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CX-CMCS

Centre of Excellence for Computational Modelling of Complex Systems



Deliverable D08

12M Progress report

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Abstract: Deliverable D08 – “12M Progress report” is a public document. The deliverable presents information regarding the implementation of the first year of the CX-CMCS project.

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Preface

The basic strategic objective of the CX-CMCS proposal is to transform the Scientific Computing Laboratory (SCL) into a centre of excellence, i.e. to decisively increase the quality of research conducted at SCL, and make it a preferred WB research partner for EU institutions working in the fields of simulation of complex systems and of GRID technology.

SCL is a unit of the Institute of Physics in Belgrade. The Institute contributes more than 10% of the total scientific output of Serbia and constantly ranks among the best R&D institutions in the region. SCL has 14 staff members, and participates in several international and national projects, including FP6 project SEE-GRID and Cost action P10. SCL defines the current state of the art in high performance computing in WBC with its PARADOX cluster (64+2 processors with aggregate speed $R_{max}=0.21$ Tflops).

The proposed CX-CMCS SSA aims to reinforce research capacity at SCL by: hiring young researchers, providing of training and mobility for the research staff, and upgrading the computing infrastructure. The success of this endeavour will be measured through a benchmarking exercise to be performed in the project's last year. Our networking partners (4 from EU and 3 from Serbia) have been carefully selected to provide the skills and expertise necessary to reinforce the research potential of SCL through training and joint research. The proposed equipment upgrade (storage element, high throughput switch, and upgrade of RAM) will make it possible to tackle even the most complex GRID applications allowing SCL to become a key regional player in deployment and use of emerging GRID technology. CX-CMCS plans to set up an International Advisory Board whose expertise will help SCL develop a long term strategy and facilitate integration into ERA.

CX-CMCS aims to be a living example that it is possible to bridge the "digital divide" between countries and regions having high tech ICT technologies and those that do not.

Strategic objectives

The basic strategic objective of the CX-CMCS proposal is to transform SCL into a centre of excellence, i.e. to decisively increase the quality of research conducted at SCL, and make it a preferred WB research partner for EU institutions working in the fields of simulation of complex systems and of GRID technology.

Centres of excellence do not exist in a vacuum, however. In order for SCL to achieve and maintain a status of excellence, the proposed SSA aims to positively effect the research environment in Serbia at several levels: SCL's immediate R&D environment (the national partners in this proposal), the high performance computing segment, and the national R&D system as a whole.

Specific objectives

The specific objectives for the current SSA proposal have been formulated through an analysis of the following key points:

- Wider developmental objectives of Serbia and Montenegro and the West Balkan region pertaining to research and development (as presented in the Action Plan adopted at the Ministerial conference in Thessaloniki in June 2003);
- Existing strengths and weaknesses at SCL in the high performance computing sector in Serbia including: professional resources, material resources, financial and organizational resources, principle impediments;
- Assessment of availability of graduate students and young researchers that could be newly employed at SCL.
- Assessment of indirect social impacts of the process of strengthening of SCL and its efficient integration into a wider European R&D effort.

The outlined analysis has resulted in the following specific objectives, each of which directly leads to a set of measurable and directly verifiable sub-objectives.

Objective 1 – Enhance quality of R&D at SCL

- **Sub-objective 1.1:** Set up an International Advisory Board for the new centre of excellence;
- **Sub-objective 1.2:** Establish a framework for more efficient management of research at SCL by developing a flexible, problem oriented R&D plan that will successfully integrate that research into a wider European effort.
- **Sub-objective 1.3:** Develop a specific set of benchmarks for tracking the quality of R&D at SCL, and perform a benchmarking exercise.
- **Sub-objective 1.4:** Devise and implement a long term strategy for achieving and maintaining research excellence.
- **Sub-objective 1.5:** Insure viability of SCL as a centre of excellence beyond the project lifetime by finding other sources of funding.

Objective 2 – Expand and mobilize human resources

- **Sub-objective 2.1:** Recruit and employ young researchers; develop explicit career plans for the newly employed researchers.
- **Sub-objective 2.2:** Enhance working conditions for young researchers by setting up an R&D environment at SCL that is integrated into ERA, providing challenging research problems, state of the art equipment, and enhanced mobility.

Objective 3 – Reinforce existing S&T capacities at SCL

- **Sub-objective 3.1:** Maintain and upgrade existing S&T equipment and high-tech infrastructure.
- **Sub-objective 3.2:** Improve the availability and reliability of SCL's computing resources, determine and implement optimal strategies for their use.

Objective 4 – Enhance mobility and integration into ERA

- **Sub-objective 4.1:** Network with EU, regional and national partner institutions through exchange of personnel, research results and joint numerical experiments; participate in joint RTD activities within these networks.
- **Sub-objective 4.2:** Host scientists from EU for training and research.
- **Sub-objective 4.3:** Organize training of graduate students and young researchers through short-term missions at EU institutions.

Objective 5 – Contribute to the reinforcing of ICT capacities at the national level

- **Sub-objective 5.1:** Reinforce the quality of research in SCL's immediate R&D environment, by strengthening their human capacity through stipends, yearly visits, and by conducting joint research activities.
- **Sub-objective 5.2:** Reinforce human capacity in Serbia's high performance computing sector by training young researchers to be employed at national research institutions and hi-tech companies.
- **Sub-objective 5.3:** Contribute to the national R&D system by developing a set of recommendations for policy makers at national and local levels for fostering growth of research excellence in a rapidly changing high-tech environment.

The three year CX-CMCS project kicked-off on July 1, 2006. The project plans to issue the following deliverables:

Deliverable No	Deliverable title	Delivery date	Nature	Dissemination level
D01	CX-CMCS Web site	M1	R	PU
D02	Career development plan for newly employed young researchers	M2	R	CO
D03	CX-CMCS International Advisory Board	M3	O	PU
D04	Equipment tendering and procurement report	M3	R	PU
D05	Inauguration meeting report	M4	R	PU
D06	Mobility and training plan	M6	R	PU
D07	CX-CMCS Brochure	M6	R	PU
D08	12M Progress reports	M12, M24	R	PU
D09	CX-CMCS Promotional video material	M15	O	PU
D10	Benchmark procedures for quality assessment of RTD centres of excellence	M18	R	PU
D11	SCL research quality assessment	M24	R	PU
D12	Proceedings of International dissemination workshop	M30	R	PU
D13	Strategy of long term sustainable growth of research excellence in transition	M30	R	PU
D14	Scientific computing landscape of Serbia	M33	R	PU
D15	Presentation of policy papers to decision makers	M34	R	PU
D16	Final project report	M36	R	PU

Legend: R = Report, O = Other, PU = Public, CO = Confidential (only for members of the consortium incl. EC).

