

SANET, eScience and Collaborative Systems in Slovakia



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Ministry of Education, SR

International ICFA Workshop on
HEP Networking, Grid and Digital Divide Issues for Global e-Science

October 27, 2007 Mexico City

Slovakia – stable EU country



Capital – Bratislava

Independence: January 1, 1993

due to dissolution of Czechoslovakia

EU membership: May 1, 2004

Population – 5,379,455

GDP Growth – 8,3 % (in 2006), 4,2 % (in 2003)

Inflation – 2,5 % (in 2006) 8,5 % (in 2003)

Unemployment rate – 11 % now, about 19 % in 2002

Regions and Districts: 8 Regions with a certain degree of autonomy, 79 districts

Current Rating of the Slovak Republic

Agency	Standard & Poor's	Moody's	Fitch Ratings	R & I	JCR
Grade	A stable outlook	A1 stable outlook	A positive outlook	A- stable outlook	A positive outlook
Assignment Date	December 19, 2005	October 17, 2006	July 23, 2007	October 3, 2006	June 27, 2007

Priorities:

January 1, 2008 Slovakia is ready to enter **Shengen Area**

January 2009: Slovakia plans to join an economic and monetary union (**the euro adoption**)

To continue in Healthcare reform, Pension reform, Public finances reform, **Education reform...**

Education in Slovakia

Slovakia ranks among countries with well-developed school educational system. In general, education is under the control of state, church or private bodies. State and religious schools are free of charge, they are financed by the state, while private schools charge high tuition fees.

Pre-school education includes crèches, nursery schools and kindergartens. They are attended by the children at the age 2 to 6.

Compulsory education is for children between the ages 6 to 16.

There is no selection of children entering primary schools. **Primary education** lasts 8 (9) years and is comprehensive, providing basic knowledge for the pupils. It includes subjects like : languages, maths, physics, history, geography, biology, music, physical education, arts and crafts, and so on.

The system of **secondary education** consists of three types of schools. There are 3-years vocation schools, secondary technical schools with or without school leaving examination and grammar schools where students are prepared for their next undergraduate study at universities and colleges.

Nowadays, several types of private grammar schools appeared which are usually specialized on languages, computers or economy.

After finishing a secondary school one can continue studying at any of technical, economic, medicine, natural science or other **colleges**. It is possible to choose Bachelor or Diploma study. The last one usually ends with the state examinations and the pleading of the thesis.

The last step in our educational system is the postgraduate study, where a student is improving his ability for independent scientific work under the guide of the experienced specialist.

20 public Universities and colleges, 10 private Universities in Slovakia

In 2006: 209517 students (10,4 % more then in 2005)

Near future: accreditation of all universities → to establish scientific universities

Research in Slovakia: Slovak Academy of Sciences & Universities

Organisations of Slovak Academy of Sciences

Section I - Physical, Space, Earth, and Engineering Sciences

Section II – Life, Chemical, Medical, and Environmental Sciences

Section III – Social Sciences, Humanities, Arts, and Culture

Earth and Space Sciences:

[Astronomical Institute](#) [Geological Institute](#) [Geophysical Institute](#) [Institute of Geography](#) [Institute of Hydrology SAS](#)

Mathematical and Physical Sciences, and Computer Science:

[Institute of Experimental Physics](#) [Institute of Informatics](#) [Institute of Physics](#) [Mathematical Institute](#)

Engineering Sciences [Institute of Construction and Architecture](#) [Institute of Electrical Engineering](#) [Institute of Geotechnics](#) [Institute of Materials and Machine Mechanics](#) [Institute of Materials Research](#) [Institute of Measurement Science](#)

Medical Sciences: [Cancer Research Institute](#) [Institute for Heart Research](#) [Institute of Experimental Endocrinology](#) [Institute of Experimental Pharmacology](#) [Institute of Molecular Physiology and Genetics](#) [Institute of Neurobiology](#) [Institute of Neuroimmunology](#) [Institute of Normal and Pathological Physiology](#) [Institute of Virology](#)

Biological and Chemical Sciences: [Institute of Botany](#) [Institute of Chemistry](#) [Institute of Inorganic Chemistry](#) [Institute of Molecular Biology](#) [Institute of Plant Genetics and Biotechnology](#) [Polymer Institute](#)

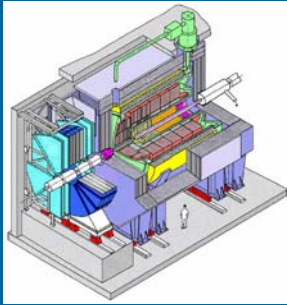
Agricultural and Veterinary Sciences: [Institute of Animal Biochemistry and Genetics](#) [Institute of Animal Physiology](#) [Institute of Forest Ecology](#) [Institute of Landscape Ecology](#) [Institute of Zoology](#) [Parasitological Institute](#)

What is important: Research is mainly concentrated in Bratislava region and also that Universities claim big investment into its research area.

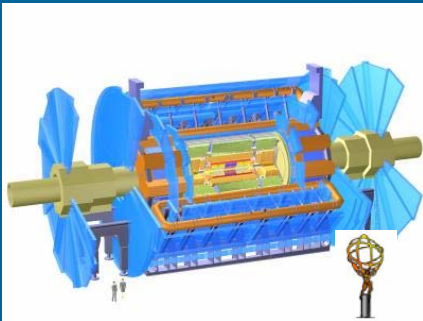
The problem will be solved in near future, exploiting European Infrastructure Fund... projects are in preparatory phase...

