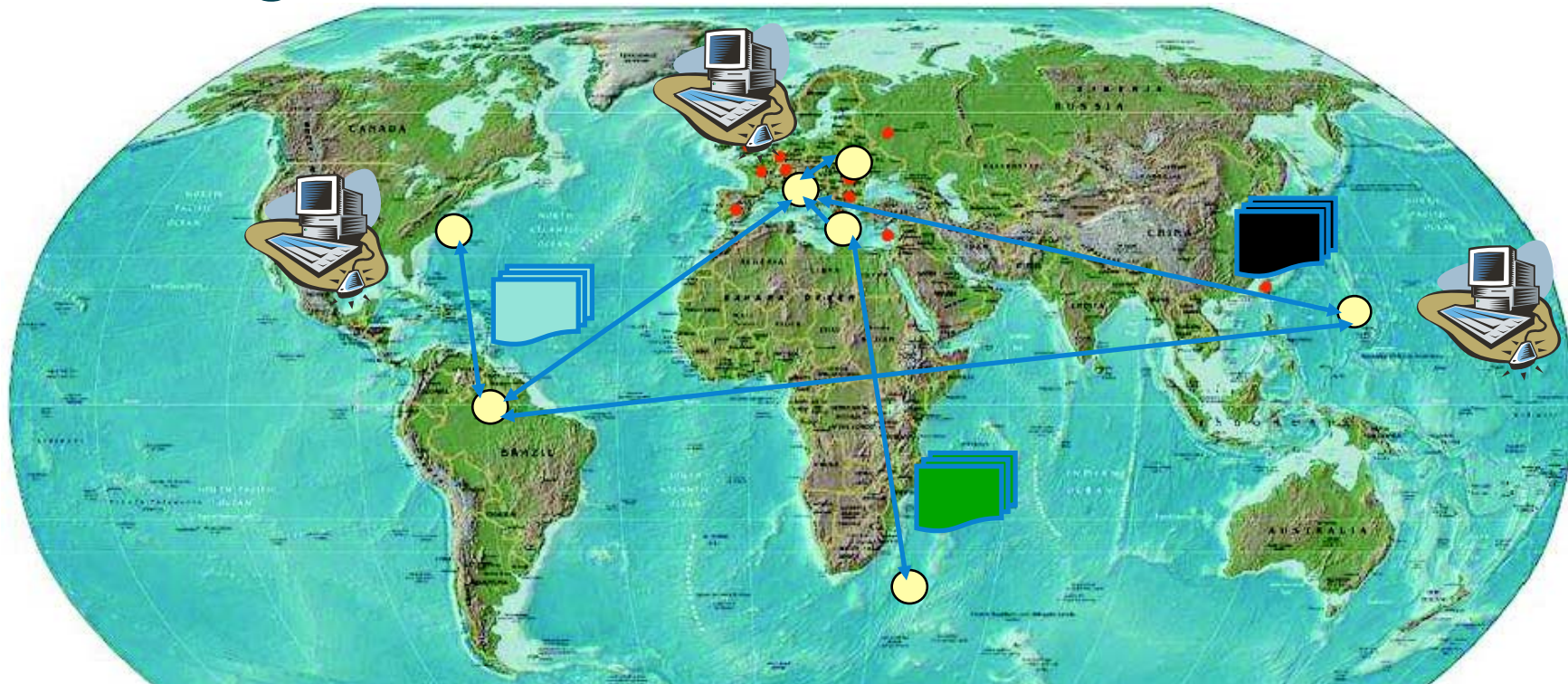
What is the Grid?

- **The World Wide Web provides seamless access to information that is stored in many millions of different geographical locations**
- **In contrast, the Grid is a new computing infrastructure which provides seamless access to computing power, data and other resources distributed over the globe**
- **The name Grid is chosen by analogy with the electric power grid: plug-in to computing power without worrying where it comes from, like a toaster**



