



RINGGrid

The logo icon consists of a central circle with a ring around it, surrounded by several smaller circles of varying sizes, all arranged in a roughly circular pattern.

REMOTE INSTRUMENTATION IN NEXT-GENERATION GRIDS

Marcin Lawenda

Poznań Supercomputing and Networking Center

<http://www.ringgrid.eu/>

Why Vlabs ?

VERY limited access

Main reason - **COSTS**

Main **GOAL** - to make commonly accessible

Added Value

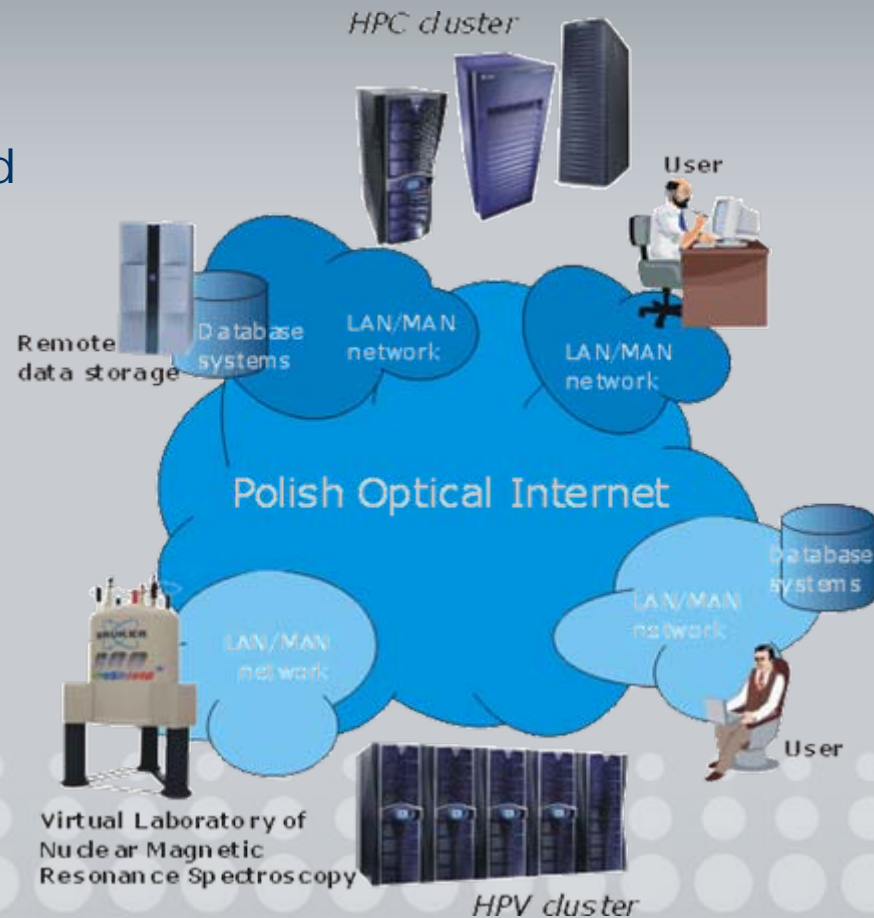


virtual, remote, ... **Grid-enabled**

Virtual Laboratory overview