Table of contents

1. Publishable executive summary	9
1.1. SUMMARY OF MAIN PROJECT ACHIEVEMENTS	13
2. Workpackage progress of the period	14
2.1. WP1 – PROJECT MANAGEMENT	14
2.2. WP2 – REINFORCING RESEARCH CAPACITY	15
2.3. WP3 – MOBILITY AND TRAINING	15
2.4. WP4 – DISSEMINATION AND VISIBILITY.....	16
2.5. WP5 – BENCHMARKING AND POLICY DEVELOPMENT	16
2.6. LIST OF DELIVERABLES.....	16
2.7. LIST OF MILESTONES.....	19
2.8. USE OF KNOWLEDGE	20
2.9. DISSEMINATION OF KNOWLEDGE	22
2.9.1. <i>Overview: Summary and Highlights of key Dissemination events</i>	22
2.9.2. <i>Presentations</i>	23
2.9.3. <i>Scientific Papers/Publications</i>	25
2.9.4. <i>Promotion package</i>	26
2.9.5. <i>Selected Articles / Newsletters</i>	26
2.9.6. <i>Workshops</i>	26
2.9.7. <i>Dissemination and use material</i>	27
2.9.8. <i>Trainings</i>	27
2.9.9. <i>Other dissemination activities</i>	27

Table of figures

<i>Figure 1 – AEGIS01-PHY-SCL GRID site at night (long exposition)</i>	13
<i>Figure 2 – Work at the SCL</i>	14
<i>Figure 3 – SCL young researchers with Commissioner Potocnik, Minister Popovic and INCO Director Siegler during their visit to SCL at the start of the CX-CMCS project.</i>	19
<i>Figure 4 – Presentation of candidates for SCL’s young researchers at CX-CMCS Inauguration meeting.</i>	20

References

- [1] Project CX-CMCS – 026343 – Annex I – Description of Work

Executive summary

What is the focus of this Deliverable?

The focus of this deliverable is to present a public document giving the 12M progress report of activities and tasks related to the implementation of the CX-CMCS project.

What is next in the process to deliver the CX-CMCS results?

The deliverable and workflow progress is described in the project Annex-I – Description of Work [1]

What are the deliverable contents?

The 12M progress of CX-CMCS is presented first at the level of the project, then at the level of work packages. Finally, a list of dissemination results is given.

Conclusions

The results of first year of the project have conformed to expectations in all key aspects of the implementation of CX-CMCS.

1. Publishable executive summary



CX-CMCS: Centre of Excellence for Computational Modelling of Complex Systems

Background

The basic strategic objective of the CX-CMCS project is to transform the Scientific Computing Laboratory (<http://scl.phy.bg.ac.yu/>) into a centre of excellence, i.e. to decisively increase the quality of research conducted at SCL, and make it a preferred West Balkan research partner for EU institutions working in the fields of simulation of complex systems and of GRID technology.

SCL is a unit of the Institute of Physics in Belgrade. The Institute contributes more than 10% of the total scientific output of Serbia and constantly ranks among the best R&D institutions in the region. SCL currently has 18 staff members, and participates in several international and national projects, including FP6 projects CX-CMCS, SEE-GRID, SEE-GRID-2, EGEE-II, and Cost action P10. SCL defines the current state of the art in high performance computing in the West Balkan region with its PARADOX cluster.

CX-CMCS aims to reinforce the research capacity of the SCL by: hiring young researchers; providing training and mobility for the research staff; upgrading the computing infrastructure. The success of this endeavour will be measured through a benchmarking exercise to be performed in the project's last year. Our networking partners (4 from EU and 3 from Serbia) have been carefully selected to provide the skills and expertise necessary to reinforce the research potential of SCL through training and joint research. The proposed equipment upgrade will make it possible to tackle even the most complex GRID applications allowing SCL to become a key regional player in deployment and use of this emerging technology. The CX-CMCS International Advisory Board will help SCL develop a long term strategy and facilitate its integration into ERA.

CX-CMCS aims to be a living example that it is possible to bridge the "digital divide" between countries and regions having high tech ICT technologies and those that do not.

Objectives

The basic **strategic objective** of CX-CMCS is to transform SCL into a centre of excellence, i.e. to decisively increase the quality of research conducted at SCL, and make it a preferred WB research partner for EU institutions working in the fields of simulation of complex systems and of GRID technology.

Centres of excellence do not exist in a vacuum, however. In order for SCL to achieve and maintain a status of excellence, CX-CMCS aims to positively effect the research environment in Serbia at several levels: SCL's immediate R&D environment (the national partners in this proposal), the high performance computing segment, and the national R&D system as a whole.

The specific objectives for CX-CMCS have been formulated through an analysis of the following key points:

- Wider developmental objectives of Serbia and Montenegro and the West Balkan region pertaining to research and development (as presented in the Action Plan adopted at the Ministerial conference in Thessaloniki in June 2003);
- Existing strengths and weaknesses at SCL in the high performance computing sector in Serbia including: professional resources, material resources, financial and organizational resources, principle impediments;
- Assessment of availability of graduate students and young researchers that could be newly employed at SCL.
- Assessment of indirect social impacts of the process of strengthening of SCL and its efficient integration into a wider European R&D effort.

The outlined analysis has resulted in the following five **specific objectives**:

1. **Enhance quality of R&D at SCL**
2. **Expand and mobilize human resources**
3. **Reinforce existing S&T capacities at SCL**
4. **Enhance mobility and integration into ERA**
5. **Contribute to the reinforcing of ICT capacities at the national level**

