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Short summary and main findings of the event "Digitized Research and its Costs: Discussing Sustainable Development"

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As part of the event series "Critical Perspectives on Digitalization" the half-day event "Digitized Research and its Costs: Discussing Sustainable Development" took place on 18 September 2024. The event was organized by the Office for Sustainable Development and the Research Management Office under the auspices of the Vice-Rectorate Quality and Sustainable Development.
Amongst others the event dealt with the question "How can large digital (research) infrastructures, such as the Alps supercomputer, be harmonised with sustainability goals?". After the keynote input by Prof. Jan Bieser, Assistant Professor for Digitalization and Sustainability at Bern University of Applied Sciences, a lively discussion with invited experts from the Swiss research landscape and the participants of the event took place. At the core of the discussion stood the examination of the social, ecological and economic costs of digitized research and how these can be navigated with scientific goals. The panel discussion consisted of the following participants: Lea Quilitz, responsible for sustainability at SNSF, Dr. Joost VandeVondele, ETHZ and Deputy Director for Science at the Swiss National Supercomputing Center (CSCS), Prof. Benjamin Stocker, Unit Leader Geocomputation and Earth Oberservation at the Institute of Geography at UniBE, and Prof. Jan Bieser.
Below you will find a brief summary of the main messages and key findings of the event.

Prof. Heike Mayer, Vice-Rector for Quality and Sustainable Development at the University of Bern opened the event. In her introduction she mentioned, how much energy is used at the University of Bern for digitalization and its infrastructure: around a third of the University's electricity requirements go into the IT server and network infrastructure, which corresponds to around 10-12 GWh per year. This suggests that digitalization should be discussed in the context of sustainable development and led us to Jan Bieser's presentation on "Potentials and challenges of digitalization for environmental protection". At the beginning, Jan Bieser addressed digital acceleration and posed the question of what this means for our ecosystems. In research, a distinction is made between 2 effects: the direct effects (= Footprint), which include the production, use and disposal of digital technologies and the indirect effects (= Handprint), which describe (behavioural) change effected by digital applications and thus reduce or increase environmental impacts in other sectors. With regard to the footprint, Jan Bieser began by discussing the ICT sector's energy consumption, which is increasing at a similar rate to turnover. He also mentioned the increasing energy consumption of artificial intelligence (AI) related technologies. Initial comparisons have shown that a query on ChatGPT requires around 10 times more energy than a classic Google search. For an AI-supported Google search, it is even 20-30 times as much. Therefore it should increasingly be discussed where the use of AI makes sense and where it does not. The question of where the electricity comes from should also be asked. For example, one kilowatt hour generated in China causes 111 times more CO2 emissions compared to the generation of the same amount in Norway.

If we consider the ICT sector as a whole, it is assumed that it is responsible for around 1.5 – 4% of global greenhouse gas (GHG) emissions. Although this may not sound like much at first, it is still more than the entire global cement production or air traffic causes.

There are many reasons why the ICT sector's footprint will either decrease or increase in the future. However, examples of the development and use of questionable digital technologies are showing that we should critically question more often the necessity of using digitalization.

With regard to the handprint, there is a widespread assumption that digitalization leads to greater sustainability. However, the climate protection contributions of digitalization are often overestimated and the climate-damaging effects are often overlooked. Jan Bieser demonstrated this on the example of video conferences. Although this technology has great theoretical potential to avoid emissions caused by business travel, video conferencing does not necessarily reduce business travel. Many digital services often have a high theoretical potential to make a positive contribution to sustainable development, but this potential is often not exploited. In order to reconcile digitalization and sustainable development, the digital strategy and the sustainability strategy have to be linked. The sustainability strategy should address the opportunities and risks of digitalization and the digital strategy should also adress climate impacts. For sustainable digitalization, digitalization would have to be based on clear criteria. This means, that in a first step, we have to ask what needs to change in order for to achieve sustainability goals and in a second step we can ask, how digital technology should be used to induce this change, while we should always monitor the intended and unintended consequences of digitalization.

After Jan Bieser's keynote presentation, the question "How can we harmonize digitized research with sustainable development goals?" was discussed with the panel participants and the audience.

It was discussed that the large amounts of data offer new opportunities for research that wouldn't have been possible 20 years ago. However, it was also noted that the accumulation of Big Data should always be viewed critically. Today, we find ourselves in an "ocean of data" within which the credo seems to be "the more the better". Often as much data as possible is collected without thinking about what data is actually needed. It is therefore important, regardless of the discipline, to always weigh up the costs and value and to critically reflect on one's own data-intensive research. Generally speaking, there is no "one-size-fits-all" solution. However, it is important to create awareness and provide the necessary information. Researchers should also be offered support on how to handle and use the new opportunities offered by for example Artificial Intelligence and new digital research infrastructures. The appropriate tools should be made available here. The teaching and training on how to use the new digital infrastructures and data models therefore plays a fundamental role.

It is also mentioned that resource-intensive research infrastructures are constantly being further developed and therefore becoming more efficient. In addition Artificial Intelligence will become a larger fraction and new domains will be developed therefore.

Finally, the creation of a shared infrastructure was mentioned. It would be important to discuss centralized research infrastructures and also where to have these resource-intense infrastructures. It would probably be worth considering whether these infrastructures should be built in countries where energy production causes fewer emissions.