Slovakia and European Research Area

1987 Slovakia member of H1 collaboration in DESY

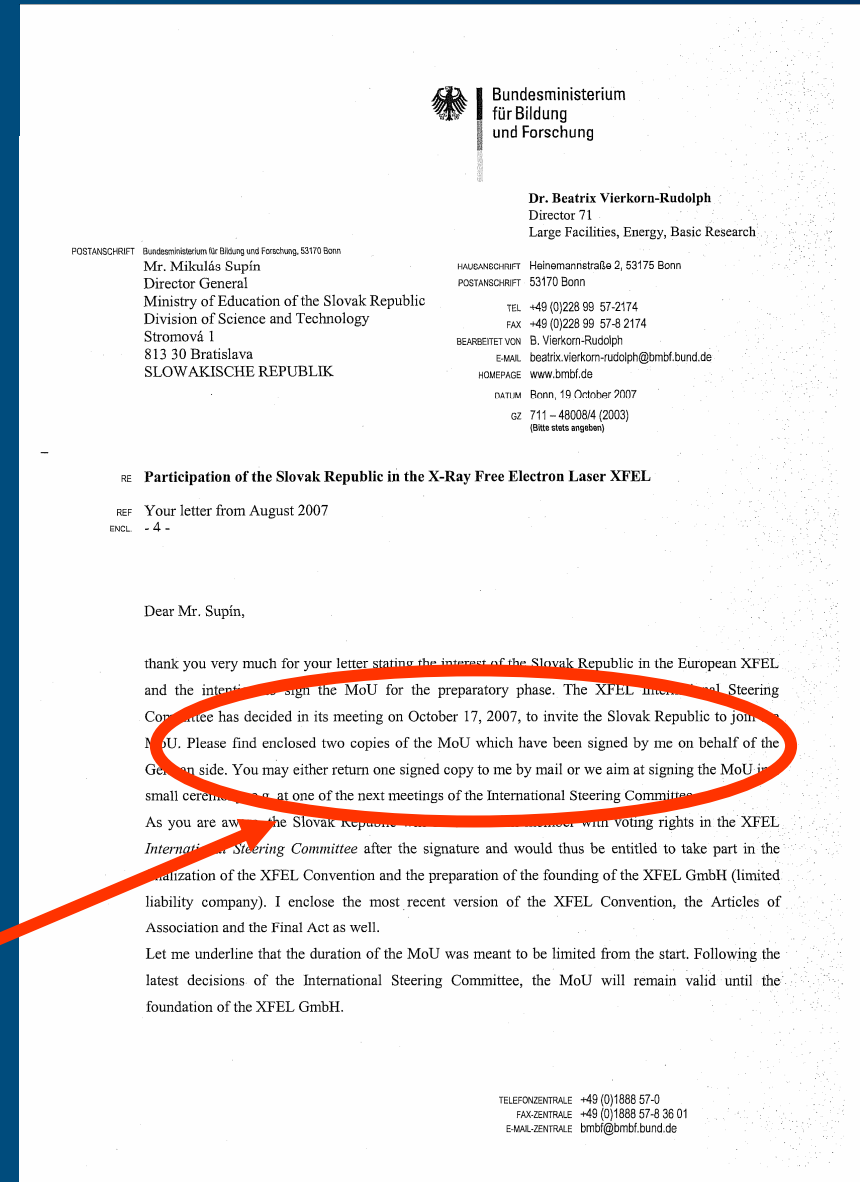


1993 Slovakia Member State of CERN



2007 Slovakia enter XFEL

... The XFEL International Steering Committee has decided in its meeting on October 17, 2007, to invite the Slovak Republic to join the MoU...



Virtual Collaboration = sharing equipments, technology and human sources

Academy of Arts in Banská Bystrica	2004
University of Economics in Bratislava	2003
Catholic University in Ružomberok	2004
University of Prešov in Prešov	2002
Slovak University of Agriculture in Nitra	2004
Slovak University of Technology in Bratislava	2004
University of Technology in Košice	2001
University of Technology in Zvolen	2002
University of Trenčín in Trenčín	2003
University of Trnava in Trnava	2003
Comenius University in Bratislava	2000
University of Constantinus Philosopher in Nitra	2003
Matej Bel University in Banská Bystrica	2001
Pavel Jozef Šafárik University in Košice	1999
University of St. Cyril and Methodius in Trnava	2003
University of Veterinary Medicine in Košice	2004
Academy of Performing Arts in Bratislava	2004
Academy of Fine Arts and Design in Bratislava	2004
University of Žilina in Žilina	2001

Central project of Ministry of Education, SR

...started in 2003, budget 200 000 EUR/Year;

Implementation of intelligent digital technologies of new generation into education and organisation of research work



...coherent waves of activities across Slovakia...

Virtual Collaboration (VK) = 1th stage: VK is the social vacuum fluctuation.

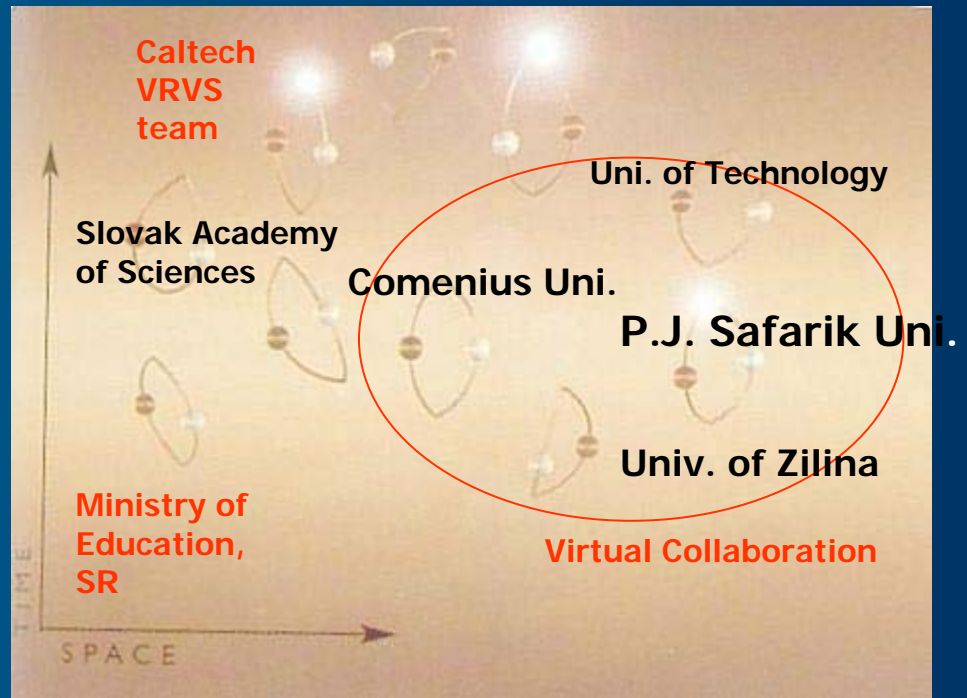
Academy of Arts in Banská Bystrica	2004
University of Economics in Bratislava	2003
Catholic University in Ružomberok	2004
University of Prešov in Prešov	2002
Slovak University of Agriculture in Nitra	2004
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University of Veterinary Medicine in Košice	2004
Academy of Performing Arts in Bratislava	2004
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University of Žilina in Žilina	2001

Status in 1999

-We had an Idea, 1 WEB Camera, 100 MHz PC only...