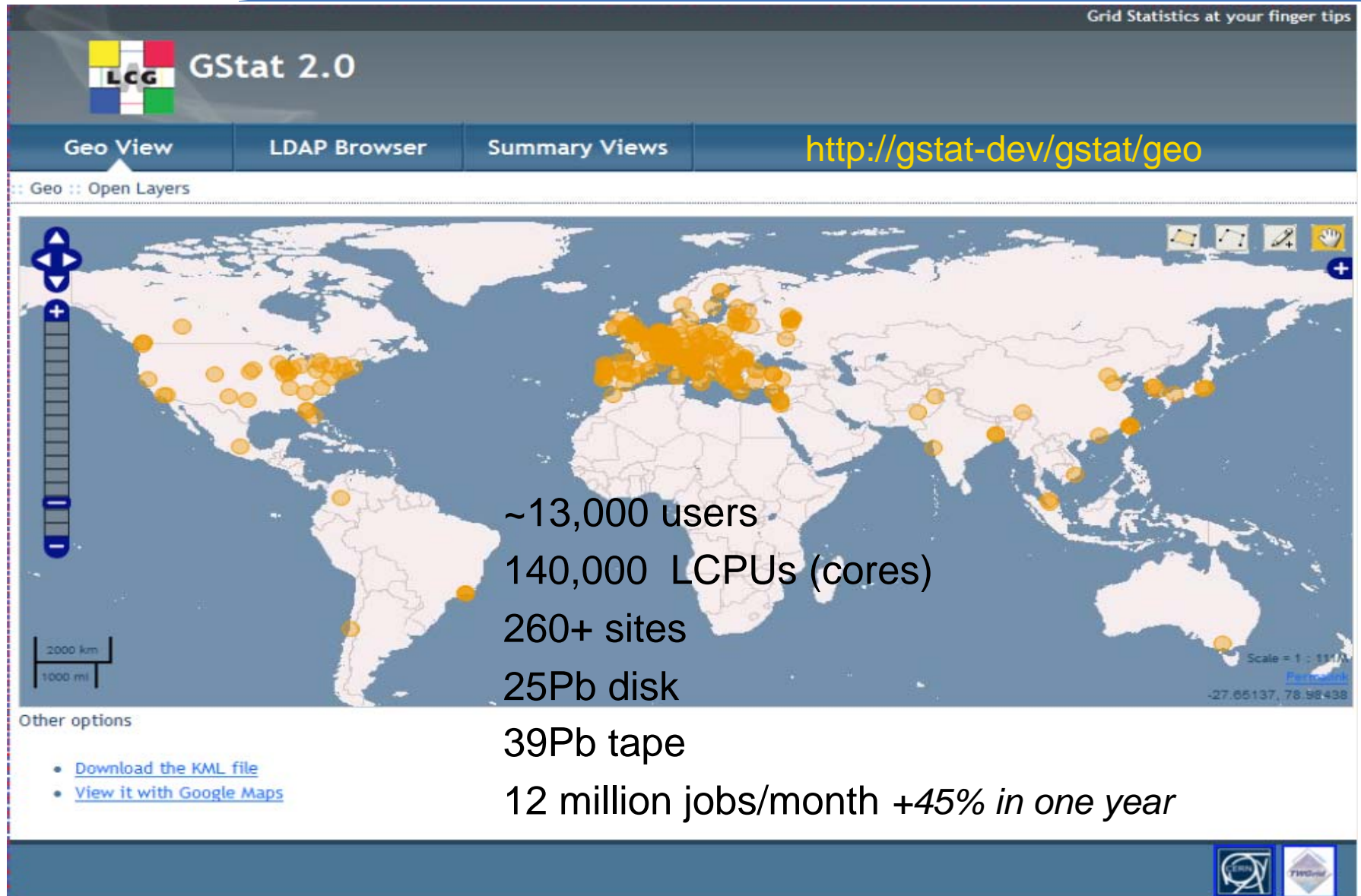
The grid added value for international collaboration

- *Grids offer unprecedented opportunities for sharing information and resources world-wide*

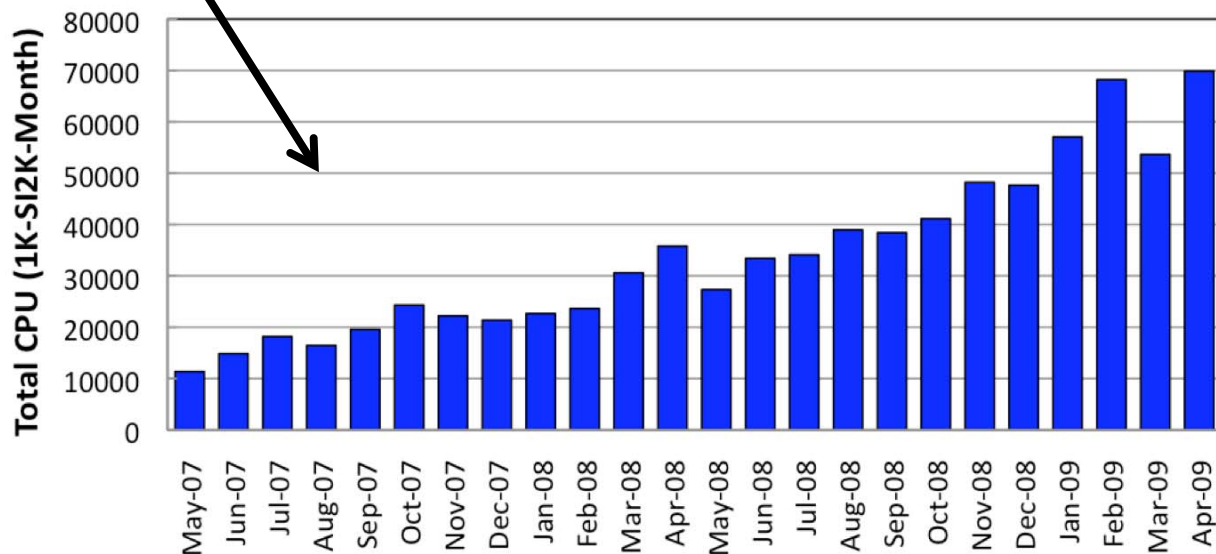


Grids are unique tools for :

- Collecting and sharing information
- Networking experts
- Mobilizing resources routinely or in emergency



Consistent doubling every 12-18 months.
 High Energy Physics largest users / contributors
 Growing contributions from other disciplines



Domain	VOs	Users
AstroPhy & Astronomy	20	373
Comp Chem	4	347
Comp Sci	4	21
Earth Sci	7	142
Fusion	2	68
High Energy Phys	36	8577
Life Sci	9	379
"Regional"	26	1658
Other	28	1816
TOTAL	136	13381