Planned impacts

- **Impact on technology** – Maintain and extend SCL infrastructure representing the current state of the art of computing and communication facilities in the West Balkan region; Implement latest GRID-related technologies.
- **Impact on research** – Improve research environment, human and computing capacities making it possible to study complex systems characterized with very large data sets and requiring extensive computing power. This will allow: comprehensive survey of near-Earth objects and estimation of catastrophic impacts, modelling the formation of Earth-like planets around other stars; study of the large-scale topology of the Internet, study of granular systems, efficient simulations in High Energy Physics.
- **Social impact** – The brain-drain of tens of thousands of young professionals with key skills is a phenomenon of paramount social impact on a region that has until recently endured a decade of wars, social instability and economic hardship. Of those that left, many were educated in the physical sciences and engineering and their continued education in the USA coincided with the emergence of robust new research fields as well as with the birth of several new technologies. Today, West Balkan (and EU) RTD has the potential of tapping into this extremely important human resource. The key precondition for alleviating the consequences of brain-drain is in identifying of high quality research centres to serve as brain-gain focal points.
- **Impact on national RTD policy** – Develop a set of recommendations for policy makers at national and local levels for fostering growth of research excellence in a rapidly changing high-tech environment.
- **Contribution to EU policies** – In particular those addressing the issue of bridging the “digital divide” between countries and regions.
- **Dissemination and exploitation of results** – Improve EU-wide visibility and future participation in ERA; Maintain leading position of SCL in Serbian research; Promote modelling of complex systems using high performance computing resources in fundamental and applied research; Enhance interest of general public in S&T by showing examples of how scientific computing research can benefit every day life; Provide relevant data and recommendations regarding scientific computing to policy makers at national and local levels.
- **Impact on related national and international research activities** – SCL is active in two overlapping research fields: investigation of complex systems and development and deployment of GRID-based technologies. As a result of its expertise in both fields SCL is a prominent participant in several international and national projects. It is the driving force of the Academic and Educational Grid Initiative of Serbia (AEGIS), and the instigator of the ARETE initiative (Advancing Research Excellence and Technological Efficiency).

The first year of CX-CMCS – Reinforced human capital

From the start of CX-CMCS a total of eight new young researchers have come to SCL. Each of these talented young physicists have been recipients of prestigious Ministry of Science stipends that serve as matching funds that complement their CX-CMCS stipends. As a result of this matching, CX-CMCS has doubled the planned number of young researchers brought to SCL. During the first year of CX-CMCS four of these new researchers have already been hired by the Institute of Physics in Belgrade.



SCL has also attracted four young people working in the field of computer sciences as its new ICT staff. Their primary task is related to the administering of SCL's Grid site AEGIS01-PHY-SCL. This state-of-the-art distributed computing platform is giving each of them a chance to conduct forefront research in several key new ICT fields. The CX-CMCS stipends of the new technical staff are being matched by funds from SCL infrastructure projects SEE-GRID, SEE-GRID-2 and EGEE II.

The first year of CX-CMCS – Enhanced mobility

In the first year of the CX-CMCS project SCL has conducted an extensive mobility program. The program was of greater scope than envisaged in the project proposal. The principle reason for this is that SCL has already procured additional funds for mobility from other sources. These additional funds covered the mobility of senior SCL researchers as well as the incoming mobility of EU and US researchers coming to SCL.

As a result of CX-CMCS the newly hired young researchers at SCL have participated in 20 meetings abroad (conferences, workshops, schools), actively contributing to 13 of these. Altogether at these meetings they presented 5 papers, 4 posters and gave a total of 17 lectures. These mobility and training activities were held in 6 different countries from the EU and the region (Italy, Germany, Spain, Romania, Croatia, Bosnia and Herzegovina). In addition, these same young researchers took part in 12 training events held at various research institutions in five cities throughout Serbia (Belgrade, Novi Sad, Nis, Kragujevac, Valjevo). All of these events were organized by SCL and represented a wide front of national Grid training events held through the active participation of most of SCL's young researchers.

The first year of CX-CMCS – Reinforced infrastructure

SCL's high performance computing infrastructure is organized around the AEGIS01-PHY-SCL grid site, a key part of national and regional production grid infrastructure, and an esteemed partner at the pan-European level.

The current configuration consists of 200 CPU cores with 212 GB RAM, 27 TB storage space, 40 kVA UPS, high throughput network layer 3 switches stacked to an aggregate of 206 Gbps ports. The whole configuration is stored in 5 racks and cooled by a contained 170 kBTU integrated system. The AEGIS01-PHY-SCL Grid site is logically organized into:

- **Worker nodes** – 42 quad-core nodes each with 4 GB RAM, connected through two channel-bonded Gbps ethernet interfaces to stacked layer 3 network switches.
- **Storage element** – 3 storage units each with 9 TB disk space in RAID-5 hardware configuration for data protection and integrity. Each storage unit has a quad-core configuration with 4 GB RAM.
- **Core services** – 8 dual-core servers with 4 GB RAM providing all essential Grid services that integrate the above computing and storage resources into a unified resource. In addition, AEGIS01-PHY-SCL also provides core services for national, regional and pan-European Grid infrastructures integrating all of them into a unified and user friendly resource.

The first year of CX-CMCS – High visibility

On July 14, 2006 the SCL and IPB were hosts to high level delegations from EU Directorate General for Research, headed by Janez Potocnik, Commissioner for Research, and from the Ministry of Science of Serbia, headed by Aleksandar Popovic, Minister of Science. The joint delegation included Andras Siegler, Director INCO, Giancarlo Caratti, JRC, Tania Friederichs, DG Research, Ivan Videnovic, Assistant Minister of Science, and Gradimir Milovanovic, Chairman of the National Science Council.

The main purpose of the Commissioner's visit to IPB was to get first hand information about its four laboratories that were the recipients of EU Centre of Excellence grants in the 2005 SSA call for reinforcing of research excellence in the West Balkans. Serbia's R&D centre's got 8 of the region's 10 grants, half of these went to the IPB, including the best evaluated R&D proposal in the region – CX-CMCS.

During the first year of CX-CMCS the researchers and students at SCL had a substantial media presence. The number of interviews given was 30, and they were distributed according to media as follows: 14 in print media, 12 TV interviews, 4 radio interviews. Of these, 24 were in non-specialist media and publications, while 6 interviews were for specialized audiences. 20 of the interviews were given to media with national coverage, while 10 were for international media.

CX-CMCS is a project that aspires not only to reinforce the Scientific Computing Laboratory of the Institute of Physics in Belgrade turning it into a Centre of Excellence, but also to make visible social impact by becoming a brain-gain focal point for Serbia in the dynamic fields of complex systems and Grid computing. Through its high visibility and its key reports documenting the “Scientific computing landscape of Serbia” and the “Strategy of long term sustainable growth of research excellence in transition” CX-CMCS aims to contribute to national RTD policy. CX-CMCS is the instigator of the ARETE initiative (Advancing Research Excellence and Technological Efficiency) seeking to bring together national RTD institutions having the pursuit of excellence in research as common goal.



Figure 1 – AEGIS01-PHY-SCL GRID site at night (long exposition)

1.1. Summary of main project achievements

The main achievements of CX-CMCS project in its 1st year of execution are:

WP1. Project management

- Project deliverables prepared and delivered on time.
- Inauguration meeting held.
- Additional funding obtained – a step towards sustainability of SCL.

