

HPC User Forum 2023



EURO²

NCC Bulgaria: Highlights

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About EuroCC2

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- **National Competence Centres in the framework of EuroHPC phase 2 (EuroCC2)**
- Call: DIGITAL-EUROHPC-JU-2022-NCC-01
 - Topic: DIGITAL-EUROHPC-JU-2022-NCC-01-01
 - Coordinator: *University of Stuttgart, Germany*
- Partnership: 32 partners from 32 countries
 - 20 countries, including Bulgaria, participate with consortia
- Duration: 36 months (1.01.2023 – 31.12.2025)
- The mission of EuroCC 2 is to continue the establishment of a **network of National Centres of Competence (NCC)** in the most efficient way, while continuing to address the differences in the maturity of HPC deployment in Europe
- Financing: up to €62 million, 50% European + 50% national co-financing
- National co-financing for Bulgaria is provided by Ministry of Education and Science

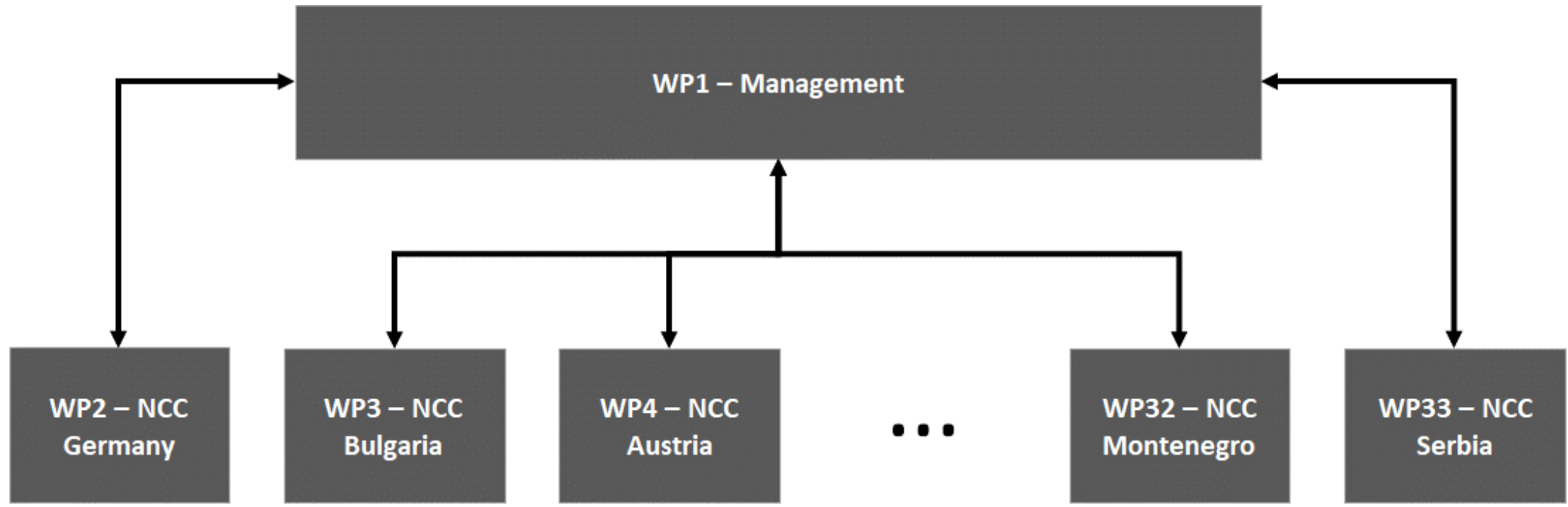


EuroCC2: objectives

- EuroCC 2 aims to achieve high maturity level, addressing the differences between countries.
- Foster cooperation, exchange of best practices and knowledge
- Accelerate development of HPC+ competences and their uptake in industry, as well as in academia and public administration.
- Consequently, the National Competence Centres in HPC:
 - Develop and display a comprehensive and transparent map of **HPC competences and institutions** in their country
 - Act as a **gateway for industry and academia** to providers with suitable expertise or relevant projects, may that be national or international
 - Collect **HPC training offers** in their country and display them in a central place together with international training offers collected by other NCCs
 - Foster the **industrial uptake of HPC**