- **How to realize our Ideas?**

To utilize the human potential... The human who would like to change the world around...



Picture represents the fluctuations of the physical vacuum...

A correlation between objects in Space of "the Social vacuum fluctuation" was established ... **The Virtual Collaboration was created...**

The results of the 1th stage of Virtual Collaboration Evolution (1999 – 2006)

VRVS/EVO Caltech SK team

- The Slovak development Team is located at UPJŠ in Košice, Slovakia
- Developing/enhancing of user's applications for VRVS/EVO
- Videocodex (H.261/H.263), VRVS client for PocketPC, desktop sharing, OpenGL integration, videotranscoding, whiteboard,...

Ing. Pavel Farkaš, PhD. Ing. Michal Pauliny Ing. Viktor Michalčín, PhD.

Mgr. Rastislav Adamek Ing. Martin Harčár

•2 members (Ing. Juraj Sučík and Ing. Marek Domaracký) are working in C

Portal of the Virtual services <http://vk.upjs.sk>

Academic calendar - 2006



Core of experts

Dissemination teams

VK – technical service team

Bratislava

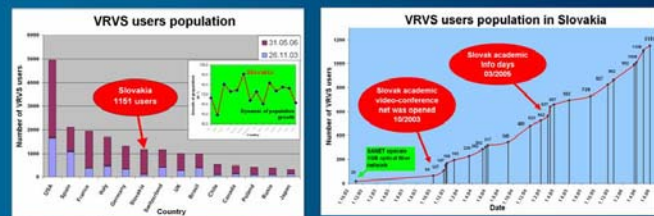
Kosice

... how to enter 2 virtual session at the same time...

New videoconference rooms at all universities and at Ministry of Education

Communication channel

Status of the project implementation, May 2006



DIV - didactic internet broadcast. ... magnetic levitation ...

Physics masterclasses ...60 EU universities.

Service teams

Education activities

Science activities

Methodology

... to enter EU Research Area...

- problem definition
- looking for world leader
- creating a expert team to start a effective collaboration with world leader team
- creating a large dissemination team to correlate activities thru whole Slovakia

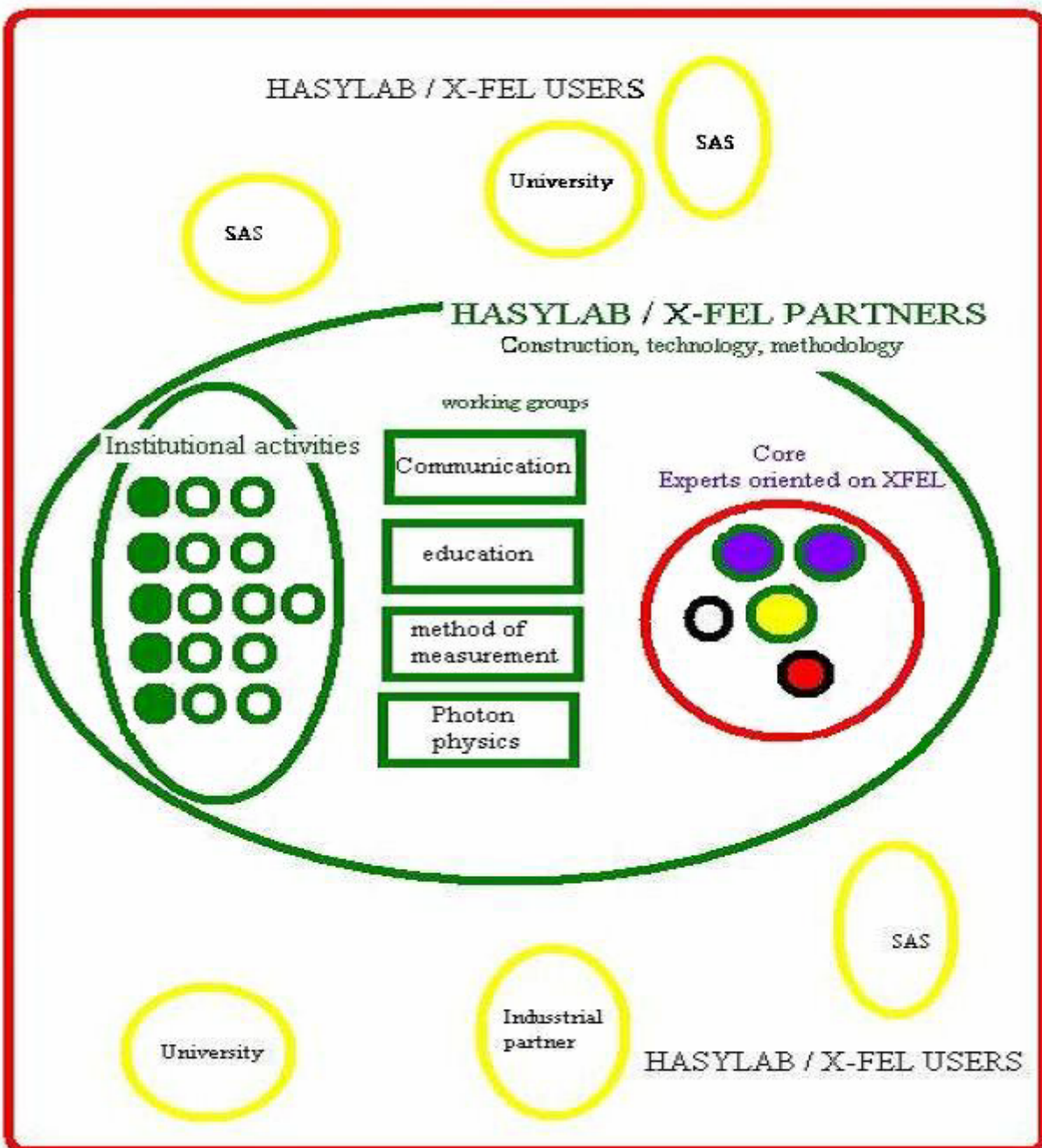
examples:

- Collaboration with CALTECH
- Collaboration with HASYLAB



-Virtual Institute of Material Research

Slovakian PARTNERSHIP to HASYLAB / X-FEL



Virtual Collaboration (VK) = 2th stage: materialization of virtual states

Academy of Arts in Banská Bystrica	2004
University of Economics in Bratislava	2003
Catholic University in Ružomberok	2004
University of Prešov in Prešov	2002
Slovak University of Agriculture in Nitra	2004
Slovak University of Technology in Bratislava	2004
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Academy of Performing Arts in Bratislava	2004
Academy of Fine Arts and Design in Bratislava	2004
University of Žilina in Žilina	2001

Status in 2007

Videoconferencing infrastructure:

"Slovakia is EVOland" ...

prof. Michal Kobel, EPPOG meeting, CERN, October 2007

We are starting to build up different clusters of institutions... (Technology development, methodology evaluation (into different societies...), virtual or distant laboratories...

Technology Transfer Laboratory

P.J. Safarik Uni.

Uni. Of Technology in Kosice

Uni. of Zilina

Digital archive and communication

Comenius University

Uni in Nitra

Uni in Presov

Institutions involved into XFEL related activities

Distant laboratory of material research

Education...

APVV project: Development of the videoconference archive system AVE and users applications for the EVO system.

Virtual Collaboration in future: **ISI GRID**

WEB portals like stars are weak interacting systems... How to detect a "track" represent a social event by independent WEB portals?

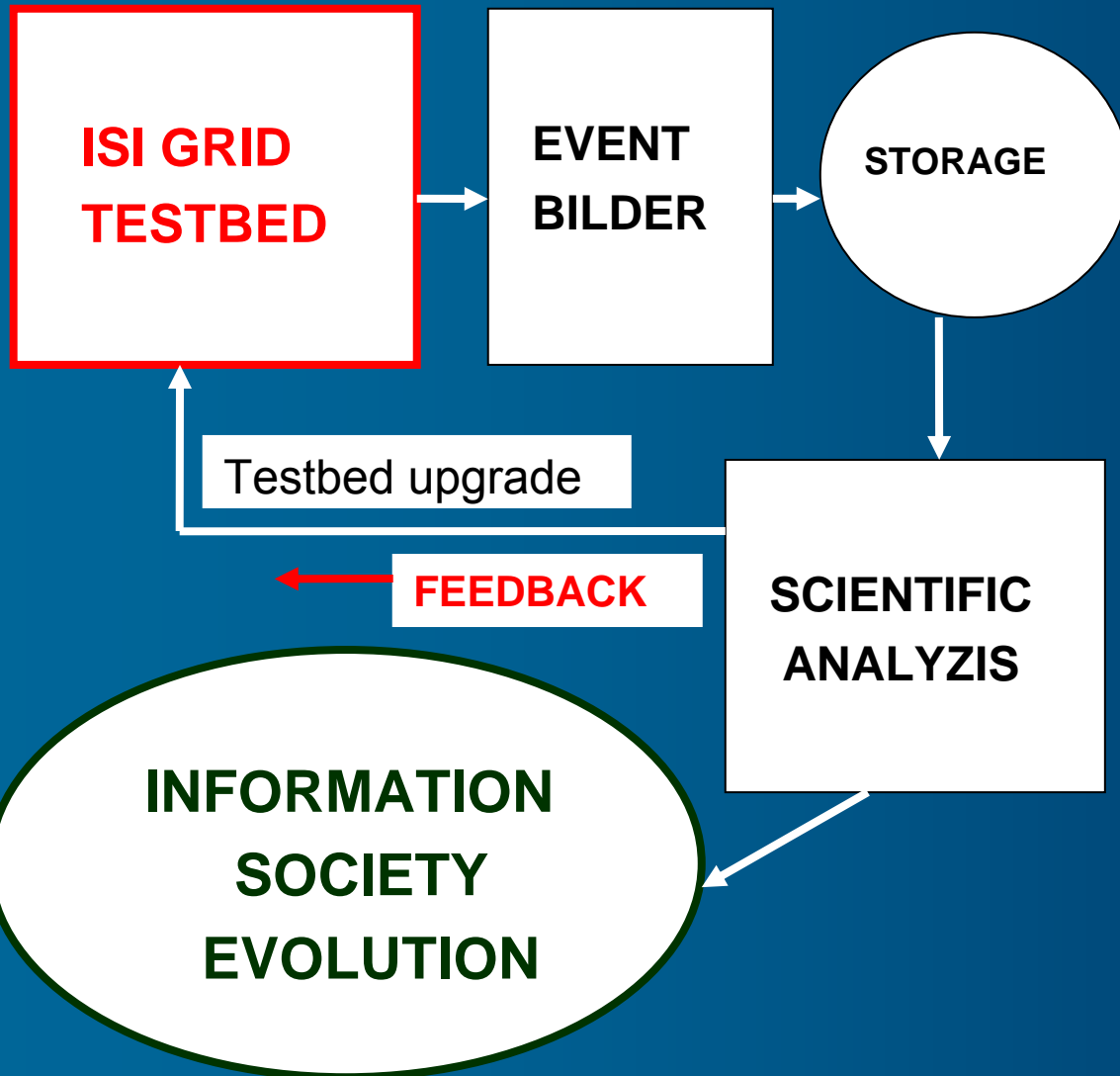
Evolution of students to be physicist

Project is / will be implemented as a social experiment using methodology typical for HEP,

but, of course, accepting human ethics...