>13000
Registered Users

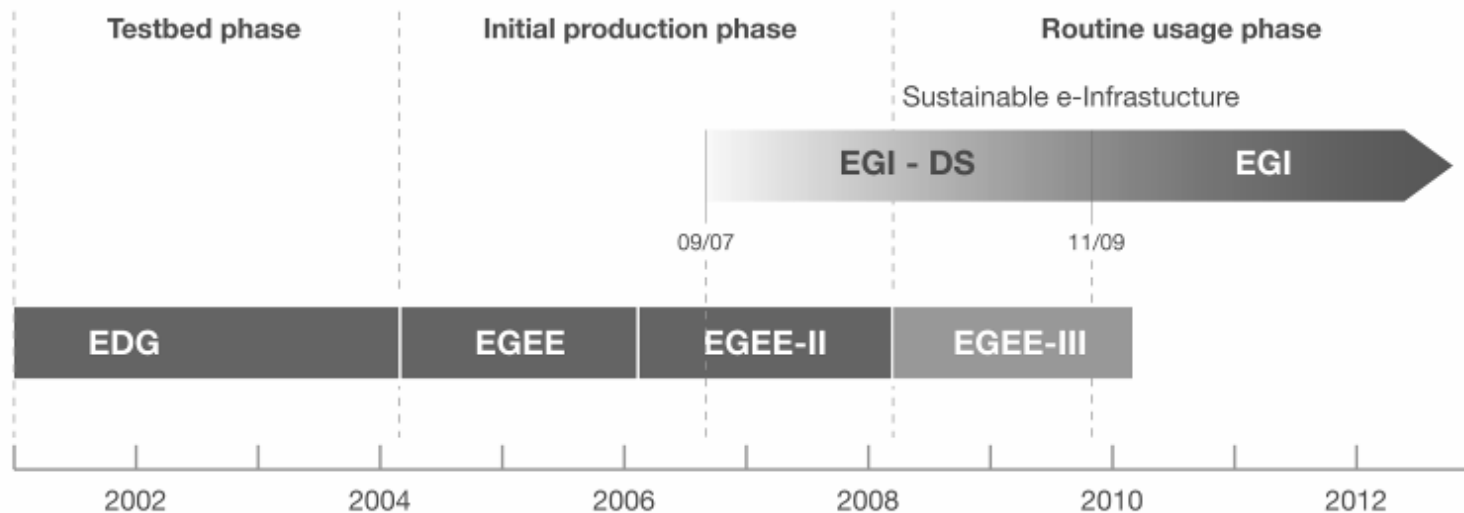
CIC Portal: <http://cic.gridops.org/>

Accounting Portal: <http://www3.egee.cesga.es/>



<http://bit.ly/EGEEtrainingmap>

- EGEE was a **project** funded by the **European Commission** within FP7
- EGI is a **federation of National Grid Initiatives**
 - EC is funding the glue between the national grids



Are grids only for rich countries ?

- *Grids are powerful instruments to address digital divide*
 - *Clouds are not !*
 - *All grid users access the same services and resources*
 - *Requirement: an access point (or User Interface) to the grid*
- *There are two conditions*
 - *Network connectivity*
 - *Training of local users and administrators*