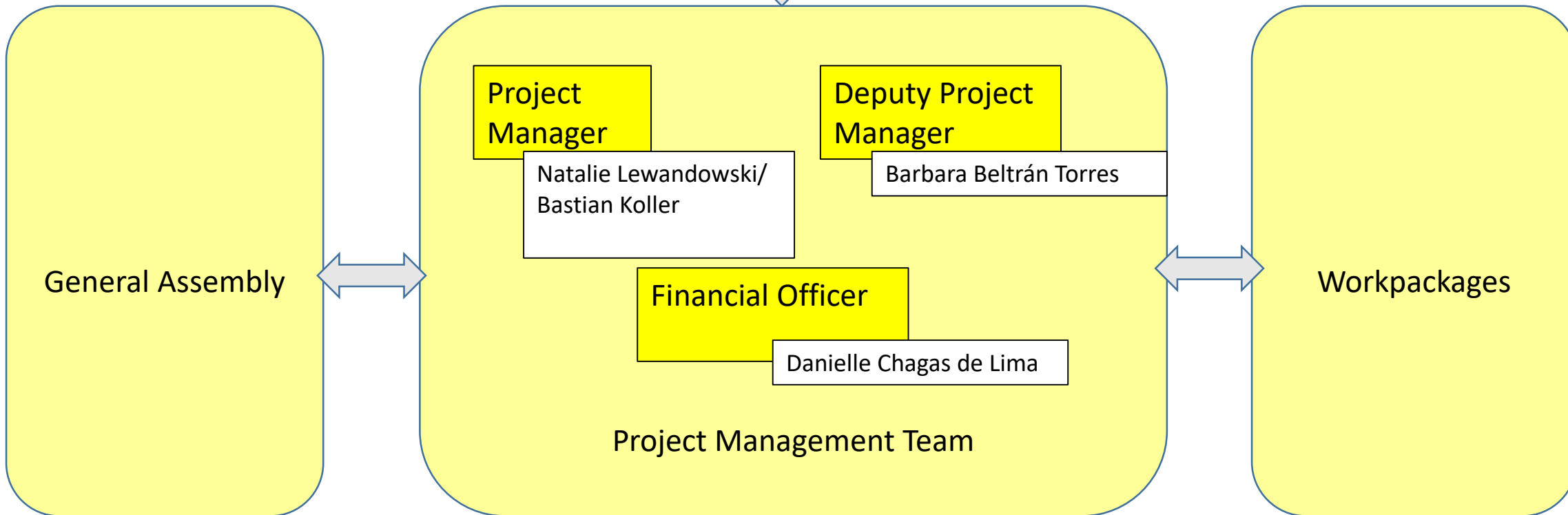


The EuroCC2 WP structure





EuroHPC
Joint Undertaking



Overview of EuroCC2 deliverables

- D1.2 Data Management Plan (M4)
- D1.19 List of NCC Services with pricing information (M4)
- D1.18 Handling common knowledge (M4)
- D1.20 NCC Roadmaps for Phase 2 (M5)
- D1.6 CASTIEL 2 (a joint CASTIEL 2- EuroCC 2 deliverable!): Collaboration Plan with NCCs (M6)
- TPR Q1, TPRQ2, Financial Reports Q1, Q2, Q3
- D1.3 Initial Maturity Report
- D1.6 Initial NCC Collaboration Report
- D1.9 Report on Technology Transfer and HPC Adoption
- D1.12 – Report on Impact and Collaboration Analysis
- D1.15 EuroCC2 Management Report
- TPR Q3, TPRQ4, Financial Report Q4

Bulgarian Competence Centre in High Performance Computing



The Bulgarian National Competence Centre (Bulgarian NCC) in High Performance Computing has been established within the framework of the EuroCC project and now further developed under EuroCC2

- **Strong partnership:**

- Institute of Information and Communication Technologies
 - Sofia University
 - University of National and World Economics
- IICT is leader of the CoE in Informatics and Information and Communication Technologies - <http://ict.acad.bg/?lg=en>
 - Sofia University leads the CoE “Universities for Science, Informatics and Technologies in eSociety” - <https://unite-bg.eu/>
 - UNWE leads the CC “Digitalization of Economy in a Big Data Environment” - <https://bigdataacc.bg/>