WP2. Reinforcing research capacity

- Eight young researchers hired at SCL.
- Two 3-month traineeships concluded.
- Memory at the SCL parallel cluster upgraded.

WP3. Mobility and training

SCL's newly hired young researchers

- participated in 20 meetings abroad, presenting 5 papers, 4 posters and giving a total of 17 lectures.
- took part in 12 training events throughout Serbia.

WP4. Dissemination and visibility

- SCL achieved high visibility – there were 30 interviews: 14 in print media, 12 on TV, and 4 on radio.
- On July 14, 2006 SCL was visited by high level delegations from EU Directorate General for Research, headed by Janez Potocnik, Commissioner for Research, and from the Ministry of Science of Serbia, headed by Aleksandar Popovic, Minister of Science.
- Promotional materials (Info sheets, Project Brochure) were created.

WP5. Benchmarking and policy development

- CX-CMCS project International Advisory Board constituted.



Figure 2 – Work at the SCL

2. Workpackage progress of the period

In this sub-section we provide detailed description of Project progress per workpackage.

2.1. WP1 – Project management

Within WP1 an efficient and lightweight project management structure was established within the first year of the project. Periodic Activity and Management Reports were produced and submitted on time. All project deliverables were prepared in time and all but one milestones met (see Tables 1 and 2 below). Inauguration meeting was held (see deliverable D05 “Inauguration meeting report”). Strong liaison was established with related Grid projects SEE-GRID-2 and EGEE-II, and input was provided for preparing SEE-GRID-SCI and EGEE-III proposals. Additional sources of funding were aggressively sought and found, providing additional financing for young researchers working at SCL and their mobility, as well as for hardware upgrades. Success in procuring these matching funds are contributing considerably to sustainability of SCL.

2.2. WP2 – Reinforcing research capacity

The planned reinforcement of SCL's research capacity has two aims: human capacity building (through the hiring of young researchers), and reinforcement of existing material resources (upgrading of the existing high tech computing infrastructure). The first goal builds on SCL's strong outreach to students in physics and computer sciences. The planned hiring of 4 young researchers to work at SCL has been significantly expanded upon. This was made possible by the obtained of matching funds for students from the Ministry of Science (scholarships awarded to best students) and the earlier than expected hiring of SCL's four new young scientists at the IPB. The matching funds halved the necessary CX-CMCS contribution to individual young researcher salaries. As a result SCL was able to hire eight researchers. The resulting increase in mobility and training costs that resulted from the increase in number of hired people was covered through SCL participation in other EU projects (SEE-GRID, SEE-GRID-2, EGEE II). Finally, a key part of sustainability was that IPB and the three national networking partners within CX-CMCS had made firm commitments to each hire one of the planned four young researchers after the completion of CX-CMCS. This agreement stands, however it has been substantially expanded upon by the unforeseen hiring of four SCL students at IPB. The result is that all of SCL's young researchers have a permanent position after the end of CX-CMCS. The planned exchange of further young staff between local partner institutions giving the best of them tri-monthly stipends to work at SCL has proceeded well. Two such three-month traineeships have been successfully concluded in the project's first year. These young people have also benefit from the training and, indirectly, from the increased mobility and networking to EU as have the RTD institutions they have returned to.

The second goal of the capacity reinforcement work package was to upgrade the existing computing infrastructure. The CX-CMCS proposal developed a plan to reinforce the existing hi-tech infrastructure by getting rid of its three existing weaknesses: lack of adequate storage space to tackle an important array of modern GRID applications; inadequate number of stackable high throughput switches to optimally link all the existing nodes into a more versatile cluster; inadequate RAM for fine-grained applications that are difficult to parallelise (e.g. weather forecasting, fault propagation in materials, searching through distributed databases such as GRID based medical databases, human genome databases, etc.). The infrastructure upgrade has been late. The principle reason for this has to do with the implementing of new VAT tax laws in Serbia after the start of the project, as well as the long time it took to clear up how IPB can be released from paying these duties on the imported equipment. The financial transaction related to the infrastructure upgrades were finalized at the end of the first project year and the equipment is now due to arrive. For operational reasons it was not possible to delay the acquisition of the high throughput switches and their purchase was cover from different sources. The good side of the long delay is that the unit prices of the sought after components for the cluster were substantially decreased. As a result the same funds made it possible to procure substantially better upgrade both of RAM and of data storage elements.

2.3. WP3 – Mobility and training

The planned mobility, training and networking consist of exchange of personnel, research results, and the setting up and performing of joint numerical experiments. In the section on WP2 we have already commented on how the increase in the number of people hired did not affect mobility and training. In fact, as a result of procurement of funds from other sources, it was possible not only to broaden the mobility and training to more young researchers, but also to increase the mobility of each individual. The primary way that this was done was by finding funds from other SCL projects to cover the mobility of SCL's senior researchers as well as the incoming mobility of foreign researchers coming to SCL. As a result CX-CMCS funds were concentrated on young researcher mobility. During the first year the newly hired young researchers at SCL have participated in 20 meetings abroad (conferences, workshops, schools), actively contributing to 13 of these. Altogether at these meetings they presented 5 papers, 4 posters and gave a total of 17 lectures. These mobility and training activities were held in 6 different countries from the EU and the region (Italy, Germany, Spain, Romania, Croatia, Bosnia and Herzegovina). In addition, these same young researchers took part in 12 training events held at various research institutions in five cities throughout Serbia (Belgrade, Novi Sad, Nis, Kragujevac, Valjevo). All of these events were organized by SCL and represented a wide front of national Grid training events held through the active participation of most of SCL's young researchers.

2.4. WP4 – Dissemination and visibility

CX-CMCS puts a strong emphasis on the dissemination and visibility of the results of the performed research as well as the effort to produce a high technology centre of excellence in the WB region. To be successful in this role it was determined that the dissemination and visibility work package needed to address four distinct audiences: the EU research community; the research community in Serbia; the wider public in Serbia; the relevant policy makers at local and national levels. During the first year of CX-CMCS the researchers and students at SCL had a substantial media presence. The number of interviews given was 30, and they were distributed according to media as follows: 14 in print media, 12 TV interviews, 4 radio interviews. Of these, 24 were in non-specialist media and publications, while 6 interviews were for specialized audiences. 20 of the interviews were given to media with national coverage, while 10 were for international media.