Other grid infrastructures around the world

eGEE
Enabling Grids
for E-science



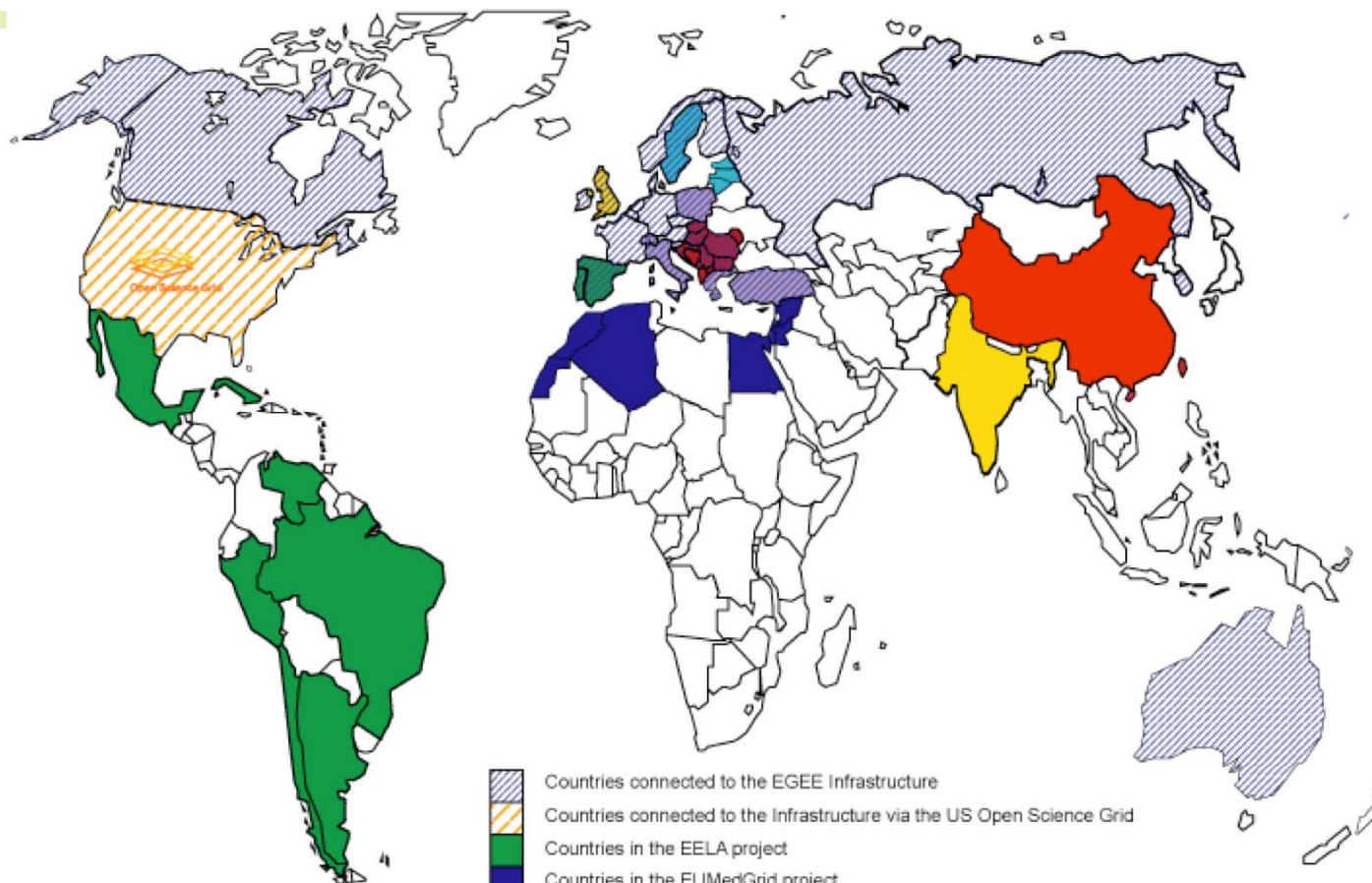
Open Science Grid



TeraGrid

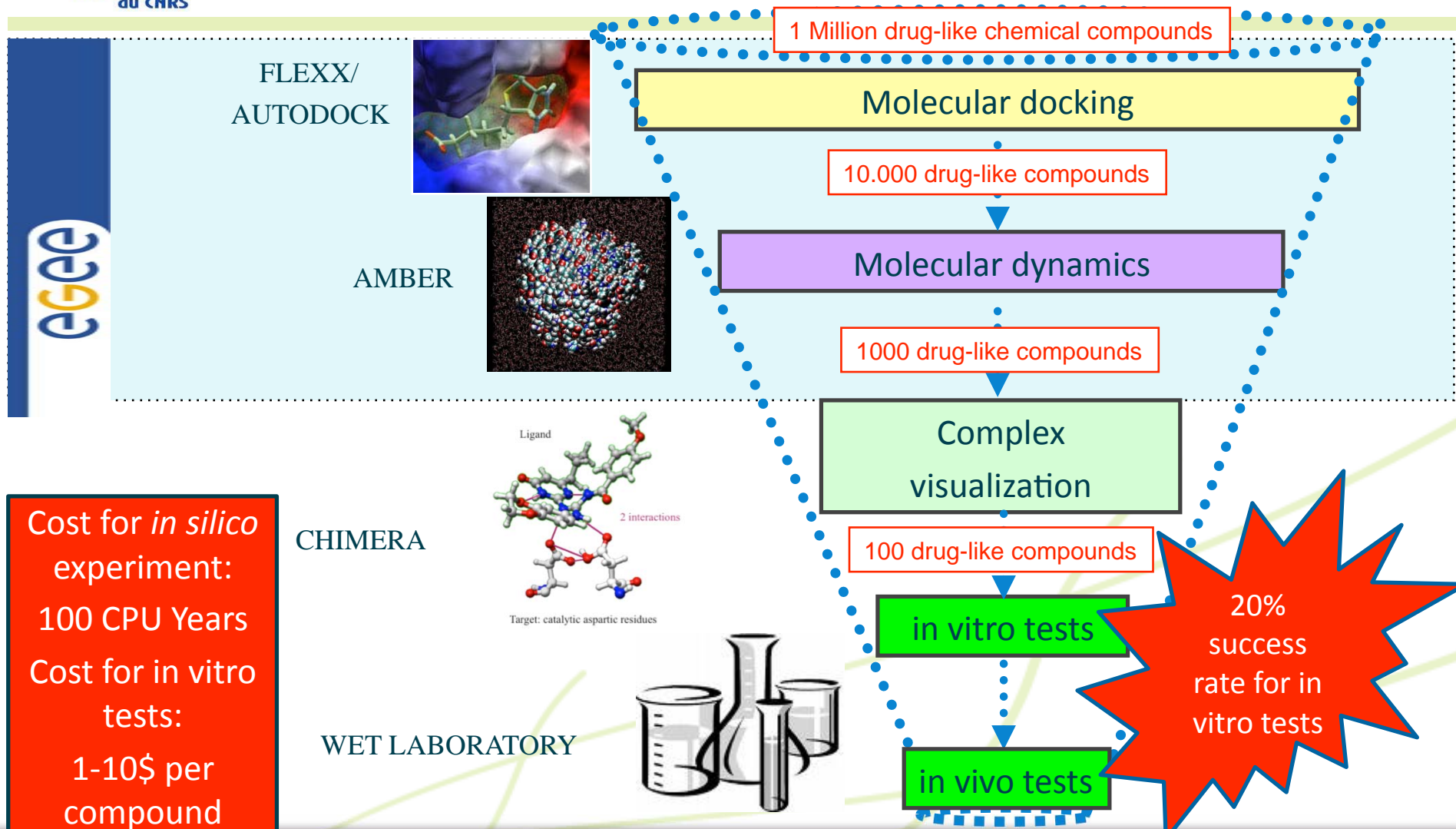


GEANT2



-  Countries connected to the EGEE Infrastructure
-  Countries connected to the Infrastructure via the US Open Science Grid
-  Countries in the EELA project
-  Countries in the EU MedGrid project
-  Countries in the BalticGrid project
-  Countries in the SEE-GRID project
-  Countries in the EU IndiaGrid project
-  Countries in the EU ChinaGrid project
-  Countries in several regional projects