...we assume to build up the new equipment infrastructure as a process... where also social scientists are invited to optimize the future infrastructure...

ISI GRID PROJECT AND ITS REALIZATION



Project is / will be implemented as a social experiment using methodology typical for HEP,

but, of course, accepting human ethics...

...we assume to build up the new equipment infrastructure as a process... where also social scientists are invited to optimize the future infrastructure...

ISI GRID LAYERS STRUCTURE

T
R
I
G
G
E
R

Portal of Virtual services

Subtrigger Subevent

Communication Grid System - EVO

Subtrigger Subevent

Archive Grid system - AVE

Subtrigger Subevent

Computational GRID System – EGEE

Subtrigger Subevent

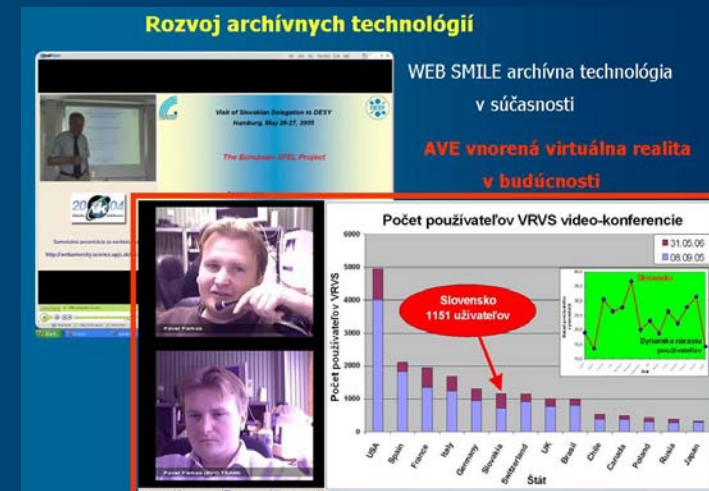
Networking infrastructure - SANET

Subtrigger Subevent

Why ?

... request for a new services...

... to build up a scalable system, which will support a heterogenic and distributed systems...



Present portal of Virtual Collaboration

<http://vk.upjs.sk/>

Portal of the Virtual services <http://vk.upjs.sk>



New portal of Virtual services is supporting multi-institutional activities, it allows to build a social track and analyze it.

http://vk.upjs.sk/vk_beta/

EVO archive - short talks presented by:


Tibor Wais (SANET status)

Branislav Šima (Grid status)

Mirek Binas (activities at Computer Networks Laboratory)

VRVS archive:

Ivan Melo (Physics Masterclasses)



Slovak Academic Network
From the Leased Lines to Dark Fibres

Tibor Wais
Vice-president of SANET




Grid activities in Slovakia

Branislav Šimo, Ladislav Hluchý



Institute of Informatics,
Slovak Academy of Sciences




Computer Networks Laboratory
www.cnl.tuke.sk

Computer Networks Laboratory
at DCI TU Košice

Miroslav Biñas (miroslav.binas@tuke.sk)
František Jakab (frantisek.jakab@tuke.sk)

3rd International Particle Physics
Masterclasses 2007 in Slovakia



Ivan Melo (University of Žilina)
in collaboration with
A. Dirner, J. Hlavacova and Ľ. Tarjanyiova



Slovak Academic Network

From the Leased Lines to Dark Fibres

Tibor Weis

Vice-president of SANET



SANET History

- Established by Slovak Universities and Academy of Science in 1991
 - Supported by Ministry of Education SR and its members
 - First backbone based on leased lines from Slovak Telecom with the maximum speed 19,2kb/s
 - Slow development up to year 2001 when the SANET-II project started
-

The year 2001





SANET II – Big step to optical networking

- Project financed by Slovak Government
 - Budget for 2001- 2003 7 MEUR (280 mil. Sk)
 - Utilization of new Technologies
 - Main Goal–bandwidth upgrade into gigabit range
 - Transition to optical infrastructure
-

The Aims of SANET II

- Gigabit access for all Slovak Universities and Research Institutes of SAV
 - Establish MANs in Regional Centres (8)
 - International Connections to
 - GEANT
 - Neighbor countries
 - Internet
-

Current Status - 2007

- IRU-like contracts for 1660 km of dark fibre with 3 suppliers
 - cca 40 km Optical Cables owned by SANET in MANs - 8 Regional Centres
 - Backbone – Mixture of 10Gb and Gigabit Ethernet
-



SANET - Slovak Academic Network (January 2007)





SANET Future

- SANET III Project
 - Extension of SANET Backbone to other 54 cities
 - Building of Metropolitan optical network and connect more than 500 Slovak Secondary schools with speed 1Gbps
 - Project funded by Ministry of Education
 - Project will start in year 2008 and finish in 2012
 - Project management will be coordinated by SANET together with Universities
 - SANET III Project will bring Gigabit Networking to more than 85% Schools and allow to use advanced technology for education in Slovakia
-



Tibor Weis
weis@sanet.sk

Grid activities in Slovakia

Branislav Šimo, Ladislav Hluchý



*Institute of Informatics,
Slovak Academy of Sciences*



About II SAS

Institute of Informatics (II SAS) is one of more than 50 scientific and research institutes of Slovak Academy of Sciences, Bratislava, Slovakia.

The scope of activities of II SAS includes scientific and research work in informatics, information technology, control theory, robotics and artificial intelligence.