A particularly important facet of visibility at the EU level came at the very beginning of CX-CMCS with the July 14, 2006 visit to SCL of high level delegations from EU Directorate General for Research, headed by Janez Potocnik, Commissioner for Research, and from the Ministry of Science of Serbia, headed by Aleksandar Popovic, Minister of Science. The joint delegation included Andras Siegler, Director INCO, Giancarlo Caratti, JRC, Tania Friederichs, DG Research, Ivan Videnovic, Assistant Minister of Science, and Gradimir Milovanovic, Chairman of the National Science Council. The main purpose of the Commissioner's visit to IPB was to get first hand information about its four laboratories that were the recipients of EU Centre of Excellence grants in the 2005 SSA call for reinforcing of research excellence in the West Balkans. Serbia's R&D centre's got 8 of the region's 10 grants, half of these went to the IPB, including the best evaluated R&D proposal in the region – CX-CMCS.

The key venue for obtaining information about the CX-CMCS project and the research conducted at SCL is the project's web site (<http://cx-cmcs.phy.bg.ac.yu/>) along with the SCL web site (<http://scl.phy.bg.ac.yu/>). During the first project year both sites have grown into extensive repositories of publicly available documents and information about SCL research and CX-CMCS activities. The project has also generated a two-page information sheet (developed specifically for the visit of Commissioner Potocnik) and a more detailed four-page promotional brochure. Wider public outreach has also been carried out through promotions in national and local media and the organizing of two popular lectures.

2.5. WP5 – Benchmarking and policy development

The only activity within this work package that was planned for the first reporting period was the constituting of the CX-CMCS project International Advisory Board (IAB). This was achieved and reported in deliverable D03. The IAB represents one of the major points of the CX-CMCS project. The IAB is made up of leading researchers from EU partner institutions and their expertise, insight and recommendations is expected to help in the creation of a long term development strategy for SCL.

2.6. List of deliverables

Table 1 covers all planned contractual deliverables due in the 1st reporting period as specified in the Description of Work (DoW) [1]. It indicates their name, WP under which they belong, when was it planned to deliver them and when were they actually prepared, and finally the effort used in preparing deliverables.

Since the current situation at Month 12, i.e. the end of the 1st reporting period, differs considerably from the situation at the time of preparing deliverables D02-a and D06-a, new updated versions of these deliverables, D02-b and D06-b, were produced in order to document the significant advances achieved by the Project. These extra deliverables are also shown in the table.

Furthermore, since the procurement of the equipment was not finished as anticipated at Month 3, the report D04-a that has been produced at that time does not contain the complete information pertaining to procurement and installation of new equipment. Therefore, it was decided that the new deliverable D04-b will be produced at the end of the procurement and installation procedure, which is estimated to be at Month 15. Similarly, the Internationals Advisory Board (IAB) was constituted at Month 3 (see report in D03-a), and it was not planned to schedule the site visit to SCL during the 1st reporting period. The report covering this visit will be given in new deliverable D03-b expected at Month 15. The two anticipated new deliverables D03-b and D04-b are also given in Table 1 for completeness.

Table 1: Deliverables List

Del. no.	Deliverable name	WP no.	Date due	Actual/Forecast delivery date	Estimated indicative person-months	Used indicative person-months	Lead contractor
D01	CX-CMCS Web site	WP4	M1	M1	N/A	2 ¹	SCL
D02-a	Career development plan for newly employed young researchers	WP2	M2	M2	N/A	1 ²	SCL
D03	CX-CMCS International Advisory Board	WP5	M3	M3	N/A	0 ³	SCL
D04-a	Equipment tendering and procurement report	WP2	M3	M3	N/A	2	SCL
D05	Inauguration meeting report	WP1	M4	M4	N/A	0.5	SCL
D06-a	Mobility and training plan	WP3	M6	M6	N/A	1	SCL
D07	CX-CMCS Brochure	WP4	M6	M6	N/A	2	SCL
D08-a	12M Progress reports	WP1	M12	M12	N/A	1.5	SCL
D02-b	Career development plan for newly employed young researchers	WP2	N/A	M12	N/A	1 ⁴	SCL
D06-b	Mobility and training plan	WP3	N/A	M12	N/A	1 ⁴	SCL
D04-b	Equipment tendering and procurement report	WP2	N/A	M15	N/A	2 ⁵	SCL

¹ Includes also the maintenance of the web-site

² Newly employed young researchers have consumed 72 person-months during the 1st reporting period

³ The actual effort of 0.2 person-months was covered from other sources

⁴ Effort consumed in the 2nd reporting period.

⁵ Estimate. To be consumed in the 2nd reporting period.

2.7. List of milestones

Table 2 covers all planned contractual milestones due in the 1st reporting period as specified in the Description of Work (DoW) [1]. It indicates their name, WP under which they belong, when was it planned to achieve them and when were they actually achieved.

All milestones due in the 1st reporting period were achieved on time except the “Equipment upgraded” which is overdue due to unforeseen difficulties with import procedures and achievement of VAT-free status, and “Start of mobility and training” that was achieved considerably earlier than planned due to the opportunities that presented themselves and were seized by the Project.

Table 2: Milestones List

Milestone no.	Milestone name	Workpackage no.	Date due	Actual/Forecast delivery date	Lead contractor
N/A	New research staff employed	WP2	M02	M02	SCL
N/A	Equipment upgraded	WP2	M03	M15	SCL
N/A	IAB set up	WP5	M03	M03	SCL
N/A	Start-up phase completed	WP1	M03	M06	SCL
N/A	Start of mobility and training	WP3	M07	M03	SCL
N/A	First year completed	WP1	M12	M12	SCL



Figure 3 – SCL young researchers with Commissioner Potocnik, Minister Popovic and INCO Director Siegler during their visit to SCL at the start of the CX-CMCS project.



Figure 4 – Presentation of candidates for SCL's young researchers at CX-CMCS Inauguration meeting.

2.8. Use of Knowledge

The use of knowledge focuses on the project results in the area of applications development and deployment based on the scientific research performed throughout the project. During the first year of CX-CMCS four applications were developed, and two of them are identified at this stage as potential ones relevant for the Use of Knowledge.

SPEEDUP application

Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
<i>Computer Monte Carlo simulation for the calculation of path integrals in Quantum Theory</i>	<i>Probability amplitudes; Energy spectra and other properties of matter</i>	<ol style="list-style-type: none"> 1. <i>Quantum Mechanics</i> 2. <i>Condensed Matter Theory</i> 3. <i>Statistical Physics</i> 			<i>SCL, Institute of Physics Belgrade (owner)</i>

Since their inception path integrals have presented an extremely compact and rich formalism for dealing with quantum theories. They have grown into powerful tools for dealing with symmetries (including gauge symmetry), for deriving non-perturbative results (e.g. solitons, instantons, symmetry breaking) and for showing connections between different theories or different sectors of the same theory (e.g. bosonization, duality). They have also consistently allowed us to extend and generalize quantization procedures to ever more complicated systems. Today, path integrals are used both analytically and numerically in many other areas of physics, chemistry and materials science. They are starting to play more prominent roles in several areas of mathematics and in modern finance.