Short overview on our strengths

- A long history of HPC in Bulgaria:
 - National HPC infrastructure: supercomputer Avitohol since 2015 (BG/P 2009-2015), and several smaller HPC systems.
NEW: HEMUS (#360 in TOP500, 14.11.2023)
 - Core teams in the HPC resource centers provide generic e-infrastructure services, trainings, user support.
- Experienced teams of researchers (more than 400 HPC users)
- A lot of experience in the EU HPC and e-I projects (PRACE, HP-SEE, SESAMEnet, VI-SEEM, EOSChub, EGI-ACE, NI4OS-Europe, etc.)
- The partners in NCC Bulgaria (IICT, SU and UNWE) through their large projects funded by the ESIF are in a process of procurement of a significant amount of new equipment with HPC capabilities and substantially bigger data capacity
- The petascale EuroHPC supercomputer Discoverer in Sofia Tech Park (No. 133 at Top500 list of supercomputers)
- Imbalance between state-of-the-art hardware and advanced scientific research and much smaller overall share of industrial use, which opens up many opportunities



Bulgarian NCC activities

- Surveys
- Training programmes
- Training
- Workshops
- Round-tables
- Competence mapping and service portfolio management
- Materials (guides, success stories, training materials, etc.)
- Consultations and knowledge transfer
- Proof of Concept development
- Web and social media tools and content
- <http://eurocc-bulgaria.bg/bg/>
- International collaborations and networking



Training and Skills Development

Training events organized:

- 12 training events for end-users,
- 2 train-the-trainers events,
- 1 five-days training course on how to use WAM on a supercomputer, one training course for users from pharmaceutical company,
- 22 hours thematic training consultations for end-users and
- 18 hours consultations on openMPI for generating complex images.

Training materials prepared:

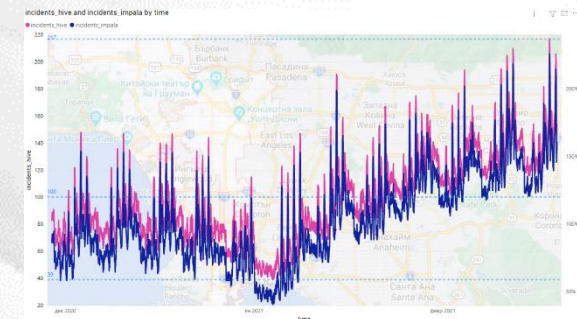
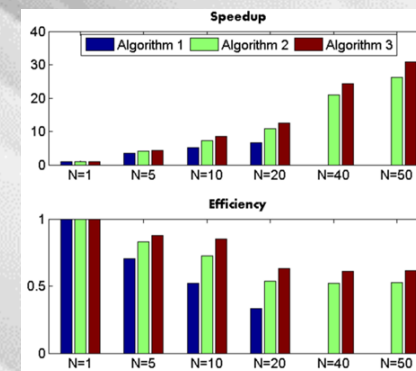
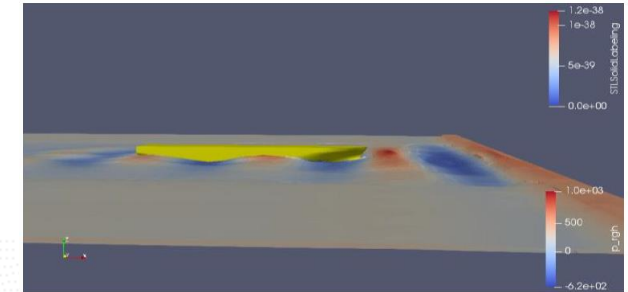
- “How to use the HPC system”,
- “Guide for using supercomputer Avitohol” and
- “How to use the parallel computing cluster PhysOn”. “GPU programming”,
- “Guide for Designing an Information Security Operations Center for a Big Data Environment”,
- “Guidelines for Integrating Big Data System Hadoop with Petascale Supercomputer”,

The participation of Bulgarian HPC experts and users in 11 training workshops, seminars and courses organized by EuroCC2/CASTIEL2



Working with SMEs and industry

- Expanding the uptake of HPC+ technologies is an important goal not only for EuroCC and EuroHPC JU, but for Europe in general.
 - Examples of challenges addressed:
 - Efficient simulation of the motion of a trimaran/ship in multiphase flow conditions
 - Implement a low-cost, low-latency, high-accuracy AI-based gesture recognition solution
 - Accurately identify, extract, transfer and integrate reliable and fast changing data from traffic events and alerts to be followed by sophisticated and exhaustive analysis
- Variety of technologies used, with focus on HPC/AI/HPDA, and industrial sectors involved.
- Working with EDIHs and industrial bodies