Grid-enabled *in silico* drug discovery



Cost for *in silico* experiment:
100 CPU Years
Cost for in vitro tests:
1-10\$ per compound



GRIDS

- EGEE, Auvergrid,
- TwGrid, EELA,
- EuChina,
- EuMedGrid

EUROPEAN PROJECTS

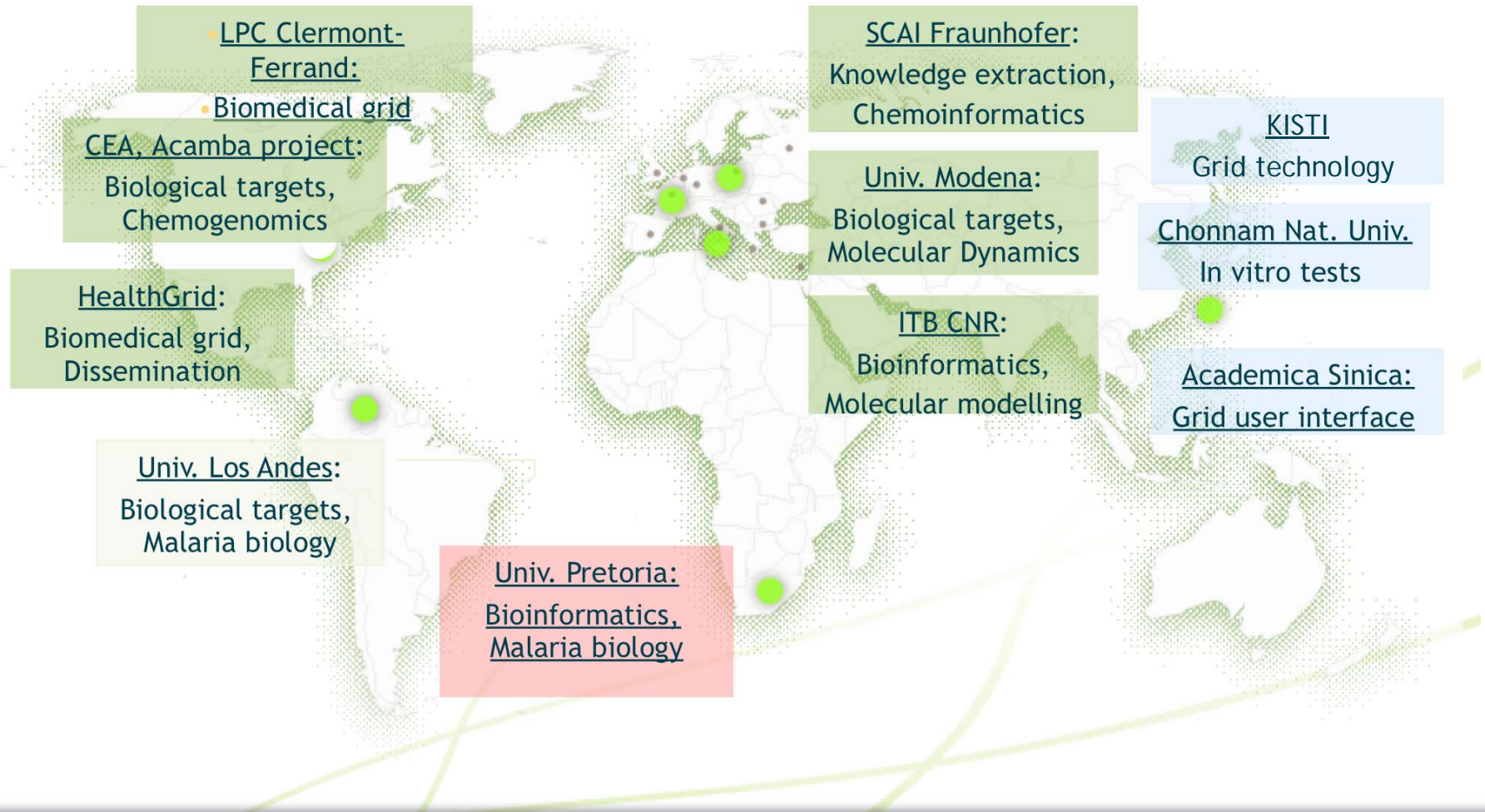
- Embrace
- EGEE
- BioInfoGrid

INSTITUTES

- SCAI, CNU
- Academia Sinica of Taiwan
- ITB, Unimo Univ., LPC, CMBA
- CERN-Arda, Healthgrid, KISTI