The definition of path integrals as a limit of multiple integrals makes their numerical evaluation quite natural. The most all-around applicable numerical method for such calculations is based on Monte Carlo simulations. However, numerical integration of path integrals is notoriously demanding of computing time - so much so that specific path integral calculations serve as benchmarks for new generations of supercomputers.

In order to significantly speed up numerical procedures for calculating path integrals for a generic theory it is necessary to add new analytical input. In our investigations we have looked at the relation between different discretizations of a given theory. A result of this has been a procedure for constructing a series of effective actions $S^{(p)}$ having the same continuum limit as the starting action S , but which approach that limit as $1/N^p$. Using this we obtained explicit expressions for these effective actions up to $p=12$. Monte Carlo code developed and used in these investigations is SPEEDUP, and it is available on the following address:

<http://scl.phy.bg.ac.yu/modules.php?name=News&file=item&sid=55>

GRANULAR application

Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
<i>Computer simulation of the properties of granular materials</i>	<i>Properties of granular materials</i>	<i>1. Condensed Matter Theory 2. Statistical Physics</i>			<i>SCL, Institute of Physics Belgrade (owner)</i>

Granular materials are large assemblies of solid macroscopic particles. If they are noncohesive, the forces between them are strictly repulsive. The particles are usually surrounded by a fluid, most often air, which may play a role in the dynamics of the systems. Examples of such materials include sand, stones, soil, ores, pharmaceuticals, and variety of chemicals.

At the root of the unique status of granular materials are two characteristic: ordinary temperature plays no role, and the interactions between grains are dissipative because of static friction and the inelasticity of collisions. There are no long-range interactions between individual grains or between individual grains and the walls of a confining container. Yet despite this seeming simplicity, a granular material behaves differently from any of the other familiar forms of matter - solids, liquids, or gases. For instance one can cite internal stress fluctuations, strain localization, non-Newtonian rheology, spontaneous clusterization, size segregation or spatial pattern creations. All these phenomena have no equivalent in classical solid- or liquid-state physics. Therefore, granular material should be considered an additional state of matter in its own right.

Attempts toward understanding and controlling both static and dynamic properties of granular materials are thus of highest interest to many fields of physics, applied sciences and engineering. We are generally interested in understanding of the cooperative dynamics of powder and relationship between the macroscopic behavior of granular materials and their microstructures. Current projects under investigation by the Scientific Computing Laboratory include the following:

- Molecular dynamics simulations (MDS) of the compaction of spherical particles systems under vertical vibrations:
 - Global analysis (densification kinetics and glassy behavior): dynamics of compaction, hysteresis, aging, two-time density-density correlation functions, importance of convection in the compaction mechanisms;
 - Local analysis (structural properties): density profiles, size and volume distributions of the pores, structure and distribution of arches (bridges);
- Numerical model for compaction of anisotropic granular media under vertical tapping:
 - Reversible random sequential model (RSA) of granular compaction on triangular lattice: memory effects, symmetry effects;

- Compaction model (RSA) of polydisperse granular mixtures;
- Fractional model for the compaction of a vertically tapped granular material;
- Granular gases: instabilities, late clustering regime, large-scale molecular dynamics simulations.

2.9. Dissemination of Knowledge

2.9.1. Overview: Summary and Highlights of key Dissemination events

In the table below key dissemination events and papers published are given.

Planned/ actual dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
2006	Scientific papers/publications: J. Grujic, A. Bogojevic, A. Balaz, "Energy estimators and calculation of energy expectation values in the path integral formalism", Phys. Lett. A 360, 217 (2006)	Research & Education	All		IPB
2006	Scientific papers/publications: D. Stojiljkovic, A. Bogojevic, A. Balaz, "Efficient calculation of energy spectra using path integrals", Phys. Lett. A 360, 205 (2006)	Research & Education	All		IPB
2006	Scientific papers/publications: "Simulation Study of Granular Compaction Dynamics under vertical tapping", D. Arsenovic, S. B. Vrhovac, Z. M. Jaksic, Lj. Budinski-Petkovic, and A. Belic, Phys. Rev E 74, 061302, (2006).	Research & Education	All		IPB
2006	Scientific papers/publications: "Grid Approach to Path Integral Monte Carlo Calculations", D. Stojiljkovic, A. Balaz, A. Bogojevic, A. Belic, Proc. of INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006	Research & Education	All		IPB
2006	Scientific papers/publications: "gLite Workload Management System Performance Measurements", N. Svraka, A. Balaz, A. Bogojevic, A. Belic, Proc. of INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006	Research & Education	All		IPB

Planned/ actual dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
July 2006	Promotion package: CX-CMCS info sheet	General Public	All	1,000	IPB
July 2006	CX-CMCS Inauguration Event	Research & Education	Serbia	50	
December 2006 / January 2007	Promotion package: CX-CMCS Brochure	General Public	All	1,000	IPB
February 2006	SCL researchers give interview for weekly newspaper Ana	General Public	Serbia	20,000	IPB
March 2007	A. Balaz: Lecture on HPC experiences in South Eastern Europe, Advanced School in High Performance Computing : Tools for e-Science at International Centre for Theoretical Physics, Trieste, Italy, March 5 – 16, 2007	Research & Education	All	50	IPB
March 2007	A. Bogojevic gives interview to BBC Radio	General Public	All	50,000	IPB
May 2007	Article about CX-CMCS in the weekly newspaper Vreme	General Public	Serbia	30,000	IPB

2.9.2. Presentations

The goals and achievements of CX-CMCS were presented in the following presentations:

- A. Balaz, “Physics Research and Grid Computing at SCL”, 2nd Supercomputing Day, Texas A&M University at Qatar, September 13, 2006, Doha, Qatar
- A. Balaz, “SEE-GRID Infrastructure and Grid Operations”, SEE-GRID Regional Grids Concertation Workshop held during the EGEE’06 Conference, Geneva, September 28, 2006
- M. Mitrovic, “Heuristic Algorithm for Determination of Local Properties of Scale-Free Networks”, Marie Curie Workshop 2006: Commemorating the 150th Anniversary of the Birth of Nikola Tesla, Zagreb and Belgrade, October 7, 2006
- J. Grujic, “Efficient Calculation of Energy Expectation Values in Path Integral Formalism”, Marie Curie Workshop 2006: Commemorating the 150th Anniversary of the Birth of Nikola Tesla, Zagreb and Belgrade, October 7, 2006
- “Introduction to Grids”, A. Balaz, EGEE-II/SEE-GRID-2 gLite Training Event, Podgorica, Montenegro, 2 November 2006
- “Design and Basic Services of gLite Grid Middleware”, A. Balaz, EGEE-II/SEE-GRID-2 gLite Training Event, Podgorica, Montenegro, 2 November 2006
- “Grid Approach to Path Integral Monte Carlo Calculations”, Danica Stojiljkovic, Antun Balaz, Aleksandar Bogojevic, Aleksandar Belic, Presented by D.