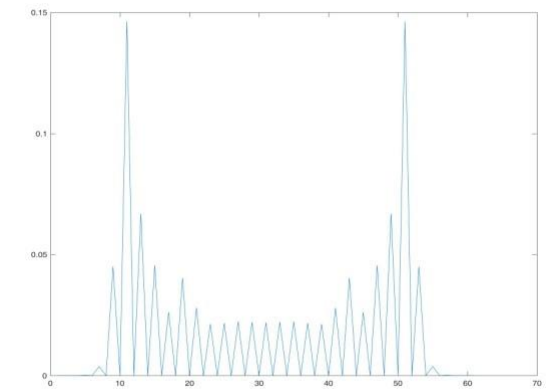
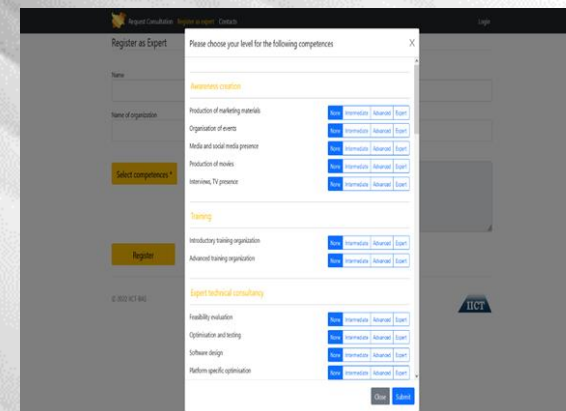
Service to and Interaction with Industry

- The adopted sector-based approach is executed through meetings with representatives of industry chambers and associations, leading to concrete discussions with perspective SME/Big Industry partners about the necessary administrative steps and competences for successful PoC.
- Various meetings with 16 companies were organized and conducted.
- 11 Memoranda for collaboration were signed.
- 5 consultations to SMEs were given. 4 projects with SME were initiated and 2 were finalised.
- Three industrial success stories were released.
- The training event for 15 users from pharmaceutical company was followed by several meetings and formulating new projects.
- Regular contacts with CASTIEL2 WP4 and participation in Industrial WG meetings were performed.



Working with academia

- Thematic workshops
- Training
- Code repositories
- Guides
- Working with big infrastructures and initiatives, European CoEs
- Consultancy



Services to and Interaction with Academia and Public Administration

- For academia: Technical and scientific expertise, consulting services, computational tools and modern facilities are provided at the appropriate level for various communities.
- 11 days thematic consultations for end-users and application developers in Climatology, Computational Chemistry, DCH, Computer Algebra, Bioinformatics and Drug design and others were given.
- The access to supercomputers was facilitated – several seminar presentations and guided tours to the new supercomputer HEMUS located at IICT were given.
- The NCC Bulgaria organized and conducted five thematic HPC workshops for academic users (3 in Sofia, one in Shumen and one in Russe) where the NCC Bulgaria services, success stories and use cases were presented.
- Discussions and consultations for public administration were organized and conducted (Ministry of Education and Science, Ministry of Innovations, Ministry of e-Government and several state agencies.)



Service Portfolio and Competence Management, Additional Services


- Integration of services developed within the other tasks and general services identified within this task into a comprehensive NCC service portfolio. Preparation and submission of the Deliverable **List of NCC Bulgaria Services with prices**
- Continue to maintain the competence mapping, adding new competences.
- Updating the NCC Bulgaria portal configuration to allow access to services and competences .
- Information about the available services and conditions of their use was distributed to potential users.
- With some companies with greater potential, specific discussions and consultations were conducted in order to define goals and tasks for future cooperation.
- Participation in the meetings of Competence&Networking WG.
- Participation in the events organized by EuroCC2, CASTIEL2, other NCCs and CoEs, as well as several national level meetings.
- Some of the initially advertised services are now being used, including by industrial/SME users.