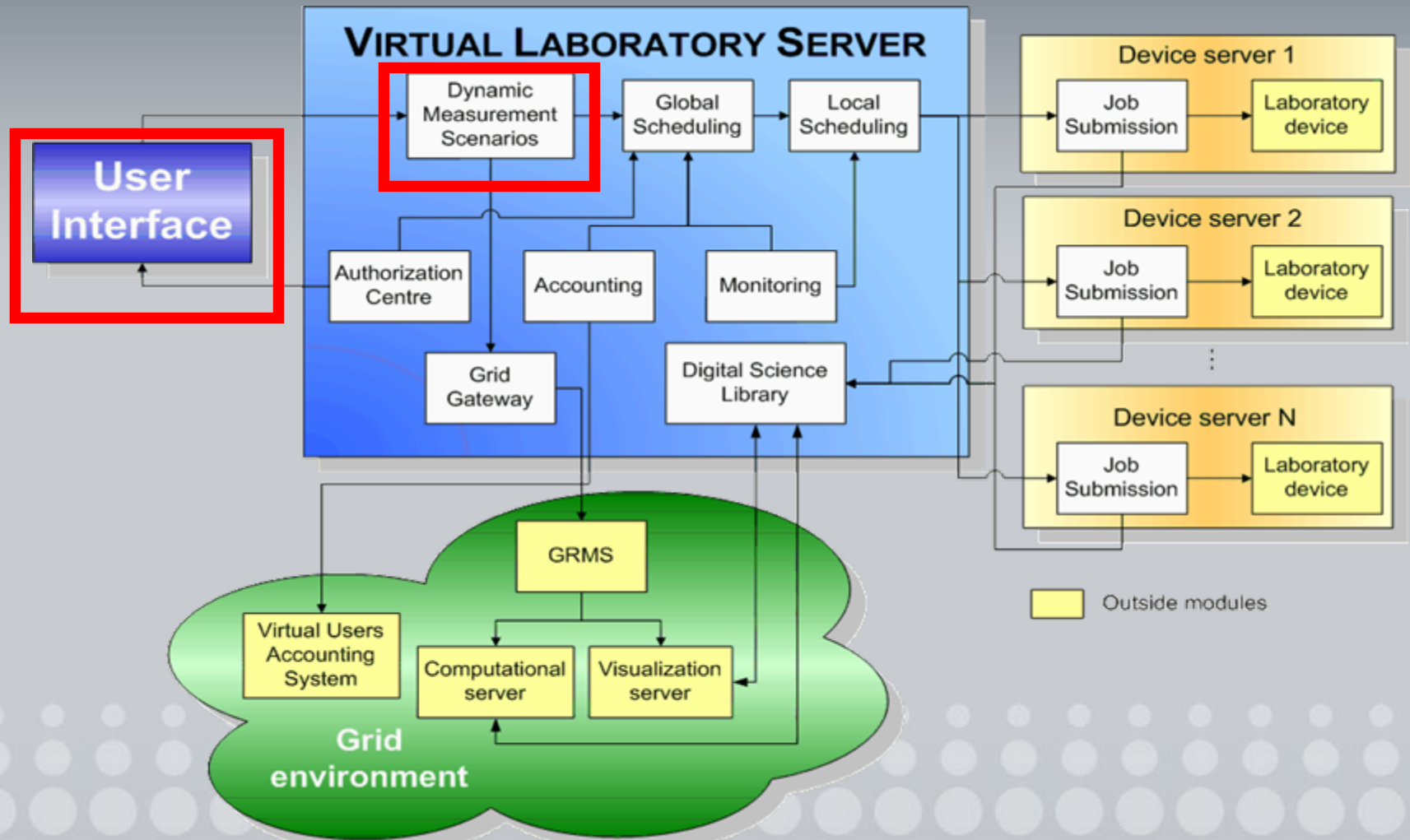
A distributed environment, providing its users with the following functionality:

- Remote access to complex and expensive laboratory research equipment
- User-customized Dynamic Measurement Scenarios
- Data storage and management
- Digital Science Library
- Workgroup collaboration tools
- Educational potential



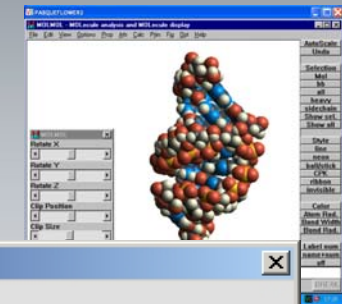
<http://vlab.psnc.pl>

VLab - workflow



Scenario Submission Application

The user is welcome to create the measurement diagram using the Scenario Submission Application (SSA).