Stojiljkovic at the INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006

- “gLite Workload Management System Performance Measurements”, Neda Svraka, Antun Balaz, Aleksandar Belic, Aleksandar Bogojevic, Presented by N. Svraka at the INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006
- “Introduction to Clusters and Grids”, A. Belic, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “AEGIS, EGEE-II and SEE-GRID-2”, A. Belic, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “Introduction to gLite”, A. Balaz, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “gLite Basic Services”, A. Balaz, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “AEGIS, EGEE-II, and SEE-GRID-2 Infrastructure Overview”, A. Balaz, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “Data Mangement”, N. Svraka, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “gLite WMS”, N. Svraka, gLite Training for Users, Novi Sad, Serbia, 19 January 2007
- “Speeding up and Stabilising the CE”, A. Balaz, Presented at WLCG Operations Workshop, CERN, 25-26 January, 2007
- “Serbian NGI – AEGIS – Report”, presented by A. Balaz at the SEE-GRID-2 PSC04 Meeting on Kopaonik, Serbia, 12-13 March 2007
- “HPC Experiences in South Eastern Europe, presented by A. Balaz at the Advanced School in High Performance Computing : Tools for e-Science at International Centre for Theoretical Physics, Trieste, Italy, March 2007
- “Serbian Grid Infrastructure: AEGIS, EGEE-II, SEE-GRID-2”, presented by A. Balaz at the AEGIS dissemination event during the YUINFO06 conference on Kopaonik, Serbia, 13 March 2007
- “Grid Paradigm and Calculation of Path Integrals in Quantum Physics”, presented by A. Balaz at SEENET-MTP seminar at the Faculty of Science and Mathematics of the University of Nis, 13 April 2007
- “Design and Basic Services of gLite Grid Middleware”, A. Balaz, EGEE-II/SEE-GRID-2 gLite Training Event, Astronomical Observatory Belgrade, Serbia, 17 April 2007
- “AEGIS, EGEE-II, and SEE-GRID-2 Infrastructure Overview”, A. Balaz, EGEE-II/SEE-GRID-2 gLite Training Event, Astronomical Observatory Belgrade, Serbia, 17 April 2007
- “SEE-GRID Operations”, A. Balaz, Presented at WLCG/EGEE ROC Managers phone meeting, 18 April 2007
- “Systematic Speedup of Path Integrals”, presented by A. Bogojevic on the occasion of receiving of IPB prize for scientific achievements, 4 May 2007
- “New Scientific Method”, presented by A. Bogojevic at the Gallery of the Serbian Academy of Sciences and Arts, 25 May 2007
- "Efficient calculation of energy expectation values in path integral formalism", presented by J. Grujic at the Four Seas Conference, Iasi, Romania, 29 May – 3 June 2007

- "SEE-GRID operational tools and Grid services improvements", presented by A. Balaz at the EGEE/WLCG Operations Meeting, Stockholm, Sweden, 11-15 June 2007
- "Modern Cosmology", presented by D. Stojkovic, Kolarac National University, Belgrade, 21 June 2007

2.9.3. Scientific Papers/Publications

- J. Grujic, A. Bogojevic, A. Balaz, "Energy estimators and calculation of energy expectation values in the path integral formalism", *Phys. Lett. A* 360, 217 (2006)
- D. Stojiljkovic, A. Bogojevic, A. Balaz, "Efficient calculation of energy spectra using path integrals", *Phys. Lett. A* 360, 205 (2006)
- "Grid Approach to Path Integral Monte Carlo Calculations", Danica Stojiljkovic, Antun Balaz, Aleksandar Bogojevic, Aleksandar Belic, in Proceedings of INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006
- "gLite Workload Management System Performance Measurements", Neda Svraka, Antun Balaz, Aleksandar Belic, Aleksandar Bogojevic, in Proceedings of INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006
- "Simulation Study of Granular Compaction Dynamics under vertical tapping", D. Arsenovic, S. B. Vrhovac, Z. M. Jaksic, Lj. Budinski-Petkovic, and A. Belic, *Phys. Rev E* 74, 061302, (2006).
- S. B. Vrhovac, Z. M. Jaksic, Lj. Budinski-Petkovic, and A. Belic, "Linear kinetic equation: Long-time behavior of one-particle distribution function", *Eur. Phys. J. B* 53, 225 (2006)
- Lj. Budinski-Petkovic, M. Petkovic, Z. M. Jaksic, and S. B. Vrhovac, "Compaction of anisotropic granular materials: symmetry effects", *Materials Sci. Forum* 518, 355 (2006)
- A. Bogojevic, A. Lalovic, and B. Ackovic, "Model of Binary System Formation", *Publ. Astronomical Observatory Belgrade* no 80 , 123-127 (2006)
- A. Bogojevic, A. Balaz, and A. Belic, "Spacing of Planets in an Effective Gravitational Accretion Model", *Publ. Astronomical Observatory Belgrade* no 80 , 149-153 (2006)
- A. Bogojevic, A. Balaz, and A. Belic, "Linearized Gaussian Halving in $d=1$ ", *Physics of Low-Dimensional Structures* no 1 , 52 (2006)
- A. Bogojevic, A. Balaz, and A. Belic, "Gaussian Halving of Path Integrals in $d=1$ ", *Physics of Low-Dimensional Structures* no 1, 49 (2006)
- A. Petkovic and M. V. Milovanovic, "Fractionalization into Merons in Quantum Dots", *Phys. Rev. Lett.* **98**, 066808 (2007).
- M. V. Milovanovic, "Wavefunctional Approach to the Bilayer $\nu = 1$ System and a Possibility for a Double Non-Chiral Pseudospin Liquid", *Phys. Rev. B* **75**, 035314 (2007).
- Z. Papić and M.V. Milovanovic, "Quantum Disorder of the $\nu = 1$ State and the Compressible - Incompressible Transition in Quantum Hall Bilayer Systems", *Phys. Rev. B* **75**, 195304 (2007).
- D. Arsenovic, B. Vrhovac, Z. M. Jaksic, Lj. Budinski-Petkovic, and A. Belic, "Simulation Study of Granular Compaction Dynamics Under Vertical Tapping", *Mat. Sci. Forum* **555**, 107 (2007)