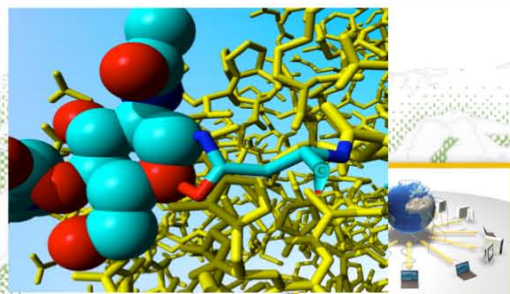
More than 15 papers in peer-reviewed scientific journals
5 patents on molecules

WISDOM partners

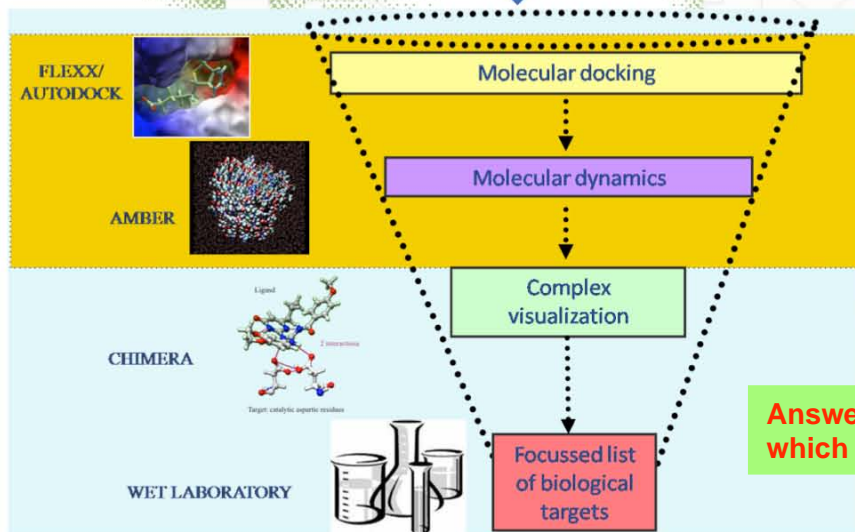


Discovering new drugs in Vietnam

PDB database
> 50.000 3D structures
including biological targets
for cancer, malaria, AIDS...



Question: are these products
potentially
active against cancer, malaria,
AIDS ?