Organized in **7** departments:

- **Parallel and distributed computing**
- Design and diagnostics of digital systems
- Numerical methods and algorithms
- Speech analysis and synthesis
- Electron beam lithography
- Discrete processes modeling and control
- Sensor systems



EU Grid Projects at II SAS

- **EGEE, EGEE2**
 - General grid infrastructure
- **CrossGris, int.eu.grid**
 - Infrastructure focused on MPI and interactivity
- **KWf-Grid**
 - Automatic workflow construction of grid services based on semantic technologies
- **MEDIGRID**
 - Distributed framework for multi-risk assessment of natural disasters – based on Grid services
- **DEGREE**
 - Dissemination and Exploitation of GRids in Earth scienceE



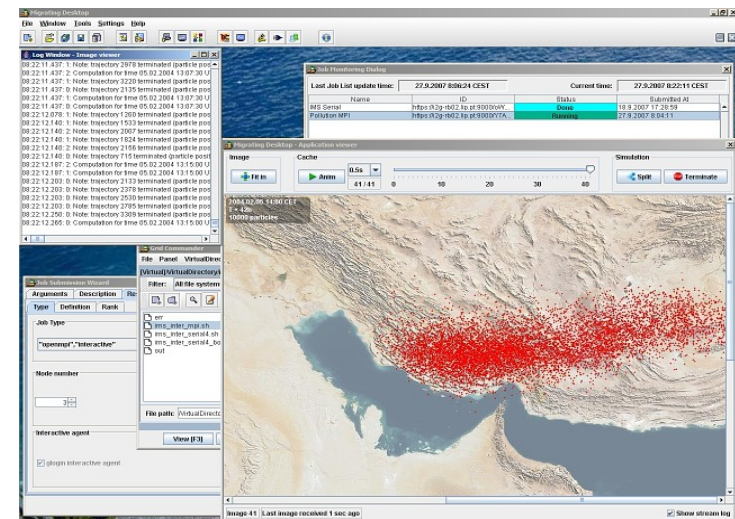
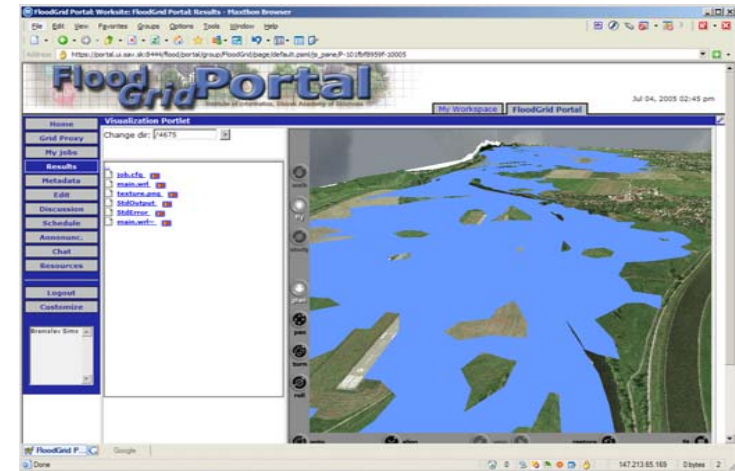
Infrastructure projects

■ EGEE, EGEE2

- General and largest pan-european grid infrastructure
- High Throughput Computing
- We operate cluster, support users, give tutorials

■ CrossGrid, int.eu.grid

- Infrastructure spread over several countries
- Focused on parallel MPI jobs and interactivity
- We operate cluster, support applications (parallelization, gridification)





Research projects

■ Kwf-Grid

- Semi-automatic workflow construction of grid services
- Execution and monitoring of the workflows
- Based on semantic technologies

■ MEDIGRID

- Distributed framework for multi-risk assessment of natural disasters
- Multiplatform grid services for data management and job submission

The image displays several screenshots from the Kwf-Grid and MEDIGRID systems. The top-left screenshot shows the 'K-Wf Grid' portal with a 'Workflow Applet' displaying a complex workflow diagram. The middle-left screenshot shows a 'Knowledge Management GCM' interface with a tree view of data objects and a table of values. The bottom-left screenshot shows a 'Virtual Filesystem Browser' with a list of files and folders. The bottom-right screenshot shows a 'Tools Remote Explorer' interface with a file list and a code editor displaying a script for data processing.



Specific support projects

■ DEGREE

- Dissemination and Exploitation of GRids in Earth scienceE
- Linking the Earth science and GRID communities throughout Europe
 - Surveying existing technologies and practices in ES and Grid
 - Proposing and testing integration of existing services on ES selected applications and data sources



Infrastructure at II SAS

- Production
 - EGEE
 - 42 CPUs cluster
 - Int.eu.grid
 - 32 CPUs cluster
- Development
 - CrossGrid
 - 8 CPUs
 - GILDA
 - 4 CPUs cluster





Slovak grid sites in EGEE

- Institute of Informatics, SAS, Bratislava
 - 42 CPUs cluster, 754 GB storage
- Comenius University, Bratislava
 - 54 CPUs cluster, 2 TB storage
- Technical University, Kosice
 - 8 CPUs, 20 GB storage
- Institute of Experimental Physics, SAS, Kosice
 - 57 CPUs, 6.6 TB storage



Future

■ Infrastructures

- Extending current infrastructure
- Creation of Slovak national grid initiative
- Helping other institutions to be part of Grid

■ Research

- More focus on service based grids



Thank you

`branislav.simo@savba.sk`

3rd International Particle Physics Masterclasses 2007 in Slovakia



Ivan Melo (University of Žilina)

in collaboration with

A. Dirner, J. Hlavacova and G. Tarjanyiova

Particle Physics Masterclasses:

Started in Great Britain 10 years ago



High school students become scientists for one day and put hands on the top research as members of the university research team



- Lectures
- Computer exercises
- EVO videoconference

MC 2007:

70 universities from Europe, USA
and Africa, 4 600 students



- 8 universities from Slovakia
- All videoconferences supported by the Slovak-Caltech EVO team
- Slovakia evaluates (with USA) questionnaires from students