2.9.4. Promotion package

- CX-CMCS info sheet
- CX-CMCS core brochure
- CX-CMCS core presentation
- CX-CMCS logo

2.9.5. Selected Articles / Newsletters

- Press release regarding the CX-CMCS project kick-off, July 2006
- Press release regarding the visit of EU Commissioner Potocnik; July 2006
- Interview of SCL researchers for weekly newspaper Ana, February 2006
- Interview of SCL's Aleksandar Bogojevic for daily newspaper Danas, February 2006
- Article about SCL and Grids on B92 Internet portal, April/May 2007
- Article about CX-CMCS in the weekly newspaper Vreme, May 2007
- Interview of SCL's Aleksandar Bogojevic for magazine Standard, May 2007

2.9.6. Workshops

- A. Balaz, 2nd Supercomputing Day, Texas A&M University at Qatar, September 13, 2006, Doha, Qatar
- A. Balaz, "SEE-GRID Infrastructure and Grid Operations", SEE-GRID Regional Grids Concertation Workshop held during the EGEE'06 Conference, Geneva, September 28, 2006
- M. Mitrovic and J. Grujic, Marie Curie Workshop 2006: Commemorating the 150th Anniversary of the Birth of Nikola Tesla, Zagreb and Belgrade, October 7, 2006
- D. Stojiljkovic and N. Svraka, INDEL 2006 Conference, Banjaluka, Bosnia and Herzegovina, 10-11 November 2006
- A. Balaz participated at the Operations Workshop, part of WLCG Collaboration Workshop, 22-26 January 2007
- AEGIS dissemination event during the YUINFO06 conference on Kopaonik, Serbia, 13 March 2007
- Participation of A. Balaz as the lecturer, two SCL students as Teaching Assistants, and two SCL students as participants in the Advanced School in High Performance Computing Tools for e-Science - joint DEMOCRITOS/INFM-eLab/SISSA-ICTP activity, held in March 2007 at the International Centre for Theoretical Physics, Trieste, Italy
- A. Balaz, SEENET-MTP seminar at the Faculty of Science and Mathematics of the University of Nis, 13 April 2007
- J. Grujic, Four Seas Conference, Iasi, Romania, 29 May – 3 June 2007
- A. Balaz, EGEE/WLCG Operations Meeting, Stockholm, Sweden, 11-15 June 2007

2.9.7. Dissemination and use material

- Lecture notes in Monte Carlo methods and applications, by A. Belic
- Lecture notes in Quantum Field Theory, by A. Bogojevic

2.9.8. Trainings

Below is the subset of trainings. The Training report – D5.5 gives the full list.

- UOB third party EGEE-II gLite Site Administrator Training meeting and set up the new SEE-GRID site in Kragujevac – AEGIS04-KG, held on 24. June 2006 at CSANU
- A. Belic, A. Balaz, N. Svraka, B. Ackovic participated in gLite training for users in Novi Sad, Serbia, 19 January 2007
- A. Balaz, N. Svraka, B. Ackovic participated in EGEE-II/SEE-GRID-2 gLite Training Event, Astronomical Observatory Belgrade, Serbia, 17 April 2007

2.9.9. Other dissemination activities

- IPB and its Scientific Computing Laboratory (SCL) was presented on the Serbian National Broadcasting Corporation RTS in their Euro Net series; Grids in general and SCL projects were presented to the broad audience; further information available on <http://scl.phy.bg.ac.yu/>
- On July 14, 2006 the Institute of Physics in Belgrade (IPB) and its Scientific Computing Laboratory were hosts to high level delegations from EU Directorate General for Research, headed by Janez Potocnik, Commissioner for Research, and from the Ministry of Science of Serbia, headed by Aleksandar Popovic, Minister of Science. The joint delegation also included Andras Siegler, Director INCO, Giancarlo Caratti, JRC, Tania Friederichs, DG Research, Ivan Videnovic, Assistant Minister of Science, and Gradimir Milovanovic, Chairman of the National Science Council. Commissioner Potocnik was particularly interested to learn about SCL's participation in EU INCO (CX-CMCS) and e-Infrastructure projects (SEE-GRID, SEE-GRID-2, and EGEE-II). This visit was announced and popularized on several national TV stations and in newspapers; further information available on <http://scl.phy.bg.ac.yu/>
- Serbian Ministers of Science Aleksandar Popovic and of Finance Mladjan Dinkic visit Institute of Physics and Scientific Computing Laboratory on July 19, 2006. The purpose of their visit was to announce of new Serbian Government program - National Investment Plan. During the visit, both ministers were informed about IPB's involvement in EU FP6 Grid projects, SEE-GRID-2 and EGEE-II, as well as SCL's promotion to EU Centre of Excellence for Computational Modelling of Complex Systems (CX-CMCS). This visit was announced and popularized on several national TV stations and in newspapers; further information available on <http://scl.phy.bg.ac.yu/>
- On 2 March 2007 SCL's A. Bogojevic gave an interview to BBC radio focusing on how EU Centres of Excellence like SCL can become focal points for reversing brain drain in Serbia and the region. The interview was held by Marijana Zivkovic and was first broadcasted on March 5, at 14:00 GMT+1 on BBC radio and radio B92.

- On 5 March 2007 SCL graduate student Jelena Grujic took part in the FameLab Competition organized by the British Council and co-organized in Serbia by the Ministry of Science. Her presentation "Why the sky is blue" won her a place in the final round of the competition in Serbia, held on 5 April. At the finals, Jelena Grujic took 2nd place in FameLab Finals. The happening was very well covered by press and electronic media (Telekom Internet portal Na dlanu, daily newspapers Politika, Novosti, 24 sata).
- On 17 May 2007 SCL's student Jelena Grujic was a guest on Radio Beograd in the youth program "Step to Science". She talked about science competitions, especially the FameLab competition she recently took part in, but also about other competitions in which she participated, e.g. the National Physics Olympiad. The show was broadcast live on Radio Belgrade I at 9 AM.
- On 7 June 2007 SCL's student Jelena Grujic was guest at Kontekst 21 - scientific TV program on National TV. She talked about Four Seas Conference that she took part in.