Scenario
Submission
Application

Conclusions (#1)

- General framework
- Integration of labour facilities with Grid environment
- Testbed installation
- **Missing**
 - production infrastructure
 - worldwide approach
 - limited number of facilities
 - enhanced architecture – vision of the future

RINGrid

Remote Instrumentation in Next-generation Grids

- Call: FP6-2005-Infrastructures-7
- **Specific Support Action**
- Contract no. 031891
- 18 months: from October 2006 – March 2008

Participants

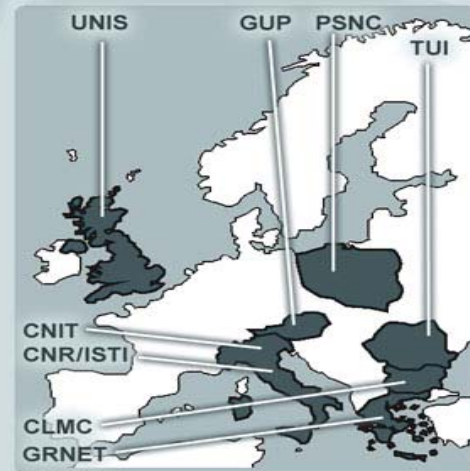


CLARA



cnit

UniS
University of Surrey



Objectives

- Identification of instruments and user communities, definition of requirements
- Synergy between remote instrumentation and next-generation high-speed communications networks and grid infrastructures
 - **New generation eInfrastructure**
- Trend analysis and recommendations for designing next-generation remote instrumentation services
- Promoting egalitarian access to European e-Infrastructure opportunities
- Dissemination of project results to **scientific and business** groups of users

Workpackages

- WP1 - Project management
- WP2 - Identification of instruments and user communities, definition of requirements
- WP3 - Evaluation and requirements for infrastructures
- WP4 - Future emerging trends and recommendations
- WP5 - Dissemination, standardisation and cooperation with other projects
- WP6 - Prototyping and verification

Identification of instruments

WP2

- **Identification** of scientific instruments for integration with Grid environment
- Identification of **user groups** and instrument owners as potential beneficiaries of remote instrumentation systems
- Definition of instrument and instrument owner technical and policy **requirements**
- Influence on the **e-Infrastructure** vision (e-IRG, ESFRI)
- Carrying out extended research to identify further groups of users potentially interested in remote instrumentation
- Evaluation of **cost** savings through the use of remote instruments as compared with the conventional use, rented or owned equipment

Evaluation and requirements for infrastructures WP3

- **Evaluation** of the existing network and grid infrastructure available for the remote instrumentation communities identified in WP2
- Analysis of the scientific instrument requirements with respect to the present **research network infrastructures**
- Analysis of the scientific instrument requirements with respect to the present state of the art of **grid middleware** and other **grid-enabled software**
- Requirements definition of infrastructure for remote instrumentation systems

Future emerging trends and recommendations

WP4

- Analysis of the impact of **next-generation multi-gigabit network infrastructures** (e.g. Geant 2) and networking technologies advances (e.g. IPv6, QoS support, MPLS) on the use of remote instrumentation services
- Analysis of **future trends** concerning network technologies that may be used to access remote instrumentation services and virtual research laboratories
- Guidelines for the **development of new software services** enabling user-friendly interactions (e.g. access, control, monitor) with remote scientific devices
- Recommendations for the development of virtual research laboratories to reduce access costs and expand accessibility to top-level instruments

Prototyping and verification WP6

Validation of the project results will base on the following testbed implementations:

- PSNC Virtual Laboratory (<http://vlab.psnc.pl/>)



- GridCC (<http://www.gridcc.org/>)



- CLARA (<http://www.redclara.net/>)



Prototyping and verification

WP6

- Specification and working out of 'use cases', which match the profile of requirements set defined by the previous work packages
- Preparation of prototype installations
- Execution of tests and collection of remarks concerning results achieved and user experiences
- Analysis of the verification process results and production of a coherent list of recommendations for instrumentation grid infrastructures