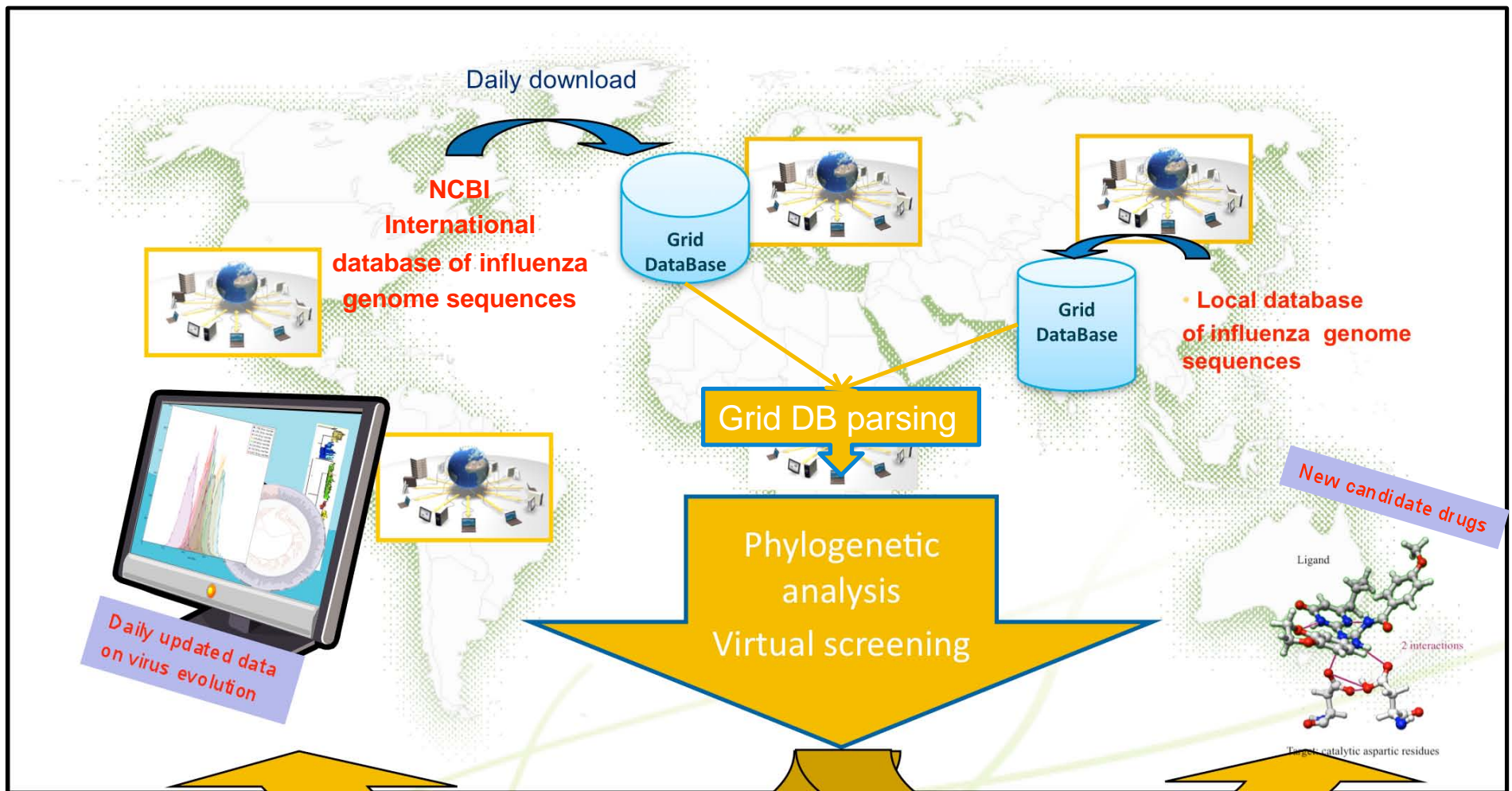


Hanoi
INPC

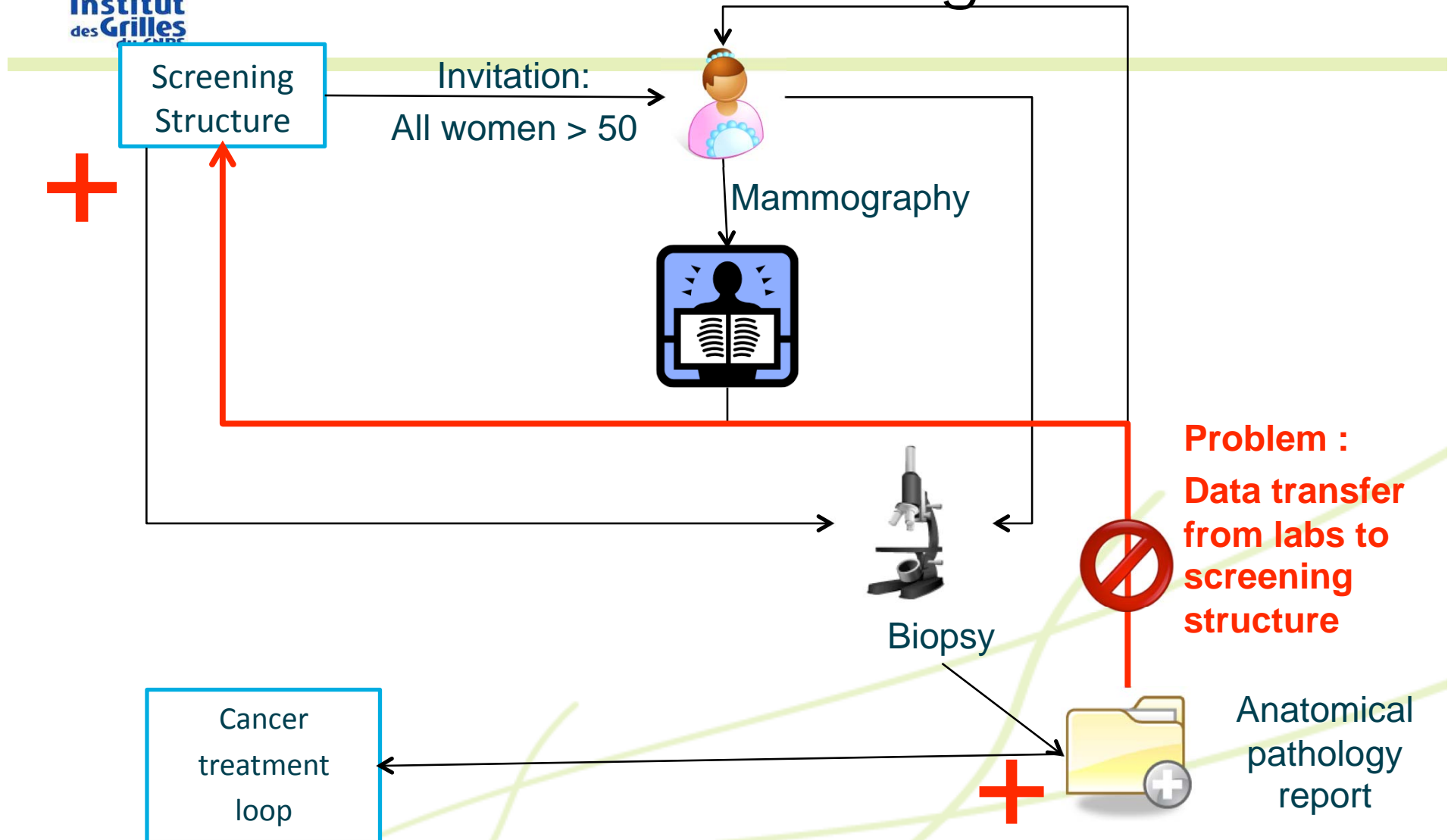
Local DataBase of
Natural chemical
products extracted
from local
biodiversity

Answer: focused list of biological targets on
which the compound is most active *in silico*

