Beware the Next Wave – Modeling Scenarios for the COVID-19 Pandemic

As the COVID-19 pandemic started to take hold in Germany, the CoSiMo (COVID simulation and modeling) group was established as a collaboration between JSC and the Frankfurt Institute for Advanced Studies (FIAS). At the same time, the new SimLab Epidemiology and Pandemics was also established. Early in April, initial results were presented, demonstrating the potential effects of nonpharmaceutical interventions on the mitigation/suppression of the first wave and predicting the risk of a second one in the coming months.

As the second wave started to show in October 2020 and discussions veered towards different intervention strategies, the group simulated various scenarios capturing different intervention strategies. The results were presented on the homepage of Forschungszentrum Jülich's website (press release from 6 November; in German) and were recently published in *Influenza and other respiratory viruses*. More recently, the group produced updated simulations demonstrating the possible effects of the holiday season (press release from 26 November; in German). Short-term predictions are provided to the forecast hub established at KIT (https://kitmetricslab.github.io/forecasthub/forecast).

Since there are too many factors influencing the epidemic that cannot be reliably estimated or predicted based on available data and knowledge, the simulations only show scenarios for different assumptions about these factors. In particular, long-term predictions are of a qualitative nature at best. The most reliable result predicts that a single 4-week-long shutdown – even if temporarily effective in reducing case numbers and fatalities – would not be sufficient in keeping the epidemic at bay for the rest of the winter. On the contrary, a number of contact reduction measures need to be applied throughout the next few months if further waves, and therefore repeated shutdowns, are to be avoided. This result was confirmed by the case/death counts of several countries such as France and Ireland which went into a second strict lockdown in the autumn followed by a subsequent new increase in cases shortly after the lockdown measures were lifted.

Further scenarios and simulations taking new data into account are to be provided and will address the issue of vaccinations, among other matters.

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New European CoE RAISE

Artificial intelligence (AI) methods are developing at a rapid rate and being progressively applied to numerous workflow stages to solve complex problems. Analysing and processing big data requires high computational power and scalable AI solutions. Therefore, entirely new workflows must be developed from current applications that can be run efficiently on future high-performance computing (HPC) architectures at exascale. To tackle these topics, a new European Centre of Excellence "Research on AI- and Simulation-Based Engineering at Exascale" (CoE RAISE) was founded and is being funded by the EU.

Forschungszentrum Jülich coordinates the CoE RAISE, which was launched on 1 January 2021 with a total budget of around € 5 million. The CoE brings together eleven full partners and two third parties with expertise in AI and HPC. RAISE will be an excellent enabler for the advancement of these technologies in Europe on industrial and academic levels, and a driver for novel intertwined AI/HPC methods. These technologies will be advanced on the basis of representative use cases, covering a wide spectrum of academic and industrial applications, for example wind energy harvesting, hydrodynamics of wetting, manufacturing, physics, turbomachinery, and aerospace.

RAISE aims at closing the gap in full loops using forward simulation models and AI-based inverse inference models in conjunction with statistical methods in order to learn from current and historical data. In this context, novel hardware technologies such as modular supercomputing architectures, quantum annealing, and HPC prototypes will be used to explore unseen performance in data processing. RAISE's European network will develop and provide best practices, support, and education for industry, SMEs, academia, and HPC centres on the Tier-2 level, attracting new user communities. This will be

coupled with the development of a business providing new services to various user communities.

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RISC2: EU and Latin America Coordinating HPC Research

Throughout the world, we are seeing that intense investments in HPC are essential to compete at a global level. In this context, coordination and capacity sharing between partner regions is crucial. The EU RISC2 project was launched on 1 January 2021 as a network to support the coordination of high-performance computing research between Europe and Latin America and to encourage greater cooperation between their research and industrial communities on HPC applications and infrastructure deployment. The project brings together eight key European HPC stakeholders (including Atos, BSC, CINECA, INRIA, and JSC) and the main HPC actors from Brazil, Mexico, Argentina, Colombia, Uruguay, Costa Rica, and Chile. It is scheduled to run for a period of two years.

RISC2 will promote the exchange of best practices through meetings, workshops, and training sessions organized to coincide with major HPC events in Europe and Latin America. The main project deliverable will be a cooperation roadmap aimed at policymakers, the scientific community, and industry. The roadmap will identify key application areas, HPC infrastructure, and policy requirements, and explore ways for the activities established during the project to have a lasting impact. The training carried out during the project will provide a boost to Latin American HPC, while the structured interaction between researchers and policymakers in both regions will reinforce links and help define a coordinated policy and a clear roadmap for the future.

Within the RISC2 project, JSC will coordinate the work package on "Workshops, Training and Events". The primary objectives of this work package are to exchange best practices, to organize events that raise awareness and allow for networking and capacity building, and to stimulate public/private inter-regional and bi-regional dialogue on the use of HPC through an active and constant communication flow between Europe and Latin America.

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DICE – Data Infrastructure Capacity for EOSC

In January 2021, the European Commission launched projects to increase the services offered by the EOSC Portal. JSC participates in the "Data Infrastructure Capacities for EOSC" (DICE) project that brings together a network of computing and data centres, research infrastructures, and data repositories. They offer a European storage and data management infrastructure for EOSC, providing generic services and building blocks to store, find, access, and process data in a consistent and persistent way. Eighteen providers from 11 European countries are offering 14 state-of-the-art data management services with more than 50 PB of storage capacity.

JSC coordinates activities to integrate DICE services and resources with other platforms and infrastructures. It also offers B2DROP – a secure and trusted cloud storage service, B2SAFE – a service for data replication and long-term preservation, and B2ACCESS – a federated cross-infrastructure authorization and authentication framework. The DICE project is funded under the grant agreement ID 101017207 and is scheduled to run from January 2021 to June 2023 with a total budget of almost € 7 million. Further information can be found at https://www.dice-eosc.eu.

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Calls for Computing Time Applications

The following synchronized calls for computing time applications were published on 18 January 2021. For all calls, the strict deadline for submitting proposals is 17:00 (CET) on 15 February 2021.

The Gauss Centre for Supercomputing (GCS) issued the 25th call for large-scale projects on HAWK at HLRS, SuperMUC-NG at LRZ, and JUWELS at JSC. Furthermore, researchers at German universities and publicly funded research institutions can now apply for regular GCS/NIC projects on the JUWELS Cluster and Booster modules as well as on the JURECA Booster module.

Researchers from all HGF institutions in the research field "Earth and Environment" together with their national cooperation partners outside HGF are invited to apply for resources on the ESM partition of JUWELS.

Finally, researchers from RWTH Aachen University and Forschungszentrum Jülich can submit applications for computing time on the JARA Partition and for VSR projects.

For an overview over all calls and detailed information please visit
https://www.fz-juelich.de/ias/jsc/computingtime.

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Lars Osiewacs – Best MATSE in Germany

Lars Osiewacz completed his IHK training as Germany's best trainee 2020 among mathematical-technical software developers (MATSEs). Unfortunately, the event held to honour Germany's best trainees had to be cancelled due to the current pandemic. Osiewacs completed his MATSE training, which is offered by the Jülich Supercomputing Centre together with the Aachen University of Applied Sciences, as part of the dual bachelor's degree programme in scientific programming. For the practical part of his training, he worked on the real-time visualization of measurement data at the Institute of Biological Information Processing – Electronics Laboratory (IBI-TAE).

Osiewacz continues to work at IBI-TAE while undertaking a master's degree in applied mathematics and computer science at the Aachen University of Applied Sciences. We congratulate Lars Osiewacz on his achievement.