Identified Instrumentation

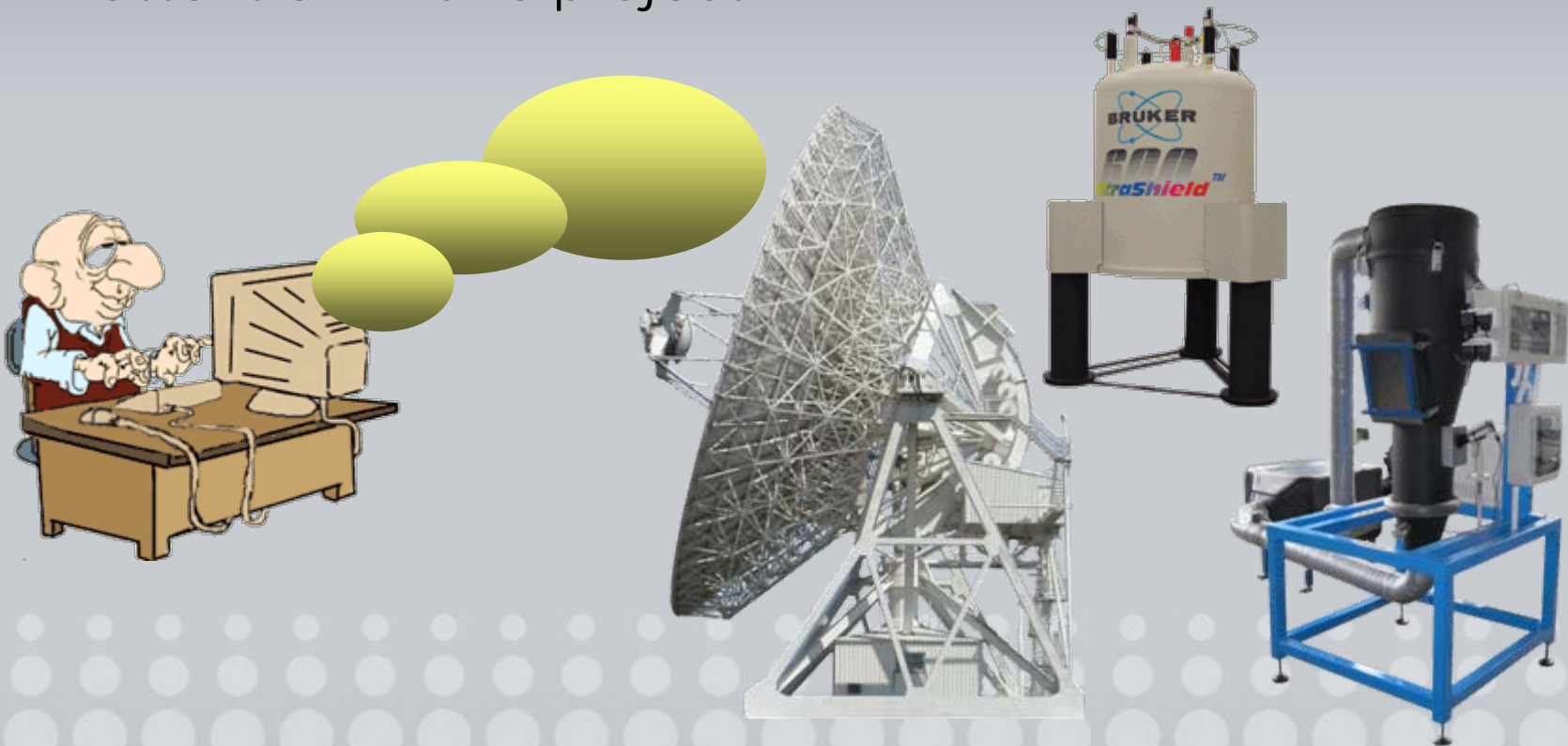
... from labour equipments to sensors

- **Material Science**
 - Synchrotron Light Source - 11 beam lines
 - High Resolution Transmission Electron Microscope (HR-TEM)
 - Field Emission Scanning Electron Microscope (FEG-SEM)
- **Optical Astronomy at LNA (www.lna.br)**
 - 4.1 m optical telescope at Southern Astrophysical Research Telescope (SOAR)
- **Vibration spectroscopy**
 - BRUKER Tensor 37 FTIR
 - Electron spectroscopy
 - VARIAN Cary 100 UV-Vis
- **Chemistry**
 - Bruker AC - 250 P
 - Laser Scan Microscope
 - Zeiss LSM 410 Confocal Microscope
 - Diffractionmeter
 - Siemens D-5000(<http://microlab.berkeley.edu/labmanual/chap8/8.44.html>)
- **Satellite communications, telecommunication systems and networking measurement equipment**
 - Satellite network (mesh topology); 24 earth stations; audio and video multicasting
 - Vector Signal Generator Agilent ESG E4438C (250 kHz - 6 GHz, IEEE 802.11b option)
- **Food processing, chemistry, other**
 - Gas Chromatograph Varian 38000
 - Atomic Absorption Varian AA 800