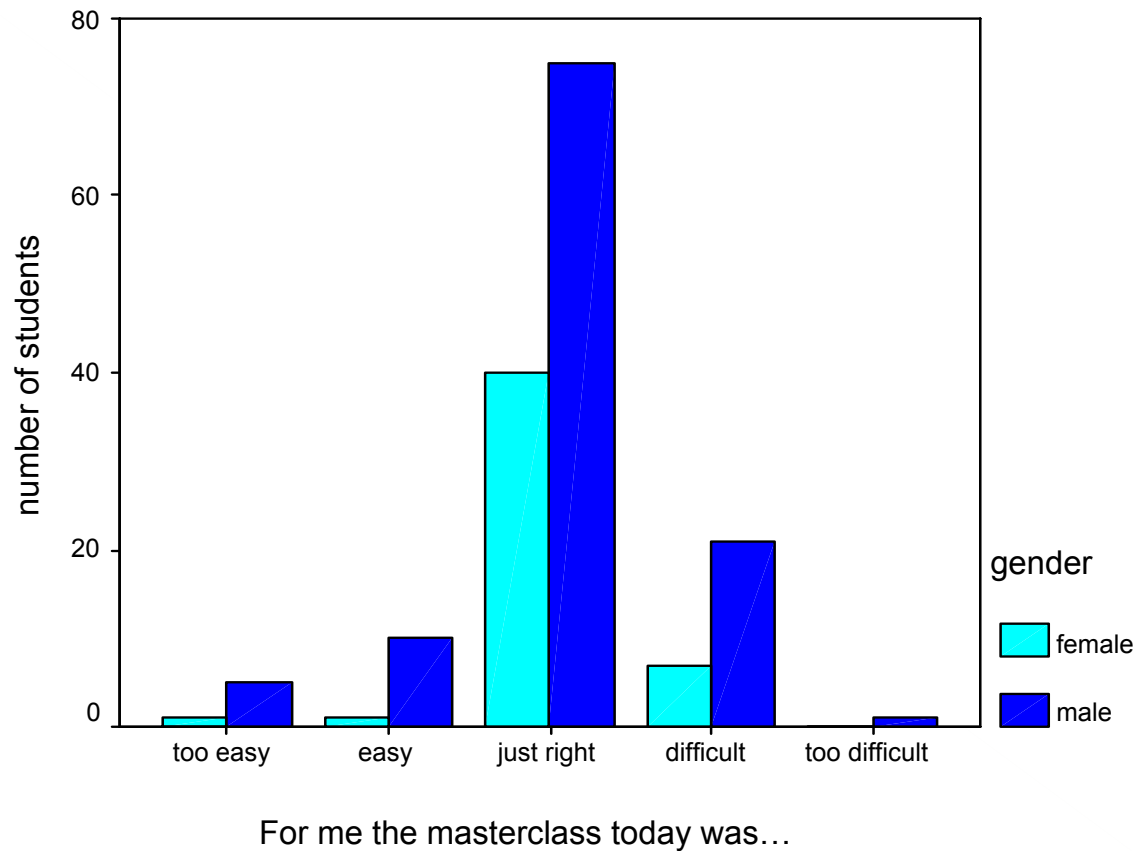
MC 2007 in Slovakia

8 universities from all regions

244 students and 20 teachers from 50 high schools



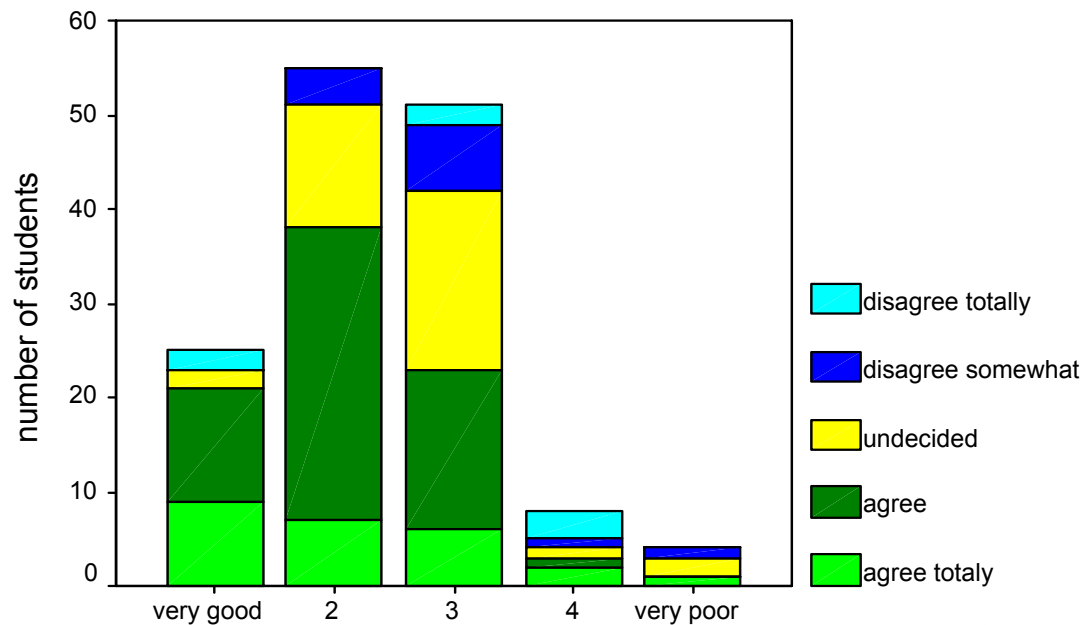
Severity of Masterclasses



Video-conference

Very good ! Interesting to see the students around the world

The video connection gave some insight how international research collaborations work.



The technical quality of the final video linkup was...

Cool !

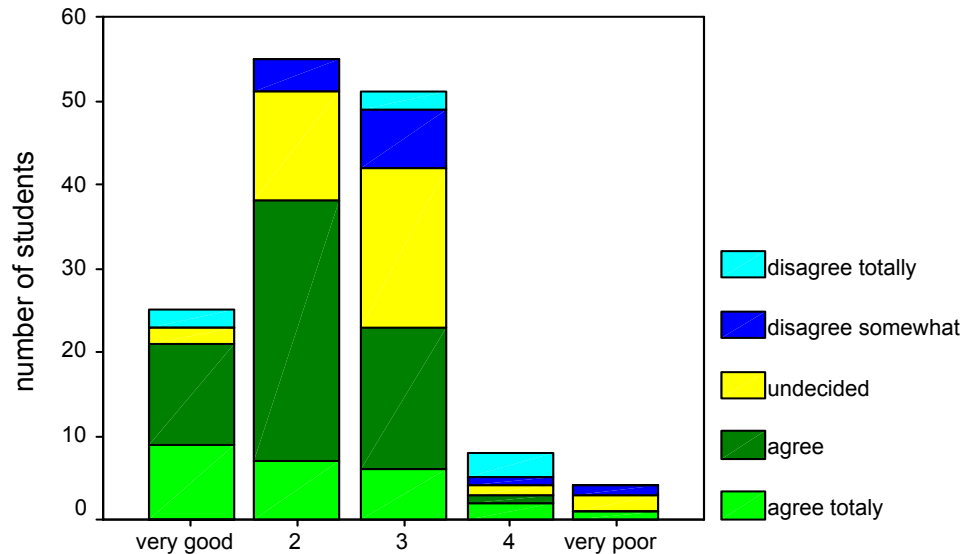
We were better than Manchester !