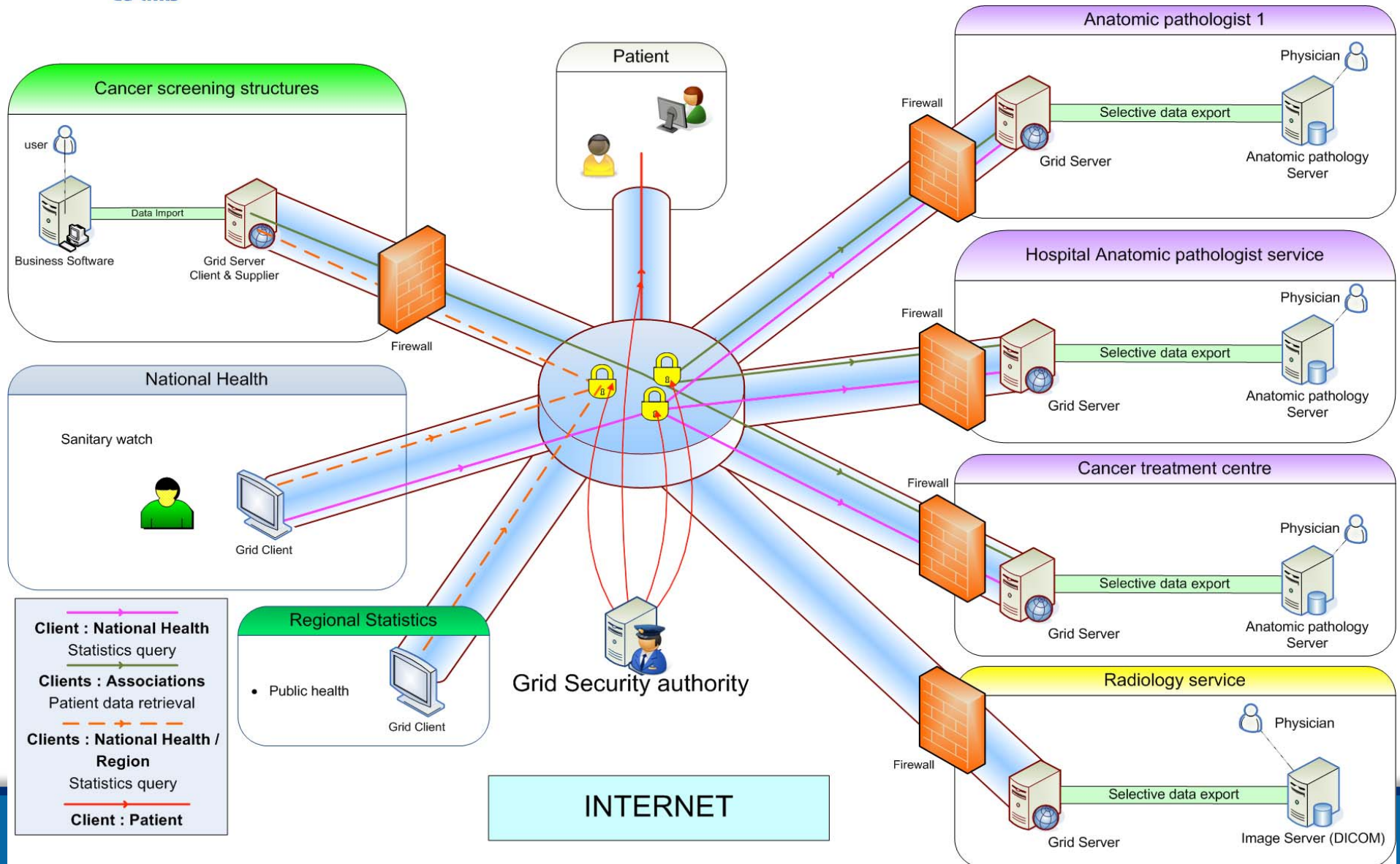
Monitoring the evolution of influenza viruses



Breast cancer screening



Architecture



Where grids can help medical development in developing countries

- *Improve the ability to undertake health innovation*
 - *Strengthen the integration of life science research laboratories in the world community*
 - *Provide access to resources*
 - *Provide access to bioinformatics services*
- *Contribute to the development and deployment of new drugs and vaccines*
 - *Improve collection of epidemiological data for research (modeling, molecular biology)*
 - *Improve the deployment of clinical trials on plagued areas*
 - *Speed-up drug discovery process (in silico virtual screening)*
- *Improve disease monitoring*
 - *Monitor the impact of policies and programs*
 - *Monitor drug delivery and vector control*
 - *Improve epidemics warning and monitoring system*



Conclusion

- *Grid services are better than they have ever been*
 - *Opportunities to do science differently or at a larger scale*
- *Many opportunities for collaboration with Mediterranean countries*
 - *Life sciences and health*
 - *Earth sciences*
 - *Climate change*
- *Institut des Grilles du CNRS will pursue active collaboration with Mediterranean countries*
 - *Already active collaborations with developing countries (Senegal, South Africa, Vietnam)*
 - *Involvement in EUMedGrid-Support and EPIKH (see F. Ruggieri's talk)*

Suggestion: an open source toolkit for the modelling of climate change

- *Background: polemics on climate change*
 - « Last » episod: climategate
 - Beyond polemics: lack of consistency between existing models
- *Proposal: build an open source toolkit for the modelling of climate*
 - *Added value of the open source approach*
 - Common tool
 - Transparency
 - Potential consensus
 - *Grid added value: distributed data collection*

Grids are learning to speak to each other

- *Grids have different operating systems or middlewares*
 - *EGEE has glite*
 - *Open Science Grid (USA) has Globus*
 - *Japanese grid has Naregi*
 - *Most desktop grids use Boinc*
- *Progress with technology opens doors to interoperability of grids*