 - Varian Cary 1E UV-Visible Spectrophotometer
- **Radio Astronomy**
 - 32m Radio Telescope in Piwnice, Poland



Interactivity

- Interactive* access to equipment is under special attention in this project



Relevant network parameters

- Batch computation
- Bandwidth
- Interactive applications
- Latency
- Jitter

Seq: s2pul Exp:1 Index: 1

acqi

Abort Acq Cancel Cmd GLIDE Main Menu Help Flip Resize Acqi

Box Full Integral Full sp wp Mark Phase Th Resets Dscale Lvl/Tlt Set Int Ref Pl

varian ACQUISITION STATUS

STATUS: Idle QUEUED:
 USER: EXP: SAMPLE:
 FID: CT: DEC: Off
 Completion Time: LOCK: Regulated
 Remaining Time: level: 49.6
 Data Stored at:
 SPINNER: Not Reg.
 Actual: 21 Hz
 Setting: 20 Hz

io 10.0 cr 0 is 35094.8 delta

ACQUISITION	SAMPLE	PROCESSING	FI
sfrq 121.446	date Sep 19 2002	lb 1.00	il
tn P31	solvent D2O	sb not used	in
at 0.533	file exp gf	not used	dp
np 32000	DECOUPLING	awc not used	hs
sw 30007.5	dn H1	lsfid not used	SPI
fb 16600	dof 1000.0	phfid not used	temp
bs 4	dm yyy	wtfile	
ss 0	dmm w	proc	ft
tpwr 55	dmf 11000	fn	65536