We could practice English

Why didn't they speak Slovak ? 😊

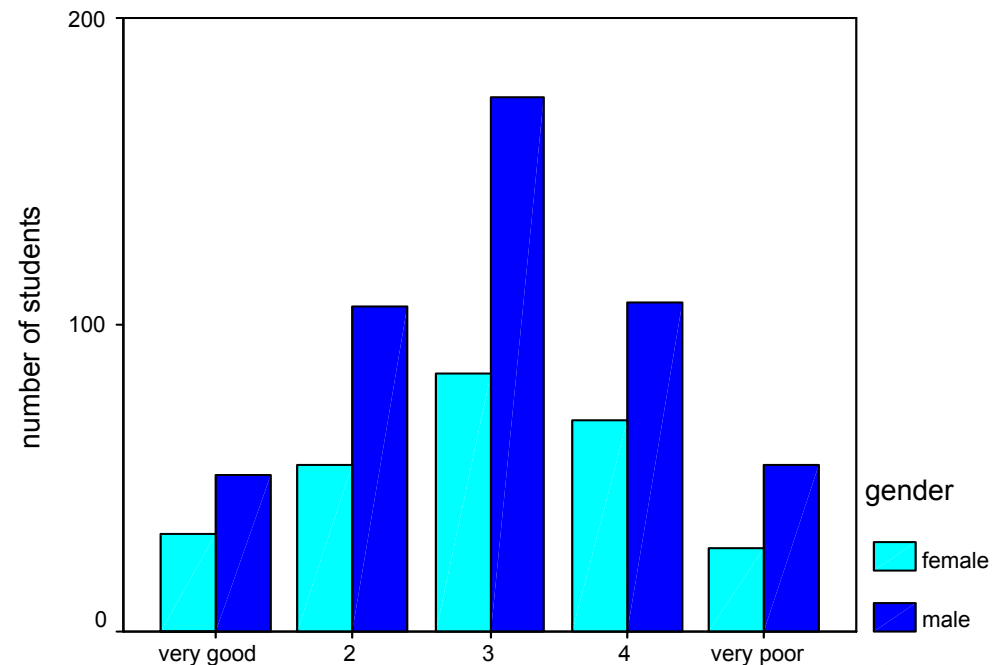
Video-conference (comparison)

The video connection gave some insight how international research collaborations work.



The technical quality of the final video linkup was...

Slovakia (169)



The technical quality of the final video linkup was ...

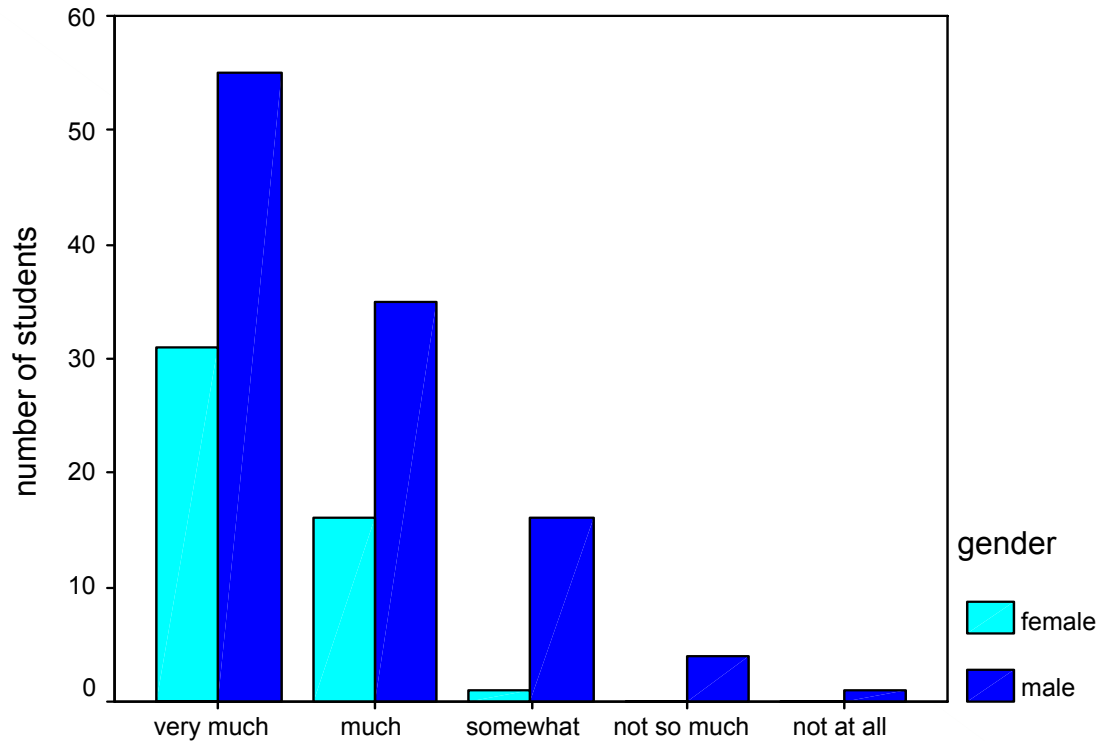
gr,hu,it,pl,pt,sk,sp,sv (824)

Did they like it ?

Excellent and lot of fun.
It's a pity time went so fast

Nice people,
good lunch, a lot
of boys 😊

We had too little
muons !



How did you like the particle physics masterclass you attended today ?



Thanks

murin@vk.upjs.sk