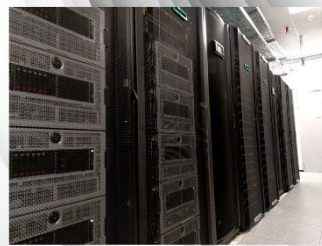


Collaboration

- Interactions with within EuroCC2 and CASTIEL2
- General collaboration with the EuroHPC ecosystem, e.g., the Centres of Excellence, the EDIHs and more, as well as with HPC related national networks are implemented.
- The NCC Bulgaria continues and extends the collaborations with other NCCs
 - we organised joint f2f workshop and expert meeting with NCC UK,
 - online meetings with NCC Estonia, NCC Serbia, NCC North Macedonia, NCC Sweden, NCC Croatia, etc.
 - Training materials with other NCCs are exchanged.
 - NCC Poland and NCC Romania participated with presentations at the HPC User Forum, Sofia, 16 of November 2023.
- Meetings with Bulgarian team of CoE Combustion and EDIH Zagore and EDIH Trakia were organized.
- Events organised by CASTIEL2 and other NCCs were announced through our web portal and distributed via e-mail and, thus, well participated.



Recent developments - Petascale supercomputer at ICT-BAS 



- Already delivered, installation to complete 15th September 2023
- Non-blocking InfiniBand interconnection
- Petascale performance – more than 3 PetaFlops

Awareness Creation and Communication

- The NCC Bulgaria continues the dissemination and communication activities to ensure visibility.
- Constant updating and news feeding of the main web portal of NCC Bulgaria and solid social media presence on LinkedIn and Twitter were ensured.
- Various national networking events were organised, including five thematic workshops, HPC User Forum and many seminars and webinars.
- The project was presented in 5 large international scientific conferences held in Bulgaria, Open Doors events, Night of Scientists, etc.
- This task also supports Tasks 3.2, 3.3 and 3.4 in their activities: distributing information to users groups, ensuring tailored dissemination materials to industry, academia and public administration, etc.
- The inauguration of the new HEMUS supercomputer on October 19, 2023 in IICT, was extensively covered by all national media (including TV, radio, newspapers, etc.) and attracted substantial interest to the potential of the HPC technology.



Conclusions

- The Bulgarian National Competence Centre in HPC has established structure, strong teams of experts and diverse modern hardware
- Different approaches for working with academia and public administration and industry to increase the uptake of HPC+ technologies were implemented
- Working with SMEs and industry is challenging but offers unique opportunities



- <http://eurocc-Bulgaria.bg>
- https://twitter.com/EuroCC_Bulgaria
- <https://www.linkedin.com/company/eurocc-bulgaria/>

Thanks!



EuroHPC
Joint Undertaking

This project has received funding from the European High-Performance Computing Joint Undertaking (JU) under grant agreement No 101101903. The JU receives support from the Digital Europe Programme and Germany, Bulgaria, Austria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Lithuania, Latvia, Poland, Portugal, Romania, Slovenia, Spain, Sweden, France, Netherlands, Belgium, Luxembourg, Slovakia, Norway, Türkiye, Republic of North Macedonia, Iceland, Montenegro, Serbia

HPC User Forum: Programme



9:40 – 9:45 **Opening** (Prof. S. Margenov, Corresponding member, Director of IICT-BAS, Chair of NCC Bulgaria AB)

9:45 - 10:15 **NCC Bulgaria: Highlights** (Prof. A. Karaivanova)

10:15 – 10:30 **NCC Poland – services and achievements** (Marta Maj, ACC Cyfronet AGH) (online)

10:30 – 10:45 **NCC Romania – ways to elevate the national level of HPC knowledge** (Andreea Dinu, ICI, Romania) (online)

10: 45 – 12:00 **Panel 1: HPC infrastructure in Bulgaria – new developments**

Moderator: Prof. E. Atanassov. **Participants:** Prof. S. Margenov (IICT), Prof. K. Stefanov (SU), Prof. V. Kissimov (UNWE), Prof. Simeon Stoyanov (Supercomputer Discoverer)

12:00 – 13:00 Lunch

13:00 – 14:45 **Panel 2: HPC+ for Research and Public Administration**

Moderator: Prof. A. Proykova. **Participants:** Prof T. Gurov, Prof. P. Koprinkova, Assoc. Prof. V. Ivanov, Assoc. Prof. Ivan Hristov, Assoc. Prof. Gergana Gerova, Dr. Ivona Velkova)

14:45 – 15:00 Coffee Break

15:00 – 16:45 **Panel 3: HPC+ for Industry**

Moderator: Prof. K. Stefanova. **Participants:** Dimitar Gjulev (Antipodes Ltd.), Ivan Denev (ACVA-90 engineering Ltd), S. Harizanov (AMET Ltd.), S. Stoykov (FactSet, IICT) Ana Proykova (SU), Metodi Pankov (SU)

16:45 - 17:00 Closing