varian ACQUISITION

CLOSE FID SHIM LARGE

SPIN: off LOCK: off SAMPLE: insert
 on on eject
 auto

flock_level = 56.8

LOCKED SPIN: 20

[-1014]
 20 -1+ -4+ -16+ -64+

[51]
 lockpower -1+ -4+ -16+ -64+

[57]
 lockgain -1+ -4+ -16+ -64+

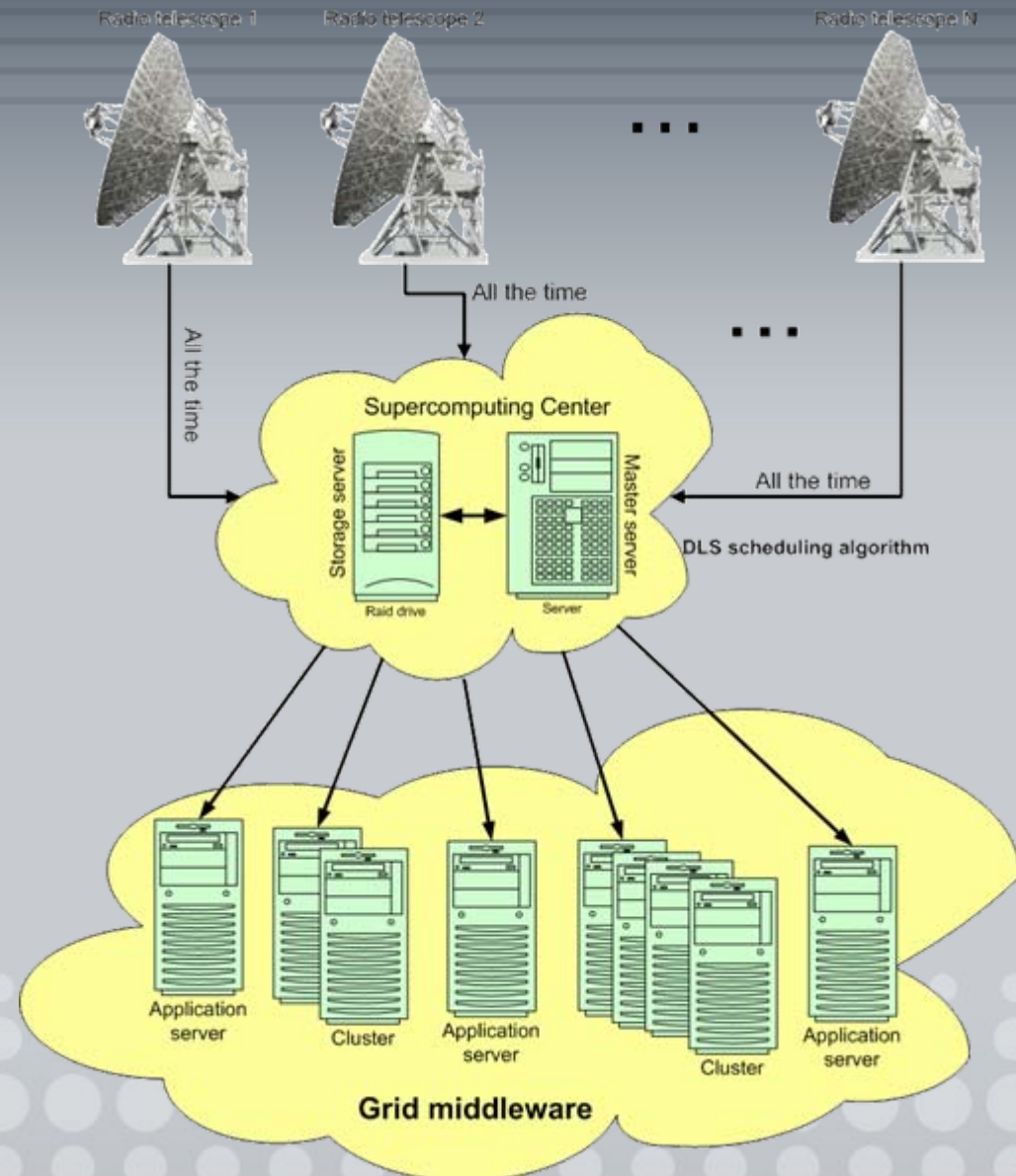
[248]
 lockphase -1+ -4+ -16+ -64+

[20]
 spin -1+ -4+ -16+ -64+

Relevant network functionality

- Bandwidth on demand
 - reservation only for experiment duration
 - allows to save money

- Need for bandwidth in e.g. eVLBI system:
 - 4 tel. – 128 Mb/s
 - 10 tel. – 512 Mb/s
 - 16 tel. – 1 Gb/s
 - 32 tel. – 4 Gb/s



Summary

- RINGrid will provide an architecture which will integrate instrumentations with e-Infrastructure:
 - encompasses the current state of art, **near** future technology
 - conceptual design of missing architectural 'pieces'
 - support by Grid and network environment (**e-Infrastructure**)
- Prototyping and validation is foreseen – 4Q2007/1Q2008
- Large set of instruments being a reference for architecture definition
- RINGrid is looking for collaboration in terms of interactivity and joint efforts
 - Proposition of new European Technical Group (TG10) and OGF research group under discussion

Thank YOU
for your attention !

<http://www.ringrid.eu>